CONTROLS, AIR CONDITIONING & REFRIGERATION PRODUCTS

The European Products Catalogue 2009

Johnson Controls


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A more comfortable,
safe and sustainable world

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Company profile

Johnson Controls has expanded remarkably since Professor Warren Johnson founded the company to manufacture his invention, the electric room thermostat. Since its start in 1885, Johnson Controls has grown into a global leader in automotive experience, building efficiency and power solutions.
The company provides innovative automotive interiors that help make driving more comfortable, safe and enjoyable. For buildings, it offers products and services that optimize energy use and improve comfort and security. Johnson Controls also provides batteries for automobiles and hybrid electric vehicles, along with systems engineering and service expertise.

Our vision

A more comfortable,
safe and sustainable world.

Our values

Integrity
Honesty, fairness, respect, and safety are of the utmost importance.

Customer Satisfaction
Our future depends on us helping to make our customers successful. We are proactive and easy to do business with. We offer expert knowledge and practical solutions, and we deliver on our promises.

Employee Engagement
We foster a culture that promotes excellent performance, teamwork, inclusion, leadership and growth.

Innovation
We believe there is always a better way. We encourage change and seek the opportunity it brings.

Sustainability
Through our products, services, operations and community involvement, we promote the efficient use of resources to benefit all people and the world.

Linear Actuators

for Terminal Unit Valves

for Plant Valves

Rotary Actuators

Silence and Small Family

Standard Family

Spring Return Family

Special and Security Family

Valve Family

Valves

Sensors

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Thermostats

Hardwired, Analogue

Networked

Transducers & Converters

Electro-Pneumatic Transducers

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VA-7010

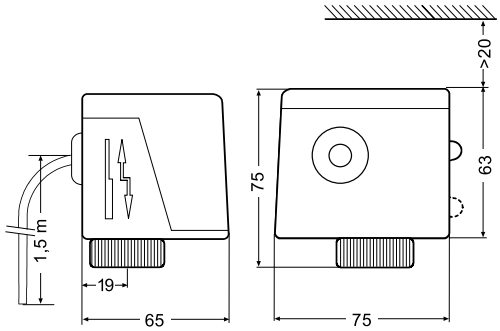
ON/OFF Control

The VA-7010 electric ON/OFF actuator provides a two-position (open-closed) control and can easily be mounted with a threaded mounting nut onto VG5000 terminal unit valves.

A lever at the side of the actuator housing can be used to manually open a 2-way PDTO valve, or the normally closed port of a 3-way valve.

Features

- 24 VAC and 230 VAC models
- ON/OFF Control
- Manual lever
- Threaded mounting nut M28 x 1.5
- Factory mounted cable 1.5 m



Dimensions in mm

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Minimum Force	Stroke	Full Stroke Time	Protection Class	Power Consumption
VA-7010-8101	24 VAC	ON/OFF	90 N	3 mm (max. 5 mm)	10 s (Actuator stem extends) 5 s (Actuator stem retracts)	IP 40	7 VA
VA-7010-8103	230 VAC						

VA-7030

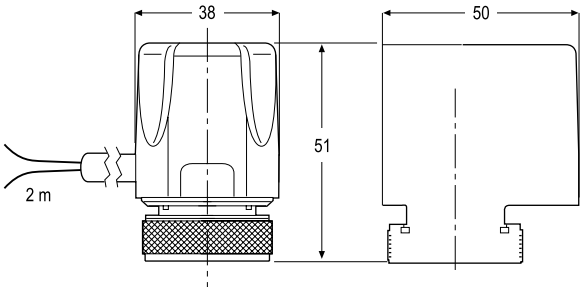
ON/OFF Control

The VA-703x electrothermic actuator provides a two position (open / closed) control in HVAC applications. The compact design of this actuator makes it suitable for installation in confined spaces, such as fan coil applications.

The VA-703x series actuator is designed for field mounting onto VG6000 series terminal unit valves

Features

- 24 VAC/VDC and 230 VAC models
- ON/OFF or DAT Control
- Models for Direct Action and Models for Reverse Action
- Threaded mounting nut M30 x 1.5
- Factory mounted cable 2 m
- Auxiliary switch (max 700 mA - 250 V~)



Dimensions in mm

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Auxiliary Switch	Force	Stroke	Full Stroke Time*	Protection Class	Power Consumption	
								Continuous	Start-up
VA-7030-21NO	24 VAC / VDC	ON/OFF Stem extends when energized	---	80 N	3.5 mm	5 min	IP 44	2.5 W	6 W
VA-7035-21NO			▪						
VA-7030-21NC		ON/OFF Stem retracts when energized	---	100 N					
VA-7035-21NC			▪						
VA-7030-23NO	230 VAC	ON/OFF Stem extends when energized	---	80 N		3 min		2.5 W	95 W
VA-7035-23NO			▪						
VA-7030-23NC		ON/OFF Stem retracts when energized	---	100 N					
VA-7035-23NC			▪						

Note
*** :** at ambient temperature 20 °C

VA-7040

ON/OFF Control

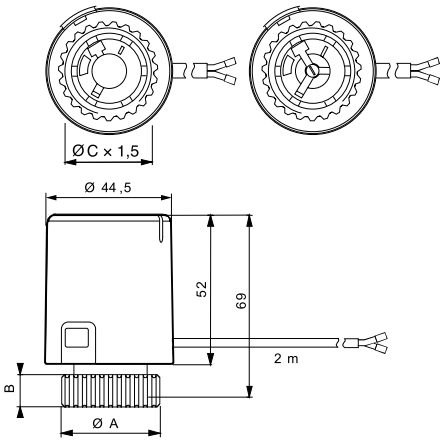
The VA-704x actuators provide ON/OFF or DAT control in HVAC applications.

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

The VA-704x are designed for field mounting onto VG5000 and V5000 terminal unit valves.

Features

- 24 VAC/DC and 230 VAC models
- ON/OFF or DAT Control
- Configurable to Direct and Reverse Action
- Threaded mounting nut (M28 x 1.5 for VG5000 or M30 x 1.5 for V5000 or 3rd party valves)
- Factory mounted cable 2 m



Dimensions in mm

Codes	Ø A	B	Ø C
VA-7040-2x	32	10	M28 x 1,5
VA-7047-2x	34	11	M30 x 1,5
VA-7048-2x	34	11	M30 x 1,5

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Force	Stroke	Factory Setting	Protection Class	Power Consumption	
							Continuous	Start-up
VA-7040-21	24 VAC or 24 VDC	ON/OFF or DAT	125 N	4.5 mm	**Direct Acting** stem extend when energized	IP 44	3 W	6 W (250 mA) max
VA-7047-21								
VA-7048-21					**Reverse Acting** stem retracts when energized			
VA-7040-23	230 VAC				**Direct Acting** stem extend when energized		2.5 W	36 W (150 mA) max
VA-7047-23								
VA-7048-23					**Reverse Acting** stem retracts when energized			

VA-7060

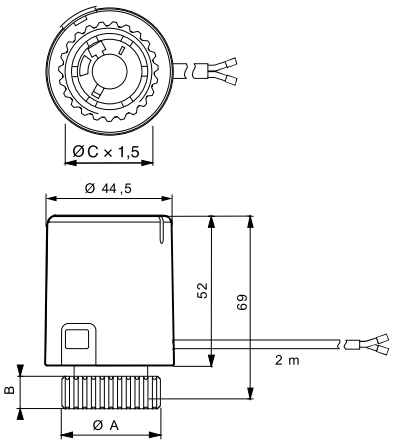
Proportional Control

The VA-706x actuators provide Proportional control in HVAC applications. The compact design of these actuators make them suitable for installations in confined spaces, such as fan-coil applications.

The VA-706x actuators are designed for field mounting onto VG5000 and V5000 terminal unit valves.

Features

- 24 VAC/DC
- Proportional Control
- Configurable to Direct and Reverse Action
- Threaded mounting nut (M28 x 1.5 for VG5000 or M30 x 1.5 for V5000)
- Factory mounted cable 2 m



Dimensions in mm

Codes	A Ø	B	C Ø
VA-7060-21	32	10	M28 x 1,5
VA-7067-21	34	11	M30 x 1,5

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Force	Stroke	Factory Setting	Protection Class	Power Consumption	
							Continuous	Start-up
VA-7060-21	24 VAC or 24 VDC	Proportional	125 N	4.5 mm	**Direct Acting** stem extend when energized	IP 44	3 W	6 W (230 mA) max
VA-7067-21								

VA-7450

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Floating and Proportional Controls

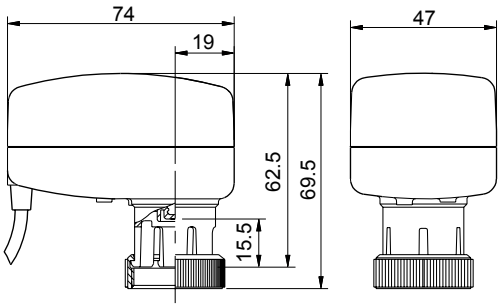
The VA-7450 Series provides floating or proportional control.

Their compact design makes them suitable for installation in confined spaces, such as fan coil applications.

They are designed for field mounting onto VG5000 Terminal Unit Valves.

Features

- 24 VAC supply voltage
- Floating and proportional control
- Threaded mounting nut (M28 x 1.5 for VG5000)
- Factory mounted cable 1.5 m
- Self calibrating
- Configurable to direct and reverse action
- Configurable antisticking cycle
- Configurable split ranging



Dimensions in mm

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Nominal Force	Stroke	Full Stroke Time	Protection Class	Power Consumption
VA-7450-1001	24 VAC	Floating	120 N	3 mm (max 5 mm)	45 sec	IP 40	2.7 VA
VA-7452-1001		Proportional*					
VA-7452-9001		Proportional**					

Notes

Models with longer cable or different mounting nut, are available on request

***** : Fixed factory setting: 0-10 VDC input direct acting antisticking disabled

****** : Fully configurable: input signal (0-10 V, 5-10 V, 0-5 V) action (direct or reverse acting) antisticking (disable or enable)

Accessories

Ordering Codes	Description
VA-7450-8900	Manual override ring accessory for VG5000

VA-747x

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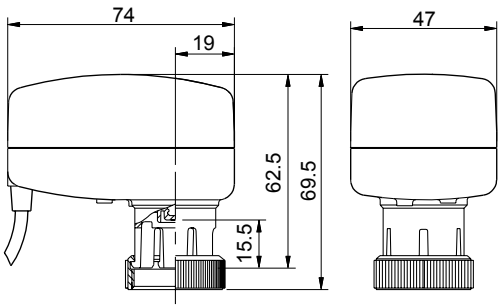
Floating and Proportional Controls

The VA-747x Series provides incremental or proportional control in terminal unit valve applications.
Their compact design makes them suitable for installation in confined spaces, such as fan coil applications.

They are designed for field mounting onto VG6000 and V5000 terminal unit valves.

Features

- 24 VAC supply voltage
- Floating and proportional control
- Threaded mounting nut M30 x 1.5 for VG6000 and V5000
- Factory mounted cable 1.5 m
- Self calibrating
- Configurable to direct and reverse action
- Configurable antisticking cycle
- Configurable split ranging



Dimensions in mm

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Nominal Force	Stroke	Full Stroke Time	Protection Class	Power Consumption
VA-7470-1001	24 VAC	Floating	120 N	3 mm (max 5 mm)	45 sec	IP 40	2.7 VA
VA-7472-1001		Proportional*					
VA-7472-9001		Proportional**					

Notes
Models with longer cable or different mounting nut, are available on request
***** **:** Fixed factory setting: 0-10 VDC input direct acting antisticking disabled
****** **:** Fully configurable: input signal (0-10 V, 5-10 V, 0-5 V) action (direct or reverse acting) antisticking (disable or enable)

FA-2000

Floating and Proportional Control

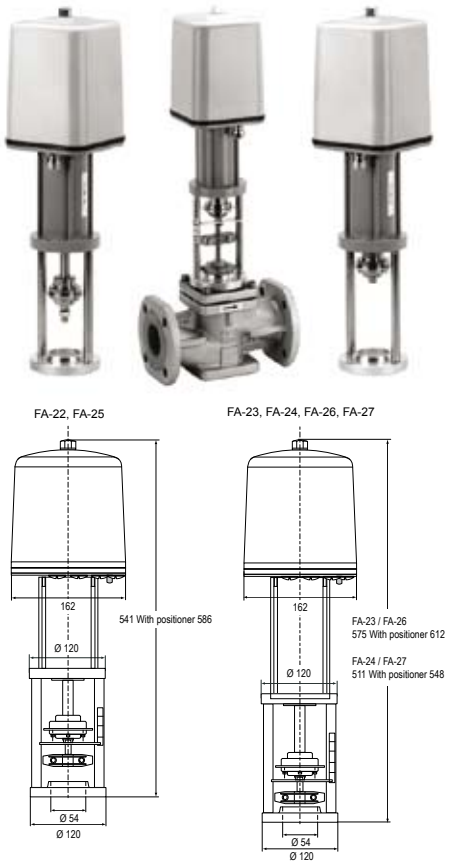
The FA-2000 series electric actuators are available for 3-point control or with electronic positioner for 0...10 V or 0...20 mA control. It provides a fully variable valve aperture, a power failure spring return safety mechanism and an electrically operated manual override.

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 FA-24 ("failsafe" position down) and FA-27 ("failsafe" position up): this model pair has a stroke of 13 mm and 2000 N minimum thrust.

The actuator can be combined with VG8000 (H, N, V) 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



Dimensions in mm

Ordering Codes*	Supply Voltage (50 Hz)	Action Control	Spring Return Function	Nominal Thrust	Nominal Stroke	Protection Class	Power Consumption	Emergency Shut of speed
FA-22xx-7511	230 VAC	Floating and Proportional	Stem fully extended	2.4 kN	25 mm	IP 54	5 VA	≤ 89
FA-22xx-7516	24 VAC						6.1 VA	≤ 81
FA-25xx-7511	230 VAC		Stem fully retracted				5 VA	
FA-25xx-7516	24 VAC						6.1 VA	
FA-23xx-7411	230 VAC		Stem fully extended	2.2 kN	42 mm		5 VA	≤ 201
FA-23xx-7416	24 VAC						6.1 VA	
FA-26xx-7411	230 VAC		Stem fully retracted				5 VA	
FA-26xx-7416	24 VAC						6.1 VA	
FA-24xx-7111	230 VAC		Stem fully extended	2 kN	13 mm		5 VA	≤ 51
FA-24xx-7116	24 VAC						6.1 VA	
FA-27xx-7111	230 VAC		Stem fully retracted				5 VA	
FA-27xx-7116	24 VAC						6.1 VA	

Note

*** xx =** 00 None
01 2 Auxiliary switches
02 2 KΩ feedback potentiometer
03 2 KΩ feedback potentiometer and 2 auxiliary switches
04 135 Ω feedback potentiometer
40 Built-in electronic positioner 0...10 V / 0(4)...20 mA (not for 230 V models)
41 Built-in electronic positioner 0...10 V / 0(4)...20 mA (not for 230 V models) and 2 auxiliary switches

For further information and additional models see Product Installation Guide

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FA-3000

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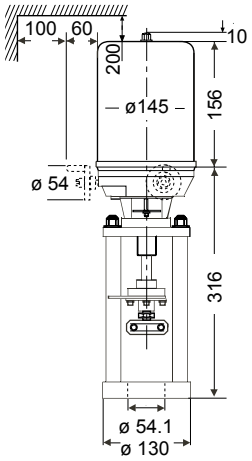
Heavy Duty Actuators

The FA-3300 heavy duty series provides floating or proportional control and can be mounted with VG8000 flanged valves.

Features

- 24 VAC and 230 VAC power supply
- Floating and Proportional control
- Manual override
- Special clamp coupler
- Uses synchronous motor with calibrated pressure limit switches



Dimensions in mm

Ordering Codes	Supply Voltage (50/60Hz)	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	IP 65	37 VA	none
FA-3303-7416								2 aux switches and 2 KΩ pot
FA-3304-7416								135 Ω pot
FA-3341-7416		Proportional					42 VA	2 aux switches
FA-3300-7411	230 VAC	Floating					37 VA	none
FA-3303-7411								2 aux switches and 2 KΩ pot
FA-3304-7411								135 Ω pot
FA-3341-7411		Proportional					42 VA	2 aux switches

MP8000

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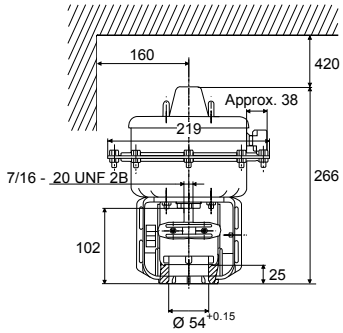
Pneumatic Valve-Actuators

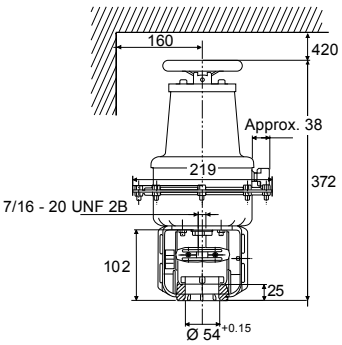
The MP8000 series pneumatic valve-actuators are designed to accurately position valve plugs in larger chilled water, hot water and steam applications in response to a pneumatic signal from a controller. A pneumatic positioner is also available for use in applications where sequential operation is desired 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 (H, N, V) 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

Ordering Codes	Accessories	Positioner and hand wheel
MP822x50-20	Standard	None
MP822x52-20	(2) Auxiliary switches and 2 KΩ position feedback pot	
MP822x60-20	Standard	DA positioner
MP822x62-20	(2) Auxiliary switches and 2 KΩ position feedback pot	
MP822x70-20	Standard	DA positioner and hand wheel
MP822x72-20	(2) Auxiliary switches and 2 KΩ position feedback pot	
MP822x80-20	Standard	Hand wheel
MP822x82-20	(2) Auxiliary switches and 2 KΩ position feedback pot	
MP832x50-20	Standard	None
MP832x52-20	(2) Auxiliary switches and 2 KΩ position feedback pot	
MP832x60-20	Standard	DA positioner
MP832x62-20	(2) Auxiliary switches and 2 KΩ position feedback pot	
MP832x70-20	Standard	DA positioner and hand wheel
MP832x72-20	(2) Auxiliary switches and 2 KΩ position feedback pot	
MP832x80-20	Standard	Hand wheel
MP832x82-20	(2) Auxiliary switches and 2 KΩ position feedback pot	

PA-2000

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ON/OFF Control

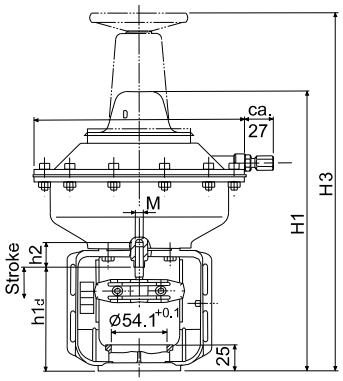
The PA-2000 Pneumatic Valve Actuators Series is available for ON/OFF Control.

The actuator can be combined with VG8000 (H, N, V) and VG8300 (H, N) series 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
- Teflon free series
- Reversible action in-situ
- Accessories available



Dimensions in mm

Ordering Codes*	Handwheel**	Spring Range	Diaphram Area	Stroke
PA-20xy-Z2K2	---	20 - 50 kPa	150 cm²	13 mm
PA-21xy-Z2K7	▪	70 - 100 kPa		
PA-20xy-Z3K2	---	20 - 50 kPa	300 cm²	25 mm
PA-21xy-Z3K7	▪	70 - 100 kPa		
PA-20xy-Z6K2	---	20 - 50 kPa	600 cm²	42 mm
PA-21xy-Z6K7	▪	70 - 100 kPa		
PA-20xy-Z7K2	---	20 - 50 kPa		25 mm
PA-21xy-Z7K7	▪	70 - 100 kPa		

Notes

***** = **x:** 0 = Without Positioner
3 = With Positioner (PR10)

y: 0 = Without Switches and potentiometer
3 = 2 Auxiliary Switches and ekr feedback potentiometer

Z: 3 = Standard Models
9 = Teflon free

K: 1 = DA Actuator stem extend (Spring Return UP)
2 = RA Actuator stem retract (Spring return DOWN)

RA-3000

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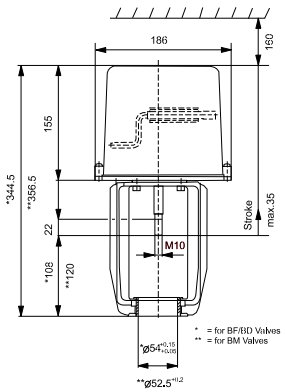
Floating and Proportional Control

The RA-3000 series synchronous motor-driven reversible actuators are available for 3-point (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 JC flanged valves according to maximum close-off pressure ratings specified.

Factory fitted options, such as 2kOhm feedback potentiometer, auxiliary switches and hand crank are available.



Dimensions in mm

Features

- Uses synchronous motor with pressure switches
- Special clamp coupler quick-fit systems
- Models for 3-point 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

	RA-3xxx-712x	RA-3xxx-722x	RA-3xxx-732x
H1	58 mm	66 mm	66 mm

Ordering Codes*	Hand Crank**	Actuator Force	Supply Voltage	Nominal Stroke	Protection Class
RA-30xx-7126	---	1600 N	24 V, 50/60 Hz	13 mm	IP 54
RA-31xx-7126	▪				
RA-30xx-7127	---		230 V, 50/60 Hz		
RA-31xx-7127	▪				
RA-30xx-7226	---	1800 N	24 V, 50/60 Hz	25 mm	
RA-31xx-7226	▪				
RA-30xx-7227	---		230 V, 50/60 Hz		
RA-31xx-7227	▪				
RA-30xx-7325	---	3000 N	24 V, 60 Hz	42 mm	
RA-31xx-7325	▪				
RA-30xx-7326	---		24 V, 50 Hz		
RA-31xx-7326	▪				
RA-30xx-7327	---		230 V, 50 Hz		
RA-31xx-7327	▪				
RA-30xx-7328	---		230 V, 60 Hz		
RA-31xx-7328	▪				

Notes

*** : xx =** 100 None
03 2 auxiliary switches and 2 KΩ feedback potentiometer
41 Built-in positioner 0...10 VDC and 2 auxiliary switches (only 24 VAC models)

VA1000

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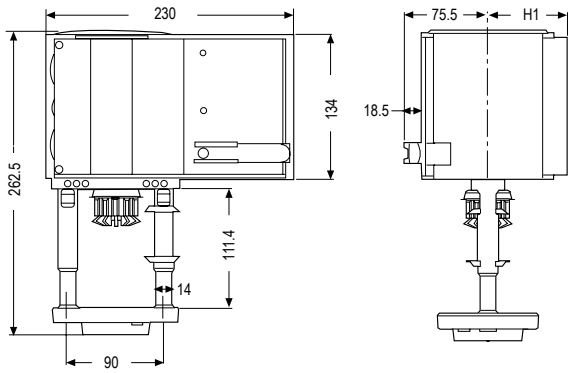
Floating and Proportional Controls

The VA1000 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 (H, N, V), VG8300N&H 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 aux. switches, feedback potentiometer and split range unit available
- IP66
- Selectable characteristic curve
- Selectable running time



Dimensions in mm

	VA1125-GGA-1	VA1220-GGA-1 & VA1420-GGA-1
H1	60 mm	73 mm

Ordering Codes	24V Actuators	Power Consumption	Protection Class	Nominal Stroke
VA1125-GGA-1	2500N; Non-spring return	20.5 VA	IP 66	49 mm
VA1220-GGA-1	2000N; Spring return retracts	17 VA		
VA1420-GGA-1	2000N; Spring return extends	17 VA		

Accessories modules for in-situ installation

VA1000-M230	AC 230V module
VA1000-P2	2 KΩ feedback potentiometer
VA1000-S2	2 SPDT aux. switches
VA1000-SRU	Split range unit module for proportional actuators only
VA1000-EP	Extension kit for applications with temperatures greater than 140°C up to 200°C
111 6348 011	Cable adaptor M20x1.5
111 6349 011	Cable adaptor M16x1.5

VA-7150

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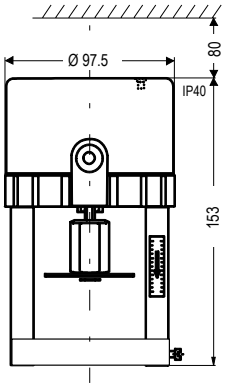
Floating and Proportional Control

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, VGS800 and VG9000 flanged 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 Codes	Supply Voltage (50/60 Hz)	Action Control	Protection Class	Coupler Type
VA-7150-1001	24 VAC	Floating	IP 40	Threaded
VA-7150-1003	230 VAC			
VA-7150-8201	24 VAC			Slotted
VA-7150-8203	230 VAC			
VA-7152-1001	24 VAC	Proportional 0...10 V		Threaded
VA-7152-1003	230 VAC			
VA-7152-8201	24 VAC			Slotted
VA-7152-8203	230 VAC			

VA-7200

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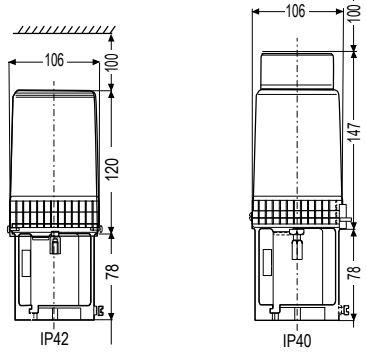
Floating and Proportional Control

The VA-720x Series synchronous motor driven actuator provides floating or proportional control of valves, with up to 19mm 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, VG8000 (H, N, V), VG9000 and VGS800 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 Codes	Supply Voltage (50/60 Hz)	Action Control	Motor Raiting	Stroke	Protection Class
For VG700 series valves					
VA-7200-1001	24 VAC	Floating	5 W	20 mm max	IP 42
VA-7202-1001		Proportional 0...10 VDC / 0(4)...20 mA			
For VG8000 / VG9000 / VGS8000					
VA-7200-8201	24 VAC	Floating	5 W	20 mm max	IP 42
VA-7202-8201		Proportional 0...10 VDC / 0(4)...20 mA			

VA-7310

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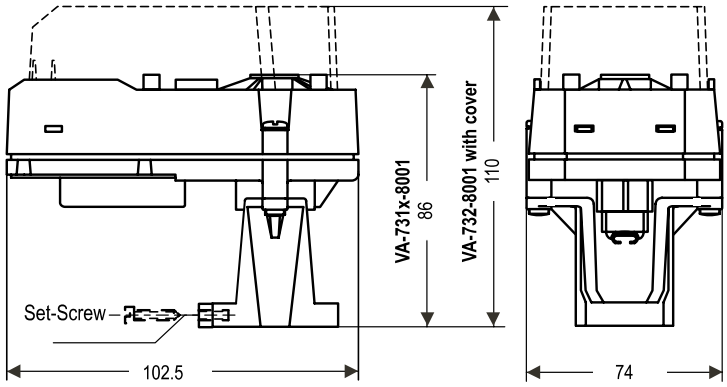
Floating and Proportional Controls

The VA-7310 Series provides floating or proportional control and can be mounted onto VG7000 globe control with slotted stem (VG7xxxxS).

Features

- 24 VAC supply voltage
- Floating and proportional control
- Manual override using a standard 5 mm allen key
- Configurable to Direct and Reverse action



Dimensions in mm

Ordering Codes	Supply Voltage (50Hz)	Control	Force	Stroke	Full Stroke Time	Protection Class	Power Consumption
VA-7310-8001	24 VAC	Floating	150 N ±20%	8 mm (max. 10 mm)	60 sec	IP 40	2 VA
VA-7312-8001		Proportional					

For further information and additional models see Product Installation Guide

Johnson Controls

VA-7700

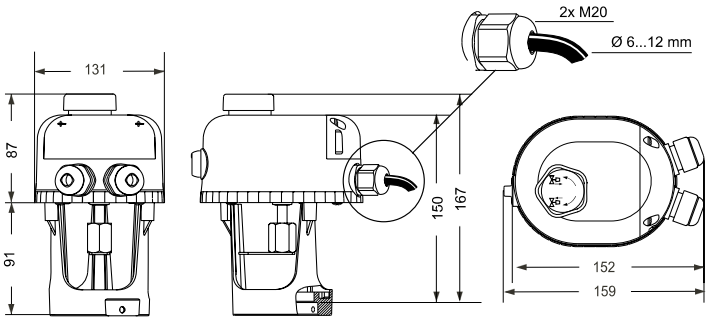
Page 16

Floating and Proportional Controls

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

Mounting onto VG7000 Series Valves

Ordering 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	IP 54	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

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Force	Stroke	Full Stroke Time	Protection Class	Power Consumption
VA-7700-8201	24 VAC	Floating	500 N	20 mm	190 s	IP 54	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							

VA7800 - *1/2 pages*

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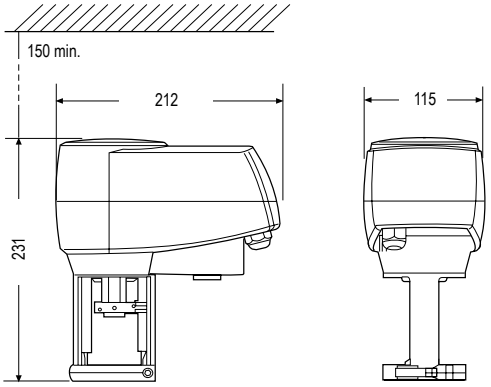
Floating and Proportional Controls

The VA78x0 spring return and non-spring return actuator with 1000 N thrust for valves in heating, ventilation and air conditioning applications is available for floating (3-point) control 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 VG9000, VG8000 (H, N, V) and VG8300N&H 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 kΩ feedback potentiometer
- Control-Signal failure - stem to pre-determined position
- Stroke position indicator
- Spring return functions (VA7820 and VA7830 models)



Dimensions in mm

Mounting onto VG7000 Series Valves

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Force	Stroke	Full Stroke Time	Protection Class	Power Consumption	Spring Return Action	Accessories Factory mounted
VA-7810-ADA-11	230 VAC	ON/OFF or Floating	1000 N	25 mm	150 s	IP 54	8 VA	---	---
VA-7810-ADC-11									2 aux switches
VA-7810-AGA-11	24 VAC						3 VA		---
VA-7810-AGC-11									2 aux switches
VA-7810-AGH-11									2 KΩ pot
VA-7810-GGA-11		ON/OFF, Floating or Proportional			150 s (selectable 75 s)		6 VA		---
VA-7810-GGC-11									2 aux switches

For further information and additional models see Product Installation Guide

Johnson Controls

VA7800 - *2/2 pages*

Page 18

Floating or Proportional Controls

Mounting onto VB, BM Series Valves

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Force	Stroke	Full Stroke Time	Protection Class	Power Consumption	Spring Return Action	Accessories Factory mounted
VA-7810-GGA-11B	230 VAC	ON/OFF or Floating	1000 N	25 mm	150 s	IP 54	8 VA	---	---
VA-7810-GGC-11B									2 aux switches

Mounting onto VGS8000, VG8000 and VG9000 Series Valves

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Force	Stroke	Full Stroke Time	Protection Class	Power Consumption	Spring Return Action	Accessories Factory mounted
VA-7810-ADA-12	230 VAC	ON/OFF or Floating	1000 N	25 mm	150 s	IP 54	8 VA	---	---
VA-7810-ADC-12									2 aux switches
VA-7810-AGA-12	24 VAC						3 VA		---
VA-7810-AGC-12									2 aux switches
VA-7810-AGH-12									2 KΩ pot
VA-7810-GGA-12		ON/OFF, Floating or Proportional			150 s (selectable 75 s)		6 VA		---
VA-7810-GGC-12									2 aux switches

Mounting onto VG8000 and VGS9000 Series Valves

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Force	Stroke	Full Stroke Time	Protection Class	Power Consumption	Spring Return Action	Accessories Factory mounted
VA7820-GGA-11	24 VAC	ON/OFF, Floating or Proportional	1000 N	25 mm	150 s (selectable 75 s)	IP 54	11 VA	Actuator stem retracts	---
VA7820-GGC-11									2 aux switches
VA7830-GGA-11								Actuator stem extend	---
VA7830-GGC-11									2 aux switches

Mounting onto VGS8000, VG8000 and VG9000 Series Valves

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Force	Stroke	Full Stroke Time	Protection Class	Power Consumption	Spring Return Action	Accessories Factory mounted
VA7820-GGA-12	24 VAC	ON/OFF, Floating or Proportional	1000 N	25 mm	150 s (selectable 75 s)	IP 54	11 VA	Actuator stem retracts	---
VA7820-GGC-12									2 aux switches
VA7830-GGA-12								Actuator stem extend	---
VA7830-GGC-12									2 aux switches

M910x-xGA-xS *(Joventa DAB / DAD / DMD)*

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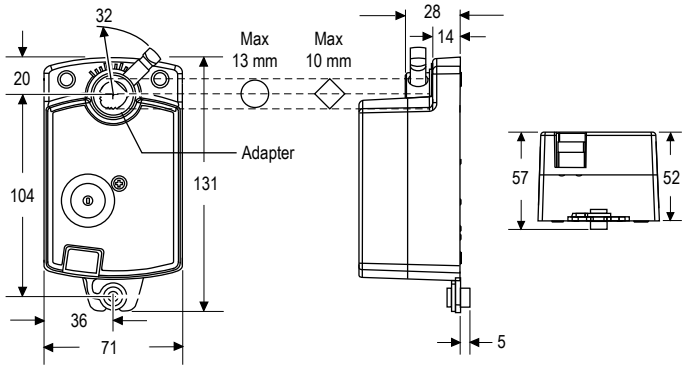
2 and 4 Nm, Non Spring Return

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 Ø 8...13 mm or with 8...10 mm square shaft. 45 mm minimum shaft length
- Selectable direction of rotation
- Manual release button
- Devices meet CE requirements



Dimensions in mm

Ordering Codes		Torque	Running Time	Damper Size	Control Signals	2 x Adjustable Auxiliary Contacts	Supply Voltage (50/60Hz)	Connection
Johnson Controls	Joventa							
M9102-AGA-1S	**DAB1.4**	2 Nm	36 s	0.4 m²	Floating without timeout	---	AC 24 V	PVC-cable
M9102-AGA-5S	**DAB1.4C**							Terminal block
M9102-IGA-1S	**DAB1**				ON/OFF and Floating with timeout			PVC-cable
M9102-IGA-5S	**DAB1C**							Terminal block
M9104-AGA-1S	**DAD1.4**	4 Nm	72 s	0.8 m²	Floating without timeout			PVC-cable
M9104-AGA-5S	**DAD1.4C**							Terminal block
M9104-IGA-1S	**DAD1**				ON/OFF and Floating with timeout			PVC-cable
M9104-IGA-5S	**DAD1C**							Terminal block
M9104-GGA-1S	**DMD1.2**				Proportional 0...10 VDC			PVC-cable
M9104-GGA-5S	**DMD1.2C**							Terminal block

M9304-xxx-1N *(Joventa DAN / DAN2 / DMN)*

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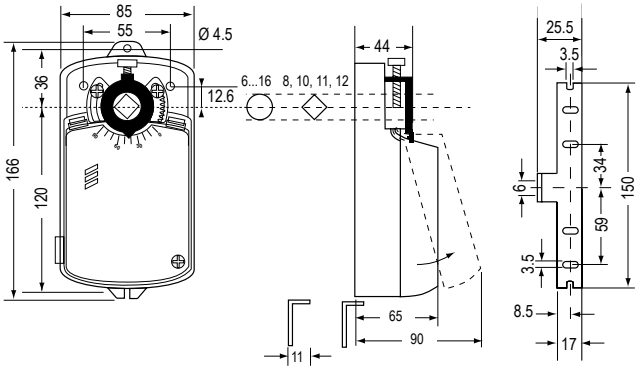
4 Nm, Non Spring Return

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 Ø 6 mm to 16 mm shaft or with M9000-Z01DN 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
- Customized versions available
- Devices meet CE requirements



Dimensions in mm

Ordering Codes		Torque	Running Time	Damper Size	Control Signals	2 x Adjustable Auxiliary Contacts	Supply Voltage (50/60Hz)
Johnson Controls	Joventa *						
M9304-AGA-1N	DAN1N	4 Nm	35 s	0.8 m²	ON/OFF and Floating	---	24 VAC/DC
M9304-AGC-1N	DAN1.SN					▪	
M9304-ADA-1N	DAN2N					---	230 VAC
M9304-ADC-1N	DAN2.SN					▪	
M9304-AKA-1N	DAN5N					---	48 VDC
M9304-AKC-1N	DAN5.SN					▪	
M9304-BDA-1N	DAN2.C					---	230 VAC
M9304-BDC-1N	DAN2.SC					▪	
M9304-GGA-1N	DMN1.2N				DC 1...10 V	---	24 VAC/DC
M9304-GKA-1N	DMN5.2N					---	48 VAC/DC

Note
* : by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

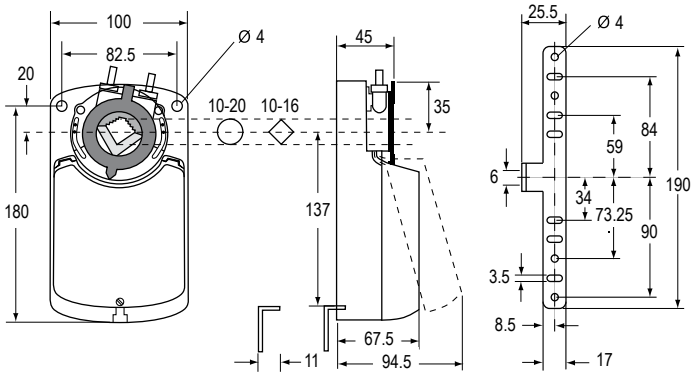
M91xx-xxx-1N(1) *(Joventa DAS-DMS / DA-DM / DAL-DML / DAG-DMG)* - *1/3 pages* Page 21

8, 16, 24 and 32 Nm, Non Spring Return

The Standard electric actuators have been specially designed for use with small and medium-sized air dampers and for terminal control units in air volume control systems.
Thanks to their very small size and clever construction they are also ideal for applications where space is limited. A key feature of the design is the special JOHNSON CONTROLS spindle adapter which also incorporates angle-of-rotation limiting and position indication.

Features

- ON/OFF, Floating and Proportional Control
- Load independent running time
- Paralleling of up to 5 actuators possible
- Screw terminal connections
- Universal adapter for:
  round spindles from 10 to 20 mm dia. or
  Square spindles 10 ...16 mm with min. 48 mm ax length
- Choice of rotation
- Angle-of-rotation limiting
- Manual control by pushbutton
- 2 auxiliary switches
- Automatic end stops
- Power saving at end stops
- Customising available
- CE approval
- IP54



Dimensions in mm

M91xx-xxx-1N *(Joventa DAS-DMS / DA-DM / DAL-DML / DAG-DMG)* - *2/3 pages* Page 22

8, 16, 24 and 32 Nm, Non Spring Return

Ordering Codes		Running Time	Damper Size	Control Signals	2 x Auxiliary Contacts	Feedback Potentiiometer	Supply Voltage (50/60Hz)
Johnson Controls	Joventa*						
8 Nm							
M9108-AGA-1N	**DAS1**	30 s	1.5 m²	ON/OFF and Floating	---	---	24 VAC/DC
M9108-AGC-1N	**DAS1.S**				▪	---	
M9108-AGE-1N	**DAS1.P1**				---	1 KOhm	
M9108-AGD-1N	**DAS1.P2**				---	140 Ohm	
M9108-AGF-1N	**DAS1.P4**				---	2 KOhm	
M9108-ADA-1N	**DAS2**				---	---	230 VAC
M9108-ADC-1N	**DAS2.S**				▪	---	
M9108-ADE-1N	**DAS2.P1**				---	1 KOhm	
M9108-ADD-1N	**DAS2.P2**				---	140 Ohm	
M9108-ADF-1N	**DAS2.P4**				---	2 KOhm	
M9108-GGA-1N	**DMS1.1**			Proportional 0(2)...10 VDC 0(4)...20 mA	---	---	24 VAC/DC
M9108-GGC-1N	**DMS1.1S**				▪	---	
M9108-GDA-1N	**DMS2.2**			Proportional 0(2)...10 VDC	---	---	230 VAC
M9108-GDC-1N	**DMS2.2S**				▪	---	
M9108-GDA-1N1	**DMS2.5**			Proportional 0(4)...20 mA	---	---	
M9108-GDC-1N1	**DMS2.5S**				▪	---	
16 Nm							
M9116-AGA-1N	**DA1**	80 s	3 m²	ON/OFF and Floating	---	---	24 VAC/DC
M9116-AGC-1N	**DA1.S**				▪	---	
M9116-AGE-1N	**DA1.P1**				---	1 KOhm	
M9116-AGD-1N	**DA1.P2**				---	140 Ohm	
M9116-AGF-1N	**DA1.P4**				---	2 KOhm	
M9116-ADA-1N	**DA2**				---	---	230 VAC
M9116-ADC-1N	**DA2.S**				▪	---	
M9116-ADE-1N	**DA2.P1**				---	1 KOhm	
M9116-ADD-1N	**DA2.P2**				---	140 Ohm	
M9116-ADF-1N	**DA2.P4**				---	2 KOhm	
M9116-GGA-1N	**DM1.1**			Proportional 0(2)...10 VDC 0(4)...20 mA	---	---	24 VAC/DC
M9116-GGC-1N	**DM1.1S**				▪	---	
M9116-GDA-1N	**DM2.2**			Proportional 0(2)...10 VDC	---	---	230 VAC
M9116-GDC-1N	**DM2.2S**				▪	---	
M9116-GDA-1N1	**DM2.5**			Proportional 0(4)...20 mA	---	---	
M9116-GDC-1N1	**DM2.5S**				▪	---	

Note
* : by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

M91xx-xxx-1N *(Joventa DAS-DMS / DA-DM / DAL-DML / DAG-DMG)* - *3/3 pages*

8, 16, 24 and 32 Nm, Non Spring Return

Ordering Codes		Running Time	Damper Size	Control Signals	2 x Auxiliary Contacts	Feedback Potentiiometer	Supply Voltage (50/60Hz)
Johnson Controls	Joventa*						
24 Nm							
M9124-AGA-1N	DAL1	125 s	4.5 m²	ON/OFF and Floating	---	---	24 VAC/DC
M9124-AGC-1N	DAL1.S				▪	---	
M9124-AGE-1N	DAL1.P1				---	1 KOhm	
M9124-AGD-1N	DAL1.P2				---	140 Ohm	
M9124-AGF-1N	DAL1.P4				---	2 KOhm	
M9124-ADA-1N	DAL2				---	---	230 VAC
M9124-ADC-1N	DAL2.S				▪	---	
M9124-ADE-1N	DAL2.P1				---	1 KOhm	
M9124-ADD-1N	DAL2.P2				---	140 Ohm	
M9124-ADF-1N	DAL2.P4				---	2 KOhm	
M9124-GGA-1N	DML1.1			Proportional 0(2)...10 VDC 0(4)...20 mA	---	---	24 VAC/DC
M9124-GGC-1N	DML1.1S				▪	---	
M9124-GDA-1N	DML2.2			Proportional 0(2)...10 VDC	---	---	230 VAC
M9124-GDC-1N	DML2.2S				▪	---	
M9124-GDA-1N1	DML2.5			Proportional 0(4)...20 mA	---	---	
M9124-GDC-1N1	DML2.5S				▪	---	
32 Nm							
M9132-AGA-1N	DAG1	140 s	6 m²	ON/OFF and Floating	---	---	24 VAC/DC
M9132-AGC-1N	DAG1.S				▪	---	
M9132-AGE-1N	DAG1.P1				---	1 KOhm	
M9132-AGD-1N	DAG1.P2				---	140 Ohm	
M9132-AGF-1N	DAG1.P4				---	2 KOhm	
M9132-ADA-1N	DAG2				---	---	230 VAC
M9132-ADC-1N	DAG2.S				▪	---	
M9132-ADE-1N	DAG2.P1				---	1 KOhm	
M9132-ADD-1N	DAG2.P2				---	140 Ohm	
M9132-ADF-1N	DAG2.P4				---	2 KOhm	
M9132-GGA-1N	DMG1.1	200 s		Proportional 0(2)...10 VDC 0(4)...20 mA	---	---	24 VAC/DC
M9132-GGC-1N	DMG1.1S				▪	---	

Note
* : by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

M9206-xxx-1S *(Joventa DBF1.06 / DAFx.06 / DMF1.06)*

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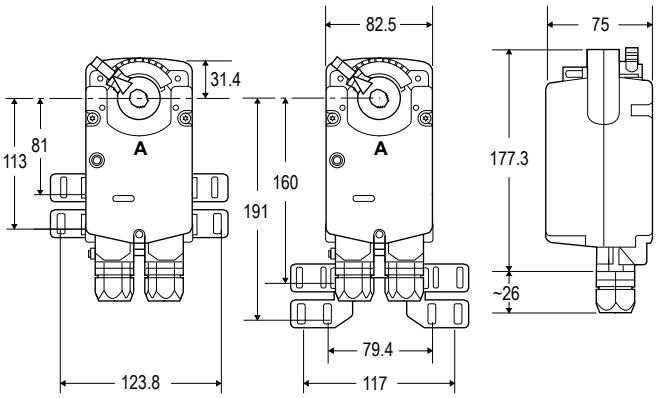
6 Nm

The Spring Return electric, spring return damper actuator series has been specially developed for the motorized operation of safetyair dampers (anti-icing) in air conditioning systems, smoke evacuation dampers and sealing dampers. When the control signal is applied the actuator drives the damper to the operational position, while evenly tensioning the integrated spring. Should the power supply to the actuator be interrupted, the stored energy in the spring will immediately move the damper to the safety position.The compact design and universal adapter fitted with limitation of rotation angle make this actuator highly versatile.

Features

- ON/OFF, Floating and 0(2)...10 VDC or 0(4)...20 mA Control
- Electrical connections with halogen-free cable
- Up to 5 actuators in parallel operation possible
- Plug-in terminal block connection (only for Bxx models)
- Simple direct-mount withuniversal adapter on Ø 10...16 mm shaft or square shaft from 10...14 mm. minimum damper shaft of 45 mm length.
- Selectable direction of rotation
- Limitation of rotation angle
- 1 adjustable auxiliary switch
- Automatic shut-off at end position (overload switch)
- Energy saving at end positions
- Customized versions available
- Devices meet CE requirements



Dimensions in mm

Ordering Codes		Torque	Running Time		Damper Size	Control Signals	1 x Auxiliary contacts	Supply Voltage (50/60Hz)
Johnson Controls	Joventa*		Motor	Spring				
M9206-AGA-1	DBF1.06	6 Nm	60...90 s	35...90 s	1.1 m²	ON/OFF or Floating	---	24 VAC ±25% 24 VDC ±10%
M9206-AGB-1	DBF1.06S						▪	
M9206-BGA-1S	DAF1.06		10...40 s	35...70 s		ON/OFF	---	24 VAC
M9206-BGB-1S	DAF1.06S						▪	
M9206-BDA-1S	DAF2.06		10...65 s				---	230 VAC
M9206-BDB-1S	DAF2.06S						▪	
M9206-GGA-1	DMF1.06		25...40 s	35...90 s		Proportional 0...10 VDC 2...10 VDC	---	24 VAC ±25% 24 VDC ±10%
M9206-GGB-1	DMF1.06S						▪	

Note
* : by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

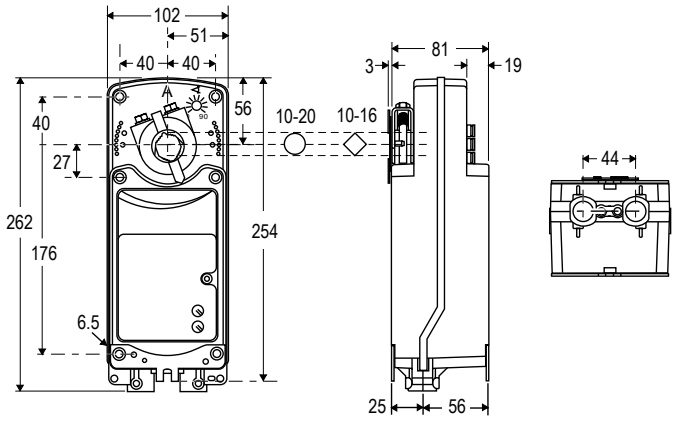
M92x0-xxx-1 (*Joventa DAFx.10 / DBF1.10 / DMF1.10*) - *1/2 pages*

10, 20 Nm

The M9210 and 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)



Dimensions in mm

Ordering Codes		Torque	Running Time		Damper Size	Control Signals	2 x Auxiliary contacts	Supply Voltage (50/60Hz)
Johnson Controls	Joventa*		Motor	Spring				
10 Nm								
M9210-AGA-1	**DBF1.10**	10 Nm	150 s	20 s	2.0 m²	ON/OFF and Floating	---	AC/DC 24 V
M9210-AGC-1	**DBF1.10S**						▪	
M9210-BDA-1	**DAF2.10**		25...57 s	11...15 s		ON/OFF	---	230 VAC
M9210-BDC-1	**DAF2.10S**						▪	
M9210-BGA-1	**DAF1.10**						---	AC/DC 24 V
M9210-BGC-1	**DAF1.10S**						▪	
M9210-GGA-1	**DMF1.10**		150 s	26 s		Proportional 0(2)...10 VDC	---	
M9210-GGC-1	**DMF1.10S**						▪	
M9210-HGA-1	**DHF1.10**					Proportional 0(2)...10 VDC with Span offset	---	
M9210-HGC-1	**DHF1.10S**						▪	

Note
* : by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

M92x0-xxx-1 (*Joventa DAFx.10 / DBF1.10 / DMF1.10*) - *2/2 pages*

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10, 20 Nm

Ordering Codes		Torque	Running Time		Damper Size	Control Signals	2 x Auxiliary contacts	Supply Voltage (50/60Hz)
Johnson Controls	Joventa*		Motor	Spring				
20 Nm								
M9220-AGA-1	**DBF1.20**	20 Nm	150 s	20 s	2.0 m²	ON/OFF and Floating	---	AC/DC 24 V
M9220-AGC-1	**DBF1.20S**						▪	
M9220-BDA-1	**DAF2.20**		25...57 s	11...15 s	4.0 m²	ON/OFF	---	230 VAC
M9220-BDC-1	**DAF2.20S**						▪	
M9220-BGA-1	**DAF1.20**						---	AC/DC 24 V
M9220-BGC-1	**DAF1.20S**						▪	
M9220-GGA-1	**DMF1.20**		150 s	26 s		Proportional 0(2)...10 VDC	---	
M9220-GGC-1	**DMF1.20S**						▪	
M9220-HGA-1	**DHF1.20**					Proportional 0(2)...10 VDC with Span offset	---	
M9220-HGC-1	**DHF1.20S**						▪	

Note
* : by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

Accessories and Replacement Parts (Order Separately)

Ordering Codes	Description
DMPR-KC003*	178 mm Blade Pin Extension (without Bracket) for Johnson Controls® Direct Mount Damper Applications
M9000-158	Tandem Mounting Kit used to Mount Two Models of M9220-xxx-3 Series Proportional Electric Spring Return Actuators
M9000-153	Crank arm
M9000-170	Remote Mounting Kit, Horizontal. Kit includes Mounting Bracket, M9000-153 Crank Arm, Ball Joint and Mounting Bolts
M9000-171	Remote Mounting Kit, Vertical. Kit includes Mounting Bracket, M9000-153 Crank Arm, Ball Joint and Mounting Bolts
M9000-200	Commissioning Tool that Provides a Control Signal to Drive 24 V Floating, Floating, Proportional and/or Resistive Electric Actuators
M9000-604	Replacement Anti-rotation Bracket Kit (with Screws) for M9220-xxx-3 Series Proportional Electric Spring Return Actuators
M9220-600	25 mm Jackshaft Coupler Kit (with Locking Clip) for Mounting M9220-xxx-3 Series Proportional Electric Spring Return Actuators on Dampers with 19 to 27 mm Round Shafts, or 16, 18 and 19 mm Square Shafts
M9220-601	Replacement Coupler Kit (with Locking Clip) for Mounting M9220-xxx-3 Series Proportional Electric Spring Return Actuators on Damper with 12 to 19 mm Round Shafts, or 10, 12 and 14 mm Square Shafts
M9220-602	Replacement Locking Clips for M9220-xxx-3 Series Proportional Electric Spring Return Actuators (FiveperBag)
M9220-603	Adjustable Stop Kit for M9220-xxx-3 Series Proportional Electric Spring Return Actuators
M9220-604	Replacement Manual Override Cranks for M9220-xxx-3 Series Proportional Electric Spring Return Actuators (Five per Bag)
M9220-610	Replacement Shaft Gripper, 10 mm Square Shaft with Locking Clip
M9220-612	Replacement Shaft Gripper, 12 mm Square Shaft with Locking Clip
M9220-614	Replacement Shaft Gripper, 14 mm Square Shaft with Locking Clip

Note
* : Furnished with the damper and may be ordered separately.

M9216-xxx-1 *(Joventa DA1.4F / DA1.F-DA2.F / DM1.1F)*

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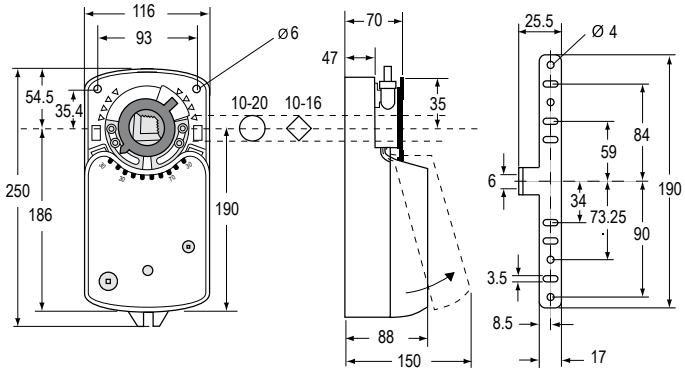
16 Nm

This Johnson Controls elecric spring-return damper-actuator has been specially developed for the motorised operation of safety (anti-icing) air dampers in air conditioninig systems, smoke evacuation and sealing 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 spring immediately brings the damper to the safe position. Manual operation is automatically cancelled when the actuator is in electrical operation.

Features

- ON/OFF, Floating and Proportional Control
- Up to 5 actuator in parallel operation possible
- Screw terminal connections
- Universal adapter for:
- Round shafts from 10...20 mm dia.
- Square shafts from 10...16 mm
- Low noise level
- Direction of rotation selection
- Angle-of-rotation limiting
- Manual control by pushbutton
- 2 floating auxiliary switches
- Power saving at end stops
- Customising available



Dimensions in mm

Ordering Codes		Torque	Running Time		Damper Size	Control Signals	2 x Auxiliary contacts	Feedback Potentiometer	Supply Voltage (50/60Hz)
Johnson Controls	Joventa*		Motor	Spring					
M9216-AGA-1	DA1.4F	16 Nm	90...120 s	10 s	3.0 m²	Floating	---	---	AC/DC 24 V
M9216-AGC-1	DA1.4FS						▪		
M9216-AGE-1	DA1.4FP1						---	1 KOhm	
M9216-AGD-1	DA1.4FP2						---	140 Ohm	
M9216-BGA-1	DA1.F					ON/OFF	---	---	
M9216-BGC-1	DA1.FS						▪		
M9216-BDA-1	DA2.F						---		230 VAC
M9216-BDC-1	DA2.FS						▪		
M9216-HGA-1	DM1.1F		90 s	10 s		Proportional 0...10 VDC 0...20 mA	---		AC/DC 24 V
M9216-HGC-1	DM1.1FS						▪		

Note
* : by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

M91xx-xxx-1N4 *(Joventa SAx.1xxx / SM1.1x)* - *1/2 pages*

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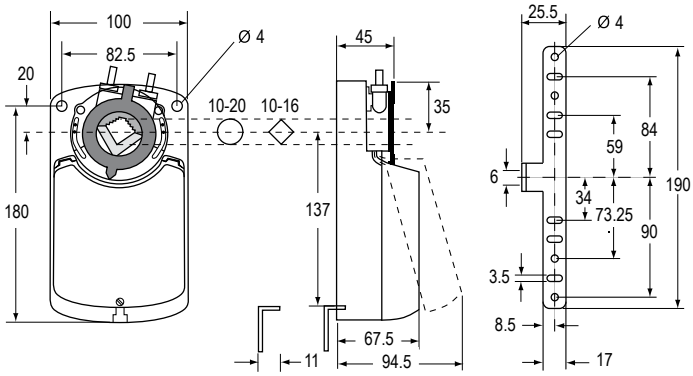
8 and 16 Nm

The Special electric actuators have been specially designed for use with small and medium-sized air dampers and for terminal control units in air volume control systems. Thanks to their very small size and clever construction they are also ideal for applications where space is limited. A key feature of the design is the special JOHNSON CONTROLS spindle adapter which also incorporates angle-of-rotation limiting and position indication.

Features

- ON/OFF, Floating and Proportional Control
- Paralleling of up to 5 actuators possible
- Screw terminal connections
- Universal adapter for:
  Round spindles from 10 to 20 mm Ø or adapter Z01DN... for
  Square spindles 10 to 16 mm, min. ax length 48 mm
- Choice of rotation
- Angle-of-rotation limiting
- Manual control by pushbutton
- Automatic end stops
- Power saving at end stops
- Customising available
- CE approval
- IP54



Dimensions in mm

M91xx-xxx-1N4 *(Joventa SAx.1xxx / SM1.1x)* - *2/2 pages*

Page 29

8 and 16 Nm

Ordering Codes		Running Time	Damper Size	Control Signals	2 x Auxiliary Contacts	Feedback Potentiometer	Supply Voltage (50/60Hz)
Johnson Controls	Joventa*						
8 Nm							
M9108-AGA-1N4	**SA1.10**	8 s	1.5 m²	ON/OFF and Floating	---	---	AC/DC 24 V
M9108-AGC-1N4	**SA1.10S**				▪	---	
M9108-AGE-1N4	**SA1.10P1**				---	1 KOhm	
M9108-AGD-1N4	**SA1.10P2**				---	140 Ohm	
M9108-AGF-1N4	**SA1.10P4**				---	2 KOhm	
M9108-ADA-1N4	**SA2.10**				---	---	230 VAC
M9108-ADC-1N4	**SA2.10S**				▪	---	
M9108-ADE-1N4	**SA2.10P1**				---	1 KOhm	
M9108-ADD-1N4	**SA2.10P2**				---	140 Ohm	
M9108-ADF-1N4	**SA2.10P4**				---	2 KOhm	
M9108-GGA-1N4	**SM1.10**			Proportional 0(2)...10 VDC 0(4)...20 mA	---	---	AC/DC 24 V
M9108-GGC-1N4	**SM1.10(S)**				▪	---	
16 Nm							
M9116-AGA-1N4	**SA1.12**	16 s	3.0 m²	ON/OFF and Floating	---	---	AC/DC 24 V
M9116-AGC-1N4	**SA1.12S**				▪	---	
M9116-AGE-1N4	**SA1.12P1**				---	1 KOhm	
M9116-AGD-1N4	**SA1.12P2**				---	140 Ohm	
M9116-AGF-1N4	**SA1.12P4**				---	2 KOhm	
M9116-ADA-1N4	**SA2.12**				---	---	230 VAC
M9116-ADC-1N4	**SA2.12S**				▪	---	
M9116-ADE-1N4	**SA2.12P1**				---	1 KOhm	
M9116-ADD-1N4	**SA2.12P2**				---	140 Ohm	
M9116-ADF-1N4	**SA2.12P4**				---	2 KOhm	
M9116-GGA-1N4	**SM1.12**			Proportional 0(2)...10 VDC 0(4)...20 mA	---	---	AC/DC 24 V
M9116-GGC-1N4	**SM1.12(S)**				▪	---	

Note
* : by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

For further information and additional models see Product Installation Guide

Johnson Controls

M91xx-GAx-1.01 *(Joventa SMxx.5)*

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8, 16, 24 Nm

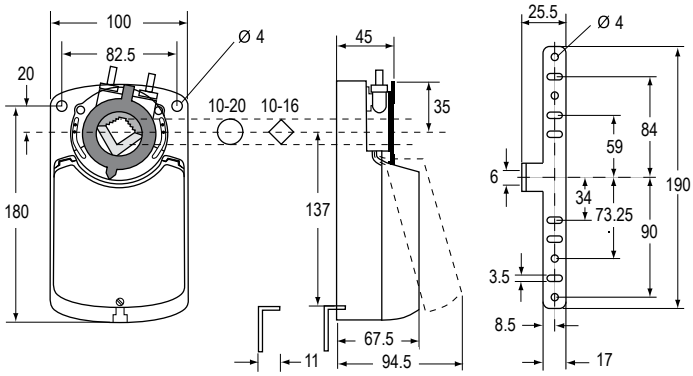
The Special electric actuators have been specially designed for use with medium and large air dampers.

Thanks to their very small size and clever construction they are ideal for applications where space is limited.

A key feature of the design is the special JOHNSON CONTROLS spindle adapter which also incorporates angle-of-rotation limiting and position indication.

