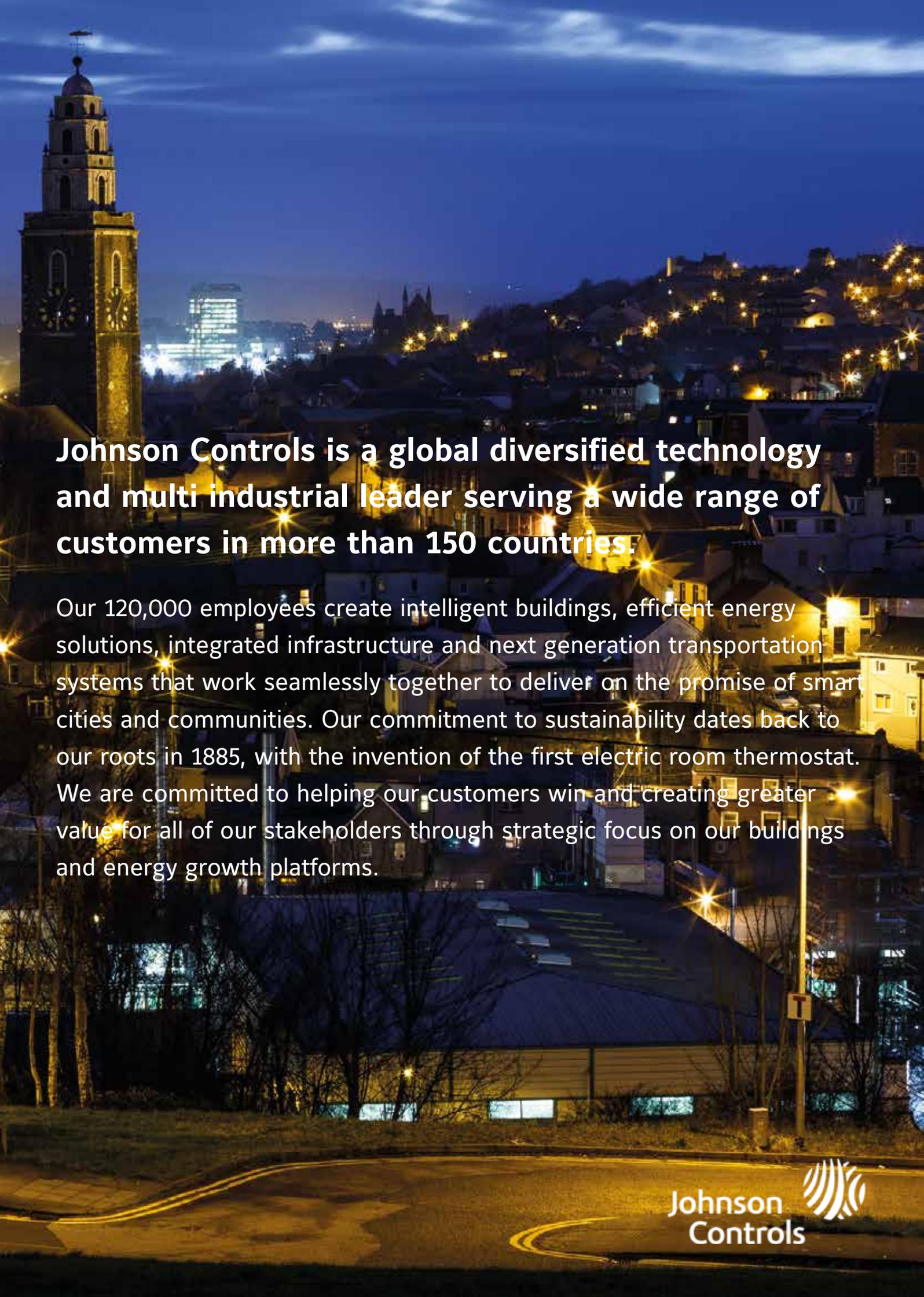




# EUROPEAN PRODUCTS CATALOGUE 2019

CONTROLS, FIELD DEVICES AND COMMERCIAL REFRIGERATION PRODUCTS



**Johnson Controls is a global diversified technology and multi industrial leader serving a wide range of customers in more than 150 countries.**

Our 120,000 employees create intelligent buildings, efficient energy solutions, integrated infrastructure and next generation transportation systems that work seamlessly together to deliver on the promise of smart cities and communities. Our commitment to sustainability dates back to our roots in 1885, with the invention of the first electric room thermostat. We are committed to helping our customers win and creating greater value for all of our stakeholders through strategic focus on our buildings and energy growth platforms.



# A SAFE, COMFORTABLE, AND SUSTAINABLE WORLD

- ACTUATORS AND VALVES
- SENSORS
- THERMOSTATS
- PNEUMATIC AND TRANSDUCERS
- BUILDING AUTOMATION PRODUCTS
- PENN<sup>®</sup> COMMERCIAL REFRIGERATION

# ACTUATORS AND VALVES

## ACTUATORS

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## ACTUATORS

### TERMINAL UNIT VALVE ACTUATORS

## VA-7080

### THERMAL ON/OFF CONTROL

The VA-7080 Terminal Unit Valve Actuators series provide ON/OFF and DAT control in HVAC application.

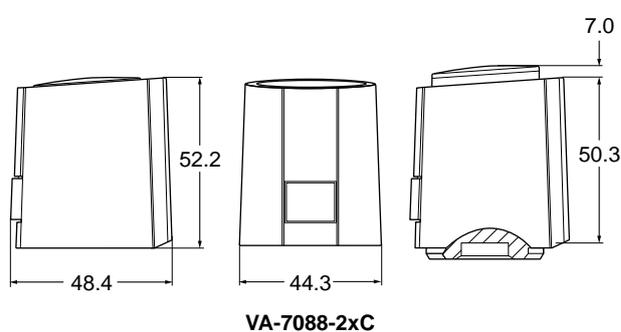
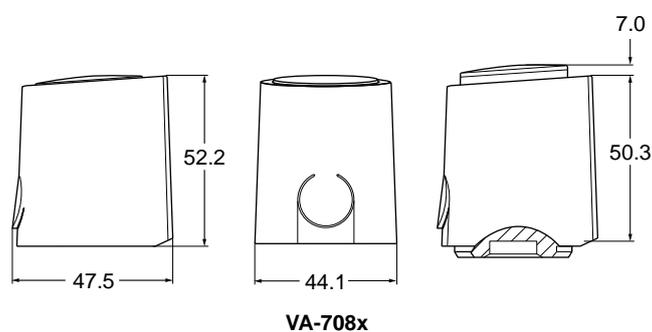
The compact design of these actuators make them suitable for installations in confined spaces, such as fan-coil applications.

The VA-7080 Actuators are designed for field mounting onto all Johnson Controls Terminal Unit Valves: VG3000, VP1000 (see pertinent Product Bulletins).

### FEATURES

- 24 VAC/DC and 230 VAC power supply
- ON/OFF or DAT controls
- NC version (stem retracts when energized)
- NO version (stem extends when energized)
- Easy mounting solution
- Factory mounted cable 1,5 m
- Models with auxiliary switch

### DIMENSIONS (in mm)





## ACTUATORS

### VA-7080 TERMINAL UNIT VALVE ACTUATORS

## ORDERING INFORMATION

CODES	SUPPLY VOLTAGE	ACTION CONTROL	FORCE	STROKE	FACTORY SETTING	MOUNTING THREAD	PROTECTION CLASS	PACKAGING	POWER CONSUMPTION		AUXILIARY SWITCHES	
									Continuous	Start-up		
VA-7081-21	24 VAC/VDC	ON/OFF or DAT	100 N	5.0 mm	Normally closed (stem retracts when energized) 2 m cable length	M28x1.5	IP54	Single packaged in carton box	1 W	<300 mA during max 2 min.	---	
VA-7088-21						M30x1.5						
VA-7081-23	230 VAC					M28x1.5						
VA-7088-23						M30x1.5						
VA-7080-21	24 VAC/VDC				Normally open (stem extends when energized) 2 m cable length	M28x1.5				<300 mA during max 2 min.		
VA-7087-21						M30x1.5						
VA-7080-23	230 VAC					M28x1.5						<550 mA during 100 ms. max
VA-7087-23						M30x1.5						
VA-7088-21C	24 VAC/VDC				Normally closed (stem retracts when energized) 2 m cable length	M30x1.5				<300 mA during max 2 min.		■
VA-7088-23C	230 VAC									<550 mA during 100 ms. max		■

## ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
VA50	Adapter for VG6000
VA64	Adapter for VP1000

## SPARE PARTS

CODES	DESCRIPTION
VA80	Standard adapter M30 x 1.5 for VG3000 and V5000, included in the product package
VA17	Standard adapter M28 x 1.5 for VG5000 and VG4000, included in the product package



## ACTUATORS

### VA-7080 TERMINAL UNIT VALVE ACTUATORS

#### ADAPTER SELECTION GUIDE FOR JOHNSON CONTROLS VALVES

VALVE	ACTUATOR	ADAPTER	NOTE
VG3000	VA-7087-2x	---	Included in the actuator packaging
	VA-7088-2x	---	Included in the actuator packaging
V5000	VA-7087-2x	---	Included in the actuator packaging
	VA-7088-2x	---	Included in the actuator packaging
VG6000	VA-7087-2x	VA50	To be ordered separately
	VA-7088-2x	VA50	To be ordered separately
VP1000	VA-7087-2x	VA64	To be ordered separately
	VA-7088-2x	VA64	To be ordered separately
VG5000	VA-7080-2x	---	Included in the actuator packaging
	VA-7081-2x	---	Included in the actuator packaging
VG4000	VA-7080-2x	---	Included in the actuator packaging
	VA-7081-2x	---	Included in the actuator packaging

## ACTUATORS

### TERMINAL UNIT VALVE ACTUATORS

## VA-7090

THERMAL 0...10 V CONTROL

The VA-709x Series Terminal Unit Valve Actuators provides Proportional Control in HVAC application.

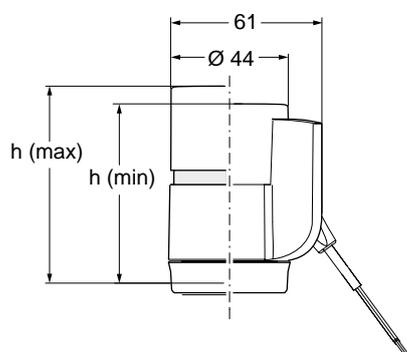
The compact design of these actuators make them suitable for installations in confined spaces, such as fan-coil applications. The VA-709x Actuators are designed for field mounting onto all Johnson Controls terminal unit valves: VG3000 and VP1000 (see *pertinent bulletins*).

Moreover, thanks to an innovative fixing system, the VA-709x is suitable for almost all the terminal unit valves in the market.

### FEATURES

- 24 VAC power supply
- 0...10 V control signal
- NC version (stem retracts when energised)
- NO version (stem extends when energized)
- Easy mounting solution
- Factory mounted cable 2 m

### DIMENSIONS (in mm)



	H (max)	H (min)
Normally closed	66 mm	59 mm
Normally open	64 mm	59 mm





## ACTUATORS

### VA-7090 TERMINAL UNIT VALVE ACTUATORS

## ORDERING INFORMATION

CODES	SUPPLY VOLTAGE	ACTION CONTROL	FORCE	STROKE	FACTORY SETTING	MOUNTING THREAD	PROTECTION CLASS	PACKAGING	POWER CONSUMPTION	
									Continuous	Start-up
VA-7090-21	24 VAC	0...10 V	125 N	4.5 mm	Normally open	M28x1.5	IP54	Single packaged in carton box	2 W	250 mA
VA-7091-21					Normally closed					
VA-7097-21					Normally open	M30x1.5				
VA-7098-21					Normally closed					

## ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION	PACKAGING
0550390001	Elevated Bayonet Nut M30x1.5 with normal and short insert	Single packaged in Plastic Bag
0550390101	Elevated Bayonet Nut M28x1.5 with normal and short insert	
0550390201	Elevated Bayonet Nut M30x1 with normal and short insert	

## ACTUATORS

### TERMINAL UNIT VALVE ACTUATORS

## VA-7480

#### MOTORIZED FLOATING AND PROPORTIONAL CONTROL

The VA-748x series provides Floating, Proportional or Proportional control with 0-10 V position feedback signal in HVAC applications. The compact design of this actuator makes it suitable for installation in confined spaces, such as fan coil, chilled ceiling, manifolds, etc.

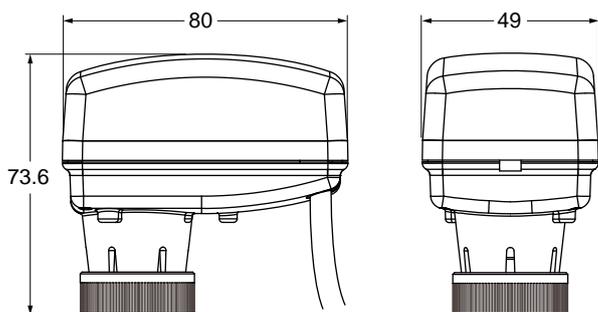
The VA-748x series actuator is designed for field mounting onto VG3000 and VP1000 terminal unit valves (*see pertinent bulletin*).

Due to the innovative concept of different strokes setting the VA-748x can be installed over most of the terminal unit valve in the market.

### FEATURES

- 24 VAC/VDC and 230 VAC power supply
- Floating and Proportional control
- Threaded nut M28x1.5 and M30x1.5
- Auto stroke detection
- Configurable stroke
- Configurable to direct and reverse action
- Configurable analog inputs
- Max mechanical stroke 6.3 mm
- Feedback Control

### DIMENSIONS (in mm)





## ACTUATORS

### VA-7480 TERMINAL UNIT VALVE ACTUATORS

## ORDERING INFORMATION

CODES	CONTROL TYPE	POWER SUPPLY	RUNNING TIME	NOMINAL FORCE	FACTORY STROKE CONFIGURATION	CABLE LENGTH	MOUNTING THREAD NUT	UPPER MECHANICAL END STROKE	FEEDBACK	
VA-7480-0011	Floating	24 VAC	13 sec/mm	120 N	---	1.5 m (PVC)	M28x1.5	16.3	---	
VA-7481-0011			8 sec/mm							
VA-7480-0001			13 sec/mm							
VA-7481-0001			8 sec/mm							
VA-7480-4001			13 sec/mm							
VA-7480-4003		230 VAC	13 sec/mm				16.3			
VA-7480-0013			13 sec/mm							
VA-7481-0013			8 sec/mm							
VA-7480-0003			13 sec/mm							
VA-7481-0003			8 sec/mm							
VA-7482-0011	Proportional	24 VAC/VDC	8 sec/mm	160 N	Auto stroke detection	2 m (Halogen Free)	M28x1.5	16.3	■	
VA-7482-1001										3.2 mm
VA-7482-2001										4.3 mm
VA-7482-3001										6.0 mm
VA-7482-5001										2.8 mm
VA-7482-6001							M30x1,5	5.3 mm		14.5
VA-7482-7001								5.8 mm		
VA-7482-8201								16.3		
VA-7482-9201								14.5		
VA-7483-8201								16.3		
VA-7483-9201	14.5									

#### Note

Models available with special cable length and reverse action factory set (*Please refer to the Product Bulletin*)

# ACTUATORS AND VALVES

## ACTUATORS

### TERMINAL UNIT VALVE ACTUATORS

## VA9905

### NON-SPRING RETURN ROTARY ACTUATOR

This Electric Non-Spring Return Valve Actuators is designed for use with Proportional controls, and it is available for AC/DC 24 V power supplies at 50/60 Hz.

The VA9905 delivers 5 Nm of running torque, and provides 60 seconds of rotation time for 90° of travel (constant for all operating conditions).

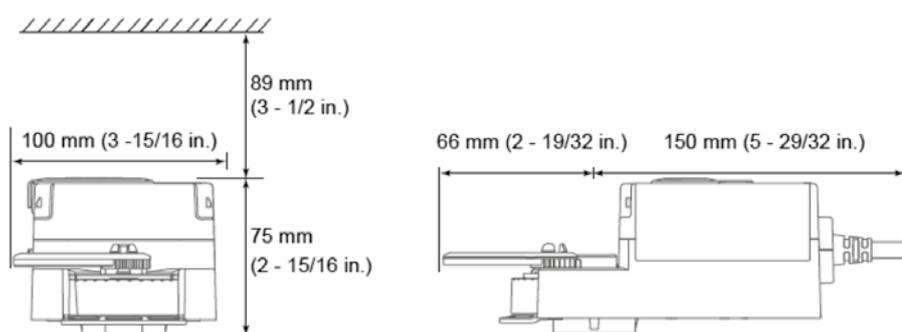
VA9905 features a compact NEMA 5/IP54 actuator enclosure and dual proportion input signal.



## FEATURES

- Proportional AC/DC 24V
- Dual 0...10 Analog Input (one for cooling / one for heating)
- Fool-proof mounting system ensures no mistake in installation
- Pointer/handle system to manually shut off the valve for commissioning or maintenance

## DIMENSIONS (in mm)



## ORDERING INFORMATION

CODES	CONTROL TYPE	POWER SUPPLY	RUNNING RATE	INPUT SIGNAL	ENCLOSURE
VA9905-KGA-1	Proportional	AC/DC 24 V	1,5°/sec	2x 0(2) to 10 V DC or 0(4) to 20 mA with field furnished 500 ohm 1/4 W resistor	IP54

## ACTUATORS

### NON-SPRING RETURN PLANT VALVE ACTUATORS

## VA-7150

#### FLOATING AND PROPORTIONAL CONTROL

The VA-7150 series Synchronous Motor Driven Actuator provides Floating or Proportional control of valves with up to 19 mm stroke in heating, ventilation and air conditioning applications.

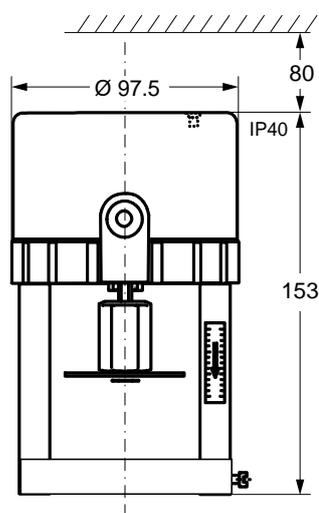
This compact, Non-Spring Return Actuator has 500 N nominal thrust and responds to a variety of input signals. The VA-7150 series can be easily installed on site or ordered pre-fitted to VG7000 and VGS800 valve series in accordance with the specified maximum close-off pressure ratings.



### FEATURES

- 500 N force output in a compact unit
- Magnetic clutch
- Unique Yoke design
- Coupler for simple Actuator attachment to Flanged Valves
- Positioner with adjustable starting point and span, reverse and direct action modes
- "Signal fail" safe position

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	SUPPLY VOLTAGE (50/60 Hz)	ACTION CONTROL	PROTECTION CLASS	COUPLER TYPE
VA-7150-1001	24 VAC	Floating	IP40	Threaded
VA-7150-1003	230 VAC			
VA-7152-1001	24 VAC	Proportional 0...10 V		

## ACTUATORS

### NON-SPRING RETURN PLANT VALVE ACTUATORS

## VA-7200

#### FLOATING AND PROPORTIONAL CONTROL

The VA-720x Series Synchronous Motor Driven Actuator provides Floating or Proportional control of valves, with up to 19 mm stroke in heating, ventilation and air conditioning applications.

This compact Non-Spring Return Actuator has a 1000N nominal force and responds to a variety of input signals.

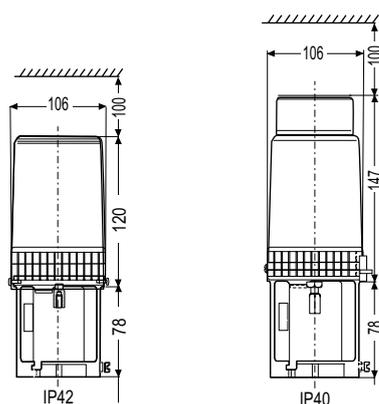
The VA-7200 series can be easily field mounted or ordered factory coupled to VG7000 series valves in accordance with the specified maximum close-off pressure ratings.



## FEATURES

- 1000N force output compact unit
- Magnetic clutch
- Signal fail "safe position"

## DIMENSIONS (in mm)



## ORDERING INFORMATION

CODES	SUPPLY VOLTAGE (50/60 Hz)	CONTROL	MOTOR RATING	PROTECTION CLASS
VA-7200-1001	24 VAC	Floating	5 W	IP42
VA-7202-1001		Proportional 0...10 VDC / 0(4)...20 mA		

## ACTUATORS

### NON-SPRING RETURN PLANT VALVE ACTUATORS

## VA-7700

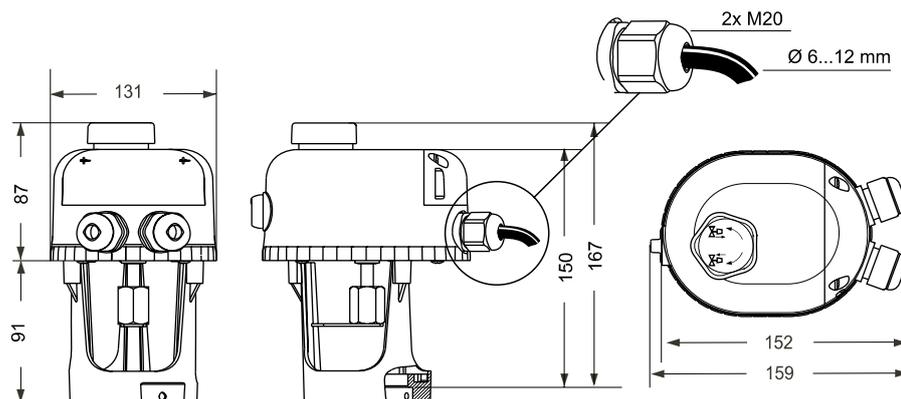
FLOATING AND PROPORTIONAL CONTROL

The VA-7700 series provides Floating and Proportional control and can be mounted onto VG7000, VGS800 and VG9000 valves.

### FEATURES

- 24 VAC and 230 VAC power supply
- Floating and proportional control
- Manual override
- LED operating status display
- Self calibrating
- IP54 enclosive protection

### DIMENSIONS (in mm)





## ACTUATORS

### VA-7700 NON-SPRING RETURN PLANT VALVE ACTUATORS

## ORDERING INFORMATION

### MOUNTING ONTO VG7000 SERIES VALVES

CODES	SUPPLY VOLTAGE (50/60HZ)	ACTION CONTROL	FORCE	STROKE	FULL STROKE TIME	PROTECTION CLASS	POWER CONSUMPTION
VA-7700-1001	24 VAC	Floating	500 N	20 mm	190 s	IP54	2.4 VA
VA-7700-1003	230 VAC						
VA-7740-1001	24 VAC						
VA-7740-1003	230 VAC						
VA-7706-1001	24 VAC	Proportional					4.4 VA
VA-7746-1001							

### MOUNTING ONTO VGS8000 AND VG9000 SERIES VALVES

CODES	SUPPLY VOLTAGE (50/60 Hz)	ACTION CONTROL	FORCE	STROKE	FULL STROKE TIME	PROTECTION CLASS	POWER CONSUMPTION
VA-7700-8201	24 VAC	Floating	500 N	20 mm	190 s	IP54	2.4 VA
VA-7700-8203	230 VAC						
VA-7740-8201	24 VAC						
VA-7740-8203	230 VAC						
VA-7706-8201	24 VAC	Proportional					4.4 VA
VA-7746-8201							

## ACTUATORS

### NON-SPRING RETURN PLANT VALVE ACTUATORS

## VA7810

#### FLOATING AND PROPORTIONAL CONTROL

The VA7810 Non Spring Return Actuator with 1000 N thrust for valves in heating, ventilation and air conditioning applications is available for Floating or Proportional control.

All models have manual override as standard and provide stroke capabilities of 7 mm to 25 mm. Proportional models are self-calibrating.

The actuator is intended for use with Johnson Controls VG7000 and VGS800 threaded valves as well as VG8000 and VG9000 flanged valves. All valves should be fitted in accordance with the maximum close-off pressure ratings specified.

Valve/actuators can be ordered as separate units or as a factory fitted valve/actuator combinations.

### FEATURES

- Proportional Actuators are self calibrating
- All models can also be used as floating and ON/OFF Actuators
- Force controlled motor shut-off
- Manual override as standard
- IP54 enclosure protection
- Delivered with fitted 1.5 m cable and wire terminals
- Status LED
- Models with optional aux. switches or 2 k $\Omega$  feedback potentiometer
- Control-Signal failure – stem to pre-determined position
- Stroke position indicator

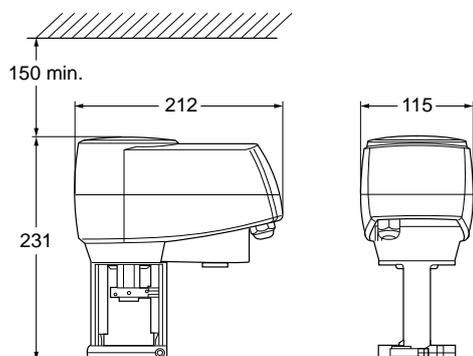




## ACTUATORS

### VA7810 NON-SPRING RETURN PLANT VALVE ACTUATORS

#### DIMENSIONS (in mm)



#### ORDERING INFORMATION

##### MOUNTING ONTO VG7000 AND VGS800 THREADED VALVES

CODES	SUPPLY VOLTAGE (50/60 Hz)	ACTION CONTROL	FORCE	STROKE	FULL STROKE TIME	PROTECTION CLASS	POWER CONSUMPTION	SPRING RETURN ACTION	ACCESSORIES FACTORY MOUNTED
VA7810-ADA-11	230 VAC	ON/OFF or Floating	1000 N	25 mm	150 s	IP54	8 VA	---	---
VA7810-ADC-11									2 aux switches
VA7810-AGA-11	---								
VA7810-AGC-11	3 VA				2 aux switches				
VA7810-AGH-11	24 VAC				2 KΩ pot				
VA7810-GGA-11	6 VA				ON/OFF, Floating or Proportional		150 s (selectable 75 s)		---
VA7810-GGC-11		2 aux switches							

##### MOUNTING ONTO VG8000 AND VG9000 FLANGED VALVES

CODES	SUPPLY VOLTAGE (50/60 Hz)	ACTION CONTROL	FORCE	STROKE	FULL STROKE TIME	PROTECTION CLASS	POWER CONSUMPTION	SPRING RETURN ACTION	ACCESSORIES FACTORY MOUNTED
VA7810-ADA-12	230 VAC	ON/OFF or Floating	1000 N	25 mm	150 s	IP54	8 VA	---	---
VA7810-ADC-12									2 aux switches
VA7810-AGA-12	---								
VA7810-AGC-12	3 VA				2 aux switches				
VA7810-AGH-12	24 VAC				2 KΩ pot				
VA7810-GGA-12	6 VA				ON/OFF, Floating or Proportional		150 s (selectable 75 s)		---
VA7810-GGC-12		2 aux switches							

## ACTUATORS

### NON-SPRING RETURN PLANT VALVE ACTUATORS

## VA1125

#### FLOATING AND PROPORTIONAL CONTROL

The VA1125 Valve Actuators are used to control Valves in HVAC systems. They are of modular construction so that the required type of control signal is achieved simply by fitting a module with the required function in-situ. It can be mounted onto VG8000, VG8300 and VG9000 series valves.

### FEATURES

- 24 VAC and 230 VAC power supply
- Floating and Proportional control
- Manual override
- Automatic stem coupling
- Actuator fixed to valve with one ring nut
- Self adjusting, automatic stroke adjustment, calibrated pressure control at the end positions
- 2 auxiliary switches, feedback potentiometer and split range unit available
- IP66
- Selectable characteristic curve
- Selectable running time

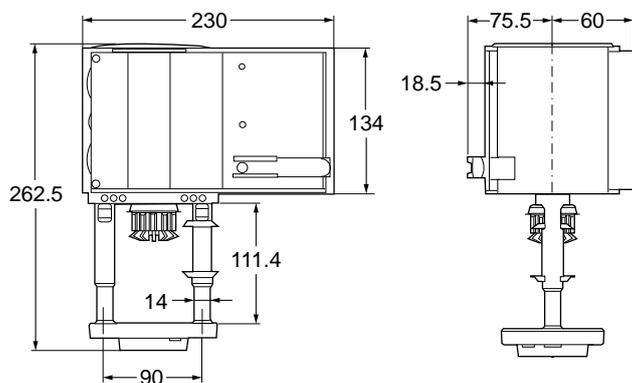




## ACTUATORS

### VA1125 NON-SPRING RETURN PLANT VALVE ACTUATORS

#### DIMENSIONS (in mm)



#### ORDERING INFORMATION

CODES	24 V ACTUATORS	POWER CONSUMPTION	PROTECTION CLASS	NOMINAL STROKE
VA1125-GGA-1	2500N; Non-Spring Return	20.5 VA	IP66	49 mm

#### ACCESSORIES MODULES FOR ON SITE INSTALLATION

CODES	DESCRIPTION
VA1000-M230N	AC 230 V module
VA1000-P2	2 K $\Omega$ feedback potentiometer
VA1000-S2	2 SPDT auxiliary switches
VA1000-EP	Extension kit for applications with temperatures greater than 140°C up to 200°C





## ACTUATORS

### FA-3000 NON-SPRING RETURN PLANT VALVE ACTUATORS

#### ORDERING INFORMATION

CODES	SUPPLY VOLTAGE (50/60 Hz)	ACTION CONTROL	FORCE	STROKE	FULL STROKE TIME	PROTECTION CLASS	POWER CONSUMPTION	ACCESSORIES FACTORY MOUNTED
FA-3300-7416	24 VAC	Floating	6000 N	42 mm (max 45)	150 s	IP65	37 VA	---
FA-3303-7416								2 aux switches and 2 K $\Omega$ pot
FA-3341-7416		Proportional					42 VA	2 aux switches
FA-3300-7411	230 VAC	Floating					37 VA	---
FA-3303-7411								2 aux switches and 2 K $\Omega$ pot

## ACTUATORS

### NON-SPRING RETURN PLANT VALVE ACTUATORS

## RA-3000

#### FLOATING AND PROPORTIONAL CONTROL

The RA-3000 Series Synchronous Motor-Driven Reversible Actuators are available for floating or with electric positioner for 0...10 V control.

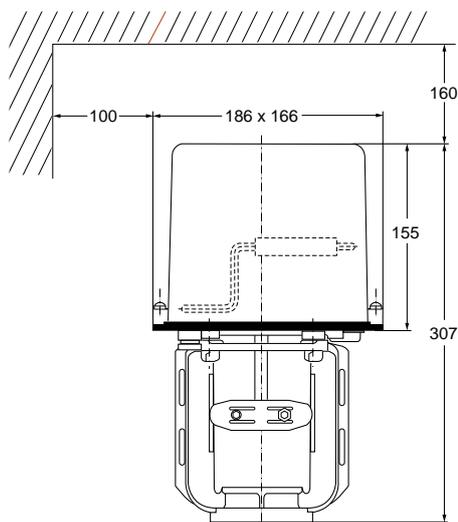
They feature factory calibrated pressure switches to provide specified close-off ratings.

These actuators are available in three sizes with 1600 N, 1800 N and with 3000 N nominal force and can be used with VG8000 and VG9000 series valves according to maximum close-off pressure ratings specified. Factory fitted options, such as 2kOhm feedback potentiometer, auxiliary switches and hand crank are available.

#### FEATURES

- Uses synchronous motor with pressure switches
- Special clamp coupler quick-fit systems
- Models for floating and proportional 0...10 VDC control
- Positioner with adjustable starting point, span, and direct/reverse action
- Active 0...10 VDC position feedback on proportional models
- Optional auxiliary switches and feedback potentiometer available
- Optional hand crank

#### DIMENSIONS (in mm)





## ACTUATORS

### RA-3000 NON-SPRING RETURN PLANT VALVE ACTUATORS

#### ORDERING INFORMATION

##### FOR FLOATING CONTROL

CODES	HAND CRANK	ACTUATOR FORCE	SUPPLY VOLTAGE	NOMINAL STROKE	PROTECTION CLASS
RA-3000-7226	---	1800 N	24 V, 50/60 Hz	25 mm	IP54
RA-3100-7226	■				
RA-3000-7227	---		230 V, 50/60 Hz		
RA-3100-7227	■				
RA-3000-7325	---	3000 N	24 V, 60 Hz	42 mm	
RA-3100-7325	■				
RA-3000-7326	---		24 V, 50 Hz		
RA-3100-7326	■				
RA-3000-7327	---		230 V, 50 Hz		
RA-3100-7327	■				

##### FOR FLOATING CONTROL, WITH 2 AUXILIARY SWITCHES AND 2 K Ohm FEEDBACK POTENTIOMETER

CODES	HAND CRANK	ACTUATOR FORCE	SUPPLY VOLTAGE	NOMINAL STROKE	PROTECTION CLASS
RA-3003-7226	---	1800 N	24 V, 50/60 Hz	25 mm	IP54
RA-3103-7226	■				
RA-3003-7227	---		230 V, 50/60 Hz		
RA-3103-7227	■				
RA-3003-7325	---	3000 N	24 V, 60 Hz	42 mm	
RA-3103-7325	■				
RA-3003-7326	---		24 V, 50 Hz		
RA-3103-7326	■				
RA-3003-7327	---		230 V, 50 Hz		
RA-3103-7327	■				

##### FOR PROPORTIONAL CONTROL WITH BUILT-IN POSITIONER 0...10 VDC AND 2 AUXILIARY SWITCHES

CODES	HAND CRANK	ACTUATOR FORCE	SUPPLY VOLTAGE	NOMINAL STROKE	PROTECTION CLASS
RA-3041-7226	---	1800 N	24 V, 50/60 Hz	25 mm	IP54
RA-3141-7226	■				
RA-3041-7325	---	3000 N	24 V, 60 Hz	42 mm	
RA-3141-7325	■				
RA-3041-7326	---		24 V, 50 Hz		
RA-3141-7326	■				

## ACTUATORS

### NON-SPRING RETURN PLANT VALVE ACTUATORS

## VA9104

4 Nm, ON/OFF, FLOATING AND PROPORTIONAL CONTROL  
ROTARY ACTUATORS FOR BALL VALVES

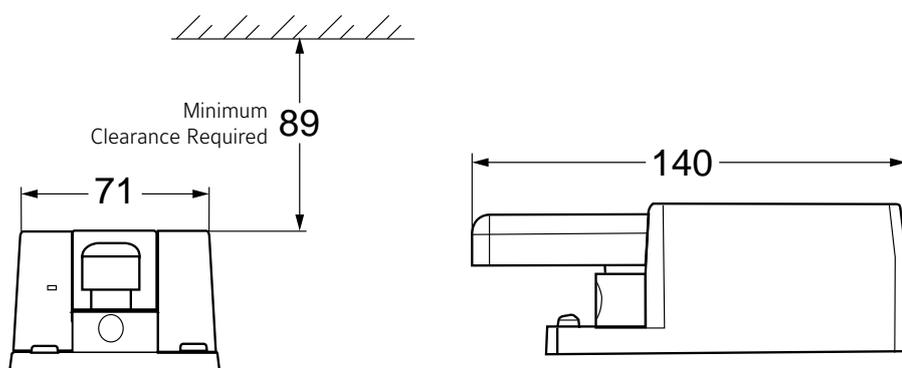
The Electric Actuator Series have been developed for operation of ball valves.

These synchronous, motor driven actuators are used to provide accurate positioning on VG1000 series DN15, DN20 and DN25 Ball Valves.

### FEATURES

- ON/OFF, Floating with timeout and Proportional control
- Load-independent running time
- Up to 5 Actuators in parallel operation possible
- Manual release button
- 1.2 m PVC cable
- Selectable direction of rotation
- Automatic shut-off at end position

### DIMENSIONS (in mm)





## ACTUATORS

### VA9104 NON-SPRING RETURN PLANT VALVE ACTUATORS

#### ORDERING INFORMATION

CODES	RUNNING TIME	CONTROL SIGNALS	SUPPLY VOLTAGE (50/60 Hz)
VA9104-AGA-1S	72 s	Floating without timeout	24 VAC
VA9104-IGA-1S		ON/OFF and Floating with timeout	
VA9104-IUA-1S			100 to 240 VAC
VA9104-GGA-1S		Proportional 0(2)...10 VDC 0(4)...20 mA	24 VAC

## ACTUATORS

### NON-SPRING RETURN PLANT VALVE ACTUATORS

## VA9300

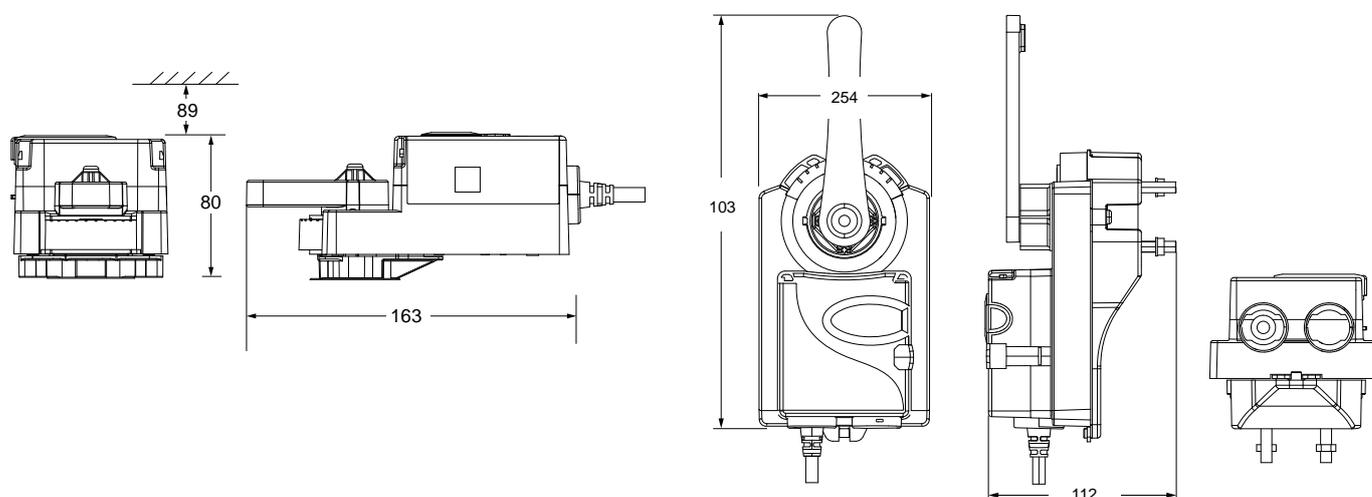
8, 10, 20 AND 35 Nm, ON/OFF, FLOATING AND PROPORTIONAL  
CONTROL ROTARY ACTUATORS FOR BALL VALVES

The VA9300 Series Electric Non Spring Return Actuators are used to provide accurate positioning on Johnson Controls® VG1000 Series DN15 up to DN150 Ball Valves in Heating, Ventilating and Air Conditioning (HVAC) applications.

### FEATURES

- Automatic models with signal input detection model: On/Off, Floating and Proportional
- High speed actuator models
- Line voltage models
- Optional auxiliary switch & potentiometer feedback
- Direct-Coupled Design
- Rugged IP54 Rated Enclosure
- Electronic stall detection
- Microprocessor-controlled Brushless DC Motor

### DIMENSIONS (in mm)





## ACTUATORS

### VA9300 NON-SPRING RETURN PLANT VALVE ACTUATORS

#### ORDERING INFORMATION

CODES	TORQUE (Nm)	RUNNING TIME (s)	CONTROL SIGNALS	SUPPLY VOLTAGE (50/60 Hz)
VA9308-AGA-1Z	8	8	ON/OFF and Floating	24V AC/DC
VA9310-AUA-1	10	90		100 to 240 VAC
* VA9310-GUA-1			ON/OFF, Floating and Proportional	24V AC/DC
VA9310-HGA-1			ON/OFF and Floating	100 to 240 VAC
* VA9320-AUA-1	20	90	ON/OFF, Floating and Proportional	24V AC/DC
* VA9320-GUA-1			ON/OFF and Floating	100 to 240 VAC
* VA9320-HGA-1			ON/OFF, Floating and Proportional	24V AC/DC
* VA9335-AUA-1	35	90	ON/OFF and Floating	100 to 240 VAC
* VA9335-GUA-1			ON/OFF, Floating and Proportional	24V AC/DC
* VA9335-HGA-1			ON/OFF and Floating	100 to 240 VAC
* VA9335-HGA-1			ON/OFF, Floating and Proportional	24V AC/DC

#### Note

\* Available in Spring 2019

#### ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
M9000-342	NEMA 4X, IP66 Weathershield (quantity 1)
M9000-561	Thermal Barrier Kit for low pressure steam application (quantity 1)
M9000-606	Position indicator (quantity 5)
M9300-1	Auxiliary Switch Kit (one single-pole, double-throw)
M9300-2	Auxiliary Switch Kit (two single-pole, double-throw)
M9300-100	Threaded Conduit Adapters for 12.7 mm electrician's fittings (quantity 5)
M9300-140	External Feedback Potentiometer 140k Ohm
M9300-1K	External Feedback Potentiometer 1k Ohm
M9300-2K	External Feedback Potentiometer 2k Ohm
M9300-10K	External Feedback Potentiometer 10k Ohm
M9310-500	Ball Valve Linkage Kit for applying M9310 Series Electric Actuators to VG1000 Series Valves (quantity 1)

## ACTUATORS

### NON-SPRING RETURN PLANT VALVE ACTUATORS

## VA-9070

68 - 2030 Nm, ON/OFF, FLOATING AND PROPORTIONAL  
CONTROL ROTARY ACTUATORS FOR BUTTERFLY VALVES

The Actuator is specially developed for use with VFB Butterfly Valves in the HVAC industry. These bidirectional actuators are direct mounted on VFB Valves without any linkage. A single VA-9070 provides 68, 226, 339, 565, 734, 1470, 2030 Nm torque depending on the model.

With a power supply of 24 VAC or 230 VAC the actuators can be controlled in ON/OFF, Floating or Proportional configuration. Two isolated auxiliary switches and an electrical heater are standard in these series. The protection class is IP65 to ensure a dust-proof and shower-proof from all angles.

An hand operation is standard. When hand operation is active, a yellow ring is displayed and the actuator motor is not operative. The position indicator is clearly recognizable all around.

The opening and closing speed is independently adjustable in the proportional application.

## FEATURES

- Exact positioning ensures precise flow control
- Complete opening and closing from 100% to 0
- Range from 68 Nm to 2030 Nm
- Self-regulating heater as standard
- Construction optimized for operation with butterfly valves
- Two isolated auxiliary switches as standard



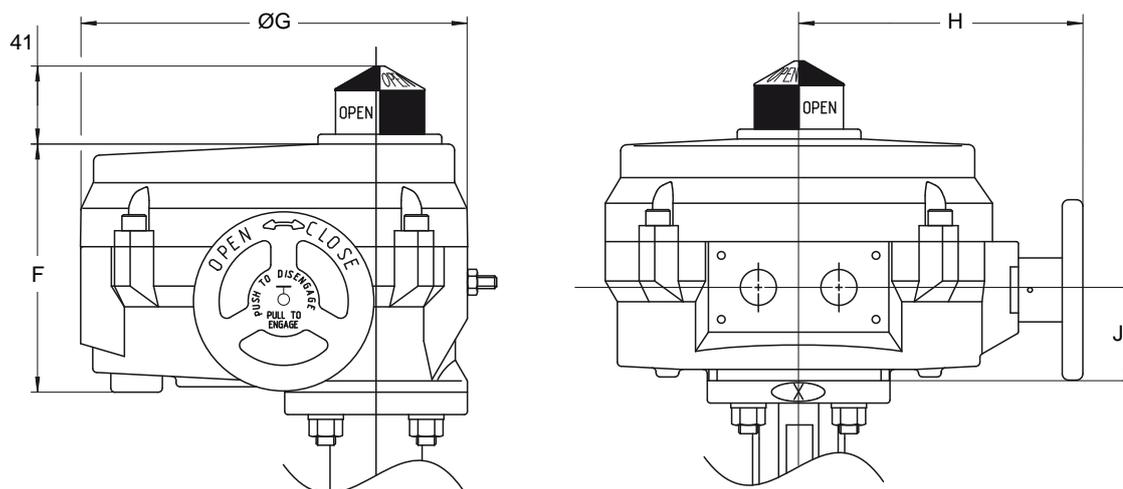


## ACTUATORS

### VA9070 NON-SPRING RETURN PLANT VALVE ACTUATORS

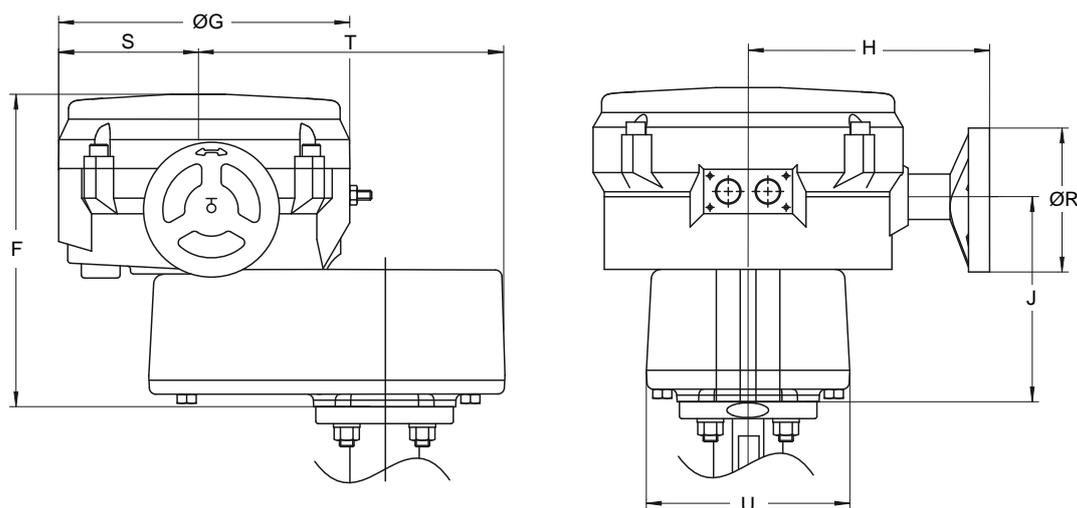
#### DIMENSIONS (in mm)

VALVES WITH VA-9072 / VA-9075 / VA-9077 / VA-9078 ACTUATORS



CODES	F	G	H	J	S	T	R	U	TOP FLANGE
VA-9072	130	191	142	48	---	---	---	---	F07
VA-9075	165	257	198	64	---	---	---	---	F07/F12

VALVES WITH VA-907A / VA-907B ACTUATORS



CODES	F	G	H	J	S	T	R	U	TOP FLANGE
VA-9077 / VA-9078	183	307	241	74	---	---	---	---	F12/F16
VA-907A / VA-907B	317	307	241	206	155	323	305	203	F12/F16



## ACTUATORS

### VA9070 NON-SPRING RETURN PLANT VALVE ACTUATORS

#### ORDERING INFORMATION

CODES	TORQUE	POWER SUPPLY	CONTROLS
VA-9072-13	68 Nm	24 VAC	Proportional control
VA-9072-14			ON/OFF and Floating control
VA-9072-23		230 VAC	Proportional control
VA-9072-24			ON/OFF and Floating control
VA-9075-13	226 Nm	24 VAC	Proportional control
VA-9075-14			ON/OFF and Floating control
VA-9075-23		230 VAC	Proportional control
VA-9075-24			ON/OFF and Floating control
VA-9077-13	565 Nm	24 VAC	Proportional control
VA-9077-14			ON/OFF and Floating control
VA-9078-23	735 Nm	230 VAC	Proportional control
VA-9078-24			ON/OFF and Floating control
VA-907A-23	1470 Nm		Proportional control
VA-907A-24			ON/OFF and Floating control
VA-907B-23	2034 Nm	Proportional control	
VA-907B-24		ON/OFF and Floating control	

## ACTUATORS

### NON-SPRING RETURN PLANT VALVE ACTUATORS

## VAP1000-VAP3000

VAP LINEAR ACTUATORS FOR VPA PRESSURE INDEPENDENT  
FLANGED VALVES

The VAP Actuators have been specifically designed to drive the VPA Pressure Independent Valve.

They provide 1000N or 3000N according with the valve dimensions.

The actuators are used to control the valve and to set the maximum desired flow.



## FEATURES

- Linear actuator with high control accuracy provides the equal percentage flow curve
- Actuator has manual function that allows for manual positioning of the Valve
- The potentiometer on the actuator is use to set the maximun flow of the VPA Valve
- They provide 1000N or 3000N according with the valve dimensions.
- In the VAP300-24-C model, a led display gives several function information
- 0-10 VDC or 4-20 mA setpoint and feedback

## ORDERING INFORMATION

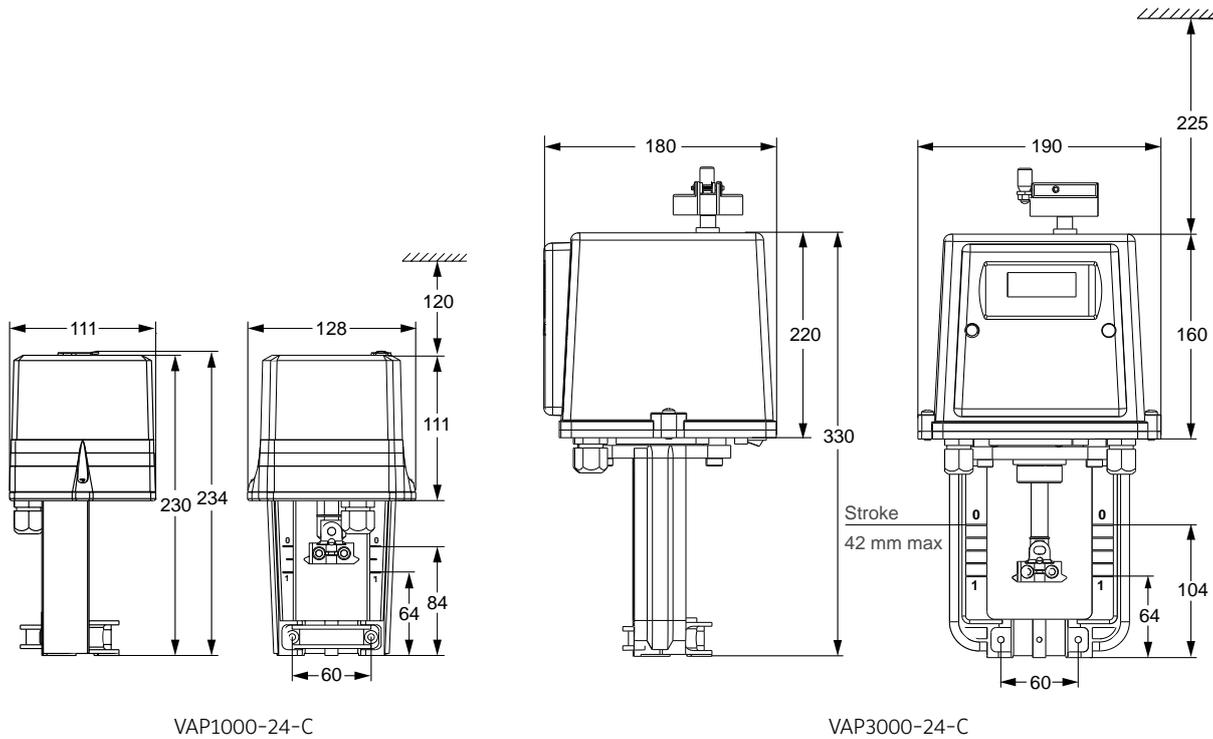
CODES	FORCE	POWER SUPPLY	CONTROL SIGNAL	MANUAL OVERRIDE	RUNNING SPEED	WEIGHT (kg)
VAP1000-24-C	1000N	24 VAC	0(2) ~ 10 V, 0(4)~20 mA	■	3.85 s/mm	1.7
VAP3000-24-C	3000N	24 VAC	0(2) ~ 10 V, 0(4)~20 mA	■	3.2 s/mm	5.2



## ACTUATORS

### VAP NON-SPRING RETURN PLANT VALVE ACTUATORS

#### DIMENSIONS (in mm)



## ACTUATORS

### SPRING RETURN PLANT VALVE ACTUATORS

## VA7820 - VA7830

#### FLOATING AND PROPORTIONAL CONTROL

The VA78x0 Spring Return Actuator with 1000 N thrust for valves in Heating, Ventilation and Air Conditioning applications is available for Floating or Proportional control.

All models have manual override as standard and provide stroke capabilities of 7 mm to 25 mm. Proportional models are self-calibrating.

The actuator is intended for use with Johnson Controls VG7000 and VGS800 threaded valves as well as VG8000 and VG9000 flanged valves.

All valves should be fitted in accordance with the maximum close-off pressure ratings specified. Valve/actuators can be ordered as separate units or as a factory fitted valve/actuator combinations.

### FEATURES

- Proportional Actuators are self calibrating
- All models can also be used as floating and ON/OFF actuators
- Force controlled motor shut-off
- Manual override as standard
- IP54 enclosure protection
- Delivered with fitted 1.5 m cable and wire terminals
- Status LED
- Control-Signal failure - stem to pre-determined position
- Stroke position indicator
- Spring return functions

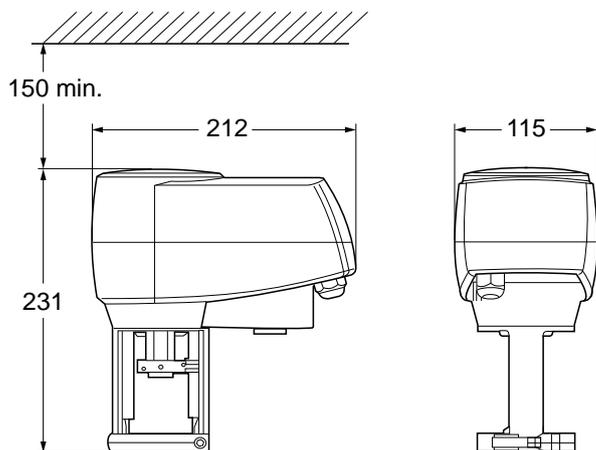




## ACTUATORS

### VA7800 SPRING RETURN PLANT VALVE ACTUATORS

#### DIMENSIONS (in mm)



#### ORDERING INFORMATION

CODES	SUPPLY VOLTAGE (50/60 Hz)	ACTION CONTROL	FORCE	STROKE	FULL STROKE TIME	PROTECTION CLASS	POWER CONSUMPTION	SPRING RETURN ACTION	ACCESSORIES FACTORY MOUNTED
Actuator with threaded coupler for VG7000 valves									
VA7820-GGA-11	24 VAC	ON/OFF, Floating or Proportional	1000 N	25 mm	150 s (selectable 75 s)	IP54	11 VA	Actuator stem retracts	---
VA7820-GGC-11								2 aux switches	
VA7830-GGA-11								Actuator stem extend	---
VA7830-GGC-11								2 aux switches	
Actuator with clamp coupler for VG8000 and VG9000 valves									
VA7820-GGA-12	24 VAC	ON/OFF, Floating or Proportional	1000 N	25 mm	150 s (selectable 75 s)	IP54	11 VA	Actuator stem retracts	---
VA7820-GGC-12								2 aux switches	
VA7830-GGA-12								Actuator stem extend	---
VA7830-GGC-12								2 aux switches	

## ACTUATORS

### SPRING RETURN PLANT VALVE ACTUATORS

## VA1220 - VA1420

#### FLOATING AND PROPORTIONAL CONTROL

The VA1220 - VA1420 Valve Actuators are used to control valves in HVAC systems. They are of modular construction so that the required type of control signal is achieved simply by fitting a module with the required function in-situ. It can be mounted onto VG8000 and VG9000 series valves.



### FEATURES

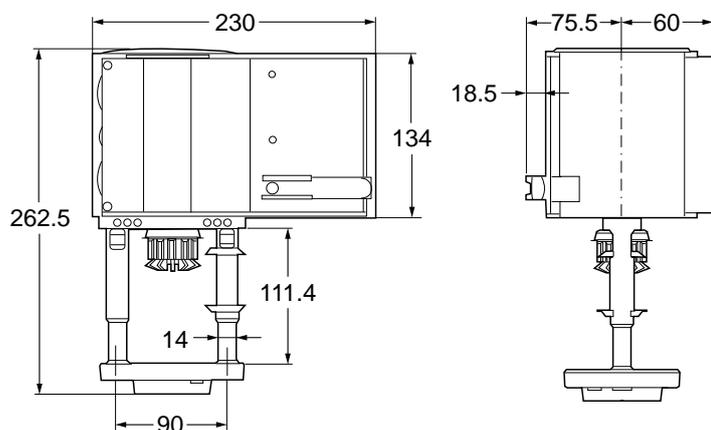
- 24 VAC and 230 VAC power supply
- Floating and Proportional control
- Manual override
- Automatic stem coupling
- Actuator fixed to valve with one ring nut
- Self adjusting, automatic stroke adjustment, calibrated pressure control at the end positions
- 2 auxiliary switches, feedback potentiometer and split range unit available
- IP66
- Selectable characteristic curve
- Selectable running time



## ACTUATORS

### VA1x20 SPRING RETURN PLANT VALVE ACTUATORS

#### DIMENSIONS (in mm)



#### ORDERING INFORMATION

CODES	24 V ACTUATORS	POWER CONSUMPTION	PROTECTION CLASS	NOMINAL STROKE
VA1220-GGA-1	2000N; Spring return retracts	17 VA	IP66	49 mm
VA1420-GGA-1	2000N; Spring return extends			

#### ACCESSORIES MODULES FOR IN-SITU INSTALLATION

CODES	DESCRIPTION
VA1000-M230N	AC 230 V module
VA1000-P2	2 K $\Omega$ feedback potentiometer
VA1000-S2	2 SPDT auxiliary switches
VA1000-EP	Extension kit for applications with temperatures greater than 140°C up to 200°C

## ACTUATORS

### SPRING RETURN PLANT VALVE ACTUATORS

## FA-2000

#### FLOATING AND PROPORTIONAL CONTROL

The FA-2000 Series Electric Actuators are available for floating or with electronic positioner for 0...10 V or 0...20 mA control.

It provides a fully variable valve aperture, a power failure spring return safety mechanism and an electrically operated manual override.

Three models of the FA-2000 are available.

The FA-22 ("failsafe" position down = stem fully extended) and FA-25 ("failsafe" position up = stem fully retracted): this model pair has a 25 mm stroke and a minimum of 2400 N thrust.

The FA-23 ("failsafe" position down) and FA-26 ("failsafe" position up): this model pair has a 42 mm stroke of and a minimum thrust of 2200 N.

The actuator can be combined with VG8000 series in accordance with the maximum close-off pressure ratings specified.

The FA-2000, when delivered as a single unit, is pre-set to facilitate installation with minimum adjustment; it is also available with a variety of options such as auxiliary switches and feedback potentiometers.

## FEATURES

- Power failure mechanism (spring return)
- Visible calibration ring on stem coupling
- Positioner with adjustable starting point, span and direct/reverse action
- Electrically operated manual override
- Quick-fit coupling clamp

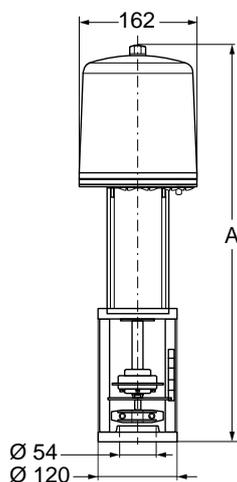




## ACTUATORS

### FA-2000 SPRING RETURN PLANT VALVE ACTUATORS

#### DIMENSIONS (in mm)



A	WITHOUT POSITIONER	WITH POSITIONER
FA-22 / FA-25	541	586
FA-23 / FA-26	575	612

#### ORDERING INFORMATION

CODES	SUPPLY VOLTAGE (50 Hz)	ACTION CONTROL	SPRING RETURN FUNCTION	BUILT-IN ELECTRONIC POSITIONER	NOMINAL THRUST	NOMINAL STROKE	PROTECTION CLASS	POWER CONSUMPTION	EMERGENCY SHUT OF SPEED
FA-2200-7516	24 VAC	Floating and Proportional	Stem fully extended	---	2.4 kN	25 mm	IP54	6.1 VA	≤ 81
FA-2500-7516			Stem fully retracted						
FA-2300-7416			Stem fully extended		2.2 kN	42 mm			≤ 201
FA-2600-7416			Stem fully retracted						
FA-2240-7516			Stem fully extended	0...10 V / 0(4)...20 mA	2.4 kN	25 mm			≤ 81
FA-2540-7516			Stem fully retracted						
FA-2340-7416			Stem fully extended	2.2 kN	42 mm	≤ 201			
FA-2640-7416			Stem fully retracted						
FA-2241-7516			Stem fully extended	0...10 V / 0(4)...20 mA and 2 auxiliary switches	2.4 kN	25 mm			≤ 81
FA-2541-7516			Stem fully retracted						
FA-2341-7416			Stem fully extended		2.2 kN	42 mm			≤ 201
FA-2641-7416			Stem fully retracted						

## ACTUATORS

### SPRING RETURN PLANT VALVE ACTUATORS

## VA9203

3 Nm, ON/OFF, FLOATING AND PROPORTIONAL CONTROL  
ROTARY ACTUATORS FOR BALL VALVES

The VA9203 Series Electric Spring Return Actuators are direct-mount actuators.

These bidirectional actuators are used to provide accurate positioning on Johnson Controls® VG1000 Series DN15 up to DN25 Ball Valves in Heating, Ventilating and Air Conditioning (HVAC) applications.

One Integral line voltage auxiliary switch, available only on the VA9203-xxB-1(Z) models, indicate end-stop position, or perform switching functions within the selected rotation range.

A graduated scale from 0% to 100% and a position indicator provide visual indication of the valve's opening.

When power fails during service, the mechanical spring return system open or close the valve ports.

The series includes the following control options:

- ON/OFF, 24 V AC/DC, 100 to 240 VAC power
- ON/OFF and floating point, 24 V AC/DC power
- Proportional, 24 V AC/DC power, for 0(2) to 10 VDC or 0(4) to 20 mA control

## FEATURES

- 3 Nm rated torque
- Mechanical Spring Return System
- Direct-coupled design
- Reversible mounting
- Rugged IP54 rated enclosure
- Electronic stall detection
- Double-insulated construction
- Microprocessor controlled brushless DC Motor (-AGx and -GGx models)
- External mode selection switch (-AGx and -GGx models)
- Integral cables with colored and numbered conductors
- Optional integrated auxiliary switch
- Override control (proportional models only)
- UL, CE, and C-Tick Compliance
- Manufacturing under International Standards Organization (ISO) 9001 Quality Control Standards

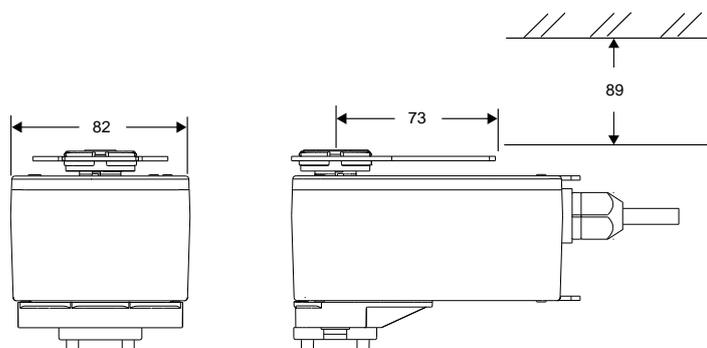




## ACTUATORS

### VA-9203 SPRING RETURN PLANT VALVE ACTUATORS

#### DIMENSIONS (in mm)



#### ORDERING INFORMATION

CODES	TORQUE	RUNNING TIME		CONTROL SIGNALS	SUPPLY VOLTAGE (50/60 Hz)	1 AUXILIARY SWITCH	
		Motor	Spring				
VA9203-GGA-1Z	3 Nm	90 s	12...17 s	Proportional	24 V AC/DC	---	
VA9203-GGB-1Z						■	
VA9203-AGA-1Z				ON/OFF and Floating		---	
VA9203-AGB-1Z						■	
VA9203-BGA-1		53...71 s	19...23 s	ON/OFF		100 to 230 VAC	---
VA9203-BGB-1							■
VA9203-BUA-1						---	
VA9203-BUB-1						■	

#### ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
M9000-560	Ball valve linkage kit for applying M9203 and M9208 series actuators to VG1000 series valves (quantity 1)
M9000-561	Thermal barrier extends M(VA)9104, M(VA)9203 and M(VA)9208 series electric spring return actuator applications to include low pressure steam (quantity 1)
M9000-342	Weathershield kit for VG1000 series ball valve application of M(VA)9104, M(VA)9203 and M(VA)9208 series electric spring return actuators (quantity 1)
M9000-607	Position indicator for VG1000 series ball valve applications (quantity 5)

## ACTUATORS

### SPRING RETURN PLANT VALVE ACTUATORS

## VA9208

8 Nm, ON/OFF, FLOATING AND PROPORTIONAL CONTROL  
ROTARY ACTUATORS FOR BALL VALVES

The VA9208 Series Electric Spring Return Actuators are direct-mount actuators.

These bidirectional actuators are used to provide accurate positioning on Johnson Controls® VG1000 Series DN32 up to DN50 Ball Valves in Heating, Ventilating and Air Conditioning (HVAC) applications.

Two integral line voltage auxiliary switches are available only on the VA9208-xxC-1 models, indicate end-stop position, or perform switching functions within the selected rotation range.

A graduated scale from 0% to 100% and a position indicator provide visual indication of the valve's opening.

When power fails during service, the mechanical spring return system open or close the valve ports.

The series includes the following control options:

- ON/OFF, 24 V AC/DC, 230 V AC power
- ON/OFF and floating control, 24 V AC/DC power
- Proportional, 24 V AC/DC power, for 0(2) to 10 VDC or 0(4) to 20 mA control

## FEATURES

- 8 Nm rated torque
- Mechanical Spring Return System
- Direct-coupled design
- Reversible mounting
- Rugged IP54 rated enclosure
- Electronic stall detection
- Double-insulated construction
- Microprocessor controlled brushless DC motor (-AGx and -GGx models)
- External mode selection switch (-AGx and -GGx models)
- Integral cables with colored and numbered conductors
- Optional integrated auxiliary switches
- UL, CE, and C-Tick Compliance
- Manufacturing under International Standards Organization (ISO) 9001 Quality Control Standards

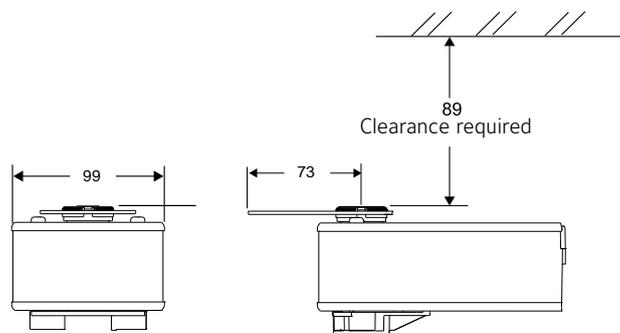




## ACTUATORS

### VA-9208 SPRING RETURN PLANT VALVE ACTUATORS

#### DIMENSIONS (in mm)



#### ORDERING INFORMATION

CODES	TORQUE	RUNNING TIME		CONTROL SIGNALS	SUPPLY VOLTAGE (50/60 Hz)	2 AUXILIARY SWITCH	
		Motor	Spring				
VA9208-GGA-1	8 Nm	150 s	17...25 s	Proportional	24 V AC/DC	---	
VA9208-GGC-1						■	
VA9208-AGA-1				ON/OFF and Floating		---	
VA9208-AGC-1						■	
VA9208-BGA-1		53...71 s	13...26 s	ON/OFF		230 VAC	---
VA9208-BGC-1							■
VA9208-BDA-1						---	
VA9208-BDC-1						■	

#### ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
M9000-560	Ball valve linkage kit for applying M9203 and M9208 series actuators to VG1000 series valves (quantity 1)
M9000-561	Thermal barrier extends M(VA)9104, M(VA)9203 and M(VA)9208 series electric spring return actuator applications to include low pressure steam (quantity 1)
M9000-342	Weathershield kit for VG1000 series ball valve application, IP54
M9000-607	Position Indicator for VG1000 Series ball valve applications (quantity 5)

## ACTUATORS

### NON-SPRING RETURN DAMPER ACTUATORS

## M9102-M9104

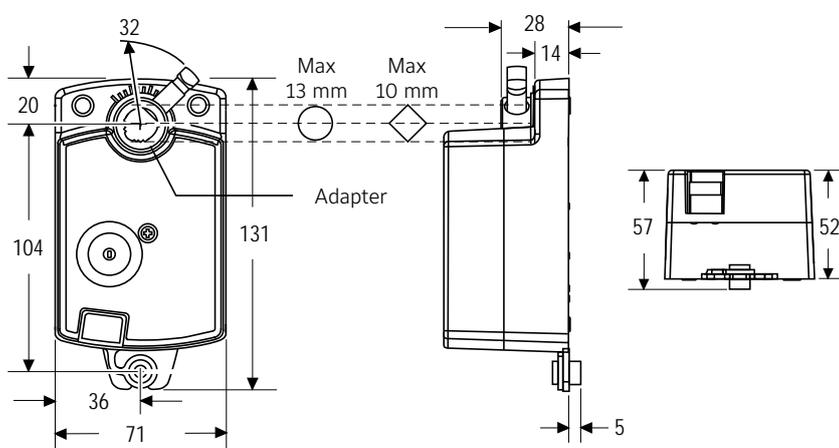
2 AND 4 Nm, ON/OFF, FLOATING AND PROPORTIONAL CONTROL

The small family Electric Damper Actuator Series have been developed to operate small air dampers in Ventilation and Air Conditioning Systems. The compact design make this actuator highly versatile.

### FEATURES

- Floating, ON/OFF and Proportional control
- Load-independent running time
- Up to 5 Actuators in parallel operation possible
- Actuators available with PVC cable or with plug-in terminal block connection
- Simple direct mounting with universal adapter for fitting to  $\varnothing$  8...13 mm or with 8...10 mm square shaft. 45 mm minimum shaft length
- Selectable direction of rotation
- Manual release button

### DIMENSIONS (in mm)





## ACTUATORS

### M9102/M9104 NON-SPRING RETURN DAMPER ACTUATORS

#### ORDERING INFORMATION

CODES	TORQUE	RUNNING TIME	CONTROL SIGNALS	SUPPLY VOLTAGE (50/60 Hz)	CONNECTION
M9102-AGA-1S	2 Nm	36 s	Floating without timeout	AC 24 V	PVC-cable
M9102-AGA-5S					Terminal block
M9102-IGA-1S			ON/OFF and Floating with timeout		PVC-cable
M9102-IGA-5S					Terminal block
M9104-AGA-1S	4 Nm	72 s	Floating without timeout		PVC-cable
M9104-AGA-5S					Terminal block
M9104-IGA-1S			ON/OFF and Floating with timeout		PVC-cable
M9104-IGA-5S					Terminal block
M9104-IUA-5S				AC 100 to 240 V	PVC-cable
M9104-GGA-1S			Proportional 0...10 VDC	AC 24 V	PVC-cable
M9104-GGA-5S					Terminal block

## ACTUATORS

### NON-SPRING RETURN DAMPER ACTUATORS

## M9304

4 Nm, ON/OFF, FLOATING AND PROPORTIONAL CONTROL

The Silence Electric Damper Actuator Series have been developed to operate small and medium air dampers in Ventilation and Air Conditioning Systems. The compact design and universal adapter fitted with limitation of rotation angle make this actuator highly versatile. A key feature of the design is the Johnson Controls® stem adapter which also incorporates angle-of-rotation limiting and position indication.

### FEATURES

- ON/OFF, Floating and Proportional control
- Load-independent running time
- Up to 5 actuators in parallel operation possible
- Plug-in terminal block connection
- Simple direct mounting with universal adapter for fitting to  $\varnothing$  6 mm to 16 mm shaft or with M9000-ZxxDN adapter kit for 8, 10, 11 and 12 mm square shaft. 45 mm min shaft length
- Selectable direction of rotation
- Limitation of rotation angle
- Manual release button
- 2 adjustable auxiliary switches
- Automatic shut-off at end position (overload switch)
- Energy saving at end positions
- Actuators available with 1 m halogen-free cable

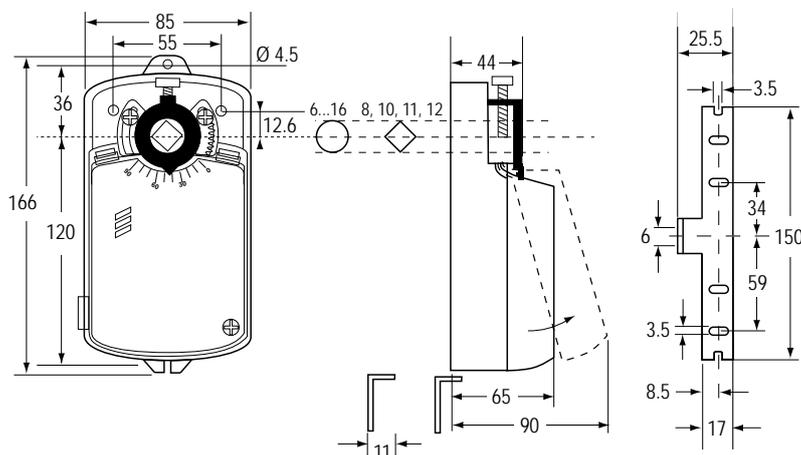




## ACTUATORS

### M9304 SPRING RETURN PLANT VALVE ACTUATORS

#### DIMENSIONS (in mm)



#### ORDERING INFORMATION

CODES	TORQUE	RUNNING TIME	2 ADJUSTABLE AUXILIARY CONTACTS	SUPPLY VOLTAGE (50/60 Hz)
M9304-AGA-1N	4 Nm	35 s	---	24 VAC/DC
M9304-AGC-1N			■	
M9304-ADA-1N			---	230 VAC
M9304-ADC-1N			■	
M9304-AKA-1N			---	48 VDC
M9304-AKC-1N			■	
M9304-BDA-1N			---	230 VAC
M9304-BDC-1N			■	
M9304-GGA-1N			---	24 VAC/DC
M9304-GKA-1N			---	48 VAC/DC

## ACTUATORS

### NON-SPRING RETURN DAMPER ACTUATORS

## M9300

8, 10, 20 AND 35 Nm, ON/OFF, FLOATING AND PROPORTIONAL CONTROL

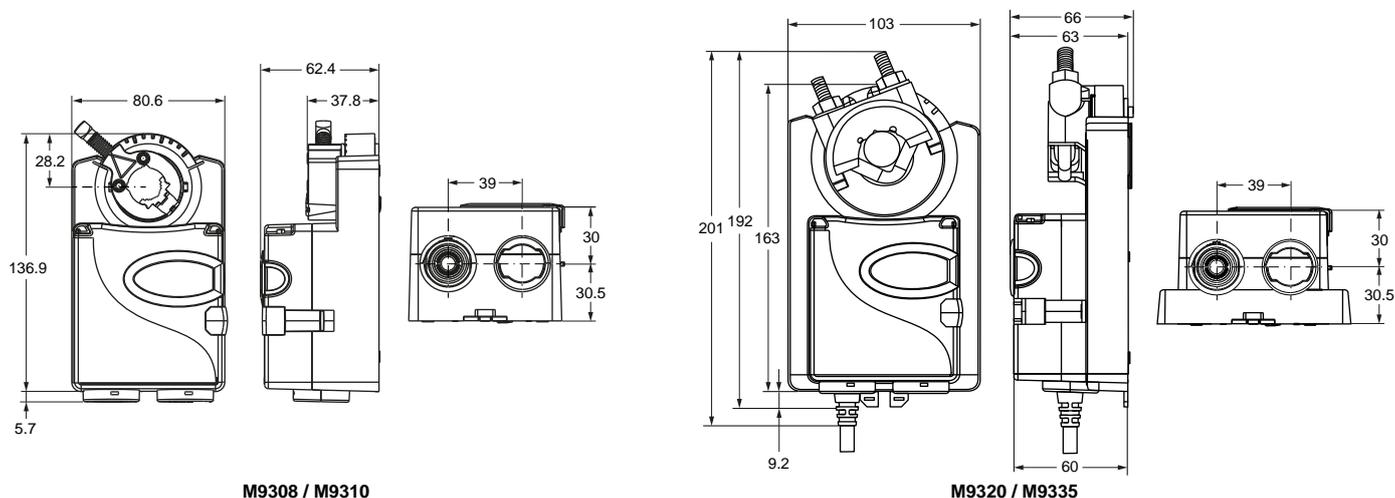
The M9300 Series Electric Non-Spring Return Actuators provide control of dampers in HVAC Systems with 8, 10, 20 and 35 Nm rated torque.

These bidirectional actuators do not require a damper linkage and are easily installed on round shafts or square shafts. An optional line voltage auxiliary switch kits can be field installed to indicate an end-stop position or perform switching functions within the selected rotation range.

### FEATURES

- Automatic signal input detection model: ON/OFF, Floating and Proportional
- High speed actuator model
- Optional auxiliary switch and potentiometer feedback
- 8, 10, 20 and 35 Nm rated torque
- Self-calibrating to adjust stroke
- Electronic stall detection
- Microprocessor-controlled Brushless DC motor

### DIMENSIONS (in mm)





## ACTUATORS

### M9300 NON-SPRING RETURN DAMPER ACTUATORS

#### ORDERING INFORMATION

CODES	TORQUE (Nm)	RUNNING TIME (s)	CONTROL SIGNALS	SUPPLY VOLTAGE (50/60 Hz)
* M9308-AUA-1Z	8	8	ON/OFF and Floating	100 to 240 VAC
M9308-AGA-1Z	8	8	ON/OFF and Floating	24V AC/DC
M9310-AUA-1	10	90	ON/OFF and Floating	100 to 240 VAC
* M9310-GUA-1	10	90	ON/OFF, Floating and Proportional	100 to 240 VAC
M9310-HGA-1	10	90	ON/OFF, Floating and Proportional	24V AC/DC
M9320-AUA-1	20	90	ON/OFF and Floating	100 to 240 VAC
* M9320-GUA-1	20	90	ON/OFF, Floating and Proportional	100 to 240 VAC
M9320-HGA-1	20	90	ON/OFF, Floating and Proportional	24V AC/DC
* M9335-AUA-1	35	150	ON/OFF and Floating	100 to 240 VAC
* M9335-GUA-1	35	150	ON/OFF, Floating and Proportional	100 to 240 VAC
M9335-HGA-1	35	150	ON/OFF, Floating and Proportional	24V AC/DC

#### Note

\* Available in Spring 2019

#### ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
M9000-322	NEMA 4, IP66 Weathershield kit for damper application of M9104, M9310, M9203 and M9208 series electric actuators (quantity 1)
M9000-323	NEMA 4X, IP66 Weathershield kit for damper application of M9320 and M9335 series electric actuators (quantity 1)
M9000-400	Jackshaft linkage adapter kit (quantity 1)
M9000-561	Thermal barrier kit. Extends the VA9104, VA9310, VA9203 and VA9208 series electric non spring return actuators applications to include low pressure steam (quantity 1)
M9000-604	Replacement anti-rotation bracket Kit for M9310, M9203, M9208, M9210 and M9220 series electric actuators
M9000-606	Position indicator for M3000 kits (quantity 5)
M9300-1	Auxiliary switch kit (one single-pole, double-throw)
M9300-2	Auxiliary switch kit (two single-pole, double-throw)
M9300-100	Threaded conduit adapters for 12.7 mm electrician's fittings (quantity 5)
M9300-140	External auxiliary feedback potentiometer 140k Ohm
M9000-151	Remote mounting kit, with crank arm and damper linkage for M9100 and M9300 series actuators
M9300-1K	External auxiliary feedback potentiometer 1k Ohm
M9300-2K	External auxiliary feedback potentiometer 2k Ohm
M9300-10K	External auxiliary feedback potentiometer 10k Ohm
M9310-600	Standard coupler kit, M9310 series (9.5 to 19 mm - 9.5 to 16 mm) (quantity 1)

## ACTUATORS

### NON-SPRING RETURN DAMPER ACTUATORS

## M9100

8, 16, 24 AND 32 Nm, ON/OFF, FLOATING AND PROPORTIONAL CONTROL

The M9100 Series Electric Actuators are direct-mount Actuators.

These bidirectional actuators do not require a damper linkage, and are easily installed on round shafts or square shafts using the standard shaft clamp included with the actuator.

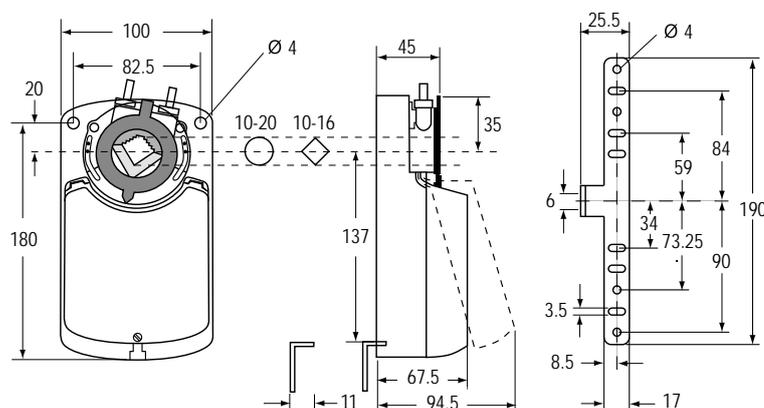
A single M9100 series electric non spring return actuator provides 8, 16, 24 or 32 Nm torque depending on the model. Two integral line voltage auxiliary switches, available only on the M91xx-xxC models, indicate end stop position or performs switching functions within the selected rotation range.

M9100 series actuators provide 90° of rotation. A graduated scale from 0° to 90° and a position indicator provide visual indication of stroke.

## FEATURES

- Direct-coupled design
- Selectable direction of rotation
- Electronic stall detection
- Double-insulated construction
- Load independent
- Optional integrated auxiliary switches
- Manufactured under International Standards Organization (ISO) 9001 Quality Control Standards

## DIMENSIONS (in mm)





## ACTUATORS

### M9100 NON-SPRING RETURN DAMPER ACTUATORS

#### ORDERING INFORMATION

CODES	RUNNING TIME	CONTROL SIGNALS	2 AUXILIARY CONTACTS	FEEDBACK POTENTIOMETER	SUPPLY VOLTAGE (50/60 Hz)	
8 Nm						
M9108-AGA-1N	30 s	ON/OFF and Floating	---	---	24 VAC/DC	
M9108-AGC-1N			■	---		
M9108-AGE-1N			---	1 KOhm		
M9108-AGD-1N			---	140 Ohm		
M9108-AGF-1N			---	2 KOhm		
M9108-ADA-1N			---	---		100 ... 230 VAC
M9108-ADC-1N			■	---		
M9108-ADE-1N			---	1 KOhm		
M9108-ADD-1N			---	140 Ohm		
M9108-ADF-1N			---	2 KOhm		
M9108-GGA-1N			Proportional 0(2)...10 VDC / 0(4)...20 mA	---	---	
M9108-GGC-1N				■	---	
M9108-GDA-1N			Proportional 0(2)...10 VDC	---	---	230 VAC
M9108-GDC-1N				■	---	
M9108-GDA-1N1			Proportional 0(4)...20 mA	---	---	
M9108-GDC-1N1				■	---	
16 Nm						
M9116-AGA-1N	80 s	ON/OFF and Floating	---	---	24 VAC/DC	
M9116-AGC-1N			■	---		
M9116-AGE-1N			---	1 KOhm		
M9116-AGD-1N			---	140 Ohm		
M9116-AGF-1N			---	2 KOhm		
M9116-ADA-1N			---	---		100 ... 230 VAC
M9116-ADC-1N			■	---		
M9116-ADE-1N			---	1 KOhm		
M9116-ADD-1N			---	140 Ohm		
M9116-ADF-1N			---	2 KOhm		
M9116-GGA-1N			Proportional 0(2)...10 VDC / 0(4)...20 mA	---	---	
M9116-GGC-1N				■	---	
M9116-GDA-1N			Proportional 0(2)...10 VDC	---	---	230 VAC
M9116-GDC-1N				■	---	
M9116-GDA-1N1			Proportional 0(4)...20 mA	---	---	
M9116-GDC-1N1				■	---	



## ACTUATORS

### M9100 NON-SPRING RETURN DAMPER ACTUATORS

#### ORDERING INFORMATION

CODES	RUNNING TIME	CONTROL SIGNALS	2 AUXILIARY CONTACTS	FEEDBACK POTENTIOMETER	SUPPLY VOLTAGE (50/60 Hz)		
<b>24 Nm</b>							
M9124-AGA-1N	125 s	ON/OFF and Floating	---	---	24 VAC/DC		
M9124-AGC-1N			■	---			
M9124-AGE-1N			---	1 KOhm			
M9124-AGD-1N			---	140 Ohm			
M9124-AGF-1N			---	2 KOhm			
M9124-ADA-1N			---	---		100 ... 230 VAC	
M9124-ADC-1N			■	---			
M9124-ADE-1N			---	1 KOhm			
M9124-ADD-1N			---	140 Ohm			
M9124-ADF-1N			---	2 KOhm			
M9124-GGA-1N			Proportional 0(2)...10 VDC	---	---		24 VAC/DC
M9124-GGC-1N			0(4)...20 mA	■	---		
M9124-GDA-1N			Proportional 0(2)...10 VDC	---	---	230 VAC	
M9124-GDC-1N			■	---			
M9124-GDA-1N1			Proportional 0(4)...20 mA	---	---		
M9124-GDC-1N1			■	---	---		
<b>32 Nm</b>							
M9132-AGA-1N	140 s	ON/OFF and Floating	---	---	24 VAC/DC		
M9132-AGC-1N			■	---			
M9132-AGE-1N			---	1 KOhm			
M9132-AGD-1N			---	140 Ohm			
M9132-AGF-1N			---	2 KOhm			
M9132-ADA-1N			---	---		100 ... 230 VAC	
M9132-ADC-1N			■	---			
M9132-ADE-1N			---	1 KOhm			
M9132-ADD-1N			---	140 Ohm			
M9132-ADF-1N			---	2 KOhm			
M9132-GDA-1N			Proportional 0(2)...10 VDC	---	---		230 VAC
M9132-GDC-1N			■	---	---		
M9132-GGA-1N			200 s	Proportional 0(2)...10 VDC	---	---	24 VAC/DC
M9132-GGC-1N					■	---	

## ACTUATORS

### SPRING RETURN DAMPER ACTUATORS

## M9203

#### 3 Nm, ON/OFF, FLOATING AND PROPORTIONAL CONTROL

The M9203 Series Electric Spring Return Actuators are direct-mount Actuators.

These bidirectional actuators do not require a damper linkage, and are easily installed on round shafts or square shafts using the standard shaft clamp included with the actuator.

A single M9203 series electric spring return actuator provides 3 Nm running and spring return torque.

An integral line voltage auxiliary switch, available only on the M9203-xxB-1(Z) models, indicates end stop position, or performs switching functions within the selected rotation range.

M9203 Series Actuators provide 95° of rotation. A graduated scale from -5° to 90° and a position indicator provide visual indication of stroke.

When power fails during service, the mechanical spring return system provides rated torque to the connected equipment, returning it to the home position.

The series includes the following control options:

- ON/OFF, 24 V, 100 to 240 VAC power
- ON/OFF and floating point, 24 V power
- Proportional, 24 V power, for 0(2) to 10 VDC or 0(4) to 20 mA control signal

## FEATURES

- 3 Nm rated torque
- Direct-coupled design
- Reversible mounting
- Electronic stall detection
- Double-insulated construction
- Microprocessor-controlled brushless DC motor (-AGx and GGx types)
- External mode selection switch (-AGx and -GGx types)
- Integral cables with colored and numbered conductors
- Optional Integrated Auxiliary Switch
- Override control (proportional models only)
- Manufactured under International Standards Organization (ISO) 9001 Quality Control Standards

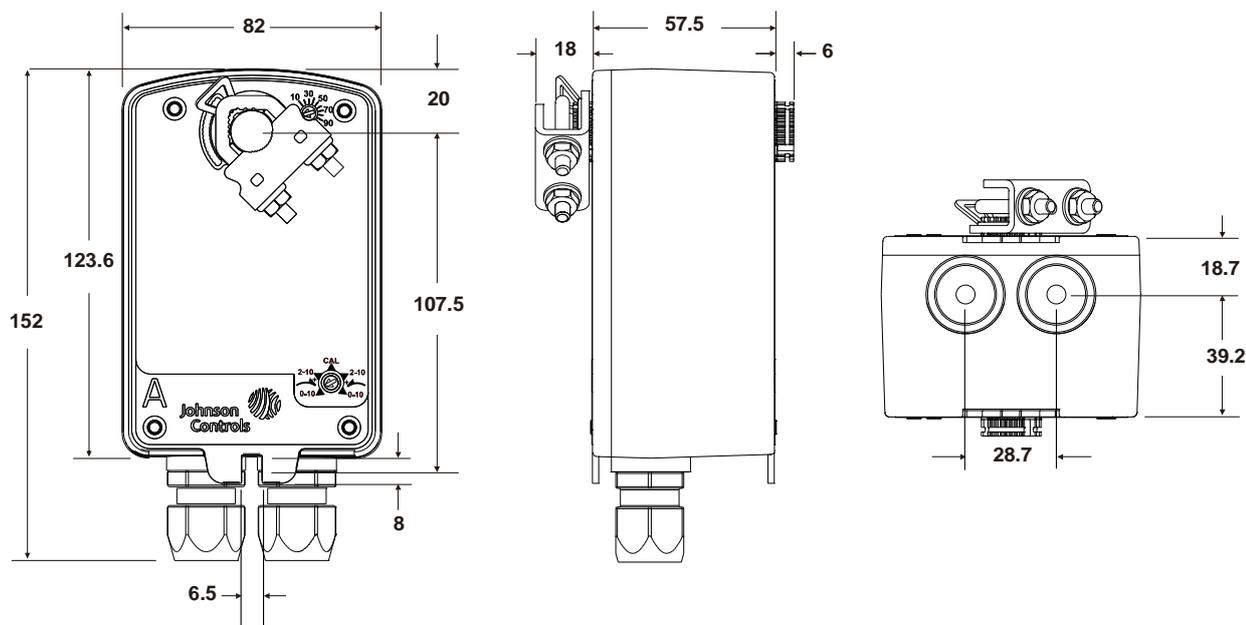




## ACTUATORS

### M9203 SPRING RETURN DAMPER ACTUATORS

#### DIMENSIONS (in mm)



#### ORDERING INFORMATION

CODES	TORQUE	RUNNING TIME	CONTROL SIGNALS	SUPPLY VOLTAGE (50/60 Hz)	1 AUXILIARY SWITCH					
M9203-AGA-1	3 Nm	150 s	ON/OFF and Floating	24 VAC / DC	---					
M9203-AGB-1					■					
M9203-AGA-1Z					---					
M9203-AGB-1Z					■					
M9203-BGA-1		60 s			ON/OFF	100 - 240 VAC	---			
M9203-BGB-1							■			
M9203-BUA-1							---			
M9203-BUB-1							■			
M9203-BUA-1Z		27 s	ON/OFF	100 - 240 VAC			---			
M9203-BUB-1Z							■			
M9203-GGA-1							150 s	Proportional	24 VAC/DC	---
M9203-GGB-1										■
M9203-GGA-1Z		---								
M9203-GGB-1Z		■								
M9203-GGB-1Z		90 s			---	---	---			■



## ACTUATORS

### M9203 SPRING RETURN DAMPER ACTUATORS

#### ORDERING INFORMATION

##### ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
M9000-322	Weathershield kit for damper application of M9203 and M9208 series electric spring return Actuators (quantity 1)
M9000-342	Weathershield kit for VG1000 series ball valve application of M(VA)9104, M(VA)9203 and M(VA)9208 series electric spring return Actuators (quantity 1)
M9000-400	Jackshaft linkage adapter kit (quantity 1)
M9000-560	Ball valve linkage kit for applying M9203 and M9208 series electric Actuators to VG1000 series valves (quantity 1)
M9000-561	Thermal barrier kit for M9000-560 ball valve linkage. Extends M(VA)9104, M(VA)9203 and M(VA)9208 series electric spring return Actuators applications to include low pressure steam (quantity 1)
M9000-604	Replacement anti-rotation bracket Kit for M9203, M9208, M9210 and M9220 series electric spring return Actuators (quantity 1)
M9000-606	Position indicator for damper applications (quantity 5)
M9000-607	Position indicator for VG1000 series ball valve applications (quantity 5)
M9203-100	Remote mounting kit with crankarm kit (quantity 1)
M9203-110	Universal mounting kit without Crankarm kit (quantity 1)
M9203-115	Universal mounting kit with crankarm kit (quantity 1)
M9203-150	Crankarm kit (quantity 1)
M9203-250	Remote mounting kit with crankarm kit and damper linkage for D1300 dampers (quantity 1)
M9203-601	Replacement standard coupler kit (with retainer) for mounting M9203 series electric spring return Actuators (quantity 1)
M9203-602	Replacement retainer for M9203 series electric spring return Actuators (quantity 5)
M9203-603	Adjustable stop kit for M9203 series electric spring return Actuators (quantity 1)

## ACTUATORS

### SPRING RETURN DAMPER ACTUATORS

## M9208

8 Nm, ON/OFF, FLOATING AND PROPORTIONAL CONTROL

The Spring Return Electric Damper-Actuator series has been specially developed for the motorized operation of air dampers in Air Conditioning Systems.

When the control signal is applied the actuator drives the damper to the operational position, while evenly tensioning the integrated spring.

After a power failure the stored energy in the spring immediately brings the damper to the safety position.

Manual operation is automatically cancelled when the actuator is in electrical operation.

The compact design and universal adapter fitted with limitation of rotation angle make this actuator highly versatile.

## FEATURES

- ON/OFF and Floating control signal
- Up to 5 actuators in parallel operation possible
- Electrical connection with halogen-free cable
- Simple direct mounting with universal adapter on  $\varnothing$  8 mm to 16 mm shaft or 6 mm to 12 mm square shaft. An optional M9208-600 Jackshaft coupler kit is available for 12 to 19 mm round shafts, or 10 mm to 14 mm square shafts
- Limitation of rotation angle
- Manual positioning with crank handle
- 2 auxiliary switches, 1 adjustable

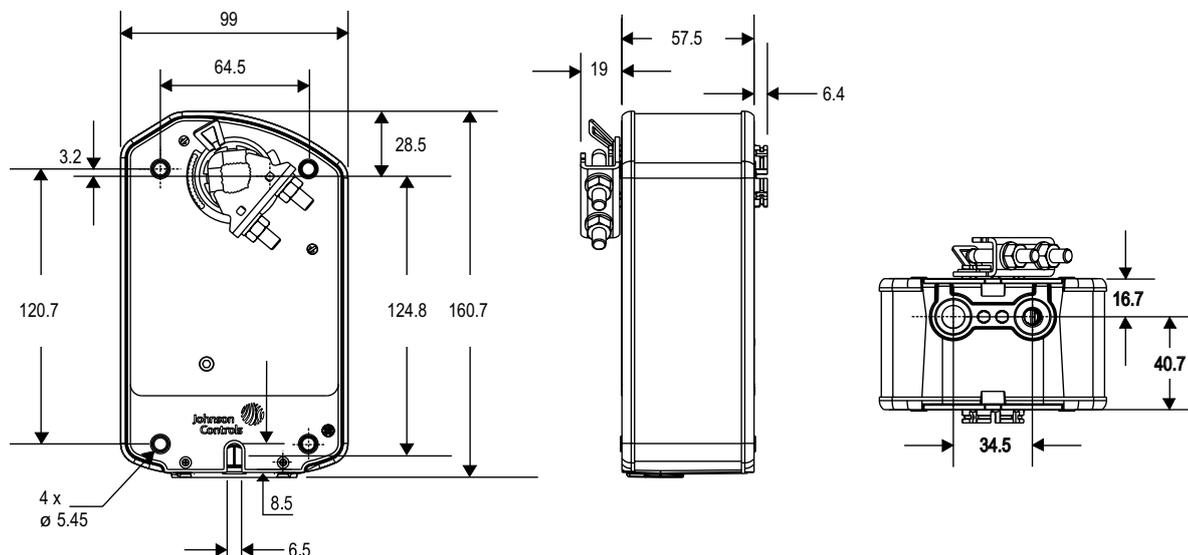




## ACTUATORS

### M9208 SPRING RETURN DAMPER ACTUATORS

#### DIMENSIONS (in mm)



#### ORDERING INFORMATION

CODES	TORQUE	RUNNING TIME		CONTROL SIGNALS	SUPPLY VOLTAGE (50/60 Hz)	2 AUXILIARY CONTACTS
		Motor	Spring			
M9208-AGA-1	8 Nm	150 s	17...25 s	ON/OFF or Floating	24 VAC / 24 VDC	---
M9208-AGC-1						■
M9208-BGA-1		55...71 s	13...26 s	ON/OFF	24 VAC	---
M9208-BGC-1						■
M9208-BDA-1		55...71 s	13...26 s	ON/OFF	230 VAC	---
M9208-BDC-1						■
M9208-GGA-1		150 s	17...25 s	Proportional 0...10 VDC / 2...10 VDC	24 VAC / 24 VDC	---
M9208-GGC-1						■

## ACTUATORS

### SPRING RETURN DAMPER ACTUATORS

## M9220

20 Nm, ON/OFF, FLOATING AND PROPORTIONAL CONTROL

The M9220 Series Actuators are direct mount, Spring Return Electric that provide reliable control of dampers and valves in Heating, Ventilating, and Air Conditioning (HVAC) Systems.

The actuators are available for use with ON/OFF, floating, and proportional controllers. These bidirectional actuators do not require a damper linkage, and are easily installed on dampers.

### FEATURES

- ON/OFF, Floating and Proportional control
- Two or three models mounted in tandem deliver twice or triple the torque
- Up to 5 actuators in parallel operation possible
- Optional adjustable end stops.  
The optional adjustable end stops are used to shorten the actuator stroke electronic stall detection throughout entire rotation range that extends the life of the actuator by deactivating the actuator motor when an overload condition is detected
- Integrated cables halogen-free cables
- IP54 (NEMA2)
- Rated aluminium enclosure
- Easy-to-use locking manual override with auto release and crank storage
- Energy saving at end position
- Two integral gold auxiliary switches (xxC Models)

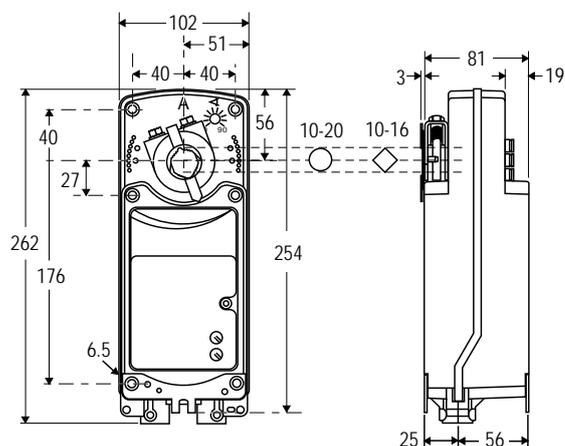




## ACTUATORS

### M9220 SPRING RETURN DAMPER ACTUATORS

#### DIMENSIONS (in mm)



#### ORDERING INFORMATION

CODES	TORQUE	RUNNING TIME		CONTROL SIGNALS	SUPPLY VOLTAGE (50/60 Hz)	2 AUXILIARY CONTACTS
		Motor	Spring			
M9220-AGA-1	20 Nm	150 s	20 s	ON/OFF and Floating	AC/DC 24 V	---
M9220-AGC-1						■
M9220-BDA-1		25...57 s	11...15 s	ON/OFF	230 VAC	---
M9220-BDC-1						■
M9220-BGA-1						---
M9220-BGC-1		■				
M9220-GGA-1		150 s	26 s	Proportional 0(2)...10 VDC	AC/DC 24 V	---
M9220-GGC-1						■
M9220-HGA-1				Proportional 0(2)...10 VDC with span offset		---
M9220-HGC-1						■

## ACTUATORS

### SAFETY DAMPER ACTUATORS

## S9208

8 Nm, ON/OFF CONTROL

The S9208 Security Fire Electric, Spring Return Damper Actuator series has been specially developed for the motorized operation of fire protection dampers.

When the control signal is applied the actuator drives the damper to the operational position, while evenly tensioning the integrated spring.

After a power failure the stored energy in the spring immediately brings the damper to the safety position.

Manual operation is automatically cancelled when the actuator is in electrical operation.

### FEATURES

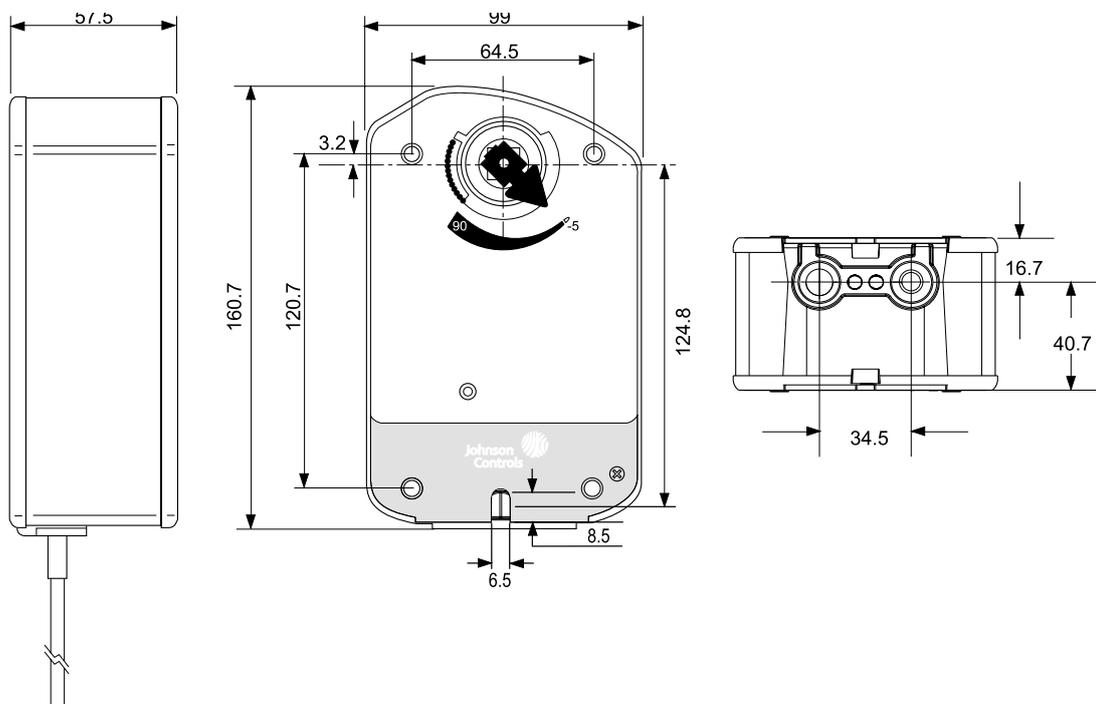
- ON/OFF control signal
- 12 mm square shaft and 10 mm, 8 mm adapter inside the package
- Connection with halogen-free cable
- ST1.72E temperature sensor. Switch point of temperature sensor ca. 72°C
- Actuator temperature sensor to monitor ambient sensor
- Low noise level
- Manual positioning with crank handle
- 2 fixed auxiliary switches (8° and 83°)



### S9208 SAFETY DAMPER ACTUATORS



### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	SUPPLY VOLTAGE (50-60 Hz)	DESCRIPTION
S9208-BGC-33	24 VAC / VDC	Without sensor
S9208-BGC-33A		With ambient thermosensor
S9208-BGC-33B		With duct sensor
S9208-BGC-33C		With duct and ambient sensors
S9208-BDC-33	230 VAC	Without sensor
S9208-BDC-33A		With ambient thermosensor
S9208-BDC-33B		With duct sensor
S9208-BDC-33C		With duct and ambient sensors

## ACTUATORS

### PNEUMATIC VALVE ACTUATORS

## MP8000



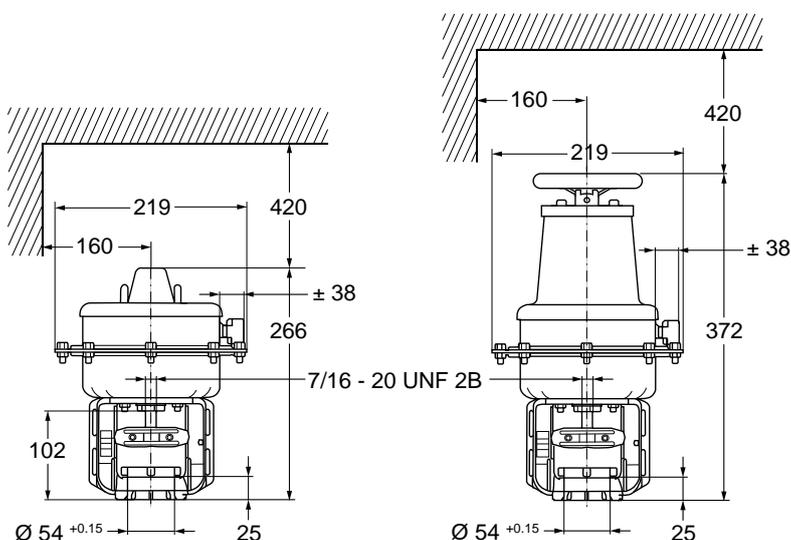
The MP8000 Series Pneumatic Valve-Actuators are designed to accurately position valve plugs in larger chilled water, hot water and steam applications in response to a pneumatic signal from a controller. A pneumatic positioner is also available for use in applications where sequential operation is desired or more positioning power and accuracy are required. They can be ordered as a factory fitted and ready-to-install valve/actuator combination or separately for local installation.

This robust actuator can be combined with VG8000 series flanged valves in accordance with the maximum close-off pressure ratings specified.

## FEATURES

- Pneumatic positioner
- Quick-fit coupler system
- Action reversible in-situ
- Optional hand wheel for factory or in-situ installation
- Optional auxiliary switches and feedback potentiometer available

## DIMENSIONS (in mm)





## ACTUATORS

### MP8000 PNEUMATIC VALVE ACTUATORS

#### ORDERING INFORMATION

CODES	POSITIONER AND HAND WHEEL
MP822C5020	---
MP822C6020	Direct Acting positioner
MP822C7020	Direct Acting positioner and hand wheel
MP822C8020	Hand wheel
MP832C5020	---
MP832C6020	Direct Acting positioner
MP832C7020	Direct Acting positioner and hand wheel
MP832C8020	Hand wheel

# ACTUATORS AND VALVES

## ACTUATORS

### PNEUMATIC VALVE ACTUATORS

## PA-2000



The PA-2000 Pneumatic Valve Actuators series is available for ON/OFF control.

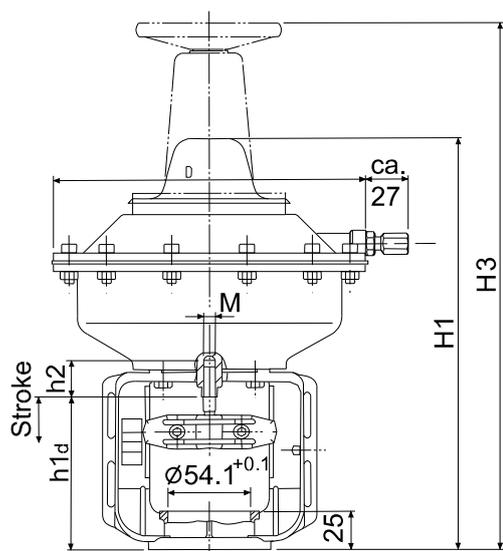
The actuator can be combined with VG8000 series valves in accordance with the maximum close-off pressure ratings specified.

The fail safe position of the PA-2000 can be changed in-situ with a conversion kit.

## FEATURES

- Manual override
- Reversible action in-situ
- Accessories available

## DIMENSIONS (in mm)





## ACTUATORS

### PA-2000 PNEUMATIC VALVE ACTUATORS

#### ORDERING INFORMATION

CODES	HANDWHEEL	SPRING RANGE	POSITIONER (PR10)	SPRING RETURN ACTION	DIAPHRAM AREA	STROKE		
PA-2000-3212	---	20 - 50 kPa	---	Direct Acting Actuator stem extends	150 cm <sup>2</sup>	13 mm		
PA-2100-3217	■	70 - 100 kPa				25 mm		
PA-2000-3312	---	20 - 50 kPa			600 cm <sup>2</sup>	42 mm		
PA-2100-3317	■	70 - 100 kPa				25 mm		
PA-2000-3612	---	20 - 50 kPa			■	Reverse Acting Actuator stem extends	150 cm <sup>2</sup>	13 mm
PA-2100-3617	■	70 - 100 kPa						25 mm
PA-2000-3712	---	20 - 50 kPa					600 cm <sup>2</sup>	42 mm
PA-2100-3717	■	70 - 100 kPa						25 mm
PA-2030-3222	---	20 - 50 kPa	---	Direct Acting Actuator stem extends	150 cm <sup>2</sup>	13 mm		
PA-2130-3227	■	70 - 100 kPa				25 mm		
PA-2030-3322	---	20 - 50 kPa			600 cm <sup>2</sup>	42 mm		
PA-2130-3327	■	70 - 100 kPa				25 mm		
PA-2030-3622	---	20 - 50 kPa			■	Reverse Acting Actuator stem extends	150 cm <sup>2</sup>	13 mm
PA-2130-3627	■	70 - 100 kPa						25 mm
PA-2030-3722	---	20 - 50 kPa					600 cm <sup>2</sup>	42 mm
PA-2130-3727	■	70 - 100 kPa						25 mm
PA-20x0-3212	---	20 - 50 kPa	---	Direct Acting Actuator stem extends	150 cm <sup>2</sup>	13 mm		
PA-2100-3217	■	70 - 100 kPa				25 mm		
PA-2000-3312	---	20 - 50 kPa			600 cm <sup>2</sup>	42 mm		
PA-2100-3317	■	70 - 100 kPa				25 mm		
PA-2000-3612	---	20 - 50 kPa			■	Reverse Acting Actuator stem extends	150 cm <sup>2</sup>	13 mm
PA-2100-3617	■	70 - 100 kPa						25 mm
PA-2000-3712	---	20 - 50 kPa					600 cm <sup>2</sup>	42 mm
PA-2100-3717	■	70 - 100 kPa						25 mm
PA-2030-3222	---	20 - 50 kPa	---	Direct Acting Actuator stem extends	150 cm <sup>2</sup>	13 mm		
PA-2130-3227	■	70 - 100 kPa				25 mm		
PA-2030-3322	---	20 - 50 kPa			600 cm <sup>2</sup>	42 mm		
PA-2130-3327	■	70 - 100 kPa				25 mm		
PA-2030-3622	---	20 - 50 kPa			■	Reverse Acting Actuator stem extends	150 cm <sup>2</sup>	13 mm
PA-2130-3627	■	70 - 100 kPa						25 mm
PA-2030-3722	---	20 - 50 kPa					600 cm <sup>2</sup>	42 mm
PA-2130-3727	■	70 - 100 kPa						25 mm

# VALVES AND ACTUATORS COMBINATIONS

## CONTROL VALVE SELECTION

	VFB	VG1000	VP1000	VPA	VG3000	VG7000	VGS800	VG9000	VG8000	VG8300	VG1600
2-way	■	■	■	■	■	■	■	■	■	■	
3-way mixing valve		■			■	■	■	■	■		
3-way diverting valve		■							■		
3-way + by-pass valve					■						
6-way valves											■
Thermal actuator			■		■						
Electric actuator	■	■	■	■	■	■	■	■	■	■	■
Pneumatic actuator						■			■	■	
$K_{VS}$ 0,25											
$K_{VS}$ 0,4											
$K_{VS}$ 0,63											
$K_{VS}$ 1											
$K_{VS}$ 1,6											
$K_{VS}$ 2,5											
$K_{VS}$ 3,3											
$K_{VS}$ 4											
$K_{VS}$ 6,3											
$K_{VS}$ 10											
$K_{VS}$ 16											
$K_{VS}$ 25											
$K_{VS}$ 40											
$K_{VS}$ 52											
$K_{VS}$ 63											
$K_{VS}$ 72											
$K_{VS}$ 100											
$K_{VS}$ 124											
$K_{VS}$ 126			N/A	N/A							
$K_{VS}$ 150											
$K_{VS}$ 160											
$K_{VS}$ 180											
$K_{VS}$ 243											
$K_{VS}$ 250											
$K_{VS}$ 350											
$K_{VS}$ 397											
$K_{VS}$ 721											
$K_{VS}$ 1083											
$K_{VS}$ 1591											
$K_{VS}$ 2852											
$K_{VS}$ 4670											
$K_{VS}$ 6946											
$K_{VS}$ 9063											
$K_{VS}$ 12044											
$K_{VS}$ 14804											
$K_{VS}$ 19212											

## VALVES

### TERMINAL UNIT VALVES

## VG3000

DN10...25, PN16

The VG3000 brass valve series is primarily designed to regulate the flow of water in response to the demand of a controller in zone and terminal unit applications.