Features

- Proportional Control signal
- Paralleling of up to 5 actuators possible
- Screw terminal connections
- Universal adapter for:
  Round spindles from 10...20 mm
  Square spindles from 10...16 mm min.ax length 48 mm
- Choice of rotation
- Angle-of-rotation limiting
- Manual control by pushbutton
- 2 floating auxiliary switches
- Automatic end stops
- Power saving at end stops
- Customising available
- CE approval
- IP54



Dimensions in mm

Ordering Codes		Torque	Running Time	Damper Size	Signals Y1	2 x Auxiliary contacts	Supply Voltage (50-60Hz)
Johnson Controls	Joventa*						
M9108-GAA-1.01	SMS4.5	8 Nm	30..45 s	1.5 m²	0(4)...20 mA	---	110 VAC
M9108-GAC-1.01	SMS4.5S					▪	
M9116-GAA-1.01	SM4.5	16 Nm	80..110 s	3.0 m²		---	
M9116-GAC-1.01	SM4.5S					▪	
M9124-GAA-1.01	SML4.5	24 Nm	125..160 s	4.5 m²		---	
M9124-GAC-1.01	SML4.5S					▪	

Note
* : by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

M9116-Axx-1 *(Joventa SAx.30)*

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16 Nm

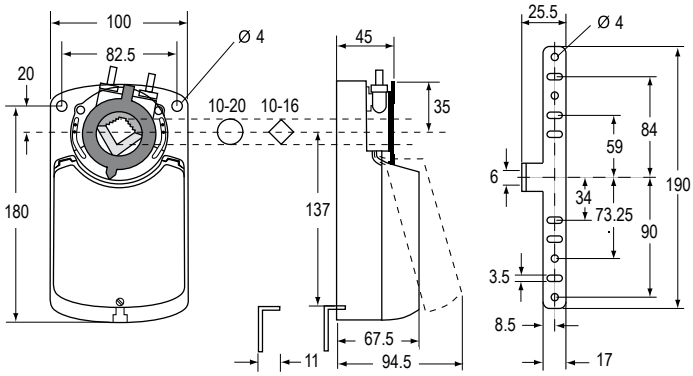
The Special electric actuators have been specially designed for use with medium and large air dampers.

Thanks to their very small size and clever construction they are ideal for applications where space is limited.

A key feature of the design is the special JOHNSON CONTROLS spindle adapter which also incorporates angle-of-rotation limiting and position indication.

Features

- ON/OFF and Floating control
- Paralleling of up to 5 actuators possible
- Screw terminal connections
- Universal adapter for:
  Round spindles from 10...20 mm
  Square spindles from 10...16 mm min. ax length 48 mm
- Low noise level
- Choice of rotation
- Angle-of-rotation limiting
- Manual control by pushbutton
- Automatic end stops
- Power saving at end stops
- Customising available
- CE approval
- IP54



Dimensions in mm

Ordering Codes		Torque	Running Time	Damper Size	Control Signals	2 x Auxiliary Contacts	Supply Voltage (50/60Hz)
Johnson Controls	Joventa*						
M9116-AAA-1	**SA4.30**	16 Nm	80...110 s	3 m²	ON/OFF and Floating	---	100 VAC
M9116-AAC-1	**SA4.30S**					▪	

Note
* : by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

S92x0-BxC-3xx *(Joventa SAFx.10 / SAFx.20)* - *1/3 pages*

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10, 20 Nm

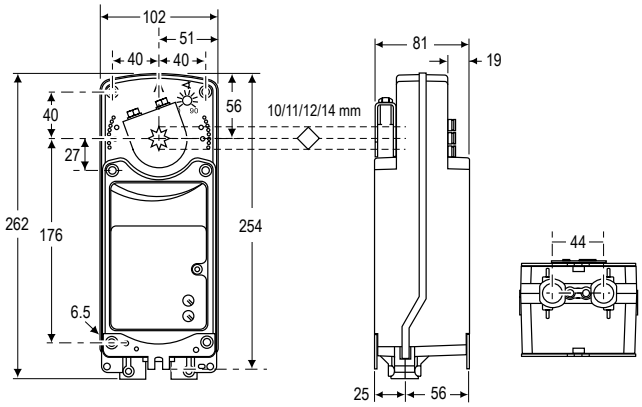
The S9210 and S9220 Security Fire electric, spring return damper-actuator series has been specially developed for the motorized operation of safety dampers e.g. fire protection dampers.

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.

Features

- ON/OFF Control
- 10/11/12/14 mm steel adapter for square shaft
- Ambient temperature sensor and direct connection of duct temperature sensor
- Low noise level
- Energy saving at end position
- 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)



Dimensions in mm

Accessories and Replacement Parts (Order Separately)

Ordering Codes	Description
DMPR-KC003*	178 mm Blade Pin Extension (without Bracket) for Johnson Controls® Direct Mount Damper Applications
M9000-158	Tandem Mounting Kit used to Mount Two Models of M9220-xxx-3 Series Proportional Electric Spring Return Actuators
M9000-153	Crank arm
M9000-170	Remote Mounting Kit, Horizontal. Kit includes Mounting Bracket, M9000-153 Crank Arm, Ball Joint and Mounting Bolts
M9000-171	Remote Mounting Kit, Vertical. Kit includes Mounting Bracket, M9000-153 Crank Arm, Ball Joint and Mounting Bolts
M9000-200	Commissioning Tool that Provides a Control Signal to Drive 24 V Floating, Floating, Proportional and/or Resistive Electric Actuators
M9000-604	Replacement Anti-rotation Bracket Kit (with Screws) for M9220-xxx-3 Series Proportional Electric Spring Return Actuators
M9220-600	25 mm Jackshaft Coupler Kit (with Locking Clip) for Mounting M9220-xxx-3 Series Proportional Electric Spring Return Actuators on Dampers with 19 to 27 mm Round Shafts, or 16, 18 and 19 mm Square Shafts
M9220-601	Replacement Coupler Kit (with Locking Clip) for Mounting M9220-xxx-3 Series Proportional Electric Spring Return Actuators on Damper with 12 to 19 mm Round Shafts, or 10, 12 and 14 mm Square Shafts
M9220-602	Replacement Locking Clips for M9220-xxx-3 Series Proportional Electric Spring Return Actuators (FiveperBag)
M9220-603	Adjustable Stop Kit for M9220-xxx-3 Series Proportional Electric Spring Return Actuators
M9220-604	Replacement Manual Override Cranks for M9220-xxx-3 Series Proportional Electric Spring Return Actuators (Five per Bag)
M9220-610	Replacement Shaft Gripper, 10 mm Square Shaft with Locking Clip
M9220-612	Replacement Shaft Gripper, 12 mm Square Shaft with Locking Clip
M9220-614	Replacement Shaft Gripper, 14 mm Square Shaft with Locking Clip

Note

* : Furnished with the damper and may be ordered separately.

S92x0-BxC-3xx *(Joventa SAFx.10 / SAFx.20)* - *2/3 pages*

10, 20 Nm

Ordering Codes		Power Supply	Squareshaft Adapter	Sensor
Johnson Controls	Joventa*			
10 Nm				
S9210-BDC-31	**SAF2.10S/10**	AC 230 V	10 mm	---
S9210-BDC-31A	**SAF2.10SA/10**			Ambient Sensor
S9210-BDC-31B	**SAF2.10SB/10**			Duct Sensor
S9210-BDC-31C	**SAF2.10SC/10**			Ambient and Duct Sensor
S9210-BDC-32	**SAF2.10S/11**		11 mm	---
S9210-BDC-32A	**SAF2.10SA/11**			Ambient Sensor
S9210-BDC-32B	**SAF2.10SB/11**			Duct Sensor
S9210-BDC-32C	**SAF2.10SC/11**			Ambient and Duct Sensor
S9210-BDC-33	**SAF2.10S/12**		12 mm	---
S9210-BDC-33A	**SAF2.10SA/12**			Ambient Sensor
S9210-BDC-33B	**SAF2.10SB/12**			Duct Sensor
S9210-BDC-33C	**SAF2.10SC/12**			Ambient and Duct Sensor
S9210-BDC-34	**SAF2.10S/14**		14 mm	---
S9210-BDC-34A	**SAF2.10SA/14**			Ambient Sensor
S9210-BDC-34B	**SAF2.10SB/14**			Duct Sensor
S9210-BDC-34C	**SAF2.10SC/14**			Ambient and Duct Sensor
S9210-BGC-31	**SAF1.10S/10**	AC/DC 24 V	10 mm	---
S9210-BGC-31A	**SAF1.10SA/10**			Ambient Sensor
S9210-BGC-31B	**SAF1.10SB/10**			Duct Sensor
S9210-BGC-31C	**SAF1.10SC/10**			Ambient and Duct Sensor
S9210-BGC-32	**SAF1.10S/11**		11 mm	---
S9210-BGC-32A	**SAF1.10SA/11**			Ambient Sensor
S9210-BGC-32B	**SAF1.10SB/11**			Duct Sensor
S9210-BGC-32C	**SAF1.10SC/11**			Ambient and Duct Sensor
S9210-BGC-33	**SAF1.10S/12**		12 mm	---
S9210-BGC-33A	**SAF1.10SA/12**			Ambient Sensor
S9210-BGC-33B	**SAF1.10SB/12**			Duct Sensor
S9210-BGC-33C	**SAF1.10SC/12**			Ambient and Duct Sensor
S9210-BGC-34	**SAF1.10S/14**		14 mm	---
S9210-BGC-34A	**SAF1.10SA/14**			Ambient Sensor
S9210-BGC-34B	**SAF1.10SB/14**			Duct Sensor
S9210-BGC-34C	**SAF1.10SC/14**			Ambient and Duct Sensor

Note
* : by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

For further information and additional models see Product Installation Guide

S92x0-BxC-3xx *(Joventa SAFx.10 / SAFx.20)* - *3/3 pages*

10, 20 Nm

Ordering Codes		Power Supply	Squareshaft Adapter	Sensor
Johnson Controls	Joventa*			
S9220-BDC-31	SAF2.20S/10	AC 230 V	10 mm	---
S9220-BDC-31A	SAF2.20SA/10			Ambient Sensor
S9220-BDC-31B	SAF2.20SB/10			Duct Sensor
S9220-BDC-31C	SAF2.20SC/10			Ambient and Duct Sensor
S9220-BDC-32	SAF2.20S/11		11 mm	---
S9220-BDC-32A	SAF2.20SA/11			Ambient Sensor
S9220-BDC-32B	SAF2.20SB/11			Duct Sensor
S9220-BDC-32C	SAF2.20SC/11			Ambient and Duct Sensor
S9220-BDC-33	SAF2.20S/12		12 mm	---
S9220-BDC-33A	SAF2.20SA/12			Ambient Sensor
S9220-BDC-33B	SAF2.20SB/12			Duct Sensor
S9220-BDC-33C	SAF2.20SC/12			Ambient and Duct Sensor
S9220-BDC-34	SAF2.20S/14		14 mm	---
S9220-BDC-34A	SAF2.20SA/14			Ambient Sensor
S9220-BDC-34B	SAF2.20SB/14			Duct Sensor
S9220-BDC-34C	SAF2.20SC/14			Ambient and Duct Sensor
S9220-BGC-31	SAF1.20S/10	AC/DC 24 V	10 mm	---
S9220-BGC-31A	SAF1.20SA/10			Ambient Sensor
S9220-BGC-31B	SAF1.20SB/10			Duct Sensor
S9220-BGC-31C	SAF1.20SC/10			Ambient and Duct Sensor
S9220-BGC-32	SAF1.20S/11		11 mm	---
S9220-BGC-32A	SAF1.20SA/11			Ambient Sensor
S9220-BGC-32B	SAF1.20SB/11			Duct Sensor
S9220-BGC-32C	SAF1.20SC/11			Ambient and Duct Sensor
S9220-BGC-33	SAF1.20S/12		12 mm	---
S9220-BGC-33A	SAF1.20SA/12			Ambient Sensor
S9220-BGC-33B	SAF1.20SB/12			Duct Sensor
S9220-BGC-33C	SAF1.20SC/12			Ambient and Duct Sensor
S9220-BGC-34	SAF1.20S/14		14 mm	---
S9220-BGC-34A	SAF1.20SA/14			Ambient Sensor
S9220-BGC-34B	SAF1.20SB/14			Duct Sensor
S9220-BGC-34C	SAF1.20SC/14			Ambient and Duct Sensor

Note

* : by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

VA9104-xGA-xS *(Joventa BAD1.4 / BAD1 / BMD1.2)*

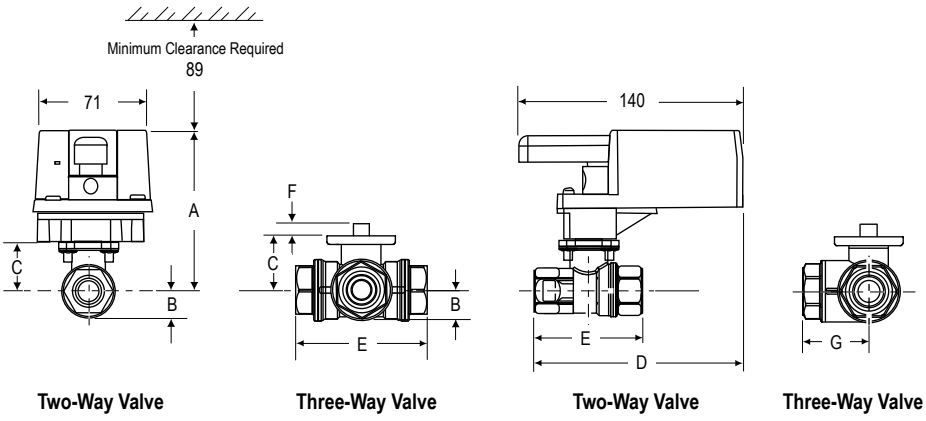
Page 35

4 Nm

The electric Actuator series have been developped for operation of ball valves.
These synchronous, motor driven actuators are used to provide accurate positioning on VG100 series DN15, DN20 and DN25 ball valves.

Features

- ON/OFF, Floating with Timeout *(IGA models only)* and Proportional Control
- Load-independent runnin time
- Up to 5 actuators in parallel operation possible
- Manual release button
- Devices meet CE requirements
- 1.2 m PVC cable or Terminal block
- Selectable direction of rotation
- Automathic shut-off at end position



Dimensions in mm

Valve Size (DN)*	A	B	C	D	E	F	G
DN15	98	17	31	129	64	9	32
DN20	98	17	31	133	71	9	36
DN25	100	19	33	141	87	9	43

Note
* : On models with the flow-characterizing disk, the disk is located in Port A. Port A must be the Valve inlet.

Ordering Codes		Running Time	Control Signals	Terminal Block	PVC cable (1.2 m)	Supply Voltage (50/60Hz)
Johnson Controls	Joventa					
VA9104-AGA-1S	BAD1.4	72 S	Floating without Timeout	---	▪	24 VAC
VA9104-AGA-5S	BAD1.4C			▪	---	
VA9104-IGA-1S	BAD1		ON/OFF and Floating with Timeout	---	▪	
VA9104-IGA-5S	BAD1C			▪	---	
VA9104-GGA-1S	BMD1.2		Proportional 0(2)...10 VDC 0(4)...20 mA	---	▪	
VA9104-GGA-5S	BMD1.2C			▪	---	

M9108-xxx-5 *(Joventa BAS1 / BAS2 / BMS1.1)*

Page 36

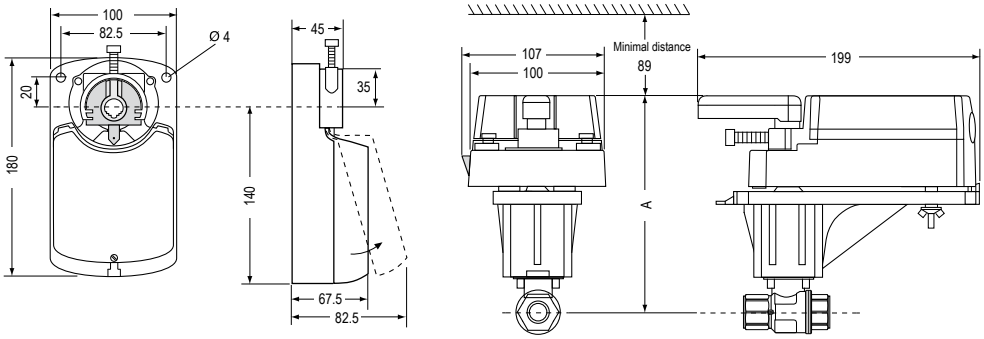
8 Nm

The M9108-xxx-5 electric actuator series have been developed for operating VG1000 series ball valves. The actuators can be mounted onto the valves by the means of the M9000-525-5 linkage kit.

Features

- ON/OFF, Floating and Proportional Control
- Halogen-free connecting wire
- Load-independent running time
- Easy assembly on the console
- Selectable direction of rotation
- Manual adjustement by pushing the release button and turning the handle with position indicator (the release button does not automatically spring back into position)
- Automatic switching off in the limit positions
- Customized versions available
- Devices meet CE requirement

	A
DN15	160
DN20	160
DN25	162
DN32	173
DN40	177
DN50	182



Dimensions in mm

Ordering Codes		Torque	Running Time	Control Signals	2 x Auxiliary Contacts	Supply Voltage (50/60Hz)
Johnson Controls	Joventa					
M9108-AGA-5	**BAS1**	8 Nm	30 s	ON/OFF and Floating	---	AC/DC 24 V
M9108-AGC-5	**BAS1.S**				▪	
M9108-ADA-5	**BAS2**				---	230 VDC
M9108-ADC-5	**BAS2.S**				▪	
M9108-GGA-5	**BMS1.1**			Modulating	---	AC/DC 24 V
M9108-GGC-5	**BMS1.1S**				▪	

M9116-xxx-1N2 *(Joventa MA1 / MA2 / MM1.1 / MM2.2)*

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16 Nm

These electric actuators have been specially designed for the motorised operation of various types of water valves and fittings such as mixing valves, butterfly valves and ball valves. The mechanical design of the actuators is such that, with the aid of mounting kits, they can be used on many different types of valves and fittings.

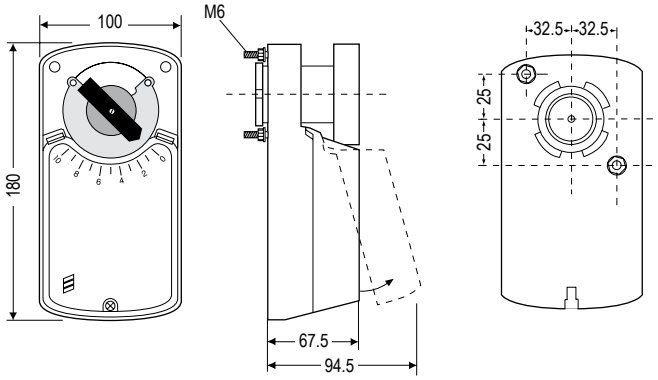
The universal coupling between the actuator and the final controlling element is simplicity itself to use since it provides both; a positive drive and flexibility.

Features

- ON/OFF, Floating and Proportional Control
- Load independent running time
- Screw terminal connections
- Universal adapter with knob for manual operation and position indication
- Reversible
- Automatic end stops
- Power saving at end stops
- Customising available
- CE approval
- IP54

Accessories for mixer mounting kits

- ZMA001 for Esbe mixers
- ZMA002 for Centra-Duplex mixers
- ZMA003 for Holter mixers
- ZMA004 for GF ball valves



Dimensions in mm

Ordering Codes *		Torque	Running time	Control signals	2 x Auxiliary contacts	Supply voltage (50/60Hz)
Johnson Controls	Joventa *					
M9116-AGA-1N2	MA1	16 Nm	120 s	ON/OFF and Floating	---	AC/DC 24 V
M9116-AGC-1N2	MA1.S				▪	
M9116-ADA-1N2	MA2				---	AC 230 V
M9116-ADC-1N2	MA2.S				▪	
M9116-GGA-1N2	MM1.1			Proportional 0(2)...10 VDC 0...20 mA	---	AC/DC 24 V
M9116-GGC-1N2	MM1.1S				▪	
M9116-GDA-1N2	MM2.2			Proportional 0(2)...10 VDC 0...10 VDC	---	AC 230 V
M9116-GDC-1N2	MM2.2S				▪	

Note:
* by adding a K after the type number you will acquire the same model with a Halogene free cable (1 m)

M9206-xxx-5S *(DBF1.06 / DAFx.06 / DMF1.06)*

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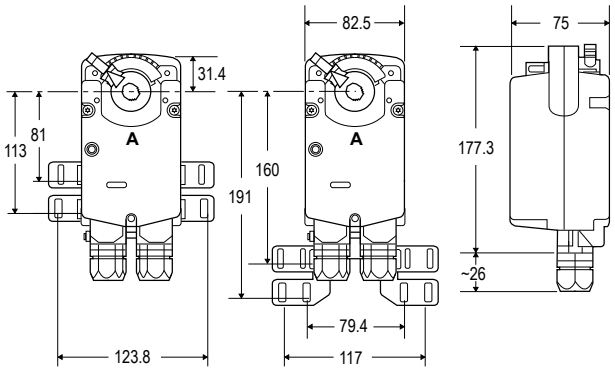
6 Nm

The M9206-xxx-5S Series Actuators are direct-mount, spring return electric actuators intended for use with on/off, floating, or proportional controllers. BGx models operate on AC 24 V power, AGx and GGx models operate on AC/DC 24 V power, and BDx models operate on AC 230 V power. These bidirectional actuators are to be mounted onto Johnson Controls VG1000 Series Forged Brass Ball Valves using the M9000-520-5 Ball Valve Linkage Kit. The M9206-xxx-5S Series Electric Spring Return Actuators provide a running torque of 6 Nm. The rotation range is mechanically adjustable. An integral line voltage auxiliary switch is available on the M9206-xxB models to indicate end-stop position, or to perform switching functions within the selected rotation range. Position feedback is provided on proportional control models through a proportional DC voltage signal.

Features

- ON/OFF, Floating and Proportional Control
- Automatic Stroke Calibration at Installation.
- Reversible Mounting Design.
- Electronic Stall Detection Throughout Entire Rotation Range
- Removable Coupler
- Integral Auxiliary Switch (xxB Models)
- 24 VAC, 24 VAC/VDC and 230 VAC Power Options; 0(2)...10 VDC and 0(4)... 20 mA Input Signal Options
- Ambient Operating Temperature Limits of -32 to 60°C



Dimensions in mm

Ordering Codes		Torque	Running Time	Control Signals	Input Signal	1 x Auxiliary Contacts	Supply Voltage (50/60Hz)
Johnson Controls	Joventa						
M9206-AGA-5S	**DBF1.06**	6 Nm	60...90 s	ON/OFF and Floating	24 VAC/VDC	---	24 VAC/VDC
M9206-AGB-5S	**DBF1.06S**					▪	
M9206-BDA-5S	**DAF1.06**		10...40 s	ON/OFF	230 VAC	---	230 VAC
M9206-BDB-5S	**DAF1.06S**					▪	
M9206-BGA-5S	**DAF2.06**				24 VAC	---	24 VAC
M9206-BGB-5S	**DAF2.06S**					▪	
M9206-GGA-5S	**DMF1.06**		25...40 s	Proportional	0(2)...10 VDC 0(4)...20 mA*	---	24 VAC/VDC
M9206-GGB-5S	**DMF1.06S**					▪	

Note
* : 0(4) to 20 mA input signal requires field furnished 500 Ω resistor.

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DN10...20, PN16

These valves are primarily designed to regulate the flow of water and steam in response to the demand of a controller in zone and terminal unit applications.

Following actuators are available:

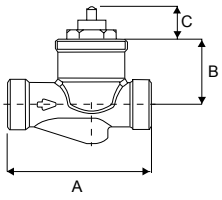
VA-7047 and VA-7048 thermal ON/OFF actuators

VA-7067 thermal 0...10 VDC actuators

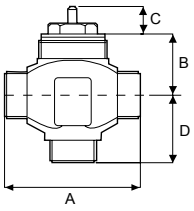
VA-747x floating and proportional actuators.

Features

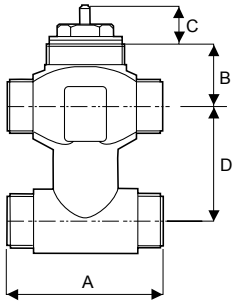
- Forged brass body, stainless steel stem and spring
- Kvs 0.16...5
- 2-way PDTC (normally open), 3-way mixing and 3-way diverting and 3-way mixing and 3-way diverting with built-in bypass configurations
- Fluid temperature 2...120 °C
- BSPP and compression fitting body connections
- Inherent flow characteristic: equal percentage
- Rangeability 50:1



2-way valve



3-way valve



3-way bypass valve

Dimensions in mm

Body Size	Connection Size	A	B	C	D
2-way (Normally Open) Configuration					
DN10	½"	60	27.5	15.5	---
DN15	¾"	65	33.7		
DN20	1"				
3-way Mixing/Diverting Configuration					
DN10	½"	60	27	15.2	30
DN15	¾"				
DN20	1"				
3-way Mixing/Diverting with built-in bypass Configuration					
DN10	½"	60	27	15.2	40
DN15	¾"				
DN20	1"				50

V5000 - *2/2 pages*

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DN10...20, PN16

Ordering Codes*	Compression fitting kit**	Body Size	Kvs (Control port)	Kvs (By-pass port)	Close-off Pressure (kPa)
2-way configuration					
V52x0ZC	---	DN10	0.16	---	400
V52x0BC			0.4		
V52x0CC			0.63		
V52x0DC			1		
V52x0EC			1.6		
V5210JC	▪	DN15	2.5		110
V5210KC			3.5		
V5210MC		DN20	4.5		
3-way Mixing/Diverting Configuration					
V5810BC	---	DN10	0.4	0.3	120
V5810CC			0.63	0.4	
V5810DC			1	0.63	
V5810EC			1.6	1	
V5810JC		DN15	2.5	1.6	150
V5810KC			4	2.5	
V5810MC		DN20	5	3.5	110
3-way Mixing/Diverting with built-in bypass Configuration					
V55x0BC	---	DN10	0.4	0.3	180
V55x0CC			0.63	0.4	
V55x0DC			1	0.63	
V55x0EC			1.6	1	
V5510JC	▪	DN15	2.5	1.6	150
V5510KC			4	2.5	
V5510MC		DN20	5	3.5	110

Notes

* **x = 1:** BSPP
x = 9: Compression fitting

** Compression fitting kit available for DN15 and DN20
DN15: 0378145015
DN20: 0378145020

VG5000 - *1/3 pages*

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DN15...25, PN16

These valves are primarily designed to regulate the flow of water and steam in response to the demand of a controller in zone and terminal unit applications.

Following actuators are available:

VA-7010 ON/OFF actuators

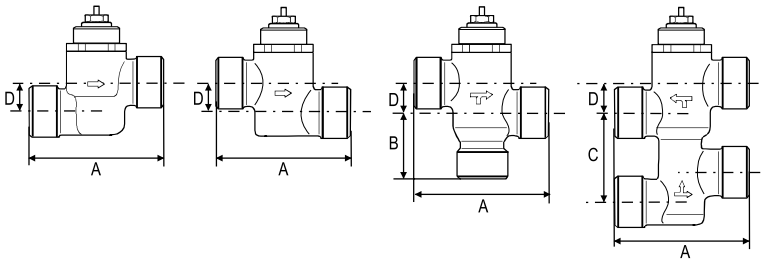
VA-7040 thermal ON/OFF actuators

VA-7060 thermal proportional actuators

VA-745x floating and proportional actuators.

Features

- Forged brass body
- Kvs 0.25...5.5
- 2-way PDTO (normally open), 2-way PDTC (normally closed), 3-way mixing and 3-way mixing with built-in (normally open) bypass configurations
- Fluid temperature 2...95 °C
- Built-in return spring
- BSPP male, female and compression fitting body connections
- Inherent flow characteristic: quick opening



VG52xx VG54xx VG58xx VG55xx

Male Thread Connection *(1/2)*

Ordering Codes*	Body Size	Connection Size	Kvs (Control Port)	Kvs (By-pass port)	Close-off Pressure (kPa)	Dimensions in mm			
						A	B	C	D
2-way PDTO (Normally Open) Configuration									
VG52z0AC	DN15	½"	0.25	---	200	68	---	---	11
VG52z0BC			0.4	---			---	---	
VG52z0CC			0.63	---			---	---	
VG52z0DC			1	---			---	---	
VG52z0EC			1.6	---	100	72	---	---	13.5
VG5210JC	DN20	¾"	2.5	---	140	74		---	15
VG5210KC			3.5	---	100			---	
2-way PDTC (Normally Closed) Configuration									
VG54z0AC	DN15	½"	0.25	---	200	68	---	---	11
VG54z0BC			0.4	---			---	---	
VG54z0CC			0.63	---			---	---	
VG54z0DC			1	---			---	---	
VG54z0EC			1.6	---	100	72	---	---	13.5
VG5410JC	DN20	¾"	2.5	---		74		---	15
VG5410KC			3.5	---				---	

Note

* **z = 1:** BSP parallel
z = 9: Compression fitting (only for DN15 valves)

VG5000 - *2/3 pages*

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DN15...25, PN16

Male Thread Connection *(2/2)*

Ordering Codes*	Body Size	Kvs (Control Port)	Kvs (By-pass port)	Close-off Pressure (kPa)	Dimensions in mm			
					A	B	C	D
3-way Mixing Configuration								
VG58z0AC	DN15	0.25	0.25	200	68	26.5	---	11
VG58z0BC		0.4	0.4			26.5	---	11
VG58z0CC		0.63	0.63			26.5	---	11
VG58z0DC		1	1			26.5	---	11
VG58z0EC		1.6	1.6	100	72	34.5	---	13.5
VG5810JC	DN20	2.5	2.5		74	36	---	15
VG5810KC		3.5	3.5			36	---	15
3-way + built-in (Normally Open) bypass Configuration								
VG55z0AC	DN15	0.25	0.25	200	68	---	40	11
VG55z0PC		0.4	0.25					
VG55z0BC		0.4	0.4					
VG55z0QC		0.63	0.4					
VG55z0CC		0.63	0.63					
VG55z0RC		1.0	0.63					
VG55z0DC		1.0	1.0					
VG55z0SC		1.6	1.0	100	72			13.5
VG55z0EC		1.6	1.6					
VG5510TC	DN20	2.5	1.6		74			15
VG5510JC		2.5	2.5					
VG5510UC		3.0	2.5					
VG5510KC		3.0	3.0					

Note

* **z = 1:** BSP parallel
z = 9: Compression fitting (only for DN15 valves)

VG5000 - *3/3 pages*

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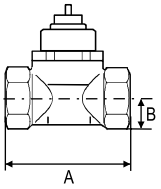
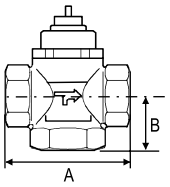
DN15...25, PN16



VG52x
VG540x



VG580x

Female Thread Connection

Ordering Codes	Body Size	Kvs (Control Port)	Kvs (By-pass port)	Close-Off Pressure (kPa)	Dimensions in mm	
					A	B
2-way PDTO (Normally Open) Configuration						
VG5200AC	DN15	0.25	---	200	55	15
VG5200BC		0.4	---			
VG5200CC		0.63	---			
VG5200DC		1	---			
VG5200EC		1.6	---			
VG5200JC	DN20	2.5	---	140	66	19
VG5200KC		3.5	---	100		
VG5200MC	DN25	5.5	---	62	90	24
2-way PDTC (Normally Closed) Configuration						
VG5400AC	DN15	0.25	---	200	55	15
VG5400BC		0.4	---			
VG5400CC		0.63	---			
VG5400DC		1	---			
VG5400EC		1.6	---			
VG5400JC	DN20	2.5	---	100	66	19
VG5400KC		3.5	---			
VG5400MC	DN25	5.5	---	62	90	24
3-way Mixing						
VG5800CC	DN15	0.63	0.63	200	55	29
VG5800DC		1	1			
VG5800EC		1.6	1.6			
VG5800JC	DN20	2.5	2.5	100	66	33.5
VG5800KC		3.5	3.5			
VG5800MC	DN25	5.5	5.5	62	90	37.5

VG6000

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DN15...25, 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 actuators are available:

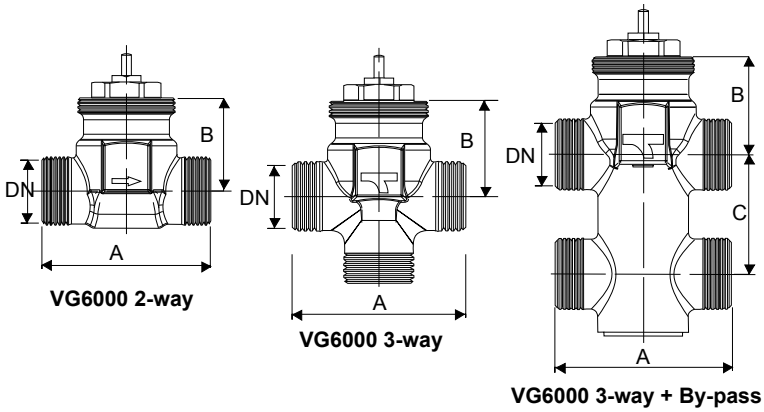
VA-7030 ON/OFF actuators

VA-747x electric actuators.

Features

- Forged brass body
- Kvs 1.7...4.5
- 2-way PDTC (normally open), 3-way mixing and diverting, 3-way mixing and diverting with built-in bypass configurations
- Fluid temperature 2...110 °C
- BSPP threaded body connection
- Inherent flow characteristic: quick opening

VG6000 2-way VG6000 3-way VG6000 3-way + Bypass



Ordering Codes	Body Size	Connection Size	Kvs (Control port)	Kvs (By-pass port)	Close-off pressure (kPa)	Dimensions in mm		
						A	B	C
2-way PDTC Configuration								
VG6210EC	DN15	½"	1.7	---	250	52	29	---
VG6210JC	DN20	¾"	2.6	---	150	56	28	---
VG6210LC	DN25	1"	4.5	---	70	82	30.5	---
3-way Mixing and Diverting Configuration								
VG6810EC	DN15	½"	1.7 (Mixing)	1.2 (Mixing)	250	52	29	---
			1.7 (Diverting)	1.3 (Diverting)				
VG6810JC	DN20	¾"	2.5 (Mixing)	1.6 (Mixing)	150	56	28	---
			2.6 (Diverting)	1.8 (Diverting)				
VG6810LC	DN25	1"	4.5 (Mixing)	3.1 (Mixing)	70	82	30.5	---
			4.5 (Diverting)	4.5 (Diverting)				
3-way Mixing and Diverting with built-in bypass								
VG6510EC	DN15	½"	1.7 (Mixing)	1.2 (Mixing)	250	52	29	40
			1.7 (Diverting)	1.3 (Diverting)				
VG6510JC	DN20	¾"	2.5 (Mixing)	1.6 (Mixing)	150	56	28	40
			2.6 (Diverting)	1.8 (Diverting)				
VG6510LC	DN25	1"	4.5 (Mixing)	3.1 (Mixing)	70	82	30.5	74
			4.5 (Diverting)	4.5 (Diverting)				

VG1000 - *1/4 pages*

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DN15...50, PN40

These ball valves are primarily designed to regulate the flow of hot or chilled water and low-pressure steam in response to the demand of a controller in heating, ventilating and air conditioning systems.

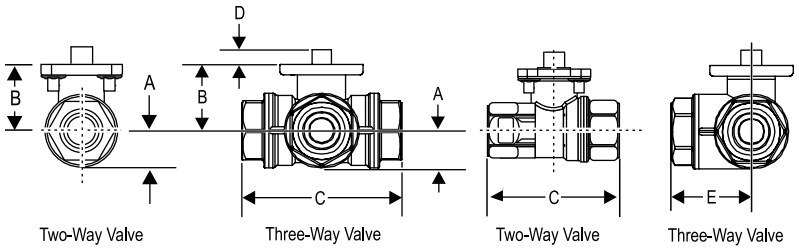
Following ON/OFF, floating or proportional control electric actuators are available:

VA9104 direct mounted Non Spring Return actuators

M9108 Non Spring Return actuators

M9206 and M9216 Spring Return actuators.

All valves and actuators available as factory mounted assemblies.



Features

- Forged brass body
- Kvs 0.63...63
- 2-way, 3-way mixing and diverting configurations
- Inherent Equal Percentage Flow Characteristic in the in-line port of all valves
- Chrome-plated brass ball and stem
  Fluid temperature -30...95 °C
  (-5... 95 °C with VA9104)
- Stainless steel ball and stem
  Fluid temperature -30...140 °C
  (-30 to 100 °C with VA9104)
- BSPP female threaded body connections
- M9000-520-5 linkage kit available for field mounting to M9206 series electric actuators
- M9000-510-5 linkage kit available for field mounting to M9216 series electric actuators
- M9000-525-5 linkage kit available for field mounting to M9108 series electric actuators

Dimensions in mm

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

VG1000 - *2/4 pages*

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DN15...50, PN40

Factory-mounted assemblies of valves with PROPORTIONAL actuators

Spring Return Function	---				▪			
Supply Voltage	24 VAC							
Torque	4 Nm		8 Nm		6 Nm		16 Nm	
Running Time	72 s		30 s		25 - 40 s		90 - 120 s	
Spring Return Time Power Off	---				35 s (max 70 s)		10 s	
Control Signal VDC	0 - 10 / 2 - 10							
Control Signal mA	0 - 20 / 4 - 20						---	
Switches	---		2 x SPDT		---	1 x SPDT	---	2 x SPDT
Feedback VDC	---	0 - 10 / 2 - 10					0 - 10	
Close-off Pressure	1380 kPa							
Actuator Codes	**VA9104-GGA-5S**	**VA9104-GGA-1S**	**M9108-GGA-5**	**M9108-GGC-5**	**M9206-GGA-5S**	**M9206-GGB-5S**	**M9216-HGA-1**	**M9216-HGC-1**
Linkage Codes	---		**M9000-525-5**		**M9000-520-5**		**M9000-510-5**	
Ordering Code Suffix for Assemblies	**+5T4GGA**	**+5A4GGA**	**+5A8GGA**	**+5A8GGC**	**+536GGA** (Spring Opens) **+556GGA** (Spring Closes)	**+536GGB** (Spring Opens) **+556GGB** (Spring Closes)	**+526HGA** (Spring Opens) **+546HGA** (Spring Closes)	**+526HGC** (Spring Opens) **+546HGC** (Spring Closes)

Valve Codes*	Body Size	Kvs (Control Port)	Kvs (Bypass Port)**	Disc	Valid combinations of valves, linkages and actuators							
VG1x0yAD	DN15	1.0	0.63	▪	▪	▪	---	▪	▪	▪	---	---
VG1x0yAE		1.6	1.0		▪	▪	---	▪	▪	▪	---	---
VG1x0yAF		2.5	1.6		▪	▪	---	▪	▪	▪	---	---
VG1x0yAG		4.0	2.5		▪	▪	---	▪	▪	▪	---	---
VG1x0yAL		6.3	4.0		▪	▪	---	▪	▪	▪	---	---
VG1x0yAN		10	5.0	---	▪	▪	---	▪	▪	▪	---	---
VG1x0yBG	DN20	4.0	2.5	▪	▪	▪	---	▪	▪	▪	---	---
VG1x0yBL		6.3	4.0		▪	▪	---	▪	▪	▪	---	---
VG1x0yBN		10	5.0	---	▪	▪	---	▪	▪	▪	---	---
VG1x0yCL	DN25	6.3	4.0	▪	▪	▪	---	▪	▪	▪	---	---
VG1x0yCN		10	6.3		▪	▪	---	▪	▪	▪	---	---
VG1x0yCP		16	8.0	---	▪	▪	---	▪	▪	▪	---	---
VG1x0yDN	DN32	10	6.3	▪	---	---	▪	▪	▪	▪	---	---
VG1x0yDP		16	10.0		---	---	▪	▪	▪	▪	---	---
VG1x0yDR		25	12.5	---	---	---	▪	▪	▪	▪	---	---
VG1x0yEP	DN40	16	10	▪	---	---	▪	▪	▪	▪	---	---
VG1x0yER		25	16		---	---	▪	▪	▪	▪	---	---
VG1x0yES		40	20	---	---	---	▪	▪	▪	▪	---	---
VG1x0yFR	DN50	25	16.0	▪	---	---	▪	▪	---	---	▪	▪
VG1x0yFS		40	25.0		---	---	▪	▪	---	---	▪	▪
VG1x0yFT		63	31.5	---	---	---	▪	▪	---	---	▪	▪

Notes

* **x = 2:** 2-way
x = 8: 3-way

y = 1: Plated brass trim
y = 5: Stainless steel trim

** only 3-way valves

For further information and additional models see Product Installation Guide

VG1000 - *3/4 pages*

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DN15...50, PN40

Factory-mounted assemblies of valves with FLOATING actuators

Spring return function	---								▪			
Supply voltage	24 VAC						230 VAC		24 VAC			
Torque	4 Nm				8 Nm				6 Nm		16 Nm	
Running time	72 s				30 s				60 - 90 s		90 - 120 s	
Spring return time Power off	---								35 s (max 70 s)		10 s	
Control signal	Floating		Floating with time-out and ON/OFF						Floating			
Switches	---				2 x SPDT		---	2 x SPDT	---	1 x SPDT	---	2 x SPDT
Feedback	---											
Close-off pressure	1380 kPa											
Actuator code	VA9104-AGA-5S	VA9104-AGA-1S	VA9104-IGA-5S	VA9104-IGA-1S	M9108-AGA-5	M9108-AGC-5	M9108-ADA-5	M9108-ADC-5	M9206-AGA-5S	M9206-AGB-5S	M9216-AGA-1	M9216-AGC-1
Linkage code	---				M9000-510-5				M9000-520-5		M9000-510-5	
Ordering code suffix for assemblies	+5T4 AGA	+5A4 AGA	+5T4 IGA	+5A4 IGA	+5A8 AGA	+5A8 AGC	+5A8 ADA	+5A8 ADC	+536 AGA (Spring Opens) +556 AGA (Spring Closes)	+536 AGB (Spring Opens) +556 AGB (Spring Closes)	+526 AGA (Spring Opens) +546 AGA (Spring Closes)	+526 AGC (Spring Opens) +546 AGC (Spring Closes)

Valve code *	Body size	Kvs (Control Port)	Kvs (Bypass Port) **	Disc	Valid combinations of valves, linkages and actuators											
VG1x0yAD	DN15	1.0	0.63	▪	▪	▪	▪	▪	---	▪	▪	▪	▪	▪	---	---
VG1x0yAE		1.6	1.0		▪	▪	▪	▪	---	▪	▪	▪	▪	▪	---	---
VG1x0yAF		2.5	1.6		▪	▪	▪	▪	---	▪	▪	▪	▪	▪	---	---
VG1x0yAG		4.0	2.5		▪	▪	▪	▪	---	▪	▪	▪	▪	▪	---	---
VG1x0yAL		6.3	4.0		▪	▪	▪	▪	---	▪	▪	▪	▪	▪	---	---
VG1x0yAN		10	5.0	---	▪	▪	▪	▪	---	▪	▪	▪	▪	▪	---	---
VG1x0yBG	DN20	4.0	2.5	▪	▪	▪	▪	▪	---	▪	▪	▪	▪	▪	---	---
VG1x0yBL		6.3	4.0		▪	▪	▪	▪	---	▪	▪	▪	▪	▪	---	---
VG1x0yBN		10	5.0	---	▪	▪	▪	▪	---	▪	▪	▪	▪	▪	---	---
VG1x0yCL	DN25	6.3	4.0	▪	▪	▪	▪	▪	---	▪	▪	▪	▪	▪	---	---
VG1x0yCN		10	6.3		▪	▪	▪	▪	---	▪	▪	▪	▪	▪	---	---
VG1x0yCP		16	8.0	---	▪	▪	▪	▪	---	▪	▪	▪	▪	▪	---	---
VG1x0yDN	DN32	10	6.3	▪	---	---	---	---	▪	▪	▪	▪	▪	▪	---	---
VG1x0yDP		16	10.0		---	---	---	---	▪	▪	▪	▪	▪	▪	---	---
VG1x0yDR		25	12.5	---	---	---	---	---	▪	▪	▪	▪	▪	▪	---	---
VG1x0yEP	DN40	16	10	▪	---	---	---	---	▪	▪	▪	▪	▪	▪	---	---
VG1x0yER		25	16		---	---	---	---	▪	▪	▪	▪	▪	▪	---	---
VG1x0yES		40	20	---	---	---	---	---	▪	▪	▪	▪	▪	▪	---	---
VG1x0yFR	DN50	25	16.0	▪	---	---	---	---	▪	▪	▪	▪	---	---	▪	▪
VG1x0yFS		40	25.0		---	---	---	---	▪	▪	▪	▪	---	---	▪	▪
VG1x0yFT		63	31.5	---	---	---	---	---	▪	▪	▪	▪	---	---	▪	▪

Notes

* **x = 2:** 2-way
x = 8: 3-way

y = 1: Plated brass trim
y = 5: Stainless steel trim

** only 3-way valves

For further information and additional models see Product Installation Guide

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DN15...50, PN40

Factory-mounted Assemblies of Valves with ON/OFF Actuators

Spring Return Function	▪							
Supply Voltage	24 VAC				230 VAC			
Torque Nm	6		16		6		16	
Running Time	10 - 40 s		90 - 120 s		10 - 40 s		90 - 120 s	
Spring Return Time Power-off	30 s ±20%		10 s		30 s ±20%		10 s	
Control Signal	ON/OFF							
Switches	---	1 x SPDT	---	2 x SPDT	---	1 x SPDT	---	2 x SPDT
Feedback	---							
Close-off Pressure	1380 kPa							
Actuator Codes	**M9206-BGA-5S**	**M9206-BGB-5S**	**M9216-BGA-1**	**M9216-BGC-1**	**M9206-BDA-5S**	**M9206-BDB-5S**	**M9216-BDA-1**	**M9216-BDC-1**
Linkage Codes	**M9000-520-5**		**M9000-510-5**		**M9000-520-5**		**M9000-510-5**	
Ordering Codes Suffix for Assemblies	**+536BGA** (Spring Opens) **+556BGA** (Spring Closes)	**+536BGB** (Spring Opens) **+556BGB** (Spring Closes)	**+526BGA** (Spring Opens) **+546BGA** (Spring Closes)	**+526BGC** (Spring Opens) **+526BGC** (Spring Closes)	**+536BDA** (Spring Opens) **+556BDA** (Spring Closes)	**+536BDB** (Spring Opens) **+556BDB** (Spring Closes)	**+526BDA** (Spring Opens) **+546BDA** (Spring Closes)	**+526BDC** (Spring Opens) **+546BDC** (Spring Closes)

Valve Codes*	Body Size	Kvs (Control port)	Kvs (Bypass port)**	Disc	Valid combinations of valves, linkages and actuators							
VG1x0yAD	DN15	1.0	0.63	▪	▪	▪	---	---	▪	▪	---	---
VG1x0yAE		1.6	1.0		▪	▪	---	---	▪	▪	---	---
VG1x0yAF		2.5	1.6		▪	▪	---	---	▪	▪	---	---
VG1x0yAG		4.0	2.5		▪	▪	---	---	▪	▪	---	---
VG1x0yAL		6.3	4.0		▪	▪	---	---	▪	▪	---	---
VG1x0yAN		10	5.0	---	▪	▪	---	---	▪	▪	---	---
VG1x0yBG	DN20	4.0	2.5	▪	▪	▪	---	---	▪	▪	---	---
VG1x0yBL		6.3	4.0		▪	▪	---	---	▪	▪	---	---
VG1x0yBN		10	5.0	---	▪	▪	---	---	▪	▪	---	---
VG1x0yCL	DN25	6.3	4.0	▪	▪	▪	---	---	▪	▪	---	---
VG1x0yCN		10	6.3		▪	▪	---	---	▪	▪	---	---
VG1x0yCP		16	8.0	---	▪	▪	---	---	▪	▪	---	---
VG1x0yDN	DN32	10	6.3	▪	▪	▪	---	---	▪	▪	---	---
VG1x0yDP		16	10.0		▪	▪	---	---	▪	▪	---	---
VG1x0yDR		25	12.5	---	▪	▪	---	---	▪	▪	---	---
VG1x0yEP	DN40	16	10	▪	▪	▪	---	---	▪	▪	---	---
VG1x0yER		25	16		▪	▪	---	---	▪	▪	---	---
VG1x0yES		40	20	---	▪	▪	---	---	▪	▪	---	---
VG1x0yFR	DN50	25	16.0	▪	---	---	▪	▪	---	---	▪	▪
VG1x0yFS		40	25.0		---	---	▪	▪	---	---	▪	▪
VG1x0yFT		63	31.5	---	---	---	▪	▪	---	---	▪	▪

Note
* **x = 2:** 2-way
x = 8: 3-way
y = 1: Plated brass trim
y = 5: Stainless steel trim

Note
** **:** only 3-way valves

For further information and additional models see Product Installation Guide

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DN15...50, PN16

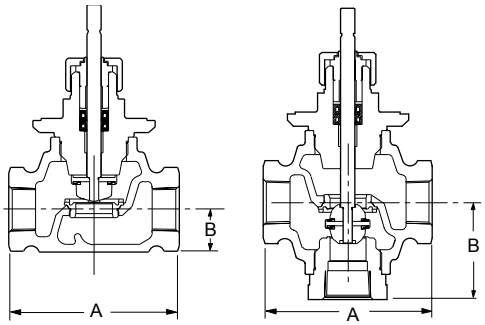
These electrically and pneumatically actuated globe valves are primarily designed to regulate the flow of water and steam in response to the demand of a controller in heating, ventilating and air conditioning systems.

Features

- Cast bronze body
- Kvs 0.25...40
- 2-way PDTO (normally open), 2-way PDTC (normally open), 3-way mixing configurations
- Fluid temperature:
  Brass trim models 2...140 °C,
  Stainless steel trim models 2...170 °C
- BSPP female threaded body connections

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



Dimensions

For further information and additional models see Product Installation Guide

Johnson Controls

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2-way Configuration

			Brass Trim Valves				Stainless Steel Trim Valves		
Body Size	Kvs	Valve stroke (mm)	Ordering Codes	Close-off Pressure kPa			Ordering Codes	Close-off Pressure kPa	
				VA-731x * 150 N	VA-77xx 500 N	VA78xx 1000 N		VA-77xx 500 N	VA78xx 1000 N
2-way PDTC (Normally Open)									
DN15	0.25	8	VG7201AS VG7201AT	1600	1600	---	VG7203AT	1600	1600
	0.4		VG7201BS VG7201BT				VG7203BS VG7203BT		
	0.63		VG7201CS VG7201CT	700			VG7203CT		
	1.0		VG7201DS VG7201DT				VG7203DT		
	1.6		VG7201ES VG7201ET				VG7203ET		
	2.5		VG7201FS VG7201FT	400	1490		VG7203FT	930	
	4.0		VG7201GS VG7201GT				VG7203GT		
DN20	6.3		VG7201LT	250	950		VG7203LT	595	1220
DN25	10	13	VG7201NT	---	595	1235	VG7203NT	370	770
DN32	16		VG7201PT		360	750	VG7203PT	230	470
DN40	25	19	VG7201RT		235	480	VG7203RT	145	300
DN50	40		VG7201ST		145	310	VG7203ST	90	190
2-way PDTO (Normally Closed)									
DN15	0.25	8 mm	VG7401AT	1600	1600	---	VG7403AT	1600	1600
	0.4		VG7401BS VG7401BT				VG7403BT		
	0.63		VG7401CS VG7401CT	700			VG7403CT		
	1.0		VG7401DS VG7401DT				VG7403DT		
	1.6		VG7401ES VG7401ET				VG7403ET		
	2.5		VG7401FS VG7401FT	400	1490		VG7403FT	930	
	4.0		VG7401GS VG7401GT				VG7403GT		
DN20	6.3		VG7401LS VG7401LT	250	950		VG7403LS VG7403LT	595	1220
DN25	10	13 mm	VG7401NT	---	595	1235	VG7403NT	370	770
DN32	16		VG7401PT		360	750	VG7403PT	230	470
DN40	25	19 mm	VG7401RT		235	480	VG7403RT	145	300
DN50	40		VG7401ST		145	310	VG7403ST	90	190

Note

***** : When using VA-7310 series actuators a valve with a slotted stern (VG7xxxxS) is required.
Fluid temperature limit in conjunction with VA-7310 = 120 °C.

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

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3-way mixing configuration

			Brass Trim Valves				Stainless Steel Trim Valves		
				Close-off Pressure kPa				Close-off Pressure kPa	
Body Size	Kvs	Valve Stroke (mm)	Ordering Codes	VA-731x * 150 N	VA-77xx 500 N	VA78xx 1000 N	Ordering Codes	VA-77xx 500 N	VA78xx 1000 N
DN15	0.25	8	VG7802AS VG7802AT	1600	1600	---	VG7804AT	1600	1600
	0.4		VG7802BS VG7802BT				VG7804BT		
	0.63		VG7802CS VG7802CT	700			VG7804CT		
	1.0		VG7802DS VG7802DT				VG7804DT		
	1.6		VG7802ES VG7802ET				VG7804ET		
	2.5		VG7802FS VG7802FT	400	1490		VG7804FT	930	
	4.0		VG7802GS VG7802GT				VG7804GT		
DN20	6.3		VG7802LS VG7802LT	250	950		VG7804LS VG7804LT	595	1220
DN25	10	13	VG7802NT	---	595	1235	VG7804NT	370	770
DN32	16		VG7802PT		360	750	VG7804PT	230	470
DN40	25	19	VG7802RT		235	480	VG7804RT	145	300
DN50	40		VG7802ST		145	310	VG7804ST	90	190

Note

* When using VA-7310 series actuators a valve with a slotted stern (VG7xxxxS) is required.
Fluid temperature limit in conjunction with VA-7310 = 120 °C.

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

VGS800W1N

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DN15...50, PN16

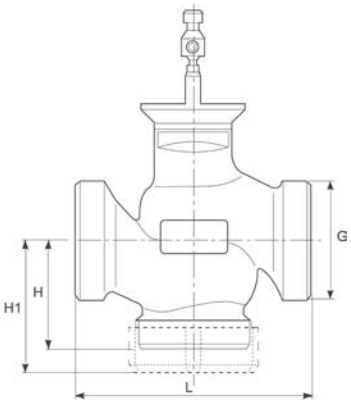
These valves are primarily designed to regulate the flow of water in response to the demand of a controller in zone and terminal unit applications.

Following electric actuators are available:

VA-77xx and VA78xx electric valve actuators.

Features

- Cast bronze body
- Kvs 0.63...40
- 2-way PDTO (normally closed) using 3-way mixing valve with modkit, 3-way mixing configuration
- Fluid temperature 2...130 °C
- BSPP male threaded body connections



Dimensions in mm

Body Size	G	L	H	H1
DN15	1 ⅛	80	55	65
DN20	1 ¼	90	55	65
DN25	1 ½	110	55	66
DN32	2	120	55	67
DN40	2 ¼	130	60	72
DN50	2 ¾	150	65	77

3-way mixing configuration

Ordering Codes	Body Size	Kvs	Nominal Stroke (mm)	Close-off Pressure kPa	
				VA-77x820x 500 N	VA-78xx-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 separetely or factory mounted.
When factory mounted, please add "+M" to the order code for the actuator.

Pipe muffles

Ordering Codes	Muffles
121 4935 151	DN15 / Rp ½
121 4935 201	DN20 / Rp ¾
121 4935 251	DN25 / Rp 1
121 4935 321	DN32 / Rp 1 ¼
121 4935 401	DN40 / Rp 1 ½
121 4935 501	DN50 / Rp 2

Note
3 pipe muffels are needed for the mixing valves

Modkit for transformation of 2-way into 3-way valves

Ordering Codes	Mod kit for:
121 4930 151	DN15 / Rp ½
121 4930 201	DN20 / Rp ¾
121 4930 251	DN25 / Rp 1
121 4930 321	DN32 / Rp 1 ¼
121 4930 401	DN40 / Rp 1 ½
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

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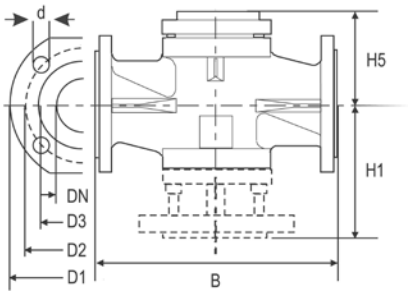
DN15...150, PN25

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 systems.

A variety of electric and pneumatic actuators are available.

Features

- Nodular cast iron body
- Kvs 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

Note
For the dimensions of actuator + valve with cooling fin just replace H5 with Hc in the valve and actuator dimensions table.

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DN15...150, PN25

2-way PDTC (Normally Open) Configuration

Ordering Codes*	Body Size	Kvs	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
VG82A6S1H	DN15	0.4	---	---	---	---	---	2500	2500	2500
VG82A5S1H		0.63								
VG82A4S1H		1.0								
VG82A3S1H		1.6								
VG82A2S1H		2.5								
VG82A1S1H		4.0								
VG82B2S1H	DN20	4.0								2030
VG82B1S1H		6.3								
VG82C2S1H	DN25	6.3								1360
VG82C1S1H		10								
VG82D2S1H	DN32	10								660
VG82D1S1H		16								
VG82E2S1H	DN40	16						1550	2000	370
VG82E1S1H		25								
VG82F1S1H	DN50	40		920		1300	600	750	1020	---
VG82G1S1H	DN65	63		710		1010	450	580	750	
VG82H1S1H	DN80	100		330		480	200	260	370	
VG82J1S1H	DN100	160	180	---	720	290	100	140	210	
VG82K1S1H	DN125	250	100		450	170	---	80	120	
VG82L1S1H	DN150	350	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 kvs 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.

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DN15...150, PN25

3-way Mixing Configuration

Ordering Codes*	Body Size	Kvs	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
VG88A6S1H	DN15	0.4	---	---	---	---	---	2500	2500	2500
VG88A5S1H		0.63								
VG88A4S1H		1.0								
VG88A3S1H		1.6								
VG88A2S1H		2.5								
VG88A1S1H		4.0								
VG88B2S1H	DN20	4.0								2030
VG88B1S1H		6.3								
VG88C2S1H	DN25	6.3								1360
VG88C1S1H		10								
VG88D2S1H	DN32	10								660
VG88D1S1H		16								
VG88E2S1H	DN40	16						1550	2000	370
VG88E1S1H		25								
VG88F1S1H	DN50	40		920		1300	600	750	1020	---
VG88G1S1H	DN65	63		710		1010	450	580	750	
VG88H1S1H	DN80	100		330		480	200	260	370	
VG88J1S1H	DN100	160	180	---	720	290	100	140	210	
VG88K1S1H	DN125	250	100		450	170	---	80	120	
VG88L1S1H	DN150	350	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 kvs 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.

For further information and additional models see Product Installation Guide

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DN15...150, PN25

3-way Diverting Configuration

Ordering Codes*	Body Size	Kvs	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
VG89A6S1H	DN15	0.4	---	---	---	---	---	2500	2500	2500
VG89A5S1H		0.63								
VG89A4S1H		1.0								
VG89A3S1H		1.6								
VG89A2S1H		2.5								
VG89A1S1H		4.0								
VG89B2S1H	DN20	4.0								2030
VG89B1S1H		6.3								
VG89C2S1H	DN25	6.3								1360
VG89C1S1H		10								
VG89D2S1H	DN32	10								660
VG89D1S1H		16								
VG89E2S1H	DN40	16						1550	2000	370
VG89E1S1H		25								
VG89F1S1H	DN50	40		920		1300	600	750	1020	---
VG89G1S1H	DN65	63		710		1010	450	580	750	
VG89H1S1H	DN80	100		330		480	200	260	370	
VG89J1S1H	DN100	160	180	---	720	290	100	140	210	
VG89K1S1H	DN125	250	100		450	170	---	80	120	
VG89L1S1H	DN150	350	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 kvs 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.

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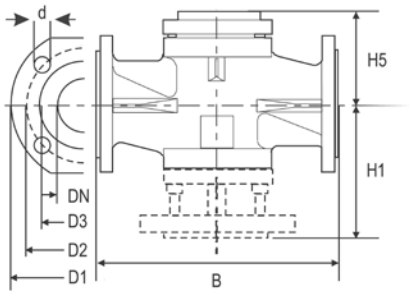
DN15...150, PN16

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 systems.

A variety of electric and pneumatic actuators are available.

Features

- Nodular cast iron body
- Kvs 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

VG8000N - *2/4 pages*

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DN15...150, PN16

2-way PDTC (Normally Open) Configuration

Ordering Codes*	Body Size	Kvs	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
VG82A9S1N	DN15	0.1	---	---	---	---	1600	1600	1600
VG82A8S1N		0.16							
VG82A7S1N		0.25							
VG82A6S1N		0.4							
VG82A5S1N		0.63							
VG82A4S1N		1.0							
VG82A3S1N		1.6							
VG82A2S1N		2.5							
VG82A1S1N		4.0							
VG82B2S1N	DN20	4.0							
VG82B1S1N		6.3							
VG82C2S1N	DN25	6.3							1570
VG82C1S1N		10							
VG82D2S1N	DN32	10							770
VG82D1S1N		16							
VG82E2S1N	DN40	16							440
VG82E1S1N		25							
VG82F1S1N	DN50	40		1030		650	800	1080	---
VG82G1S1N	DN65	63		790		500	630	830	
VG82H1S1N	DN80	100		370		220	380	390	
VG82J1S1N	DN100	160	190	---	740	120	160	230	
VG82K1S1N	DN125	250	110		460	---	90	140	
VG82L1S1N	DN150	350	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 - *3/4 pages*

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DN15...150, PN16

3-way Mixing Configuration

Ordering Codes*	Body Size	Kvs	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
VG88A6S1N	DN15	0.4	---	---	---	---	1600	1600	1600
VG88A5S1N		0.63							
VG88A4S1N		1.0							
VG88A3S1N		1.6							
VG88A2S1N		2.5							
VG88A1S1N		4.0							
VG88B2S1N	DN20	4.0							
VG88B1S1N		6.3							
VG88C2S1N	DN25	6.3							1570
VG88C1S1N		10							
VG88D2S1N	DN32	10							770
VG88D1S1N		16							
VG88E2S1N	DN40	16							440
VG88E1S1N		25							
VG88F1S1N	DN50	40		1030		650	800	1080	---
VG88G1S1N	DN65	63		790		500	630	830	
VG88H1S1N	DN80	100		370		220	380	390	
VG88J1S1N	DN100	160	190	---	740	120	160	230	
VG88K1S1N	DN125	250	110		460	---	90	140	
VG88L1S1N	DN150	350	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 - *4/4 pages*

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DN15...150, PN16

3-way Diverting Configuration

Ordering Codes*	Body Size	Kvs	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
VG89A6S1N	DN15	0.4	---	---	---	---	1600	1600	1600
VG89A5S1N		0.63							
VG89A4S1N		1.0							
VG89A3S1N		1.6							
VG89A2S1N		2.5							
VG89A1S1N		4.0							
VG89B2S1N	DN20	4.0							
VG89B1S1N		6.3							
VG89C2S1N	DN25	6.3							1570
VG89C1S1N		10							
VG89D2S1N	DN32	10							770
VG89D1S1N		16							
VG89E2S1N	DN40	16							440
VG89E1S1N		25							
VG89F1S1N	DN50	40		1030		650	800	1080	---
VG89G1S1N	DN65	63		790		500	630	830	
VG89H1S1N	DN80	100		370		220	380	390	
VG89J1S1N	DN100	160	190	---	740	120	160	230	
VG89K1S1N	DN125	250	110		460	---	90	140	
VG89L1S1N	DN150	350	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.