Following actuators are available:

- VA-708x thermal ON/OFF actuator
- VA-709x thermal 0...10 V actuator
- VA-748x electric terminal unit valve actuator

The valves are available in 2-way, 3-way mixing and 3-way mixing with built-in by-pass configurations.

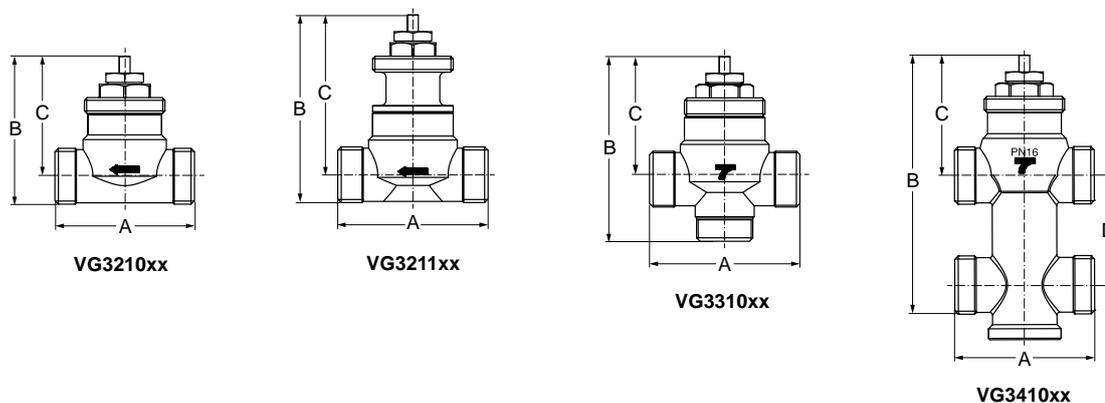
## FEATURES

- 2-way PDTC (NO) with 6 bar close off pressure
- Extend range of  $K_{VS}$  (0.4...6.3)
- Forged brass body, stainless steel stem and spring
- Actuator can be field installed after piping
- Commissioning cap available as accessory (VG3000-CAP)





## DIMENSIONS (in mm)



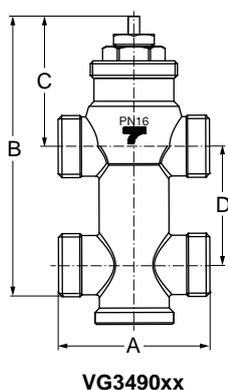
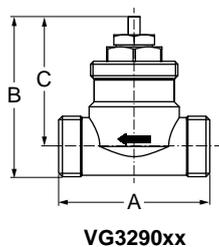
### THREADED MALE CONNECTION - BSPP

CODES	DIMENSIONS			
	A	B	C	D
VG3210BS	52	55	45	---
VG3210CS				
VG3210DS				
VG3210ES				
VG3210FS	56	58	45.5	---
VG3210JS				
VG3210KS	66	61.5	45.5	---
VG3210LS	80			
VG3211BS	52	70	60	---
VG3211CS				
VG3211DS				
VG3211ES				
VG3211FS	56	73	46	---
VG3211JS				
VG3211KS	66	74	46	---
VG3211LS	80			

CODES	DIMENSIONS			
	A	B	C	D
VG3310BS	52	66	45	---
VG3310CS				
VG3310DS				
VG3310ES				
VG3310FS	56	67	46	---
VG3310JS		73		
VG3310KS	66	85	46	---
VG3310LS	80			
VG3410BS	52	95.5	45	40
VG3410CS				
VG3410DS				
VG3410ES				
VG3410FS	56	96.5	46	---
VG3410JS		98.2		
VG3410KS	66	125	46	---
VG3410LS	80			

### VG3000 - TERMINAL UNIT VALVES

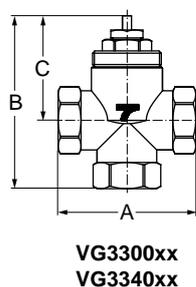
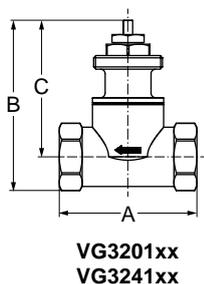
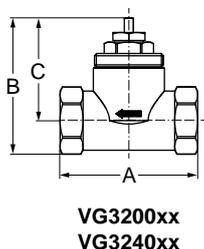
#### DIMENSIONS (in mm)



#### COMPRESSION FITTING

CODES	DIMENSIONS			
	A	B	C	D
VG3290BS	52	55	45	---
VG3290CS				
VG3290DS				
VG3290ES				
VG3290FS	56			

CODES	DIMENSIONS			
	A	B	C	D
VG3490BS	52	95.5	45	40
VG3490CS				
VG3490DS				
VG3490ES				
VG3490FS	56	96.5		



#### THREADED FEMALE CONNECTION - BSPP

CODES	DIMENSIONS		
	A	B	C
VG3200FS	60	58	45
VG3200KS	65	60	45
VG3200LS	80	64	45.5
VG3201FS	60	73	60
VG3201KS	65	75	60
VG3201LS	80	77	58
VG3300FS	60	76	46
VG3300KS	65	80	46
VG3300LS	80	85.5	46

#### THREADED FEMALE CONNECTION - NPT

CODES	DIMENSIONS		
	A	B	C
VG3240FS	60	58	45
VG3240KS	65	60	45
VG3240LS	80	64	45.5
VG3241FS	60	73	60
VG3241KS	65	75	60
VG3241LS	80	77	58
VG3340FS	60	76	46
VG3340KS	65	80	46
VG3340LS	80	85.5	46

### VG3000 - TERMINAL UNIT VALVES



## ORDERING INFORMATION

### THREADED MALE CONNECTION - BSPP

CODES	BODY TYPE	BODY SIZE	K <sub>VS</sub> (CV) CONTROL PORT	K <sub>VS</sub> BY-PASS PORT
VG3210BS	2-way PDTC (NO)	DN10	0.4 (0.43)	---
VG3210CS			0.63 (0.70)	
VG3210DS			1.0 (1.12)	
VG3210ES			1.6 (1.9)	
VG3210FS			2.5 (2.9)	
VG3210JS		DN15	2.5 (2.9)	
VG3210KS			4.0 (4.7)	
VG3210LS		DN20	6.3 (7.4)	
VG3211BS		2-way PDTC (NO)	DN10	
VG3211CS	0.63 (0.70)			
VG3211DS	1.0 (1.12)			
VG3211ES	1.6 (1.9)			
VG3211FS	2.5 (2.9)			
VG3211JS	DN15		2.5 (2.9)	
VG3211KS			4.0 (4.7)	
VG3211LS	DN20		6.3 (7.4)	
VG3310BS	3-way Mixing		DN10	0.4 (0.43)
VG3310CS		0.63 (0.70)		0.4
VG3310DS		1.0 (1.12)		0.63
VG3310ES		1.6 (1.9)		1.0
VG3310FS		2.5 (2.9)		---
VG3310JS		DN15	2.5 (2.9)	1.6
VG3310KS			4.0 (4.7)	2.5
VG3310LS		DN20	6.3 (7.4)	4.0
VG3410BS		3-way with Built-in By-pass Mixing	DN10	0.4 (0.43)
VG3410CS	0.63 (0.70)			0.4
VG3410DS	1.0 (1.12)			0.63
VG3410ES	1.6 (1.9)			1.0
VG3410FS	2.5 (2.9)			---
VG3410JS	DN15		2.5 (2.9)	1.6
VG3410KS			4.0 (4.7)	2.5
VG3410LS	DN20		6.3 (7.4)	4.0



## ORDERING INFORMATION

### COMPRESSION FITTING

CODES	BODY TYPE	BODY SIZE	K <sub>VS</sub> (CV) CONTROL PORT	K <sub>VS</sub> BY-PASS PORT
VG3290BS	2-way PDTC (NO)	DN10	0.4 (0.43)	---
VG3290CS			0.63 (0.70)	
VG3290DS			1.0 (1.12)	
VG3290ES			1.6 (1.9)	
VG3290FS			2.5 (2.9)	
VG3490BS	3-way with Built-in By-pass Mixing	DN10	0.4 (0.43)	0.25 (0.29)
VG3490CS			0.63 (0.70)	0.4 (0.43)
VG3490DS			1.0 (1.12)	0.63 (0.70)
VG3490ES			1.6 (1.9)	1.0 (1.12)
VG3490FS			2.5 (2.9)	1.6 (1.9)

### THREADED FEMALE CONNECTION - BSPP

CODES	BODY TYPE	BODY SIZE	K <sub>VS</sub> (CV) CONTROL PORT	K <sub>VS</sub> BY-PASS PORT
VG3200FS	2-way PDTC (NO)	DN15	2.5 (2.9)	---
VG3200KS		DN20	4.0 (4.7)	---
VG3200LS		DN25	6.3 (7.4)	---
VG3201FS	2-way PDTC (NO)	DN15	2.5 (2.9)	---
VG3201KS		DN20	4.0 (4.7)	---
VG3201LS		DN25	6.3 (7.4)	---
VG3300FS	3-way Mixing	DN15	2.5 (2.9)	1.6
VG3300KS		DN20	4.0 (4.7)	2.5
VG3300LS		DN25	6.3 (7.4)	4.0



## VALVES

### VG3000 - TERMINAL UNIT VALVES

## ORDERING INFORMATION

### THREADED FEMALE CONNECTION - NPT

CODES	BODY TYPE	BODY SIZE	$K_{VS}$ (CV) CONTROL PORT	$K_{VS}$ BY-PASS PORT
VG3240FS	2-way PDTC (NO)	DN15	2.5 (2.9)	---
VG3240KS		DN20	4.0 (4.7)	---
VG3240LS		DN25	6.3 (7.4)	---
VG3241FS	2-way PDTC (NO)	DN15	2.5 (2.9)	---
VG3241KS		DN20	4.0 (4.7)	---
VG3241LS		DN25	6.3 (7.4)	---
VG3340FS	3-way Mixing	DN15	2.5 (2.9)	1.6
VG3340KS		DN20	4.0 (4.7)	2.5
VG3340LS		DN25	6.3 (7.4)	4.0

## ACCESSORY (ORDER SEPARATELY)

CODE	DESCRIPTION
VG3000-CAP	Plastic commissioning cap

## VALVES

### TERMINAL UNIT VALVES

## VG1600

DN15 AND DN20, PN16

The newest patented Johnson Controls 270° 6-way valve are designed to regulate the flow in an easy and most efficient way of both hot and chilled water in response to the demand of a controller in HVAC systems.

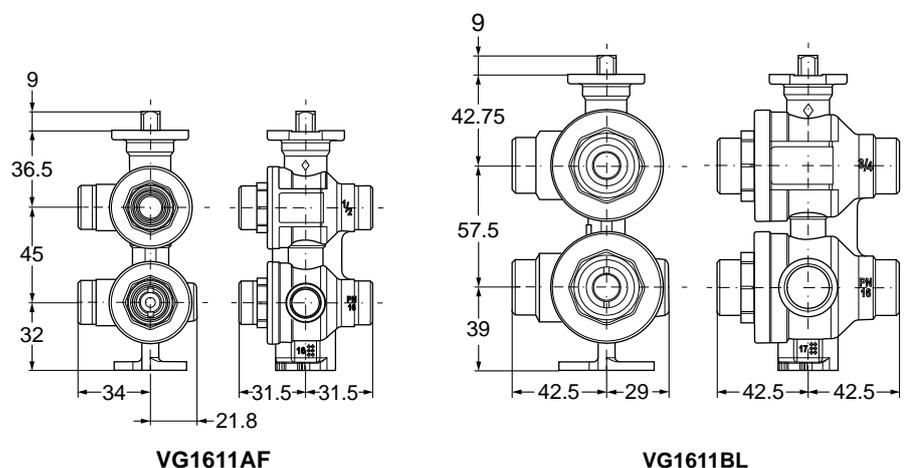
It substitutes either four through valves or two through valves and one change-over valve.

Available in 1/2" and 3/4" size, the valve is supplied at maximum  $K_V$  but smaller  $K_V$  can be obtained by installing one of the flow disk included in the valve box.

### FEATURES

- Interchangeable flow disks
- Dual stainless steel AISI 304 ball and stem
- Leakage rate A, air-bubble-tight
- Tested for 100,000 full stroke cycles at harsh water conditions with 900 ppm of iron oxide
- Overpressure system to prevent any damage in the terminal unit circuit.
- 5-year unconditional warranty

### DIMENSIONS (in mm)





## VALVES

### VG1600 - TERMINAL UNIT VALVES

#### ORDERING INFORMATION

CODES	$K_{VS}$ MAX	$K_{VS}$ WITH DISK	CONNECTION
VG1611AF	3.3	0.63 / 1 / 1.6 / 2.5	1/2" Male Flat Ends
VG1611BL	6.3	4.0 / 5.0	3/4" Male Flat Ends

#### ACCESSORY (ORDER SEPARATELY)

CODES	DESCRIPTION
VG1600-01	Mounting bracket
VG1600-02	Flow disk kit 1/2"
VG1600-03	Insulating shell 1/2"
VG1600-05	Flow disk kit 3/4"
VG1600-06	Insulating shell 3/4"

## VALVES

### TERMINAL UNIT VALVES

## V6W0000

DN15...20, PN16

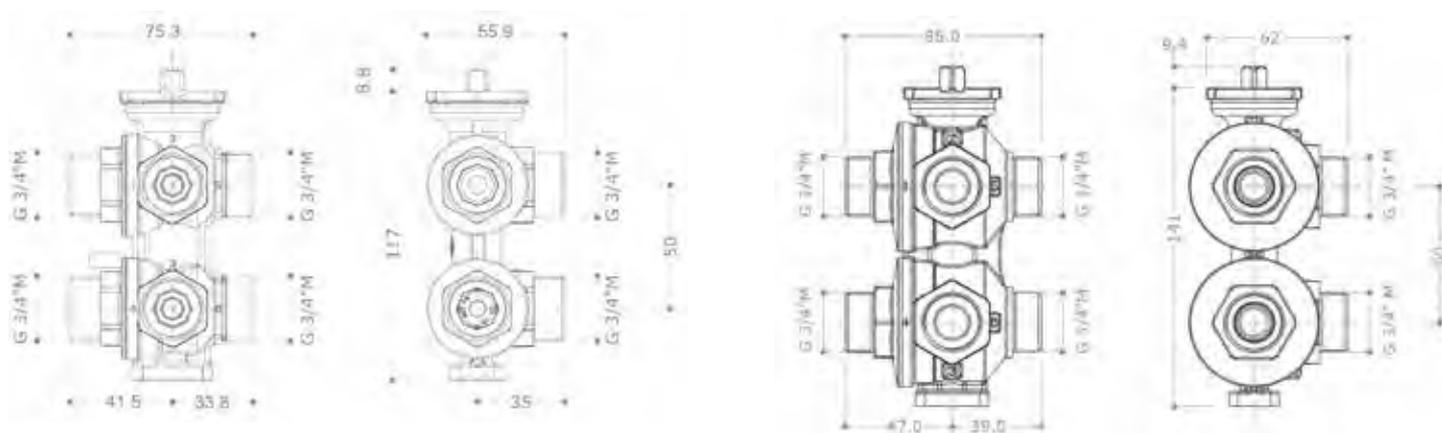


The V6W0000 line consists in 6-way ball valves used for HVAC 4-pipes applications to automatically carry out the winter-summer change-over or, potentially, the control of radiant ceilings, fan coils and chilled beams.

### FEATURES

- No cross-flow between floating and cooling circuits
- Different  $K_{VS}$  combination for an accurate and valuable control
- Compact and cost effective solution
- Changeable disk to select  $K_{VS}$  on site, avoiding any possible ordering mistakes

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	BODY SIZE	$K_{VS}$ MAX	$K_{VS}$ WITH DISK	CONNECTION
V6W1AAE	DN15	1.25	1 - 0.63 - 0.4 - 0.25	3/4" Male Flat ends
V6W1BCF	DN20	2.7	2.1 - 1.6 - 1.0 - 0.7	
V6W0AAE	DN15	1.25	1 - 0.63 - 0.4 - 0.25	1/2" Female BSP

## VALVES

### PLANT VALVES

## VGS800

DN15...50, PN16



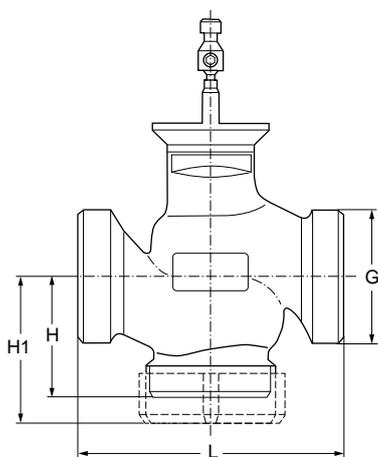
These valves are primarily designed to regulate the flow of water in response to the demand of a controller in zone and terminal unit applications. Following electric actuators are available:

- VA-77xx and VA78xx electric valve actuators

### FEATURES

- Cast bronze body
- $K_{VS}$  0.63...40
- 2-way PDT0 (normally closed) using 3-way mixing valve with modkit, 3-way mixing configuration
- Fluid temperature 2 to 130°C
- BSPP male threaded body connections

### DIMENSIONS (in mm)



BODY SIZE	G	L	H	H1
DN15	1-1/8	80	55	65
DN20	1-1/4	90	55	65
DN25	1-1/2	110	55	66
DN32	2	120	55	67
DN40	2-1/4	130	60	72
DN50	2-3/4	150	65	77



## VALVES

### VGS800 - PLANT VALVES

## ORDERING INFORMATION

### 3-WAY MIXING CONFIGURATION

CODES	BODY SIZE	K <sub>VS</sub>	NOMINAL STROKE (mm)	CLOSE-OFF PRESSURE kPa	
				VA-77xx-820x 500 N	VA78xx-xxx-12 1000 N
VGS8A5W1N	DN15	0.63	13	958	1600
VGS8A4W1N		1.0			
VGS8A3W1N		1.6			
VGS8A2W1N		2.5			
VGS8A1W1N		4.0			
VGS8B1W1N	DN20	6.3		605	1600
VGS8C1W1N	DN25	10		280	1046
VGS8D1W1N	DN32	16		176	744
VGS8E1W1N	DN40	25		54	369
VGS8F1W1N	DN50	40		---	208

#### Note

Ordering of factory mounted valves and electric actuators. The valves and actuators can be ordered separately or factory mounted. When factory mounted, please add "+M" to the order code for the actuator.

### PIPE MUFFLES

CODES	MUFFLES
121 4935 151	DN15 / Rp 1/2
121 4935 201	DN20 / Rp 3/4
121 4935 251	DN25 / Rp 1
121 4935 321	DN32 / Rp 1-1/4
121 4935 401	DN40 / Rp 1-1/2
121 4935 501	DN50 / Rp 2

#### Note

3-pipe muffles are needed for the mixing valves

### MODKIT FOR TRANSFORMATION OF 3-WAY INTO 2-WAY VALVES

CODES	MOD KIT FOR:
121 4930 151	DN15 / Rp 1/2
121 4930 201	DN20 / Rp 3/4
121 4930 251	DN25 / Rp 1
121 4930 321	DN32 / Rp 1-1/4
121 4930 401	DN40 / Rp 1-1/2
121 4930 501	DN50 / Rp 2

#### Note

2-pipe muffles and 1 modkit are required to alter a 3-way valve into a 2-way valve

## VALVES

### PLANT VALVES

## VG7000

DN15...50, PN16

VG7000 series bronze control valves are designed primarily to regulate the flow of water and steam in response to the demand of a controller in Heating, Ventilating and Air Conditioning (HVAC) systems.

These valves are available in Push-Down-To-Close (PDTC), Push-Down-To-Open (PDTO), and 3-way mixing configurations. Both electric and pneumatic actuators are available for factory or field mounting.

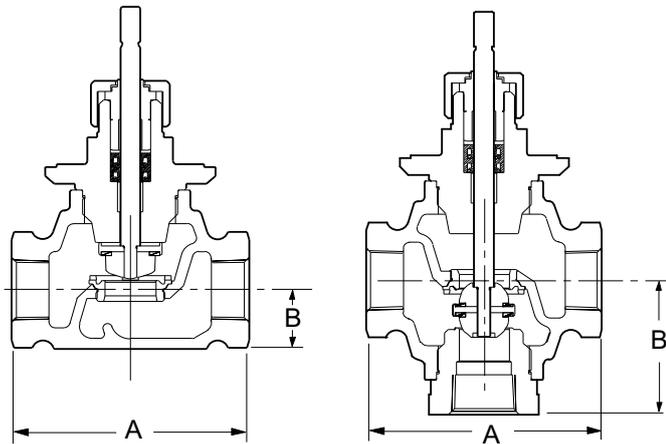


## FEATURES

- DN15 through DN50 bronze valves, in 2-way PDTC, PDTO and 3-way mixing configurations
- Wide range of electric actuators available for all valves
- Every valve tested for tight shutoff
- Uses Standard Johnson Controls U-cup Packing
- Flexible features-and-options ordering template
- Standard bonnet and stem design
- Leakage
  - Brass trim: 0.01% of maximum flow
  - Stainless steel trim: 0.05% of maximum flow
- Inherent flow characteristics
  - Equal percentage: 2-way valves
  - Linear: 3-way valves
- Rangeability: 25:1 at 0.25...1 KVS and 100:1 at 1.6...40  $K_{VS}$
- Maximum recommended operating pressure drop: 240 kPa for DN15 and DN32 - 200 kPa for DN40 to DN50
- Fluid temperature operating limits valves with brass trim:
  - With V-3801 and VA-731x actuators: 2 to 120°C water / 100 kPa Saturated Steam
  - With all other actuators: 2 to 140°C water / 260 kPa Saturated Steam
- Valves with stainless steel trim: 2 to 170°C / 690 kPa Saturated Steam



## DIMENSIONS (in mm)



BODY SIZE	A	B		
		2-way PDTC	2-way PDTO	3-way
DN15	76	21	39	46
DN20	81	24	41	54
DN25	104	29	44	65
DN32	119	34	51	70
DN40	130	55	70	85
DN50	150	53	72	95



## ORDERING INFORMATION FOR VALVE BODIES

VG7

### STEM TYPE

T	Standard threaded stem
S	Slotted stem and small bonnet (for VA-7310 electric and V-3801 pneumatic actuators only, only available for DN15 and DN20 valves with brass trim)

	SIZE	FLOW COEFFICIENT $K_{VS}$
A	DN15	0.25
B	DN15	0.4
C	DN15	0.63
D	DN15	1.0
E	DN15	1.6
F	DN15	2.5
G	DN15	4.0
L	DN20	6.3
N	DN25	10
P	DN32	16
R	DN40	25
S	DN50	40

	BODY CONFIGURATION	TRIM TYPE	INHERENT FLOW CHARACTERISTICS
1	2-way	Brass trim	Equal percentage
2	3-way mixing	Brass trim	Linear in both ports
3	2-way	Stainless steel trim	Equal percentage
4	3-way mixing	Stainless steel trim	Linear in both ports
5	3-way mixing	Brass trim	Equal percentage in control port, linear in bypass port (only available for VG7x1... valves with BSPP male connection)

### END CONNECTION

0	BSP Parallel Female Threaded
1	BSP Parallel Male Threaded (only DN15 and DN20, with Brass Trim)

### BODY CONFIGURATION

2	2-way PDTC (Normally Open)
4	2-way PDTO (Normally Closed)
8	3-way Mixing



## VALVES

### VG7000 - PLANT VALVES

MAXIMUM CLOSE-OFF PRESSURES (*in kPa*), FOR VALVES WITH BRASS TRIM AND ELECTRIC ACTUATORS

SIZE	VA-731x	VA-715x / VA-77xx	VA-720x / VA78xx
DN15	1600	1600	---
DN15	700	1600	---
DN15	400	1490	---
DN20	250	950	---
DN25	---	595	1235
DN32	---	360	750
DN40	---	235	480
DN50	---	145	310

MAXIMUM CLOSE-OFF PRESSURES (*in kPa*), FOR VALVES WITH STAINLESS STEEL TRIM AND ELECTRIC ACTUATORS

SIZE	VA-731x	VA-715x / VA-77xx	VA-720x / VA78xx
DN15	---	1600	1600
DN15	---	1600	1600
DN15	---	930	1600
DN20	---	595	1220
DN25	---	370	770
DN32	---	230	470
DN40	---	145	300
DN50	---	90	190

### VG7000 - PLANT VALVES



MAXIMUM CLOSE-OFF PRESSURES (*in kPa*), FOR VALVES WITH BRASS TRIM AND PNEUMATIC ACTUATORS

ACTUATOR	VALVES SIZE	2-WAY PDTTC OR 3-WAY VALVES WITH 138 kPa AIR SUPPLY		2-WAY PDTO OR 3-WAY VALVES WITH 0 kPa AIR SUPPLY	
		Spring range kPa *			
		21 to 42	63 to 91	21 to 42	63 to 91
V-3801	DN15	1600	1600	580	1600
	DN15	1180	530	165	715
	DN15	670	300	90	405
	DN20	430	190	55	255
V-3000	DN15	1600	1600	1430	1600
	DN15	1600	1100	405	1450
	DN15	1310	620	230	820
	DN20	835	390	145	525
	DN25	520	240	85	315
	DN32	320	145	50	195
	DN40	200	95	35	125
	DN50	130	60	20	85
V-400	DN25	1600	985	400	1275
	DN32	1220	600	240	780
	DN40	785	385	160	495
	DN50	500	250	95	315

### VG7000 - PLANT VALVES



MAXIMUM CLOSE-OFF PRESSURES (*in kPa*), FOR VALVES WITH STAINLESS STEEL TRIM AND PNEUMATIC ACTUATORS

ACTUATOR	VALVES SIZE	2-WAY PDTC OR 3-WAY VALVES WITH 138 kPa AIR SUPPLY		2-WAY PDTO OR 3-WAY VALVES WITH 0 kPa AIR SUPPLY	
		SPRING RANGE KPA *			
		21 to 42	63 to 91	21 to 42	63 to 91
V-3000	DN15	1600	1600	1090	1600
	DN15	1600	825	300	1085
	DN15	980	470	170	615
	DN20	630	295	110	395
	DN25	385	180	60	240
	DN32	240	110	35	145
V-400	DN15	1600	1600	1600	1600
	DN15	1600	1600	1345	1600
	DN15	1600	1600	760	1600
	DN20	1600	1175	485	1520
	DN25	1510	740	295	960
	DN32	925	450	185	585
	DN40	595	290	115	370
	DN50	380	185	75	240

**Note**  
\* The recommended spring ranges for use with a V-9502 Positioner are: 21 to 42 kPa for PDTC valves, 63 to 91 kPa for PDTO valves and 63 to 91 kPa for three way valves.

# ACTUATORS AND VALVES

## VALVES

### PLANT VALVES

## VG9000

DN15...100, PN6 AND PN10

These flanged valves are primarily designed to regulate the flow of water and low pressure steam in response to the demand of a controller, in Heating, Ventilating and Air Conditioning (HVAC) systems.

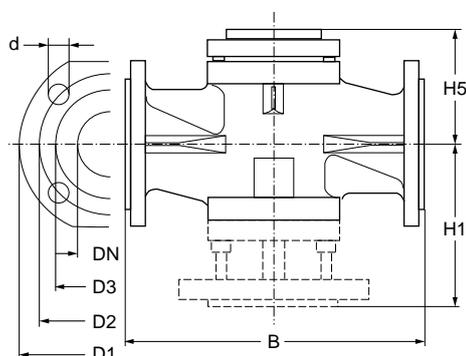
Following electric actuators are available:

- VA-7700 for DN15...50 valves
- VA7810 for DN15...65 valves
- VA1000 for DN65...100 valves

### FEATURES

- Nodular cast iron body
- $K_{VS}$  0.63...160
- 2-way PDT0 (normally closed) and 3-way mixing configurations
- Fluid temperature 2 to 140°C
- DIN flanged

### DIMENSIONS (in mm)



BODY SIZE	PN6							PN10						
	B	D1	D2	D3	d	H1	Holes	B	D1	D2	D3	d	H1	Holes
DN15	130	80	55	38	11	65	4	130	95	65	46	14	65	4
DN20	140	90	65	48	11	70	4	150	105	75	56	14	75	4
DN25	150	100	75	58	11	75	4	160	115	85	65	14	80	4
DN32	180	120	90	69	14	90	4	180	140	100	76	19	90	4
DN40	180	130	100	78	14	90	4	200	150	110	84	19	100	4
DN50	200	140	110	88	14	100	4	230	165	125	99	19	115	4
DN65	240	160	130	108	14	120	4	290	185	145	118	19	145	4
DN80	260	190	150	124	19	130	4	310	200	160	132	19	155	8
DN100	300	210	170	144	19	150	4	350	220	180	156	19	175	8





## VALVES

### VG9000 - PLANT VALVES

## ORDERING INFORMATION

### PN6 SERIES (VG9xxxS1K)

CODES *	BODY SIZE	K <sub>VS</sub>	CLOSE-OFF PRESSURE kPa					
			RA-3000-732x 3000 N	VA-1x20-GGA-1 2000 N	VA-1125-GGA-1 2500 N	VA-77xx-820x 500 N	VA78xx-xxx-12 1000 N	
2-way PDTO (Normally Closed) configuration								
VG94A5S1K	DN15	0.63	---	---	---	600	600	
VG94A4S1K		1.0						
VG94A3S1K		1.6						
VG94A2S1K		2.5						
VG94A1S1K		4.0						
VG94B1S1K	DN20	6.3	---	---	---	590	600	
VG94C1S1K	DN25	10						
VG94D1S1K	DN32	16						
VG94E1S1K	DN40	25						
VG94F1S1K	DN50	40						
VG94G1S1K	DN65	63	470	620	---	---	150	
VG94H1S1K	DN80	100	510	300				400
VG94J1S1K	DN100	160	320	180				240
3-way mixing configuration								
VG98A5S1K	DN15	0.63	---	---	---	600	600	
VG98A4S1K		1.0						
VG98A3S1K		1.6						
VG98A2S1K		2.5						
VG98A1S1K		4.0						
VG98B1S1K	DN20	6.3	---	---	---	490	600	
VG98C1S1K	DN25	10						
VG98D1S1K	DN32	16						
VG98E1S1K	DN40	25						
VG98F1S1K	DN50	40						
VG98G1S1K	DN65	63	470	620	---	---	130	
VG98H1S1K	DN80	100	510	300				400
VG98J1S1K	DN100	160	320	180				240

#### Note

\* For factory mounted valve actuators just add "+M" to the actuator ordering code.



## VALVES

### VG9000 - PLANT VALVES

## ORDERING INFORMATION

### PN10 SERIES (VG9xxxS1L)

CODES *	BODY SIZE	K <sub>VS</sub>	CLOSE-OFF PRESSURE kPa						
			RA-3000-732x 3000 N	VA-1x20-GGA-1 2000 N	VA-1125-GGA-1 2500 N	VA-77xx-820x 500 N	VA78xx-xxx-12 1000 N		
2-way PDTO (Normally Closed) configuration									
VG94A5S1L	DN15	0.63	---	---	---	1000	1000		
VG94A4S1L		1.0							
VG94A3S1L		1.6							
VG94A2S1L		2.5							
VG94A1S1L		4.0							
VG94B1S1L	DN20	6.3				980			
VG94C1S1L	DN25	10				640			
VG94E2S1L	DN32	16				400	900		
VG94E1S1L	DN40	25				210	510		
VG94F1S1L	DN50	40				110	310		
VG94G1S1L	DN65	63				470	620	160	
VG94H1S1L	DN80	100				510	300	400	---
VG94J1S1L	DN100	160				320	180	240	---
3-way Mixing configuration									
VG98A5S1L	DN15	0.63	---	---	---	1000	1000		
VG98A4S1L		1.0							
VG98A3S1L		1.6							
VG98A2S1L		2.5							
VG98A1S1L		4.0							
VG98B1S1L	DN20	6.3				880			
VG98C1S1L	DN25	10				430			
VG98E2S1L	DN32	16				240	790		
VG98E1S1L	DN40	25				110	420		
VG98F1S1L	DN50	40				40	240		
VG98G1S1L	DN65	63				470	620	120	
VG98H1S1L	DN80	100				510	300	400	---
VG98J1S1L	DN100	160				320	180	240	---

#### Note

\* For factory mounted valve actuators just add "+M" to the actuator ordering code.

## VALVES

### PLANT VALVES

## VG8000N

DN15...150, PN16

These electrically and pneumatically operated flanged valves are primarily designed to regulate the flow of water and steam in response to the demand of a controller in Heating, Ventilating and Air Conditioning (HVAC) systems.

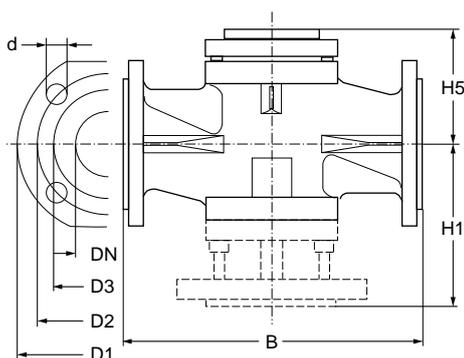
A variety of electric and pneumatic actuators are available.



### FEATURES

- Nodular cast iron body
- $K_{VS}$  0.1...350
- 2-way PDTC (normally open), 3-way mixing and 3-way diverting configurations
- Fluid temperature 0...180°C with Glycerine cup -10...180°C
- DIN flanged

### DIMENSIONS (in mm)



BODY SIZE	B	D1	D2	D3	D	H1	H5	BOLTS	HOLES
DN15	130	95	65	45	13.5	100	76	M12 x 45	4
DN20	150	105	75	58	13.5	106	76	M12 x 50	4
DN25	160	115	85	68	13.5	106	76	M12 x 50	4
DN32	180	140	100	78	17.5	123	81	M16 x 55	4
DN40	200	150	110	88	17.5	140	78	M16 x 55	4
DN50	230	165	125	102	17.5	145	101	M16 x 60	4
DN65	290	185	145	122	17.5	156	102	M16 x 60	4
DN80	310	200	160	138	17.5	180	108	M16 x 65	8
DN100	350	220	180	158	17.5	225	136	M16 x 70	8
DN125	400	250	210	188	17.5	255	155	M16 x 75	8
DN150	480	285	240	212	22	290	175	M20 x 75	8



## VALVES

### VG8000N - PLANT VALVES

## ORDERING INFORMATION

### 2-WAY PDTC (NORMALLY OPEN) CONFIGURATION

CODES *	BODY SIZE	K <sub>VS</sub>	CLOSE-OFF PRESSURE kPa						
			FA-2000-741x 2400 N	FA-2000-751x 2200 N	FA-3300 6000 N	RA-3100-8226 2700 N	VA1x20 ** 2000 N	VA1125 ** 2500 N	VA78xx 1000 N
VG82A4S1N	DN15	1.0	---	---	---	---	1600	1600	1600
VG82A3S1N		1.6							
VG82A2S1N		2.5							
VG82A1S1N		4.0							
VG82B1S1N	DN20	6.3	---	---	---	650	800	1080	---
VG82C1S1N	DN25	10							
VG82D1S1N	DN32	16							
VG82E1S1N	DN40	25							
VG82F1S1N	DN50	40	---	1030	---	500	630	830	---
VG82G1S1N	DN65	63							
VG82H1S1N	DN80	100							
VG82J1S1N	DN100	160							
VG82K1S1N	DN125	250	---	---	---	460	90	140	---
VG82L1S1N	DN150	350							
			190		740	120	160	230	
			110		460		90	140	
			50		280		40	75	

#### Notes

\* For factory mounted valve actuators just add "+M" to the actuator ordering code  
 For ordering a valve with Glycerine cup packing, add suffix "20" to the ordering code: i.e. VG8xxxS1H20.  
 Teflon free model are available on request.

\*\* For fluid temperature >140°C the extension kit VA1000-EP must be mounted.



## ORDERING INFORMATION

### 3-WAY MIXING CONFIGURATION

CODES *	BODY SIZE	K <sub>VS</sub>	CLOSE-OFF PRESSURE kPa						
			FA-2000-741x 2400 N	FA-2000-751x 2200 N	FA-3300 6000 N	RA-3100-8226 2700 N	VA1x20 ** 2000 N	VA1125 ** 2500 N	VA78xx 1000 N
VG88A4S1N	DN15	1.0	---	---	---	---	1600	1600	1600
VG88A3S1N		1.6							
VG88A2S1N		2.5							
VG88A1S1N		4.0							
VG88B1S1N	DN20	6.3	---	---	---	650	800	1080	---
VG88C1S1N	DN25	10							
VG88D1S1N	DN32	16							
VG88E1S1N	DN40	25							
VG88F1S1N	DN50	40	---	---	---	500	630	830	---
VG88G1S1N	DN65	63							
VG88H1S1N	DN80	100							
VG88J1S1N	DN100	160							
VG88K1S1N	DN125	250	---	---	---	---	90	140	---
VG88L1S1N	DN150	350							
			190		740	120	160	230	
			110		460				
			50		280		40	75	

#### Notes

- \* For factory mounted valve actuators just add "+M" to the actuator ordering code  
For ordering a valve with Glycerine cup packing, add suffix "20" to the ordering code: i.e. VG8xxxS1H20.  
Teflon free model are available on request.

- \*\* For fluid temperature >140°C the extension kit VA1000-EP must be mounted.

### VG8000N - PLANT VALVES



## ORDERING INFORMATION

### 3-WAY MIXING CONFIGURATION

CODES *	BODY SIZE	K <sub>VS</sub>	CLOSE-OFF PRESSURE kPa						
			FA-2000-741x 2400 N	FA-2000-751x 2200 N	FA-3300 6000 N	RA-3100- 8226 2700 N	VA1x20 ** 2000 N	VA1125 ** 2500 N	VA78xx 1000 N
VG89A4S1N	DN15	1.0	---	---	---	---	1600	1600	1600
VG89A3S1N		1.6							
VG89A2S1N		2.5							
VG89A1S1N		4.0							
VG89B1S1N	DN20	6.3	---	---	---	1600	1600	1600	---
VG89C1S1N	DN25	10							
VG89D1S1N	DN32	16							
VG89E1S1N	DN40	25							
VG89F1S1N	DN50	40	---	---	---	1600	1600	1600	---
VG89G1S1N	DN65	63							
VG89H1S1N	DN80	100							
VG89J1S1N	DN100	160							
VG89K1S1N	DN125	250	---	---	---	1600	1600	1600	---
VG89L1S1N	DN150	350							

#### Notes

\* For factory mounted valve actuators just add "+M" to the actuator ordering code  
For ordering a valve with Glycerine cup packing, add suffix "20" to the ordering code: i.e. VG8xxxS1H20.  
Teflon free model are available on request.

\*\* For fluid temperature >140°C the extension kit VA1000-EP must be mounted.

## VALVES

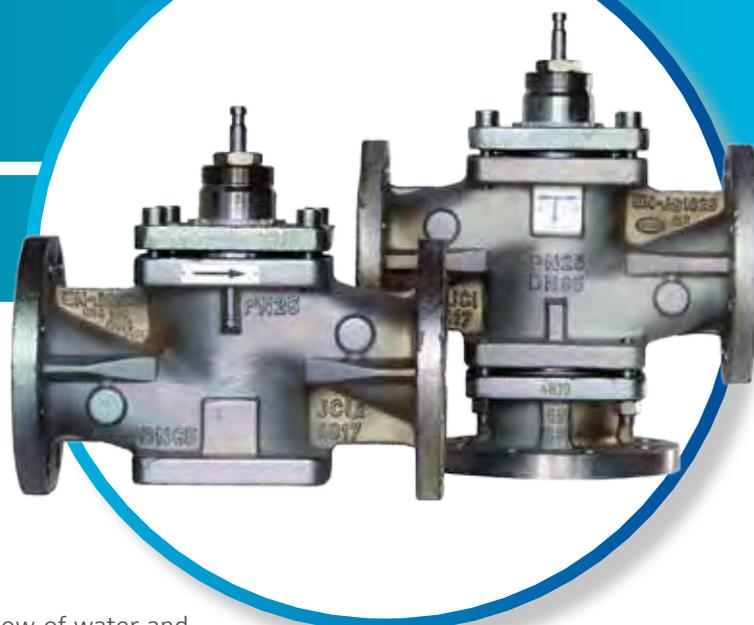
### PLANT VALVES

## VG8000H

DN15...150, PN25

These flanged valves are primarily designed to regulate the flow of water and steam in response to the demand of a controller, in Heating, Ventilating and Air Conditioning (HVAC) systems.

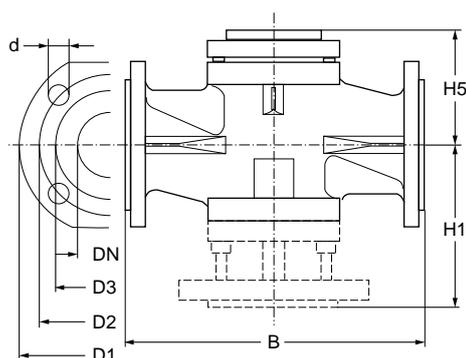
A variety of electric and pneumatic actuators are available.



### FEATURES

- Nodular cast iron body
- $K_{VS}$  0.4...350
- 2-way PDTC (normally open), 3-way mixing and 3-way diverting configurations
- Fluid temperature 2...200°C, with glycerin cup: -20...200°C, with cooling fins: up to 280°C
- DIN Flanged

### DIMENSIONS (in mm)



BODY SIZE	B	D1	D2	D3	D	H1	H5	BOLTS	HOLES
DN15	130	95	65	45	13.5	100	76	M12 x 45	4
DN20	150	105	75	58	13.5	106	76	M12 x 50	4
DN25	160	115	85	68	13.5	106	76	M12 x 50	4
DN32	180	140	100	78	17.5	123	81	M16 x 55	4
DN40	200	150	110	88	17.5	140	78	M16 x 55	4
DN50	230	165	125	102	17.5	145	101	M16 x 60	4
DN65	290	185	145	122	17.5	156	102	M16 x 60	8
DN80	310	200	160	138	17.5	180	108	M16 x 65	8
DN100	350	235	190	162	22	225	136	M20 x 70	8
DN125	400	270	220	188	26	255	155	M24 x 75	8
DN150	480	300	250	218	26	290	175	M24 x 80	8



## VALVES

### VG8000H - PLANT VALVES

## ORDERING INFORMATION

### 2-WAY PDTC (NORMALLY OPEN) CONFIGURATION

CODES *	BODY SIZE	K <sub>VS</sub>	CLOSE-OFF PRESSURE kPa												
			FA-2000-741x 2200 N	FA-2000-751x 2400 N	FA-3300-741x 6000 N	RA-3000-732x 3000 N	RA-3100-8226 1700 N	VA1x20 ** 2000 N	VA1125 ** 500 N	VA78xx 1000 N					
VG82A4S1H	DN15	1.0	---	---	---	---	---	2500	2500	2500					
VG82A3S1H		1.6													
VG82A2S1H		2.5													
VG82A1S1H		4.0													
VG82B1S1H	DN20	6.3	---	---	---	---	---	2500	2500	2030					
VG82C1S1H	DN25	10								1360					
VG82D1S1H	DN32	16								660					
VG82E1S1H	DN40	25								370					
VG82F1S1H	DN50	40	---	---	---	---	---	---	---	---					
VG82G1S1H	DN65	63									920	1300	600	750	1020
VG82H1S1H	DN80	100									710	1010	450	580	750
VG82J1S1H	DN100	160									330	480	200	260	370
VG82K1S1H	DN125	250	---	---	---	---	---	---	---	---					
VG82L1S1H	DN150	350									180	290	100	140	210
			100	450	170	---	80	120							
			50	270	100	---	40	70							

#### Notes

- \* For factory mounted valve actuators just add "+M" to the type model number  
For ordering a valve with Cooling fin, add suffix "10" to the ordering code: i.e. VG8xxxS1H10  
For ordering a valve with Glycerine cup packing, add suffix "20" to the ordering code: i.e. VG8xxxS1H20.  
Reduced k<sub>vs</sub> coefficients are available on request.

\*\* For fluid temperature >140°C the extension kit VA1000-EP must be mounted. Max-Fluid temperature must not exceed 200°C.



## ORDERING INFORMATION

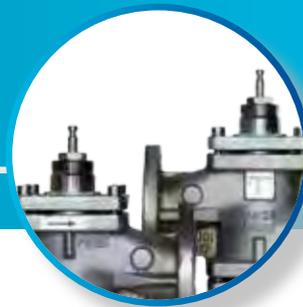
### 3-WAY MIXING CONFIGURATION

CODES *	BODY SIZE	K <sub>VS</sub>	CLOSE-OFF PRESSURE kPa												
			FA-2000-741x 2200 N	FA-2000-751x 2400 N	FA-3300-741x 6000 N	RA-3000-732x 3000 N	RA-3100-8226 1700 N	VA1x20 ** 2000 N	VA1125 ** 500 N	VA78xx 1000 N					
VG88A4S1H	DN15	1.0	---	---	---	---	---	2500	2500	2500					
VG88A3S1H		1.6													
VG88A2S1H		2.5													
VG88A1S1H		4.0													
VG88B1S1H	DN20	6.3	---	---	---	---	---	2500	2500	2030					
VG88C1S1H	DN25	10								1360					
VG88D1S1H	DN32	16								660					
VG88E1S1H	DN40	25								370					
VG88F1S1H	DN50	40	---	---	---	---	---	---	---	---					
VG88G1S1H	DN65	63									920	1300	600	750	1020
VG88H1S1H	DN80	100									710	1010	450	580	750
VG88J1S1H	DN100	160									330	480	200	260	370
VG88K1S1H	DN125	250	---	---	---	---	---	---	---	---					
VG88L1S1H	DN150	350									180	720	290	100	140
			100	450	170	---	80	120							
			50	270	100	---	40	70							

#### Notes

- \* For factory mounted valve actuators just add "+M" to the type model number  
 For ordering a valve with Cooling fin, add suffix "10" to the ordering code: i.e. VG8xxxS1H10  
 For ordering a valve with Glycerine cup packing, add suffix "20" to the ordering code: i.e. VG8xxxS1H20.  
 Reduced K<sub>VS</sub> coefficients are available on request.

\*\* For fluid temperature >140°C the extension kit VA1000-EP must be mounted. Max-Fluid temperature must not exceed 200°C.



## VALVES

### VG8000H - PLANT VALVES

## ORDERING INFORMATION

### 3-WAY DIVERTING CONFIGURATION

CODES *	BODY SIZE	K <sub>VS</sub>	CLOSE-OFF PRESSURE kPa												
			FA-2000-741x 2200 N	FA-2000-751x 2400 N	FA-3300-741x 6000 N	RA-3000-732x 3000 N	RA-3100-8226 1700 N	VA1x20 ** 2000 N	VA1125 ** 500 N	VA78xx 1000 N					
VG89A4S1H	DN15	1.0	---	---	---	---	---	2500	2500	2500					
VG89A3S1H		1.6													
VG89A2S1H		2.5													
VG89A1S1H		4.0													
VG89B1S1H	DN20	6.3	---	---	---	---	---	1550	2000	2030					
VG89C1S1H	DN25	10								1360					
VG89D1S1H	DN32	16								660					
VG89E1S1H	DN40	25								370					
VG89F1S1H	DN50	40	---	---	---	---	---	---	---	---					
VG89G1S1H	DN65	63									920	1300	600	750	1020
VG89H1S1H	DN80	100									710	1010	450	580	750
VG89J1S1H	DN100	160									330	480	200	260	370
VG89K1S1H	DN125	250	---	---	---	---	---	---	---	---					
VG89L1S1H	DN150	350									180	720	290	100	140
			100	450	170	---	80	120							
			50	270	100	---	40	70							

#### Notes

- \* For factory mounted valve actuators just add "+M" to the type model number  
For ordering a valve with Cooling fin, add suffix "10" to the ordering code: i.e. VG8xxxS1H10  
For ordering a valve with Glycerine cup packing, add suffix "20" to the ordering code: i.e. VG8xxxS1H20.  
Reduced k<sub>vs</sub> coefficients are available on request.

- \*\* For fluid temperature >140°C the extension kit VA1000-EP must be mounted. Max-Fluid temperature must not exceed 200°C.

## VALVES

### PLANT VALVES

## VG8300N

DN40...150, PN16 PRESSURE BALANCED

These pressure balanced flanged valves are primarily designed to regulate the flow of water and steam in response to the demand of a controller in Heating, Ventilating and Air Conditioning (HVAC) systems.

These valves have a specially designed plug, which through specific balancing of pressures allows higher close-off pressures with standard actuator combinations.

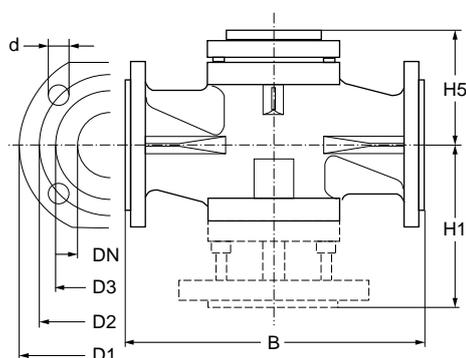
A variety of electric and pneumatic actuators are available.



### FEATURES

- Nodular cast iron bodies
- $K_{VS}$  25...350
- 2-way PDTC (normally open) configuration
- PN16 Fluid temperature 2...180°C with glycerin cup -10...180°C
- Pressure balanced valve plug
- DIN flanged

### DIMENSIONS (in mm)



BODY SIZE	B	D1	D2	D3	D	H1	H5	BOLTS	HOLES
DN40	200	150	110	88	17.5	140	78	M16 x 55	4
DN50	230	165	125	102	17.5	145	101	M16 x 60	4
DN65	290	185	145	122	17.5	156	102	M16 x 60	4
DN80	310	200	160	138	17.5	180	108	M16 x 65	8
DN100	350	220	180	158	17.5	225	136	M16 x 70	8
DN125	400	250	210	188	17.5	255	155	M16 x 75	8
DN150	480	285	240	212	22	290	175	M20 x 75	8



## ORDERING INFORMATION

CODES *	BODY SIZE	K <sub>VS</sub>	CLOSE-OFF PRESSURE kPa							
			Spring return		Non spring return					
			FA-2000-741x 2200 N	VA1x20 ** 2000 N	RA-3100-8126 1200 N	RA-3100-8226 1700 N	VA1125 ** 2500 N	VA78xx 1000 N		
VG83E1S1N	DN40	25	---	1600	1600	---	1600	1600		
VG83F1S1N	DN50	40			---	1600			1600	---
VG83G1S1N	DN65	63								
VG83H1S1N	DN80	100								
VG83J1S1N	DN100	160	1600	1500	---	1600	---	---		
VG83K1S1N	DN125	250							1400	1500
VG83L1S1N	DN150	350								

#### Notes

\* For factory mounted valve actuators just add "+M" to the actuator ordering code.

\*\* For fluid temperature >140°C the extension kit VA1000-EP must be mounted.

## VALVES

### PLANT VALVES

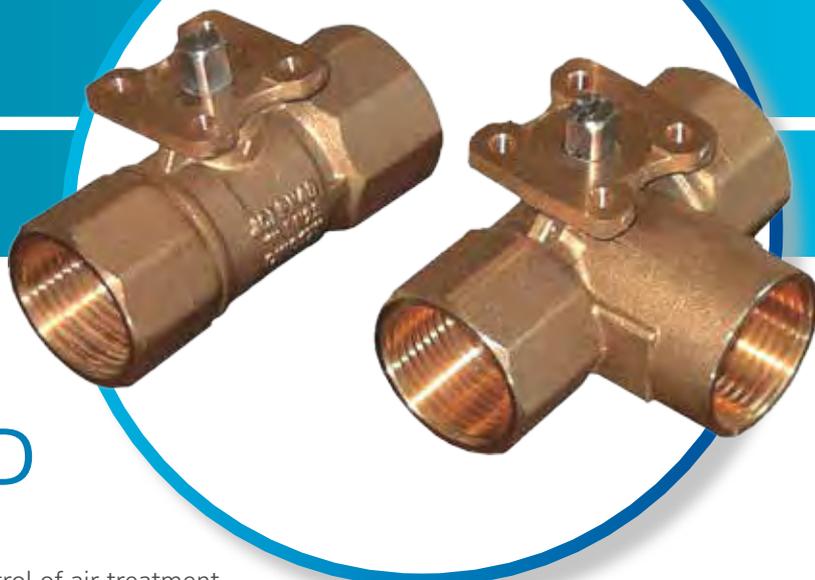
## VG1000 THREADED

DN15...50, PN40

The VG1000 series ball valves are used for the water control of air treatment systems in Heating, Ventilating and Air Conditioning (HVAC) systems. They are operated by direct or remote mounted spring return and non spring return actuators.

### FEATURES

- Forged brass body
- $K_{VS}$  1...63
- 2-way, 3-way mixing and diverting configurations
- Inherent equal percentage flow characteristic in the in-line port of all valves
- BSPP female threaded body connections
- Service
  - Hot and cold water: -30...95°C with VA9104 series  
(140°C with M9000-561 Thermal Barrier)
  - 30...100°C with VA9203, VA9208, VA9308 and VA9310 series  
(140°C with M9000-561 Thermal Barrier)
- Water with glycol to max 50% volume
- Steam to max 100 kPa at 120°C with thermal barrier

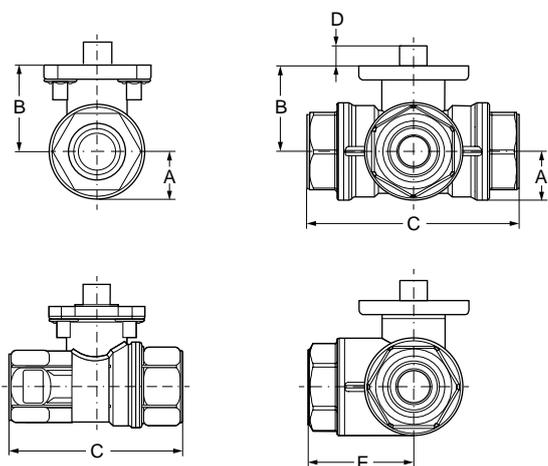




## VALVES

### VG1000 THREADED - PLANT VALVES

#### DIMENSIONS (in mm)



Two-way Valve

Three-way Valve

BODY SIZE	A	B	C	D	E
DN15	17	31	67	9	33
DN20			75		38
DN25	19	33	92		46
DN32	26	44	109		54
DN40	29	48	119		59
DN50	37	53	139		74

#### ORDERING INFORMATION

CODES	BODY SIZE	$K_{VS}$ (CONTROL PORT)	$K_{VS}$ (BY-PASS PORT)
VG1x05AD	DN15	1.0	0.63
VG1x05AE		1.6	1.0
VG1x05AF		2.5	1.6
VG1x05AG		4.0	2.5
VG1x05AL		6.3	4.0
VG1x05AN		10	5.0
VG1x05BL	DN20	6.3	4.0
VG1x05BN		10	5.0
VG1x05CN	DN25	10	6.3
VG1x05CP		16	8.0
VG1x05DP	DN32	16	10.0
VG1x05DR		25	12.5
VG1x05ER	DN40	25	16
VG1x05ES		40	20
VG1x05FS	DN50	40	25.0
VG1x05FT		63	31.5



## VALVES

### PLANT VALVES

## VG1000 FLANGED

DN65...150, PN16

The VG1000 series control ball valves are used for the water control of air treatment systems in ventilation and air conditioning units as well as heating system.

They are operated by remote mounted spring return and non spring return actuators.

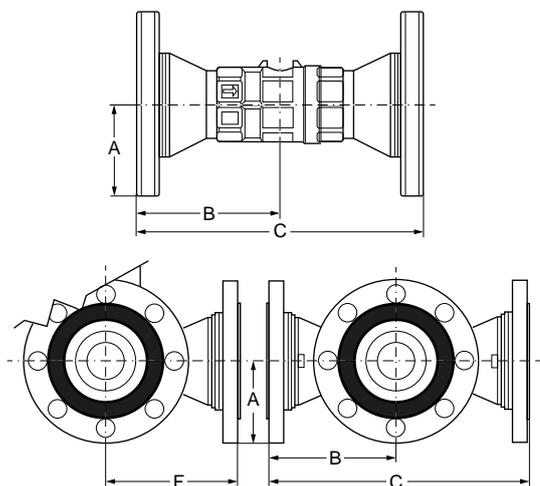


## FEATURES

- 2-way and 3-way mixing
- Body rating PN16
- Hot water, chilled water, 50/50 glycol solutions and 172 kPa saturated steam for HVAC Systems
- Valve fluid temperature limits -20 to 140°C
- Maximum close-off pressure 2-way: 690 kPa / 3-way: 345 kPa
- Maximum recommended operating pressure drop 200 kPa for quiet service
- Flow characteristics
  - 2-way: Equal percentage
  - 3-way: Equal percentage in Inline port (Coil) and linear characteristics in angle port (By-pass)
- Rangeability greater than 500:1
- Leakage 2-way and 3-way: 0.01% of maximum flow, control port
- 3-way: 1% of maximum flow, by-pass ports



#### DIMENSIONS (in mm)



CODES	VALVE SIZE	A	B	C	F	HOLES FOR FLANGE	HOLES DIAMETERS	BOLT
VG1xE5Gx	DN65	92.5	145	290	149	4	19	M16x60
VG1xE5Hx	DN80	100	155	310	159	8	19	M16x65
VG1xE5Jx	DN100	110	175	350	179	8	19	M16x70
VG1xE5MW		110	175	350	225	8	19	M16x70
VG1xE5NY	DN125	125	200	400	255	8	19	M16x75
VG1xE5PZ	DN150	142.5	240	480	290	8	23	M20x80



## VALVES

### VG1000 FLANGED - PLANT VALVES

## ORDERING INFORMATION

### ASSEMBLIES OF VALVES WITH PROPORTIONAL ACTUATORS

Spring Return Function	---		■	
Supply Voltage	24 VAC/DC			
Torque	24 Nm		20 Nm	
Running Time	125 s		150 s	
Spring Return Time Power Off	---		26 s	
Control Signal	VDC	0 - 10 / 2 - 10		
	mA	0 - 20 / 4 - 20		
Switches	---	2 x SPDT	---	2 x SPDT
Feedback	VDC	0 - 10 / 2 - 10		
Actuator Codes	<b>M9124-GGA-1N</b>	<b>M9124-GGC-1N</b>	<b>M9220-HGA-1</b>	<b>M9220-HGC-1</b>
Linkage Codes	<b>M9000-518</b>		<b>M9000-519</b>	
Ordering Code Suffix for Assemblies	<b>+ 524GGA</b>	<b>+ 524GGC</b>	<b>+ 530HGA</b> (Spring opens)	<b>+ 530HGC</b> (Spring opens)
			<b>+ 550HGA</b> (Spring closes)	<b>+ 550HGC</b> (Spring closes)

VALVE CODES	BODY SIZE	K <sub>VS</sub> (Control port)	K <sub>VS</sub> (By-pass port)	VALID COMBINATIONS OF VALVES, LINKAGES AND ACTUATORS			
2-way models							
VG12E5GT	DN65	63	---	■	■	■	■
VG12E5GU		100	---	■	■	■	■
VG12E5HU	DN80	100	---	■	■	■	■
VG12E5HW		180	---	■	■	■	■
VG12E5JV	DN100	150	---	■	■	■	■
VG12E5MW		160	---	■	■	■	■
VG12E5NY	DN125	250	---	■	■	■	■
VG12E5PZ	DN150	350	---	■	■	■	■
3-way models							
VG18E5GT	DN65	63	40	■	■	■	■
VG18E5GU		100	63	■	■	■	■
VG18E5HU	DN80	100	63	■	■	■	■
VG18E5HW		180	75	■	■	■	■
VG18E5JV	DN100	150	75	■	■	■	■
VG18E5MW		160	160	■	■	■	■
VG18E5NY	DN125	250	160	■	■	■	■
VG18E5PZ	DN150	350	160	■	■	■	■



## VALVES

### VG1000 FLANGED - PLANT VALVES

## ORDERING INFORMATION

### ASSEMBLIES OF VALVES WITH FLOATING AND ON/OFF ACTUATORS

Spring Return Function	---				■					
Supply Voltage	24 VAC / DC		230 VAC		24 VAC / DC				230 VAC	
Torque	24 Nm				20 Nm					
Running Time	125 s				150 s				24 - 57 s	
Spring Return Time Power Off	---				20 s				11...50 s	
Control Signal	Floating and ON/OFF						ON/OFF			
Switches	---	2 x SPDT	---	2 x SPDT	---	2 x SPDT	---	2 x SPDT	---	2 x SPDT
Feedback	---									
Actuator Codes	M9124-AGA-1N	M9124-AGC-1N	M9124-ADA-1N	M9124-ADC-1N	M9220-AGA-1	M9220-AGC-1	M9220-BGA-1	M9220-BGC-1	M9220-BDA-1	M9220-BDC-1
Linkage Codes	M9000-518				M9000-519					
Ordering Code Suffix for Assemblies	+524AGA	+524AGC	+524ADA	+524ADC	+530AGA	+530AGC	+530BGA	+530BGC	+530BDA	+530BDC
					(Spring Opens)					
Ordering Code Suffix for Assemblies	+524AGA	+524AGC	+524ADA	+524ADC	+550AGA	+550AGC	+550BGA	+550BGC	+550BDA	+550BDC
					(Spring Closes)					

VALVE CODES	BODY SIZE	K <sub>vs</sub> (Control port)	K <sub>vs</sub> (By-pass port)	VALID COMBINATIONS OF VALVES, LINKAGES AND ACTUATORS									
				2-way models									
VG12E5GT	DN65	63	---	■	■	■	■	■	■	■	■	■	■
VG12E5GU		100	---	■	■	■	■	■	■	■	■	■	■
VG12E5HU	DN80	100	---	■	■	■	■	■	■	■	■	■	■
VG12E5HW		180	---	■	■	■	■	■	■	■	■	■	■
VG12E5JV	DN100	150	---	■	■	■	■	■	■	■	■	■	■
VG12EMW		160	---	■	■	■	■	■	■	■	■	■	■
VG12E5NY	DN125	250	---	■	■	■	■	■	■	■	■	■	■
VG12E5PZ	DN150	350	---	■	■	■	■	■	■	■	■	■	■
3-way models													
VG18E5GT	DN65	63	40	■	■	■	■	■	■	■	■	■	■
VG18E5GU		100	63	■	■	■	■	■	■	■	■	■	■
VG18E5HU	DN80	100	63	■	■	■	■	■	■	■	■	■	■
VG18E5HW		180	75	■	■	■	■	■	■	■	■	■	■
VG18E5JV	DN100	150	75	■	■	■	■	■	■	■	■	■	■
VG18EMW		160	160	■	■	■	■	■	■	■	■	■	■
VG18E5NY	DN125	250	160	■	■	■	■	■	■	■	■	■	■
VG18E5PZ	DN150	350	160	■	■	■	■	■	■	■	■	■	■

## VALVES

### PLANT VALVES

# VFB BUTTERFLY VALVES

DN25...500, PN16

VFB butterfly valves series are specifically designed for a wide range of Heating, Ventilating, and Air Conditioning (HVAC) applications, including two-position and modulating control of hot, chilled, or condenser water, and 50/50 glycol solutions. All valves are factory tested for bubble-tight shutoff at 100% of the fully-rated pressure. These valves are also bidirectional, allowing positive shutoff with the flow in either direction.

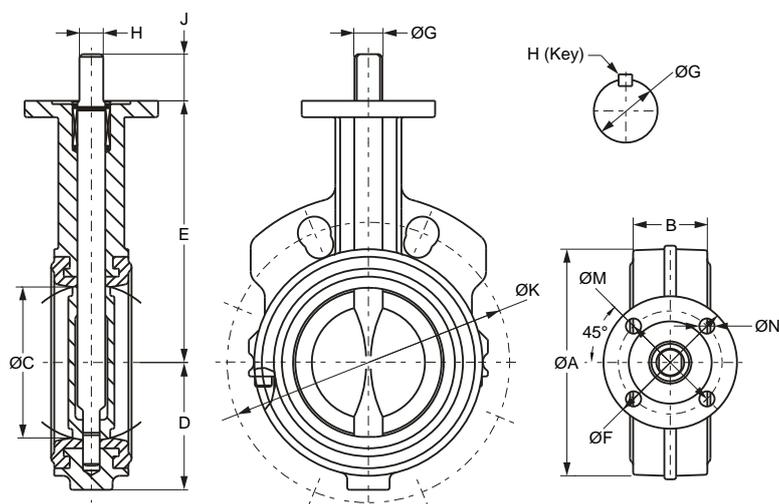
## FEATURES

- **Low seating/unseating torques** - Reduce actuator torque and size requirements, particularly with lower-pressure rated valves
- **Bubble-tight shutoff** - Ensures positive closure when needed
- **Broad range of pre-assembled actuators** - Offers a wide selection for new and replacement electric and pneumatic actuators
- **High-integrity components** - Provide quality valve assemblies, combining long cycle life with optimal engineered functional designs
- **Fluid temperature limits** -29°C to 121°C
- **Flow characteristics** - Modified equal percentage



### VFB BUTTERFLY VALVES - PLANT VALVES

#### DIMENSIONS (in mm)



#### TWO-WAY VALVE

VALVE SIZE (mm)	VALVE SIZE (inch)	A	B	C	D	E	F	M	N	G	H	J	VALVE NET WEIGHT ** (kg)	TOP FLANGE ISO 5211	NUMBER OF HOLES ON FLANGE		NUMBER OF HOLES ON FLANGE		NUMBER OF HOLES ON FLANGE	
															K*	PN6	K*	PN10	K*	PN16
25	1	60	30	32	43	25	65	50	7	10	8	25	1	F05	75	4 x M10	85	4 x M12	85	4 x M12
32	1-¼	70	32	41	53	25	65	50	7	10	8	25	1,2	F05	90	4 x M12	100	4 x M16	100	4 x M16
40	1-½	80	32	47	55	25	65	50	7	10	8	25	2.8	F05	100	4 x M12	110	4 x M16	110	4 x M16
50	2	94	42	51	56	140	90	70	10	14	10	32	3.1	F07	110	4 x M12	125	4 x M16	125	4 x M16
65	2-½	106	45	64	63	152	90	70	10	14	10	32	4.1	F07	130	4 x M12	145	4 x M16	145	4 x M16
80	3	124	45	76	71	159	90	70	10	14	10	32	4.3	F07	150	4 x M16	160	8 x M16	160	8 x M16
100	4	154	51	102	87	178	90	70	10	16	11	32	4.9	F07	170	4 x M16	180	8 x M16	180	8 x M16
125	5	179	55	127	102	190	90	70	10	19	13	32	7.2	F07	200	8 x M16	210	8 x M16	210	8 x M16
150	6	206	55	146	115	203	90	70	10	19	13	32	9.5	F07	225	8 x M16	240	8 x M20	240	8 x M20
200	8	267	59	197	146	241	150	125	14	22	16	32	12	F07	280	8 x M16	295	8 x M20	295	12 x M20
250	10	324	67	248	181	273	150	125	14	30	22	51	17	F12	335	12 x M16	350	12 x M20	355	12 x M24
300	12	378	77	298	206	311	150	125	14	30	22	51	20	F12	395	12 x M20	400	12 x M20	410	12 x M24
350	14	433	78	337	238	346	150	125	14	35	10x10***	51	23	F12	445	12 x M20	460	16 x M20	470	16 x M24
400	16	488	102	387	273	375	150	125	14	35	10x10***	51	27	F12	495	16 x M20	515	16 x M24	525	16 x M27
450	18	536	114	438	305	406	210	165	21	50	10x12***	64	30	F16	---	---	565	20 x M24	585	20 x M27
500	20	591	127	489	356	436	210	165	21	50	10x12***	64	33	F16	---	---	650	20 x M24	650	20 x M30

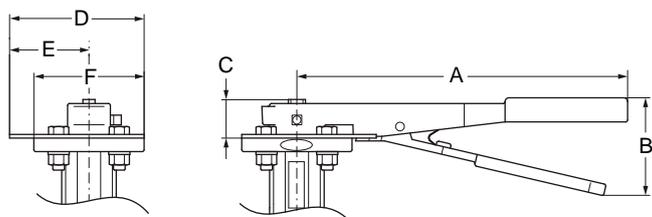
#### Notes

- \* Disc chordal dimension at valve face.
- \*\* Net weight is for valve only (no actuator).
- \*\*\* Key: the key is needed to link the actuator. It is inside the package of the valve. Dimensions in mm (high x width).

### VFB BUTTERFLY VALVES - PLANT VALVES

#### DIMENSIONS (in mm)

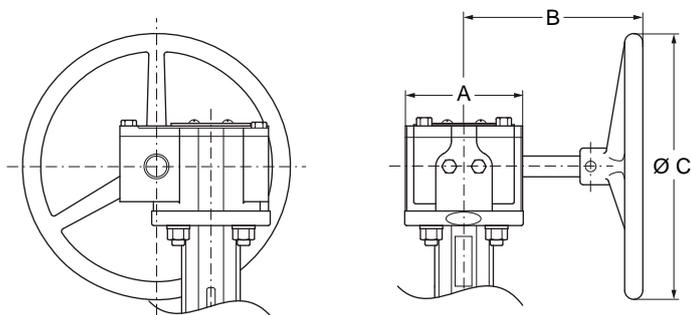
##### TEN-POSITION MANUAL HANDLE



VALVE SIZE (mm)	VALVE SIZE (inch)	CODES *	A	B	C
25 to 40	1/2" to 1-1/2"	VF-998-100	196	60	25
50 to 80	2" to 3"	VF-998-101	270	80	32
100	4"	VF-998-102	270	80	32
125 to 150	5" to 6"	VF-998-103	270	80	32
200	8"	VF-998-104	298	80	32
250 to 300	10" to 12"	VF-998-105	298	80	51

##### Note

\* Kit includes a manual gear operator, adaptor (if required), and mounting hardware.



VALVE SIZE (mm)	VALVE SIZE (inch)	CODES *	A	B	C
50 to 150	2" to 6"	VF-998-303	90	136	203
200	8"	VF-998-304	150	190	203
250 to 300	10" to 12"	VF-998-305	150	190	203
350 to 400	14" to 16"	VF-998-307	150	303	305
450 to 500	18" to 20"	VF-998-308	210	379	305

##### Note

\* Kit includes a manual gear operator, adaptor (if required), and mounting hardware.



## VALVES

### VFB BUTTERFLY VALVES - PLANT VALVES

#### ORDERING INFORMATION

CODES	BODY SIZE	VALVE SIZE (inch)	$K_{VS}$ VALUE	MAX $\Delta P$ (kPa) CLOSE-OFF PRESSURE
High pressure close-off (12 Bar from DN50 to DN300, 10 Bar all other sizes)				
VFB025H	DN25	1	52	1000
VFB032H	DN32	1 ¼	72	
VFB040H	DN40	1 ½	126	
VFB050H	DN50	2	124	1200
VFB065H	DN65	2 ½	243	
VFB080H	DN80	3	397	
VFB100H	DN100	4	723	
VFB125H	DN125	5	1083	
VFB150H	DN150	6	1591	
VFB200H	DN200	8	2852	
VFB250H	DN250	10	4670	1000
VFB300H	DN300	12	6946	
VFB350H	DN350	14	9063	
VFB400H	DN400	16	12044	
VFB450H	DN450	18	14804	
VFB500H	DN500	20	19212	
Low pressure close-off (3,5 Bar from DN100 to DN500)				
VFB100L	DN100	4	723	350
VFB125L	DN125	5	1083	
VFB150L	DN150	6	1591	
VFB200L	DN200	8	2852	
VFB250L	DN250	10	4670	
VFB300L	DN300	12	6946	
VFB350L	DN350	14	9063	
VFB400L	DN400	16	12044	
VFB450L	DN450	18	14804	
VFB500L	DN500	20	19212	

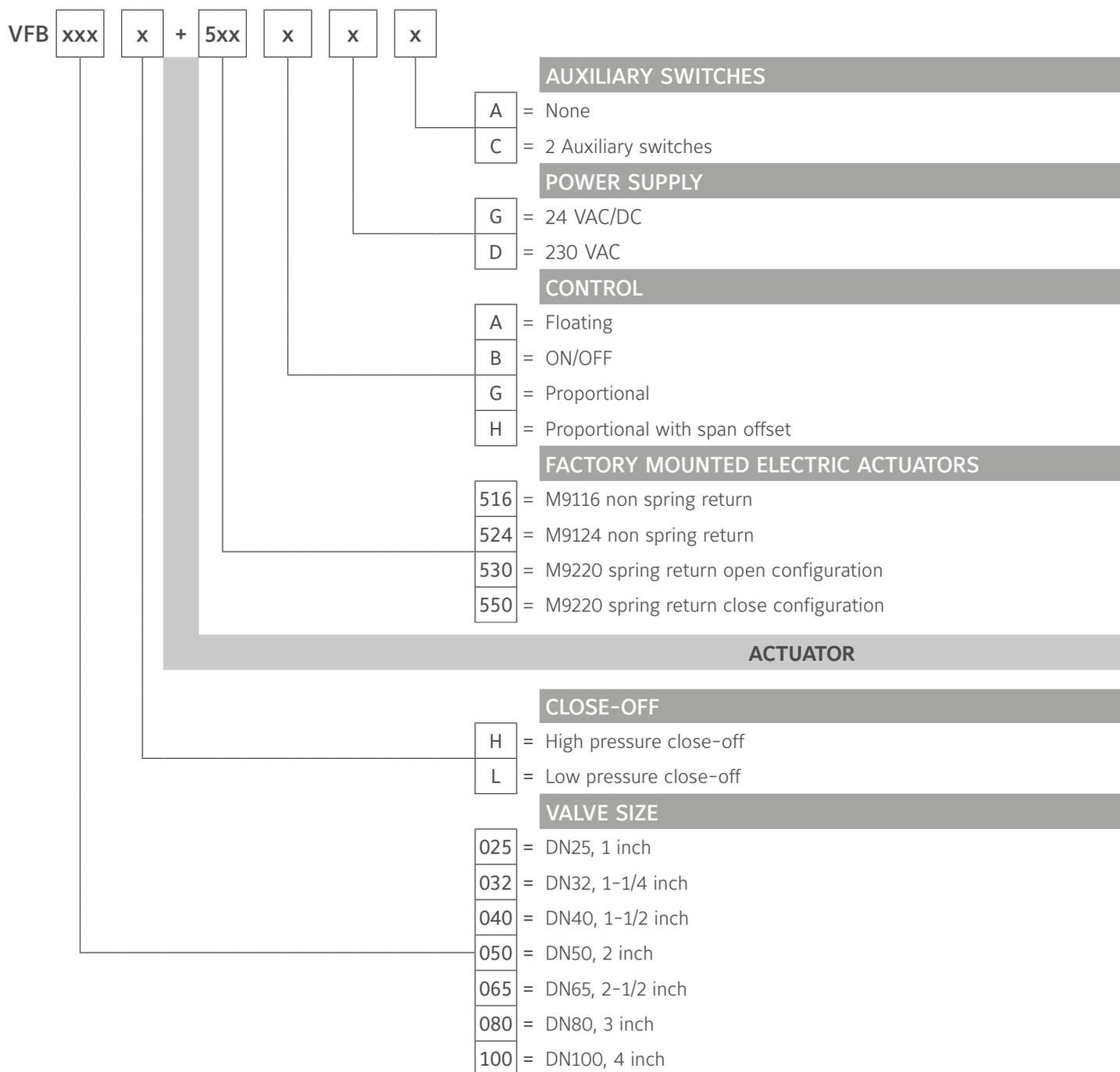


## VALVES

### VFB BUTTERFLY VALVES - PLANT VALVES

#### ORDERING CODES

##### VFB BUTTERFLY VALVES WITH M9000 ACTUATORS ASSEMBLY





## VALVES

### VFB BUTTERFLY VALVES - PLANT VALVES

#### ORDERING INFORMATION

VBF VALVES WITH M9000 ACTUATORS AND NECESSARY LINKAGE CODE - AVAILABLE COMBINATION

VALVES				ACTUATORS		
				Non Spring Return		Spring Return
				Torque ( <i>Nm</i> )		
				16	24	20
CODES	DN	INCHES	MAX CLOSE-OFF PRESSURE ( <i>bar</i> )	M9116	M9124	M9220
VFB025H	25	1"	12	M9100-100A	---	M9200-100A
VFB032H	32	1-1/4"	12	M9100-100A		M9200-100A
VFB040H	40	1-1/2"	12	M9100-100A		M9200-100A
VFB050H	50	2"	12	M9100-100B		M9200-100B
VFB065H	65	2-1/2"	12	M9100-100B		M9200-100B
VFB080H	80	3"	12	---	M9100-100B	M9200-100B
VFB100L	100	4"	3.5		M9100-100C	M9200-100C

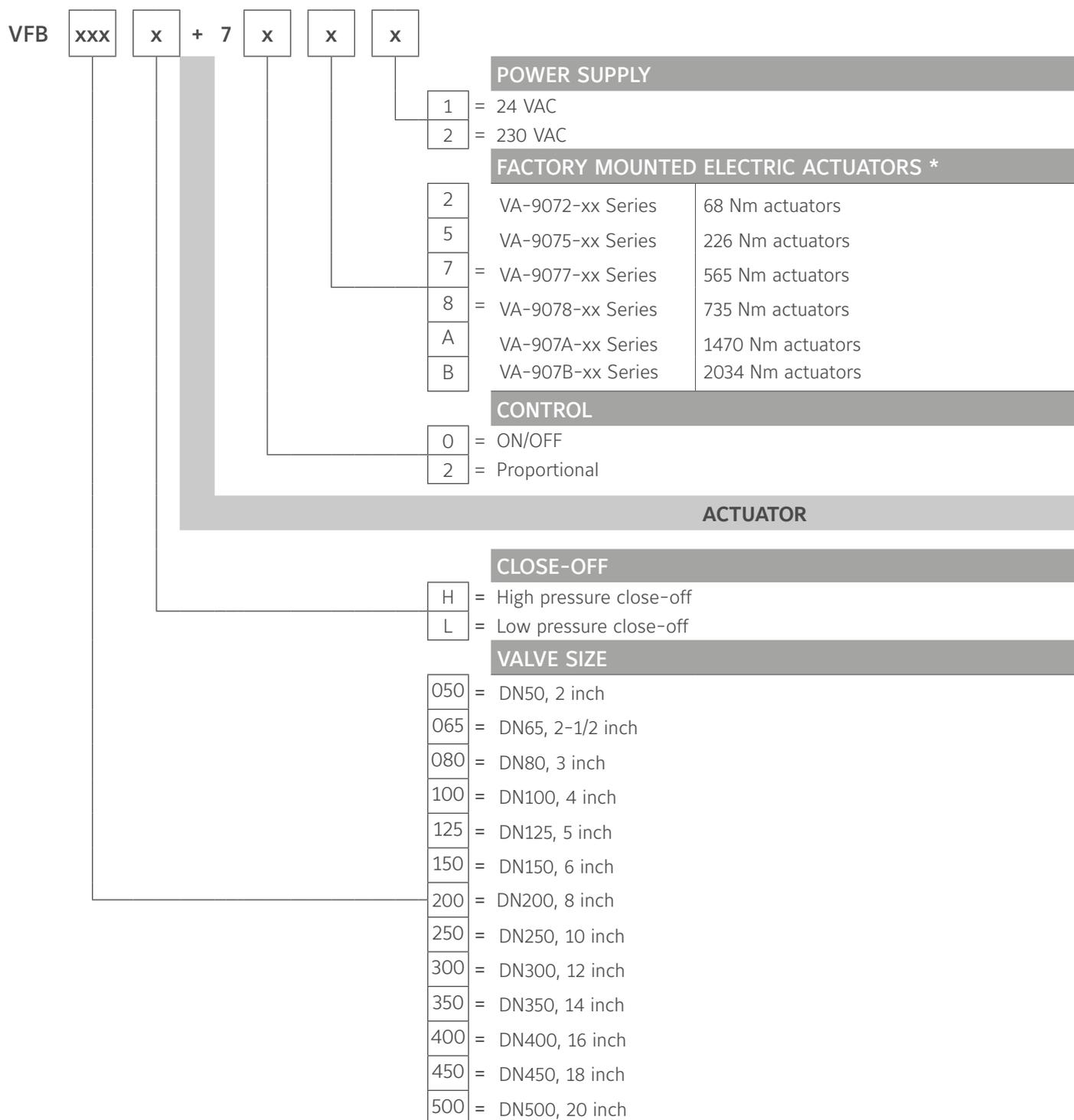


## VALVES

### VFB BUTTERFLY VALVES - PLANT VALVES

## ORDERING CODES

### VFB BUTTERFLY VALVES WITH VA-9070 ACTUATORS ASSEMBLY



**Note**

\* See VA-9070 Product Bulletin for more details



## VALVES

### VFB BUTTERFLY VALVES - PLANT VALVES

#### ORDERING INFORMATION

##### VBF VALVES WITH VA-9070 SERIES ACTUATORS - AVAILABLE COMBINATION

JCI VFB VALVES				ACTUATORS								
				POWER SUPPLY 230 VAC					POWER SUPPLY 24 VAC			
				Torque (Nm)								
				68	226	735	1470	2034	68	226	565	
VALVES CODES	DN	INCHES	MAX CLOSE-OFF PRESSURE (bar)	VA-9072	VA-9075	VA-9078	VA-907A	VA-907B	VA-9072	VA-9075	VA-9077	
VFB050H	50	2	12	■	---	---	---	---	■	---	---	
VFB065H	65	2-½	12	■	---	---	---	---	■	---	---	
VFB080H	80	3	12	■	---	---	---	---	■	---	---	
VFB100H	100	4	12	■	---	---	---	---	■	---	---	
VFB125H	125	5	12	■	---	---	---	---	■	---	---	
VFB150H	150	6	12	■	---	---	---	---	■	---	---	
VFB200H	200	8	12	---	■	---	---	---	---	■	---	
VFB250H	250	10	12	---	---	■	---	---	---	---	■	
VFB300H	300	12	10	---	---	■	---	---	---	---	■	
VFB350H	350	14	10	---	---	■	---	---	---	---	---	
VFB400H	400	16	10	---	---	---	■	---	---	---	---	
VFB450H	450	18	10	---	---	---	■	---	---	---	---	
VFB500H	500	20	10	---	---	---	---	■	---	---	---	
VFB100L	100	4	3.5	■	---	---	---	---	■	---	---	
VFB125L	125	5	3.5	■	---	---	---	---	■	---	---	
VFB150L	150	6	3.5	■	---	---	---	---	■	---	---	
VFB200L	200	8	3.5	---	■	---	---	---	---	■	---	
VFB250L	250	10	3.5	---	■	---	---	---	---	■	---	
VFB300L	300	12	3.5	---	---	■	---	---	---	---	■	
VFB350L	350	14	3.5	---	---	■	---	---	---	---	■	
VFB400L	400	16	3.5	---	---	■	---	---	---	---	■	
VFB450L	450	18	3.5	---	---	■	---	---	---	---	■	
VFB500L	500	20	3.5	---	---	■	---	---	---	---	---	

**Note**

\* See VA-9070 Product Bulletin for more details

## VALVES

### PRESSURE INDEPENDENT VALVES

## VP1000

DN15...32, PN25  
DN40...50, PN16



VP1000 pressure independent control valve is a combination of a differential pressure regulator and a regulating valve for flow adjustment.

VP1000 valve allows to adjust the flow rate also in case of partial load of the system and it always ensures a stable adjustment of the supply connected to it. The differential pressure regulator corrects any differential pressure variation. This leads to a considerable reduction in temperature variations and adjustment movements and to the extension of the life of the moving devices connected to it.

VP1000 valves offer a remarkable adjustment flexibility.

In combination with Johnson controls actuators they can be set to a specific flow rate value and they allow precise modulating control.

The valves always guarantee a suitable flow rate, therefore avoiding too high energy consumption.

Since VP1000 valve performs the functions of two valves (balancing and adjustment), the installation costs are considerably reduced.

The automatic flow rate limitation eliminates system adjustment costs. Since adjustment is very easy to perform, design flow rates can be modified at any time and at low costs.

Since it is not necessary to adjust the valve after its installation, the valve can work immediately after it has been assembled, for example, on the floors where works are already finished.

In order to adjust the flow rate, just set the selected value using the adjustment knob.

Since flow rate is the only parameter to be considered, choosing the suitable valve is easy and fast. VP1000 valve maximum adjustment matches the maximum flow rate allowed by the pipe size, on the basis of the values established by international standards.

## FEATURES

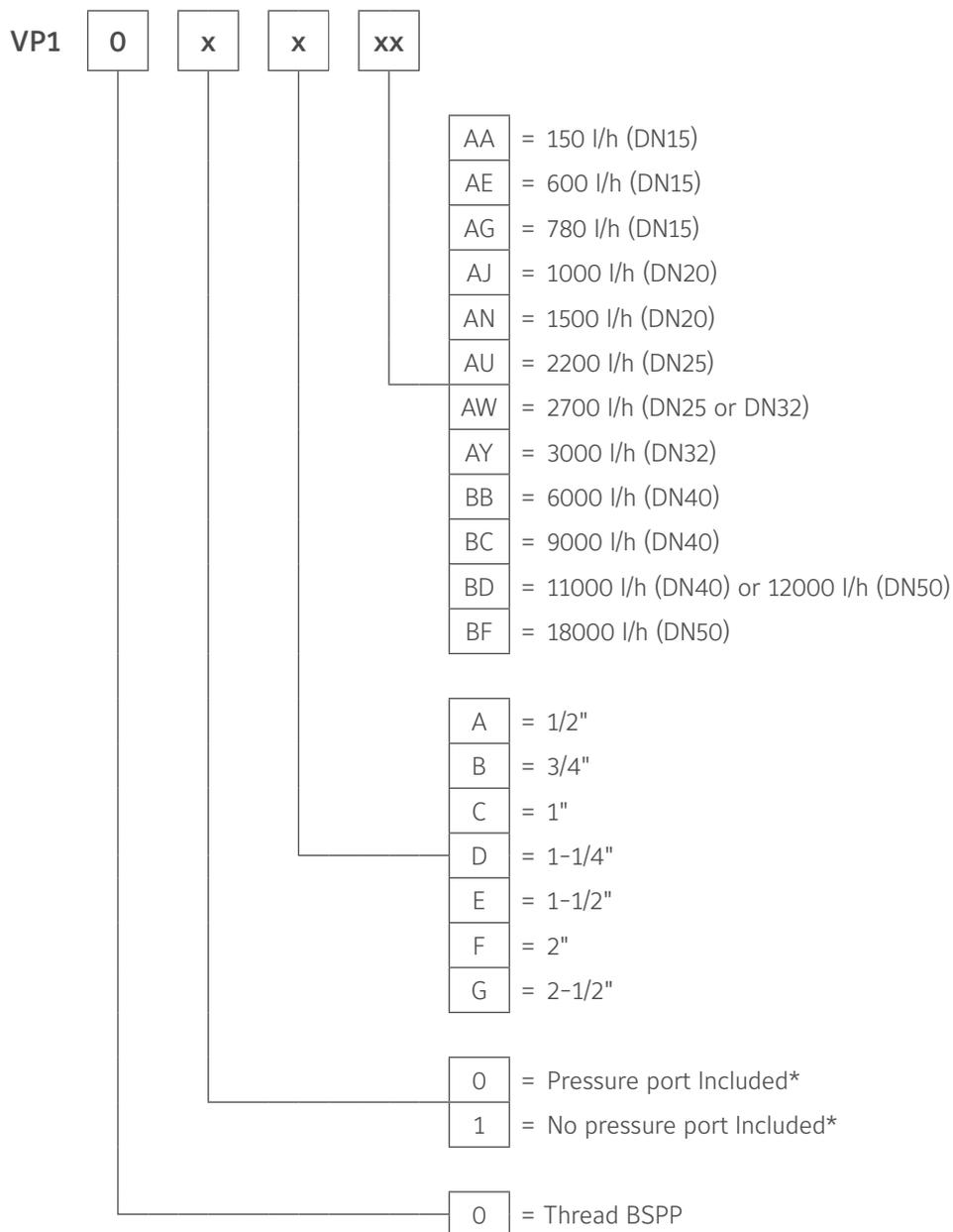
- $K_{VS}$  calculation is not necessary
- Valve authority calculation is not required
- Specific devices or knowledge are not necessary
- Compact design that allows installing the valve also in small spaces such as fan-coils or narrow supply spaces
- Flow rate adjustment without disassembling the actuators
- Dirty resistance allows long life characteristic



## VALVES

### VP1000 - PRESSURE INDEPENDENT VALVES

#### ORDERING INFORMATION

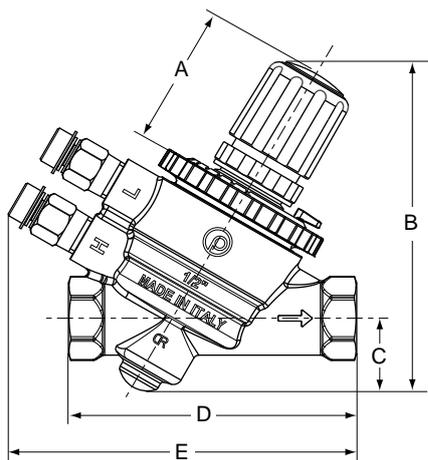


**Note**

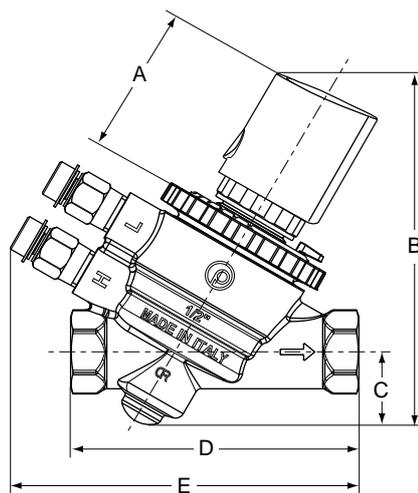
\* On the DN50 Ball Valve, the pressure port are always included despite the Codes VP101xxx

#### DIMENSIONS (in mm)

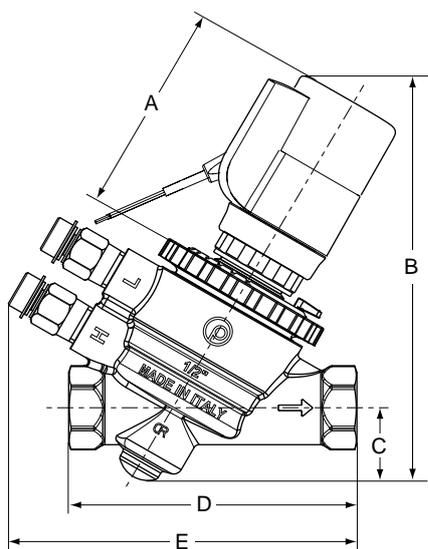
DN15 - DN20



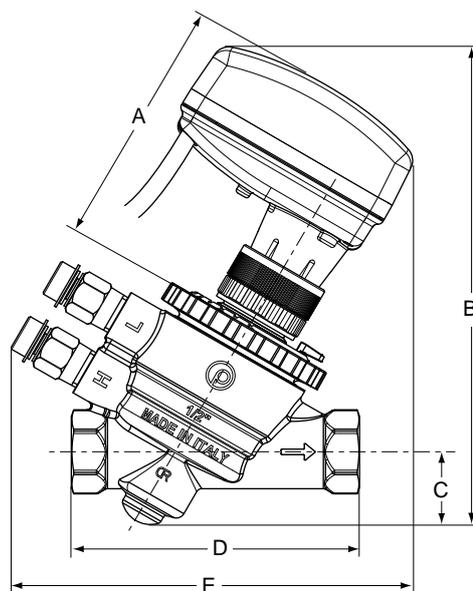
SIZE	A	B	C	D	E
DN15	47	115	25	99	120
DN20				108	



SIZE	A	B	C	D	E
DN15	61.5	133	25	99	127
DN20	61.5	133	25	108	127



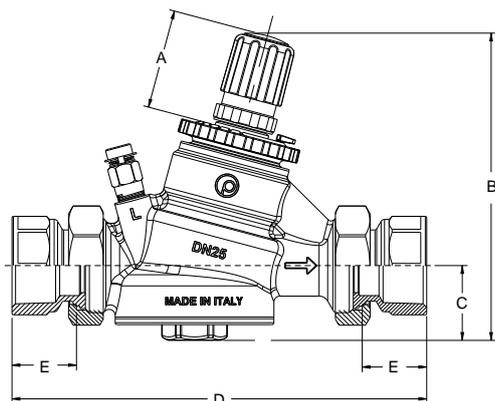
SIZE	A	B	C	D	E
DN15	75	143	25	99	127
DN20				108	



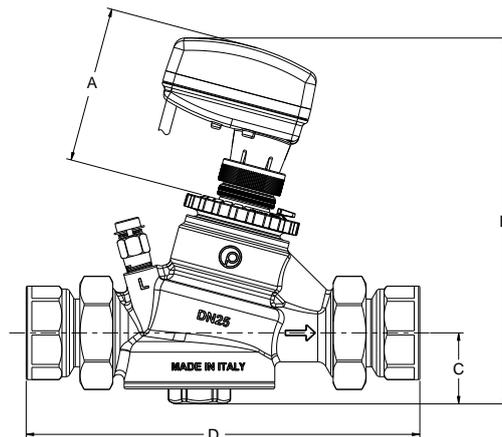
SIZE	A	B	C	D	E
DN15	80	166	25	99	130
DN20				108	

#### DIMENSIONS (in mm)

DN25 - DN32



SIZE	A	B	C	D *	E
DN25	47	152	38	184	21.5
DN32				209	22



SIZE	A	B	C	D *
DN15	83.4	195.7	38	184
DN20				209

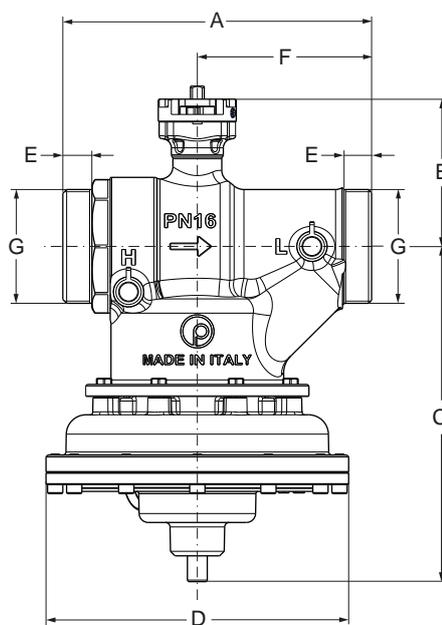
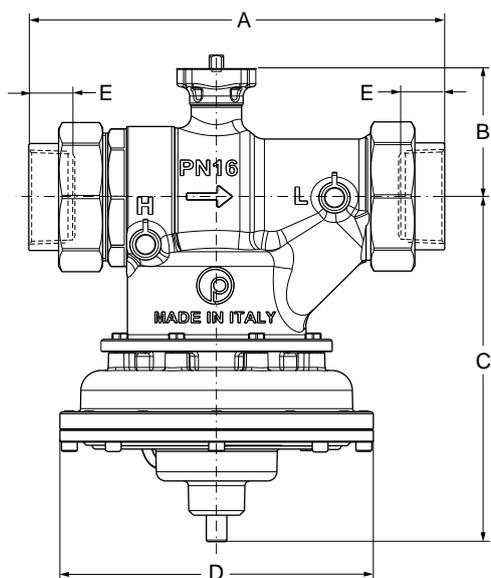
#### Note

\* Dimensional data without fittings



## DIMENSIONS (in mm)

DN40 - DN50



CODES	SIZE	A	B	C	D	E
VP101DBB	DN40	230	89	180	156	23.6
VP101EBB	DN40	230	89	180	156	23.6
VP101EBC	DN40	230	89	180	156	23.6
VP101EBD	DN40	230	89	180	156	23.6
VP101FBD	DN50	264	97	221	198	28
VP101FBF	DN50	264	97	221	198	28

CODE	SIZE	A	B	C	D	E	F	G
VP101GBF	DN50	202	97	221	198	19	114	G ISO-228 G 2.1/2"



## VALVES

### VP1000 - PRESSURE INDEPENDENT VALVES

#### TECHNICAL SPECIFICATIONS - AXIAL MODELS

##### DN15 - DN20

	VP10xAAA	VP10xAAE	VP10xAAG	VP10xBAJ	VP10xBAN
Flow rate max.	150 l/h - 0,042 l/s	600 l/h - 0,167 l/s	780 l/h - 0,217 l/s	1000 l/h - 0,278 l/s	1500 l/h - 0,417 l/s
Accuracy 0 ÷ 1 bar	± 5%				
Start-up max.	20 kPa - 0,20 bar			25 kPa - 0,25 bar	
ΔP max.	600 kPa - 6 bar				
Leakage	Class IV - IEC 60534-4				
Temperature	-10 to 120°C				
Working pressure max.	2500 kPa - 25 bar				
Fittings	Female BSPP Rp 1/2" EN 10226-1			Female BSPP Rp 3/4" EN 10226-1	

##### DN25 - DN32

	VP100CAU	VP100CAW	VP100DAW	VP100DAY
Flow rate max.	2200 l/h - 0,611 l/s	2700 l/h - 0,750 l/s		3000 l/h - 0,833 l/s
Accuracy 0 ÷ 1 bar	± 5%			
Start-up max.	25 kPa - 0,25 bar			
ΔP max.	600 kPa - 6 bar			
Leakage	0,01% of flow rate			
Temperature	-10 to 120°C			
Working pressure max.	2500 kPa - 25 bar			
Fittings	Female BSPP Rc 1" EN 10226-1		Female BSPP Rc 1-1/4" EN 10226-1	

#### ASSEMBLY CODES

Following actuators are available:

- VA-708x ON/OFF thermal \*
- VA-709x thermal 0...10 VDC \*
- VA-748x floating and proportional electric

##### Note

\* VA-708x and VA-709x are suitable for valves DN15 and DN20 only



## VALVES

### VP1000 - PRESSURE INDEPENDENT VALVES

#### TECHNICAL SPECIFICATIONS - BALL MODELS

DN40 - DN50

	VP101DBB	VP101EBB	VP101EBC	VP101EBD	VP101FBD	VP101FBF	VP101GBF
Flow Rate max.	6000 l/h - 1,667 l/s		9000 l/h - 2,5 l/s	11000 l/h - 3,056 l/s	12000 l/h - 3,33 l/s	18000 l/h - 5,00 l/s	
Accuracy 0 ÷ 1 bar	± 5%						
Start-up max.	30 kPa - 0,30 bar		25 kPa - 0,25 bar	30 kPa - 0,30 bar		35 kPa - 0,35 bar	
ΔP max.	600 kPa - 6 bar						
Leakage	Class VI IEC 60534-4						
Temperature	-10 to 120°C						
Working Pressure max.	1600 kPa - 16 bar						
Fittings	Rc 1-1/4" union female EN 10226-1	Rc 1-1/2" union female EN 10226-1		Rc 2" union female EN 10226-1			Rc 2 1/2" male EN 10226-1

#### ASSEMBLY CODES

CODES	DESCRIPTION
+510HGA *	VA9310-HGA-1, 10 Nm Non Spring Return Actuator, 24 V AC/DC, Proportional Control
+538GGA	VA9208-GGA-1, 8 Nm Spring Return Actuator, 24 V AC/DC, Proportional Control, assembled in Spring Open Valve configuration
+538GGC	VA9208-GGC-1, 8 Nm Spring Return Actuator, 24 V AC/DC, Proportional Control, two auxiliary switches, assembled in Spring Open Valve configuration
+558GGA	VA9208-GGA-1, 8 Nm Spring Return Actuator, 24 V AC/DC, Proportional Control, assembled in Spring Close Valve configuration
+558GGC	VA9208-GGC-1, 8 Nm Spring Return Actuator, 24 V AC/DC, Proportional Control, two auxiliary switches, assembled in Spring Close Valve configuration

#### Note

\* The M9000-525-5 linkage is part of the assembly.

## VALVES

### PRESSURE INDEPENDENT VALVES

#### VPA

DN50...150, PN16

VP1000 pressure independent control valve is a combination of a differential VPA pressure independent control valve is a combination of a differential pressure regulator and a regulating valve for flow adjustment.

VPA valves offer a remarkable adjustment flexibility. In combination with VAP actuators they can be set to a specific flow rate value and they allow precise modulating control. The valves always guarantee a suitable flow rate, therefore avoiding too high energy consumption.

Since VPA valve performs the functions of two valves (balancing and adjustment), the installation costs are considerably reduced.

The automatic flow rate limitation eliminates system adjustment costs. Since adjustment is very easy to perform, design flow rates can be modified at any time and at low costs.



## FEATURES

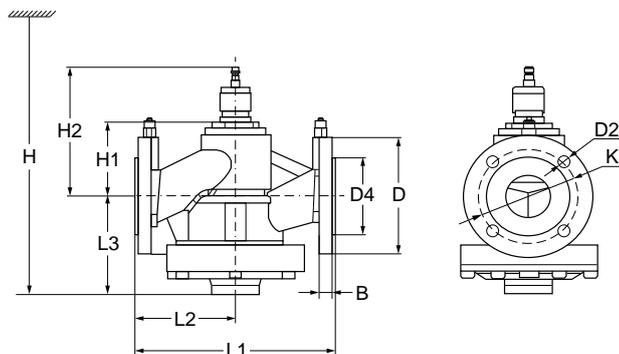
- The max. flow of VPA valve could be set according to the requirement. The flow can be set easily by the actuator potentiometer
- The built-in balancing tube has more compact structure and can avoid damages during shipping and installation compared to the external tube
- Valve body is made of ductile iron material, with anticorrosion treatment on the surface
- High close-off pressure with very low leakage rate
- Linear actuator with high control accuracy provides the equal percentage flow curve



## VALVES

### VPA - PRESSURE INDEPENDENT VALVES

#### DIMENSIONS (in mm)



DN	B	D	D2	D4	K	L1	L2	L3	H1	H	WEIGHT (kg)
50	20	Ø 165	4 - Ø 18	Ø 99	Ø 125	230	115	136	95	461	19
65	20	Ø 185	4 - Ø 18	Ø 118	Ø 145	290	145	155	115	500	28
80	20	Ø 200	8 - Ø 18	Ø 132	Ø 160	310	155	167	148	698	36
100	22	Ø 220	8 - Ø 18	Ø 156	Ø 180	350	181	181	150	710	54
125	22	Ø 250	8 - Ø 18	Ø 184	Ø 210	400	200	197	158	745	68
150	24	Ø 285	8 - Ø 22	Ø 211	Ø 240	480	240	222	198	810	89

#### ORDERING INFORMATION

VALVES	DN		PN	CLOSING PRESSURE (bar)	FLOW RATE			STROKE (mm)	ACTUATORS	ΔP RANGE (kPa)
	(mm)	(in)			m <sup>3</sup> /h	l/s	GPM			
VPA050-C	50	2"	16	16	13	3.64	57	20	VAP1000-24-C	35~400
VPA065-C	65	2-1/2"	16	16	21	5.8	92	20	VAP1000-24-C	35~400
VPA080-C	80	3"	16	16	28	7.8	123	40	VAP3000-24-C	35~400
VPA100-C	100	4"	16	16	50	13.9	219	40	VAP3000-24-C	35~400
VPA125-C	125	5"	16	16	90	25.0	396	40	VAP3000-24-C	35~400
VPA150-C	150	6"	16	16	145	40.3	638	40	VAP3000-24-C	35~400

#### Note

Valve closes when valve stem retracts.

# SENSORS

## CARBON DIOXIDE

### CD-2xx-E00-00

#### WALL MOUNT - CO<sub>2</sub> AND TEMPERATURE TRANSMITTER

The CD-2xx-E00-00 series is a wall mount transmitter for measuring the CO<sub>2</sub> levels and the relevant temperature within Heating, Ventilation and Air Conditioning applications.

The CD-2xx Series incorporates a single beam dual wavelength NDIR CO<sub>2</sub> sensor, which compensates for ageing effects, is highly insensitive to pollution and offers outstanding long term stability.

A multiple point CO<sub>2</sub> and T factory adjustment procedure leads to excellent CO<sub>2</sub> measurement accuracy over the entire T working range.

This compact wall-mounted device produces 0 to 10 V or 4 to 20 mA signals and it is designed to work as part of any HVAC control system.

This new CO<sub>2</sub> transmitter is easy to install, offers a full 3-year warranty, and requires no maintenance or field calibration



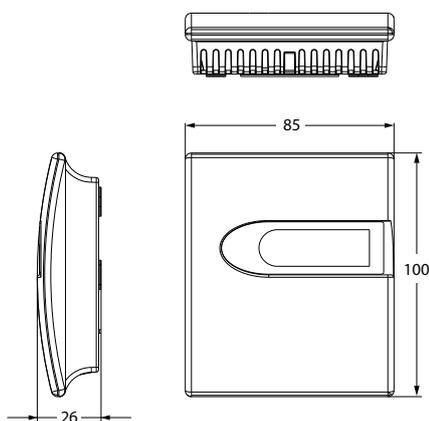
## FEATURES

- Power supply 15...35 VDC / 24 VAC
- 0...10 V or 4...20 mA CO<sub>2</sub> and temperature output
- Models with display
- Snap-on enclosure
- Outstanding long-term stability
- CO<sub>2</sub> factory calibration certificate



## CD-2xx-E00-00 CARBON DIOXIDE

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	CO <sub>2</sub> OUTPUT	CO <sub>2</sub> WORKING RANGE	TEMPERATURE OUTPUT	TEMPERATURE WORKING RANGE	DISPLAY	CALIBRATION CERTIFICATE	
CD-200-E00-00	0...10 V	0...2000 ppm	0...10 V	0 to 50°C	---	■	
CD-201-E00-00			0...10 V		■	■	
CD-220-E00-00	4...20 mA		4...20 mA		---	■	■
CD-221-E00-00			4...20 mA		■	■	

## CARBON DIOXIDE

### CD-3xx-E00-00

WALL MOUNT - CO<sub>2</sub> / RELATIVE HUMIDITY  
AND TEMPERATURE TRANSMITTER

The CD-3xx-E00-00 series is a wall mount transmitter for measuring the CO<sub>2</sub> levels, the relevant humidity and the temperature within Heating, Ventilation and Air Conditioning applications. The CD-3xx series incorporates a single beam dual wavelength NDIR CO<sub>2</sub> sensor, which compensates for ageing effects, is highly insensitive to pollution and offers outstanding long term stability. A multiple point CO<sub>2</sub> and T factory adjustment procedure leads to excellent CO<sub>2</sub> measurement accuracy over the entire T working range. The CD-3xx room sensor are designed to work as part of any HVAC control system. This new CO<sub>2</sub> transmitter is easy to install and requires no maintenance or field calibration.

## FEATURES

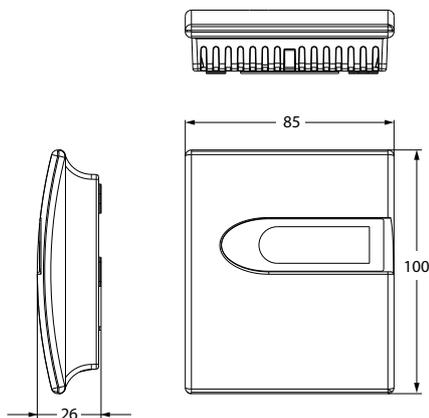
- Power supply 15...35 VDC / 24 VAC
- 0...10 V CO<sub>2</sub> and relative humidity output
- 0...10 V and Pt1000 temperature output on the same device
- Models with display
- Snap-on enclosure
- Outstanding long-term stability
- CO<sub>2</sub> factory calibration certificate





## CD-3xx-E00-00 CARBON DIOXIDE

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	CO <sub>2</sub> OUTPUT	CO <sub>2</sub> WORKING RANGE	RH% OUTPUT	RH% WORKING RANGE	TEMPERATURE OUTPUT	TEMPERATURE WORKING RANGE	DISPLAY	CALIBRATION CERTIFICATE
CD-310-E00-00	0...10V	0...2000 ppm	0...10 V	10...90% RH	0...10V and Pt 1000	0 to 50°C (active model)	---	■
CD-311-E00-00							■	■

## CARBON DIOXIDE

### CD-Px000

#### DUCT MOUNT - CO<sub>2</sub> AND TEMPERATURE TRANSMITTER

The CD-P series duct mount transmitters are designed for the measurement of Carbon Dioxide (CO<sub>2</sub>) and Temperature in Heating Ventilating and Air Conditioning applications where Demand Control Ventilation (DCV), fresh air and indoor Air Quality (IAQ), and rooftop air handling economizer control systems are often required.