VG8000V - *1/2 pages*

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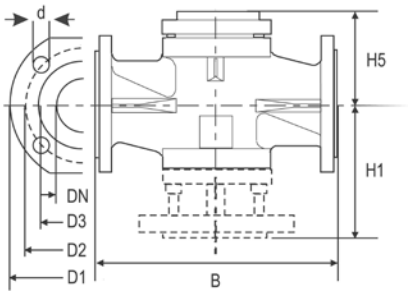
DN15...150, PN16

These electrically and pneumatically operated 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 systems.

A variety of electric and pneumatic actuators are available.

Features

- Nodular cast iron body
- Kvs 2.5....350
- 2-way PDTC (normally open) and 3-way mixing configurations
- Fluid temperature 0...140 °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

VG8000V - *2/2 pages*

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DN15...150, PN16

Ordering Codes*	Body Size	Kvs	Close-off Pressure kPa				
			FA-3300-741x 6000 N	RA-3000-732x 3000 N	VA1x20** 2000N	VA1125** 2500N	VA78xx 1000 N
2-way PDTC (Normally Open)							
VG82A2V1N	DN15	2.5	---	---	1600	1600	1600
VG82A1V1N		4.0					
VG82B1V1N	DN20	6.3					
VG82C1V1N	DN25	10					1570
VG82D1V1N	DN32	16					770
VG82E1V1N	DN40	25					440
VG82F1V1N	DN50	40		1350	800	1080	---
VG82G1V1N	DN65	63		1050	630	830	
VG82H1V1N	DN80	100		500	380	390	
VG82J1V1N	DN100	160	740	310	160	230	
VG82K1V1N	DN125	250	460	190	90	140	
VG82L1V1N	DN150	350	280	110	40	75	
3-way Mixing Configuration							
VG88A2V1N	DN15	2.5	---	---	1600	1600	1600
VG88A1V1N		4.0					
VG88B1V1N	DN20	6.3					
VG88C1V1N	DN25	10					1570
VG88D1V1N	DN32	16					770
VG88E1V1N	DN40	25					440
VG88F1V1N	DN50	40		1350	800	1080	---
VG88G1V1N	DN65	63		1050	630	830	
VG88H1V1N	DN80	100		500	380	390	
VG88J1V1N	DN100	160	740	310	160	230	
VG88K1V1N	DN125	250	460	190	90	140	
VG88L1V1N	DN150	350	280	110	40	75	

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.

VG8300H & N - *1/2 pages*

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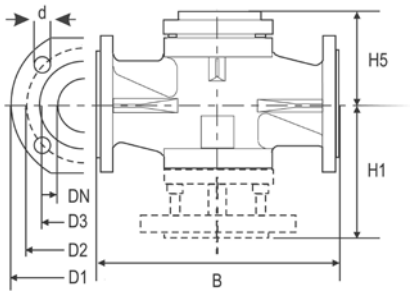
DN40...150, PN16 and PN25

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 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
- Kvs 25...350
- 2-way PDTC (normally open) configuration
- PN16
  Fluid temperature 2...180 °C
  with Glycerin cup -10...180 °C
- PN25
  Fluid temperature 2...200 °C
  with Glycerin cup -20...200 °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

VG8300H & N - *2/2 pages*

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DN40...150, PN16 and PN25

VG8300H, PN25

Ordering Codes*	Body Size	Kvs	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
VG8300H, PN25								
VG83E1S1H	DN40	25	---	2500	2500	---	2500	2500
VG83F1S1H	DN50	40			---	2500		---
VG83G1S1H	DN65	63						
VG83H1S1H	DN80	100						
VG83J1S1H	DN100	160	2500	2000				
VG83K1S1H	DN125	250		1400			1900	
VG83L1S1H	DN150	350		1000			1500	
VG8300N, PN16								
VG83E1S1N	DN40	25	---	1600	1600	---	1600	1600
VG83F1S1N	DN50	40			---	1600		---
VG83G1S1N	DN65	63						
VG83H1S1N	DN80	100						
VG83J1S1N	DN100	160	1600	1500				
VG83K1S1N	DN125	250		1400			1500	
VG83L1S1N	DN150	350		1000			1400	

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.

VG9000 - *1/3 pages*

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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 systems.

Following electric actuators are available:

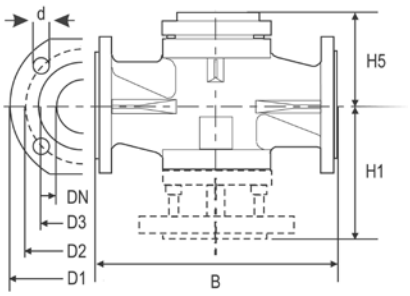
VA-7700 for DN15...50 valves

VA7810 for DN15...65 valves

VA1000 for DN65...100 valves.

Features

- Nodular cast iron body
- Kvs 0.63...160
- 2-way PDTO (normally closed) and 3-way mixing configurations
- Fluid temperature 2...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

VG9000 - *2/3 pages*

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DN15...100, PN6 and PN10

PN6 Series

Ordering Codes*	Body Size	Kvs	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					
VG94C1S1K	DN25	10				590	600
VG94E2S1K	DN32	16				360	
VG94E1S1K	DN40	25				190	480
VG94F1S1K	DN50	40				100	290
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					
VG98C1S1K	DN25	10				490	600
VG98E2S1K	DN32	16				280	
VG98E1S1K	DN40	25				130	440
VG98F1S1K	DN50	40				60	260
VG98G1S1K	DN65	63		470	620	---	130
VG98H1S1K	DN80	100	510	300	400		---
VG98J1S1K	DN100	160	320	180	240		---

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.

VG9000 - *3/3 pages*

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DN15...100, PN6 and PN10

PN10 series

Ordering Codes*	Body Size	Kvs	Close-off Pressure LPa				
			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		

Notes

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

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

CD-W00-00-1

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Transmitter Wall Mount

The CD-W00-00-1 Series Wall Mount CO_2 Sensors feature a Carbon Dioxide (CO_2) transmitter for measuring and transmitting CO_2 levels, ranging from 0 to 2,000 parts per million (ppm), within Heating Ventilating, and Air Conditioning (HVAC) CO_2 applications.

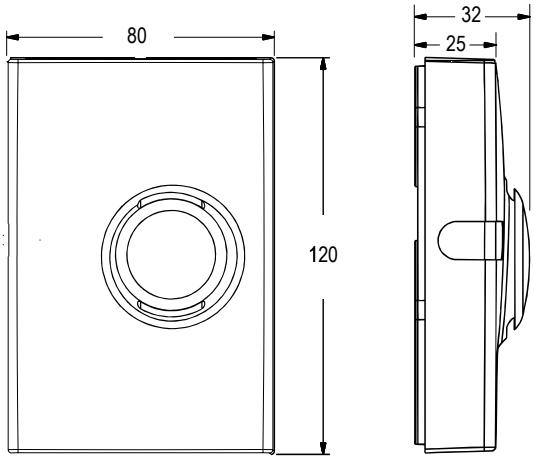
Specific HVAC CO_2 applications include Demand Control Ventilation (DCV), fresh air and indoor Air Quality (IAQ), and rooftop air handling Economizer controls system.

This compact devices produces 0 to10 V (default), 0 to 20 mA and 4 to 20 mA signals.

They are designed to work in stand-alone mode, Connected to Metasys system, as part on any integrated Building Automation System (BAS) and are easy to install and requires no maintenance or field calibration.

Features

- Power supply: 20 to 30 VAC (18 to 30 VDC), Class 2
- Response time (0 to 63%): 1 minute
- Accuracy at 25 °C: ± 50 ppm + 3.0% of reading
- Operating temperature Range: -5 to 45 °C
- Humidity Range: 0 to 85%



Dimensions in mm

Ordering Codes	Description
CD-W00-00-1	Wall Mount CO_2 Transmitter

Accessories

Ordering Codes	Description
ACC-DWCLIP-0	Drywall Spring-Clip Mounting Kit
Y65T31-0	Multiple Primary Transformer, 40 VA, 120/208/240 V Primary, 24 V Class 2 Secondary with Screw Terminals: Foot Mounting or 4 x 4 in. (100 x 100 mm) Plate

CD-Wxx-00-0

Transmitter Wall Mount

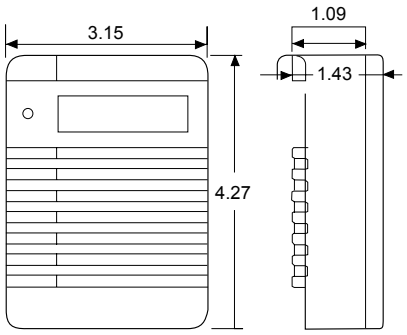
The CD-Wxx-00-0 Series Wall Mount CO_2 sensors feature a Carbon Dioxide (CO_2) transmitter for measuring and transmitting CO_2 levels, ranging from 0 to 2,000 parts per million (ppm), within Heating Ventilating, and Air Conditioning (HVAC) CO_2 applications. Specific HVAC CO_2 applications include Demand Control Ventilation (DCV), fresh air and indoor Air Quality (IAQ), and rooftop air handling Economizer controls system.

This compact devices produces 0 to10 V (default), 0 to 20 mA and 4 to 20 mA signals.

They are designed to work in stand-alone mode, Connected to Metasys system, as part on any integrated Building Automation System (BAS) and are easy to install and requires no maintenance or field calibration field calibration.

Features

- Power supply: 20 to 30 VAC (18 to 30 VDC), Class 2
- Response time (0 to 63%): 1 minute
- Accuracy at 20 °C: ± 30 ppm + 2.0% of reading
- Operating temperature Range: -5 to 45 °C
- Humidity Range: 0 to 85%
- Analog temperature Output: Linear 0 to 10 VDC for 0 to 50 °C
- Relay Output: Maximum 30 V, 0.5A, Class 2



Dimensions in mm

Ordering Codes	Description
CD-WA0-00-0	Transmitter with Analog Temperature Output
CD-WR0-00-0	Transmitter with Relay
CD-WRD-00-0	Transmitter with Relay and Display

Replacement Parts

Ordering Codes	Description
ACC-CD-A	Analog Temperature Module for CD-WA0-00-0 Only
ACC-DWCLIP-0	Drywall Spring-clip Mounting Kit
ACC-CD-DR	Replacement Relay and Display Module for CD-WRD-00-0 Only
ACC-CD-R	Relay Output Module for CD-WR0-00-0

Accessories

Ordering Codes	Description
ACC-CD-S	Relay Setpoint Software Kit; includes software and interface cable to reset the On and Off relay setpoints for CD-WR0-00-0 or CD-WRD-00-0
Y65T31-0	Multiple Primary Transformer, 40 VA, 120/208/230V Primary, 24V Class 2 Secondary with Screw Terminals: Foot Mounting or 101.6 x 101.6 mm Plate

CD-Pxx-00-0

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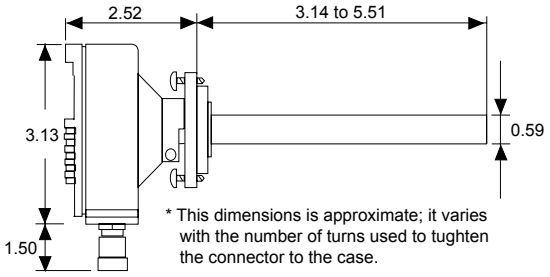
Transmitter Duct Mount

The CD-Pxx-00-0 Series Duct Mount CO2 sensors feature a Carbon Dioxide (CO2) transmitter for measuring and transmitting CO2 levels, ranging from 0 to 2,000 parts per million (ppm), within Heating Ventilating, and Air Conditioning (HVAC) CO2 applications.
Specific HVAC CO2 applications include Demand Control Ventilation (DCV), fresh air and indoor Air Quality (IAQ), and rooftop air handling Economizer controls system.

The device produce 0 to 10 V (default) 0 to 20 mA or 4 to 20 mA signal.



Dimensions in mm

Features

- Power supply: 20 to 30 VAC (18 to 30 VDC), Class 2
- Response time (0 to 63%): 1 minute
- Accuracy at 25 °C: ± 30 ppm + 2.0% of reading
- Operating temperature Range: -5 to 45 °C
- Humidity Range: 0 to 85%

Ordering Codes	Description
CD-P00-00-0	Duct Mount CO_2 Transmitter
CD-PR0-00-0	Duct Mount CO_2 Transmitter with Relay

Replacement Parts

Ordering Codes	Description
ACC-CD-R	Relay Output Module for use in CD-P00-00-0 or CD-PR0-00-0
ACC-CD-CFK1	Conduit Adaptor Kit

Accessories

Ordering Codes	Description
ACC-CD-S	Relay Setpoint Software Kit; includes software and interface cable to reset the On and Off relay setpoints for CD-PR0-00-0
Y65T31-0	Multiple Primary Transformer, 40 VA, 120/208/230V Primary, 24V Class 2 Secondary with Screw Terminals: Foot Mounting or 101.6 x 101.6 mm Plate

HX-9000

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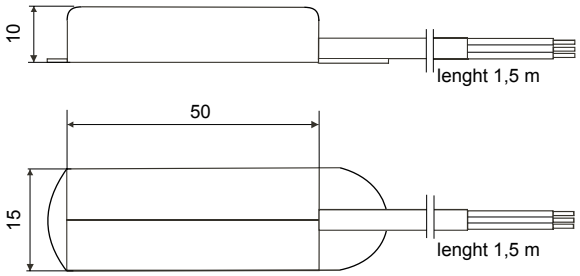
The HX-9100 Dew Sensor is used to prevent condensation on surfaces such as cold water pipes, cool ceilings and windows. The HX-9100 can be connected to Johnson Controls System controllers to provide override functions when condensation is forming.

Features

- Supply voltage: 15 VDC ± 10%
- Action: ON/OFF or 0...10 VDC
- Hysteresis: 1%
- Output: open collector closed: 0.5 VDC max or ≤ + 0.5 VDC
- Protection class: IP44



Dimensions in mm

Ordering Codes	Action	Output at Condensation	Power Supply
HX-9100-8001	ON/OFF	Open collector closed, 0.5 VDC max	15 VDC ±10%
HX-9100-9001	0...10 VDC	≤ +0.5 VDC	

HT-9000

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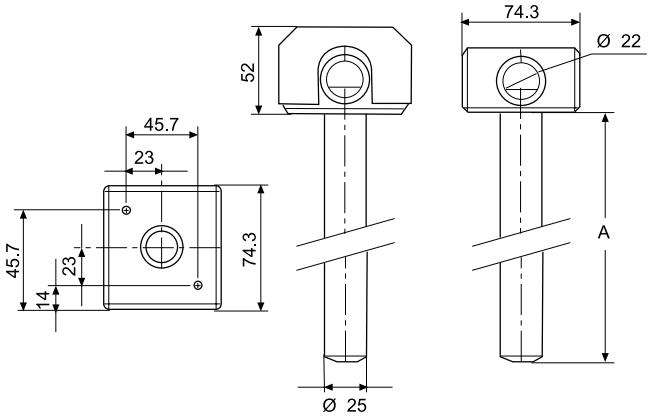
Duct Mount

The HT-9000 Series measures humidity over the entire range of 0 to 100% RH (non condensing) and has a wide operating temperature range. Its fast response, reliable long-term performance makes this transmitter well suited for refrigeration and HVAC installations. This range also includes models with an integrated temperature sensing elements.

Features

- Power Supply 12...30 VDC / 24 VAC
- Humidity Range 0...100% (non condensing)
- Humidity Output 0...10 VDC
- Humidity Accuracy 4% RH from 10 to 90% RH
- Temperature Outputs 0...10 VDC, NTC K2, Pt 100, Pt 1000, A99
- Duct probes lengths 153 mm and 230 mm
- Protection class: IP30

	A
HT-90xx-UD1	153 mm
HT-90xx-UD2	230 mm



Dimensions in mm

Ordering Codes	Humidity Range	Humidity Output	Temperature Range	Temperature Output	Supply Voltage	Probe Lenght (mm)
HT-9000-UD1	0 to 100% RH	0 to 10 VDC	---	---	12 to 30 VDC 24 VAC +15%	153
HT-9001-UD1			0...40 °C	0...10 VDC		
HT-9003-UD1			0...40 °C	NTC K2		
HT-9005-UD1			0...60 °C	Pt100		
HT-9006-UD1			0...60 °C	Pt1000		
HT-9009-UD1			0...60 °C	A99		
HT-9000-UD2			---	---		230
HT-9001-UD2			0...40 °C	0...10 VDC		
HT-9003-UD2			0...40 °C	NTC K2		
HT-9005-UD2			0...60 °C	Pt100		
HT-9006-UD2			0...60 °C	Pt1000		
HT-9009-UD2			0...60 °C	A99		

For further information and additional models see Product Installation Guide

Johnson Controls

HT-9000

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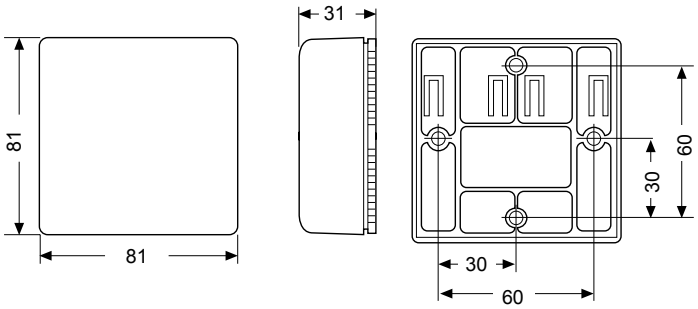
Wall Mount

The HT-9000 Series measures humidity over the entire range of 0 to 100% RH (non condensing) and has a wide operating temperature range. Its fast response, reliable long-term performance makes this transmitter well suited for refrigeration and HVAC installations. This range also includes models with an integrated temperature sensing element.

Features

- Power Supply 12...30 VDC / 24 VAC
- Humidity Range 0...100% (non condensing)
- Humidity Output 0...10 VDC
- Humidity Accuracy 4% RH from 10 to 90% RH
- Temperature Outputs 0...10 VDC, NTC K2, Pt 100, Pt 1000, A99
- Room enclosure 80 x 80 mm
- Protection Class: IP 30



Dimensions in mm

Ordering Codes	Humidity Range	Humidity Output	Temperature Range	Temperature Output	Supply Voltage
HT-9000-URW	0 to 100% RH	0...10 VDC	---	---	12 to 30 VDC 24 VAC ± 15 %
HT-9001-URW			0...40 °C	0...10 VDC	
HT-9003-URW				NTC K2	
HT-9005-URW			0...60 °C	Pt100	
HT-9006-URW				Pt1000	
HT-9009-URW				A99	

For further information and additional models see Product Installation Guide

Johnson Controls

PS-9101

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Differential Pressure

The PS-9101 Differential pressure is designed to measure the difference between two sensed pressures to produce 0...10 V DC proportional output.

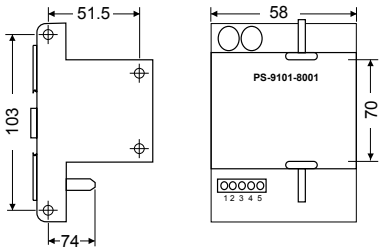
The differential pressure, as sensed by the sensing ports, is applied to both sides of a mass air flow sensor, directed across the surface of the sensing element.

The output voltage varies in proportion to the differential temperature of sensing elements, as a consequence of increasing/decreasing the mass air flow through the inlet and outlet ports caused by sensed differential pressure.

Features

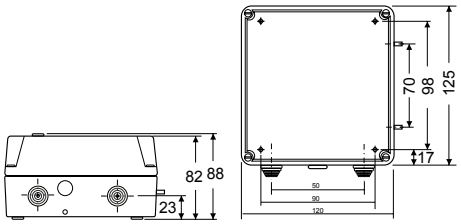
- Model available in 3 differential pressure ranges
- Models for DIN Rail mounting
- Models with splash proof dust tight case
- Fast response (< 50 ms)

PS-9101-800x (IP20)



Dimensions in mm

PS-9101-850x (IP54)



Dimensions in mm

Ordering Codes	Operating Range	Maximum overload pressure	Enclosure	Supply Voltage
PS-9101-8001	0...750 Pa	34.5 kPa	IP20	15 VDC +/- 10% 24 VAC +10%; -15 %
PS-9101-8002	0...330 Pa			
PS-9101-8003	0...130 Pa			
PS-9101-8501	0...750 Pa		IP54	
PS-9101-8502	0...330 Pa			
PS-9101-8503	0...130 Pa			

Accessories (order separately)

Ordering Codes	Description
A-4000-8001	Inline Air Filter (required for all models)
FT-G18A-8001	Romote probe kit
PS-9101-8900	DIN rail mounting kit

PT-5215

Page 75

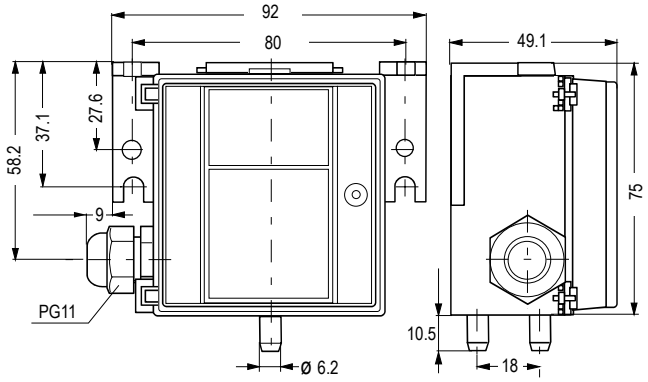
Differential Pressure

The PT-5215 Differential Air Pressure Transmitter measures low differential pressure and converts the measurement into a standard proportional 0...10 V or 4 - 20 mA signal.

The PT-5215 is especially adapted to measure static, velocity and differential pressures.

Features

- Low zero drift/time
- Low sensibility to ambient temperature change
- Low hysteresis
- High accuracy
- Good overrangeability
- Splash proof dust tight case
- Compact enclosure, light weight, simple and quick installation



Dimensions in mm

Ordering Codes	Operating Range	Maximum Overload Pressure	Output Signal	Enclosure	Supply Voltage
PT-5215-7306	-50...+50 Pa	5 kPa	0...10 V	IP54	24 VAC ±15%, 50/60Hz or 13,5...33 VDC, max. 10 mA
PT-5215-7307	-50...+50 Pa		4..20 mA		24 VAC ±15%, 50/60Hz or 11...33 VDC, max. 10 mA
PT-5215-7308	0...100 Pa	10 kPa	0...10 V		24 VAC ±15%, 50/60Hz or 13,5...33 VDC, max. 10 mA
PT-5215-7309	0...250 Pa	5 kPa			
PT-5215-7310	0...2500 Pa	20 kPa			
PT-5215-7311	0...1000 Pa	10 kPa			

For further information and additional models see Product Installation Guide

Johnson Controls

PT-5217

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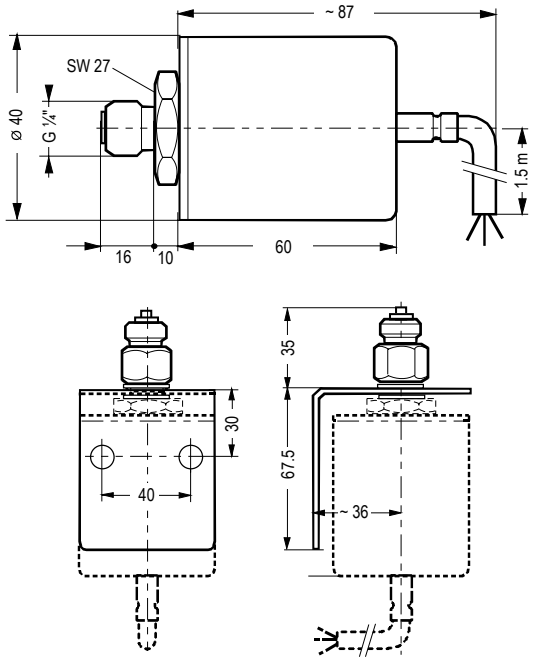
Pressure Transmitter

The PT-5217 Pressure Transmitter accurately measures pressure and converts the measurement into a 0...10 V signal. The PT-5215 is especially adapted to measure air, water and inert gases pressure.

The PT-5217 can also be used in pneumatic control systems to convert pneumatic into electric standard signals.

Features

- Low zero drift/time
- Low sensibility to ambient temperature change
- Low hysteresis
- High accuracy
- Direct mounting, 1,5 m cable included
- Splash proof enclosure



Dimensions in mm

Ordering Codes	Operating Range	Maximum Overload Pressure	Enclosure	Supply Voltage
PT-5217-7011	0...100 kPa	200 kPa	IP65	24 VAC ±15% / -10%, 50/60Hz or 13,5...33 VDC, max. 5 mA
PT-5217-7101	0...1000 kPa	2000 kPa		

Accessories (order separately)

Ordering Codes	Description
EQ-6056-7000	Mounting kit for plastic hose 4 x 6 mm
EQ-0100-7001	Mounting kit for DIN rail

TE-7000

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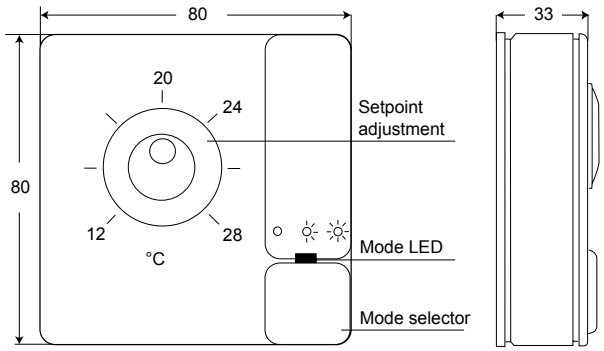
Room Command Module

The TE-7000 Room Command Module is designed for use with the VMA1400 series 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 VMA1400 series VAV Modular Assembly and the air supply system.



Dimensions in mm

Features

- Power supply: Power from VMA1400
- Temperature sensor: NTC K2
- Occupancy Override button
- Protection Class: IP30
- Remote setpoint adjustment

Ordering 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)

Ordering 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 og 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

RS-1100

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Room Command Module

The RS-1100 Room Command Modules are designed for use with Facility Explorer Series or System 91 controllers from Johnson Controls and provides a 0...10 V signal directly proportional to the sensed temperature. Models are available with and without LCD display, room temperature setpoint adjustment dial and temporary occupied override function and fan speed button.

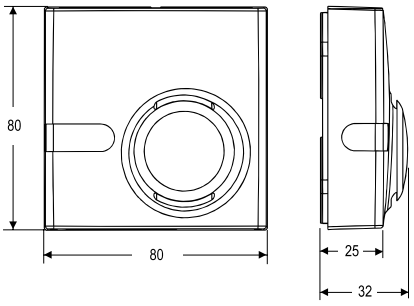
RS-1140

RS-1160 / RS-1190

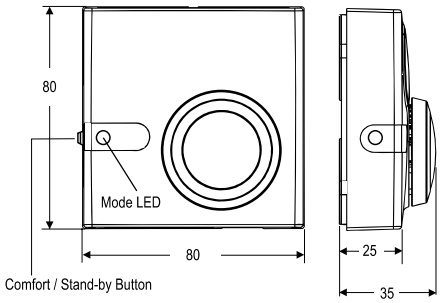
RS-1180

Features

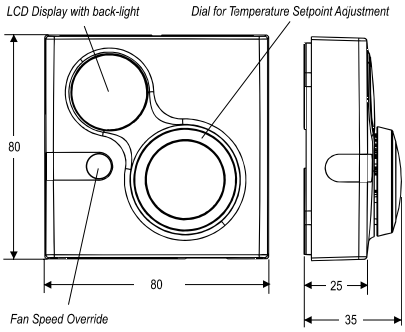
- Power Supply
  15 VDC (all models)
  24 VAC/VDC (only models with display)
- 0...10 VDC temperature output
- Remote temperature setpoint adjustment,
- Occupancy override function, (models with or without display)
- Room enclosures 80 x 80 mm
- Protection Class: IP 30
- Fan speed button



RS-1140-0000
Dimensions in mm



RS-1160-0005
Dimensions in mm



RS-1180-0000
Dimensions in mm

Ordering Codes	Temperature Output	LCD Display	Setpoint Dial Scale	Temporary Occupancy Ovveride Function	Fan speed Selection
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)

Ordering Codes	Description
TM-1100-8931	Plastic surface mounting kit
TM-9100-8900	Special tool for opening enclosure

For further information and additional models see Product Installation Guide

Johnson Controls

TM-1100

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Room Command Module

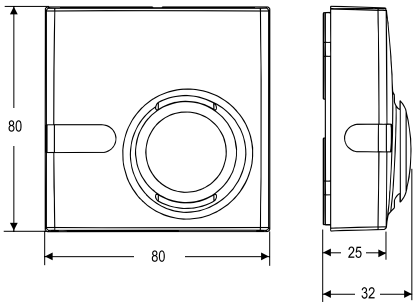
The TM-1100 Series of Room Command Modules are designed for use with the TC-9102, TC-9109 and TCU series of DDC terminal unit controllers. The setpoint dial enables the room occupant to adjust the working set point of the controller within the range of 12...28 °C or -3...+3°, according to the model number.

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.

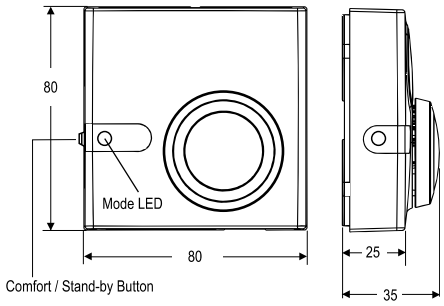
An LED indicator shows the current operating mode. For TC-9102 and TCU Fan Coil Unit controllers, a Room Command Module with a 3-speed fan override is available. Models without a temperature sensing element are provided for application where the temperature sensor is mounted inside the Fan Coil Unit.

Features

- Passive Sensor
- NTC K2 Temperature Output
- Remote Temperature Setpoint adjustment
- 3-speed fan override
- Occupancy override button
- Room enclosures 80 x 80 mm
- IP 30



TM-1140-0000
Dimensions in mm



TM-1160-0007 and TM-1170-0007
Dimensions in mm

Ordering 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		12-28°C		
TM-1160-0005		+/-		
TM-1160-0002		12-28°C	3-Speed Fan Override	
TM-1160-0007		+/-		
TM-1170-0005	Without		---	
TM-1170-0007			3-Speed Fan Override	
TM-1190-0000	NTC K2	12-28°C	---	---
TM-1190-0005		+/-		

Accessories (order separately)

Ordering 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

TM-2100

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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...28 °C or -3...+3°, according to the model number.

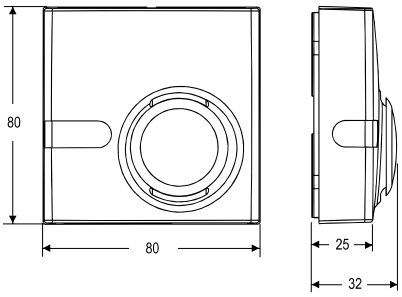
The occupancy button enables the occupant to switch the mode of operation of the controller between COMFORT and STANDBY or to request a temporary COMFORT mode during NIGHT operation.

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

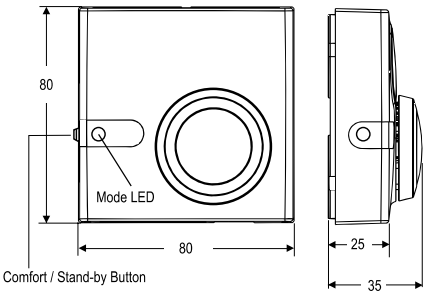
TM-2100 Series Room Control Module

Features

- Passive Sensor
- NTC 10K Temperature Output
- Remote Temperature Setpoint adjustment
- 3-speed fan override
- Occupancy override button
- Room enclosures 80 x 80 mm
- IP 30



TM-2140-0000
Dimensions in mm



TM-2160-0007 and TM-2170-0007
Dimensions in mm

Ordering Codes	Built-in Sensing Element	Temperature Setpoint Dial Scale	Fan Speed Override	Occupancy Button
TM-2140-0000	NTC 10K	---	---	---
TM-2150-0000				▪
TM-2160-0000		12-28 °C		
TM-2160-0005		+/-		
TM-2160-0002		12-28 °C	3-Speed Fan Override	
TM-2160-0007		+/-	3-Speed Fan Override	
TM-2190-0000		12-28 °C	---	---
TM-2190-0005		+/-		

Accessories (order separately)

Ordering 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

TS-9100 TE-9100 - *1/4 pages*

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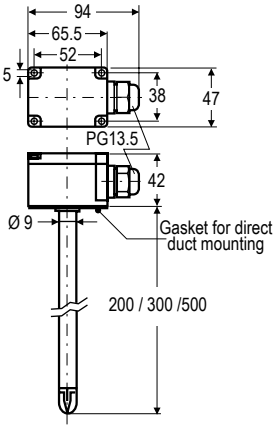
Plant Sensor

The TS-9100/TE-9100 series temperature sensors and transducers provide a passive or active signal that corresponds with the air or water temperature in heating, ventilating and air conditioning applications.

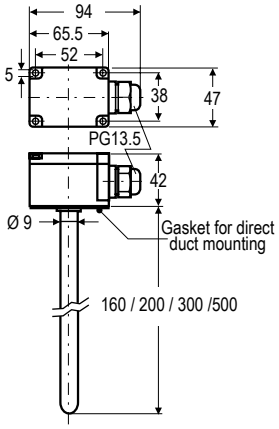
They provide either a 0...10 VDC signal directly proportional to the sensed temperature, or a passive resistive NTC, Pt1000 or Pt100 signal.

Features

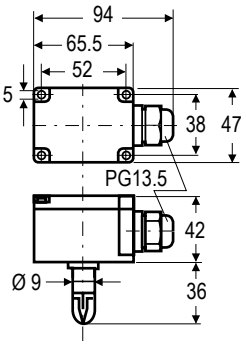
- Wide range of enclosures and signal outputs
- For immersion applications, well can be mounted before rod sensor is mounted
- Various lengths of tubes and wells for duct and immersion applications
- IP 54 enclosure



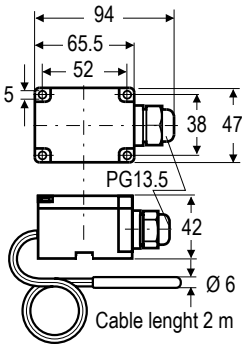
Rod fast response sensor



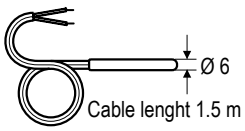
Rod sensor



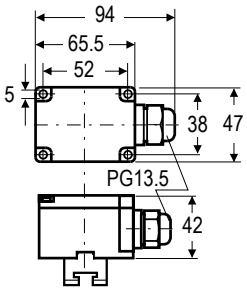
Ceiling sensor TS-910x-870x



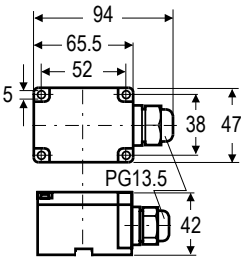
Remote sensor TS-9101-810x



Cable sensor TE-910x-850x



Strap-on sensor TS-910x-860x



Outdoor Sensor TS-910x-840x

For further information and additional models see Product Installation Guide

Johnson Controls

TS-9100 TE-9100 - *2/4 pages*

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Plant Sensor

Ordering Codes	Output Signal	Sensor Type	Rod Length in mm	Temperature Range
TS-9101-8101	0...10 V	Remote element	---	-40...50 °C
TS-9101-8103				0...40 °C
TS-9101-8104				0...100 °C
TS-9101-8212		Rod *	160	-20...40 °C
TS-9101-8213				0...40 °C
TS-9101-8214				0...100 °C
TS-9101-8222			200	-20...40 °C
TS-9101-8223				0...40 °C
TS-9101-8224				0...100 °C
TS-9101-8225				0...150 °C
TS-9101-8226				20...120 °C
TS-9101-8227				50...150 °C
TS-9101-8232			300	-20...40 °C
TS-9101-8233				0...40 °C
TS-9101-8234				0...100 °C
TS-9101-8235				0...150 °C
TS-9101-8252			500	-20...40 °C
TS-9101-8253				0...40 °C
TS-9101-8254				0...100 °C
TS-9101-8312		Rod fast response	160	-20...40 °C
TS-9101-8313				0...40 °C
TS-9101-8314				0...100 °C
TS-9101-8322			200	-20...40 °C
TS-9101-8323				0...40 °C
TS-9101-8324				0...100 °C
TS-9101-8325				0...150 °C
TS-9101-8326				20...120 °C
TS-9101-8327				50...150 °C
TS-9101-8332			300	-20...40 °C
TS-9101-8333				0...40 °C
TS-9101-8334				0...100 °C
TS-9101-8335				0...150 °C
TS-9101-8352			500	-20...40 °C
TS-9101-8353				0...40 °C
TS-9101-8354				0...100 °C
TS-9101-8401		Outdoor	---	-40...50 °C
TS-9101-8402				-20...40 °C
TS-9101-8602		Strap-on		-20...40 °C
TS-9101-8604				0...100 °C
TS-9101-8703		Ceiling		0...40 C°

For further information and additional models see Product Installation Guide

TS-9100 TE-9100 - *3/4 pages*

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Plant Sensor

Ordering Codes	Output Signal	Sensor Type	Rod Length in mm	Temperature Range
TE-9100-8501	NTC K2	**Cable Sensor**		-20...40 °C
TS-9103-8210		Rod *	160	0...40 °C
TS-9103-8220			200	
TS-9103-8230			300	
TS-9103-8250			500	
TS-9103-8310		Rod fast response	160	
TS-9103-8320			200	
TS-9103-8330			300	
TS-9103-8350			500	
TS-9103-8400		Outdoor	---	
TS-9103-8600		Strap-on	---	
TS-9103-8700		Ceiling	---	
TE-9100-8502	NTC K10	**Cable Sensor**		-20...40 °C
TS-9104-8210		Rod *	160	0...120 °C
TS-9104-8220			200	
TS-9104-8230			300	
TS-9104-8250			500	
TS-9104-8310		Rod fast response	160	
TS-9104-8320			200	
TS-9104-8330			300	
TS-9104-8350			500	
TS-9104-8400		Outdoor	---	
TS-9104-8600		Strap-on	---	
TS-9104-8700		Ceiling	---	
TS-9105-8220	Pt100	Rod *	200	-20...150 °C
TS-9105-8230			300	
TS-9105-8250			500	
TS-9105-8400		Outdoor		-40...50 °C
TS-9105-8600		Strap-on		-20...100 °C
TS-9105-8700		Ceiling		0...40 °C
TS-9106-8210	Pt1000	Rod *	160	-20...150 °C
TS-9106-8220			200	
TS-9106-8230			300	
TS-9106-8250			500	
TS-9106-8310		Rod fast response	160	
TS-9106-8320			200	
TS-9106-8330			300	
TS-9106-8350			500	
TS-9106-8400		Outdoor	---	-40...50 °C
TS-9106-8600		Strap-on	---	-20...100 °C
TS-9106-8700		Ceiling	---	0...40 °C

Note

***** Rod sensor can either be for: - Duct applications (alone)
- Immersions applications (with well)

TS-9100 TE-9100 - *4/4 pages*

Plant Sensor

Accessories (order separately)

Ordering Codes	Description
TS-9100-8950	Duct mounting flange

Ordering Codes	Description	Material	Thread	Lenght (mm)	External Diam. (mm)
TS-9100-8905	Immersion well	Copper	R1/2"	50	9
TS-9100-8901				120	12
TS-9100-8907				150	
TS-9100-8902				200	
TS-9100-8903				260	
TS-9100-8925		Stainless steel		50	9
TS-9100-8921				120	12
TS-9100-8927				150	
TS-9100-8922				200	
TS-9100-8923				260	
TS-9100-8915		Stainless steel	G1/2"	50	9
TS-9100-8911				120	12
TS-9100-8917				150	
TS-9100-8912				200	
TS-9100-8913				260	

WRS Many-to-One and TE-7800 One-to-One

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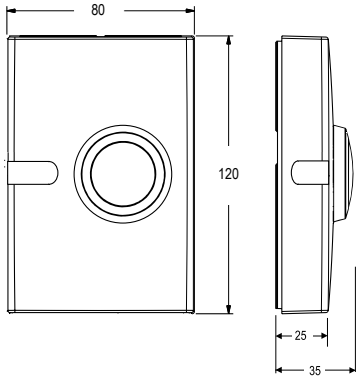
Wireless Sensors

The WRS Many-to-One and TE-7800 One-to-One Wireless Room Temperature Sensing System are designed to gather temperature and zone data from multiple wireless room temperature sensors, and distribute that data to multiple field controllers on a Metasys® network.

A Many-to-One WRS system consists of multiple WRS-TTx Series Wireless Room Temperature Sensors communicating with one or more WRS-RTN Series Receivers. The receivers collect wireless temperature, zone, and battery-condition data messages and route that data over Ethernet to a Network Automation Engine (NAE) or a Network Control Engine (NCE). The NAE or NCE distributes the temperature and zone data to supported BACnet®, N2, and LonWorks® controllers on Metasys networks

A simple One-to-One wireless sensing system consists of one WRS-TTx Series Wireless Room Temperature Sensor communicating single-zone temperature data to an associated TE-7800 Series Receiver. Up to four sensors can report to a single receiver to provide enhanced zone control.



Dimensions in mm

Features

- Power supply: 24 VAC
- RF band: 2.4 GHZ ISM Bands
- Transmission Range: 114 m Max Indoor Line-of-Sight
  50 m Practical Average Indoor
- Transmissions: every 60 seconds
- Ambient operating Temperature: 0 to 50 °C
- Ambient operating Humidity: 0 to 95% RH

Ordering Codes	Description	Transmission Power
TE-7820-1	Receiver with Zone Bus Interface for One-to-One Wireless Room Temperature Sensing System, Interfaces with VMA1400 Series Controllers (Only). Includes 1.8 m Zone Bus Interface Cable and Omnidirectional Antenna	10 dBm (CE Mark)
TE-7830-1	Receiver with Analog Interface for One-to-One Wireless Room Temperature Sensing System, Interfaces with Specified Analog Digital Controllers (Johnson Controls AS-AHU, AS-UNT, AS-VAV, DX-9100, or FXxx Series Controllers). Includes 1.8 m Analog Interface Cable and Omnidirectional Antenna.	10 dBm (CE Mark)
WRS-RTN0000-1	Receiver for Many-to-One Wireless Room Temperature Sensing System, Includes Omnidirectional Antenna	10 dBm (CE Mark)
WRS-TTP0000-1	Wireless Room Temperature Sensor, Warmer/Cooler (+/-) Set Point Adjustment	10 dBm (CE Mark)
WRS-TTR0000-1	Wireless Room Temperature Sensor, No Set Point Adjustment	10 dBm (CE Mark)
WRS-TTS0000-1	Wireless Room Temperature Sensor, Set Point Adjustment Scale: 13 to 29°C	10 dBm (CE Mark)

TC-8900 & PM-8900 - *1/2 pages*

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Room Thermostat

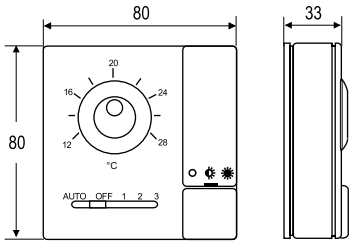
TC-8900 is a family of analogue controllers designed for control of fan coils with 2-pipe, 2-pipe with change-over, 2-pipe with electrical coil or 4-pipe configurations.

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 withoput 3-speed fan override
- 80 x 80 mm room enclosures
- Temperature dial ranges 12...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-890x Stand Alone Controllers

Ordering Codes	Built-in NTC K10 Sensing Element	Setpoint Range	Input	Fan Output	Outputs			
			0...10 V		PAT	0...10 V	DAT	On/Off
TC-8903-1131-WK	▪	12...28 °C	---	---	1	---	---	---
TC-8901-2131-WK					---	2	---	---
TC-8904-2131-WK					---	---	2	---
TC-8906-2131-WK					---	---	---	2
TC-8903-1132-WK	---				1	---	---	---
TC-8901-2132-WK					---	2	---	---
TC-8904-2132-WK					---	---	2	---
TC-8906-2132-WK					---	---	---	2
TC-8903-1151-WK	▪	0...40 °C			1	---	---	---
TC-8903-1152-WK	---				1	---	---	---
TC-8903-1183-WK		0...100%	▪		1	---	---	---
TC-8901-2183-WK					---	2	---	---

TC-8900 & PM-8900 - *2/2 pages*

Room Thermostat

TC-893x Local Controllers with ES-8930-3031-WK remote setpoint module

Ordering 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...28 °C		---	---	---	---

TC-894x Local Controllers with ES-8940 central setpoint module

Ordering 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...28 °C		---	---	---	---

TC-894x Local Controllers with ES-8940 central setpoint module

Ordering Codes	Built-in NTC K10 Sensing Element	Setpoint Range	Fan Output	Outputs	Power module Ordering Codes	Configuration
TC-8902-1031-WK	▪	12...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	---			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...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	
TC-8947-2041-WK (only in connection with ES-8940-4130-WK)				2 x Relay 3A 230 V/24 V	PM-8907-0300	

For further information and additional models see Product Installation Guide

Johnson Controls

TEC2000 - *1/3 pages*

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Room Thermostat

The TEC2000 Series Thermostat is a networked small equipment controller providing N2, BACnet® MS/TP and LonWorks® communicating options. It offers equipment control from a single product: thermostat, controller and temperature sensor.

The TEC Series staged controllers can be used with rooftop units (with and without economizers), heat pumps and single- and multi-stage heating/cooling equipment.

The TEC2x45, TEC2xx6 and TEC2xx7 Series controllers are available for commercial and hospitality applications, including cabinet unit heaters, perimeter heating/cooling, zoning and fan coil units.

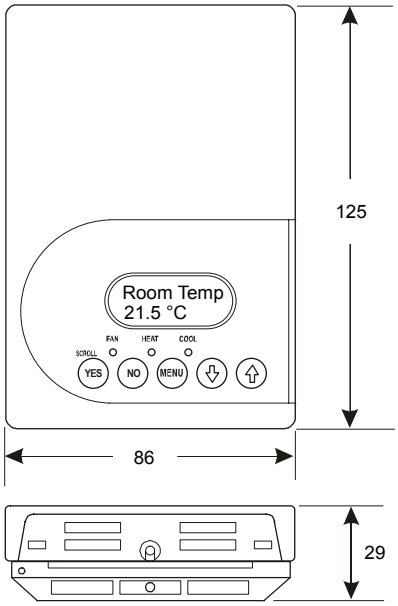
They provide control of various two- and four-pipe fan coil equipment, have options for one- to three-speeds of fan control and offer additional application flexibility by providing advanced control signals – proportional 0 to 10 VDC, ON/OFF, or Floating.

All TEC2000 models have two configurable binary inputs for advanced functions and features over

20 configurable parameters, which enable the thermostat to be customized for any application.

The thermostats features a two-line, eight-character backlit LCD display with status texts in English.

Models with display texts in other languages are available on special requests. For easy programming and commissioning, all controllers are pre-programmed and may be configured directly using the local display and keyboard eliminating the need for separate tools.



Dimensions in mm

For further information and additional models see Product Installation Guide

Johnson Controls

TEC2000 - *2/3 pages*

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Room Thermostat

Ordering Codes	Control	Fan Control	Model Type	Application
for BACnet® MS/TP Communication				
TEC2645-2	1 Output 0...10 VDC	1 Speed	Commercial	Commercial two-pipe equipment, cabinet unit heaters, and perimeter heating/cooling
TEC2616-2	2 Outputs ON/OFF	1, 2 or 3 Speed	Commercial	Two or four-pipe fan coil equipment
TEC2626-2	2 Outputs ON/OFF or Floating			
TEC2646-2	2 Outputs 0...10 VDC			
TEC2616H-2	2 Outputs ON/OFF		Hospitality	
TEC2626H-2	2 Outputs ON/OFF or Floating			
TEC2646H-2	2 Outputs 0...10 VDC			
TEC2627-2	2 Outputs ON/OFF or Floating	---	Commercial Non programmable	Two or four-pipe equipment, hydronic reheat valve control, and pressure dependent VAV with or without local reheat
TEC2647-2	2 Outputs 0...10 VDC			
TEC2601-2	Single Stage	On, Off or Auto		Fan coil unit, unit heaters, and single-stage packaged heating/cooling equipment
TEC2602-2	Heat Pump			Heat pump with up to 3 heating/2 cooling stages
TEC2603-2	Multi Stage			Multi-staged packaged heating/cooling stages
TEC2604-2	Economizer			Packaged rooftop units with economizers
for N2 Open Communication				
TEC2145-2	1 Output 0...10 VDC	1 Speed	Commercial	Commercial two-pipe equipment, cabinet unit heaters, and perimeter heating/cooling
TEC2116-2	2 Outputs ON/OFF	1, 2 or 3 Speed	Commercial	Two or four-pipe fan coil equipment
TEC2126-2	2 Outputs ON/OFF or Floating			
TEC2146-2	2 Outputs 0...10 VDC			
TEC2116H-2	2 Outputs ON/OFF		Hospitality	
TEC2126H-2	2 Outputs ON/OFF or Floating			
TEC2146H-2	2 Outputs 0...10 VDC			
TEC2127-2	2 Outputs ON/OFF or Floating	---	Commercial Non programmable	Two or four-pipe equipment, hydronic reheat valve control, and pressure dependent VAV with or without local reheat
TEC2147-2	2 Outputs 0...10 VDC			
TEC2101-3	Single Stage	On, Off or Auto		Fan coil unit, unit heaters, and single-stage packaged heating/cooling equipment
TEC2102-3	Heat Pump			Heat pump with up to 3 heating/2 cooling stages
TEC2103-3	Multi Stage			Multi-staged packaged heating/cooling stages
TEC2104-3	Economizer			Packaged rooftop units with economizers

For further information and additional models see Product Installation Guide

Johnson Controls

TEC2000 - *3/3 pages*

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Room Thermostat

for LonWorks® Communication

Ordering Codes	Control	Fan Control	Model Type	Application
TEC2245-2	1 Output 0...10 VDC	1 Speed	Commercial	Commercial two-pipe equipment, cabinet unit heaters, and perimeter heating/cooling
TEC2216-2	2 Outputs ON/OFF	1, 2 or 3 Speed	Commercial	Two or four-pipe fan coil equipment
TEC2226-2	2 Outputs ON/OFF or Floating			
TEC2246-2	2 Outputs 0...10 VDC			
TEC2216H-2	2 Outputs ON/OFF		Hospitality	
TEC2226H-2	2 Outputs ON/OFF or Floating			
TEC2246H-2	2 Outputs 0...10 VDC			
TEC2227-2	2 Outputs ON/OFF or Floating	---	Commercial Non programmable	Two or four-pipe equipment, hydronic reheat valve control, and pressure dependent VAV with or without local reheat
TEC2247-2	2 Outputs 0...10 VDC			
TEC2201-3	Single Stage	On, Off or Auto		Fan coil unit, unit heaters, and single-stage packaged heating/cooling equipment
TEC2202-3	Heat Pump			Heat pump with up to 3 heating/2 cooling stages
TEC2203-3	Multi Stage			Multi-staged packaged heating/cooling stages
TEC2204-3	Economizer			Packaged rooftop units with economizers
TEC2261-3	Single Stage	---	Commercial LonWorks Programmable	Fan coil unit, unit heaters, and single-stage packaged heating/cooling equipment
TEC2262-3	Heat Pump			Heat pump with up to 3 heating/2 cooling stages
TEC2263-3	Multi Stage			Multi-staged packaged heating/cooling stages
TEC2264-3	Economizer			Packaged rooftop units with economizers

Accessories

Ordering Codes	Description
SEN-600-1	Remote NTC K10 Room Temperature Sensor in TEC2000 Style
SEN-600-4	Remote NTC K10 Room Temperature Sensor with Occupancy Override in TEC2000 Style

EP-1000

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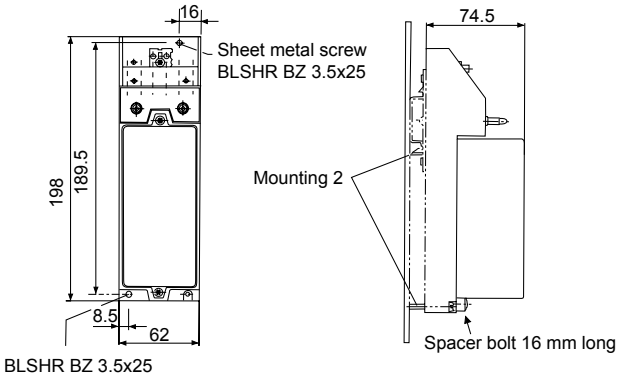
These service and data information sheets (in brief SDI) are operating instructions for the safe installation and operation of the EP-1110-700x (EP-1110) Electro-Pneumatic Transformer. Should difficulties occur during installation which, cannot be solved with the help of this SDI please ask your supplier for further information.

These SDI are in accordance with the relevant EN safety standards, regulations and control boards of the Federal Republic of Germany.
When operating the valve-actuator outside the Federal Republic of Germany, it is the responsibility of the control system administrator or operator to ensure that valid national control standards are met. The manufacturer maintains all rights for technical changes and improvements at any time. Usage of this SDI assumes adequate qualifications (see "Qualified Personnel" below) Operators are to receive instructions in accordance with this SDI.



Dimensions in mm

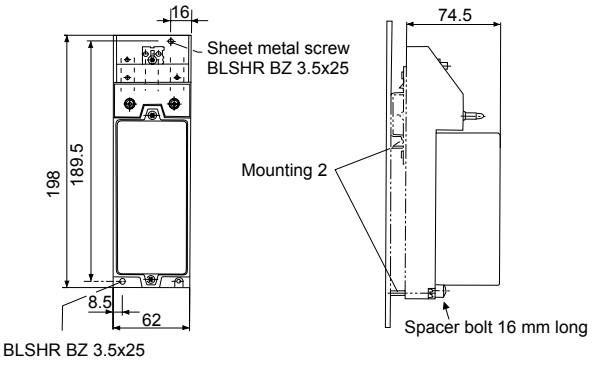
Ordering Codes	Input	Output
EP-1110-7001	0...10 V (DC), Ri ≥ 1 kΩ, current through coil approx. 10 mA	20-100 kPa, linearly proportional to input
EP-1110-7002	2...10 V (DC), 0...10 V (DC), Ri ≥ 1 kΩ, current through coil approx. 10 mA	20-100 kPa, 3...100 kPa, linearly proportional to input
EP-1110-7003	0...20 mA (DC), Ri ≤ 450 Ω, current through coil approx. 10 mA	20-100 kPa, linearly proportional to input
EP-1110-7004	4...20 V (DC), 0...20 mA (DC), Ri ≤ 450 Ω, current through coil approx. 10 mA	20-100 kPa, 3...100 kPa, linearly proportional to input

EP-2000

Page 92

These service and data information sheets (in brief SDI) are operating instructions for the safe installation and operation of the EP-2000-70xx (EP-2000) Electro-Pneumatic transducer. Should difficulties occur during installation which, cannot be solved with the help of this SDI please ask your supplier for further information.

These SDI are in accordance with the relevant EN safety standards, regulations and control boards of the EU. When operating the valve-actuator outside the Federal Republic of Germany, it is the responsibility of the control system administrator or operator to ensure that valid national control standards are met. The manufacturer maintains all rights for technical changes and improvements at any time. Usage of this SDI assumes adequate qualifications (see "Qualified Personnel" below) Operators are to receive instructions in accordance with this SDI.



Dimensions in mm

Ordering Codes	Limit switch and 2 k Ω feedback potentiometer	Accessories	Voltage Supply (50/60 Hz)
EP-2000-7001	120 seconds	None	230 V
EP-2000-7004			24 V
EP-2000-7011		135 Ω potentiometer	230 V
EP-2000-7014			24 V
EP-2000-7021		2 kΩ potentiometer	230 V
EP-2000-7024			24 V
EP-2001-7001	60 seconds*	None	230 V
EP-2001-7004			24 V
EP-2001-7011		135 Ω potentiometer	230 V
EP-2001-7014			24 V
EP-2001-7021		2 kΩ potentiometer	230 V
EP-2001-7024			24 V
EP-2002-7001	30 seconds*	None	230 V
EP-2002-7004			24 V
EP-2002-7011		135 Ω potentiometer	230 V
EP-2002-7014			24 V
EP-2002-7021		2 kΩ potentiometer	230 V
EP-2002-7024			24 V

Note
* Option upon request

EP-8000

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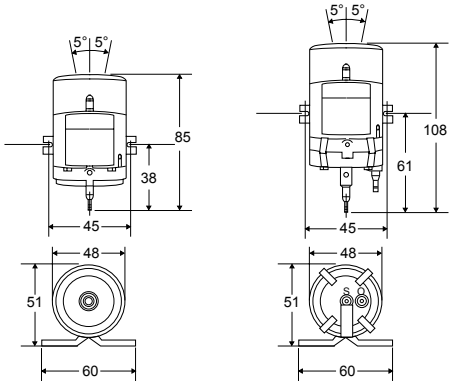
EP-8000 Series Electro-Pneumatic Transducers convert a voltage or current signal from an electronic controller into a pneumatic output pressure signal. An increase or decrease in the input signal proportionally increases or decreases (respectively) the output pressure signal from the EP-8000.

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 ¼ 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).



Dimensions in mm

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

Ordering 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

Ordering 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 (from Milwaukee)
G-2010 Series	0 to 210 kPa (0 to 30 psig) Gauge (from Milwaukee)

FX03 - *1/2 pages*

Page 94

Configurable Terminal Unit Controller

The FX03 is a Configurable Terminal Unit Controller in the Facility Explorer range of products.

The controller is designed specifically to provide direct digital control of terminal unit applications with heating and/or cooling coils, an electric heater and a 3-speed or variable speed fan.

These applications include close control units, fan coil units, unit ventilators and chilling or heating ceiling beam installations.

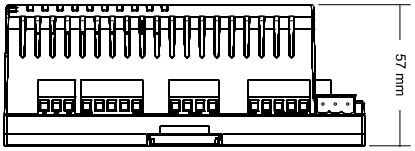
The device can be configured by the installer, without the need of a PC and software tool, using a set of on-board dip-switches.

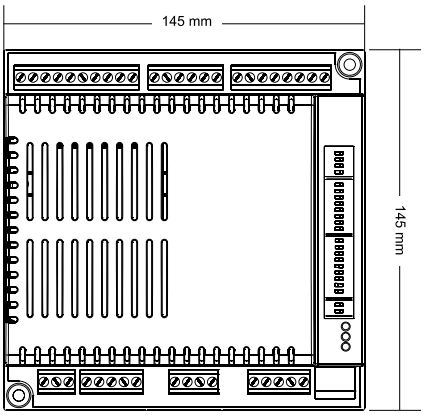
The controller is designed for field installation in a panel or enclosure or for mounting by original equipment manufacturers (OEMs) on DIN-rail or directly on a surface.

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 with other devices on the network.





Dimensions in mm

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 FX Tools

Ordering Codes	Description
LP-FX03A01-000C	230 VAC N2 / BACnet Terminal Unit Controller, No Cover
LP-FX03A11-000C	230 VAC N2 / BACnet Terminal Unit Controller

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Configurable Terminal Unit Controller

Ordering Codes	Description
Room Sensor Modules 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
Room Sensor Modules 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
Room Sensor Modules 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
Accessories	
LP-KIT003-010C	Remote Temperature Sensor, NTC 50k Ω, Bulb, 80 cm leads
LP-KIT003-011C	Remote Temperature Sensor, NTC 50k Ω, Wall Mount, Decorative box
LP-KIT003-012C	Remote Temperature Sensor, NTC 50k Ω, Duct Mount
LP-KIT003-013C	Remote Temperature Sensor, NTC 50k Ω, Wall Mount, Decorative box
HX-9100-8001	Condensation (Dew Point) sensor
TE-9100-8502	Remote Temperature Sensor, NTC 10k Ω, Bulb, 150 cm leads
TS-9104-8700	Remote Temperature Sensor, NTC 10k Ω, Ceiling

LP-RSM003-000C

RS Series

LP-RSM003-003C and LP-RSM003-004C

LP-RSM003-001C

TM Series

For further information and additional models see Product Installation Guide

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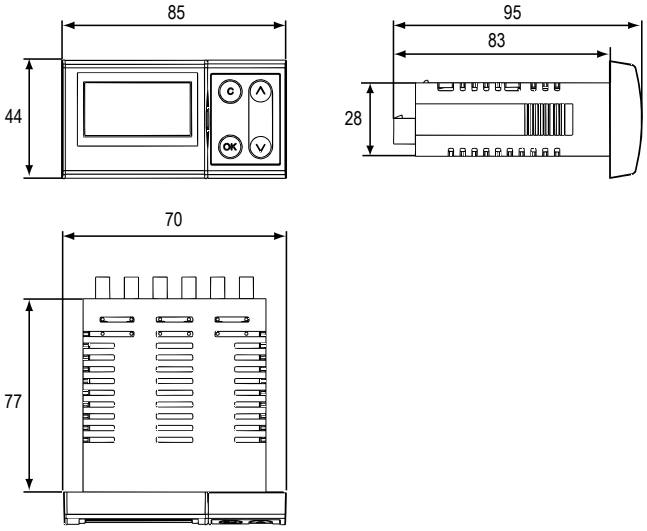
Field Controller

The FX06 is a Compact Field Controller in the Facility Explorer range of products. The controller is designed specifically for commercial Heating, Ventilating, and Air Conditioning (HVAC) and Refrigeration applications.
The FX06 is a high performance controller with a powerful 16-bit microprocessor and state-of-the-art software for the precise control of many types of mechanical and electrical equipment. The FX06 controller has 17 physical inputs and outputs and supports a wide range of temperature sensors and actuating devices. Active sensors for the measurement of humidity, pressure, and other variables are also supported. The FX06 has a state-of-the-art LCD display including a set of graphic status icons used in the most common HVAC/R applications. The FX06 controller is available with plug-in communication modules to enable the controller to be integrated into an N2 Open or LonWorks® compatible building automation system. In addition the FX06 field controller also features communications services to transmit event notification messages via Short Messaging Service (SMS). The FX06 field controller is fully configurable or programmable, using the FX Tools software package, for a wide range of commercial HVACR applications.