The transmitters incorporate the a dual wavelength NDIR CO<sub>2</sub> sensor, which compensates for ageing effects, is highly insensitive to pollution and offers outstanding long term stability.

The CD-P1000 Transmitter is available with CO<sub>2</sub> output only, 0-10V or 4-20 mA, while the CD-P2000 range offers CO<sub>2</sub> and Temperature with active and passive outputs.



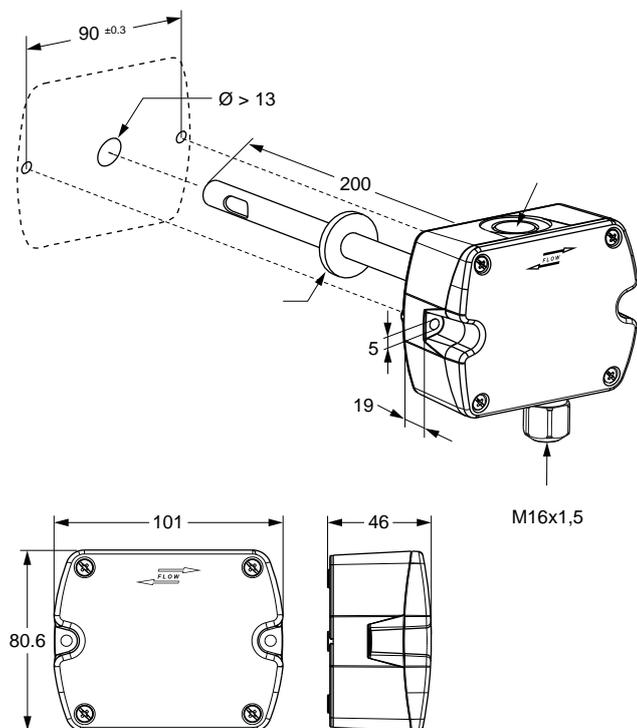
## FEATURES

- Dual wavelength non-dispersive infrared technology (NDIR)
- Measuring range 0...2000 ppm
- CO<sub>2</sub> Accuracy at 25°C: <math>\pm 50 \text{ ppm} + 2\% \text{ of measured value}</math>
- Temperature accuracy  $\pm 0.3^\circ\text{C}$
- Response time  $\tau_{63} < 100\text{s}$  at 3m/s (590 ft/min) air speed
- Power supply: 24 VAC  $\pm 20\%$  or 15 - 30 VDC
- Housing material polycarbonate, UL94V-0 approved
- Protection class enclosure: IP65, probe: IP20
- Working conditions: -20 to 60°C; 0...95% RH (non-condensing)
- Factory calibration certificate (DIN EN10204 - 2.2)



## CD-Px000 CARBON DIOXIDE

### DIMENSIONS (in mm)

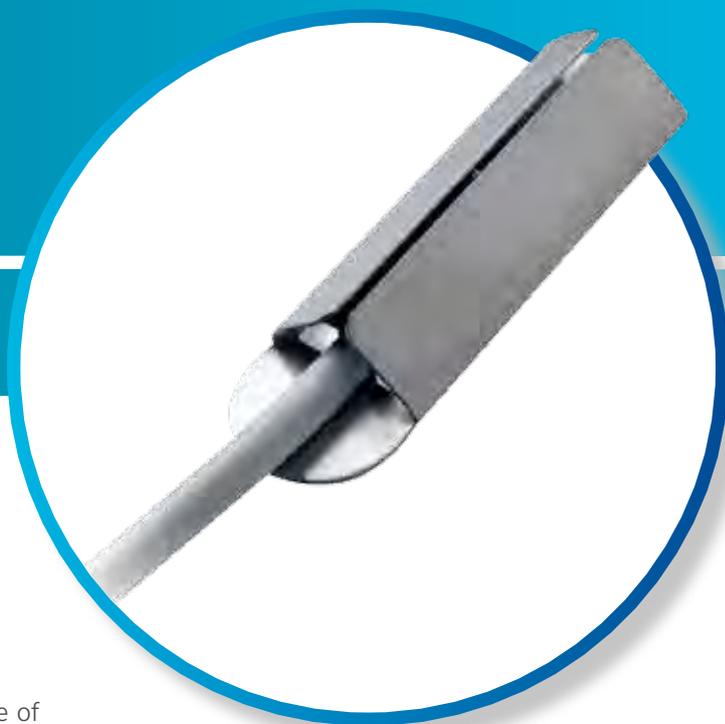


### ORDERING INFORMATION

CODES	DESCRIPTION
CD-P1000-00-00	Duct CO <sub>2</sub> 0/2000 PPM, output 0...10 V or 4...20 mA selectable
CD-P2010-00-00	Duct CO <sub>2</sub> 0/2000 PPM, output 0...10 V or 4...20 mA selectable + Temperature 0...10 V @ 0...50°C
CD-P2016-00-00	Duct CO <sub>2</sub> 0/2000 PPM, output 0...10 V or 4...20 mA selectable + passive Pt1000
CD-P2017-00-00	Duct CO <sub>2</sub> 0/2000 PPM, output 0...10 V or 4...20 mA selectable + passive NTC10K

## DEW POINT

### HX-9100



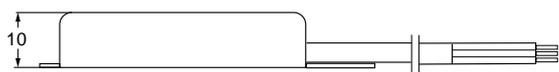
The HX-9100 dew point sensor provides warning signal in case of condensation on surfaces such as cold water pipes, cool ceilings and windows.

The HX-9100 can be powered at 15 VDC or 24 VAC, it detects the dew point condition providing an on/off signal to an analog or a digital input of the controller that will override functions in order to prevent the condensation on cooled surfaces.

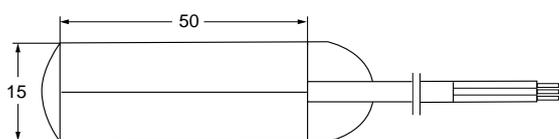
## FEATURES

- Supply voltage: 15 VDC  $\pm 10\%$  or 24 VAC  $\pm 15\%$
- Action: 0 to 10 VDC or ON/OFF
- Hysteresis: 1%
- Output: 0.5 VDC max @ RH > 90%
- Protection class: IP44

## DIMENSIONS (in mm)



**HX-9100-9024 / HX-9100-9A24:**  
Cable Length 1.5 m



**HX-9100-9324:**  
Cable Length 3 m

## ORDERING INFORMATION

CODES	ACTION	OUTPUT AT CONDENSATION	CABLE LENGTH	POWER SUPPLY
HX-9100-9A24	0...10 VDC	$\leq +0.5$ VDC @ RH > 90%	1.5 m	15 VDC $\pm 10\%$ or 24 VAC $\pm 15\%$ 24 VDC $\pm 15\%$
HX-9100-9024	ON/OFF	Open collector closed, 0.5 VDC max @ RH > 90%		
HX-9100-9324	ON/OFF	Open collector closed, 0.5 VDC max @ RH > 90%	3 m	

# SENSORS



## DIFFERENTIAL PRESSURE

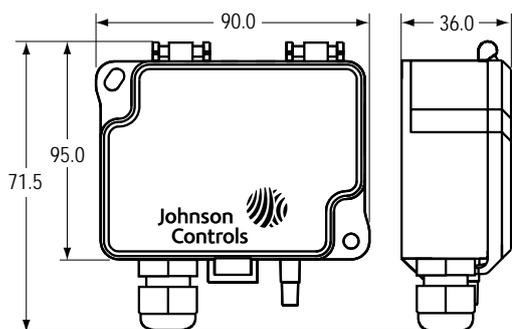
# DP7000 – DP2500 – DP0250

The DP low differential pressure transmitter series is an accurate and cost competitive solution for measuring low pressures of air and non-aggressive gases in order to monitor and control pressures in building automation, HVAC and clean room systems.

## FEATURES

- Power supply 24 VAC/VDC
- Pressure range: 8 different ranges in one device (see the table)
- Output signal: 0...10 VDC or 4...20 mA
- Automatically autozero point adjusting
- Response time selectable
- 2 rows x 12 characters digit display
- Back-light display
- Protection class: IP54
- Configurable measuring unit (Pa, kPa, mbar, inch WC, mm WC, psi)
- Factory Calibration Certificate available on request

## DIMENSIONS (in mm)





## DP7000-DP2500-DP0250 DIFFERENTIAL PRESSURE

### ORDERING INFORMATION

ORDERING CODES	PACKAGING	OPERATING RANGE (Pa)	AUTO ZERO	DISPLAY	OUTPUT SIGNAL	ENCLOSURE	SUPPLY VOLTAGE	SPAN POINT ADJUSTMENT				
DP7000-R8	Single	0...1000 0...1500 0...2000 0...2500 0...3000 0...4000 0...5000 0...7000	---	---	0...10 VDC or 4...20 mA	IP54	24 VAC / VDC	---				
DP7000-R8-01	Bulk		---									
DP7000-R8-AZ	Single		■									
DP7000-R8-AZ-01	Bulk		■	■								
DP7000-R8-D	Single		---									
DP7000-R8-AZ-D	Single		■									
DP2500-R8	Single		-100...+100 0...100 0...250 0...500 0...1000 0...1500 0...2000 0...2500	---					---	0...10 VDC or 4...20 mA	IP54	24 VAC / VDC
DP2500-R8-01	Bulk	---										
DP2500-R8-AZ	Single	■										
DP2500-R8-AZ-01	Bulk	■		■								
DP2500-R8-D	Single	---										
DP2500-R8-AZ-D		Single		■								
DP0250-R8-AZ	Bulk	0...25 0...50 0...100 0...250	■	---	0...10 VDC or 4...20 mA	IP54	24 VAC / VDC	---				
DP0250-R8-AZ-01				---								
DP0250-R8-AZ-D				■								
DP0250-R8-AZS				---								
DP0250-R8-AZ-DS				■								
	Single	-25...+25 -50...+50 -100...+100 -150...+150		---								■

### ACCESSORY KIT

CODE	DESCRIPTION
T00199	DP Transmitter accessory kit, 2 fixing screws, 2 plastic tube connectors and 2 m tube Ø 4/7 mm



## DP7000-DP2500-DP0250 DIFFERENTIAL PRESSURE

### FACTORY CALIBRATION CERTIFICATES

On request, the DP7000, DP2500 and DP0250 transmitter can be provided with the Factory calibration certificate for a specific pressure range setting.

The certificate will report:

- Date and validity
- Device type and calibration range
- Device ID
- Test report on 3 measurement points

The calibration test performed in the factory ensures the accuracy of the pressure readings measured by the sensor. A calibration certificate is provided with any error measured in the test declared. This error value can be used when configuring the analog input channel for the sensor. Select the error at the nearest value the pressure sensors is expected to be typically measuring, this should normally be mid-range, and use this as the offset when setting up the analog input channel. This will ensure the sensor provides the greatest accuracy possible at the normal operating condition.



### HOW TO ORDER A DP WITH CALIBRATION CERTIFICATE

The calibration certificate performed in the factory can be provided for a specific pressure range only. To determine the ordering code please select the Certificate required from the table below. Take into consideration that pressure range changes from one model to another.

		DP7000	DP2500	DP0250
DPxxxx-	C1	0...1000 Pa	-100...+100 Pa	0...25 Pa
	C2	0...1500 Pa	0...100 Pa	0...50 Pa
	C3	0...2000 Pa	0...250 Pa	0...100 Pa
	C4	0...2500 Pa	0...500 Pa	0...250 Pa
	C5	0...3000 Pa	0...1000 Pa	-25...+25 Pa
	C6	0...4000 Pa	0...1500 Pa	-50...+50 Pa
	C7	0...5000 Pa	0...2000 Pa	-100...+100 Pa
	C8	0...7000 Pa	0...2500 Pa	-150...+150 Pa

For Display or Autozero options then add:

- **D** Display
- **AZ** Autozero Option
- **AZ-D** Autozero and Display

#### Note

- i.e. **DP0250-C3-AZ** DP0250 with autozero with Calibration certified for 0...100 Pa range setting
- DP2500-C3-AZ-D** DP2500 with autozero and Display with Calibration certified for 0...250 Pa range setting
- DP7000-C3** DP7000 Calibration certified for 0...2000 Pa range setting

# SENSORS



## PLANT HUMIDITY

### HT-1300

#### DUCT MOUNT

Specially designed for HVAC, the HT-1300 duct mount humidity sensor is a cost effective, highly accurate and reliable solution for measuring relative air humidity and temperature.

The enclosure minimizes installation cost and provides outstanding protection against contamination and condensation, thus ensuring flawless operation.

The HT-130x-UD1 employs the new humidity/temperature sensor with excellent long-term stability and resistance to pollutants. Long term performance is granted by the PTFE membrane fitted to the standard protection cap, suitable for most common HVAC applications.

The standard protection cap can be replaced with a series of alternative protection caps specially designed for harsh environments.

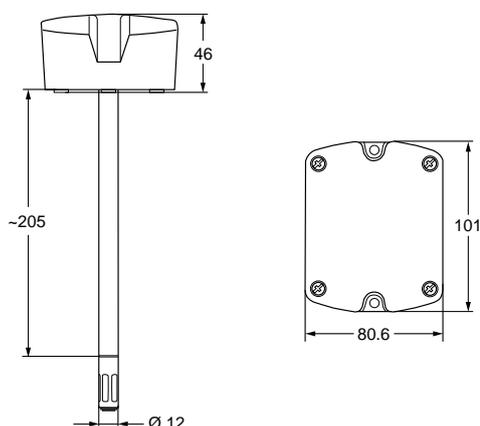
## FEATURES

- Power supply 15...35 VDC / 24 VAC  $\pm$ 20%
- Humidity range 0...100%
- Humidity output 0...10 VDC
- Humidity accuracy 2,5% from 10 to 95% RH
- Temperature outputs 0...10 VDC or passive
- Duct probes length 200 mm
- Protection caps for harsh environment application
- Protection class: IP65
- Inspection Certificate according EN 10204:2004



## HT-1300 PLANT HUMIDITY

### DIMENSIONS (in mm)



PROTECTION CAPS FOR HARSH ENVIROMENT

### ORDERING INFORMATION

#### HT-1300 PLANT HUMIDITY SENSORS

CODES	HUMIDITY WORKING RANGE	HUMIDITY OUTPUT	HUMIDITY ACCURACY	TEMPERATURE WORKING RANGE	TEMPERATURE OUTPUT	CALIBRATION CERTIFICATE	SUPPLY VOLTAGE
HT-1301-UD1	10...95 %	0...10 VDC	2,5 %	-15 to 60°C	0...10 VDC	■	15 to 35 VDC or 24 VAC ±20%
HT-1302-UD1				0 to 40°C			
HT-1303-UD1				-15 to 60°C	NTC 2k2		
HT-1305-UD1					Pt100		
HT-1306-UD1					Pt1000		

### FILTER CAPS FOR HARSH ENVIRONMENTS - ACCESSORIES

CODES	DESCRIPTION	APPLICATION
HT-1300-CAP-103	Stainless steel sintered filter cap	For industrial, agriculture, barns
HT-1300-CAP-105	PTFE sintered filter cap	For chemical and very polluted environment
HT-1300-CAP-106	Polycarbonate body with stainless steel wire mesh filter cap	For dryers and humidifiers
HT-1300-CAP-115	Catalytic filter in PTFE filter caps	For pharm, biotech, high oxygen concentration, sterilization with H2O2

### STANDARD FILTER CAP - ACCESSORY

CODE	DESCRIPTION
HT-1300-UD1-KIT	Kit of 10 pcs: Mounting flange, cable gland, screws/fishers, gasket and standard protection Cap, PTFE membrane for dusty and building automation applications.

# SENSORS

## PLANT TEMPERATURE

### TS-6300

The TS-6300 series temperature sensors provide a passive signal that corresponds to the air or water temperature Heating, Ventilation and Air Conditioning (HVAC) applications.

They are passive resistive signal NTC K2, NTC K10, Pt100 or Pt1000 related to the sensed temperature.

The TS-6300 temperature sensor series has been designed to work as a part of any HVAC control system.



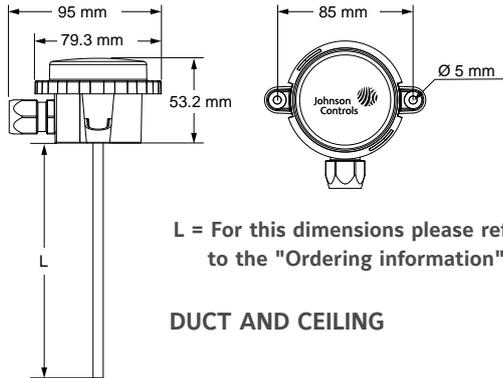
## FEATURES

- Wide range of mounting types and signal outputs
- Different length of tubes and wells for duct and immersion applications
- Bayonet mounting system
- For immersion applications, well can be mounted before duct sensor is mounted
- IP54 ingress protection (except cable sensor)
- IP67 ingress protection for cable sensor

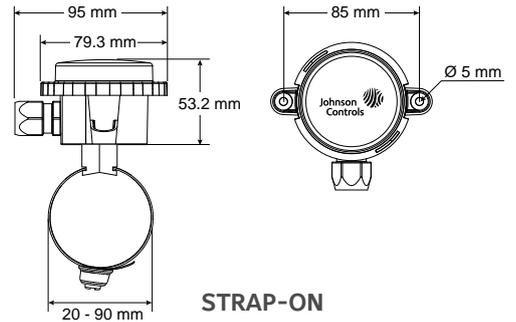


## TS-6300 PLANT TEMPERATURE

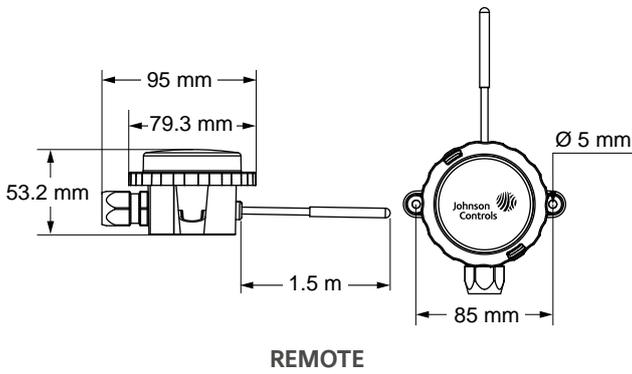
### DIMENSIONS (in mm)



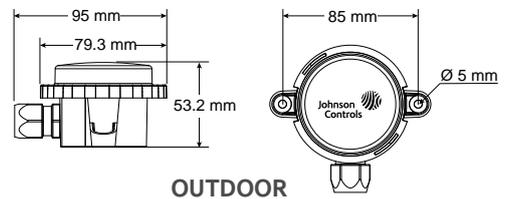
**DUCT AND CEILING**



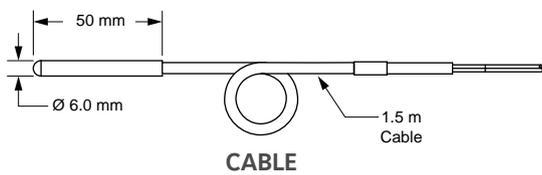
**STRAP-ON**



**REMOTE**



**OUTDOOR**



**CABLE**



## TS-6300 PLANT TEMPERATURE

### ORDERING INFORMATION

CODES	OUTPUT	MOUNTING TYPE	LENGTH (mm)	TEMPERATURE RANGE
TS-6370D-A11	0...10 VDC	Duct / immersion	138	-40 to 50°C
TS-6370D-B11			192	
TS-6370D-C11			290	
TS-6370D-D11			446	
TS-6370D-A12			138	-20 to 40°C
TS-6370D-B12			192	
TS-6370D-C12			290	
TS-6370D-D12			446	
TS-6370D-A13			138	0 to 40°C
TS-6370D-B13			192	
TS-6370D-C13			290	
TS-6370D-D13			446	
TS-6370D-A14			138	0 to 100°C
TS-6370D-B14			192	
TS-6370D-C14			290	
TS-6370D-D14			446	
TS-6330D-A10	2K2 NTC	Duct / immersion	138	-40 to 120°C
TS-6330D-B10			192	
TS-6330D-C10			290	
TS-6330D-D10			446	
TS-6340D-A10	10K NTC		138	
TS-6340D-B10			192	
TS-6340D-C10			290	
TS-6340D-D10			446	
TS-6350D-A10	Pt100		138	
TS-6350D-B10			192	
TS-6350D-C10			290	
TS-6350D-D10			446	
TS-6360D-A10	Pt1000		138	
TS-6360D-B10			192	
TS-6360D-C10			290	
TS-6360D-D10			446	



## TS-6300 PLANT TEMPERATURE

### ORDERING INFORMATION

CODES	OUTPUT	MOUNTING TYPE	LENGTH (mm)	TEMPERATURE RANGE	
TS-6370R-F01	0...10 VDC	Remote sensor	1.5 m cable length	-40 to 50°C	
TS-6370R-F03				0 to 40°C	
TS-6370R-F04				0 to 100°C	
TS-6330K-F00	2K2 NTC	Cable sensor		---	-40 to 100°C
TS-6340K-F00	10K NTC				
TS-6360K-F00	Pt1000				
TS-6370E-001	0...10 VDC	Outdoor	---		-40 to 50°C
TS-6370E-002					-20 to 40°C
TS-6330E-000	2K2 NTC	Outdoor			-40 to 70°C
TS-6340E-000	10K NTC				
TS-6350E-000	Pt100				
TS-6360E-000	Pt1000				
TS-6370S-002	0...10 VDC			Strap-on	
TS-6370S-004		0 to 100°C			
TS-6330S-000	2K2 NTC	Strap-on		-40 to 100°C	
TS-6340S-000	10K NTC				
TS-6350S-000	Pt100				
TS-6360S-000	Pt1000				
TS-6370C-E13	0...10 VDC		Ceiling		36
TS-6330C-E10	2K2 NTC	Ceiling	-40 to 70°C		
TS-6340C-E10	10K NTC				
TS-6350C-E10	Pt100				
TS-6360C-E10	Pt1000				



## TS-6300 PLANT TEMPERATURE

### ORDERING INFORMATION

#### OUTDOOR SENSOR GREY

CODES	OUTPUT	MOUNTING TYPE	OPERATING RANGE
TS-6330E-050	2K2 NTC	Outdoor grey enclosure	-40 to 70°C
TS-6340E-050	10K NTC		
TS-6350E-050	Pt100		
TS-6360E-050	Pt1000		-40 to 50°C
TS-6370E-051	0...10 VDC		-20 to 40°C
TS-6370E-052			

### ACCESSORIES

CODES	LENGTH (mm)	MATERIAL	MOUNTING THREAD	PN
TS-6300W-E200	50 *	Brass/Copper	R 1/2"	PN16
TS-6300W-D200	80			
TS-6300W-F200	120			
TS-6300W-G200	150			
TS-6300W-H200	200			
TS-6300W-I200	260			
TS-6300W-E300	50 *	Stainless steel	R 1/2"	PN25
TS-6300W-D300	80			
TS-6300W-F300	120			
TS-6300W-G300	150			
TS-6300W-H300	200			
TS-6300W-I300	260			
TS-6300W-E400	50 *		G 1/2"	
TS-6300W-D400	80			
TS-6300W-F400	120			
TS-6300W-G400	150			
TS-6300W-H400	200			
TS-6300W-I400	260			

TS-6300D-000	Duct flange kit
TS-6300W-900	Retrofitting thermowell adapter kit

#### Note

\* for cable sensor only

# SENSORS



## PRESSURE

### PT-5217

#### LIQUID OR AIR PRESSURE TRANSMITTER

The PT-5217 pressure transmitter accurately measures pressure and converts the measurement into a standard proportional 0...10 V signal.

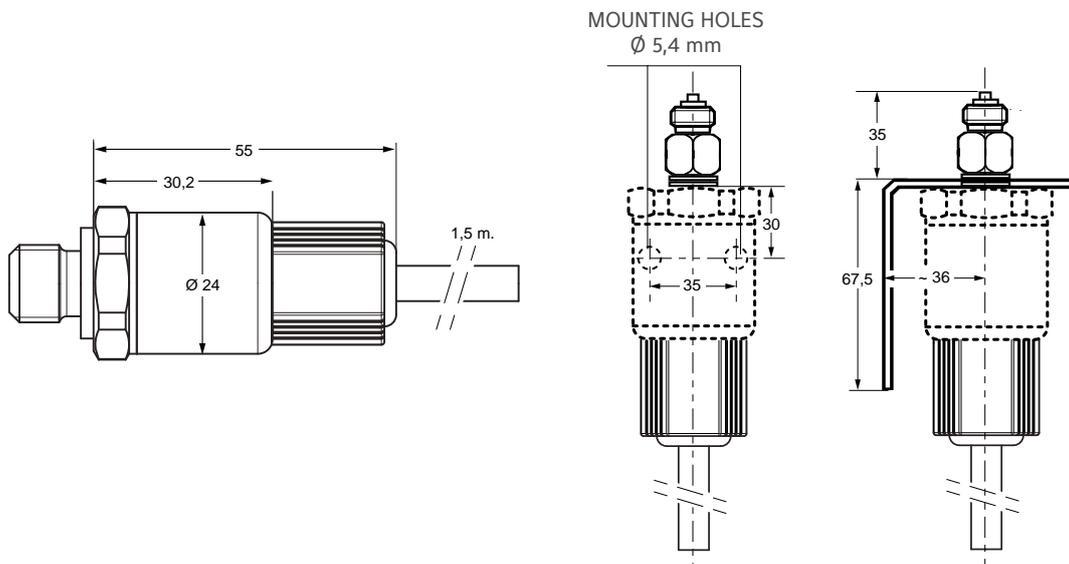
The PT-5217 is especially adapted to measure relative and absolute pressure of liquid and gases.

The pressure transmitter consists of a piezoresistive ceramic measuring cell with a diaphragm, installed in a stainless steel housing.

## FEATURES

- Compact, rugged construction
- Negligible temperature influence on accuracy
- Low hysteresis
- High accuracy
- Direct mounting, 1.5 m cable included
- Splash proof enclosure

## DIMENSIONS (in mm)





## PT-5217 PRESSURE

### ORDERING INFORMATION

CODES	OPERATING RANGE	ENCLOSURE	SUPPLY VOLTAGE
PT-5217-7011	0...100 kPa	IP67	24 VAC +15% / -15%, 50/60 Hz or 12...33 VDC, < 7 mA
PT-5217-7101	0...1000 kPa		

### ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
EQ-6056-7000	Mounting kit for plastic hose 4 x 6 mm

# SENSORS

## ROOM HUMIDITY

### HT-1000

#### WALL MOUNT

The HT-1000 series room humidity sensors provide active sensing of relative humidity and on specific models, also active/passive sensing of temperature in HVAC applications.

It features a polymer capacitance humidity sensing element and provides within either  $\pm 2\%$  or  $\pm 4\%$  accuracy a voltage output signal proportional 0 to 100% relative humidity.

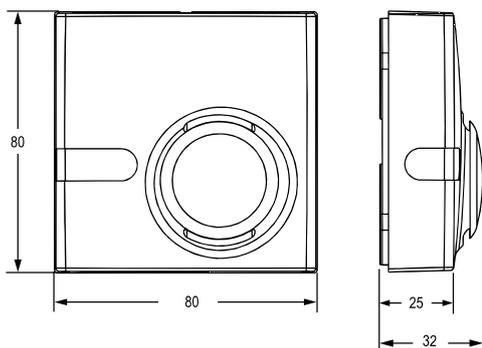
The HT-1000 series room humidity sensors are designed for use with any type of Johnson Controls or third party HVAC controllers.



## FEATURES

- Supply voltage: 15 VAC / 24 VAC
- Output RH%: 0...10 VDC
- Output Temperature: 0...10 VDC, NTC K2, Pt1000
- Protection class: IP30

## DIMENSIONS (in mm)





## HT-1000 ROOM HUMIDITY

### ORDERING INFORMATION

CODES	HUMIDITY RANGE	HUMIDITY OUTPUT	HUMIDITY ACCURACY	TEMPERATURE RANGE	TEMPERATURE OUTPUT	SUPPLY VOLTAGE
HT-1201-UR	0...100% RH	0...10 VDC	±2%	0 to 40°C	0...10 VDC	12 to 30 VDC 24 VAC ±15%
HT-1300-UR			---	---		
HT-1301-UR			±4%	0 to 40°C	0...10 VDC	
HT-1303-UR				NTC K2		
HT-1306-UR				0 to 60°C	Pt1000	

# SENSORS



## FLUSH MOUNT SENSORS

### RS-7000

#### ANALOG SENSORS

The Flush Mount RS-7000 Analog Sensors Series with LCD is an electronic room command module designed to work with Johnson Controls® controllers in heating, ventilating and air conditioning (HVAC) systems. Models in this series monitor the zone temperature and humidity, and transmit data to a field controller using up to three analog outputs.

RS-7060-0000 can toggle between Temperature and RH on the display, depending on desired default display.

The temperature only model RS-7080-0002 includes Fan mode push button to set the desired fan speed (OFF-LOW-MED-HIGH-AUTO). Both models with display have occupancy button, which allows user to select when the zone is occupied, to set the comfort mode only when is necessary.

The model without display RS-7040-0000 provides a combined measurement of the zone temperature and humidity. Installation is quite easy, given the possibility to configure the Setpoint Mode and temperature limits during installation.

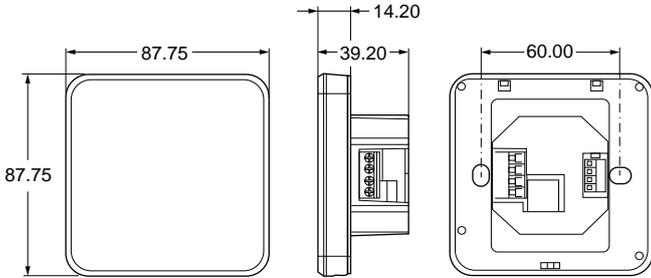
## FEATURES

- **Temperature sensor with combined humidity for best comfort** - RS-7000 range offers fan speed control or combined humidity sensor for best comfort
- **Configurable options reduce stock need** - The setpoint mode adjust or warmer/cooler can be configured during the installation
- **Large backlit display in a low profile enclosure** - Provides a modern looking and clear user interface
- **Customizable display helps to meet building policy** - RS-7000 can show actual values or setpoint only
- **Keypad lockable in public space** - The RS-7000 sensor buttons can be locked against misuse in public space
- **Flush mount installation** - Suitable for various installation boxes, offers low profile enclosure



## RS-7000 FLUSH MOUNT SENSORS

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	COLOR <sup>1</sup>	LCD	TEMPERATURE	HUMIDITY <sup>2</sup>	FAN CONTROL	TEMPERATURE ADJUSTMENT <sup>3</sup>	°F/°C SCALE TOGGLE	OCCUPANCY OVERRIDE
RS-7040-0000	White	---	■	■ (±3%)	---	---	---	---
RS-7060-0000		■			---	---	■	■
RS-7080-0002		---		■	---	Adj/WC	---	■

#### Notes

1. Device color white only.
2. For models with humidity sensor, the humidity value can be displayed in LCD too.
3. Adj/WC, Setpoint Adjust 12 to 28°C (Default) / WC (Warmer/Cooler) Setpoint ±3°C mode.

# SENSORS

## FLUSH MOUNT SENSORS

### NSA-7000

#### NETWORK SENSORS

The Flush Mount NSA-7000 Network Sensor Series with LCD is an electronic zone sensor designed to function directly with Johnson Controls® BACnet® MS/TP digital controllers in heating, ventilating and air conditioning (HVAC) systems. Models in this series monitor the temperature set point, zone temperature and humidity and transmit this data to a field controller on the Sensor Actuator (SA) bus. NSA-FHR71x3-0 can toggle on the display between temperature and relative humidity, depending on desired default display. A push button is included in NSA-FTD70x3-0 to set the desired fan speed (OFF/LOW-MED-HIGH-AUTO). All models have occupancy button, which allows user to signal when the zone is occupied, to set the comfort mode only when is necessary. The model without display NSA-FHN7001-0 has not buttons but provides an accurate measurement of the zone temperature and humidity.

For communication wiring flexibility, all models have both a modular jack and screw terminals for an easy connection to the Metasys® controllers.

## FEATURES

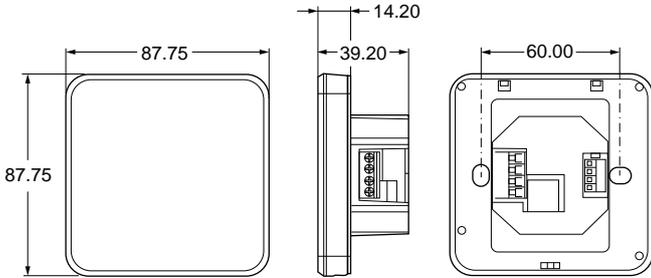
- **Large backlit display in a low profile enclosure** - Provides a modern looking clear user interface
- **Flush mount installation** - Suitable for various installation boxes, offers low profile enclosure
- **Programmable SA Bus Address** - Addressable through the display without the use of tool or screwdriver
- **Easy wiring** - NSA700 offers both type of connections: Modular Jack (MJ) and Screw terminal (ST)
- **Configurable options help product selection** - Setpoint type and limits can be configured during the installation
- **Customizable display helps tenants to meet building policy** - NSA can show actual values or setpoint only
- **Keypad lockable in public space** - The NSA sensor buttons can be locked against misuse in public space
- **Customize colors meet customer needs** - The white front panel may be optionally customized in black or other colors





## NSA-7000 FLUSH MOUNT SENSORS

### DIMENSIONS (in mm)



## ORDERING INFORMATION

### WHITE STANDARD DEVICES

CODES	LCD	TEMPERATURE	HUMIDITY <sup>1</sup>	FAN CONTROL	TEMPERATURE ADJUSTMENT <sup>2</sup>	°F/°C SCALE TOGGLE	OCCUPANCY OVERRIDE	SCREW TERMINAL <sup>3</sup>	ADDRESS SELECTION <sup>4</sup>
NSA-FHN7001-0	---	■	■ (±3%)	---	---	---	---	ST/MJ	---
NSA-FTD7003-0	■	■	---	■	Adj/WC	■	■	ST/MJ	■
NSA-FTB7003-0	■	■	---	---	Adj/WC	■	■	ST/MJ	■
NSA-FHR7103-0	■	■	■ (±3%)	---	Adj/WC	■	■	ST/MJ	■

### BLACK OPTIONAL DEVICES

There is MOQ (Minimum Order Quantity) requirement for black devices

CODES	LCD	TEMPERATURE	HUMIDITY <sup>1</sup>	FAN CONTROL	TEMPERATURE ADJUSTMENT <sup>2</sup>	°F/°C SCALE TOGGLE	OCCUPANCY OVERRIDE	SCREW TERMINAL <sup>3</sup>	ADDRESS SELECTION <sup>4</sup>
NSA-FHN7011-0	---	■	■ (±3%)	---	---	---	---	ST/MJ	---
NSA-FTD7013-0	■	■	---	■	Adj/WC	■	■	ST/MJ	■
NSA-FTB7013-0	■	■	---	---	Adj/WC	■	■	ST/MJ	■
NSA-FHR7113-0	■	■	■ (±3%)	---	Adj/WC	■	■	ST/MJ	■

#### Notes

- For models with humidity sensor, the humidity value also can be displayed in LCD.
- Adj/WC, Setpoint Adjust 12 to 28°C (Default) / WC (Warmer/Cooler) Setpoint ±3°C mode.
- All models equipped with both ST (Screw Terminal) and MJ (Modular Jack).
- Default address is 199. Model without display has fixed address 199. Model with display can be configured between 199 to 215. In a mixed bus configuration 4 sensors max.

# SENSORS



## ANALOG SENSORS

### RS-1100

#### ROOM COMMAND MODULE

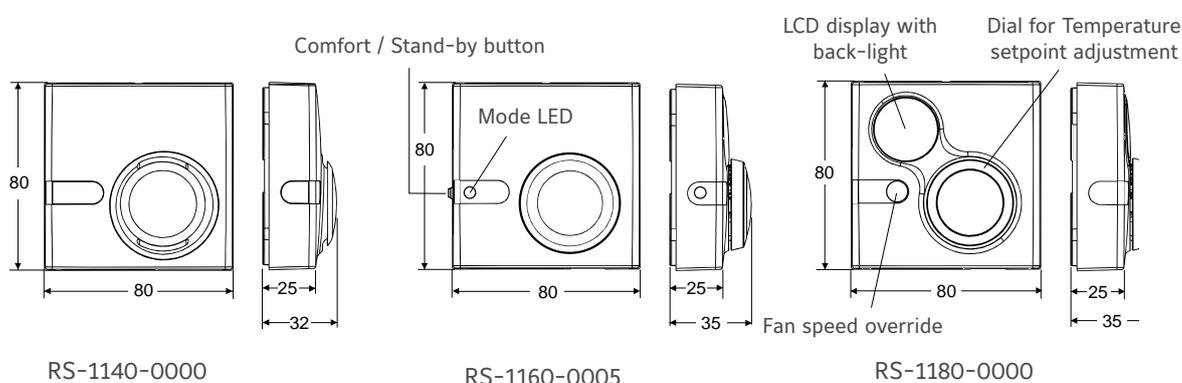
The RS-1100 room command modules are designed for use with any type of Johnson Controls or third party HVAC controllers that can accept a 0...10 V signal directly proportional to the sensed temperature.

Models are available with and without LCD display, room temperature setpoint adjustment dial, temporary occupied override function and fan speed button.

## FEATURES

- Power supply:  
15 VDC (all models)  
24 VAC / VDC (only models with display)
- 0...10 VDC temperature output
- Remote temperature setpoint adjustment
- Occupancy override function (models with or without display)
- Room enclosures 80 x 80 mm
- Protection class: IP30
- Fan speed button

## DIMENSIONS (in mm)





## RS-1100 ANALOG SENSORS

### ORDERING INFORMATION

CODES	TEMPERATURE OUTPUT	LCD DISPLAY	SETPOINT DIAL SCALE	TEMPORARY OCCUPANCY OVERRIDE FUNCTION	FAN SPEED OVERRIDE
RS-1140-0000	0...10 VDC	---	---	---	---
RS-1160-0000		---	12...28°C	Pushbutton	---
RS-1160-0005		---	+/-		---
RS-1180-0000		■	12...28°C	Integrated	---
RS-1180-0005		■	+/-		---
RS-1190-0000		---	12...28°C	---	---
RS-1190-0005		---	+/-		---
RS-1180-0002		■	12...28°C	Integrated	■
RS-1180-0007		■	+/-	Integrated	■

### ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
TM-1100-8931	Plastic surface mounting kit
TM-9100-8900	Special tool for opening enclosure

# SENSORS



## ANALOG SENSORS

### TM-1100

#### ROOM COMMAND MODULE

The TM-1100 series of room command modules are designed for use with the TC-9102, TC-9109 and TCU series of DDC terminal unit controllers.

The setpoint dial enables the room occupant to adjust the working set point of the controller within the range of 12 to 28°C or -3 to +3°, according to the model number.

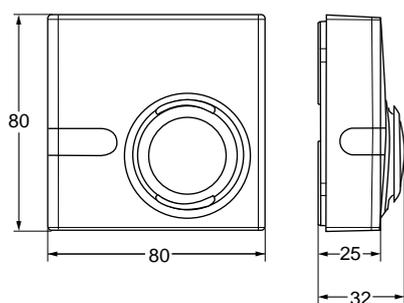
The occupancy button enables the occupant to switch the mode of operation of the controller between COMFORT and STANDBY or to request a temporary COMFORT mode during NIGHT operation.

A LED indicator shows the current operating mode. For TC-9102 and TCU fan coil unit controllers, a room command module with a 3-speed fan override is available. Models without a temperature sensing element are provided for application where the temperature sensor is mounted inside the fan coil unit.

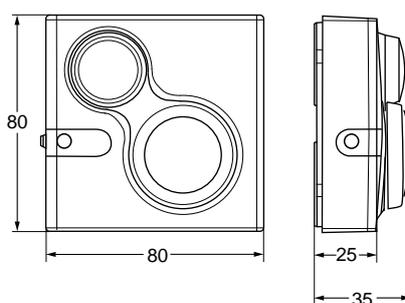
## FEATURES

- Passive sensor
- NTC K2 temperature output
- Remote temperature setpoint adjustment
- 3-speed fan override
- Occupancy override button
- Room enclosures 80 x 80 mm
- Protection class: IP30

## DIMENSIONS (in mm)



TM-1140-0000



TM-1160-0007 and TM-1170-0007



## TM-1100 ANALOG SENSORS

### ORDERING INFORMATION

CODES	BUILT-IN SENSING ELEMENT	TEMPERATURE SETPOINT DIAL SCALE	FAN SPEED OVERRIDE	OCCUPANCY BUTTON		
TM-1140-0000	NTC K2	---	---	---		
TM-1150-0000						
TM-1160-0000		12 to 28°C				
TM-1160-0005		+/-				
TM-1160-0002		12 to 28°C			3-speed fan override	■
TM-1160-0007						
TM-1170-0005	Without	+/-	---			
TM-1170-0007			3-speed fan override			
TM-1190-0000	NTC K2	12 to 28°C	---	---		
TM-1190-0005		+/-				

### ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
TM-1100-8931	Plastic base for surface mount
TE-9100-8501	Unit mount NTC K2 temperature sensor (1.5 m cable)
TM-9100-8900	Special tool for opening enclosure

# SENSORS



## ANALOG SENSORS

### TM-2100

#### ROOM COMMAND MODULE

The TM-2100 series of room command modules are designed for use with the FCC and Facility Explorer series of DDC terminal unit controllers. The setpoint dial enables the room occupant to adjust the working set point of the controller within the range of 12 to 28°C or -3 to +3°, according to the model number.

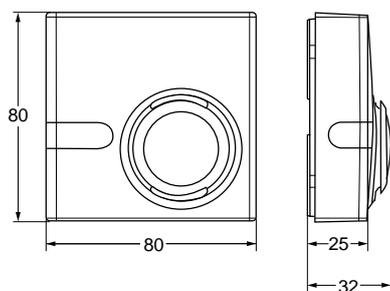
The occupancy button enables the occupant to switch the mode of operation of the controller between COMFORT and STANDBY or to request a temporary COMFORT mode during NIGHT operation.

A LED indicator shows the current operating mode. A Room Command Module with a 3-speed fan override adjuster is available.

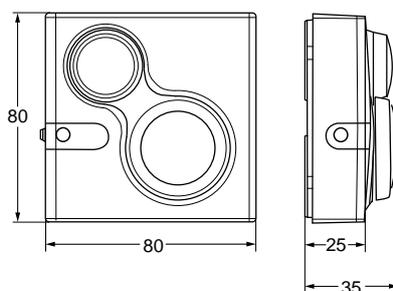
## FEATURES

- Passive sensor
- NTC 10K temperature output
- Remote temperature setpoint adjustment
- 3-speed fan override
- Occupancy override button
- Room enclosures 80 x 80 mm
- Protection class: IP30

## DIMENSIONS (in mm)



TM-2140-0000



TM-2160-0007 and TM-2170-0007



## TM-2100 ANALOG SENSORS

### ORDERING INFORMATION

CODES	BUILT-IN SENSING ELEMENT	TEMPERATURE SETPOINT DIAL SCALE	FAN SPEED OVERRIDE	OCCUPANCY BUTTON
TM-2140-0000	NTC 10K	---	---	---
TM-2150-0000		---		3-speed fan override
TM-2160-0000		12-28°C		
TM-2160-0005		+/-	■	
TM-2160-0002		12-28°C		
TM-2160-0007		+/-		
TM-2190-0000		12-28°C	---	
TM-2190-0005		+/-	---	---

### ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
TM-1100-8931	Plastic base for surface mount
TE-9100-8502	Unit mount NTC K10 temperature sensor (1.5 m cable)
TM-9100-8900	Special tool for opening enclosure

# SENSORS

## ANALOG SENSORS TM-3100

### ROOM COMMAND MODULE

The TM-3100 series room temperature sensor provide passive sensing of temperature in HVAC application.

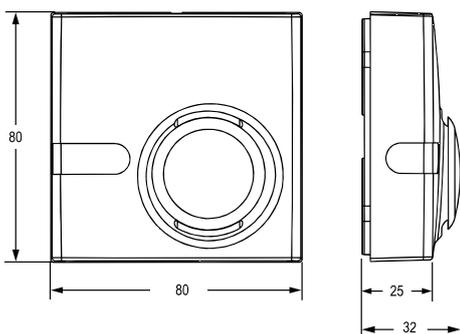
The TM-3100 is equipped with a Pt1000 class A sensing element and provides an output proportional signal to the measured ambient temperature.

The TM-3100 series room temperature sensor is designed for use with the Facility Explorer series and with the Field Equipment controller series.

### FEATURES

- Passive sensor
- Pt1000
- Room enclosure: 80 x 80 mm
- Protection Class: IP30

### DIMENSIONS (in mm)





## TM-3100 ANALOG SENSORS

### ORDERING INFORMATION

CODES	BUILT-IN SENSING ELEMENT	TEMPERATURE SETPOINT DIAL SCALE	FAN SPEED OVERRIDE	OCCUPANCY BUTTON
TM-3140-0000	Pt 1000	---	---	---

### ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
TM-1100-8931	Plastic base for surface mount
TM-9100-8900	Special tool for opening enclosure

# SENSORS

## ANALOG SENSORS

### TE-7000

#### ROOM COMMAND MODULE

The TE-7000 room command module is designed for use with Johnson Controls VAV Modular Assembly.

The module has an NTC temperature sensor, a dial for setpoint adjustment within the range of 12 to 28°C or -3 to +3K, and an occupancy button with an LED indicator.

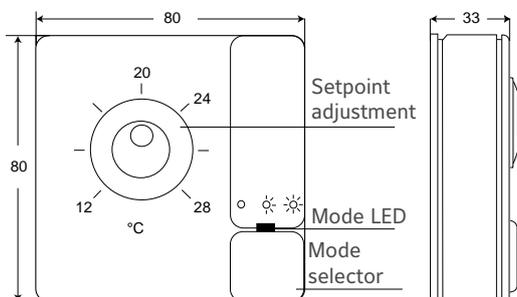
If the VAV controller is not already in occupied mode, as shown by the LED indicator, the occupant may press the occupancy button to obtain comfort control for a set period of time, normally defaulted to one hour.

The module also has a built-in connector for a PC with the software to test and commission the VAV modular assembly and the air supply system.

## FEATURES

- Power supply: +15 Vdc
- Temperature sensor: NTC
- Occupancy override button
- Protection class: IP30
- Remote setpoint adjustment

## DIMENSIONS (in mm)





## TE-7000 ANALOG SENSORS

### ORDERING INFORMATION

CODES	COLOR	SETPOINT DIAL RANGE
TE-7000-8002	Off-white / Gray base	12 to 28°C
TE-7000-8002-W	White / White base	
TE-7000-8003	Off-white / Gray base	-3 to +3 K
TE-7000-8003-W	White / White base	

#### Note

Add **"-K"** to code for setpoint dial with serrated edge, e.g. TE-7000-8002-K, TE-7000-8002-WK

### ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
TE-7000-8900	Service tool connector cable (1.5 m) (for use with IU-9100 converter)
TM-9100-8900	Special tool (to open module)
TM-9100-8901	Dial-Stop screws kit (bag of 100 self-tapping screws)
TM-9100-8902	Serrated knob kit (bag of 10 knobs) - Off-white
TM-9100-8902-W	Serrated knob kit (bag of 10 knobs) - white

# SENSORS

## NETWORK SENSORS

### NS

#### NETWORK ROOM COMMAND MODULE

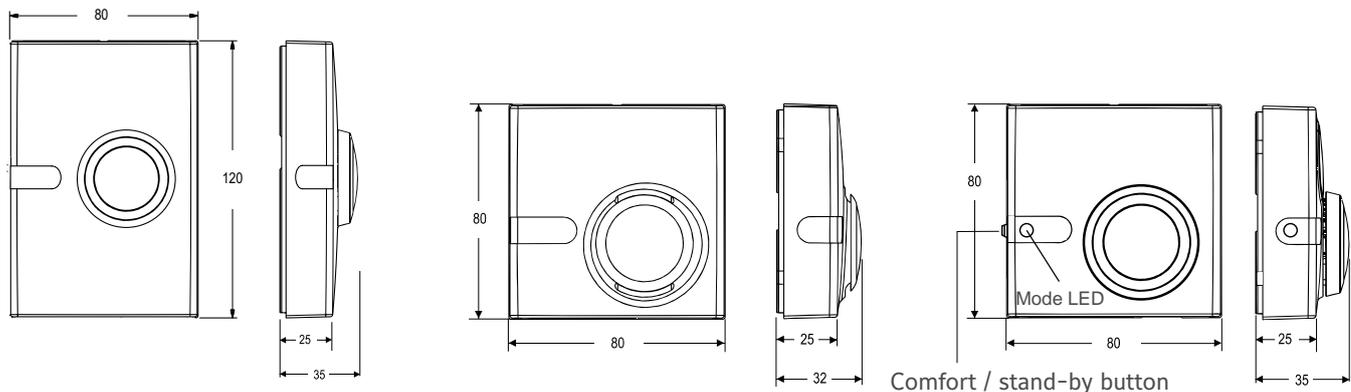
The NS series network sensors are designed to function directly with *Metasys*® system Field Equipment Controllers (FECs), Input/Output Modules (IOMs), Variable Air Volume (VAV) Modular Assembly (VMA16) Controllers.

The majority of NS series network zone sensors monitor room temperature; however, options are available to also monitor zone humidity, carbon dioxide (CO<sub>2</sub>), local temperature setpoint adjustments and other variables. This data is transmitted to a controller on the Sensor Actuator (SA) Bus.

#### FEATURES

- BACnet® Master-Slave/Token-Passing (MS/TP) protocol communication: provides compatibility with *Metasys* system field controllers and Facility Explorer programmable controllers in a proven communication network
- Backlit Liquid Crystal Display (LCD) available on some models: provides real-time status of the environment with backlighting activated during user interaction
- Simple temperature setpoint adjustment available on some models: enables to change the setpoint with the turn of a dial or just pressing up and down buttons
- Temporary occupancy available on some models: provides a timed override command, which temporarily initiates an alternate mode
- Field selectable default display setting on some models: allows to toggle between temperature and RH on the display and set the desired default for continuous viewing
- Fahrenheit/Celsius (F/C) button available on some models: toggles the display temperature between degrees Celsius and degrees Fahrenheit

#### DIMENSIONS (in mm)





## NS - NETWORK SENSORS

### ORDERING INFORMATION

#### SURFACE MOUNTING - TEMPERATURE ONLY MODELS

CODES	LCD DISPLAY	SETPOINT ADJUSTMENT	W/C WARMER AND COOLER (+-3°C)	OCCUPANCY BUTTON	PIR OCCUPANCY	°F/°C SCALE TOGGLE	FAN CONTROL	SCREW TERMINALS	MODULAR JACK	ADDRESS SWITCHES
Size - Height x Width: 80 x 80 mm - Temperature 0 to 40°C										
NS-ATA7001-0	■	■	---	■ <sup>4</sup>	---	---	---	---	■	---
NS-ATA7002-0	■	■	---	■ <sup>4</sup>	---	---	---	■	---	---
NS-ATA7003-0	■	■	---	■ <sup>4</sup>	---	---	---	■	---	■
NS-ATA7004-2 <sup>1</sup>	■	■	---	■ <sup>4</sup>	---	---	---	■	■	■
NS-ATB7001-0	■	■	---	■ <sup>4</sup>	---	■	---	---	■	---
NS-ATB7002-0	■	■	---	■ <sup>4</sup>	---	■	---	■	---	---
NS-ATB7003-0	■	■	---	■ <sup>4</sup>	---	■	---	■	---	■
NS-ATC7001-0	■	■	---	■ <sup>4</sup>	---	---	■	---	■	---
NS-ATC7002-0	■	■	---	■ <sup>4</sup>	---	---	■	■	---	---
NS-ATC7005-2 <sup>1</sup>	■	■	---	■ <sup>4</sup>	---	---	■	■	■	---
NS-ATD7001-0	■	■	---	■ <sup>4</sup>	---	■	■	---	■	---
NS-ATD7002-0	■	■	---	■ <sup>4</sup>	---	■	■	■	---	---
NS-ATF7001-0	■	---	■	■ <sup>4</sup>	---	■	---	---	■	---
NS-ATF7002-0	■	---	■	■ <sup>4</sup>	---	■	---	■	---	---
NS-ATN7001-0	---	---	---	---	---	---	---	---	■	---
NS-ATN7001-2 <sup>1</sup>	---	---	---	---	---	---	---	---	■	---
NS-ATN7003-0	---	---	---	---	---	---	---	■	---	■
NS-ATN7003-2 <sup>1</sup>	---	---	---	---	---	---	---	■	---	■
NS-ATN7004-2 <sup>1</sup>	---	---	---	---	---	---	---	■	■	■
NS-ATP7001-0	---	---	■	■	---	---	---	---	■	---
NS-ATP7001-2 <sup>1</sup>	---	---	■	■	---	---	---	---	■	---
NS-ATP7002-0	---	---	■	■	---	---	---	■	---	---
NS-ATP7002-2 <sup>1</sup>	---	---	■	■	---	---	---	■	---	---
NS-ATP7003-0	---	---	■	■	---	---	---	■	---	■
NS-ATP7003-2 <sup>1</sup>	---	---	■	■	---	---	---	■	---	■
NS-ATV7001-0 <sup>2</sup>	■	■	---	■ <sup>4</sup>	---	■	3	---	■	---
NS-ATV7002-0 <sup>2</sup>	■	■	---	■ <sup>4</sup>	---	■	3	■	---	---

#### Note

- <sup>1</sup> Models without Johnson Controls logo
- <sup>2</sup> VAV Balancing feature
- <sup>3</sup> Fan button is replaced by a light bulb button for the VAV balancing process
- <sup>4</sup> Occupancy activated by dial



## NS - NETWORK SENSORS

### ORDERING INFORMATION

#### SURFACE MOUNTING - TEMPERATURE ONLY MODELS

CODES	LCD DISPLAY	SETPOINT ADJUSTMENT	W/C WARMER AND COOLER (+/-3°C)	OCCUPANCY BUTTON	PIR OCCUPANCY	°F/°C SCALE TOGGLE	FAN CONTROL	SCREW TERMINALS	MODULAR JACK	ADDRESS SWITCHES
Size - Height x Width: 120 x 80 mm - Temperature 0 to 40°C										
NS-BTB7001-0	■	■	---	■ <sup>4</sup>	---	■	---	---	■	---
NS-BTB7001-2 <sup>1</sup>	■	■	---	■ <sup>4</sup>	---	■	---	---	■	---
NS-BTB7002-0	■	■	---	■ <sup>4</sup>	---	■	---	■	---	---
NS-BTB7003-0	■	■	---	■ <sup>4</sup>	---	■	---	■	---	■
NS-BTB7003-2 <sup>1</sup>	■	■	---	■ <sup>4</sup>	---	■	---	■	---	■
NS-BTF7001-0	■	---	■	■ <sup>4</sup>	---	■	---	---	■	---
NS-BTF7002-0	■	---	■	■ <sup>4</sup>	---	■	---	■	---	---
NS-BTL7003-0	---	---	---	■	---	---	---	■	---	■
NS-BTN7001-0	---	---	---	---	---	---	---	---	■	---
NS-BTN7001-2 <sup>1</sup>	---	---	---	---	---	---	---	---	■	---
NS-BTN7003-0	---	---	---	---	---	---	---	■	---	■
NS-BTN7003-2 <sup>1</sup>	---	---	---	---	---	---	---	■	---	■
NS-BTP7001-0	---	---	■	■	---	---	---	---	■	---
NS-BTP7001-2 <sup>1</sup>	---	---	■	■	---	---	---	---	■	---
NS-BTP7002-0	---	---	■	■	---	---	---	■	---	---
NS-BTP7002-2 <sup>1</sup>	---	---	■	■	---	---	---	■	---	---
NS-BTP7003-0	---	---	■	■	---	---	---	■	---	■
NS-BTV7001-0 <sup>2</sup>	■	■	---	■ <sup>4</sup>	---	■	3	---	■	---
NS-BTV7002-0 <sup>2</sup>	■	■	---	■ <sup>4</sup>	---	■	3	■	---	---
NS-MTB7001-0	■	■	---	■ <sup>4</sup>	■	■	---	---	■	---
NS-MTB7002-0	■	■	---	■ <sup>4</sup>	■	■	---	■	---	---
NS-MTB7004-2 <sup>1</sup>	■	■	---	■ <sup>4</sup>	■	■	---	■	■	■
NS-MTL7001-0	---	---	---	■ <sup>4</sup>	■	---	---	---	■	---
NS-MTL7002-0	---	---	---	■	■	---	---	■	---	---
NS-MTN7004-2 <sup>1</sup>	---	---	---	---	■	---	---	■	■	■

#### Note

- <sup>1</sup> Models without Johnson Controls logo
- <sup>2</sup> VAV Balancing feature
- <sup>3</sup> Fan button is replaced by a light bulb button for the VAV balancing process
- <sup>4</sup> Occupancy activated by dial



## NS - NETWORK SENSORS

### ORDERING INFORMATION

#### SURFACE MOUNTING - TEMPERATURE ONLY MODELS, BLACK VERSION

CODES	DISPLAY	SETPOINT ADJUSTMENT	W/C WARMER AND COOLER (+/-3°C)	OCCUPANCY BUTTON	PIR OCCUPANCY	°F/°C SCALE TOGGLE	FAN CONTROL	SCREW TERMINALS	MODULAR JACK	ADDRESS SWITCH
Size - Height x Width: 80 x 80 mm - Temperature 0 to 40°C										
NS-ATA7002-3	■	■	---	■	---	---	---	■	---	---
Size - Height x Width: 120 x 80 mm - Temperature 0 to 40°C										
NS-BTB7001-3	■	■	---	■	---	■	---	---	■	---

#### Note

Occupancy override through the set-point dial.

#### HANDHELD VAV BALANCING TOOL

CODES	DESCRIPTION
NS-ATV7003-0	Handheld VAV balancing tool

#### SURFACE MOUNTING - TEMPERATURE AND HUMIDITY SENSORS WITH PUSH BUTTONS

CODES	LCD DISPLAY	SETPOINT ADJUSTMENT	HUMIDITY ACCURANCY	OCCUPANCY BUTTON *	PIR OCCUPANCY	°F/°C SCALE TOGGLE	RH% /°C TOGGLE	FAN CONTROL	SCREW TERMINALS	MODULAR JACK	ADDRESS SWITCHES
Size - Height x Width: 120 x 80 mm - Temperature 0 to 40°C											
NS-BHM7101-0	■	■	3%	■	---	■	■	---	---	■	---
NS-BHM7102-0	■	■	3%	■	---	■	■	---	■	---	---
NS-BHM7103-0	■	■	3%	■	---	■	■	---	■	---	■
NS-BTJ7001-0	■	■	---	■	---	■	---	---	---	■	---
NS-BTJ7002-0	■	■	---	■	---	■	---	---	■	---	---
NS-BTJ7003-0	■	■	---	■	---	■	---	---	■	---	■
NS-BTK7001-0	■	■	---	■	---	■	---	■	---	■	---
NS-BTK7002-0	■	■	---	■	---	■	---	■	■	---	---
NS-MTJ7001-0	■	■	---	■	■	■	---	---	---	■	---
NS-MTJ7002-0	■	■	---	■	■	■	---	---	■	---	---

#### Note

\* Occupancy is activated by pressing SP buttons

On request the sensor with pushbuttons are available without logo



## NS - NETWORK SENSORS

### ORDERING INFORMATION

#### SURFACE MOUNTING - TEMPERATURE AND HUMIDITY MODELS (WITHOUT RH% DISPLAY)

CODES	DISPLAY TEMPERATURE ONLY	HUMIDITY ACCURACY	SETPOINT ADJUSTMENT	WARMER AND COOLER (+/-3°C)	OCCUPANCY BUTTON	PIR OCCUPANCY	°F/°C SCALE TOGGLE	FAN CONTROL	SCREW TERMINALS	MODULAR JACK	ADDRESS SWITCHES
Size - Height x Width: 80 x 80 mm - Temperature 0 to 40°C											
NS-AHA7001-0	■	3%	■	---	■ <sup>2</sup>	---	---	---	---	■	---
NS-AHA7002-0	■	3%	■	---	■ <sup>2</sup>	---	---	---	■	---	---
NS-AHA7004-2 <sup>1</sup>	■	3%	■	---	■ <sup>2</sup>	---	---	---	■	■	■
NS-AHB7001-0	■	3%	■	---	■ <sup>2</sup>	---	■	---	---	■	---
NS-AHB7002-0	■	3%	■	---	■ <sup>2</sup>	---	■	---	■	---	---
NS-AHB7003-0	■	3%	---	---	■ <sup>2</sup>	---	■	---	■	---	■
NS-AHN7001-0	---	3%	---	---	---	---	---	---	---	■	---
NS-AHN7001-2 <sup>1</sup>	---	3%	---	---	---	---	---	---	---	■	---
NS-AHN7003-0	---	3%	---	---	---	---	---	---	■	---	■
NS-AHN7004-2 <sup>1</sup>	---	3%	---	---	---	---	---	---	■	■	■
NS-AHP7001-0	---	3%	---	■	■	---	---	---	---	■	---
NS-APA7001-0	■	2%	■	---	■ <sup>2</sup>	---	---	---	---	■	---
NS-APA7002-0	■	2%	■	---	■ <sup>2</sup>	---	---	---	■	---	---
NS-APB7001-0	■	2%	■	---	■ <sup>2</sup>	---	■	---	---	■	---
NS-APB7002-0	■	2%	■	---	■ <sup>2</sup>	---	■	---	■	---	---
NS-APB7003-0	■	2%	■	---	■ <sup>2</sup>	---	■	---	■	---	■
Size - Height x Width: 120 x 80 mm - Temperature 0 to 40°C											
NS-BHB7001-0	■	3%	■	---	■ <sup>2</sup>	---	■	---	---	■	---
NS-BHB7002-0	■	3%	■	---	■ <sup>2</sup>	---	■	---	■	---	---
NS-BHB7003-0	■	3%	■	---	■ <sup>2</sup>	---	■	---	■	---	■
NS-BHN7001-0	---	3%	---	---	---	---	---	---	---	■	---
NS-BHN7001-2 <sup>1</sup>	---	3%	---	---	---	---	---	---	---	■	---
NS-BHN7003-0	---	3%	---	---	---	---	---	---	■	-	■
NS-BHP7001-0	---	3%	---	■	■	---	---	---	---	■	-
NS-BHP7003-0	---	3%	---	■	■	---	---	---	■	-	■
NS-BPB7001-0	■	2%	■	---	■ <sup>2</sup>	---	■	---	---	■	---
NS-BPB7002-0	■	2%	■	---	■ <sup>2</sup>	---	■	---	■	---	---
NS-BPB7003-0	■	2%	■	---	■ <sup>2</sup>	---	■	---	■	---	■
NS-MHB7004-2 <sup>1</sup>	■	3%	■	---	■ <sup>2</sup>	■	■	---	■	■	■
NS-MHL7001-0	---	3%	---	---	■	■	---	---	---	■	---
NS-MHL7002-0	---	3%	---	---	■	■	---	---	■	-	---
NS-MHN7004-2 <sup>1</sup>	---	3%	---	---	---	■	---	---	■	■	■

#### Note

<sup>1</sup> Models without Johnson Controls logo

<sup>2</sup> Occupancy activated by dial



## NS - NETWORK SENSORS

### ORDERING INFORMATION

SURFACE MOUNTING - TEMPERATURE AND HUMIDITY MODELS  
(DISPLAY TEMPERATURE OR RH% - FIELD SELECTABLE)

CODES	DISPLAY	HUMIDITY ACCURACY	SETPOINT ADJUSTMENT	W/C WARMER AND COOLER (+/-3°C)	OCCUPANCY BUTTON	PIR OCCUPANCY	°F/°C SCALE TOGGLE	FAN CONTROL	SCREW TERMINALS	MODULAR JACK	ADDRESS SWITCHES
Size - Height x Width: 80 x 80 mm - Temperature 0 to 40°C											
NS-AHR7101-0	■	3%	■	---	■ <sup>2</sup>	---	■	---	---	■	---
NS-AHR7102-0	■	3%	■	---	■ <sup>2</sup>	---	■	---	■	---	---
NS-AHR7103-0	■	3%	■	---	■ <sup>2</sup>	---	■	---	■	---	■
NS-APR7101-0	■	2%	■	---	■ <sup>2</sup>	---	■	---	---	■	---
NS-APR7102-0	■	2%	■	---	■ <sup>2</sup>	---	■	---	■	---	---
Size - Height x Width: 120 x 80 mm - Temperature 0 to 40°C											
NS-BHR7101-0	■	3%	■	---	■ <sup>2</sup>	---	■	---	---	■	---
NS-BHR7103-0	■	3%	■	---	■ <sup>2</sup>	---	■	---	■	---	■

### FLUSH MOUNT - TEMPERATURE ONLY MODELS

CODES	DISPLAY	SCREW TERMINALS	MODULAR JACK	ADDRESS SWITCHES
Size - Height x Width: 114 x 70 mm - Temperature 0 to 40°C				
NS-FTN7003-0	---	■	---	■
NS-FTN7003-2 <sup>1</sup>	---	■	---	■

### SURFACE MOUNTING - PIR OCCUPANCY ONLY MODELS

CODES	PIR OCCUPANCY	SCREW TERMINALS	MODULAR JACK	ADDRESS SWITCHES
Size - Height x Width: 120 x 80 mm				
NS-MNN7001-0	■	---	■	---
NS-MNN7003-0	■	■	---	■
NS-MNN7004-2 <sup>1</sup>	■	■	■	■

#### Notes

<sup>1</sup> Models without Johnson Controls logo

<sup>2</sup> Occupancy activated by dial



## NS - NETWORK SENSORS

### ORDERING INFORMATION

#### SURFACE MOUNTING - CO<sub>2</sub> OCCUPANCY ONLY MODELS

CODES	RANGE (PPM)	SCREW TERMINALS	MODULAR JACK	ADDRESS SWITCHES
Size - Height x Width: 120 x 80 mm				
NS-BCN7004-0	2.000	■	■	■
NS-BCN7004-2 <sup>1</sup>	2.000	■	■	■

#### DUCT MOUNTING - DISCHARGE AIR SENSORS

CODES	SCREW TERMINALS + CABLE (3 m LENGTH)	PROBE LENGTH (mm)	ADDRESS SWITCHES
Size - Height x Width: 76 x 76 mm - Temperature -10 to 60°C			
NS-DTN7043-0	■	102	■
NS-DTN7043-2 <sup>1</sup>	■		■
NS-DTN7083-0	■	203	■
NS-DTN7083-2 <sup>1</sup>	■		■

#### Notes

<sup>1</sup> Models without Johnson Controls logo

<sup>2</sup> Occupancy activated by dial

# SENSORS

## WIRELESS SENSORS

### WRZ

#### ZIGBEE WIRELESS PROTOCOL

The WRZ series wireless room sensors are designed to sense room/zone temperature and transmit wireless temperature control data. Some models also sense and transmit relative humidity.

In a ZFR1800 series wireless field bus system application, the sensors communicate with FEC16 Series, FEC26 series and VMA16 series controllers by means of the ZFR1811 router.

In wired field bus applications, the sensors communicate with a WRZ-7860 wireless receiver. The WRZ-7860 receiver transfers data to the controller by means of the Sensor Actuator (SA) communication bus. In a typical application, one WRZ series sensor reports to one WRZ-7860 receiver, but up to five WRZ series sensors can be associated with a single WRZ-7860 receiver for multi-sensor averaging or high/low temperature selection.

WRZ series sensor models are available with or without a Liquid Crystal Display (LCD). Depending on the sensor model, the WRZ series sensor can transmit sensed temperature, setpoint temperature, sensed humidity, occupancy status and PIR occupancy sensor and low battery conditions to an associated router or receiver. The WRZ series sensors are designed for indoor, intra-building applications only.

The WRZ sensors use direct-sequence, spread-spectrum RF technology, and operate on the 2.4 GHz Industrial, Scientific and Medical (ISM) band. The receiver meets the IEEE 802.15.4 standard for low power, low duty cycle RF transmitting systems.

*Refer to the WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653) for important product application information.*

## FEATURES

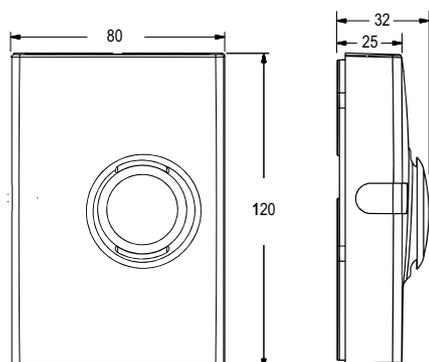
- Wireless RF design
- Integral wireless signal strength testing built into the sensor
- Easy installation and relocation
- Easily-applicable data types
- Simple, field adjustable DIP switches
- Optional, battery-powered WRZ-SST-110 wireless system survey tool
- High resistance to RF interference from other radio devices or RF noise sources
- User selectable default display for humidity models
- Display models
- Three temperature setpoint range options





## WRZ - WIRELESS SENSORS

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	DESCRIPTION
WRZ-THB0000-0	Wireless room temperature and humidity sensor with display, warmer/cooler (+/-) setpoint adjustment or setpoint adjustment scale: 13 to 27°C, F/C button, relative humidity (RH) button and manual occupancy override button
WRZ-THN0000-0	Wireless room temperature and humidity sensor with battery level/signal strength LED and manual occupancy override button
WRZ-THP0000-0	Wireless room temperature and humidity sensor with warmer/cooler (+/-) setpoint adjustment and manual occupancy override button
WRZ-TTB0000-0	Wireless room temperature sensor with display, F/C button and manual occupancy override button
WRZ-TTD0000-0	Wireless room temperature sensor with display, F/C Button, fan speed control and manual occupancy override button
WRZ-TTP0000-0	Wireless room temperature sensor with warmer/cooler (+/-) setpoint adjustment, battery level/signal strength LED and manual occupancy override button
WRZ-TTR0000-0	Wireless room temperature sensor with battery level/signal strength LED, manual occupancy override button and no setpoint adjustment
WRZ-TTS0000-0	Wireless room temperature sensor with setpoint adjustment scale: 13 to 27°C, battery level/signal strength LED and manual occupancy override button
WRZ-MNN0100-0	Wireless Zigbee™ sensor, occupancy (PIR)
WRZ-MTN0100-0	Wireless Zigbee™ sensor, occupancy (PIR), temperature, no display
WRZ-MHN0100-0	Wireless Zigbee™ sensor, occupancy (PIR), temperature, 3% relative humidity, no display
WRZ-MTB0100-0	Wireless sensor, occupancy (PIR), temperature, display, warmer/cooler dial, Fahrenheit/Celsius pushbutton, occupancy override
WRZ-SST-120	Wireless system survey tool



## WRZ - WIRELESS SENSORS

### ORDERING INFORMATION

#### WRZ SENSOR MODEL COMPARISON

CODES	TEMPERATURE	3% HUMIDITY	DISPLAY	F/°C BUTTON	FAN CONTROL	OCCUPANCY OVERRIDE	PIR OCCUPANCY SENSOR	SETPOINT ADJUSTMENT DIAL *
WRZ-THB0000-0	■	■	■	■	---	■	---	CONFIG
WRZ-THN0000-0	■	■	---	---	---	■	---	NO DIAL
WRZ-THP0000-0	■	■	---	---	---	■	---	W/C
WRZ-TTB0000-0	■	---	■	■	---	■	---	CONFIG
WRZ-TTD0000-0	■	---	■	■	■	■	---	CONFIG
WRZ-TTP0000-0	■	---	---	---	---	■	---	W/C
WRZ-TTR0000-0	■	---	---	---	---	■	---	NO DIAL
WRZ-TTS0000-0	■	---	---	---	---	■	---	SCALED
WRZ-MNN0100-0	---	---	---	---	---	---	■	NO DIAL
WRZ-MTN0100-0	■	---	---	---	---	---	■	NO DIAL
WRZ-MHN0100-0	■	■	---	---	---	---	■	NO DIAL
WRZ-MTB0100-0	■	---	■	■	---	■	■	W/C

#### Note

\* Warmer/cooler temperature offset (W/C), single-value in 13 to 29°C range (SCALED), CONFIG - system-configured (available on display models only)



## ELECTRIC FANCOIL THERMOSTAT

### T125-E

#### STAND-ALONE FANCOIL THERMOSTATS

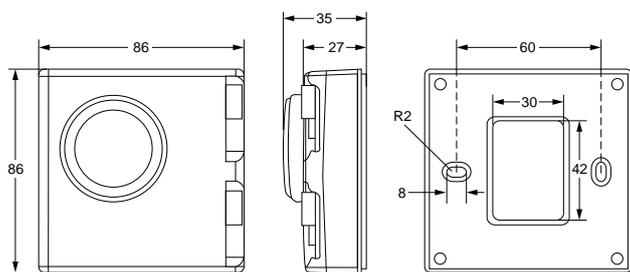
T125 electric fan coil thermostats are designed to control heating, cooling, or air conditioning unit in commercial, industrial and residential installation.

Typical application includes the control of fan coil units, packaged terminal air conditioners and combination heating and cooling equipment. As part of the system that consists of a two-way or three-way valve and a multi-speed line voltage fan.

### FEATURES

- 220 V power supply
- Heating and Cooling mode
- 2-4 pipes configuration
- 3-speed fan override
- 86 x 86 mm room enclosures
- Temperature dial ranges 10 to 30°C
- Relay output max. 5A

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	BUILT-IN NTC	SETPOINT RANGE	2 PIPES (HEATING OR COOLING)	4 PIPES (HEATING AND COOLING)	OUTPUTS	
					PAT	ON/OFF
T125BAC-JS0-E	■	10 to 30°C	■	---	■	■
T125FAC-JS0-E			---	■	---	■

AVAILABLE  
IN SPRING 2019

## ELECTRIC FANCOIL THERMOSTAT

### T7200

#### STAND-ALONE FANCOIL THERMOSTATS

The T7200 Series Modbus® LCD thermostats are designed to control heating and cooling through air conditioning unit in commercial and residential application.

Typical applications include the control of fancoil units, floor heating, packaged terminal air conditioners and combination of heating and cooling equipment.

T7200 with its large LCD screen displays the working mode (cooling, heating, air venting, floor heating), fan speed, indoor temperature and set point.



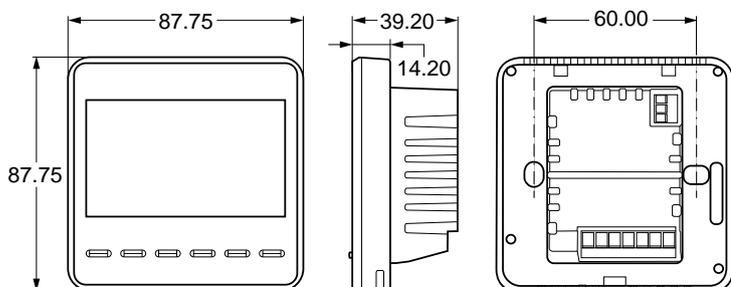
## FEATURES

- Flush mount for a stylish appearance
- Large screen backlighted with timeout
- Stand Alone
- 2 or 4-pipes ON/OFF or Proportional
- Multispeed Fan or Proportional Fan speed (ECM)
- Customizable display can show actual temperature or setpoint only
- Protected against misuse in public spaces
- Function, On/Off Timer, ESP filter control



## T7200 - ELECTRIC FANCOIL THERMOSTAT

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	APPLICATION	VALVE CONTROL	OTHERS CONTROL	FAN CONTROL	
T7200-TB20-9J00	2-pipe FCU, ON/OFF	1 x relay (SPST) output	---	3 x relay (SPST) output	
	Floor heating	---	Floor heating 1 x relay (SPST) output	---	
T7200-TF20-9JS0	2-pipe FCU, ON/OFF	1 x relay (SPST) output	---	3 x relay (SPST) output	
	4-pipe FCU, ON/OFF	2 x relay (SPST) output	---		
	2-pipe FCU, Floating	2 x relay (SPST) output	---		
	2-pipe FCU with TiO <sub>2</sub> /ESP, ON/OFF	1 x relay (SPST) output	TiO <sub>2</sub> /ESP 1 x relay (SPST) output		
	2-pipe FCU with floor heating, ON/OFF	1 x relay (SPST) output	Floor heating 1 x relay (SPST) output		
	Water source heat pump	1 x relay (SPST) output	Reversing valve 1 x relay (SPST) output		
T7200-TB21-9JS0	2-pipe FCU, ON/OFF	1 x relay (SPST) output	---	ECM fan 1 x 0-10VDC output 1 x relay (SPST) output	
	4-pipe FCU, ON/OFF	2 x relay (SPST) output	---		
	2-pipe FCU, Floating	2 x relay (SPST) output	---		
	2-pipe FCU with TiO <sub>2</sub> /ESP, ON/OFF	1 x relay (SPST) output	TiO <sub>2</sub> /ESP 1 x relay (SPST)		
	2-pipe FCU with floor heating, ON/OFF	1 x relay (SPST) output	Floor heating 1 x relay (SPST) output		
	Water source heat pump	1 x relay (SPST) output	Reversing valve 1 x relay (SPST) output		
	Single fan speed AHU	1 x 0-10VDC output	Damper 1 x relay (SPST) output		1 x relay (SPST) output
	2-pipe FCU, Proportional	1 x 0-10VDC output	---		3 x relay (SPST) output

#### Note

1. User can configure one model to different applications by parameter setting
2. T7200-TB20-9J00 and T7200-TB20-9J0B don't have remote sensor input and binary input; T7200-TF20-9JS0 and T7200-TB21-9JS0 only have binary input

## ELECTRIC FANCOIL THERMOSTAT

### T7600

Modbus® FANCOIL THERMOSTATS

The T7600 Series Modbus® LCD thermostats are designed to control heating and cooling through air conditioning unit in commercial and residential application.

Typical applications include the control of fancoil units, floor heating, packaged terminal air conditioners and combination of heating and cooling equipment. As part of the system, T7600 series thermostat can control 2-way or 3-way valve and multiplespeed line voltage fan or ECM fan.

T7600 with its large LCD screen displays the working mode (cooling, heating, air venting, floor heating), fan speed, indoor temperature and set point.



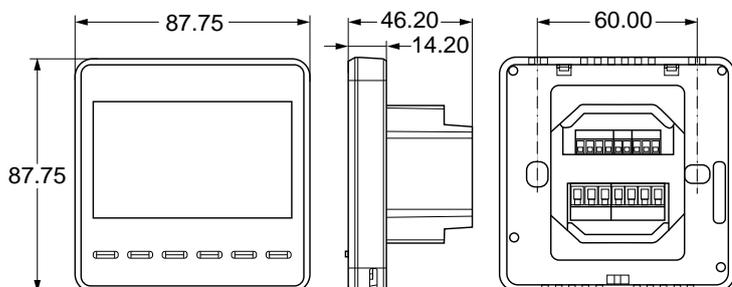
## FEATURES

- Flush mount for a stylish appearance
- Large screen backlighted with timeout
- Stand Alone or Communicating in Modbus® RTU
- 2 or 4-pipes ON/OFF or Proportional
- Multispeed Fan or Proportional Fan speed (ECM)
- Customizable display can show actual temperature or setpoint only
- Protected against misuse in public spaces
- Configurable inputs
- Function, On/Off Timer, ESP filter control



## T7600 - ELECTRIC FANCOIL THERMOSTAT

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	POWER	MODE	INPUT	VALVES OUTPUTS	FAN CONTROLS	OPERATING CONDITION	COMM
T7601-TF20-9JSO	100-240 VAC 50/60 Hz	2 or 4-pipe On/Off 2-pipe three wires On/Off 2-pipe with floor heating 2-pipe with TiO2/ESP filter 2-pipe proportional (AO) Water source heat pump	<b>Input 1:</b> Remote Sensor or Autochangeover *	2 x SPST Relay 2.2A @ 240 VAC	ECM AO = 0 to 10 V Configurable with Cut-off relay	0 to 40°C 10 - 90 RH% non condensing	Modbus®
T7600-TF21-9JSO		Two pipe proportional (AO) Four pipe proportional (AO)	<b>Input 2 Configurable:</b> Occupancy, SP reduction	2 x AO 0 to 10 V (100 K Ohms)	3 x SPST Relay 2.2A @ 240 VAC		
T7600-TF20-9JSO		Two or four pipe On/Off Two pipe three wires On/Off Two pipe with floor heating Two pipe with TiO2/ESP filter Water source heat pump	Dew point alarm Shut off Filter alarm	2 x SPST Relay 2.2A @ 240 VAC	3 x SPST Relay 2.2A @ 240 VAC		
T7600-TB21-9JAO		Two pipe Proportional with Feedback	<b>Input 1:</b> Remote Sensor or Autochangeover *	<b>Input 2 Configurable:</b> Occupancy, SP reduction Dew point alarm Shut off Filter alarm	<b>Input 3:</b> AI for Valve Motor feedback to BMS		

#### Note

\* Input 1 can be used for remote temperature monitoring or in two pipe system to determine the seasonal changeover. Requires a 10K NTC JC Type II.

## ELECTRIC FANCOIL THERMOSTAT

### T8800

BACnet® MS/TP THERMOSTATS

The T8800 touch screen thermostats designed to control heating and cooling in commercial, industrial and residential installation.

Typical applications include the control of fan coil units, packaged terminal air conditioners and combination of heating and cooling equipment. As part of the system, the T8800 thermostats control two-way or three-way valves and multi-speed line voltage fans.

The T8800 can communicate with any Building Automation System. The T8800 models are designed to be connected to the Johnson Controls Building Automation System *Metasys*® using BACnet MS/TP communication.

The integration in *Metasys* improves usability and enhances energy saving strategies.

The large LCD touchscreen display of the T8800 thermostat provides the status of current working mode, the fan speed, the indoor temperature and the temperature set point.



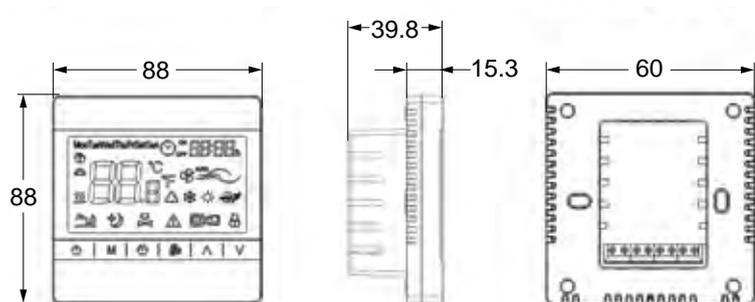
## FEATURES

- Stylish appearance
- Touch screen backlighted with timeout
- Stand Alone or Communicating
- BACnet MS/TP
- Protected against misuse (Keys lockable)
- Remote or occupancy options
- Timer function, runtime and On/Off Timer



## T8800 - ELECTRIC FANCOIL THERMOSTAT

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	POWER	MODE	INPUT	VALVES CONTROL	FAN CONTROLS	WORKING RANGE	COMMUNICATION
T8800-TB40-9JS0	AC 20-30 V 50/60 Hz	2-pipe, On/Off heating or cooling	Remote sensor *	On/Off relay 2A 24 Vn	Three speed relays 2A 24 Vn	0 to 45°C 90 Rh% non condensing	BACnet MS/TP
T8800-TF40-9JS0		4-pipe, On/Off heating and cooling	OR Occupancy NO/NC contact				

#### Note

\* Input accepts standard NTC 10K Type II, TS-6340K-F00 cable sensor can be order when appropriated.

## SMART THERMOSTAT CONTROLLERS

### TEC3000

STAND-ALONE, BACnet® MS/TP OR N2 NETWORKED

The TEC3000 series thermostat controllers are stand-alone, and field-selectable BACnet® Master-Slave/Token-Passing or N2 networked devices that provide on/off, floating, and proportional control of the following:

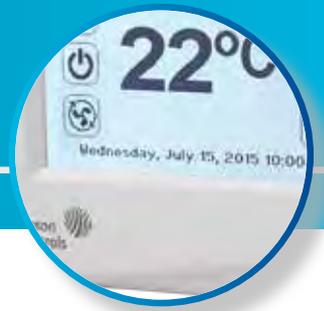
- Local hydronic reheat valves
- Pressure-dependent VAV equipment with or without local reheat
- Two-or four-pipe fan coils
- Cabinet unit heaters
- Other zoning equipment using an ON/OFF, floating, or 0 to 10 VDC proportional control input

Models also provide single-or two-stage control of unitary rooftop units (RTUs) with or without economizers and heat pumps.

## FEATURES

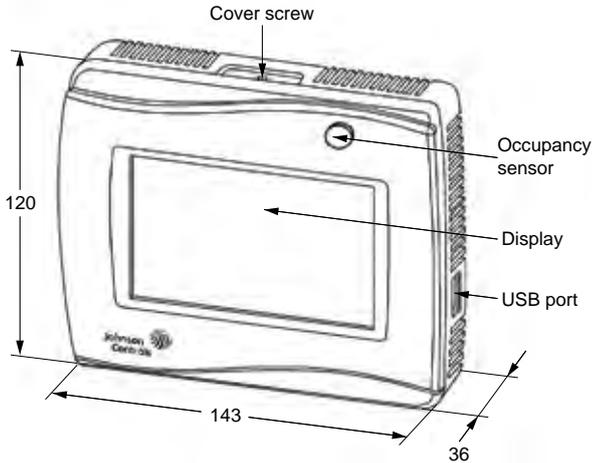
- Stand alone or BACnet (MS/TP) or N2 Bus
- Touchscreen display with timeout of the adjustable backlight
- Customizable user interface with password protection
- Local weekly schedules available via BACnet
- Mobile Access Portal (MAP) gateway compatibility
- Auto-tuning (PRAC+) and optimal start
- Measurement trends of the last 24 hours
- Commissioning menu and fault diagnostic warnings
- USB port for back-up, restore and cloning
- Multiple fan configurations On/Off or VSD (0...10V)
- Optional on board occupancy sensor (PIR)
- Optional integral humidity sensor with dehumidification





## TEC3000 - SMART THERMOSTAT CONTROLLERS

### DIMENSIONS (in mm)



### ORDERING INFORMATION

#### STAND ALONE MODELS

CODES	EQUIPMENT CONTROL	OPTIONS	OUTPUTS	INPUTS
TEC3310-00-000	ON/OFF and Floating 2 or 4-pipe FCU or VAV with or w/o auto change-over and reheating	T Only	---	<ul style="list-style-type: none"> <li>• 2 BI Configurable: Windows, OCC, fan status, filter</li> <li>• 1 AI Supply Temperature, contact or passive sensor</li> <li>• 1 AI Remote zone passive sensor</li> </ul>
TEC3311-00-000			PIR	
TEC3312-00-000		T+RH%	---	
TEC3313-00-000			PIR	
TEC3320-00-000	Proportional 2 or 4-pipe FCU or VAV with or w/o auto change-over and reheating	T Only	---	<ul style="list-style-type: none"> <li>• 2 BI Configurable: Windows, OCC, fan status, filter</li> <li>• 1 AI Supply Temperature, passive sensor</li> <li>• 1 AI Remote zone passive sensor</li> </ul>
TEC3321-00-000			PIR	
TEC3322-00-000		T+RH%	---	
TEC3323-00-000			PIR	
TEC3330-00-000	Single / two stage RTU / Heatpump / Economizer	T Only	---	<ul style="list-style-type: none"> <li>• 2 BI Configurable: Windows, OCC, fan status, filter</li> <li>• 1 AI Supply Temperature, passive sensor</li> <li>• 1 AI Remote passive sensor</li> <li>• 1 AI Outside passive sensor</li> </ul>
TEC3331-00-000			PIR	



## TEC3000 - SMART THERMOSTAT CONTROLLERS

### ORDERING INFORMATION

#### BACnet® MS/TP OR N2 NETWORKED MODELS

CODES	EQUIPMENT CONTROL	OPTIONS	OUTPUTS	INPUTS	
TEC3610-00-000	ON/OFF and Floating 2 or 4-pipe FCU or VAV with or w/o auto change-over and reheating	T Only	---	<ul style="list-style-type: none"> <li>• 3 BO Fan speed</li> <li>• 4 BO Heat/cooling</li> <li>• 1 BO Aux</li> <li>• 1 AO Fan VSD</li> </ul>	<ul style="list-style-type: none"> <li>• 2 BI Configurable: Windows, OCC, fan status, filter</li> <li>• 1 AI Supply temp contact or passive sensor</li> <li>• 1 AI Remote zone passive sensor</li> </ul>
TEC3611-00-000			PIR		
TEC3612-00-000		T+RH%	---		
TEC3613-00-000			PIR		
TEC3620-00-000	Proportional 2 or 4-pipe FCU or VAV with or w/o auto change-over and reheating	T Only	---	<ul style="list-style-type: none"> <li>• 3 BO Fan speed</li> <li>• 1 BO Aux</li> <li>• 2 AO Heat/cooling</li> <li>• 1 AO Fan VSD</li> </ul>	
TEC3621-00-000			PIR		
TEC3622-00-000		T+RH%	---		
TEC3623-00-000			PIR		
TEC3630-00-000	Single / two stage RTU / heatpump / economizer	T Only	---	<ul style="list-style-type: none"> <li>• 2 BO Cooling stage 1/2</li> <li>• 2 BO Heating stage 1/2</li> <li>• 1 BO Fan</li> <li>• 1 AO Economizer</li> </ul>	<ul style="list-style-type: none"> <li>• 2 BI Configurable: Windows, OCC, fan status, filter</li> <li>• 1 AI Supply T. passive sensor</li> <li>• 1 AI Remote passive sensor</li> <li>• 1 AI Outside passive sensor</li> </ul>
TEC3631-00-000			PIR		

### TECHNICAL SPECIFICATION

Power Requirements	19 to 30 VAC, 50/60 Hz, 4 VA at 24 VAC nominal, Class 2 or safety extra-low voltage (SELV)
Touch screen display	4,2" Backlit dimmable, with backlight time-out
Analog output rating	0 to 10 VDC into 2k ohm resistance – minimum (Proportional Control Models)
Relay contact rating	19 to 30 VAC, 1.0 A maximum, 15 mA minimum, 3.0 A in-rush
Binary Inputs	Dry contact across terminal COM to terminals BI1, BI2 or COS
Analog Inputs	Nickel, platinum, A99B, 2.25k NTC, 10k NTC, 10k NTC Type 3
MS/TP Network	Up to 100 devices maximum per Network Automation Engine (NAE); 1,219 m maximum cable length, repeaters can be added to extend this length BACnet Testing Laboratories™ (BTL) 135-2001 Listed BACnet Application Specific Controller (B-ASC)
Temperature Range	
<i>Backlit display</i>	-40.0 to 50.0°C in 0.5° increments
<i>Heating control</i>	4.5 to 32.0°C
<i>Cooling control</i>	12.0 to 38.0°C
Accuracy	
<i>Temperature</i>	±0.5 °C at 21.0 °C typical calibrated
<i>Humidity</i>	±5% RH from 20 to 80% RH at 10 to 32 °C
Minimum Deadband	1°C between heating and cooling
Occupancy Sensor (PIR)	Minimum of 94 angular degrees up to a distance of 4.6 m; based on a clear line of sight
Ambient Conditions	
<i>Operating</i>	0 to 50°C; 95% RH maximum, non-condensing
<i>Storage</i>	-30 to 50°C; 95% RH maximum, non-condensing
CE Compliance	Johnson Controls declares that this product complies with the essential requirements and other relevant provisions of the Low Voltage Directive (LVD), the EMC Directive, and the RoHS Directive.

## ANALOG ROOM CONTROLLER

## TC-8900 / PM-8900

### ROOM THERMOSTATS

TC-8900 is a family of analogue controllers designed for control of fan coils with 2-pipe, 2-pipe with change-over, 2-pipe with electrical coil or 4-pipe configurations.

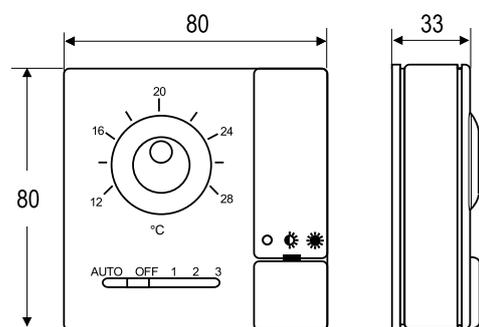
For applications without fan speed control the family includes stand alone units (TC-890x), local controllers (TC-893x) with remote setpoint module (ES-8930) and local controllers (TC-894x) with central setpoint module (ES-8940).

For applications with fan speed control the family includes the PM-8900 power modules in connection with TC-894x with or without central setpoint module (ES-8940).

### FEATURES

- 2-pipe, 2-pipe with change-over, 2-pipe with electrical coil or 4-pipe configurations with and without 3-speed fan override
- 80 x 80 mm room enclosures
- Temperature dial ranges 12 to 28°C, +/-
- 24 VAC power supply for the TC-8900 controls, 230 VAC in connection the the PM-8900 power module

### DIMENSIONS (in mm)





## TC-8900 / PM-8900 - ANALOG ROOM CONTROLLER

### ORDERING INFORMATION

#### TC-890x STAND ALONE CONTROLLERS

CODES	BUILT-IN NTC K10 SENSING ELEMENT	SETPOINT RANGE	INPUT 0...10 V	FAN OUTPUT	OUTPUTS						
					PAT	0...10 V	DAT	ON/OFF			
TC-8903-1131-WK	■	12 to 28°C	---	---	1	---	---	---			
TC-8901-2131-WK					---	2	---	---			
TC-8904-2131-WK					---	---	2	---			
TC-8906-2131-WK					---	---	---	2			
TC-8903-1132-WK	---				12 to 28°C	---	---	1	---	---	---
TC-8901-2132-WK								---	2	---	---
TC-8904-2132-WK								---	---	2	---
TC-8906-2132-WK								---	---	---	2
TC-8903-1151-WK	■	0 to 40°C	---	---				1	---	---	---
TC-8903-1152-WK								1	---	---	---
TC-8903-1183-WK	---	0...100%	---	---				1	---	---	---
TC-8901-2183-WK								---	2	---	---

#### TC-893x LOCAL CONTROLLERS WITH ES-8930-3031-WK REMOTE SETPOINT MODULE

CODES	BUILT-IN NTC K10 SENSING ELEMENT	SETPOINT RANGE	FAN OUTPUT	OUTPUTS			
				PAT	0...10 V	DAT	ON/OFF
TC-8933-1112-W	---	---	---	1	---	---	---
TC-8931-2112-W				---	2	---	---
TC-8934-2112-W				---	---	2	---
TC-8936-2112-W				---	---	---	2
ES-8930-3031-WK	■	12 to 28°C	---	---	---	---	



## TC-8900 / PM-8900 - ANALOG ROOM CONTROLLER

### ORDERING INFORMATION

#### TC-894x LOCAL CONTROLLERS WITH ES-8940 CENTRAL SETPOINT MODULE

CODES	BUILT-IN NTC K10 SENSING ELEMENT	SETPOINT RANGE	FAN OUTPUT	OUTPUTS			
				PAT	0...10 V	DAT	ON/OFF
TC-8943-1141-WK	■	+/-	---	1	---	---	---
TC-8941-2141-WK				---	2	---	---
TC-8944-2141-WK				---	---	2	---
TC-8946-2141-WK				---	---	---	2
ES-8940-4130-WK	---	12 to 28°C		---	---	---	---

#### TC-894x LOCAL CONTROLLERS WITH ES-8940 CENTRAL SETPOINT MODULE

CODES	BUILT-IN NTC K10 SENSING ELEMENT	SETPOINT RANGE	FAN OUTPUT	OUTPUTS	POWER MODULE CODES	CONFIGURATION		
TC-8902-1031-WK	■	12 to 28°C	3 Speed	1 x 0...10 VDC 1 x DAT 230 V 1 x DAT 24 V	PM-8902-0500 PM-8905-0300 PM-8905-0500	2-pipe with change over		
TC-8907-1031-WK				1 x Relay 3A 230 V/24 V	PM-8907-0300			
TC-8902-2031-WK				2 x 0...10 VDC 2 x DAT 230 V 2 x DAT 24 V	PM-8902-0500 PM-8905-0300 PM-8905-0500	4-pipe		
TC-8907-2031-WK				2 x Relay 3A 230 V/24 V	PM-8907-0300			
TC-8902-1032-WK	---			12 to 28°C	3 Speed	1 x 0...10 VDC 1 x DAT 230 V 1 x DAT 24 V	PM-8902-0500 PM-8905-0300 PM-8905-0500	2-pipe with change over
TC-8907-1032-WK						1 x Relay 3A 230 V/24 V	PM-8907-0300	
TC-8902-2032-WK						2 x 0...10 VDC 2 x DAT 230 V 2 x DAT 24 V	PM-8902-0500 PM-8905-0300 PM-8905-0500	4 pipe
TC-8907-2032-WK						2 x Relay 3A 230 V/24 V	PM-8907-0300	
TC-8942-2041-WK (only in connection with ES-8940-4130-WK)	■	+/- on local controller TC-89, 12 to 28°C on ES-8940 central setpoint module				2 x 0...10 VDC 2 x DAT 230 V 2 x DAT 24 V	PM-8902-0500 PM-8905-0300 PM-8905-0500	4 pipe
TC-8947-2041-WK (only in connection with ES-8940-4130-WK)						2 x Relay 3A 230 V/24 V	PM-8907-0300	

## ELECTRONIC HEATING CONTROLLER

### ER65-DRW

DIGITAL CONTROLLER HOT WATER AND AIR UNIT

The controller is a digital device for domestic or residential heating units. It covers water and air heating applications.

All-in-one design allows full flexibility to apply a single controller to many small heating applications.

The controller incorporates a comprehensive energy saving application, and can be connected to a supervisory system via its on board communications port.

### FEATURES

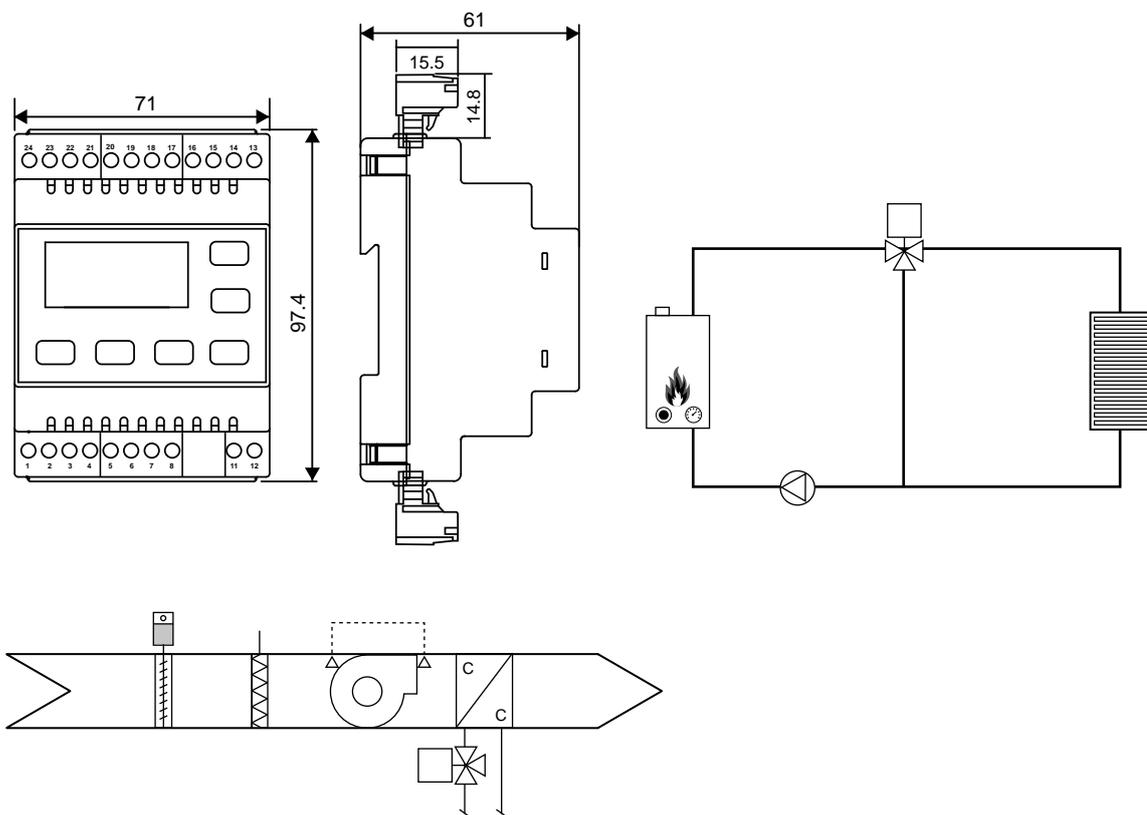
- Standard heating systems
- Compact design: up to 3 sensors, 2 digital inputs and 5 outputs in a 4 DIN modules housing
- Robust front panel for durability and long term use
- Removable plug connectors for quick mounting and wiring
- Direct 230 V supply: no external transformer required
- Embedded RS485: no additional communication card required
- Pre-set models and selectable options to extend controller options





## ER65-DRW ELECTRONIC HEATING CONTROLLER

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODE	DESCRIPTION
ER65-DRW-501C	Heating controller, sensor not included, compatible with the ER-NTC sensor line, Modbus® communication

# HVAC CONTROL PRODUCTS

## PNEUMATIC AND TRANSDUCERS

## ELECTRO-PNEUMATIC TRANSDUCERS

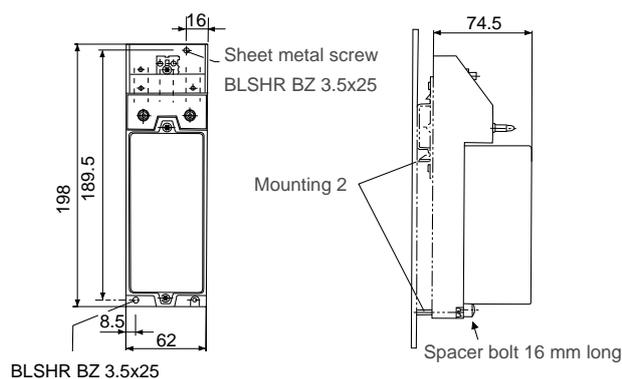
# EP-1110



The EP-1110 is an electric to air pressure transducer designed to convert an electrical input signal into a pressure output with a linear relationship. It is using a force balance with moving coil system.

The input signal 0...+10 V or 0...20 mA is converted to an output signal 0,2...1 bar.

## DIMENSIONS (in mm)



## ORDERING INFORMATION

CODES	INPUT	OUTPUT
EP-1110-7001	0...10 V (DC), $R_i \geq 1 \text{ k}\Omega$ , current through coil approx. 10 mA	20-100 kPa, linearly proportional to input
EP-1110-7002	2...10 V (DC), 0...10 V (DC), $R_i \geq 1 \text{ k}\Omega$ , current through coil approx. 10 mA	20-100 kPa, 3...100 kPa, linearly proportional to input
EP-1110-7003	0...20 mA (DC), $R_i \leq 450 \Omega$ , current through coil approx. 10 mA	20-100 kPa, linearly proportional to input
EP-1110-7004	4...20 V (DC), 0...20 mA (DC), $R_i \leq 450 \Omega$ , current through coil approx. 10 mA	20-100 kPa, 3...100 kPa, linearly proportional to input

# HVAC CONTROL PRODUCTS

## PNEUMATIC AND TRANSDUCERS

## ELECTRO-PNEUMATIC TRANSDUCERS

# EP-2000

The EP-2000 electro-pneumatic transducer with motor drive is used for converting an electrical contact signal into a 0.2 to 1.0 bar pneumatic standard signal.

The instrument is suitable for connection of electrical incremental controllers with pneumatic devices or for electrical remote adjustment of the set point of pneumatic controllers.

A reversible synchronous motor drives a cam disk over a gear box.

The direction of travel of the cam disk is transformed by a leaf spring into a change of force, which by a pneumatic force comparison system is converted into a control pressure change.

On models with position transmitter a potentiometer is installed for electrical position feed back.



## FEATURES

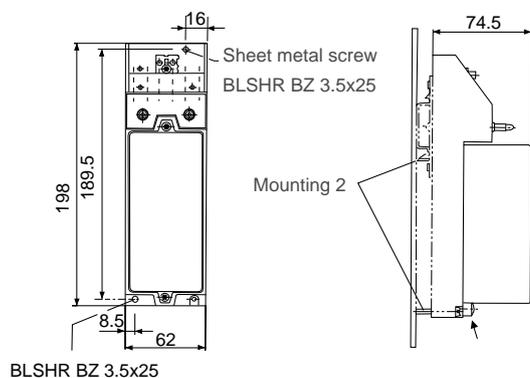
- High linearity
- Low hysteresis
- high accuracy
- Small supply air influence
- Small air consumption
- High air capacity



## PNEUMATIC AND TRANSDUCERS

### EP2000 ELECTRO-PNEUMATIC TRANSDUCERS

#### DIMENSIONS (in mm)



#### ORDERING INFORMATION

CODES	LIMIT SWITCH AND 2 kΩ FEEDBACK POTENTIOMETER	ACCESSORIES	VOLTAGE SUPPLY (50/60 Hz)
EP-2000-7001	120 seconds	---	230 V
EP-2000-7004			24 V
EP-2000-7021		2 kΩ potentiometer	230 V
EP-2000-7024			24 V

# HVAC CONTROL PRODUCTS

## PNEUMATIC AND TRANSDUCERS

## ELECTRO-PNEUMATIC TRANSDUCERS

# EP-8000



EP-8000 series electro-pneumatic transducers convert a voltage or current signal from an electronic controller into a pneumatic output pressure signal. An increase or decrease in the input signal proportionally increases or decreases (respectively) the output pressure signal from the EP-8000.

It is designed to output a proportional pneumatic control signal in response to an electronic control signal. All units feature barbed air connections for 5/32 or 1/4 inch O.D. polytubing.

Sequencing of pneumatic valve or damper actuators can be accomplished using a Johnson Controls V-9502 (valve) or D-9502 (damper) actuator positioner.

Four models are available, which are grouped into two basic versions: low volume output units (nonrelay) and high volume output units (relay).

## FEATURES

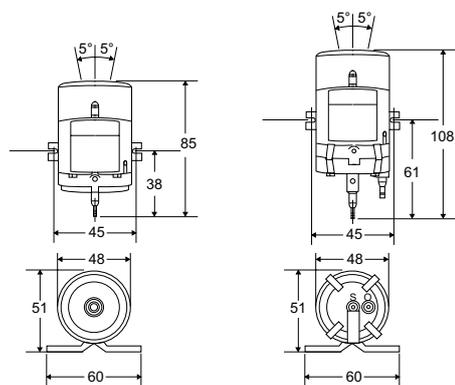
- Compact, simple design
- Choice of 0 to 10 VDC or 4 to 20 mA input range
- Hypodermic needle test point
- Factory set, fully adjustable zero and span
- High accuracy with low hysteresis



## PNEUMATIC AND TRANSDUCERS

### EP8000 ELECTRO-PNEUMATIC TRANSDUCERS

#### DIMENSIONS (in mm)



#### ORDERING INFORMATION

CODES	OUTPUT	INPUT RANGE	FACTORY OUTPUT RANGE kPa (psig)
EP-8000-1	Low volume (non-relay)	0.5...9 VDC	7...126 (1-18)
EP-8000-2	High volume (relay)	0.25...9.5 VDC	3.5...133 (0.5-19)
EP-8000-3	Low volume (non-relay)	4...20 mADC	21...105 (3-15)
EP-8000-4	High volume (relay)	4...20 mADC	21...105 (3-15)

#### ACCESSORIES

CODES	DESCRIPTION
R-3710 Series	0.18 mm restrictor (required for low volume models)
EP-8000-101	Electro-pneumatic transducer mounting kit
A-4000-8001	Inline air filter (required for all models)
JC 5361	Hypodermic needle test probe assembly

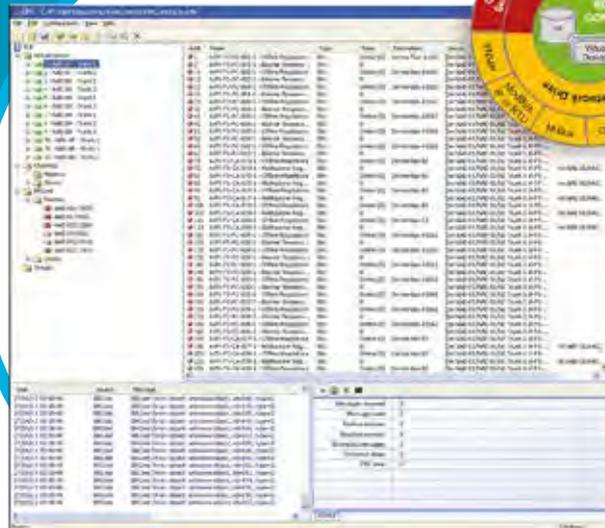
# BUILDING AUTOMATION PRODUCTS

## SUPERVISOR SOFTWARE AND TOOLS

### METASYS® SOFTWARE

# EDE SOFTWARE

## EXTENDED DATA ENGINE



EDE is a powerful multiprotocol software application. It allows multiple connectivity with the most commonly used protocols with serial connections and over IP. EDE has been the connectivity Engine for the M3i/M5i supervisory software solution since 2007. The EDE BACnet option now allows the EDE to be used with *Metasys* to meet many complex integration requirements.

## FEATURES

- EDE manages the following protocols either as a Client or Server:
- OPC (Client and Server)
- Modbus®S RTU (Master and Slave)
- Modbus IP (Client and Server)
- MBUS (Client)
- MBUS IP (Client)
- SNMP (Polling using GET and Trap receiver)
- BACnet IP (Client and Server)
- SOAP Webservices (Server)
- N2 (System 91, N2 Open and N2B)
- REST Webservices (Server)

In addition to the above EDE provides the following other features:

- Data Bridge between all the connectivity's above
- Applying Math Calculations to the values
- Trend Feature

## IMPORTANT

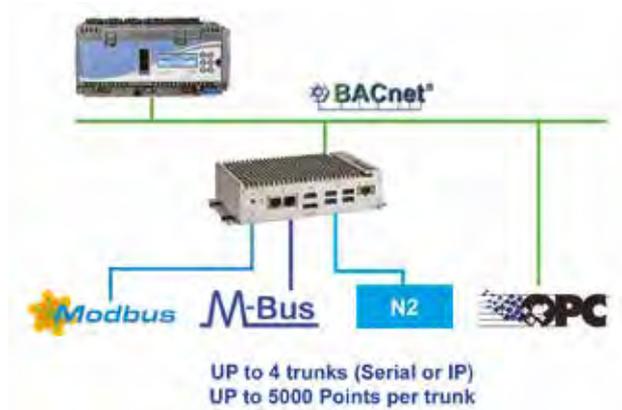
EDE must be installed on a suitable hardware platform, please consult the EDE Installation and Commissioning Application Note for details. On request EDE can be supplied pre-installed on an industrial PC, please contact SIS Europe for details and pricing. Microsoft Windows 7.0 is the latest OS version validated for EDE. To use EDE with later versions of Windows, please contact SIS Europe for advice.



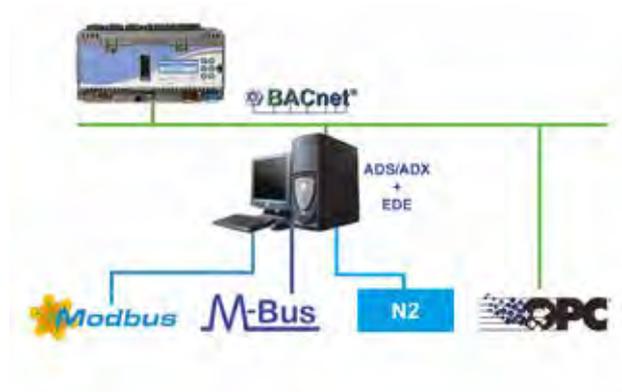
## SUPPORTED ARCHITECTURE

The EDE software with BACnet supports several different architectures and can be installed on various hardware platforms.

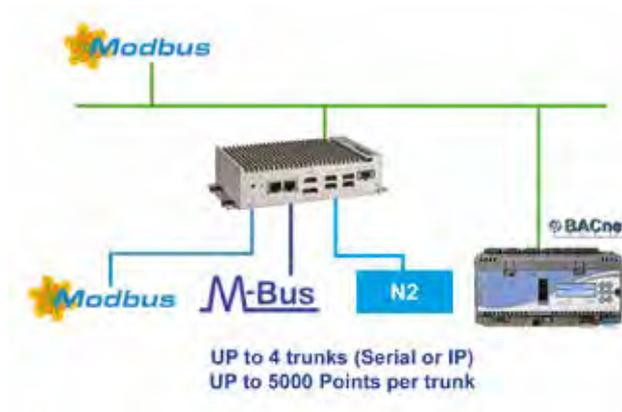
### BACnet option - Standalone solution



### Installed with ADS/ADX server



### BACnet option with additional IP protocol





## ORDERING INFORMATION

When ordering and applying the EDE it is necessary to order the Extended Data Engine software plus the protocol drivers required.

For example to use EDE to manage a Modbus® integration into *Metasys* you would need to order the product codes as follows: MW-EDE-0E and SIS-EDE-BAC-0E and MW-EDE-04-xx-0E.

EDE BASE SOFTWARE	EDE BACNET (REQD FOR METASYS)	INTEGRATION PROTOCOL DRIVERS (UP TO 4 TRUNKS, 5000 OBJECTS PER TRUNK)
CODE	CODE	CODES
MW-EDE-0E	SIS-EDE-BAC-0E	MW-EDE-02-05-0E
		MW-EDE-02-15-0E
		MW-EDE-02-50-0E
		MW-EDE-04-05-0E
		MW-EDE-04-15-0E
		MW-EDE-04-50-0E
		MW-EDE-05-05-0E
		MW-EDE-05-15-0E
		MW-EDE-05-50-0E
		MW-EDE-06-05-0E
		MW-EDE-06-15-0E
		MW-EDE-06-50-0E
		DESCRIPTION
		EDE N2 Protocol 500 N2 Objects
		EDE N2 Protocol 1500 N2 Objects
		EDE N2 Protocol 5000 N2 Objects
		EDE Modbus® Serial 500 Objects
		EDE Modbus Serial 1500 Objects
		EDE Modbus Serial 5000 Objects
		EDE Modbus IP 500 Objects
		EDE Modbus IP 1500 Objects
		EDE Modbus IP 5000 Objects
		EDE M-BUS IP 500 Objects
		EDE M-BUS IP 1500 Objects
		EDE M-BUS IP 5000 Objects

CODES	DESCRIPTION
SIS-EDE-BAC-0E	EDE Software only, BACnet IP Client/Server, 20,000 Objects
MW-EDE-0E	Standalone EDE Extended Data Engine Software with OPC server
MW-EDE-02-05-0E	EDE N2 protocol connectivity for System 9100 or N2Open devices for max. 500 N2 objects
MW-EDE-02-15-0E	EDE N2 protocol connectivity for System 9100 or N2Open devices for max. 1500 N2 objects
MW-EDE-02-50-0E	EDE N2 protocol connectivity for System 9100 or N2Open devices for max. 5000 N2 objects
MW-EDE-04-05-0E	EDE Modbus Serial Protocol RTU or ASCII connectivity for max. 500 points
MW-EDE-04-15-0E	EDE Modbus Serial Protocol RTU or ASCII connectivity for max. 1500 points
MW-EDE-04-50-0E	EDE Modbus Serial Protocol RTU or ASCII connectivity for max. 5000 points
MW-EDE-05-05-0E	EDE Modbus IP Protocol connectivity for max. 500 points
MW-EDE-05-15-0E	EDE Modbus IP Protocol connectivity for max. 1500 points
MW-EDE-05-50-0E	EDE Modbus IP Protocol connectivity for max. 5000 points
MW-EDE-06-05-0E	EDE M-BUS Serial Protocol connectivity for max. 500 points
MW-EDE-06-15-0E	EDE M-BUS Serial Protocol connectivity for max. 1500 points
MW-EDE-06-50-0E	EDE M-BUS Serial Protocol connectivity for max. 5000 points

# BUILDING AUTOMATION PRODUCTS

## SUPERVISOR SOFTWARE AND TOOLS

### METASYS® SOFTWARE

## ADS-LITE

### METASYS SERVER LITE



The Application and Data Server (ADS) Lite-E is an optional component of the *Metasys*® system that manages the collection and presentation of large amounts of trend data, event messages, operator transactions, and system configuration data. As Site Director, the ADS-Lite-E provides secure communication to a network of Network Automation Engine (NAE) 35s, NAE45s, Network Control Engines (NCEs), and Network Integration Engines (NIEs). The ADS-Lite-E is available for purchase and use in Europe and Latin America. For more information on the NIE29, NIE39, and NIE49, contact Johnson Controls® Systems Integration Services (SIS).

The Site Management Portal UI of the ADS-Lite-E provides flexible system to change online configuration of the *Metasys* system, optimize control strategies, and perform administrative tasks. The ADS-Lite-E includes an Open Database Connectivity (ODBC) compliant database package for secure storage of historical and configuration data.

**Note:** In this document, the term engine refers to all supported NAE35s, NAE45s, NCEs, and NIE, unless otherwise noted. The ADS-Lite supports up to five engines in any combinations of NAE35, NAE45, NCE, or NIE29/39/49

## FEATURES

- Support of IT Standards and Internet Technologies
- Secure User Access
- Flexible System Navigation and Dynamic User Graphics
- Alarm and Event Management
- Long-Term Trend Data Storage

## ORDERING INFORMATION

CODES *	DESCRIPTION
MS-ADSLE5U-0	ADS-Lite New project software for up to 5 users
MS-ADSLE5U-6	ADS-Lite Upgrade project software: for up to 5 users, on site with a previous version of the <i>Metasys</i> software
MS-ADS05U-8	ADS-Lite to full ADS Migration project software: for up to 5 users, on site migrating from a previous major release of ADS-Lite, to the current release of full ADS

### Note

\* Availability: The ADS-Lite is available for purchase and use in Europe, Africa and Latin America. Refer to *ADS Lite Product Bulletin (LIT-12011690)* for important product application information



## TECHNICAL SPECIFICATIONS

Recommended Computer Platform <sup>1</sup>	Intel i7 processor latest version with at least 4 cores or better 2 x 320 GB hard disk (RAID 1) <sup>2</sup> with 40 GB free space after installation of all prerequisite software and before installation of ADS-Lite software. Configure RAID 1 (mirroring) with disk write-caching turned on. <b>Note:</b> Prerequisite software includes the supported operating system, database software, .NET Framework, and any other software or service packs required for your ADS configuration. Graphics adapter (1 GB RAM, ATI® Technologies or NVIDIA® Corporation, 64-bit compatible [for 64-bit operating systems], Small Form Factor [SFF] if required)	
Required Minimum Memory	16 GB RAM minimum	
Supported Operating Systems <sup>3</sup> and Database Software	Windows® 10 Pro and Enterprise Editions with Anniversary Update (version 1607 or later) (64-bit) Supports: SQL Server® 2016 Express with SP1 (64-bit) SQL Server® 2014 Express with SP2 (64-bit) SQL Server® 2012 Express with SP4 (64-bit) <sup>4</sup>	
	Windows® 8.1 Pro and Enterprise Editions with Update 1 (64-bit) Supports: SQL Server® 2016 Express with SP1 (64-bit) SQL Server® 2014 Express with SP2 (64-bit) SQL Server® 2012 Express with SP4 (64-bit) <sup>4</sup>	
	Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit) Supports: SQL Server® 2014 Express with SP2 (64-bit) SQL Server® 2012 Express with SP4 (64-bit) <sup>4</sup>	
Supported Virtual Environments	Microsoft Hyper-V™ VMware®	
Supported User Interfaces	Site Management Portal (SMP) Metasys UI	
Additional Software Included with the ADS-Lite	CCT software	Launcher software
	Export Utility software	Metasys UI
	Metasys Database Manager software	SCT software
	Microsoft .NET Framework Version 4.6.1	
Optional Hardware	Any network or local printer supported by the qualified Windows operating system	
Optional Software	Graphic Generation Tool	

### Notes

- 1** Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the Network and IT Guidance Technical Bulletin (LIT-12011279) for more information regarding computer/server recommendations.
- 2** For best performance, use Serial Attached SCSI (SAS) hard drives, not Small Computer System Interface (SCSI) hard drives.
- 3** Refer to the Network and IT Guidance Technical Bulletin (LIT-12011279) for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.
- 4** Microsoft SQL Server 2012 Express with SP3 is not an automatic Windows update. For more information, refer to <https://support.microsoft.com/en-us/kb/2979597>.

# BUILDING AUTOMATION PRODUCTS

## SUPERVISOR SOFTWARE AND TOOLS

### METASYS® SOFTWARE

## ADX / ADS

### METASYS SERVER



The Application and Data Server (ADS) and Extended Application and Data Server (ADX) are optional components of the *Metasys*® system that manage the collection and presentation of large amounts of trend data, event messages, operator transactions, and system configuration data. The ADS is an entry-level server that runs on personal computers and supports up to five concurrent users. The ADX is a larger scale system that runs on a server operating system to provide extended historical archiving and reporting capabilities. The ADX is offered in several models to support up to 10, 25, 50, or 100 concurrent users. As Site Director, the ADS/ADX provides secure communication to a network of Network Automation Engines (NAEs), Network Control Engines (NCEs), and Network Integration Engines (NIEs).

*Metasys* Release 10.0 provides exciting new features and capabilities that continue to position the *Metasys* system as the leading building automation system in the industry, including:

- Building Network tree allows for faster delivery of the *Metasys* User Interface (UI) by enabling its deployment prior to the spaces and equipment configuration process. It also provides a familiar navigation experience for *Metasys* operators who have previous experience using the All Items tree of the Site Management Portal.
- Advanced Search and Reporting in the *Metasys* UI allows *Metasys* operators to find and report on operational data and make bulk commands to restore order more quickly. The Advanced Search and Reporting feature provides *Metasys* users the ability to quickly search *Metasys* objects by Building Network, equipment, equipment type, or space.
- Custom Dashboards for the *Metasys* User Interface. Custom Dashboard enable *Metasys* UI designers to create dashboards that provide the most relevant and critical information to *Metasys* operators for enhanced productivity and creates an experience that mimics users operational styles for ease of use.
- Graphics Custom Behaviors provide *Metasys* UI designers the flexibility to use custom symbols that are required for their individual building or campus needs or their local standards.
- Trend widget updates allow users to identify patterns including outliers, using an intuitive candlestick chart that displays min, max, and averages.

The Site Management Portal UI of the ADS/ADX provides flexible system to change online configuration of the *Metasys* system, optimize control strategies, and perform administrative tasks. The ADS/ADX includes an Open Database Connectivity (ODBC) compliant database package for secure storage of historical and configuration data.

The ADS and ADX support virtual environments, including VMware® and Microsoft® Hyper-V™. Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information.

The *Metasys* system can communicate with cloud-based applications easily and securely. To make this connection, the *Metasys* system requires minor programming and setup by Johnson Controls. When you are connected, you can access multiple cloud-based applications and features. To learn more, please visit the [Building Management](#) page located on the Johnson Controls® website.



## FEATURES

- Support of IT Standards and Internet Technologies
- Secure User Access
- Flexible System Navigation and Dynamic User Graphics
- Alarm and Event Management
- Long-Term Trend Data Storage
- Optional *Metasys* Advanced Reporting System and Energy Essentials

## APPLICATIONS

### USE AN ADS WHEN:

- The number of network engines becomes larger than a single network engine can handle efficiently as Site Director
- Long-term historical data storage needs exceed the capacity of a typical network engine
- The number of simultaneous users logging in exceeds the capacity of a single network engine.  
The ADS supports up to 5 simultaneous users, and up to 10 to 14 NxE engines.  
*Refer to the Metasys System Configuration Guide (LIT-12011832).*

### USE AN ADX WHEN:

- The *Metasys* Advanced Reporting System, Energy Essentials, or the *Metasys* for Validated Environments (MVE), Extended Architecture application is required
- You need to support more than 5 simultaneous users. The ADX supports up to 10, 25, 50, or 100 users, and up to 1,000 NxE engines. *Refer to the Metasys System Configuration Guide (LIT-12011832).*
- Any one of your data storage or access requirements is not met by an ADS

To further help you decide whether an ADS or ADX is right for your facility, consider their respective data storage and data access capabilities.



## ORDERING INFORMATION

For complete ordering information, refer to the Metasys System Software purchase options Product Bulletin (LIT-12011703).

### NEW OR UPGRADE SOFTWARE

NEW CODES	DESCRIPTION	UPGRADE CODES	MIGRATION CODES
MS-ADS05U-0	Application and Data Server For up to 5 users	MS-ADS05U-6	MS-ADS05U-8
MS-ADX10U-0	Extended Application and Data Server For up to 10 users	MS-ADX10U-6	MS-ADX10U-8
MS-ADX10SQL-0	Extended Application and Data Server For up to 10 users Includes Microsoft <sup>®</sup> SQL Server 2012 with SP2 software	MS-ADX10SQL-6	MS-ADX10SQL-8
MS-ADX25U-0	Extended Application and Data Server For up to 25 users	MS-ADX25U-6	MS-ADX25U-8
MS-ADX25SQL-0	Extended Application and Data Server For up to 25 users Includes Microsoft SQL Server 2012 with SP2 software	MS-ADX25SQL-6	MS-ADX25SQL-8
MS-ADX50U-0	Extended Application and Data Server For up to 50 users	MS-ADX50U-6	MS-ADX50U-8
MS-ADX50SQL2-0	Extended Application and Data Server For up to 50 users For use on server with dual processors or 8 cores <sup>1</sup> Includes Microsoft SQL Server 2012 with SP2 software	MS-ADX50SQL2-6	MS-ADX50SQL2-8
MS-ADX50SQL-0	Extended Application and Data Server For up to 50 users For use on server with single processor or 4 cores Includes Microsoft SQL Server 2012 with SP2 software	MS-ADX50SQL-6	MS-ADX50SQL-8
MS-ADX100U-0	Extended Application and Data Server For up to 100 users	MS-ADX100U-6	MS-ADX100U-8
MS-ADX100SQL2-0	Extended Application and Data Server For up to 100 users For use on server with dual processors or 8 cores <sup>1</sup> Includes Microsoft SQL Server 2012 with SP2 software	MS-ADX100SQL2-6	MS-ADX100SQL2-8

#### Note

<sup>1</sup> Servers with dual processors or 8 cores are recommended for ADX 50 user and 100 user software.



## TECHNICAL SPECIFICATIONS

### ADS SYSTEM REQUIREMENTS (5 USERS) - (PART 1/2)

<p>Recommended Computer Platform <sup>1</sup></p>	<p>Intel i7 processor latest version with at least four cores or better 2 x 500 GB hard disk (RAID 1) <sup>2</sup> with 40 GB free space after installation of all prerequisite software and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on. <b>Note:</b> Prerequisite software includes the supported operating system, database software, .NET Framework, and any other software or service packs required for your ADS configuration.</p> <p>Graphics card (1 GB RAM, ATI® Technologies or NVIDIA® Corporation, 64-bit compatible [for 64-bit operating systems], Small Form Factor [SFF] if required)</p>
<p>Required Minimum Memory <sup>3</sup></p>	<p>16 GB RAM</p>
<p>Supported Operating Systems <sup>4</sup> and Database Software</p>	<p>Windows® 10 Pro and Enterprise Editions with Creators Update (version 1709 or later) (64-bit) Supports: • SQL Server® 2016 Express with SP1 (64-bit) • SQL Server® 2014 Express with SP2 (64-bit) • SQL Server® 2012 Express with SP4 (64-bit) <b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update. <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i></p> <hr/> <p>Windows® 8.1 Pro and Enterprise Editions with Update 1 (64-bit) Supports: • SQL Server® 2016 Express with SP1 (64-bit) • SQL Server® 2014 Express with SP2 (64-bit) • SQL Server® 2012 Express with SP4 (64-bit) <b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update. <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i></p> <hr/> <p>Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit) Supports: • SQL Server® 2014 Express with SP2 (64-bit) • SQL Server® 2012 Express with SP4 (64-bit) <b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update. <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i></p>
<p>Supported Operating Systems for Metasys Site Management Portal Client Computer</p>	<p>Windows® 10 Pro and Enterprise Editions with Creators Update (version 1709 or later) (64-bit) Windows® 8.1 Pro and Enterprise Editions with Update 1 (64-bit) Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit) Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit) Apple® macOS® 10.13 High Sierra Apple® macOS® 10.12 Sierra Apple® OS X® 10.11 El Capitan</p>
<p>Supported Web Browser Software for Metasys Site Management Portal Client Computers</p>	<p>Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later <b>Note:</b> In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under <b>Tools &gt;Compatibility View Settings</b>, to ensure that websites appear and function correctly. Apple® Safari® 11 or later <b>Notes:</b> • In OS X, you cannot view Graphics+ graphics in the Site Management Portal UI. • You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to the Site Management Portal (SMP) UI.</p>

...Continued...



## TECHNICAL SPECIFICATIONS

### ADS SYSTEM REQUIREMENTS (5 USERS) - (PART 2/2)

Supported Web Browser Software for <i>Metasys</i> UI Client Devices	Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later <b>Notes:</b> <ul style="list-style-type: none"> <li>• The <i>Metasys</i> UI does not support Internet Explorer 11 on Windows 10 operating systems.</li> <li>• In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under <b>Tools&gt; Compatibility View Settings</b>, to ensure that websites appear and function correctly.</li> <li>• <i>Metasys</i> UI does not support InPrivate Browsing. To exit InPrivate Browsing, close the browser window and open a new browser window.</li> </ul> Microsoft® Edge® version 41 or later Google® Chrome™ version 61 or later <b>Note:</b> <i>Metasys</i> UI does not support incognito mode. To exit incognito mode, click or tap the <b>X</b> icon of the browser window or tab and then open a new browser window or tab. For more information on incognito mode in Google Chrome, click <a href="#">here</a> . Apple® Safari® 11 or later <b>Note:</b> <i>Metasys</i> UI does not support private browsing. To exit private browsing, click or tap <b>Private</b> in the browser window. Other web browsers, such as Mozilla® Firefox®, are not officially supported by the UI. However, the <i>Metasys</i> UI may appear and function appropriately in these web browsers.
Supported Virtual Environments	Microsoft Hyper-V™ VMware®
Supported User Interfaces	Site Management Portal (SMP) <i>Metasys</i> UI
Additional Software Included with the ADS (one license per ADS license)	CCT software SCT software Export Utility software
Additional Software Included with the ADS Software Download	Launcher software, Network Engine images, Summary Definition Examples, Microsoft .NET Framework (multiple versions), SQL Server Management Studio, <i>Metasys</i> Database Manager, Toggletunnel, SNMP Management Information Base example files (MIBs), Report Viewer 2010 and Report Viewer 2012.
Optional Hardware	Any network or local printer supported by the qualified Windows operating system
Optional Software	Graphic Generation Tool

#### Notes

- 1 Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information regarding computer/server recommendations.
- 2 For best performance, use Serial Attached SCSI (SAS) hard drives, not Small Computer System Interface (SCSI) hard drives.
- 3 For best performance, use the maximum amount of memory that the computer allows.
- 4 Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for specific Microsoft Windows operating system settings that may be required for your *Metasys* system configuration.



## TECHNICAL SPECIFICATIONS

### EXTENDED ADS SYSTEM REQUIREMENTS (UNIFIED ADX SYSTEMS, 10 OR 25 USERS) - (PART 1/2)

Recommended Server Platform <sup>1</sup>	2.4 GHz Intel Xeon® 6 core single processor or better 2 x 600 GB hard disk (RAID 1) <sup>2</sup> with 40 GB free space after installation of all prerequisite software and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on. DVD drive <b>Note:</b> ADX prerequisite software includes the Windows operating system, SQL Server software, Windows .NET Framework, and any other software or SPs required by your ADX configuration.
Required Minimum Memory <sup>3</sup>	16 to 32 GB RAM
Supported Operating Systems <sup>4</sup> and Database Software	Windows® Server® 2016 (64-bit) Supports: • SQL Server® 2016 with SP1 (64-bit) • SQL Server® 2014 with SP2 (64-bit) • SQL Server® 2012 with SP3 (64-bit) <b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update. <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i>
	Windows® Server® 2012 R2 with Update 1 (64-bit) Supports: • SQL Server® 2016 with SP1 (64-bit) • SQL Server® 2014 with SP2 (64-bit) • SQL Server® 2012 with SP3 (64-bit) <b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update. <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i>
	Windows® Server® 2012 R2 with Update 1 (64-bit) Supports: • SQL Server® 2016 with SP1 (64-bit) • SQL Server® 2014 with SP2 (64-bit) • SQL Server® 2012 with SP3 (64-bit) <b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update. <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i>
	Windows® Server® 2012 (64-bit) Supports: • SQL Server® 2016 with SP1 (64-bit) • SQL Server® 2014 with SP2 (64-bit) • SQL Server® 2012 with SP4 (64-bit) <b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update. <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i>
Supported Operating Systems for Metasys Site Management Portal Client Computer	Windows® 10 Pro and Enterprise Editions with Creators Update (version 1709 or later) (64-bit) Windows® 8.1 Pro and Enterprise Editions with Update 1 (64-bit) Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit) Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit) Apple® macOS® 10.12 Sierra Apple® OS X® 10.11 El Capitan

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## TECHNICAL SPECIFICATIONS

### EXTENDED ADS SYSTEM REQUIREMENTS (UNIFIED ADX SYSTEMS, 10 OR 25 USERS) - (PART 2/2)

Supported Web Browser Software for <i>Metasys</i> Site Management Portal Client Computers	Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later <b>Notes:</b> • In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under <b>Tools &gt; Compatibility View Settings</b> , to ensure that websites appear and function correctly. • <i>Metasys</i> Advanced Reporting System and Energy Essentials support Internet Explorer 11 on all computer platforms except on Windows 10. On Windows 10 computers, both Internet Explorer 11 and Microsoft® Edge® version 41 or later. Apple® Safari® 11 or later <b>Notes:</b> • In OS X, you cannot view Graphics+ graphics in the Site Management Portal UI. • You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to the Site Management Portal (SMP) UI.	
Supported Web Browser Software for <i>Metasys</i> UI Client Devices	Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later <b>Notes:</b> • The <i>Metasys</i> UI does not support Internet Explorer 11 on Windows 10 operating systems. • In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under <b>Tools &gt; Compatibility View Settings</b> , to ensure that websites appear and function correctly. • <i>Metasys</i> UI does not support InPrivate Browsing. To exit InPrivate Browsing, close the browser window and open a new browser window. Microsoft® Edge® version 41 or later Google® Chrome™ version 61 or later <b>Note:</b> <i>Metasys</i> UI does not support incognito mode. To exit incognito mode, click or tap the <b>X</b> icon of the browser window or tab and then open a new browser window or tab. For more information on incognito mode in Google Chrome, click <a href="#">here</a> . Apple® Safari® 11 or later <b>Note:</b> <i>Metasys</i> UI does not support private browsing. To exit private browsing, click or tap Private in the browser window. Other web browsers, such as Mozilla® Firefox®, are not officially supported by the UI. However, the <i>Metasys</i> UI may appear and function appropriately in these web browsers.	
Supported Virtual Environments	Microsoft Hyper-V™; VMware®	
Supported User Interfaces	Site Management Portal (SMP) <i>Metasys</i> UI	
Additional Software Included with the ADX	CCT software	Microsoft SQL Server 2012 software with SP4 <sup>5</sup>
	Export Utility software	SCT software
	<i>Metasys</i> Database Manager software	Microsoft .NET Framework Version 4.6.1
	Launcher software	
	<b>Note:</b> The <i>Metasys</i> Advanced Reporting System requires an ADX. The SCT computer must be online and accessible to the ADX at all times.	
Optional Hardware	Any network or local printer supported by the qualified Windows operating system	
Optional Software	Energy Essentials; Graphic Generation Tool	

#### Notes

- Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information regarding computer/server recommendations.
- For best performance, use SAS hard drives (not SATA hard drives) that use RAID controllers with write-caching enabled.
- For best performance, use the maximum amount of memory. An ADX with 16 GB RAM has much greater performance than an ADX with only 4 GB RAM.
- Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for specific Microsoft Windows operating system settings that may be required for your *Metasys* system configuration.
- SQL Server software is only included with the MS-ADX10SQL product. For SQL Server software, you must purchase SQL Server software licenses per the guidelines listed here: [SQL Server 2016](#), [SQL Server 2014](#), and [SQL Server 2012](#).



## TECHNICAL SPECIFICATIONS

### EXTENDED ADS SYSTEM REQUIREMENTS (UNIFIED ADX SYSTEMS, 50 OR 100 USERS) - (PART 1/2)

Recommended Server Platform <sup>1</sup>	<p><b>Two processors:</b> 2.4 GHz Intel Xeon® Dual Processors with a minimum of 8 cores each or better 6 x 300 GB 15,000 RPM hard disk (RAID 5) <sup>2</sup> with 50 GB free space after installation of all prerequisite software and before installation of ADS software. Configure RAID 5 with disk write-caching turned on. RAID Controller-PERC H710 with 1 GB Cache DVD drive</p> <p><b>Note:</b> ADX prerequisite software includes the Windows operating system, SQL Server software, Windows .NET Framework, and any other software or SPs required by your ADX configuration.</p>
Required Minimum Memory	32 GB RAM
Supported Operating Systems <sup>3</sup> and Database Software	<p>Windows® Server® 2016 (64-bit) Supports: • SQL Server® 2016 with SP1 (64-bit) • SQL Server® 2014 with SP2 (64-bit) • SQL Server® 2012 with SP4 (64-bit)</p> <p><b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update. <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i></p> <hr/> <p>Windows® Server® 2012 R2 with Update 1 (64-bit) Supports: • SQL Server® 2016 with SP1 (64-bit) • SQL Server® 2014 with SP2 (64-bit) • SQL Server® 2012 with SP4 (64-bit)</p> <p><b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update. <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i></p> <hr/> <p>Windows® Server® 2012 (64-bit) Supports: • SQL Server® 2016 with SP1 (64-bit) • SQL Server® 2014 with SP2 (64-bit) • SQL Server® 2012 with SP4 (64-bit)</p> <p><b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update. <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i></p>
Supported Operating Systems for Metasys Site Management Portal Client Computer	<p>Windows® 10 Pro and Enterprise Editions with Creators Update (version 1709 or later) (64-bit) Windows® 8.1 Pro and Enterprise Editions with Update 1 (64-bit) Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit) Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit) Apple® macOS® 10.12 Sierra Apple® OS X® 10.11 El Capitan</p>
Supported Web Browser Software for Metasys Site Management Portal Client Computers	<p>Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under <b>Tools &gt; Compatibility View Settings</b>, to ensure that websites appear and function correctly.</li> <li>• Metasys Advanced Reporting System and Energy Essentials support Internet Explorer 11 on all computer platforms except on Windows 10. On Windows 10 computers, both Internet Explorer 11 and Microsoft® Edge® version 41 or later.</li> </ul> <p>Apple® Safari® 11 or later</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• In OS X, you cannot view Graphics+ graphics in the Site Management Portal UI.</li> <li>• You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to the Site Management Portal (SMP) UI.</li> </ul>

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## TECHNICAL SPECIFICATIONS

### EXTENDED ADS SYSTEM REQUIREMENTS (UNIFIED ADX SYSTEMS, 50 OR 100 USERS) - (PART 2/2)

Supported Web Browser Software for <i>Metasys</i> UI Client Devices	<p>Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• The <i>Metasys</i> UI does not support Internet Explorer 11 on Windows 10 operating systems.</li> <li>• In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under <b>Tools &gt; Compatibility View Settings</b>, to ensure that websites appear and function correctly.</li> <li>• <i>Metasys</i> UI does not support InPrivate Browsing. To exit InPrivate Browsing, close the browser window and open a new browser window.</li> </ul> <p>Microsoft® Edge® version 41 or later Google® Chrome™ version 61 or later</p> <p><b>Note:</b> <i>Metasys</i> UI does not support incognito mode. To exit incognito mode, click or tap the <b>X</b> icon of the browser window or tab and then open a new browser window or tab. <i>For more information on incognito mode in Google Chrome, click <a href="#">here</a>.</i></p> <p>Apple® Safari® 11 or later</p> <p><b>Note:</b> <i>Metasys</i> UI does not support private browsing. To exit private browsing, click or tap <b>Private</b> in the browser window.</p> <p>Other web browsers, such as Mozilla® Firefox®, are not officially supported by the UI. However, the <i>Metasys</i> UI may appear and function appropriately in these web browsers.</p>									
Supported Virtual Environments	Microsoft Hyper-V™ VMware®									
Supported User Interfaces	Site Management Portal (SMP) <i>Metasys</i> UI									
Additional Software Included with the ADX	<table border="1"> <tr> <td>CCT software</td> <td>Microsoft SQL Server 2012 software with SP4 <sup>4</sup></td> </tr> <tr> <td>Export Utility software</td> <td>Microsoft .NET Framework Version 4.6.1</td> </tr> <tr> <td><i>Metasys</i> Database Manager software</td> <td>SCT software</td> </tr> <tr> <td>Launcher software</td> <td></td> </tr> </table>	CCT software	Microsoft SQL Server 2012 software with SP4 <sup>4</sup>	Export Utility software	Microsoft .NET Framework Version 4.6.1	<i>Metasys</i> Database Manager software	SCT software	Launcher software		
CCT software	Microsoft SQL Server 2012 software with SP4 <sup>4</sup>									
Export Utility software	Microsoft .NET Framework Version 4.6.1									
<i>Metasys</i> Database Manager software	SCT software									
Launcher software										
	<b>Note:</b> The <i>Metasys</i> Advanced Reporting System requires an ADX. The SCT computer must be online and accessible to the ADX at all times.									
Optional Hardware	Any network or local printer supported by the qualified Windows operating system.									
Optional Software	Energy Essentials Graphic Generation Tool									

#### Notes

- 1 Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information regarding computer/server recommendations.
- 2 For best performance, use SAS hard drives (not SATA hard drives) that use RAID controllers with write caching enabled.
- 3 Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for specific Microsoft Windows operating system settings that may be required for your *Metasys* system configuration.
- 4 SQL Server software is only included with the MS-ADX50SQL product.

For SQL Server software, you must purchase SQL Server software licenses per the guidelines listed here: [SQL Server 2016](#), [SQL Server 2014](#), and [SQL Server 2012](#).



## TECHNICAL SPECIFICATIONS

### EXTENDED ADS SYSTEM REQUIREMENTS (SPLIT ADX SYSTEMS, 10 OR 25 USERS) - (PART 1/3)

<p>Recommended Server Platform <sup>1</sup></p>	<p><b>Web/Application Server</b>                  2.4 GHz Intel Xeon<sup>®</sup> 6 core single processor or better.                  2 x 600 GB hard disk (RAID 1) <sup>2</sup> with 40 GB free space after installation of all prerequisite software <sup>3</sup> and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on.                  DVD drive  <b>Notes:</b>                  • Metasys Advanced Reporting System and Energy Essentials must reside on the ADX web/application server.                  • Metasys UI must reside on the ADX web/application server.</p> <hr/> <p><b>Database Server</b>                  2.4 GHz Intel Xeon<sup>®</sup> 6 core single processor or better.                  2 x 600 GB hard disk (RAID 1) with 40 GB free space after installation of all prerequisite software <sup>3</sup> and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on.                  DVD drive</p> <hr/> <p><b>SCT Computer</b>                  In a split configuration, you cannot install SCT on either the ADX web/application server computer or the ADX database server computer.                  Refer to the System Configuration Tool Catalog Page (LIT-1900198) for current SCT computer requirements.</p>
<p>Required Minimum Memory <sup>4</sup></p>	<p>16 GB RAM (web/application server and database server for 10 or 25 user ADX)</p>
<p>Supported Operating Systems <sup>5, 6</sup> with Supported Database Software</p>	<p>Windows<sup>®</sup> Server<sup>®</sup> 2016 (64-bit)                  Supports:                  • SQL Server<sup>®</sup> 2016 with SP1 (64-bit)                  • SQL Server<sup>®</sup> 2014 with SP2 (64-bit)                  • SQL Server<sup>®</sup> 2012 with SP4 (64-bit)  <b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update.                  For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</p> <hr/> <p>Windows<sup>®</sup> Server<sup>®</sup> 2012 R2 with Update 1 (64-bit)                  Supports:                  • SQL Server<sup>®</sup> 2016 with SP1 (64-bit)                  • SQL Server<sup>®</sup> 2014 with SP2 (64-bit)                  • SQL Server<sup>®</sup> 2012 with SP4 (64-bit)  <b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update.                  For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</p> <hr/> <p>Windows<sup>®</sup> Server<sup>®</sup> 2012 (64-bit)                  Supports:                  • SQL Server<sup>®</sup> 2016 with SP1 (64-bit)                  • SQL Server<sup>®</sup> 2014 with SP2 (64-bit)                  • SQL Server<sup>®</sup> 2012 with SP4 (64-bit)  <b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update.                  For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</p>

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## TECHNICAL SPECIFICATIONS

### EXTENDED ADS SYSTEM REQUIREMENTS (SPLIT ADX SYSTEMS, 10 OR 25 USERS) - (PART 2/3)

Supported Operating Systems for <i>Metasys</i> Site Management Portal Client Computer	Windows® 10 Pro and Enterprise Editions with Creators Update (version 1709 or later) (64-bit) Windows® 8.1 Pro and Enterprise Editions with Update 1 (64-bit) Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit) Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (32-bit) Apple® macOS® 10.12 Sierra Apple® OS X® 10.11 El Capitan	
Supported Web Browser Software for <i>Metasys</i> Site Management Portal Client Computers	Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later <b>Notes:</b> <ul style="list-style-type: none"> <li>In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under <b>Tools &gt; Compatibility View Settings</b>, to ensure that websites appear and function correctly.</li> <li><i>Metasys</i> Advanced Reporting System and Energy Essentials support Internet Explorer 11 on all computer platforms except on Windows 10. On Windows 10 computers, both Internet Explorer 11 and Microsoft® Edge® version 41 or later.</li> </ul> Apple® Safari® 11 or later <b>Notes:</b> <ul style="list-style-type: none"> <li>In OS X, you cannot view Graphics+ graphics in the Site Management Portal UI.</li> <li>You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to the Site Management Portal (SMP) UI</li> </ul>	
Supported Web Browser Software for <i>Metasys</i> UI Client Devices	Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later <b>Notes:</b> <ul style="list-style-type: none"> <li>The <i>Metasys</i> UI does not support Internet Explorer 11 on Windows 10 operating systems.</li> <li>In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under <b>Tools &gt; Compatibility View Settings</b>, to ensure that websites appear and function correctly.</li> <li><i>Metasys</i> UI does not support InPrivate Browsing. To exit InPrivate Browsing, close the browser window and open a new browser window.</li> </ul> Microsoft® Edge® version 41 or later Google® Chrome™ version 61 or later <b>Note:</b> <i>Metasys</i> UI does not support incognito mode. To exit incognito mode, click or tap the <b>X</b> icon of the browser window or tab and then open a new browser window or tab. For more information on incognito mode in Google Chrome, click <a href="#">here</a> . Apple® Safari® 11 or later <b>Note:</b> <i>Metasys</i> UI does not support private browsing. To exit private browsing, click or tap Private in the browser window. Other web browsers, such as Mozilla® Firefox®, are not officially supported by the UI. However, the <i>Metasys</i> UI may appear and function appropriately in these web browsers.	
Supported Virtual Environments	Microsoft Hyper-V™ VMware®	
Supported User Interfaces	Site Management Portal (SMP) <i>Metasys</i> UI	
Additional Software Included with the ADX	CCT software	Microsoft SQL Server 2012 software with SP4 (64-bit) <sup>7</sup>
	Export Utility software	Microsoft .NET Framework Version 4.6.1
	<i>Metasys</i> Database Manager software	SCT software
	Launcher software	
<b>Note:</b> The <i>Metasys</i> Advanced Reporting System requires an ADX. The SCT computer must be online and accessible to the ADX at all times.		

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## TECHNICAL SPECIFICATIONS

### EXTENDED ADS SYSTEM REQUIREMENTS (SPLIT ADX SYSTEMS, 10 OR 25 USERS) - (PART 3/3)

Optional Hardware	Any network or local printer supported by the qualified Windows operating system.
Optional Software	Energy Essentials Graphic Generation Tool

#### Notes

- 1** Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information regarding computer/server recommendations.
- 2** For best performance, use SAS hard drives (not SATA hard drives) that use RAID controllers with write caching enabled.
- 3** FADX prerequisite software includes the Windows operating system and SQL Server software, Windows .NET Framework, and any other software or service packs required for your ADX configuration.
- 4** For best performance, use the maximum amount of memory. An ADX with 16 GB RAM has much greater performance than an ADX with only 4 GB RAM.
- 5** The web/application and database servers must have the same operating system installed.
- 6** Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.
- 7** SQL Server software is only included with the MS-ADX10SQL product.  
For SQL Server software, you must purchase SQL Server software licenses per the guidelines listed here: [SQL Server 2016](#), [SQL Server 2014](#), and [SQL Server 2012](#).



## TECHNICAL SPECIFICATIONS

### EXTENDED SYSTEM REQUIREMENTS (SPLIT ADX SYSTEM, 50 OR 100 USERS) - (PART 1/3)

<p>Recommended Server Platform <sup>1</sup></p>	<p><b>Web/Application Server</b>  <b>Two processors:</b> 2.4 GHz Intel Xeon® Dual Processors with a minimum of 8 cores each or better          6 x 300 GB 15,000 RPM hard disk (RAID 5) <sup>2</sup> with 50 GB free space after installation of all prerequisite software <sup>3</sup> and before installation of ADS software. Configure RAID 5 with disk write-caching turned on. RAID Controller–PERC H710 with 1 GB cache</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• Metasys Advanced Reporting System and Energy Essentials must reside on the ADX web/application server.</li> <li>• Metasys UI must reside on the ADX web/application server.</li> </ul> <hr/> <p><b>Database Server</b>  <b>Two processors:</b> 2.4 GHz Intel Xeon® Dual Processors with a minimum of 8 cores each or better          6 x 300 GB 15,000 RPM hard disk (RAID 5) with 50 GB free space after installation of all prerequisite software <sup>3</sup> and before installation of ADS software. Configure RAID 5 with disk write-caching turned on. RAID Controller–PERC H710 with 512 NV Cache</p> <hr/> <p><b>SCT Computer</b>          In a split configuration, you cannot install SCT on either the ADX web/application server computer or the ADX database server computer.  <i>Refer to the System Configuration Tool Catalog Page (LIT-1900198) for current SCT computer requirements.</i></p>
<p>Required Minimum Memory <sup>4</sup></p>	<p>32 GB RAM</p>
<p>Supported Operating Systems and Database Software <sup>5, 6</sup></p>	<p>Windows® Server® 2016 (64-bit)          Supports:</p> <ul style="list-style-type: none"> <li>• SQL Server® 2016 with SP1 (64-bit)</li> <li>• SQL Server® 2014 with SP2 (64-bit)</li> <li>• SQL Server® 2012 with SP4 (64-bit)</li> </ul> <p><b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update.  <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i></p> <hr/> <p>Windows® Server® 2012 R2 with Update 1 (64-bit)          Supports:</p> <ul style="list-style-type: none"> <li>• SQL Server® 2016 with SP1 (64-bit)</li> <li>• SQL Server® 2014 with SP2 (64-bit)</li> <li>• SQL Server® 2012 with SP4 (64-bit)</li> </ul> <p><b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update.  <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i></p> <hr/> <p>Windows® Server® 2012 (64-bit)          Supports:</p> <ul style="list-style-type: none"> <li>• SQL Server® 2016 with SP1 (64-bit)</li> <li>• SQL Server® 2014 with SP2 (64-bit)</li> <li>• SQL Server® 2012 with SP4 (64-bit)</li> </ul> <p><b>Note:</b> SQL Server 2012 Express with SP3 is not an automatic Windows update.  <i>For more information, refer to <a href="https://support.microsoft.com/en-us/kb/2979597">https://support.microsoft.com/en-us/kb/2979597</a>.</i></p>

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## TECHNICAL SPECIFICATIONS

### EXTENDED ADS SYSTEM REQUIREMENTS (SPLIT ADX SYSTEM, 50 OR 100 USERS) - (PART 2/3)

Supported Operating Systems for <i>Metasys</i> Site Management Portal Client Computer	Windows® 10 Pro and Enterprise Editions with Creators Update (version 1709 or later) (64-bit) Windows® 8.1 Pro and Enterprise Editions with Update 1 (64-bit) Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit) Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit) Apple® macOS® 10.12 Sierra Apple® OS X® 10.11 El Capitan	
Supported Web Browser Software for <i>Metasys</i> Site Management Portal Client Computers	Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later <b>Notes:</b> <ul style="list-style-type: none"> <li>In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under <b>Tools &gt; Compatibility View Settings</b>, to ensure that websites appear and function correctly.</li> <li><i>Metasys</i> Advanced Reporting System and Energy Essentials support Internet Explorer 11 on all computer platforms except on Windows 10. On Windows 10 computers, both Internet Explorer 11 and Microsoft® Edge® version 41 or later.</li> </ul> Apple® Safari® 11 or later <b>Notes:</b> <ul style="list-style-type: none"> <li>In OS X, you cannot view Graphics+ graphics in the Site Management Portal UI.</li> <li>You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to the Site Management Portal (SMP) UI.</li> </ul>	
Supported Web Browser Software for <i>Metasys</i> UI Client Devices	Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later <b>Notes:</b> <ul style="list-style-type: none"> <li>The <i>Metasys</i> UI does not support Internet Explorer 11 on Windows 10 operating systems.</li> <li>In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under <b>Tools &gt; Compatibility View Settings</b>, to ensure that websites appear and function correctly.</li> <li><i>Metasys</i> UI does not support InPrivate Browsing. To exit InPrivate Browsing, close the browser window and open a new browser window.</li> </ul> Microsoft® Edge® version 41 or later Google® Chrome™ version 61 or later <b>Note:</b> <i>Metasys</i> UI does not support incognito mode. To exit incognito mode, click or tap the <b>X</b> icon of the browser window or tab and then open a new browser window or tab. For more information on incognito mode in Google Chrome, click <a href="#">here</a> . Apple® Safari® 11 or later <b>Note:</b> <i>Metasys</i> UI does not support private browsing. To exit private browsing, click or tap <b>Private</b> in the browser window. Other web browsers, such as Mozilla® Firefox®, are not officially supported by the UI. However, the <i>Metasys</i> UI may appear and function appropriately in these web browsers.	
Supported Virtual Environments	Microsoft Hyper-V™ VMware®	
Supported User Interfaces	Site Management Portal (SMP) <i>Metasys</i> UI	
Additional Software Included with the ADX	CCT software	Microsoft SQL Server 2012 software with SP4 <sup>7</sup>
	Export Utility software	SCT software
	<i>Metasys</i> Database Manager software	Microsoft .NET Framework Version 4.6.1
	Launcher software	
	<b>Note:</b> The <i>Metasys</i> Advanced Reporting System requires an ADX. The SCT computer must be online and accessible to the ADX at all times.	

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## TECHNICAL SPECIFICATIONS

### EXTENDED ADS SYSTEM REQUIREMENTS (SPLIT ADX SYSTEM, 50 OR 100 USERS) - (PART 2/3)

Optional Hardware	Any network or local printer supported by the qualified Windows operating system
Optional Software	Energy Essentials Graphic Generation Tool

#### Notes

- 1 Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information regarding computer/server recommendations.
- 2 For best performance, use SAS hard drives (not SATA hard drives) that use RAID controllers with write caching enabled.
- 3 ADX prerequisite software includes the Windows operating system and SQL Server software, Windows .NET Framework, and any other software or service packs required for your ADX configuration.
- 4 For best performance, use the maximum amount of memory. An ADX with 32 GB RAM has much greater performance than an ADX with only 16 GB RAM.
- 5 The web/application and database servers must have the same operating system installed.
- 6 Refer to the *Network and IT Guidance Technical Bulletin (LIT-12011279)* for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.
- 7 SQL Server software is only included with the MS-ADX50SQL product.  
For SQL Server software, you must purchase SQL Server software licenses per the guidelines listed here: [SQL Server 2016](#), [SQL Server 2014](#), and [SQL Server 2012](#).

# BUILDING AUTOMATION PRODUCTS

## SUPERVISOR SOFTWARE AND TOOLS

### METASYS® SOFTWARE

## MEU

### METASYS EXPORT UTILITY

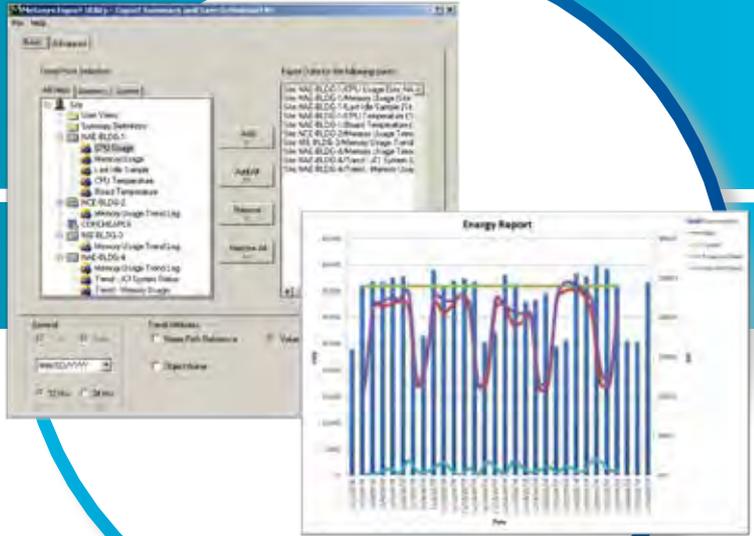
The *Metasys* system Export Utility makes it easy for a facility manager to efficiently manage daily operations. The Export Utility extracts historical trend, alarm, and audit data from the system and presents the historical data in a variety of formats. Using these flexible formats, in programs such as Microsoft® Excel® and Access®, you can easily sort, compare, and archive data in spreadsheets and databases.

Export Utility is a valuable tool for effective historical data analysis. You can determine how to use the data to perform time studies and root cause analyses of system changes and mechanical equipment failure.

The scheduling capability of Export Utility allows you to extract the selected data immediately, or to schedule an extraction at a convenient time or interval.

When the base set of reports provided with Export Utility is insufficient, functionality is included that allows you to create a program to customize reports that fit your needs.

Refer to the *Metasys Export Utility Product Bulletin (LIT-1201800)* for important product application information.



## FEATURES

- Historical Data Retrieval
- Flexible Filtering of Historical Data
- Scheduled Collection of Historical Data
- Versatile Report Capabilities
- Custom Reporting
- Dynamic Link Library (DLL) Examples
- Historical Data Backup

## ORDERING INFORMATION

### EXPORT UTILITY SELECTION CHARTS

CODES <sup>1</sup>	DESCRIPTION
MS-EXPORT-0	Export Utility new project software. Software and license for one computer (not per site).
MS-EXPORT-6	Export Utility upgrade software to current release version. Software and license for one computer (not per site).

#### Note

**1** Export Utility software is sold separately from *Metasys* software. However, some *Metasys* software packages include Export Utility software. For more information on *Metasys* software packages, refer to the *Metasys System Software Purchase Options Product Bulletin (LIT-12011703)*.



## TECHNICAL SPECIFICATIONS

### EXPORT UTILITY SYSTEM REQUIREMENTS

Code	MS-EXPORT-0, MS-EXPORT-6
Required Computer/ Server Platform	<p>When <i>Metasys</i> Export Utility is installed on an Application and Data Server/Extended Application and Data Server (ADS/ADX) or Open Data Server (ODS), follow the requirements for an ADS/ADX or ODS. Refer to the <i>Application and Data Server (ADS) and Extended Application and Data Server (ADX) Product Bulletin (LIT-1201525)</i>, the <i>Application and Data Server (ADS) Lite-E Product Bulletin (LIT-1201690)</i>, the <i>Application and Data Server (ADS) Lite-A Product Bulletin (LIT-1201694)</i>, or the <i>Open Data Server Product Bulletin (LIT-12011943)</i>.</p> <p><b>Note:</b> Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the <i>Metasys® System Configuration Guide (LIT-12011832)</i> for more information regarding computer/server recommendations.</p>
Recommended Memory	<p>Computer Platforms: 8 GB RAM Server Platforms: 16 GB RAM</p>
Supported Operating Systems	<p>Windows® 10 Pro and Enterprise Editions with Creators Update (version 1709) (64-bit) Windows® 8.1 Pro and Enterprise Editions with Update 1 (64-bit) Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit) Windows® Server® 2016 (64-bit) Windows® Server® 2012 R2 with Update 1 (64-bit) Windows® Server® 2012 (64-bit)</p>
Additional Requirements (Order Separately)	<p>Microsoft Office Professional 2013, Microsoft Office Enterprise 365, Microsoft Office Professional 2010, or Microsoft Office Professional 2007 software to generate reports</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>To extract data to Microsoft Excel or Microsoft Access software, you must have the respective software installed on the computer running <i>Metasys</i> Export Utility.</li> <li><i>Metasys</i> Export Utility can extract data to 32-bit and 64-bit versions of Microsoft Office. However, the DLL file and example files used to create custom reports are compatible only with 32-bit versions of Microsoft Office. Microsoft Office Professional 2013 and Microsoft Office 2010 do not support custom DLL files.</li> </ul>
Additional Software Included on the Product Disks	<p>Microsoft .NET Framework version 3.5 SP1</p> <p>For steps on installing .NET Framework version 3.5 SP1, refer to the <i>Metasys® Server Installation and Upgrade Instructions Wizard (LIT-12012162)</i>, <i>ADS-Lite Installation and Upgrade Instructions Wizard (LIT-12011688)</i>, or the <i>ODS and SCT Installation and Upgrade Instructions Wizard (LIT-12011945)</i>.</p> <p><b>Note:</b> Windows 10, Windows 8.1, Windows 7, Windows Server 2016, Windows Server 2012 R2, and Windows Server 2012 include Microsoft .NET Framework version 3.5/3.5.1.</p> <p>These applications are built into the operating system (no separate software installation is necessary). We recommend you also install Microsoft .NET Framework version 4.5 if you are using Windows 8.1, Windows Server 2012 R2, or Windows Server 2012 and Microsoft .NET Framework version 4.6.1 if you are using Windows 10.</p>
Additional requirements (Order separately)	<p>Microsoft Office Professional 2013, Microsoft Office Enterprise 365, Microsoft Office Professional 2007, Microsoft Office Professional 2010 software to generate reports</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>To extract data to Microsoft Excel or Microsoft Access software, you must have the Microsoft software installed on the computer that is running Export Utility.</li> <li>Export Utility can extract data to 32-bit and 64-bit versions of Microsoft Office. However, the dynamic-link library (DLL) file and example files used to create custom reports are compatible only with the 32-bit version of Microsoft Office.</li> </ul>

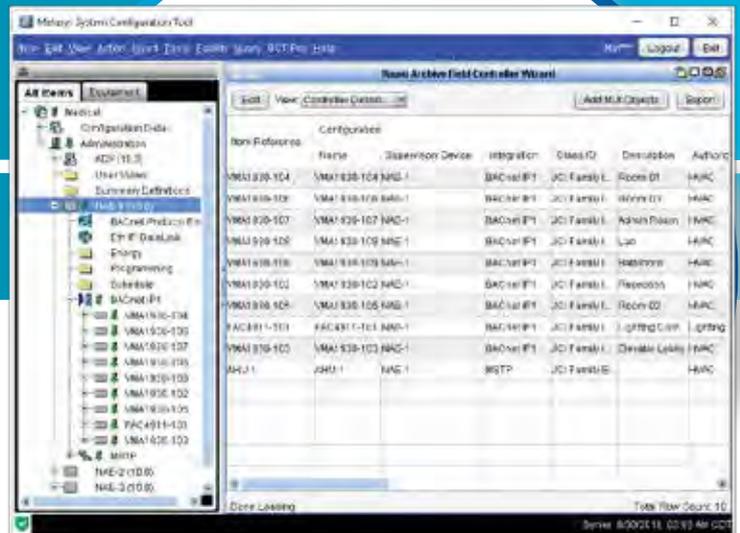
# BUILDING AUTOMATION PRODUCTS

## SUPERVISOR SOFTWARE AND TOOLS

### METASYS® SOFTWARE

## SCT

### SYSTEM CONFIGURATION TOOL



The System Configuration Tool (SCT) supports the engineering, installation, and commissioning of your building automation system. The SCT application enables fast offline generation and *Metasys* UI configuration of the complete site, including point naming; integration of N1, N2, BACnet®, and LonWorks® networks; integration of Modbus®, M-Bus, and KNX third-party protocols; integration of building systems such as C-CURE 9000 access control, victor video management, Simplex fire, and connected lighting systems from preferred vendors; integration of local and remote MS/TP devices; definition of tailored summaries and user views; and the creation of custom control logic using a graphical user interface.

SCT also manages the maintenance of the archive database for the Network Automation Engine (NAE), Network Control Engine (NCE), Network Integration Engine (NIE), Application and Data Server/Extended Application and Data Server (ADS/ADX), Open Data Server (ODS), and *Metasys*® User Interface (UI). To keep the archive database current, the user can set up the SCT to schedule regular uploads from the devices on the site. When the system is operational, you can make online changes to the database at the engine, ADS/ADX, or ODS with the same user interface that was used for the offline data generation in SCT.

SCT offers productivity features, such as the mass creation of equipment, spaces, and serving relationships, and the migration of supervisory devices. You can also use SCT to fully manage a mixed release site for a *Metasys* system at Release 5.2 or later.

SCT has a one-click installation. The new SCT installer installs the required software prerequisites, such as Internet Information Services (IIS), SQL Server® 2014 Express software (if no SQL Server present), and Microsoft® .NET Framework 4.6.1. The new SCT installers also include two additional applications. You can use the *Metasys* UI Offline software to configure *Metasys* UI graphics and the display of data without a live connection to devices. SCT Pro is a web application that significantly streamlines some SCT workflows, and greatly simplifies tasks such as scheduling recurring backups, upgrading sites, and site discovery. For example, with site discovery, you can rebuild the entire archive database from the online system. This is a useful option if the original archive is missing, corrupt, or was never maintained.

## IT SECURITY COMMITMENT

*Metasys* uses secure HTTP with Transport Layer Security (TLS) 1.2 between the SCT computer, all *Metasys* servers, and network engines that are upgraded to *Metasys* Release 9.0 and later. The encrypted HTTPS communications apply to the ADS, ADX, ODS, *Metasys* UI, network engines, and SCT. This ensures that unauthorized users and computer hackers cannot view the contents of communications sent between *Metasys* equipment. By default, self-signed certificates are installed on supported products, with the option of configuring trusted certificates configured by an internal IT department or a Certificate Authority. To indicate the active security level (trusted, self-signed, or untrusted), three small security shield icons appear on the SCT login screens and on the SCT UI screens.

Johnson Controls continues to enhance the security of *Metasys* with the addition of signed resource files, and the pairing of supervisory devices with the site director to ensure encrypted communication.



## FEATURES

- **Forced Change of Default Password** – Provides improved security by forcing default passwords to be changed as part of the workflow when interacting with NxEs.
- **Signed Resource Files** – Provides improved security to identify resource files that are created by Johnson Controls, and to check that they have not been modified.
- **Site Director Pairing** – Provides improved security in the communication between supervisory devices and site directors through use of a unique password for each pairing.
- **New Archive Wizard** – Provides interface improvements to display useful information and perform common operations with fewer clicks.
- **Enable/Disable and Deferred Switchover** – Provides more control over the start-up of an application in a field controller that has 8.0 and above firmware, which includes the new field controllers released with *Metasys* 10.0.
- **Improved Rapid Archive Creation** – Provides several enhancements including the creation of controller templates and equipment definitions in one step, support for third-party devices, and the ability to create *Metasys* UI spaces and equipment information for existing devices.
- **Mass Relabeling** – Provides a more efficient process to update labels and descriptions for devices, equipment, equipment definitions, spaces, and controller templates.
- **Supervisory Device Migration** – Provides support to easily accommodate the upgrade of supervisory device hardware.
- **Rapid Archive Features** – Provides new sites a quick and simplified way to configure archives from a Rapid Archive Schedule spreadsheet. You can also use the feature to easily configure *Metasys* UI spaces and equipment for existing sites.
- **Simplified Building System Integrations** – Provides an automated integration process for systems through an updated Mass Change Tool utility and the Rapid Archive feature.
- **Streamlined One-Click Installer** – Provides a faster and more convenient method for tool installation.
- **Certificate Management** – Provides privacy with built-in certificate management options to regulate trusted certificates for network engines from SCT.
- **Auto-Discovery Serving Relationships through Equipment Discovery** – Provides existing sites with faster *Metasys* UI and navigation tree configuration.
- **Drag and Drop Functionality** – Provides the ability to enable mass creation of spaces and equipment relationships.
- **Security Database and *Metasys* UI Spaces and Equipment in Manage Archive Options** – Provides improved upload and download of supervisory devices and optional download of spaces and equipment.
- **User Definable Attribute IDs and Child Item Field Syntax for Summary Definitions** – Provides advanced system searching capabilities.
- **Tailored Summary Definition Templates** – Provides the ability to quickly view, mass copy, edit, or delete any extensions on points or devices.



## FEATURES

- **Integrated Trunk Utilities with Parameter Sheets** – Provides the ability to transfer CAFs between controllers and the SCT system through NxE Passthru, Direct Ethernet, or MAP 4.2 and later Router connections. In addition to the file transfer options, the feature also supports viewing and editing device parameters per field controller trunk.
- **Controller and Equipment Template Master Files** – Provides a comprehensive list of common points to easily generate and tailor specific equipment definitions for the equipment creation process.
- **Expanded Field Controller Support** – Provides the integration and support for the IP field controllers released with *Metasys* 9.0.

## ORDERING INFORMATION

CODES	DESCRIPTION
TL-SCT-0	System Configuration Tool Software for local installations. New project software for sites that do not have a previous version of SCT installed.
TL-SCT-6	System Configuration Tool Software for local installations. Upgrade software for previous SCT versions being upgraded to the latest release.

### Note

The SCT software and Trunk Utility features require license activation at Release 13.0. SCT and Field Controller packages can be licensed using the Software Activation Manager (SAM) installed through the SCT installation wizard.

*For more information on software licensing, refer to the Software Activation Manager Help (LIT-12012389).*



## SCT - METASYS® SOFTWARE

### TECHNICAL SPECIFICATIONS

For instances where the SCT is installed on the same computer as the ADS/ADX software, refer to the specifications in the Application and Data Server (ADS/ADX) Product Bulletin (LIT-1201525). For applications where the SCT is installed on an ODS, refer to the specifications in the Open Data Server (ODS) Product Bulletin (LIT-12011943).

**Note:** Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-1201279) for specific Microsoft Windows OS settings that may be required for your Metasys system configuration.

**Note:** For information on licensing Microsoft SQL Server, refer to the Microsoft SQL Server Licensing Guide for the edition of Microsoft SQL Server that you install.

### SCT SYSTEM REQUIREMENTS (PART 1/2)

Codes	<b>TL-SCT-0</b>	New project software
	<b>TL-SCT-6</b>	Upgrade software
Recommended Platform	<i>Full Server Platform</i>	Intel® Core™ 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum) 20 GB minimum free hard disk space available. Use a Solid State Drive (SSD) to significantly improve performance compared to other types of hard disks. 16 GB RAM (4 GB RAM minimum)
	<i>Desktop Computer Platform</i>	Intel Core 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum) 20 GB minimum free hard disk space available. Use a Solid State Drive (SSD) to significantly improve performance compared to other types of hard disks. 16 GB RAM (4 GB RAM minimum)
Supported Operating Systems and Database Software	<i>Full Server Platforms</i>	<b>Windows Server 2016</b> Supports Microsoft SQL Server 2016 with SP1 (64-bit), Microsoft SQL Server 2014 with SP2 (64-bit), or SQL Server 2012 with SP3 (64-bit)
		<b>Windows Server 2012 R2 with Update 1</b> Supports Microsoft SQL Server 2016 with SP1 (64-bit), Microsoft SQL Server 2014 with SP2 (64-bit), or SQL Server 2012 with SP4 (64-bit)
		<b>Windows Server 2012</b> Supports Microsoft SQL Server 2016 with SP1 (64-bit), Microsoft SQL Server 2014 with SP2 (64-bit), or SQL Server 2012 with SP4 (64-bit)
Supported operating systems and database software <sup>1, 3</sup>	<i>Desktop Computer Platforms</i>	<b>Windows® 10 Professional or Enterprise (64-bit) with Creators Update (version 1709)</b> Supports Microsoft SQL Server 2016 Express with SP1 (64-bit), Microsoft SQL Server 2014 Express with SP2 (64-bit), or SQL Server 2012 Express with SP4 (64-bit) <b>Note:</b> The Windows 10 Creators Update (version 1709) is required for any Windows 10 computer that runs Metasys 10.0 software, including the ADS, ADX, ODS, and any Metasys software application. Verify this update <b>before</b> installing Metasys 10.0 software. If you are upgrading to Metasys Release 10.0 and do not have this update, you must <b>uninstall</b> the previous release of all Metasys software, apply the Windows 10 Creators Update (version 1709), then proceed with the Metasys 10.0 upgrade.
		<b>Windows 8.1 Pro and Windows 8.1 Enterprise Editions with Update 1</b> Supports Microsoft SQL Server 2016 Express with SP1 (64-bit), Microsoft SQL Server 2014 Express with SP2 (64-bit), or SQL Server 2012 Express with SP4 (64-bit)
		<b>Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit)</b> Supports Microsoft SQL Server 2016 Express with SP1 (64-bit), Microsoft SQL Server 2014 Express with SP2 (64-bit), or SQL Server 2012 Express with SP4 (64-bit)

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## TECHNICAL SPECIFICATIONS

### SCT SYSTEM REQUIREMENTS (PART 2/2)

Supported Web Browser Software for <i>Metasys</i> Client computers	Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later, Microsoft® Edge® version 41 or later, Apple® Safari® 11 or later, and Google® Chrome™ version 61 or later. <b>Note:</b> In Internet Explorer 11, select the Use Microsoft compatibility lists option, found under Tools > Compatibility View Settings, to ensure that websites appear and function correctly. Other browsers, such as Mozilla® Firefox®, may also be used but are not fully supported. <b>Note:</b> Use the web browsers to download the Launcher application. After you install the Launcher application, you can use the Launcher to log in to the SCT UI. You can also use the web browsers to access the Site Management Portal (SMP) UI, <i>Metasys</i> UI, <i>Metasys</i> UI Offline, and SCT Pro sites. You can also add a bookmark to the <i>Metasys</i> UI, <i>Metasys</i> UI Offline and SCT Pro sites.
Network Communication for <i>Metasys</i> System Configuration Tool Client Computers	Ethernet network interface card 10/100/1000 Mbps (100 Mbps network or better recommended)
Optional Software Packaging	<b>Note:</b> A license for the SCT 13.0 is not included with the ADX, ADS, or ODS software. You must obtain a license for each installation of the SCT.

# BUILDING AUTOMATION PRODUCTS

## SUPERVISOR SOFTWARE AND TOOLS

### METASYS® SOFTWARE

## VMD

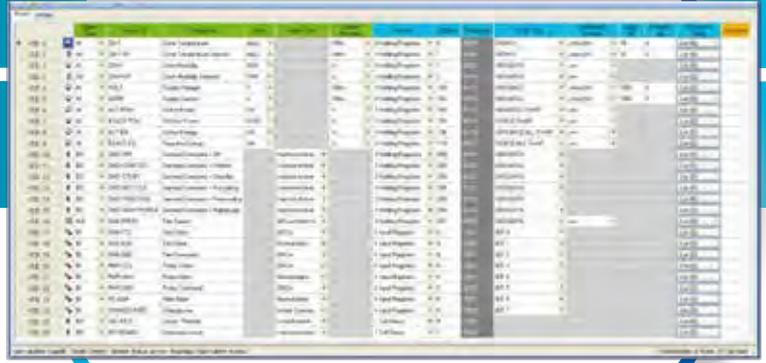
### GENERATOR EXPRESS

VMD Generator Express (VGE) is software designed to support the creation of the Vendor Model Definition (VMD) files, used by the Modbus® RTU and TCP integration on NAE (Metasys 10.0+) & NIEEx9 for third party integrations platform.

VMD Generator Express supplies a user friendly user's interface to create, modify and view VMD files.

VMD Generator Express incorporates a version tracking system, storing user, date/time and comment, every time a VMD is saved (created or modified).

VMD Generator Express allows creating generic models for standard integrations, like meters, chillers, AHU, to optimize the engineering time and follow standardization approach.



## FEATURES

- User friendly UI
- Version Tracking
- User Target Behaviour
- Excel string Import
- Model / Standardization
- Points List Export

## ORDERING INFORMATION

CODES	DESCRIPTION
TL-NIE-DVD	VMD Generator Express software. It does not include the license

**Note**  
The usage of the VMD Generator Express Tool requires a certification, which is achieved by attending a training course. For more information please contact your local technical support team.

# BUILDING AUTOMATION PRODUCTS

## SUPERVISOR SOFTWARE AND TOOLS

### METASYS® SOFTWARE

## CCT

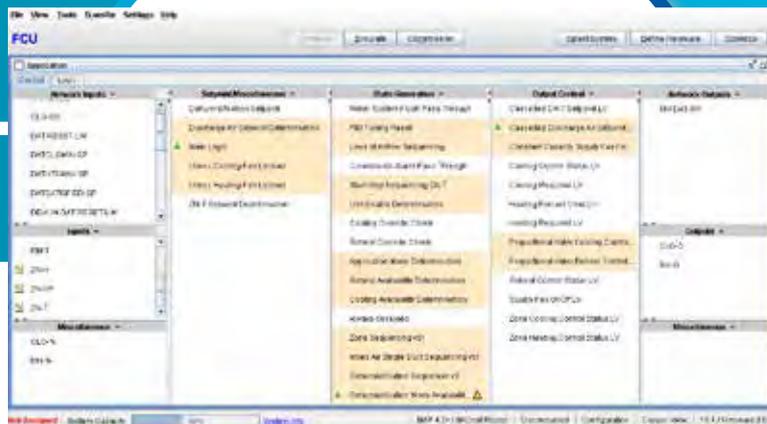
### CONTROLLER CONFIGURATION TOOL

You can use the Controller Configuration Tool (CCT) to configure, simulate, commission, and transfer application files to the following controllers on an MS/TP bus:

- Advanced Application Field Equipment Controllers (FACs)
- Advanced Application Programmable Controllers (PCAs)
- Expansion Input/Output Modules (PCXs)
- Field Equipment Controllers (FECs)
- General Purpose Application Controllers (CGMs)
- General Purpose Programmable Controllers (PCGs)
- Input/Output Modules (IOMs)
- Programmable Variable Air Volume Box Controllers (PCVs)
- Variable Air Volume Controllers (VAVs)
- Variable Air Volume Modular Assembly Controllers (VMAs)
- Variable Air Volume Terminal Equipment Controllers (CVMs)

CCT operates in the following three modes that provide key functionality for your system:

- You can use the **Configuration** mode to select a wide variety of mechanical and control logic options through system selection trees for typical air handling, terminal unit, central plant, and VAV box mechanical systems. When required, you can customize the standard logic provided by the system selection process to meet your specialized control logic requirements.
- You can use the **Simulation** mode to review the application logic as if you were commissioning the system. You can make adjustments to setpoints, inputs, or sensors during a simulation session to validate the logic before assigning the configuration to a specific controller. A simulation debugging console is also available to setup break points that pause the simulation session based on criteria that you set up. While viewing a simulation session, transitions taking place in the logic are highlighted for a few seconds to help you quickly identify where the changes occur.
- You can use the Commissioning mode to connect to a device and view actual data from that device. You can use this mode to monitor your device and set Offsets, COVs, and Polarity in addition to other parameter and detail changes. For VAV applications, CCT includes an optional box flow test to automatically exercise all the VAV boxes to ensure correct mechanical installation and proper configuration of the key flow setup parameters. The ZFR Checkout Tool (ZCT) is available to validate the wireless connectivity and health of your wireless mesh network. *Refer to the ZFR Checkout Tool Help (LIT-12012292) for details.* Controller Application Files (CAFs) can be transferred and commissioned to a device through a wide variety of connection interfaces including: NxE Passthru, MAP 4.2+ /BACnet® router, ZigBee® and Direct Ethernet.



## CCT - METASYS® SOFTWARE



### CCT AND FIELD CONTROLLER PACKAGE LICENSING

CCT software and field controller package files require license activation at Release 13.0. You can license CCT and field controller packages using the Software Activation Manager (SAM), which is installed through the CCT installation wizard. *For more information on software licensing, refer to the Software Activation Manager Help (LIT-12012389).*

Field controller package files are bundled separately at this release. You can use the licensing infrastructure to download package files, and the Package Importer wizard to install them.

*For information on CCT and field controller package licensing, and on how to install field controller package files, refer to the CCT Installation Instructions (LIT-12011529).*

### CCT AND FX-PCT

CCT and the Facility Explorer® Programmable Controller Tool (FX-PCT) are no longer separate software tools. Users of CCT and FX-PCT at Release 10.2 must first uninstall the previous version before installing 13.0. Users of CCT and FX-PCT software at Release 10.3 can upgrade directly to Release 13.0.

*For information on how to upgrade to or install CCT, refer to the CCT Installation Instructions (LIT-12011529).*

## FEATURES

- **FSM Explorer** – Provides a new way of viewing the Finite State Machine (FSM) in Configuration, Simulation and Commissioning mode.
- **New CAF Workflow** – Helps you pick the correct Release Mode for your application.
- **Transfer to Device (Download) Enhancements** – Enables you to control when to activate transferred files on a controller and enable and disable the logic of applications in a device.
- **Online Library** – Enables you to download, publish and share CAF files, Controller Templates, Equipment Definitions and CCT Modules. This feature is only available to Technician licensed users.
- **Support for SA Bus Provisioning** – Provides the ability to update the firmware of all devices attached on the Sensor/Actuator Bus. You can check the status of SA Bus devices in the Transfer Wizard.
- **BBMD Functionality** – Provides you with the ability to configure IP controllers with BACnet Broadcast Management Device (BBMD) enabled.
- **N2 Application Transfer** – Facilitates the transfer of N2 applications to N2 capable devices without requiring explicit communication switching.

## ORDERING INFORMATION

CODES	DESCRIPTION
TL-CCT-0	New project software for sites that do not have a previous version of CCT installed
TL-CCT-6	Upgrade software for previous CCT versions being upgraded to the latest release
MS-FCP-0	Metasys Field Controller Packages
FX-FCP-0	FX Field Controller Packages



## TECHNICAL SPECIFICATIONS

### CCT SYSTEM REQUIREMENT

Recommended Computer	Intel® Core™ 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum) 20 GB free hard disk available (600 MB minimum)
Recommended Memory	Computer Platforms: 16 GB RAM (600 MB minimum)
Supported Operating System (OS) and Database Software	<p><b>Windows® 10 Pro and Enterprise Editions with Creators Update (version 1709) (64 bit)</b> Supports Microsoft® SQL Server® 2016 Express with SP1 (64-bit), Microsoft SQL Server 2014 Express with SP2 (64-bit) , or Microsoft SQL Server 2012 Express with SP4 (64-bit) Supports Microsoft SQL Server 2016 Standard with SP1 (64-bit), Microsoft SQL Server 2014 Standard with SP2 (64-bit) , or Microsoft SQL Server 2012 Standard with SP4 (64-bit) <b>Note:</b> The OS and software must both be 64-bit.</p> <p><b>Windows 8.1 Pro and Windows 8.1 Enterprise Editions with Update 1 (64-bit)</b> Supports Microsoft SQL Server 2016 Express with SP1 (64-bit), Microsoft SQL Server 2014 Express with SP2 (64-bit) , or Microsoft SQL Server 2012 Express with SP4 (64-bit) Supports Microsoft SQL Server 2016 Standard with SP1 (64-bit), Microsoft SQL Server 2014 Standard with SP2 (64-bit) , or Microsoft SQL Server 2012 Standard with SP4 (64-bit) <b>Note:</b> The OS and software must both be 64-bit.</p> <p><b>Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit)</b> Supports Microsoft SQL Server 2014 Express with SP2 (64-bit), or Microsoft SQL Server 2012 Express with SP4 (64-bit) Supports Microsoft SQL Server 2014 Standard with SP2 (64-bit), or Microsoft SQL Server 2012 Standard with SP4 (64-bit) <b>Note:</b> The OS and software must both be 64-bit.</p>
Required Web Browser Software for Metasys Client Computers	<p>Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later, Microsoft Edge® version 41 or later, Apple Safari® 11 or later, and Google® Chrome™ version 61 or later.</p> <p><b>Note:</b> In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under <b>Tools &gt; Compatibility View Settings</b> , to ensure that websites appear and function correctly.</p> <p><b>Note:</b> Web browser software is required if you want to view the Controller Tool Help (LIT-12011147) online. However, you can also access this help system as a PDF from the software.</p>
Network Communication for CCT Client Computers	Ethernet network interface card 10/100/1000 Mbps (100 Mbps network or better recommended)
Software Optionally Installed During CCT Install	Microsoft .NET Framework version 4.6.1 Microsoft SQL Server 2014 Express software with SP2
Optional Connection Devices (Order Separately)	<p>Bluetooth Commissioning Converter (MS-BTCVT-1) <b>Note:</b> The BTCVT is no longer available but continues to be supported.</p> <p>Laptop with Bluetooth® wireless communications or a computer with a USB Bluetooth converter The USB Dongle with ZigBee® Driver (ZFR-USBHA-0) has a wireless connection through the CCT for wireless commissioning of the wireless enabled FEC and VMA16 field controllers. It also uses the ZCT in CCT. The Mobile Access Portal (MAP) Gateway (TL-MAP1810-0Px ) at Release 4.2 has a BACnet Router connection to the SA Bus of an IP field controller on your subnet. BACnet Router Setup for Tool Connections—The BACnet Router setup has been updated to allow the MAP Gateway to easily connect to the field controller and System Tools through a WIFI connection to perform file transfers and commissioning function. <i>For further information, refer to the Mobile Access Portal Gateway Product Bulletin (LIT-12011884).</i> The Portable BACnet/Internet Protocol to MS/TP Router (TLBRTRP-0) routes information between BACnet/ IP and MS/TP networks. <i>For further information, refer to the Portable BACnet®/IP to MS/TP Router (Part No. 24-10414-2).</i> Adobe® Reader® software <b>Note:</b> A PDF reader software is required for the Print function in CCT.</p>
Optional Hardware	Any network or local printer supported by the qualified Windows operating system

# BUILDING AUTOMATION PRODUCTS

## SUPERVISOR SOFTWARE AND TOOLS

### METASYS® SOFTWARE

## CPO10

### CENTRAL PLANT OPTIMIZATION™



Johnson Controls has combined expertise from designing YORK® chillers and *Metasys* controls to bring the best world-class program to operate your chiller plant. The result is Johnson Controls Central Plant Optimization™ 10, which saves energy and improves reliability in your facility. A facility's central chiller plant uses a significant portion of the HVAC energy, typically 35%. Managing this load, while still maintaining occupant comfort is a primary strategy for overall energy management.

CPO10, which is powered by the *Metasys* system, provides such a strategy. The *Metasys* CPO10 application uses field-proven, factory-tested and fully documented best practices to select the most efficient combination of chillers, pumps, heat exchangers and cooling towers needed to match the building load. The application then commands the selected devices to the appropriate state or speed, providing the necessary sequencing of pumps, isolation valves and main equipment, while observing all the timing delays for safe and stable operation of the central chiller plant.

## FEATURES

- **Advanced Control Algorithms** – Evaluate all possible combinations of devices considering capacities, efficiencies, runtimes, and number of starts resulting in the most efficient operating state rather than simply selecting the next available device as the building load increases.
- **Total Automation of All Equipment** – Provides proper sequencing of all devices in a safe and stable fashion.
- **Simulation Mode Application Preview** – Allows you to test a newly generated program prior to downloading the program to the field controllers.
- **Optional Integration of Third-Party Equipment** – Provides additional energy savings.
- **Control Sequences Created by the System Selection Tool (SST) within Controller Configuration Tool (CCT)** – Allow you to select from tens of thousands of possible equipment combinations, piping configurations, and control strategies, each resulting in the automatic creation of a software program using proven best practices.
- **CCT Editor Allowing Customization of Individual Components of the Program Created Using SST** – Addresses special situations that cannot be described in SST and easily customizes the program, without the need to build the entire program from scratch.



## APPLICATION SUPPORTS

- Up to eight chillers, centrifugal (mix of constant or variable speed), screw, reciprocating or scroll compressor of mixed sizes, piped in parallel
- Up to eight primary chilled water pumps of mixed sizes, all dedicated or headered and all constant or variable speed
- Up to eight secondary chilled water pumps that are mixed in size, are piped in parallel and are variable speed
- Up to eight condenser water pumps that are mixed in size, all dedicated or headered and all constant or variable speed
- Up to four heat exchangers of mixed sizes, piped in parallel
- Up to eight cooling towers piped in common to the chillers, are single speed (with optional vernier control), multispeed or variable speed with a variety of tower/sump valve arrangements
- A non-integrated waterside economizer able to control up to eight total devices (chillers and heat exchangers) piped in parallel
- Air-cooled chillers

The CPO10 application offers a variety of primary control strategies including measuring building chilled-water flow and differential temperature, the chillers' kW load and flow through a decoupler pipe in a primary/secondary system, or differential temperature only in a constant speed chilled water pump system. You can also select dozens of secondary strategies, such as open loop control of the cooling towers (as defined by the American Society of Heating, Refrigerating and Air-Conditioning Engineers [ASHRAE]) or closed loop control of condenser-water setpoint.

The CPO10 application supports 24 sequences through any combination of the following chilled water systems and condenser water systems:

### CHILLED WATER SYSTEMS

- Variable Primary Headered
- Variable Primary Dedicated
- Primary Secondary Headered
- Primary Secondary Dedicated
- Constant Headered

### CONDENSER WATER SYSTEMS

- Constant Dedicated
- Variable Headered
- Variable Dedicated
- Constant Headered

# BUILDING AUTOMATION PRODUCTS

## SUPERVISORY AND NETWORK CONTROLLERS

### METASYS® NETWORK ENGINE

## NAE

### NETWORK AUTOMATION ENGINE

The *Metasys*® network engines perform a key role in the *Metasys* system architecture. These network engines provide network management and system-wide control coordination over one or more networks of equipment controllers, including the following *Metasys* field controllers:

- General Purpose Application MS/TP Controllers (CGMs)
- VAV Box Equipment MS/TP Controllers (CVMs)
- Field Equipment Controllers (FECs) and Advanced Application Field Equipment Controllers (FACs)
- Terminal Equipment Controllers (TECs)
- Legacy *Metasys* controllers, such as Unitary (UNT) controllers, Variable Air Volume Assembly (VMA14xx) controllers, and DX-9100 controllers
- Third-party equipment controllers

The network engines can be networked together for scaling up on large projects, and they can be networked with an Application and Data Server (ADS) or an Extended Application and Data Server (ADX) for additional functionality and site unification.

Network engines provide building control scheduling, alarm and event management, energy management, data exchange, historical data storage and management, and custom control logic. Network engines include an embedded user interface called the Site Management Portal (SMP). Users access the SMP for system navigation and operation using web browser connections. Network engines are secured from unauthorized access using password protection and permission access control as well as IT security best practices.

In addition to providing general comprehensive equipment monitoring and control, network engines also offer specialized capabilities by series, model, and software release to meet a variety of application requirements. The network engines are identified by three types:

### SMALL-CAPACITY ENGINES

- Network Automation Engines: NAE35 and NAE45
- Network Control Engine: NCE25
- Network Integration Engines: NIE29, NIE39, and NIE49



## NAE - METASYS® NETWORK ENGINE



### LARGE-CAPACITY ENGINES

- Network Automation Engine: NAE55
- Network Integration Engines: NIE55 and NIE59

### SOFTWARE-ONLY ENGINES

- Network Automation Engine: NAE85
- Network Integration Engine: NIE85 and NIE89

NAEs provide network supervisor capabilities and IP network connectivity. NCEs also provide network supervisor capabilities and IP network connectivity, but also feature the I/O point connectivity and direct digital control capabilities of an FEC. NIEs are variants of NAEs and NCEs that include legacy and third-party device integration capabilities.

## FEATURES

### NETWORK ENGINES

The features and benefits below are applicable to all network engines, with specific features varying by model and software release.

- **Supervision of controller networks including Johnson Controls and third-party protocol devices –** Supports connectivity to open network standards for complete flexibility in the selection of field devices. Supported protocols are model and software release dependent. They include BACnet MS/TP, BACnet/IP, LonWorks, N2 Bus, Modbus® RTU, Modbus TCP, M-Bus (EN 13757-3) serial and IP, KNX IP, and other third-party protocols. Prior to *Metasys* system Release 9.0.7, the Network Integration Engines (NIEs) provided the Modbus, M-Bus, and KNX integrations. At Releases 9.0.7 and 10.0, these third-party integrations are included with all NAEs.
- **Communication using commonly accepted IT standards at the automation and enterprise level –** Allows you to install a system on your existing IT infrastructure within a building or enterprise and use standard IT communication services over the company intranet, WAN, public Internet with VPN tunnel and firewall protection. Network engines also support the ability to optionally authenticate non-local users through a Remote Authentication Dialin User Services (RADIUS) server and Syslog Destination Delivery Agent (DDA) for network logging of *Metasys* audits and events.
- **Secure web-based user interface –** Allows you to access system data in the network engines from any supported web browser device connected to the network, including remote users connected by dial-up telephone or an Internet Service Provider (ISP). All upgraded network engines have self-signed certificates that provide for encrypted communication. Optionally, you can deploy trusted certificates to network engines. The customer's IT department or a Certificate Authority (CA) can provide trusted certificates.
- **Site Director function –** Allows you to access all data on one site through one device. The device that is designated as the Site Director coordinates the display of data from multiple devices for easy navigation through the entire site. This capability is available to all network engine models.
- **Embedded user interface and online system configuration software –** Lets you enable, configure, commission, archive data, monitor, command, and perform system diagnosis from any device by using a web browser, without the need for separate workstation software.



## FEATURES

### NETWORK ENGINES

- **Internet connection for data access** – Allows connection of a web browser through the IP network using the Ethernet port.
- **Embedded Site Management Portal system configuration software** – Gives you password-protected access to system configuration, monitoring, commanding, diagnosis, and a cloud-based application from any device with web browser software without the need for separate workstation software.
- **No hardware to replace** – Upgrade from a Microsoft® Windows® Embedded operating system to a version of the Linux operating system using a simple network download (Releases 9.0.7 and 10.0 only). Switching to Linux reassures customers that the underlying OS of their network engines supports future security updates.

### NETWORK CONTROL ENGINES

The features and benefits below are specific to Network Control Engines (NCEs):

- **Integral field controller with 33 I/O Points** – Provides field-level control of central plant and large air-handler applications combined with enterprise level IP network connectivity.
- **Expandable I/O point capacity, NS sensor connectivity, and VFD control on field controller SA Bus** – Allow you to connect multiple Input/Output Modules (IOMs), NS Series Network Sensors, and VFDs to the field controller SA Bus, greatly expanding the NCE's field level control capabilities.



## ORDERING INFORMATION

### NCE25 (RELEASES 9.0 AND 9.0.7 ONLY)

CODES	RELEASE	DESCRIPTION
MS-NCE25xx-x (Base Features on Each NCE25)	N/A	Each NCE25 Series model requires a 24 VAC power supply and includes one RS-232-C serial port, one RS-485 optically isolated SA Bus port, one USB serial port, one Ethernet port, and an MSBAT1020-0 Data Protection Battery. Each NCE25 Series model has 33 integral I/O points and supports up to 128 additional I/O points on the SA Bus. Supports BACnet IP network.
MS-NCE2500-0	9.0.7	Base features with no physical field controller trunk connection.
MS-NCE2506-0	9.0.7	Base features with no physical field controller trunk connection. Includes integral display screen.
MS-NCE2510-0	9.0.7	Supports two third-party trunks (Modbus® RTU or TCP, M-Bus, or KNX) and one N2 Bus. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported.
MS-NCE2511-0	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported. Includes internal modem. <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 9.0.7 or later.
MS-NCE2516-0	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported. Includes integral display screen.
MS-NCE2517-0	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported. Includes integral display screen and internal modem. <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 9.0.7 or later.
MS-NCE2520-0	9.0	Supports one LonWorks trunk with up to 32 LonWorks devices.
MS-NCE2521-0	9.0	Supports one LonWorks trunk with up to 32 LonWorks devices. Includes internal modem.
MS-NCE2526-0	9.0	Supports one LonWorks trunk with up to 32 LonWorks devices. Includes integral display screen.
MS-NCE2527-0	9.0	Supports one LonWorks trunk with up to 32 LonWorks devices. Includes integral display screen and internal modem.
MS-NCE2560-0	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one MS/TP Bus. The number of supported devices on the third-party trunk depends on the protocol. For the MS/TP bus, up to 32 devices are supported.
MS-NCE2561-0	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one MS/TP Bus. The number of supported devices on the third-party trunk depends on the protocol. For the MS/TP bus, up to 32 devices are supported. Includes internal modem. <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 9.0.7 or later.
MS-NCE2566-0	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one MS/TP Bus. The number of supported devices on the third-party trunk depends on the protocol. For the MS/TP bus, up to 32 devices are supported. Includes integral display screen.
MS-NCE2567-0	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one MS/TP Bus. The number of supported devices on the third-party trunk depends on the protocol. For the MS/TP bus, up to 32 devices are supported. Includes integral display screen and internal modem. <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 9.0.7 or later.



## ORDERING INFORMATION

### NCE25 ACCESSORIES

CODES	DESCRIPTION
MS-BAT1020-0	Replacement data protection battery for NAE35, NAE45, and NCE25. Rechargeable NiMH battery: 3.6 V 500 mAh, with a typical life of 5 to 7 years at 21°C.
TL-MAP1810-xx	Pocket-sized web server that provides a wireless mobile user interface to <i>Metasys</i> field controllers, thermostats, and smart rooftop units. <i>Refer to the Mobile Access Portal Gateway Catalog Page (LIT-1900869) to identify the appropriate product for your region.</i> <b>Note:</b> The MAP Gateway serves as a replacement for the BTCVT, which is no longer available but continues to be supported.
MS-DIS1710-0	Local Controller Display connects to NCE on SA Bus and provides menu display and navigation keypad for monitoring status and controlling parameters on the NCE's integral field controller. <b>Note:</b> A DIS1710 display does not operate on NCE models that have an integral controller display.
MS-EXPORT-0	License enabling <i>Metasys</i> Export Utility software for new installation. Software may be obtained by electronic download from the Licensing Portal or by ordering a DVD copy.

### NAE35 (RELEASE 9.0 OR 9.0.7 ONLY) (PART 1/2)

CODES	RELEASE	DESCRIPTION
MS-NAE35xx-x (Base Features of Each NAE35)	N/A	NAE35 Network Automation Engines: Requires a 24 VAC power supply. Each model includes one RS-232-C serial port, one USB serial port, one Ethernet port, and an MS-BAT1020-0 Data Protection Battery. Supports a BACnet IP network.
MS-NAE3510-2	9.0.7	Supports two third-party trunks (Modbus® RTU or TCP, M-Bus, or KNX) and one N2 Bus or BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or MS/TP trunk, up to 50 devices are supported. <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 9.0.7 or later.
MS-NAE3511-2	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus or BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or MS/TP trunk, up to 50 devices are supported. Includes internal modem. <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 9.0.7 or later.
MS-NAE3514-2	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus or BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or MS/TP trunk, up to 50 devices are supported. Engine is limited to Basic Access support. <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 9.0.7 or later.
MS-NAE3515-2	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus or BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or MS/TP trunk, up to 50 devices are supported. Engine is limited to Basic Access support; includes internal modem. <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 9.0.7 or later.

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NAE - METASYS® NETWORK ENGINE



ORDERING INFORMATION

NAE35 (RELEASE 9.0 OR 9.0.7 ONLY) (PART 2/2)

CODES	RELEASE	DESCRIPTION
MS-NAE3520-2	9.0	Supports one LonWorks trunk; includes an additional RS-232-C serial port for optional external modem. Supports a maximum of 64 devices on the LonWorks port.
MS-NAE3521-2	9.0	Supports one LonWorks trunk; includes an internal modem. Supports a maximum of 64 devices on the LonWorks port.
MS-NAE3524-2	9.0	Supports one LonWorks trunk; limited to Basic Access support; and includes an additional RS-232-C serial port for optional external modem. Supports a maximum of 64 devices on the LonWorks trunks.
MS-NAE3525-2	9.0	Supports one LonWorks trunk; limited to Basic Access support; and includes an internal modem. Supports a maximum of 64 devices on the LonWorks trunks.

NAE55-2 (RELEASE 5.2 OR 8.1 ONLY)

CODES	RELEASE	DESCRIPTION
MS-NAE55xx-x (Base Features of Each NAE55)	N/A	NAE55 Network Automation Engines: Requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, two USB serial ports, two RS-485 ports, one Ethernet port, and one MS-BAT1010-0 Data Protection Battery. Supports a BACnet IP network.

NAE55-3 (RELEASE 8.1 OR 10.0 ONLY) (PART 1/2)

CODES	RELEASE	DESCRIPTION
MS-NAE55xx-x (Base Features of Each NAE55)	N/A	NAE55 Network Automation Engines: Requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, two USB serial ports, two RS-485 ports, one Ethernet port, and one MS-BAT1010-0 Data Protection Battery. Supports a BACnet IP network.
MS-NAE5510-3E	10.0	Supports two third-party trunks (Modbus® RTU or TCP, M-Bus, or KNX) and two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk). Supports up to 100 devices on each N2 or BACnet MS/TP trunk. This model is a BACnet BTL-Listed controller at Protocol Revision 15 (PR15).
MS-NAE5511-3E	10.0	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk); includes an internal modem. Supports up to 100 devices on each N2 or BACnet MS/TP trunk. This model is a BACnet BTL-Listed controller at Protocol Revision 15 (PR15). <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 10.0 or later.
MS-NAE5511-3E	10.0	Supports a LonWorks trunk, two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX), or two N2 trunks/BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk). Supports up to 255 devices on the LonWorks trunk. Supports up to 100 devices on each N2 or BACnet MS/TP trunk. This model is a BACnet BTL-Listed controller at Protocol Revision 15 (PR15).
MS-NAE5520-3E	10.0	Supports a LonWorks trunk, two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX), or two N2 trunks/BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk); includes an internal modem. Supports up to 255 devices on the LonWorks trunk. Supports up to 100 devices on each N2 or BACnet MS/TP trunk. This model is a BACnet BTL-Listed controller at Protocol Revision 15 (PR15). <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 10.0 or later.

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## ORDERING INFORMATION

### NAE55-3 (RELEASE 8.1 OR 10.0 ONLY) (PART 2/2)

CODES	RELEASE	DESCRIPTION
MS-NAE5511-3E	10.0	Supports two third-party trunks (Modbus® RTU or TCP, M-Bus, or KNX) and two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk); includes an internal modem. Supports up to 100 devices on each N2 or BACnet MS/TP trunk. This model is a BACnet BTL-Listed controller at Protocol Revision 15 (PR15). <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 10.0 or later.
MS-NAE5520-3E	10.0	Supports a LonWorks trunk, two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX), or two N2 trunks/BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk). Supports up to 255 devices on the LonWorks trunk. Supports up to 100 devices on each N2 or BACnet MS/TP trunk. This model is a BACnet BTL-Listed controller at Protocol Revision 15 (PR15).
MS-NAE5521-3E	10.0	Supports a LonWorks trunk, two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX), or two N2 trunks/BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk); includes an internal modem. Supports up to 255 devices on the LonWorks trunk. Supports up to 100 devices on each N2 or BACnet MS/TP trunk. This model is a BACnet BTL-Listed controller at Protocol Revision 15 (PR15). <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 10.0 or later.

## ACCESSORIES

### NETWORK ENGINES

CODES	DESCRIPTION
MS-BAT1010-0	Replacement data protection battery for NAE55 and NIE55. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of 3 to 5 years at 21°C
MS-BAT1020-0	Replacement data protection battery for NAE35, NAE45, and NCE25. Rechargeable NiMH battery: 3.6 V 500 mAh, with a typical life of 5 to 7 years at 21°C
TL-MAP1810-xx	Pocket-sized web server that provides a wireless mobile user interface to <i>Metasys</i> field controllers, thermostats, and smart rooftop units. <i>Refer to the Mobile Access Portal Gateway Catalog Page (LIT-1900869) to identify the appropriate product for your region.</i> <b>Note:</b> The MAP Gateway serves as a replacement for the BTCVT, which is no longer available but continues to be supported.
MS-MULTENGSW-6	DVD with Network Engine software images for all NAEs, NIEs, and NCEs; for upgrading existing, engine-only (no ADS/X) installations.
MS-EXPORT-0	License enabling <i>Metasys</i> Export Utility software for new installation. Software may be obtained by electronic download from the Licensing Portal or by ordering a DVD copy.
MS-COPY-EXPORT	DVD reproduction of <i>Metasys</i> Export Utility product, unlicensed AS-XFR100-1 Power transformer (Class 2, 24 VAC, 92 VA maximum output), with enclosure
SC450RM1U (OEM Part No.)	Recommended UPS for NxE85 model: APC Smart-UPS SC 450 VA, 280 W, 120 VAC input/output with NEMA 5-15R output connections



## ORDERING INFORMATION

### NAE85 (RELEASE 10.0 ONLY)

CODES	RELEASE	DESCRIPTION
MS-NXE85SW-0	10.0	License enabling NAE8500 software for new installation; supports a maximum of 10,000 objects. Software may be obtained by electronic download from the Licensing Portal or by ordering a DVD copy.
MS-NXE85SW-6	10.0	License enabling NAE8500 software for upgrading existing installation; supports a maximum of 10,000 objects. Software may be obtained by electronic download from the Licensing Portal or by ordering a DVD copy.
MS-15KUPG-0	10.0	License enabling an additional 15,000 objects on NAE8500 or LCS8500 (resulting in supporting a maximum of 25,000 total objects).
MS-COPY-NXE85SW	10.0	DVD copy of unlicensed NAE8500 software.

### NIE55-3 (RELEASE 9.0 ONLY)

CODES	DESCRIPTION
MS-NIE55xx-x (Base Features of Each NIE55)	NIE Network Integration Engines: Requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, two USB serial ports, one Ethernet port, and one MS-BAT1010-0 Data Protection Battery. Supports an IP Ethernet network.
MS-NIE5510-3E	Supports N1 network migrations
MS-NIE5511-3E	Supports N1 network migrations, includes an internal modem

## ACCESSORIES

### NIE

CODES	DESCRIPTION
MS-15KUPG-0	License enabling an additional 15,000 objects on Nx85 or LCS85 (resulting in supporting a maximum of 25,000 total objects).
MS-MULTENGSW-6	DVD with Network Engine software images for all NAEs, NIEs, and NCEs; for upgrading existing, engine-only (no ADS/X) installations.
MS-BAT1010-0	Replacement data protection battery for NAE55 and NIE55; rechargeable gel cell battery with a typical life of 3 to 5 years at 21°C
(OEM Part No.) SC450RM1U	Recommended Uninterruptible Power Supply for NIE85 Models: APC Smart-UPS SC 450 VA, 280 W 120 VAC input/output with NEMA 5-15R output connections



## ORDERING INFORMATION

NXE5XX-1 SERIES WINDOWS EMBEDDED STANDARD 2009 IMAGE FILES (ONLY APPLIES TO THE MS-NAE55XX-1, MS-NIE55XX-1, AND MS-NIE59XX-1)

CODES	DESCRIPTION
MS-NXE5-1WES-10	10 Licenses—operating system upgrade from Windows XP Embedded to Windows Embedded Standard 2009
MS-NXE5-1WES-25	25 Licenses—operating system upgrade from Windows XP Embedded to Windows Embedded Standard 2009
MS-NXE5-1WES-50	50 Licenses—operating system upgrade from Windows XP Embedded to Windows Embedded Standard 2009
MS-NXE5-1SWO-6	Software Only (no licenses)—upgrade software for previously purchased software and license part numbers MS-NXE5-1WES-xx

## NIE29 (RELEASE 9.0 OR 9.0.7 ONLY)

CODES	RELEASE	DESCRIPTION
MS-NIE29xx-x (base features on each NIE29)	N/A	Each NIE29 Series model requires a 24 VAC power supply and includes one RS-232-C serial port, one USB serial port, one SA Bus port, one RS-485 or LON port, one Ethernet port, and an MS-BAT1020-0 Data Protection Battery. Each NIE29 Series model supports 33 hard-wired Input/Output points. Up to two ports can be defined for third-party integration. The other ports have to be defined in order to use standard protocols (N2, BACnet MS/TP, or LON). Supports BACnet/IP network.
MS-NIE2910-0	9.0 » 9.0.7	Supports two third-party trunks (Modbus® RTU or TCP, M-Bus, or KNX) and one N2 Bus. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported.
MS-NIE2916-0	9.0 » 9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported. Includes integral display screen.
MS-NIE2920-0	9.0	only Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX), and one LonWorks trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported. For the LonWorks trunk, up to 32 devices are supported. This product does not support the 9.0.7 upgrade.
MS-NIE2926-0	9.0 only	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX), and one LonWorks network trunk. The number of supported devices on the third-party trunk depends on the protocol. For the LonWorks trunk, up to 32 devices are supported. Includes integral display screen. This product does not support the 9.0.7 upgrade.
MS-NIE2960-0	9.0 » 9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the BACnet MS/TP trunk, up to 32 devices are supported.
MS-NIE2966-0	9.0 » 9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the BACnet MS/TP trunk, up to 32 devices are supported. Includes integral display screen.



## ORDERING INFORMATION

### NIE39 (RELEASE 9.0 OR 9.0.7 ONLY)

CODES	RELEASE	DESCRIPTION
MS-NIE39xx-x (Base Features of Each NIE39)	N/A	Each NIE39 Series model requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, one USB serial port, one RS-485 or LON port, one Ethernet port, and an MSBAT1020- 0 Data Protection Battery. Up to two ports can be defined for third-party integration. The other ports have to be defined in order to use standard protocols (N2, BACnet MS/TP, or LON). Supports BACnet/IP network.
MS-NIE3910-2	9.0 » 9.0.7	Supports two third-party trunks (Modbus® RTU or TCP, M-Bus, or KNX) and one N2 Bus or one BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or BACnet MS/TP trunk, up to 50 devices are supported.
MS-NIE3920-2	9.0 only	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one LonWorks trunk. The number of supported devices on the third-party trunk depends on the protocol. For the LonWorks trunk, up to 64 devices are supported. This product does not support the 9.0.7 upgrade.

### NIE49 (RELEASE 9.0 OR 9.0.7 ONLY)

CODES	RELEASE	DESCRIPTION
MS-NIE49xx-x (Base features of each NIE49)	N/A	Each NIE49 Series model requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, one USB serial port, one RS-485 or LON port, one Ethernet port, and an MSBAT1020- 0 Data Protection Battery. Up to two ports can be defined for third-party integration. The other ports have to be defined in order to use standard protocols (N2, BACnet MS/TP, or LON). Supports BACnet/IP network.
MS-NIE4910-2	9.0 » 9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus or one BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or BACnet MS/TP trunk, up to 100 devices are supported.
MS-NIE4920-2	9.0 only	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one LonWorks trunk. The number of supported devices on the third-party trunk depends on the protocol. For the LonWORKS trunk, up to 127 devices are supported. This product does not support the 9.0.7 upgrade.

### NIE59-3 (FIELD UPGRADEABLE TO RELEASE 10.0 ONLY)

CODES	RELEASE	DESCRIPTION
MS-NIE59xx-3 (Base Features of Each NIE59)	N/A	Each NIE59-3 Series model requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, two USB serial ports, two RS-485 ports, one Ethernet port, and one MSBAT1010- 0 Data Protection Battery. Supports up to 100 devices on each N2 or BACnetMS/TP trunk and up to 100 devices on the integration trunk. Up to two ports can be defined for third-party integration. The other ports have to be defined in order to use standard protocols (N2, BACnet MS/TP, or LON). Supports BACnet IP network.
MS-NIE5960-3	10.0	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and two N2 or BACnet MS/TP (RS-485) trunks. The number of supported devices depends on third-party protocol. For the N2 or BACnet MS/TP (RS-485) trunk, up to 100 devices are supported.
MS-NIE5920-3	10.0	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX), two N2 or BACnet MS/TP (RS-485) trunks, and one LonWorks Network trunk. The number of supported devices depends on protocol. For each N2 or BACnet MS/TP (RS-485) trunk, up to 100 devices are supported. For the LonWorks trunk, up to 255 devices are supported.



## ORDERING INFORMATION

### ACCESSORIES

#### NIEX9

CODES	DESCRIPTION
MS-BAT1010-0	Replacement data protection battery for NAE55 and NIE59. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of three to five years at 21°C
MS-BAT1020-0	Replacement data protection battery for NAE35, NIE39, NAE45, NIE45, NIE49, NCE25, or NIE29. Rechargeable NiMH 3.6 VDC, 500 mAh battery with a typical life of five to seven years at 21°C. (Higher operating temperatures reduce battery life).

#### Modbus®

CODE	DESCRIPTION
IU-9100-8401	RS232-to-RS485 converter, 230 VAC
IU-9100-8404	RS232-to-RS485 converter, 24 VAC

#### M-BUS

CODES	DESCRIPTION
SIS-MBUSSCSL-OE	RS232-to-M-Bus level converter for up to 6 unit loads; 24 VAC/VDC
SIS-MBUSSCLL-OE	RS232-to-M-Bus level converter for up to 100 unit loads; 24 VAC/VDC
SIS-MBUSRPLL-OE	RS232-to-M-Bus level repeater for up to 100 unit loads; 24 VAC/VDC
SIS-MBUSRPLH-OE	RS232-to-M-Bus level repeater for up to 100 unit loads; 230 VAC
SIS-MBUSNCLL-OE	IP-to-M-Bus level converter for up to 100 unit loads; 24 VAC/VDC
SIS-MBUSNCLH-OE	IP-to-M-Bus level converter for up to 100 unit loads; 230 VAC
INT-DX-KAB01	Optional connection cable SUB-D to RJ-12 for use with SIS-MBUSSCLL-OE

#### KNX

CODES	DESCRIPTION
SIS-KNXNIXL-OE	KNX IP interface module to connect KNX line through Ethernet to an NIEx9
SIS-KNXNRXL-OE	KNX IP router to connect KNX line through Ethernet to an NIEx9, including line or area coupler functionality

#### VGE TOOL TRAINING

CODE	DESCRIPTION
PTK-CONT-26	VGE Tool Software Software Training. The VGE tool is required to generate custom Modbus mapping tables for the NIE.