Dimensions in mm

Features

- Modular Network communication options
- On-Board Real Time Clock
- Freely programmable or configurable using FX Tools software package
- Resistance Temperature Dependent (RTD - PT1000 and A99), Negative Temperature Coefficient (NTC 10K) or Active Temperature Sensor Inputs
- Integral Liquid Crystal Display (LCD) User Interface with Control Buttons and Graphic Icons
- Models with Various Output Configurations of Solid-State Triacs and Relay Contacts

Ordering Codes	Description
LP-FX06P00-000C	4 AIs, 5 BIs, 2 AOs (0-10V), 6 BOs Relays, no Communication Module
LP-FX06P01-000C	4 AIs, 5 BIs, 2 AOs (0-10V), 6 BOs Relays, N2 Open module, 1 cable set
LP-FX06P02-000C	4 AIs, 5 BIs, 2 AOs (0-10V), 6 BOs Relays, LonWorks® module, 1 cable set
LP-FX06P03-000C	4 AIs, 5 BIs, 2 AOs (0-10V), 6 BOs Relays, RS-232 module, 1 cable set
LP-FX06P10-000C	4 AIs, 5 BIs, 2 AOs (1 0-10V,1 PWM (Factory setting), 6 BOs Relays, no Communication Module
LP-FX06P11-000C	4 AIs, 5 BIs, 2 AOs (1 0-10V,1 PWM (Factory setting), 6 BOs Relays, N2 Open module, 1 cable set
LP-FX06P12-000C	4 AIs, 5 BIs, 2 AOs (1 0-10V,1 PWM (Factory setting), 6 BOs Relays, LonWorks® module, 1 cable set
LP-FX06P13-000C	4 AIs, 5 BIs, 2 AOs (1 0-10V,1 PWM (Factory setting), 6 BOs Relays, RS-232 module, 1 cable set
LP-FX06P20-000C	4 AIs, 5 BIs, 2 AOs (0-10V), 6 BOs (4 Relays, 2 Triacs), no Communication Module
LP-FX06P21-000C	4 AIs, 5 BIs, 2 AOs (0-10V), 6 BOs (4 Relays, 2 Triacs), N2 Open module, 1 cable set
LP-FX06P22-000C	4 AIs, 5 BIs, 2 AOs (0-10V), 6 BOs (4 Relays, 2 Triacs), LonWorks® module, 1 cable set
LP-FX06P23-000C	4 AIs, 5 BIs, 2 AOs (0-10V), 6 BOs (4 Relays, 2 Triacs), RS-232 module, 1 cable set
LP-FX06P30-000C	4 AIs, 5 BIs, 2 AOs (0-10V), 6 BOs (3 Intrlck Relays, 1 free Relay, 2 Triacs), no Communication Module
LP-FX06P31-000C	4 AIs, 5 BIs, 2 AOs (0-10V), 6 BOs (3 Intrlck Relays, 1 free Relay, 2 Triacs), N2 Open module, 1 cable set
LP-FX06P32-000C	4 AIs, 5 BIs, 2 AOs (0-10V), 6 BOs (3 Intrlck Relays, 1 free Relay, 2 Triacs), LonWorks® module, 1 cable set
LP-FX06P33-000C	4 AIs, 5 BIs, 2 AOs (0-10V), 6 BOs (3 Intrlck Relays, 1 free Relay, 2 Triacs) RS-232 module, 1 cable set

For further information and additional models see Product Installation Guide

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Field Controller

Communication Modules

Ordering Codes	Description
LP-NET061-000C	N2 Open Communication Module
LP-NET062-000C	LonWorks® Communication Module
LP-NET063-000C	RS-232 Communication Module

User Interfaces

Ordering Codes	Description
LP-DIS60P20-0C	Remote Medium User Interface (MUI) for Panel Mount
LP-DIS60P21-0C	Remote Medium User Interface (MUI) for Wall Mount
LP-KIT007-005C	Link Cable for connection of FX06 to Panel Mount MUI

Software

Ordering Codes	Description
LP-FXTPRO-0	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON) New User
LP-FXTPRO-6	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON) Upgrade

Accessories

Ordering Codes	Description
LP-KIT006-010C	Cable set for LP-FX06Px0-000C OEM models delivered without a cable set.
LP-KIT100-000C	FX Programming Key
DT-9100-8901	Power Supply for Programming Key: 230 VAC / 12 VDC
LP-KIT007-002C	Interface Cable 1.5 m for GSM modem to FX06
LP-KIT090-000C	GSM 900/1800 FastTrack Modem
LP-KIT090-001C	GSM Modem Plug-In Antenna
LP-KIT090-003C	GSM Modem Magnetic Mount Antenna with 2.5 m Cable
LP-KIT090-004C	GSM Modem Panel Mount Antenna with 5 m Cable
LP-KIT090-005C	GSM Modem Power Adapter, 230 VAC / 12 VDC, Wall Plug

Room Command Modules

Room Sensor Modules – 80 mm x 80 mm, °C (TM Series without Display)

Ordering Codes	Description
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

Room Command Modules

Network Room Modules with Serial Bus Connection to FX07 – 80 mm x 80 mm, °C

Ordering Codes	Description
LP-NRM001-000C	Network Room Module, temperature sensor only, no display, no setpoint dial
LP-NRM002-000C	Network Room Module with LCD display, temperature sensor, setpoint dial, occupancy function
LP-NRM003-000C	Network Room Module with LCD display, temperature sensor, setpoint dial, fan speed override button, occupancy function

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Field Controller

Technical Specifications

Power Requirements	24 VAC/VDC ±15%, 50/60 Hz – SELV (Europe) – Class 2 North America			
Power Consumption	7 VA			
Protection Class	Front Plate: IP55 Rear: IP20			
Ambient Operating Conditions	-20 to 50 °C 10 to 95% RH (non condensing)			
Ambient Storage Conditions	-40 to 70 °C 10 to 95% RH (non condensing)			
Display Range and Resolution	-999 to 999 or -99.9 to 99.9 (4 digits in each of two rows)			
Digital Inputs	Voltage free contacts Transition counter function at 50 Hz (minimum 10 ms ON and minimum 10 ms OFF)			
Analog Inputs and Accuracy at 20 °C Ambient *(sensor error not included)*	Not isolated. Software configurable.			
	Sensor Type		**Range**	**Accuracy**
	A99		-40 to 100 °C	±0.5 °C
	NTC K10		-20 to 70 °C	±0.5 °C
	PT1000 Extended		-40 to 160 °C	±0.5 °C
	Ni1000		-40 to 120 °C	±0.5 °C
	Active 0...10 V		0..10 VDC	±0.05 VDC
	Active Ratio-metric		0.5 to 4.5 VDC	±0.05 VDC
Analog Outputs	0...10 VDC, 3 mA, not isolated for actuating and control devices. Pulse Width Modulation (PWM) Signal at 100 Hz cycle frequency			
Relay Outputs	Dielectric test voltage on open relay contact: 1,000 VAC RMS Maximum relay switching rate at nominal load: 6 operations / min Average relay contact life: 30,000 operations at maximum load.			
Digital Outputs for Selected Models	**Model**	**Channel**	**Type**	**Remark/Application**
	FX06P0x / P1x	DO1 – DO6	SPST 3(1)A, 250 VAC power relay	Each relay contact is independent with its own common terminal.
	FX06P2x / P3x	DO1, DO2	0.5A / 24 VAC triacs	3-point incremental actuators, thermal actuators, etc
		DO3 – DO6	SPST 3(1)A, 250 VAC power relay	On the FX06P2x models, each relay contact is independent with its own common terminal. On the FX06P3x model, DO4, DO5 and DO6 relays are physically interlocked, i.e. only one output can be closed at one time. Application: 3-speed fan motors. The DO3 relay is independent.
Dimensions (H x W x D)	44 x 85 x 95 - 52 x 85 x 95 with Communication Module			
CE Compliance	73/23 EEC directive: EN 60730 - 89/336 EEC directive: EN 50081-1 (EN 61000-6-3), EN 50082-2 (EN 61000-6-2)			
UL Compliance	UL916			

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Field Controller

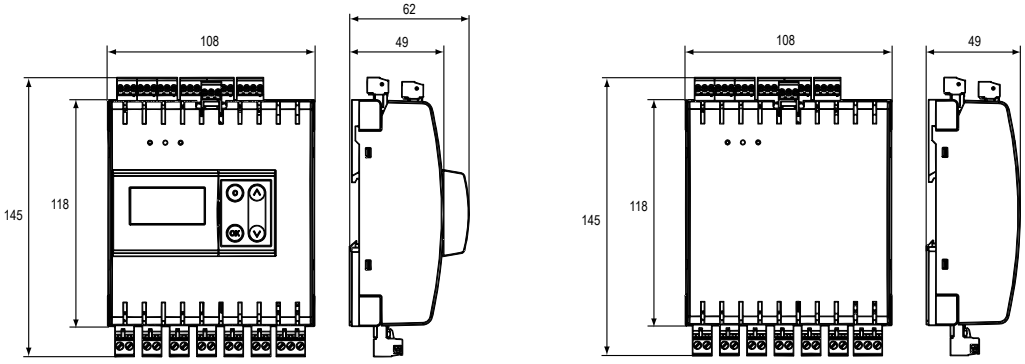
The FX07 is a terminal unit controller in the Facility Explorer range of products. The controller is designed specifically for commercial Heating, Ventilating, Air Conditioning, and Refrigeration (HVACR) applications.

The controller has 17 physical inputs and outputs and supports a wide range of temperature sensors and actuating devices. Active sensors for the measurement of humidity, pressure, and other variables are also supported.
The FX07 also includes an onboard Real-Time Clock to support the start-stop scheduling of equipment and real-time based control sequences.

The FX07 has an optional attractive Liquid Crystal Display (LCD) with a set of graphic status icons used in the most common HVACR applications. The controller also supports a remote panel or wall mounted Medium User Interface (MUI). Communication cards are available to enable the controller to be integrated into an N2 Open, LonWorks® network of a building automation system.
For stand-alone applications, the FX07 Field Controller also features communications services to transmit event notification messages via Short Messaging Service (SMS). Using the FX Tools software package, the FX07 terminal unit controller is fully configurable for a wide range of commercial HVACR applications. These applications include small refrigeration compressors, close control units, roof-top air handlers, fan coil units, unit ventilators, and chilled or heating ceiling beam installations.

Features

- Freely Programmable Controller
- Network Communication Card Options
- Remote Communication Services
- Optional Integral Liquid Crystal Display User Interface with Four Control Buttons
- Analog Outputs with Pulse Width Modulated (PWM) Option
- Models with Various Output Configurations of Solid State Triacs and Line Voltage Relays



With and Without Display Models
Dimensions in mm

For further information and additional models see Product Installation Guide

Johnson Controls

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Field Controller

24 VAC/VDC Models

Ordering Codes		Description
Without Display	**With Integral Display**	
LP-FX07D00-000C	LP-FX07D50-000C	4 AIs, 5 DIs, 2 AOs (0-10 V or PWM), 6 DOs (Relays), no communication card
LP-FX07D01-000C	LP-FX07D51-000C	4 AIs, 5 DIs, 2 AOs (0-10 V or PWM), 6 DOs (Relays), N2 Open card
LP-FX07D02-000C	LP-FX07D52-000C	4 AIs, 5 DIs, 2 AOs (0-10 V or PWM), 6 DOs (Relays), LonWorks® card
LP-FX07D03-000C	LP-FX07D53-000C	4 AIs, 5 DIs, 2 AOs (0-10 V or PWM), 6 DOs (Relays), RS-232C card
LP-FX07D04-000C	LP-FX07D54-000C	4 AIs, 5 DIs, 2 AOs (0-10 V or PWM), 6 DOs (Relays), BACnet card
LP-FX07D20-000C	LP-FX07D70-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (4 Relays, 2 Triacs), no communication card
LP-FX07D21-000C	LP-FX07D71-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (4 Relays, 2 Triacs), N2 Open card
LP-FX07D22-000C	LP-FX07D72-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (4 Relays, 2 Triacs), LonWorks® card
LP-FX07D23-000C	LP-FX07D73-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (4 Relays, 2 Triacs), RS-232C card
LP-FX07D24-000C	LP-FX07D74-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (4 Relays, 2 Triacs), BACnet card
LP-FX07D30-000C	LP-FX07D80-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (3 Interlocked Relays, 1 Free Relay, 2 Triacs), no comm. card
LP-FX07D31-000C	LP-FX07D81-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (3 Interlocked Relays, 1 Free Relay, 2 Triacs), N2 Open card
LP-FX07D32-000C	LP-FX07D82-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (3 Interlocked Relays, 1 Free Relay, 2 Triacs), LonWorks® card
LP-FX07D33-000C	LP-FX07D83-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (3 Interlocked Relays, 1 Free Relay, 2 Triacs), RS-232C card
LP-FX07D34-000C	LP-FX07D84-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (3 Interlocked Relays, 1 Free Relay, 2 Triacs), BACnet card

90-240 VAC/VDC Models

Ordering Codes		Description
Without Display	**With Integral Display**	
LP-FX07A00-000C	LP-FX07A50-000C	4 AIs, 5 DIs, 2 AOs (0-10 V or PWM), 6 DOs (Relays), no communication card
LP-FX07A01-000C	LP-FX07A51-000C	4 AIs, 5 DIs, 2 AOs (0-10 V or PWM), 6 DOs (Relays), N2 Open card
LP-FX07A02-000C	LP-FX07A52-000C	4 AIs, 5 DIs, 2 AOs (0-10 V or PWM), 6 DOs (Relays), LonWorks® card
LP-FX07A03-000C	LP-FX07A53-000C	4 AIs, 5 DIs, 2 AOs (0-10 V or PWM), 6 DOs (Relays), RS-232C card
LP-FX07A04-000C	LP-FX07A54-000C	4 AIs, 5 DIs, 2 AOs (0-10 V or PWM), 6 DOs (Relays), BACnet card
LP-FX07A20-000C	LP-FX07A70-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (4 Relays, 2 Triacs), no communication card
LP-FX07A21-000C	LP-FX07A71-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (4 Relays, 2 Triacs), N2 Open card
LP-FX07A22-000C	LP-FX07A72-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (4 Relays, 2 Triacs), LonWorks® card
LP-FX07A23-000C	LP-FX07A73-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (4 Relays, 2 Triacs), RS-232C card
LP-FX07A24-000C	LP-FX07A74-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (4 Relays, 2 Triacs), BACnet card
LP-FX07A30-000C	LP-FX07A80-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (3 Interlocked Relays, 1 Free Relay, 2 Triacs), no comm. card
LP-FX07A31-000C	LP-FX07A81-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (3 Interlocked Relays, 1 Free Relay, 2 Triacs), N2 Open card
LP-FX07A32-000C	LP-FX07A82-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (3 Interlocked Relays, 1 Free Relay, 2 Triacs), LonWorks® card
LP-FX07A33-000C	LP-FX07A83-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (3 Interlocked Relays, 1 Free Relay, 2 Triacs), RS-232C card
LP-FX07A34-000C	LP-FX07A84-000C	4 AIs, 5 DIs, 2 AOs (0-10 V), 6 DOs (3 Interlocked Relays, 1 Free Relay, 2 Triacs), BACnet card

Accessories

Ordering Codes	Description
LP-KIT100-000C	FX Programming Key
DT-9100-8901	Power Supply Adapter for Programming Key: 230 VAC/12 VDC
LP-KIT007-013C	Null modem cable for computer connection, 3 m
LP-KIT007-014C	Null modem cable for computer connection, 15 m

Communication Card

Ordering Codes	Description
LP-NET071-000C	N2 Open Communication Card
LP-NET072-000C	LonWorks® Communication Card
LP-NET073-000C	RS-232 Communication Card
LP-NET074-000C	BACnet Communication Card

For further information and additional models see Product Installation Guide

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Field Controller

User Interfaces

Ordering Codes	Description
LP-DIS60P20-0C	Remote Medium User Interface (MUI Version 3) - Panel Mount (non-isolated model)
LP-DIS60P21-0C	Remote Medium User Interface (MUI Version 3) - Wall Mount (isolated model)
LP-KIT007-000C	Link cable for the connection of the FX07 to the Panel Mount MUI display - 3 m

Software

Ordering Codes	Description
LP-FXTPRO-0	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) New User
LP-FXTPRO-6	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) Upgrade

Room Command Modules

Room Sensor Modules – 80 mm x 80 mm, °C (TM Series without Display)

Ordering Codes	Description
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

Room Command Modules

Network Room Modules with Serial Bus Connection to FX07 – 80 mm x 80 mm, °C

Ordering Codes	Description
LP-NRM001-000C	Network Room Module, temperature sensor only, no display, no setpoint dial
LP-NRM002-000C	Network Room Module with LCD display, temperature sensor, setpoint dial, occupancy function
LP-NRM003-000C	Network Room Module with LCD display, temperature sensor, setpoint dial, fan speed override button, occupancy function

Digital (Binary) Outputs for Specific Models

Models	Channel	Type	Remark/Application
FX07D0x-xxx **FX07D5x-xxx**	DO1, DO2, DO3	SPST 8(3)A, 250 VAC Relay	Heavy duty relays that can be used to switch electric heater up to 2 KW at 230 VAC. *(Europe only)* Each relay contact is independent with its own common terminal.
FX07A0x-xxx **FX07A5x-xxx**	DO4, DO5, DO6	SPST 3(1)A, 250 VAC Relay	Each relay contact is independent with its own common terminal
FX07D2x-xxx **FX07D3x-xxx** **FX07D7x-xxx** **FX07D8x-xxx**	DO1, DO2	0.5A/24 VAC Triacs	Low voltage 3-point incremental actuators and thermal actuators
FX07A2x-xxx **FX07A3x-xxx** **FX07A7x-xxx** **FX07A8x-xxx**	DO1, DO2	0.5A / 250 VAC Triacs	Line voltage 3-point incremental actuators and thermal actuators. Can also be used to switch 24 VAC low voltage devices.
FX07D2x-xxx **FX07D3x-xxx** **FX07D7x-xxx** **FX07D8x-xxx** **FX07A2x-xxx** **FX07A3x-xxx** **FX07A7x-xxx** **FX07A8x-xxx**	DO3	SPST 8(3)A, 250 VAC Relay	Heavy duty relay that can be used to switch electric heater up to 2 KW at 230 VAC *(Europe only)*
	DO4 – DO6	SPST 3(1)A, 250 VAC Relay	On the **FX07x2x-xxx** and **FX07x7x-xxx** models, each relay contact is independent with its own common terminal. On the **FX07x3x-xxx** and **FX07x8x-xxx** model, **DO4, DO5, DO6** Relays are physically interlocked such that only one output can be closed at one time. Application: 3-speed fan motors.

For further information and additional models see Product Installation Guide

Johnson Controls

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Field Controller

Technical Specifications

Product Codes	**LP-FX07xxx-xxx**
Power Supply Requirements	**LP-FX07Dxx-xxx:** 24 VAC/DC ±15%, 50/60 Hz - SELV (Europe) - Class 2 North America **LP-FX07Axx-xxx:** 90 to 240 VAC, 50/60 Hz
Power Consumption	**LP-FX07Dxx-xxx:** 9 VA maximum **LP-FX07Axx-xxx:** 17 VA maximum
Protection Class	IP20 CEI/EN60529
Ambient Operating Conditions	-40 °C to 50 °C, 10 to 95% RH (non condensing) ***Note that the integral user interface does not operate below -20 °C***
Ambient Storage Conditions	-40 °C to +70 °C, 10 to 95% RH (non condensing)
Dimensions (H x W x D)	145 mm including terminals x 108 mm x 49 mm - 62 mm with display
Weight (with package)	0.60 kg
Integral LCD Display Resolution	-999 to 999 or −99.9 to 99.9
Digital Inputs	Voltage free contacts Transition counter function at 50 Hz (minimum 10 ms ON and minimum 10 ms OFF)
Analog Inputs and Accuracy at 20 °C Ambient *(sensor error not included)*	Not isolated. Software configurable.

Sensor Type	Range	Accuracy
A99	-40 to 100 °C	±0.5 °C
NTC K10	-20 to 70 °C	±0.5 °C
PT1000 Extended	-40 to 160 °C	±0.5 °C
Ni1000	-40 to 120 °C	±0.5 °C
Active 0...10 V	0..10 VDC	±0.05 VDC
Active Ratio-metric	0.5 to 4.5 VDC	±0.05 VDC

Analog Outputs	0...10 VDC, 3 mA, not isolated for actuating and control devices. Pulse Width Modulation (PWM) Signal at 100 Hz cycle frequency
Relay Outputs	Dielectric test voltage on open relay contact: 1,000 VAC RMS Maximum relay switching rate at nominal load: 6 operations / min Average relay contact life: 30,000 operations at maximum load.
Connection Terminals for outputs and Power Supply	Screw terminals for max 2 x 1.5 mm^2 (AWG16) wires, included in the package.
Connection Terminals for inputs and LON/N2 Open/BACnet Bus	Screw terminals for max. 1 x 1.5 mm^2 (AWG16) wires or 2 x Belden cable, 2-core twisted pair with shield ≥ 0.8 mm (AWG20), included in the package
CE Compliance	89/336 EEC directive: EN 61000-6-3, EN 61000-6-1 73/23 EEC directive: EN 60730
UL Compliance	UL916

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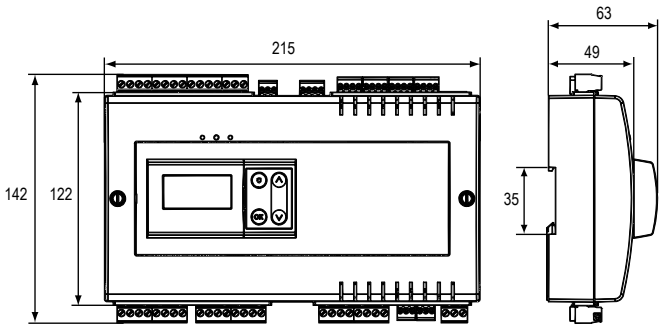
Field Controller

The FX14 is an equipment field controller in the Facility Explorer range of products.
The controller is designed specifically for commercial Heating, Ventilating, and Air Conditioning (HVAC) and Refrigeration applications. The controller has 29 physical inputs & outputs and supports a wide range of temperature sensors and actuating devices. Parameters in the control application can be displayed and modified from the optional LCD Displays. The FX14 has a state-of-the-art integral LCD display including a set of graphic status icons used in the most common HVAC/R applications and/or remote (MUI) user interfaces.
The FX14 field controller can be fitted with an optional communication modules for integration into an N2 Open, LonWorks® or Bacnet® compatible Building Automation System. The FX14 also features communications services to transmit event notification messages via Short Messaging Service (SMS). The FX14 field controller is fully configurable or programmable, using the FX Tools software package, for a wide range of commercial HVACR applications.
The FX14 also includes an on-board Real Time Clock to support the start-stop scheduling of equipment and real time based control sequences.



Dimensions in mm

Features

- Modular Network communication options
- On-Board Real Time Clock
- Communication services
- Freely programmable or configurable using FX Tools software package
- Software selectable analog inputs
- User interfaces, integral or remote

Ordering Codes	Description
LP-FX14D10-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (5 Relays + 4 Triacs) - no communication card
LP-FX14D11-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (5 Relays + 4 Triacs) - N2 Open Card
LP-FX14D12-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (5 Relays + 4 Triacs) - LonWorks® Card
LP-FX14D13-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (5 Relays + 4 Triacs) - RS232C Card
LP-FX14D14-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (5 Relays + 4 Triacs) - BACnet® Communications Card
LP-FX14D60-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (5 Relays + 4 Triacs) - Integral User Interface, no communication card
LP-FX14D61-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (5 Relays + 4 Triacs) - N2 Open Card and Integral User Interface
LP-FX14D62-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (5 Relays + 4 Triacs) - LonWorks® Card and Integral User Interface
LP-FX14D63-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (5 Relays + 4 Triacs) - RS232C Card and Integral User Interface
LP-FX14D64-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (5 Relays + 4 Triacs) - BACnet® Card and Integral User Interface
LP-FX14D20-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (9 Relays) - no communication card
LP-FX14D21-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (9 Relays) - N2 Open Card
LP-FX14D22-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (9 Relays) - LonWorks® Card
LP-FX14D23-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (9 Relays) - RS232C Card
LP-FX14D24-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (9 Relays) - BACnet® Card
LP-FX14D70-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (9 Relays) - Integral User Interface, no communication card
LP-FX14D71-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (9 Relays) - N2 Open Card and Integral User Interface
LP-FX14D72-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (9 Relays) - LonWorks® Card and Integral User Interface
LP-FX14D73-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (9 Relays) - RS232C Card and Integral User Interface
LP-FX14D74-000C	6 AIs, 12 BIs, 2 AOs (0-10 V or PWM), 9 BOs (9 Relays) - BACnet® Card and Integral User Interface

For further information and additional models see Product Installation Guide

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Field Controller

Communication Cards

Ordering Codes	Description
LP-NET151-010C	N2 Open Communication Card
LP-NET142-000C	LonWorks® Communication Card
LP-NET163-000C	RS-232C Communication Card
LP-NET164-000C	BACnet® Card for FX14 RevB

User Interfaces

Ordering Codes	Description
LP-DIS60P20-0C	Medium User Interface (MUI) - Panel Mount
LP-DIS60P21-0C	Medium User Interface (MUI) - Wall Mount
LP-KIT007-000C	Link cable for the connection of the FX07 to the Panel Mount MUI display - 3 m

Software

Ordering Codes	Description
LP-FXTPRO-0	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) New User
LP-FXTPRO-6	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) Upgrade

Accessories

Ordering Codes	Description
LP-KIT007-000C	Link cable for the connection of the FX14 to the Panel Mount MUI display - 3 m
LP-KIT014-000C	Kit of female screw connectors
LP-KIT100-000C	FX Programming Key
DT-9100-8901	Power Supply Adapter for Programming Key: 230 VAC/12 VDC

Room Command Modules
Room Sensor Modules – 80 mm x 80 mm, °C (TM Series without Display)

Ordering Codes	Description
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

Room Command Modules
Network Room Modules with Serial Bus Connection to FX07 – 80 mm x 80 mm, °C

Ordering Codes	Description
LP-NRM001-000C	Network Room Module, temperature sensor only, no display, no setpoint dial
LP-NRM002-000C	Network Room Module with LCD display, temperature sensor, setpoint dial, occupancy function
LP-NRM003-000C	Network Room Module with LCD display, temperature sensor, setpoint dial, fan speed override button, occupancy function

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Field Controller

Channel	Type	Remark/Application
Analog Input (AI)		
AI1, AI2, AI3, AI4, AI5, AI6	*See table below* 16-bit resolution	Freely software configurable. Application: temperature, humidity, or pressure
AI V Ref	+16 V, 20 mA max or +5 V, 20 mA max	To power directly from the FX14 Active 0..10 V Sensors or to power directly from the FX14 Active Ratiometric Sensors. The selection between the two configuration is done by jumpers
Digital Input (DI)		
DI1, DI2, DI3, DI4, DI5, DI6, DI7, DI8, DI9,DI10, DI11,DI12	Potential free contacts	Transition counter function, Maximum 10 ms on and 10 ms off (@ 50 Hz)
Digital Output (DO)		
DO1, DO2, DO3	SPST 8(3)A, 250 V power relays	There is double insulation between the relays, and they can be used at different voltages from one another
DO4, DO5	SPST 8(3)A, 250 V power relays	
DO6	SPST 8(3)A, 250 V power relays or 0.5A, 24Vac triacs	
DO7, DO8, DO9	SPST 8(3)A, 250 V power relays or 0.5A, 24Vac triacs	
Analog Output (AO)		
AO V Ref	15 VDC 10 mA max	Voltage Reference signal used for PWM inputs of frequency drives, fan speed controllers
AO1	0...10 VDC, 3 mA or PWM, 100 Hz	Used to drive motor actuator, power triacs, frequency drivers or fan speed controller. 16 bit resolution
AO V Ref	15 VDC 10 mA max	Voltage Reference signal used for PWM inputs of frequency drives, fan speed controllers
AO2	0...10 VDC, 3 mA or PWM, 100 Hz	Used to drive motor actuator, power triacs, frequency drivers or fan speed controller. 16 bit resolution

Available Sensor Types

Sensor Type	Linearization Range	Accuracy @ 20°C Controller Ambient
Ni1000 JCI	-40°C to 120°C	±0.5 °C
Pt1000	-50°C to 160°C	±0.5 °C
A99	-50°C to 100°C	±0.5 °C
NTC K10	-20°C to 70°C	±0.5 °C
0 to 5 VDC ratiometric	0.5 to 4.5 VDC (10 to 90% of supply voltage)	±0.05 VDC
0 to 10 VDC	0 to 10 VDC	±0.05 VDC

For further information and additional models see Product Installation Guide

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Field Controller

Technical Specifications

Product Codes	**LP-FX14Dxx-000C**
Power Supply Requirements	24 VAC ±15%, 50/60 Hz - Class 2 Power Supply – SELV in Europe
Power Consumption	19.5 VA at max load
Protection Class	IP20 controller / IP55 integral LCD display
Ambient Operating Conditions	-40 °C to +60 °C, 10 to 95% RH (noncondensing) ***Note that the integral user interface does not operate below -20 °C***
Ambient Storage Conditions	-40 °C to +70 °C, 10 to 95% RH (noncondensing)
Dimensions (H x W x D)	142 mm x 215 mm x 49 mm With display: 142 mm x 215 mm x 63 mm
Weight (with package)	0.74 kg
Integral LCD Display Resolution	-999 to 999 or -99.9 to 99.9 (4 digits for each row)
Connection Terminals for AIs, DOs and Power Supply	Screw terminals for max 1 x 1.5 mm^2 (AWG16) wires, included in the package.
Connection Terminals for LON/N2 Open Bus	Screw terminals, cable size up to 1.5 mm^2, AWG24 to AWG16, included in the package. Belden cable, 2-core twisted pair with shield ≥ 0.8 mm (AWG20)
Connection Terminals for AOs, DIs and Remote Display	Screw terminals, cable size up to 1.5 mm^2, AWG24 to AWG16, included in the package.
CE Compliance	89/336 EEC directive: EN 50081-1 (EN 61000-6-3), EN 50082-1 (EN 61000-6-1) 73/23 EEC directive: EN 60730
UL Compliance	UL916

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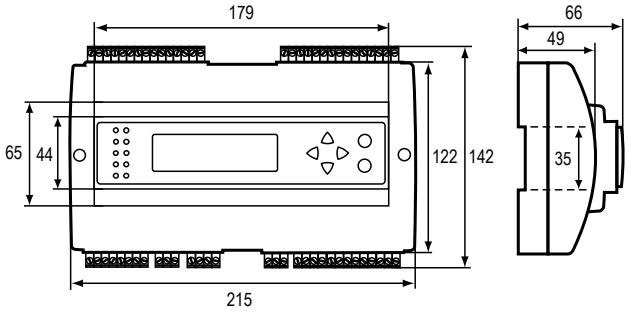
Field Controller

The FX15 Field Controller (FX15 Classic) is a high performance field controller in the Facility Explorer system specifically designed for commercial Heating, Ventilating, and Air Conditioning (HVAC) and refrigeration applications such as chillers and rooftops, indoor packaged air conditioning units, Air Handling Units (AHUs), and close control units. The FX15 has 27 physical inputs and outputs and supports a wide range of temperature sensors and actuating devices. Up to 64 additional physical inputs and outputs may be achieved by adding the XT/XP expansion modules on the Local N2 Open bus. The FX15 is fully programmable or configurable, using the FX Tools software package, for a wide range of commercial HVAC and refrigeration applications. The FX15 controller can be fitted with an optional communication card for integration into an N2 Open or LonWorks® compatible Building Automation System. The FX15 also includes an onboard Real Time Clock to support the start-stop scheduling of equipment and real-time based control sequences.

Features

- Modular Communication Card options
- On board Real-Time Clock
- Freely programmable or configurable using FX Tools software package
- Software selectable analog inputs
- User interfaces, integral or remote



Dimensions in mm

Standard Temperature Range Controllers

Ordering Codes	Description
LP-FX15D10-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 Relays + 5 Triacs, no communication card.
LP-FX15D11-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 Relays + 5 Triacs, N2 Open Card.
LP-FX15D12-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 Relays + 5 Triacs, LonWorks® Card.
LP-FX15D60-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 Relays + 5 Triacs, Integral MUI.
LP-FX15D61-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 Relays + 5 Triacs, N2 Open Card and Integral MUI.
LP-FX15D62-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 Relays + 5 Triacs, LonWorks® Card and Integral MUI.
LP-FX15D20-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 Relays, no communication card.
LP-FX15D21-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 Relays, N2 Open Card.
LP-FX15D22-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 Relays, LonWorks® Card.
LP-FX15D70-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 Relays, Integral MUI, no communication card.
LP-FX15D71-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 Relays, N2 Open Card and Integral MUI.
LP-FX15D72-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 Relays, LonWorks® Card and Integral MUI.

Extended Temperature Range Controllers

Ordering Codes	Description
LP-FX15X10-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 Relays + 5 Triacs, no communication card.
LP-FX15X11-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 Relays + 5 Triacs, N2 Open Card.
LP-FX15X12-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 Relays + 5 Triacs, LonWorks® Card.
LP-FX15X20-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 Relays, no communication card.
LP-FX15X21-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 Relays, N2 Open Card.
LP-FX15X22-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 Relays, LonWorks® Card.

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Field Controller

Communications Cards

Ordering Codes	Description
LP-NET151-010C	N2 Open Communication Card
LP-NET152-010C	LonWorks® Communication Card

User Interfaces

Ordering Codes	Description
LP-DIS60P20-0C	Medium User Interface (Panel Mount)
LP-DIS60P21-0C	Medium User Interface (Wall Mount)

Expansion I/O Modules

Ordering Codes	Description
LP-XT91D00-000C	Extension Module
LP-XP91D02-000C	Expansion Board: 6 AIs, 2 AOs
LP-XP91D03-000C	Expansion Board: 8 DOs (triacs)
LP-XP91D04-000C	Expansion Board: 4 DIs, 4 DOs (triacs)
LP-XP91D05-000C	Expansion Board: 8 DIs
LP-XP91D06-000C	Expansion Board: 4 DOs (relays) 230 VAC (Europe only)

Software

Ordering Codes	Description
LP-FXTPRO-0	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) New User
LP-FXTPRO-6	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) Upgrade

Accessories

Ordering Codes	Description
LP-KIT007-000C	Link Interface cable 3 m for the connection of the FX15 to the MUI user interfaces
LP-KIT015-000C	Kit of Female Screw Connectors
LP-KIT015-001C	Kit of Female Cage Clamp Connectors
LP-KIT100-000C	FX Programming Key

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Field Controller

Technical Specifications - I/O details

Terminals (Cont.)	Channel	Type	Remark/Application
Analog Input (AI)			
TB1	AI1, AI2, AI3, AI4, AI5, AI6	***See table below.*** 16-bit resolution	Freely software configurable. Application: temperature, humidity, or pressure
3, 8	EXT-VDC	+16 V, 80 mA	0 - 10 V Sensors or max no. 4 0/4 - 20 mA Sensors
13	AVPS/EXT-VDC	AVPS = +5 V, 20 mA EXT-VDC = +16 V, 80 mA	To power directly from the FX15 ratiometric sensors, with AVPS or 0 - 10 V, 0/4 - 20 mA Sensors with EXT-VDC. The selection between AVPS and EXT-VDC is done by jumpers.
Digital Input (DI)			
TB2	DI1, DI2, DI3, DI4, DI5, DI6, DI7, DI8	Potential free contacts	The insulation from the microprocessor is achieved if a different 24 VAC power supply from the one used to power the controller is used to power the digital inputs (through Terminals 34, 35). Transition counter function maximum 500 ms on and 500 ms off (1 Hz). For quicker counter function, use the LP-XP91D05 module.
Digital Output (DO)			
TB3	DO1, DO2, DO3	SPST 8(3)A, 250 V power relays	There is double insulation between the relays, and they can be used at different voltages from one another.
TB4	DO4, DO5	SPST 5(3)A, 250 V power relays or 0.5 A, 24 VAC triacs	This group is double insulated from the other relays, but they share the same common between them; therefore, they have to be connected at the same voltage.
TB5	DO6, DO7, DO8	SPST 5(3)A, 250 V power relays or 0.5 A, 24 VAC triacs	This group is double insulated from the other relays, but they share the same common between them; therefore, they have to be connected at the same voltage.
TB6	FAIL	SPDT 8(3)A, 250 V power relay	Fail relay for enhanced security. The relay returns to its NC position not only at power fail, but also in case the microprocessor should fail: watch-dog, brown-out, etc.
Analog Output (AO)			
TB7	AO1, AO2	0...10 VDC, 3 mA 16 bit resolution	The insulation from the microprocessor is achieved if a different 24 VAC power supply from the one used to power the controller is used to power the analog outputs.
TB8	AO3, AO4	0...10 VDC, 3 mA 16 bit resolution	The insulation from the microprocessor is achieved if a different 24 VAC power supply from the one used to power the controller is used to power the analog outputs (through Terminals 79, 80).

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Field Controller

Available Sensor Types

Sensor Type	Linearization Range	Accuracy @ 20 °C Ambient
Ni1000 JCI	-45 to 120 °C	±0.5 °C
Ni1000 JCI Extended	20 to 287 °C	
Ni1000 Siemens™	-50 to 160 °C	
Ni1000 DIN	-60 to 180 °C	
Pt1000	-50 to 160 °C	
A99	-50 to 100 °C	
NTC 2.2K	-40 to 150 °C	
0 to 5 VDC ratiometric	0.5 to 4.5 VDC (10 to 90% of Supply Voltage)	±0.05 V
0 to 10 VDC	0 to 10 Volts	
0 to 20 mA	0 to 20 mA	±0.1 mA

FX15 Standard and Extended Range Models (Extended Range Information in Bold)

Product Codes	LP-FX15Dxx-000C **LP-FX15Xxx-000C**
Power Supply Requirements	24 VAC ±15%, 50/60 Hz - Class 2 Power Supply – SELV in Europe
Power Consumption	15 VA at max load
Protection Class	IP20 controller IP40 integral MUI
Ambient Operating Conditions	STD controller: -20 to 50 °C, 10 to 95% RH (non condensing) **Extended range controller: -40 to 60 °C, 10 to 95% RH (noncondensing)** **Note that the integral user interface does not operate below -20 °C**
Ambient Storage Conditions	-40 to 70 °C, 10 to 95% RH (non condensing)
Dimensions (H x W x D)	142 mm x 215 mm x 49 mm With display: 142 mm x 215 mm x 66 mm
Weight (with package)	0.74 kg
Connection Terminals for Signals and Power Supply	Screw terminals for max 1 x 1.5 mm² (AWG16) wires, included in the package.
LON/N2 Open Bus Connection Terminals	Screw terminals, cable size up to 1.5 mm², AWG24 to AWG16, included in the package. Belden® cable, 2-core twisted pair with shield > 0.8 mm (AWG20)
Connection Terminals for Extension Bus and Remote Display	Screw terminals, cable size up to 1.5 mm², AWG24 to AWG16, included in the package.
CE Compliance	89/336 EEC directive: EN 50081-1 (EN 61000-6-3), EN 50082-1 (EN 61000-6-1) 73/23 EEC directive: EN 60730
UL Compliance	UL916

For further information and additional models see Product Installation Guide

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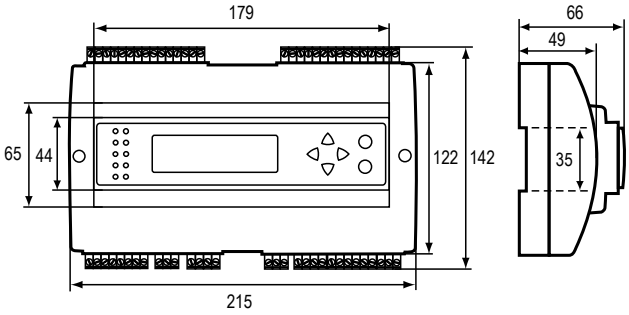
Universal Field Controller

The FX15 Universal Field Controller is a high performance field controller in the Facility Explorer system specifically designed for commercial Heating, Ventilating, and Air Conditioning (HVAC) and refrigeration applications such as chillers and rooftops, indoor packaged air conditioning units, Air Handling Units (AHUs), and close control units.

The FX15 Universal has 26 physical inputs and outputs and supports a wide range of temperature sensors and actuating devices. Up to 64 additional physical inputs and outputs may be achieved by adding the XT/XP expansion modules on the Local N2 Open bus.

The FX15 is fully programmable or configurable, using the FX Tools software package, for a wide range of commercial HVAC and refrigeration applications. The FX15 controller can be fitted with an optional communication card for integration into an N2 Open or LonWorks® compatible Building Automation System.

The FX15 also includes an onboard Real-Time Clock to support the start-stop scheduling of equipment and real-time based control sequences.



Dimensions in mm

Features

- Modular communication card options
- On board real-time clock
- Freely programmable or configurable using FX Tools software package
- Software selectable analog inputs
- User interfaces, integral or remote
- Galvanic isolation between power supply, I/O channels and CPU

Ordering Codes	Description
LP-FX15D00-000C	6 AIs, 8 DIs, 4 AOs, 8 DOs: 3 Relays + 5 Triacs.
LP-FX15D01-000C	6 AIs, 8 DIs, 4 AOs, 8 DOs: 3 Relays + 5 Triacs, N2 Open Card.
LP-FX15D02-000C	6 AIs, 8 DIs, 4 AOs, 8 DOs: 3 Relays + 5 Triacs, LON® Card.
LP-FX15D50-000C	6 AIs, 8 DIs, 4 AOs, 8 DOs: 3 Relays + 5 Triacs, integral MUI display.
LP-FX15D51-000C	6 AIs, 8 DIs, 4 AOs, 8 DOs: 3 Relays + 5 Triacs, N2 Open Card, integral MUI.
LP-FX15D52-000C	6 AIs, 8 DIs, 4 AOs, 8 DOs: 3 Relays + 5 Triacs, LON® Card, integral MUI.

Communications Cards

Ordering Codes	Description
LP-NET151-000C	N2 Open Communication Card
LP-NET152-000C	LonWorks® Communication Card

User Interface Displays

Ordering Codes	Description
LP-DIS60P20-0C	Medium User Interface, (4 x 26 character) LCD backlit display, panel mount version.
LP-DIS60P21-0C	Medium User Interface, (4 x 26 character) LCD backlit display, wall mount isolated version.

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Universal Field Controller

Expansion Modules

Ordering Codes	Description
LP-XT91D00-000C	Extension Module
LP-XP91D02-000C	Expansion Board: 6 AIs, 2 AOs
LP-XP91D03-000C	Expansion Board: 8 DO (triacs)
LP-XP91D04-000C	Expansion Board: 4 DI, 4 DOs (triacs)
LP-XP91D05-000C	Expansion Board: 8 DI
LP-XP91D06-000C	Expansion Board: 4 DO (relays) 230 VAC (Europe only)

Software

Ordering Codes	Description
LP-FXTPRO-0	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) New User
LP-FXTPRO-6	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) Upgrade

Accessories

Ordering Codes	Description
LP-KIT007-000C	Link cable for the connection of the FX15 Universal to the MUI display-3m
LP-KIT100-000C	FX Programming Key

Technical Specifications - I/O details

Terminals (Cont.)	Channel	Type	Remark/Application
Analog Input (AI)			
TB1	AI1, AI2, AI3, AI4, AI5, AI6	16-bit resolution	Freely software configurable. For the 0-20 / 4-20 mA configuration see "Jumper Configuration" Application: temperature, humidity, pressure, etc.
3, 8	EXT-VDC	+17 V, 80 mA	To power, directly from the controller, max 4 0-20 / 4-20 mA sensors
13	AVPS/EXT-VDC	AVPS = +5 V, 20 mA EXT-VDC = +16 V, 80 mA	To power directly from the FX15 ratiometric sensors, with AVPS or 0 - 10 V, 0/4 - 20 mA Sensors with EXT-VDC. The selection between AVPS and EXT-VDC is done by jumpers.
Digital Input (DI)			
TB6	DI1, DI2, DI3, DI4, DI5, DI6, DI7, DI8	Potential free contacts	Transition counter function maximum 500 ms on and 500 ms off (1 Hz). For quicker counter function, use the XP-9105 module.
Digital Output (DO)			
TB1	FAIL, DO7, DO6	SPST 8(3)A power relays	
TB2	DO1, DO2, DO3, DO4, DO5	0.5A / 24 VAC triacs	
Analog Output (AO)			
TB3	AO1, AO2, AO3, AO4	0 ÷ 10 VDC (max 10 mA) or 0/4 ÷ 20 mA (max 500 ohm)	Software configurable and jumper selectable (see "Jumper Configuration" to drive motor actuators, power triacs, frequency drives. 16 bit resolution
To Supervisor	1: RT+, 2: RT- or NETA, 3: Com or NETB	Connection to Supervisor system, N2Open or LON	The Communication Card is optional, in case it is not mounted the female connector will be missing
Display / Extension Bus	LL+, LL-, +9 DC, Com	RS485 downlink + power supply Display / Extension Bus	Expansion Bus to field devices, expansion I/O board, display and programming key. Power supply to display and programming key provided by the controllers.

FX15 - *3/3 pages*

Universal Field Controller

Available Sensor Types

Sensor Type	Linearization Range	Accuracy @ 20 °C Ambient
Ni1000 JCI	-45°C to 120°C	±0.5 °C
Ni1000 JCI Extended	20°C to 287°C	
Ni1000 Siemens™	-50°C to 160°C	
Ni1000 DIN	-60°C to 180°C	
Pt1000	-50°C to 160°C	
A99	-50°C to 100°C	
NTC 2.2K	-40°C to 150°C	
0 to 5 VDC ratiometric	0.5 to 4.5 VDC (10 to 90% of supply voltage)	±0.05 V
0 to 10 VDC	0 to 10 Volts	
0 to 20 mA	0 to 20 mA	±0.1 mA

FX15 Universal

Product Codes	**LP-FX15DOx-000C** **LP-FX15D5x-000C**
Power Supply Requirements	24 VAC ±15%, 50/60 Hz - Class 2 Power Supply
Power Consumption	15 VA at max load
Protection Class	IP20 controller IP40 integral MUI
Ambient Operating Conditions	-20°C to +50°C, 10 to 95% RH (noncondensing)
Ambient Storage Conditions	-20°C to +70°C, 10 to 95% RH (noncondensing)
Dimensions (H x W x D)	142 mmx 215 mm x 49 mm
Weight (with package)	0.74 kg
Connection Terminals for Signals and Power Supply	Screw terminals for max 1 x 1.5 mm² (AWG16) wires, included in the package.
LON/N2 Open Bus Connection Terminals	Screw terminals, cable size up to 1.5 mm², AWG24 to AWG16, included in the package. Belden® cable, 2-core twisted pair with shield > 0.8 mm (AWG20)
Connection Terminals for Extension Bus and Remote Display	Screw terminals, cable size up to 1.5 mm², AWG24 to AWG16, included in the package.
CE Compliance	89/336 EEC directive: EN 50081-1 (EN 61000-6-3), EN 50082-1 (EN 61000-6-1) 73/23 EEC directive: EN 60730
UL Compliance	UL916

For further information and additional models see Product Installation Guide

Johnson Controls

FX16 - *1/4 pages*

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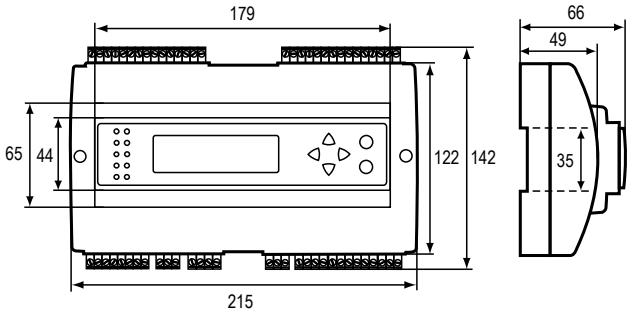
Master Controller

The FX16 Master Controller is a high performance field controller in the Facility Explorer system designed for commercial Heating, Ventilating, Air Conditioning, and Refrigeration (HVACR) applications such as chillers, rooftops, packaged air conditioning units, Air Handling Units (AHUs) and close control units. The FX16 has 27 physical inputs and outputs and supports a wide range of temperature sensors and actuating devices. Up to 64 additional physical inputs and outputs may be achieved by adding XT/XP expansion modules. The FX16 can manage a distributed control application with up to 16 FX slave controllers (FX05 Advanced, FX06, FX07, FX14, FX15). Parameters in the distributed control application can be displayed and modified from the optional user interfaces.

The FX16 also features communications services to transmit event notification messages via Short Messaging Service (SMS) or by e-mail. With its onboard Web server, you can browse and make adjustments to parameters of the application from a remote location.

The FX16 Master Controller is fully configurable or programmable, using the FX Tools software package, for a wide range of commercial HVAC and refrigeration applications. The FX16 Master Controller is available with an optional serial communication card for integration into an N2 Open, LonWorks® or BACnet compatible Building Automation System (BAS).



Dimensions in mm

Features

- Distributed control application
- Embedded Web server
- Communication services
- Modular communication card options
- Freely programmable or configurable using FX Tools software package
- Onboard trend and event logging
- Software selectable analog inputs
- Optional integral or remote User Interfaces (UI)

Standard Temperature Range Controllers

Ordering Codes	Description
LP-FX16D00-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 relays, no Communication Card
LP-FX16D01-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 relays, N2 Open Communication Card
LP-FX16D02-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 relays, LON Communication Card
LP-FX16D03-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 relays, RS-232 Communication Card
LP-FX16D10-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 relays, 5 triacs, no Communication Card
LP-FX16D11-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 relays, 5 triacs, N2 Open Communication Card
LP-FX16D12-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 relays, 5 triacs, LON Communication Card
LP-FX16D13-000C	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 relays, 5 triacs, RS-232 Communication Card

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Master Controller

Extended Temperature Range Controllers

Ordering Codes		
Without Display	**With Integral Display**	**Description**
LP-FX16X00-000C	**LP-FX16X50-000C**	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 relays, no Communication Card
LP-FX16X01-000C	**LP-FX16X51-000C**	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 relays, N2 Open Communication Card
LP-FX16X02-000C	**LP-FX16X52-000C**	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 relays, LON Communication Card
LP-FX16X03-000C	**LP-FX16X53-000C**	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 relays, RS-232 Communication Card
LP-FX16X04-000C	**LP-FX16X54-000C**	6 AIs, 8 DIs, 4 AOs, 9 DOs: 9 relays, BACnet Communications Card
LP-FX16X10-000C	**LP-FX16X60-000C**	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 relays, 5 triacs, no Communication Card
LP-FX16X11-000C	**LP-FX16X61-000C**	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 relays, 5 triacs, N2 Communication Card
LP-FX16X12-000C	**LP-FX16X62-000C**	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 relays, 5 triacs, LON Communication Card
LP-FX16X13-000C	**LP-FX16X63-000C**	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 relays, 5 triacs, RS-232 Communication Card
LP-FX16X14-000C	**LP-FX16X64-000C**	6 AIs, 8 DIs, 4 AOs, 9 DOs: 4 relays, 5 triacs, BACnet Communications Card

Communications Cards

Ordering Codes	Description
LP-NET151-010C	N2 Open Communication Card for FX15 and FX16
LP-NET161-000C	N2 Open Communication Card for FX16x Rev. A
LP-NET152-010C	LON Communication Card for FX15 and FX16
LP-NET163-000C	RS-232 Communication Card for FX16
LP-NET164-000C	BACnet Communications Card for FX16x Rev. A

User Interfaces

Ordering Codes	Description
LP-DIS60P20-0C	Remote Medium User Interface for FX16 (Panel Mount)
LP-DIS60P21-0C	Remote Medium User Interface for FX16 (Wall Mount)

Expansion I/O Modules

Ordering Codes	Description
LP-XT91D00-000C	Facility Explorer Extension Module
LP-XP91D02-000C	Facility Explorer Expansion Module 6 AI, 2 AO
LP-XP91D03-000C	Facility Explorer Expansion Module 8 DO (triacs)
LP-XP91D04-000C	Facility Explorer Expansion Module 4 DI, 4 DO (triacs)
LP-XP91D05-000C	Facility Explorer Expansion Module 8 DI
LP-XP91D06-000C	Facility Explorer Expansion Module 4 Relays, 230 VAC (Europe Only)

Software

Ordering Codes	Description
LP-FXTPRO-0	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) New User
LP-FXTPRO-6	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) Upgrade

For further information and additional models see Product Installation Guide

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Master Controller

Accessories

Ordering Codes	Description
LP-KIT007-000C	Interface Cable 3 m for Medium User Interface (MUI) to FX16
LP-KIT007-001C	Interface Cable for standard modem to FX16 and Master Display
LP-KIT007-013C	Null modem cable, 3 m
LP-KIT007-014C	Null modem cable, 15 m
LP-KIT100-000C	Programming Key
LP-KIT015-000C	Kit of screw connectors for FX15 and FX16
LP-KIT007-002C	Interface Cable 1.5 m for GSM modem to FX16 and Master Display
LP-KIT090-000C	GSM 900/1800 FastTrack Modem
LP-KIT090-001C	GSM Modem Plug-In Antenna
LP-KIT090-003C	GSM Modem Magnetic Mount Antenna with 2.5 m Cable
LP-KIT090-004C	GSM Modem Panel Mount Antenna with 5 m Cable
LP-KIT090-005C	GSM Modem Power Adapter, 230 VAC/12 VDC, Wall Plug
LP-KIT015-001C	Kit of Female Cage Clamp Connectors

Technical Specifications - I/O details

Terminals (Cont.)	Channel	Type	Remark/Application
		Analog Input (AI)	
TB1	AI1, AI2, AI3, AI4, AI5, AI6	See the following table. 16 bit resolution	Freely software configurable Application: temperature, humidity, pressure
3, 8	EXT-VDC	+16 V, 80 mA	0-10 V Sensors or max no. 4 0/4 - 20 mA Sensors
13	AVPS/EXT-VDC	AVPS = +5 V, 20 mA EXT-VDC = +16 V, 80 mA	To power directly from the FX16 ratiometric sensors, with AVPS or 0-10 V, 0/4 - 20 mA Sensors with EXT-VDC The selection between AVPS and EXT-VDC is done by jumpers.
		Digital Input (DI)	
TB2	DI1, DI2, DI3, DI4, DI5, DI6, DI7, DI8	Potential free contacts	In order to ensure galvanic isolation, a different 24 VAC power supply must be used to power the digital inputs (through Terminals 34, 35). Transition counter function maximum 500 ms on and 500 ms off (1Hz) For quicker counter function, use the LP-XP91D05 module.
		Digital Output (DO)	
TB3	DO1, DO2, DO3	SPST 8(3)A power relays	UL/CUR rating: 8A 250 VAC, 8A 30 VDC VDE rating: 8A 250 VAC Expected electrical life min. operations: 1 x 100,000 operations (360 ops x hour) Dielectric strength: coil-contacts 4000 VRMS
TB4	DO4, DO5	SPST 5(3)A power relays or 0,5A/24 VAC triacs	Rating (resistive): 5A 125 VAC, 5A 250 VAC, 5A 30 VDC Expected electrical life (min operations): 5A 125 VAC 50,000; 5A 250 VAC 50,000; 5A 30 VDC 100,000 Dielectric strength:coil-contacts 4000 VRMS for 1 min
TB5	DO6, DO7, DO8	SPST 5(3)A power relays or 0,5A/24 VAC triacs	
TB6	DO9	SPDT NC 8(3)A 250V relay	Same as TB3 relays Fail relay for enhanced security. The relay will return to its NC position not only at power fail but also in case the microprocessor should fail: for example, watch-dog, brown-out.
		Analog Output (AO)	
TB7	AO1, AO2	0 to 10 VDC (max 1.5 mA)	Used to drive analog actuators, frequency drives; 16 bit resolution.
TB8	AO3, AO4	0 to 10 VDC (max 1.5 mA)	Used to drive analog actuators, frequency drives; 16 bit resolution
79, 80	AO V~ Hot AO V~ Com	24 VAC	In order to assure galvanic isolation, a different 24 VAC power supply must be used to power the analog outputs.

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Master Controller

Available Sensor Types

Sensor Type	Linearization Range	Accuracy @ 20 °C Ambient
Ni1000 JCI	-45 °C to 120°C	±0.5 °C
Ni1000 JCI Extended	20°C to 287°C	
Ni1000 Siemens™	-50°C to 160°C	
Ni1000 DIN	-60°C to 180°C	
Pt1000	-50°C to 160°C	
A99	-50°C to 100°C	
NTC 2.2K	-40°Cto 150°C	
0 to 5 VDC ratiometric	0.5 to 4.5 VDC (10 to 90% of supply voltage)	±0.05 V
0 to 10 VDC	0 to 10 Volts	
0 to 20 mA	0 to 20 mA	±0.1 mA

FX16 Standard and Extended Range Models (Extended Range Information in Bold)

Product Codes	LP-FX16Dxx-000C **LP-FX16Xxx-000C**
Power Supply Requirements	24 VAC ±15%, 50/60 Hz - Class 2 Power Supply – SELV in Europe
Power Consumption	15 VA at max load
Internal Fuse	2 A, 250 V
Protection Class	IP20
Ambient Operating Conditions	STD controller: -20°C to +50°C, 10 to 95% RH (noncondensing) **Extended range controller: -40°C to +60°C, 10 to 95% RH (noncondensing)** **Note that integral user interface does not operate below -20 °C**
Ambient Storage Conditions	-20°C to +70°C, 10 to 95% RH (noncondensing)
Dimensions (H x W x D)	142 mm x 215 mm x 49 mm With display: 142 mm x 215 mm x 66 mm
Weight (with package)	0.74 kg
Connection Terminals for Signals and Power Supply	Screw terminals for max 1 x 1.5 mm² (AWG16) wires, included in the package.
LON / N2 Open / BACnet Bus Connection Terminals	Screw terminals, cable size up to 1.5 mm², AWG24 to AWG16, included in the package.
Belden® cable, 2-core twisted pair with shield	
Connection Terminals for Extension Bus and Remote Display	Screw terminals, cable size up to 1.5 mm², AWG24 to AWG16, included in the package.
CE Compliance	89/336 EEC directive: EN 50081-1 (EN 61000-6-3), EN 50082-1 (EN 61000-6-1) 73/23 EEC directive: EN 60730
UL Compliance	UL916

For further information and additional models see Product Installation Guide

Johnson Controls

MD20 - *1/3 pages*

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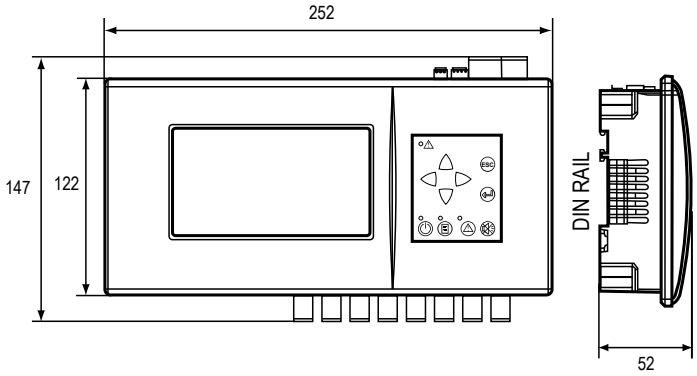
Master Display

The Master Display (MD20) is a supervisory controller of the Facility Explorer system.

The Master Display monitors and interacts with a network of Heating, Ventilating, Air Conditioning, and Refrigeration (HVACR) controllers to form a complete building or equipment control system and provides operating data to local and remote users and operators via a number of different media options. The device has an integral graphic display along with a number of operating keys and indicators that present data to the user in a standard or customized way to view and acknowledge alarms, display historical trend data, and to override the operation of the monitored equipment. An embedded Web server enables you to access data from a Web browser by telephone line and modem or by direct connection to the Master Display. You can view current operating data, including active alarms, as well as trend logs and the event history file. You can also acknowledge alarms and send commands to the controlling devices using the user identification and password control on the Web page.

The Master Display can also send alarm messages by e-mail, by Short Message Service (SMS) to a mobile telephone, by fax, and to a printer for a local record of events as they occur. The Master Display is freely programmable using the FX Tools Pro software package and the functions include centralized control and management of distributed applications as well as the display and communication features.



Dimensions in mm

Features

- Embedded Web server
- Communication services
- Supervisory options
- Monitoring and control
- Distributed application
- Onboard trend and event logging
- Integral display and keyboard
- Local printer option
- Freely programmable

Ordering Codes	Description
LP-MD20D00-000C	Includes RS-232C port (for download and commissioning only), 2 DIs and 2 relay DOs
LP-MD20D01-000C	Includes N2 Open supervisory interface, 2 DIs and 8 relay DOs
LP-MD20D02-000C	Includes RS232 (for download and commissioning only), LonWorks® interface, 2 DIs and 8 relay DOs
LP-MD20D03-000C	Includes RS-232 (for modem/personal computer), 2DIs and 8 relay DOs
LP-MD20D04-000C	Includes RS232 for modem/personal computer, LonWorks® interface, 2 DIs and 8 relay DOs
LP-MD20D05-000C	Includes N2 Open supervisory interface, LonWorks® interface, 2 DIs and 8 relay DOs

MD20 - *2/3 pages*

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Master Display

Expansion Modules

Ordering Codes	Description
LP-XT91D00-000C	Extension module
LP-XP91D02-000C	Expansion board: 6AI, 2AO
LP-XP91D03-000C	Expansion board: 8DO (triacs)
LP-XP91D04-000C	Expansion board: 4DI, 4DO (triacs)
LP-XP91D05-000C	Expansion board: 8DI
LP-XP91D06-000C	Expansion board: 4DO (relays) 230 VAC (Europe only)

Software

Ordering Codes	Description
LP-FXTPRO-0	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) New User
LP-FXTPRO-6	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) Upgrade

Accessories

Ordering Codes	Description
LP-KIT020-000C	Panel mount kit for master display
LP-KIT007-001C	Link cable for connection of MD20 to standard modem with DB9 connectors, 1.5 m
LP-KIT007-013C	Null Modem link cable: RS-232, 3 m
LP-KIT007-014C	Null Modem link cable: RS-232, 15 m
LP-KIT007-015C	Commissioning adapter
LP-KIT100-000C	FX Programming Key
LP-KIT090-000C	Modem GSM 900/1800 FastTrack
LP-KIT007-002C	Link Cable for connection of GSM modem to FX16 and Master Display
LP-KIT090-001C	GSM modem plug-in antenna
LP-KIT090-003C	GSM modem magnetic mount antenna – 2.5 m cable
LP-KIT090-004C	GSM modem panel mount antenna – 5 m cable
LP-KIT090-005C	Power adapter for GSM modem 230 VAC/12 VDC with central European plug

Technical Specifications - I/O details

Terminals	Channel	Type	Remark/Application
Binary (Digital) Input (BI)			
21-24	BI1, BI2,	Voltage free contacts	Transition counter function: Minimum 10 ms on and 10 ms off for detection (50 Hz) Prescaler function: max division by 100
Power Supply			
31 32 33	Earth Ground 24 ~ Com 24 ~ Hot	24 VAC Power Supply	At maximum load
Binary (Digital) Output (BO)			
1,2 3,4 5,6 7,8 9,10 11,12 13,14 15,16	BO1, BO2, BO3, BO4, BO5, BO6, BO7, BO8	SPST 5(1)A power relays	Rating (resistive): 5A 250 VAC Expected electrical life: 50,000 operations Dielectric strength: coil-contacts: 4000 Vrms for 1 min

MD20 - *3/3 pages*

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Master Display

Technical Specifications

Product	**MD20 Master Display**
Power Supply	24 VAC ±15% 50/60 Hz – Safety extra low voltage (SELV) Class 2 in North America
Power Consumption	15 VA maximum
Enclosure Protection Class **Enclosure Material**	Front panel mounted: IP54 Rear of panel: IP30 - IEC529 Self-extinguishing to UL94 5VB
Ambient Operating Conditions	-20 to +50 °C,10 to 95% RH (non condensing)
Ambient Storage Conditions	-20 to +70 °C ,10 to 95% RH (non condensing)
Dimensions (H x W x D)	122 mm x 252 mm x 52 mm
Weight (in delivery package)	1 kg
Display Screen Resolution	240 x 128 Pixels
Supervisory Port	RS-485 N2 Open Protocol at 9600 Baud
Communications Port	RS-232C PPP Protocol at 9600 Baud for GSM Modem
Printer Port Comm. Speed	9600 Baud
LonWorks® Interface	FTT (Free Topology Transceiver) at 78 Kbps. MIP interface between Neuron® chip and controller microprocessor
Local Link Bus	RS-485 N2 Open/N2 System91 Protocol at 9600 Baud
I/O Expansion Bus	RS-485 N2 XT Bus Protocol at 9600 Baud
Output Relay Contacts	SPST 250 VAC 5(1)A (Minimum closure time 100 ms)
Input Binary Contacts	Voltage-free, 1k ohm maximum
Power Supply and I/O Terminals	Screw terminal connectors for max 1.5 mm^2 (AWG 16) wire
Communication Terminals	RS-485 (N2) and LonWorks (FTT) – screw terminals for max 0.8 mm (AWG20) wire
CE Compliance	89/336 EEC EMC Directive: EN 61000-6-3 & EN 61000-6-2 73/23 EEC LV Directive: EN 60730
UL Compliance	UL916

MUI

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Medium User Interface

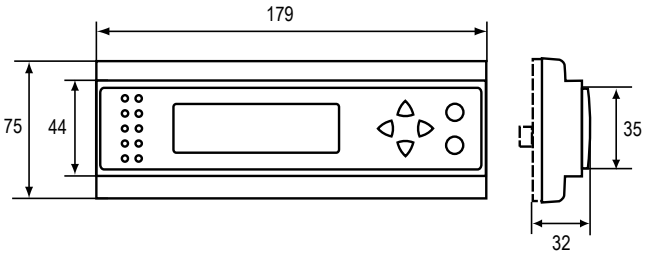
The Medium User Interface, is a local / remote display for the FX06, FX07, FX14, FX15, FX15 Universal Field Controller and FX16 Master Controller.

It is designed for the end user or for the maintenance people who needs a clear and straightforward way to monitor and adjust data.

Information are presented in textual format in the 4 x 26 backlit LCD display. The display is IP54, it has an extended temperature range: -20 °C to 50 °C and can be hand held or permanently mounted on a panel or on a wall.

Features

- Menu operations
- Alarm summary page
- Password access
- Software customisation
- Universal power supply



Dimensions in mm

Ordering Codes	PowerSupply	Protection Class	Description
LP-DIS60P20-000C	9 - 48 VDC 24 VAC ±10%	Hand-held and Wall mount applications IP30 Panel mount applications IP54	MUI Display, Panel mount non-isolated version
LP-DIS60P21-000C			MUI Display, Wall or panel mount isolated version
LP-KIT007-000C			3 m connection cable for FX07, FX14, FX15, FX15 Universal and FX16 Master Controller

XM07 and XM14 - *1/6 pages*

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FX Input/Output (I/O) Modules

The FX Input/Output (I/O) Modules provide additional physical input and output points for FX field controllers in the Facility Explorer range of products. The modules extend the capability of the FX16X Master Controller to monitor and control additional points within its control application. The modules do not perform control functions.

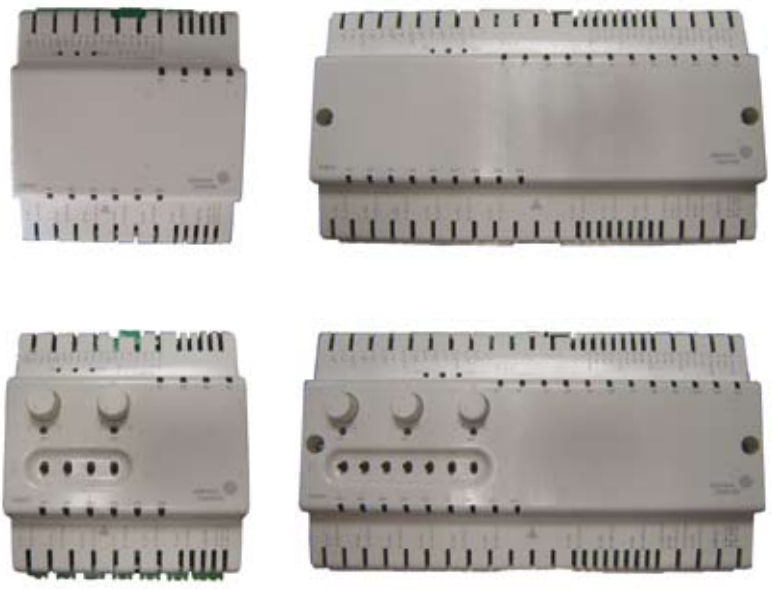
The FX I/O Module series also includes models with manual overrides for a number of the analog, relay, and triac outputs. The manual override function is always active when power is applied to the module. The manual override function does not depend on communication with the FX16X Master Controller.

XM07 modules have 18 physical inputs and outputs including relays and triacs, with four digital output overrides and two analog output overrides. XM14 modules have 31 physical inputs and outputs including relays and triacs, with seven digital output overrides and three analog output overrides.

Both support a wide range of temperature sensors and actuating devices. Active sensors for the measurement of humidity, pressure, and other variables are also supported as well as digital (binary) inputs.

The modules communicate with an FX16X Master Controller over its local link bus.

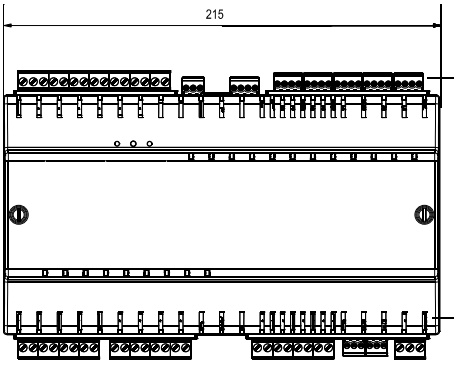
Using the FX Tools software package, you can fully configure and program the FX16X Master Controller and its connected FX I/O Modules for a wide range of commercial Heating, Ventilating, Air Conditioning, and Refrigeration (HVACR) applications.

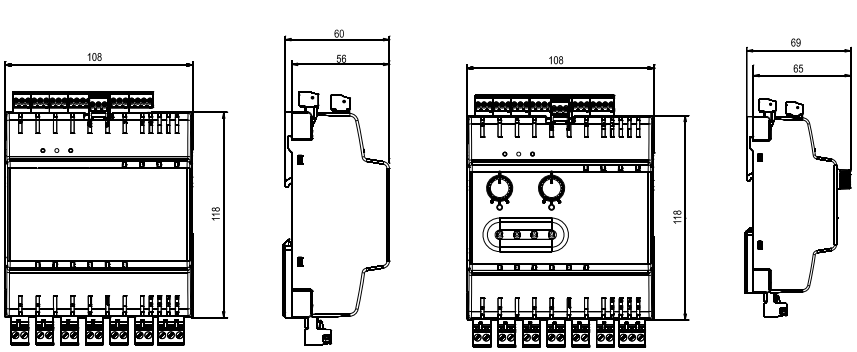


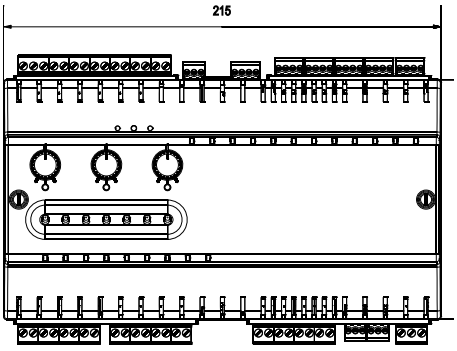
Models with and without overrides

Features

- Expanded Input and Output capability for FX16X controllers
- Fully Programmable modules using FX Tools
- Design and physical characteristics similar to FX controllers
- Models available with manual overrides for digital and analog outputs
- Light-emitting diodes (LED) indicators for digital inputs and outputs
- Modules connect to FX16X local link bus







Dimensions in mm

For further information and additional models see Product Installation Guide

Johnson Controls

XM07 and XM14 - *2/6 pages*

FX Input/Output (I/O) Modules

XM07 Modules

Ordering Codes	Description
24 VAC Power Supply	
LP-XM07X01-000C	FX I/O Module with 5 UIs, 4 BIs, 3 AOs, 6 Relay DOs
LP-XM07X11-000C	FX I/O Module with 5 UIs, 4 BIs, 3 AOs, 2 Triac DOs, 4 Relay DOs.
LP-XM07X51-000C	FX I/O Module with 5 UIs, 4 BIs, 3 AOs, 6 Relay DOs. Manual Overrides for 2 AOs and 4 Relay DOs.
LP-XM07X61-000C	FX I/O Module with 5 UIs, 4 BIs, 3 AOs, 2 Triac DOs, 4 Relay DOs. Manual Overrides for 2 AOs, 2 Triac DOs, and 2 Relay DOs.
90 to 240 VAC Power Supply (Not Available in North America)	
LP-XM07B01-000C	FX I/O Module with 5 UIs, 4 BIs, 3 AOs, 6 Relay DOs.
LP-XM07B11-000C	FX I/O Module with 5 UIs, 4 BIs, 3 AOs, 2 Triac DOs, 4 Relay DOs.
LP-XM07B51-000C	FX I/O Module with 5 UIs, 4 BIs, 3 AOs, 6 Relay DOs. Manual Overrides for 2 AOs and 4 Relay DOs.
LP-XM07B61-000C	FX I/O Module with 5 UIs, 4 BIs, 3 AOs, 2 Triac DOs, 4 Relay DOs. Manual Overrides for 2 AOs, 2 Triac DOs, and 2 Relay DOs.

XM14 Modules

Ordering Codes	Description
24 VAC Power Supply	
LP-XM14X01-000C	FX I/O Module with 6 UIs, 12 BIs, 4 AOs, 9 Relay Dos.
LP-XM14X11-000C	FX I/O Module with 6 UIs, 12 BIs, 4 AOs, 4 Triac DOs.
LP-XM14X51-000C	FX I/O Module with 6 UIs, 12 BIs, 4 AOs, 9 Relay DOs. Manual Overrides for 3 AOs and 7 Relay DOs
LP-XM14X61-000C	FX I/O Module with 6 UIs, 12 BIs, 4 AOs, 4 Triac DOs, 5 Relay DOs. Manual Overrides for 3 AOs, 2 Triac DOs, and 5 Relay DOs
90 to 240 VAC Power Supply (Not Available in North America)	
LP-XM14B01-000C	FX I/O Module with 6 UIs, 12 BIs, 4 AOs, 9 Relay DOs.
LP-XM14B11-000C	FX I/O Module with 6 UIs, 12 BIs, 4 AOs, 4 Triac DOs.
LP-XM14B51-000C	FX I/O Module with 6 UIs, 12 BIs, 4 AOs, 9 Relay DOs. Manual Overrides for 3 AOs and 7 Relay DOs
LP-XM14B61-000C	FX I/O Module with 6 UIs, 12 BIs, 4 AOs, 4 Triac DOs, 5 Relay DOs. Manual Overrides for 3 AOs, 2 Triac DOs, and 5 Relay DOs

Accessories

Ordering Codes	Description
LP-KIT007-200C	Screw connectors kit for XM07 (replacement part – kit included in each XM07 module)
LP-KIT014-200C	Screw connectors kit for XM14 (replacement part – kit included in each XM14 module)
LP-NET071-000C	Local link (N2 Open RS-485) communication card for XM07 (replacement part – card included in each XM07 module)
LP-NET161-000C	Local link (N2 Open RS-485) communication card for XM14 (replacement part – card included in each XM14 module)

XM07 and XM14 - *3/6 pages*

FX Input/Output (I/O) Modules

Technical Specifications - Universal Inputs (UI) - All Models

Models	Channel	Type	Remark/Application
LP-XM07 *(All Models)*	UI1, UI2, UI3, UI4, UI5	*See "Universal Input Sensor Types" in table below.*	Software configurable. Application: temperature, humidity, pressure analog inputs at 16-bit resolution or equipment status binary inputs. **Jumper for permanent current shunt path on one input UI1 on XM07 and UI6 on XM14.**
LP-XM14 *(All Models)*	UI1, UI2, UI3, UI4, UI5, UI6		
LP-XM07 and LP-XM14 *(All Models)*	+5 V	UI Power: 5 VDC +/-10% at 20 mA max	Used to power active or ratiometric sensors directly from the controller
	+15 V	UI/AO Power: 15 VDC +/-10% at 80 mA max	Used to power active sensors directly from the controller. **(Also used for PWM outputs using 10 mA each.)**

Universal Input Sensor Types

Sensor Types	Full Linearization Range	Accuracy at 20°C Module Circuits Only *(Sensor Accuracy Not Included)*
A99	-50 to 100°C	±0.5°C
NTC 10k	-40 to 150°C	
PT1000 Extended	-50 to 160°C	
Ni1000 (Johnson Controls)	-45 to 120°C	
Active Voltage	0-10 VDC	±0.05 VDC
Active Ratiometric	0.5-4.5 VDC	
Active Current	0(4)-20 mA	±0.2 mA
Potential-Free Contact	Binary open/close sense	Not applicable

Digital (Binary) Input (DI) - All Models

Models	Channel	Type	Indication	Remark/Application
LP-XM07 *(All Models)*	DI1, DI2, DI3, DI4	Potential-free contact open/close	Software configurable LED (green or red) ON for closed or open contact	Equipment status and events
LP-XM14 *(All Models)*	DI1, DI2, DI3, DI4, DI5, DI6, DI7, DI8, DI9, DI10, DI11, DI12			Transition counter at 50 Hz max Minimum Time ON: 10 ms Minimum Time OFF: 10 ms

XM07 and XM14 - *4/6 pages*

FX Input/Output (I/O) Modules

XM07 Digital (Binary) Output (DO)

Models	Channel	Type	Indication	Remark/Application
LP-XM07X01-x **LP-XM07B01-x** ***(without manual override)***	DO1, DO2, DO3	Relay SPST 8(3)A, 250 VAC (UL: 1/6 Hp at 120 VAC)	Green LED - ON when contact closed	Heavy duty relay. Each relay contact set can be used with different voltage and source.
	DO4, DO5, DO6	Relay SPST 3(1)A, 250 VAC		Pilot relay. Each relay contact set can be used with different voltage and source.
LP-XM07X11-x **LP-XM07B11-x** ***(without manual override)***	DO1, DO2	Triac 0.5 A LP-XM07X11 - 24 VAC only LP-XM07B11 – up to 230 VAC	Green LED - ON when triac on	Frequently switching loads
	DO3	Relay SPST 8(3)A, 250 VAC (UL: 1/6 Hp at 120 VAC)	Green LED - ON when contact closed	Heavy duty relay. Relay contact set can be used with different voltage and source.
	DO4 – DO6	Relay SPST 3(1)A, 250 VAC		Pilot relay. Each relay contact set can be used with different voltage and source.
LP-XM07X51-x **LP-XM07B51-x** ***(with manual override)***	DO1, DO2, DO3 Manual override	Relay SPST 8(3)A, 250 VAC (UL: 1/6 Hp at 120 VAC)	LED – ON when contact closed. Auto – green Manual – amber	Heavy duty relay. Each relay contact set can be used with different voltage and source.
	DO4 Manual override	Relay SPST 3(1)A, 250 VAC		Pilot relay. Relay contact set can be used with different voltage and source.
	DO5, DO6	Relay SPST 3(1)A, 250 VAC	Green LED – ON when contact closed	Pilot relay. Each relay contact set can be used with different voltage and source.
LP-XM07X61-x **LP-XM07B61-x** ***(with manual override)***	DO1, DO2 Manual override	Triac 0.5 A LP-XM07X61 – 24 VAC only LP-XM07B61 – up to 230 VAC	LED – ON when triac on. Auto – green Manual – amber	Frequently switching loads
	DO3 Manual override	Relay SPST 8(3)A, 250 VAC (UL: 1/6 Hp at 120 VAC)	LED – ON when contact closed. Auto – green Manual – amber	Heavy duty relay. Relay contact set can be used with different voltage and source.
	DO4 Manual override	Relay SPST 3(1)A, 250 VAC		Pilot relay. Relay contact set can be used with different voltage and source.
	DO5, DO6	Relay SPST 3(1)A, 250 VAC	Green LED – ON when contact closed	Pilot relay. Each relay contact set can be used with different voltage and source.
Relay Outputs	Dielectric strength coil-contacts: 4,000 V RMS for 1 minute. Dielectric test voltage on open relay contact: 1,000 VAC RMS. Maximum relay switching rate at maximum load: 6 operations/minute. Average relay contact life: 30,000 operations at maximum load.			

XM07 Analog Output (AO)

Models	Channel	Type	Indication	Remark/Application
All Models	+15 V	UI/AO Power 15 VDC +/-10% at 80 mA max	---	Voltage reference source for PWM outputs (Also available for UI sensor power)
LP-XM07X01-x **LP-XM07X11-x** **LP-XM07B01-x** **LP-XM07B11-x** ***(without manual override)***	AO1, AO2, AO3	0-10 VDC (10 mA max) **or** Pulse Width Modulation (PWM) output at 100 Hz cycle frequency with 10 mA sink from 15 VDC reference power source		Actuators and control devices Fan speed controller with PWM input 13-bit resolution – accuracy ±0.1 VDC or 1% of full range
LP-XM07X51-x **LP-XM07X61-x** **LP-XM07B51-x**	AO1, AO2 Manual override		Amber LED – ON when in manual mode Manual dial marked: 0...10	
LP-XM07B61-x ***(with manual override)***	AO3		---	

For further information and additional models see Product Installation Guide

Johnson Controls

XM07 and XM14 - *5/6 pages*

FX Input/Output (I/O) Modules

XM07 Digital (Binary) Output (DO)

Models	Channel	Type	Indication	Remark/Application
LP-XM14X01-x **LP-XM14B01-x** ***(without manual override)***	DO1, DO2, DO3, DO4, DO5, DO6, DO7, DO8, DO9	Relay SPST 8(3)A, 250 VAC (UL: 1/6 Hp at 120 VAC)	Green LED - ON when contact closed	Heavy duty relay. Each relay contact set can be used with different voltage and source.
LP-XM14X11-x **LP-XM14B11-x** ***(without manual override)***	DO1, DO2, DO3, DO4, DO5			
	DO6, DO7, DO8, DO9	Triac 0.5 A LP-XM14X11 - 24 VAC only LP-XM14B11 – up to 230 VAC	Green LED - ON when triac on	Frequently switching loads
LP-XM14X51-x **LP-XM14B51-x** ***(with manual override)***	DO1, DO2, DO3, DO4, DO5, DO6, DO7 Manual Override	Relay SPST 8(3)A, 250 VAC (UL: 1/6 Hp at 120 VAC)	LED – ON when contact closed. Auto – green Manual – amber	Heavy duty relay. Each relay contact set can be used with different voltage and source.
	DO8, DO9		Green LED – ON when contact closed	
LP-XM14X61-x **LP-XM14B61-x** ***(with manual override)***	DO1, DO2, DO3, DO4, DO5 Manual Override	Relay SPST 8(3)A, 250 VAC (UL: 1/6 Hp at 120 VAC)	LED – ON when contact closed. Auto – green Manual – amber	
	DO6, DO7 Manual Override	Triac 0.5 A LP-XM14X61 - 24 VAC only LP-XM14B61 – up to 230 VAC		Frequently switching loads
	DO8, DO9		Green LED - ON when triac on	
Relay Outputs	Dielectric strength coil-contacts: 4,000 V RMS for 1 minute. Dielectric test voltage on open relay contact: 1,000 VAC RMS. Maximum relay switching rate at maximum load: 6 operations/minute. Average relay contact life: 30,000 operations at maximum load.			

XM14 Analog Output (AO)

Models	Channel	Type	Indication	Remark/Application
All Models	AO1 power	15 VDC +/-10% at 10 mA max	---	Voltage reference source for PWM outputs
	AO2 power			
	AO3, AO4 power	15 VDC +/-10% at 20 mA max		
LP-XM14X01-x **LP-XM14X11-x** **LP-XM14B01-x** **LP-XM14B11-x** ***(without manual override)***	AO1, AO2, AO3, AO4	0-10 VDC (10 mA max) **or** Pulse Width Modulation (PWM) output at 100 Hz cycle frequency with 10 mA sink from 15 VDC reference power source		Actuators and control devices Fan speed controller with PWM input 13-bit resolution – accuracy ±0.1 VDC or 1% of full range
LP-XM14X51-x **LP-XM14X61-x** **LP-XM14B51-x**	AO1, AO2, AO3 Manual override		Amber LED – ON when in manual mode Manual dial marked: 0...10	
LP-XM14B61-x ***(with manual override)***	AO4	0-10 VDC (10 mA max) **or** Pulse Width Modulation (PWM)	---	Actuators and control devices Fan speed controller with PWM input

For further information and additional models see Product Installation Guide

XM07 and XM14 - *6/6 pages*

FX Input/Output (I/O) Modules

General Technical Specifications of FX Input/Output Modules (XM07 and XM14 Models)

Product Codes	**LP-XM07xxx-xxxC**	**LP-XM14xxx-xxxC**
Power Supply Requirements	**LP-XM07Xxx-xxxC:** 24 VAC/DC ±15%, 50/60 Hz - Safety Extra Low Voltage (SELV) in Europe – Class 2 North America **LP-XM07Bxx-xxxC:** 90 to 240 VAC, 50/60 Hz - not available in North America	**LP-XM14Xxx-xxxC:** 24 VAC/DC ±15%, 50/60 Hz - Safety Extra Low Voltage (SELV) in Europe – Class 2 North America **LP-XM14Bxx-xxxC:** 90 to 240 VAC, 50/60 Hz - not available in North America
Power Consumption	LP-XM07Xxx-xxxC: 15 VA, 12 W maximum LP-XM07Bxx-xxxC: 19 VA, 12 W maximum	LP-XM14Xxx-xxxC: 20 VA, 13 W maximum LP-XM14Bxx-xxxC: 24 VA, 13 W maximum
Housing Material	ABS + polycarbonate, self-extinguishing: UL 94-V0 flammability rating	
Protection Class	IP20 CEI/EN60529	
Ambient Operating Conditions	-40 to 50°C, 10 to 95% RH (noncondensing)	
Ambient Storage Conditions	-40 to 70°C, 10 to 95% RH (noncondensing)	
Dimensions (H x W x D)	145 mm x 108 mm x 60 mm D = 69 mm with manual override controls	145 mm x 215 mm x 60 mm
Weight (with Package)	0.55 kg	0.8 kg
Digital (Binary) Output Manual Override	Three-position toggle switch: on-auto-off (I A 0) LED indicator: auto on = green, manual on = amber	
Analog Output Override	Dial marked 0...10 with push function for auto-manual mode LED indicator: manual mode = amber	
I/O Ratings	See I/O tables.	
Connection for Digital Outputs and Power	Screw terminals for max 2 x 1.5 mm^2 (16 AWG) wires, included in the package	
Connection for Inputs, Analog Outputs, and Local Link Bus	Screw terminals for max 1 x 1.5 mm^2 (16 AWG) wires or 2 x Belden® cable, 2 core twisted pair with shield ≥0.8 mm (20 AWG), included in the package	
Cable Length for Inputs	Max 100 m with cables ≥0.6 mm, 22 AWG	
FX Controller Support for I/O Modules on Local Link Bus (max)	**FX16X Controller Rev. A or Rev. B** (not FX16D nor FX16 no Rev.) 4 x XM07 **or** 2 x XM14 **or** 2 x XM07 + 1 x XM14	
Agency Compliance		
Europe (all models)	89/336/EEC, EMC Directive: EN 61000-6-3, EN 61000-6-2 72/23/EEC, Low Voltage Directive: EN 60730	
Canada (LP-XM07Xxx-x and LP-XM14Xxx-x models only)	UL Listed (PAZX7), CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada, ICES-003	
United States (LP-XM07Xxx-x and LP-XM14Xxx-x models only)	UL Listed (PAZX), UL 916, Energy Management Equipment FCC compliant to CFR 47, Part 15, Subpart B, Class A	

Local Link Bus (RS-485) Specifications

RS-485 Bus; 9600 Baud	Maximum local link bus length: 1,200 m, 0.8/0.6 mm (20/22 AWG) 2 x twisted pair with shield. Use the same cable type throughout segment.
Number of Devices	Maximum of 20 devices on local link bus
End-of-Line Termination	220 ohm at each end of segment >100 m. For segment <100 m, only one 220 ohm termination is required.
Electrical Isolation in XM07 and XM14	500 V

LP-XT and LP-XP

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Extension Module and Espansion Module

The XT91D00 Extension Module and XP91D0x Expansion Modules have been designed to provide additional input and output capacity within Facility Explorer networks, specifically for the FX Controllers (FX15 Field Controller, FX15 Universal Field Controller, FX16 Master Controller and MD20 Master Display).

The XT91D00 module provides the communications interface, and the XP91Dxx modules provide the analog and digital inputs and outputs.

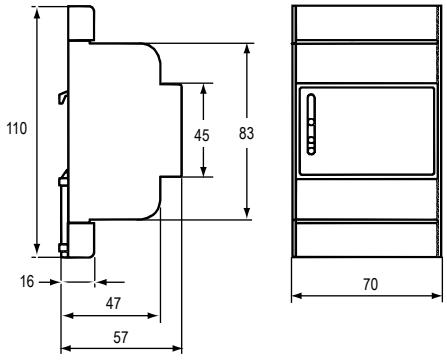
Up to 64 additional physical inputs and outputs may be achieved by adding the XT/XP expansion modules on the Local Link bus of the Facility Explorer controllers.

The FX controllers communicate with the XT91D00 via the Local Link N2 Bus, and data from the XT91D00 is updated and stored in the FX Controllers.

They may be mounted next to the controller on the same DIN rail or, remotely, up to 1200 meters from the controller.

Features

- Low cost additional I/O capacity
- Software and Hardware selectable inputs and outputs
- Configurable using FX Tools software package



Dimensions in mm

Ordering Codes	Description
LP-XT91D00-000C	Extension module
LP-XP91D02-000C	Expansion board: 6AI, 2AO
LP-XP91D03-000C	Expansion board: 8DO (triacs)
LP-XP91D04-000C	Expansion board: 4DI, 4DO (triacs)
LP-XP91D05-000C	Expansion board: 8DI
LP-XP91D06-000C	Expansion board: 4DO (relays) 230 VAC (Europe only)

Technical Specifications

Ordering Codes	Analog Inputs	Binary Inputs	Analog Outputs	Binary Outputs		Supply Voltage
	0..10 V, 0/4..20 mA, Ni1000, Pt1000, A99		0..10 V, 0..20 mA	Relay 250 VAC, 3 A	Triac 24 VAC, 0.5 A	
LP-XT91D00-000C	Extension Module for LP-XPD91xx modules connection to FX Controllers					24 VAC, 15% - 10%, 50-60 Hz
LP-XP91D02-000C	6	---	2	---	---	
LP-XP91D03-000C	---	---	---	---	8	
LP-XP91D04-000C	---	4	---	---	4	
LP-XP91D05-000C	---	8	---	---	---	
LP-XP91D06-000C	---	---	---	4	---	

FX TOOLS PRO

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FX Tools Pro is a Windows® based software package for the configuration, downloading and commissioning of Heating, Ventilating, Air Conditioning, and Refrigeration (HVACR) applications for the Facility Explorer field controllers.
The FX Tools Pro software package includes FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet and FX Loader.
The FX Builder tool provides the menus, navigation trees, and graphic screens for the programming and configuration of the Facility Explorer controllers. The configuration includes the definition of the controllers to be connected, the physical inputs and outputs and data points to be monitored, and the format of the local display screen of the controller.

The Facility Explorer controllers are downloaded and commissioned using the FX CommPro tool. FX CommPro is available in three versions: FX CommPro N2, FX CommPro LON and FX CommPro BACnet.

FX CommPro enables the monitoring and control of the connected Facility Explorer controller. Setting parameters, tuning controls, and saving default parameters for other controller configurations are all features of the FX CommPro for the N2 Open, LonWorks® and BACnet protocols.

FX Loader is a specialized utility used to download applications and firmware updates to Facility Explorer controllers.

Features

- FX device support
- Graphical environment
- Application Management
- Reusable macro assemblies
- Offline simulation
- Online commissioning

Ordering Codes	Description
LP-FXTPRO-0	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) New User
LP-FXTPRO-6	FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) Upgrade

System Requirements

Operating System	Microsoft Windows 2000 (with Service Pack 4 or later) Microsoft Windows XP (with Service Pack 1 or later)
Hardware Requirements	
Processor	Intel® Pentium® Processor, 500 MHz or higher
RAM	Minimum 512 MB RAM
Hard Disk	60 MB available hard disk storage minimum
Display	Display resolution 800 x 600 16-bit (32,768) color minimum
Interface	RS232, USB
Other Software Requirements	Microsoft Internet Explorer Version 5.0 or later

TCU - *1/5 pages*

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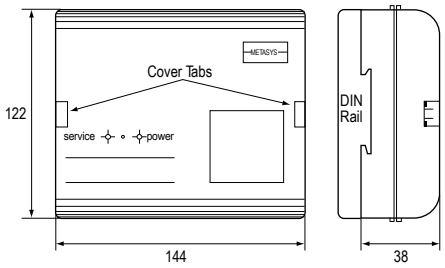
Unit Controller

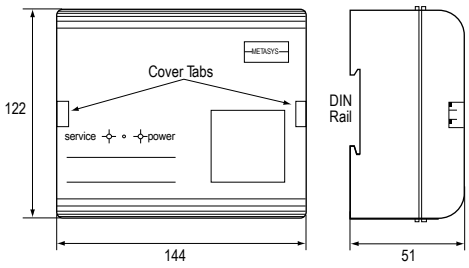
The TCU Fan Coil Unit Controller is a LonWorks® network compatible device that provides direct digital control of fan coil units with heating and/or cooling coils, and a single-speed, three-speed or variable-speed fan. The controller is designed for field installation or for mounting by original equipment manufacturers (OEMs). The space comfort set points, occupancy mode and fan speed may be adjusted from the TM 1100 Series Room Command Module, or from a LonWorks compatible Room Command Module when the controller is connected to a LonWorks network.
The controller complies with the LonMark® interoperability guidelines for sharing data with other network sensors and devices. Operating variables and parameters can be monitored and adjusted from a LonWorks compatible supervisory system, including the Metasys® NCM network controller that integrates the fan coil unit controller into a facility-wide network.

Features

- Range of models designed for field and factory installations
  Relay outputs for fan control
  Choice of outputs for heating and cooling control
  230 VAC or 24 VAC power supply models
- Software commissioning tool
- Library of configurations for all models
- Multiple modes of operation for various occupancy conditions
- Setpoint and mode override from room command module
- LonWorks peer-to-peer communications network
- LonWorks Space Comfort Controller Profile
- LonWorks network connection to Metasys network controller
- Standalone operation with default parameters
- Non-volatile memory (Flash and E2PROM)



Dimensions 24 VAC



Dimensions 230 VAC

For further information and additional models see Product Installation Guide

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Unit Controller

24 VAC Models

Ordering Codes	Application	Power Supply	Output Configuration		
			Output 1 (Analog or 2 x Triac)	**Output 2 (Analog or 2 x Triac)**	**Output 3 (Relay)**
AD-TCU1215-1AxA **AD-TCU1215-1ExA****	Two-pipe Fan Coil Unit	24 VAC, ±15% at 50/60 Hz (+60 VA max. for controlled devices) Independent 230 VAC supply for fan motor	Triac 1: not used Triac 2: Lighting On/Off	Analog 0 - 10 VDC Heating/Cooling	On/Off Fan
AD-TCU2215-1AxA **AD-TCU2215-1ExA****			Triac 1: not used Triac 2: Lighting On/Off	Analog 0 - 10 VDC Heating/Cooling	3-Speed Fan
AD-TCU1225-1AxB **AD-TCU1225-1ExB****			Triac 1: Heat/Cool On/Off Triac 2: not used	Triac 1: not used Triac 2: Lighting On/Off	On/Off Fan
AD-TCU2225-1AxB **AD-TCU2225-1ExB****			Triac 1: Heat/Cool On/Off Triac 2: not used	Triac 1: not used Triac 2: Lighting On/Off	3-Speed Fan
AD-TCU1225-1AxC **AD-TCU1225-1ExC****			Triac 1: Heat/Cool DAO Triac 2: not used	Triac 1: not used Triac 2: Lighting On/Off	On/Off Fan
AD-TCU2225-1AxC **AD-TCU2225-1ExC****			Triac 1: Heat/Cool DAO Triac 2: not used	Triac 1: not used Triac 2: Lighting On/Off	3-Speed Fan
AD-TCU1225-1AxD **AD-TCU1225-1ExD****			Triac 1: } Heat/Cool PAO Triac 2: }	Triac 1: not used Triac 2: Lighting On/Off	On/Off Fan
AD-TCU2225-1AxD **AD-TCU2225-1ExD****			Triac 1: } Heat/Cool PAO Triac 2: }	Triac 1: not used Triac 2: Lighting On/Off	3-Speed Fan
AD-TCU1205-1BxA **AD-TCU1205-1CxA***	Four-pipe Fan Coil Unit (or separate heating and cooling sources)	24 VAC, ±15% at 50/60 Hz (+60 VA max. for controlled devices) Independent 230 VAC supply for fan motor	Analog 0 - 10 VDC Heating	Analog 0 - 10 VDC Cooling	On/Off Fan
AD-TCU2205-1BxA			Analog 0 - 10 VDC Heating	Analog 0 - 10 VDC Cooling	3-Speed Fan
AD-TCU1225-1BxB **AD-TCU1225-1CxB***			Triac 1: Heating On/Off Triac 2: Lighting On/Off	Triac 1: Cooling On/Off Triac 2: not used	On/Off Fan
AD-TCU2225-1BxB			Triac 1: Heating On/Off Triac 2: Lighting On/Off	Triac 1: Cooling On/Off Triac 2: not used	3-Speed Fan
AD-TCU1225-1BxC **AD-TCU1225-1CxC***			Triac 1: Heating DAO Triac 2: Lighting On/Off	Triac 1: Cooling DAO Triac 2: not used	On/Off Fan
AD-TCU2225-1BxC			Triac 1: Heating DAO Triac 2: Lighting On/Off	Triac 1: Cooling DAO Triac 2: not used	3-Speed Fan
AD-TCU1225-1BxD **AD-TCU1225-1CxD***			Triac 1: } Heating PAO Triac 2: }	Triac 1: } Cooling PAO Triac 2: }	On/Off Fan
AD-TCU2225-1BxD			Triac 1: } Heating PAO Triac 2: }	Triac 1: } Cooling PAO Triac 2: }	3-Speed Fan
AD-TCU1225-1BxE			Triac 1: } Heating Stage 1 Triac 2: } Heating Stage 2	Triac 1: } Cooling Stage 1 Triac 2: } Cooling Stage 2	On/Off Fan
AD-TCU2225-1BxE			Triac 1: } Heating Stage 1 Triac 2: } Heating Stage 2	Triac 1: } Cooling Stage 1 Triac 2: } Cooling Stage 2	3-Speed Fan
AD-TCU1215-1BxF **AD-TCU1215-1CxF***			Triac 1: Heating On/Off Triac 2: Lighting On/Off	Analog 0 - 10 VDC Cooling	On/Off Fan
AD-TCU2215-1BxF			Triac 1: Heating On/Off Triac 2: Lighting On/Off	Analog 0 - 10 VDC Cooling	3-Speed Fan
AD-TCU1215-1BxG **AD-TCU1215-1CxG***			Triac 1: Heating DAO Triac 2: Lighting On/Off	Analog 0 - 10 VDC Cooling	On/Off Fan
AD-TCU2215-1BxG			Triac 1: Heating DAO Triac 2: Lighting On/Off	Analog 0 - 10 VDC Cooling	3-Speed Fan
AD-TCU1215-1BxH **AD-TCU1215-1CxH***			Triac 1: } Heating PAO Triac 2: }	Analog 0 - 10 VDC Cooling	On/Off Fan
AD-TCU2215-1BxH			Triac 1: } Heating PAO Triac 2: }	Analog 0 - 10 VDC Cooling	3-Speed Fan
AD-TCU1215-1BxJ **AD-TCU1215-1CxJ***			Triac 1: } Heating Stage 1 Triac 2: } Heating Stage 2	Analog 0 - 10 VDC Cooling	On/Off Fan
AD-TCU2215-1BxJ			Triac 1: } Heating Stage 1 Triac 2: } Heating Stage 2	Analog 0 - 10 VDC Cooling	3-Speed Fan
AD-TCU1215-1DxB			Triac 1: } Heating On/Off Triac 2: } Cooling On/Off	Analog 0 - 10 VDC Variable-Speed Fan	Lighting On/Off
AD-TCU1215-1DxC			Triac 1: } Heating DAO Triac 2: } Cooling DAO	Analog 0 - 10 VDC Variable-Speed Fan	Lighting On/Off

Notes

* Models operate with Condensation Sensor (BI1) to close cooling valve, (AD-TCU1205-1CBA, for example).
Hardware setpoint range: x = A for 12 to 28°C x = B for ±3°C
Outputs 1 and 2 are powered from 24 VAC supply with a maximum total output capacity of 60 VA
Analog outputs are direct acting for normally closed valves. Reverse acting outputs available on special request

** Models operate with binary hardware input (BI1) to set Heat/Cool mode (AD-TCU1215-1EAA for example). Other models use Source Temperature input

For further information and additional models see Product Installation Guide

Johnson Controls

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Unit Controller

230 VAC Models

Ordering Codes	Application	Power Supply	Output Configuration		
			Output 1 (2 x Triac – 230VAC)	**Output 2 (2 x Triac – 230VAC)**	**Output 3 (Relay)**
AD-TCU3245-1AxB **AD-TCU3245-1ExB****	Two-pipe Fan Coil Unit	230 VAC, ±10% at 50/60 Hz (690 VA max. for fan motor – triacs separatly powered)	Triac 1: Heat/Cool On/Off Triac 2: not used	Triac 1: not used Triac 2: Lighting On/Off	On/Off Fan
AD-TCU4245-1AxB **AD-TCU4245-1ExB****			Triac 1: Heat/Cool On/Off Triac 2: not used	Triac 1: not used Triac 2: Lighting On/Off	3-Speed Fan
AD-TCU3245-1AxC **AD-TCU3245-1ExC****			Triac 1: Heat/Cool DAO Triac 2: not used	Triac 1: not used Triac 2: Lighting On/Off	On/Off Fan
AD-TCU4245-1AxC **AD-TCU4245-1ExC****			Triac 1: Heat/Cool DAO Triac 2: not used	Triac 1: not used Triac 2: Lighting On/Off	3-Speed Fan
AD-TCU3245-1AxD **AD-TCU3245-1ExD****			Triac 1: } Heat/Cool PAO Triac 2: }	Triac 1: not used Triac 2: Lighting On/Off	On/Off Fan
AD-TCU4245-1AxD **AD-TCU4245-1ExD****			Triac 1: } Heat/Cool PAO Triac 2: }	Triac 1: not used Triac 2: Lighting On/Off	3-Speed Fan
AD-TCU3245-1BxB **AD-TCU3245-1CxB***	Four-pipe Fan Coil Unit (or separate heating and cooling sources)	230 VAC, ±10% at 50/60 Hz (690 VA max. for fan motor – triacs separatly powered)	Triac 1: Heating On/Off Triac 2: Lighting On/Off	Triac 1: Cooling On/Off Triac 2: not used	On/Off Fan
AD-TCU4245-1BxB			Triac 1: Heating On/Off Triac 2: Lighting On/Off	Triac 1: Cooling On/Off Triac 2: not used	3-Speed Fan
AD-TCU3245-1BxC **AD-TCU3245-1CxC***			Triac 1: Heating DAO Triac 2: Lighting On/Off	Triac 1: Cooling DAO Triac 2: not used	On/Off Fan
AD-TCU4245-1BxC			Triac 1: Heating DAO Triac 2: Lighting On/Off	Triac 1: Cooling DAO Triac 2: not used	3-Speed Fan
AD-TCU3245-1BxD **AD-TCU3245-1CxD***			Triac 1: } Heating PAO Triac 2: }	Triac 1: } Cooling PAO Triac 2: }	On/Off Fan
AD-TCU4245-1BxD			Triac 1: } Heating PAO Triac 2: }	Triac 1: } Cooling PAO Triac 2: }	3-Speed Fan
AD-TCU3245-1BxE			Triac 1: } Heating Stage 1 Triac 2: } Heating Stage 2	Triac 1: } Cooling Stage 1 Triac 2: } Cooling Stage 2	On/Off Fan
AD-TCU4245-1BxE			Triac 1: } Heating Stage 1 Triac 2: } Heating Stage 2	Triac 1: } Cooling Stage 1 Triac 2: } Cooling Stage 2	3-Speed Fan

Notes

* Models operate with Condensation Sensor (BI1) to close cooling valve, (AD-TCU3245-1CBC, for example)
Hardware setpoint range: x = A for 12 to 28°C x = B for ±3°C
Outputs 1 and 2 are externally powered at 230 VAC with a maximum output capacity of 1 ampere for each triac

** Models operate with binary hardware input (BI1) to set Heat/Cool mode (AD-TCU3245-1EAB for example). Other models use Source Temperature input.

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Unit Controller

230 VAC Models

Ordering Codes	Application	Power Supply	Output Configuration		
			Output 1 (Analog or 2 x Triac)	**Output 2 (Analog or 2 x Triac)**	**Output 3 (Relay)**
AD-TCU5215-1AxA **AD-TCU5215-1ExA****	Two-pipe Fan Coil Unit	230 VAC, ±10% at 50/60 Hz (includes 6 VA max. for controlled devices at 24 VAC ± 15% and 690 VA max. for fan motor)	Triac 1: not used Triac 2: Lighting On/Off	Analog 0 - 10 VDC Heating/Cooling	On/Off Fan
AD-TCU6215-1AxA **AD-TCU6215-1ExA****			Triac 1: not used Triac 2: Lighting On/Off	Analog 0 - 10 VDC Heating/Cooling	3-Speed Fan
AD-TCU5225-1AxB **AD-TCU5225-1ExB****			Triac 1: Heat/Cool On/Off Triac 2: not used	Triac 1: not used Triac 2: Lighting On/Off	On/Off Fan
AD-TCU6225-1AxB **AD-TCU6225-1ExB****			Triac 1: Heat/Cool On/Off Triac 2: not used	Triac 1: not used Triac 2: Lighting On/Off	3-Speed Fan
AD-TCU5225-1AxC **AD-TCU5225-1ExC****			Triac 1: Heat/Cool DAO Triac 2: not used	Triac 1: not used Triac 2: Lighting On/Off	On/Off Fan
AD-TCU6225-1AxC **AD-TCU6225-1ExC****			Triac 1: Heat/Cool DAO Triac 2: not used	Triac 1: not used Triac 2: Lighting On/Off	3-Speed Fan
AD-TCU5225-1AxD **AD-TCU5225-1ExD****			Triac 1: } Heat/Cool PAO Triac 2: }	Triac 1: not used Triac 2: Lighting On/Off	On/Off Fan
AD-TCU6225-1AxD **AD-TCU6225-1ExD****			Triac 1: } Heat/Cool PAO Triac 2: }	Triac 1: not used Triac 2: Lighting On/Off	3-Speed Fan
AD-TCU5205-1BxA **AD-TCU5205-1CxA***	Four-pipe Fan Coil Unit (or separate heating and cooling sources)	230 VAC, ±10% at 50/60 Hz (includes 6 VA max. for controlled devices at 24 V ± 15%) + 690 VA max. for fan motor)	Analog 0 - 10 VDC Heating	Analog 0 - 10 VDC Cooling	On/Off Fan
AD-TCU6205-1BxA			Analog 0 - 10 VDC Heating	Analog 0 - 10 VDC Cooling	3-Speed Fan
AD-TCU5225-1BxB **AD-TCU5225-1CxB***			Triac 1: Heating On/Off Triac 2: Lighting On/Off	Triac 1: Cooling On/Off Triac 2: not used	On/Off Fan
AD-TCU6225-1BxB			Triac 1: Heating On/Off Triac 2: Lighting On/Off	Triac 1: Cooling On/Off Triac 2: not used	3-Speed Fan
AD-TCU5225-1BxC **AD-TCU5225-1CxC***			Triac 1: Heating DAO Triac 2: Lighting On/Off	Triac 1: Cooling DAO Triac 2: not used	On/Off Fan
AD-TCU6225-1BxC			Triac 1: Heating DAO Triac 2: Lighting On/Off	Triac 1: Cooling DAO Triac 2: not used	3-Speed Fan
AD-TCU5225-1BxD **AD-TCU5225-1CxD***			Triac 1: } Heating PAO Triac 2: }	Triac 1: } Cooling PAO Triac 2: }	On/Off Fan
AD-TCU6225-1BxD			Triac 1: } Heating PAO Triac 2: }	Triac 1: } Cooling PAO Triac 2: }	3-Speed Fan
AD-TCU5225-1BxE			Triac 1: } Heating Stage 1 Triac 2: } Heating Stage 2	Triac 1: } Cooling Stage 1 Triac 2: } Cooling Stage 2	On/Off Fan
AD-TCU6225-1BxE			Triac 1: } Heating Stage 1 Triac 2: } Heating Stage 2	Triac 1: } Cooling Stage 1 Triac 2: } Cooling Stage 2	3-Speed Fan
AD-TCU5215-1BxF **AD-TCU5215-1CxF***			Triac 1: Heating On/Off Triac 2: Lighting On/Off	Analog 0 - 10 VDC Cooling	On/Off Fan
AD-TCU6215-1BxF			Triac 1: Heating On/Off Triac 2: Lighting On/Off	Analog 0 - 10 VDC Cooling	3-Speed Fan
AD-TCU5215-1BxG **AD-TCU5215-1CxG***			Triac 1: Heating DAO Triac 2: Lighting On/Off	Analog 0 - 10 VDC Cooling	On/Off Fan
AD-TCU6215-1BxG			Triac 1: Heating DAO Triac 2: Lighting On/Off	Analog 0 - 10 VDC Cooling	3-Speed Fan
AD-TCU5215-1BxH **AD-TCU5215-1CxH***			Triac 1: } Heating PAO Triac 2: }	Analog 0 - 10 VDC Cooling	On/Off Fan
AD-TCU6215-1BxH			Triac 1: } Heating PAO Triac 2: }	Analog 0 - 10 VDC Cooling	3-Speed Fan
AD-TCU5215-1BxJ **AD-TCU5215-1CxJ***			Triac 1: } Heating Stage 1 Triac 2: } Heating Stage 2	Analog 0 - 10 VDC Cooling	On/Off Fan
AD-TCU6215-1BxJ			Triac 1: } Heating Stage 1 Triac 2: } Heating Stage 2	Analog 0 - 10 VDC Cooling	3-Speed Fan
AD-TCU5215-1DxB			Triac 1: } Heating On/Off Triac 2: } Cooling On/Off	Analog 0 - 10 VDC Variable-Speed Fan	Lighting On/Off
AD-TCU5215-1DxC			Triac 1: } Heating DAO Triac 2: } Cooling DAO	Analog 0 - 10 VDC Variable-Speed Fan	Lighting On/Off

Notes

* Models operate with Condensation Sensor (BI1) to close cooling valve, (AD-TCU5205-1CBA, for example)
Hardware setpoint range: x = A for 12 to 28°C x = B for ±3°C
Outputs 1 and 2 are externally powered at 24 VAC with a maximum total output capacity of 6 VA
Analog outputs are direct acting for normally closed valves. Reverse acting outputs available on special request.

** Models operate with binary hardware input (BI1) to set Heat/Cool mode (AD-TCU5215-1EAA for example). Other models use Source Temperature input.

For further information and additional models see Product Installation Guide

Johnson Controls

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Unit Controller

Room Command Module (Direct Connect)

Ordering Codes	Description			
TM-1150-0000	Occupancy Button	NTC Sensor	w/o S.P. dial	---
TM-1160-0000			12 - 28 °C	
TM-1160-0005			±3 K	
TM-1160-0002			12 - 28 °C	3-Speed Fan Override
TM-1160-0007			±3 K	
TM-1170-0000		w/o Sensor	12 - 28 °C	---
TM-1170-0005			±3 K	
TM-1170-0002			12 - 28 °C	3-Speed Fan Override
TM-1170-0007			±3 K	
TM-1190-0000	---	NTC Sensor	12 - 28 °C	---
TM-1190-0005			±3 K	

Note
The TCU Fan Coil Unit Controller does not support the TM-9180 Room Command Module.

Software and Accessories

Ordering Codes	Description
TE-9100-8501	Unit Mount NTC Temperature Sensor (1.5 m cable)
COMM-PRO-1	TCU Commissioning Software for Windows (CD ROM)

AD-FCC and AD-FCD - *1/2 pages*

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Fan Coil Control Solution

The AD-FCC and AD-FCD Fan Coil Unit Controller are LonWorks® network compatible devices that provide direct digital control of a fan coil unit with heating and/or cooling coils, an electric heater and a three-speed fan.

The controller is designed for field installation or for mounting by original equipment manufacturers (OEMs). The space comfort set point, occupancy mode and fan speed may be adjusted from a room command module.

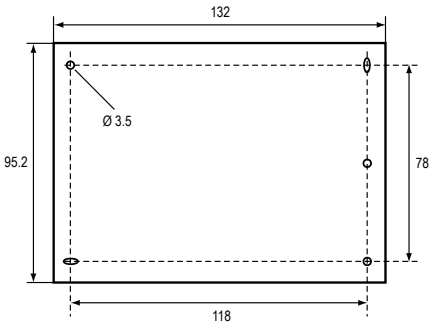
The AD-FCC connects to the TM-21x0 series module and the AD-FCD uses the AD-IRM1005 module with a digital LCD display. A LonWorks compatible Room Command Module may also be used when the controller is integrated into a LonWorks network. The controller complies with the LonMark® interoperability guidelines for sharing data with other network sensors and devices. Operating data can be monitored and controlled from a LonWorks compatible supervisory system, including the Metasys® NCM Network Control Module and NAE Network Automation Engine that integrate the fan coil unit controller into a facility-wide management network.

Features

- 230 VAC power
- Relay outputs at 230 VAC 3A for direct fan control
- Triac outputs at 230 VAC for heating and cooling valve control
- Relay output for electric heater control
- Temperature setpoint and fan speed override from attractively styled room command module with option for digital display
- Multiple modes of operation for various occupancy conditions
- Configuration and commissioning using any LonMark compatible LonWorks network or commissioning tool
- LonWorks peer-to-peer communications network
- LonMark Space Comfort Controller Profile
- LonWorks network connection to Metasys network controller

AD-IRM1005
Integrated Room Module with display

TM-2100
Series Room Module



Dimensions in mm

AD-FCC and AD-FCD - *2/2 pages*

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Fan Coil Control Solution

Ordering Codes	Description
Fan Coil Controller Modules	
AD-FCC4245-0	Fan Coil Controller with LonWorks® Interface, 230 VAC Power Supply, 2 x Triac Outputs (230 VAC PWM) for Heating/Cooling, Relay Output for Electric Heater (1.5KW), Relay Outputs for 3-speed Fan (3A).
AD-FCD4245-0	Fan Coil Controller with LonWorks® Interface, 230 VAC Power Supply, 2 x Triac Outputs (230VAC PWM) for Heating/Cooling, Relay Output for Electric Heater (1.5KW), Relay Outputs for 3-speed Fan (3A) and Serial Bus for AD-IRM1005 Room Module
Room Modules with Temperature Sensor (80 mm x 80 mm) for AD-FCC	
TM-2140-0000	Room Module, NTC 10K Sensor
TM-2150-0000	Room Module, NTC 10K Sensor, Occupancy Button
TM-2160-0000	Room Module, NTC 10K Sensor, Setpoint Dial 12 - 28 °C, Occupancy Button
TM-2160-0002	Room Module, NTC 10K Sensor, Setpoint Dial 12 - 28 °C, 3-speed Fan Override, Occupancy Button
TM-2160-0005	Room Module, NTC 10K Sensor, Setpoint Dial +/-, Occupancy Button
TM-2160-0007	Room Module, NTC 10K Sensor, Setpoint Dial +/-, 3-speed Fan Override, Occupancy Button
TM-2190-0000	Room Module, NTC 10K Sensor, Setpoint Dial 12 - 28 °C
Room Module with Temperature Sensor (80 mm x 80 mm) for AD-FCD and Accessories	
AD-IRM1005-0	Integrated Room Command Module with Serial Bus I/F (to AD-FCD Controller)
AD-IRCBL99S-0	Serial bus cable RJ9 to RJ9 – Length 30 cm
AD-IRCBL99L-0	Serial bus cable RJ9 to RJ9 – Length 6 m
AD-IRCKJ09-0	Connectors RJ9 - Pack of 50
TE-9100-8502	Unit Mount NTC 10k Temperature Sensor

AD-IRC - *1/2 pages*

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Integrated Room Control Solution

The Integrated Room Control Solution provides the control of the heating, cooling, lighting and sunblinds within an occupied space, such as an office or small conference room, in one coordinated control system with a single point of control interface for the occupant.

The AD-IRC Integrated Room Controller is a LonWorks® network compatible device that is the master device in the system. The AD-IRC provides direct digital control of a fan coil unit with heating and/or cooling coils, an electric heater and a three-speed fan. Alternatively it can control a chilled ceiling and heating radiators. It is mounted within the fan coil unit or other protective enclosure. One or two zones of lighting in the space and optionally sunblinds are controlled by AD-IRL, AD-IRS and AD-ILS slave modules that can be mounted directly in the ceiling void.

The space comfort set point, occupancy mode and fan speed may be adjusted from the AD-IRM Integrated Room Command Module. From the same module the occupant can switch and adjust the lighting level and operate the sunblinds. The controller complies with the LonMark® interoperability guidelines for sharing data with other network sensors and devices. Operating data can be monitored and controlled from a LonWorks compatible supervisory system, including the Metasys® NCM Network Control Module and NAE Network Automation Engine that connect the integrated room control system into a facility-wide building management network

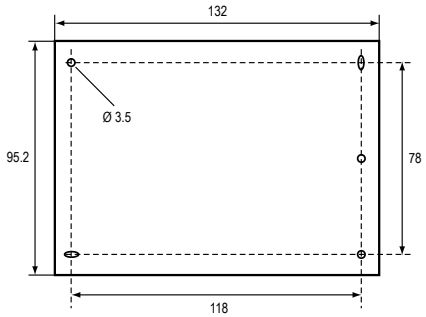
Features

- Single point of control for environmental comfort in the room for the occupants – temperature, lighting, sunblinds
- Attractively styled wall-mounted room command module with back-lit digital display and control buttons for lighting and sunblind
- Modular configuration of hardware for HVAC, lighting and sunblind control with simple serial bus inter-connection
- Each control module is separately powered by 230 VAC
- HVAC controller for FCU or chilled ceiling
  - Relay outputs at 230 VAC 3A for direct fan control
  - Triac outputs at 230 VAC or analog output at 0 - 10 VDC for heating and cooling valve control
  - Relay output for electric heater control
- Configuration and commissioning using any LonMark compatible LonWorks network or commissioning tool
- Multiple modes of operation for various occupancy conditions
- Single point of interface from integrated room control system to LonWorks network
- LonMark Space Comfort Controller Profile

AD-IRC Integrated Room Controller

IRM Integrated Room Module (80 mm x 120 mm)

AD-IRS Integrated Sunblind Control Module



Dimensions in mm

For further information and additional models see Product Installation Guide

Johnson Controls

AD-IRC - *2/2 pages*

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Integrated Room Control Solution

Ordering Codes	Description
Integrated Room Control Solution Components	
AD-IRC4205-0	IRC HVAC Controller with LonWorks® Interface and Serial Bus I/F (to IRC Lighting, Sunblind and Room Command Modules), 230 VAC Power Supply, 2 x Analog Outputs (0 - 10 V) for Heating/Cooling, Relay Output for Electric Heater (1.5KW), Relay Outputs for 3-speed Fan (3A)
AD-IRC4245-0	IRC HVAC Controller with LonWorks® Interface and Serial Bus I/F (to IRC Lighting, Sunblind and Room Command Modules), 230 VAC Power Supply, 4 x Triac Outputs (230 VAC PWM or INC/DEC) for Heating/Cooling, Relay Output for Electric Heater (1.5KW), Relay Outputs for 3-speed Fan (3A)
AD-ILS1035-0	IRC Lighting and Sunblind Module with Serial Bus I/F (to HVAC Controller), 230 VAC Power Supply, 2 x Lighting On/Off and 1 x Sunblind Outputs (230 VAC)
AD-IRL1025-0	IRC Lighting Module with Serial Bus I/F (to HVAC Controller), 230 VAC Power Supply, 2 x Lighting On/Off Outputs (230 VAC)
AD-IRL2025-0	IRC Lighting Module with Serial Bus I/F (to HVAC Controller), 230 VAC Power Supply, 2 x Lighting Outputs (230 VAC) with Dimming Control
AD-IRS1035-0	IRC Sunblind Module with Serial Bus I/F (to HVAC Controller), 230 VAC Power Supply, 3 x Sunblind Outputs (230 VAC)
AD-IRM1005-0	Integrated Room Command Module with Serial Bus I/F (to HVAC Controller) – HVAC only (80 mm x 80 mm)
AD-IRM1015-0	Integrated Room Command Module with Serial Bus I/F (to HVAC Controller) – 2 Lighting Control Buttons (80 mm x 120 mm)
AD-IRM1025-0	Integrated Room Command Module with Serial Bus I/F (to HVAC Controller) – 2 x Lighting + 1 x Sunblind Control Buttons (80 mm x 120 mm)
AD-IRM1035-0	Integrated Room Command Module with Serial Bus I/F (to HVAC Controller) – 2 Lighting + 2 x Sunblind Control Buttons (80 mm x 120 mm)
Integrated Room Control Solution Accessories	
TE-9100-8502	Unit Mount NTC 10k Temperature Sensor
AD-IRL1025CK-0	Connector Kit for AD-IRL1025-0 (Power + 2 x Lighting Circuit)
AD-IRL2025CK-0	Connector Kit for AD-IRL2025-0 (Power + 2 x Lighting/Dimming Circuit)
AD-IRS1035CK-0	Connector Kit for AD-IRS1035-0 (Power + 3 x Sunblind Circuit)
AD-ILS1035CK-0	Connector Kit for AD-ILS1035-0 (Power + 2 x Lighting + Sunblind Circuit)
AD-IRCBL911S-0	Serial bus cable RJ9 to RJ11 – Length 30 cm
AD-IRCBL911L-0	Serial bus cable RJ9 to RJ11 – Length 6 m
AD-IRCBL99S-0	Serial bus cable RJ9 to RJ9 – Length 30 cm
AD-IRCBL99L-0	Serial bus cable RJ9 to RJ9 – Length 6 m
AD-IRCKJ09-0	Connectors RJ9 - Pack of 50
AD-IRCKJ11-0	Connectors RJ11 - Pack of 50

DX-9121 - *1/3 pages*

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Digital Controller N2E

The DX-9121 LonWorks® Digital Controller, is the ideal digital control solution for multiple chiller or boiler plant control applications, for air handling units or for distributed lighting and related electrical equipment control applications.