## TECHNICAL SPECIFICATIONS

### NCE25 (PART 1/2)

Power Requirement	Dedicated nominal 24 VAC, SELV power supply, at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
Power Consumption	25 VA maximum for NCE25 only <b>Note:</b> The 25 VA rating does <b>not</b> include any power supplied by the NCE to devices connected at the NCE BOs. BO devices connected to and powered by an NCE can require an additional 125 VA (maximum).
Power Source	+15 VDC power source terminals provide 100 mA total current; quantity of inputs: five, located in Universal IN terminals; for active (3-wire) input devices
Ambient Operating Conditions	0 to 50°C, 10 to 90% RH, 30°C maximum dew point
Ambient Storage Conditions	-40 to 70°C, 5 to 95% RH, 30°C maximum dew point
Data Protection Battery	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0
Processors	
<i>Supervisory Controller</i>	192 MHz Renesas SH4 7760 RISC processor
<i>Field Controller</i>	20 MHz Renesas H8S2398 processor
Memory	
<i>Supervisory Controller</i>	128 MB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup and 128 MB SDRAM for operations data dynamic memory
<i>Field Controller</i>	1 MB flash memory and 1 MB RAM
Operating System	Microsoft Windows Embedded CE 6.0 (Release 9.0) Buildroot 2017.08.2 with Linux kernel 14.4 (Release 9.0.7 patch)
Network and Serial Interfaces (Depending on NCE model)	<ul style="list-style-type: none"> <li>• One Ethernet port; 10/100 Mbps; 8-pin RJ-45 connector</li> <li>• One optically isolated RS-485 SA Bus port; with a pluggable and keyed 4-position terminal block (on all NCE25 models)</li> <li>• One optically isolated RS-485 port; with a pluggable and keyed 4-position terminal block (only on NCE25 models that support an N2 Bus or MS/TP bus trunk)</li> <li>• One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (only on NCE25 models that support a LonWorks Network trunk). The LonWorks models are supported to run the <i>Metasys</i> Release 9.0 software, <b>but not the Release 9.0.7 patch update</b>.</li> <li>• One RS-232-C serial port with standard 9-pin sub-D connector that supports standard baud rates</li> <li>• One USB serial port with standard USB connector that supports an optional, user-supplied external modem. Modem functions are available with <i>Metasys</i> Release 9.0, but <b>are not</b> available after the NAE is patched with Release 9.0.7.</li> <li>• Option: One telephone port for internal modem; up to 56 Kbps; 6-pin modular connector (NAE models with an optional internal modem have one RS-232-C serial port only; not supported for engine with Release 9.0.7.)</li> </ul>
Analog Input/Analog Output Point Resolution	<ul style="list-style-type: none"> <li>• Analog Input Points: 16-bit resolution</li> <li>• Analog Output Points: 16-bit resolution and ±200 mV accuracy on 0-10 VDC applications</li> </ul>
Input/Output Capabilities	<ul style="list-style-type: none"> <li>• 10-Universal Inputs: Defined as 0-10 VDC, 4-20mA, 0-600k ohm, or Binary Dry Contact</li> <li>• 8-Binary Inputs: Defined as Dry Contact Maintained or Pulse/ Accumulator Mode</li> <li>• 4-Analog Outputs: Defined as 0-10 VDC or 4-20mA</li> <li>• 7-Binary Outputs: Defined as 24 VAC Triac (selectable internal or external source power)</li> <li>• 4-Configurable Outputs: Defined as 0-10 VDC or 24 VAC Triac BO</li> </ul>

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## TECHNICAL SPECIFICATIONS

### NCE25 (PART 2/2)

Dimensions (Height x Width x Depth)	155 x 270 x 64 mm, minimum mounting space required: 250 x 370 x 110 mm
Housing	Plastic housing Plastic material: ABS and polycarbonate Protection: IP20 (IEC60529)
Mounting	On flat surface with screws, on three mounting clips, or a single 35 mm DIN rail
Shipping Weight	1.2 kg
 Compliance  <i>BACnet International</i>	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	BTL 135-2012 Listed B-BC, Protocol Revision 12

### NAE35 AND NAE45 (PART 1/2)

Power Requirement	Dedicated nominal 24 VAC, SELV power supply, at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
Power Consumption	25 VA maximum
Ambient Operating Conditions	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
Ambient Storage Conditions	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
Data Protection Battery	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0
Processor	192 MHz Renesas SH4 7760 RISC processor
Memory	128 MB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 128 MB SDRAM for operations data dynamic memory
Operating System	Microsoft Windows Embedded CE 6.0 (Release 9.0) Buildroot 2017.08.2 with Linux kernel 14.4 (Release 9.0.7 patch)
Network and Serial Interfaces	<ul style="list-style-type: none"> <li>• One Ethernet port; connects at 10 or 100 Mbps; 8-pin RJ-45 connector</li> <li>• One optically isolated RS-485 port; 9.6k, 19.2k, 38.4k, or 76.8k baud (depending on protocol); with a pluggable and keyed 4-position terminal block (FC Bus available on NAE351x and NAE451x models only)</li> <li>• One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (LonWorks port available on NAE352x-x and NAE452x models only). The LonWorks models are supported to run the <i>Metasys</i> Release 9.0 software, <b>but not the Release 9.0.7 patch update</b>.</li> <li>• One RS-232-C serial port with standard 9-pin sub-D connector that supports standard baud rates.</li> <li>• Second serial port, on models without an internal modem, that supports an optional, user-supplied external modem. Modem functions are available with <i>Metasys</i> Release 9.0, but <b>are not</b> available after the NAE is patched with Release 9.0.7.</li> <li>• One USB serial port with standard USB connector that supports an optional, user-supplied external modem. Modem functions are available with <i>Metasys</i> Release 9.0, but <b>are not</b> available after the NAE is patched with Release 9.0.7.</li> <li>• Option: One telephone port for internal modem; up to 56 Kbps; 6-pin modular connector (NAE models with an optional internal modem have one RS-232-C serial port only; not supported for engine with Release 9.0.7.)</li> </ul>

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NAE - METASYS® NETWORK ENGINE



TECHNICAL SPECIFICATIONS

NAE35 AND NAE45 (PART 2/2)

Housing	Plastic housing material: ABS polycarbonate UL94-5VB Protection: IP20 (IEC 60529)
Mounting	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
Dimensions (Height x Width x Depth)	131 x 270 x 62 mm Minimum space for mounting NAE35 and NAE45: 210 x 350 x 110 mm
Shipping Weight	1.2 kg
 Compliance <i>BACnet International</i>	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	BTL 135-2012 Listed B-BC, Protocol Revision 12

NAE55XX-3E

Power Requirement	Dedicated nominal 24 VAC, SELV power supply, at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
Power Consumption	50 VA maximum
Ambient Operating Conditions	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
Ambient Storage Conditions	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
Data Protection Battery	Supports data protection on power failure. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of 3 to 5 years at 21°C; Product Code Number: MS-BAT1010-0
Clock Battery	Maintains real-time clock through a power failure. Onboard cell; typical life 10 years at 21°C
Processor	1.46 GHz Intel® Atom® Bay Trail E3815 processor for MS-NAE55xx-3 models
Memory	16 GB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup for MS-NAE55xx-3 models. 2 GB DDR3 SDRAM for operations data dynamic memory for all models
Operating System	Johnson Controls OEM Version of Microsoft Windows Embedded Standard 7 with SP1 (WES7, Release 9.0) Wind River Linux 9 (Release 10.0)
Network and Serial Interfaces	<ul style="list-style-type: none"> <li>• One Ethernet port; 10/100/1,000 Mbps; 8-pin RJ-45 connector</li> <li>• Two optically isolated RS-485 ports; 9,600, 19.2k, 38.4k, or 76.8k baud; pluggable and keyed 4 position terminal blocks (RS-485 terminal blocks available on NAE55 models only)</li> <li>• Two RS-232-C serial ports, with standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• Two USB 2.0 serial ports; standard USB connectors support an optional, user-supplied external modem</li> <li>• Options: One telephone port for internal modem; up to 56 kbps; 6-pin RJ-12 connector</li> <li>• One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (LonWorks port available on NAE552x-x models only)</li> </ul>
Housing	Plastic housing with internal metal shield Plastic material: ABS + polycarbonate; Protection: IP20 (IEC 60529)
Mounting	On flat surface with screws on four mounting feet or on dual 35 mm DIN rail
Dimensions (Height x Width x Depth)	226 x 332 x 96.5 mm including mounting feet Minimum space for mounting: 303 x 408 x 148 mm
Shipping Weight	2.9 kg
 Compliance <i>BACnet International</i>	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	BTL 135-2016 Listed B-BC, Protocol Revision 15 at <i>Metasys</i> Release 10.0



## TECHNICAL SPECIFICATIONS

### NAE85 SOFTWARE SYSTEM RECOMMENDATIONS FOR INSTALLATION/UPGRADE

Recommended Computer Platform	IntelXeon E5506, 2.13 GHz, 4 MB Cache 2 x 160 GB 7.2K SATA, 8.9 cm (3.5 in.) Cabled 3 Gbps, RAID 1 configuration with add-in SAS6/iR (SATA/SAS Controller)
Recommended Memory	2 GB RAM minimum
Hard Disk	160 GB minimum
Supported Operating Systems and Software	<ul style="list-style-type: none"> <li>• Windows® Server® 2016 (64-bit)</li> <li>• Windows® Server® 2012 R2 with Update 1 (64-bit)</li> <li>• Windows® Server® 2012 (64-bit)</li> </ul> <p><b>Note:</b> The NAE85 software requires two Windows components: Microsoft .NET Framework Version 3.5 SP1 and Microsoft .NET Framework Version 4.6.1.</p>
Supported Operating Systems for <i>Metasys</i> Client Computers	<ul style="list-style-type: none"> <li>• Windows® 10 Pro and Enterprise Editions with Creators Update (version 1709) (64-bit)</li> <li>• Windows® 8.1 Pro and Enterprise Editions with Update 1 (64-bit)</li> <li>• Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit)</li> <li>• Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (32-bit)</li> <li>• Apple® macOS® 10.12 Sierra</li> <li>• Apple® OS X® 10.11 El Capitan</li> </ul> <p><b>Note</b></p> <ul style="list-style-type: none"> <li>• Apple® operating systems are supported for <i>Metasys</i> client computers only</li> <li>• In Apple® OS X®, you cannot view Graphics+ graphics in the Site Management Portal UI.</li> </ul>
Internal Optical Drive	DVD ROM, SATA
Recommended Antivirus Software	Symantec Endpoint Protection version 12
Supported Web Browser Software for <i>Metasys</i> Client Computers	<ul style="list-style-type: none"> <li>• Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later</li> <li>• Google® Chrome™ version 61 or later</li> <li>• Apple® Safari® 11 or later</li> </ul> <p><b>Note</b></p> <ul style="list-style-type: none"> <li>• In Internet Explorer 11, select the Use Microsoft compatibility lists option, found under Tools &gt; Compatibility View Settings, to ensure that websites appear and function correctly</li> <li>• Other browsers, such as Mozilla® Firefox®, may also be used but are not fully supported</li> <li>• You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to <i>Metasys</i> Site Management Portal (SMP) UI.</li> </ul>
Supported Virtual Environments	Microsoft Hyper-V™, VMware®
Network Communication	Network Interface: 1 Gbps Ethernet network interface card connects at 10 Mbps, 100 Mbps, or 1 Gbps (100 Mbps or better recommended)
Recommended Data Protection	UPS for NxE85 model: APC Smart-UPS SC 450VA, 280 W, 120 VAC input/ output, NEMA 5-15R output connections, OEM Part No. SC450RM1U



## TECHNICAL SPECIFICATIONS

### NIE55XX-3E

Power Requirement	Dedicated nominal 24 VAC, SELV power supply, at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
Power Consumption	50 VA maximum
Ambient Operating Conditions	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
Ambient Storage Conditions	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
Data Protection Battery	Supports data protection on power failure. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of 3 to 5 years at 21°C; Product Code Number: MS-BAT1010-0
Clock Battery	Maintains real-time clock through a power failure. Onboard cell; typical life 10 years at 21°C
Processor	1.46 GHz Intel Atom™ Bay Trail E3815 processor
Memory	16 GB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 2 GB DDR3 SDRAM for operations data dynamic memory for all models
Operating System	Johnson Controls OEM Version of Microsoft Windows Embedded Standard 7 with SP1 (WES7, Release 9.0)
Network and Serial Interfaces	<ul style="list-style-type: none"> <li>• One Ethernet port; connects at 10 Mbps, 100 Mbps, or 1 Gbps; 8-pin RJ-45 connector</li> <li>• Two RS-232-C serial ports, with standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• Two USB serial ports; standard USB connectors support an optional, user-supplied external modem</li> <li>• Options: One telephone port for internal modem; up to 56 kbps; 6-pin modular connector</li> </ul>
Housing	Plastic housing with internal metal shield Plastic material: ABS + polycarbonate; Protection: IP20 (IEC 60529)
Mounting	On flat surface with screws on four mounting feet or on dual 35 mm DIN rail
Dimensions (Height x Width x Depth)	226 x 332 x 96.5 mm including mounting feet Minimum space for mounting: 303 x 408 x 148 mm
Shipping Weight	4.15 kg
<b>CE</b> Compliance	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
<i>BACnet International</i>	BTL 135-2012 Listed B-BC, Protocol Revision 12



## TECHNICAL SPECIFICATIONS

### NIE85 SOFTWARE SYSTEM RECOMMENDATIONS FOR INSTALLATION/UPGRADE

Code	<i>MS-NXE85SW-0</i>	NIE85 or NAE85 software for 10,000 objects (new projects only software)
Recommended Computer Platform		Intel® Xeon® E5506, 2.13 GHz, 4 MB cache 2 x 160 GB 7.2K RPM SATA, 8.9 cm cabled 3 Gbps, RAID 1 configuration with add-in SAS6/iR (SATA/SAS Controller) Recommended Memory 2 GB RAM minimum
Hard Disk		160 GB minimum
Supported Operating Systems and Software		<ul style="list-style-type: none"> <li>• Windows® Server® 2016 (64-bit)</li> <li>• Windows® Server® 2012 R2 with Update 1 (64-bit)</li> <li>• Windows® Server® 2012 (64-bit)</li> </ul> <p><b>Note:</b> Microsoft .NET Framework 3.5 Service Pack (SP) 1 and Microsoft .NET Framework 4.6.1 are required for any of the operating systems.</p>
Supported Operating Systems for <i>Metasys</i> Client Computer		<ul style="list-style-type: none"> <li>• Windows® 10 Pro and Enterprise Editions with Anniversary Update (version 1607) (64-bit)</li> <li>• Windows® 8.1 Pro and Enterprise Editions with Update 1 (64-bit)</li> <li>• Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit)</li> <li>• Apple® macOS® 10.12 Sierra</li> <li>• Apple® OS X® 10.11 El Capitan</li> <li>• Apple OS X 10.10 Yosemite</li> </ul> <p><b>Note:</b> Apple operating systems are supported for <i>Metasys</i> client computers only. Also, in Apple OS X, you cannot view Graphics+ graphics in the Site Management Portal UI.</p>
Internal Optical Drive		DVD ROM, SATA
Recommended Antivirus Software		Symantec Endpoint Protection Version 12
Supported Web Browser Software for <i>Metasys</i> Client Computers		<p>Windows® Internet Explorer® 11.0.9600.18449 Update version 11.0.35 or later Google® Chrome™ version 54 or later Apple® Safari® 10 or later</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• In Internet Explorer 11, select the Use Microsoft compatibility lists option, found under Tools &gt; Compatibility View Settings, to ensure that websites appear and function correctly.</li> <li>• Other browsers, such as Mozilla® Firefox®, may also be used but are not fully supported.</li> <li>• You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to <i>Metasys</i> Site Management Portal (SMP) UI.</li> </ul>
Supported Virtual Environments		Microsoft Hyper-V™, VMware®
Network Communication		Network Interface: Single 1 Gbps Ethernet network interface card 10/100/1000 Mbps (100 Mbps or better recommended)
Recommended Data Protection		UPS: APC Smart-UPS SC 450 VA, 280 W, 120 VAC input/output, NEMA 5-15R output connections, OEM Part No. SC450RM1U



## TECHNICAL SPECIFICATIONS

### NIE29 (PART 1/2)

Power Requirement	Dedicated nominal 24 VAC, SELV power supply, at 50/60 Hz (20 VAC minimum to 30 VAC maximum)	
Power Consumption	25 VA maximum for NCE25 only The 25 VA rating does <b>not</b> include any power supplied to devices connected at the NIE BOs. Binary output devices connected to and powered by an NIE can require an additional 125 VA (maximum).	
Power Source	+15 VDC power source terminals provide 100 mA total current; quantity of inputs: five, located in Universal IN terminals; for active (3-wire) input devices	
Ambient Operating Conditions	0 to 50°C; 10 to 90% RH, 30°C maximum dew point	
Ambient Storage Conditions	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point	
Data Protection Battery	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0	
Processors		
<i>Supervisory Controller</i>	192 MHz Renesas SH4 7760 RISC processor	
<i>Field Controller</i>	20 MHz Renesas H8S2398 processor	
Memory		
<i>Supervisory Controller</i>	128 MB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup and 128 MB SDRAM for operations data dynamic memory	
<i>Field Controller</i>	1 MB flash and 1 MB RAM	
Operating System	Microsoft Windows Embedded CE 6.0 (Release 9.0) Buildroot 2017.08.2 with Linux kernel 14.4 (Release 9.0.7 patch)	
Network and Serial Interfaces	<p><b>MS-NIE291x-0 (MS/TP) or MSNIE296x-0 (N2)</b> Release 9.0.7:</p> <ul style="list-style-type: none"> <li>• One Ethernet port: 10/100 Mbps; 8-pin RJ-45 connector</li> <li>• One optically isolated RS-485 FC Bus port or N2 Bus port; with a pluggable and keyed 4-position terminal block</li> <li>• One optically isolated RS-485 SA Bus port; with a pluggable and keyed 4-position terminal block</li> <li>• One RS-232-C serial port: standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• One USB serial port: not used for engine at Release 9.0.7</li> </ul>	<p><b>MS-NIE292x-0 (LON)</b> Release 9.0 only, not 9.0.7:</p> <ul style="list-style-type: none"> <li>• One Ethernet port: 10/100 Mbps; 8-pin RJ-45 connector</li> <li>• One optically isolated RS-485 SA Bus port; with a pluggable and keyed 4-position terminal block</li> <li>• One RS-232-C serial port: standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• One USB serial port: standard USB connector to support an optional, user-supplied external modem</li> <li>• One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3- position terminal block</li> </ul>
Analog Input/Analog Output Resolution and Accuracy	Analog Input Points: 16-bit resolution Analog Output Points: 16-bit resolution and +200 mV accuracy on 0-10 VDC applications	
Dimensions (Height x Width x Depth)	155 x 270 x 64 mm Minimum mounting space required: 250 x 370 x 110 mm	
Housing	Plastic housing Plastic material: ABS and polycarbonate Protection: IP20 (IEC60529)	

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## TECHNICAL SPECIFICATIONS

### NIE29 (PART 2/2)

Mounting	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
Shipping Weight	1.2 kg
 Compliance <i>BACnet International</i>	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	BTL 135-2012 Listed B-BC, Protocol Revision 12

### NIE39 AND NIE49

Power Requirement	Dedicated nominal 24 VAC, SELV power supply, at 50/60 Hz (20 VAC minimum to 30 VAC maximum)	
Power Consumption	25 VA maximum	
Ambient Operating Conditions	0 to 50°C; 10–90% RH, 30°C maximum dew point	
Ambient Storage Conditions	–40 to 70°C; 5–95% RH, 30°C maximum dew point	
Data Protection Battery	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0	
Processor	192 MHz Renesas® SH4 7760 RISC processor	
Memory	128 MB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup and 128 MB SDRAM for operations data dynamic memory	
Operating System	Microsoft Windows Embedded CE 6.0 (Release 9.0) Buildroot 2017.08.2 with Linux kernel 14.4 (Release 9.0.7 patch)	
Network and Serial Interfaces	<b>MS-NIE3910-2/MS-NIE4910-2 (MS/ TP and N2)</b> Release 9.0.7: <ul style="list-style-type: none"> <li>• One Ethernet port: 10/100 Mbps; 8-pin RJ-45 connector</li> <li>• One optically isolated RS-485 port: 9,600, 19.2k, 38.4k, or 76.8k baud; pluggable and keyed 4 position terminal blocks</li> <li>• Two RS-232-C serial ports: standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• One USB 2.0 serial port: not used for engine at Release 9.0.7</li> </ul>	<b>MS-NIE3920-2/MS-NIE4920-2 (LON)</b> Release 9.0 only, not 9.0.7 <ul style="list-style-type: none"> <li>• One Ethernet port: 10/100 Mbps; 8-pin RJ-45 connector</li> <li>• One optically isolated RS-485 port: 9,600, 19.2k, 38.4k, or 76.8k baud; pluggable and keyed 4 position terminal blocks</li> <li>• Two RS-232-C serial ports: standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• One USB 2.0 serial port: standard USB connectors support an optional, usersupplied external modem</li> <li>• One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3- position terminal block</li> </ul>
Housing	Plastic housing material: ABS + polycarbonate UL94-5VB Protection: IP20 (IEC 60529)	
Mounting	On flat surface with screws on three mounting clips or a single 35 mm DIN rail	
Dimensions (Height x Width x Depth)	131 x 270 x 62 mm Minimum space for mounting NIE: 210 x 350 x 110 mm	
Shipping Weight	1.2 kg	
 Compliance <i>BACnet International</i>	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.	
	BTL 135-2012 Listed B-BC, Protocol Revision 12	



## TECHNICAL SPECIFICATIONS

### NIE59xx-3E

Power Requirement	Dedicated nominal 24 VAC, SELV power supply, at 50/60 Hz (20 VAC minimum to 30 VAC maximum)	
Power Consumption	50 VA maximum	
Ambient Operating Conditions	0 to 50°C; 10 to 90% RH, 30°C maximum dew point	
Ambient Storage Conditions	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point	
Data Protection Battery	Supports data protection on power failure. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of 3 to 5 years at 21°C; Product Code Number: MS-BAT1010-0	
Clock Battery	Maintains real-time clock through a power failure. Onboard cell: typical life of 10 years at 21°C	
Processor	1.46 GHz Intel Atom® Bay Trail E3815 processor for MS-NIE59xx-3 models	
Memory	16 GB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup for MS-NIE59xx-3 models. 2 GB DDR3 SDRAM for operations data dynamic memory for all models	
Operating System	Johnson Controls® OEM Version of Microsoft Windows Embedded Standard 7 with SP1 (WES7)	
Network and Serial Interfaces	<p><b>MS-NIE5960-3 (MS/TP and N2)</b></p> <ul style="list-style-type: none"> <li>• One Ethernet port: 10/100/1,000 Mbps; 8-pin RJ-45 connector</li> <li>• Two optically isolated RS-485 ports: 9,600, 19.2k, 38.4k, or 76.8k baud; pluggable and keyed 4 position terminal blocks</li> <li>• Two RS-232-C serial ports: standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• Two USB 2.0 serial ports: standard USB connectors support an optional, usersupplied external modem</li> </ul>	<p><b>MS-NIE5920-3 (MS/TP, N2, LON)</b></p> <ul style="list-style-type: none"> <li>• One Ethernet port: 10/100/1,000 Mbps; 8-pin RJ-45 connector</li> <li>• Two optically isolated RS-485 ports: 9,600, 19.2k, 38.4k, or 76.8k baud; pluggable and keyed 4 position terminal blocks</li> <li>• Two RS-232-C serial ports: standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• Two USB 2.0 serial ports: standard USB connectors support an optional, usersupplied external modem</li> <li>• One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3- position terminal block</li> </ul>
Housing	Plastic housing with internal metal shield Plastic material: ABS + polycarbonate; Protection: IP20 (IEC 60529)	
Mounting	On flat surface with screws on four mounting feet or on dual 35 mm DIN rail	
Dimensions (Height x Width x Depth)	226 x 332 x 96.5 mm including mounting feet Minimum space for mounting: 303 x 408 x 148 mm	
Shipping Weight	4.15 kg	
 Compliance <i>BACnet International</i>	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.	
	BTL 135-2016 Listed B-BC, Protocol Revision 15	



## TECHNICAL SPECIFICATIONS

### NXE85/LCS85 SOFTWARE SYSTEM RECOMMENDATIONS FOR INSTALLATION/UPGRADE

Codes	
MS-NXE85SW-0	Network Integration Engine Software for 10,000 objects (new projects only software, Release 10.0)
MS-LCS85SW-0	Network Integration Engine Software for 10,000 objects (new projects only software, Release 10.0)
Recommended Computer Platform	Intel Xeon E5506, 2.13 GHz, 4 MB Cache 2 x 160 GB 7.2K SATA, 8.9 cm (3.5 in.) Cabled 3 Gbps, RAID 1 configuration with add-in SAS6/iR (SATA/SAS Controller)
Recommended Memory	8 GB RAM minimum
Hard Disk	160 GB minimum
Supported 64-bit Operating Systems and Software	<ul style="list-style-type: none"> <li>• Windows® Server® 2016 (64-bit)</li> <li>• Windows® Server® 2012 R2 with Update 1 (64-bit)</li> <li>• Windows® Server® 2012 (64-bit)</li> </ul> <p><b>Note:</b> Microsoft .NET Framework 3.5 Service Pack (SP) 1 and Microsoft .NET Framework 4.6.1 are required for any of the operating systems.</p>
Supported Operating Systems for <i>Metasys</i> Client Computers	<ul style="list-style-type: none"> <li>• Windows® 10 Pro and Enterprise Editions with Anniversary Update (version 1607) (64-bit)</li> <li>• Windows® 8.1 Pro and Enterprise Editions with Update 1 (64-bit)</li> <li>• Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit)</li> <li>• Apple® macOS® 10.12 Sierra</li> <li>• Apple® OS X® 10.11 El Capitan</li> </ul> <p><b>Note:</b> Apple operating systems are supported for <i>Metasys</i> client computers only. Also, in Apple OS X, you cannot view Graphics+ graphics in the Site Management Portal UI.</p>
Internal Optical Drive	DVD ROM, SATA
Supported Web Browser Software for <i>Metasys</i> Site Management Portal Client Computers	Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later <b>Note:</b> In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under <b>Tools &gt; Compatibility View Settings</b> , to ensure that websites appear and function correctly. Google® Chrome™ version 61 or later Apple® Safari® 11 or later Other browsers, such as Mozilla® Firefox®, may also be used but are not fully supported.
Supported Virtual Environments	Microsoft Hyper-V™, VMWare®
Network Communication	Selectable Network Interface (if computer has multiple network cards, during NxE85/LCS85 installation, select the network card that was configured for <i>Metasys</i> system use before installation) Ethernet network interface card 10/100/1000 Mbps (100 Mbps or better recommended)
Recommended Data Protection	Uninterruptible power supply (UPS) Smart-UPS SC 450VA, 280 W, 120 VAC input/output, NEMA 5-15R output connections, OEM Part No. SC450RM1U

# BUILDING AUTOMATION PRODUCTS

## SUPERVISORY AND NETWORK CONTROLLERS

### METASYS® NETWORK ENGINE

# NIEx9 FOR THIRD-PARTY INTEGRATIONS



Network Integration Engines (NIEx9s) for third-party integrations enable IP connectivity and webbased access to *Metasys* Building Management Systems (BMSs).

NIEx9s integrate standard building management communication technologies, including BACnet® MS/TP, BACnet/IP, N2 Bus, Modbus®, M-Bus (EN 13757-3), KNX, and third-party proprietary protocols to monitor and supervise a wide variety of HVAC, lighting, security, fire, electrical and thermal measuring, and access control equipment. For third-party integrations, one NIEx9 can support two Modbus integrations, two M-Bus integrations, a combination of one Modbus and one M-Bus, or a single KNX integration. The NIEx9 comes from the factory with these three integrations pre-installed and pre-licensed, ready for your use.

NIEx9s provide comprehensive equipment monitoring and control, scheduling, alarm and event management, energy management, data exchange, data trending, and data storage.

NIEx9s feature an embedded Site Management Portal (SMP) UI, support multiple concurrent web browser sessions with password and permission access control, and provide the protection of industry-standard IT security.

The NIE29 models enable compact and combined solutions including supervisory and control capacity. They can be used in smaller facilities where an all-in-one (supervisory, control, and integration) platform is required.

The NIE39/NIE49 models enable cost-effective NIEx9 connectivity and control in smaller facilities, and can extend NIEx9 supervisory functions in larger facilities.

LonWorks® versions of the NIE29s, NIE39s, and NIE49s are not supported at Release 9.0.7. These models will remain at Release 9.0. In addition, the NIE59 and NIE89 models are no longer available at Release 9.0.7. The functionality provided by these models is now available with the NAE55 and NAE85 at Release 10.0, respectively.

*For details, refer to the Network Engine Product Bulletin (LIT-12012138).*

A tool called the VMD Generator Express (VGE) tool is available to create Vendor Model Definition (VMD) tables for specific third-party equipment using Modbus protocol.



## NIEx9 FOR THIRD-PARTY INTEGRATIONS - METASYS®

### FEATURES

- **Communication Using Commonly Accepted IT Standards at the Automation and Enterprise Level -** Provides the ability to install a system on your existing IT infrastructure within a building or enterprise and use standard IT communication services over the company intranet, WAN, or public internet with firewall protection.
- **Web-Based User Interface -** Provides the ability to access system data in the NIEx9s from any supported web browsing device connected to the network, including remote users connected by dial-up telephone or an ISP.
- **Support for Web Services at the Automation Network Level -** Provides the ability to develop facility-specific advanced data interfaces and applications.
- **Embedded Site Management Portal System Configuration Software -** Provides you with password-protected access to system configuration, monitoring, commanding, diagnosis, and cloud-based applications from any device with web browser software without the need for separate workstation software.
- **Improved Security with New Operating System -** Provides a higher level of protection from threats with the adoption of the Linux Buildroot operating system, a full replacement of the recently expired Windows CE operating system.
- **Supervision of Controller Networks Including BACnet MS/TP, BACnet/IP, N2 Bus, LonWorks, Modbus® RTU, Modbus TCP, M-Bus (EN 13757-3) serial and IP, KNX IP, and third-party protocol devices -** Supports connectivity to open network standards for complete flexibility in the selection of field devices. The LonWorks NIE29, NIE39, and NIE49 models are not supported at Release 9.0.7.
- **Support for Dual Trunks -** Significantly improves the flexibility and extends the investment of integrations to thirdparty equipment. The dual trunk feature potentially reduces the number of NIEx9s required on a project and allows you to add integrations to existing NIEx9s that are at Release 7.0 and later. You can more easily adapt to the requirements of projects that have fewer devices that require integration but use separate networks and different protocols.



## NIEx9 FOR THIRD-PARTY INTEGRATIONS - METASYS®

### ORDERING INFORMATION

#### NIE29 (RELEASE 9.0 OR 9.0.7 ONLY)

CODES	RELEASE	DESCRIPTION
MS-NIE29xx-x (base features on each NIE29)	N/A	Each NIE29 Series model requires a 24 VAC power supply and includes one RS-232-C serial port, one USB serial port, one SA Bus port, one RS-485 or LON port, one Ethernet port, and an MS-BAT1020-0 Data Protection Battery. Each NIE29 Series model supports 33 hard-wired Input/Output points. Up to two ports can be defined for third-party integration. The other ports have to be defined in order to use standard protocols (N2, BACnet MS/TP, or LON). Supports BACnet/IP network.
MS-NIE2910-0	9.0 » 9.0.7	Supports two third-party trunks (Modbus® RTU or TCP, M-Bus, or KNX) and one N2 Bus. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported.
MS-NIE2916-0	9.0 » 9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported. Includes integral display screen.
MS-NIE2920-0	9.0 only	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX), and one LonWorks trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported. For the LonWorks trunk, up to 32 devices are supported. This product does not support the 9.0.7 upgrade.
MS-NIE2926-0	9.0 only	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX), and one LonWorks network trunk. The number of supported devices on the third-party trunk depends on the protocol. For the LonWorks trunk, up to 32 devices are supported. Includes integral display screen. This product does not support the 9.0.7 upgrade.
MS-NIE2960-0	9.0 » 9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the BACnet MS/TP trunk, up to 32 devices are supported.
MS-NIE2966-0	9.0 » 9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the BACnet MS/TP trunk, up to 32 devices are supported. Includes integral display screen.

#### NIE39 (RELEASE 9.0 OR 9.0.7 ONLY)

CODES	RELEASE	DESCRIPTION
MS-NIE39xx-x (Base Features of Each NIE39)	N/A	Each NIE39 Series model requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, one USB serial port, one RS-485 or LON port, one Ethernet port, and an MSBAT1020-0 Data Protection Battery. Up to two ports can be defined for third-party integration. The other ports have to be defined in order to use standard protocols (N2, BACnet MS/TP, or LON). Supports BACnet/IP network.
MS-NIE3910-2	9.0 » 9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus or one BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or BACnet MS/TP trunk, up to 50 devices are supported.
MS-NIE3920-2	9.0 only	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one LonWorks trunk. The number of supported devices on the third-party trunk depends on the protocol. For the LonWorks trunk, up to 64 devices are supported. This product does not support the 9.0.7 upgrade.



## NIEx9 FOR THIRD-PARTY INTEGRATIONS - METASYS®

### ORDERING INFORMATION

#### Modbus® ACCESSORIES

CODES	DESCRIPTION
IU-9100-8401	RS232-to-RS485 converter, 230 VAC
IU-9100-8404	RS232-to-RS485 converter, 24 VAC

#### NIE49 (RELEASE 9.0 OR 9.0.7 ONLY)

CODES	RELEASE	DESCRIPTION
MS-NIE49xx-x (Base features of each NIE49)	N/A	Each NIE49 Series model requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, one USB serial port, one RS-485 or LON port, one Ethernet port, and an MSBAT1020-0 Data Protection Battery. Up to two ports can be defined for third-party integration. The other ports have to be defined in order to use standard protocols (N2, BACnet MS/TP, or LON). Supports BACnet/IP network.
MS-NIE4910-2	9.0 » 9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus or one BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or BACnet MS/TP trunk, up to 100 devices are supported.
MS-NIE4920-2	9.0 only	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one LonWorks trunk. The number of supported devices on the third-party trunk depends on the protocol. For the LonWORKS trunk, up to 127 devices are supported. This product does not support the 9.0.7 upgrade.

#### NIEX9 ACCESSORIES

CODES	DESCRIPTION
MS-BAT1010-0	Replacement data protection battery for NAE55 and NIE59. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of three to five years at 21°C.
MS-BAT1020-0	Replacement data protection battery for NAE35, NIE39, NAE45, NIE45, NIE49, NCE25, or NIE29. Rechargeable NiMH 3.6 VDC, 500 mAh battery with a typical life of five to seven years at 21°C. (Higher operating temperatures reduce battery life.)



## ORDERING INFORMATION

### ACCESSORIES

#### M-BUS

CODES	DESCRIPTION
SIS-MBUSSCSL-OE	RS232-to-M-Bus level converter for up to 6 unit loads; 24 VAC/VDC
SIS-MBUSSCLL-OE	RS232-to-M-Bus level converter for up to 100 unit loads; 24 VAC/VDC
SIS-MBUSRPLL-OE	RS232-to-M-Bus level repeater for up to 100 unit loads; 24 VAC/VDC
SIS-MBUSRPLH-OE	RS232-to-M-Bus level repeater for up to 100 unit loads; 230 VAC
SIS-MBUSNCLL-OE	IP-to-M-Bus level converter for up to 100 unit loads; 24 VAC/VDC
SIS-MBUSNCLH-OE	IP-to-M-Bus level converter for up to 100 unit loads; 230 VAC
INT-DX-KAB01	Optional connection cable SUB-D to RJ-12 for use with SIS-MBUSSCLL-OE

#### KNX

CODES	DESCRIPTION
SIS-KNXNIXL-OE	KNX IP interface module to connect KNX line through Ethernet to an NIEx9
SIS-KNXNRXL-OE	KNX IP router to connect KNX line through Ethernet to an NIEx9, including line or area coupler functionality

#### VGE TOOL TRAINING

CODE	DESCRIPTION
PTK-CONT-26	VGE Tool Software Software Training. The VGE tool is required to generate custom Modbus mapping tables for the NIE.



## TECHNICAL SPECIFICATIONS

### NIE29 (PART 1/2)

Power Requirement	SELV power supply, at 50/60 Hz (20 VAC minimum to 30 VAC maximum)	
Power Consumption	25 VA maximum for NCE25 only The 25 VA rating does <b>not</b> include any power supplied to devices connected at the NIE BOs. Binary output devices connected to and powered by an NIE can require an additional 125 VA (maximum).	
Power Source	+15 VDC power source terminals provide 100 mA total current; quantity of inputs: five, located in Universal IN terminals; for active (3-wire) input devices	
Ambient Operating Conditions	0 to 50°C; 10 to 90% RH, 30°C maximum dew point	
Ambient Storage Conditions	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point	
Data Protection Battery	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0	
Processors		
<i>Supervisory Controller</i>	192 MHz Renesas SH4 7760 RISC processor	
<i>Field Controller</i>	20 MHz Renesas H8S2398 processor	
Memory		
<i>Supervisory Controller</i>	128 MB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup and 128 MB SDRAM for operations data dynamic memory	
<i>Field Controller</i>	1 MB flash and 1 MB RAM	
Operating System	Microsoft Windows Embedded CE 6.0 (Release 9.0) Buildroot 2017.08.2 with Linux kernel 14.4 (Release 9.0.7 patch)	
Network and Serial Interfaces	<b>MS-NIE291x-0 (MS/TP) or MSNIE296x-0 (N2)</b> Release 9.0.7: <ul style="list-style-type: none"> <li>• One Ethernet port: 10/100 Mbps; 8-pin RJ-45 connector</li> <li>• One optically isolated RS-485 FC Bus port or N2 Bus port; with a pluggable and keyed 4-position terminal block</li> <li>• One optically isolated RS-485 SA Bus port; with a pluggable and keyed 4-position terminal block</li> <li>• One RS-232-C serial port: standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• One USB serial port: not used for engine at Release 9.0.7</li> </ul>	<b>MS-NIE292x-0 (LON)</b> Release 9.0 only, not 9.0.7: <ul style="list-style-type: none"> <li>• One Ethernet port: 10/100 Mbps; 8-pin RJ-45 connector</li> <li>• One optically isolated RS-485 SA Bus port; with a pluggable and keyed 4-position terminal block</li> <li>• One RS-232-C serial port: standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• One USB serial port: standard USB connector to support an optional, user-supplied external modem</li> <li>• One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block</li> </ul>
Analog Input/Analog Output Resolution and Accuracy	Analog Input Points: 16-bit resolution Analog Output Points: 16-bit resolution and +200 mV accuracy on 0-10 VDC applications	
Dimensions (Height x Width x Depth)	155 x 270 x 64 mm Minimum mounting space required: 250 x 370 x 110 mm	
Housing	Plastic housing Plastic material: ABS and polycarbonate Protection: IP20 (IEC60529)	

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## NIEX9 FOR THIRD-PARTY INTEGRATIONS - METASYS®

### TECHNICAL SPECIFICATIONS

#### NIEX9 MODELS

##### NIEX9 (PART 2/2)

Mounting	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
Shipping Weight	1.2 kg
 Compliance	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive. BACnet International: BTL 135-2010 Listed B-BC

##### NIEX39 AND NIEX49

Power Requirement	SELV power supply (Europe), at 50/60 Hz (20 VAC minimum to 30 VAC maximum)	
Power Consumption	25 VA maximum	
Ambient Operating Conditions	0 to 50°C; 10–90% RH, 30°C maximum dew point	
Ambient Storage Conditions	–40 to 70°C; 5–95% RH, 30°C maximum dew point	
Data Protection Battery	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0	
Processor	192 MHz Renesas® SH4 7760 RISC processor	
Memory	128 MB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup and 128 MB SDRAM for operations data dynamic memory	
Operating System	Microsoft Windows Embedded CE 6.0 (Release 9.0) Buildroot 2017.08.2 with Linux kernel 14.4 (Release 9.0.7 patch)	
Network and Serial Interfaces	<b>MS-NIE3910-2/MS-NIE4910-2 (MS/ TP and N2)</b> Release 9.0.7: <ul style="list-style-type: none"> <li>• One Ethernet port: 10/100 Mbps; 8-pin RJ-45 connector</li> <li>• One optically isolated RS-485 port: 9,600, 19.2k, 38.4k, or 76.8k baud; pluggable and keyed 4 position terminal blocks</li> <li>• Two RS-232-C serial ports: standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• One USB 2.0 serial port: not used for engine at Release 9.0.7</li> </ul>	<b>MS-NIE3920-2/MS-NIE4920-2 (LON)</b> Release 9.0 only, not 9.0.7 <ul style="list-style-type: none"> <li>• One Ethernet port: 10/100 Mbps; 8-pin RJ-45 connector</li> <li>• One optically isolated RS-485 port: 9,600, 19.2k, 38.4k, or 76.8k baud; pluggable and keyed 4 position terminal blocks</li> <li>• Two RS-232-C serial ports: standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• One USB 2.0 serial port: standard USB connectors support an optional, usersupplied external modem</li> <li>• One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block</li> </ul>
Housing	Plastic housing material UL94-5VB Protection ABS + polycarbonate IP20 (IEC 60529)	
Mounting	On flat surface with screws on three mounting clips or a single 35 mm DIN rail	
Dimensions (Height x Width x Depth)	131 x 270 x 62 mm Minimum space for mounting NIE: 210 x 350 x 110 mm	
Shipping Weight	1.2 kg	
 Compliance	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.	

# NxE TO NIE MIGRATION KIT

## NETWORK INTEGRATION ENGINE

The NxE to NIE Migration kit provides the tools and licenses to convert an existing NAE or NCE into an NIE. This allows you to take a standard NCE or NAE device and add the integration capabilities.

The NIE migration can be applied to an NxE from release 4.1 or later.

All standard NIE's being shipped can only be used with *Metasys* release 7.0 or higher. It is not possible to downgrade a new NIE to an earlier version of *Metasys*. If you would like to install an NIE on an existing site that cannot be upgraded to the latest version of *Metasys* this solution can be used to create an NIE with *Metasys* release 4.1 or later.

**Note:** This kit is not required if upgrading an existing NAE to *Metasys* release 10.0 or later.

## FEATURES

- Add an NIE at required *Metasys* release to existing site that cannot be upgraded to release 7.0 or later
- To add 3<sup>rd</sup> party integration capabilities to an existing NxE
- Avoid the need to upgrade from ADS-Lite to ADS when integrations are required. Integrations can be added to existing engine to remain within the limit for ADS-Lite

## BENEFITS

- To be more competitive with our integration solutions
- Provide flexible integration solutions to the market
- Reduce installation costs, eliminates the need to replace the engine to add integration





## ORDERING INFORMATION

CODE	DESCRIPTION
SIS-NIEX9LIC-OE	NxE to NIE Migration kit. Includes NIE license and 'Engineered Connectivity' sticker to identify migrated device

## TOOLS

ITEM	DESCRIPTION
VMD Generator Express Tool	The VMD Generator Express Tool is required to manage the creation of the 3 <sup>rd</sup> party integrations on the NIE platform. The usage of the VMD Generator Express Tool requires a certification, which is achieved by attending a training course. <i>For more information please contact your local Technical Support Team.</i>

## NxE TO NIE PRODUCT CODE MIGRATION

STANDARD NxE		MIGRATION KIT		NIE EQUIVALENT
MS-NCE2510-0	Apply	SIS-NIEX9-LIC-OE	Makes	MS-NIE2910-0
MS-NCE2516-0				MS-NIE2916-0
MS-NCE2520-0				MS-NIE2920-0
MS-NCE2526-0				MS-NIE2926-0
MS-NCE2560-0				MS-NIE2960-0
MS-NCE2566-0				MS-NIE2966-0
MS-NAE3510-2				MS-NIE3910-2
MS-NAE3520-2				MS-NIE3920-2
MS-NAE4510-2				MS-NIE4910-2
MS-NAE4520-2				MS-NIE4920-2
MS-NAE5510-3E				MS-NIE5960-3
MS-NAE5520-3E				MS-NIE5920-3

# BUILDING AUTOMATION PRODUCTS

## PROGRAMMABLE CONTROLLERS

### METASYS® CONTROLLERS



## FEC

### FIELD EQUIPMENT CONTROLLERS

The Field Equipment Controller (FEC) Series products are programmable controllers that can be switched between BACnet® MS/TP and N2 communications protocols. When they are used as BACnet MS/TP devices, they are BACnet Application Specific Controllers (B-ASCs) with integral MS/TP communications. In N2 mode, they can be used to modernize sites with legacy Johnson Controls® controllers. FECs feature 32-bit microprocessor architecture, patented continuous tuning adaptive control, and peer-to-peer communications, and are available with an optional built-in LCD screen local UI.

A full range of FEC models combined with the Input/Output Module (IOM) models can be applied to a wide variety of building applications ranging from simple fan coil or heat pump control to advanced central plant management. All FEC Series Controllers configured for BACnet support wireless communications using the ZFR System accessories.

## FEATURES

- **Switchable Communications Protocols** – Provides flexibility with a choice between BACnet MS/TP and N2 communication
- **Standard BACnet® Protocol** – Provides interoperability with other Building Automation System (BAS) products that use the widely accepted BACnet standard.
- **Standard Hardware and Software Platform** – Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows. Also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.
- **ZFR Wireless Field Controller (FC) or Sensor/Actuator (SA) Bus Interface** – Provides a wireless alternative to hard-wired *Metasys*® system counterparts with either the ZFR1800 Series Wireless Bus or the WNC1800/ZFR182x Pro Series Wireless Field Bus (ZFR Pro), offering application flexibility and mobility with minimal disruption to building occupants.
- **Bluetooth® Wireless Commissioning** – Provides an easy-to-use connection to the configuration and commissioning tool.
- **Auto-Tuned Control Loops** – Reduce commissioning time, eliminate change-of-season re-commissioning, and reduce wear and tear on mechanical devices.
- **Universal Inputs, Configurable Outputs, and Point Expansion Modules** – Allows multiple signal options to provide input/output flexibility.
- **Optional Local User Interface Display** – Allows convenient monitoring and adjusting capabilities at the local device.



## FEC - METASYS® CONTROLLERS

### FEATURES

- **BACnet® Testing Laboratories (BTL) Listed** – Ensures interoperability with other BTL-listed devices. BTL is a third-party agency, which validates that BAS vendor products meet the BACnet industry-standard protocol.
- **32-bit Microprocessor** – Ensures optimum performance and meets industry specifications.
- **BACnet Automatic Discovery** – Supports easy controller integration into a *Metasys* BAS.
- **End-of-Line (EOL) Switch in MS/TP Field Controllers** – Enables field controllers to be terminating devices on the communications bus.
- **Pluggable Communications Bus and Supply Power Terminal Blocks** – Expedites installation and troubleshooting.
- **Patented proportional adaptive control (P-Adaptive) and Pattern Recognition Adaptive Control (PRAC) technologies** – Provide continuous loop tuning.
- **Wireless Connectivity through the ZFR1800 Series or the WNC1800/ZFR182x Pro Series Wireless Field Bus Systems in MS/TP Controllers** – Enables wireless mesh connectivity to supervisory controllers, facilitating easy initial location and relocation.
- **Writable Flash Memory** – Allows standard or customized applications to be downloaded from the Controller Configuration Tool (CCT) and enables persistent application data.
- **Large Product Family** – Provides a wide range of point mix to meet application requirements and allows for the addition of one or more Input/Output Module (IOM) and Network Sensors to provide even more I/O capacity.
- **User-Friendly Graphic Theme and Clear Pushbutton Identification** – Facilitate easy navigation of the integral or optional UI/display.



## ORDERING INFORMATION

### MODEL INFORMATION (INCLUDING POINT TYPE COUNTS)

		FEC2511 <sup>1</sup>	FEC16	FEC26
Communication Protocol		BACnet MS/TP, N2		
Engines		All Model types. Some NIE models support MS/TP and N2 devices. Refer to the Network Engines Product Bulletin (LIT-12012138) for details.		
Modular Jacks		6-pin SA Bus Modular Port supports one communicating sensor. Or you can wire up to four communicating sensors to the SA Bus Terminal Block. They cannot be used at the same time.		
		6-pin FC Bus for tool support		
Point Types	Signals Accepted			
Universal Input (UI)	Analog Input, Voltage Mode, 0–10 VDC Analog Input, Current Mode, 4–20 mA <sup>2</sup> Analog Input, Resistive Mode, 0–2k ohm, resistance temperature detector (RTD) (1k NI [Johnson Controls], 1k PT, A99B SI), negative temperature coefficient (NTC) (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	4 (Does not support Current Mode)	2	6
Binary Input (BI)	Dry Contact Maintained Mode Pulse Counter/Accumulator Mode (High Speed), 100 Hz	6	1	2
Analog Output (AO)	Analog Output, Voltage Mode, 0–10 VDC Analog Output, Current Mode, 4–20 mA	2 (Does not support Current Mode)		2
Binary Output (BO)	24 VAC Triac	2 (External Power Only)	3	3
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	2	4	4

#### Notes

- 1** The FEC2511 is currently only available in Europe. Contact your local Johnson Controls representative for more information.
- 2** Analog Input, Current Mode is set by hardware for the FEC26, and by software for the FEC16.



## ORDERING INFORMATION

CODES	DESCRIPTION
MS-FEC1611-1	10-Point Field Equipment Controller with 2 UI, 1 BI, 3 BO, and 4 CO; 24 VAC; FC and SA Bus Support
MS-FEC1611-1ET	10-Point Field Equipment Controller Extended Temperature controller for rooftop applications. Supports Operational Temperature Range of -40 to 70°C.
MS-FEC1621-1	10-Point Field Equipment Controller with 2 UI, 1 BI, 3 BO, and 4 CO; 24 VAC; FC and SA Bus Support; Integral Display and 6-Button Navigation Touchpad
MS-FEC2511-0	16-Point Field Equipment Controller with 4 UI, 6 BI, 2 AO, 2 BO, and 2 CO; 24 VAC; FC and SA Bus Support. The FEC2511 model does not support current mode.
MS-FEC2611-0	17-Point Field Equipment Controller with 6 UI, 2 BI, 3 BO, 2 AO, and 4 CO; 24 VAC; FC and SA Bus Support FEC2611 Extended Temperature controller for rooftop applications. Supports Operational Temperature Range of -40 to 70°C
MS-FEC2611-0ET	17-Point Field Equipment Controller with 6 UI, 2 BI, 3 BO, 2 AO, and 4 CO; 24 VAC; FC and SA Bus Support; Integral Display and 6-Button Navigation Touchpad
MS-FEC2621-0	1 This model is currently only available in Europe. Contact your local Johnson Controls representative for more information.

## ACCESSORIES (PART 1/2)

CODES	DESCRIPTION
Mobile Access portal (MAP) Gateway	Refer to the Mobile Access Portal Gateway Catalog Page (LIT-1900869) to identify the appropriate product for your region.
MS-DIS1710-0	Local Controller Display Refer to Local Controller Display Product Bulletin (LIT-12011273) for more information.
MS-BTCVT-1	Wireless Commissioning Converter with Bluetooth Technology
MS-BTCVTCBL-700	Cable Replacement Set for the MS-BTCVT-1 or the NS-ATV7003-0; Includes One 1.5 m Retractable Cable
WRZ Series Wireless Room Sensors	Refer to the WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653) for specific sensor model descriptions.
ZFR1800 Series Wireless Field Bus System	This system is used for installations that only support BACnet MS/TP. Refer to the WNC1800/ZFR182x Pro Series Wireless Field Bus System Product Bulletin (LIT-12012320) for a list of available products.
NS Series Network Sensors	Refer to the NS Series Network Sensors Product Bulletin (LIT-12011574) for specific sensor model descriptions.
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 30 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown (Bulk Pack of 10)
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector (Bulk Pack of 10)
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray (Bulk Pack of 10)

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## ORDERING INFORMATION

### ACCESSORIES (PART 2/2)

CODES	DESCRIPTION
AS-CBLTSTAT-0	Cable adapter that provides a connection between 8-pin TE-6700 Series sensors and field controllers that do not have a 8-pin sensor connection.
ZFR-USBHA-0	ZFR USB Dongle provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled FEC, Advanced Application Field Equipment Controller (FAC), IOM, and VMA16 controllers. Also allows use of the ZFR Checkout Tool (ZCT) in CCT. <b>Note:</b> The ZFR-USBHA-0 replaces the IA OEM DAUBI_2400 ZigBee® USB dongle. For additional information on the ZFR-USBHA-0 ZigBee dongle, refer to the ZFR1800 Series Wireless Field Bus System Technical Bulletin (LIT-12011295) or ZFR1800 Series Wireless Field Bus System Quick Reference Guide (LIT-12011630).
TL-BRTRP-0	Portable BACnet IP to MS/TP Router

## TECHNICAL SPECIFICATIONS (PART 1/3)

Codes	
<i>MS-FEC1611-1</i>	10-Point FEC
<i>MS-FEC1611-1ET</i>	FEC1611 Extended Temperature controller for rooftop applications. Supports Operational Temperature Range of -40 to 70°C.
<i>MS-FEC1621-1</i>	10-Point FEC with Integral Display and Pushbutton User Interface
<i>MS-FEC2511-0</i>	16-Point FEC
<i>MS-FEC2611-0</i>	17-Point FEC
<i>MS-FEC2611-0ET</i>	FEC2611 Extended Temperature controller for rooftop applications. Supports Operational Temperature Range of -40 to 70°C
<i>MS-FEC2621-0</i>	17-Point FEC with Integral Display and Push Button User Interface
Supply Voltage	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety, Extra-Low Voltage (SELV)
Power Consumption	
<i>MS-FEC2511-0</i>	14 VA maximum (no integral display)
<i>MS-FEC1621-1 and MS-FEC2621-0 (with integral display)</i>	20 VA maximum
	<b>Note:</b> VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 84 VA (maximum).
Ambient Conditions	
<i>Operating</i>	0 to 50°C; 10 to 90% RH noncondensing
<i>Storage</i>	-40 to 80°C; 5 to 95% RH noncondensing
	<b>Note:</b> FEC models with an -xET suffix have an operating temperature range of -40 to 70°C.

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## TECHNICAL SPECIFICATIONS (PART 2/3)

Controller Addressing	
<i>For BACnet-configured controllers</i>	DIP switch set; valid field controller device addresses 4–127 (device addresses 0–3 and 128–255 are reserved)
<i>For N2-configured controllers</i>	DIP switch set; valid control device addresses 1–255
Communications Bus *	RS-485, field selectable between BACnet MS/TP and N2 communications: 3-wire FC Bus between the supervisory controller and field controllers 4-wire SA Bus between field controller, network sensors, and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from field controller) to bus devices
Processor	
<i>MS-FEC16 and MS-FEC26 models</i>	H8SX/166xR Renesas® 32-bit microcontroller
<i>MS-FEC2511-0</i>	RX631 Renesas, 32-bit microcontroller
Memory	
<i>MS-FEC16 and MS-FEC26 models</i>	1 MB Flash Memory and 512 KB RAM
<i>MS-FEC2511-0</i>	4 MB Flash Memory and 8 MB SDRAM
Input and Output Capabilities	
<i>MS-FEC16 Models</i>	2 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 1 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 3 - Binary Outputs: Defined as 24 VAC Triac (selectable internal or external source power) 4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO
<i>MS-FEC2511-0 Models</i>	4 - Universal Inputs: Defined as 0–10 VDC, 0–600k ohm, or Binary Dry Contact 6 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 2 - Binary Outputs: Does not have internal 24 VAC source, external power is required 2 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO 2 - Analog Outputs: Defined as 0–10 VDC
<i>MS-FEC26 Models</i>	6 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 3 - Binary Outputs: Defined as 24 VAC Triac (selectable internal or external source power) 4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO 2 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA
Analog Input/Analog Output Resolution and Accuracy	
<i>MS-FEC16 and MS-FEC26 Models</i>	Analog Input: 16-bit resolution Analog Output: 16-bit resolution and ±200 mV in 0–10 VDC applications
<i>MS-FEC2511-0</i>	Analog Input: 15-bit resolution
Terminations	
<i>MS-FEC16 and MS-FEC26 Models</i>	Input/Output: Fixed Screw Terminal Blocks FC Bus, SA Bus, and Supply Power: 3-wire and 4-wire Pluggable Screw Terminal Blocks FC Bus and SA Bus Port: RJ-12 6-pin Modular Jacks
<i>MS-FEC2511-01</i>	Input/Output: Fixed Screw Terminal Blocks FC Bus, SA Bus, and Supply Power: 3-wire and 4-wire Pluggable Screw Terminal Blocks SA Bus Port: RJ-12 6-pin Modular Jack
Mounting	Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller

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## TECHNICAL SPECIFICATIONS (PART 3/3)

Housing	
<i>MS-FEC16 and MS-FEC26 Models</i>	Enclosure material: ABS and polycarbonate UL94 5VB; self-extinguishing; Plenum-rated; Protection Class: IP20 (IEC529)
<i>MS-FEC2511-0</i>	Enclosure material: ABS and polycarbonate, Rating V0 minimum; Protection Class: IP20 (IEC529)
Dimensions (Height x Width x Depth)	
<i>MS-FEC16 Models</i>	150 x 164 x 53 mm including terminals and mounting clips
<i>MS-FEC2511-01</i>	150 x 164 x 48 mm including terminals and mounting clips
<i>MS-FEC26 Models</i>	150 x 190 x 53 mm including terminals and mounting clips
<b>Note:</b> Mounting space for all field controllers requires an additional 50 mm (2 in.) space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.	
Weight	
<i>MS-FEC16 Models</i>	0.4 kg
<i>MS-FEC25 and MS-FEC26 Models</i>	0.5 kg
 Compliance	
Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.	
<i>BACnet International</i>	<b>MS-FEC16 and MS-FEC26 Models:</b> BACnet Testing Laboratories (BTL) Protocol Revision 4 Listed BACnet Application Specific Controller (B-ASC) <b>MS-FEC2511-0:</b> BACnet Testing Laboratories Protocol Revision 9 Listed BACnet Application Specific Controller (B-ASC)

### Note

\* For more information, refer to the MS/TP Communications Bus Technical Bulletin (LIT-12011034).

# BUILDING AUTOMATION PRODUCTS

## PROGRAMMABLE CONTROLLERS

### METASYS® CONTROLLERS

## FAC

### FIELD ADVANCED CONTROLLERS



The Advanced Application Field Equipment Controller (FAC) Series Controllers are programmable controllers that can communicate using BACnet/IP, MS/TP, or N2 communications protocols, depending on the model. The FAC4911 is a BACnet Advanced Application Controller (B-AAC) that communicates using BACnet/IP communications protocol. All other FAC Series controllers can be switched between MS/TP and N2 communication protocols. FAC controllers used as MS/TP devices are B-AACs with integral RS-485 MS/TP communications.

FAC Series Controllers feature an integral real-time clock. FACs support time-based tasks and maintain time-based control, which enables these field controllers to monitor and control schedules, calendars, alarms, and trends. FACs can continue time-based control and monitoring when offline for extended periods of time from a *Metasys* system network.

FAC Series Controllers can also operate as stand-alone controllers in applications that do not require a networked supervisory device or for network applications where it is preferred to have the scheduling, alarming, and/or trending performed locally in the field controllers.

The FAC4911 controllers operate on BACnet/IP networks and integrate into Johnson Controls® and third-party systems.

The FAC3611 and FAC3613 models include a fast persistence feature that allows data values to be held at a configurable value, up to once per second. Persistence refers to how often samples of data are stored locally. In the event of a problem, such as a loss of power, data can be retrieved up to the rate that the data is persisted, minimizing the potential loss of data. When power is restored, previously persisted data, up to the rate of persistence, remains available and accessible.

For example, if persistence is configured for once per second, you only risk losing one second of data. Persisting data may be essential for situations that require greater data accuracy, including certain methods of utility data collection and billing.

The FAC2612 controller features line-voltage relay outputs, which makes this controller well-suited for use in terminal units.

The FAC2612-2 model uses a line-voltage power supply, which eliminates the need for a 24 VAC transformer in line-voltage applications.

The FAC2611, FAC2612, FAC3611, and FAC3613 controllers using the MS/TP protocol support wireless communications using the ZFR or ZFR Pro Series accessories and the WRZ-7860 One-to-One Receiver.



## FEATURES

- **Switchable Communications Protocols** – Provides flexibility with a choice between BACnet MS/TP and N2 communication.
- **Standard BACnet Protocol** – Provides interoperability with other Building Automation System (BAS) products that use the widely accepted BACnet standard.
- **Standard Hardware and Software Platform** – Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows; also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.
- **ZFR Wireless FC or SA Bus Interface** – Both the ZFR1800 Series Wireless and WNC1800/ZFR182x Pro Series Wireless Field Bus (ZFR Pro) provide a wireless alternative to hard-wired *Metasys* system counterparts, offering application flexibility and mobility with minimal disruption to building occupants.
- **Bluetooth® Wireless Commissioning** – Provides an easy-to-use connection to the configuration and commissioning tool.
- **Auto-Tuned Control Loops** – Reduce commissioning time, eliminate change-of-season recommissioning, and reduce wear and tear on mechanical devices.
- **Universal Inputs and Configurable Outputs** – Allows multiple signal options to provide input/output flexibility.
- **BACnet Testing Laboratories (BTL) Listed and Certified** – Ensures interoperability with other BTL-listed devices. BTL is a third-party agency, which validates that BAS vendor products meet the BACnet industry-standard protocol.
- **32-bit Microprocessor** – Ensures optimum performance and meets industry specifications.
- **BACnet Automatic Discovery** – Supports easy controller integration into a *Metasys* BAS.
- **End-of-Line (EOL) Switch in MS/TP Field Controllers** – Enables field controllers to be terminating devices on the communications bus.
- **Pluggable Communications Bus and Supply Power Terminal Blocks** – Expedites installation and troubleshooting.
- **Writable Flash Memory** – Allows standard or customized applications to be downloaded from the CCT and enables persistent application data.
- **DIS17 Remote Display and the MAP Gateway Support** – Enable monitoring and commanding of I/O and configuration parameters



ORDERING INFORMATION

MODEL INFORMATION (INCLUDING POINT TYPE COUNTS)

		FAC2513	FAC2611	FAC2612	FAC3611	FAC3613	FAC4911
Communication Protocol		BACnet MS/TP	BACnet MS/TP, N2				BACnet/IP
Engines Supported		All Model types. Some NIE models support MS/TP and N2 devices. Refer to the Network Engines Product Bulletin (LIT-12012138) for details.					NAE55, NAE85, ODS at R9.0 or later
Modular Jacks		6-pin SA Bus Modular Port supports one communicating sensor. <b>Or</b> you can wire up to four communicating sensors to the SA Bus Terminal Block. They cannot be used at the same time.					
		6-pin FC Bus for tool support					
Point Types	Signals Accepted						
Universal Input (UI)	Analog Input, Voltage Mode, 0-10 VDC Analog Input, Current Mode, 4- 20 mA Analog Input, Resistive Mode, 0-2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A99B SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	4 Current Mode not supported	6	5	8	8	10
Binary Input (BI)	Dry Contact Maintained Mode Pulse Counter/Accumulator Mode (High Speed), 100 Hz	6	2	4	6	6	6
Analog Output (AO)	Analog Output, Voltage Mode, 0-10 VDC Analog Current Mode, 4-20 mA	2 Current Mode not supported	2	6	6	4	
Binary Output (BO)	24 VAC Triac	2 External Power only	3	6	6	4	
Configurable Output (CO)	Analog Output, Voltage Mode, 0-10 VDC Binary Output Mode, 24 VAC Triac	2	4	4	4		
Relay Output (RO)	RO: Single-Pole, Double-Throw (SPDT) RO: Single-Pole, Single-Throw (SPST)			2 - SPDT and 3 -SPST linevoltage relays, 1/4 hp 120 VAC, 1/2 hp 240 VAC			



## ORDERING INFORMATION

CODES	DESCRIPTION
MS-FAC2513-0	16-Point Advanced Application Field Equipment Controller with 4 UI, 6 BI, 2 CO, 2 BO, and 2 AO; 24 VAC; SA Bus; FC Bus; Integral Real-time Clock <b>Note:</b> This model is only available in certain regions. Contact your local Johnson Controls representative for more information.
MS-FAC2611-0	17-Point Advanced Application Field Equipment Controller with 6 UI, 2 BI, 4 CO, 3 BO, and 2 AO; 24 VAC; SA Bus; FC Bus; Integral Real-time Clock
MS-FAC2612-1	18-Point Advanced Application Field Equipment Controller with 5 UI, 4 BI, 4 CO, 2 SPDT and 3 SPST Line-Voltage ROs 1/4 hp 120 VAC, 1/2 hp 240 VAC; 24 VAC; SA Bus; FC Bus; Integral Real-time Clock;
MS-FAC2612-2	18-Point Advanced Application Field Equipment Controller with 5 UI, 4 BI, 4 CO, 2 SPDT and 3 SPST Line-Voltage ROs, 1/4 hp 120 VAC, 1/2 hp 240 VAC; 100–240 VAC; SA Bus; FC Bus; Integral Real-time Clock
MS-FAC3611-0	26-Point Advanced Application Field Equipment Controller with 8 UI, 6 BI, 6 BO, and 6 AO; 24 VAC; SA Bus; FC Bus; Integral Real-time Clock; Fast Persistence
MS-FAC3613-0	26-Point Advanced Application Field Equipment Controller with 8 UI, 6 BI, 6 BO, and 6 AO; 24 VAC; SA Bus; FC Bus; Integral Real-time Clock; Fast Persistence
MS-FAC4911-0	28-Point Advanced Application Field Equipment Controller with 10 UI, 6 BI, 4 BO, 4 AO, and 4 CO; 24 VAC; SA Sensor Port; Integral Real-time Clock; 2 Ethernet Ports for BACnet/IP Communications

## ACCESSORIES

### FAC ACCESSORIES (PART 1/2)

CODES	DESCRIPTION
IOM Series	Refer to the Metasys® System Field Equipment Controllers and Related Products Product Bulletin (LIT-12011042) for a complete list of available IOM Series Controllers.
TL-CCT-0	Metasys Controller Configuration Tool (CCT) software
MS-FCP-0	Metasys Field Controller Firmware Package Files for CCT
Mobile Access Portal (MAP) Gateway	Refer to the Mobile Access Portal Gateway Catalog Page (LIT-1900869) to identify the appropriate product for your region. <b>Note:</b> The MAP Gateway serves as a replacement for the the BTCVT, which is no longer available for purchase, but continues to be supported.
NS Series Network Sensors	Refer to the NS Series Network Sensors Product Bulletin (LIT-12011574) for specific sensor model descriptions.
WRZ Series Wireless Room Sensors	Refer to the WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653) for specific sensor model descriptions.
MS-DIS1710-0	Local Controller Display: Refer to Local Controller Display Product Bulletin (LIT-12011273) for more information.
WRZ-7860-0	Receiver for One-to-One Wireless Room Sensing Systems - functions with WRZ Series Sensors room sensors
WRZ-SST-120	Wireless System Survey Tool
ZFR1800 Series Wireless Field Bus System	This system is used for installations that only support BACnet MS/TP. Refer to the WNC1800/ZFR182x Pro Series Wireless Field Bus System Product Bulletin (LIT-12012320) for a list of available products.

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## ORDERING INFORMATION

### ACCESSORIES

#### FAC ACCESSORIES (PART 2/2)

CODES	DESCRIPTION
ZFR-USBHA-0	USB Dongle with ZFR Driver provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled FEC, FAC, IOM, and VMA16 controllers. Also allows use of the ZFR Checkout Tool (ZCT) in CCT. <b>Note:</b> The ZFR-USBHA-0 replaces the IA OEM DAUBI_2400 ZFR USB dongle. For additional information about the ZFR-USBHA-0 ZFR dongle, refer to the <i>ZFR1800 Series Wireless Field Bus System Technical Bulletin (LIT-12011295)</i> or <i>ZFR1800 Series Wireless Field Bus System Quick Reference Guide (LIT-12011630)</i> .
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 30 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown (Bulk Pack of 10)
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector (Bulk Pack of 10)
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray (Bulk Pack of 10)
AS-CBLTSTAT-0	Cable adapter for connection to 8-pin TE-6700 Series sensors
MS-TBKLV03-0	Terminal Block Kit - FAC Line Voltage AC Power - 3 Pieces
MS-TBKRO02-0	Terminal Block Kit - FAC 2-Position Relay Output - 9 Pieces
MS-TBKRO03-0	Terminal Block Kit - FAC 3-Position Relay Output - 6 Pieces
MS-TBKCO04-0	Terminal Block Kit - FAC 4-Position Configurable Output - 6 Pieces
MS-TBKUI04-0	Terminal Block Kit - FAC 4-Position Universal Input - 3 Pieces
MS-TBKUI05-0	Terminal Block Kit - FAC 5-Position Universal Input - 3 Pieces
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router



## TECHNICAL SPECIFICATIONS (PART 1/4)

Codes	<p><i>MS-FAC2513-0</i> 16-Point FAC with Integral Real-Time Clock and 24 VAC Supply Power</p> <p><i>MS-FAC2611-0</i> 17-Point FAC with Integral Real-Time Clock and 24 VAC Supply Power</p> <p><i>MS-FAC2612-1</i> 18-Point FAC with Integral Real-Time Clock and 24 VAC Supply Power</p> <p><i>MS-FAC2612-2</i> 18-Point FAC with Integral Real-Time Clock and 100–240 VAC Supply Power</p> <p><i>MS-FAC3611-0</i> 26-Point FAC with Integral Real-Time Clock and 24 VAC Supply Power with Fast Persistence</p> <p><i>MS-FAC3613-0</i> 26-Point FAC with Integral Real-Time Clock and 24 VAC Supply Power with Fast Persistence</p> <p><i>MS-FAC4911-0</i> 28-Point FAC with Integral Real-Time Clock and 24 VAC Supply Power; Communicates over BACnet/IP network</p>
Communications Protocol	<p><i>MS-FAC2513-0, MS-FAC2611-0, MS-FAC2612-1, MS-FAC2612-2, MS-FAC3611-0, MS-FAC3613-0</i> BACnet MS/TP, N2</p> <p><i>MS-FAC4911-0</i> BACnet/IP</p>
Engines Supported	<p><i>MS-FAC2513-0, MS-FAC2611-0, MS-FAC2612-1, MS-FAC2612-2, MS-FAC3611-0, MS-FAC3613-0</i> All Model types. Some NIE models support MS/TP and N2 devices. Refer to the Network Engines Product Bulletin (LIT-12012138) for details.</p> <p><i>MS-FAC4911-0</i> NAE55, NAE85, ODS (FAC4911 supports R9.0 or later versions of these engines.)</p>
Power Requirement	<p><i>MS-FAC2513-0, MS-FAC2611-0, MS-FAC2612-1, MS-FAC3611-0, MS-FAC3613-0, MS-FAC4911-0</i> 24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60Hz, SELV</p> <p><i>MS-FAC2612-2</i> 100–240 VAC 50/60 Hz</p>
Power Consumption	<p><i>MS-FAC2513-0, MS-FAC2611-0, MS-FAC3611-0, MS-FAC3613-0, MS-FAC4911-0</i> 14 VA maximum</p> <p><i>MS-FAC2612-1</i> 30 VA maximum</p> <p><i>MS-FAC2612-2</i> 40 VA maximum</p> <p><b>Note:</b> VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 84 VA (maximum).</p>
Ambient Conditions	<p><i>Operating</i> 0 to 50°C, 10 to 90% RH noncondensing; Pollution Degree 2</p> <p><i>Storage</i> -40 to 80°C, 5 to 95% RH noncondensing</p>
Addressing	<p><i>For BACnet MS/TP-configured controllers</i> DIP switch set; valid field controller device addresses 4–127 (device addresses 0–3 and 128–255 are reserved and not valid controller addresses.)</p> <p><i>For BACnet/IP controllers</i> 3 rotary switches to assign unique number for each controller on the subnet to identify it in the Controller Tool for uploading, downloading, and commissioning</p> <p><i>For N2-configured controllers</i> DIP switch set; valid controller device addresses 1–254</p>

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## TECHNICAL SPECIFICATIONS (PART 2/4)

<p>Communications Bus</p> <p><i>RS-485, field selectable between BACnet MS/TP and N2 communications on certain models</i></p> <p><i>MS-FAC4911-0</i></p>	<ul style="list-style-type: none"> <li>• 3-wire FC Bus between the supervisory controller and field controllers</li> <li>• 4-wire SA Bus between field controller, network sensors, and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from field controller) to bus devices.</li> </ul> <hr/> <ul style="list-style-type: none"> <li>• BACnet/IP over Ethernet cable</li> <li>• 4-wire SA Bus between field controller, network sensors, and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from field controller) to bus devices.</li> </ul>
<p>Processor</p> <p><i>MS-FAC2611-0, MS-FAC2612-1, MS-FAC2612-2</i></p> <p><i>MS-FAC3611-0</i></p> <p><i>MS-FAC2513-0, MS-FAC3613-0</i></p> <p><i>MS-FAC4911-0</i></p>	<p>H8SX/166xR Renesas® microcontroller</p> <hr/> <p>RX630 32-Bit Renesas microcontroller</p> <hr/> <p>RX631 32-Bit Renesas microcontroller</p> <hr/> <p>RX63N 32-Bit Renesas microcontroller</p>
<p>Memory</p> <p><i>MS-FAC2611-0, MS-FAC2612-1, MS-FAC2612-2, MS-FAC3611-0</i></p> <p><i>MS-FAC2513-0, MS-FAC3613-0</i></p> <p><i>MS-FAC4911-0</i></p>	<p>4 MB Flash Memory and 1 MB RAM</p> <hr/> <p>16 MB Flash Memory and 8 MB SDRAM</p> <hr/> <p>16 MB Flash Memory and 8 MB RAM</p>
<p>Input and Output Capabilities</p> <p><i>MS-FAC2513-0</i></p> <p><i>MS-FAC2611-0</i></p> <p><i>MS-FAC2612-1, MS-FAC2612-2</i></p> <p><i>MS-FAC3611-0, MS-FAC3613-0</i></p> <p><i>MS-FAC4911-0</i></p>	<p>4 - Universal Inputs: Defined as 0-10 VDC, 0-600k ohm, or Binary Dry Contact</p> <p>6 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p> <p>2 - Analog Outputs: Defined as 0-10 VDC 2 - Binary Outputs: Defined as 24 VAC Triac (external power source only)</p> <p>2 - Configurable Outputs: Defined as 0-10 VDC or 24 VAC Triac BO</p> <hr/> <p>6 - Universal Inputs: Defined as 0-10 VDC, 4-20 mA, 0-600k ohm, or Binary Dry Contact</p> <p>2 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p> <p>2 - Analog Outputs: Defined as 0-10 VDC or 4-20 mA</p> <p>3 - Binary Outputs: Defined as 24 VAC Triac (selectable internal or external source power)</p> <p>4 - Configurable Outputs: Defined as 0-10 VDC or 24 VAC Triac BO</p> <hr/> <p>5 - Universal Inputs: Defined as 0-10 VDC, 4-20 mA, 0-600k ohm, or Binary Dry Contact</p> <p>4 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p> <p>4 - Configurable Outputs: Defined as 0-10 VDC or 24 VAC Triac BO</p> <p>2 - Relay Outputs (Single-Pole, Double-Throw): UL 916: 1/4 hp 120 VAC, 1/2 hp 240 VAC; 360 VA Pilot Duty at 120/240 VAC (B300); 3 A Non-inductive 24-240 VAC; EN 60730: 6 (4) A N.O. or N.C. only</p> <p>3 - Relay Outputs (Single-Pole, Single-Throw): UL 916: 1/4 hp 120 VAC, 1/2 hp 240 VAC; 360 VA Pilot Duty at 120/240 VAC (B300); 3 A Non-inductive 24-240 VAC; EN 60730: 6 (4) A N.O. or N.C. only</p> <hr/> <p>8 - Universal Inputs: Defined as 0-10 VDC, 4-20 mA, 0-600k ohms, or Binary Dry Contact</p> <p>6 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p> <p>6 - Binary Outputs: Defined as 24 VAC Triac (external power source only)</p> <p>6 - Analog Outputs: Defined as 0-10 VDC or 4-20 mA</p> <hr/> <p>10 - Universal Inputs: Defined as 0-10 VDC, 0-600k ohms, or Binary Dry Contact</p> <p>6 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p> <p>4 - Binary Outputs: Defined as 24 VAC Triac (external power source only)</p> <p>4 - Analog Outputs: Defined as 0-10 VDC or 4-20 mA</p> <p>4 - Configurable Outputs: Defined as AO mode , 0-10 VDC or BO mode, 24 VAC Triac</p>

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TECHNICAL SPECIFICATIONS (PART 3/4)

Analog Input (AI)/Analog Output (AO) Resolution and Accuracy	
<i>Analog Input</i>	15-bit resolution
<i>Analog Output</i>	15-bit resolution, +/- 200 mV accuracy in 0–10 VDC applications
Terminations	
<i>MS-FAC2513-0</i>	Input/Output: Fixed Screw Terminal Blocks FC Bus, SA Bus and Supply Power: 3-wire and 4-wire Pluggable Screw Terminal Blocks SA Bus Port: RJ-12 6-pin Modular Jacks
<i>MS-FAC2611-0, MS-FAC3611-0, and MS-FAC3613-0</i>	Input/Output: Fixed Screw Terminal Blocks FC Bus, SA Bus and Supply Power: 3-wire and 4-wire Pluggable Screw Terminal Blocks FC Bus and SA Bus Port: RJ-12 6-pin Modular Jacks
<i>MS-FAC2612-1 and MS-FAC2612-2</i>	Input/Output: Pluggable Screw Terminal Blocks FC Bus, SA Bus and Supply Power: 3-wire and 4-wire Pluggable Screw Terminal Blocks FC Bus and SA Bus Port: RJ-12 6-pin Modular Jacks
<i>MS-FAC4911-0</i>	Input/Output: Fixed Screw Terminal Blocks SA Bus and Supply Power: 3-wire and 4-wire Pluggable Screw Terminal Blocks SA Bus Port: RJ-12 6-pin Modular Jacks
Mounting	Horizontal on single 35 mm DIN rain mount (preferred), or screw mount on flat surface with three integral mounting clips on controller
Housing	Enclosure material: ABS and polycarbonate UL94 5VB, self-extinguishing; Plenumrated Protection Class: IP20 (IEC529) (except the FAC2612 controller)
Dimensions (Height x Width x Depth)	
<i>MS-FAC2513-0</i>	150 x 164 x 48 mm including terminals and mounting clips
<i>MS-FAC2611-0</i>	150 x 190 x 53 mm including terminals and mounting clips
<i>MS-FAC2612-x</i>	150 x 164 x 53 mm including terminals and mounting clips
<i>MS-FAC3611-0, MS-FAC3613-0, MS-FAC4911-0</i>	150 x 220 x 57.5 mm including terminals and mounting clips
	<b>Note:</b> Mounting space for FAC models requires an additional 50 mm space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.
Weight	0.5 kg
<b>CE</b> Compliance	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive. Johnson Controls, declares that the FAC2612-2 models are also in compliance with the essential requirements and other relevant provisions of the Low Voltage Directive. Declared as Independently Mounted, Intended for Panel Mounting, Operating Control Type 1.B, 4kV rated impulse voltage, 100°C ball pressure test.
BACnet International	
<i>MS-FAC261x-x</i>	BACnet® Testing Laboratories (BTL) Protocol Revision 7 Listed BACnet Advanced Application Controller (B-AAC)
<i>MS-FAC3611-0</i>	BACnet® Testing Laboratories (BTL) Protocol Revision 9 Listed BACnet Advanced Application Controller (B-AAC)
<i>MS-FAC2513-0, MS-FAC3613-0, MS-FAC4911-0</i>	BACnet® Testing Laboratories (BTL) Protocol Revision 15 Listed and Certified BACnet Advanced Application Controller (B-AAC)

Note

The MS-FAC2513-0 model is only available in certain regions. Contact your local Johnson Controls representative for more information.

# BUILDING AUTOMATION PRODUCTS

## PROGRAMMABLE CONTROLLERS

### METASYS® CONTROLLERS

## CVM

### VAV BOX CONTROLLERS

The CVM03050 equipment controllers are designed for variable air volume (VAV) box applications. CVM03050 controllers operate on an RS-485 BACnet® MS/TP bus as BACnet Advanced Application Controllers (B-AACs), and integrate into Johnson Controls® and third-party BACnet systems.

CVM03050 controllers feature an integral damper actuator, a digital Differential Pressure Transducer (DPT) sensor, and a 32-bit microprocessor. The CVM03050-OP model features an integral potentiometer to sense actual VAV box damper position. These controllers include an integral real-time clock, which enables the controllers to monitor and control schedules, calendars, and trends, and operate for extended periods of time as stand-alone controllers when offline from the *Metasys*™ system network. These controllers also connect easily to the wired and wireless network sensors for zone and discharge air temperature sensing.

## FEATURES

- **Sleek and modern packaging and styling** - Provides a modern, aesthetically pleasing industrial design.
- **Standard hardware and software platform** - Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows. Also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.
- **High memory capacity and fast processing power** - Provides application engineers with the horsepower to meet sophisticated control requirements.
- **Auto-Tuned Control Loops** - Reduce commissioning time, eliminate change-of-season re-commissioning, and reduce wear and tear on mechanical devices.
- **Patented Proportional Adaptive Control (P-Adaptive) and PRAC** - Provides continuous loop tuning.
- **Standard BACnet protocol** - Provides interoperability with other Building Automation System (BAS) products that use the widely accepted BACnet standard.
- **Models to support both BACnet MS/TP and N2, with auto-detection of the communications protocols** - Controller auto-detects the BACnet MS/TP or N2 protocol that is connected to it, which enables the same controller to support multiple communication protocols without the need to purchase a special model per protocol, and without extra manual setup.
- **BACnet Testing Laboratories (BTL) listed and certified as BACnet Advanced Application Controllers (B-AAC)** - Ensures openness and interoperability with other BTL-listed devices. BTL is a third-party agency, which validates that BAS vendor products meet the BACnet industry-standard protocol.
- **BACnet automatic discovery** - Supports easy controller integration into a *Metasys*® BAS.





## FEATURES

- **Wireless ZFR and ZFR Pro support** - Provides a wireless alternative to hard-wired MS/TP networking, offering application flexibility and mobility with minimal disruption to building occupants, and also simplifies and speeds up replacements.
- **Integral real-time clock** - An integral real-time clock, which enables the controllers to monitor and control schedules, calendars, and trends, and operate for extended periods of time as stand-alone controllers when offline from the *Metasys* system network.
- **Pluggable screw terminal blocks** - Pluggable input/output wiring terminal blocks that can be removed from the controller provide electrical installers and field technicians the ability to quickly and easily install and service a controller without the need to disconnect and reconnect the input/output wiring.
- **Decimal MS/TP address set with three rotary switches** - Easy-to-use rotary switches set the MS/TP address in decimal format.
- **Universal Inputs and Configurable Outputs** - Allows multiple signal options to provide input/output flexibility.
- **End-of-Line (EOL) switch in MS/TP equipment controllers** - Enables equipment controllers to be terminating devices on the communications bus.
- **Default state for Input/Output wiring validation** - Enables validation of the input and output terminals' wiring prior to download of an application file.
- **Background transfer coupled with enable/disable logic options in Controller Configuration Tool (CCT)** - Saves field technicians' time, enables productivity and minimizes equipment disruption, since the controllers are operating while file updates take place in the background and the application can be left disabled until the system is ready to run.
- **SA Bus commissioning improvements** - Saves field technicians time when commissioning SA Bus devices by enabling an equipment controller to transfer and apply firmware files to all the SA Bus IOM devices connected to it at the same time.



## ORDERING INFORMATION

		CVM03050-0	CVM03050-0P
Communication Protocols	BACnet MS/TP, N2		
Network Engines	All network engine model types <i>Refer to the Network Engines Product Bulletin (LIT-12012138) for details.</i>		
Modular Jacks	FC and SA Bus Modular Ports: RJ-12 6-Pin Modular Jacks		
Point Types	Signals Accepted:		
Universal Input (UI)	15 VDC Power Source (Provides 35mA total current source) Analog Input - Voltage Mode (0-10 VDC) Analog Input - Resistive Mode (0-600k ohm), RTD (1k Nickel [Johnson Controls sensor], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	3	3
Configurable Output (CO)	Analog Output - Voltage Mode (0-10 VDC) Binary Output 24 VAC Triac Analog Output Signal Common Binary Output Signal Common	2	2
Binary Output (BO)	Binary Output - 24 VAC Triac	3	3
Integrated Actuator	Internal	1	1
Differential Pressure Transducer	Internal	1	1
Integrated Feedback Potentiometer	Internal	No	Yes
Zone Sensor Input	On SA Bus <b>Note:</b> A total of 10 MS/TP addresses (IOMs), not including sensor addresses, can be used in a single CVM equipment controller.	Up to 4 NS Series Network Sensors Up to 9 WRZ sensors when using the ZFR or ZFR Pro Series wireless router configuration and up to 5 WRZ sensors when using the one-to-one WRZ-78xx wireless configuration	



## ORDERING INFORMATION

CODES	DESCRIPTION
M4-CVM03050-0	VAV Box Controller with Integrated Actuator and Digital Differential Pressure Transducer (DPT) Sensor. Includes MS/TP (and N2) communication; 8 points (3 UI, 2 CO, and 3 BO); real-time clock; 32-bit microprocessor; 24 VAC input.
M4-CVM03050-OP	VAV Box Controller with Integrated Actuator, Position Feedback, and DPT Sensor. Includes MS/TP (and N2) communication; 8 points (3 UI, 2 CO, and 3 BO); real-time clock; 32-bit microprocessor; 24 VAC input.

## ACCESSORIES - ORDER SEPERATELY (PART 1/2)

CODES	DESCRIPTION
IOM Series Controllers	Refer to the Metasys® System Field Equipment Controllers and Related Products Product Bulletin (LIT-12011042) for a complete list of available IOM Series Controllers.
TL-CCT-0	License enabling Metasys Controller Configuration Tool (CCT) software for one user
MS-FCP-0	License enabling Metasys Equipment Controller Firmware Package Files required for CCT
Mobile Access Portal (MAP) Gateway	Refer to the Mobile Access Portal Gateway Catalog Page (LIT-1900869) to identify the appropriate product for your region. <b>Note:</b> The MAP Gateway serves as a replacement for the BTCVT, which is no longer available for purchase, but continues to be supported.
MS-DIS1710-0	Local Controller Display
NS-ATV7003-0	Handheld VAV Balancing Tool
NS Series Network Sensors	Refer to the NS Series Network Sensors Product Bulletin (LIT-12011574) for specific sensor model descriptions.
AS-CBLTSTAT-0	Cable adapter for connection to 8-pin TE-6700 Series sensors
NS-WALLPLATE-0	Network Sensor Wall Plate
WRZ Series Wireless Room Sensors	Refer to the WRZ Series Wireless Room Sensors Product Bulletin (LIT-12000653) for specific sensor model descriptions.
WRZ-7860-0	Refer to the WRZ-7860 Receiver for One-to-One Wireless Room Sensing Product Bulletin (LIT-12011640) for a list of available products.
WRZ-SST-120	Refer to the WRZ-SST-120 Wireless Sensing System Tool Installation Instructions (LIT-24-10563-55) for usage instructions.
WNC1800/ZFR182x Pro Wireless Field Bus System	Refer to the WNC1800/ZFR182x Pro Series Wireless Field Bus System Product Bulletin (LIT-12012320) for a list of available products.
ZFR1800 Series Wireless Field Bus System	Refer to the ZFR1800 Series Wireless Field Bus System Product Bulletin (LIT-12011336) for a list of available products.
ZFR-USBHA-0	ZFR USB Dongle provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled CGM, CVM, FAC, FEC, VMA16, and IOM controllers. It also allows use of the ZFR Checkout Tool (ZCT) in CCT. <b>Note:</b> The ZFR-USBHA-0 replaces the IA OEM DAUBI_2400 ZFR USB dongle. For additional information about the ZFRUSBHA-0 ZFR dongle, refer to the ZCT Checkout Tool Help LIT-12012292 or the WNC1800_ZFR182x Pro Series Wireless Field Bus System Technical Bulletin (LIT-12012356).

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## ORDERING INFORMATION

### ACCESSORIES - ORDER SEPERATELY (PART 2/2)

CODES	DESCRIPTION
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 72.2 cm, Primary Leads and 76.2 cm Secondary Leads, Class 2 Y65A13-0 Transformer, 120 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 20.32 cm, Primary Leads and 76.2 cm Secondary Leads, Class 2
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 20.32 cm, Primary Leads and Secondary Screw Terminals, Class 2
F-1000-325	Replacement Barbed Fitting for Connecting Tubing, Bulk Pack of 10. For use on CVM03050-0, and also on VMA1630, VMA1615, and VMA1832 models. <b>Note:</b> This accessory is only available for the CVM and some VMA equipment controllers. This accessory is not compatible with the CVM03050-0P (with position feedback) model.
F-1000-326	Flexible Tubing Extension with Barbed Fitting for CVM03050-0x, VMA1615, VMA1630, and VMA1832, 35.56 cm Length. Bulk Pack of 20. Use to extend tubing that connects between the DPT connectors and the DPT sensors, including when replacing a VMA1400 series controller with a CVM03050-0x, VMA16xx or VMA18xx controller. <b>Note:</b> This accessory is only available for CVM and some VMA equipment controllers.
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router



TECHNICAL SPECIFICATION (PART 1/2)

Codes	
<i>M4-CVM03050-0</i>	VAV Box Controller with Integrated Actuator and Digital Differential Pressure Transducer (DPT) Sensor. Includes MS/TP (and N2) communication; 8 points (3 UI, 2 CO, and 3 BO); real-time clock; 32-bit microprocessor; 24 VAC input.
<i>M4-CVM03050-0P</i>	VAV Box Controller with Integrated Actuator, Position Feedback, and DPT Sensor. Includes MS/TP (and N2) communication; 8 points (3 UI, 3 BO, and 2 CO); real-time clock; 32-bit microprocessor; 24 VAC input.
Power Requirement	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV)
Power Consumption	10 VA typical, 14 VA maximum <sup>1</sup> <b>Note:</b> The USB feature is not currently supported.
Power Source	+15 VDC power source terminals provide 35 mA total current. Quantity 1 located in Universal IN terminals - for active (3-wire) input devices
Ambient Conditions	
<i>Operating</i>	0 to 50°C
<i>Storage</i>	-40 to 70°C
Network Engines	All network engine model types
Communications Protocol	BACnet MS/TP; N2. Wireless also supported (at FC Bus and for Sensors) with additional hardware.
Device Addressing for BACnet MS/TP	Decimal address set via three rotary switches: valid controller device addresses 4-127
Device Addressing for N2	Decimal address set via three rotary switches: valid controller device addresses 1-254
Communications Bus <sup>2</sup>	BACnet MS/TP (default), N2 3-wire FC Bus between the supervisory controller and equipment controllers 4-wire SA Bus between equipment controller, network sensors and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from equipment controller) to bus devices
Processor	RX64M 32-bit Renesas microcontroller
Memory	16MB Flash Memory and 8MB SDRAM
Real-Time Clock Backup Power Supply	Super capacitor maintains power to the onboard real-time clock for a minimum of 72 hours when supply power to the controller is disconnected.
Input and Output Capabilities	
<i>3 - Universal Inputs</i>	Defined as 0-10 VDC, 0-600k ohms, or Binary Dry Contact
<i>2 - Configurable Outputs</i>	Defined as 0-10 VDC or 24 VAC Triac BO
<i>3 - Binary Outputs</i>	Defined as 24 VAC Triac (external power source only)
Universal Input (UI) Resolution/Configurable Output (CO) Accuracy	
<i>UI Analog Input Mode</i>	15-bit resolution on UIs
<i>CO Analog Output Mode</i>	0-10 VDC ± 200 mV

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## TECHNICAL SPECIFICATION (PART 2/2)

Air Pressure Differential Sensor	Range: -1.5 in. to 1.5 in. W.C.
<i>Performance Characteristics</i>	Typical Accuracy at ambient operating conditions: +/- 1% in W.C. Typical accuracy at zero (null) pressure is +/- 0.0006 in W.C.
Actuator Rating	4 N·m (35 lb·in) minimum shaft length = 44 mm (1-3/4 in.) (if provided)
Terminations	
<i>Inputs/Outputs</i>	Pluggable Screw Terminal
<i>FC Bus, SA Bus, and Supply Power</i>	4-Wire and 2-Wire Pluggable Screw Terminal Blocks
<i>FC and SA Bus Modular Ports</i>	RJ-12 6-Pin Modular Jacks
Mounting	Mounts to damper shaft using single set screw and to duct with single mounting screw
Housing	
<i>Enclosure material</i>	ABS and polycarbonate UL94 5VB; Selfextinguishing Protection Class: IP20 (IEC529)
Dimensions (Height x Width x Depth)	165 x 125 x 73 mm <b>Center of Output Hub to Center of Captive Spacer: 135 mm</b>
Weight	0.69 kg
<b>CE</b> Compliance	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive.
<i>BACnet International</i>	BACnet Testing Laboratories™ (BTL) Protocol Revision 15 Listed and Certified BACnet Advanced Application Controller (B-AAC), based on ANSI/ASHRAE 135-2016

### Notes

- 1 The VA rating does not include any power supplied to the peripheral devices connected to Configurable Outputs (COs) or Binary Outputs (BOs), which can consume up to 12 VA for each CO or BO, for a possible total consumption of an additional 60 VA (maximum).
- 2 For more information, refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)*.

# BUILDING AUTOMATION PRODUCTS

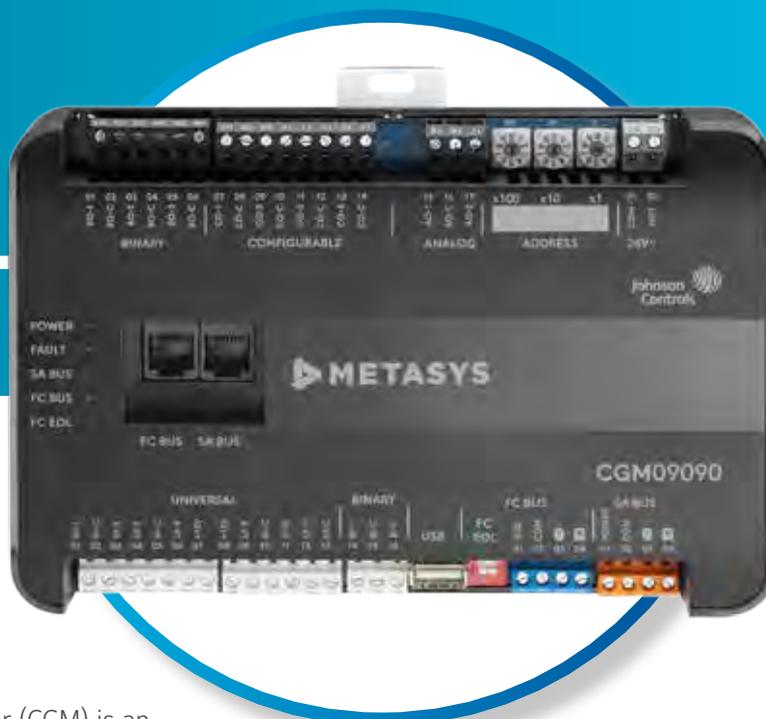
## PROGRAMMABLE CONTROLLERS

### METASYS® CONTROLLERS

## CGM

### GENERAL PURPOSE APPLICATION CONTROLLER

The CGM09090 General Purpose Application MS/TP Controller (CGM) is an equipment controller that runs pre-engineered and user-programmed applications, and provides the inputs and outputs required to monitor and control a wide variety of HVAC and other facility equipment. CGM09090 equipment controllers operate on an RS-485 BACnet® MS/TP bus as BACnet Advanced Application Controllers (B-AACs) and integrate into Johnson Controls® and third-party BACnet systems. CGM equipment controllers include an integral real-time clock, which enables the controllers to monitor and control schedules, calendars, and trends, and operate for extended periods of time as standalone controllers when offline from the *Metasys* system network.



## FEATURES

- **Sleek and modern packaging and styling** - Provides a modern, aesthetically pleasing industrial design.
- **Standard hardware and software platform** - Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows. Also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.
- **High memory capacity and fast processing power** - Provides application engineers with the horsepower to meet sophisticated control requirements.
- **Auto-Tuned Control Loops** - Reduce commissioning time, eliminate change-of-season re-commissioning, and reduce wear and tear on mechanical devices.
- **Patented Proportional Adaptive Control (P-Adaptive) and PRAC** - Provides continuous loop tuning.
- **Standard BACnet protocol** - Provides interoperability with other Building Automation System (BAS) products that use the widely accepted BACnet standard.
- **Models to support both BACnet MS/TP and N2, with auto-detection of the communications protocols** - Controller auto-detects the BACnet MS/TP or N2 protocol that is connected to it, which enables the same controller to support multiple communication protocols without the need to purchase a special model per protocol, and without extra manual setup.
- **BACnet Testing Laboratories (BTL) listed and certified as BACnet Advanced Application Controllers (B-AAC)** - Ensures openness and interoperability with other BTL-listed devices. BTL is a third-party agency, which validates that BAS vendor products meet the BACnet industry-standard protocol.
- **BACnet automatic discovery** - Supports easy controller integration into a *Metasys*® BAS.



## FEATURES

- **Wireless ZFR and ZFR Pro support** - Provides a wireless alternative to hard-wired MS/TP networking, offering application flexibility and mobility with minimal disruption to building occupants, and also simplifies and speeds up replacements.
- **Integral real-time clock** - An integral real-time clock, which enables the controllers to monitor and control schedules, calendars, and trends, and operate for extended periods of time as stand-alone controllers when offline from the *Metasys* system network.
- **Pluggable screw terminal blocks** - Pluggable input/output wiring terminal blocks that can be removed from the controller provide electrical installers and field technicians the ability to quickly and easily install and service a controller without the need to disconnect and reconnect the input/output wiring.
- **Decimal MS/TP address set with three rotary switches** - Easy-to-use rotary switches set the MS/TP address in decimal format.
- **Universal Inputs and Configurable Outputs** - Allows multiple signal options to provide input/output flexibility.
- **End-of-Line (EOL) switch in MS/TP equipment controllers** - Enables equipment controllers to be terminating devices on the communications bus.
- **Default state for Input/Output wiring validation** - Enables validation of the input and output terminals' wiring prior to download of an application file.
- **Background transfer coupled with enable/disable logic options in Controller Configuration Tool (CCT)** - Saves field technicians' time, enables productivity and minimizes equipment disruption, since the controllers are operating while file updates take place in the background and the application can be left disabled until the system is ready to run.
- **SA Bus commissioning improvements** - Saves field technicians time when commissioning SA Bus devices by enabling an equipment controller to transfer and apply firmware files to all the SA Bus IOM devices connected to it at the same time.



## ORDERING INFORMATION

		M4-CGM09090-0
Communication protocol	BACnet MS/TP, N2	
Network Engines	All network engine model types <i>Refer to the Network Engines Product Bulletin (LIT-12012138) for details.</i>	
Modular Jacks	FC and SA Bus Modular Ports: RJ-12 6-Pin Modular Jacks	
Point Types	Signals Accepted:	
Universal Input (UI)	15 VDC Power Source (Provide 100mA total current) Analog Input - Voltage Mode (0-10 VDC) Analog Input - Current Mode (4-20 mA) Analog Input - Resistive Mode (0-600k ohm), RTD (1k Nickel [Johnson Controls sensor], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode Universal Input Common (ICOMn)	7
Binary Input (BI)	Binary Input, Dry Contact Maintained Mode Binary Input - Pulse Counter/Accumulator Mode Binary Input Common for all Binary Input (IN) terminals	2
Binary Output (BO)	Binary Output - 24 VAC Triac (External Power Source) Binary Output Common (for OUTn terminal)	3
Configurable Output (CO)	Analog Output - Voltage Mode (0-10 VDC) Binary Output 24 VAC Triac Analog Output Signal Common Binary Output Signal Common	4
Analog Output (AO)	Analog Output - Voltage Mode (0-10 VDC) Analog Output - Current Mode (4-20 mA) Analog Output Signal Common for all Analog OUT terminals	2

CODE	DESCRIPTION
M4-CGM09090-0	General Purpose Application Controller Includes: MS/TP (and N2) communication; 18 points (7 UI, 2 BI, 4 CO, 2 AO, 3 BO); real-time clock; 32-bit microprocessor; 24 VAC input



## ORDERING INFORMATION

### ACCESSORIES (ORDER SEPERATELY) (PART 1/2)

CODES	DESCRIPTION
IOM Series Controllers	Refer to the Metasys® System Field Equipment Controllers and Related Products Product Bulletin (LIT-12011042) for a complete list of available IOM Series Controllers.
TL-CCT-0	License enabling Metasys Controller Configuration Tool (CCT) software for one user
MS-FCP-0	License enabling Metasys Equipment Controller Firmware Package Files required for CCT
Mobile Access Portal (MAP) Gateway	Refer to the Mobile Access Portal Gateway Catalog Page (LIT-1900869) to identify the appropriate product for your region. <b>Note:</b> The MAP Gateway serves as a replacement for the BTCVT, which is no longer available for purchase, but continues to be supported.
MS-DIS1710-0	Local Controller Display
NS-ATV7003-0	Handheld VAV Balancing Tool
NS Series Network Sensors	Refer to the NS Series Network Sensors Product Bulletin (LIT-12011574) for specific sensor model descriptions.
AS-CBLTSTAT-0	Cable adapter for connection to 8-pin TE-6700 Series sensors
NS-WALLPLATE-0	Network Sensor Wall Plate
WRZ Series Wireless Room Sensors	Refer to the WRZ Series Wireless Room Sensors Product Bulletin (LIT-12000653) for specific sensor model descriptions.
WRZ-7860-0	Refer to the WRZ-7860 Receiver for One-to-One Wireless Room Sensing Product Bulletin (LIT-12011640) for a list of available products.
WRZ-SST-120	Refer to the WRZ-SST-120 Wireless Sensing System Tool Installation Instructions (LIT-24-10563-55) for usage instructions.
WNC1800/ZFR182x Pro Wireless Field Bus System	Refer to the WNC1800/ZFR182x Pro Series Wireless Field Bus System Product Bulletin (LIT-12012320) for a list of available products.
ZFR1800 Series Wireless Field Bus System	Refer to the ZFR1800 Series Wireless Field Bus System Product Bulletin (LIT-12011336) for a list of available products.
ZFR-USBHA-0	ZFR USB Dongle provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled CGM, CVM, FAC, FEC, VMA16, and IOM controllers. It also allows use of the ZFR Checkout Tool (ZCT) in CCT. <b>Note:</b> The ZFR-USBHA-0 replaces the IA OEM DAUBI_2400 ZFR USB dongle. For additional information about the ZFRUSBHA-0 ZFR dongle, refer to the ZCT Checkout Tool Help LIT-12012292 or the WNC1800_ZFR182x Pro Series Wireless Field Bus System Technical Bulletin (LIT-12012356).
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 72.2 cm, Primary Leads and 76.2 cm Secondary Leads, Class 2
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 20.32 cm, Primary Leads and Secondary Screw Terminals, Class 2

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## ORDERING INFORMATION

### ACCESSORIES (ORDER SEPERATELY) (PART 2/2)

CODES	DESCRIPTION
F-1000-325	Replacement Barbed Fitting for Connecting Tubing, Bulk Pack of 10. For use on CVM03050-0, and also on VMA1630, VMA1615, and VMA1832 models. <b>Note:</b> This accessory is only available for the CVM and some VMA equipment controllers. This accessory is not compatible with the CVM03050-0P (with position feedback) model.
F-1000-326	Flexible Tubing Extension with Barbed Fitting for CVM03050-0x, VMA1615, VMA1630, and VMA1832, 35.56 cm Length. Bulk Pack of 20. Use to extend tubing that connects between the DPT connectors and the DPT sensors, including when replacing a VMA1400 series controller with a CVM03050-0x, VMA16xx or VMA18xx controller. <b>Note:</b> This accessory is only available for CVM and some VMA equipment controllers.
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router

## TECHNICAL SPECIFICATIONS (PART 1/2)

Code	
<i>M4-CGM09090-0</i>	General Purpose Application Controller Includes: MS/TP (and N2) communication; 18 points (7 UI, 2 BI, 4 CO, 2 AO, 3 BO); real-time clock; 32-bit microprocessor; 24 VAC input
Power Requirement	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV)
Power Consumption	14 VA maximum <sup>1</sup> <b>Note:</b> The USB feature is not currently supported. Power Source +15 VDC power source terminals provide 100 mA total current. Quantity 2 located in Universal IN terminals - for active (3-wire) input devices
Ambient Conditions	
<i>Operating</i>	0 to 50°C; 10 to 90% RH noncondensing
<i>Storage</i>	-40 to 80°C; 5 to 95% RH noncondensing
Network Engines	All network engine model types
Communications Protocol	BACnet MS/TP; N2. Wireless also supported (at FC Bus and for Sensors) with additional hardware.
Device Addressing for BACnet MS/TP	Decimal address set via three rotary switches: valid controller device addresses 4-127
Device Addressing for N2	Decimal address set via three rotary switches: valid controller device addresses 1-254
Communications Bus	BACnet MS/TP (default); N2 3-wire FC Bus between the supervisory controller and equipment controllers 4-wire SA Bus between equipment controller, network sensors and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from equipment controller) to bus devices.
Processor	RX64M Renesas® 32-Bit microcontroller
Memory	16 MB flash memory and 8 MB SDRAM
Real-Time Clock Backup Power Supply	Super capacitor maintains power to the onboard real-time clock for a minimum of 72 hours when supply power to the controller is disconnected.

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## TECHNICAL SPECIFICATIONS (PART 2/2)

Input and Output Capabilities	
7 - Universal Inputs	Defined as 0–10 VDC, 4–20 mA, 0–600k ohms, or Binary Dry Contact
2 - Binary Inputs	Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode
4 - Configurable Outputs	Defined as 0–10 VDC or 24 VAC Triac BO
2 - Analog Outputs	Defined as 0–10 VDC or 4–20 mA
3 - Binary Outputs	Defined as 24 VAC Triac (external power source only)
Universal Input (UI) Resolution/ Analog Output (AO) Accuracy	
Input	24-bit Analog to Digital converter
Output	+/- 200 mV accuracy in 0–10 VDC applications
Terminations	
Input/Output	Pluggable Screw Terminal Blocks
FC Bus, SA Bus, and Supply Power	4-Wire and 2-Wire Pluggable Screw Terminal Blocks
FC and SA Bus Modular Ports	RJ-12 6-Pin Modular Jacks
Mounting	Horizontal on single 35 mm DIN rail mount (recommended), or screw mount on flat surface with three integral mounting clips on controller
Housing	
Enclosure material	ABS and polycarbonate UL94 5VB; Selfextinguishing Protection Class: IP20 (IEC529)
Dimensions (Height x Width x Depth)	150 x 190 x 44.5 mm including terminals and mounting clips <b>Note:</b> Mounting space requires an additional 50 mm space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.
Weight	0.5 kg
CE Compliance	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive.
BACnet International	BACnet Testing Laboratories™ (BTL) Protocol Revision 15 Listed and Certified BACnet Advanced Application Controller (B-AAC), based on ANSI/ASHRAE 135-2016

### Note

- <sup>1</sup> The VA rating does not include any power supplied to the peripheral devices connected to Configurable Outputs (COs) or Binary Outputs (BOs), which can consume up to 12 VA for each CO or BO; for a possible total consumption of an additional 84 VA (maximum).

# BUILDING AUTOMATION PRODUCTS

## PROGRAMMABLE CONTROLLERS

### METASYS® CONTROLLERS

# VMA16 / VMA18 / VMA19



#### VARIABLE AIR VOLUME MODULAR ASSEMBLY

VMA16s (32-bit) and VMA18s are programmable digital controllers tailored for VAV applications that can be switched between MS/TP and N2 communications protocols. When they are used as MS/TP devices, they communicate through the BACnet® MS/TP protocol. In N2 mode, they can be used as replacements for legacy Johnson Controls® controllers.

**Note:** When a VMA1400 Series controller is replaced on an existing N2 network, the VMA18 Series controller is the preferred device because certain existing sensor models can be reused. VMA18 controllers are intended for use as functional replacements for the VMA1410, VMA1415, VMA1420, and VMA1440 controllers only. VMA18 controllers support field-selectable BACnet MS/TP or N2 protocols. VMA18 controllers support the N2 Open Communications protocol at a maximum rate of 9600 baud.

The VMA1930 programmable controller uses BACnet/IP networking for higher speed communication with the Controller Configuration Tool (CCT) and improved bandwidth. This gives you more flexibility in choosing controllers for your site's specific needs.

The VMA1615, VMA1630, VMA1832, and VMA1930 (32-bit) controllers feature an integral digital differential pressure transducer (DPT), an integral damper actuator, and a 32-bit microprocessor. The controllers' small package size facilitates quick field installation and efficient use of space, while not compromising high-tech control performance. These controllers easily adapt NS Series Network Sensors for zone and discharge air temperature sensing.

The VMA1626 controller is shipped with an actuator but without a differential pressure transducer (DPT), making it well suited for commercial zoning applications or for pressure-dependent VAV box applications where no DPT is required.

The VMA1656 controller is shipped without a differential pressure transducer but with an integrated actuator and ball valve linkage. These controllers are for use on the Johnson Controls VG-1000 1/2 - 1 inch valves and needs to be used primarily as a replacement for the VMA assembly of the VG-1000 Series Smart Valve product. The smart valve product line is ideal for chilled beam applications.

The VMA1628 includes a DPT but does not have an actuator. Without an actuator, this controller is well suited for controlling large VAV boxes that require more than 4 N·m of torque. These features make the VMA16 (32-bit) controllers the product of choice for VAV systems. The wide variety of network sensor models provides options for measuring and displaying zone temperature, occupancy detection, duct temperature, zone humidity and dewpoint determination, carbon dioxide (CO<sub>2</sub>) level, setpoint adjustments, VAV box fan speed control, and discharge air temperatures.

The VMA18 models are designed to be functional replacements for the VMA14xx Series Variable Air Volume Modular Assembly controllers. They contain a sensor actuator bus port and accessories well suited for replacing VMA14xx controllers.



## VMA16 / VMA18 / VMA19 – METASYS® CONTROLLERS

### FEATURES

- **Standard BACnet Protocol** – Provides interoperability with other Building Automation System (BAS) products that use the widely accepted BACnet standard.
- **Standard Hardware and Software Platform** – Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows; also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.
- **Switchable communications protocols from BACnet MS/TP to N2 protocols or N2 to BACnet MS/TP protocols**
- **ZFR Wireless FC or SA Bus Interface** – Both the ZFR1800 Series Wireless and WNC1800/ZFR182x Pro Series Wireless Field Bus (ZFR Pro) provide a wireless alternative to hard-wired *Metasys* system counterparts, offering application flexibility and mobility with minimal disruption to building occupants.
- **Bluetooth® Wireless Commissioning** – Provides an easy-to-use connection to the configuration and commissioning tool.
- **Auto-Tuned Control Loops** – Reduce commissioning time, eliminate change-of-season recommissioning, and reduce wear and tear on mechanical devices.
- **Universal Inputs and Configurable Outputs** – Allows multiple signal options to provide input/ output flexibility.
- **Optional Local User Interface Display** – Allows convenient monitoring and adjusting capabilities at the local device.
- **BACnet Testing Laboratories (BTL) Listed and Certified** – Ensures interoperability with other BTL-listed devices. BTL is a third-party agency, which validates that BAS vendor products meet the BACnet industry-standard protocol.
- **32-bit Microprocessor** – Ensures optimum performance and meets industry specifications.
- **BACnet Automatic Discovery** – Supports easy controller integration into a *Metasys* BAS.
- **End-of-Line (EOL) Switch in MS/TP Field Controllers** – Enables field controllers to be terminating devices on the communications bus.
- **Pluggable Communications Bus and Supply Power Terminal Blocks** – Expedites installation VMA Programmable VAV Box Controllers Catalog Page 5 and troubleshooting.
- **Writable Flash Memory** – Allows standard or customized applications to be downloaded from the CCT and enables persistent application data.

The following features are specific to particular models:

- Models that include a DPT feature a state-of-the-art digital non-flow DPT to provide 14-bit resolution with bidirectional flow operation that supports automatic correction for polarity on high- and low-pressure DP tube connections; this pressure sensor eliminates high- and lowpressure connection mistakes.
- A phone jack-style connector on the FC Bus and SA Bus of the VMA16 supports quick connection to the Mobile Access Portal (MAP) Gateway, Wireless Commissioning Converter (BTCVT), ZFR or ZFR Pro Series Wireless Field Bus System wireless routers, and network sensors.
- Models that include an actuator feature a fast response actuator that drives the damper from full open to full closed (90°) in 60 seconds to reduce commissioning time.



## ORDERING INFORMATION

### VMA16 (32-BIT) SERIES AND VMA1930 (INCLUDING POINT TYPE COUNTS PER MODEL)

	VMA 1615	VMA 1626	VMA 1628	VMA 1630	VMA 1656	VMA 1930
Communication Protocol	BACnet MS/TP, N2					BACnet/IP
Engines	All Model types *					NAE55, NAE85, ODS at R9.0 or later
	* Some NIE models support MS/TP and N2 devices. Refer to the Network Engines Product Bulletin (LIT-12012138) for details.					
Modular Jacks	6-pin SA Bus Modular Port supports one communicating sensor. <b>Or</b> you can wire up to four communicating sensors to the SA Bus Terminal Block. They cannot be used at the same time.					
	6-pin FC Bus for tool support					
Universal Input (UI) <i>Analog Input, Voltage Mode, 0-10 VDC</i> <i>Analog Input, Resistive Mode, 0-2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2)</i> <i>Binary Input, Dry Contact Maintained Mode</i>	3	3	3	3	3	3
Binary Output (BO) <i>24 VAC Triac</i>	2	3	3	3	3	3
Configurable Output (CO) <i>Analog Output, Voltage Mode, 0-10 VDC</i> <i>Binary Output Mode, 24 VAC Triac</i>		2	2	2	2	2
Integrated Actuator <i>Internal</i>	1	1		1	1 with ball valve linkage	1
Differential Pressure Transducer <i>Internal</i>	1		1	1		1
Zone Sensor Input <i>On SA Bus (A total of 10 MS/TP addresses (IOMs), not including sensor addresses, can be used in a single VMA controller.)</i>	Up to 4 NS Series Network Zone Sensors					
	Up to 9 WRZ sensors when using the ZFR or ZFR Pro Series wireless router configuration and up to 5 WRZ sensors when using the one-to-one WRZ-78xx wireless configuration					



## ORDERING INFORMATION

### VMA18 SERIES (INCLUDING POINT TYPE COUNTS PER MODEL)

	VMA1826	VMA1832
Communication Protocol	BACnet MS/TP, N2	
Engines	NAEs, NCEs, ODS	
Modular Jacks	8-pin SA Bus supports analog non-communicating sensor	
Point Types Signals Accepted		
Universal Input (UI)		
Analog Input, Voltage Mode, 0-10 VDC <i>Analog Input, Resistive Mode, 0-2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode</i>	3	3
Binary Output (BO) <i>24 VAC Triac</i>	3	3
Configurable Output (CO) <i>Analog Output, Voltage Mode, 0-10 VDC Binary Output Mode, 24 VAC Triac</i>	2	2
Integrated Actuator <i>Internal</i>	1	1
Differential Pressure Transducer <i>Internal</i>		1
Zone Sensor Input <i>On SA Bus (A total of 10 MS/TP addresses (IOMs), not including sensor addresses, can be used in a single VMA controller.)</i>	Up to 4 NS Series Network Zone Sensors Up to 9 WRZ sensors when using the ZFR or ZFR Pro Series wireless router configurations and up to 5 WRZ sensors when using the one-to-one WRZ-78xx wireless configuration	

VMA16 / VMA18 / VMA19 - METASYS® CONTROLLERS



ORDERING INFORMATION

VMA16 (32-BIT), VMA18 AND VMA1930 SERIES

CODES	DESCRIPTION
MS-VMA1615-1	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI and 2 BO; 24 VAC; FC Bus, and SA Bus
MS-VMA1626-1	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus; (No DPT)
MS-VMA1628-1	32-bit, Integrated VAV Controller and DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No Actuator)
MS-VMA1630-1	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus
MS-VMA1656-1	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus, Integrated Ball Valve Linkage
MS-VMA1826-1	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus; Includes cable adapters for use when replacing VMA14xx Series controllers. Recommended replacement for VMA1440 controller (No DPT)
MS-VMA1832-1	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI and 2 BO; 24 VAC; FC Bus, and SA Bus, includes cable adapters for use when replacing VMA14xx Series controllers. Recommended replacement for VMA1410, VMA1415, or VMA1420 controller.
MS-VMA1930-0	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; and SA Sensor Port; Integral Real-time Clock; 2 Ethernet Ports for BACnet/IP Communications

VMA16 (32-BIT) ACCESSORIES (PART 1/2)

CODES	DESCRIPTION
IOM Series	Refer to the Metasys® System Field Equipment Controllers and Related Products Product Bulletin (LIT-12011042) for a complete list of available IOM Series Modules.
TL-CCT-0	Metasys Controller Configuration Tool (CCT) software
MS-FCP-0	Metasys Field Controller Firmware Package Files for CCT Mobile Access Portal (MAP) Gateway Refer to the Mobile Access Portal Gateway Catalog Page (LIT-1900869) to identify the appropriate product for your region. <b>Note:</b> The MAP Gateway serves as a replacement for the the BTCVT, which is no longer available for purchase, but continues to be supported.
NS Series Network Sensors	Refer to the NS Series Network Sensors Product Bulletin (LIT-12011574) for specific sensor model descriptions.
MS-DIS1710-0	Local Controller Display: Refer to Local Controller Display Product Bulletin (LIT-12011273) for more information.
NS-ATV7003-0	Handheld VAV Balancing Tool WRZ Series Wireless
Room Sensors	Refer to the WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653) for specific sensor model descriptions.
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 30 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
AP-TBK1002-0	2-Position Screw Terminal that Plugs onto VMA Output Point Spade Lug

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## ORDERING INFORMATION

### VMA16 (32-BIT) ACCESSORIES (PART 2/2)

CODES	DESCRIPTION
AP-TBK1003-0	3-Position Screw Terminal that Plugs onto VMA Output Point Spade Lugs
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown (Bulk Pack of 10)
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector (Bulk Pack of 10)
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray (Bulk Pack of 10)
AP-TBK2PW-0	Replacement Power Terminal, 2-Position Connector, Gray (Bulk Pack of 10)
AS-CBLTSTAT-0	Cable adapter for connection to 8-pin TE-6700 Series sensors
AS-CBLVMA-1	Cable Adapter, 8-Pin Female Socket to 6-Pin Male Jack (Bulk Pack of 10)
AS-CBLVMA-2	Cable Adapter, 8-Pin Female Socket to 8-Pin Male Jack with 6-Pin Female Socket for Wireless Commissioning Converter (Bulk Pack of 10)
MS-TBKLV03-0	Terminal Block Kit - FAC Line Voltage AC Power - 3 Pieces
MS-TBKRO02-0	Terminal Block Kit - FAC 2-Position Relay Output - 9 Pieces
MS-TBKRO03-0	Terminal Block Kit - FAC 3-Position Relay Output - 6 Pieces
MS-TBKCO04-0	Terminal Block Kit - FAC 4-Position Configurable Output - 6 Pieces
MS-TBKUI04-0	Terminal Block Kit - FAC 4-Position Universal Input - 3 Pieces
MS-TBKUI05-0	Terminal Block Kit - FAC 4-Position Universal Input - 3 Pieces
NS-WALLPLATE-0	Network Sensor Wall Plate
F-1000-325	Replacement Barbed Fitting for use on VMA1615, VMA1630, and VMA1832 for Connecting Tubing (Bulk Pack of 10)
F-1000-326	Flexible Tubing Extension with Barbed Fitting for VMA1615, VMA1630, and VMA1832, 14 in. Length (Bulk Pack of 20). Use to extend tubing that connects between the DPT connectors and the DPT sensors, including when replacing a VMA1400 series controller with a VMA16xx or VMA18xx controller.
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router
WRZ-7860-0	Receiver for One-to-One Wireless Room Sensing Systems - functions with WRZ Series Sensors room sensors
ZFR-USBHA-0	ZFR USB Dongle provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled FEC, FAC, IOM, and VMA16 controllers. Also allows use of the ZFR Checkout Tool (ZCT) in CCT. <b>Note:</b> The ZFR-USBHA-0 replaces the IA OEM DAUBI_2400 ZFR USB dongle. For additional information about the ZFR-USBHA-0 ZFR dongle, refer to the ZFR1800 Series Wireless Field Bus System Technical Bulletin (LIT-12011295) or ZFR1800 Series Wireless Field Bus System Quick Reference Guide (LIT-12011630).



## TECHNICAL SPECIFICATIONS (PART 1/3)

VMA Codes	
<i>MS-VMA1615-1</i>	32-bit, Integrated VAV Controller/Actuator/Pressure Sensor, 3 UI and 2 BO; 24 VAC; FC and SA Bus
<i>MS-VMA1626-1</i>	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No DPT)
<i>MS-VMA1628-1</i>	32-bit, Integrated VAV Controller and DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No Actuator)
<i>MS-VMA1630-1</i>	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, 2 CO; 24 VAC; FC and SA Bus
<i>MS-VMA1656-1</i>	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus, Integrated Ball Valve Linkage (No DPT)
<i>MS-VMA1826-1</i>	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus, with 8-9 in TSTAT Port, Recommended for use as a replacement for VMA1440 (No DPT)
<i>MS-VMA1930-0</i>	32-bit, Integrated VAV Controller/Actuator/Pressure Sensor - DPT, 3 UI and 3 BO, 2 CO, 24 VAC, and SA Bus, Includes 6-pin Sensor Port for use with TE-7xx Series Non-Communicating Sensors and two Ethernet Ports for BACnet/IP Communications
Communications Protocol	
<i>MS-VMA16xx-x</i> , <i>MS-VMA18xx-x</i>	BACnet MS/TP, N2
<i>MS-VMA1930-0</i>	BACnet/IP
Engines Supported	
<i>MS-VMA16xx-x</i> , <i>MS-VMA18xx-x</i>	All Models
<i>MS-VMA1930-0</i>	NAE55, NAE85, ODS (MS-VMA1930-0 supports R9.0 or later versions of these engines.)
Power Requirement	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV)
Power Consumption	10 VA typical, 14 VA maximum <b>Note:</b> VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 60 VA (maximum).
Ambient Conditions	
<i>Operating</i>	0 to 50°C
<i>Storage</i>	-40 to 70°C
Terminations	
<i>MS-VMA1615-x</i> , <i>MS-VMA1626-x</i> , <i>MS-VMA1628-x</i> , <i>MS-VMA1630-x</i> , <i>MSVMA1656-x</i>	Inputs/Outputs: 6.3 mm Spade Lugs FC Bus, SA Bus, and Supply Power: 4-Wire and 2-Wire Pluggable Screw Terminal Blocks FC Bus and SA Bus Port: RJ-12 6-Pin Modular Jacks
<i>MS-VMA1826-x</i> , <i>MS-VMA1832-x</i>	Inputs/Outputs, SA Bus, and Supply Power: 6.3 mm Spade Lugs N2/FC Bus: Pluggable Screw Terminal Block TSTAT Modular Port: RJ-45 8-Pin Modular Jack
<i>MS-VMA1930-0</i>	Inputs/Outputs: 6.3 mm Spade Lugs SA Bus and Supply Power: 4-Wire and 2-Wire Pluggable Screw Terminal Blocks SA Bus Modular Ports: RJ-12 6-Pin Modular Jacks

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## TECHNICAL SPECIFICATIONS (PART 2/3)

Controller Addressing	
<i>For BACnet-configured controllers</i>	DIP switch set: valid field controller device addresses 4–127 (device addresses 0–3 and 128–255 are reserved)
<i>For BACnet/IP controllers</i>	3 rotary switches to assign a unique number for each controller on the subnet to identify it in the Controller Tool for uploading, downloading, and commissioning
<i>For N2-configured controllers</i>	DIP switch set; valid control device addresses 1–254
Communications Bus	
<i>MS-VMA16xx and MS-VMA18xx models</i>	RS-485, field selectable between BACnet MS/TP and N2 communications: <b>N2/FC Bus:</b> 1.5 mm (18 AWG) standard 3-wire, twisted, shielded cable recommended between the supervisory controller and field controllers <b>BACnet MS/TP:</b> 0.6 mm (22 AWG) stranded, 4-wire (2-twisted pairs) shielded cable recommended from the VMA controller for network sensors and other sensor/actuator devices; includes a terminal to source 15 VDC supply power from VMA to SA Bus devices <b>Note:</b> For more information, refer to the MS/TP Communications Bus Technical Bulletin (LIT-12011034).
<i>MS-VMA1930-0</i>	<b>BACnet/IP:</b> Two Ethernet ports; 10/100 Mbps; 8-pin RJ-45 connector
Processor	
<i>MS-VMA16 (32-bit) and MS-VMA18 models</i>	RX630 32-bit Renesas® microcontroller
<i>MS-VMA1930-0</i>	RX63N 32-bit Renesas microcontroller
Memory	
<i>MS-VMA16 (32-bit) and MS-VMA18 models</i>	1 MB Flash Memory and 512 KB RAM
<i>MS-VMA1930-0</i>	16 MB serial flash memory and 8 MB of SDRAM
Input and Output Capabilities	
<i>MS-VMA1615-x</i>	3 - Universal Input: Defined as 0–10 VDC, 0–600k ohm, or Binary Dry Contact 2 - Binary Outputs: Defined as 24 VAC Triac (internal power source)
<i>MS-VMA1626-x, MS-VMA1628-x, MS-VMA1630-x, MS-VMA1656-x, MS-VMA1826-x, MS-VMA1832-x, MS-VMA1930-0</i>	3 - Universal Input: Defined as 0–10 VDC, 0–600k ohm, or Binary Dry Contact 3 - Binary Outputs: Defined as 24 VAC Triac (internal power source) 2 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO
Analog Input/Analog Output Accuracy	
<i>Analog Input</i>	15-bit resolution on UIs
<i>Analog Output</i>	0–10 VDC ± 200 mV

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## TECHNICAL SPECIFICATIONS (PART 3/3)

Differential Pressure Transducer	Range: -1.5 in. to 1.5 in. W.C.
<i>Performance Characteristics</i>	Accuracy +/-1.3% Full Span Maximum (+/- .039 in. w.c.) <b>Note:</b> Combined error due to offset, non-linearity, and temperature variation. Typical accuracy at zero (null) pressure is +/-0.2% fullscale <b>Note:</b> Includes error due to non-linearity.
Mounting	Mounts to damper shaft using single set screw and to duct with single mounting screw.
Actuator Rating	4 N·m (35 lb·in.) minimum shaft length = 44 mm (1-3/4 in.)
Dimensions (Height x Width x Depth)	165 x 125 x 73 mm <b>Center of Output Hub to Center of Captive Spacer:</b> 135 mm
Weight	0.65 kg
<b>CE</b> Compliance	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive.
<i>BACnet International</i>	<b>MS-VMA16xx and MS-VMA18xx models:</b> BACnet Testing Laboratories (BTL) Protocol Revision 7 Listed BACnet Application Specific Controller (B-ASC) <b>MS-VMA1930-0:</b> BACnet Testing Laboratories (BTL) Protocol Revision 15 Listed and Certified BACnet Advanced Application Controller (B-AAC)

# BUILDING AUTOMATION PRODUCTS

## PROGRAMMABLE CONTROLLERS

### METASYS<sup>®</sup> CONTROLLERS

## IOM

### INPUT/OUTPUT MODULES

The IOM Series expansion I/O modules have integral RS-485 MS/TP communications and integrate into the web-based *Metasys*<sup>®</sup> system.

IOMs can serve in one of two capacities, depending on where they are installed in the *Metasys* system. When installed on the Sensor/Actuator (SA) Bus of an Advanced Application Field Equipment Controller (FAC), Field Equipment Controller (FEC), or VAV Modular Assembly (VMA) controller, the IOM expands the point count of these controllers. When installed on the Field Controller (FC) Bus, IOMs can be used as I/O point multiplexors to support monitoring and control from a Network Automation Engine (NAE) or Network Control Engine (NCE). The point multiplexor can also be useful for sharing points between other field controllers on the FC Bus using peer-to-peer connectivity.

**Note:** At Controller Configuration Tool (CCT) Release 10.1 and later, FACs, FECs, and VMAs can communicate by using either the BACnet<sup>®</sup> or the N2 field bus networking protocol. The operation of the IOM Input/Output Module is not affected by the selection of the BACnet or the N2 protocol in the host controller.

All IOM expansion modules are BACnet Testing Laboratory (BTL) listed and certified.

## FEATURES

- **Ability to Reside on the FC Bus or SA Bus** – Provides application flexibility.
- **Standard BACnet Protocol** – Provides interoperability with other Building Automation System (BAS) products that use the widely accepted BACnet standard.
- **BACnet Testing Laboratories (BTL) Listed and Certified** – Ensures interoperability with other BTL-listed devices. BTL is a third-party agency, which validates that BAS vendor products meet the BACnet industry-standard protocol.
- **Standard Hardware and Software Platform** – Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows; also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.
- **Universal Inputs and Configurable Outputs** – Allows multiple signal options to provide input/output flexibility.
- **32-bit Microprocessor** – Ensures optimum performance and meets industry specifications.
- **BACnet Automatic Discovery** – Supports easy controller integration into a *Metasys* BAS.
- **Pluggable Communications Bus and Supply Power Terminal Blocks** – Expedites installation and troubleshooting.
- **Wireless Connectivity through the ZFR1800 Series or the WNC1800/ZFR182x Pro Series Wireless Field Bus Systems in MS/TP Controllers** – Enables wireless mesh connectivity to supervisory controllers, facilitating easy initial location and relocation.
- **Bluetooth<sup>®</sup> Wireless Commissioning** – Provides an easy-to-use connection to the configuration and commissioning tool.
- **End-of-Line (EOL) Switch in MS/TP Field Controllers** – Enables field controllers to be terminating devices on the communications bus.





## ORDERING INFORMATION

### IOM SERIES MODEL (INCLUDING POINT TYPE COUNTS)

	IOM 1711	IOM 2711	IOM 2721	IOM 3711	IOM 3721	IOM 3731	IOM 4711	IOM 2723	IOM 3723	IOM 3733
Communication Protocol	BACnet MS/TP									
Engines	All Model types. Some NIE models support MS/TP and N2 devices. <i>Refer to the Network Engines Product Bulletin (LIT-12012138) for details.</i>									
Modular Jacks	6-pin SA Bus Modular Port supports one communicating sensor. <b>Or</b> you can wire up to four communicating sensors to the SA Bus Terminal Block. They cannot be used at the same time.									
	6-pin FC Bus for tool support									
Point Types Signals Accepted										
Universal Input (UI) <i>Analog Input, Voltage Mode, 0-10 VDC</i> <i>Analog Input, Current Mode, 4-20 mA</i> <i>Analog Input, Resistive Mode, 0-2 kOhm,</i> <i>RTD (1k NI [Johnson Controls], 1k PT,</i> <i>A99B SI), NTC (10k Type L, 2.252k Type 2)</i> <i>Binary Input, Dry Contact Maintained Mode</i>		2	8	4			6	8		
Binary Input (BI) <i>Dry Contact Maintained Mode</i> <i>Pulse Counter/Accumulator Mode</i> <i>(High Speed), 100 Hz</i>	4				16	8	2		16	8
Analog Output (AO) <i>Analog Output, Voltage Mode, 0-10 VDC</i> <i>Analog Output, Current Mode, 4-20 mA</i>			2				2	2		
Binary Output (BO) <sup>1</sup> <i>24 VAC Triac</i>						8	3			8

**Note**  
**1** The IOM2723, IOM3723, and IOM3733 models are only available in certain regions. Contact your local Johnson Controls representative for more information.



## ORDERING INFORMATION

CODES	DESCRIPTION	CE MARKED
MS-IOM1711-0	4-Point IOM with 4 BI, FC Bus and SA Bus Support	■
MS-IOM2711-2	6-Point IOM with 2 UI, 2 UO, 2 BO, FC Bus, and SA Bus Support. Relays are rated for 240 VAC.	■
MS-IOM2721-0	10-Point IOM with 8 UI, 2 AO, FC Bus, and SA Bus Support	■
MS-IOM2723-0	10-Point IOM with 8 UI, 2 AO, FC Bus, and SA Bus Support	■
MS-IOM3711-2	12-Point IOM with 4 UI, 4 UO, 4 BO, FC Bus, and SA Bus Support. Relays are rated for 240 VAC.	■
MS-IOM3721-0	16-Point IOM with 16 BI, FC Bus, and SA Bus Support	■
MS-IOM3723-0	16-Point IOM with 16 BI, FC Bus, and SA Bus Support	■
MS-IOM3731-0	16-Point IOM with 8 BI, 8 BO, FC Bus, and SA Bus Support	■
MS-IOM3733-0	16-Point IOM with 8 BI, 8 BO, FC Bus, and SA Bus Support. Binary Outputs (BOs) on MS-IOM3733 controllers do not supply power for the outputs; the BOs require external low-voltage (<30 VAC) power sources.	■
MS-IOM4711-0	17-Point IOM with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, FC and SA Bus Support	■

## ACCESSORIES

CODES	DESCRIPTION
TL-CCT-0	Metasys Controller Configuration Tool (CCT) software
MS-FCP-0	Metasys Field Controller Firmware Package Files for CCT Mobile Access
Portal (MAP) Gateway	Refer to the Mobile Access Portal Gateway Catalog Page (LIT-1900869) to identify the appropriate product for your region. <b>Note:</b> The MAP Gateway serves as a replacement for the the BTCVT, which is no longer available for purchase, but continues to be supported.
ZFR1800 Series Wireless Field Bus System	This system is used for installations that only support BACnet MS/TP. Refer to the WNC1800/ZFR182x Pro Series Wireless Field Bus System Product Bulletin (LIT-12012320) for a list of available products.
ZFR-USBHA-0	ZFR USB Dongle provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled FEC, FAC, IOM, and VMA16 controllers. Also allows use of the ZFR Checkout Tool (ZCT) in CCT.
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 30 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown (Bulk Pack of 10)
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector (Bulk Pack of 10)
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray (Bulk Pack of 10)
AS-CBLTSTAT-0	Cable adapter for connection to 8-pin TE-6700 Series sensors
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router



## TECHNICAL SPECIFICATIONS (PART 1/3)

Codes	
<i>MS-IOM1711-0</i>	4-Point IOM with 4 BI, FC Bus and SA Bus Support
<i>MS-IOM2711-2</i>	6-Point IOM with 2 UI, 2 UO, 2 BO, FC Bus, and SA Bus Support. Relays are rated for 240 VAC
<i>MS-IOM2721-0</i>	10-Point IOM with 8 UI, 2 AO, FC Bus, and SA Bus Support
<i>MS-IOM2723-0</i>	10-Point IOM with 8 UI, 2 AO, FC Bus, and SA Bus Support
<i>MS-IOM3711-2</i>	12-Point IOM with 4 UI, 4 UO, 4 BO, FC Bus, and SA Bus Support. Relays are rated for 240 VAC
<i>MS-IOM3721-0</i>	16-Point IOM with 16 BI, FC Bus, and SA Bus Support
<i>MS-IOM3723-0</i>	16-Point IOM with 16 BI, FC Bus, and SA Bus Support
<i>MS-IOM3731-0</i>	16-Point IOM with 8 BI, 8 BO, FC Bus, and SA Bus Support
<i>MS-IOM3733-0</i>	16-Point IOM with 8 BI, 8 BO, FC Bus, and SA Bus Support
<i>MS-IOM4711-0</i>	17-Point IOM with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, FC and SA Bus Support
Power Requirement	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV)
Power Consumption	14 VA maximum <b>Note:</b> VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 84 VA (maximum), depending on the IOM model.
Ambient Conditions	
<i>Operating</i>	0 to 50°C; 10 to 90% RH noncondensing
<i>Storage</i>	-40 to 80°C; 5 to 95% RH noncondensing
Addressing	DIP switch set; valid field controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid IOM addresses).
Communications Bus	BACnet MS/TP, RS-485 3-wire FC Bus between the supervisory controller and expansion modules (for MS/TP bus communications at 38,400 baud) 4-wire SA Bus between field controller, network sensors, and other sensor/actuator devices. Includes a lead source 15 VDC supply power (from controller or expansion module) to bus devices (for MS/TP bus communications at 38,400 baud). <b>Note:</b> For more information, refer to the MS/TP Communications Bus Technical Bulletin (LIT-12011034)
Processor	
<i>MS-IOM1711-0,</i> <i>MS-IOM2711-2,</i> <i>MS-IOM2721-0,</i> <i>MS-IOM3711-2,</i> <i>MS-IOM3731-0,</i> <i>MS-IOM4711-0</i>	H8SX/166xR Renesas® 32-bit microcontroller
<i>MS-IOM2723-0,</i> <i>MS-IOM3723-0,</i> <i>MS-IOM3733-0</i>	RX631 Renesas 32-bit microcontroller

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## TECHNICAL SPECIFICATIONS (PART 2/3)

<p>Memory</p> <p><i>MS-IOM1711-0,</i> <i>MS-IOM2711-2,</i> <i>MS-IOM2721-0,</i> <i>MS-IOM3711-2,</i> <i>MS-IOM3731-0,</i> <i>MS-IOM4711-0</i></p> <p><i>MS-IOM2723-0,</i> <i>MS-IOM3723-0,</i> <i>MS-IOM3733-0</i></p>	<p>512 KB Flash Memory and 128 KB RAM</p> <hr/> <p>4 MB External Serial Flash Memory and 768 KB internal flash and 128 KB internal RAM</p>
<p>Input and Output Capabilities</p> <p><i>MS-IOM1711-0</i></p> <p><i>MS-IOM2711-2</i></p> <p><i>MS-IOM2721-0,</i> <i>MS-IOM2723-0</i></p> <p><i>MS-IOM3711-2</i></p> <p><i>MS-IOM3721-0,</i> <i>MS-IOM3723-0</i></p> <p><i>MS-IOM3731-0,</i> <i>MS-IOM3733-0</i></p> <p><i>MS-IOM4711-0</i></p>	<p>4 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p> <hr/> <p>2 - Universal Inputs: Defined as 0-10 VDC, 4-20 mA, 0-600k ohm, or Binary Dry Contact 2 - Universal Outputs: Analog Output: Voltage Mode, 0-10 VDC; Binary Output Mode: 24 VAC/DC FET; Analog Output: Current Mode, 4-20 mA 2 - Relay Outputs: (Single-Pole, Double-Throw) <b>EN 60730:</b> 6 (4) A N.O. or N.C. only, 240 VAC</p> <hr/> <p>8 - Universal Inputs: Defined as 0-10 VDC, 4-20 mA, 0-600k ohm, or Binary Dry Contact 2 - Analog Outputs: Defined as 0-10 VDC or 4-20 mA</p> <hr/> <p>4 - Universal Inputs: Defined as 0-10 VDC, 4-20 mA, 0-600k ohm, or Binary Dry Contact 4 - Universal Outputs: Analog Output: Voltage Mode, 0-10 VDC; Binary Output Mode: 24 VAC/DC FET; Analog Output: Current Mode, 4-20 mA 4 - Relay Outputs: (Single-Pole, Double-Throw) <b>EN 60730:</b> 6 (4) A N.O. or N.C. only, 240 VAC</p> <hr/> <p>16 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode</p> <hr/> <p>8 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 8 - Binary Outputs: Defined as 24 VAC Triac (Require external low-voltage power source) <b>Note:</b> Binary Outputs (BOs) on MS-IOM3733-0 models do not supply power for the outputs; the BOs require external low-voltage (&lt; 30 VAC) power sources.</p> <hr/> <p>6 - Universal Inputs: Defined as 0-10 VDC, 4-20 mA, 0-600k ohm, or Binary Dry Contact 2 - Binary Inputs: Defined as Dry Contact Maintained or Pulse/Counter Accumulator Mode 3 - Binary Outputs: Defined as 24 VAC Triac (selectable internal or external source power) 4 - Configurable Outputs: Defined as 0-10 VDC or 24 VAC Triac BO 2 - Analog Outputs: Defined as 0-10 VDC or 4-20 mA</p>
<p>Analog Input/Analog Output Resolution and Accuracy</p> <p><i>MS-IOM1711-0,</i> <i>MS-IOM2711-2,</i> <i>MS-IOM2721-0,</i> <i>MS-IOM3711-2,</i> <i>MS-IOM3731-0,</i> <i>MS-IOM4711-0</i></p> <p><i>MS-IOM2723-0,</i> <i>MS-IOM3723-0,</i> <i>MS-IOM3733-0</i></p>	<p><b>Analog Input:</b> 16-bit resolution <b>Analog Output:</b> 16-bit resolution and ±200 mV in 0-10 VDC applications</p> <hr/> <p><b>Analog Input:</b> 15-bit resolution <b>Analog Output:</b> ±200 mV in 0-10 VDC applications</p>

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## TECHNICAL SPECIFICATIONS (PART 3/3)

<p>Terminations</p> <p><i>MS-IOM1711-0,</i> <i>MS-IOM2711-2,</i> <i>MS-IOM2721-0,</i> <i>MS-IOM3711-2,</i> <i>MS-IOM3731-0,</i> <i>MS-IOM4711-0</i></p>	<p>Input/Output: Fixed Screw Terminal Blocks SA/FC Bus and Supply Power: 4-wire and 3-wire Pluggable Screw Terminal Blocks SA/FC Bus Port: RJ-12 6-Pin Modular Jacks</p>
<p><i>MS-IOM2723-0,</i> <i>MS-IOM3723-0,</i> <i>MS-IOM3733-0</i></p>	<p>Input/Output: Fixed Screw Terminal Blocks <b>Note:</b> There are no labels on I/O terminal blocks. The labels are above/below the terminal blocks on the IOM packaging. SA/FC Bus and Supply Power: 4-wire and 3-wire Pluggable Screw Terminal Blocks</p>
<p>Mounting</p>	<p>Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller</p>
<p>Housing</p>	<p>Enclosure material: ABS and polycarbonate UL94 5VB; self-extinguishing, Plenum-rated protection class: IP20 (IEC529)</p>
<p>Dimensions (Height x Width x Depth)</p> <p><i>MS-IOM1711,</i> <i>MS-IOM2711 models</i></p> <p><i>MS-IOM2721-0,</i> <i>MS-IOM2723-0,</i> <i>MS-IOM3721-0,</i> <i>MS-IOM3723-0,</i> <i>MS-IOM3731-0,</i> <i>MS-IOM3733-0 models</i></p> <p><i>MS-IOM3711-0,</i> <i>MS-IOM4711-0 models</i></p>	<p>150 x 120 x 53 mm including terminals and mounting clips</p> <p>150 x 164 x 53 mm including terminals and mounting clips</p> <p>150 x 190 x 53 mm including terminals and mounting clips</p> <p><b>Note:</b> Mounting space for all field controllers requires an additional 50 mm space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.</p>
<p>Weight</p>	<p>0.5 kg maximum</p>
<p><b>CE</b> Compliance</p> <p><i>BACnet International</i></p>	<p>Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive. Declared as Independently Mounted, Intended for Panel Mounting, Operating Control Type 1.B, 4kV rated impulse voltage, 100.7°C ball pressure test.</p> <p><b>MS-IOM1711-0, MS-IOM2711-2, MS-IOM2721-0, MS-IOM3711-2, MS-IOM3731-0, MS-IOM4711-0:</b> BACnet Testing Laboratories (BTL) Protocol Revision 4 Listed BACnet Application Specific Controller (B-ASC) <b>MS-IOM2723-0, MS-IOM3723-0, and MS-IOM3733-0:</b> BACnet Testing Laboratories (BTL) Protocol Revision 15 listed and certified BACnet Smart Actuator (B-SA)</p>

### Note

The MS-IOM2723-0, MS-IOM3723-0, and MS-IOM3733-0 models are only available in certain regions. Contact your local Johnson Controls representative for more information.

# BUILDING AUTOMATION PRODUCTS

## PROGRAMMABLE CONTROLLERS

### METASYS® CONTROLLERS

## ROMUTEC

### INPUT/OUTPUT MODULES



Romutec Input/Output Modules are designed to integrate seamlessly into the *Metasys* system. They are installed on the BACnet MS/TP Sensor Actuator (SA) Bus of a Network Control Engine (NCE) or on the SA Bus of a Field Equipment Controller (FEC/FAC) and expand the point count of these controllers. A full range of FEC/FACs, NCEs and Romutec IO Modules allow various combinations, which will meet the requirements from simple to advanced building applications.

Romutec Input/Output modules can be used when manual overrides are required or when control panel space is limited and a small footprint is needed.

Six models of IO modules are offered with different combinations of BI's, BO's, AI's and AO's. In addition to the standard models optional manual override modules are available. Manual override modules come in two versions, one which can be used inside a control cabinet (DIN rail mounting) and the other for fixing on the cabinet door (front panel mounting). The manual override modules are connected with a USB type cable directly to their corresponding host IO Module. They are preconfigured so setting up requires nothing more than selecting the appropriate DIP switch settings.

Six additional models are also available to meet the requirement for DIN rail mounted IO modules with integral overrides and point status LED's.

## FEATURES

- Small footprint, compared with the *Metasys*® Input/Output module (IOM) series.
- Manual overrides available as an option. Integral manual overrides for AO and BO on selected models.
- Models available for indicating the status of binary inputs with LED's.
- Supports BI, BO, AI and AO objects.
- Easy engineering as supported by CCT (Controller Configuration Tool).
- Quick engineering for manual overrides as all modules are preconfigured.
- Connected to the SA Bus of the FEC/FAC or NCE controller as an MSTP slave device.
- Equipped with fault and status LED's for troubleshooting.
- Pluggable terminals with spring clamp for quick and simple wire termination without special tools.



## ORDERING INFORMATION

### POINT TYPES, FUNCTIONS AND RATINGS

POINT TYPES	FUNCTION	SIGNAL/RATING
Analog IN	Analog Input, Voltage mode	Accepts a 0-10VDC input signal, internal 75kΩ pull-down
	Analog Input, Current mode	Accepts a 0-20 mA input signal, internal 100Ω load impedance
	Analog Input, Resistive mode	Accepts a 0-600 kΩ input signal, internal 12V, 15kΩ pull-up RTD:1k Nickel [L & G], 1k Nickel [DIN], 1k Platinum, A99B Silicon Temperature sensor
Binary IN	Binary Input, Dry contact maintained mode	0.01s minimum pulse width (50Hz at 50% duty cycle) Internal 35V, 2.7kΩ pull-up
Analog OUT	Analog Output, Voltage mode, sources 0-10 VDC output voltage	External 1kΩ minimum load required 10 VDC maximum output voltage, 10 mA maximum output current
Binary OUT	Binary Output, up to 250VAC Relay contact Connects NO to common when activated	Characteristics (Resistive Load): Initial contact resistance 100mΩ (at 1A / 24VDC) Rated load 5A at 250VAC, 5A at 30VDC, 10A at 125VAC Max. switching voltage 277VAC, 30VDC Max. switching capacity 1250VA (AC), 150W (DC) Endurance 1x10 <sup>5</sup> ops (Rated Load), 1x10 <sup>7</sup> ops (no Load)
	Binary Output, up to 250VAC Relay contact Disconnects NC from Common when activated	Characteristics (Resistive Load): Initial contact resistance 100mΩ (at 1A / 24 VDC) Rated load 3A at 250VAC, 5A at 30VDC, 10A at 125VAC Max. switching voltage 277VAC, 30VDC Max. switching capacity 1250VA (AC), 150W (DC) Endurance 1x10 <sup>5</sup> ops (Rated Load), 1x10 <sup>7</sup> ops (no Load)

## SELECTION TABLE

### INPUT/OUTPUT MODULE WITH OPTIONAL CONTROL PANELS

ITEM	BI	BO	AI	AO	CONTROL PANEL
JDB1610	16				JBD1620 (for status LED)
JDB8010	8				JBD8020 or JDB8040 (for status LED)
JDB8410	8	4			JBD8420 or JDB8440 (for outputs manual override)
JAB0410				4	JAB0420 or JAB0440 (for manual override)
JAB6610	2	2	4	4	No control panel available

### INPUT/OUTPUT MPODULES WITH INTEGRATED CONTROL PANELS

ITEM	BI	BO	AI	AO	CONTROL PANEL
JDB1651	16				Integral status LED
JDB8051	8				Integral status LED
JDB8451	8	4			Integral BO manual override and BI status LED
JDB6451	6	4			Integral BO manual override and BO status LED
JAB0451				4	Integral manual override and status LED
JAB6651	2	2	4	4	No control panel available



## ORDERING INFORMATION

CODES	DESCRIPTION
JAB0410	4-point Romutec IOM with 4 AO and SA Bus support
JAB0420	Optional manual overrides for JAB0410, front panel mounting
JAB0430	Bundle of JDB8010 (Base module), JAB0420 (Override module, panel) and 3.0 m USB-cable
JAB0440	Optional manual overrides for JAB0410, DIN Rail mounting
JAB0450	Bundle of JAB0410 (Base module), JAB0440 (Override module, DIN rail) and 0.1 m USB-cable
JAB0451	4-point Romutec IOM with 4 AO and SA Bus support with integral overrides and status LED's, DIN rail mounting
JAB6610	12-point Romutec IOM with 2 BI, 2 BO, 4 AI, 4 AO and SA Bus support (Points only, no overrides or input status LED's), DIN rail mounting
JAB6651	12-point Romutec IOM with 2 BI, 2 BO, 4 AI, 4 AO and SA Bus Support (Points only, no overrides or input status LED's), DIN rail mounting, part of integral family
JDB1610	16 Binary input point Romutec IOM
JDB1620	Optional point status LED module for JDB1610, front panel mounting
JDB1630	Bundle of JDB1610 (Base module), JDB1620 (Status LED module, panel) and 3.0 m USB-cable
JDB1651	16-point Romutec IOM with 16 BI and SA Bus Support with point status LED's, DIN rail mounting
JDB6451	10-point Romutec IOM with 6 BI, 4 BO (two 2-state drives) and SA Bus support with integral overrides and status LED's, DIN rail mounting
JDB8010	8-point Romutec IOM with 8 BI and SA Bus support
JDB8020	Optional LED's for indicating the BI status of JDB8010, front panel mounting
JDB8030	Bundle of JDB8010 (Base module), JDB8020 (LED module, panel) and 3.0 m USB-cable
JDB8040	Optional LED module for indicating the BI status of JDB8010, DIN Rail mounting
JDB8050	Bundle of JDB8010 (Base module), JDB8040 (LED module, DIN rail) and 0.1 m USB-cable
JDB8051	8-point Romutec IOM with 8 BI and SA Bus Support with integral status LED's, DIN rail mounting
JDB8410	12-point Romutec IOM with 8 BI, 4 BO and SA Bus support (four 1-state drives)
JDB8420	Optional manual override module for JDB8410, front panel mounting
JDB8430	Bundle of JDB8410 (Base module), JDB8420 (Override module, panel) and 3.0 m USB-cable
JDB8440	Optional manual overrides for JDB8410, DIN Rail mounting
JDB8450	Bundle of JDB8410 (Base module), JDB8440 (Override module, DIN rail) and 0.1 m USB-cable
JDB8451	12-point Romutec IOM with 8 BI, 4 BO (four 1-state drives) and SA Bus Support with Integral overrides and status LED's, DIN rail mounting

## ACCESSORIES

CODES	DESCRIPTION
USB-A-B-0.1	USB-cable A-B type, 0.1 m
USB-A-B-3.0	USB-cable A-B type, 3.0 m
USB-A-B-5.0	USB-cable A-B type, 5.0 m
JD-RTR4084	19"-rack 4HE/84TE, plastic (GRP), for mounting of 10 front panels
JD-RTR4084S	Same as JD-RTR4084, but with transparent lockable cover and IP54 protection class
JD-RTR7050	19"-rack 7HE/50TE, plastic (GRP), for mounting of 12 front panels
JD-RTR7050S	Same as JD-RTR7050, but with transparent lockable cover and IP54 protection class
JDL8000	Cover 3HE/8TE, colour blue, for unused slots
JD-JUMPER	Three-pole jumper, needed for coding the colour of a LED to orange



## TECHNICAL SPECIFICATIONS

Codes	<b>JAB0410</b> <b>JDB1610</b> <b>JDB6410</b> <b>JAB6610</b> <b>JDB8010</b> <b>JDB8410</b>	<b>JAB0420</b> <b>JDB1620</b> <b>JDB6420</b> <b>JDB8020</b> <b>JDB8420</b>	<b>JAB0440</b> <b>JDB6440</b> <b>JDB8040</b> <b>JDB8440</b>	<b>JAB0451</b> <b>JDB1651</b> <b>JDB6451</b> <b>JAB6651</b> <b>JDB8051</b> <b>JDB8451</b>
Supply voltage	24 VAC ±10% at 50 or 60 Hz	5 VDC ±5%, provided by the I/O-Module via USB		24 VAC ±10% at 50 or 60 Hz
Power consumption	12 VA maximum incl. Front panel Load	1 VA maximum, provided by I/O-Module		12 VA maximum
Ambient conditions				
<i>Operating</i>	0 to 50°C; 10 to 90% RH non-condensing			
<i>Storage</i>	0 to 70°C; 10 to 90% RH non-condensing			
Terminations	Spring-type terminals for I/O's, power supply and MS/TP Bus	USB type B for the connection to the I/O Module		Spring-type terminals for I/O's, power supply and MS/TP Bus
Device addressing	DIP switch set (128-254). Addresses 0-127, 255 are reserved	Not Required		DIP switch set (128-254). Addresses 0-127, 255 are reserved
Communications Bus	BACnet® MS/TP; 4-wire SA Bus (3 wires used)	USB connection to host module		BACnet® MS/TP; 4-wire SA Bus (3 wires used)
Mounting	35 mm DIN rail	Panel front 19" Rack	35 mm DIN rail	
Dimensions (Height x Width x Depth)	116 x 32 x 166 mm	129 x 40.5 x 43 mm	116 x 32 x 166 mm	92 x 72 x 70 mm
Housing				
<i>Plastic housing, Plastic material</i>	PA6.6 25%GF	ABS + Polycarbonate UL94 5VB	PA6.6 25%GF	PC-GF10
Protection	IP20 (IEC529)			
Weight	<b>JAB0410:</b> 0.180 kg <b>JDB1610:</b> 0.180 kg <b>JDB6410:</b> 0.232 kg <b>JAB6610:</b> 0.222 kg <b>JDB8010:</b> 0.180 kg <b>JDB8410:</b> 0.240 kg	<b>JAB0420:</b> 0.102 kg <b>JDB1620:</b> 0.075 kg <b>JDB6420:</b> 0.089 kg <b>JDB8020:</b> 0.075 kg <b>JDB8420:</b> 0.105 kg	<b>JAB0440:</b> 0.143 kg <b>JDB6440:</b> 0.133 kg <b>JDB8040:</b> 0.132 kg <b>JDB8440:</b> 0.135 kg	<b>JAB0451:</b> 0.240 kg <b>JDB1651:</b> 0.160 kg <b>JDB6451:</b> 0.200 kg <b>JAB6651:</b> 0.190 kg <b>JDB8051:</b> 0.150 kg <b>JDB8451:</b> 0.210 kg
<b>CE</b> Compliance	Johnson Controls declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.			

# BUILDING AUTOMATION PRODUCTS

## CONFIGURABLE FIELD CONTROLLERS

## TERMINAL UNIT CONTROLLERS

# TUC03

### TERMINAL UNIT CONTROLLER

The TUC03 configurable Terminal Unit Controller is designed specifically to provide direct digital control of terminal unit applications with heating and/or cooling coils, an electric heater and a three-speed or variable speed fan.

These applications include close control units, fan coil units, unit ventilators and chilling or heating ceiling beam installations. The device can be configured by the installer, without the need of a PC and software tool, using a set of on-board dip-switches. The controller is designed for field installation in a panel or enclosure or for mounting by original equipment manufacturers (OEMs) on DIN-rail or directly on a surface.

The space comfort set point, occupancy mode and fan speed may be adjusted from a wide range of room sensor modules with options for a digital display.

Communication options are available to enable the controller to be integrated into an N2 Open or BACnet® network of a building automation system. The BACnet interface of the controller complies with the ANSI/ASHRAE Standard 135-2004 for sharing data other devices on the network.

## FEATURES

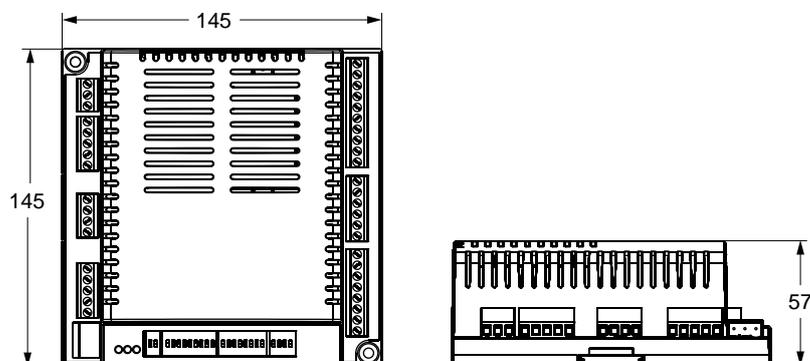
- Field Selectable application type, communication protocol and room module, via dip-switches on controller
- 230 VAC power supply
- 5 VDC / 15 VDC / 24 VAC power supply for field devices, directly provided by the controller
- Modular range of room sensor modules
- Network communications options - N2 Open and BACnet MS/TP
- BACnet MS/TP with peer to peer communication
- Configurable using standard tools



TUC03 - TERMINAL UNIT CONTROLLERS



**DIMENSIONS (in mm)**



**ORDERING INFORMATION**

CODES	DESCRIPTION
TUC0301-2	230 VAC N2 / BACnet Terminal Unit Controller, no cover
TUC0311-2	230 VAC N2 / BACnet Terminal Unit Controller

**ROOM SENSOR MODULES**

CODES	DESCRIPTION
With LCD display and Integrated IR Receiver	
LP-RSM003-000C	Room Sensor Module, wall mount
LP-RSM003-001C	Room Sensor Module, horizontal flush mount
LP-RSM003-003C	IR receiver w/ integrated temperature sensor
LP-RSM003-004C	IR hand held remote control unit
Without display - 80 mm x 80 mm	
TM-2140-0000	Room sensor module, temperature sensor only
TM-2150-0000	Room sensor module, occupancy button and LED
TM-2160-0000	Room sensor module, 12-28 °C setpoint dial, occupancy button and LED
TM-2160-0002	Room sensor module, 12-28 °C setpoint dial, occupancy button and LED, fan speed override
TM-2160-0005	Room sensor module, +/- setpoint dial, occupancy button and LED
TM-2160-0007	Room sensor module, +/- setpoint dial, occupancy button and LED, fan speed override
TM-2190-0000	Room sensor module, 12-28 °C setpoint dial
TM-2190-0005	Room sensor module, +/- setpoint dial
With backlit LCD display - 80 mm x 80 mm	
RS-1180-0000	Room Sensor module, 12-28 °C setpoint dial
RS-1180-0005	Room Sensor module, +/- setpoint dial
RS-1180-0002	Room Sensor module, 12-28 °C setpoint dial, fan speed override
RS-1180-0007	Room Sensor module, +/- setpoint dial, fan speed override



ORDERING INFORMATION

ACCESSORIES

CODES	DESCRIPTION
LP-KIT003-010C	Remote temperature sensor, NTC 50k $\Omega$ , bulb, 80 cm leads
LP-KIT003-011C	Remote temperature sensor, NTC 50k $\Omega$ , wall mount, decorative box
LP-KIT003-012C	Remote temperature sensor, NTC 50k $\Omega$ , duct mount
LP-KIT003-013C	Remote temperature sensor, NTC 50k $\Omega$ , wall mount, decorative box
HX-9100-8001	Condensation (dew point) sensor
TS-6340K-F00	Remote temperature sensor, NTC 10k $\Omega$ , bulb, 200 cm leads
TS-6340C-E10	Remote temperature sensor, NTC 10k $\Omega$ , ceiling



LP-RSM003-000C



RS Series



LP-RSM003-003C  
and LP-RSM003-004C



LP-RSM003-001C



TM Series

# BUILDING AUTOMATION PRODUCTS

## CONFIGURABLE FIELD CONTROLLERS

## TERMINAL UNIT CONTROLLER

# TUC03 PLUS

### TERMINAL UNIT CONTROLLER PLUS

The TUC03 Plus configurable Terminal Unit Controller is specifically designed to provide an improved BACnet® integration compared to the standard TUC03 model.

It allows the direct digital control of terminal unit applications with heating and/or cooling coils, an electric heater and a three-speed or variable speed fan.

These applications include close control units, fan coil units, unit ventilators and chilling or heating ceiling beam installations. The device can be configured by the installer, without the need of a PC and software tool, using a set of on-board dip-switches. The controller is designed for field installation in a panel or enclosure or for mounting by original equipment manufacturers (OEMs) on DIN-rail or directly on a surface.

The space comfort set point, occupancy mode and fan speed may be adjusted from a wide range of room sensor modules with options for a digital display.

The MS/TP field bus is available to enable the controller to be integrated into a BACnet network of a building automation system.

By focusing on supporting the BACnet protocol only, the TUC03 Plus provides a much better BACnet integration compared to its standard version. The N2 protocol will continue to be available on the standard TUC03 model.

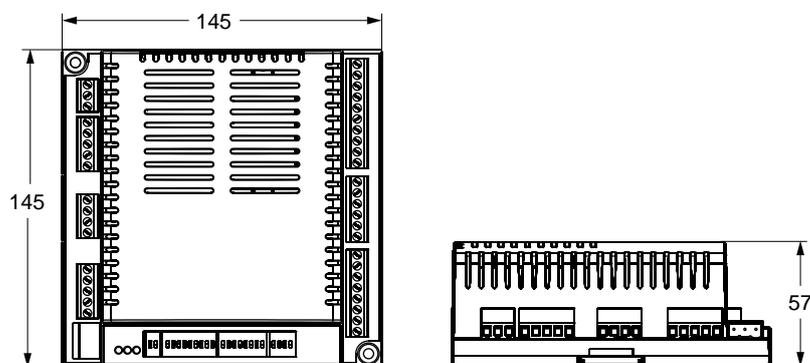
## FEATURES

- **Improved Performances** – TUC03 Plus BACnet Change-of-Value and Segmentation features improve the overall system communication performances allowing to reduce the number of components required to manage the whole network and therefore saving on the total installed costs.
- **Enhanced User Experience** – TUC03 Plus BACnet State Text features enable a quicker, simpler but enhanced user experience lowering engineers effort during integrations then reducing the engineering costs.
- **Dedicated Room Module** – TUC03 Plus features a new and unique room module with touch screen interface on both white and black colors widening the offering of room user interfaces.





## DIMENSIONS (in mm)



## ORDERING INFORMATION

CODES	DESCRIPTION
TUC0312-2	230 VAC BACnet TUC Plus

## ACCESSORIES

CODES	DESCRIPTION
TRM0312-0W	Touch Room Module for TUC03 Plus - White
TRM0312-0B	Touch Room Module for TUC03 Plus - Black



Touch Room Modules

# BUILDING AUTOMATION PRODUCTS

## CONFIGURABLE FIELD CONTROLLERS INTEGRATED ROOM CONTROL

### IRC 3<sup>rd</sup> EDITION

#### INTEGRATED ROOM CONTROLLER

IRC Controllers are microprocessor-based programmable controllers designed to control terminal units such as fan coils, heatpumps and chilled beams.

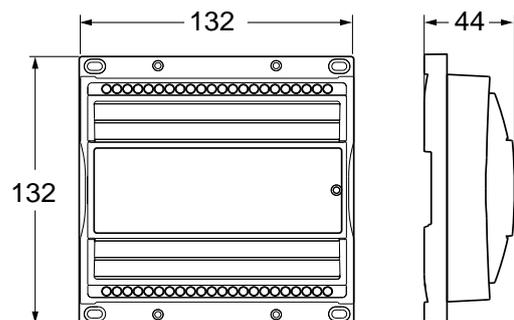
Controllers can be used as standalone or integrated to a LonWorks® or BACnet® network.

Controllers can also be extended with light and sunblind modules and work with a wide range of room sensors that could include CO<sub>2</sub> sensing and motion detection to allow the system to adjust to actual operating conditions and to increase energy savings. They also include wireless capability to connect remotely room sensors.

#### FEATURES

- Single point of control for environmental comfort in the room for the occupants – temperature, air quality, lighting and sunblinds
- Standard Protocols (Lon and BACnet) to guarantee interoperability with other manufacturers
- Expandable with lighting and sunblind modules to build an integrated room control solution, for up to 45% energy savings
- Universal power supply and optional 24 VAC power outputs, for a direct connection of the controller to the main power supply and outputs such dampers and valve actuators, eliminating the need for transformer
- Multiple sensors management, for a full room management including ambient (temperature-humidity), air quality (CO<sub>2</sub>) and presence detection (motion sensor)
- Large choice of user interfaces: remote controls devices, room devices
- Network or wireless room sensors, to reduce wiring cost and create wire-free installations

#### DIMENSIONS (in mm)



# IRC 3<sup>rd</sup> EDITION - INTEGRATED ROOM CONTROL



## ORDERING INFORMATION

### POINT TYPE COUNTS PER MODEL

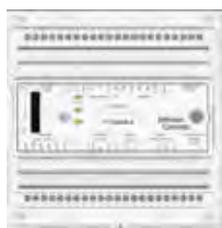
POINT TYPES	SIGNALS ACCEPTED	IRCx205-3	IRCx225-3
Universal Input (UI)	Analog input voltage mode 0 – 10 VDC, Binary input dry contact, Binary input pulse counter 1Hz max	2	2
Sensor Input (SI)	Temperature NTC (10k type II, III)	1	1
Binary Input (BI)	Dry contact, Pulse counter 20Hz max	3	3
Analog Output (AO)	Analog output voltage mode 0 – 10 VDC	4	2
Powered Relay Outputs	100-240 VAC, same as device power supply voltage, 3 A max (inductive or resistive load) for the total sum of the 3 outputs	3	3
Relay Outputs	255 VAC maximum voltage, 9 A max non inductive 100 – 255 VAC, 2kW at 230 VAC	1	1
Powered Triac Outputs	100 – 240 VAC, same as device power supply voltage 0,5A continuous, 1A at 15 duty cycle for a 10-minute period	2	0
24 VAC Triac Outputs (DO)	See Note *	0	2

#### Note

\* 24 VAC power supply outputs used to power both triac outputs and analogue output, 24 VAC ± 10%, 50 Hz, 500 mA max with a resistive load (12 VA at 24 VAC), peak current 0.8A max, short-circuit and overload protected.

## ORDERING INFORMATION

### CONTROLLERS



IRC

#### INTEGRATED ROOM CONTROLLERS

CODES	DESCRIPTION
IRC3205-3	16-point BACnet Terminal Unit Controller, 110 – 240 VAC with 2 UI, 1 SI, 3 DI, 4 AO, 2 Triacs, 4 relays, Subnet Bus, Wireless Port
IRC3225-3	14-point BACnet Terminal Unit Controller, 110 – 240 VAC with 2 UI, 1 SI, 3 DI, 2 AO, 2 Triacs, 4 relays, 24 VAC outputs, Subnet bus, Wireless Port
IRC4205-3	16-point LONWORKS Terminal Unit Controller, 110 – 240 VAC with 2 UI, 1 SI, 3 DI, 4 AO, 2 Triacs, 4 relays, Subnet Bus, Wireless Port
IRC4225-3	14-point LONWORKS Terminal Unit Controller, 110 – 240 VAC with 2 UI, 1 SI, 3 DI, 2 AO, 2 Triacs, 4 relays, 24 VAC outputs, Subnet bus, Wireless Port



IRS/IRL/  
IRD

#### LIGHT AND SUNBLIND MODULES

CODES	DESCRIPTION
IRS1045-3	Sunblind module, 4 outputs, 4 digital inputs, 100 – 240 VAC power supply and sunblind outputs (8 A max, total for the 4 outputs), quick connectors (wieland type)
IRL1045-3	Lighting on-off module, 4 outputs, 4 digital inputs, 0 – 240 VAC power supply and light outputs (6 A max, total for all outputs), quick connectors (wieland type)
IRL2045-3	Lighting dimming module, 4 outputs, 4 digital inputs, 0 – 240 VAC power supply and light outputs (6 A max, total for all outputs), 1 – 10 V dimming command, quick connectors (wieland type)

# IRC 3<sup>rd</sup> EDITION - INTEGRATED ROOM CONTROL

## ORDERING INFORMATION



### ROOM MODULES



IRM

#### NETWORK ROOM DISPLAY

CODES	DESCRIPTION
IRM1005-3	Room temperature sensor (NTC 10k) with backlit display and graphical menus



IRU

#### NETWORK ROOM COMMAND

CODES	DESCRIPTION
IRU1045-3	Room temperature sensor (NTC 10k) with setpoint knob, occupancy button and fan speed selection knob
Accessories	
ILK1000-3	Lighting add-on commands for IRU room module
ISK1000-3	Sunblind add-on control for IRU room module



INS

#### NETWORK ROOM SENSOR

CODES	DESCRIPTIONS
INS1005-3	Room temperature sensor (NTC 10k)

### STANDARD ACCESSORIES



IMS

#### MULTI-SENSOR

CODES	DESCRIPTION
IMS2005-3	Infrared multi sensor, motion sensor and Lux level measure
IMK1000-3	Subnetwork adaptor (optional, not requested if IMS is the last device on the subnet)



RCL

#### REMOTE CONTROLS

CODES	DESCRIPTION
RCL1025-3	Infrared remote control, wall-mounted support, irremovable

# IRC 3<sup>rd</sup> EDITION - INTEGRATED ROOM CONTROL

## ORDERING INFORMATION

### SPECIFIC ACCESSORIES

These items can be ordered under specific conditions.



CODES	DESCRIPTIONS
IRK1000-3	Strain relief and terminal cover for IRC controllers
IRD1045-3	Lighting DALI module, 4 outputs, 4 digital inputs, 100 - 240 VAC power supply and light outputs (6 A max, total for all outputs), quick connectors (wieland type)
IMS1005-3	Infrared multi sensor, motion sensor
IMS3005-3	Infrared multi sensor, motion sensor, temperature and Lux level measure
RCL1015-3	Infrared remote control
RCK1025-3	Wall-mounted support, irremovable remote control
RCK1015-3	Wall-mounted support, removable remote control
IRM2005-3	Room temperature (NTC 10k) and motion sensors with backlit display and graphical menus
IRM3005-3	Room temperature (NTC 10k) and humidity sensors with backlit display and graphical menus
IRM4005-3	Room temperature (NTC 10k), motion and humidity sensors with backlit display and graphical
IRM5005-3	Room temperature (NTC 10k) and CO <sub>2</sub> sensors with backlit display and graphical menus
IRM6005-3	Room temperature (NTC 10k), CO <sub>2</sub> and motion sensors with backlit display and graphical menus
IRM7005-3	Room temperature (NTC 10k), CO <sub>2</sub> and humidity sensors with backlit display and graphical menus
IRM8005-3	Room temperature (NTC 10k), CO <sub>2</sub> motion and humidity sensors with backlit display and graphical menus
IRU1015-3	Room temperature sensor (NTC 10k) with setpoint knob
IRU1025-3	Room temperature sensor (NTC 10k) with setpoint knob and fan speed selection knob
IRU1035-3	Room temperature sensor (NTC 10k) with setpoint knob and occupancy button
INS2005-3	Room temperature (NTC 10k) and humidity sensors
INS3005-3	Room temperature (NTC 10k) and CO <sub>2</sub> sensors
INS4005-3	Room temperature (NTC 10k), CO <sub>2</sub> and humidity sensors

# BUILDING AUTOMATION PRODUCTS

## SMART EQUIPMENT CONTROLLERS

### PEAK™ CONTROLLERS

## PEAK™

### HVAC/R CONTROLLERS



The PEAK 18 and PEAK 32 Controllers are configurable controllers that can be switched between MS/TP, Modbus® RTU, and N2 Communication protocols real-time through the onboard local display or through the Mobile Access Portal (MAP) Gateway. When the controllers are used as MS/TP devices, they are BACnet® Advanced Application Controllers (B-AACs) with integral RS-485 Master-Slave/Token-Passing (MS/TP) communications.

PEAK Series Controllers feature an integral real-time clock and support time-based tasks, which enables these field controllers to monitor and control schedules, calendars, alarms, and trends.

The PEAK 18 controller features line-voltage relay outputs, making this controller well-suited for use in terminal units. PEAK 18 model uses a line-voltage power supply, eliminating the need for a 24 VAC transformer in line-voltage applications. PEAK 18 comes both in 24 VAC and 120 to 240 VAC power models, with or without display.

The PEAK 32 with larger inputs and outputs counts also features linevoltage relay outputs for many suitable applications. PEAK 32 comes in 24 VAC model, with or without display.

A full range of PEAK 18 and 32 models combined with the Input/Output Module (IOM) models can be applied to a wide variety of HVAC/R applications ranging from simple fan coil or heat pump control to advanced AHU or chiller applications.

## FEATURES

- **Standard BACnet Protocol** – Provides interoperability with other Building Automation Systems (BAS) products that use the widely accepted BACnet standard.
- **Standard Software and Application Development** – Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows. Also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.
- **Configurable Controller** – Eliminates the need for software or programming in the field. Factory commission and programmed. Only configuration of parameters in the field through local display or MAP.
- **Real-time Switchable communication protocols from BACnet MS/TP to Modbus® or N2** – Is available through the onboard display or MAP Gateway one configuration parameter can be set to switch the protocol in real time.
- **Dedicated Modbus Integration bus** – Provides interoperability with other Modbus devices through the dedicated Modbus master port.
- **Predefined alarms and trends** – Based on HVAC/R application all alarms and trends will be predefined within the controller.



## FEATURES

- **Onboard display with real time clock to support local scheduling and trends** – Provides an onboard display for configuration and commissioning of the equipment, validation of controls, validation of alarms, faults and control.
- **Auto-Tuned Control Loops** – Reduce commissioning time, eliminate change-of-season re-commissioning, and reduce wear and tear on mechanical devices.
- **Universal Inputs, Configurable Outputs, and Point Expansion Modules** – Allow multiple signal options to provide input/output flexibility.
- **Optional Local User Interface Display** – Allows convenient monitoring and adjusting capabilities at the local device.
- **Optional Mobile Interface** – Allow monitoring, servicing, and commissioning of the equipment through the MAP gateway, utilizing any smart mobile devices.
- **USB Port** – Onboard USB port for firmware upgrades and backup/restore of configuration of the controller.
- **BACnet Testing Laboratories (BTL) Listing** – Ensures interoperability with other BTL rev 12- listed devices. BTL is a third-party agency, which validates that BAS vendor products meet the BACnet industry-standard protocol.
- **Verasys Connectivity** – Support of Equipment Model technology for plug and play of equipment to the system level.



## ORDERING INFORMATION

### PEAK CONTROLLERS

CODES	DESCRIPTION
PK-OEM1810-0	PEAK 18, 24 Volts no Display – 5 UI, 4 BI, 2 BO, 4 RO and 3 CO
PK-OEM1811-0	PEAK 18, 240 Volts no Display – 5 UI, 4 BI, 2 BO, 4 RO and 3 CO
PK-OEM1820-0	PEAK 18, 24 Volts with Display – 5 UI, 4 BI, 2 BO, 4 RO and 3 CO
PK-OEM1821-0	PEAK 18, 240 Volts with Display – 5 UI, 4 BI, 2 BO, 4 RO and 3 CO
PK-OEM3210-0	PEAK 32, 24 Volts no Display – 6 UI, 12 BI, 4 BO, 5 RO, 4 CO and 1 PWM
PK-OEM3220-0	PEAK 32, 24 Volts with Display – 6 UI, 12 BI, 4 BO, 5 RO, 4 CO and 1 PWM

### PEAK IOM SERIES

CODES	DESCRIPTION	CE MARKED
PK-IOM1711-0	4-Point IOM with 4 BI, SA Bus Support	■
PK-IOM2711-2	6-Point IOM with 2 UI, 2 UO, 2 BO, SA Bus Support. Relays are rated for 240 VAC	■
PK-IOM2721-0	10-Point IOM with 8 UI, 2 AO, SA Bus Support	■
PK-IOM3711-2	12-Point IOM with 4 UI, 4 UO, 4 BO, SA Bus Support. Relays are rated for 240 VAC	■
PK-IOM3721-0	16-Point IOM with 16 BI, SA Bus Support	■
PK-IOM3731-0	16-Point IOM with 8 BI, 8 BO, SA Bus Support	■
PK-IOM4711-0	17-Point IOM with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, SA Bus Support	■
PK-IOM5711-0	16-Point IOM with 16 UI, SA Bus Support	■
PK-IOM5731-0	16-Point IOM with 8 AO, 8 BO with HOA switches and LED indicators, SA Bus Support	■

### ACCESSORIES (ORDER SEPARATELY)

CODES	DESCRIPTION
PK-KIT1810-0	PEAK 18, 24 Volts removable terminal block kit for all spade connections
PK-KIT1811-0	PEAK 18, 240 Volts removable terminal block kit for all spade connections
PK-KIT3210-0	PEAK 32, 24 Volts removable terminal block kit for all spade connections
NS Series Sensors	NS Series Network Sensors: <i>Refer to the NS Series Network Sensors Product Bulletin (LIT-12011574) for specific sensor model descriptions</i>
TL-MAP1810-OPE	Portable MAP Gateway includes MAP Gateway, RJ-12 cable, protective shell, and lanyard.
TL-BRTRP-0	Portable BACnet IP to MS/TP Router

PEAK™ – SMART EQUIPMENT CONTROLLERS



TECHNICAL SPECIFICATION

PEAK CONTROLLERS (PART 1/2)

Codes		
	<i>PK-OEM1810-0</i>	PEAK 18, 24 Volts no display – 5 UI, 4 BI, 2 BO, 4 RO and 3 CO
	<i>PK-OEM1820-0</i>	PEAK 18, 24 Volts with display – 5 UI, 4 BI, 2 BO, 4 RO and 3 CO
	<i>PK-OEM1811-0</i>	PEAK 18, 240 Volts no display – 5 UI, 4 BI, 2 BO, 4 RO and 3 CO
	<i>PK-OEM1821-0</i>	PEAK 18, 240 Volts with display – 5 UI, 4 BI, 2 BO, 4 RO and 3 CO
	<i>PK-OEM3210-0</i>	PEAK 32, 24 Volts no display – 6 UI, 12 BI, 4 BO, 5 RO, 4 CO and 1 PWM
	<i>PK-OEM3220-0</i>	PEAK 32, 24 Volts with display – 6 UI, 12 BI, 4 BO, 5 RO, 4 CO and 1 PWM
Supply Voltage		
	<i>PEAK 18/24 Volts and PEAK 32/24 Volts</i>	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV)
	<i>PEAK 18/240 Volts</i>	90 to 240 VAC, 50/60 Hz, Safety Extra-Low Voltage (SELV)
Power Consumption		20 VA Maximum VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 60 VA (maximum).
Ambient Conditions		
	<i>Operating</i>	-20 to 70°C; 10 to 95% RH noncondensing; Pollution Degree 2
	<i>Storage</i>	-40 to 85°C; 5 to 95% RH noncondensing
Controller Addressing		
	<i>BACnet® MS/TP</i>	60 VA; valid field controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid field controller addresses.)
	<i>N2</i>	Valid field controller device addresses 1 to 255
Communications Bus		BACnet® MS/TP, Modbus® (Master/Slave) and N2 via RS-485: <ul style="list-style-type: none"> <li>• 3-wire FC Bus between the supervisory controller and field controller addresses).</li> <li>• 3-wire SA Bus between controller, network sensors, and other sensor/actuator devices, includes a lead-to source 15 VDC supply power (from controller) to bus devices.</li> <li>• 3-wire one Modbus communication half-duplex (Master RTU port)</li> </ul>
Processor		RX631 Renesas® 32-bit microcontroller
Memory		2 MB flash memory and 8 MB RAM
Input and Output Capabilities		
PEAK 18		
	<i>Five Universal Inputs</i>	User-configurable, 3 available modes: <ul style="list-style-type: none"> <li>• Voltage input: 0 to 10 VDC</li> <li>• Current sense input: 4 to 20 mA</li> <li>• Resistive inputs/dry contact Inputs</li> </ul>
	<i>Four Binary Inputs</i>	Defined as dry contact maintained or pulse counter/accumulator mode (high speed), 100 HZ
	<i>Three Configurable Outputs</i>	User-configurable, 2 available modes: <ul style="list-style-type: none"> <li>• Analog output: 0 to 10 VDC, 10 mA</li> <li>• Triac output: 24 VAC, 0.5 A (Externally source powered)</li> </ul>
	<i>Four Binary Outputs (Relays)</i>	Single-pole, Single-throw. Dry Contacts rated 240 VAC. <ul style="list-style-type: none"> <li>• UL: 5A Resistive, 1.9 FLA/11.1LRA, D300 Pilot Duty, 70°C (30,000 cycles)</li> <li>• IEC: 3A Resistive, 3A Inductive, Cos(phi)=0.6, -20 to 70°C (100,000 cycles)</li> </ul>
	<i>Two Binary Outputs (Triacs)</i>	Output: 24 VAC or 240VAC, 0.5A (Externally Powered). <b>Note:</b> Reference all triac commons to the same pole of the supply circuit.
	<i>Utility Output Power Port</i>	Ability to deliver 24 VAC

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PEAK™ – SMART EQUIPMENT CONTROLLERS



TECHNICAL SPECIFICATION

PEAK CONTROLLERS (PART 2/2)

Input and Output Capabilities PEAK 32	
<i>Six Universal Inputs</i>	User-configurable, 3 available modes: <ul style="list-style-type: none"> <li>• Voltage input: 0 to 10 VDC</li> <li>• Current sense input: 4 to 20mA</li> <li>• Resistive inputs/dry contact inputs</li> </ul>
<i>Twelve Binary Inputs</i>	Defined as dry contact maintained or pulse counter/accumulator mode (high speed), 100 HZ
<i>Four Configurable Outputs</i>	User-configurable, 2 available modes: <ul style="list-style-type: none"> <li>• Analog Output: 0 to 10 VDC, 10 mA</li> <li>• Triac Output: 24 VAC, 0.5 A (Externally sourced powered)</li> </ul>
<i>Five Binary Outputs (Relays)</i>	2 single-pole, single-throw. Dry contacts rated 240 VAC, 1 SPDT 240 VAC, 2 double insulated SPST, 240 VAC <ul style="list-style-type: none"> <li>• UL: 5 A Resistive, 1.9 FLA/11.1LRA, D300 Pilot Duty, 70°C (30,000 cycles)</li> <li>• IEC: 3 A Resistive, 3 A Inductive, Cos(phi)=0.6, -20 to 70°C (100,000 cycles)</li> </ul>
<i>Four Binary Outputs (Triacs)</i>	Output: 24 VAC or 240 VAC, 0.5A (Externally powered)
<i>One Pulse Width Modulation</i>	PWM 0 to 15 VDC at 10 ma max 100 HZ <b>Note:</b> Reference all triac commons to the same pole of the supply circuit.
Analog Input/Analog Output Resolution and Accuracy	
	Analog input: 15-bit resolution Analog output: 15-bit resolution, ±200 mV accuracy in 0 to 10 VDC applications
<i>Terminations PEAK 18 and PEAK 32</i>	Input/output: Fixed spade terminals SA/FC/Modbus®: 4-wire and 3-wire pluggable screw terminal blocks SA Bus tool Port: RJ-12 6-Pin modular jacks
<i>Terminations PEAK 18 and PEAK 32 Field Install Option</i>	Input/output: Fixed solder terminals SA/FC/Modbus: 4-wire and 3-wire pluggable screw terminal blocks SA Bus tool Port: RJ-12 6-Pin modular jacks
Mounting	
	Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller
Housing	
	Enclosure material: ABS and polycarbonate UL94 5VB; Self-extinguishing, Plenum Rated Protection Class: IP20 (IEC 60529)
Dimensions (Height x Width x Depth)	
<i>PEAK 18, 24 Volts</i>	150 x 164 x 53 mm including terminals and mounting clips
<i>PEAK 18, 240 Volts</i>	150 x 190 x 53 mm including terminals and mounting clips
<i>PEAK 32, 24 Volts</i>	150 x 220 x 53 mm including terminals and mounting clips
Weight	
	0.5 kg
 Compliance	
	Johnson Controls declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.

PEAK™ – SMART EQUIPMENT CONTROLLERS

TECHNICAL SPECIFICATIONS



PEAK IOM SERIES (PART 1/2)

Codes	<i>PK-IOM1711-0</i>	4-point IOM with 4 BI, SA Bus Support
	<i>PK-IOM2711-2</i>	6-point IOM with 2 UI, 2 UO, 2 BO, SA Bus Support. Relays are rated for 240 VAC
	<i>PK-IOM2721-0</i>	10-point IOM with 8 UI, 2 AO, SA Bus Support
	<i>PK-IOM3711-2</i>	12-point IOM with 4 UI, 4 UO, 4 BO, SA Bus Support. Relays are rated for 240 VAC
	<i>PK-IOM3721-0</i>	16-point IOM with 16 BI, SA Bus Support
	<i>PK-IOM3731-0</i>	16-point IOM with 8 BI, 8 BO, SA Bus Support
	<i>PK-IOM4711-0</i>	17-point IOM with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, SA Bus Support
	<i>PK-IOM5711-0</i>	16-Point IOM with 16 UI, SA Bus Support
	<i>PK-IOM5731-0</i>	16-Point IOM with 8 AO, 8 BO with HOA switches and LED indicators, SA Bus Support
Supply Voltage	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV)	
Power Consumption	14 VA maximum <b>Note:</b> VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 84 VA (maximum), depending on the IOM model.	
Ambient Conditions	<i>Operating</i>	0 to 50°C; 10 to 90% RH noncondensing
	<i>Storage</i>	-40 to 80°C; 5 to 95% RH noncondensing
Addressing	DIP switch set; valid field controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid IOM addresses).	
Communications Bus	BACnet MS/TP, RS-485 4-wire SA Bus between field controller, network sensors, and other sensor/actuator devices. Includes a lead source 15 VDC supply power (from field controller) to bus devices.	
Processor	H8SX/166xR Renesas® 32-bit microcontroller	
Memory	512 KB Flash Memory and 128 KB RAM	
Input and Output Capabilities		
	<i>PK-IOM1711</i>	4 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/ Accumulator Mode
	<i>PK-IOM2711</i>	2 - Universal Inputs: Defined as 0 to 10 VDC, 4 to 20 mA, 0 to 600k ohm, or Binary Dry Contact 2 - Universal Outputs: Analog output: Voltage mode, 0-10 VDC; Binary output mode: 24 VAC/DC FET; Analog output: Current mode, 4 to 20 mA 2 - Relay Outputs: (Single-pole, Double-throw); EN 60730 (-2 model only) 6 (4) A N.O. or N.C. only, 240 VAC
	<i>PK-IOM2721</i>	8 - Universal Inputs: Defined as 0 to 10 VDC, 4 to 20 mA, 0 to 600k ohm, or Binary Dry Contact 2 - Analog Outputs: Defined as 0 to 10 VDC or 4 to 20 mA
	<i>PK-IOM3711</i>	4 - Universal Inputs: Defined as 0 to 10 VDC, 4 to 20 mA, 0 to 600k ohm, or Binary Dry Contact 4 - Universal Outputs: Analog Output: Voltage Mode, 0-10 VDC; Binary Output Mode: 24 VAC/DC FET; Analog Output: Current Mode, 4 to 20 mA 4 - Relay Outputs: (Single-Pole, Double-Throw); EN 60730 (-2 model only): 6 (4) A N.O. or N.C. only, 240 VAC
	<i>PK-IOM3721</i>	16 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode
	<i>PK-IOM3731</i>	8 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 8 - Binary Outputs: Defined as 24 VAC Triac (Require external low-voltage power source) <b>Note:</b> Binary Outputs (BOs) on MS-IOM3731-0A controllers do not supply power for the outputs; the BOs require external low-voltage (<30 VAC) power sources.

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## TECHNICAL SPECIFICATION

### PEAK IOM SERIES (PART 2/2)

Input and Output Capabilities	
<i>PK-IOM4711</i>	6 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Binary Inputs: Defined as Dry Contact Maintained or Pulse/Counter Accumulator Mode 3 - Binary Outputs: Defined as 24 VAC Triac (selectable internal or external source power) 4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO 2 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA
<i>PK-IOM5711</i>	16 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact
<i>PK-IOM5731</i>	8 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA 8 - Relay Outputs: Defined as 120 VAC–240 VAC SPDT Form C
Analog Input/Analog Output Resolution and Accuracy	
<i>Analog Input</i>	16-bit resolution
<i>Analog Output</i>	16-bit resolution and ±200 mV in 0–10 VDC applications
Terminations	
<i>Input/Output</i>	Fixed screw terminal blocks
<i>SA Bus and Supply Power</i>	4-wire pluggable screw terminal blocks SA Bus Port: RJ-12 6-Pin modular jacks
Mounting	
	Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller
Housing	
<i>Enclosure Material</i>	ABS and polycarbonate UL94 5VB; self-extinguishing, Plenum-rated protection class IP20 (IEC529)
Dimensions (Height x Width x Depth)	
<i>PK-IOM17 and PK-IOM27 Family Models</i>	150 x 120 x 53 mm including terminals and mounting clips
<i>PK-IOM2721, PK-IOM3721, and PK-IOM3731 Models</i>	150 x 164 x 53 mm including terminals and mounting clips
<i>PK-IOM37 and PK-IOM47 Family Models</i>	150 x 190 x 53 mm including terminals and mounting clips
	<b>Note:</b> Mounting space for all field controllers requires an additional 50 mm space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.
Weight	
	0.5 kg maximum
 Compliance	
	Johnson Controls declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.

# BUILDING AUTOMATION PRODUCTS

## SMART EQUIPMENT CONTROLLERS

## SMART TERMINAL UNIT CONTROLLERS

# ATC

### ADVANCED TERMINAL UNIT CONTROLLER

The Advanced Terminal unit Controller (ATC) from Johnson Controls® is a series of configurable controllers specifically designed for terminal unit equipment.

The ATC is available in two line voltage powered hardware models, and controls 2-pipe and 4-pipe equipment. The controller meets the most demanding comfort and efficiency requirements, due to its energy optimization and on demand ventilation controls.

The ATC features a long list of Johnson Controls patents, best practices. An extensive library of factory-programmed, fully documented and proven applications are available to lower engineering and commissioning costs, granting superior reliability and efficiency.

The on-board power sources for the ancillary field devices reduce the number of required components, such as transformers and wires, therefore cutting installation costs.

The cable strain relief and optional safety cover reduce installation costs, this enables, where regulation allows, the ATC to be installed without an additional cabinet.

The controller's field-selectable communications protocols, including BACnet®, Modbus® and N2, make the ATC suitable for both new and retrofit installations because they provide a cost effective upgrade and modernization path for customers who are using existing N2 controllers.

The ATC fully supports the SMART Equipment™ technology, making it plug and play on the Verasys® smart control systems.

## FEATURES

- **Applications Library** - Lower engineering and commissioning costs providing a full set of advanced features as the patented automatic PID tuning, network sensors plug and play, indoor air quality control, energy performance indication, fault detection diagnostics and automatic commissioning mode
- **Line power supply with on-board power for field devices** - Reduce the number of components required which lowers total installation costs
- **Cable strain relief and optional safety covers** - Enable installation without the need for an electrical box which lowers installation costs where applicable
- **Specialized models for Simpler and Complex Applications** - Lower product cost
- **Fully featured SMART Equipment technology** - Verasys SMART Control System enabled
- **Real-time switchable communications protocols** - Suitable for new and retrofit installation, providing higher flexibility, thus protecting investments
- **Standard BACnet protocol** - BACnet Testing Laboratories (BTL) Listing Rev 12 provides interoperability with other Building Automation Systems (BAS) products that use the widely accepted BACnet standard





## ORDERING INFORMATION

CODES	DESCRIPTION
LC-ATC1100-0	11-points Advanced Terminal unit Controller with 2 UI, 2 BI, 2 BO, 2 CO, 3 RO, FC and SA Bus, 240 VAC
LC-ATC1500-0	15-points Advanced Terminal unit Controller with 4 UI, 2 BI, 2 BO, 3 CO, 4 RO, FC and SA Bus, 240 VAC

## ACCESSORIES

CODE	DESCRIPTION
LC-IP20	Advanced Terminal unit Controller IP20 Safety Terminal Cover Kit
TL-MAP1810-OPE	Portable MAP Gateway - includes MAP Gateway, RJ-12 cable, protective shell, and lanyard

## TECHNICAL SPECIFICATIONS (PART 1/2)

Codes	
<i>LC-ATC1100-0</i>	11-points Advanced Terminal unit Controller with 2 UI, 2 BI, 2 BO, 2 CO, 3 RO, FC and SA Bus, 240 VAC
<i>LC-ATC1500-0</i>	15-points Advanced Terminal unit Controller with 4 UI, 2 BI, 2 BO, 3 CO, 4 RO, FC and SA Bus, 240 VAC
Supply Voltage	240 VAC, 50/60 Hz
Power Consumption	20 VA max
Ambient Conditions	
<i>Operating</i>	0 to 40°C; 10 to 95% RH noncondensing
<i>Storage</i>	-40 to 85°C; 5 to 95% RH noncondensing
Addressing	
<i>BACnet MS/TP</i>	Valid field controller device addresses 4-127 (Device addresses 0 to 3, 117, and 128 to 255 are reserved and not valid field controller addresses)
<i>N2 Slave</i>	Valid field controller device addresses 1 to 255
Communication Bus	
<i>BACnet MS/TP, Modbus® and N2 through RS-485</i>	FC Bus between the supervisory controller and field controller SA Bus between controller, network sensors and other sensor/actuator devices, includes a 15 VDC, 210 mA power supply for bus devices
Processor	Renesas® RX631 32-bit microcontroller, 2 MB Flash, 128 kB RAM
External Memory	16 MB Flash and 8 MB RAM



TECHNICAL SPECIFICATIONS (PART 2/2)

Input and Output Capabilities	<p><b>Binary Input (BI):</b></p> <ul style="list-style-type: none"> <li>• Dry Contact Maintained</li> <li>• Pulse Counter/Accumulator Mode (30 Hz)</li> </ul> <p><b>Universal Input (UI):</b> User-Configurable, 3 available modes:</p> <ul style="list-style-type: none"> <li>• Voltage Input: 0 to 10 VDC</li> <li>• Resistive (0-10 kOhm)</li> <li>• Dry-contact maintained binary</li> </ul> <p><b>Configurable Output (CO):</b></p> <ul style="list-style-type: none"> <li>• User-Configurable, 2 available modes:</li> <li>• Voltage Output: 0 to 10 VDC, 10 mA</li> <li>• Triac Output: 24 VAC, 500 mA (Externally sourced)</li> </ul>		<p><b>24 VAC out for actuator power:</b> 24 VAC at 500 mA</p> <p><b>5A Relay Output (5A RO):</b></p> <ul style="list-style-type: none"> <li>• Single-Pole, Single-Throw, Normally Open</li> <li>• 240 VAC, 5 A Resistive, 50K cycles</li> <li>• 240 VAC, 0.66 FLA / 4 LRA, 50K cycles</li> <li>• Shared common terminal between all 5 A RO's</li> </ul> <p><b>Binary Output Triac (BO):</b></p> <ul style="list-style-type: none"> <li>• 24 VAC or 240 VAC, 500 mA</li> <li>• Externally powered</li> <li>• Shared common terminal between all BO Triacs</li> </ul> <p><b>10 A Relay Output (10A RO):</b></p> <ul style="list-style-type: none"> <li>• Single-Pole, Single-Throw, Normally Open</li> <li>• 240 VAC, 10 A Resistive, 100K cycles</li> </ul>				
Input and Output Count		<b>BI</b>	<b>UI</b>	<b>CO</b>	<b>5 A RO</b>	<b>BO</b>	<b>10 A RO</b>
	<b>LC-ATC1100-0</b>	2	2	2	3	2	0
	<b>LC-ATC1500-0</b>	2	4	3	3	2	1
Analog Input / Output Resolution	<p><i>Analog Input</i> 12-bit resolution, ±1% in the 0-10 kOhm range, ±50 mV in the 0-10 VDC range</p> <p><i>Analog Output</i> 15-bit, ±200 mV in the 0-10 VDC range</p>						
Terminations	<p><i>Input/Output</i> Screw terminals</p> <p><i>FC Bus</i> 4-wire pluggable Screw Terminal Block</p> <p><i>SA Bus</i> 4-wire pluggable Screw Terminal Block and RJ-12, 6-pin modular jack</p>						
Mounting	<p>Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller. Mount the controller on a wall or DIN rail inside an enclosure</p>						
Dimensions (Height x Width x Depth)	<p>165 x 130 x 63 mm 165 x 165 x 63 mm including terminals and mounting clips (with IP20 cover)</p>						
Weight	0.6 kg						
CE Compliance	<p>Johnson Controls declares that this product is also in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive (IEC/EN60730-1). Declared as an Electronic Independantly-Mounted Control for mounting in or on a panel</p>						
BACnet International	BACnet Testing Laboratories (BTL) Protocol Revision 12 Listed BACnet Application Specific Controller (B-ASC)						

# BUILDING AUTOMATION PRODUCTS

## SMART EQUIPMENT CONTROLLERS

### VERASYS® APPLICATION CONTROLLERS

## VAC

### VERASYS APPLICATION CONTROLLERS

The Verasys® Application Controllers are part of the SMART Equipment Controller family. The Verasys Application Controllers run pre-engineered applications and provide the inputs and outputs required to monitor and control a wide variety of HVAC equipment.

Verasys Application Controllers operate on an RS-485 BACnet® MS/TP Bus as BACnet Advanced Application Controllers (B-AACs). The controllers integrate into Johnson Controls® and third-party BACnet systems.

Verasys Application Controllers include an integral real-time clock that enables the controllers to monitor and control schedules, calendars, and trends. The controllers can operate for extended periods of time as stand-alone controllers when they are disconnected from the system network.

## FEATURES

- **Standard BACnet Protocol** – Provides interoperability with other Building Automation Systems (BAS) products that use the widely accepted BACnet standard.
- **Standard Software and Application Development** – Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows. Also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.
- **Configurable Controller** – Eliminates the need for software or programming in the field. Factory commission and programmed. Only configuration of parameters in the field through local display or MAP.
- **Real-time Switchable communication protocols from BACnet MS/TP to Modbus® or N2** – Is available through the onboard display or MAP Gateway one configuration parameter can be set to switch the protocol in real time.
- **Dedicated Modbus Integration bus** – Provides interoperability with other Modbus devices through the dedicated Modbus master port.
- **Predefined alarms and trends** – Based on HVAC/R application all alarms and trends will be predefined within the controller.
- **Auto-Tuned Control Loops** – Reduce commissioning time, eliminate change-of-season re-commissioning, and reduce wear and tear on mechanical devices.
- **Universal Inputs, Configurable Outputs, and Point Expansion Modules** – Allow multiple signal options to provide input/output flexibility.
- **USB Port** – Onboard USB port for firmware upgrades and backup/restore of configuration of the controller.
- **BACnet Testing Laboratories (BTL) Listing** – Ensures interoperability with other BTL rev 12- listed devices. BTL is a third-party agency, which validates that BAS vendor products meet the BACnet industry-standard protocol.





## ORDERING INFORMATION

CODES	DESCRIPTION
LC-VAC1000-0	Verasys Application Controller 18 Points 24 VAC – No Application
LC-VAC1100-0	Verasys Application Controller 18 Points 240 VAC – No Application
LC-VAC3000-0	Verasys Application Controller 32 Points 24 VAC – No Application

## TECHNICAL SPECIFICATIONS

### LC-VAC1000-0; 18 POINT, 24 VAC, WITH DISPLAY (PART 1/2)

Supply Voltage	24 VAC, 20 VAC minimum and 30 VAC maximum, 50/60 Hz, Safety Extra-Low Voltage (SELV)
Power Consumption	20 VA maximum for LC-VAC1000-0 <b>Note:</b> VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs). This can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 60 VA maximum.
Ambient Conditions	
<i>Operating</i>	-20 to 70°C; 10 to 95% RH noncondensing; Pollution Degree 2
<i>Storage</i>	-40 to 85°C; 5 to 95% RH noncondensing.
Addressing	
<i>BACnet® MS/TP</i>	Valid field controller device addresses 4–127 Device addresses 0–3 and 128–255 are reserved and not valid field controller addresses.
<i>N2</i>	Valid field controller device addresses 1 to 255
Communications Bus	<b>BACnet® MS/TP, Modbus® and N2 through RS-485:</b> <ul style="list-style-type: none"> <li>• Three-wire System Bus between the supervisory controller and field controller</li> <li>• Three-wire Sensor Bus between controller, network sensors and other sensor/actuator devices, includes a lead to source 15 VDC supply power from controller to bus devices</li> <li>• Three-wire one Modbus communication half-duplex (Master RTU port)</li> </ul>
Processor	RX631 Renesas® 32-bit microcontroller
Memory	16 MB flash memory and 8 MB RAM
Input and Output Capabilities	<b>Five universal inputs:</b> User-configurable, 3 available modes: <ul style="list-style-type: none"> <li>• Voltage input: 0 to 10 VDC</li> <li>• Current sense input: 4 to 20 mA</li> <li>• Resistive inputs/dry contact inputs</li> </ul> <b>Four binary inputs:</b> Defined as Dry Contact maintained or Pulse Counter/Accumulator Mode <b>Three configurable outputs:</b> User-configurable, 2 available modes: <ul style="list-style-type: none"> <li>• Analog output: 0 to 10 VDC, 10 mA</li> <li>• Triac output: 24 VAC, 0.5 A (externally sourced powered)</li> </ul> <b>One utility output power port (24- OUT):</b> Ability to deliver 24 VAC <b>Four binary outputs (relays):</b> Single-Pole, Single-Throw. Dry contacts rated 240 VAC. <ul style="list-style-type: none"> <li>• UL: 240 VAC 5 A Resistive, 1.9 LA/11.1LRA, D300 Pilot Duty, 70°C (30,000 cycles)</li> <li>• IEC: 240 VAC 3 A Resistive, 3A Inductive, Cos=0.6, -20 to 70°C (100,000 cycles)</li> </ul> <b>Note:</b> Reference all relay commons to the same pole of the supply circuit. <b>Two Binary Outputs (Triacs):</b> Output: 24 VAC or 240 VAC, 0.5 A (externally powered) <b>Note:</b> Reference all triac commons to the same pole of the supply circuit.

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## TECHNICAL SPECIFICATIONS

### LC-VAC1000-0; 18 POINT, 24 VAC, WITH DISPLAY (PART 2/2)

Analog Input/Analog Output Resolution and Accuracy	
<i>Analog Input</i>	12-bit resolution
<i>Analog Output</i>	15-bit resolution; +/- 200 mV accuracy in 0 to 10 VDC applications
Terminations	Input/output: Fixed spade terminals Sensor/System/Modbus: 4-wire and 3-wire pluggable screw terminal blocks Sensor bus tool port: RJ-12 6-pin modular jack <b>Field install option:</b> Input/output: Fixed solder terminals Sensor/System/Modbus: 4-wire and 3-wire pluggable screw terminal blocks Sensor Bus tool port: RJ-12 6-pin modular jack
Mounting	Horizontal on single 35 mm DIN rail mount is preferred, or screw mount on flat surface with three integral mounting clips on controller Mount the controller on a wall or DIN rail inside an enclosure rated at least IP20.
Housing	Enclosure material: Polycarbonate Lexan SABIC EXL9330
Dimensions (Height x Width x Depth)	164 mm x 125 mm x 53 mm excluding terminals and mounting clips
Weight	0.5 kg
<b>CE</b> Compliance	Johnson Controls declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.

### LC-VAC1100-0; 18 POINT, 240 VAC, WITH DISPLAY (PART 1/2)

Supply Voltage	240 VAC, 50/60 Hz, Safety Extra-Low Voltage (SELV)
Power Consumption	<b>20 VA maximum for LC-VAC110x-0</b> <b>Note:</b> VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs). This can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 60 VA (maximum).
Ambient Conditions	<i>Operating</i> -20 to 70°C; 10 to 95% RH noncondensing; Pollution Degree 2 <i>Storage</i> -40 to 85°C; 5 to 95% RH noncondensing.
Addressing	<i>BACnet® MS/TP</i> Valid field controller device addresses 4-127 Device addresses 0-3 and 128-255 are reserved and not valid field controller addresses. <i>N2</i> Valid field controller device addresses 1 to 255
Communications Bus	<b>BACnet® MS/TP, Modbus® and N2 through RS-485:</b> • Three-wire System Bus between the supervisory controller and field controller • Three-wire Sensor Bus between controller, network sensors, and other sensor and actuator devices, includes a lead to source 15 VDC supply power (from controller) to bus devices • Three-wire one Modbus communication half-duplex (Master RTU port)
Processor	RX631 Renesas® 32-bit microcontroller
Memory	16 MB flash memory and 8 MB RAM

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## TECHNICAL SPECIFICATIONS

### LC-VAC1100-0; 18 POINT, 240 VAC, WITH DISPLAY (PART 2/2)

<p>Input and Output Capabilities</p>	<p><b>Five universal inputs:</b> User-configurable, 3 available modes:</p> <ul style="list-style-type: none"> <li>• Voltage input: 0 to 10 VDC</li> <li>• Current sense input: 4 to 20 mA</li> <li>• Resistive inputs/dry contact inputs</li> </ul> <p><b>Four binary inputs:</b> Defined as Dry Contact maintained or Pulse Counter/Accumulator Mode</p> <p><b>Three configurable outputs:</b> User-configurable, 2 available modes:</p> <ul style="list-style-type: none"> <li>• Analog Output: 0 to 10 VDC, 10 mA</li> <li>• Triac Output: 24 VAC, 0.5 A (externally sourced powered)</li> </ul> <p><b>One utility output power port:</b> Ability to deliver 24 VAC</p> <p><b>Four binary outputs (relays):</b> Single-Pole, Single-Throw. Dry contacts rated 240 VAC.</p> <ul style="list-style-type: none"> <li>• UL: 240 VAC, 5 A Resistive, 1.9 LA/11.1LRA, D300 Pilot Duty, (30,000 cycles)</li> <li>• IEC: 240 VAC, 3 A Resistive, 3 A Inductive, Cos=0.6, -20 to 70°C (100,000 cycles)</li> </ul> <p><b>Note:</b> Reference all relay commons to the same pole of the supply circuit.</p> <p><b>Two Binary Outputs (Triacs):</b> Output: 24 VAC or 240 VAC, 0.5 A (externally powered)</p> <p><b>Note:</b> Reference all triac commons to the same pole of the supply circuit.</p>
<p>Analog Input/Analog Output Resolution and Accuracy</p>	<p><i>Analog Input</i> 12-bit resolution</p> <p><i>Analog Output</i> 15-bit resolution, +/- 200 mV accuracy in 0 to 10 VDC applications</p>
<p>Terminations</p>	<p>Input/output: Fixed spade terminals</p> <p>Sensor/System/Modbus: 4-wire and 3-wire pluggable screw terminal blocks</p> <p>Sensor bus tool port: RJ-12 6-pin modular jack</p> <p><b>Field install option:</b></p> <p>Input/output: Fixed solder terminals</p> <p>Sensor/System/Modbus: 4-wire and 3-wire pluggable screw terminal blocks</p> <p>Sensor Bus Tool Port: RJ-12 6-pin modular jack</p>
<p>Mounting</p>	<p>Horizontal on single 35 mm DIN rail mount is preferred, or screw mount on flat surface with three integral mounting clips on controller. Mount the controller on a wall or DIN rail inside an enclosure (rated at least IP20).</p>
<p>Method to Provide Earthing (Grounding)</p>	<p>Functional earthing: Terminal W44</p>
<p>Housing</p>	<p>Enclosure material: Polycarbonate Lexan SABIC EXL9330</p>
<p>Dimensions (Height x Width x Depth)</p>	<p>190 mm x 125 mm x 58 mm excluding terminals and mounting clips</p>
<p>Weight</p>	<p>0.5 kg</p>
<p><b>CE</b> Compliance</p>	<p>Johnson Controls declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.</p>



## TECHNICAL SPECIFICATIONS

### LC-VAC3000-0; 32 POINT, 24 VAC WITH DISPLAY (PART 1/2)

Supply Voltage	24 VAC, 20 VAC minimum/30 VAC maximum, 50/60 Hz, Safety Extra-Low Voltage (SELV).
Power Consumption	<b>20 VA maximum</b> <b>Note:</b> VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs). This can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 60 VA (maximum).
Ambient Conditions	
<i>Operating</i>	-20 to 70°C; 10 to 95% Relative Humidity (RH) noncondensing; Pollution Degree 2.
<i>Storage</i>	-40 to 85°C; 5 to 95% RH noncondensing
Addressing	
<i>BACnet<sup>®</sup> MS/TP</i>	Valid field controller device addresses 4-127 Device addresses 0-3 and 128-255 are reserved and not valid field controller addresses.
<i>N2</i>	Valid field controller device addresses 1 to 255
Communications Bus	<b>BACnet<sup>®</sup> MS/TP, Modbus<sup>®</sup> and N2 through RS-485:</b> Three-wire System Bus between the supervisory controller and field controller addresses Three-wire Sensor Bus between controller, network sensors and other sensor and actuator devices, includes a lead to source 15 VDC supply power (from controller) to bus devices Three-wire one Modbus communication half-duplex (master RTU port)
Processor	RX631 Renesas <sup>®</sup> 32-bit microcontroller
Memory	16 MB flash memory and 8 MB RAM
Input and Output Capabilities	<b>Six Universal Inputs:</b> User-configurable, 3 available modes: Voltage input: 0 to 10 VDC Current sense input: 4 to 20 mA Resistive inputs/dry contact inputs <b>12 Binary Inputs:</b> Defined as Dry Contact maintained or Pulse Counter/Accumulator Mode <b>Four Configurable Outputs:</b> User-configurable, 2 available modes: Analog Output: 0 to 10 VDC, 10 mA Triac Output: 24 VAC, 0.5 A (externally sourced powered) One Utility Output Power Port (24~ OUT): Ability to deliver 24 VAC <b>Four Binary Outputs (Relays):</b> Single-Pole, Single-Throw. Dry Contacts rated 240 VAC UL: 240 VAC 5A Resistive, 1.9 LA/11.1LRA, D300 Pilot Duty, (30,000 cycles) IEC: 240 VAC 3A Resistive, 3A Inductive, Cos=0.6, -20 to 70°C (100,000 cycles) <b>One Binary Outputs (Relays):</b> Single-Pole, Double-Throw, Dry Contacts rated 240 VAC UL: 240 VAC 5A Resistive, 1.9 LA/11.1LRA, D300 Pilot Duty, (30,000 cycles) IEC: 240 VAC 3A Resistive, 3A Inductive, Cos=0.6, -20 to 70°C (100,000 cycles) <b>One PWM Output Port:</b> 5 V, 12 V, 15 V selectable PWM output voltage, 10 mA (maximum) continuous current, 100 Hz <b>Note:</b> Reference all relay commons to the same pole of the supply circuit. <b>Four Binary Outputs (Triacs):</b> Output: 24 VAC or 240 VAC, 0.5 A (externally powered) <b>Note:</b> Reference all triac commons to the same pole of the supply circuit.

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## TECHNICAL SPECIFICATIONS

### LC-VAC3000-0; 32 POINT, 24 VAC WITH DISPLAY (PART 2/2)

Analog Input/Analog Output Resolution and Accuracy	<i>Analog Input</i>	12-bit resolution
	<i>Analog Output</i>	15-bit resolution, +/- 200 mV accuracy in 0 to 10 VDC applications
Terminations	Input/Output: Fixed spade terminals Sensor/System/Modbus: 4-wire and 3-wire pluggable screw terminal blocks Sensor Bus Tool Port: RJ-12 6-pin modular jack <b>Field install option:</b> Input/output: Fixed solder terminals Sensor/System/Modbus: 4-wire and 3-wire pluggable screw terminal blocks Sensor Bus Tool Port: RJ-12 6-pin modular jack	
Mounting	Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller. Mount the Verasys Controllers on a wall or DIN rail inside an enclosure (rated at least IP20).	
Housing	Enclosure material: Polycarbonate LEXAN® SABIC EXL9330	
Dimensions (Height x Width x Depth)	220 mm x 125 mm x 58 mm	
Weight	0.5 kg	
 Compliance	Johnson Controls declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.	

## VERASYS® CONTROL SYSTEM SUPERVISORY CONTROLLERS

### SBH200

#### SMART BUILDING HUB

The Smart Building Hub is the base controller for the Verasys® Building Automation System and provides wired and wireless connections and plug and play configuration between all Smart Equipment layers and controls.

Offering many-to-one, multi-client connectivity, the Smart Building Hub is a web based control system that provides an intuitive user interface to any supported smart equipment and Johnson Controls branded field controllers and thermostats.

The Smart Building Hub has a USB Wi-Fi access point, and allows personnel to use an intuitive, browser-based interface to access advanced features like fault detection, alarms, and point configuration.

The Smart Building Hub can be connected to an Ethernet backbone to enable remote connectivity and additional features like email alarms.

The Smart Building Hub user interface scales to the device you are using. On a computer screen, mobile phone or tablet, the main menus and screens are side by side.

#### Supported Controllers

The Verasys 3.x control system fully supports smart equipment devices, including the flexible PEAK® and Verasys Application Controller (VAC) series of HVAC/R controllers and a wide variety of configurable terminal unit controllers and thermostats as the Advanced Terminal unit Controller (ATC), TUC03 Plus and TEC36xx series.

### FEATURES

- **Plug & Play** - Provides access to all identifiable and supported devices connected to the field bus without the need of any tool.
- **Remote Access** - Allows you to access device information through any supported web browser via secure connection and access level.
- **Alarm Notifications** - When connected to Internet, e-Mails can be configured to alert in case of alarms.
- **Space Views** - Space views provides a quick snapshot of what each space is doing and the ability to intuitively change the space working conditions.
- **Data Share** - Allows to share meaningful data between smart system components.
- **Advanced Features** - Allows to view alarms, events, and trends. Also to modify schedules and commission devices.
- **Schedule Synch** - Allows to view synchronize schedule between different smart system components and to access them for monitoring and editing from a single view.
- **Global Schedule** - Allows to view synchronize schedule between different smart system components and to access them for monitoring and editing from a single view.
- **Interlocks to Verasys IOMs Application Controller** - Connect different systems through IOMs Application Controller, into the Verasys Network.





## SBH200 – SUPERVISORY CONTROLLERS

### ORDERING INFORMATION

CODE	DESCRIPTION
LC-SBH200-0	Verasys Smart Building Hub 200 with Wifi Dongle

### CONTROLLERS

CODES	DESCRIPTION
LC-VAC1000	Verasys Application Controller 18 Points 24 VAC – No Application
LC-VAC1100	Verasys Application Controller 18 Points 240 VAC – No Application
LC-VAC3000	Verasys Application Controller 18 Points 240 VAC – No Application

### ACCESSORIES

CODES	DESCRIPTION
ACC-PWRKIT-1E24	SBH200 24 VDC Power Adapter for Europe
ACC-WIFIKIT-ODU	SBH200 WiFi Dongle Spare Part

### TECHNICAL SPECIFICATION

Power Consumption	38W maximum
Ambient Temperature Conditions	
<i>Operating</i>	0 to 50°C
<i>Operating Survival</i>	-30 to 60°C
<i>Non-Operating</i>	-40 to 70°C
Ambient Humidity Conditions	
<i>Storage</i>	5 to 95% RH 30°C maximum dew point conditions
<i>Operating</i>	10-90% RH, 30°C maximum dew point conditions
Transmission Speeds	<b>Serial Communication (SA/FC Bus):</b> 9600,19.2k, 67.8k, or 115.2k bps <b>Ethernet Communication:</b> 10, 100 Mbps,1 Gbps
Transmission Range (Typical)	<b>Wireless Communication:</b> 30 m line-of-sight indoors 91 m line-of-sight outdoors
Network and Serial Interfaces	Two SA/FC ports (RJ12 6-pin port; connects with 1.5 m RJ-12 field bus cable, and one screw terminal plug, 4-pin). Three USB ports (one Micro-B port, and two USB A ports). All support USB 2.0 and Open Host Controller Interface [Open HCI] specification
Dimensions (Height x Width x Depth)	190 mm x 125 mm x 44.5 mm
Housing	White Polycarbonate and Acrylonitrile butadiene styrene (ABS) blend
Weight	0.387 kg
Web Browser Requirements for Computers and Handheld Devices	<b>Computer:</b> Windows Internet Explorer® 10 and Windows Internet Explorer 11, or Google® Chrome™ <b>Handheld Device:</b> The handheld device must be running either Internet Explorer Mobile for Windows® Mobile version 5 or version 6 operating system (OS); Android™ 4.0.3, 4.0.4, and 4.1+, or Google Chrome. Other web browsers may display the UI, but the functionality is not guaranteed.
 Compliance	Johnson Controls declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.

# BUILDING AUTOMATION PRODUCTS

## NETWORK DISPLAYS, WEBSERVER AND GATEWAYS

### MAP GATEWAYS

## MAP

### MOBILE ACCESS PORTAL GATEWAY

The Mobile Access Portal (MAP) gateway is a pocket-sized web server that provides a wireless mobile user interface to Johnson Controls branded system controllers.

The MAP Gateway can be used to see trunk devices on *Metasys*® systems. It supports Johnson Controls branded Field Controllers, including PEAK®, FEC, FAC, and VMA.

Offering many-to-one, multi-client connectivity, the MAP Gateway gives you access to any supported device that is on a connected BACnet® Master-Slave/Token-Passing (MS/TP) field bus.

The MAP Gateway solution is conveniently sized and has a built-in wireless access point. The MAP Gateway provides an intuitive, browser-based user interface to access advanced features like alarms and point configuration.



## FEATURES

- **Multi-Client Connectivity** - Provides access to all identifiable supported devices connected to the BACnet® MS/TP trunk
- **Browser-based Interface** - Offers a local display replacement solution that allows you to access device information through any supported web browser
- **Wi-Fi Connectivity** - Lets you commission, configure, and access building automation equipment using Wi-Fi-enabled smart devices or laptops
- **Advanced Features** - Allows you to view alarms, events, and trends. Also to modify schedules and commission devices
- **Browser-based Remote Building Management** - Allows remote management of building systems
- **Portable Size and Mobility** - Allows for options to permanently mount or carry the unit from site to site
- **Configurable Home Pages for Devices** - Allows you to customize your work processes using the Display Object in the Controller Tool
- **Easy-to-use Intuitive User Interface** - Uses color coded bars on point listings to enable you to quickly get the most important statuses from a long list of points

MAP GATEWAYS



ORDERING INFORMATION

CODE	DESCRIPTION
TL-MAP1810-OPE	Portable MAP Gateway - includes MAP Gateway, RJ-12 cable, protective shell and lanyard

ACCESSORIES

CODES	DESCRIPTION
TL-PWRKIT-OD	Universal AC Power Supply Adapter – Used for connecting to Ethernet
MP-STAKIT-0	Stationary Mounting Cradle only - includes mounting bracket
MP-STAFBA-0	Field Bus Adapter - RJ-12 to 4-position Terminal Block Adapter. Used for connecting directly to MS/TP Field Bus



Portable MAP Gateway



Stationary Mounting Cradle



## MAP GATEWAYS

### TECHNICAL SPECIFICATIONS (PART 1/2)

Code	<i>TL-MAP1810-OPE</i>	Portable MAP Gateway - includes MAP Gateway, RJ-12 cable, bumper guard, and lanyard
Power Consumption		From SA/FC bus: 15 VDC at 2.7 VA maximum
Ambient Temperature Conditions	<i>Operating</i>	0 to 50°C
	<i>Operating Survival</i>	-30 to 60°C
	<i>Storage</i>	-40 to 70°C
Ambient Humidity Conditions	<i>Storage</i>	-40 to 70°C; 5 to 95% RH 30°C maximum dew point conditions
	<i>Operating</i>	0 to 50°C; 5 to 95% RH, 30°C maximum dew point conditions
Transmission Power (Typical)	<i>Wireless Local Area Network (WLAN) Transmission Power</i>	+14.5 dBm, 54 Mbps +12.5 dBm, 65 Mbps
	<i>WLAN Receiver Sensitivity (Typical)</i>	-76 dBm, 10% packet error rate (PER), 54 Mbps -73 dBm, 10% PER, 65 Mbps
Transmission Speeds	<i>Wireless Communication</i>	2.4 GHz ISM bands, 802.11 b/g/n, 11/22/54 Mbps
	<i>Serial Communication (SA/FC Bus)</i>	9600, 19.2k, 38.4k, or 115.2k bps
	<i>Ethernet Communication</i>	10, 100 Mbps
Transmission Range (Typical)	<i>Wireless Communication</i>	30 m line-of-sight indoors 90 m line-of-sight outdoors
	<i>WLAN Range Performance</i>	0 - 15 m = Excellent 15 - 30 m = Good 30 - 90 m = Weakest, approaching out of range
Wireless Security		WPA2-PSK TKIP (Wi-Fi Protected Access Pre-Shared Key mode Temporal Key Integrity Protocol)
Network and Serial Interfaces		One SA/FC port (6-pin port; connects with 1.5 m RJ-12 field bus cable) One USB port (Micro-B port; 2.0; supports Open Host Controller Interface [Open HCI] specification)
Dimensions (Height x Width x Depth)	<i>Unit Alone</i>	120 x 70 x 24.5 mm (when used vertically)
	<i>Unit in Shell</i>	128 x 75 x 29.5 mm (when used vertically)
Housing		White Acrylonitrile butadiene styrene (ABS) bracket Black silicone shell
Weight	<i>Unit Alone</i>	0.10 kg
	<i>Unit in Shell</i>	0.15 kg
		<b>Note:</b> Weights do not include any peripheral components such as cables, lanyard, or an external power supply.

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## MAP GATEWAYS

### TECHNICAL SPECIFICATIONS (PART 2/2)

<p>Web browser requirements for computers and handheld devices</p>	
<p><i>Computer</i></p>	<p>Windows® Internet Explorer® 10 and Windows Internet Explorer 11, Apple® Safari® 6.1 and later, or Google® Chrome™</p>
<p><i>Handheld device</i></p>	<p>The handheld device must be running either Internet Explorer Mobile for Windows Mobile version 5 or version 6 operating system (OS); Apple® iPhone® and iPod touch® iOS version 7.0 or greater; or Android™ 4.0.3, 4.0.4, and 4.1+, or Google Chrome. Other web browsers may display the UI, but the functionality is not guaranteed.</p>
<p><b>CE</b> Compliance</p>	<p>Johnson Controls declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.</p>

# BUILDING AUTOMATION PRODUCTS

## NETWORK DISPLAYS, WEBSERVER AND GATEWAYS FIELD ADVANCED DISPLAY

### FAD

The Field Advanced Display (FAD) is a user friendly operator interface featuring BACnet® communication and a colorful, graphic display with touch-screen interface.

The solution is specifically designed to enable user interaction with a BACnet MS/TP-based Building Automation Control System through a convenient, comprehensive and intuitive user interface.

The FAD is delivered with a factory programmed application for ease of use and to reduce and simplify its set-up.

Its flexible, attractive and intuitive graphical interface allows any user type to navigate the Building Automation Control System to view useful information such as temperatures, adjust parameters as set-points, program schedules and calendars and monitor dynamic information such as alarms and events. The access authority to information is managed through a series of optional user passwords.

The FAD offers various options to configure. It can be configured directly without the need of a PC or software tool, using its own user interface or it can be conveniently prepared off-line using a PC.

The device configuration can be easily archived, exported or imported with a widely supported file format (CSV) through the embedded USB port.

Its compact dimensions, IP protection ratings and multiple mounting options, together with its modern and discrete design, allow the FAD to properly adapt its style to any type of room and user's preference.

### FEATURES

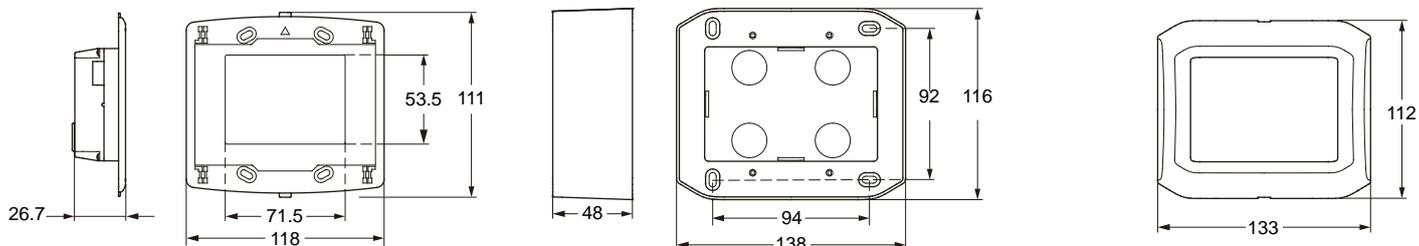
- Factory Programmed Application
- BACnet® MS/TP Communication
- Portable configurations and easily upgradeable
- Compact and neutral design



FAD - FIELD ADVANCED DISPLAY



**DIMENSIONS (in mm)**



Wall mount box (WMB0351-0)

Plastic frame  
(WPF0351-0 and BPF0351-0)

**ORDERING INFORMATION**

CODES	DESCRIPTION
FAD0351-0	3.5" Field Advanced Display
WMB0351-0	Wall mounting box
FMB0351-0	Flush mounting box
IPG0351-0	IP65 gasket
WPF0351-0	White plastic frame
BPF0351-0	Black plastic frame
USB0351-0	USB cable, 0.5 m
USB0351-1	USB cable, 2 m

**CONTROLLERS WITH DISPLAY PACKAGED SOLUTIONS**

A series of bundle packages are available to facilitate and optimize ordering and logistics operations.

These bundles are including the selected field controller and a Field Advanced Display to offer a convenient solution.

CODES	DESCRIPTION
FED2611-0	Field Equipment controller, 24 VAC, 17-points with FAD display
FCD2612-1	Field Advanced controller, 24 VAC, 18-points with FAD display
FCD2612-2	Field Advanced controller, 230 VAC, 18-points with FAD display
FCD2611-0	Field Advanced controller, 24 VAC, 17-points with FAD display
FCD3611-0	Field Advanced controller, 24 VAC, 26-point with FAD display

# BUILDING AUTOMATION PRODUCTS

## NETWORK DISPLAYS, WEBSERVER AND GATEWAYS

## TOUCH ADVANCED DISPLAY

# TAD

The Touch Advanced Display (TAD) is a comprehensive series of freely programmable operator interfaces featuring both IP and MSTP BACnet® communication and colorful, graphic displays with touch-screen interface.

TAD Displays feature bright TFT widescreen (16:9) displays of different sizes 4.3", 7" and 10" with a fully dimmable LED backlight and resistive touch interface. The integrated HTML 5.0 web server grants remote access whenever the units are connected to an accessible IP network.

TAD series offers an unprecedented price / performance ratio to meet challenging applications requirements from offices to control rooms. They combine state-of-the-art features and top performance with an outstanding design.