The controller has both the hardware and software flexibility to adapt to the variety of control requirements in its targeted applications and can extend its input and output point capability by communicating with input/output (I/O) extension modules on an extension bus.

The controller provides monitoring and control of all connected points at an integral LED display and keyboard or from a separate DT-9100 display unit. The DT-9100 display unit, with a text and graphic LCD screen and keypad, provides a standard and customized presentation of data according to the application and customer requirements. Both the DX-9121 controller and the DT-9100 display unit can be mounted within an electrical enclosure or in a cabinet door, and the DT-9100 display unit can also be mounted directly onto the controller within a panel, on a wall or can be used as a portable device. Additionally, each controller can share data with other DX-9121 controllers on the same N2E bus.

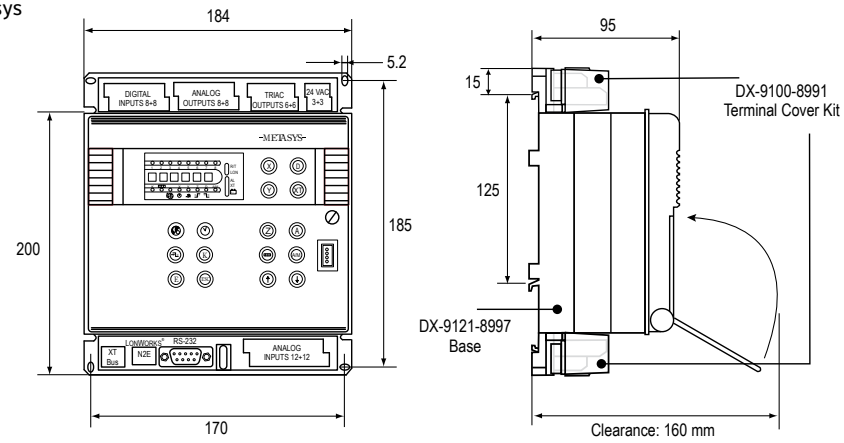
When the N2E bus is integrated into a Metasys® system, point and control information is available throughout the network and at all Metasys operator workstations.

DX-9121 Digital Controller with LED display and Keyboard in Cabinet Door Mounting Frame

DX-9121 Digital Controller - Black Box - on panel mounting Base

Features

- LonWorks® network communications (Metasys N2E)
- Dynamic data access capabilities with NCM and Metasys system network
- Full set of control algorithms in software modules
- Graphic configuration tool
- Standalone control
- Real-time clock and time programs
- Trend data storage
- Extension bus for additional I/O points
- Extension modules for a variety of analog and digital I/O combinations
- Model with integral display and control panel
- Text and graphic display unit (DT-9100)
- Extension modules with manual override switches



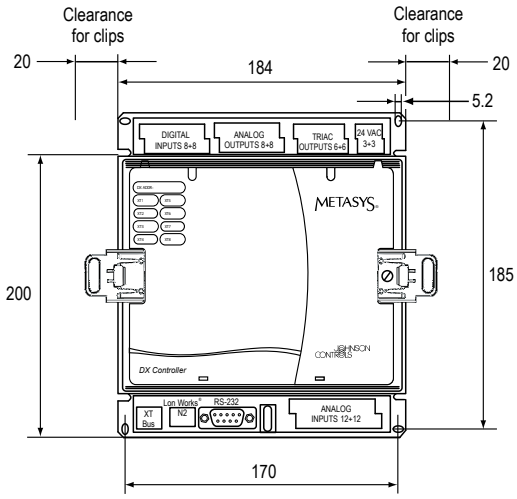
Dimensions in mm

Ordering Codes	Analog Inputs	Binary Inputs	Analog Outputs	Binary Outputs	Panel with LED Display	Power Supply	Communication Bus
DX-9121-8004	8	8	8	6	NO (Black Box)	24 VAC ±10%, 50/60 Hz	FTT
DX-9121-8454					YES		
	Jumper Selectable ■ RTD (1KΩ NI) ■ 0-10 VDC Transmitter ■ 0-20 mA Transmitter (4 max.)	Dry Contacts	Jumper Selectable ■ 0-10 VDC ■ 0-20 mA (4)	24 VAC Triacs at 0.5 amps			

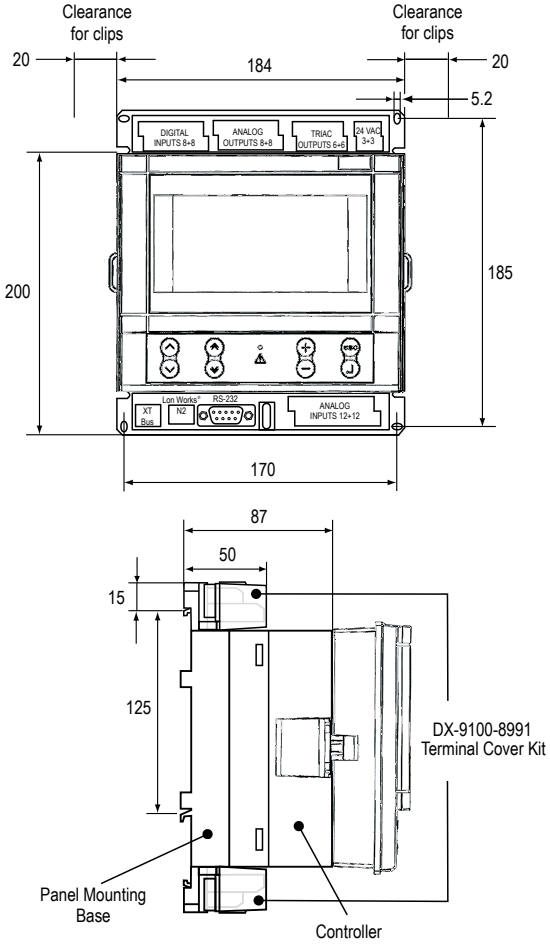
Note
Refer to DX-9200 Technical Bulletin for details of the LonWorks network interface specifications. LonWorks® is a Registered Trade Mark of Echelon Corp.

DX-9121 - *2/3 pages*

Digital Controller N2E

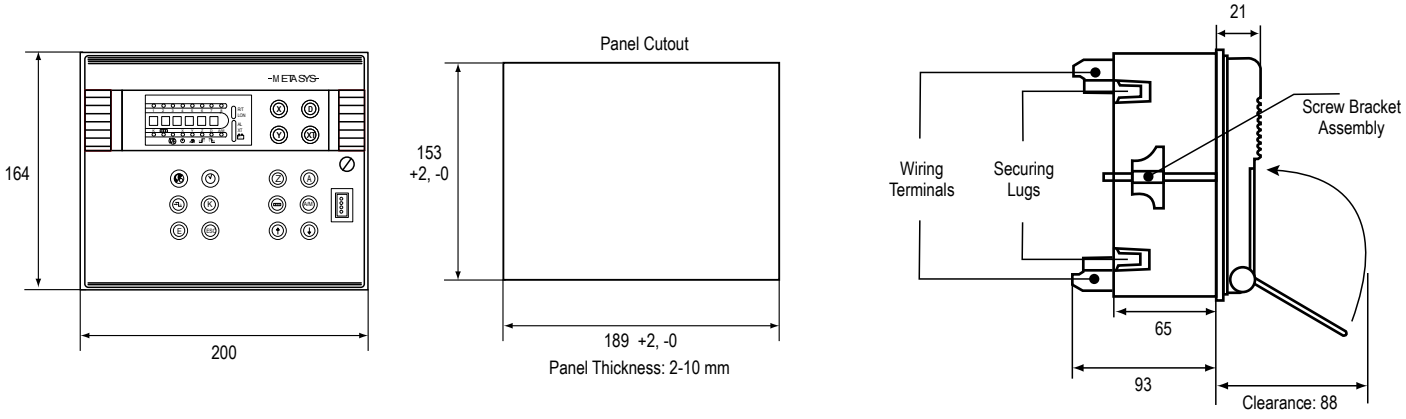


Black Box Controller DX-9121-8004
Dimensions in mm



Black Box Controller DX-9121-8004
with LCD Display DT-9100-8204
Dimensions in mm

Installation Details of the DX-9121-8454 Controller with Cabinet Door Mounting Frame



Front View

Side View

For further information and additional models see Product Installation Guide

Johnson Controls

DX-9121 - *3/3 pages*

Digital Controller N2E

DT-9100 Display Unit

Ordering Codes	Description	
DT-9100-8204	Display unit with panel mounting kit for DX-9121-8004	24 VAC ±10%, 4VA 50/60Hz or 9 to 12 VDC, 2 VA
DT-9100-8902	Display unit wall mounting kit	
DT-9100-8901	12 VDC power supply for 230 VAC source	

Software and Accessories

Ordering Codes	Description
DX-9121-8997	Panel Mounting Base with Terminal Covers for DX-9121-8004 and DX-9121-8454
DX-9121-8996	Cabinet Door Mounting Frame for DX-9121-8454
DC-9100-8905	Access protection key for DX-9121-8454
DC-9100-6800	Lithium Battery

Note
For DX Configuration Tools Software contact your local Johnson Controls office.

DX-9200 - *1/3 pages*

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Digital Controller

The LonWorks® compatible digital controller, DX-9200 Series, is the ideal digital control solution for air handling unit or distributed lighting and related electrical equipment control applications. The controller has both the hardware and software flexibility to adapt to the variety of control requirements in its targeted applications and can extend its input and output point capability by communicating with input/output (I/O) modules on an extension bus.

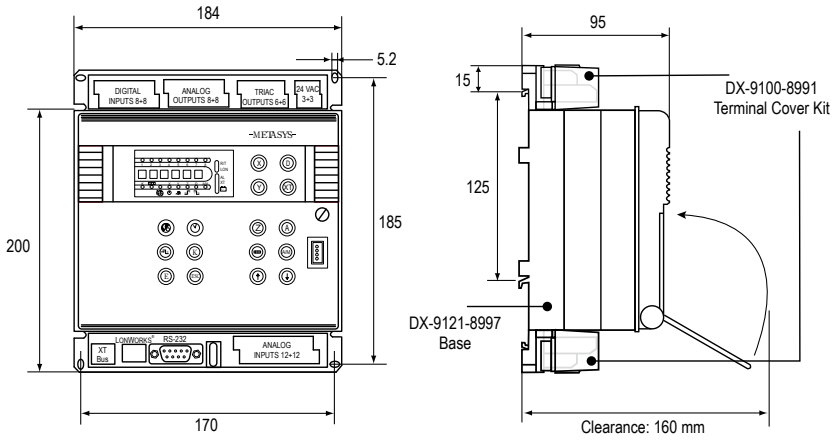
The controller provides monitoring and control of all connected points at an integral LED display and keyboard or from a separate DT-9100 display unit. The DT-9100 display unit, with a text and graphic LCD screen and keypad, provides a standard and customized presentation of data according to the application and customer requirements. Both the DX-9200 controller and the DT-9100 display unit can be mounted within an electrical enclosure or in a cabinet door, and the DT-9100 display unit can also be mounted directly onto the controller within a panel, on a wall or can be used as a portable device. Additionally, the controller can share data with other LonMark® compatible devices on the same LonWorks network. When the LonWorks network is integrated into a Metasys® system, point and control information is available throughout the network and at all Metasys operator workstations.

DX-9200 Digital Controller with LED display and Keyboard in Cabinet Door Mounting Frame

DX-9200 Digital Controller - Black Box - on panel mounting Base

Features

- LonWorks® compatible network variable interface FTT
- Integration into Metasys system network via NAE
- Dynamic data access capabilities with Metasys system network
- Full set of control algorithms in software modules
- Graphic configuration tool software
- Standalone control of HVAC and other equipment
- Real-time clock and time programs
- Extension bus for additional I/O points
- Extension modules for a variety of analog and digital I/O combinations
- Model with integral display and control panel
- Text and graphic display unit (DT-9100)
- Extension modules with manual override switches



Dimensions in mm

Ordering Codes	Analog Inputs	Binary Inputs	Analog Outputs	Binary Outputs	Panel with LED Display	Power Supply	Application
DX-9200-8004-A	8	8	8	6	NO (Black Box)	24 VAC ±10%, 50/60Hz	Room and light control
DX-9200-8004-D							Air handling control
DX-9200-8454-A					YES		Room and light control
DX-9200-8454-D							Air handling control
	Jumper Selectable ■ RTD(1KΩ NI) ■ 0-10 VDC Transmitter ■ 0-20 mA Transmitter (4 max.)	Dry Contacts	Jumper Selectable ■ 0-10 VDC ■ 0-20 mA (4)	24 VAC Triacs at 0.5 amps			

Note
Refer to DX-9200 Technical Bulletin for details of the LonWorks network interface specifications. LonWorks® is a Registered Trade Mark of Echelon Corp.

DX-9200 - *2/3 pages*

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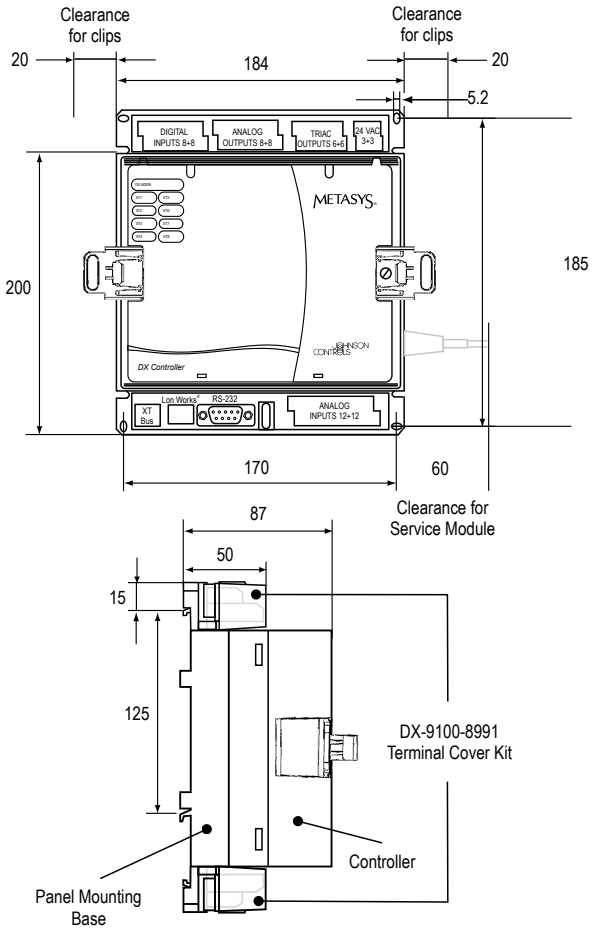
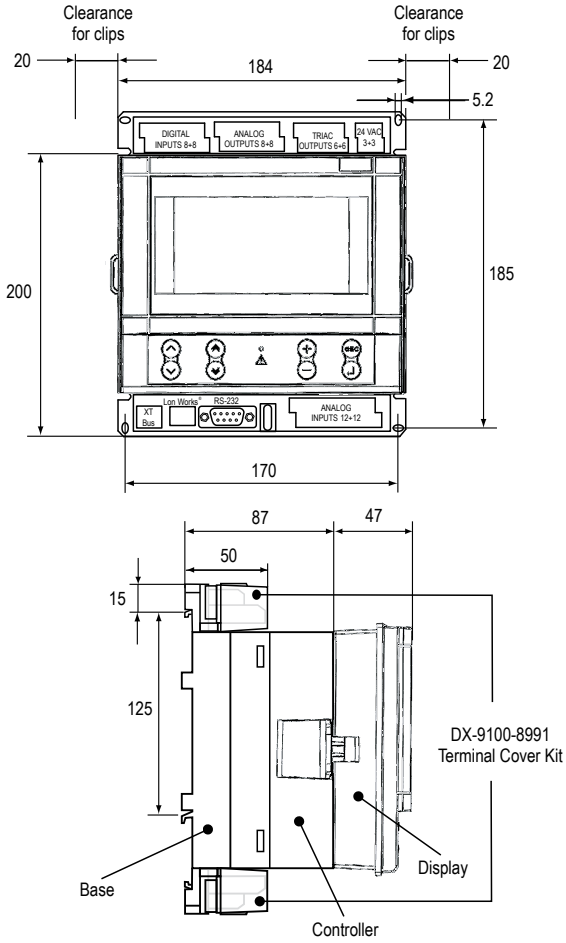
Digital Controller

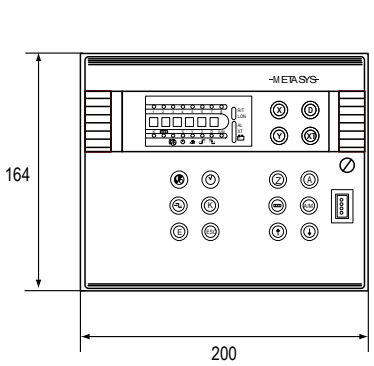


Black Box Controller DX-9200-8004-x
Dimensions in mm

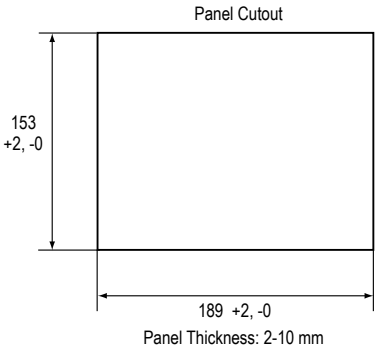


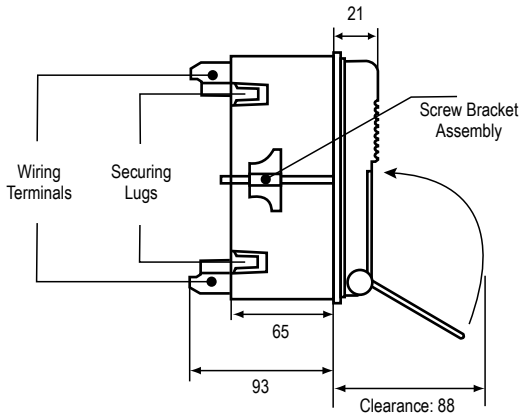
Black Box Controller DX-9200-8004-x with LCD Display DT-9100-8204
Dimensions in mm

Installation Details of the DX-9200-8454-x Controller with Cabinet Door Mounting Frame



Front View





Side View

DX-9200 - *3/3 pages*

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Digital Controller

DT-9100 Display Unit

Ordering Codes	Description	
DT-9100-8204	Display unit with panel mounting kit for DX-9200-8004-x	24 VAC ±10%, 4VA 50/60Hz or 9 to 12 VDC, 2 VA
DT-9100-8902	Display unit wall mounting kit	
DT-9100-8901	12 VDC power supply for 230 VAC source	

Software and Accessories

Ordering Codes	Description
DX-9200-8997	Panel Mounting Base with Terminal Covers for DX-9200-8454-x and DX-9200-8004-x
DX-9200-8996	Cabinet Door Mounting Frame for DX-9200-8454-x
DC-9100-8905	Access protection key for DX-9200-8454-x
DC-9100-6800	Lithium Battery

Note
For DX Configuration Tools Software contact your local Johnson Controls office.

DX-9100 - *1/3 pages*

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Extended Digital Controller

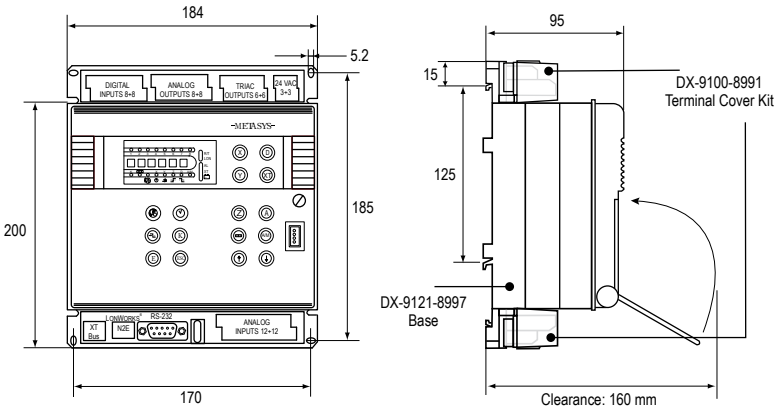
The DX-9100 Digital Controller is the ideal digital control solution for multiple chiller or boiler plant control applications, for air handling units or for distributed lighting and related electrical equipment control applications.
As a standalone controller, the DX has both the hardware and software flexibility to adapt to the control requirements in its targeted applications. Along with its outstanding control flexibility, the controller can extend its input and output point capability by communicating with input/output (I/O) extension modules on an extension bus. The controller provides monitoring and control of all connected points at an integral LED display and keyboard or from a separate DT-9100 display unit. The DT-9100 display unit, with a text and graphic LCD screen and keypad, provides a standard and customized presentation of data according to the application and customer requirements. Both the DX-9100 controller and the DT-9100 display unit can be mounted within an electrical enclosure or in a cabinet door, and the DT-9100 display unit can also be mounted directly onto the controller within a panel, on a wall or can be used as a portable device.
When the DX controller is integrated into a Metasys® system, point and control information is available throughout the network and at all Metasys operator workstations.

DX-9121 Digital Controller with LED display and Keyboard in Cabinet Door Mounting Frame

DX-9121 Digital Controller - Black Box - on panel mounting Base

Features

- Full set of control algorithms in software modules
- Graphic configuration tool
- Standalone control
- Real-time clock and time programs
- Trend data storage
- Extension bus for additional I/O points
- Extension modules for a variety of analog and digital I/O combinations
- Model with integral display and control panel
- Text and graphic display unit (DT-9100) – for one or up to eight DX controllers on N2 Bus network
- Extension modules with manual override switches
- N2 Bus communications
- Dynamic data access capabilities with Metasys system network



Dimensions in mm

Ordering Codes	Analog Inputs	Binary Inputs	Analog Outputs	Binary Outputs	Panel with LED Display	Power Supply	Communication Bus
DX-9100-8154	8	8	2	6	YES	24 VAC ±10%, 50/60 Hz	N2
DX-9100-8454			8				
DX-9100-8004					NO (Black Box)		

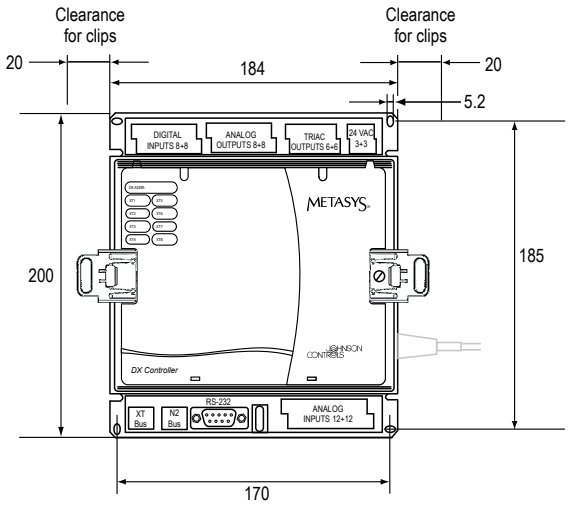
Note
Refer to DX-9100 Technical Bulletin for details of the N2 Bus installation specifications.

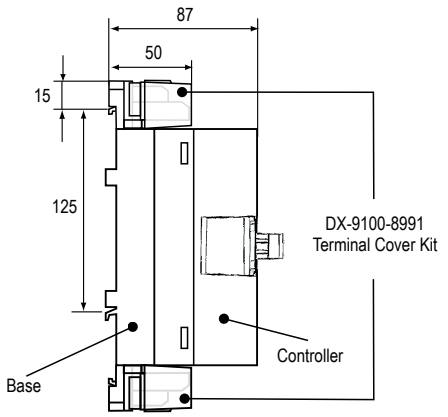
For further information and additional models see Product Installation Guide

Johnson Controls

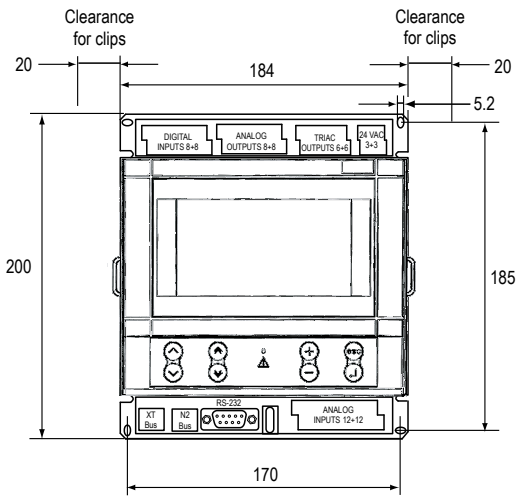
DX-9100 - *2/3 pages*

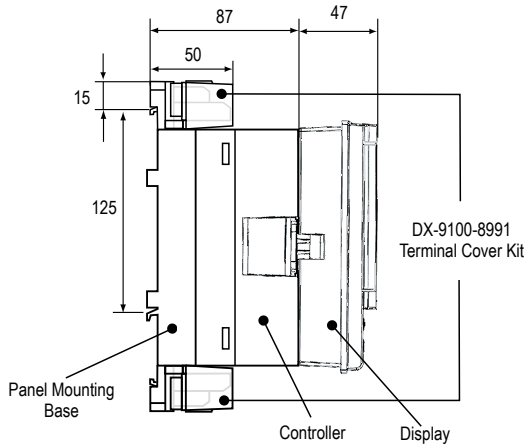
Extended Digital Controller





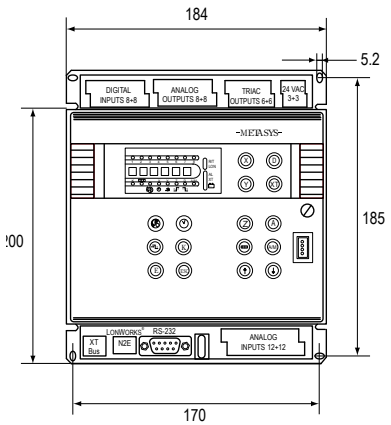
Black Box Controller DX-9100-8004
Dimensions in mm

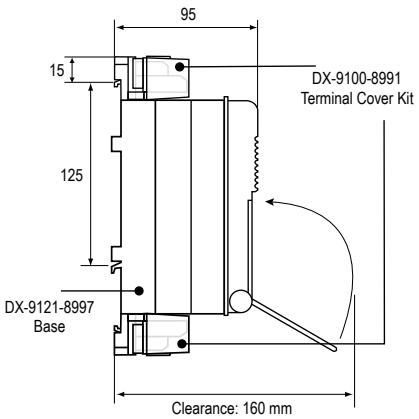




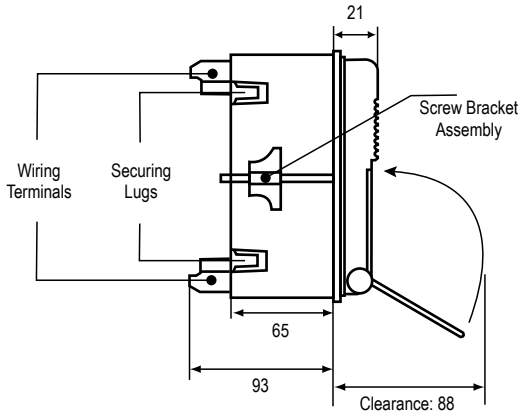
Black Box Controller DX-9100-8004
with LCD Display DT-9100-8204
Dimensions in mm

Installation Details of the DX-9100-8454 Controller with Cabinet Door Mounting Frame





Front View



Side View

For further information and additional models see Product Installation Guide

Johnson Controls

DX-9100 - *3/3 pages*

Extended Digital Controller

DT-9100 Display Unit

Ordering Codes	Description	
DT-9100-8204	Display unit with panel mounting kit for DX-9100-8004	24 VAC ±10%, 4 VA 50/60 Hz or 9 to 12 VDC, 2 VA
DT-9100-8902	Display unit wall mounting kit	
DT-9100-8901	12 VDC power supply for 230 VAC source	

Software and Accessories

Ordering Codes	Description
DX-9100-8997	Panel Mounting Base with Terminal covers for DX-9100-8454 and DX-9100-8004
DX-9100-8996	Cabinet Door Mounting Frame for DX-9100-8454
DC-9100-8905	Access protection key for DX-9100-8154 and DX-9100-8454
DC-9100-6800	Lithium Battery

Note:
For DX Configuration Tools Software contact your local Johnson Controls office.

XTM-905 / XT-9100 and XP /XT -910x

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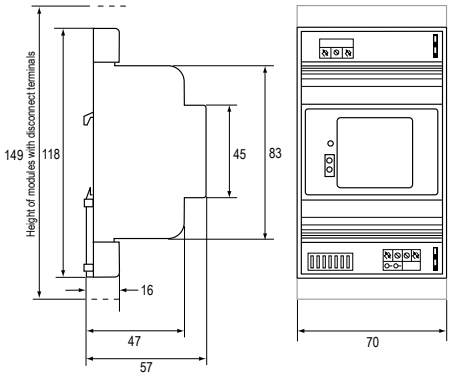
Extension Module and Expansion Modules

Extension Modules (XT-9100/XP910x or XTM-905/XPx) are submodules that provide various combinations of analog and binary input/output points. They may be mounted next to the DX-9100, DX-9121 or DX-9200 controller on the same DIN rail, or remotely, up to 1200 meters from the controller.

Up to eight submodule combinations can connect to the XT Bus of the DX controller, providing up to 64 additional I/O points. The XT Bus has the same physical characteristics as the Metasys N2 Bus



Dimensions in mm

XT-9100 and XT-910x Expansion Modules

Ordering Codes	Analog Inputs	Binary Inputs	Analog Outputs	Binary Outputs		Supply Voltage	Override
	0-10 V, 0/4-20 mA, Ni 1000, Pt1000, A99	Voltage free	0-10 V, 0-20 mA	Relay 250 VAC, 3A	Triac 24 VAC, 0.5 A		
XT-9100-8304	Extension Module for XP module connection to DX module					24 VAC ±10%, 50/60Hz	---
XP-9102-8304	6	---	2	---	---		
XP-9103-8304	---		---		8		
XP-9104-8304		4			4		
XP-9105-8304		8			---		
XP-9106-8304		---		4			

XTM-905/XPx Modules

Ordering Codes	Analog Inputs	Binary Inputs	Analog Outputs	Binary Outputs		Supply Voltage	Override
	0-10 V, 0/4-20 mA, Ni 1000, Pt1000, A99	Voltage free	0-10 V, 0-20 mA	Relay 250 VAC, 3A	Triac 24 VAC, 0.5A		
XTM-905-5	Extension Module for XPx expansion modules connection to DX module					24 VAC, +15% 50-60 Hz	---
XPA-421-5	4	---	---	---	---		Option on outputs
XPA-442-5	---	---	4				
XPA-821-5	6	---	2				
XPB-821-5	---	8	---		---		
XPM-401-5		4		2 (momentary)			
XPL-401-5				3 (mech. latch)			
XPE-401-5				3 (electric latch)			
XPE-404-5				4 (electric latch)			
XPT-401-5				---	4		
XPT-861-5		---			8		---

Accessories (order separately)

Ordering Codes	Description
TR-9100-8101	Transformer 230 V AC / 24 V AC, 9 VA

TC-9100

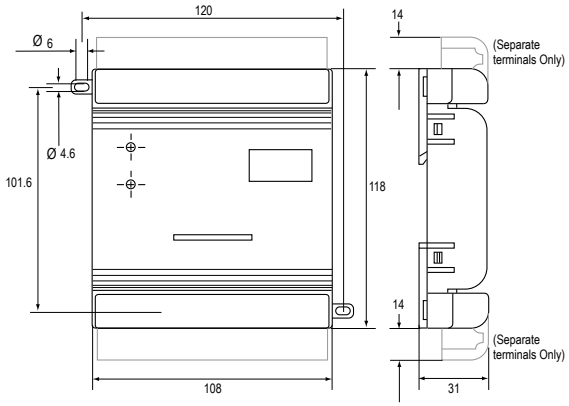
Page 149

Universal Controller

The TC-9100 Universal microprocessor-based DDC Controller provides room temperature control and is designed for use with HVAC terminal units having a heating and/or cooling function, with and without fan-assisted air circulation or flow control by damper positioning. Applications include fan coil units, hot-water radiators and cold ceilings, variable air volume (VAV) units, and small air handling units. The controller is fully configurable to provide a wide range of control strategies using its four analog inputs to measure temperatures and flow rates, its two digital inputs to detect environmental conditions such as space occupancy, window opening or fan failure, and its seven analog or binary outputs to control heating, cooling and air flow control devices. An RS-1100 or RS-1180 series room command module provides space temperature, set point adjust capabilities and a temporary occupancy override of the COMFORT, STANDBY and NIGHT operating modes of the controller. When connected to a communications bus, the controller provides operating data to a supervisory system, which also allows a user to modify control set points and to set the operating mode of the controller either manually or according to a time schedule. The TC-9100 controller is part of the System 91 series of controllers and is fully compatible with the Metasys network system.

Features

- Models designed for field and factory installation
- Analog and triac output types
- Fully configurable with software configuration tool
- Multiple modes of operation for various occupancy conditions
- Condensation sensor input to close cooling valve
- Window contact input to switch the controller to off mode
- Setpoint adjustment and mode override from room command module
- Low space temperature protection feature
- Winter and summer setpoint compensation
- N2 Bus communications for supervisory network
- Standalone operation
- Nonvolatile memory (EEPROM)
- Threaded mounting nut
- Factory mounted cable 1.2 m



Dimensions in mm

RS-1160 Room Command Module

RS-1180 Room Command Module

Ordering Codes	Description
TC-9100-x000*	TC-9100 Universal Controller with Analog Outputs
TC-9100-x001*	TC-9100 Universal Controller without Analog Outputs

Note

* x = 0 for controller with standard terminals
x = 1 with separable terminals

For TC-9100 Configuration Tools Software contact your local Johnson Controls office.

TC-9102 - *1/2 pages*

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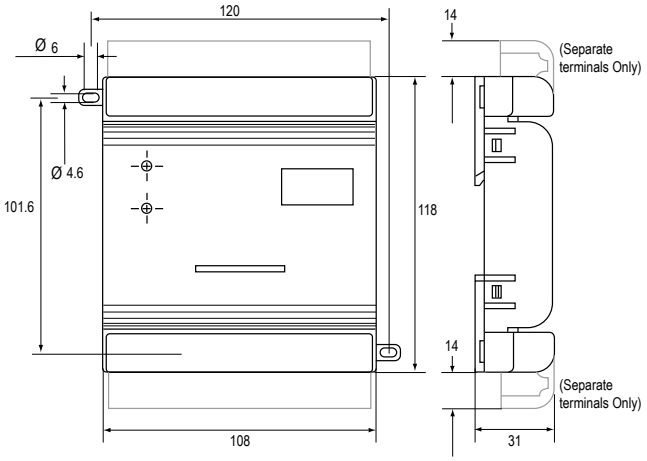
Fan Coil Unit Controller

The TC-9102 Series Fan Coil Unit Controller is designed for digital control of fan coil units with heating and/or cooling coils, and a single-speed, three-speed or variable-speed fan. The comfort set point and occupancy mode may be adjusted from the TM-1100 Series Room Command Module, which can also provide manual override of fan speed in three-speed fan applications. The controller is designed for field installation or for use by original equipment manufacturers. The fan coil unit controller can operate in stand-alone mode with local room override control, or it can communicate on the Metasys® N2 Bus, allowing monitoring and facility-wide control applications on the network.

Features

- Range of models designed for field and factory installations
- Relay outputs for fan control
- Choice of output types for heating and cooling control
- Software configuration tool
- Library of configurations for all models
- Multiple modes of operation for various occupancy conditions
- Setpoint adjustment and mode override from room command module
- Low space temperature protection feature
- Winter and summer setpoint compensation
- Window contact input to switch the controller to off mode
- N2 Bus communications for supervisory network
- Standalone operation
- Nonvolatile memory (EEPROM)



Dimensions in mm

For further information and additional models see Product Installation Guide

Johnson Controls

TC-9102 - *2/2 pages*

Page 151

Fan Coil Unit Controller

Ordering Codes*	Outputs		Set point Range
TC-91a2-b220	0 to 10 VDC Fan Control	2 x 0 to 10 VDC	12 - 28 °C
TC-91a2-b225			±3 K
TC-91a2-b440		2 x DAT	12 - 28 °C
TC-91a2-b445			±3 K
TC-91a2-b550		2 x PAT	12 - 28 °C
TC-91a2-b555			±3 K
TC-91a2-b660		2 x 2 Stage On/Off	12 - 28 °C
TC-91a2-b665			±3 K
TC-91a2-b221	On/Off Fan	2 x 0 to 10 VDC	12 - 28 °C
TC-91a2-b226			±3 K
TC-91a2-b441		2 x DAT	12 - 28 °C
TC-91a2-b446			±3 K
TC-91a2-b551		2 x PAT	12 - 28 °C
TC-91a2-b556			±3 K
TC-91a2-b661		2 x 2 Stage On/Off	12 - 28 °C
TC-91a2-b666			±3 K
TC-91a2-b222	3-Speed Fan	2 x 0 to 10 VDC	12 - 28 °C
TC-91a2-b227			±3 K
TC-91a2-b442		2 x DAT	12 - 28 °C
TC-91a2-b447			±3 K
TC-91a2-b552		2 x PAT	12 - 28 °C
TC-91a2-b557			±3 K
TC-91a2-b662		2 x 2 Stage On/Off	12 - 28 °C
TC-91a2-b667			±3 K

Note

* **a = 0** Controller for remote set point; **a = 1** with integral set point
b = 0 Controller with standard terminals; **b = 1** with separable terminals

Software and Accessories

Ordering Codes	Description
TE-9100-8501	Unit Mount NTC Temperature Sensor (1.5-m cable)
TC-9100-TOOL	Commissioning Software for DOS (3.5" diskette)

Note

For TC Configuration Tools Software contact your local Johnson Controls office.

TC-9109 - *1/2 pages*

Page 152

Heating/Cooling Controller with Condensation Sensor

The TC-9109 Series of microprocessor-based controllers is designed for heating and cooling control applications with water valves, and provides an optional connection for a condensation sensor to close the cooling valve.

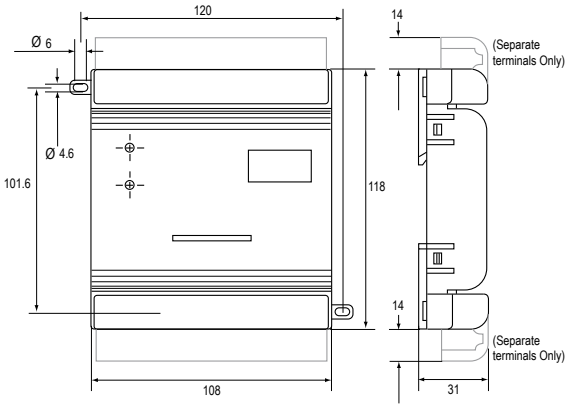
A typical application is for chilled beam ceilings.

The comfort temperature set point of the controller may be adjusted via a TM-1100 Series Room Command Module, and the occupied and unoccupied control modes of operation temporarily changed. A window open sensing contact may be connected to switch the controller to the off mode, and a low temperature limit protection feature is included. The controller is designed for field installation or for use by original equipment manufacturers.

The heating/cooling controller can operate in stand-alone mode with local room override control, or it can communicate on the Metasys® N2 Bus, allowing monitoring and facility-wide control applications on the network.

Features

- Range of models designed for field and factory installations
- Choice of output types for heating and cooling control
- Software configuration tool
- Library of configurations for all models
- Multiple modes of operation for various occupancy conditions
- Condensation sensor input to close cooling valve
- Window contact input to switch the controller to off mode
- Setpoint adjustment and mode override from room command module
- Low space temperature protection feature
- Winter and summer setpoint compensation
- N2 Bus communications for supervisory network
- Standalone operation
- Nonvolatile memory (EEPROM)



Dimensions in mm

TM-1160 Room Command Module

TC-9109 - *2/2 pages*

Heating/Cooling Controller with Condensation Sensor

XTM-905/XPx Modules

Ordering Codes	Heating Output	Cooling Output	Set Point Range
TC-91a9-b204	0 to 10 VDC	0 to 10 VDC	12 - 28 °C
TC-91a9-b209			±3 K
TC-91a9-b440	DAT	DAT	12 - 28 °C
TC-91a9-b445			±3 K
TC-91a9-b404	DAT	0 to 10 VDC	12 - 28 °C
TC-91a9-b409			±3 K
TC-91a9-b550	PAT	PAT	12 - 28 °C
TC-91a9-b555			±3 K
TC-91a9-b504	PAT	0 to 10 VDC	12 - 28 °C
TC-91a9-b509			±3 K

Controller for remote setpoint: a = 0, with integral setpoint: a = 1
Controller with standard terminals: b = 0, with separable terminals: b = 1

Software and Accessories

Ordering Codes	Description
TE-9100-8501	Unit Mount NTC Temperature Sensor (1.5-m cable)
HX-9100-8001	Condensation (Dew Point) Sensor (Strap-on)
TC-9100-TOOL	Commissioning Software for DOS (3.5" diskette)

Note
For TC-9100 Configuration Tools Software contact your local Johnson Controls office.

VMA

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Variable Air Volume Controller

The Variable Air Volume Modular Assembly (VMA) is a family of configurable digital controllers. Differing models in the VMA1400 series combine a controller, pressure sensor and/or actuator housed in one pre-assembled unit.

The VMA1400 series is available in four models:

- Cooling Only (VMA1410)
- Cooling with Reheat and/or Fan
- (VMA1420)
- External Actuator (VMA1430)

The VMA1410, 1420, 1430 are designed for pressure-independent, single duct systems.
The VMA1420 and VMA1430 can also be used with parallel or series fan powered boxes, supply/exhaust applications, and dual duct systems.

Features

- Easy-to-handle unit with a compact footprint
- Pre-wired controller with pressure sensor and actuator for reduced installation time
- Fast response actuator that drives the damper from full open to full closed (90°)
- Continuous loop tuning through proportional adaptive algorithms using patented P-Adaptive and Pattern Recognition Adaptive Control (PRAC)

Ordering Codes	Inputs / Outputs	Point	Rating	Model			Description
				1410	1420	1430	
	Analog Inputs						
AP-VMA1410-0	Zone temperature	AI-1	1K Ni,Si, Pt, or 2.25 K NTC	▪	▪	▪	Integrated VAV Controller/Actuator/Pressure sensor (cooling only)
	Zone setpoint	AI-2	1.6 Kohm pot.meter	▪	▪	▪	
	Sideloop (humidity, dew point)	AI-3	0..10 VDC	---	▪	▪	
AP-VMA1420-0	Supply air temp. or supplemental heat temp.	AI-4	1K Ni,Si, Pt, or 2.25 K NTC	▪	▪	▪	Integrated VAV Controller/Actuator/Pressure sensor (w/ Reheat and Fan-Powered)
AP-VMA1430-0	Velocity pressure	internal	0...374 pa	▪	▪	▪	Integrated VAV Controller/Pressure sensor (w/ Reheat and Fan-Powered)
	Binary Inputs						
	Tempory occupied/Standby	BI-1	Dry contact	▪	▪	▪	
	Occupied	BI-2		▪	▪	▪	
	Off or window or shutdown	BI-3		---	▪	▪	
	Analog Outputs						
	Proportional heat	AO-1 AO-2	0...10 VDC at 10 mA	---	▪	▪	
	Binary Outputs						
	Lights, Fan, Box Heat-Valve or 1-3 stage Electric, Supplement Heat-Valve or Single Stage Electric Box Heat, External Damper Actuator,	BO-1 BO-2 BO-3 BO-4 BO-5	24 VAC at 0.5 A each	---	▪	▪	
	Stepper Motor with Position Actuator	Internal	2-phase Stepper	▪	▪	---	

For further information and additional models see Product Installation Guide

Johnson Controls

SC-9100

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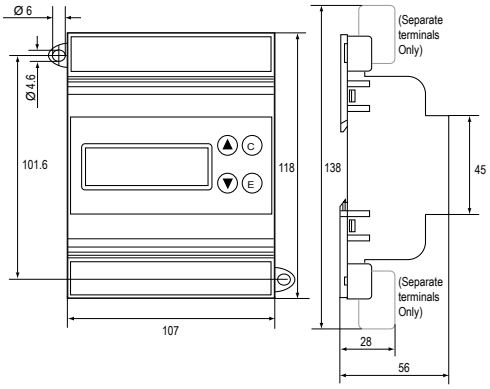
Controller

SC-9100 is a preconfigured, controller, designed for the control of heating, ventilation or air conditioning installations. The SC-9100 is a unique controller with multiple standard applications, which can be chosen from the controller's memory during installation. Parameters can be adapted to fit the exact requirements.
The display shows in clear text the inputs, outputs and main control information. The controller is protected to avoid unauthorized use (password).
The SC-9100 is a full stand-alone controller, and may be connected to an N2 communication bus as part of a JOHNSON CONTROLS Supervisory System.

The room command module SC-9180 may be connected to the SC-9100 to provide remote set point and real time clock.

Features

- Ready-to-use connection diagrams
- Great number of application programs available from a single controller
- Clear alpha-numeric backlighted display
- Removable connectors, DIN rail mounting or screw mounting
- Communication bus
- Real time clock option using SC-9180 room command module



Dimensions in mm

Ordering Codes	Application Examples	Analog Inputs				Binary Inputs		Analog Outputs			Binary Outputs				Supply Voltage 50/60 Hz
		AI1	AI2	AI3	AI4	DI1	DI2	AO1.1	AO1.2	AO2	TR1	TR2	REL	15 VDC	
SC-9100-8GEN-1*	Single loop, 1 output	▪	▪	▪	---	▪	▪	▪	---	---	▪	▪	---	---	24 VAC, +15%-10%
	Single loop, 2 output	▪	▪	▪	---	▪	▪	▪	---	▪	---	---	---	---	
	Outdoor air comp., 1 output	▪	▪	▪	---	▪	▪	▪	---	---	▪	▪	---	---	
	Outdoor air comp., 2 output	▪	▪	▪	---	▪	▪	▪	---	▪	---	---	---	---	
	Cascade, 1 output	▪	▪	▪	▪	▪	▪	▪	---	---	▪	▪	---	---	
	Cascade, 2 output	▪	▪	▪	▪	▪	▪	▪	---	▪	---	---	---	---	
	Single loop + limit, 1 output	▪	▪	---	---	▪	▪	▪	---	---	▪	▪	---	---	

Note
* The SC-9100 has models that are defined to local applications. For the local code numbers, please contact your nearest supplier.

Accessories (order separately)

Ordering Codes	Description
SC-9100-MK	Mounting kit for panel mount

SC-9180

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Room Command Module

The room command module SC-9180 with LCD display is designed for use with the SC-9100 series Easy DDC controller.

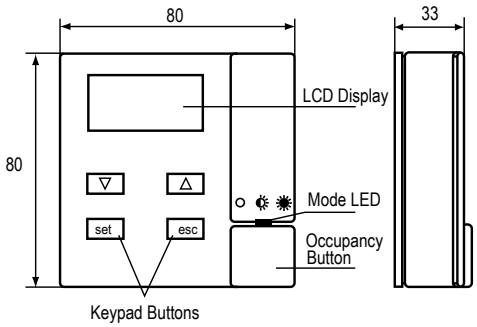
A Key pad and LCD display on the front of the module allow the room occupant to view and change the operating parameters of the connected SC-9100 controller.

In addition, an occupancy button enables the occupant to change the mode operation of the controller from “COMFORT” to “STANDBY” or to request a temporary “COMFORT” during “NIGHT” operation.

The current operating mode is shown by an LED indicator.

Features

- LCD display with decimal point
- Temperature and setpoint reading
- Weekly scheduling
- Occupancy button
- Clock back-up supply



Dimensions in mm

Ordering Codes	Displays	Temperature Sensor	Communications Interface	Mounting	Clock Back-up Supply	Mode Indicator
SC-9180-0000-W	Room Temperature	NTC Thermistor (sensor included)	Synchronous serial link	Direct surface mount	15 hours	Red LED to indicate: Comfort (ON) Standby (BLINK) Night/Off (OFF)

Accessories (order separately)

Ordering Codes	Description
TM-9100-8931-W	Plastic base for surface mount (white RAL 9010)
TM-9100-8941-W	Mounting kit for wall box (white RAL 9010)
TM-9100-8951-W	Mounting kit for panel mount (white RAL 9010)
TM-9100-8900	Tool for opening module
SC-9180-8900	20 m extension cable
TE-9100-8501	NTC element with 1.5 m cable
TE-8800-8902	Mounting kit for TE-9100-8501
TE-8800-8901	Rubber grommet for NTC sensor cable

V46 - *1/6 pages*

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Two-way Pressure Actuated Water Valves

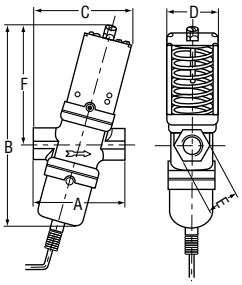
These pressure actuated modulating valves control the quantity of water to a condenser by directly sensing pressure changes in a refrigerant circuit.

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
- High refrigerant pressure resistant bellows
- Pressure actuated
- 3/8, 1/2, 3/4" are angled body type valves with high Kv 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



Valve Size	Dimension in mm					
	A	B	C	D	E	F
3/8"	69	153	66	43	18	89
1/2"	80	170	86	51	27	100
3/4"	91	183	95	55	36	110

V46 - *2/6 pages*

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Two-way Pressure Actuated Water Valves

Ordering Codes	Range (bar)	Body Style	Size Thread according to ISO 228	Style	Capillary Length	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 -9610						With special washer to prevent waterhammer at low flow capacity/nickel plated seat
V46AA -9602*				13	100	Nickel plated seat/longer capillary
V46AA -9950				34	75	Nickel plated seat/ solder connection
V46AA -9951*						.040" i.d.cap./solder connection
V46AB -9600			1/2"	13	75	---
V46AB -9950				34		Solder connection/ "062" id.cap
V46AC -9600			3/4"	13	75	---
V46AC -9606					120	Longer capillary
V46AC -9951				34	75	Solder connection
V46AA -9300	5...23	Angled	3/8"	5	-	---
V46AA -9301*						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	-	---
V46AB -9605				13	75	Nickel plated seat, high range
V46AB -9951				34	75 -	Solder connection,high range
V46AB -9510				50		High range
V46AC -9300			3/4"	5		---
V46AC -9605				13	75	Nickel plated seat, high range
V46AC -9502				50	140	Longer cap.
V46AC -9510					75	High range

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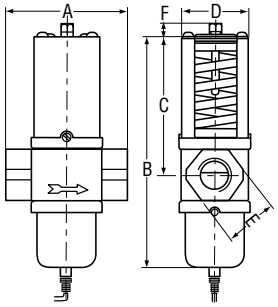
Two-way Pressure Actuated Water Valves

V46 Straight



Valve Size	Dimension in mm					
	A	B	C	D	E	F
1"	124	233	139	72	50	13
1¼"	125	243	145	72	58	13

Ordering Codes	Range (bar)	Body Style	Size Thread according to ISO 7-Rc	Style	Capillary Length	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		
V46AE -9300			1¼"	5	---	
V46AE -9510				50	75	
V46AE -9600				13	75	
V46AD -9511	10...23		1"	50	75	High range
V46AE -9512			1¼"			

For further information and additional models see Product Installation Guide

Johnson Controls

V46 - *4/6 pages*

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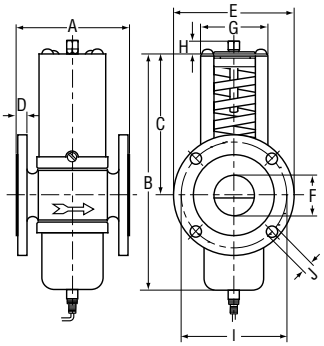
Two-way Pressure Actuated Water Valves

V46 Flanged



Valve Size	Dimensions in mm									
	A	B	C	D	E	F	G	H	I	J
1½"	137	244	144	18	150	47	67	13	110	18
2"	168	304	164	20	165	57	90	18	125	
2½"	172				185	70			145	

Ordering Codes	Range (bar)	Body Style	Size DIN2533 Flang Connections	Style	Capillary Length	Additional Features It is possible to change Style 13 into Style 45A by ordering KIT031N600
V46AR-9300	5...18	Straight	1½"	5	---	---
V46AR-9600				13	75	
V46AR-9700	7...14			15	---	For ammonia applications
V46AS-9300	5...11.5		2"	5		---
V46AS-9301	11...18					
V46AT-9300	5...11.5		2½"			
V46AT-9301	11...18					

V46 - *5/6 pages*

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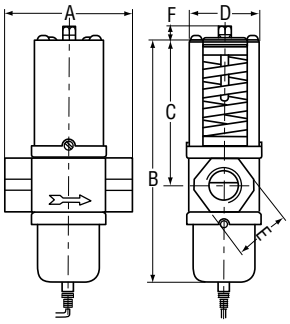
Two-way Pressure Actuated Water Valves

V46 Straight



Valve Size	Dimension in mm					
	A	B	C	D	E	F
3/8"	68	161	80	42	32	10
1/2"	79	165	86	52	29	
3/4"	86	175	96	55	35	
1"	124	246	139	71	39	13
1¼"		254	144		48	

Ordering Codes	Range (bar)	Body Style	Size thread according to ISO 228	Style	Capillary Length	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"			
V46BD-9601					120	Longer capillary
V46BE-9510			1¼"	50	75	---
V46BE-9600				13		
V46BE-9601					120	Longer capillary
V46BA-9510	5 ...23		3/8"	50	75	---
V46BB-9510			1/2"			
V46BC-9510			3/4"			
V46BC-9511					140	Longer capillary
V46BD-9510	10...23		1"		75	---
V46BE-9511			1¼"		150	Longer capillary

For further information and additional models see Product Installation Guide

Johnson Controls

V46 - *6/6 pages*

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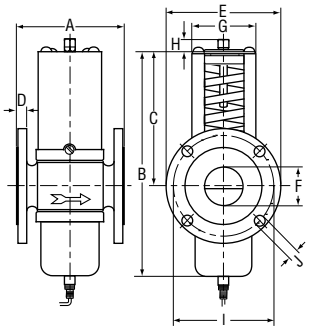
Two-way Pressure Actuated Water Valves

V46 Flanged



Valve Size	Dimensions in mm									
	A	B	C	D	E	F	G	H	I	J
1½"	135	244	144	14	150	47	67	13	110	18
2"	162	304	164	16	165	57	90	18	125	
2½"	172				185	70			145	

Ordering Codes	Range (bar)	Body Style	Size DIN 86021 flange connections	Style	Capillary Length
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"		
V46BT-9301	11...18				

For further information and additional models see Product Installation Guide

Johnson Controls

V46SA

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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.

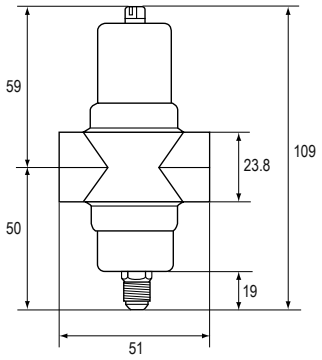
Rubber diaphragms seal the water away from the range spring and bellows part so these are not submerged in water where they would be subject to sedimentation and corrosion.

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 Codes	Range (bar)	Body Style	SizeThread according to ISO 228	Style	Capillary Length	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

V47 - *1/2 pages*

Page 164

Temperature Actuated Water Valves

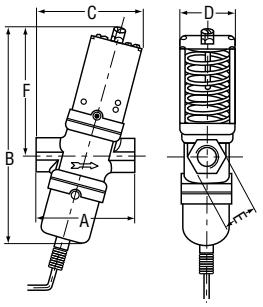
These modulating water valves can be used for heating applications. It does have an heating element which means that the bulb temperature always must be higher than the valve body (power element).

The valve opens at increasing bulb temperature.

The bulb must be mounted pointing downwards up to horizontal.

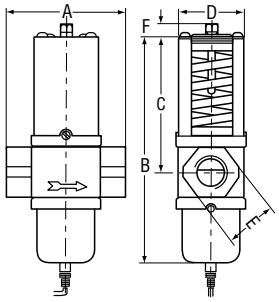
Features

- Pressure balanced valve design
- 3/8, 1/2, 3/4" are angled body type valves with high Kv value
- Quick opening valve characteristics
- No close fitting or sliding parts in water passages
- Easy to disassemble. All parts can be replaced
- Special bronze bodies



Valve Size	Dimension in mm					
	A	B	C	D	E	F
3/8"	69	153	66	43	18	89
1/2"	80	170	86	51	27	100
3/4"	91	*183*	95	55	36	110

Ordering 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"		



Valve Size	Dimensions in mm					
	A	B	C	D	E	F
1"	124	233	139	72	50	13
1¼"	125	243	145		58	

Ordering 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		1¼"		
V47AE -9161	46...82				

V47 - *2/2 pages*

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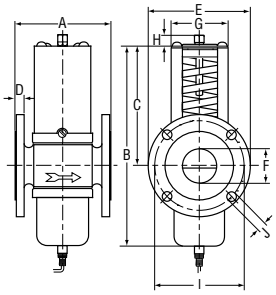
Temperature Actuated Water Valves

V47 Flanged



Valve Size	Dimensions in mm									
	A	B	C	D	E	F	G	H	I	J
1½"	137	244	144	18	150	47	67	13	110	18
2"	168	304	164	20	165	57	90	18	125	
2½"	172				185	70			145	

Ordering Codes	Range °C	Body Style	Size DIN 2533 flange connections	Capillary Length	Bulb Style 4 Length mm
V47AR -9160	24...57	Straight	1½"	1.8 m arm.	152
V47AR -9161	46...82				

For further information and additional models see Product Installation Guide

Johnson Controls

V48 - *1/2 pages*

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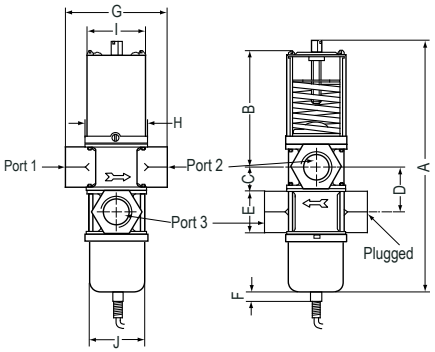
Three-way Pressure Actuated Water Valves

These watervalves 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 Kv values
- Pressure actuated
- Can be used as mixing or diverting valve

Commercial type

Valve Size	Dimensions in mm									
	A	B	C	D	E	F	G	H	I	J
1/2"	192	91	19	41	30	8	82	52	48	52
3/4"	208	100	23	45	36		88	56	52	56
1"	287	142	25	51	50		124	71	67	72
1¼"	296	141	31	61	58		127			71

Maritime type

3/4 "	203	97	22	45	35	9	95	55	52	55

Ordering Codes	Range (bar)	Body Style	Size thread according to ISO 228	Style	Capillary Length	Additional Features It is possible to change Style 13 into Style 45A by ordering KIT031N600
V48AB -9510	4...20	Straight	1/2"	50	75	---
V48AB -9600	4...16			13		
V48AC -9510	4...20		3/4"	50		
V48AC -9600	4...16			13		
			According to ISO 7-Rc			
V48AD -9510	6...20	Straight	1"	50	75	---
V48AD -9600	4...16			13		
V48AD -9602	4...16					Bodies in line (port 3 below port 2)
V48AE -9510	6...20		1¼ "	50		---
V48AE -9600	4...16			13		

Maritime types

			Size thread according to ISO 228			
V48BC -9600	4...16	Straight	3/4"	13	75	Seawater resistant

V48 - *2/2 pages*

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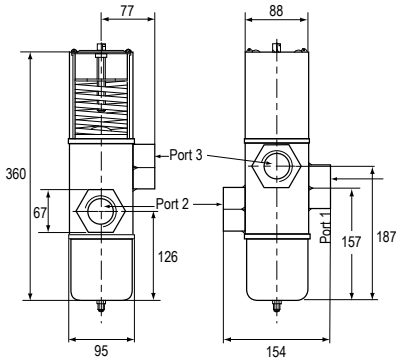
Three-way Pressure Actuated Water Valves



Commercial type

Valve Size	Dimension in mm									
	A	B	C	D	E	F	G	H	I	J
1/2"	192	91	19	41	30	8	82	52	48	52
3/4"	208	100	23	45	36		88	56	52	56
1"	287	142	25	51	50		124	71	67	72
1¼"	296	141	31	61	58		127			71

Maritime type

3/4"	203	97	22	45	35	9	95	55	52	55

Commercial types

Ordering Codes	Range (bar)	Body Style	Size Thread According to ISO 228	Style	Capillary Length	Additional Features It is possible to change Style 13 into Style 45A by ordering KIT031N600
V48AF-9300	6...14	Straight	1 1/2"	5	?????	---

Maritime type

			According to ISO 228			
V48BC-9600	4...16	Straight	3/4"	13	75	Seawater resistant

MR10 - *1/4 pages*

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Compressor and Defrost Management

The MR10 range of controllers has been specifically designed for 'static' or 'ventilated' refrigeration units working at positive or negative temperatures.
It incorporates all the features needed by modern units such as compressor and evaporator fan full management, 'off-cycle' or 'active' defrost control.