TAD Series is the ideal choice for User Interface applications enabling an intuitive and easy interaction with the building automation controls and equipment.



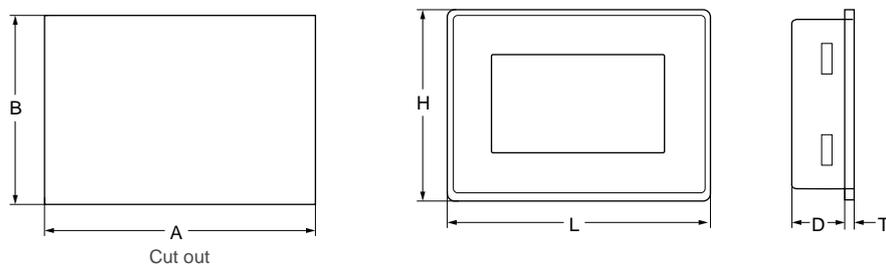
## FEATURES

- **Standard BACnet Interfaces (IP / MSTP)** - The TAD Series fulfill the standard BACnet Operator Display (B-OD) profile enriching its minimum requirements with Alarms, Time Schedules and Calendars support, enabling users to take full advantage of the features included in the connected devices.
- **Freely Programmable** - The Touch-Screen Tailoring Tool (T<sup>3</sup>) suite allows customizing the TAD user experience tailoring it to the effective User requirements. Thanks to the extensive library of symbols and widgets, building data and operations are presented in a consistent way across different applications.
- **Web-Browser Widget** - Embedded web browser devices are becoming a common demand in the marketplace. TAD features a web-browser widget that can be included in the User Interface project empowering the end user to connect to simple web pages and interact with remote systems.
- **Embedded Web-Server** - The web server capabilities natively included in TAD devices allow users to remotely connect and interact with the device through standard internet browsers. The web pages user interface will reflect the same UX of the local application therefore maintaining a consistent look across different interfaces.
- **Simple and Elegant but Robust Design** - Its simplicity of design does not preclude the immediate impression of beauty and the IP66 protection rate for the front of the unit.



## TAD - TOUCH ADVANCED DISPLAY

### DIMENSIONS (in mm)



CODES	A	B	D	H	L	T
TAD0471	136	96	29	107	147	5
TAD0701	176	136	29	147	187	5
TAD1001	271	186	29	197	282	6

### ORDERING INFORMATION

CODES	DESCRIPTION
TAD0471-0	4.3" Touchscreen Advanced Display
TAD0701-0	7.0" Touchscreen Advanced Display
TAD1001-0	10.0" Touchscreen Advanced Display

### ACCESSORIES (TO BE ORDERED SEPARATELY)

CODES	DESCRIPTION
BOX04-01	Wall mount box for TAD04
BOX07-01	Wall mount box for TAD07
BOX10-01	Wall mount box for TAD10
DEMO-STAND07	Demonstration Stand for TAD07

### PROGRAMMING TOOL LICENSE (TO BE ORDERED SEPARATELY FROM SIS EUROPE)

CODES	DESCRIPTION
TTT0103	Touchscreen Tailoring Tool, single license Key for 3 installations
TTT0110	Touchscreen Tailoring Tool, single license Key for 10 installations
TTT0130	Touchscreen Tailoring Tool, single license Key for 30 installations



## TAD - TOUCH ADVANCED DISPLAY

### TECHNICAL SPECIFICATION

Codes		
	<i>TAD0471-0</i>	4.3" Freely programmable Touchscreen Advanced Display
	<i>TAD0701-0</i>	7.0" Freely programmable Touchscreen Advanced Display
	<i>TAD1001-0</i>	10.0" Freely programmable Touchscreen Advanced Display
Display		
	<i>TAD0471</i>	4.3" Widescreen TFT 64k Colors, 480 x 272 and LED backlight
	<i>TAD0701</i>	7.0" Widescreen TFT 64k Colors, 800 x 480 and LED backlight
	<i>TAD1001</i>	10.1" Widescreen TFT 64k Colors, 1024 x 600 and LED backlight
Brightness		200 cd/m <sup>2</sup> max
Touch-Screen		Resistive
Supply Voltage		18 - 32 VDC
Real-Time Clock		Yes
Ethernet Port		1 - Port 0 10/100
Serial Port		1 - RS-232 / RS-422 / RS-485 Software Configurable
USB Port		1 - Host v. 2.0, max. 500 mA
Power Consumption		
	<i>TAD0471</i>	250 mA max at 24 VDC
	<i>TAD0701</i>	300 mA max at 24 VDC
	<i>TAD1001</i>	380 mA max at 24 VDC
Ambient Conditions		
	<i>Operating</i>	0 to 50°C, 5 to 85% RH Noncondensing
	<i>Storage</i>	-20 to 70°C, 5 to 85% RH Noncondensing
Dimensions (Height x Width x Depth)		
	<i>TAD0471</i>	107 x 147 x 29 mm
	<i>TAD0701</i>	147 x 187 x 29 mm
	<i>TAD1001</i>	197 x 282 x 29 mm
Weight		
	<i>TAD0471</i>	0.4 Kg
	<i>TAD0701</i>	0.6 Kg
	<i>TAD1001</i>	1.0 Kg
Memory		
	<i>TAD0471</i>	256 MB RAM, 2 GB Flash
	<i>TAD0701</i>	256 MB RAM, 2 GB Flash
	<i>TAD1001</i>	512 MB RAM, 4 GB Flash
Protection Class		IP66 Front*, IP20 Back *IP66 rating is achieved respecting the instructions provided.
CE Compliance		Johnson Controls declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive. Emission EN 61000-6-4, Immunity EN 61000-6-2 for installation in industrial environments Emission EN 61000-6-3, Immunity EN 61000-6-1 for installation in residential environments



## TEMPERATURE CONTROLS MECHANICAL THERMOSTATS

### 270XT

FREEZE PROTECTION, IP30

Sensing element is 3 or 6 meters long to permit attaching across the surface of a coil to guard against freezing at any point. When any 30 cm or more of this element senses a temperature as low as the control setpoint, it will "switch off".

A special version is available with bulb and 2 m capillary, range 24 to 18°C for clamp on or immersion purposes. SPDT change over contacts permit the use of an alarm signal.



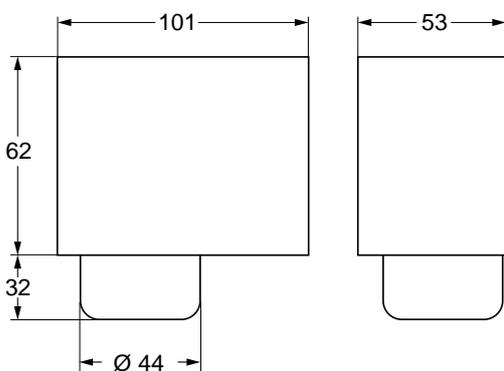
### FEATURES

- Dust tight PENN switch
- SPDT contacts
- 270XTAN provided with trip-free manual reset
- Controls have adjustable range

### APPLICATION

These controls are designed for protection against freeze up of hydronic heating coils, cooling coils and similar application.

### DIMENSIONS (in mm)



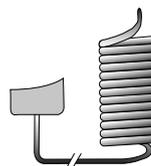


**ORDERING INFORMATION**

CODES	RANGE (°C)	DIFF. (K) FIXED	STYLE	CAP. LENGTH (m)	BULB SIZE (mm)	SWITCH 8A	ADDITIONAL FEATURES	
270XT-95008	-10 to 12	3	9	---	3.2 x 6000	SPDT open low	Automatic recycle	
270XT-95078					3.2 x 3000			
270XT-95068	-24 to 18	4	1b	2	9.5 x 80			Manual reset
270XTAN-95008	-10 to 12	---	9	---	3.2 x 6000			
270XTAN-95088					3.2 x 3000			
270XTAN-95048	-24 to 18		1b	2	9.5 x 80			



Style 1b



Style 9



TEMPERATURE  
CONTROLS  
MECHANICAL  
THERMOSTATS

## A19

CAPILLARY AND SPACE THERMOSTATS, IP30

These thermostats are available with fixed or adjustable differential. The various control ranges cover a broad range of temperature applications with a minimum number of models.

On request a built-in high or low limit stop is possible and can be adjusted quickly and easily in the field. All models have a universal way of adjustment. For this purpose a knob and sealing cap are enclosed.

All are equipped with IP30 enclosure.

### FEATURES

- Liquid filled sensing element
- Dust tight Penn switch
- Trip free manual reset
- Front adjustment

### APPLICATION

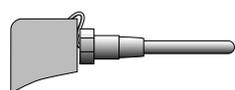
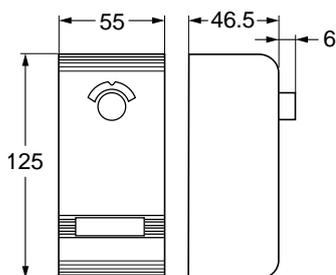
These thermostats are designed for refrigeration, cooling, heating, ventilation and air-conditioning applications. Standard models are provided for remote sensing or room sensing. Models with manual reset are available for low or high limit functions.



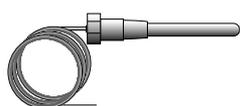


## ORDERING INFORMATION

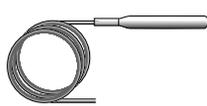
### DIMENSIONS (in mm)



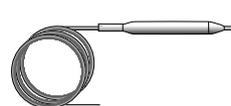
Style 2



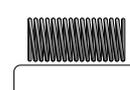
Style 4H



Style 1a



Style 1b



Style 3

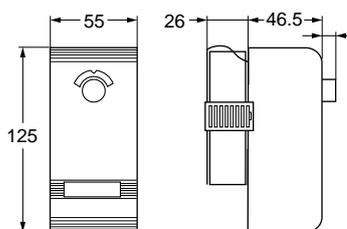
CODES	RANGE (°C)	DIFF. (K) FIXED	STYLE	CAP. LENGTH (m)	BULB SIZE (mm)	SWITCH 8A AUTO RECYCLE	ADDITIONAL FEATURES		
A19AAC-9005	-5 to 28	2	1b	2	135	SPDT open low	---		
A19AAC-9009	40 to 120	3.5			100	SPDT open high			
A19AAC-9102	-35 to 10	2.5			110				
A19AAC-9107	35 to 150	4	1a	2	265	SPDT open high	∅ 5 mm bulb		
A19AAC-9108	90 to 290	5.5			155		---		
A19AAC-9123	0 to 10	2.5	1b	5	80	SPDT open low	Bulb ∅ 9.3 mm		
A19AAC-9124	-5 to 28	2		135	---				
A19AAC-9127	1 to 60	1.5		3	115		Maximum bulb temperature 85°C		
A19AAC-9130	-10 to 14	2.5	1a	2	80	SPDT open low	Case compensation, low limit stop at 2°C		
A19AAF-9101	0 to 10	1.5					1a	2	80
A19AAF-9102					∅ 9.3 mm bulb, case compensation				
A19AAF-9103	5 to 32	0.8	1b		155	SPDT open high	---		

A19 IP30 - MECHANICAL THERMOSTATS

ORDERING INFORMATION (PART 1/2)



DIMENSIONS (in mm)



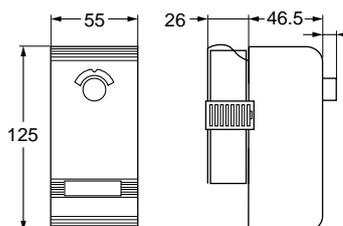
CODES	RANGE (°C)	DIFF. (K) FIXED	STYLE	CAP. LENGTH (m)	BULB SIZE (mm)	SWITCH 8A AUTO RECYCLE	ADDITIONAL FEATURES
A19A capillary thermostats							
A19ABC-9011	40 to 120	3 to 13	2	---	---	SPDT open high	1/2-14NPT connector
A19ABC-9012			4H	2	---		
A19ABC-9036	-35 to 40	2.8 to 8	1b	6.5	110	5 A switch, SPDT open low	Universal replacement
A19ABC-9037	-35 to 40			3.5		---	
A19ABC-9103	-35 to 10			2.8 to 11	2	135	SPDT open low
A19ABC-9104	-5 to 28	2 to 8	2				
A19ABC-9106	10 to 95	3.5 to 14	1a	3.5	75	SPDT open high	Ø 7.4 mm bulb
A19ABC-9116	1 to 60	2 to 8.5	1b	3	115	SPDT open low	Max. bulb temp. 85°C
A19ABC-9117				5			
A19AGF-9101*	0 to 13	1.5 fixed	1a	2	80	SPDT open low	3 A switch (see bull. 3545), no enclosure, cal. pointer with dial, screwdriver slot, case compensation, bulb Ø 9.3 mm, bulk pack
A19ACC capillary thermostat, lock-out low with manual reset							
A19ACC-9100	-35 to 10	6	1b	2	110	SPDT open low	---
A19ACC-9101	-5 to 28	4		5	135		
A19ACC-9103		6		3.5	110		Low limit stop set at 2°C
A19ACC-9105	-35 to 10	6		3	135		---
A19ACC-9107	-5 to 28	4		5	110		Low limit stop set at 2°C
A19ACC-9111	-35 to 10	6		6.5			110
A19ACC-9116							

...Continued...



ORDERING INFORMATION (PART 2/2)

DIMENSIONS (in mm)



CODES	RANGE (°C)	DIFF. (K) FIXED	STYLE	CAP. LENGTH (m)	BULB SIZE (mm)	SWITCH 8A AUTO RECYCLE	ADDITIONAL FEATURES
A19ADC capillary thermostat, lock-out high with manual reset							
A19ADC-9200	40 to 120	7	2	---	---	SPDT open high	1/2-14 NPT connector
A19B space thermostats							
A19BAC-9001	0 to 43	2	3	---	---	SPDT open high	Vinyl coated element
A19BAC-9250	-35 to 10	2.5				SPDT open low	
A19BAC-9251	-5 to 28	2				SPDT open low, 5A	
A19BBC-9275	-35 to 40	2.8 to 8					
A19D strap-on thermostats							
A19DAC-9001	40 to 120	4.5	20	---	---	SPDT open high	8 A switch, NEMA 1 enclosure, universal adjustment, including mounting strap
A19DAF-9001	92 to 116	2	20				3 A switch, universal adjustment, including mounting strap

Note

\* Quantity orders only



## TEMPERATURE CONTROLS MECHANICAL THERMOSTATS

### A19

#### CAPILLARY AND SPACE THERMOSTAT, IP65

These thermostats are available with fixed or adjustable differential. The various control ranges cover a broad range of temperature applications with a minimum number of models.

SPDT contacts are standard on all models.



### FEATURES

- Liquid filled sensing element
- Dust tight PENN switch
- IP65 protection class
- Front adjustment

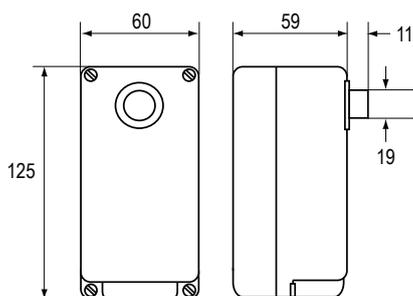
### APPLICATION

These thermostats are designed for applications where a splash-proof and/or dust-tight enclosure is required.

Four types are available:

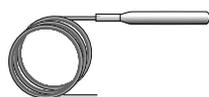
- Types A19ARC are general purpose capillary thermostats.
- Types A19BRC and A19BQC are space thermostats with coiled element to be used as farm control, outdoor thermostats or in cold storage rooms.
- Types A19AQF is specially designed for milkcool-tank applications.
- Type A19AQC-9101 is specially designed for ice-bank application.

### DIMENSIONS (in mm)

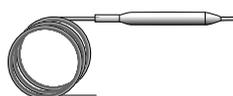




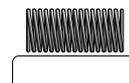
ORDERING INFORMATION



Style 1a



Style 1b



Style 3

CODES	RANGE (°C)	DIFF. (K) ADJUST.	STYLE	CAP. LENGTH (m)	BULB SIZE (mm)	SWITCH 8A AUTO RECYCLE	ADDITIONAL FEATURES
A19ARC-9100	-35 to 10	2.8 to 11	1b	2	110	SPDT open low	---
A19ARC-9101	-5 to +28	2 to 8	1b	2	135		---
A19ARC-9104	-20 to 65	3.5 to 13	1a	3.5	75		∅ 7.4 mm bulb
A19ARC-9105	5 to 50	2.5 to 11	1b	2	110		Concealed scale, screwdriver adjustment, bulb and cap. rubber coated
A19ARC-9107	40 to 120	3.5 to 13.5	1a	2	100		---
A19ARC-9109	1 to 60	2 to 8.5	1a	3	115		Maximum bulb temperature 85°C
A19ARC-9110	-10 to 50	2.5 to 11	1b	2	110		Concealed scale, screwdriver adjustment
A19ARC-9113	-35 to 40	2.8 to 11	1b	2	110		---



ORDERING INFORMATION

CODES	RANGE (°C)	DIFF. (K) ADJUST.	STYLE	CAP. LENGTH (m)	BULB SIZE (mm)	SWITCH 8A AUTO RECYCLE	ADDITIONAL FEATURES
A19A capillary thermostats							
A19AQC-9101	-5 to 5	2 fixed	1a	2	80	SPDT open low	5 A switch, Ice bank control, bulb Ø 9.3 mm, case compensation, concealed scale, screwdriver adjustment, scale calibrated at increasing temperature
A19AQC-9102	-5 to 28	2 fixed	1b	2	135		8 A switch, calibrated and set at 2°C, case compensation, pointer adjust, PG16 connect., 1/2 - 14 NPT WELL connector
A19AQC-9104	-35 to 10	2 fixed	1b	2	110		Case compensation, knob adjustment
A19AQC-9200	-5 to 55	2.5 fixed	2	---	---		---
A19AQF-9100	0 to 13	1.5 fixed	1a	2	80		3 A switch, bulb Ø 9.3 mm, case compensation, concealed scale, screwdriver adjustment
A19AQF-9102	0 to 13	1.5 fixed	1a	3	80		3 A switch, cap. thermostat, bulb Ø 9.3 mm, case compensation, concealed scale, screwdriver adjustment
A19B space thermostats							
A19BRC-9250	-5 to 28	2 to 8	3	---	---	SPDT open low	Vinyl coated element
A19BRC-9251	0 to 43	2 to 8	3				
A19BRC-9252	-35 to 10	2.8 to 11	3				
A19BRC-9253	-35 to 40	2.8 to 11	3				
A19BQC-9252	-5 to 25	2 fixed	3				Concealed scale, screwdriver adjustment



TEMPERATURE  
CONTROLS  
MECHANICAL  
THERMOSTATS

## A28

### 2-STAGE CAPILLARY AND SPACE THERMOSTAT, IP30 / IP65

Controls are compact with fixed differential per stage and (on most models) adjustable differential between stages. Liquid filled element provides wide range, constant differential over whole range and no influence from barometric pressure.

Since the bulb contains the major portion of the total fill the thermostat may be considered as cross-ambient, capillary and cup temperature variations affect the operating point only slightly due to the small amount of fill they contain.

For quantity orders it is possible to have the below stated optional constructions:

- Without case and cover for panel mounting
- Close differential per stage
- Different capillary lengths

All standard IP30 enclosure models have a universal way of adjustment. For this purpose a knob and sealing cap are enclosed.

## FEATURES

- Liquid filled sensing element
- Dust tight Penn switch
- IP65 protection class models available
- Front adjustment

## APPLICATION

These thermostats are designed for various types of heating, cooling, ventilation, or air-conditioning applications. All models have two SPDT switches providing the following control possibilities:

- 2 stage heating
- 2 stage cooling
- Heating/cooling with automatic changeover

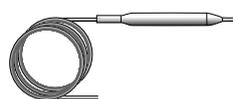
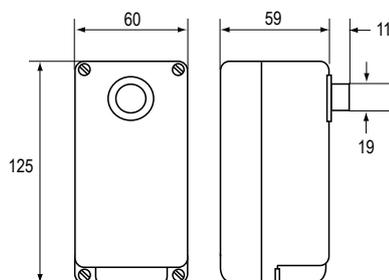
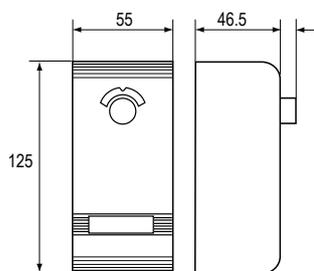


IP30

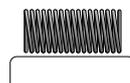
IP65

A28 - MECHANICAL THERMOSTATS

DIMENSIONS (in mm)



Style 1b



Style 3

ORDERING INFORMATION

CODES	RANGE (°C)	DIFF. (K)		STYLE	CAP. LENGTH (m)	BULB SIZE (mm)	SWITCH 5A AUTO RECYCLE	ADDITIONAL FEATURES NEMA 1 ENCLOSURE
		Stage	Betw					
IP30								
A28AA-9006	-35 to 10	2	1 to 4	1b	2	110	SPDT Open Low	General purpose
A28AA-9007	-5 to 28	1.5				135		
A28AA-9106				5				
A28AA-9113	0 to 43	2		3	---	---	SPDT Open High	
A28AA-9118	1 to 60	2	1b	3	115		Max. bulb temp. 85°C, general purpose	
IP65								
A28QA-9101	5 to 50	2	1 to 4	1b	2	110	SPDT Open Low	Concealed scale, screwdriver adjustment
A28QA-9110	-35 to 10							---
A28QA-9111	-5 to 28	1.5						---
A28QA-9114	-35 to 40	2		3.5	110	---		
A28QA-9113	0 to 43	1.5	3	---	---	SPDT Open High	Bulb stainless steel	
A28QA-9115	1 to 60	2	1b	3	115		---	
A28QA-9117	20 to 40	1.5	3	---	---		Bulb stainless steel	
A28QJ-9100	10 to 95		1 to 5	1b	3	100	SPDT Open Low	3 A Switch





TEMPERATURE  
CONTROLS  
MECHANICAL  
THERMOSTATS

## A36

### 3- OR 4-STAGE THERMOSTAT

Models are available in 'open' construction for panel mounting. Single knob adjustment moves the entire staging band up and down within the range of the control. The differential on each stage and sequencing between stages are factory set. This permits the OEM to completely engineer the cycling of their equipment without the hazard of field mis-adjustments and erratic sequencing.

## FEATURES

- Dust-tight SPDT switches
- Cushion mounted
- Operation from a single, liquid filled element
- Case compensation standard on all models

## APPLICATION

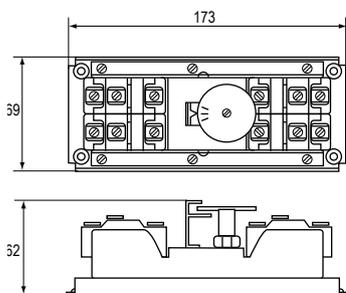
Designed for multi-stage thermostatic operation of electrically controlled equipment such as:

- Packaged liquid chillers
- Heat pumps
- Electric duct heaters
- Computer room airconditioners





## DIMENSIONS (in mm)



## ORDERING INFORMATION

CODES	RANGE (°C)	ADJUSTMENT CODE	CAP. LENGTH (m)	BULB SIZE (mm)	SWITCH AUTO RECYCLE	ADDITIONAL FEATURES
3-stage thermostats						
A36AGA-9101	-18 to 20	B1	5	125	5 A	Armored PVC capillary
A36AGA-9102			3.5			
A36AGA-9103	15 to 35	C1		125	3 A	
A36AGB-9103	-18 to 20	B2				
4-stage thermostats						
A36AHA-9105	-18 to 20	B1	3.5	125	5 A	Armored PVC capillary
A36AHA-9107	-16 to 20		5			
A36AHA-9108	15 to 35	C1	3.5	140		
A36AHB-9103	10 to 95	D2	3	100	3 A	Max. bulb temp. 115 °C
A36AHB-9104	-18 to 20	B2	3.5	125		Armored PVC capillary
A36AHB-9105			5			Braided copper capillary
A36AHB-9109			-15 to 30	5		110



## TEMPERATURE CONTROLS MECHANICAL THERMOSTATS

### T22 / T25

STAGE ROOM THERMOSTAT, LINE VOLTAGE, IP20

These thermostats with a sturdy steel cover are provided with a liquid filled sensing element. This element is formed to achieve maximum sensitivity to surrounding air temperature changes.

Coupled with a highly efficient diaphragm and leverage mechanism, the element operates a totally enclosed Penn switch contact with a close differential switching action without the use of "heat or cool" anticipators.



## FEATURES

- Liquid filled elements
- Dust tight Penn switch
- Small differential
- 2-stage thermostats with dead band and automatic change over

## APPLICATION

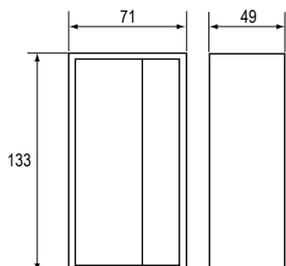
These room thermostats are designed to control heating and/or cooling equipment, in commercial industrial or residential installations. Typical uses are for unit heaters, fan coils, cooling rooms etc. Type T22SRX can be used for either heating or cooling.

Type T25B (2-stages) can be used for:

- 2-stages heating
- 2-stages cooling
- Heating/cooling with dead band and automatic change over

## T22 / T25 - MECHANICAL THERMOSTATS

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	RANGE (°C)	DIFF. (K) FIXED	ADJUSTMENT	THERMOMETER	SWITCH 3A	ADDITIONAL FEATURES
T22, 1-stage room thermostat						
T22SRX-9100	5 to 32	1	Knob	■	SPDT open high	Automatic recycle
T22SRX-9101				---		
T22SRX-9104			Concealed	---		
T25, 2-stage room thermostat						
T25B-9101	5 to 32	1	Knob	---	SPDT open high	---
T25B-9102			---	---		Concealed scale, screwdriver adjustment



TEMPERATURE  
CONTROLS  
MECHANICAL  
THERMOSTATS

## A25

### ROD AND TUBE SENSING ELEMENT

A rod and tube type sensing element actuate the switch contacts.

Main contacts (1 - 2) are normally closed, and open when the temperature at the element rises to the dial setpoint.

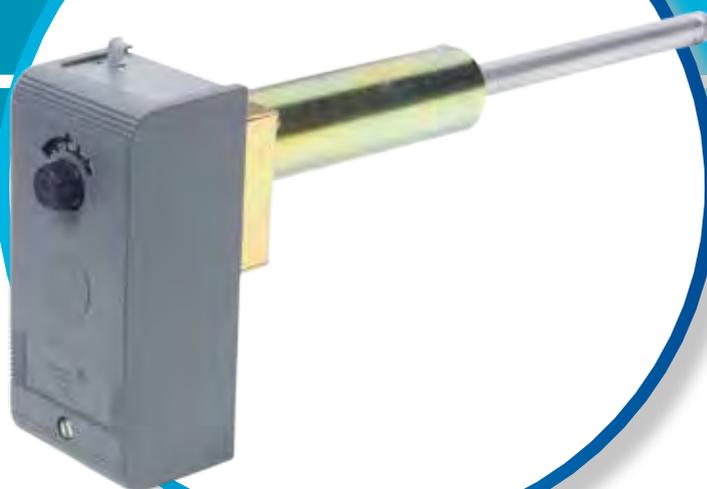
Contacts are re-closed only by operation of the reset lever. The reset lever is "trip-free" and cannot be used to block contacts in a closed position.

### FEATURES

- Rod and tube type of element
- Adjustable duct mounting flange
- Trip-free manual reset
- Dust-tight Penn switch

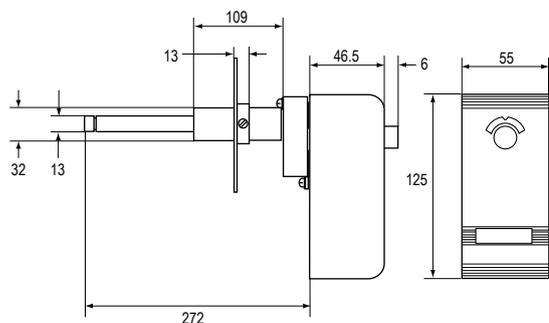
### APPLICATION

These warm air limit controls "lock out" on a temperature increase to the control setpoint. Manual reset is required to re-close the electrical contacts. A typical application is to stop air-conditioning or ventilating fans in the event of excessive return air temperature, as from a fire.





## DIMENSIONS (in mm)



## ORDERING INFORMATION

CODES	RANGE (°C)	SWITCH 8A MANUAL RESET	ADDITIONAL FEATURES
A25CN-9001	0 to 100	SPDT open high	Visible scale, Knob adjustment, NEMA 1 enclosure, with flange for duct mounting

# ACCESSORIES

## ORDERING INFORMATION

CODES	DESCRIPTION	PRIMARY USAGE	INNER Ø X TUBE LENGTH BULB WELL (mm)	INSIDE AND OUTSIDE CONNECTOR (NPT)	MATERIAL CONNECTOR POCKET
FTG13A-600R	Closed tank connector Style 1b elements, Max. 10 bar, 120°C, Min. -40°C	A19/28/36	---	---	---
KIT012N600	Capillary brackets (6 pieces)	270XT			
WEL003N602R	Bulb well, Max. pressure 70 bar, Temp. 370°C	---	9.8 x 125	1/2 - 14	Stainless steel
WEL11A601R	Bulb well, Max. pressure 20 bar, Temp. 120°C, USA item	A19	7.3 x 60	1/2 - 14	Brass/Copper
WEL14A-600R	Bulb well, Max. pressure 69 bar, Temp. 370°C, USA item	A19/28/36	11.2 x 120	1/2 - 14	Monel/Monel
WEL14A602R	Bulb well, Max. pressure 20 bar, Temp. 120°C, USA item	A19/28/36	9.8 x 125	1/2 - 14	Brass/Copper
WEL14A603R	Bulb well, Max. pressure 20 bar, Temp. 120°C, USA item	A19/28/36	9.8 x 147	1/2 - 14	Brass/Copper
WEL16A-601R	Bulb well, Max. pressure 20 bar, Temp. 120°C, USA item	A19/28/36	9.5 x 71	1/2 - 14	Brass/Copper



## FLOAT AND FLOW CONTROLS

### MECHANICAL LIQUID FLOW SWITCH

# F61

#### FLOW SWITCH FOR LIQUID

The F61 liquid flow switches can be used in liquid lines carrying water, sea water, swimming pool water, ethylene glycol or other liquids not harmful to the specified materials.

The switches have SPDT contacts and can be wired to energise one device and de-energise another when liquid flow either exceeds or drops below the set flow rate. Pipe insert models and the T-body types for low-flow applications are available.

The IP43 versions can be used for liquid temperatures above dewpoint (*for use in other environments see the Product Data Sheet*). Typical applications are to shut down the compressor on liquid chiller systems, to prove flow on electric immersion heaters and to give a signal or alarm when the pump on condenser cooling system shuts down.

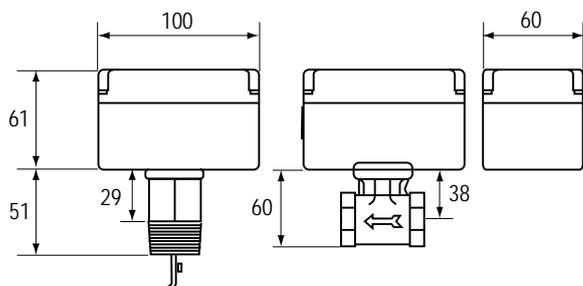
## FEATURES

- T-body and pipe-insert types available
- Polycarbonate IP43 enclosure
- Vapour tight IP67 enclosure
- Stainless steel pipe-insert type
- Large wiring space
- Range screw easy accessible.



F61 - MECHANICAL LIQUID FLOW SWITCH

DIMENSIONS (in mm)



ORDERING INFORMATION

IP43

CODES	RANGE	CONNECTION		SWITCH ACTION	ADDITIONAL FEATURES
F61SB-9100	0,15 dm <sup>3</sup> /s - 46 dm <sup>3</sup> /s	R1" DIN2999	(ISO R7)	SPDT contacts, 15(8) Amp 230 V~	4 paddles 1", 2", 3", 6" St.St. AISI 301
F61SD-9150	0,04 dm <sup>3</sup> /s - 0,07 dm <sup>3</sup> /s	1/2 -14 NPTF	T-body		---
F61SD-9175		3/4 -14 NPTF			

IP67

CODES	RANGE	CONNECTION		SWITCH ACTION	ADDITIONAL FEATURES
F61TB-9100	0,15 dm <sup>3</sup> /s - 46 dm <sup>3</sup> /s	R1" DIN2999	(ISO R7)	SPDT contacts, 15(8) amp 220 V~	4 paddles, 1", 2", 3" and 6" St.St. AISI 301
F61TB-9104				SPDT contacts, 0,4 Amp 15 V~	Lowenergy gold flashcontacts 4 paddles, 1", 2", 3" and 6" St.St. AISI 301
F61TB-9200				SPDT contacts, 15(8) Amp 220 V~	Stainless steel body assembly 3 paddles 1", 2", 3" St.St. AISI 316L
F61TD-9150	0,04 dm <sup>3</sup> /s - 0,07 dm <sup>3</sup> /s	1/2 -14 NPTF	T-body		---

ACCESSORIES FOR FLOW SWITCHES

CODES	DESCRIPTION
PLT69-11R	F61 - 6" stainless steel AISI 301 paddle
KIT21A-602	F61 - 4 paddles 1", 2", 3" and 6" St.St. AISI 301



## FLOAT AND FLOW CONTROLS

### MECHANICAL LIQUID FLOW SWITCH

# F261

FLOW SWITCH FOR LIQUID

The F261 series flow switches respond to fluid flow in lines carrying water, ethylene glycol, or other nonhazardous fluids. These models also work in applications with swimming pool water and lubricating oils.

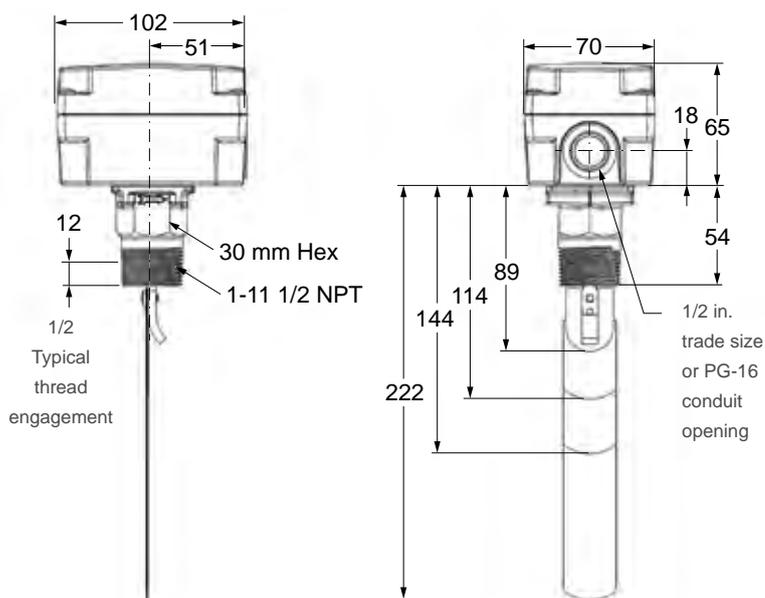
F261 series standard flow switches use a variety of paddle sizes to respond to fluid flow rates in applications with 1 inch trade size (or greater) pipe.



## FEATURES

- Type 3R (NEMA) or type 4 (NEMA) polycarbonate enclosure
- Viton® diaphragm
- Gold-plated contacts on selected models
- Maximum fluid pressure of 290 psig (20 bar)

## DIMENSIONS (in mm)



## F261 - MECHANICAL LIQUID FLOW SWITCH



### ORDERING INFORMATION

#### STANDARD MODEL FLOW SWITCHES

CODES	DESCRIPTION
F261KAH-V01C	Standard model flow switch with type 3R (NEMA) enclosure; 1 in., 2 in., 3 in., and 6 in. stainless steel paddles, lock-tooth washer, and stainless steel paddle screw supplied uninstalled
F261MAH-V01C	Standard model flow switch with type 4 (NEMA) enclosure; 1 in., 2 in., 3 in., and 6 in. stainless steel paddles, lock-tooth washer, and stainless steel paddle screw supplied uninstalled

#### REPLACEMENT PADDLE PARTS

CODES	DESCRIPTION
KIT21A-600	Stainless steel 3-piece paddle (3 in., 2 in., and 1 in. segments)
KIT21A-601	Stainless steel 6 in. paddle
PLT52A-600R	Stainless steel 3-piece paddle (3 in., 2 in., and 1 in. segments) and stainless steel 6 in. paddle

### TECHNICAL SPECIFICATIONS (PART 1/2)

#### F261XXH CERIES CTANDARD CONTROLS ELECTRICAL RATINGS

Volts, 50/60 Hz	UL60730/UL1059				EN60730	
	24	120	208	240	24	230
<i>Horsepower</i>	---	1	1	1	---	---
<i>Full load Amperes</i>	---	16	10	10	---	8
<i>Locked rotor Amperes</i>	---	96	60	60	---	48
<i>Resistive Amperes</i>	16	16	10	10	16	16
<i>Pilot duty VA</i>	125	720	720	720	77	720



## F261 - MECHANICAL LIQUID FLOW SWITCH

### TECHNICAL SPECIFICATIONS (PART 2/2)

#### UL CONFORMITY DECLARATION INFORMATION

Purpose of control	<b>F261 fluid flow switch</b>
Construction of control	Electronic independently mounted control
Number of cycles	100,000 cycles
Method of mounting control	Mounting to sensed media vessel/orientation
Type 1 or type 2 action	Type 1.C (Microinterruption)
External pollution situation	Pollution degree 4
Internal pollution situation	Pollution degree 2
Rated impulse voltage	4,000 VAC
Ball pressure temperature	
<i>Enclosure</i>	130°C
<i>Switch component</i>	122°C
Control adjustment instruction	---
Field wiring rating	<b>Wire/cord temperature ratings:</b> 60°C only permitted when ambient air and media are less than 45°C 75°C only permitted when ambient air and media are less than 60°C 90°C only permitted when ambient air is less than 60°C and media is less than 75°C 150°C permitted when ambient air is less than 60°C and media is less than 121°C
Vessel pressure	F261 fluid flow switch: 290 psi (20 Bar)

#### FLUID FLOW SWITCHES

Switch	SPDT
Enclosure	
<i>UL</i>	Type 3R or Type 4
<i>CE</i>	IP43 (IP23 with drain hole plug removed) or IP67
Wiring connections	Three color-coded screw terminals and one ground terminal
Conduit connection	One 22 mm hole for 1/2 in. trade size (or PG16) conduit
Pipe connector	Standard: 1 in. 11-1/2 NPT Threads
Maximum fluid pressure	290 psi (20 bar)
Minimum fluid temperature <sup>1</sup>	-29°C
Maximum fluid temperature <sup>2</sup>	121°C
Ambient conditions	-40 to 60°C
<b>CE</b> Compliance	Johnson Controls declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.

#### Notes

- 1 Ensure that the low liquid temperature combined with the low ambient temperature does not lead to the freezing the liquid inside the body (or bellows, where appropriate). Please observe the liquid freezing point.
- 2 At higher ambient temperatures, the maximum allowed liquid temperature becomes lower. The temperature of the electrical switch inside should not exceed 70°C.



## FLOAT AND FLOW CONTROLS

### MECHANICAL AIR FLOW SWITCH

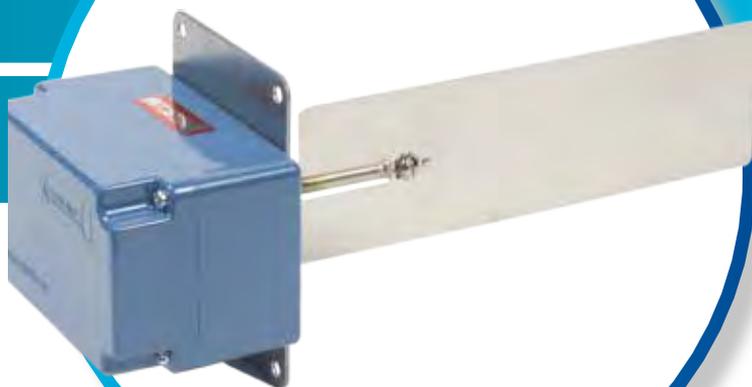
# F62

#### AIR FLOW SWITCH

The F62 airflow switch detects air flow or the absence of air flow by responding only to the velocity of air movement within a duct.

The control can be wired to open one circuit and close a second circuit (SPDT) for either signaling or interlock purposes. Failure of air flow during normal operation of air handling systems may cause over-heating, coil icing and other conditions that may be detrimental to the equipment.

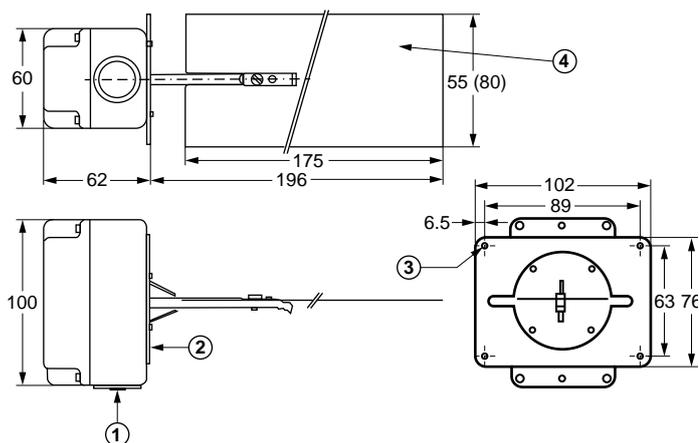
Typical applications include make-up air systems, air cooling or heating processes and exhaust systems.



## FEATURES

- Polycarbonate IP43 enclosure
- Large wiring space
- Range screw easily accessible

## DIMENSIONS (in mm)



- |   |  |
|---|--|
| 1 | Cable inlet hole $\varnothing$ 22.7 mm; Dust cup is installed                      |
| 2 | Mounting plate gasket 0.2 mm thick neoprene cell rubber                            |
| 3 | Four mounting holes $\varnothing$ 5 mm.  |
| 4 | One paddle 55 mm wide (mounted)<br>One paddle 80 mm wide (packed with the control) |



## ORDERING INFORMATION

IP43

CODES	MAX. AIR VELOCITY	SWITCH ACTION	ENCLOSURE	ADDITIONAL FEATURES
F62SA -9100	10 m/sec	SPDT Contacts 15(8) A, 230 V~	Plastic enclosure IP43	With 55 mm paddle mounted, 80 mm separate

## ACCESSORIES

CODES	DESCRIPTION
PLT112-1R	F62 - Air flow plate 55 x 175 mm
PLT112-2R	F62 - Air flow plate 80 x 175 mm



## FLOAT AND FLOW CONTROLS

### MECHANICAL LIQUID FLOW SWITCH

# F262

#### AIR FLOW SWITCH

The F262 series airflow switches detect airflow or the absence of airflow by responding only to the velocity of air movement within a duct.

The single-pole, doublethrow (SPDT) switch can be wired to open one circuit and close a second circuit for either signaling or interlock purposes.

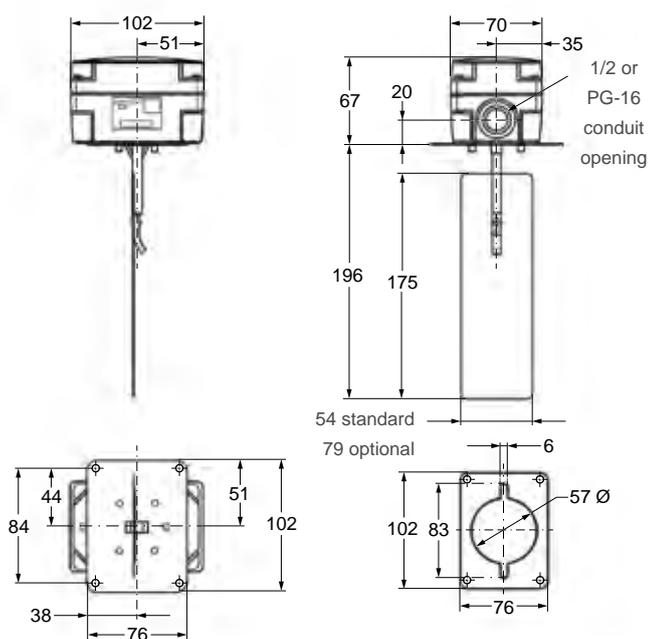
Airflow failure during the normal operation of air handling systems may cause overheating, coil icing, or other conditions that may be detrimental to the equipment.



## FEATURES

- Type 3R (NEMA) polycarbonate enclosure
- Dependable dust-protected SPDT snap-acting PENN switch
- Large wiring space
- Easily accessible range adjustment screw

## DIMENSIONS (in mm)



## F262 - MECHANICAL LIQUID FLOW SWITCH



### ORDERING INFORMATION

CODE	DESCRIPTION
F262KDH-01C	Airflow switch with a 54 mm wide x 175 mm long paddle installed and a 79 mm wide x 175 mm long paddle supplied with the control

### REPLACEMENT PADDLE KITS

CODES	DESCRIPTION
PLT112-1R	54 mm wide x 175 mm long paddle
PLT112-2R	79 mm wide x 175 mm long paddle

### TECHNICAL SPECIFICATIONS (PART 1/2)

#### ELECTRICAL RATINGS

Volts 50/60 Hz	UL60730				EN60730	
	24	120	208	240	24	230
Horsepower	---	1	1	1	---	---
Full load Amperes	---	16	10	10	---	8
Locked rotor Amperes	---	96	60	60	---	48
Resistive Amperes	16	16	10	10	16	16
Plot duty VA	125	720	720	720	125	720

Switch	SPDT
Enclosure	UL Type 3R
	CE IP43
Wiring connections	Three color-coded screw terminals and one ground terminal
Conduit connection	One 22 mm hole for 1/2 in. trade size (or PG16) conduit
Paddle material	0.15 mm stainless spring steel
Maximum air velocity	2,000 FPM (10.16 m/sec)
Maximum duct air temperature	80°C
Ambient conditions	0 to 40°C
<b>CE</b> Compliance	Johnson Controls declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.

## F262 - MECHANICAL LIQUID FLOW SWITCH

### TECHNICAL SPECIFICATIONS (PART 2/2)



#### UL CONFORMITY DECLARATION INFORMATION

Purpose of control	<b>F262 Series Airflow Switch</b>
Construction of control	Electronic independently mounted control
Number of cycles	100,000 cycles
Method of mounting control	Mounting to sensed media vessel/orientation
Type 1 or type 2 action	Type 1.C (Microinterruption)
External pollution situation	Pollution degree 4
Internal pollution situation	Pollution degree 2
Rated impulse voltage	4,000 VAC
Ball pressure temperature	
<i>Enclosure</i>	130°C
<i>Switch component</i>	122°C
Control adjustment instruction	---
Field wiring rating	<b>Wire/Cord temperature ratings:</b> 60°C only permitted when ambient air and media are less than 45°C 75°C only permitted when ambient air and media are less than 60°C 90°C only permitted when ambient air is less than 60°C and media is less than 75°C 150°C permitted when ambient air is less than 60°C and media is less than 121°C



## FLOAT AND FLOW CONTROLS

### MECHANICAL LIQUID LEVEL SWITCH

# F63

#### LIQUID LEVEL FLOAT SWITCH

The F63 liquid level switch is designed to maintain a liquid level in indoor or outdoor closed tanks holding water, chlorinated water, ethylene glycol or other non-corrosive liquids.

The switch has SPDT contacts and can be wired to close one circuit and open a second circuit when the liquid level rises above or falls below the required level.

The switch maintains the liquid level within (approx.) 13 mm.

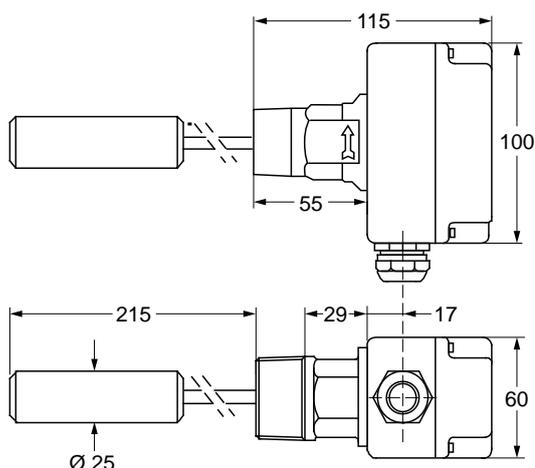
The float switch should not be used for liquids lighter than water (density less than 0.95 kg/dm<sup>3</sup>).



## FEATURES

- Solid polycarbonate float
- Vapour tight IP67 enclosure
- Convenient wiring terminals

## DIMENSIONS (in mm)



## F63 - MECHANICAL LIQUID LEVEL SWITCH



### ORDERING INFORMATION

CODE	CONNECTION	SWITCH ACTION	ENCLOSURE	ADDITIONAL FEATURES
F63BT-9102	1-11 1/2 NPT	SPDT Contacts 15(8) A, 230 V~	Plastic enclosure IP67	Plastic float, VITON diaphragm

### ACCESSORY

CODE	DESCRIPTION
FLT001N001R	F63 - Float



## FLOAT AND FLOW CONTROLS

### MECHANICAL LIQUID LEVEL SWITCH

# F263

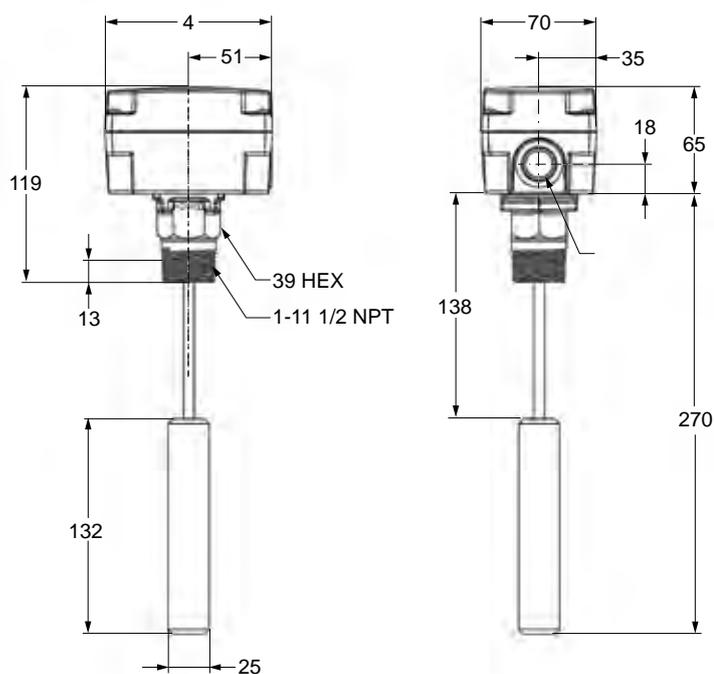
#### LIQUID LEVEL FLOAT SWITCH

The F263 series liquid level float switches are designed to maintain a liquid level in indoor or outdoor closed tanks that hold water or other nonhazardous liquids. When the liquid level in the tank rises above or falls below the required level, the single-pole, double-throw (SPDT) switch closes one circuit and opens a second circuit.

## FEATURES

- Viton® diaphragms
- Single-pole, double-throw switch
- Sturdy type 4 (NEMA) enclosure
- Solid polycarbonate float

## DIMENSIONS (in mm)



## F263 - MECHANICAL LIQUID LEVEL SWITCH



### ORDERING INFORMATION

CODE	DESCRIPTION
F263MAP-V01C	SPDT float switch with Type 4 (NEMA) enclosure and polycarbonate float for liquid temperatures -29 to 100°C); maximum liquid pressure 150 psig (1,035 kPa)

### TECHNICAL SPECIFICATIONS

#### ELECTRICAL RATINGS

Volts 50/60 Hz	UL60730				EN60730	
	24	120	208	240	24	230
Horsepower	---	1	1	1	---	---
Full load Amperes	---	16	10	10	---	8
Locked rotor Amperes	---	96	60	60	---	48
Resistive Amperes	16	16	10	10	16	16
Plot duty VA	125	720	720	720	125	720

Switch	Single-Pole, Double-Throw (SPDT)
Enclosure	UL Type 4 (NEMA)
	CE IP67
Wiring connections	Three color-coded screw terminals and one ground terminal
Conduit connection	One 22 mm hole for 1/2 in. trade size (or PG16) conduit
Pipe connector	1 in. 11-1/2 NPT threads
Minimum tank diameter	229 mm
Maximum liquid pressure	150 psig (1,035 kPa)
Liquid temperature range	
<i>Minimum</i>	-29°C or liquid freezing point
<i>Maximum</i>	100°C
Ambient conditions	
<i>Minimum</i>	-40°C
<i>Maximum</i>	60°C
CE Compliance	Johnson Controls declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.



## PRESSURE CONTROLS

### ADJUSTABLE DIFFERENTIAL PRESSURE SWITCH

# P232

#### SENSITIVE DIFFERENTIAL

This switch senses a change in the differential pressure (either velocity pressure or pressure drop across a restriction) as the air flow changes.

The pressure, as sensed by two sensing ports, is applied to the two sides of a diaphragm in the control. The spring loaded diaphragm moves and actuates the switch.

The series P232 can also be used to detect small positive gauge pressure by using only the high pressure connection and leaving the low pressure connector open, or to detect a vacuum by using only the low pressure connection and leaving the high pressure connector open to ambient pressure.



## FEATURES

- Easy to read setpoint scale
- Large wiring space
- Versatile mounting options

## APPLICATION

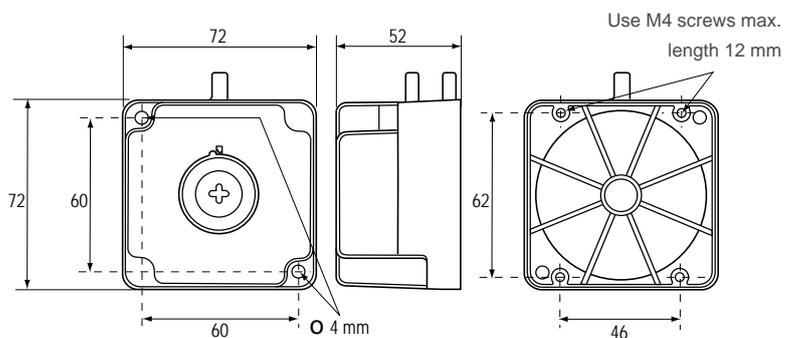
- This (differential) pressure switch is used to sense flow of air, single or differential air pressure

Typical applications include:

- Clogged filter detection
- Detection of frost on air conditioning coils and initiation of defrost cycle
- Air proving in heating or ventilation ducts
- Maximum air flow controller for variable air volume system



## DIMENSIONS (in mm)



## ORDERING INFORMATION

CODE	SWITCH POINT RANGE (in Wc)	SWITCHING DIFFERENTIAL (in Wc)	PACK
P232A-B-AAC	0,2 to 1,6	< 0.1	ind.

### Note

Other models on request, range up to 20 inWC



## PRESSURE CONTROLS

### ADJUSTABLE DIFFERENTIAL PRESSURE SWITCH

# P233

#### SENSITIVE DIFFERENTIAL

This switch senses a change in the (differential) pressure as the airflow changes. The (differential) pressure is applied to the two sides of a diaphragm in the control.

The spring-loaded diaphragm moves and actuates the switch.

The series P233A/F can also be used to detect small positive gauge pressure or to detect a vacuum.



## FEATURES

- One switch to measure relative pressure, vacuum or differential pressure
- Various accessories available
- Compact and durable construction
- Easy mounting and wiring, various mounting possibilities
- Standard PG 11 nipple and optional DIN 43650 connector
- Accurate and stable switch point
- SPDT contact standard

## APPLICATION

- This (differential) pressure switch is used to sense flow of air, single or differential air pressure

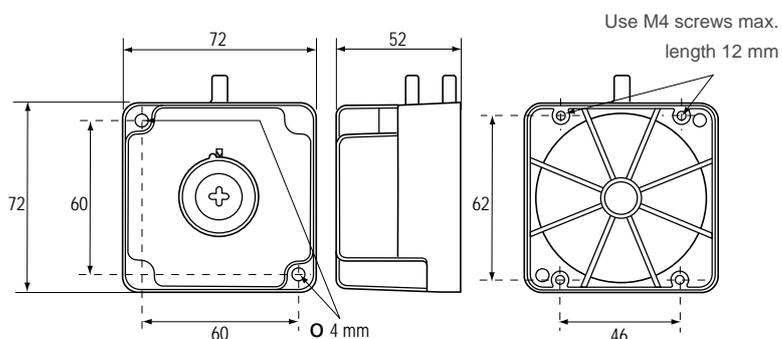
Typical applications include:

- Detect clogged filter
- Detect frost or ice build-up on air conditioning coils
- Air proving in heating or ventilation ducts
- Maximum airflow controller for variable air volume system
- Detect blocked flue or vent
- Monitor fan operation

P233 - ADJUSTABLE DIFFERENTIAL PRESSURE SWITCH



**DIMENSIONS (in mm)**



**ORDERING INFORMATION**

CODES	SWITCH POINT RANGE (mbar)	SWITCHING DIFFERENTIAL (mbar) **	CONTACTS	PACK	ADDITIONAL FEATURES	
P233F-P3-AAC	0,3 fixed	< 0.3	SPDT contacts, Contact rating 5(2) A 250 VAC	Ind.	---	
P233A-4-AAC	0,5 to 4			Bulk	---	
P233A-4-AAD *				Ind.	GMT008N600R + BKT024N002R	
P233A-4-AHC				Bulk	Scale in Pa	
P233A-4-PAD *	50 to 400 Pa			< 0.3	Ind.	---
P233A-4-PAC						Scale in Pa, GMT008N600R + BKT024N002R
P233A-4-PHC						Scale in Pa, FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-4-PKC						FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-4-AKC	0,5 to 4			< 0.5	Ind.	---
P233A-6-AAC	0,5 to 6					GMT008N600R + BKT024N002R
P233A-6-AAD *						---
P233A-10-AAC	1,4 to 10					---
P233A-10-AHC						Scale in Pa, FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-10-PAC						---
P233A-10-PKC	140 to 1000 Pa					< 0.5
P233A-10-AAD *	1,4 to 10	FTG015N602R (2x) + 2 m tube 4/7 mm				
P233A-10-AKC		---				
P233A-50-AAC	6 to 50	< 1	Ind.			
P233A-10-PHC	140 to 1000 Pa	< 0,5	Ind.	Scale in Pa, GMT008N600R + BKT024N002R		

**Notes**

\* Quantity orders only

\*\* Switching differential is maximum value mid-range



## PRESSURE CONTROLS

### ADJUSTABLE DIFFERENTIAL PRESSURE SWITCH

# P74

#### DIFFERENTIAL PRESSURE

The P74 series of differential pressure switches incorporate two opposing pressure elements and an adjustable range setpoint spring with a calibrated scale.

The control switches at the indicated setpoint on an increase in differential pressure and switches back to the normal position when the different pressure decreases to the setpoint less the mechanical switching differential.

## FEATURES

- Heavy duty pressure elements.
- These controls may be used in combination with series P28 lube oil protection control on two compressor, single motor units.

## APPLICATION

These controls are designed to sense pressure differences between two points and may be used as operating or limit controls.

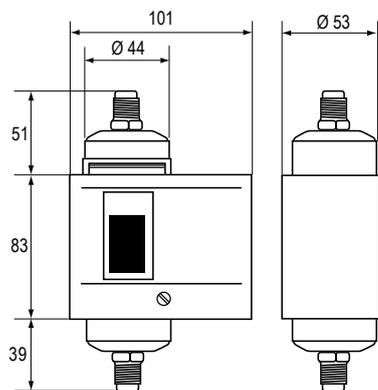
Typical applications are to detect flow across a chiller or water cooled condenser, to detect flow in a heating system and sensing lube oil pressure differential on refrigeration compressors.



P74 - ADJUSTABLE DIFFERENTIAL PRESSURE SWITCH



**DIMENSIONS (in mm)**



**ORDERING INFORMATION**

CODES	RANGE (bar)	MECH. DIFFERENTIAL (bar)	STYLE	SWITCH ACTION	ADDITIONAL FEATURES		
P74DA-9300	0.6 to 4.8	0.7 to 2 adj.	5	DPST, 10A, contacts open low	---		
P74DA-9600			13				
P74EA-9300		0.3 fix.	5	SPDT, 5 A, contact open high			
P74EA-9600			13				
P74EA-9700			15			SPDT, 3 A, contact open high	For NH3
P74EA-9701		Set 1 bar, concealed adjustment, for NH3					
P74FA-9700		0 to 1	0.1 fix.	15		SPDT, 3 A, contact open high	For water
P74FA-9701		2 to 8	0.7 fix.				For NH3



PRESSURE  
CONTROLS  
ADJUSTABLE  
PRESSURE SWITCH

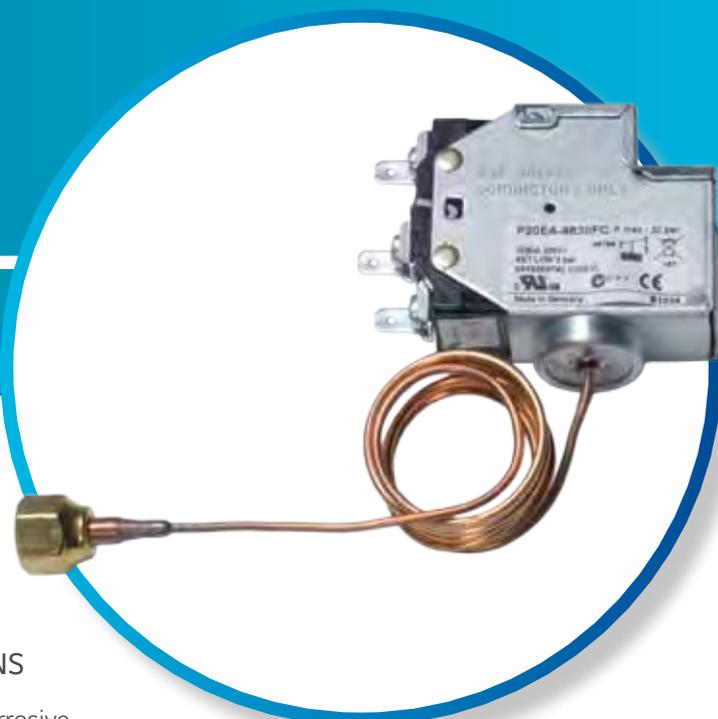
P20

FOR AIR-CONDITIONING AND HEAT PUMP APPLICATIONS

The P20 series high and low limit (cut-out) controls for all non-corrosive refrigerants are compact pressure controls ideally suited for commercial or residential packaged air conditioning units, heat pumps, small water chillers, ice cube machines and other applications where a semi fixed setting is acceptable or required and where mounting space is limited.

The P20 series includes auto reset as well as manual reset models and is factory set.

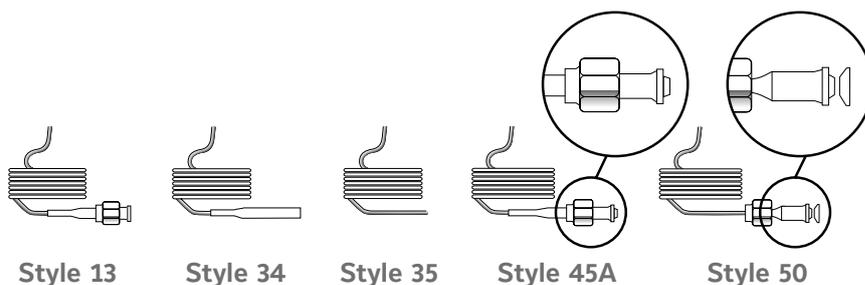
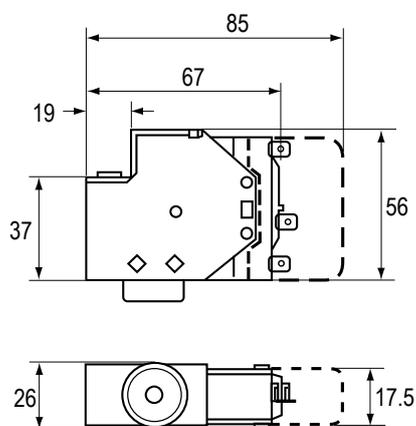
A special setting tool is available while also field (screwdriver) adjustable models can be chosen.



FEATURES

- Field proven reliability
- Reset tab must be released before restart (Trip free manual reset)
- Compact design
- Enclosed dust-tight switch
- SPDT contact with special terminals
- Test pressure 53 bar
- Designed for at least 300000 cycles

DIMENSIONS (in mm)





## P20 - ADJUSTABLE PRESSURE SWITCH

### ORDERING INFORMATION

CODES	RANGE (bar)	DIFFERENTIAL FIXED	SET AT (bar)	STYLE	CAPILLARY LENGTH (cm)	SWITCH ACTION
P20EA-9611D	0.5 to 10	0.9	2	13	120	SPDT, 8 A, open low, auto reset
P20EA-9620D		1.5			90	
P20EA-9621D					120	
P20EA-9160L	7 to 29	3.1	17	45A	90	SPDT, 8 A, open high, auto reset
P20EA-9561K		1.2	16	50		

### HIGH PRESSURE CONTROL

CODES	RANGE (bar)	DIFFERENTIAL FIXED	SET AT (bar)	STYLE	CAPILLARY LENGTH (cm)	SWITCH ACTION
P20EA-9670X	7 to 29	5.2	28	13	90	SPDT, 8 A, open high, auto reset
P20EA-9681T		7.1	24	13	120	
P20EA-9950C		1.1	10	34	90	
P20EA-9950K		1.2	16			
P20GA-9650X		---	28	13		SPDT, 8 A, open high, manual reset
P20GA-9650T		24				

### LOW AND HIGH PRESSURE CONTROL UNIVERSAL REPLACEMENTS

CODES	RANGE (bar)	DIFFERENTIAL FIXED	SET AT (bar)	STYLE	CAPILLARY LENGTH (cm)	SWITCH ACTION	ADDITIONAL FEATURES	
P20EA-9530FC	0.5 to 10	2.1	3	50	90 cm	SPDT, 8 A, auto reset	Open low	
P20EA-9630FC			3	13				
P20EA-9570XC	7 to 29	5.2	28	50			Open high	
P20EA-9670XC			28	13				
P20EL-9670TC	14 to 42	6.5	37	50		SPDT, 8 A, manual reset	Open low	
P20FA-9510FC	0.5 to 10		3	13				
P20FA-9610FC			50					
P20GA-9550XC	7 to 29		28	50			13	Open high
P20GA-9650XC								
P20GL-9650TC	14 to 42		37					



## PRESSURE CONTROLS

### ADJUSTABLE PRESSURE SWITCH

# P735

#### SINGLE PRESSURE

The P735 series pressure controls may be used for control functions or limit functions, depending on model number. All models are provided with alarm contacts. All standard models have phosphor bronze bellows and brass pressure connections. Models for use with ammonia are provided with stainless steel bellows and connectors.



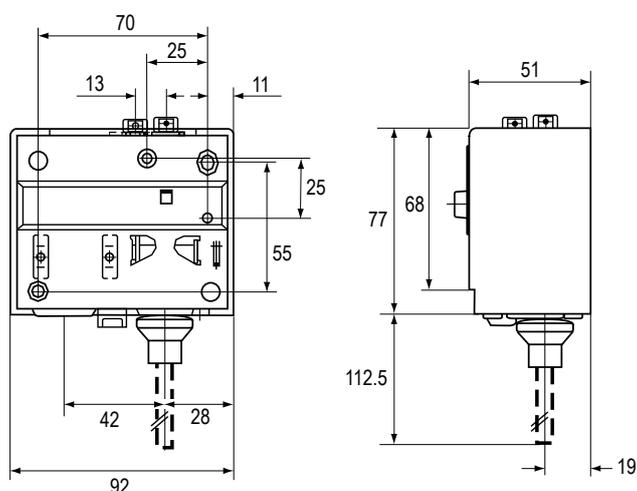
## FEATURES

- Generous wiring space
- SPDT contacts are provided as standard on single pressure controls
- Trip-free manual reset

## APPLICATION

These pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure. Models supplied have a "whole range" design, enabling them to be used with all non-corrosive refrigerants which are within the operating range of the control. They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program.

## DIMENSIONS (in mm)



Style 5



Style 28



Style 30



## P735 – ADJUSTABLE PRESSURE SWITCH

### ORDERING INFORMATION

#### FOR WATER

CODE	RANGE (bar)	DIFFERENTIAL (bar)	SWITCH ACTION (WIRE DIAG.)	MAX. BELLOWS PRESSURE	SPECIAL PRESSURE CONNECTION G <sup>1</sup> / <sub>4</sub> " FEMALE
					Ind. pack.
P735AAA	-0,2 to 10	1 to 4,5	1	15	-9200
	-0,5 to 7	0,6 to 3	1	22	-9201

#### FOR NON-CORROSIVE REFRIGERANTS

CODES	RANGE (bar)	DIFFERENTIAL (bar)	SWITCH ACTION (WIRE DIAG.)	MAX. BELLOWS PRESSURE	STYLE 5		STYLE 28	STYLE 30
					Ind. pack.	Bulkpack	Ind. pack.	Ind. pack.
P735AAA	-0.5 to 7	0.6 to 3	1	22	-9300	-9320	-9800	-9400
	-0.2 to 10	1 to 4.5	1	15	-9301	---	---	---
	3 to 30	3 to 12	2	33	-9350	-9370		
	3.5 to 21	2.1 to 5.5	2	30	-9351	---		
P735BCA	-0.5 to 7	Man. res. **	1	22	-9300	---		
P735BEA	3 to 30	Man. res. *	3	33	-9350	---		

#### Notes

\* Resettable at 3 bar below cut-out point

\*\* Resettable at 0.5 bar above cut-out point

#### FOR NON-CORROSIVE REFRIGERANTS TYPE APPROVED PRESSURE LIMITER/PRESSURE CUT OUT

CODES	RANGE (bar)	DIFFERENTIAL (bar)	SWITCH ACTION (WIRE DIAG.)	MAX. BELLOWS PRESSURE	STYLE 5		STYLE 28	PED APPROVAL
					Ind. pack.	Bulkpack	Ind. pack.	
P735AAW	-0.5 to 7	0.6 to 3	1	22	-9300	-9320	-9800	---
	3 to 30	3.5 to 12	2	33	-9350	-9370	-9850	■
P735BCB	-0.5 to 7	Man. res. **	1	22	-9300	---	---	---
P735BEB	3 to 30	Man. res. *	3	33	-9350	-9370	---	■

#### Notes

\* Resettable at 3.5 bar below cut-out point

\*\* Resettable at 0.5 bar above cut-out point



## PRESSURE CONTROLS

## ADJUSTABLE PRESSURE SWITCH

# P736

### DUAL PRESSURE

The P736 series pressure controls may be used for control functions or limit functions, depending on model number. All models are provided with alarm contacts (except P736ALA). All standard models have phosphor bronze bellows and brass pressure connections. Models for use with ammonia are provided with stainless steel bellows and connectors.

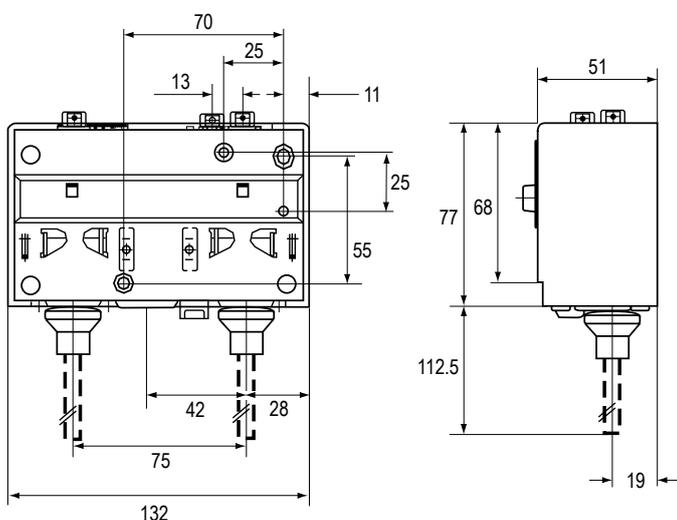
## FEATURES

- Generous wiring space
- Trip-free manual reset
- Separate alarm contacts for both low pressure and high pressure cut-out (except P736ALA)

## APPLICATION

These dual pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure. Models supplied have a "whole range" design, enabling them to be used all non-corrosive refrigerants which are within the operating range of the control. They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program.

## DIMENSIONS (in mm)



Style 5



Style 28



Style 30



## P736 – ADJUSTABLE PRESSURE SWITCH

### ORDERING INFORMATION

#### FOR NON-CORROSIVE REFRIGERANTS

CODES	LEFT SIDE		RIGHT SIDE		CONSTRUCTION LP/HP (MAX. PRESS.)	STYLE 5		STYLE 30
	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		Ind. pack.	Bulkpack	Ind. pack.
P736LCA	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 22 bar HP: 33 bar	-9300	-9320	-9400
P736MCA	-0.5 to 7	0.6 to 3	3 to 30	Man. Res. **		-9300	-9320	---
P736PGA	-0.5 to 7	Man. Res. *	3 to 30	Man. Res. **		-9300	---	---

#### DUAL PRESSURE FAN CYCLING CONTROLS FOR AIR-COOLED CONDENSERS (NON-CORROSIVE REFRIGERANTS)

CODE	LEFT SIDE		RIGHT SIDE		CONSTRUCTION HP/HP (MAX. PRESS.)	STYLE 5		STYLE 30
	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		Ind. pack.	Bulkpack	Ind. pack.
P736ALA	3.5 to 21	1.8 (fixed)	3.5 to 21	1.8 (fixed)	30 bar	-9351	****	---

#### FOR NON-CORROSIVE REFRIGERANTS TYPE APPROVED PRESSURE LIMITER/PRESSURE CUT OUT

CODES	LEFT SIDE		RIGHT SIDE		CONSTRUCTION LP/HP (MAX. PRESS.)	STYLE 5		STYLE 28	PED APPROVALS
	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		Ind. pack.	Bulkpack	Ind. pack.	
P736LCW	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 22 bar HP: 33 bar	-9300	-9320	-9800	■
P736MCB	-0.5 to 7	0.6 to 3	3 to 30	Man. Res. **		-9300	****	-9800	

#### MANUAL RESET HP/HP, TYPE APPROVED PRESSURE CUT OUT/ SAFETY PRESSURE CUT OUT

CODE	LEFT SIDE		RIGHT SIDE		CONSTRUCTION HP/HP (MAX. PRESS.)	STYLE 5		STYLE 30
	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		Ind. pack.	Bulkpack	Ind. pack.
P736PLM	3 to 30	Man. Res. *	3 to 30	Man. Res. **	30 bar	---	-9370	---

#### Notes

- \* Resettable at 0.5 bar above cut-out point
- \*\* Resettable at 3 bar below cut-out point
- \*\*\* Can be set-up for quantity orders  
100 kPa = 1 bar ≈ 14.5 psi



## PRESSURE CONTROLS

### ADJUSTABLE PRESSURE SWITCH

# P77

SINGLE PRESSURE, IP54

The P77 series pressure controls may be used for control functions or limit functions, depending on model number. All models are provided with alarm contacts. All standard models have phosphor bronze bellows and brass pressure connections.

Models for use with ammonia are provided with stainless steel bellows and connectors. Devices conforming to PED 2014/68/EU Cat. IV (HP models) have the fail-safe function with double bellows.

Their IP54 classification means that these pressure controls are suitable for almost all applications.



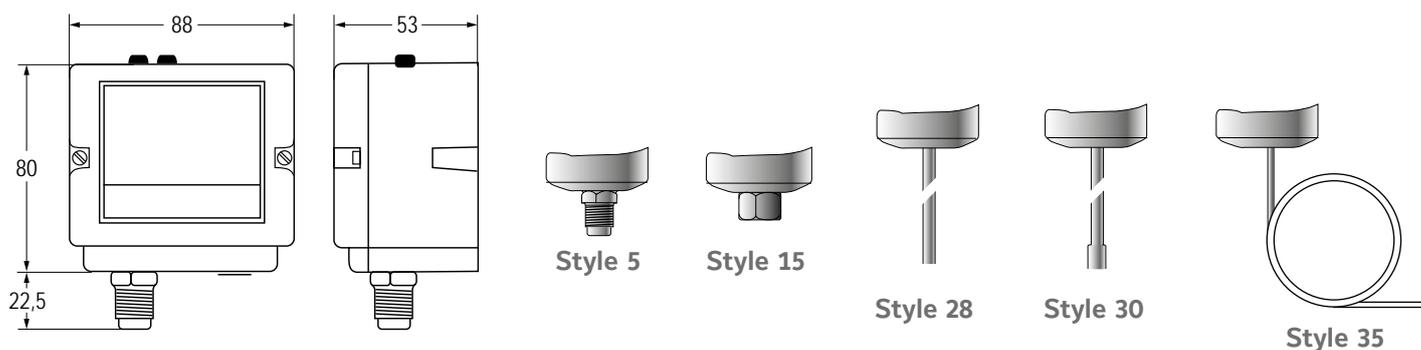
## FEATURES

- Generous wiring space
- Splash-proof enclosure (IP54)
- SPDT contacts are provided as standard on single pressure controls.
- Trip-free manual reset

## APPLICATION

These pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure. Models supplied have a "whole range" design, enabling them to be used with refrigerants R22, R134A, R404A, R410A, R290 and CO<sub>2</sub> sub-critical and all other non-corrosive refrigerants which are within the operating range of the control. They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program. Also models tested and approved to PED 2014/68/EU Cat. IV (supersedes DIN and TUV approval) are included in the program.

## DIMENSIONS (in mm)





## P77 – ADJUSTABLE PRESSURE SWITCH

### ORDERING INFORMATION

#### FOR NON-CORROSIVE REFRIGERANTS

FAMILY CODES	STYLE 5		STYLE 28	STYLE 30	STYLE 35	RANGE (bar)	DIFF. (bar)	MAX BELLOWS PRESSURE
	Ind. pack.	Bulkpack	Bulkpack	Ind. pack.	Ind. pack.			
P77AAA	-9300	-9320	-9800	-9400	-9500	-0.5 to 7	0.6 to 3	22
	-9301	---	---	---	---	-0.2 to 10	1 to 4.5	15
	-9302	---	---	---	---	-0.3 to 2	0.4 to 1.5	4
	-9350	-9370	-9850	-9450	-9550	3 to 30	3 to 12	33
	-9351	-9371	---	-9451	---	3.5 to 21	2.1 to 5.5	30
P77BCA	-9300	---	---	-9400	---	-0.5 to 7	Man. res. <sup>1</sup>	22
P77BEA	-9350	---	---	-9450	---	3 to 30	Man. res. <sup>2</sup>	33

#### FOR AMMONIA AND NON-CORROSIVE REFRIGERANTS

FAMILY CODES	STYLE 15		RANGE (bar)	DIFF. (bar)	MAX BELLOWS PRESSURE
	Ind. pack.	Bulkpack			
P77AAA	-9700	---	-0.5 to 7	0.6 to 3	14
	-9750	---	3 to 30	3.5 to 12	33
P77BCA	-9700	---	-0.5 to 7	Man. res. <sup>1</sup>	14
P77BEA	-9750	---	3 to 30	Man. res. <sup>2</sup>	33

#### FOR NON-CORROSIVE REFRIGERANTS

(PRESSURE LIMITER, PRESSURE CUT-OUT, SAFETY PRESSURE CUT-OUT, INCLUDING LOCKPLATE ASSY)

FAMILY CODES	STYLE 5		STYLE 28	RANGE (bar)	DIFF. (bar)	MAX BELLOWS PRESSURE	APPROVED ACCORDING TO PED 2014/68/EU CAT. IV
	Ind. pack.	Bulkpack	Ind. pack.				
P77AAW	-9300	-9320	-9800	-0.5 to 7	0.6 to 3	22	---
	-9350	-9370	-9850	3 to 30	3.5 to 12	33	■
	-9355	---	-9855	3 to 42	5 to 15	47.6	■
P77BCB	-9300	---	-9800	-0.5 to 7	Man. res. <sup>1</sup>	22	---
P77BEB	-9350	-9370	-9850	3 to 30	Man. res. <sup>3</sup>	33	■
	-9355	---	-9855	3 to 42	Man. res. <sup>4</sup>	47.6	■
P77BES	-9350	-9370	-9850	3 to 30	Man. res. <sup>3</sup>	33	---

#### Notes

<sup>1</sup> Resettable at 0.5 bar above cut-out point

<sup>2</sup> Resettable at 3 bar below cut-out point

<sup>3</sup> Resettable at 3.5 bar below cut-out point

<sup>4</sup> Resettable at 5 bar below cut-out point

100 kPa = 1 bar ≈ 14.5 psi



## P77 – ADJUSTABLE PRESSURE SWITCH

### ORDERING INFORMATION

FOR AMMONIA AND NON-CORROSIVE REFRIGERANTS

(PRESSURE LIMITER, PRESSURE CUT-OUT, SAFETY PRESSURE CUT-OUT, INCLUDING LOCKPLATE ASSY)

FAMILY CODES	STYLE 15		RANGE (bar)	DIFF. (bar)	MAX BELLOWS PRESSURE	APPROVED ACCORDING TO PED 2014/68/EU CAT. IV
	Ind. pack.	Bulkpack				
P77AAW	-9700	---	-0.5 to 7	0.6 to 3	14	---
	-9750	---	3 to 30	3.5 to 12	33	
P77BEB	-9750	---	3 to 30	Man. res. <sup>3</sup>	33	■
P77BES	-9750	---	3 to 30	Man. res. <sup>3</sup>	33	

FOR HAZARDOUS LOCATION APPLICATION AND NON-CORROSIVE REFRIGERANTS

(PRESSURE LIMITER, INCLUDING LOCKPLATE ASSY)

FAMILY CODES	STYLE 28		RANGE (bar)	DIFF. (bar)	PRESSURE CONNECTION	MAX BELLOWS PRESSURE	APPROVED ACCORDING TO PED 2014/68/EU CAT. IV
	Ind. pack.	Bulkpack					
P77XAAW	-18000C	-18000D	-0.5 to 7	0.6 to 3	6 mm Ø copper tube	22	---
	-18500C	-18500D	3 to 30	3.5 to 12		33	■

#### Notes

- 1** Resettable at 0.5 bar above cut-out point
- 2** Resettable at 3 bar below cut-out point
- 3** Resettable at 3.5 bar below cut-out point
- 4** Resettable at 5 bar below cut-out point

100 kPa = 1 bar ≈ 14.5 psi



## PRESSURE CONTROLS

## ADJUSTABLE PRESSURE SWITCH

# P78

DUAL PRESSURE, IP54

The P78 series pressure controls may be used for control functions or limit functions, depending on model number.

All models are provided with alarm contacts (except P78ALA). All standard models have phosphor bronze bellows and brass pressure connections. Models for use with ammonia are provided with stainless steel bellows and connectors.

Devices conforming to PED 2014/68/EU Cat. IV have a double bellows on the high pressure versions.

Their IP54 classification means that these pressure controls are suitable for almost all applications.

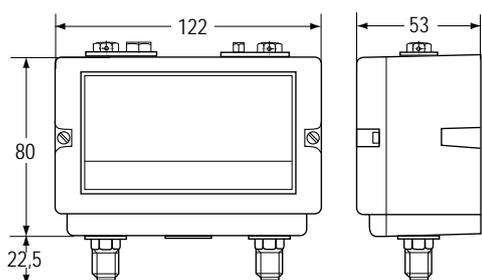
## FEATURES

- High refrigerant pressure. Suitable for R410A and CO<sub>2</sub> subcritical applications.
- Gold plated contacts
- Generous wiring space
- Splash-proof enclosure (IP54)
- Trip-free manual reset
- Patented separate alarm contacts for both low pressure and high pressure cut-out (except P78ALA)

## APPLICATION

These pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure. Models supplied have a "whole range" design, enabling them to be used with refrigerants R22, R134A, R404A, R410A, CO<sub>2</sub> sub-critical and all other non-corrosive refrigerants which are within the operating range of the control. They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program. Also models tested and approved to PED 2014/68/EU Cat. IV (supersedes DIN and TUV approval) are included in the program.

## DIMENSIONS (in mm)



Style 5



Style 15



Style 28



Style 30



## P78 – ADJUSTABLE PRESSURE SWITCH

### ORDERING INFORMATION

#### DUAL PRESSURE CONTROLS FOR NON-CORROSIVE REFRIGERANTS

FAMILY CODES	PRESSURE CONNECTION			LEFT SIDE		RIGHT SIDE		CONSTRUCTION LP/HP (MAX. PRESS.)
	Style 5		Style 30	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)	
	Ind. Pack.	Bulkpack	Ind. Pack.					
P78LCA	-9300	-9320	-9400	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 22 bar HP: 33 bar
P78MCA	-9300	-9320	-9400	-0.5 to 7	0.6 to 3	3 to 30	Man. Res. <sup>2</sup>	
P78PGA	-9300	*	-9400	-0.5 to 7	Man. Res <sup>1</sup>	3 to 30	Man. Res. <sup>2</sup>	

#### Notes

\* Can be set-up for quantity orders

<sup>1</sup> Resettable at 0.5 bar above cut-out point

<sup>2</sup> Resettable at 3 bar below cut-out point

#### FOR AMMONIA AND NON-CORROSIVE REFRIGERANTS

FAMILY CODES	PRESSURE CONNECTION		LEFT SIDE		RIGHT SIDE		CONSTRUCTION LP/HP (MAX. PRESS.)
	Style 15		Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)	
	Ind. pack.	Bulkpack					
P78LCA	-9700	*	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 14 bar HP: 33 bar
P78MCA	-9700	*	-0.5 to 7	0.6 to 3	3 to 30	Man. res. <sup>2</sup>	
P78PGA	-9700	*	-0.5 to 7	Man. res <sup>1</sup>	3 to 30	Man. res. <sup>2</sup>	

#### FAN CYCLING CONTROLS FOR AIR-COOLED CONDENSERS (NON-CORROSIVE REFRIGERANTS)

FAMILY CODES	PRESSURE CONNECTION			LEFT SIDE		RIGHT SIDE		CONSTRUCTION HP (MAX. PRESS.)
	Style 5		Style 30	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)	
	Ind. pack.	Bulkpack	Ind. pack.					
P78ALA	-9351	*	-9451	3.5 to 21	1.8 (fixed)	3.5 to 21	1.8 (fixed)	HP: 30 bar



## P78 - ADJUSTABLE PRESSURE SWITCH

### ORDERING INFORMATION

FOR NON-CORROSIVE REFRIGERANTS, TYPE APPROVED PRESSURE LIMITER/PRESSURE CUT OUT/SAFETY PRESSURE CUT OUT - (EXCEPT P78PGB<sup>-1</sup>)

FAMILY CODES	PRESSURE CONNECTION			LEFT SIDE		RIGHT SIDE		CONSTRUCTION LP/HP (MAX. PRESS.)	APPROVED ACCORDING TO PED 2014/68/EU CAT. IV
	Style 5		Style 28	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		
	Ind. pack.	Bulkpack	Ind. pack.						
P78LCW	-9300	-9320	-9800	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 22 bar HP: 33 bar	■
P78MCB	-9300	-9320	-9800	-0.5 to 7	0.6 to 3	3 to 30	Man. res. <sup>3</sup>		
P78MCS	-9300	---	---	-0.5 to 7	0.6 to 3	3 to 30	Man. res. <sup>3</sup>		
P78PGB	-9300	*	-9800	-0.5 to 7	Man. res. <sup>3</sup>	3 to 30	Man. res. <sup>3</sup>		
P78PLM	-9350	*	-9850	3 to 30	Man. res. <sup>3</sup>	3 to 30	Man. res. <sup>3</sup>		

DUAL PRESSURE CONTROLS FOR NON-CORROSIVE REFRIGERANTS, TYPE APPROVED PRESSURE LIMITER/PRESSURE CUT OUT/SAFETY PRESSURE CUT OUT

FAMILY CODES	PRESSURE CONNECTION		LEFT SIDE		RIGHT SIDE		CONSTRUCTION LP/HP (MAX. PRESS.)	APPROVED ACCORDING TO PED 2014/68/EU CAT. IV
	Style 5		Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		
	Ind. pack.							
P78LCW	-9355		-0.2 to 10	1 to 4.5	3 to 42	4 (fixed)	LP: 15 bar HP: 47.6 bar	■
P78MCB	-9355		-0.2 to 10	1 to 4.5	3 to 42	Man. res. <sup>4</sup>		
P78PLM	-9355		3 to 42	Man. res. <sup>4</sup>	3 to 42	Man. res. <sup>4</sup>		

DUAL PRESSURE CONTROL FOR HAZARDOUS LOCATION APPLICATION AND NON-CORROSIVE REFRIGERANTS

FAMILY CODE	PRESSURE CONNECTION		LEFT SIDE		RIGHT SIDE		APPROVED ACCORDING TO PED 2014/68/EU CAT. IV
	Style 28		Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)	
	Ind. pack.	Bulkpack					
P78XLCW	-18000C	-18000D	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	■

#### Notes

\* Can be set-up for quantity orders

- 1** Resettable at 0.5 bar above cut-out point
- 2** Resettable at 3 bar below cut-out point
- 3** Resettable at 3.5 bar below cut-out point
- 4** Resettable at 5 bar below cut-out point



PRESSURE  
CONTROLS

FIXED SETTING  
PRESSURE SWITCH

**P100**

DIRECT MOUNT PRESSURE SWITCH

The P100 series are encapsulated, non-adjustable, direct mount pressure controls typically used for low and high-pressure cut-outs for OEM applications.

The P100 series are produced according to switchpoint requirements of customers. The small dimensions, weight and protection class makes the P100 series applicable for use without the need of additional mounting brackets.

The P100 series can be used for all non-corrosive refrigerants like R134a; R22; R404, R410A, R290, R600, HFO1234, R744 and others.



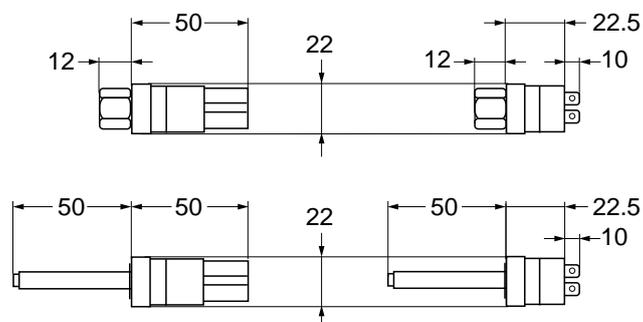
**FEATURES**

- Compact size and light weight
- Encapsulated, dust tight switch IP67
- Broad variety of electrical and pressure connections

**APPLICATION**

- Computer room air conditioning
- Refrigeration/Air conditioning condensers
- Commercial refrigeration
- Ice machines
- Food service equipment

**DIMENSIONS (in mm)**



P100 - FIXED SETTING PRESSURE SWITCH

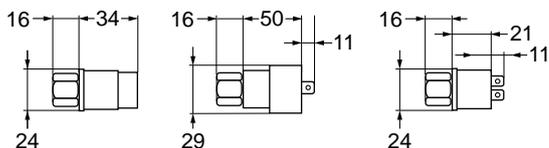


MANUAL RESET MODELS

FEATURES

- Compact size and light weight
- Encapsulated, dust tight switch IP67
- Manual reset models have a trip-free design
- Models with gold-plated contacts available
- Broad variety of electrical and pressure connections

DIMENSIONS (in mm)



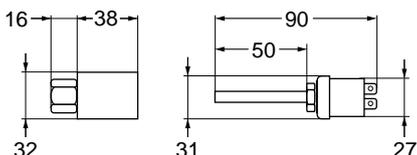
ORDERING INFORMATION

CODES	APPLICATION	REFRIGERANT	P (bar)		P OPEN ± (bar) TOLERANCE	P CLOSE ± (bar) TOLERANCE	CONNECTION		ELECTR. TERMINATION (m)	SWITCH		
			Open	Close			"1/4" "SAE Fem Flare"	50 mm straight, 6 mm Ø x 7 mm reduced end, copper clad brazing tube (TIF5)				
P100DA-66D	High pressure	R134A	16		0,7	---	■	---	2	SPST		
P100DA-67D							---	■				
P100DA-68D			R407C	26				---			■	3
P100DA-69D							---	■				
P100DA-70D		R404A		28				---	■			
P100DA-71D							---	■				
P100DA-72D	Manual reset	R410A	38		1,0	---	■	---	2			
P100DA-73D			38				---	■				
P100DA-74D		R407C	26				---	■	1,2			
P100DA-75D		R410A	42				0,7	---	■		---	2
P100DA-76D			42						---		■	

**P100 HEAVY DUTY PRESSURE CONTROLS - AUTO RESET**



**DIMENSIONS (in mm)**



**ORDERING INFORMATION**

CODES	APPLICATION	REFRIGERANT	P (bar)		P OPEN ± (bar) TOLERANCE	P CLOSE ± (bar) TOLERANCE	CONNECTION		ELECTR. TERMINATION (m)	SWITCH
			Open	Close			"1/4" SAE Fem Flare"	50 mm straight, 6 mm Ø x 7 mm reduced end, copper clad brazing tube (TIF5)		
P100EE-17D	High pressure Auto reset	R404A	20	25	1,0	1,0	■	---	1,5	SPDT
P100EE-18D		R134A	15	11						
P100EE-60D	Normally closed	R404A	28	21	0,7	0,7	---	■	2	
P100EE-61D		R134A	3	25	0,35	0,35	■	---	1,8	
P100EE-68D										

# PRESSURE SWITCHES ACCESSORIES

## ORDERING INFORMATION

CODES	DESCRIPTION	MINIMUM ORDER QUANTITY
BKT034N602R	Mounting bracket + screws for P35AC transducer	1
BKT275-1	Mounting bracket dual for P20	
210-25R	Mounting bracket for P20/P35 (single)	
WRN12-1	Wrench P20/P21	
210-604R	Terminal cover P20/P21	50
BKT024N002R	Mounting bracket for P233	1
FTG015N602R	Duct mounting kit "staight"	
FTG015N603R	Duct mounting kit "bent"	
GMT008N600R	Duct kit for P233, self locking grommet and tubing	
CNR003N001R	Connector 6 mm for P77/P78, P735/P736	
CNR003N002R	Connector 8 mm for P77/P78, P735/P736	
CNR012N001R	Adapter R3/8 female to 1/4-18 NPT male for P48	
CNR013N001R	Adapter R 3/8 female to 1/4-18 NPT female for P48	
KIT023N600	Locking kit for P48, P77/P78, P735/P736 - for field installation	
KIT031N600	Valve depressors for conversion style 13 - style 45a	
KIT031N601	Valve depressors for conversion style 51 - style 50	250 (1 box)
KIT034N600	Seal rings for style 50/51	
271-51L	Mounting bracket for P28, P45, P48, P74, P77/P78, P735/P736	50

PRESSURE SWITCHES ACCESSORIES

ORDERING INFORMATION

CAPILLARY KIT

CODES	LENGTH (cm)	STYLE	MINIMUM ORDER QUANTITY
SEC002N600	90	2x style 13	100
SEC002N602		Style 13 - style 45a	
SEC002N606	200	Style 13 - style 45a	75
SEC002N607		2x style 13	
SEC002N617	100	Style 13 - style 13	100
SEC002N621	90	Style 34 - style 34	
SEC002N622		Style 50 - style 50	
SEC002N624	200	Style 50 - style 50	75
SEC002N626	90	Style 50 - style 51	100
SEC002N627	200	Style 50 - style 51	
SEC002N628	300	Style 50 - style 51	75

REPLACEMENT - TIME RELAYS P28 - P29

CODES	TIMING (s)	VOLTAGE	SWITCH ACTION
RLY13A603R	90	120 / 240	Manual reset, dual voltage (AC)
RLY13A620R	120		
RLY13A998R	50		
RLY13A626R	90	12	Manual reset, 12 VAC/DC
RLY13A627R	120	24	Manual reset, 24 VAC/DC
RLY13A635R	90		
RLY13A644R	50		



## PRESSURE CONTROLS

## PRESSURE SWITCHES ACCESSORIES

# H735

### SYNTETIC FLEXIBLE HOSE

The synthetic hoses consist of a seamless PA compound inner layer reinforced with a braided layer of high performance synthetic fibre.

This reinforcement is protected by an oil, weather and abrasion resistant Polyester Elastomer Compound.

The standard assembly length is 0,9 meter with one straight and one elbow 90 degree hose fitting.

The fitting connection is 1/4" metal tube with 7/16"-20 UNF swivel nut connection suitable for 1/4" SAE male flare.

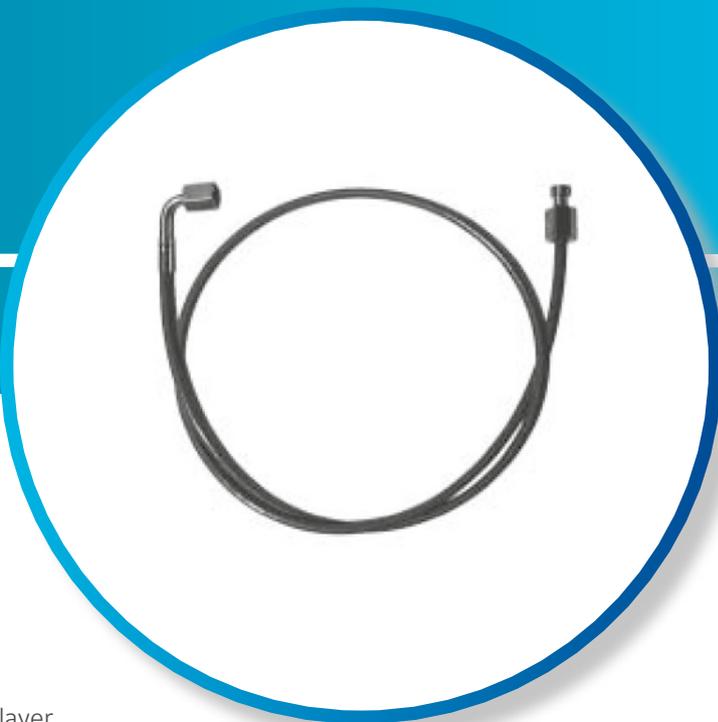
Other lengths and/or fitting connections configurations (Style 50, 51 straight or elbow) are available on request (quantity orders only).

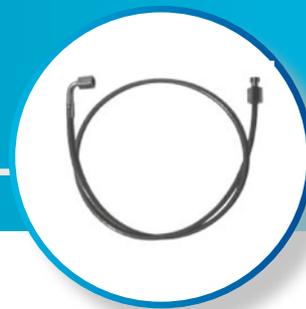
## FEATURES

- Very flexible
- Low minimum bend radius (30 mm)
- One straight and one 90° elbow pressure connection
- Polyester Elastomer Compound construction
- High pressure safety ratio
- Low effusion

## APPLICATION

These synthetic hoses are designed for pressure measuring connections. They provide, for example, a very flexible connection between a refrigerant compressor and pressure controls. The hoses can be used for all non-corrosive refrigerants including R134a, R22, R404a, R407c and R410A with pressures within the maximum pressure range of the hose. Hoses are tested with common compressor oils in combination with above mentioned refrigerants.





## ORDERING INFORMATION

CODES	PRESSURE CONNECTION	FITTING CONNECTION	LENGTH (cm)	ADDITIONAL FEATURES
H735AA-30C	Straight x 90° elbow	1/4" metal tube with 7/16"-20 UNF swivel nut connection suitable for 1/4" SAE male flare	30	All models bulk packed
H735AA-40C			40	
H735AA-50C			50	
H735AA-70C			70	
H735AA-90D			90	
H735AA-100C			100	
H735AA-150C			150	
H735AA-200C			200	

**Note**

Minimum shipping quantity 100 pieces



## PRESSURE CONTROLS

### ADJUSTABLE OIL PROTECTION SWITCH

# P28

#### OIL PROTECTION

These controls measure the pressure differential between the pressure generated by the oil pump and the refrigerant pressure at the crankcase.

A built-in time delay switch allows for pressure-pick up on start and avoids nuisance shutdowns on pressure drops of short duration during the running cycle.

When the compressor is started, the time delay switch is energised. If the net oil pressure does not build up within the required time limit, the time delay switch trips to stop the compressor. If the net oil pressure rises within the required time after the compressor starts, the time delay switch is automatically de-energised and the compressor continues to operate normally. If the net oil pressure should drop below setting (scale pointer) during the running cycle, the time delay switch is energised and, unless the net oil pressure returns to cut-in point within the time delay period, the compressor will be shut down, and have to be manual reset.

The compressor can never run longer than the predetermined time on low oil pressure.

Controls are available only for manual reset after cut-out.



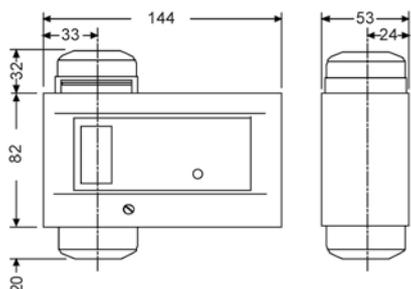
## FEATURES

- Heavy duty pressure elements
- Safety lock-out with trip-free manual reset
- Ambient compensated timing
- Dust-tight Penn switch

## APPLICATION

These oil protection controls are designed to give protection against low net lube oil pressure on pressure lubricated refrigeration compressors.

## DIMENSIONS (in mm)



P28 - ADJUSTABLE OIL PROTECTION SWITCH



ORDERING INFORMATION

CODES	RANGE (bar)	STYLE	TIME DELAY (s)	VOLTAGE	SWITCH ACTION	REFRIGERANT	ADDITIONAL FEATURES
P28DA-9341	0.6 to 4.8	5	50	115/230	15(8) A, 230 VAC, open low, alarm and safe light contacts	non-corr.	Incl 2 flare nuts 7/16"-20 UNF
P28DA-9660		13	90				---
P28DJ-9360		5	90	IP66 enclosure			
P28DJ-9861		15	90	NH3		IP66 enclosure, Incl. 2 connectors CNR003N001	
P28DP-9300		5	---	Without time delay			
P28DP-9340			50	---			
P28DP-9360			90	---			
P28DP-9380			120	---			
P28DP-9381		13		Concealed adjustment, set 0.65 bar			
P28DP-9640				50		---	
P28DP-9660				90		---	
P28DP-9680				120		---	
P28DP-9840		15		---			
P28DP-9860				90		---	
P28DN-9750				50		115/230	---



## PRESSURE CONTROLS

### ADJUSTABLE OIL PROTECTION SWITCH

# P45

#### OIL PROTECTION

The series P45 controls are designed to give protection against low lube-oil pressure on pressure lubricated refrigeration compressors.

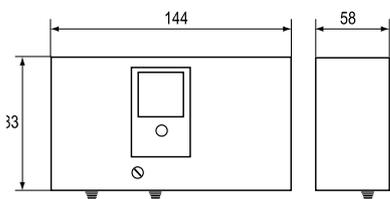
The controls measure the pressure differential (net oil pressure) between the pressure generated by the oil pump and the refrigerant pressure at the crankcase. A built-in time delay switch allows pressure build-up during start and avoids nuisance shut-down on pressure drops of short duration during the running cycle.



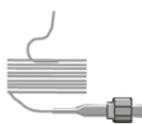
## FEATURES

- Several million in use today
- Heavy duty pressure elements
- Key specifications match/exceed other brands
- Accurate 0.2 bar switch differential standard
- Adjustable or fixed setpoint
- Safelight output standard
- Trip-free manual reset
- High current rated output
- Ambient compensated timing

## DIMENSIONS (in mm)



Style 5



Style 13



## ORDERING INFORMATION

CODES	RANGE (bar)	SETTING (bar)	TIME DELAY (s)	STYLE	VOLTAGE	SWITCH ACTION ~15(8)A 230 V OPEN LOW
P45NBB-9361B	0.5 to 4	0.6	90	5	230	Alarm/safelight contacts
P45NBB-9381B		0.6	120			
P45NBB-9640C		0.7	50	13		
P45NBB-9660C		0.7	90			
P45NBB-9660Q		1.8	90			
P45NBB-9680C		0.7	120			
P45NCA-9056		0.45	50		115/230	
P45NCA-9104		0.7	120			



## PRESSURE CONTROLS

### ADJUSTABLE STEAM PRESSURE SWITCH

# P48

#### STEAM PRESSURE

The P48 series have been developed for special applications where pressure must be controlled.

All models have an adjustable differential depending on the range (*see type number selection table*).

The P48AAA-9110 and P48AAA-9120 has the power element outside the case.

All the models have phosphor bronze bellows and brass pressure connections except the P48AAA-9150. This model has a stainless steel bellows and pressure connection and is provided with a brass adapter 1/4"-18 NPT female to R3/8 male.



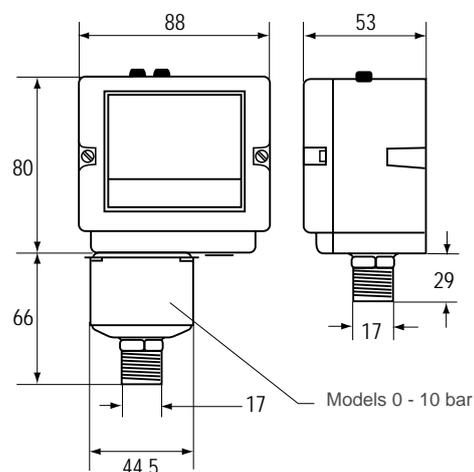
## FEATURES

- Generous wiring space provided
- Splash-proof enclosure (IP54)
- SPDT contacts are provided as standard on single pressure control
- Trip-free manual reset

## APPLICATION

The series P48 pressure controls are designed as operating or high/low cut-out control on steam, air or (hot) water applications. Also for non-combustible gases which are not harmful to the materials in contact with these mediums. On steam applications a steam trap is recommended.

## DIMENSIONS (in mm)



P48 - ADJUSTABLE STEAM PRESSURE SWITCH



ORDERING INFORMATION

CODES	RANGE (bar)	DIFFERENTIAL (bar)	PRESSURE CONNECTION	STYLE	SWITCH ACTION	ADDITIONAL FEATURES
P48AAA-9110	0 to 1	0.16 to 0.55	G 3/8" male	29a	~16(10)A 400 V... 220 V DC, 12 W (pilot duty only) SPDT, Open High	Automatic reset
P48AAA-9120	0.2 to 4	0.25 to 0.8				
P48AAA-9130	-0.2 to 10	1 to 4.5				
P48AAA-9140	1 to 16	1.3 to 2.5				Automatic reset, stainless steel bellows
P48AAA-9150	3 to 30	3 to 12				
P48BEA-9140	4 to 16	---				Manual reset



MODULATING  
WATER VALVES

PRESSURE ACTUATED  
WATER VALVES

V43 / V243

REGULATING VALVES



The V43 / V243 pressure-actuated water-regulating valves are designed to regulate water flow through the condenser of large refrigerated cooling systems. These pilot-operated valves open on an increase in refrigerant head pressure and provide modulating operation.

The V43 / V243 water-regulating valves are available for commercial and maritime applications.

V43 valves are available for non-corrosive low- and medium-pressure refrigerants such as R-134A, R-404A, R-502 and R-507. Specially designed V43 valves are also available for ammonia service (R-717).

V243 valves are available for non-corrosive high-pressure refrigerants such as R410A.

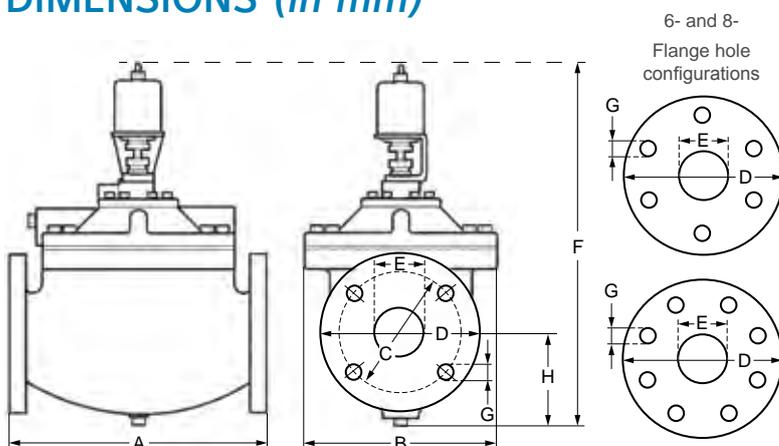
Commercial V43 / V243 valves are constructed with a cast iron body, brass internal parts, and bronze seat material.

To resist the corrosive action of sea water, the V43/V243 maritime and navy models are constructed with a red brass body, bronze and monel interior parts, and monel seat material.

FEATURES

- Built-in pilot valve
- Easy adjustment
- Drain plug
- Mesh monel screen

DIMENSIONS (in mm)



	2 inch	2-1/2 inch	3 inch	4 inch
A <sup>1</sup>	241	273	298	356
B	191	203	229	273
C	121	140	152	191
D	152	178	191	229
E	54	67	80	105
F <sup>2</sup>	387	395	421	462
F <sup>3</sup>	404	412	437	479
G	19.05 - Ø 4	19.05 - Ø 4	19.05 - Ø 4	19.05 - Ø 8
H	92	100	108	128

Notes

- 1** Flange face to flange face.
- 2** These are the measurements for the V43 valves.
- 3** These are the measurements for the V243 valves.