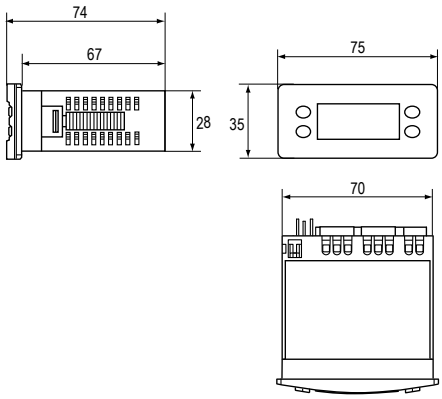
The MR10 offers the basic features for a complete solution maintaining the cost at a very competitive level.

Its style has been particularly studied in order to better suit your machine design.

Features

- Attractive Panel mount enclosure
- Up to 4 relays in a single package
- Up to 16A thermostat output
- 230 Volt power supply models available
- Accurate and interchangeable IP 68 sensor
- Wide range of sensors with various enclosures available
- SMD technology
- Keyboard lock

Panel Mount Enclosure



Dimensions in mm

MR11 Thermostats for Compressor Management

Ordering Codes	Range (°C)	Enclosure	Power Supply	Display	Output Rating	Protection Class	Additional Features
MR11PM12R-1C	-40 to +70	Panel	12 VAC/DC	3 digits	SPDT 8(3)A	Overall IP20 Faceplate IP54	Accuracy: ±1 °C
MR11PM230-1C			230 VAC	3 digits			

MR12 Thermostats with Off Cycle Defrost Control

Ordering Codes	Range (°C)	Enclosure	Power Supply	Display	Output Rating	Protection Class	Additional Features
MR12PM12R-1C	-40 to +70	Panel	12 VAC/DC	3 digits	SPST 8(3)A	Overall IP20 Faceplate IP54	Accuracy: ±1° C Power Consumption: 2 VA 50/60 Hz
MR12PM12R-A1C					SPDT 8(3)A		
MR12PM230-Z1C			230 VAC				
MR12PM12H-1C			12 VAC/DC		SPST 16(12)A		

MR10 - *2/4 pages*

Page 169

Compressor and Defrost Management

MR13 Thermostats with Active Defrost Management

Ordering Codes	Range (°C)	Enclosure	Power Supply	Display	Output Rating 250 VAC		Protection Class	Additional Features
					Compressor	Defrost		
MR13PM12R-2C	-40 to +70	Panel	12 VAC/DC	3 digits	SPST 8(3)A	SPST 8(3)A	Overall IP20 Faceplate IP54	Accuracy: ±1° C Power Consumption: 2 VA 50/60 Hz

MR14 Thermostats with Active Defrost and Fan Management

Ordering Codes	Range (°C)	Enclosure	Power Supply	Display	Output Rating 250 VAC				Protection Class	Additional Features
					Compressor	Alarm	Defrost	Fan		
MR14PM12R-2C	-40 to +70	Panel	12 VAC/DC	3 digits	SPST8(3)A	---	SPST 8(3)A	SPST 8(3)A	Overall IP20 Faceplate IP54	Accuracy: ±1° C Power Consumption: 2 VA 50/60 Hz
MR14PM12R-A2C					SPST 8(3)A	SPST 8(3)A	SPST 8(3)A	SPST 8(3)A		

For further information and additional models see Product Installation Guide

Johnson Controls

MR10 - *3/4 pages*

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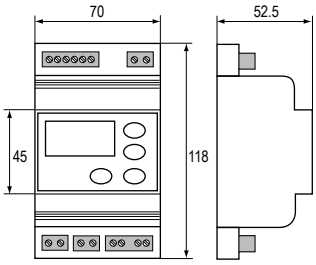
Compressor and Defrost Management

DIN-Rail enclosure



Dimensions in mm

Ordering Codes	Range (°C)	Enclosure	Power Supply	Display	Output Rating 250 VAC					Protection Class	Additional Features
					Compressor	Defrost	Fan	Alarm	Pump Down		
Thermostats for Compressor Management											
MR1DR230-1C	-40 to +70	DIN Rail (4 modules)	230 VAC	3 digits	SPST 8(3)A	---	---	Open Collector	---	IP20	Accuracy: ±1 °C Power Consumption: 2 VA 50/60 Hz
Thermostat for Compressor Management with 'Off Cycle' Defrost Control											
MR2DR230-1C	-40 to +70	DIN Rail (4 modules)	230 VAC	3 digits	SPST 8(3)A	---	---	SPST 8(3)A	---	IP20	Accuracy: ±1 °C Power Consumption: 2 VA 50/60 Hz
MR12DR230-1C					SPST 1(1)A		SPST 5(5)A	SPST 1(1)A	SPDT 1(1)A		
Thermostat with Active Defrost and Fan Management											
MR4DR230-2C	-40 to +70	DIN Rail (4 modules)	230 VAC	3 digits	SPST 8(3)A	SPST 8(3)A	---	SPST 8(3)A	---	IP20	Accuracy: ±1 °C Power Consumption: 2 VA 50/60 Hz
MR15DR230-2C					SPST 1(1)A	SPST 16(6)A	SPST 5(5)A	SPST 1(1)A	SPDT 1(1)A		

For further information and additional models see Product Installation Guide

Johnson Controls

MR10 - *4/4 pages*

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Compressor and Defrost Management

Parameters Description

Display Codes	Parameters	Setting Range	Default	MR11 and MR1	MR12 and MR2	MR13	MR14 MR4 and MR15
		Temperature Control Parameters					
Hy	Hysteresis	1 to 9 K	2	▪	▪	▪	▪
LL	Lower setpoint limit	-40 °C to higher limit	-40	▪	▪	▪	▪
HL	Higher setpoint limit	lower limit to 70 °C	70	▪	▪	▪	▪
CC	Anti short cycling	0 to 9 min	2	▪	▪	▪	▪
Co	Deep freezing time	0 to 99 min	60	▪	▪	▪	▪
		Alarm Parameters					
AH	High. temperature alarm	0 to 50 °C related to setpoint	10	▪	▪	▪	▪
AL	Low temperature alarm	-50 to 0 °C related to setpoint	-10	▪	▪	▪	▪
Ad	Alarm differential	1 to 9 K	1	▪	▪	▪	▪
At	Alarm time delay	0 to 99 min	30	▪	▪	▪	▪
		Defrost Parameters					
dF	Defrost function	0 = Electric heater 1 = Hot gas	0	---	---	▪	▪
dE	Defrost end function	0 = By time 1 = By temperature	1			▪	▪
dt	Defrost termination temp	0 to 20 °C	7			▪	▪
di	Defrost interval time	0 to 99 hours	6		▪	▪	▪
dd	Max. defrost duration	0 to 99 min	40		▪	▪	▪
dC	Dripping time	0 to 99 min	5		▪	▪	▪
dU	First defrost after power on	OFF, 0 to 99 min	OF		▪	▪	▪
dP	Display during defrost	0 = Last value before defrost 1 = Setpoint	0		▪	▪	▪
dr	Delay displayed temp after defrost	1 to 99 min	20		▪	▪	▪
		Digital Input Parameters					
iF	Digital input function	0 = Not Connected 1 = High Level Al. 2 = Delayed Alarm 3 = Door switch	0	---	▪	▪	▪
id	Digital input time delay	0 to 99 min	5		▪	▪	▪
		Fan Control Parameters					
FF	Fan operating function	0 = Parallel with compressor 1 = Continuous *Always OFF during defrost*	0	---	---	---	▪
Fd	Fan start-up delay after defrost end and power up	0 to 99 min.	5				▪
Fr	Fan start-up temperature after defrost end and power up	-30 to +5 °C	-5				▪
		Other Parameters					
SF	Thermostat operating function if sensor failure	0 = Always ON 1 = Always OFF 2 = Automatic	2	▪	▪	▪	▪
So	Sensor offset	-20 to +20 k	0	▪	▪	▪	▪
Un	Temperature units	0 = °C 1 = °F	0	▪	▪	▪	▪
PU	Display updating time	1 to 99 sec	1	▪	▪	▪	▪

MR40 - *1/3 pages*

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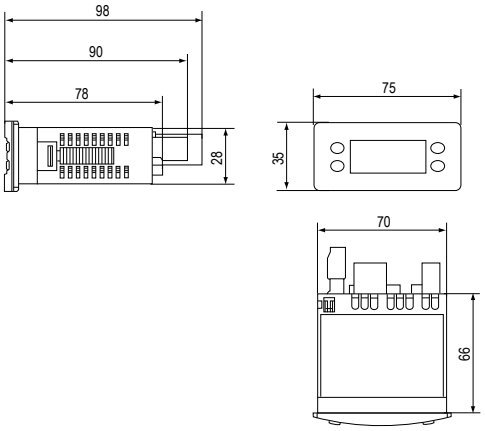
Compressor and Defrost Management - Serial Communication - Advanced Model

The MR40 is a digital controller for “static” or “ventilated” refrigeration units working at positive or negative temperatures. It incorporates all the features needed by modern units such as compressor and evaporator fan full management, “off-cycle” or “active” defrost control, additional auxiliary output for alarm signalling or light control.

The MR40 functions can be further expanded through other elements such as the LON or Johnson Controls N2 Open serial communication card. It is also optionally equipped with a Real Time Clock card for energy saving and real time scheduling of events such as defrost cycles.

Features

- Attractive Panel mount enclosure
- Up to 4 relays in the standard 35 x 72 mm enclosure
- Temperature display with “decimal” accuracy
- Decimal Point Visualisation
- Accurate and interchangeable IP 68 sensor
- Wide range of sensors with various enclosures available
- SMD technology
- LON and N2 Open™ serial communication cards (optional)
- Real Time Clock (optional)
- MFood Ready



Dimensions in mm

Ordering Codes	Range (°C)	Enclosure	Power Supply	Display	Output Rating 250 VAC				Protection Class	Additional Features
					Compressor	Alarm	Defrost	Fan		
MR42 Advanced Thermostats with “off cycle” Defrost										
MR42PM12R-A1C	-40 to +70	Panel	12 VAC/DC	3 digits	SPDT 8(3)A	SPDT 5(1)A	---	---	Overall IP20 Faceplate IP54	Accuracy: ±0.3 °C Power Consumption: 2.5 VA 50/60 Hz
MR44 Advanced Thermostats with Defrost and Fan Management										
MR44PM12R-A2C	-40 to +70	Panel	12 VAC/DC	3 digits	SPDT 8(3)A	SPST 5(1)A	SPDT 8(3)A	SPDT 8(3)A	Overall IP20 Faceplate IP54	Accuracy: ± 0.3 °C Power consumption: 2.5 VA 50/60 Hz

MR40 - *2/3 pages*

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Compressor and Defrost Management - Serial Communication - Advanced Model

Parameters Descriptions

Display Codes	Parameters	Setting Range	Default	MR42	MR44
Temperature Control Parameters					
Hy	Hysteresis	1 to 9 K	2	▪	▪
LL	Lower setpoint limit	-40 °C to 70 °C	-40	▪	▪
HL	Higher setpoint limit	-40 °C to 70 °C	70	▪	▪
CC	Anti short cycling	0 to 9 min	2	▪	▪
Co	Deep freezing time	0 to 99 min	60	▪	▪
Alarm Parameters					
AH	Higher temperature alarm	0 to 50 °C	10	▪	▪
AL	Low temperature alarm	-50 to 0 °C	-10	▪	▪
Ad	Alarm differential	1 to 9 K	1	▪	▪
At	Alarm time delay	0 to 99 min	30	▪	▪
AC	Alarm delay after power-up and defrost	0 to 99 min	20	▪	▪
Defrost Parameters					
dF	Defrost function	OFF(0) = "Off-Cycle" ELE(1) = Electric heater HGA(2) = Hot gas	ELE	---	▪
dn	Defrost initiation mode	0 = Internal timer 1 = Real Time Clock	0	▪	▪
dE	Defrost end function	0 = By temperature 1 = By time 2 = First occurrence 3 = Last occurrence	0	---	▪
dt	Defrost termination temp	0 to 20 °C	7	---	▪
di	Defrost interval time	0 to 99 hours	6	▪	▪
dd	Max. defrost duration	0 to 99 min	40	▪	▪
dC	Dripping time	0 to 99 min	5	▪	▪
dU	First defrost after power on	oFF, 0 to 99 min	oFF	▪	▪
dP	Display during defrost	0 = Last value before defrost 1 = Setpoint	0	▪	▪
dr	Delay displayed temp after defrost	1 to 99 min	20	▪	▪
Digital Input Parameters					
iF	Digital input function	0 = Not connected 1 = General alarm 2 = Delayed alarm 3 = Door switch 4 = Setpoint bias 5 = Defrost start 6 = OFF mode 7 = AUX output control 8 = Fan only mode	0	▪	▪
id	Digital input time delay	0 to 99 min	5	▪	▪
ib	Setpoint bias	-10 to +10k	3	▪	▪
Fan Control Parameters					
FF	Fan operating function	0 = Parallel to compressor 1 = Always ON 2 = By temperature *Fan always OFF during defrost*	0	---	▪
Fd	Fan start-up delay after defrost end and power-up	0 to 99 min.	5	---	▪
Fr	Fan start-up temperature after defrost end and after power-up	-30 to +5 °C	5	---	▪
FS	Fan differential	-30 to +5 °C	-5	---	▪
FH	Fan hysteresis	0 to 20 °C	2	---	▪

MR40 - *3/3 pages*

Compressor and Defrost Management - Serial Communication - Advanced Model

Parameters Descriptions

Display Codes	Parameters	Setting Range	Default	MR42	MR44
Other Parameters					
SF	Thermostat functioning if sensor failure	on(1) = Always ON oFF(0) = Always OFF AUt(2) = Automatic	AUt	▪	▪
So	Sensor offset	-20 to +20 units	0	▪	▪
Un	Temperature units	0 = °C 1 = °F	0	▪	▪
Pd	Virtual temperature weight	0 to 100 %	0	▪	▪
AA	Programmable digital output	0 = Alarm 1 = Auxiliary	0	▪	▪
Add	Serial address	1 to 255	255	▪	▪
Real Time Clock Parameters					
HH	Hour setting	0 to 23	0	▪	▪
nn	Minute setting	0 to 59	0	▪	▪
dAy	Day of the week setting	0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday	0	▪	▪
dHx **x = 1 to 6**	Event No. x Hour setting	0 to 23	8	▪	▪
dnx **x = 1 to 6**	Event No. x Minute setting	0 to 59	0	▪	▪
ddx **x = 1 to 6**	Event No. x weekday setting	0 = Never 1 = All days 2 = From Monday to Friday 3 = Saturdays & Sundays 4 = From Monday to Saturday 5 = Sundays only	0	▪	▪
biH	Bias Start Hour	0 to 23	20	▪	▪
bin	Bias Start Minute	0 to 59	0	▪	▪
bi	Bias Status	On / Off	oFF	▪	▪
bSH	Bias Stop Hour	0 to 23	0	▪	▪
bSn	Bias Stop Minute	0 to 59	0	▪	▪

MS - *1/3 pages*

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General purpose and Multi Stages

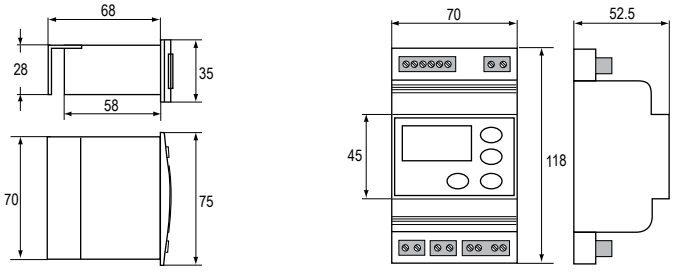
This range of versatile controls is intended for single or multistage (2 or 4 stages) applications such as heating, cooling but also humidity or pressure depending on the input type.

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 IP 68 sensor
- Wide range of enclosures for sensors available
- Keyboard lock
- SMD technology



Panel Model **DIN Rail Model**

Dimensions in mm

MS Display

Ordering 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	Accuracy: ±1 Unit Power Consumption: 1.5 VA 50/60 Hz
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

Ordering 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	Accuracy: ±1 Unit Power Consumption: 2 VA 50/60 Hz
MS1PM230T-1C		230 VAC			SPDT 8(3)A			
MS21PM12RT-1C		12 VAC			SPST 16(12)A		IP20	
MS1DR230T-1C		230 VAC	DIN rail		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			SPDT 8(3)A			
MS1DR230V-1C		230 VAC	DIN rail		SPST 8(3)A		IP20	

For further information and additional models see Product Installation Guide

Johnson Controls

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General purpose and Multi Stages

MS2 Two-stage Control

Ordering Codes	Range	Power Supply	Enclosure	Input	Output Rating 250 VAC Each Stage (1-2)	Protection Class	Additional Features
MS2PM12RT-1C	-40 to +70 °C	12 VAC/DC	Panel	A99 sensor (incl.)	SPST 8(3)A	Overall IP20 Front IP54	Accuracy: ±1 °C Power Consumption: 2 VA 50/60 Hz
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

Ordering Codes	Range	Power Supply	Enclosure	Input	Output Rating 250 VAC Each Stage (1 to 4)	Protection Class	Additional Features
MS4PM12RT-1C	-40 to +70 °C	12 VAC/DC	Panel	A99 sensor (incl.)	SPST 8(3)A	Overall IP20 Front IP54	Accuracy: ±1 Unit Power Consumption: 2 VA 50/60 Hz
MS4DR230T-1C		230 VAC	DIN rail		SPST 8(3)A		
MS4DR48T-1C		12-24 VAC/ DC 48 VDC	Panel		SPDT 8(3)A	IP20	

For further information and additional models see Product Installation Guide

Johnson Controls

MS - *3/3 pages*

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General purpose and Multi Stages

Parameters Descriptions

Display Codes	Parameters	Setting Range	Default	MS1 MSx1	MS2	MS4
Temperature control parameters						
H1	Hysteresis (HY)	1 to 9 K	2	▪	▪	▪
S2	Setpoint 2	Direct/Reverse = 1 to 40 units Deadband = 2 to 40 units Indip. Setpoint = Low to high limit	3	---	▪	▪
H2	Hysteresis (HY)	1 to 9 K	-40	---	▪	▪
S3	Setpoint 3	1 to 40 units	-40	---	---	▪
H3	Hysteresis (HY)	1 to 9 K	-40	---	---	▪
S4	Setpoint 4	1 to 40 units	-40	---	---	▪
H4	Hysteresis (HY)	1 to 9 K	-40	---	---	▪
LL	Lower setpoint limit (LL)	-40 °C to higher limit	-40	▪	▪	▪
HL	Higher setpoint limit (HL)	Lower limit to 125 units	70	▪	▪	▪
CC	Anti short cycling cooling (CC)	0 to 9 min	2	▪	▪	▪
CH	Anti short cycling heating (CH)	0 to 99 min	60	▪	▪	▪
rt	Soft start	0 to 99 min / units	3	▪	▪	▪
Alarm parameters						
AH	High. temperature alarm	0 to 50 units related to setpoint	10	▪	▪	▪
AL	Low temperature alarm	-50 to 0 units related to setpoint	-10	▪	▪	▪
Ad	Alarm differential	1 to 9 units	1	▪	▪	▪
At	Alarm time delay	0 to 99 min	30	▪	▪	▪
Temperature parameters						
Lc	Non compensated band	0 to 20 K	OF	---	---	▪
Uc	Heating compensation	0 to 6 K/K	0	---	---	▪
nc	Cooling compensation	0 to 6 K/K	20	---	---	▪
Other parameters						
So	Sensor offset	-20 to +20 units	0	▪	▪	▪
Un	Temperature units	0 = Celsius degrees 1 = Fahrenheit degrees	0	▪	▪	▪
PU	Display updating time delay	1 to 99 sec	7	▪	▪	▪
iF	Digital input function	0 = Not used 1 = Shut off and alarm signalling 2 = Stand by mode 3 = Remote switch off	6	---	▪	▪
Sb	Stand-by bias	0 to 20 units	40	---	▪	▪
Id	Digital input time delay	0 to 99 sec	5	---	▪	▪
IS	Interstage delay	3 to 99 sec	20	---	▪	▪
Lr	Low range analog input 1	-40 to high range	20	▪	▪	---
Hr	High range analog input 1	Low range to 100	20	▪	▪	---

Note
When there are 2 setpoints (MS2 or MS4 is configured for independent setpoint mode), the low alarm is linked to the lowest setpoint and the high alarm is linked to the highest setpoint.

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Electrical Cabinets

Designed to facilitate installers work, this range of electrical cabinet is intended for use in cold rooms working at positive or negative temperatures and powered either with single phase or three phase power supply.

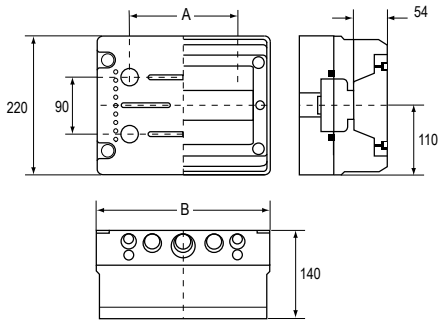
Based on specifically designed controllers, it incorporates all control functions as required by modern cold room units, such as compressor control, defrost management, fan management, alarm function and solenoid valve for "pump down".

It also includes all the safety equipment needed such as circuit breakers for the compressor and for the controller.

Particular attention has been given to the accessibility so that the installation time will be reduced to a minimum. Space has been left available for customisation.

Features

- Power rating from:
  0,37 to 1,5 kW in single phase
  1,5 to 7,5 kW in three phases
- Standard DIN rail components
- Most wiring integrated on the controller
- Specifically designed controller to manage Pump Down
- Accurate and interchangeable
- IP 68 sensor
- IP 65 standard DIN polycarbonate cabinets
- Integrate circuit breaker for motor and controller
- In field extension
- Main Switch



	Dimensions in mm	
Models	A	B
12 modules	164	275
18 modules	269	380

Positive Temperature Cold Room Cabinets

Ordering Codes	Cabinet Size Modules	Power Supply		Compressor		Evaporator Fan
		VAC	Φ	Power AC-3	Amps	Amps
CR-PS037-1	12	230	1	0,37 kW	5	1,6
CR-PS075-1	12	230	1	0,75 kW	8	1,6
CR-PS110-1	12	230	1	1,1 kW	10	3,2
CR-PS150-1	12	230	1	1,5 kW	12	4,8
CR-PT150-1	18	400	3	1,5 kW	3,5	3,2
CR-PT250-1	18	400	3	2,5 kW	5,7	3,2
CR-PT400-1	18	400	3	4,0 kW	8,5	4,8
CR-PT550-1	18	400	3	5,5 kW	11,5	4,8
CR-PT750-1	18	400	3	7,5 kW	15,5	4,8

For further information and additional models see Product Installation Guide

Johnson Controls

CR - *2/4 pages*

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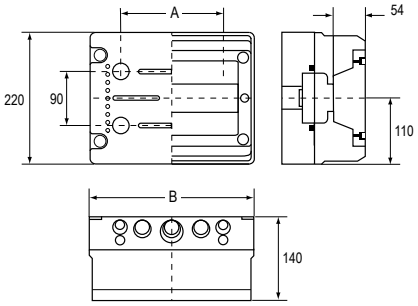
Electrical Cabinets



	Dimensions in mm	
Models	A	B
12 modules	164	275
18 modules	269	380

Negative Temperature Cold Room Cabinets

Ordering Codes	Cabinet Size Modules	Power Supply		Compressor		Evaporator Fan Amps	Auxiliary Output*	Defrost
		VAC	Φ	Power AC-3	Amps	Amps	Amps	Amps
CR-NS037-1	12	230	1	0,37 kW	5	1,6	---	8
CR-NS075-1	12	230	1	0,75 kW	8	1,6	---	12
CR-NS110-1	12	230	1	1,1 kW	10	3,2	---	12
CR-NS150-1	12	230	1	1,5 kW	12	4,8	---	16
CR-NT150-1	18	400	3	1,5 kW	3,5	3,2	3	12
CR-NT250-1	18	400	3	2,5 kW	5,7	3,2	3	12
CR-NT400-1	18	400	3	4,0 kW	8,5	4,8	3	15
CR-NT550-1	18	400	3	5,5 kW	11,5	4,8	3	15
CR-NT750-1	18	400	3	7,5 kW	15,5	4,8	3	15

Note
* = Condenser fan or door frame heater

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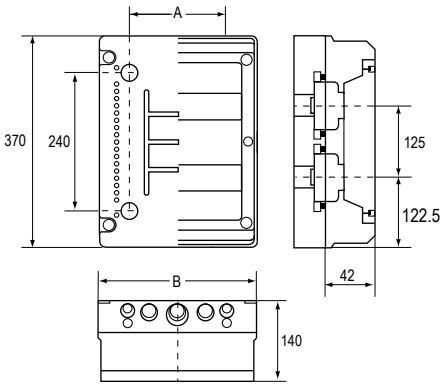
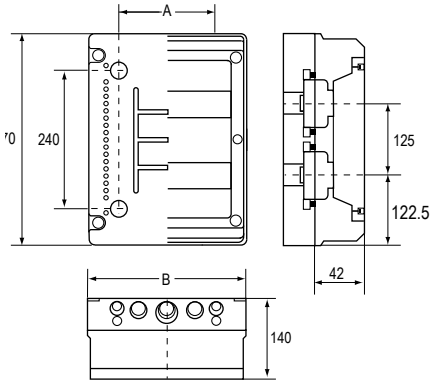
Electrical Cabinets



	Dimensions in mm	
Model	A	B
24 modules	164	275

Negative Temperature Cold Room with Three Phase Defrost

	Cabinet Size	Power Supply		Compressor		Evaporator Fan	Defrost
Ordering Codes	Modules	VAC	Φ	Power AC-3	Amps	Amps	Amps
CR-NDT150-1	24	400	3	1,5 kW	3,5	3,2	3 x 5
CR-NDT250-1	24	400	3	2,5 kW	5,7	3,2	3 x 9
CR-NDT400-1	24	400	3	4,0 kW	8,5	4,8	3 x 10
CR-NDT550-1	24	400	3	5,5 kW	11,5	4,8	3 x 12
CR-NDT750-1	24	400	3	7,5 kW	15,5	4,8	3 x 16



	Dimensions in mm	
Model	A	B
36 modules	269	380

Negative Temperature Cold Room Cabinets with Three Phase Defrost and Fan

	Cabinet Size	Power Supply		Compressor		Evaporator Fan	Auxiliary Output*	Defrost
Ordering Codes	Modules	VAC	Φ	Power AC-3	Amps	Amps	Amps	Amps
CR-NFDT150-1	36	400	3	1,5 kW	3,5	3 x 2	3	3 x 5
CR-NFDT400-1	36	400	3	4,0 kW	8,5	3 x 2	3	3 x 10
CR-NFDT750-1	36	400	3	7,5 kW	15,5	3 x 2	3	3 x 16

Note
* = Condenser fan or door frame heater

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Electrical Cabinets

Parameters Descriptions

Display Codes	Parameters	Setting Range	Default	MR12DR	MR15DR
Temperature Control Parameters					
Hy	Hysteresis (HY)	1 to 9 K	2	▪	▪
LL	Lower setpoint limit (LL)	-40 °C to higher limit	-40	▪	▪
HL	Higher setpoint limit (HL)	lower limit to 70 °C	70	▪	▪
CC	Anti short cycling (CC)	0 to 9 min	2	▪	▪
Co	Deep freezing time (Co)	0 to 99 min	60	▪	▪
Alarm parameters					
AH	High. temperature alarm	0 to 50 °C related to setpoint	10	▪	▪
AL	Low temperature alarm	-50 to 0 °C related to setpoint	-10	▪	▪
Ad	Alarm differential	1 to 9 K	1	▪	▪
At	Alarm time delay	0 to 99 min	30	▪	▪
Defrost parameters					
dF	Defrost function	0 = Electric heater 1 = Hot gas	0	---	▪
dE	Defrost end function	0 = By time 1 = By temperature	1	---	▪
dt	Defrost termination temp	0 to 20 °C	7	---	▪
di	Defrost interval time	0 to 99 hours	12	▪	▪
dd	Max. defrost duration	0 to 99 min	40	▪	▪
dC	Dripping time	0 to 99 min	5	▪	▪
dU	First defrost after power on	OFF, 0 to 99 min	OF	▪	▪
dP	Display during defrost	0 = Last value before defrost 1 = Setpoint	0	▪	▪
dr	Delay displayed temp after defrost	1 to 99 min	20	▪	▪
Digital input parameters					
iF	Digital input function	0 = Instrument OFF 1 = Alarm signalling 2 = Alarm reset 3 = Alarm reset and fan cut-off	0	▪	▪
id	Digital input time delay	0 to 99 sec	5	▪	▪
Fan control parameters					
FF	Fan operating function	0 = Parallel with compressor 1 = Continuous running	0	---	▪
Fd	Fan start-up delay after defrost end and power up	0 to 99 min.	5	---	▪
Fr	Fan start-up temperature after defrost end and power up	-30 to +5 °C/-22 to 41 °F	2	---	▪
Other parameters					
SF	Thermostat operating function when sensor failure	0 = Always ON 1 = Always OFF 2 = Automatic	2	▪	▪
So	Offset thermostat sensor	-20 to +20 units	0	▪	▪
Un	Temperature units	0 = °C 1 = °F	0	▪	▪
PU	Display updating time delay	1 to 99 sec	1	▪	▪

System 27 NOVA - *1/5 pages*

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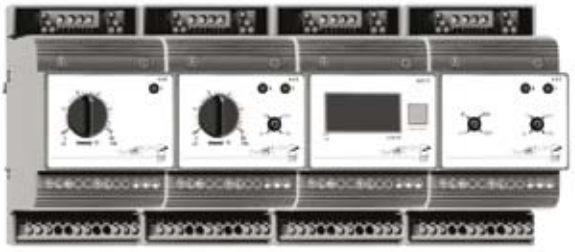
System 27 NOVA is a family of modern modular electronic modules designed for a wide variety of control configurations in refrigeration, heating, ventilation, air-conditioning and other related fields.

The modular concept was specially designed to make control configuration easier and still offer the flexibility necessary to answer the many individual control requirements encountered today.

The temperature control modules can be used as a stand alone device or together with other modules, such as, stage modules, display modules, time switch modules, etc., to achieve a diverse number of single or multistage applications.

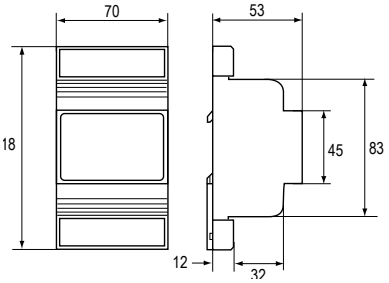


Features

- Modular design
- "Plug-in" quick connector wiring system
- Adjustable differential and heating/cooling setting
- Wide range of enclosures for sensing elements
- Attractive DIN-rail mount housing
- Setpoint shift output function

Applications

- Typical applications are:
- Refrigerated/freezer display cases
- Beverage coolers
- Liquid chillers
- Cold-room storage

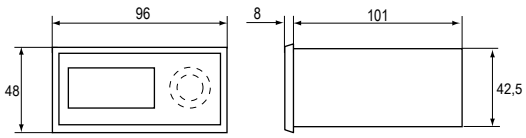


Dimensions in mm

Ordering Codes	Setpoint Range (°C)	Supply Voltage (-15/+10 %) 50/60 Hz	Additional Features	
One-Stage Thermostat, without Sensors				
A27A1N11	-40 to +40	24 VAC/DC	Mode:	Field adjustable
A27A1N12	10 to 100	24 VAC/DC	Output:	SPDT contact 10(5)A 250 VAC
A27A2N11	-40 to +40	230 VAC	Input Signal:	From A99 temp. sensor
A27A2N12	10 to 100	230 VAC	Enclosure:	DIN RAIL mount (35 mm), IP20
A27A2N14	0 to 30	230 VAC	Switch Action:	Automatic Reset
A27A2N15	-20 to 60	230 VAC	Differential:	0,5 to 15 K
			Power Consumption:	230 VAC models: 4 VA 24 VAC/DC models: 2 VA
Two-stage Thermostat, without Sensors				
A27A1N21	-40 to +40	24 VAC/DC	Mode:	Field adjustable
A27A1N22	10 to 100	24 VAC/DC	Output:	Two SPDT contacts 10(5)A 250 VAC
A27A2N21	-40 to +40	230 VAC	Switch Action:	Automatic Reset
A27A2N22	10 to 100	230 VAC	Input Signal:	From A99*-91** temp.sensor
A27A2N25	-20 to +60	230 VAC	Enclosure:	DIN RAIL mount (35 mm), IP20
A27A2N26	20 to 60	230 VAC	Differential:	0,5 to 5 K
A27A2N27	-20 to +60	230 VAC	Delta Setpoint:	0,5 to 5 K
			Power Consumption:	4,5 VA Models: 230 VAC 3 VA Models: 24 VAC/DC
Differential Thermostat, without Sensors				
	Differential (K)			
A27D2N11	0.5 to 10 K	230 VAC	Hysteresis:	0.5 to 10 K
			Output:	SPDT contact 10(5)A 250 VAC
			Input Signal:	From A99x-91xx Temperature sensor
			Power Consumption:	4 VA Models: 230 VAC 2 VA Models: 24 VAC/DC

System 27 NOVA - *2/5 pages*

D27 Panel Mount



Dimensions in mm

Ordering Codes	Range	Supply voltage (-10/+10%) 50/60 Hz	Additional Features	
Panel mount Display Modules				
D27AF-9100	-40 to +99 °C	230 VAC	Power Consumption: Enclosure Noryl™:	230 VAC models: 3 VA 24 VAC models: 1,5 VA Panel mount (48 x 96 mm), IP20
Panel mount Display/Selector Modules				
D27AG -9100	-40 to +99 °C	230 VAC	These display to selectors can accept up to 6 sensor	
			Power Consumption: Enclosure Noryl™: Input:	230 VAC models: 3 VA Panel Mount (48 x 96 mm), IP20 A99x-91xx Temperatuur Sensor

For further information and additional models see Product Installation Guide

Johnson Controls

System 27 NOVA - *3/5 pages*

The humidity control modules can be used as a stand alone device or in conjunction with other modules such as display modules, signal converter modules etc. to achieve a wide variety of single or multiple stage applications.

Features

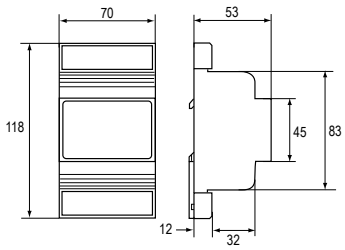
- Modular design
- "Plug-in" quick connector wiring system
- Adjustable differential and humidification/dehumidification setting
- Interchangeable humidity transmitters with different housings
- Attractive DIN-rail mount housing
- Setpoint shift output function

Applications

- Typical applications are:
- Computer rooms
- Clean rooms
- Fruit storage/ripening
- Food processing;
- Industrial processes.

Ordering Codes	Setpoint Range	Supply Voltage (-15/+10%) 50/60 Hz	Additional Features	
One-stage Humidistat				
W27N11	10 to 100% R.H.	24 VAC/DC	Mode:	Field Adjustable
W27N21	10 to 100	230 VAC	Output:	SPDT contact 10(5)A 250 VAC
			Switch Action:	Automatic Reset
			Differential:	2 to 10% R.H.
			Delta Setpoint:	0 to 30% R.H.
			Power Consumption:	230 VAC models: 4,5 VA 24 VAC/DC models: 3 VA
			Input Signal:	Room HT-9000 humidity sensor
			Enclosure:	DIN RAIL mount (35 mm), IP20
Two-stage Humidistat				
W27N12	10 to 100% R.H.	24 VAC/DC	Mode:	Field Adjustable
W27N22	10 to 100	230 VAC	Output:	Two SPDT contacts 10(5)A 250 VAC Automatic Reset
			Switch Action:	
			Differential:	2 to 10% R.H.
			Delta Setpoint:	0 to 30% R.H.
			Power Consumption:	230 VAC models: 4,5 VA 24 VAC/DC models: 3 VA
			Input Signal:	Room HT-9000 humidity sensor
			Enclosure:	DIN RAIL mount (35 mm), IP20

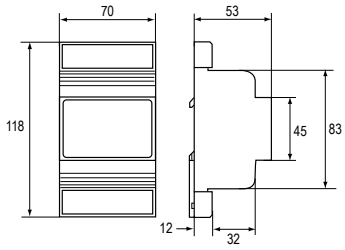
System 27 NOVA - *4/5 pages*



Dimensions in mm

Display Modules

Ordering Codes	Setpoint Range	Supply Voltage (-15/+10%) 50/60 Hz	Quick Connector	Additional Features	
D27A1N1	-40 to +100 °C	24 VAC	No	Enclosure:	DIN RAIL mount (35 mm)
D27A2N1		230 VAC		Power Consumption:	3.5 VA
D27W2N4	0 to 99% RH			Input temp. displays	
D27A2N1Q	-40 to +100 °C		Included	Temp. sensor:	From A99x-91xx



Dimensions in mm

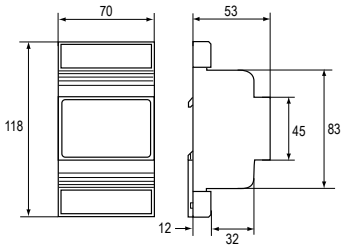
Mode:	Field Adjustable
Input Signal:	From other System 27 NOVA control modules
Enclosure:	DIN RAIL mount (35 mm), IP20
Relay Rating:	10 (5) A 250 VAC
Power Cons:	230 VAC models: 4,5 VA 24 VAC/DC models: 3 VA

System 27 NOVA Stage Modules, Incl. quick connector

Ordering Codes	Number of Outputs	Supply Voltage (-15/+10%) 50/60 Hz	Differential (K)	Additional Features
S27A1	2 x SPDT	24 VAC	0.5 to 5	Can be connected only to 1-stage or 2-stage thermostats. Setpoint stage module is related to setpoint thermostat Delta setpoint range: 0,5 to 15 K Max. number of stages connected to a thermostat: 4
S27A2	2 x SPDT	230 VAC		
S27A3	1 x SPDT		0.5 to 10 K	Can be connected only to 1-stage or 2-stage thermostats. Setpoint stage module is independent to setpoint thermostat.
S27P2	2 x SPDT		0,1 to 3,5 bar	Can be connected only to 1-stage or 2-stage pressure switch. Setpoint stage module is related to setpoint pressure switch Delta setpoint range: 0 to 4 bar Max. number of stages connected to a pressure switch: 4

System 27 NOVA - *5/5 pages*

This converter can be used to transfer an input signal (or part of an input signal) to an output signal of 0 to 10 V or 4 to 20 V



Dimensions in mm

Signal Converter

Ordering Codes	Setpoint Range	Span Range	Supply voltage (-10/+10%) 50/60 Hz	Additional Features	
Y27L1	-50/+100 °C	2 / 200 °C	24 VAC	Housing:	DIN Rail Mount
Y27L2			230 VAC	Output Load:	Voltage Output Rmin = 1k Ohm current output Rmax = 500 Ohm
	Voltage	**Voltage**			230 VAC models: 2 VA
Y27M1	0 to 10 V	1 to 10 V	24 VAC	Power Consumption	24 VAC/DC models: 1 VA
Y27M2			230 VAC		

Staging Converter

Ordering Codes	Supply voltage (-10/+10%) 50/60 Hz	Additional Features	
SR-9100-1	24 VAC	Input Signal:	0 to 10 VDC
		Setpoint Range:	5 to 95% (0,5 to 9,5 VDC)
		Differential Range:	5 to 60% (0,5 to 6 VDC) Automatic Reset
		Mode:	Field Adjustable
SR-9100-2	230 VAC	Enclosure:	DIN RAIL mount (35 mm)
		Output:	Two SPDT contacts 10(5)A 250 VAC
		Power Consumption:	230 VAC models: 4,5 VA
		Time Delay:	Stage 1: 1 second Stage 2: 2 seconds

MR44

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PT1000 Sensors

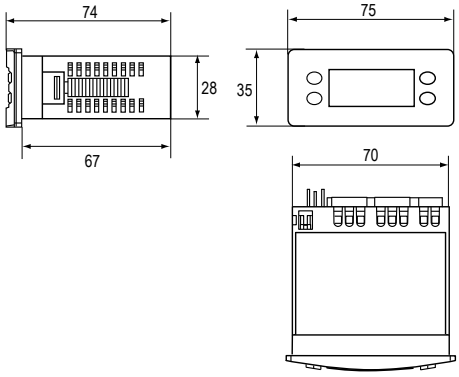
The MR40 is a digital controller for “static” or “ventilated” refrigeration units working at positive or negative temperatures. It incorporates all the features needed by modern units such as valve or compressor control, full management of the evaporator fan, “off-cycle” or “active” defrost control, additional auxiliary output for alarm signalling or master – slave defrost control.

The MR44 functions can be further expanded using an N2 Open communication card from Johnson Controls. It is also optionally equipped with a Real Time Clock card for energy saving and real time scheduling of events such as defrost cycles when not connected to a networked Building management system

By adding a network communication card, compatible with the protocol N2 Open (Johnson Controls) allows the interface to be connected to the BAS system MFood.

Features

- All parameters available to the user from the remote display
- Attractive Panel mount enclosure
- 4 relays in the standard 35 x 72 mm enclosure
- Temperature display with “decimal” accuracy
- PT1000 temperature sensor inputs
- Master- Slave defrost function
- N2 Open serial communication card (optional)
- Real Time Clock (optional)
- MFood Read



Dimensions in mm

MR44 Advanced Thermostats with Defrost and Fan Management

Ordering Codes	Range (°C)	Enclosure	Power Supply	Display	Output Rating 250 VAC				Protection Class	Additional Features
					Compressor	Alarm	Defrost	Fan		
MR44PM12R-PA2C	-40 to +70	Panel	12 VAC/DC	3 digits	SPDT 8(3)A	SPST 5(1)A	SPDT 8(3)A	SPDT 8(3)A	Overall IP20 Faceplate IP54	Accuracy: ±0.3° C Power Consumption: 2.5 VA 50/60 Hz

FX05

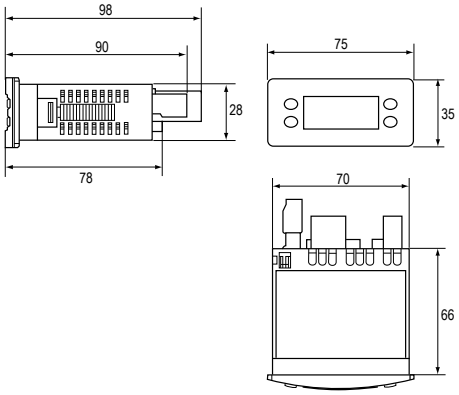
Page 188

Temperature Monitoring Module (PT1000 Sensors)

This FX05 is a high performance controller developed specifically for the surveillance, temperatures recording and temperature alarming in supermarket and industrial food processing applications. The controller is delivered pre-programmed, allowing the user to set the final parameters with the help of a large seven segment, three digit LED display, without requiring any other programming tool.

This allows the commissioning engineer to enter without effort the high and low temperature alarm limits as well as individual alarm delays for each temperature sensor. For each sensor, there exists a related binary input. This input can be programmed via the display or the network, to indicate a defrost, door open, case off, or an external alarm.

The unit also includes an ingenious system for controlling the defrosts periods for up to 4 separate zones. By adding a network communication card, compatible with the protocol N2 Open from Johnson Controls enables the interface to be connected to the BAS system MFood.



Dimensions in mm

Features

- Standard temperature monitoring application
- General alarm output
- All parameters available to the user from the remote display.
- Attractive Panel mount enclosure
- Temperature display with “decimal” accuracy
- Four PT1000 temperature sensor inputs
- Four individually configurable digital inputs
- Four individually configurable digital outputs
- Internal cyclic defrost clock
- N2 Open serial communication card (optional)
- MFood Ready

Ordering Codes	Power Supply	Protection Class	I/O Ratings				Application
			Analog Input (AI) *(sensor not included)*	Digital Input (DI)	Digital Output (DO)	Analog Output (AO)	
LP-FX05P00-800C	24 VAC/DC ±15%, 50/60 Hz	Overall: IP20 Faceplate: IP54	Pt1000 Range: -40 to 100 °C Accuracy: ±0.3 °C at 20 °C ambient	Voltage free contacts, 3k3 pull-up resitors, not isolated	SPST 5A, 250 VAC power relay Double isolated between DO1 and the other relay group. Any combination of loads must not exceed 15 A in total (the “commons” pins are internally connected). Max. 5 A on each common pin.	0...10 VDC, 5 mA, not isolated	Temperature monitoring application, Pt1000 inputs

Accessories

Ordering Codes	Description
LP-NET051-000C	N2 Open Communication Card
LP-NET052-000C	LonWorks® Communication Card on-field commissioning
LP-KIT005-000C	Pre-crimped set of cables and female connectors for number 5 FX05 Controllers

FX16 - *1/2 pages*

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Compressor and Condenser Controller

This FX16/15 combination has been specifically designed for the control and alarm management of refrigerated compressor racks, with a maximum of 6 compressors and 7 condenser fan stages. It integrates not only the control of all the compressors and condenser fans, but also all the security functions and alarms. For energy savings, Johnson Controls auto adaptive floating high pressure control is included, and can be activated or deactivated as required.

The controller is delivered pre-programmed, allowing the final site parameters to be easily entered via the large, 4 line / 20 character LCD display and keypad, without requiring the use of any other programming tool. The controller is also supplied with a communication card, compatible with the N2 Open protocol from Johnson Controls, allowing the controller to be connected to a BMS, or Johnson Controls refrigeration management system MFood.

FX16 Rack Controller

Features

- All parameters available to the user from the remote display. (password protected)
- Integrated Energy saving algorithm for the Floating HP
- Integrated 0-10V Variable speed drive output for condenser control
- Compatible with numerous refrigerant types: R12, R22, R134A, R404A, R407C, R408A, R409A et R410A
- Equal Run Time option for the compressors and or fans
- Alarm History available via the display
- Integrated N2 Open communication card
- MFood Ready

FX16 Inputs and Outputs

NR	Name	Description
	Binary Inputs	
DI1 to DI6	Fault input Compressor 1 to 6	Fault input for Compressor 1 to 6 security chain
DI7	Automatic / Manual	Manual / Automatic Override Switch - Contact Closed = Automatic
DI8	Fault input; Refrigerant liquid level	Refrigerant liquid level fault - Contact Open = Alarm

NR	Name	Description	Type	Range
		Analogical Inputs		
AI1	Outside temperature	Necessary for the Floating HP control	PT1000	-40 to 100 °C
AI2	Liquid temperature			
AI3	Low Pressure	LP control Sensor	4-20 mA	-1 to 14 bar
AI4	High Pressure	HP control Sensor		-1 to 34 bar
AI5	Measure 5	Free measure	PT1000	-40 to 100 °C
AI6	Measure 6			

NR	Name	Description
	Binary Outputs	
DO1 to DO6	Compressor 1 to 6	Command compressor 1 to 6
DO7	Watchdog	Output indicating a fault (controller, communication, LP/HP)
DO8	Liquid level alarm	Output indicating a liquid level alarm
DO9	General Alarm	Output indicating that an alarm is Present

FX16 - *2/2 pages*

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Compressor and Condenser Controller

FX15 Inputs and Outputs

NR	Name	Description
Binary Inputs		
DI1 to DI7	Fault input Fan 1 to 7	Fault input for Fan 1 to 7
DI8	Override input for DO 8 on the FX15	Manual override of output DO 8 on the FX15

NR	Name	Description	Type	Range
Analogical Inputs				
AI1 to AI6	Free Measure	Can be used for additional measures	PT1000	-40 to 100 °C

NR	Name	Description
Binary Outputs		
DO1 to DO7	Fan 1 to Fan 7	Command Fan 1 to 7
DO8	Forced Output	Forced output by DI8 of the FX15
DO9	Pressure Alarm Output	Output exclusively activated by a pressure alarm

NR	Name	Description
Analogue Outputs		
AO1	VSD Drive Output	0-10 V Output for control of condenser variable speed drives

Kits

Ordering Codes	Description
LP-KIT504-000C	Compressor / Condenser Standard application, without communication card. Kit includes FX16, FX15, panel mount MUI display and display cable.
LP-KIT505-000C	Compressor / Condenser Standard application, with N2 Open Communication Card. Kit includes FX16 with N2 Open communication card, FX15, panel mount MUI display and display cable.

Communication Modules

Ordering Codes	Description
LP-NET151-010C	N2 Open Communication Card
LP-NET162-000C	LonWorks® Communication Card
LP-KIT007-000C	3 m display connection cable for FX16

P215

Page 191

Direct Mount Pressure Actuated Single Phase

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.

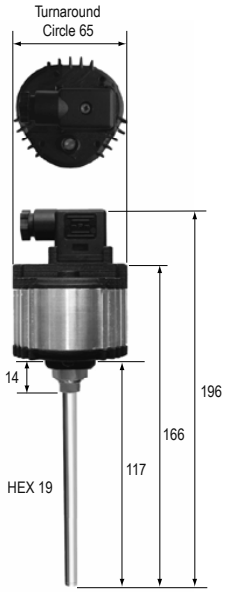
Cut-off models (fan stops at low pressure) as well as minimum speed models (fan keeps running at 30%) are available.

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

Style 47
Direct mount
7/16 –20 UNF female
(incl. valve depressor)



Style 28
Braze connection
6 mm ODM

Dimensions in mm

Ordering 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-9800	10 to 25	28	19	4.5				
P215PR-9230		47						Bulk Pack
P215PR-9232	22 to 42		26	5.5				
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.

P215 - *1/2 pages*

Page 192

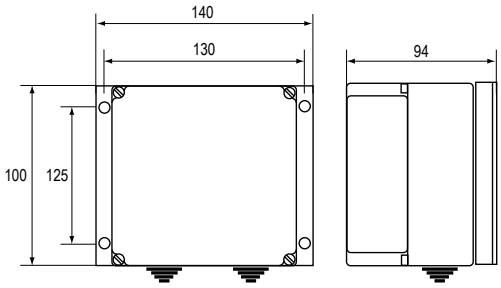
Pressure Actuated Single Phase

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. It is recommended to confirm with the electric motor manufacturer if a controller using the phase cutting principle for speed variation can be used.
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.

P215DP/SH/ST



Dimensions in mm

Features

- Condenser pressure control by fan speed variation
- Pressure input
- Transducers with proven reliability
- Easy accessible setpoint screw
- Adjustable minimum speed or cut-off selection
- Dual input possibility (P215DP only)
- Heatpump input available (P215SH)
- IP54 enclosure

Ordering Codes	Range (bar)	Prop. band (bar)	Setpoint (bar)	Pressure Connection	Supply Voltage 50/60 Hz	Rating	Additional Features *Note: Style 50 is allowed on the Dutch market!*
P215DP-9100	14 to 24	4	16	90 cm cap. st. 50	230 VAC	8 Amp	Single/dual input. For dual input a second separate transducer has to be ordered!
P215DP-9101	8 to 14	2.5	10				
P215DP-9600	14 to 24	4	16	90 cm cap. st. 51			
P215DP-9601	8 to 14	2.5	10				
P215DP-9800	14 to 24	4	16	Braze con. st. 28			
P215DP-9102	22 to 42	6	30	90 cm cap. st. 50			For use on R410A applications
P215SH-9100	14 to 24	4	16	90 cm cap. st. 50		4 Amp	Single input
P215SH-9101	8 to 14	2.5	10				
P215SH-9102	22 to 42	6	30				For use on R410A applications
P215SH-9800	14 to 24	4	16	Braze con. st. 28			Single input
P215ST-9100	14 to 24	4	16	90 cm cap. st. 50		6 Amp	Single input
P215ST-9101	8 to 14	2.5	10				
P215ST-9600	14 to 24	4	16	90 cm cap. st. 51			
P215ST-9102	22 to 42	6	30	90 cm cap. st. 50			For use on R410A applications

P215 - *2/2 pages*

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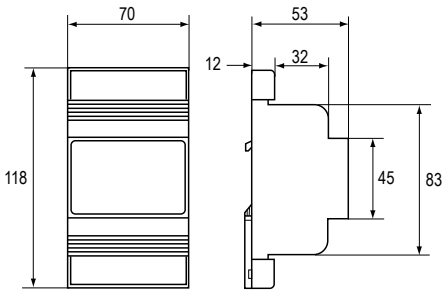
Pressure Actuated Single Phase

The P215LR is a single pressure input, the P215BR is a dual pressure input and the P215TR is a triple pressure input fan speed controller for air cooled condensers with respectively single, dual and triple refrigerant circuits.
The controller varies the fan speed by directly sensing the pressure changes of one, two or three 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 controllers can be used in non corrosive refrigerant systems and vary the supply voltage to the motor from 45% to ≥95% of the supplied voltage using the phase cutting principle. It is recommended to confirm with the electric motor manufacturer if a controller using the phase cutting principle for speed variation can be used. 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.



Dimensions in mm

Features

- Condenser pressure control by fan speed variation
- Pressure input
- Model with heatpump input available
- Transducers with proven reliability
- Easy accessible setpoint screw
- Adjustable minimum speed or cut-off selection (only on LR and BR models)
- Motor speed action can be reversed by interchanging only two wires
- Dual pressure input (BR models)
- Triple pressure input (TR models)
- Small dimensions
- DIN rail mounted

Ordering Codes	Range (bar)	Prop. band (bar)	Setpoint (bar)	Pressure Connection	Supply Voltage 50/60 Hz	Rating	Additional Features *Note: Style 50 is allowed on the Dutch market!*
P215LR -9110	14 to 24	4	16	90 cm cap. / 50	230 VAC	3 Amp	Minimum speed adjustable Single pressure input
P215LR -9111	8 to 14	2.5	10				
P215LR -9130*	Bulk pack version of type P215LR-9110 (15 pcs)						
P215LR -9210	14 to 24	4	16	direct mount / 47			
P215LR -9610				direct mount / 51			
P215LR -9611	8 to 14	2.5	10				
P215LR -9114	22 to 42	6	30	90 cm cap. / 50			For R410A applications
P215LR -9140	14 to 24	4	16				230 V heatpump input
P215LR -9120							400 V version
P215BR -9110							Minimum speed adjustable Dual pressure input
P215BR -9111	8 to 14	2.5	10				
P215BR -9210	14 to 24	4	16	direct mount / 47			
P215TR -9110				90 cm cap. / 50			Tripple pressure input

U215

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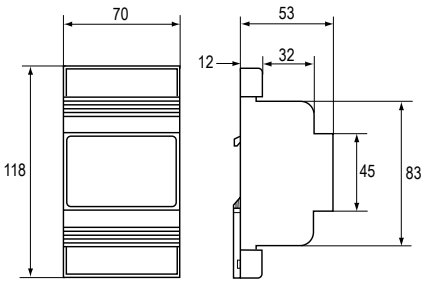
0-10 VDC/4 - 20 mA Input Single Phase

These controls can be used to modulate the fan speed in response to the demand of a control system in ventilation applications and VAV systems. A 0-10 VDC or 4-20 mA signal coming from a (e.g. temperature/ pressure/ humidity/ flow) control loop is used as input while the U215 fan speed controller acts like an actuator.

The controller modulates the speed of single phase permanent split-capacitor or shaded pole motors which do not draw more than 3 A (rms) full load current. The device varies the supply voltage to the motor from 45% to ≥95% of the supplied voltage using the phase cutting principle. It is recommended to confirm with the electric motor manufacturer if a controller using the phase cutting principle for speed variation can be used.



Dimensions in mm

Features

- Built-in suppression filter
- Input galvanically separated from high voltage part
- Adjustable minimum speed or cut-off selection
- Input selection 0-10 V or 4-20 mA
- Small dimensions
- DIN rail mounted

Ordering Codes	Range (selectable)	Supply Voltage (230 VAC) 50/60 Hz	Additional Features *Note: Style 50 is allowed on the Dutch market!*
U215LR -9110	0-10 VDC or 4-20 mA	3 Amp rating	Adjustable minimum speed or cut-off selectable

A255

Page 195

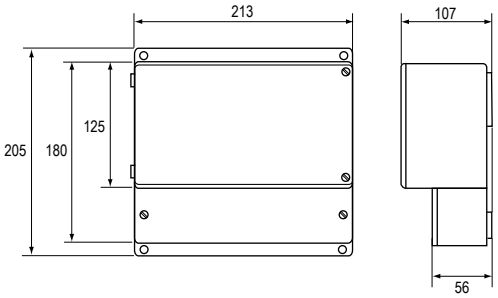
Temperature Actuated, 3-phase Motors

These controllers are designed for applications where the fan speed must be controlled by a temperature sensor input signal .

The controller varies the supply voltage to the motor from 30% to at least 96% over the proportional band using the phase cutting principle. It is recommended to confirm with the electric motor manufacturer if a controller using the phase cutting principle for speed variation can be used. Motors that will be controlled by the A255 should not draw more than 5 A per phase.

Features

- Various temperature sensor enclosures to match many applications
- Allows connection in both “Star” and “Delta” configurations
- Contact input to force output to max. or off
- Built-in direct/reverse action selector switch
- IP54 enclosure
- Built-in Setpoint adjustment
- Minimum speed or cut-off selection
- Adjustable minimum speed or cut-off
- Adjustable maximum speed limit
- Proportional band adjustment
- Adjustable hysteresis in cut-off mod



Dimensions in mm

Ordering Codes	Range (°C)	Prop. band (K)	Supply Voltage (VAC) 50/60 Hz 3 phase	Switch Rating	Additional Features
A255MM-9100	0 to 65	1 to 10	400	5A	Note: input sensor, type A99x-91xx, has to be ordered separately

P255 - *1/2 pages*

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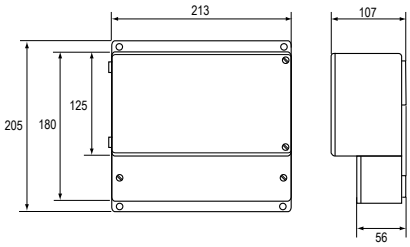
Single/Dual Input Pressure Actuated for 3-phase Motors

These controllers are designed for speed variation of 3-phase motors, especially for fan speed control on air cooled condensers.

Head pressure control of a refrigeration system, through speed variation of the fan, results in optimum performance throughout the year.

Using a pressure transducer as the input 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 96% over the proportional band using the phase cutting principle. It is recommended to confirm with the electric motor manufacturer if a controller using the phase cutting principle for speed variation can be used. Motors that will be controlled by the P255 should not draw more than 5 A per phase.

The controller used for dual pressure input varies the fan speed by directly sensing the pressure changes of two separate refrigerant circuits. Each pressure transducer can be adjusted at a setpoint between 8 to 42 bar.
The controller selects the input with the greatest cooling demand. The transducers can be used in non-corrosive refrigerant systems.



Dimensions in mm

Features

- Condenser pressure control by fan speed variation
- Pressure input
- Dual input possibility
- Transducers with proven reliability
- Easy accessible setpoint screw
- Minimum speed or cut-off selection
- Adjustable minimum speed or cut-off
- Adjustable maximum speed limit
- Proportional band adjustment
- Contact input to force output to max. or off
- Allows connection in both “Star” and “Delta” configurations
- Motor speed action can be reversed by interchanging only two wires
- Adjustable hysteresis in cut-off mode
- IP54 enclosure for electronic module
- Cosφ motor adjustment

P255 - *2/2 pages*

Page 197

Single/Dual Input Pressure Actuated for 3-phase Motors

Ordering Codes	Range (bar)	Prop. band (bar)	Pressure Connection	Supply Voltage (VAC) 50/60 Hz 3 phase	Rating	Full Volage setpoint	Additional Features
P255ML -9200	14 to 24	1 to 6	Style 47	230	5 Amp	16	Direct mount sensor
P255MM -9100			Style 45A	400			---
P255MM -9200			Style 47				Direct mount sensor
P255MM -9201	8 to 14	0.5 to 4				10	
P255MM -9600	14 to 24	1 to 6	Style 13			16	---
P255MM -9500			Style 50				Same as P255MM-9100 but Style 50
P255MM -9501	8 to 14	0.5 to 4				10	Same as P255MM-9101 but Style 50
P255MM -9502	3.5 to 10					6	---
P255MM -9503	22 to 42	1 to 8				30	For use on R410A applications

For further information and additional models see Product Installation Guide

Johnson Controls

U255

Page 198

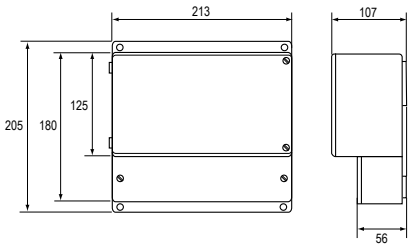
0-10 V Input, 3-phase Motors

These controllers are designed for applications where the fan speed must be controlled by a voltage input signal (e.g. 0-10 V, 1-5 V etc.) from a transmitter or control system.

The signal from one pressure transmitter connected to electronic pressostats, indicators and fan speed control eliminates pressure connections and capillaries through which possible loss of refrigerant is reduced.

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 controller varies the supply voltage to the motor from 30% to at least 96% over the proportional band using the phase cutting principle. It is recommended to confirm with the electric motor manufacturer if a controller using the phase cutting principle for speed variation can be used. Motors that will be controlled by the U255 should not draw more than 5 A per phase.