## V43 / V243 - PRESSURE ACTUATED WATER VALVES

### ORDERING INFORMATION

#### V43 SERIES

CODES	PIPE SIZE (in.)	INLET AND OUTLET	OPENING POINT ADJUSTMENT RANGE <i>psig (kPa)</i>	SHIP WEIGHT (Kg)
Commercial type – Non-corrosive refrigerants (R)				
V43AT-2C	2 1/2	4 Hole ASME Flanged	140 to 260 (1,103 to 1,793)	29.48
V43AW-2C	4	8 Hole ASME Flanged	160 to 260 (1,103 to 1,793)	64.41
Maritime type – Non-corrosive refrigerants (R)				
V43BT-7C	2 1/2	4 Hole ASME Flanged	140 to 260 (1,103 to 1,793)	29.48
V43BV-7C	3			40.82

#### NAVY NAVSEA CERTIFIED

CODES	PIPE SIZE (in.)	INLET AND OUTLET	PRESSURE CONNECTOR	OPENING POINT ADJUSTMENT RANGE <i>psig (kPa)</i>	SHIP WEIGHT (Kg)
Navy NAVSEA certified – Non-corrosive refrigerants (R)					
V43BW-7C	4	8 hole ASME flange	1/4 in. male flared conn.	70 to 150 (483 to 1,034)	64.41
V43BW-2C				140 to 260 (1,103 to 1,793)	

#### V243 SERIES

CODES	PIPE SIZE (in.)	INLET AND OUTLET	OPENING POINT ADJUSTMENT RANGE <i>psig (kPa)</i>	SHIP WEIGHT (Kg)
Commercial type – High pressure refrigerants				
V243HW-1C	4	8 hole ASME flange	200 to 400 (1,379 to 2,758)	64.41



## TECHNICAL SPECIFICATIONS

	V43	V243
Maximum water supply pressure	150 psig (1,034 kPa)	
Maximum head pressure	300 psig (2,068 kPa)	630 psig (4,344 kPa)
Head pressure range (opening points)	<b>Low pressure refrigerants:</b> R-134A – 70 to 150 psig (482 to 1,034 kPa) <b>Medium pressure refrigerants:</b> R-22, R-502, R404A – 160 to 260 psig (1,103 to 1,793 kPa) <b>Ammonia:</b> 160 to 260 psig (1,103 to 1,793 kPa)	<b>High pressure:</b> R410A – 200 to 400 psig (1,379 to 2,758 kPa)
Factory settings *	<b>Low pressure refrigerants:</b> 90 psig (621 kPa) <b>Medium pressure refrigerants:</b> 180 psig (1,241 kPa) <b>Ammonia:</b> 180 psig (1,241 kPa)	<b>High pressure:</b> 200 psig (1,379 kPa)
Maximum water supply temperature	71 °C	
Valve body material	<i>Commercial</i> Cast iron <i>Maritime</i> Red brass	
Internal parts material	<i>Commercial</i> Brass <i>Maritime</i> Bronze, Monel	
Seat material	<i>Pilot</i> Monel <i>Main Valve</i> <b>Commercial:</b> Bronze <b>Maritime:</b> Monel	
Seat disc material	Buna N™	
Packing – Bellows assembly	Brass stem, stainless steel spring, synthetic rubber boot	
Pressure connection refrigerant side	<i>Non-corrosive</i> 1/4 in. SAE male flare <i>Ammonia</i> 1/4 in. FNPT	

### Note

\* Factory setpoint for the valve is adjustable.



## MODULATING WATER VALVES

## PRESSURE ACTUATED WATER VALVES

# V46

### 2-WAY PRESSURE ACTUATED WATER VALVES - COMMERCIAL APPLICATIONS

These pressure actuated modulating valves control the quantity of water to a condenser by directly sensing pressure changes in a refrigerant circuit.

The valves can be used in non-corrosive refrigerant systems. Ammonia power elements and valves designed for salt-water applications are available.

The valves have a quick opening characteristic and open on pressure increase (direct acting). Reverse acting (close on pressure increase) is possible.

## FEATURES

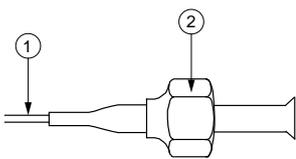
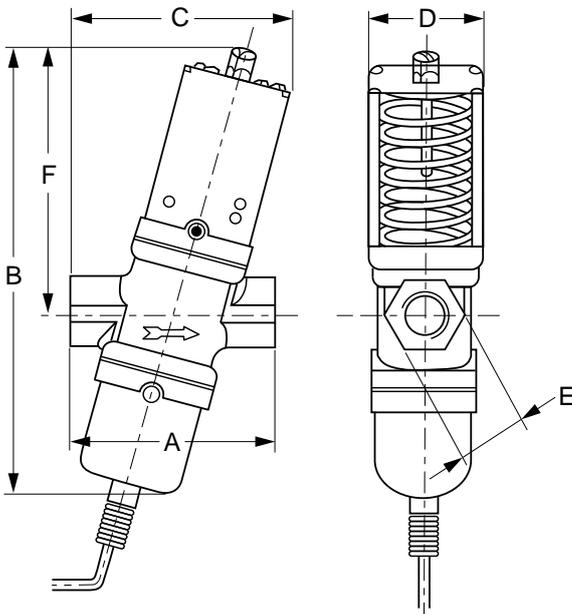
- Pressure balanced valve design
- Pressure actuated
- 3/8, 1/2, 3/4" are angled body type valves with high  $K_v$  value
- 3/8" up to 2" pressure valves "all range" types
- Quick opening valve characteristics
- No close fitting or sliding parts in water passages
- Easy to disassemble. All parts can be replaced
- Special bronze bodies and monel parts
- Power elements with stainless steel bellows available
- Wide range of pressure connection styles
- Nickel plated seats available for 3/8, 1/2, and 3/4" valves
- Direct/reverse action



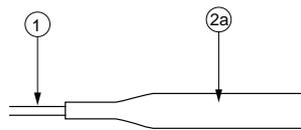


V46AA / VA46AB / VA46AC DIMENSIONS (in mm)

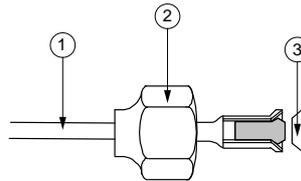
VALVE SIZE	A	B	C	D	E	F
3/8"	70	150	75	41	24	92
1/2"	80	166	86	51	27	98
3/4"	90	181	97	55	36	110



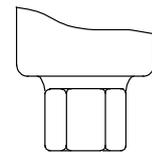
**Style 13**  
(excl. valve depressor)  
1: 75 cm capillary  
2: 7/16-20 UNF flare nut



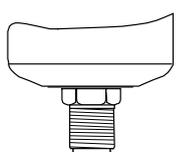
**Style 34**  
1: 75 cm capillary  
2: 1/4" tube for braze connection



**Style 50**  
(incl. valve depressor mounted into machined flare)  
1: 75 cm capillary  
2: 7/16-20 UNF flare nut  
3: copper searing



**Style 15**  
1/4-18NPT  
(female)



**Style 5**  
7/16-20 UNF

V46 - PRESSURE ACTUATED WATER VALVES



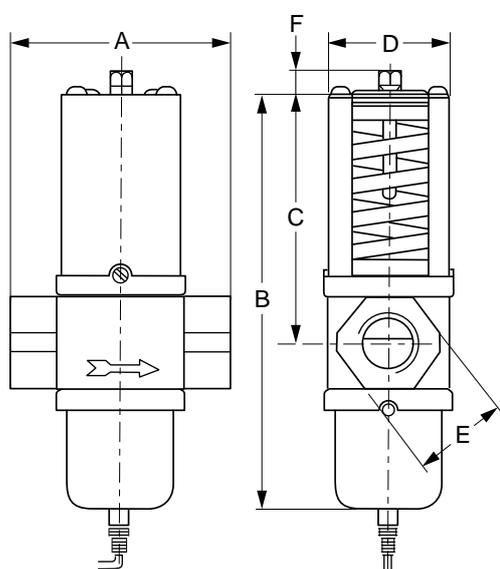
V46AA / VA46AB / VA46AC ORDERING INFORMATION

CODES	RANGE (bar)	BODY STYLE	SIZE THREAD ACCORDING TO ISO 228	STYLE	CAPILLARY LENGTH (cm)	ADDITIONAL FEATURES (IT IS POSSIBLE TO CHANGE STYLE 13 INTO STYLE 45A BY ORDERING KIT031N600)		
V46AA-9600	5...18	Angled	3/8"	13	75	---		
V46AA-9608						With special washer to prevent waterhammer at low flow capacity		
V46AA-9602						Nickel plated seat/longer capillary		
V46AA-9950				34	75	Nickel plated seat/solder connection		
V46AA-9951						.040" i.d.cap./solder connection		
V46AB-9600						---		
V46AB-9950			5...23	Angled	1/2"	13	75	Solder connection/"062" id.cap
V46AC-9600								---
V46AC-9951					3/4"	13	75	Solder connection
V46AA-9300								---
V46AA-9301	5...23	Angled	3/8"	5	---	Nickel plated seat, high range. With washer to prevent waterhammer at low flow capacity		
V46AA-9606						13	75	Nickel plated seat, high range
V46AA-9609								Nickel plated seat, high range. With washer to prevent waterhammer at low flow capacity
V46AA-9510				50	High range			
V46AB-9300				1/2"	5	75	---	
V46AB-9605							13	Nickel plated seat, high range
V46AB-9951			34				Solder connection, high range	
V46AB-9510			50		High range			
V46AC-9300			3/4"		5	75	---	
V46AC-9605							13	Nickel plated seat, high range
V46AC-9510				50			High range	



### V46AD / VA46AE DIMENSIONS (in mm)

VALVE SIZE	A	B	C	D	E	F
1"	124	233	138	71	48	13
1-1/4"	126	242	144		57	



### V46AD / VA46AE ORDERING INFORMATION

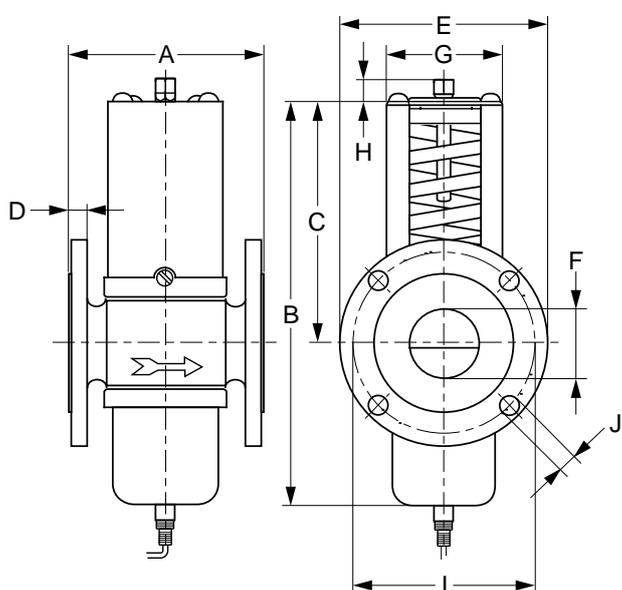
CODES	RANGE (bar)	BODY STYLE	SIZE THREAD ACCORDING TO ISO 7-RC	STYLE	CAPILLARY LENGTH (cm)	ADDITIONAL FEATURES (IT IS POSSIBLE TO CHANGE STYLE 13 INTO STYLE 45A BY ORDERING KIT031N600)
V46AD-9300	5...18	Straight	1"	5	---	---
V46AD-9510				50	75	
V46AD-9600				13	75	
V46AE-9300			1-1/4"	5	---	
V46AE-9510				50	75	
V46AE-9600				13	75	
V46AD-9511	10...23		1"	50	75	High range
V46AE-9512			1-1/4"			

V46 - PRESSURE ACTUATED WATER VALVES

V46AR / VA46AS / VA46AT DIMENSIONS (in mm)



VALVE SIZE	A	B	C	D	E	F	G	H	I	J
1-1/2"	137	242	144	18	150	47	67	13	110	18
2"	168	299	164	20	165	57	89	16	125	
2-1/2"	172				185	70			145	



V46AR / VA46AS / VA46AT ORDERING INFORMATION

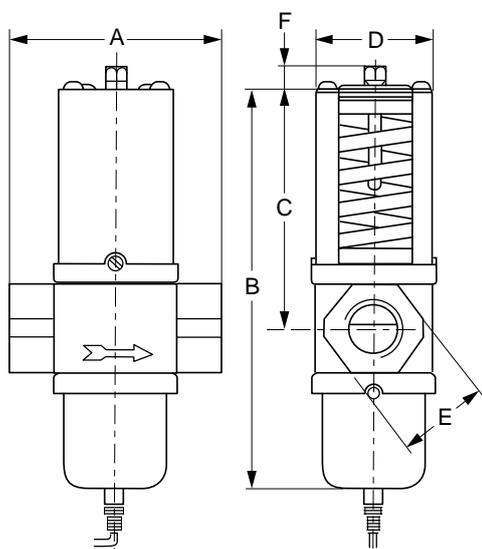
CODES	RANGE (bar)	BODY STYLE	SIZE DIN2533 FLANG CONNECTIONS	STYLE	CAPILLARY LENGTH (cm)	ADDITIONAL FEATURES (IT IS POSSIBLE TO CHANGE STYLE 13 INTO STYLE 45A BY ORDERING KIT031N600)
V46AR-9300	5...18	Straight	1-1/2"	5	---	---
V46AR-9600				13	75	
V46AS-9300	5...11.5		2"	5	---	---
V46AS-9301	11...18					
V46AT-9300	5...11.5		2-1/2"	5	---	---
V46AT-9301	11...18					



V46 - PRESSURE ACTUATED WATER VALVES

V46BA / V46BB / V46BC / V46BD / V46BE DIMENSIONS (in mm)

VALVE SIZE	A	B	C	D	E	F
3/8"	67	136	79	41	24	10
1/2"	80	153	86	51	29	
3/4"	86	163	96	55	35	
1"	124	233	138	71	52	13
1-1/4"		242	144		62	



V46BA / V46BB / V46BC / V46BD / V46BE ORDERING INFORMATION

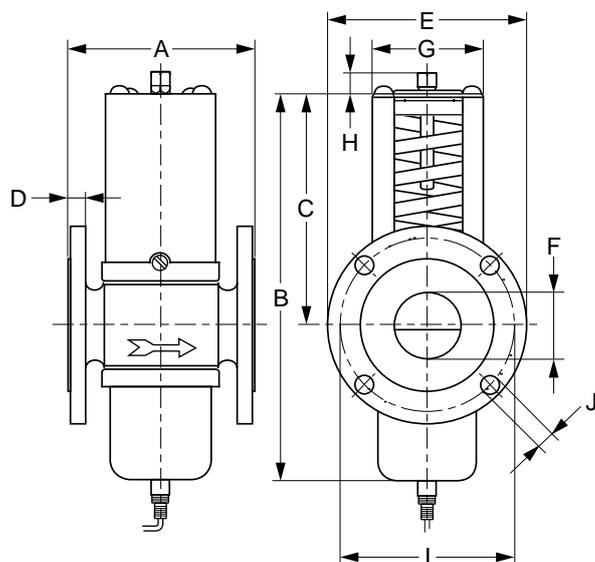
CODES	RANGE (bar)	BODY STYLE	SIZE THREAD ACCORDING TO ISO 228	STYLE	CAPILLARY LENGTH (cm)	ADDITIONAL FEATURES (IT IS POSSIBLE TO CHANGE STYLE 13 INTO STYLE 45A BY ORDERING KIT031N600)
V46BA-9600	5...18	Straight	3/8"	13	75	---
V46BB-9600			1/2"			
V46BC-9600			3/4"			
V46BD-9600			1"			
V46BE-9510			1 1/4"	50		
V46BE-9600			13			
V46BA-9510	5 ...23		3/8"	50	140	Longer capillary
V46BB-9510			1/2"			
V46BC-9510			3/4"			
V46BC-9511			1"			
V46BD-9510	10...23		1"	50	75	---
V46BE-9511			1 1/4"			



V46 - PRESSURE ACTUATED WATER VALVES

V46BR / V46BS / V46BT DIMENSIONS (in mm)

VALVE SIZE	A	B	C	D	E	F	G	H	I	J
1-1/2"	135	242	144	14	150	47	67	13	110	18
2"	162	299	164	16	165	57	89	16	125	
2-1/2"	172				185	70			145	



V46BR / V46BS / V46BT ORDERING INFORMATION

CODES	RANGE (bar)	BODY STYLE	SIZE DIN 86021 FLANGE CONNECTIONS	STYLE	CAPILLARY LENGTH (cm)
V46BR-9510	5...18	Straight	1½"	50	75
V46BR-9600				13	
V46BS-9300	5...11.5		2"	5	---
V46BS-9301	11...18				
V46BT-9300	5...11.5		2½"	5	
V46BT-9301	11...18				



## MODULATING WATER VALVES

## PRESSURE ACTUATED WATER VALVES

# V46SA

### PRESSURE ACTUATED WATER VALVES, LOW FLOW

The V46SA is a direct acting, "all range", pressure actuated modulating valve, used to control the waterflow to a condenser by directly sensing pressure changes in a non-corrosive refrigerant circuit.

The V46SA is specially designed for use on equipment requiring a low condenser waterflow such as icemakers, small heatpumps and watercoolers. The springhousing and power element are rolled to the valve body.

Rubber diaphragms seal the water away from the range spring and bellows part so these are not submerged in water where they would be subject to sedimentation and corrosion.

The valve can be ordered style 5 (without capillary), style 13, style 34 and style 50 (incl. 75 cm capillary).

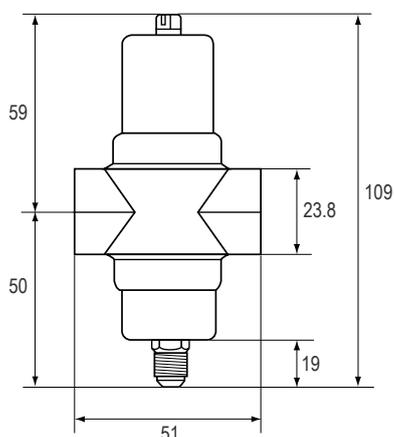
The capillary part will be delivered separated from the valve.



## FEATURES

- Valve designed for low flow
- "All range" power element and spring housing
- Small dimensions
- Pressure actuated
- Various pressure connection style
- High refrigerant pressure resistant bellows

## DIMENSIONS (in mm)





## ORDERING INFORMATION

CODES	RANGE (bar)	BODY STYLE	SIZE THREAD ACCORDING TO ISO 228	STYLE	CAPILLARY LENGTH (cm)	ADDITIONAL FEATURES (IT IS POSSIBLE TO CHANGE STYLE 13 INTO STYLE 45A BY ORDERING KIT031N600)
V46SA-9101	5...23	Straight	3/8"	45A	75	Capillary soldered to power element
V46SA-9110				50		Capillary separate
V46SA-9300				5	---	---
V46SA-9600				13	75	Capillary separate
V46SA-9950				34		---
V46SA-9951						Capillary soldered to power element



MODULATING  
WATER VALVES

PRESSURE ACTUATED  
WATER VALVES

V48

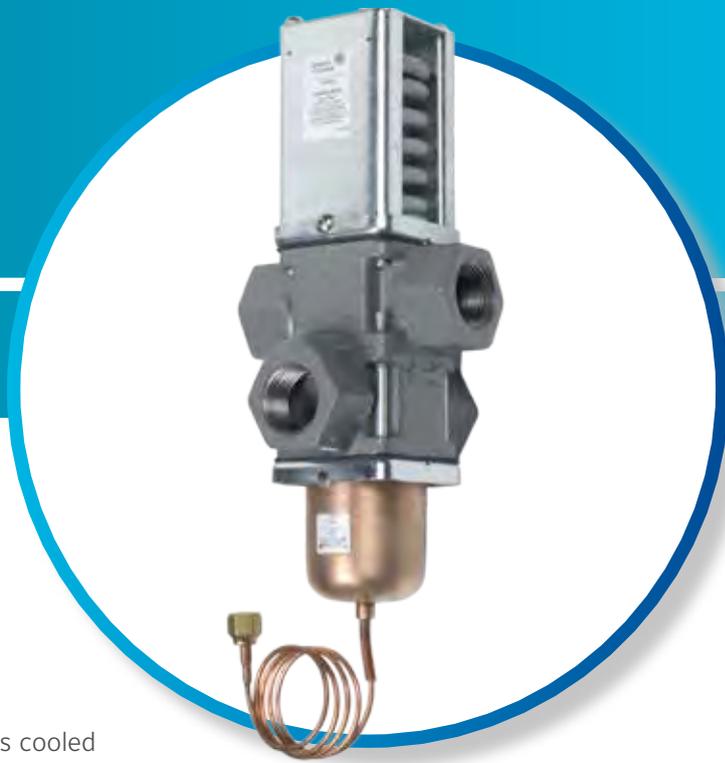
3-WAY PRESSURE ACTUATED WATER VALVES

These water valves are especially designed for condensing units cooled either by atmospheric or forced draft cooling towers. They may be used on single, or multiple condenser hook-ups to the tower.

The type V48 valve senses the compressor head pressure and allows cooling water to flow to the condenser, to by-pass the condenser, or to allow waterflow to both condenser and by-pass line in order to maintain correct refrigerant head pressure.

A further advantage of this system is that the 3-way valve permits a continuous water flow to the tower so the tower can operate efficiently with a minimum of maintenance on nozzles and wetting surfaces.

The valves can be used in non-corrosive refrigerant systems. Ammonia power elements and valves designed for salt-water applications are available. The valves have a quick opening characteristic.

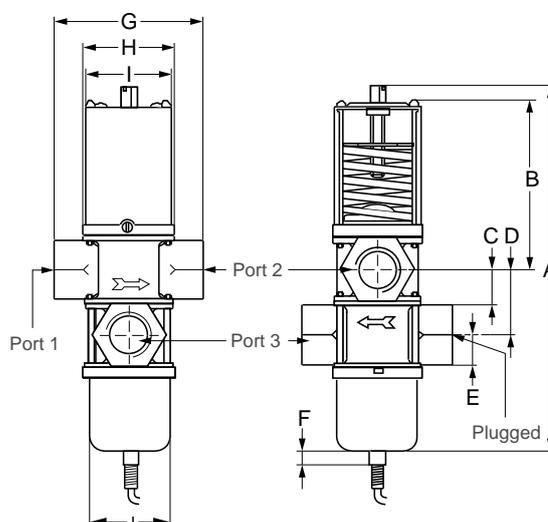


FEATURES

- Pressure balanced design
- Free movement of all parts
- Easy manual flushing
- High  $K_v$  values
- Pressure actuated
- Can be used as mixing or diverting valve

DIMENSIONS (in mm)

VALVE SIZE	A	B	C	D	E	F	G	H	I	J
Commercial type										
1/2"	201	86	24	38	29	8	81	51	47	45
3/4"	218	96	27	45	35		86	55	52	48
1"	296	138	29	51	48		124	71	67	59
1-1/4"	315	144	32	60	57		126			59
Maritime type										
3/4"	218	96	27	45	35	8	86	55	52	48



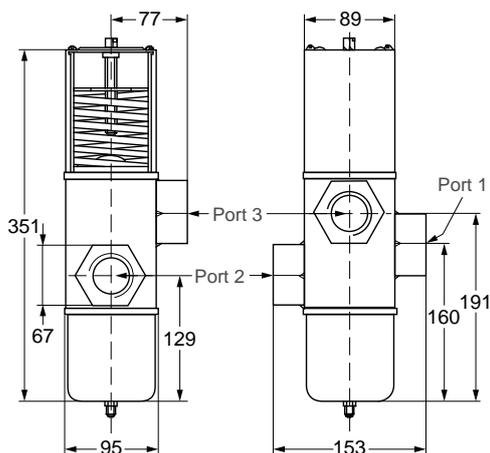


## ORDERING INFORMATION

CODES	RANGE (bar)	BODY STYLE	SIZE THREAD	STYLE	CAPILLARY LENGTH (cm)	ADDITIONAL FEATURES (IT IS POSSIBLE TO CHANGE STYLE 13 INTO STYLE 45A BY ORDERING KIT031N600)
Commercial type						
V48AB-9510	4...20	Straight	1/2" according to ISO 7-Rc	50	75	---
V48AB-9600	4...16			13		
V48AC-9510	4...20		3/4" according to ISO 7-Rc	50		
V48AC-9600	4...16			13		
V48AD-9510	6...20		1" according to ISO 7-Rc	50		
V48AD-9600	4...16			13		
V48AD-9602	4...16		1-1/4 " according to ISO 7-Rc	50		
V48AE-9510	6...20			13		
V48AE-9600	4...16					Bodies in line (port 3 below port 2)
Maritime types						
V48BC-9600	4...16	Straight	3/4" according to ISO 228	13	75	Seawater resistant

## V48AF COMMERCIAL TYPE

### DIMENSIONS (in mm)



## ORDERING INFORMATION

CODE	RANGE (bar)	BODY STYLE	SIZE THREAD ACCORDING TO ISO 7-RC	STYLE	ADDITIONAL FEATURES (IT IS POSSIBLE TO CHANGE STYLE 13 INTO STYLE 45A BY ORDERING KIT031N600)
V48AF-9300	6...14	Straight	1-1/2"	5	---



## MODULATING WATER VALVES

## PRESSURE ACTUATED WATER VALVES

# V246 / V248

### WATER REGULATING VALVES FOR HIGH PRESSURE REFRIGERANTS

The V246 / V248 series 2-way and 3-way pressure actuated water regulating valves for high-pressure refrigerants regulate water flow and control refrigerant head pressure in systems with single or multiple watercooled condensers. These valves have an adjustable opening point in a refrigerant pressure range of 200 to 400 psig (13.8 to 27.6 bar).

These series valves are designed specifically for condensing units cooled either by atmospheric or forced draft cooling towers. They are used on single or multiple condenser hook-ups to the tower to provide the most economical and efficient use of the tower. V246 / V248 valves may be used with standard non-corrosive or ammonia refrigerants.

For applications where the coolant may be corrosive to the internal parts, maritime models are available, which have nickel copper (Monel®) internal parts.

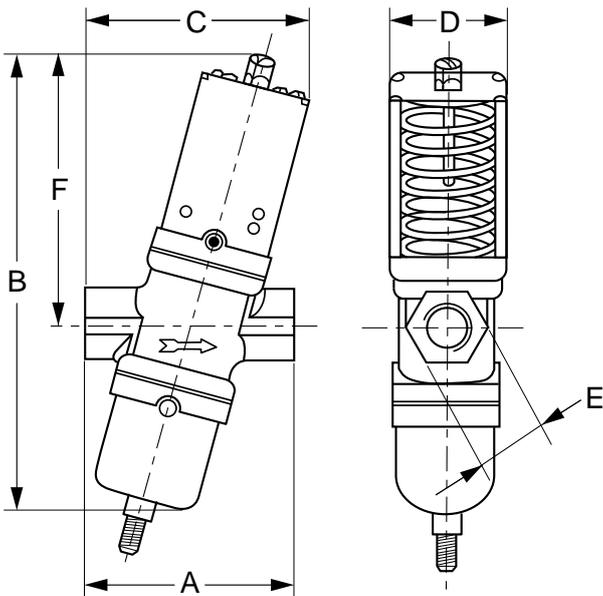
## FEATURES

- No close fitting or sliding parts in water passages
- Accessible range spring
- Take-apart construction
- Pressure-balanced design
- Corrosion-resistant material for internal parts



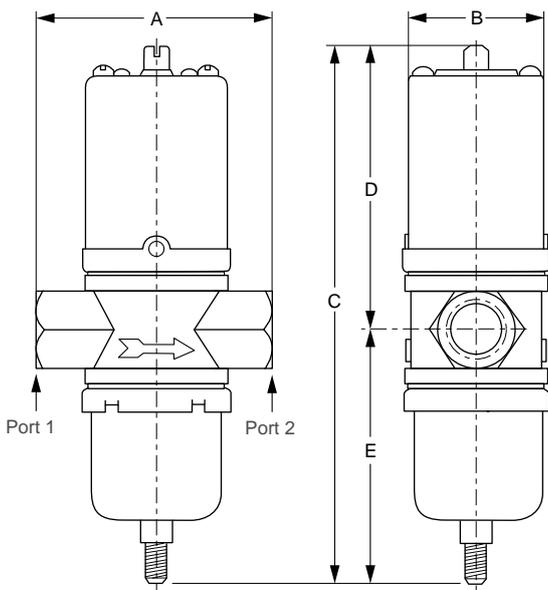
**DIMENSIONS (in mm)**

STANDARD PRODUCTION MODELS RANGE 13.8 TO 27.6 bar  
V246 SCREW CONNECTION VALVES



COMMERCIAL SERVICE

VALVE SIZE	A	B	C	D	E	F
3/8"	70	176	75	41	24	92
1/2"	80	191	86	51	27	98
3/4"	90	217	97	55	36	110



COMMERCIAL SERVICE

VALVE SIZE	A	B	C	D	E
1"	124	71	267	151	116
1-1/4"	126		276	156	121

MARITIME SERVICE

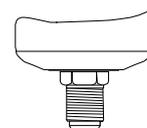
VALVE SIZE	A	B	C	D	E
3/8"	67	41	166	89	77
1/2"	78	51	182	96	86
3/4"	86	55	203	106	98
1"	124	71	267	151	116
1-1/4"	126		276	156	121



## ORDERING INFORMATION

STANDARD PRODUCTION MODELS RANGE 13.8 TO 27.6 bar  
V246 SCREW CONNECTION VALVES

CODES	CONSTRUCTION	VALVE SIZE AND CONNECTION	ELEMENT STYLE	SHIPPING WEIGHT (kg)
V246GA1A001C	Direct acting, Commercial	3/8 in. BSPP Screw, ISO 228	Style 5	1.86
V246GB1A001C		1/2 in. BSPP Screw, ISO 228		1.4
V246GC1A001C		3/4 in. BSPP Screw, ISO 228		1.7
V246GD1B001C		1 in. BSPT Screw, ISO 7		4.2
V246GE1B001C		1-1/4 in. BSPT Screw, ISO 7		4.5
V246GR1B001C		1-1/2 in. Flange, DIN2533		6.2
V246GS1B001C		2 in. Flange, DIN2533		12.3
V246HA1B001C	Direct acting, Maritime	3/8 in. BSPP Screw, ISO 228		1.86
V246HB1B001C		1/2 in. BSPP Screw, ISO 228		1.4
V246HC1B001C		3/4 in. BSPP Screw, ISO 228		2.0
V246HD1B001C		1 in. BSPT Screw, ISO 228		4.3
V246HE1B001C		1-1/4 in. BSPT Screw, ISO 228		4.7
V246HR1B001C		1-1/2 in. Flange, DIN86021		6.2
V246HS1B001C		2 in. Flange, DIN86021		12.3

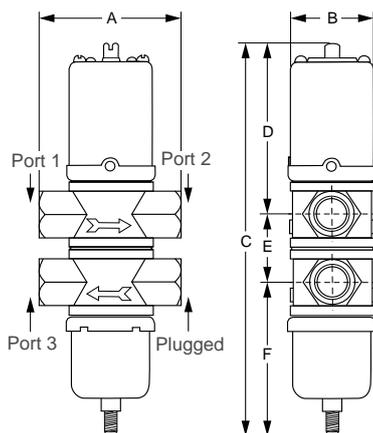


Style 5  
7/16-20 UNF



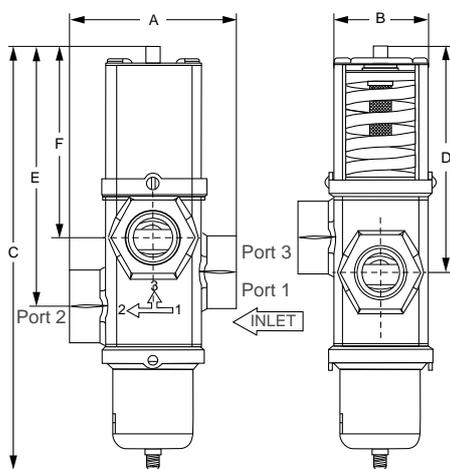
**DIMENSIONS (in mm)**

STANDARD PRODUCTION MODELS RANGE 13.8 TO 27.8 bar



1/2 in. THROUGH 1-1/4 in.

VALVE SIZE	A	B	C	D	E	F
1/2 in.	79	51	220	96	38	86
3/4 in.	86	55	248	106	45	98
1 in.	124	71	318	151	52	115
1-1/4 in.	126		336	156	60	121

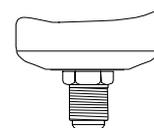


1-1/2 in.

VALVE SIZE	A	B	C	D	E	F
1-1/2 in.	152	89	387	206	237	175

**ORDERING INFORMATION**

CODES	CONSTRUCTION	VALVE SIZE AND CONNECTION	ELEMENT STYLE	SHIPPING WEIGHT (kg)
V248GB1B001C	Direct acting, Commercial	1/2 in. BSPT Screw, ISO 7	Style 5	2.3
V248GC1B001C		3/4 in. BSPT Screw, ISO 7		3.0
V248GD1B001C		1 in. BSPT Screw, ISO 7		5.5
V248GE1B001C		1-1/4 in. BSPT Screw, ISO 7		5.0
V248GF1B001C		1-1/2 in. BSPT Screw, ISO 7		11.3
V248HC1B001C	Direct acting, Maritime	3/4 in. BSPP Screw, ISO 228		3.0



**Style 5**  
7/16-20 UNF



## MODULATING WATER VALVES

## TEMPERATURE ACTUATED WATER VALVES

### V47

These modulating water valves can be used for heating applications. It does have an heating element which means that the bulb temperature always must be higher than the valve body (power element).

The valve opens at increasing bulb temperature.

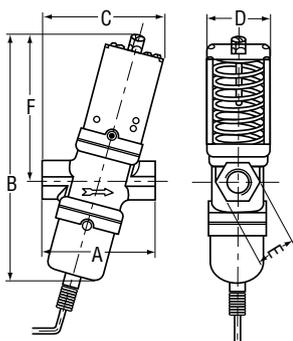
The bulb must be mounted pointing downwards up to horizontal.



## FEATURES

- Pressure balanced valve design
- 3/8, 1/2, 3/4" are angled body type valves with high  $K_v$  value
- Quick opening valve characteristics
- No close fitting or sliding parts in water passages
- Easy to disassemble. All parts can be replaced

## DIMENSION (in mm)



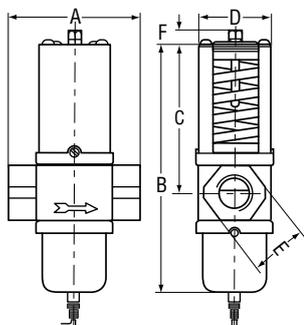
VALVE SIZE	A	B	C	D	E	F
3/8"	70	150	75	41	24	92
1/2"	80	166	86	51	27	98
3/4"	90	181	97	55	36	110

## ORDERING INFORMATION

CODES	RANGE (°C)	BODY STYLE	SIZE THREAD ACCORDING TO ISO 228	CAPILLARY LENGTH	BULB STYLE 4 LENGTH (mm)
V47AA -9161	46...82	Angled	3/8"	1.8 m plain	82
V47AB -9160	24...57		1/2"		
V47AC -9160			3/4"		



**DIMENSION (in mm)**

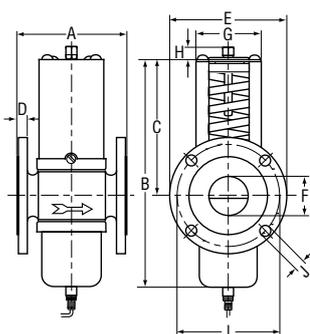


VALVE SIZE	A	B	C	D	E	F
1"	124	233	138	72	48	13
1-1/4"	125	243	144		57	

**ORDERING INFORMATION**

CODES	RANGE (°C)	BODY STYLE	SIZE THREAD ACCORDING TO ISO 7-RC	CAPILLARY LENGTH	BULB STYLE 4 LENGTH (mm)
V47AD -9160	24...57	Straight	1"	1.8 m arm.	152
V47AD -9161	46...82				
V47AE -9160	24...57		1-1/4"		
V47AE -9161	46...82				

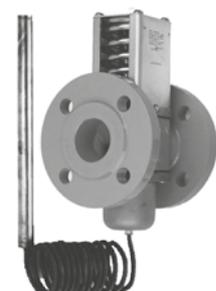
**DIMENSION (in mm)**



VALVE SIZE	A	B	C	D	E	F	G	H	I	J
1-1/2"	137	244	144	18	150	47	67	13	110	18

**ORDERING INFORMATION**

CODES	RANGE (°C)	BODY STYLE	SIZE DIN 2533 FLANGE CONNECTIONS	CAPILLARY LENGTH	BULB STYLE 4 LENGTH (mm)
V47AR -9160	24...57	Straight	1-1/2"	1.8 m arm.	152
V47AR -9161	46...82				





ELECTRONIC  
EXPANSION VALVES



## QREV-PSHC

### QUICK RESPONSE EXPANSION VALVE

The Quick Response Expansion Valve (QREV) with the Precision Superheat Controller (PSHC) is a compact, electronic, closed loop, rapid response superheat control solution for refrigeration and HVAC applications.

The QREV is next generation electronic expansion valve (EEV) technology providing maximum evaporator efficiency by quickly reaching the preferred superheat.

The QREV includes a silicon-based microelectromechanical system (MEMS) pilot valve that responds to a signal from the PSHC and pilots a smooth gliding spool valve that regulates refrigerant flow through the QREV, virtually eliminating valve wear and greatly extending valve life. QREVs are offered in several capacity ranges.

The PSHC is an electronic superheat controller that provides precise control to the QREV through varying load conditions. The PSHC is installed on a pressure port at the evaporator outlet.

The PSHC uses an internal pressure sensor and an external temperature sensor to control the QREV flow and maintain the preferred superheat at the evaporator outlet. The PSHCs are currently set up to control one of 17 approved refrigerants for easy commissioning.

## FEATURES

- **Quick response valve** – Provides rapid and precision control of evaporator outlet superheat.
- **Silicon-Based MEMS Technology and Smooth-action Spool Valve** – Reduces valve wear and extends valve life.
- **Closed loop solution** – Simplifies installation and commissioning without the need for a front-end or supervisory controller.
- **Modbus® RTU Compliant Subordinate Device** – Provides remote monitoring and adjustment on Modbus Networks.
- **Compact solution** – Allows use in limited space applications.



## ORDERING INFORMATION

### QREV NOMINAL CAPACITIES kW (ton)

CODES	REFRIGERATION PRODUCTS																
	R-134A	R-22	R-404A	R-407A	R-407C	R-407F	R-410A	R-417A	R-422A	R-422D	R-427A	R-438A	R-448A	R-449A	R-450A	R-507	R-513A
QREV01-24S-C	1.76 (1/2)	2.64 (3/4)	1.76 (1/2)	2.64 (3/4)	2.64 (3/4)	2.64 (3/4)	2.64 (3/4)	1.76 (1/2)	1.76 (1/2)	1.76 (1/2)	2.64 (3/4)	1.76 (1/2)	2.64 (3/4)	2.64 (3/4)	0.88 (1/4)	1.76 (1/2)	1.76 (1/2)
QREV02-24S-C	5.28 (1-1/2)	6.15 (1-3/4)	3.52 (1)	6.15 (1-3/4)	7.03 (2)	7.03 (2)	7.03 (2)	4.4 (1-1/4)	4.4 (1-1/4)	4.4 (1-1/4)	6.15 (1-3/4)	5.28 (1-1/2)	6.15 (1-3/4)	6.15 (1-3/4)	4.4 (1-1/4)	4.4 (1-1/4)	4.4 (1-1/4)
QREV03-24S-C	7.03 (2)	8.79 (2-1/2)	6.15 (1-3/4)	8.79 (2-1/2)	8.79 (2-1/2)	9.67 (2-3/4)	10.55 (3)	6.15 (1-3/4)	5.28 (1-1/2)	6.15 (1-3/4)	8.79 (2-1/2)	7.03 (2)	8.79 (2-1/2)	8.79 (2-1/2)	6.15 (1-3/4)	6.15 (1-3/4)	5.28 (1-1/2)
QREV04-24S-C	8.79 (2-1/2)	10.55 (3)	7.03 (2)	10.55 (3)	11.43 (3-1/4)	12.31 (3-1/2)	13.19 (3-3/4)	7.91 (2-1/4)	6.15 (1-3/4)	7.03 (2)	7.91 (2-1/4)	8.79 (2-1/2)	10.55 (3)	10.55 (3)	7.03 (2)	7.03 (2)	7.03 (2)
QREV05-24S-C	10.55 (3)	14.07 (4)	10.55 (3)	14.95 (4-1/4)	15.83 (4-1/2)	16.71 (4-3/4)	17.58 (5)	10.55 (3)	8.79 (2-1/2)	10.55 (3)	14.07 (4)	12.31 (3-1/2)	14.95 (4-1/4)	14.07 (4)	9.67 (2-3/4)	9.67 (2-3/4)	9.67 (2-3/4)
QREV09-24SC-C	24.61 (7)	31.65 (9)	21.10 (6)	31.65 (9)	35.16 (10)	35.16 (10)	35.16 (10)	24.61 (7)	17.58 (5)	21.10 (6)	31.65 (9)	31.65 (9)	31.65 (9)	31.65 (9)	21.10 (6)	21.10 (6)	21.10 (6)
QREV10-24SC-C	31.65 (9)	39.68 (11)	28.13 (8)	39.68 (11)	42.20 (12)	42.20 (12)	45.72 (13)	28.13 (8)	24.61 (7)	28.13 (8)	39.68 (11)	31.65 (9)	39.68 (11)	39.68 (11)	24.61 (7)	24.61 (7)	24.61 (7)
QREV11-24SC-C	35.16 (10)	45.72 (13)	31.65 (9)	45.72 (13)	49.24 (14)	49.24 (14)	52.75 (15)	31.65 (9)	28.13 (8)	31.65 (9)	42.20 (12)	39.68 (11)	45.72 (13)	45.72 (13)	31.65 (9)	31.65 (9)	28.13 (8)
QREV12-24SC-C	39.68 (11)	52.75 (15)	35.16 (10)	49.24 (14)	52.75 (15)	56.27 (16)	59.79 (17)	39.68 (11)	31.65 (9)	35.16 (10)	49.24 (14)	42.20 (12)	52.75 (15)	49.24 (14)	35.16 (10)	35.16 (10)	31.65 (9)
QREV13-24SC-C	45.72 (13)	56.27 (16)	42.20 (12)	56.27 (16)	59.79 (17)	63.30 (18)	70.34 (20)	42.20 (12)	39.68 (11)	35.16 (10)	39.68 (11)	56.27 (16)	49.24 (14)	56.27 (16)	39.68 (11)	39.68 (11)	39.68 (11)
QREV14-24SC-C	49.24 (14)	63.30 (18)	45.72 (13)	63.30 (18)	66.82 (19)	73.85 (21)	77.37 (22)	45.72 (13)	39.68 (11)	45.72 (13)	63.30 (18)	52.75 (15)	63.30 (18)	63.30 (18)	42.20 (12)	42.20 (12)	42.20 (12)
QREV15-24SC-C	52.75 (15)	70.34 (20)	49.24 (14)	70.34 (20)	77.37 (22)	80.89 (23)	87.92 (25)	52.75 (15)	45.72 (13)	49.24 (14)	66.82 (19)	59.79 (17)	70.34 (20)	70.34 (20)	49.24 (14)	49.24 (14)	45.72 (13)

#### IMPORTANT:

These nominal QREV capacities are determined at AHRI-ANSI standard expansion valve lab test conditions. The actual capacity required by your refrigeration system may vary significantly depending on local ambient conditions and the load encountered during system operation. The best practice is to select the valve size (tonnage) that meets the highest loads requirements of your system.



## ORDERING INFORMATION

PRECISION SUPERHEAT CONTROLLER PRODUCT CODE NUMBERS AND REFRIGERANT TYPES

CODES	REFRIGERANT PRODUCTS
PSHC01-134A-C	R134A
PSHC01-410A-C	R410A
PSHC01-0022-C	R22
PSHC01-404A-C	R404
PSHC01-0507-C	R507
PSHC01-407A-C	R407A
PSHC01-407C-C	R407C
PSHC01-407F-C	R407F
PSHC01-448A-C	R448A
PSHC01-449A-C	R449A
PSHC01-450A-C	R450A
PSHC01-513A-C	R513A
PSHC01-422A-C	R422A
PSHC01-422D-C	R422D
PSHC01-427A-C	R427A
PSHC01-438A-C	R438A

## WIRING HARNESS

CODE WHA-PSHC-150-1C



HUMIDITY  
CONTROLS  
MECHANICAL  
HUMIDITY STAT

W43

ROOM HUMIDISTATS

These room humidistats are designed to control humidification or dehumidification equipment. It provides SPDT control.

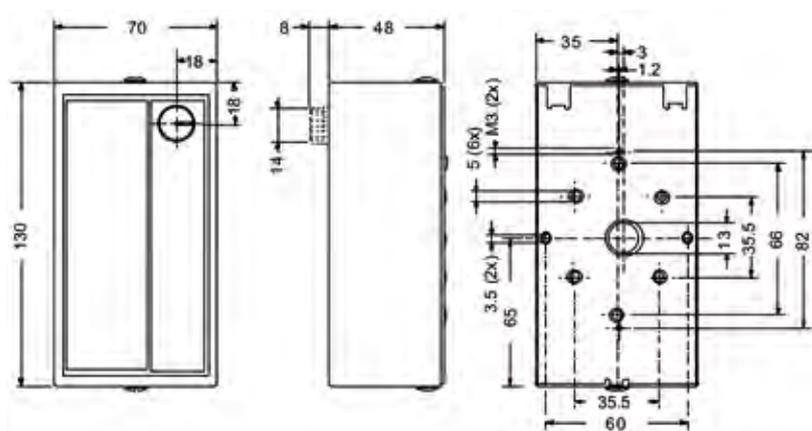
The sensing element consists of carefully selected and processed human hair, proven to be the most sensitive and stable material known for this application. Under normal conditions these controls retain their sensitivity and accuracy for many years.



FEATURES

- Wide range 0 to 90% R.H.
- Dust tight Penn switch
- SPDT Contacts
- Field adjustable high and low limit stops
- Separate mounting plate

DIMENSIONS (in mm)



ORDERING INFORMATION

CODE	DESCRIPTION
W43C-9100	Room humidistat



## CONDENSER FAN SPEED CONTROLLERS

### 1-PHASE CONDENSER FAN SPEED CONTROL

# P215PR

#### DIRECT-MOUNT SINGLE PHASE CONTROLLER

These direct mount pressure actuated condenser fan speed controllers are designed for speed variation of single-phase motors.

Head pressure control of a refrigeration system, through speed variation of the fan on an air-cooled condenser, results in optimum performance throughout the year.

A pressure actuated device, gives the most direct and fastest response to pressure variations in the refrigerant system. The controller varies the supply voltage to the motor from 30% to at least 95% over the proportional band using the phase cutting principle.

This provides speed variation of permanent split capacitor or shaded pole motors that do not draw more than 4 A (rms) full load current.

Cut-off models (fan stops at low pressure) as well as minimum speed models (fan keeps running at 30%) are available.

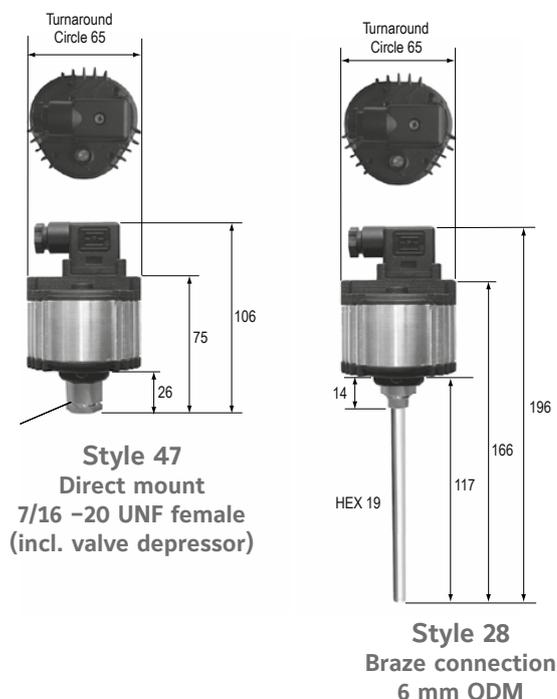
The controllers can be used in non-corrosive refrigerant systems.

## FEATURES

- Condenser pressure control by fan speed variation
- Pressure input
- Direct mount
- Setpoint screw on top
- Built-in suppression filter
- IP65
- Compact design
- Attractive styling
- Quick connector plug included
- CE
- New range 5-15 bar for R134a



**DIMENSIONS (in mm)**



**ORDERING INFORMATION**

CODES	RANGE (bar)	ELEMENT STYLE	SETPOINT (bar)	PROP. BAND (bar)	SUPPLY VOLTAGE 50/60 Hz	RATING	CONTROLLER MODE	EXTRA FEATURES			
P215PR-9200	10 to 25	47	19	4.5	230 VAC	4 Amp	Cut-off	---			
P215PR-9202	22 to 42		26	5.5							
P215PR-9203	5 to 15		9	2.5							
P215PR-9800	10 to 25	28	19	4.5				230 VAC	4 Amp	Cut-off	Bulk Pack
P215PR-9230		47									
P215PR-9232	22 to 42		9	2.5							
P215PR-9233	5 to 15		19	4.5							
P215PR-9250	10 to 25		19	4.5	Bulk Pack, 2 m cable connector incl.						

**Note**  
For a 4 Amp rating and UL approval please contact your sales representative.



## CONDENSER FAN SPEED CONTROLLERS

### 1-PHASE CONDENSER FAN SPEED CONTROL

# P215RM

#### REMOTE-MOUNT SINGLE PHASE CONTROLLER

The new P215RM (Remote Mount) is an addition model to our very successful P215PR Direct Mount FSC which is in program since 2004.

We have designed the P215RM for situations where mounting space is limited or if the refrigeration line is too thin so it cannot carry the weight of the P215PR. Also new on this product is the all-in bracket design which is part of the complete Aluminium housing.

The P215RM can be screwed to a side panel and connected to the refrigeration line by using a flexible hose or a copper capillary.



## FEATURES

- Quick and easy to install due to integral mounting bracket
- Easy mounting with style 5 pressure connection
- No need to use a male / male adaptor between P215RM and flex hose
- Three ranges available 5 - 15 bar, 10 - 25 bar, 22 - 42 bar
- Output current maximum 4A at 55°C operating ambient temperature
- Global design CE approval

## 1-PHASE CONDENSER FAN SPEED CONTROL

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	RANGE (bar)	ELEMENT STYLE	SETPOINT (bar)	PROP. BAND (bar)	SUPPLY VOLTAGE 50/60 Hz	RATING	CONTROLLER MODE	EXTRA FEATURES
P215RM-9700	10 to 25	5	19	4.5	230 VAC	4 Amp	Cut-off	---
P215RM-9702	22 to 42		26	5.5				
P215RM-9703	5 to 15		9	2.5				



## CONDENSER FAN SPEED CONTROLLERS

### 1-PHASE CONDENSER FAN SPEED CONTROL

# P216

#### CONDENSER FAN SPEED CONTROLLER

These controllers are designed for speed variation of single phase motors, especially for fan speed control on air cooled condensers. Head pressure control of a refrigeration system, through speed variation of the fan on an air-cooled condenser, results in optimum performance throughout the year.

Using a pressure transducer as the input device to the fan speed controller, gives the most direct and fastest response to pressure variations in the refrigerant system. The controller varies the supply voltage to the motor from 45% to at least 95% over the proportional band using the phase cutting principle. If the pressure drops below the adjusted setpoint minus the proportional band, the output to the motor is zero volt or the adjusted min. speed setting. This provides speed variation of permanent split capacitor or shaded pole motors which do not draw more than 12 A (rms) full load current.

The controller used for dual pressure input varies the fan speed by directly sensing the pressure changes of two separate refrigerant circuits. The setpoint of each pressure transducer can be separately adjusted. The controller selects the input with the greatest cooling demand to control the fan speed.

The transducers can be used in non-corrosive refrigerant systems.

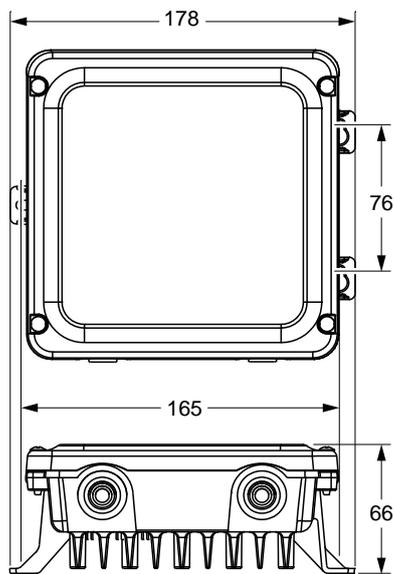
The motor manufacturer should have approved his product for this speed control principle. It is recommended to confirm with the electric motor manufacturer, that the motor can be used with a controller, using the phase cutting principle for speed variation. You can also provide a copy of this P216 product data sheet to the motor manufacturer/supplier for review.

## FEATURES

- The new benchmark in standard FSC
- Easy to Install and Easy to operate
- Output Range: 0,5 to 12 Amp (1 phase)
- Input 0-10 Vdc
- Including 0-50 bar pressure transducer P499VCS-405C
- Heatpump mode
- Reverse operation mode
- Master / Slave mode
- Fixed pressure ranges for direct replacement (P215)
- Setpoint and Min speed potmeters
- Operate with High Efficiency AC-fan motors who comply to ERP 2015 directive.



## DIMENSIONS (in mm)



## ORDERING INFORMATION

CODES	DESCRIPTION
P216EEA-2K	Wallmount P216EEA-101C + P499VCS-405C pressure transducer
P216EEA-101C	Wall mounted FSC
P499VCS-405C	Pressure transmitter with range 0-50 bar, Output 0-10V. 2 meter fixed cable. Pressure connection 7/16-20UNF female thread



## CONDENSER FAN SPEED CONTROLLERS

### 1-PHASE CONDENSER FAN SPEED CONTROL

# P266

#### PRESSURE ACTUATED SINGLE PHASE DIGITAL CONTROLLER

The P266 pressure actuated single phase digital controller is a cost-effective, weather-resistant, durable motor speed control.

The P266 control is designed for approved single-phase, Permanent Split-Capacitor (PSC) motors commonly used in a wide variety of refrigeration and air conditioning condenser fan applications.

The P266 series controls are designed to replace the Johnson Controls® P66 series and P215 series fan speed controls, providing additional features and flexibility, greater energy efficiency, and longer motor life in a compact, rugged, weather-resistant package.

P266 models are available for 208 to 240 VAC and 440 to 575 VAC range applications. P266 controls have current ratings from 4 to 12 A depending on the voltage and model.

Some P266 models provide optional control of up to three auxiliary (fixed-speed) fans or fan stages. Also, some models provide two additional high-voltage triacs, which allow you to split the source power to the main and auxiliary windings, and connect a low-speed capacitor to increase efficiency at low speed operation.

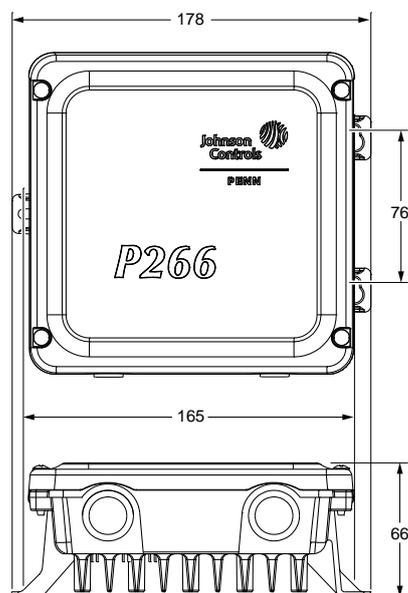
## FEATURES

- Global design CE / UL / CSA / C-tick
- Microprocessor based
- Field programmable, digital setting
- One or two electronic pressure transducers (P266SNR)
- Pressure range 0 - 35 bar or 0 - 52 bar
- Patented design
- Output 8 or 12 Amp at 60°C ambient temperature
- Robust aluminium IP54 enclosure with integral heatsink
- Multi triac control providing energy savings up to 25%
- Optional auxiliary (vernier) control
- Auto selection 50 / 60 Hz





## DIMENSIONS (in mm)



## ORDERING INFORMATION

CODES	DESCRIPTION	TRANSDUCER MODEL INCLUDED IN KIT	VOLTAGE RANGE (VAC)	MAXIMUM OUTPUT (Ampères)	HIGH VAC TRIACS	AVAILABLE AUXILIARY FAN CONTROL CIRCUITS	
P266EAA-1K *	P266 fan speed control with Internal transformer and <b>one</b> P266 pressure transducer and one 2 m cable	P266SNR-1C 0-35 bar (0-508 psi)	208 to 240	8	3	---	
P266EAA-3K *		P266SNR-2C 0-52 bar (0-754 psi)					
P266EBA-1K *		P266SNR-1C 0-35 bar (0-508 psi)					3
P266EBA-3K *		P266SNR-2C 0-52 bar (0-754 psi)					
P266ECA-1K *		P266SNR-1C 0-35 bar (0-508 psi)					---
P266ECA-3K		P266SNR-2C 0-52 bar (0-754 psi)					
P266EDA-1K *		P266SNR-1C 0-35 bar (0-508 psi)		1	3		
P266EDA-3K *		P266SNR-2C 0-52 bar (0-754 psi)					
P266EEA-1K *		P266SNR-1C 0-35 bar (0-508 psi)		12	---		
P266EFA-3K *		P266SNR-2C 0-52 bar (0-754 psi)				3	

### Note

\* Factory default settings: Start Voltage is set to 40% of the supply line-voltage. End Voltage is set to 95% of the supply line-voltage. Start Pressure is set to 44% of the P266 transducer's total pressure range. End Pressure is set to 51% of the P266 transducer's total pressure range.



## ORDERING INFORMATION

### P266SNR ELECTRONIC PRESSURE TRANSDUCERS

CODES	DESCRIPTION
P266SNR-1C	Electronic pressure transducer: 0 to 35 bar total range with a 1/4 in. SAE female flare connection and a 2 meter cable.
P266SNR-2C	Electronic pressure transducer: 0 to 52 bar total range with a 1/4 in. SAE female flare connection and a 2 meter cable.
P266PRM-1K	P266 Utility Com. Tool Kit. Communication Software Package to program and monitor P266 Control parameters.



## CONDENSER FAN SPEED CONTROLLERS

### 1-PHASE CONDENSER FAN SPEED CONTROL

# P315PR

DIRECT-MOUNT PRESSURE ACTUATED FOR EC MOTORS

The direct mount pressure actuated condenser fan speed controllers are designed for speed variation of electronically commutated (EC) motors. Head pressure control of a refrigeration system, through speed variation of the fan on an air-cooled condenser, results in optimum performance throughout the year.

The controllers can be used in non-corrosive refrigerant systems.

A pressure actuated device provides the most direct and fastest response to pressure variations in the refrigerant system. The controller varies the supply voltage to the motor from 5% to at least 95% over the proportional band.



## FEATURES

- Fan speed variation condenser pressure control
- Pressure input
- Direct mount option
- Setpoint screw location on top of device
- IP65 enclosure
- Compact design
- Attractive styling
- Quick connector plug included
- Suitable to control 1 or 3 phase EC motor



**DIMENSIONS (in mm)**



**ORDERING INFORMATION**

CODES	RANGE (bar) *	ELEMENT STYLE	SETTING (bar)	PROP. BAND (bar)	CONTROLLER MODE **	MINIMUM SHIPPING QUANTITY	ADDITIONAL FEATURES
P315PR-9200C	8 to 25	47	16	4	N/A	1	---
P315PR-9200D						25	Bulk Pack
P315PR-9202C	22 to 42		26	5		1	---
P315PR-9203C	5 to 15		6	4		25	Bulk Pack
P315PR-9203D							

**Notes**

\* 1 bar = 100 kPa ≈ 14.5 psi

\*\* Minimum speed.



## CONDENSER FAN SPEED CONTROLLERS

### 3-PHASE CONDENSER FAN SPEED CONTROL

# VFD68

#### VARIABLE FREQUENCY DRIVES

The VFD68 Variable Frequency Drive provides three-phase motor speed control in a variety of HVAC/R applications. The VFD68 drive is designed primarily for condenser fan speed control on HVAC and refrigeration condensing units, but can also be set up to control a variety of pumps, blowers and fans.

The VFD68 drive accepts an input signal from P499 electronic pressure transducer, or other devices that provide a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA signal.

The application-specific design of the VFD68 drive provides a simple interface, which makes the drive easy to understand and operate.

You can quickly and easily reconfigure the VFD68 drive to control variable speed pumps in cooling and heating applications, or to control variable speed supply fans in VAV applications.

The VFD68 drive is an RS485, RTU-compliant ModBus<sup>®</sup> slave device and can be integrated into a ModBus network.

## APPLICATIONS

The VFD68 drive accepts input signals from a variety of pressure transducers, temperature sensors, and low-voltage controllers to provide continuous response to changing condenser load conditions.

The VFD68 drive allows the system to:

- Maintain optimum condenser head pressure
- Operate in low ambient temperature conditions down to -40 °C
- Reduce short-cycling, which occurs when using
- Use on/off fan controls
- Maintain a more stable evaporator temperature
- Operate more efficiently, reducing electricity cost.

The VFD68 drive can also:

- Help optimize compressor operation, reduce wear, and extend compressor life by stabilizing the condenser head pressures
- Reduce motor repair and replacement costs by eliminating the condenser fan short-cycling
- Extend refrigerated product life and provide more consistent comfort cooling by stabilizing evaporator temperatures





## VFD68 3-PHASE CONDENSER FAN SPEED CONTROL

### FEATURES

- Selectable input types allows use with 0 to 5 VDC (ratiometric), 0 to 10 VDC, or 4 to 20 mA input signals from transducers, sensors, and controllers.
- High input signal selection of two similar inputs (230 or 460 volt models only) provides fan speed control of dual circuit condensing units, based on the highest pressure circuit.
- Compact design provides for easy and flexible installation.
- Three-phase, 230, 460, or 575 VAC models can control a wide variety of three-phase motors ranging up to 10hp.
- Simple and advanced end-user settings provide quick and simple application setup and operation, as well as advanced setup parameters for custom applications.

### ORDERING INFORMATION

#### 230 VAC ±10% PRODUCTION MODELS

CODES	DESCRIPTION
VFD68BBB-2C	VFD68 drive; 0.1 kw (1/8 hp); 128 x 68 x 81 mm
VFD68BCB-2C	VFD68 drive; 0.2 kw (1/4 hp); 128 x 68 x 81 mm
VFD68BDC-2C	VFD68 drive; 0.4 kw (1/2 hp); 128 x 68 x 113 mm
VFD68BFD-2C	VFD68 drive; 0.75 kw (1 hp); 128 x 68 x 133 mm
VFD68BGG-2C	VFD68 drive; 0.5 kw (2 hp); 128 x 108 x 136 mm
VFD68BHG-2C	VFD68 drive; 2.2 kw (3 hp); 128 x 108 x 136 mm
VFD68BJK-2C	VFD68 drive; 3.7 kw (5 hp); 128 x 170 x 142 mm
VFD68BKL-2C	VFD68 drive; 5.5 kw (7-1/2 hp); 150 x 220 x 155 mm
VFD68BLL-2C	VFD68 drive; 7.5 kw (10 hp); 150 x 220 x 155 mm
VFD68BMP-2C	VFD68 drive; 11 kw (15 hp); 260 x 220 x 190
VFD68BNP-2C	VFD68 drive; 15 kw (20 hp); 260 x 220 x 190

#### 460 VAC ±10% PRODUCTION MODELS

CODES	DESCRIPTION
VFD68CDF-2C	VFD68 Drive; 0.4 kw (1/2 hp); 128 x 108 x 130 mm
VFD68CFF-2C	VFD68 Drive; 0.75 kw (1 hp); 128 x 108 x 130 mm
VFD68CGG-2C	VFD68 Drive; 1.5 kw (2 hp); 128 x 108 x 136 mm
VFD68CHH-2C	VFD68 Drive; 2.2 kw (3 hp); 128 x 108 x 156 mm
VFD68CJJ-2C	VFD68 Drive; 3.7 kw (5 hp); 128 x 108 x 166 mm
VFD68CKL-2C	VFD68 Drive; 5.5 kw (7-1/2 hp); 150 x 220 x 155 mm
VFD68CLL-2C	VFD68 Drive; 7.5 kw (10 hp); 150 x 220 x 155 mm
VFD68CMP-2C	VFD68 Drive; 11 kw (15 hp); 260 x 220 x 190
VFD68CNP-2C	VFD68 Drive; 15 kw (20 hp); 260 x 220 x 190



## VFD68 3-PHASE CONDENSER FAN SPEED CONTROL

### ORDERING INFORMATION

575 VAC +5/-10% PRODUCTION MODELS

CODES	DESCRIPTION
VFD68DFM-2C	VFD68 Drive; 0.75 kw (1 hp); 150 x 140 x 136 mm
VFD68DGM-2C	VFD68 Drive; 1.5 kw (2 hp); 150 x 140 x 136 mm
VFD68DHM-2C	VFD68 Drive; 2.2 kw (3 hp); 150 x 140 x 136 mm
VFD68DJN-2C	VFD68 Drive; 3.7 kw (5 hp); 150 x 220 x 148 mm
VFD68DKN-2C	VFD68 Drive; 5.5 kw (7-1/2 hp); 150 x 220 x 148 mm
VFD68DLN-2C	VFD68 Drive; 7.5 kw (10 hp); 150 x 220 x 148 mm

### ACCESSORIES

THE P499R / P499A / P499V MODELS CAN BE CONNECTED TO THE VFD68

VFD68 460 V KIT MODELS (DRIVE - EMC FILTER)

VFD68 KIT	VFD68	EMC FILTER
VFD68CDF-2K	VFD68CDF-2C	FFR-CSH-036-8A-RF1
VFD68CFF-2K	VFD68CFF-2C	FFR-CSH-036-8A-RF1
VFD68CGG-2K	VFD68CGG-2C	FFR-CSH-036-8A-RF1
VFD68CHH-2K	VFD68CHH-2C	FFR-CSH-080-16A-RF1
VFD68CJJ-2K	VFD68CJJ-2C	FFR-CSH-080-16A-RF1
VFD68CKL-2K	VFD68CKL-2C	FFR-MSH-170-30A-RF1
VFD68CLL-2K	VFD68CLL-2C	FFR-MSH-170-30A-RF1



## FIELD AND COLD ROOM CONTROLLERS

## MODULAR ELECTRONIC CONTROL SYSTEM

# SYSTEM 450™

### MODULAR ELECTRONIC CONTROLS



System 450™ is a family of modular, digital electronic controls that is easily assembled and set up to provide reliable temperature, pressure, and humidity control for a wide variety of Heating, Ventilating, Air Conditioning and Refrigeration (HVACR) and commercial/industrial process applications.

The System 450 control system is designed to replace System 350™ control system and System 27, and provide many additional features and benefits with less than a dozen model variations.

All System 450 control modules are multipurpose and field configurable out-of-the-box; each module is designed for use in temperature, pressure, and humidity systems. A System 450 control system can be easily assembled and configured to monitor and control temperature, pressure, and humidity simultaneously.

A single C450 control module can be set up as a stand-alone control or connected to expansion modules to control up to ten outputs based on any of the three available inputs.

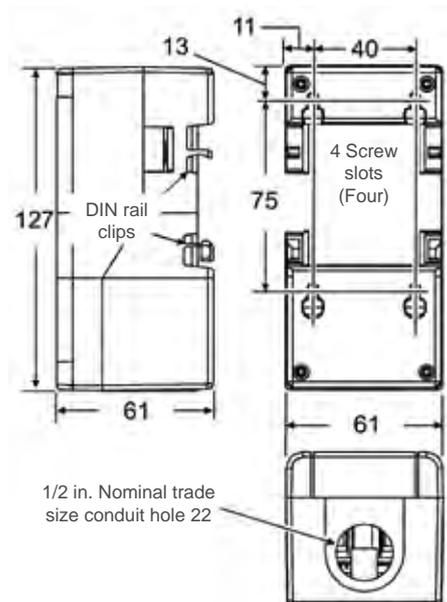
A control system may consist of relay outputs (Single-Pole, Double-Throw [SPDT]), analog outputs (0–10 VDC or 4–20 mA), or any combination of relay and analog outputs.

## FEATURES

- Durable, compact modular design with plug-together connectors and DIN rail or direct wall mount capability
- Multipurpose, field-configurable modules designed for global use
- Backlit Liquid Crystal Display (LCD) and four-button touchpad user interface
- Up to three inputs and up to ten outputs (relay or analog)
- Versatile, all-in-one, stand-alone control modules
- An extensive suite of compatible temperature and humidity sensors as well as pressure transducers
- High input signal selection
- Differential control
- Adjustable user-defined reset setpoint (C450R Only)
- Adjustable minimum and maximum setpoint temperature (C450R only)
- Selectable warm weather shutdown temperature (C450R only)
- Adjustable setback temperature (C450R only)



## DIMENSIONS (in mm)



## ORDERING INFORMATION (PART 1/2)

System 450 control modules are capable of monitoring up to three input sensors and controlling up to ten outputs that can be any combination of relay and analogue outputs (provided by expansion modules).

CODES	DESCRIPTION
C450 control module types	
C450CBN-4C	Control module 1 stage
C450CCN-4C	Control module 2 stage
C450CEN-1C	Control module with Ethernet communications, LCD, and four-button touchpad UI. (No onboard outputs available on control modules with network communications capabilities.)
C450CRN-1C	Control module with RS485 Modbus communications, LCD, and four-button touchpad UI. (No onboard outputs available on control modules with network communications capabilities.)
C450CPN-4C	Control module - 1 analog output (PI)
C450CQN-4C	Control module - 2 analog Output (PI)
C450RBN-1C	Reset control module - 1 relay stage
C450RCN-1C	Reset control module - 2 relay stage
C450RBN-3C	Reset control module with LCD, four-button touchpad UI, and SPDT relay output; provides one SPDT output relay. One A99BC-25C temperature sensor with 0.25 m silicon leads and one A99BC-300C temperature sensor with 3 m silicon leads are included in the box with the reset control module.
C450RCN-3C	Reset control module with LCD, four-button touchpad UI, and SPDT relay output; provides two SPDT output relays. One A99BC-25C temperature sensor with 0.25 m silicon leads and one A99BC-300C temperature sensor with 3 m silicon leads are included in the box with the reset control module.

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## ORDERING INFORMATION (PART 2/2)

CODES	DESCRIPTION
C450 expansion module types	
C450SBN-3C	Expansion module 1 relay stage
C450SCN-3C	Expansion module 2 relay stage
C450SPN-1C	Expansion module - 1 analog output (PI)
C450SQN-1C	Expansion module - 2 analog output (PI)
C450 power module	
C450YNN-1C	Power module 230/24 VAC - 50/60 Hz
C450 sensor types	
A99	Temperature sensors, all models, Range -40 / 120 °C
P499RCP-401C	Pressure transmitter - Range -1 / 8 bar
P499RCP-402C	Pressure transmitter - Range -1 / 15 bar
P499RCP-404C	Pressure transmitter - Range 0 / 30 bar
P499RCP-405C	Pressure transmitter - Range 0 / 50 bar
HE-67S3-0N00P	Humidity transmitter duct mount (include A99)
HE-67S3-0N0BP	Humidity transmitter wall mount (include A99)
DPT2650-0R5D-AB	Delta P transmitter 0 to 1 mbar
DPT2650-0I0D-AB	Delta P transmitter 0 to 25 mbar

## SPECIFICATIONS SPDT RELAY OUTPUT CONTACTS

- AC motor ratings at 208/240 VAC
- Full-load Amperes: 4,9 Amp
- Locked-rotor Amperes: 29,4 Amp
- Non-inductive load at 24/240 VAC: 10 Amp
- Pilot duty at 24/240 VAC: 125 VA

A99	All A99 models can be used on the C450	
P499	P499RCP-401C	Range -1 to 8 bar
	P499RCP-402C	Range -1 to 15 bar
	P499RCP-404C	Range 0 to 30 bar
	P499RCP-405C	Range 0 to 50 bar
HE	HE-67S3-0N00P	Hum transmitter duct mount (include A99)
	HE-67S3-0N0BT	Hum transmitter wall mount (include A99)
DTP	DPT2650-0R5D-AB	Delta P transmitter 0 to 0,5 INWC (or 0 to 1 mbar)
	DPT2650-0I0D-AB	Delta P transmitter 0 to 10 INWC (or 0 to 25 mbar)





## FIELD AND COLD ROOM CONTROLLERS ELECTRONIC CONTROL DEVICES

### ER LINE

#### ELECTRONIC REFRIGERATION LINE

Devices are designed to be incorporated in refrigerated display cases and cold storage rooms.

ER Line proposes progressive offer from basic controls to advanced controls including real time clock, energy saving and network communication to be integrated with monitoring system.

It also introduces specific products for supermarkets (e.g. compressor rack).



#### HARDWARE FEATURES

- Robust front panel for durability and long term usage
- Direct 230 V supply, no external transformer required
- Up to 5 relays in a single package
- NTC or PTC (A99) sensors
- Removable plug connectors for quick mounting and wiring
- Embedded real time clock, no additional clock card required
- Embedded RS485 port, no additional communication card required

#### APPLICATION FEATURES

- Positive or negative temperature units with a single product
- Minimum and maximum temperature monitoring
- Comprehensive controls
- Light and standby switching
- Energy saving (2<sup>nd</sup> setpoint)



## ORDERING INFORMATION

PRODUCTS	TYPE	MOUNTING	WIRING	COMPRESSOR RELAYS	FAN RELAYS	DEFROST RELAYS	AUXILIARY RELAYS	REAL TIME CLOCK	RS485
ER54	Evaporator control	Panel	Removable plug connectors	■	■	■	■	■	■
ER55-DR	Cold room control	Din rail	Removable plug connectors	■	■	■	■ (2 relays)	■	■
ER55-SM	Cold room control	Split	Fixed screw connectors	■	■	■	■ (2 relays)	■	■
ER65	Rack control	Din rail	Removable plug connectors	■ (4 relays)	---	---	■	---	■

### Note

Please refer to product bulletins for complete information

## ACCESSORIES

CODES	DESCRIPTION	APPLIED PRODUCTS
ER-NTC-OC	NTC sensor, cable 2 m, universal replacement	All ER products
ER-COM-1C	RS485 cable, 1.5 m, plug connector	ER54, ER55-SM
ER-COM-2C	RS485 cable, 1.5 m, RJ connector	ER55-DR
P499Axx-xxx	Pressure transducer, 4-20 mA (See also P499 catalogue section)	ER65

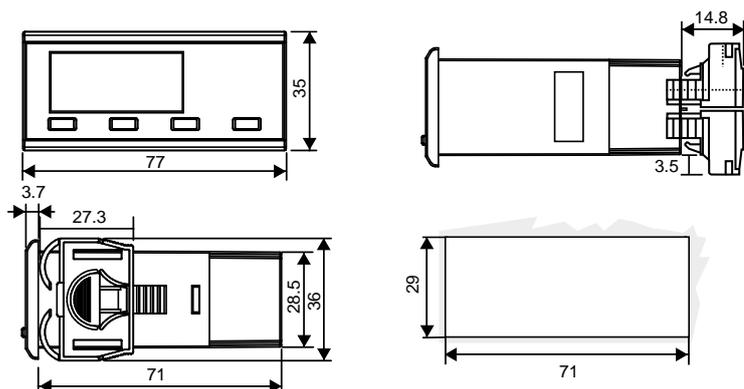


## ER54 EVAPORATOR CONTROLLERS

### FEATURES

- Panel mount controller
- cool thermostat
- comprehensive controls
- RS485
- real time clock
- plug connectors
- Delivered with one NTC sensor

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	RS485	POWER SUPPLY	PROTECTION CLASS	TEMPERATURE RANGE	DISPLAY	INPUTS	OUTPUTS
ER54-PMW-501C	MODBUS	230 VAC, +/-10% Consumption 3W	IP55 (front) IP20 (back)	-40 to 70°C Accuracy: +/-0.3 °C	LED 3 digits Decimal displaying	• 3 temperatures • 2 voltage free contacts	<ul style="list-style-type: none"> <li>• Compressor: SPST 12(5)A</li> <li>• Fan: SPST 7(2)A</li> <li>• Defrost: SPST 7(2)A</li> <li>• Auxiliary: SPST 7(2)A</li> </ul>
ER54-PMW-001C	N2 Open						

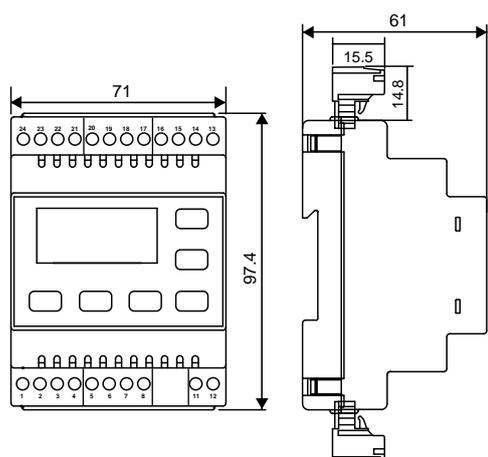


## ER55 COLD ROOM CONTROLLERS

### FEATURES

- DIN rail mounting controller
- cool thermostat
- comprehensive controls
- RS485
- real time clock
- plug connectors
- Delivered with one NTC sensor

### DIMENSIONS (in mm)



CODES	RS485	POWER SUPPLY	PROTECTION CLASS	TEMPERATURE RANGE	DISPLAY	INPUTS	OUTPUTS
ER55-DR230-501C	MODBUS	230 VAC, +/-10% Consumption 3W	IP20	-40 to 70°C Accuracy: +/-0.3°C	LED 3 digits Decimal displaying	• 3 temperatures • 2 voltage free contacts	<ul style="list-style-type: none"> <li>• Compressor: SPST 7(2)A</li> <li>• Fan: SPST 7(2)A</li> <li>• Defrost: SPST 16(4)A</li> <li>• Auxiliary 1: SPDT 7(2)A</li> <li>• Auxiliary 2: SPST 7(2)A</li> </ul>
ER55-DR230-001C	N2 Open						

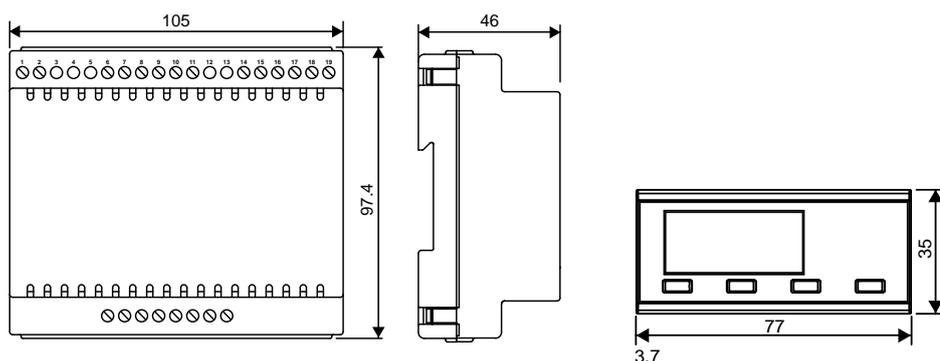


## ER55 COLD ROOM CONTROLLERS

### FEATURES

- Split mounting controller
- cool thermostat
- comprehensive controls
- RS485
- real time clock
- plug connectors
- Delivered with two NTC sensors

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	RS485	POWER SUPPLY	PROTECTION CLASS	TEMPERATURE RANGE	DISPLAY	INPUTS	OUTPUTS
ER55-SM230-501C	MODBUS	230 VAC, +/-10% Consumption 3W	IP20	-40 to 70°C Accuracy: +/-0.3°C	Remote LED 3 digits Decimal displaying	• 3 temperatures • 2 voltage free contacts	<ul style="list-style-type: none"> <li>• Compressor: SPST 16(8)A</li> <li>• Fan: SPST 8(3)A</li> <li>• Defrost: SPST 16(4)A</li> <li>• Auxiliary 1: SPST 7(2)A</li> <li>• Auxiliary 2: SPST 7(2)A</li> </ul>
ER55-SM230-001C	N2 Open						

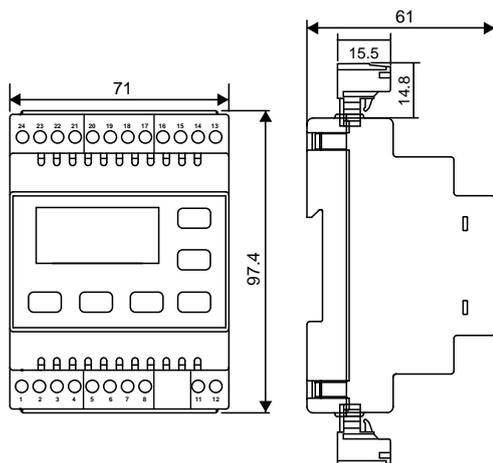


## ER65 RACK CONTROLLERS

### FEATURES

- DIN rail mounting controller
- pressure or temperature control
- 4 compressors or fans sequencer
- RS485
- plug connectors
- Sensor to be ordered separately (see also P499 pressure transducer section).

### DIMENSIONS (in mm)



### ORDERING INFORMATION

CODES	RS485	POWER SUPPLY	PROTECTION CLASS	TEMPERATURE RANGE	DISPLAY	INPUTS	OUTPUTS
ER65-RK230-501C	MODBUS	230 VAC, +/-10% Consumption 3W	IP20	-40 to 70°C Accuracy: +/-0.3°C	• LED 3 digits • Decimal displaying	• 1 temperature • 1 pressure • 2 voltage free contacts • 3 supplied contacts (230 V)	• Stages (x4): SPST 5(1)A • Alarm: SPDT 7(2)A
ER65-RK230-001C	N2 Open						



FIELD AND COLD  
ROOM CONTROLLERS  
ELECTRONIC  
CONTROL DEVICES

## A525

### ELECTRONIC REFRIGERATION CONTROLLERS WITH ADAPTIVE DEFROST

The A525 series refrigeration controller with adaptive defrost provides refrigerated space control and defrost control for medium and low temperature refrigeration applications.

The A525 controller has five integral line-voltage, dry-contact relays to control the compressor, defrost heater or solenoid, evaporator fans and (user provided) alarm devices. The controller can control resistive heat, hot-gas bypass, or passive defrost. The controller can also control two speed evaporator fans.

The adaptive defrost feature allows the controller to adjust the defrost schedule to the minimum number of defrost intervals required to maintain peak efficiency, save energy, and maintain consistent space temperature.

The A525 controller has an IP65 enclosure that allows for wall-surface mount or optional DIN Rail mount.

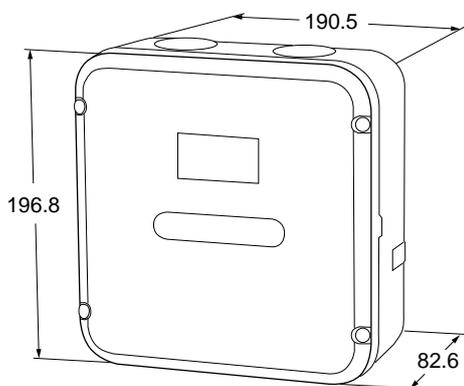


## FEATURES

- 5 Relays / 4 Inputs
- CE/UL rated
- Easy to clean display front panel
- IP65 Robust housing
- HACCP logging function
- USB port for download logging files / Upload Firmware / Commissioning
- Modern Design
- Energy saving functionality
- RS485 Modbus communication
- Communicate with QREV – PSHC Electronic Expansion Valve
- VERASYS® compatible



## DIMENSIONS (in mm)



## ORDERING INFORMATION

CODE	DESCRIPTION
A525AEDN-0203C	Electronic refrigeration controller with adaptive defrost



FIELD AND COLD  
ROOM CONTROLLERS  
MULTI-STAGES  
CONTROL DEVICES

## MS LINE

### GENERAL PURPOSE AND MULTI-STAGES

This range of versatile controls is intended for single or multistage (2 or 4 stages) applications such as heating, cooling but also humidity or pressure depending on the input type.

This range incorporates all control functions as required by modern applications and it exists in both panel mount and DIN rail enclosures. Particular attention has been given to its style in order to better suit your machine design.

This complete range of microprocessor based controls offers innovative features and "state of the art" technology.

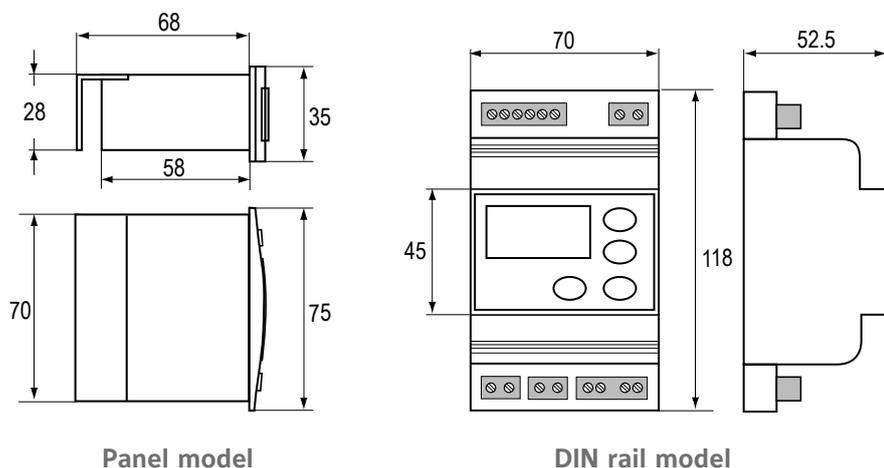


## FEATURES

- Attractive panel mount and DIN rail mount enclosure
- Up to 4 relays in panel mount enclosure
- 230 Volt power supply models available
- Accept temperature (A99) and 0-10 Volts sensor signal depending on models
- Power supply to sensors on 0-10 Volts models available from controller
- Accurate and interchangeable IP68 sensor
- Wide range of enclosures for sensors available
- Keyboard lock
- SMD technology



## DIMENSIONS (in mm)



## ORDERING INFORMATION

### MS DISPLAY

CODES	RANGE	POWER SUPPLY	ENCLOSURE	INPUT	PROTECTION CLASS	ADDITIONAL FEATURES
DIS12T-1C	-40 to 70°C	12 VAC/DC	Panel	A99 sensor (incl.)	Overall IP20 Front IP54	<ul style="list-style-type: none"> <li>Accuracy: ±1 Unit</li> <li>Power Consumption: 1.5 VA 50/60 Hz</li> </ul>
DIS230T-1C		230 VAC				
DIS12V-1C	0 to +100% (Rh)	12 VAC		0-10 V from humidity sensor (not Incl.)		
DIS230V-1C		230 VAC				

### MS1 ONE-STAGE CONTROL

CODES	RANGE	POWER SUPPLY	ENCLOSURE	INPUT	OUTPUT RATING 250 VAC	ALARM OUTPUT	PROTECTION CLASS	ADDITIONAL FEATURES
MS1PM12RT-1C	-40 to 70°C	12 VAC/DC	Panel	A99 sensor (incl.)	SPST 8(3)A	Open Collector 40 VDC/100 mA	Overall IP20 Front IP54	<ul style="list-style-type: none"> <li>Accuracy: ±1 Unit</li> <li>Power Consumption: 2 VA 50/60 Hz</li> </ul>
MS1PM230T-1C		230 VAC	DIN rail		SPDT 8(3)A		IP20	
MS1DR230T-1C		230 VAC			SPST 8(3)A			
MS1PM12RV-1C	-40 to 100	12 VAC	Panel	0-10 V	SPST 8(3)A		Overall IP20 Front IP54	
MS1PM230V-1C		230 VAC	DIN rail		SPDT 8(3)A			
MS1DR230V-1C		230 VAC			SPST 8(3)A			



## ORDERING INFORMATION

### MS2 TWO-STAGE CONTROL

CODES	RANGE	POWER SUPPLY	ENCLOSURE	INPUT	OUTPUT RATING 250 VAC	PROTECTION CLASS	ADDITIONAL FEATURES
					Each stage (1-2)		
MS2PM12RT-1C	-40 to 70 °C	12 VAC/DC	Panel	A99 sensor (incl.)	SPST 8(3)A	Overall IP20 Front IP54	<ul style="list-style-type: none"> <li>• Accuracy: ±1 °C</li> <li>• Power Consumption: 2 VA 50/60 Hz</li> </ul>
MS2DR230T-1C		230 VAC	DIN rail		SPST 8(3)A	IP20	
MS2DR48DT-1C		12-24 VAC/DC 48 VDC			SPDT 8(3)A		
MS2PM12RV-1C	-40 to 100	12 VAC	Panel	0-10 V	SPST 8(3)A	Overall IP20 Front IP54	
MS2DR230V-1C		230 VAC	DIN rail		SPST 8(3)A	IP20	

### MS4 FOUR-STAGE CONTROL

CODES	RANGE	POWER SUPPLY	ENCLOSURE	INPUT	OUTPUT RATING 250 VAC	PROTECTION CLASS	ADDITIONAL FEATURES
					Each stage (1 to 4)		
MS4PM12RT-1C	-40 to 70°C	12 VAC/DC	Panel	A99 sensor (incl.)	SPST 8(3)A	Overall IP20 Front IP54	<ul style="list-style-type: none"> <li>• Accuracy: ±1 Unit</li> <li>• Power Consumption: 2 VA 50/60 Hz</li> </ul>
MS4DR230T-1C		230 VAC	DIN rail		SPST 8(3)A		
MS4DR48T-1C		12-24 VAC/DC 48 VDC			SPDT 8(3)A	IP20	



TRANSDUCERS  
AND SENSORS  
PRESSURE  
TRANSDUCER

P499

ELECTRONIC PRESSURE TRANSDUCER



The P499 series is a new global pressure transducer with an excellent price performance ratio.

The P499 exceeds the latest industrial CE/UL requirements including surge protection, and is over voltage protected in both positive and reverse polarity.

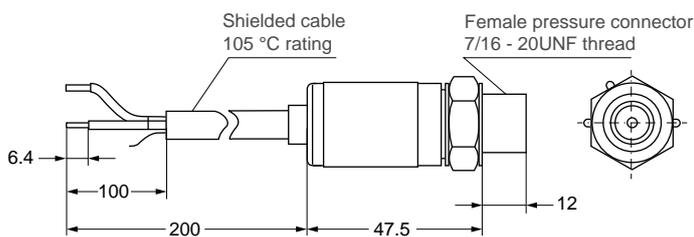
The P499 is designed to produce a linear analogue signal based on the sensed pressure.

The pressure port is machined from a solid piece of 17-4PH stainless steel. There are no O-rings or welds that are exposed to the pressure media. This results in a leak proof, all metal sealed pressure system which withstand more than 10 million pressure cycles without failure.

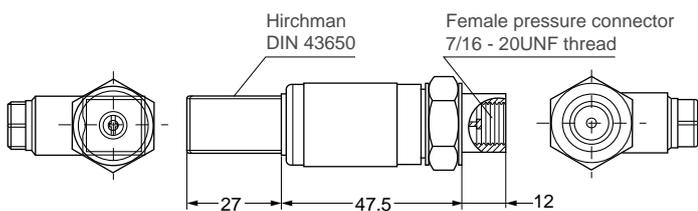
FEATURES

- Single-piece machined steel pressure port
- Environmentally sealed electronics
- Reliable, repeatable performance and long operating life
- Slender body design
- Available in several pressure ranges up to 50 bar.

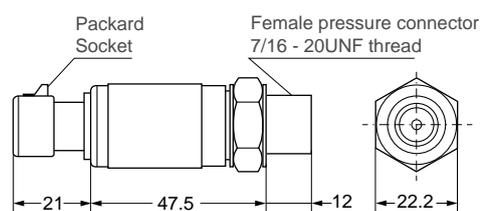
DIMENSIONS (in mm)



Shielded cable female



Hirschman female



Packard female



## P499 - PRESSURE TRANSDUCER

### ORDERING INFORMATION

#### 2 METER CABLE CONNECTIONS MODELS

CODES	PRESS. CONNECTION	OUTPUT
P499ABS-401C	Male	0.4 to 20 mA
P499ABS-404C		
P499ACS-401C	Female	
P499ACS-404C		
P499ACS-405C		
P499VBS-401C	Male	
P499VBS-404C		
P499VCS-401C	Female	
P499VCS-404C		
P499VCS-405C		

#### HIRSCHMANN DIN CONNECTOR

CODES	PRESS. CONNECTION	OUTPUT
P499ABH-401C	Male	0.4 to 20 mA
P499ABH-402C		
P499ABH-404C		
P499ACH-401C	Female	
P499ACH-402C		
P499ACH-404C		
P499RCH-401C		0.5 - 4.5 V
P499RCH-404C		
P499VBH-401C	Male	0 - 10 V
P499VBH-404C		
P499VCH-401C	Female	
P499VCH-404C		

#### PACKARD CONNECTOR

CODES	PRESS. CONNECTION	OUTPUT
P499ACP-401C	Female	0.4 to 20 mA
P499ACP-402C		
P499ACP-403C		
P499ACP-404C		
P499ACP-405C		
P499RCP-401C		0.5 - 4.5 V
P499RCP-402C		
P499RCP-404C		
P499RCP-405C		
P499VCP-404C		



TRANSDUCERS  
AND SENSORS  
PRESSURE  
TRANSDUCER

## P598

### ELECTRONIC PRESSURE TRANSDUCER

The P598 series electronic pressure transducers are compact, economical, rugged, direct-mount pressure transducers designed for use in commercial and industrial refrigeration and air conditioning applications.

These transducers provide a proportional analog signal based on the sensed pressure.

The P598 series transducers feature environmentally protected electronics with stainless steel construction. The digitally compensated P598 transducers with microelectromechanical system (MEMS) pressure sensor technology are highly accurate over a broad temperature range, resisting the effects of wide ambient temperature swings, high humidity, condensation, and icing.

The pressure port is milled from SUS303 stainless steel, except for models with a copper tube port. The P598 series transducers operate with any corrosive or non-corrosive refrigerants that are compatible with SUS303 stainless steel. The P598 transducers are also used with water, condensate, glycol, ammonia, and many other compatible fluids and gases.

The P598 series offers a variety of pressure ranges, covering most common refrigeration and air conditioning applications.

## FEATURES

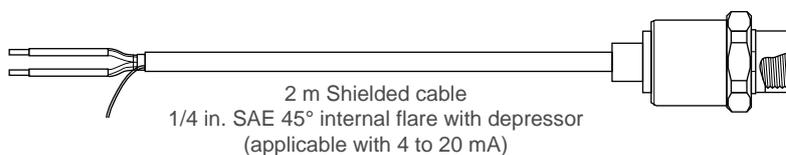
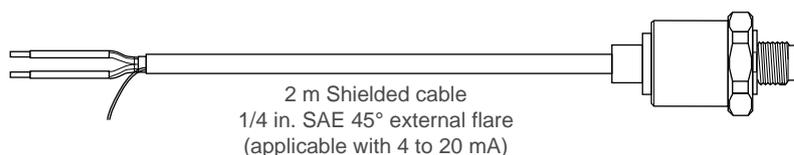
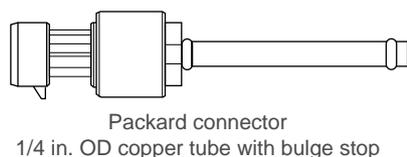
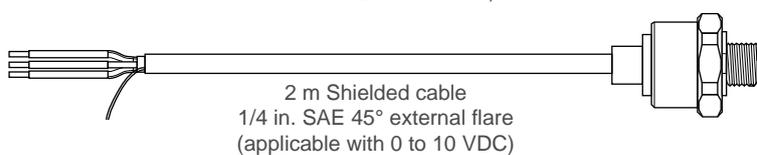
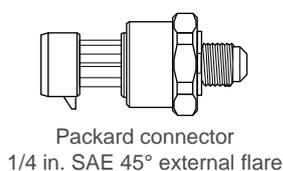
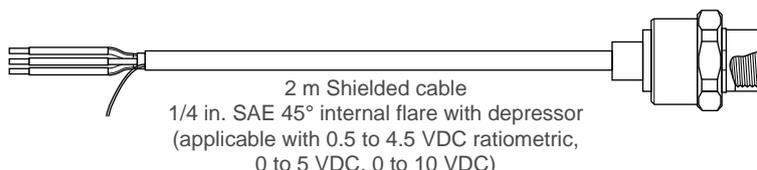
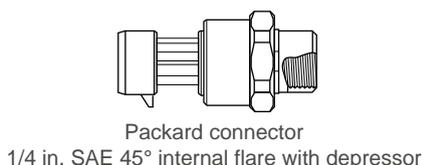
- **Innovative cavity-side MEMS pressure sensing** – Highly accurate over a wide temperature range.
- **Unique sensor circuitry** – Protects transducer from overvoltage and short-circuiting.
- **Rugged design** – Established through life cycle testing of 10 million + cycles for proven reliability.
- **Approved for Today's Refrigerants** – The P598 is approved for use with ammonia and all hydrochlorofluorocarbons (HCFC), hydro-fluorocarbons (HFC) and HFC refrigerants up to a pressure of 57.71 bar (750 psi).





ORDERING INFORMATION

STANDARD MODELS



0.5 TO 4.5 VDC RATIOMETRIC FOR BAR APPLICATIONS

CODES	PRESSURE RANGE		PRESSURE PORT	ELECTRICAL CONNECTOR
	Minimum pressure (Pmin)	Maximum pressure (Pmax)		
P598RCPSN401C	-1 bar	8 bar	1/4 in. SAE 45° internal flare with depressor	Packard
P598RCPSN402C	-1 bar	15 bar		
P598RCPSN404C	0 bar	30 bar		Shielded cable
P598RCSSN409C	0 bar	35 bar		
P598RCSSN411C	0 bar	52 bar		



## P598 - PRESSURE TRANSDUCER

### ORDERING INFORMATION

#### STANDARD MODELS

##### 0 TO 10 VDC FOR BAR APPLICATIONS

CODES	PRESSURE RANGE		PRESSURE PORT	ELECTRICAL CONNECTOR	
	Minimum pressure (Pmin)	Maximum pressure (Pmax)			
P598VBPSN401C	-1 bar	8 bar	1/4 in. SAE 45° flare external thread	Packard	
P598VBSSN401C		15 bar		Shielded cable	
P598VBSSN402C				Packard	
P598VBPSN404C	0 bar	30 bar		Shielded cable	
P598VBSSN404C					
P598VCSSN401C	-1 bar	8 bar		1/4 in. SAE 45° internal flare with depressor	Shielded cable
P598VCSSN404C		30 bar	Shielded cable		
P598VCSSN405C			50 bar		Shielded cable
P598VTPSN401C	-1 bar	8 bar	1/4 in. OD copper tube w/ bulge stop		Packard
P598VTPSN404C		0 bar			30 bar

##### 4 TO 20 MA FOR BAR APPLICATIONS

CODES	PRESSURE RANGE		PRESSURE PORT	ELECTRICAL CONNECTOR	
	Minimum pressure (Pmin)	Maximum pressure (Pmax)			
P598ABSSN401C	-1 bar	8 bar	1/4 in. SAE 45° flare external thread	Shielded cable	
P598ABPSN404C		30 bar		Packard	
P598ABSSN404C				Shielded cable	
P598ACPSN401C	-1 bar	8 bar		1/4 in. SAE 45° internal flare with depressor	Packard
P598ACSSN401C		15 bar			Shielded cable
P598ACPSN402C					
P598ACPSN403C	0 bar	30 bar			
P598ACPSN404C					Shielded cable
P598ACSSN404C					
P598ATPSN401C	-1 bar	8 bar	1/4 in. OD copper tube with bulge stop	Packard	
P598ATPSN404C		0 bar			30 bar

##### WIRE HARNESSES FOR USE WITH THE PACKARD CONNECTORS

CODES	LENGTH (m)
WHA-PKD3-200C	2.0
WHA-PKD3-400C	4.0
WHA-PKD3-600C	6.0



TRANSDUCERS  
AND SENSORS  
PRESSURE  
TRANSDUCER

## P599

### ELECTRONIC PRESSURE TRANSDUCER

The P599 series electronic pressure transducers are compact, economical, rugged, direct-mount pressure transducers designed for use in commercial and industrial refrigeration and air conditioning applications.

These transducers provide a proportional analog signal based on the sensed pressure.

The P599 series transducers feature environmentally protected electronics with stainless steel construction. The digitally compensated P599 transducers are highly accurate over a broad temperature range, resisting the effects of wide ambient temperature swings, high humidity, condensation and icing.

The pressure port is machined from 304L stainless steel. No o-rings or organic materials are exposed to the pressure media, allowing for a leak-proof, all-metal, sealed pressure system. The P599 series transducers operate with any corrosive or non-corrosive refrigerants that are compatible with stainless steel (304L SS), including water condensate, carbon dioxide, glycol, most refrigerants (including ammonia) and many other compatible fluids and gases. The P599 transducers also can be used with the following natural refrigerants: NH<sub>3</sub> (ammonia) and CO<sub>2</sub> (carbon dioxide) in accordance with hazardous location requirements.

The P599 series provides transducers in a variety of pressure ranges, covering most common refrigeration and air conditioning applications.

## FEATURES

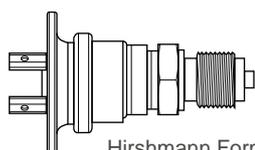
- **Industrial Duty Design** – Offers a sealed design that includes a snubber to dampen pressure pulsations and has no o-rings for reliable performance in the most harsh environments.
- **10 Million Plus Full Scale Pressure Cycle Rated Life Span** – Provides life use with no degradation of accuracy or performance over the life of the transducer.
- **Approved for Today's Refrigerants** – Use with an extensive number of refrigerants, including HCFC, HFC, CO<sub>2</sub> and ammonia.
- **Environmentally Protected Electronics** – Provide high vibration tolerance and prevent ingress and egress that can occur through suction line icing and thawing.



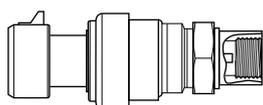


## ORDERING INFORMATION

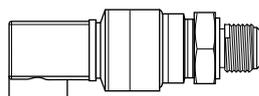
### STANDARD MODELS



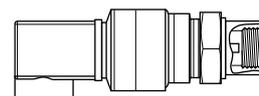
Hirshmann Form A  
G3/8 A external



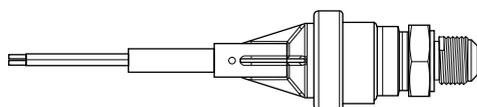
Packard connector  
1/4 in. SAE 45°  
internal flare with depressor



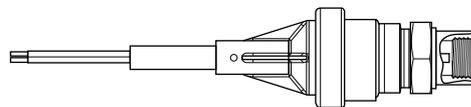
Hirshmann Form C  
1/4 in. SAE 45°  
external flare



Hirshmann Form C  
1/4 in. SAE 45° internal flare  
with depressor



2 m Shielded cable  
1/4 in. SAE 45° external flare



2 m Shielded cable  
1/4 in. SAE 45° internal flare with depressor

### 0.5 TO 4.5 VDC RATIOMETRIC FOR bar APPLICATIONS

CODES	PRESSURE RANGE		PRESSURE PORT	ELECTRICAL CONNECTOR
	Minimum pressure (Pmin)	Maximum pressure (Pmax)		
P599RCHS401C	-1 bar	8 bar	1/4 in. - SAE 45° internal flare with depressor	Hirschmann® Form C
P599RCPS401C		15 bar		Packard
P599RCPS402C		30 bar		Hirschmann Form C
P599RCHS404C	0 bar	35 bar		Packard
P599RCPS404C		50 bar		Shielded cable
P599RCSS409C	0 bar	52 bar		Packard
P599RCPS405C		59 bar		Packard
P599RCSS411C		159 bar		
P599RCHS404C	-1 bar	59 bar		
P599RCHS404C		159 bar		
P599RCHS404C		159 bar		



P599 – PRESSURE TRANSDUCER

ORDERING INFORMATION

0 TO 10 VDC FOR bar APPLICATIONS

CODES	PRESSURE RANGE		PRESSURE PORT	ELECTRICAL CONNECTOR	
	Minimum pressure (Pmin)	Maximum pressure (Pmax)			
P599VBHS401C	-1 bar	8 bar	1/4 in. - SAE 45° external flare	Hirschmann Form C	
P599VCHS401C			1/4 in. - SAE 45° internal flare with depressor		Packard
P599VCPS401C				1/4 in. - SAE 45° external flare	
P599VBSS401C			1/4 in. - SAE 45° internal flare with depressor		Packard
P599VCSS401C		15 bar		1/4 in. - SAE 45° external flare	
P599VCPS406C			1/4 in. - SAE 45° internal flare with depressor		Shielded cable
P599VBSS402C		0 bar		30 bar	
P599VCHS402C			1/4 in. - SAE 45° internal flare with depressor		Packard
P599VBHS404C	1/4 in. - SAE 45° external flare				
P599VCHS404C			1/4 in. - SAE 45° internal flare with depressor		Packard
P599VCPS404C	-1 bar	39 bar		1/4 in. - SAE 45° external flare	
P599VBSS404C			0 bar	50 bar	1/4 in. - SAE 45° internal flare with depressor
P599VCSS404C	1/4 in. - SAE 45° external flare	Shielded cable			
P599VCPS407C					1/4 in. - SAE 45° internal flare with depressor
P599VCSS405C					



## P599 – PRESSURE TRANSDUCER

4 TO 20 MA FOR bar APPLICATIONS

CODES	PRESSURE RANGE		PRESSURE PORT	ELECTRICAL CONNECTOR
	Minimum pressure (Pmin)	Maximum pressure (Pmax)		
P599ABHS401C	-1 bar	8 bar	1/4 in. - SAE 45° external flare	Hirschmann Form C
P599ACHS401C			1/4 in. - SAE 45° internal flare with depressor	
P599ACPS401C			1/4 in. - SAE 45° internal flare with depressor	Packard
P599ABSS401C			1/4 in. - SAE 45° external flare	Shielded cable
P599ACSS401C			1/4 in. - SAE 45° internal flare with depressor	
P599ABHS402C	-1 bar	15 bar	1/4 in. - SAE 45° external flare	Hirschmann Form C
P599ACHS402C			1/4 in. - SAE 45° internal flare with depressor	
P599ACPS402C			1/4 in. - SAE 45° internal flare with depressor	Packard
P599ACPS403C	0 bar	15 bar	1/4 in. - SAE 45° internal flare with depressor	Packard
P599ABHS404C	0 bar	30 bar	1/4 in. - SAE 45° external flare	Hirschmann Form C
P599ACHS404C			1/4 in. - SAE 45° internal flare with depressor	
P599ACPS404C			1/4 in. - SAE 45° internal flare with depressor	Packard
P599ABSS404C			1/4 in. - SAE 45° external flare	Shielded cable
P599ACSS404C			1/4 in. - SAE 45° internal flare with depressor	
P599ACHS405C	0 bar	50 bar		Hirschmann Form C
P599ACPS405C			1/4 in. - SAE 45° internal flare with depressor	Packard
P599ACSS405C				Shielded cable

## ACCESSORIES

WIRE HARNESSES FOR USE WITH PACKARD CONNECTORS

CODES	LENGTH (m)
WHA-PKD3-200C	2.0
WHA-PKD3-400C	4.0
WHA-PKD3-600C	6.0



TRANSDUCERS  
AND SENSORS

LEAK  
DETECTION

# LEAK DETECTORS



The JCI product range offers Leak detectors (in order to comply to the EU F-gas Directive) for the following gases:

- Ammonia (NH<sub>3</sub>)
- Synthetic refrigerants HFC (R134a, R410a etc) as shown in this catalogue
- Carbon dioxide (CO<sub>2</sub>)
- Hydro Carbons (R290, R600)

The MPU multi point units need to be used in combination with the MP series of detectors.

The GD/GS series of detectors are standalone detectors and have 3 alarm relays that are factory calibrated depending on the gas type.

## ORDERING INFORMATION

### FACTORY-SET ALARM LEVELS (BY EXPERIENCE APPROPRIATE ALARM LEVELS AND RANGES)

DETECTOR TYPE	RANGE	ALARM LEVELS
NH <sub>3</sub> -1000	0-1000 ppm	150 / 300 / 500 ppm
NH <sub>3</sub> -4000	0-4000 ppm	150 / 300 / 3000 ppm
NH <sub>3</sub> -10000	0-10000 ppm	500 / 3000 / 8000 ppm
HFC	0-4000 ppm	100 / 1000 / 2000 ppm
CO <sub>2</sub>	0-10000 ppm	2000 / 5000 / 8000 ppm
Flammable / explosive gas	0-40% LEL	5 / 10 / 20% LEL

ORDERING INFORMATION (PART 1/2)



CODES	MODEL	DETAILS	
	<b>GD</b>	<ul style="list-style-type: none"> <li>Room mounting</li> <li>Ambient temperature: -40°C to 50°C</li> <li>Humidity: 0...95% Rh (non condensing)</li> <li>IP21</li> </ul>	
GD24-HFC-4000		0-4000 ppm, 12..24 VAC/DC, max 2 W	
GD230-HFC-4000		0-4000 ppm, 230 VAC, max 2 W	
	<b>GS</b>	<ul style="list-style-type: none"> <li>Splash proof, room mounting</li> <li>Ambient temperature: -40°C to 50°C</li> <li>Humidity: 0...95% Rh (non condensing)</li> <li>IP54</li> </ul>	
GS24-HFC-4000		0-4000 ppm, 12..24V AC/DC, max 2 W	
GS230-HFC-4000		0-4000 ppm, 230V AC, max 2 W	
GSH230CO2-1000		<ul style="list-style-type: none"> <li>Splash proof, room mounted detector with build in heater</li> <li>Ambient temperature: -40°C to 50°C</li> <li>Humidity: 0...95% Rh</li> <li>IP67</li> <li>0-10000 ppm , 230 VAC</li> </ul>	
GSH24CO2-1000		<ul style="list-style-type: none"> <li>Splash proof, room mounted detector with build in heater</li> <li>Ambient temperature: -40°C to 50°C</li> <li>Humidity: 0...95% Rh</li> <li>IP67</li> <li>0-10000 ppm , 24 VAC</li> </ul>	
	<b>MP-D</b>	<ul style="list-style-type: none"> <li>Room mounting</li> <li>Ambient temperature: -40°C to 50°C</li> <li>Humidity: 0..95% Rh (non condensing)</li> <li>IP21</li> </ul>	
MP-D-HFC-4000		0-4000 ppm	
	<b>MP-DS</b>	<ul style="list-style-type: none"> <li>Splash proof, room mounting</li> <li>Ambient temperature: -40°C to 50°C</li> <li>Humidity: 0...95% Rh (non condensing)</li> <li>IP54</li> </ul>	
MP-DS-HFC-4000		0-4000 ppm	

ORDERING INFORMATION (PART 2/2)



CODES	MODEL	DETAILS			
	<b>MPS</b>	<ul style="list-style-type: none"> <li>• Splash proof, room mounted detector with build in heater</li> <li>• Ambient temperature: -40°C to 50°C</li> <li>• Humidity: 0...95% Rh</li> <li>• IP67</li> <li>• 0-10000 ppm</li> </ul>			
MPS-CO2-10000				<b>34-410</b>	
	<b>MPU</b>	<ul style="list-style-type: none"> <li>• Ambient temperature: 0°C to 50°C</li> <li>• Humidity: 10...95% Rh (non condensing)</li> <li>• IP66</li> </ul>			
MPU2C				2 channels, 230V AC / 24V DC, max 10 W	<b>20-310</b>
MPU4C				4 channels, 230V AC / 24V DC, max 10 W	<b>20-300</b>
MPU6C				6 channels, 230V AC / 24V DC, max 10 W	<b>20-305</b>
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	<b>TR-IR</b>	<ul style="list-style-type: none"> <li>• Splash proof, room mounted detector with build in heater</li> <li>• Ambient temperature: -40°C to 50°C</li> <li>• Humidity: 0...95% Rh</li> <li>• IP67</li> </ul>			
TR-IR-CO2-10000				<b>39-4312</b>	