Dimensions in mm

Features

- Adjustable voltage input.
- Allows connection in both “Star” and “Delta” configurations.
- Contact input to force output to max. or off.
- Built-in power supply.
- Built-in direct/reverse action selector switch.
- IP54 enclosure.
- Built-in Setpoint adjustment.
- Minimum speed or cut-off selection.
- Adjustable minimum speed or cut-off
- Adjustable maximum speed limit.
- Proportional band adjustment.
- Adjustable hysteresis in cut-off mode.
- Cosφ motor adjustment.

Ordering Codes	Range	Prop. band	Supply Voltage (VAC) 50/60 Hz 3 phase	Rating	Additional Features *Note: Style 50 is allowed on the Dutch market!*
U255MM -9100	0 - 10 V	0.7-10 V	400 V	5 Amp	Can also be used for 0-5 V, 1-5 V input or other inputs within the range 0-10 V.

P35

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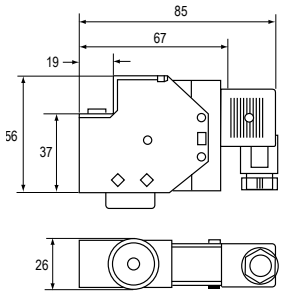
Mechanical Pressure Transducers



Dimensions in mm

Replacement Press. transducers for P215 versions (300K ohm)

Ordering Codes	Range	Setting (bar)	Style	Cap. Length (m)	Additional Features *Note: Style 50 is allowed on the Dutch market!*
P35AC -9100	14/24	16	45A	0.9	---
P35AC -9202			47		
P35AC -9203	8/14	10			
P35AC -9500	14/24	16	50		Same as P35AC-9100 but Style 50
P35AC -9501	8/14	10			Same as P35AC-9101 but Style 50
P35AC -9512	22/42	30	50		For R410A applications
P35AC -9600	14/24	16	13		(also used for replacement P15/P215 series fan speed controllers)

Replacement Press. transducers P255 versions (100K ohm)

Ordering Codes	Range	Setting (bar)	Style	Cap. Length (m)	Additional Features *Note: Style 50 is allowed on the Dutch market!*
P35AC -9200	14/24	16	47	0.9	---
P35AC -9201	8/14	10			
P35AC -9106	14/24	16	45A		
P35AC -9604	14/24		13		
P35AC -9505	8/14	10	50		Same as P35AC-9105 but Style 50
P35AC -9506	14/24	16			Same as P35AC-9106 but Style 50
P35AC -9511	22/42	30			For R410A applications

Replacement Press. transducers P255 versions (500K ohm)

Ordering Codes	Range	Setting (bar)	Style	Cap. Length (m)	Additional Features *Note: Style 50 is allowed on the Dutch market!*
P35AC-9510	14/24	16	50	0.9	Special 500 KOhm for P215LR-400V. version
P35AC-9513	22/40	30			Special 500 KOhm version for R410A applications

Accessories

Page 200

for Pressure Transducers

Ordering Codes	Description
BKT034N602R	Mounting bracket + screws for P35AC transducer
	Replacement Parts
P38AA-9111	Replacement electronic module P215LR-230 V types
P38AA-9112	Replacement electronic module P215LR-230 V incl. heatpump input types
P38AA-9211	Replacement electronic module P215BR-230 V types
P38AA-9311	Replacement electronic module P215TR-230 V types
P38AD-9100	Replacement electronic module P255MM
P38AD-9101	Replacement electronic module P255ML

F61

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Flow Switches for Liquid

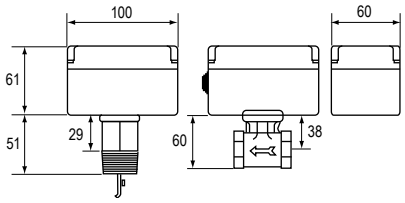
The F61 liquid flow switches can be used in liquid lines carrying water, sea water, swimming pool water, ethylene glycol or other liquids not harmful to the specified materials.

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 IP 67 enclosure
- Stainless steel Pipe-insert type
- Large wiring space
- Range screw easy accessible.



Dimensions in mm

IP43

Ordering Codes	Range	Connection		Switch Action	Additional Features
F61SB-9100	0,15 dm³/s - 46 dm³/s	R1" DIN2999	(ISO R7)	SPDT Contacts, 15(8) amp 230 V~	3 paddles 1", 2", 3" St.St. AISI 301
F61SD-9150	0,04 dm³/s - 0,07 dm³/s	½ -14 NPTF	T-body		---
F61SD-9175		¾ -14 NPTF			---
F61SD-9151	0.08 dm³/s - 0.11 dm³/s	½ -14 NPTF			---

IP67

Ordering Codes	Range	Connection		Switch Action	Additional Features
F61TB-9100	0,15 dm³/s - 46 dm³/s	R1" DIN2999	(ISO R7)	SPDT Contacts, 15(8) amp 220 V~	4 paddles, 1", 2", 3" and 6" St.St. AISI 301
F61TB-9200		R1" DIN2999	(ISO R7)		Stainless steel body, bellows, rod, 3 St.St. AISI 304 paddles 1",2",3"
F61TD-9150	0,04 dm³/s - 0,07 dm³/s	½ -14 NPTF	T-body		---

Accessories for Flow Switches

Ordering Codes	Description
PLT69-11R	F61 - 6" Stainless steel AISI 301 paddle
KIT21A602	F61 - 4 paddles 1", 2", 3" and 6" St.St. AISI 301

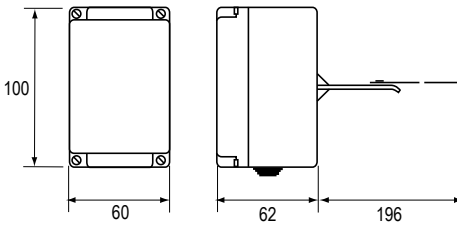
F62

Page 202

Air Flow Switches

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.



Dimensions in mm

Features

- Polycarbonate IP43 enclosure
- Large wiring space
- Range screw easily accessible.

IP43

Ordering Codes	Max. air velocity	Switch Action	Enclosure	Additional Features
F62SA -9100	10 m/sec	SPDT Contacts 15(8) A, 230 V~	Plastic Enclosure IP 43	With 55 mm paddle mounted, 80 mm separate

Accessories

Ordering Codes	Description
PLT112-1R	F62 - Air Flow plate 55 x 175 mm
PLT112-2R	F62 - Air Flow plate 80 x 175 mm

F63

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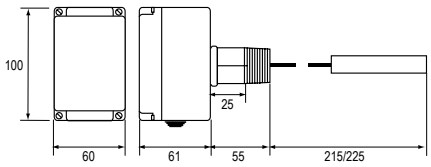
Liquid Level Float Switches

The F63 is a liquid level float switch for use in open or closed tanks where a desired liquid level has to be maintained and installations handling water, swimming pool water, sea water, brine, ethylene glycol or other liquids not harmful to the specified materials.

The switches have 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.

There are three different types available. The phosphor bronze bellows version for use in applications where the liquid is not corrosive to phosphor bronze. The stainless steel bellows version for use in environments like cooling towers (water with high calcium content) and a complete stainless steel AISI 316L version. These float switches should not be used for liquids lighter than water (density less than 0.95 kg/dm3).



Dimensions in mm

Features

- Solid polycarbonate float
- Vapour tight IP 67 enclosure
- Convenient wiring terminals

Ordering Codes	Connection	Switch Action	Enclosure	Additional Features
F63BT-9101	1-11½ NPT	SPDT Contacts 15(8) A, 230 V~	Plastic Enclosure IP 67	Plastic float, Brass body, Phosphor bronze bellows
F63BT-9102				Plastic float, Stainless steel bellows
F63BT-9200	R1" DIN2999 (ISO R7)			Plastic float, Stainless steel 316 L body, rod, bellows

Accessories

Ordering Codes	Description
FLT001N001R	F63 - Float

P232

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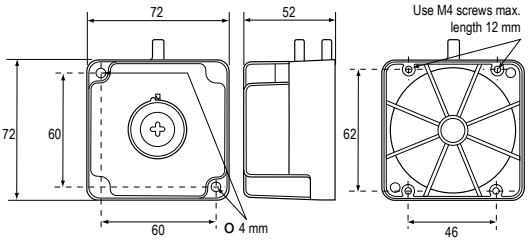
Sensitive Differential

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.



Dimensions in mm

Features

- Easy to read Setpoint scale
- Wide range (1 to 125 mm W.C.)
- Small differential (1 mm W.C.) at bottom of range
- 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

Ordering Codes	Switch point Range (in. wc)	Switching Differential (in. wc)	Pack
P232A-B-AAC	0,2 to 1,6	< 0.1	ind.

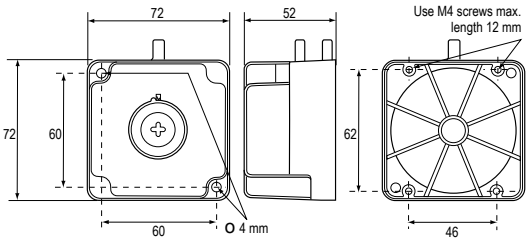
P233

Page 205

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.



Dimensions in mm

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

Ordering 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				---
P233A-4-AAD*				bulk	---
P233A-4-AHC				ind.	GMT008N600R + BKT024N001R
P233A-4-PAD*	50 to 400 Pa			bulk	Scale in Pa
P233A-4-PAC				ind.	---
P233A-4-PHC					Scale in Pa, GMT008N600R + BKT024N001R
P233A-4-PKC					Scale in Pa, FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-4-AKC	0,5 to 4				FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-6-AAD*	0,5 to 6			bulk	---
P233A-10-AAC	1,4 to 10	< 0.5		ind.	---
P233A-10-AHC					GMT008N600R + BKT024N001R
P233A-10-PAC	140 to 1000 Pa				---
P233A-10-PKC					Scale in Pa, FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-10-PAD*				bulk	---
P233A-10-AAD*	1,4 to 10				---
P233-10-AKC				Ind.	FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-50-AAC	6 to 50	< 1			
P233A-10-PHC	140 to 1000 Pa	< 0,5			Scale in Pa, GMT008N600R + BKT024N001R

Notes

* : Quantity orders only

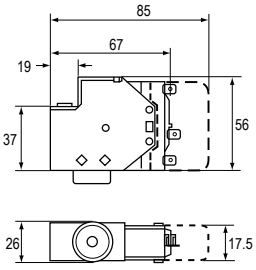
** : Switching differential is maximum value mid-range

P20 - *1/2 pages*

Page 206

for Air-conditioning and Heat pump Applications

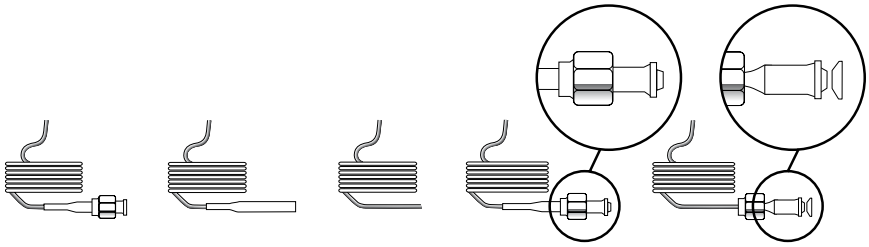
The P20 series high and low limit (cut-out) controls for all non-corrosive refrigerants are compact pressure controls ideally suited for commercial or residential packaged air conditioning units, heat pumps, small water chillers, ice cube machines and other applications where a semi fixed setting is 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.



Dimensions in mm

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



Style 13 **Style 34** **Style 35** **Style 45A** **Style 50**

Ordering Codes	Range (bar)	Differential fixed	Set at (bar)	Style	Capillary Length	Switch Action	PED approval
P20EA-9610C	0.5 to 10	0.9	1.5	13	90 cm	SPDT, 8 A, Open Low, Auto Reset	---
P20EA-9611A			0.5		120 cm		
P20EA-9611C			1.5				
P20EA-9611D			2				
P20EA-9611F			3				
P20EA-9620F		1.5			90 cm		
P20EA-9621D			2		120 cm		
P20EA-9160L	7 to 29	3.1	17	45A	90 cm	SPDT, 8 A, Open High, Auto Reset	▪
P20EA-9560Y		3.5	29	50			
P20EA-9561K		1.2	16				
P20EA-9660L		3.1	17	13			
P20EA-9660M		3.1	18				
P20EA-9670L		4.6	17				
P20EA-9681L		6.5			120 cm		
P20EA-9550V		1.4	26	50	90 cm		
P20EA-9551H		1.2	15	35	100 cm		
P20EA-9901Z	14 to 41	6.2	30	34	90 cm		---
P20EA-9960L	7 to 29	3.1	17				---
P20EA-9961		2.8	8				▪

For further information and additional models see Product Installation Guide

Johnson Controls

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for Air-conditioning and Heat pump Applications

P20 High Pressure Control

Ordering Codes	Range (bar)	Differential fixed	Set at (bar)	Style	Capillary Length	Switch Action	Additional Features	PED Approval
P20EA-9681T	7 to 29	7.1	24	13	120 cm	SPDT, 8 A, Open High, Auto Reset	---	▪
P20EA-9950C		1.1	10	34	90 cm			
P20EA-9950K		1.2	16					
P20EA-9960C		2.8	10					
P20FA-9610B*	0.5 to 10	---	1	13		SPDT, 8 A, Open Low, Manual Reset	Wrench adjustment	---
P20FA-9610F*			3					
P20GA-9550U*	7 to 29		25	50		SPDT, 8 A, Open High, Manual Reset		▪
P20GA-9650X*			28	13				
P20GA-9651N*			19		120 cm			
P20GA-9651U*			25					
P20GA-9950K*			16	34	90 cm			
P20GA-9950T*			24					
P20GA-9950X*			28					

P20 Low and High Pressure Control Universal Replacements

Ordering Codes	Range (bar)	Differential fixed	Set at (bar)	Capillary Length	Style	Switch Action	Additional Features	PED Approval
P20EA-9530FC	0.5 to 10	2.1	3	90 cm	50	SPDT, 8 A, Auto Reset	Open Low	---
P20EA-9630FC		2.1	3		13			
P20EA-9570X	7 to 29	5.2	28		50		Open High	▪
P20EA-9670X		5.2	28		13			
P20EL-9670TC	14 to 42	6.5	37					▪
P20FA-9510FC	0.5 to 10		3		50	SPDT, 8 A, Manual Reset	Open Low	---
P20GA-9550XC	7 to 29		28				Open High	▪
P20GA-9650XC					13			
P20GL-9650TC	14 to 42		37					

Note
* : Quantity orders only

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Oil Protection

DescriptionThese 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.

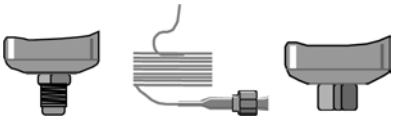
Controls are available only for manual reset after cut-out.

Features

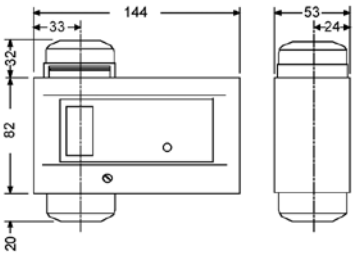
- Heavy duty pressure elements
- Safety lock-out with trip-free manual reset
- Ambient compensated timing
- Dust-tight Penn switch

Application

- These oil protection controls are designed to give protection against low net lube oil pressure on pressure lubricated refrigeration compressors.



Style 5 Style 13 Style 15



Dimensions in mm

Ordering 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. plastic PG nipple 13.5 + 2 flare nuts
P28DA-9660		13	90				
P28DJ-9300		5	---	230			IP 66 enclosure
P28DJ-9360			90				
P28DJ-9380			120				IP 66 enclosure, without time relay
P28DJ-9861		15	90			NH3	IP 66 enclosure, Incl. 2 connectors CNR003N001
P28DP-9300		5	---			non-corr.	Without time delay
P28DP-9340			50				---
P28DP-9360			90				---
P28DP-9380			120				---
P28DP-9381							Concealed adjustment, set 0.65 bar
P28DP-9640		13	50				---
P28DP-9660			90				---
P28DP-9680			120				---
P28DP-9840		15	50			NH3	---
P28DP-9860	---		90		---		---
P28DN-9750	---		50	115/230	---		Concealed adjustment, set 1,5 bar

P45

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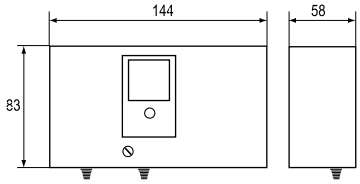
Oil Protection

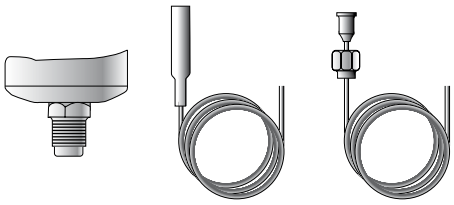
The series P45 controls are designed to give protection against low lube-oil pressure on pressure lubricated refrigeration compressors. The controls measure the pressure differential (net oil pressure) between the pressure generated by the oil pump and the refrigerant pressure at the crankcase. A built-in 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** **Style 51**

Ordering 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			

Note
* : Bulk pack

P74

Page 210

Differential Pressure

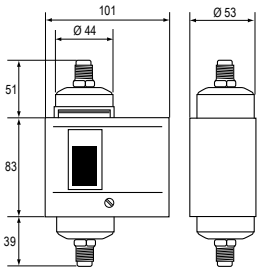
The P74 series of differential pressure switches incorporate two opposing pressure elements and an adjustable range setpoint spring with a calibrated scale. The control switches at the indicated setpoint on an increase in differential pressure and switches back to the normal position when the different 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.



Dimensions in mm

Ordering 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		for NH3
P74EA-9701					Set 1 bar, concealed adjustment, for NH3
P74FA-9700	0 to 1	0.1 fix.		SPDT, 3 A, contact Open High	for water
P74FA-9701	2 to 8	0.7 fix.			For NH3

P48

Page 211

Steam

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.

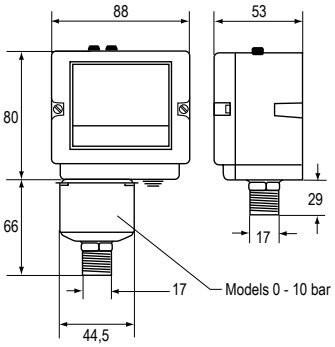
All the models have phosphor bronze bellows and brass pressure connections except the P48AAA-9150. This model has a stainless steel bellows and pressure connection and is provided with a brass adapter
¼"-18 NPT female to R3/8 male.

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 (see Accessories).



Dimensions in mm

Ordering Codes	Range (bar)	Differential (bar)	Pressure Connection	Style	Switch Action	Aditional Features	Approved According to PED 97/23/ EC Cat IV
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					
P48AAA-9150	3 to 30	3 to 12				Automatic Reset, stainless steel bellows	---
P48BEA-9140*	4 to 16	-				Manual Reset	▪

Note
* : Quantity orders only

For further information and additional models see Product Installation Guide

Johnson Controls

P735

Page 212

Single Pressure

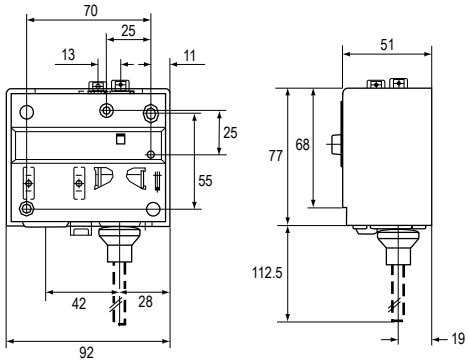
The P735 series pressure controls may be used for control functions or limit functions, depending on model number. All models are provided with alarm contacts. All standard models have phosphor bronze bellows and brass pressure connections. Models for use with ammonia are provided with stainless steel bellows and connectors.

Features

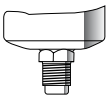
- Generous wiring space
- SPDT contacts are provided as standard on single pressure controls
- Trip-free manual reset

Application

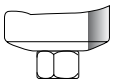
These pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure. Models supplied have a "whole range" design, enabling them to be used with all non-corrosive refrigerants which are within the operating range of the control. They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program.



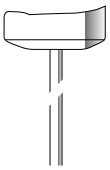
Dimensions in mm



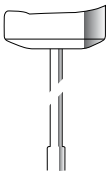
Style 5



Style 15



Style 28



Style 30

P735 Pressure Controls for Water

Family Code	Range (bar)	Differential (bar)	Switch Action (wire diag.)	Max. Bellows Pressure	Special Pressue Connection G¼" female	PED Approval
					Ind. Pack.	
P735AAA	-0,2 to 10	1 to 4,5	1	15	-9200	---
	-0,5 to 7	0,5 to 3	1	22	-9201	

P735 Pressure Controls for Non-Corrosive Refrigerants (Wachter, Begrenzer, Sicherheitsdruckbegrenzer)

Family Code	Range (bar)	Differential (bar)	Switch Action (wire diag.)	Max. Bellows Pressure	Style 5		Style 30	PED Approval
					Ind. Pack.	Bulkpack	Ind. Pack.	
P735AAA	-0.5 to 7	0.5 to 3	1	22	-9300	-9320	-9400	---
	-0.2 to10	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	-9370		

P735 Pressure Controls for Non-Corrosive Refrigerants

Family Code	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	20	-9300	-9320	---	---
	3 to 30	3,5 to 12	2	33	-9350	-9370	-9850	■
P735BCB	-0,5 to 7	Man. res.**	1	20	-9300	---	---	---
P735BEB	3 to 30	Man. res.*	3	33	-9350	-9370	-9850	■

Notes
* : Resetable at 3 bar below cut-out point
** : Resetable at 0.5 bar above cut-out point
100 kPa = 1 bar ≈ 14.5 psi

P736 - *1/2 pages*

Page 213

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.

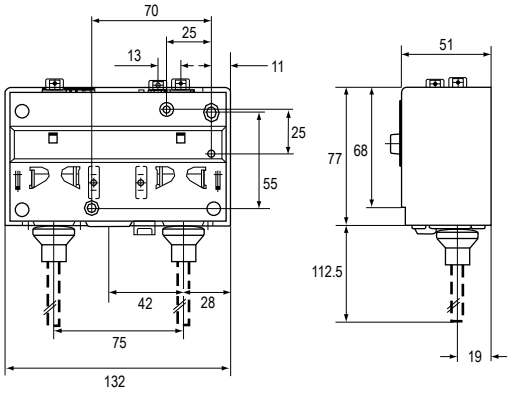
Models for use with ammonia are provided with stainless steel bellows and connectors.

Features

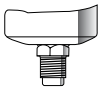
- Generous wiring space
- Trip-free manual reset
- Separate alarm contacts for both low pressure and high pressure cut-out (except P736ALA)

Application

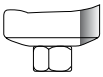
These dual pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure. Models supplied have a “whole range” design, enabling them to be used all non-corrosive refrigerants which are within the operating range of the control. They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program.



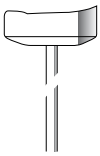
Dimensions in mm



Style 5



Style 15



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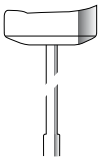

Style 30

P736 - *2/2 pages*

Page 214

Dual Pressure

P736 Dual Pressure Controls for Non-corrosive Refrigerants

Family Code	Left Side		Right Side		Contruction LP/HP (max. press.)	Style 5		Style 30	PED Approvals
	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		Ind. Pack.	Bulkpack	Ind. Pack.	
P736LCA	-0.5 to 7	0.5 to 3	3 to 30	3 (fixed)	LP: 22bar HP: 33 bar	-9300	-9320	-9400	---
P736MCA	-0.5 to 7	0.5 to 3	3 to 30	Man. Res.**		-9300	-9320	---	
P736NGA	-0.5 to 7	Man. Res.*	3 to 30	Auto Reset		---	***		
P736PGA	-0.5 to 7	Man. Res.*	3 to 30	Man. Res.**		-9300	---		

P736 Dual Pressure Fan Cycling Controls for Air-Cooled Condensers (Non-corrosive Refrigerants)

Family Code	Left Side		Right Side		Contruction HP/HP (max. press.)	Style 5		Style 30	PED Approvals
	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	****	---	---

P736 Dual Pressure Controls for Non-Corrosive Refrigerants

Family Code	Left Side		Right Side		Contruction 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	****	---	
P736MCS	-0.5 to 7	0,6 to 3	3 to 30	Man. res.**		-9300	****		
P736PGB	-0.5 to 7	Man. res.*	3 to 30	Man. res.**		-9300	****		

P736 Dual Pressure Manual Reset HP/HP, TÜV-Begrenzer + Sicherheitsbegrenzer

Family Code	Left Side		Right Side		Contruction HP/HP (max. press.)	Style 5		Style 30	PED Approvals
	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
* : Resetable at 0.5 bar above cut-out point
** : Resetable at 3 bar below cut-out point
*** : Can be set-up for quantity orders
100 kPa = 1 bar ≈ 14.5 psi

P77 - *1/2 pages*

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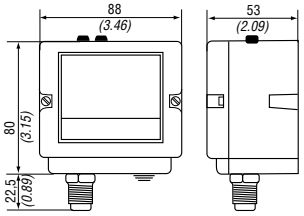
Single Pressure for IP54 Applications

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 97/23/EC 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.



Dimensions in mm

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 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 97/23/EC Cat. IV (supersedes DIN and TUV approval) are included in the program.

Style 5

Style 15

Style 28

Style 30

Ordering Codes	Range (bar)	Differential (bar)	Wiring/ Action	Style	Pack.	Refr.	Additional Features	W-sale Code	PED Approval
P77AAA-9300	-0.5 to 7	0.5 to 3	1	5	ind.	non-corr.	---	P77L	---
P77AAA-9301	-0.2 to 10	1 to 4.5							
P77AAA-9302	-0.3 to 2	0.4 to 1.5							
P77AAA-9320*	-0.5 to 7	0.5 to 3			bulk		Is P77AAA-9300 bulk pack		
P77AAA-9321*	-0.2 to 10	1 to 4.5					Is P77AAA-9301 bulk pack		
P77AAA-9350	3 to 30	3 to 12	2		ind.		---	P77H	
P77AAA-9351	3.5 to 21	2 to 5.5						P77A	
P77AAA-9370*	3 to 30	3 to 12			bulk		Is P77AAA-9350 bulk pack	---	
P77AAA-9371*	3.5 to 21	2 to 5.5					Is P77AAA-9351 bulk pack		
P77AAA-9400	-0.5 to 7	0.5 to 3	1	30	ind.	---	P77AAA-9300 solder connection ¼ "ODF		
P77AAA-9450	3 to 30	3 to 12	2			---	P77AAA-9350 solder connection ¼ "ODF		
P77AAA-9451	3.5 to 21	2 to 5.5				---	P77AAA-9351 solder connection ¼ "ODF		
P77AAA-9700	-0.5 to 7	0.5 to 3		15		NH3	---		
P77AAA-9750	3 to 30	3 to 12					---		
P77AAA-9800	-0.5 to 7	0.5 to 3	1	28	ind.	non-corr.	P77AAA-9300 solder connection 6 mm ODM		
P77AAA-9850	3 to 30	3 to 12	2				P77AAA-9350 solder connection 6 mm ODM		

Notes

* : Quantity orders only

P77 - *2/2 pages*

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Single Pressure for IP54 Applications

Ordering Codes	Range (bar)	Diff. (bar)	Wiring/ Action	Style	Pack.	Refr.	Additional Features	W-sale Code	PED Approval
P77 Pressure Controls Automatic Recycle (Wächter, including lockplate assy)									
P77AAW-9300	-0.5 to +7	0.5 to 3	1	---	ind.	non-corr.	---	---	---
P77AAW-9301*	-0.5 to +7	0.5 to 3					Gold plated contacts; Fixed setting: Open:0,5 bar; Close: 1,25 bar		
P77AAW-9320*	-0.5 to +7	0.5 to 3			bulk		P77AAW-9300 in bulk pack		
P77AAW-9350	3 to 30	3.5 to 12	2		ind.		---	P77W	▪
P77AAW-9353*	3 to 30	3.5 to 12					Gold plated contacts; Fixed setting: Open 7 bar; Close: 11 bar	---	
P77AAW-9354*	3 to 30	3.5 to 12					Gold plated contacts; Fixed setting: Open 22,5 bar; Close: 16 bar		
P77AAW-9355	3 to 42	4 to 12		5	ind.		---		
P77AAW-9370*	3 to 30	3.5 to 12		---	bulk		P77AAW-9350 in bulk pack		
P77AAW-9700	-0.5 to +7	0.5 to 3	1	15	ind.	NH3	---		---
P77AAW-9750	3 to 30	3.5 to 12	2						▪
P77AAW-9800	-0.5 to +7	0.5 to 3	1	28		non-corr.	P77AAW-9300 solder connection 6 mm ODM		---
P77AAW-9850	3 to 30	3.5 to 12	2				P77AAW-9350 solder connection 6 mm ODM		▪
P77AAW-9851*	3 to 30	3.5 to 12					Gold plated contacts; Fixed setting: Open 7 bar; Close: 11 bar, with solder connection 6 mm ODM		
P77AAW-9855	3 to 42	4 to 12	2				---	???	???
P77 Pressure Controls Manual Reset LP									
P77BCA-9300	-0.5 to +7	---	1	5	ind.	non-corr.		---	---
P77BCA-9400				30			P77BCA-9300 solder connection ¼ " ODF		
P77BCA-9700				15		NH3			
P77BCB-9300				5		non-corr.			
P77BCB-9800				28	ind.		P77BCB -9300 solder connection 6 mm ODM		
P77 Pressure Controls Manual Reset HP									
P77BEA-9350	3 to 30	---	3	5	ind.	non-corr.	---	P77HR	---
P77BEA-9450				30	ind.		P77BEA-9350 solder connection ¼ " ODF	---	
P77BEA-9750				15		NH3	---		
P77 Pressure Controls (Begrenzer, including lockplate assy)									
P77BEB-9350	3 to 30	---	3	5	ind.	non-corr.	---	P77B	▪
P77BEB-9355	3 to 42							???	???
P77BEB-9370*	3 to 30				bulk		P77BEB-9350 in bulk pack	---	▪
P77BEB-9750				15	ind.	NH3	---		
P77BEB-9850				28		non-corr.	P77BEB-9350 solder connection 6 mm ODM		
P77BEB-9855	3 to 40						---	???	???
P77 Pressure Controls (Sicherheitsdruckbegrenzer, including lockplate assy)									
P77BES-9350	3 to 30	---	3	5	ind.	non-corr.	---	P77B	▪
P77BES-9750				15	ind.	NH3		---	
P77BES-9850				28	ind.	non-corr.	P77BES-9350 solder connection 6 mm ODM		

Note
* : Quantity orders only

P78 - *1/2 pages*

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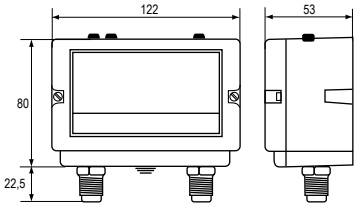
Dual Pressure for IP54 Applications

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 DIN 32733 have a double bellows on the high pressure versions.

Their IP54 classification means that these pressure controls are suitable for almost all applications.

Features

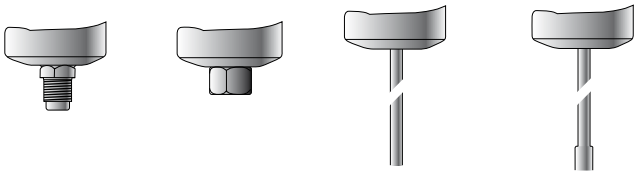
- Generous wiring space
- Splash-proof enclosure (IP54)
- Trip-free manual reset
- Patented separate alarm contacts for both low pressure and high pressure cut-out (except P78ALA)



Dimensions in mm

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 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 97/23/EC Cat. IV (supersedes DIN and TUV approval) are included in the program.



Style 5 **Style 15** **Style 28** **Style 30**

Ordering Codes	Range (bar) LP	Range (bar) HP	Diff. (bar) LP	Wiring/ Action	Style	Pack.	Refr.	Additional Features	W-sale Code	PED Approval
P78 Pressure Controls Automatic Recycle										
P78LCA-9300	-0.5 to +7	3 to 30	0.5 to 3	1	5	ind.	non-corr.	---	P78L	---
P78LCA-9320*						bulk	---	P78LCA-9300 bulk pack	---	
P78LCA-9400					30	ind.		P78LCA-9300 solder connection ¼ " ODF		
P78LCA-9500					35			P78LCA-9300 with 90 cm capillary pressure connection		
P78LCA-9700					15		NH3	---		
P78 Pressure Controls Automatic Recycle, TÜV-Wächter										
P78LCW-9300	-0.5 to +7	3 to 30	0.5 to 3	1	5	ind.	non-corr.	---	P78W	▪
P78LCW-9302*							---	Gold plated contacts	---	
P78LCW-9320*						bulk		P78LCW-9300 bulk pack		
P78LCW-9321*								P78LCW-9300 but set at 0 to 3 bar LP, 20 bar HP		
P78LCW-9800					28	ind.		P78LCW-9300 solder connection 6 mm ODM		
P78LCW-9801*								P78LCW-9800 gold plated contacts, fixed settings LP 0,3 bar; HP22,5 bar		

For further information and additional models see Product Installation Guide

Johnson Controls

P78 - *2/2 pages*

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Dual Pressure for IP54 Applications

Ordering Codes	Range (bar) LP	Range (bar) HP	Diff. (bar) LP	Wiring/ Action	Style	Pack.	Refr.	Additional Features	W-sale Code	PED Approval
P78 Pressure Controls Manual reset HP										
P78MCA-9300	-0.5 to +7	3 to 30	0.5 to 3	1	5	ind.	non-corr.	---	P78M	---
P78MCA-9400					30	ind.		P78MCA-9300 solder connection ¼ " ODF		
P78MCA-9700					15	ind.	NH3	---		
P78 Pressure Controls Manual reset LP/Auto. Reset HP										
P78PGA-9300	-0.5 to +7	3 to 30	---	1	5	ind.	non-corr.	---	P78P	---
P78PGA-9400					30	Ind.		P78PGA-9300 solder connection ¼ " ODF	---	
P78PGA-9700					15		NH3	---		
P78 Pressure Controls Manual reset LP/HP										
P78PGB-9300	-0.5 to +7	3 to 30	---	1	5	ind.	non-corr.	---	---	▪
P78PGB-9800			---		28	ind		P78PGB-9300 solder connection 6 mm ODM		
P78 Pressure Controls Manual reset HP (Begrenzer, including lockplate assy)										
P78MCB -9300	-0.5 to +7	3 to 30	0.5 to 3	1	5	ind.	non-corr.	---	P78B	▪
P78MCB-9320*						bulk		P78MCB-9300 bulk pack	---	
P78MCB-9800					28	ind.		P78MCB-9300 solder connection 6 mm ODM		
P78 Pressure Controls Manual reset HP (Sicherheltsdruckbegrenzer, including lockplate assy)										
P78MCS-9300	-0.5 to +7	3 to 30	0.5 to 3	1	5	ind.	non-corr.	---	P78S	▪
P78 Pressure Controls Manual reset HP/HP (Begrenzer + Sicherheltsdruckbegrenzer, including lockplate assy)										
P78PLM-9350	3 to 30	3 to 30	---	2	5	ind.	non-corr.	---	P78BS	▪
P78PLM-9850					28			Is P78PLM-9350 solder connection 6 mm ODM	---	
P78 Dual Fan Cycling Controls										
P78ALA-9351	3.5 to 21	3.5 to 21	---	3	5	ind.	non-corr.	---	P78A	▪
P78ALA-9451					30			Is P78ALA-9351 solder connection ¼ " ODF	---	

Note
* : Quantity orders only

P100 - *1/2 pages*

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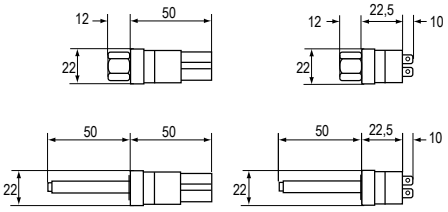
Direct Mount Pressure Switches

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 and others.



Dimensions in mm

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

Auto Reset Models

Ordering Codes	Application	Refrigerant	P (bar)		P open ± (bar) tolerance	P close ± (bar) tolerance	Connection		Electr. Termination	Switch
			Open	Close			"1/4" "SAE Fem Flare"	50 mm straight, 6 mm dia. x 7 mm reduced end, copper clad brazing tube (TIF5)		
P100AP-300D	Low Pressure Auto Reset Normally Open	R134A	2,5	4	0,5	0,5	▪	---	2 Mt.	SPST
P100AP-301D		R134A	2,5	4	0,5	0,5	---	▪	2 Mt.	SPST
P100AP-302D		R407C	4	6	0,5	0,5	▪	---	2 Mt.	SPST
P100AP-306D		R404A	0,3	2,8	0,4	0,4	▪	---	2 Mt.	SPST
P100AP-308D		---	0,5	1,5	0,3	0,3	▪	---	FASTON	SPST
P100AP-309D			0,7	2,2	0,3	0,3	▪		1,2 Mt.	SPST
P100AP-310D			0,7	2,2	0,3	0,3	▪		3 Mt.	SPST
P100CP-102D	High Pressure Auto Reset Normally Closed	R134A	16	11	0,7	1,4	▪	---	2 Mt.	SPST
P100CP-103D		R134A	16	11	0,7	1,4	---	▪	2 Mt.	SPST
P100CP-104D		R407C	24	18	0,7	1,4	▪	---	2 Mt.	SPST
P100CP-106D		R404A	28	23	0,7	0,7	▪	---	2 Mt.	SPST
P100CP-107D		R404A	28	23	0,7	0,7	---	▪	2 Mt.	SPST
P100CP-108D		R410A	38	28	0,7	0,7	▪	---	2 Mt.	SPST
P100CP-110D		---	27,6	20,7	0,7	0,7	▪	---	FASTON	SPST
P100CP-111D			26	20	0,7	0,7	▪		2 Mt.	SPST

For further information and additional models see Product Installation Guide

Johnson Controls

P100 - *2/2 pages*

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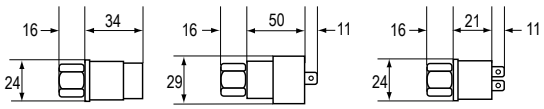
Direct Mount Pressure Switches

Features

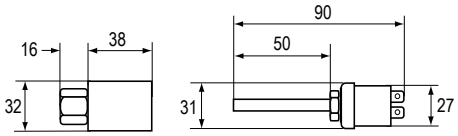
- Compact size and light weight
- Encapsulated, dust tight switch IP67
- Manual reset models have a trip-free design
- Models with gold-plated contacts available
- Broad variety of electrical and pressure connections



Dimensions in mm

Manual Reset Models

Ordering Codes	Application	Refrigerant	P (bar) Open	P (bar) Close	P open ± (bar) tolerance	P close ± (bar) tolerance	Connection "1/4" "SAE Fem Flare"	Connection 50 mm straight, 6 mm dia. x 7 mm reduced end, copper clad brazing tube (TIF5)	Electr. Termination	Switch
P100DA-66D	High Pressure Manual Reset	R134A	16		0,7	---	▪		2 Mt.	SPST
P100DA-67D		R134A	16		0,7	---		▪	2 Mt.	SPST
P100DA-68D		R407C	26		0,7	---	▪		3 Mt.	SPST
P100DA-69D		R407C	26		0,7	---		▪	3 Mt.	SPST
P100DA-70D		R404A	28		0,7	---	▪		3 Mt.	SPST
P100DA-71D		R404A	28		0,7	---		▪	3 Mt.	SPST
P100DA-72D		R410A	38		1,0	---	▪		2 Mt.	SPST
P100DA-73D		R410A	38		1,0	---		▪	2 Mt.	SPST
P100DA-74D		R407C	26		0,7	---	▪		1,2 Mt.	SPST
P100DA-75D		R410A	42		0,7	---	▪		2 Mt.	SPST
P100DA-76D		R410A	42		0,7	---		▪	2 Mt.	SPST



Dimensions in mm

P100 Heavy Duty Pressure Controls - Auto Reset

Ordering Codes	Application	Refrigerant	P (bar) Open	P (bar) Close	P open ± (bar) tolerance	P close ± (bar) tolerance	Connection "1/4" "SAE Fem Flare"	Connection 50 mm straight, 6 mm dia. x 7 mm reduced end, copper clad brazing tube (TIF5)	Electr. Termination	Switch
P100EE-17D	High Pressure Auto Reset Normally closed	R404A	20	25	1,0	1,0	▪	---	1,5 Mt.	SPDT
P100EE-18D		R134A	15	11						
P100EE-60D		R404A	28	21	0,7	0,7			2 Mt.	
P100EE-61D							---	▪		
P100EE-68D		R134A	3	25	0,35	0,35	▪	---	1,8 Mt.	

For further information and additional models see Product Installation Guide

Johnson Controls

Accessories - *1/2 pages*

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for Pressure Switches

Ordering Codes	Description	Minimum order qty.
BKT034N602R	Mounting bracket + screws for P35AC transducer	1
BKT275-1	Mounting bracket dual for P20	1
210-25R	Mounting bracket for P20/P35 (single)	1
WRN12-1	Wrench P20/P21	1
210-604R	Terminal cover P20/P21	50
BKT024N002R	Mounting bracket for P233	1
FTG015N602R	Duct mounting kit "staight"	1
FTG015N603R	Duct mounting kit "bent"	1
GMT008N600R	Duct kit for P233, self locking grommet and tubing	1
CNR003N001R	Connector 6 mm for P77/P78	1
CNR003N002R	Connector 8 mm for P77/P78	1
CNR012N001R	Adapter R3/8 female to 1/4-18 NPT male for P48	1
CNR013N001R	Adapter R 3/8 female to 1/4-18 NPT female for P48	1
TBG16A-600	Steam trap assembly P48	1
KIT023N600	Locking kit for P48, P77/P78 - for field installation	1
KIT031N600	Valve depressors for conversion style 13-style 45a	100 (1 box)
KIT034N600	Seal rings for style 50/51	250 1 box)
271-51L	Mounting bracket for P28, P45, P48, P74, P77/P78	50

Accessories - *2/2 pages*

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for Pressure Switches

Ordering Codes	Description	Minimum order qty.
SEC002N600	Capillary kit, 90 cm, 2x style 13	100
SEC002N602	Capillary kit, 90 cm, style 13 - style 45a	
SEC002N603	Capillary kit, 300 cm, 2x style 13	
SEC002N604	Capillary kit, 300 cm, style 13 - style 45a	
SEC002N606	Capillary kit, 200 cm, style 13 - style 45a	75
SEC002N607	Capillary kit, 200 cm, 2x style 13	
SEC002N608	Capillary kit, 400 cm, style 13 - style 45a	100
SEC002N609	Capillary kit, 500 cm, style 13 - style 45a	
SEC002N610	Capillary kit, 400 cm, 2x style 13	
SEC002N611	Capillary kit, 500 cm, 2x style 13	
SEC002N612	Capillary kit, 600 cm, 2x style 13	
SEC002N613	Capillary kit, 90 cm, style 34 - style 45a	
SEC002N615	Capillary kit, 90 cm, style 13 - style 34	
SEC002N616	Capillary kit, 90 cm, style 13 - cap.	150
SEC002N617	Capillary kit, 100 cm, style 13 - style 13	100
SEC002N618	Capillary kit, 100 cm, style 13 - style 34	
SEC002N619	Capillary kit, 200 cm, style 13 - style 34	
SEC002N620	Capillary kit, 200 cm, style 34 - style 34	
SEC002N621	Capillary kit, 90 cm, style 34 - style 34	
SEC002N622	Capillary kit, 90 cm, style 50 - style 50	
SEC002N623	Capillary kit, 90 cm, style 51 - cap.	
SEC002N624	Capillary kit, 200 cm, style 50 - style 50	75
SEC002N625	Capillary kit, 300 cm, style 50 - style 50	50
SEC002N626	Capillary kit, 90 cm, style 50 - style 51	100
SEC002N627	Capillary kit, 200 cm, style 50 - style 51	
SEC002N628	Capillary kit, 300 cm, style 50 - style 51	75
SEC002N629	Capillary kit, 400 cm, style 50 - style 51	50
SEC002N630	Capillary kit, 500 cm, style 50 - style 51	
SEC002N631	Capillary kit, 50 cm, style 13 style 34	100

Replacement - Time relays P28 - P29

Ordering 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		

H735 Syntetic Flexible Hose

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Accessories

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 Codes	Pressure Connection	Fitting Connection	Length (cm)	Aditional 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

P35 - *1/2 pages*

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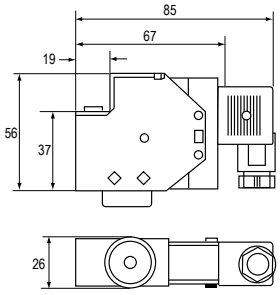
Mechanical

The P35 is a single pressure input fan speed controller for air cooled condensers. The controller varies the fan speed by directly sensing the pressure changes in a refrigerant circuit. 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 controllers can be used in non corrosive refrigerant systems and vary the supply voltage to the motor from 45% to ≥ 95% of the supplied voltage 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 3 A (rms) full load current. 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.

Features

- Condenser pressure control by fan speed variation
- Pressure input / Dual pressure input (BR models)
- Model with heat pump input available
- Transducers with proven reliability
- Easy accessible setpoint screw
- Built-in suppression filter
- Adjustable minimum speed or cut-off selection
- Motor speed action can be reversed by interchanging only two wires
- Small dimensions and DIN rail mounted



Dimensions in mm

P35 - *2/2 pages*

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Mechanical

Replacement Pressure transducers for P215 version (300 ohm)

Ordering Codes	Range	Setting (bar)	Style	Cap Length (m)	Additional Features *(Style 50 is allowed on the Dutch market)*
P35AC-9100	14/24	16	45A	0.9	---
P35AC-9101	8/14	10			
P35AC-9102	3.5/10	7			
P35AC-9108	14/24	21			
P35AC-9202	14/24	16	47		
P35AC-9203	8/14	10			
P35AC-9500	14/24	16	50		Same as P35AC-9100 but Style 50
P35AC-9501	8/14	10			Same as P35AC-9101 but Style 50
P35AC-9507	14/24	16	51		Same as P35AC-9100 but Style 51
P35AC-9508	8/14	10			Same as P35AC-9101 but Style 51
P35AC-9512	22/42	30	50		For R410A applications
P35AC-9600	14/24	16	13		(also used for replacement P15/P215 series fan speed controllers)
P35AC-9601	8/14	10			
Replacement Pressure transducers for P255 version (100 ohm)					
P35AC-9200	14/24	16	47	0.9	---
P35AC-9201	8/14	10			
P35AC-9105	14/24	10	45A		
P35AC-9106	3.5/10	16			
P35AC-9107	8/14	6.2			
P35AC-9603	14/24	10	13		
P35AC-9604	8/14	16			
P35AC-9505	14/24	10	50		Same as P35AC-9105 but Style 50
P35AC-9506	22/	16			Same as P35AC-9106 but Style 50
P35AC-9511	8/14	30			For R410A applications
Replacement Pressure transducers for P255 version (100 ohm)					
P35AC-9200	14/24	16	50	0.9	Special 500 Kohm for P215LR-400V version
P35AC-9201	22/40	30			Special 500 Kohm version for R410A applications

P499

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Electronic

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.

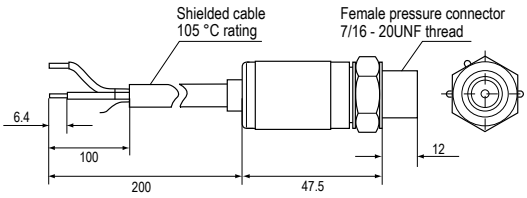
The P499 is designed to produce a linear analogue signal based on the sensed pressure.

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.

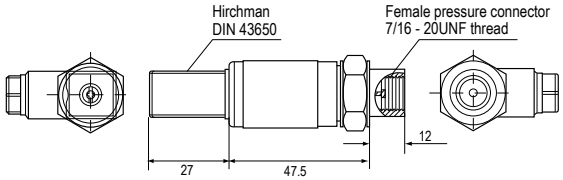
This results in a leak proof ,all metal sealed pressure system which withstand more than 10 million pressure cycles without failure.

Features

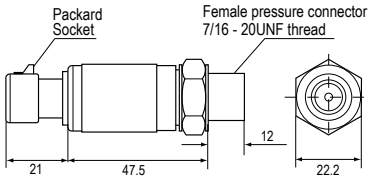
- Single-piece machined steel pressure port
- Environmentally Sealed Electronics
- Reliable, Repeatable Performance and Long Operating Life
- Slender Body Design
- Available in several pressure ranges up to 50 bar.



Shielded cable Female Dimensions in mm



Hirchman Female Dimensions in mm



Packard Female Dimensions in mm

2M cable Connections Models

Ordering Codes	Range (bar)	Output	Supply (DC)	Press. Connection	Additional Features
P499-ABS-401C	-1 to 8	0.4 to 20 mA	9 V - 32 V	Male	Maximum (short) overpressure: Range -1 to 8 bar: 16 bar Range 0 to 30 bar: 60 bar Range 0 to 50 bar: 100 bar Can be used with all media which are compatible with stainless steel type 17-4PH Accuracy: +/- 0.25% FS BFSL Total Error: +/- 1% FS
P499-ABS-404C	0 to 30				
P499-ACS-401C	-1 to 8			Female	
P499-ACS-404C	0 to 30				
P499-RBS-401C	-1 to 8	DC 0.5 V - 4.5 V	4.75 V - 5.25 V	Male	
P499-RBS-404C	0 to 30				
P499-RCS-401C	-1 to 8			Female	
P499-RCS-404C	0 to 30				
P499-VBS-401C	-1 to 8	DC 0 V - 10 V	12 V - 30 V	Male	
P499-VBS-404C	0 to 30				
P499-VCS-401C	-1 to 8			Female	
P499-VCS-404C	0 to 30				

For further information and additional models see Product Installation Guide

Johnson Controls

A19 - *1/2 pages*

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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 equiped with a NEMA1 enclosure.

All A19 style 1 wholesaler code models have a bulb clamp plus screw also enclosed.

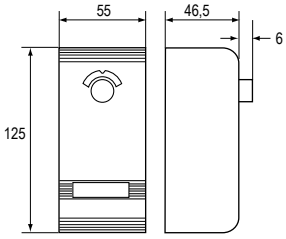
Features

- Liquid filled sensing element
- Dust tight Penn switch
- Trip free manual reset
- Front adjustment

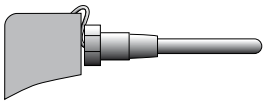
Application

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.

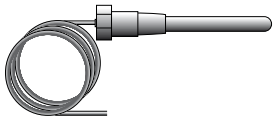
A19A Style 1b and A19B Style 3 Series



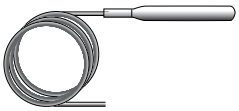
Dimensions in mm



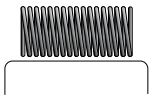
Style 2



Style 4H



Style 1a



Style 3

A19A Capillary Thermostats

Ordering Codes	Range (°C)	Diff. (K) Fixed	Style	Cap. Length (m)	Bulb Size (mm)	Switch 8A Auto Recycle	Additional Features	Wholesale Code
A19AAC-9005	-5 to +28	2	1b	2	135	SPDT Open Low	---	---
A19AAC-9009	40 to 120	3.5	1b	2	100	SPDT Open High		
A19AAC-9102	-35 to +10	2.5	1b	2	110			
A19AAC-9107	35 to 150	4	1a	2	265		Diam. 5 mm bulb	
A19AAC-9108	90 to 290	5.5	1a	2	155		---	
A19AAC-9123*	0 to 10	2.5	1a	2	80	SPDT Open Low	Bulb diam. 9.3 mm	
A19AAC-9124	-5 to +28	2	1b	5	135		---	
A19AAC-9127	1 to 60	1.5	1b	3	115		Maximum bulb temperature 85 °C	
A19AAC-9130	-10 to +14	2.5	1b	2	110		Case compensation, low limit stop at 2 °C	
A19AAF-9101	0 to 10	1.5	1a	2	80	SPDT Open Low	Diam. 9.3 mm bulb	
A19AAF-9102							Diam. 9.3 mm bulb, Case compensation	A19M
A19AAF-9103	5 to 32	0.8	1b	2	155	SPDT Open High	---	---

Note
* : Quantity orders only

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Capillary and Space Thermostats, IP30

Ordering Codes	Range (°C)	Diff. (K) Fixed	Style	Cap. Length (m)	Bulb Size (mm)	Switch 8A Auto Recycle	Additional Features	Wholesale Code
A19A Capillary Thermostats								
A19ABC-9011	40 to 120	3 to 13	2	-	-	SPDT Open High	½-14NPT 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	A19-A5
A19ABC-9037	-35 to +40	2.8 to 8	1b	3.5	110	---		A19-A4
A19ABC-9103	-35 to +10	2.8 to 11	1b	2	110	SPDT Open Low	---	A19-A1
A19ABC-9104	-5 to +28	2 to 8	1b	2	135			A19-A2
A19ABC-9106	10 to 95	3.5 to 14	1a	3.5	75	SPDT Open High	Diam. 7.4 mm bulb	---
A19ABC-9116	1 to 60	2 to 8.5	1b	3	115	SPDT Open Low	Max. bulb temp. 85 °C	A19-A3
A19ABC-9117				5				---
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	1b	2	135			
A19ACC-9103		4	1b	5				
A19ACC-9105	-35 to +10	6	1b	3.5	110		Low limit stop set at 2 °C	
A19ACC-9107	-5 to +28	4	1b	3	135		---	
A19ACC-9111	-35 to +10	6	1b	5	110		Low limit stop set at 2 °C	
A19ACC-9116				6.5			Low limit stop set at 3 °C, Universal replacement	A19F
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	A19-B3
A19BAC-9250	-35 to +10	2.5	3					A19-B1
A19BAC-9251	-5 to +28	2	3			SPDT Open Low		A19-B2
A19BBC-9275	-35 to +40	2.8 to 8	3			SPDT Open Low, 5A		A19-B4

For further information and additional models see Product Installation Guide

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Capillary and Space Thermostats, 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

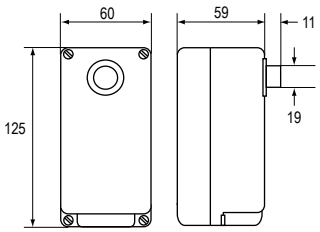
Application

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.

A19A, Style 1b



Dimensions in mm

A19A Capillary Thermostats

Ordering Codes	Range (°C)	Diff. (K) Adjust.	Style	Cap. Length (m)	Bulb Size (mm)	Switch 8A Auto Recycle	Additional Features	Wholesale Code
A19ARC-9100	-35 to +10	2.8 to 11	1b	2	110	SPDT Open Low	---	A19-AS1
A19ARC-9101	-5 to +28	2 to 8	1b	2	135			A19-AS2
A19ARC-9104	-20 to +65	3.5 to 13	1a	3.5	75		Diam. 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	A19-AS3
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		---	A19-AS4

For further information and additional models see Product Installation Guide

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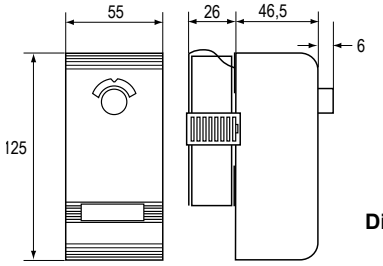
Capillary and Space Thermostats, IP65



Dimensions in mm

Ordering Codes	Range (°C)	Diff. (K) Adjust.	Style	Cap. Length (m)	Bulb ize (mm)	Switch 8A Auto Recycle	Additional Features	Wholesale Code
A19A Capillary Thermostats								
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 diam. 9.3 mm, Bulk pack	---
A19AQC-9101	-5 to +5	2 fixed	1a	2	80		5 A Switch, Ice bank control, Bulb diam 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., ½ - 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 diam. 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 diam. 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	A19BS-2
A19BRC-9251	0 to 43	2 to 8	3					A19BS-3
A19BRC-9252	-35 to +10	2.8 to 11	3					A19BS-1
A19BRC-9253	-35 to +40	2.8 to 11	3					A19BS-4
A19BQC-9252	-5 to +25	2 fixed	3				Concealed scale, screwdriver adjustment	---
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

A25

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Rod and Tube Sensing Element, IP30

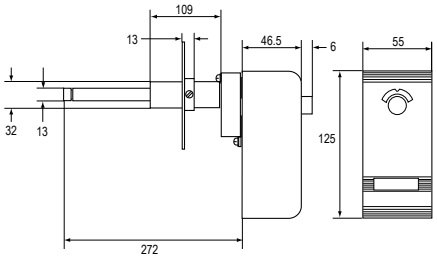
A rod and tube type sensing element actuate the switch contacts. Main contacts (1 - 2) are normally closed, and open when the temperature at the element rises to the dial setpoint. Contacts are re-closed only by operation of the reset lever. The reset lever is “trip-free” and cannot be used to block 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 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

A28

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Two-stage Capillary and Space Thermostats, IP30

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 by 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

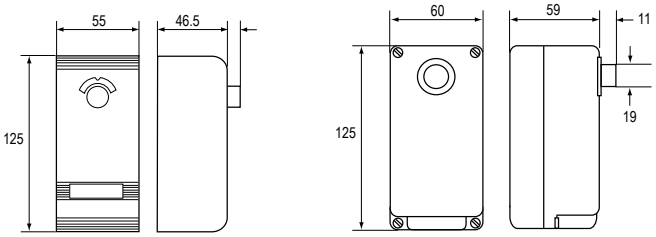
Application

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

A28AA, Style 1b and Style 3 (IP30)

A28QA, style 1b (IP65)



Dimensions in mm

Ordering Codes	Range (°C)	Diff. (K) stage	Diff. (K) betw	Style	Cap. Length (m)	Bulb Size (mm)	Switch 5A Auto Recycle	Additional Features NEMA 1 Enclosure
A28 Capillary and Space Thermostats, 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	1 to 4	1b	2	135		
A28AA-9106					5			
A28AA-9113	0 to 43	1.5	1 to 4	3	-	-	SPDT Open High	Bulb stainless steel, General purpose
A28AA-9118	1 to 60	2	1 to 4	1b	3	115		Max. bulb temp. 85 °C, General purpose
A28 Capillary and Space Thermostats, IP65								
A28QA-9101	5 to 50	2	4	1b	2	110	SPDT Open Low	Concealed scale, Screwdriver adjustment
A28QA-9110	-35 to +10	2	1 to 4					
A28QA-9111	-5 to +28	1.5	1 to 4	1b	2	135		
A28QA-9114	-35 to +40	2	1 to 4	1b	3.5	110		
A28QA-9113	0 to 43	1.5	1 to 4	3			SPDT Open High	Bulb Stainless Steel
A28QA-9115	1 to 60	2	1 to 4	1b	3	115		
A28QA-9117	20 to 40	1.5	1 to 4	3	-	-		Bulb Stainless Steel
A28QJ-9100	!0 to 95	1.5	1 to 5	1b	3	100	SPDT Open Low	3 A Switch

A36

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3- or 4- Stage Thermostats

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

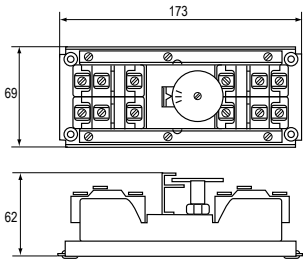
- Dust-tight SPDT switches
- Cushion mounted
- Operation from a single, liquid filled element
- Case compensation standard on all models

Application

Designed for multi-stage thermostatic operation of electrically controlled equipment such as:

- packaged liquid chillers
- heat pumps
- electric duct heaters
- computer room airconditioners

A36 3- or 4-Stage Thermostat



Dimensions in mm

Ordering Codes	Range (°C)	Adjustment Code	Cap. Length (m)	Bulb Size (mm)	Switch Auto Recycle	Additional Features
A36 Series, 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		140		
A36AGB-9103	-18 to +20	B2		125	3 A	
A36 Series, 4-Stage Thermostats						
A36AHA-9105	-18 to +20	B1	3.5	125	5 A	Armored PVC capillary
A36AHA-9107	-16 to +20	B1	5	125		
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	125		Braided Copper capillary
A36AHB-9109	-15 to +30	B2	5	110		Max. bulb temp. 75 °C

270XT

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Freeze Protection, IP20

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/+18 °C for clamp on or immersion purposes.

SPDT change over contacts permit the use of an alarm signal

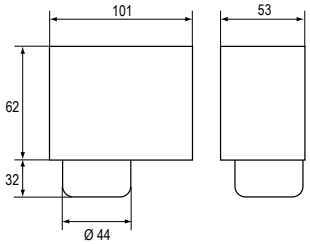
Features

- Dust tight Pennswitch
- 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.

270XT-95008, Style 9



Dimensions in mm

Ordering 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	1	2	9.5 x 80		
270XTAN-95008	-10 to +12	---	9	---	3.2 x 6000		Manual Reset
270XTAN-95088					3.2 x 3000		
270XTAN-95048	-24 to +18		1 (bulb)	2	9.5 x 80		

T22 and T25

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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.

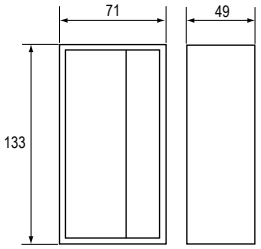
Features

- 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



Dimensions in mm

Ordering 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	1	1 to 3	Knob	---	SPDT Open High	---
T25B-9102			---	---		Concealed scale, screwdriver adjustment
T25B-9103			Knob	---		With 220 VAC signal lamp to be wired separately

Accessories

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Accessories for Temperature Controls

Ordering Codes	Description	Primary Usage	Inner Ø x Tube Length Bulb well (mm)	Inside & 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

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