

CONTROLS, HVAC & REFRIGERATION PRODUCTS

# The European Products Catalogue 2016



A more comfortable,  
safe and sustainable world





## 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.





## HVAC CONTROL PRODUCTS

### Valves

		PAGE
	Valves and Actuators Combinations	1
<i>Terminal Unit Valves</i>		
DN10...20, PN16	V5000	2
DN15...25, PN16	VG6000	4
<i>Plant Valves</i>		
DN15...50, PN16	VGS800	6
	VG7000	7
DN15...100, PN6 and PN10	VG9000	12
DN15...150, PN16	VG8000N	15
DN15...150, PN25	VG8000H	19
DN40...150, PN16, Pressure Balanced	VG8300N	23
DN65...100, PN16	VG1000 Flanged	24
DN15...50, PN40	VG1000 Threaded	27
DN15...500, PN16	VFB Butterfly Valves	31
<i>Pressure Independent Valves</i>		
DN15...32, PN25	VP1000	39
DN40...50, PN16		
DN50...150, PN16	VPA	45

## Actuators

<b>Terminal Unit Valve Actuators</b>			<b>PAGE</b>
Thermal ON/OFF Control		VA-7070	47
Thermal 0...10 V Control		VA-7090	49
Motorized Floating and Proportional Control		VA-7480	50
<b>Non Spring Return Plant Valve Actuators</b>			
		VA-7150	51
		VA-7200	52
		VA-7700	53
Floating and Proportional Control		VA7810	54
		VA1000 NSR	55
		FA-3000	56
		RA-3000	57
	4 Nm	VA9104	58
ON/OFF, Floating and Proportional Control Rotary Actuators for Ball Valves	8 Nm	M9108-xxx-5	59
	10 Nm	M9310-HGA-VA1	60
ON/OFF, Floating and Proportional Control Rotary Actuators for Butterfly Valves	68 - 2430 Nm	VA-9070	61
VAP Linear Actuators for VPA Pressure Independent Flanged Valves		VAP1000 - VAP3000	64
<b>Spring Return Plant Valve Actuators</b>			
		VA7820 - VA7830	65
Floating and Proportional Control		VA1000 SR	66
		FA-2000	67
ON/OFF, Floating and Proportional Control Rotary Actuators for Ball Valves	3 Nm	VA9203	68
	8 Nm	VA9208	70
<b>Non Spring Return Damper Actuators</b>			
	2 and 4 Nm	M9102 - M9104	72
	4 Nm	M9304	73
ON/OFF, Floating and Proportional Control	10 Nm	M9310-HGA-DA1	74
	8, 16, 24 and 32 Nm	M9108, M9116, M9124 and M9132	76
<b>Spring Return Damper Actuators</b>			
	3 Nm	M9203	79
ON/OFF, Floating and Proportional Control	8 Nm	M9208	81
ON/OFF, Floating and Proportional Control	20 Nm	M9220	82
<b>Safety Damper Actuators</b>			
ON/OFF Control	8 Nm	S9208	83
<b>Pneumatic Valve Actuators</b>			
		MP8000	84
		PA-2000	85

## Sensors

### Carbon Dioxide

		PAGE
Wall Mount - CO <sub>2</sub> and Temperature Transmitter	CD-2xx-E00-00	86
Wall Mount - CO <sub>2</sub> , Relative Humidity and Temperature Transmitter	CD-3xx-E00-00	87
Duct Mount	CD-Pxx	88

### Dew Point

	HX-9100	89
--	---------	----

### Differential Pressure

	DP2500 - DP0250	90
--	-----------------	----

### Plant Humidity

Duct Mount	HT-1300	91
------------	---------	----

### Plant Temperature

	TS-6300	92
--	---------	----

### Pressure

Liquid or Air Pressure Transmitter	PT-5217	95
------------------------------------	---------	----

### Room Humidity

Wall Mount	HT-1000	96
------------	---------	----

### Room Temperature

	RS-1100	97
	TE-7000	98
Room Command Module	TM-1100	99
	TM-2100	100
	TM-3100	101

Network Room Command Module	NS	102
-----------------------------	----	-----

### Wireless Room Sensor

Proprietary Wireless Protocol	WRS	106
ZigBee Wireless Protocol	WRZ	107

## Thermostats

<i>Electric Fan Coil Thermostat</i>		PAGE
Analog Fan Coil Thermostats	T125-E	109
LCD Digital Fan Coil Thermostats	T5200-E	110
Touch Screen Thermostats	T8200	111
<i>Programmable Networked</i>		
Room Thermostats	TEC2000	112
<i>Analog Room Controller</i>		
Room Thermostats	TC-8900 - PM-8900	115
<i>Electronic Heating Controller</i>		
Digital Controller Hot Water and Air Units	ER65-DRW	117

## Pneumatic & Transducers

<i>Electro-Pneumatic Transducers</i>		PAGE
	EP-1110	118
	EP-2000	119
	EP-8000	120

## BAS SYSTEM SOFTWARE

### Supervisor Software and Tools

<i>Metasys®</i>		PAGE
Application and Data Server-Lite	ADS-Lite	121
Application and Data Server	ADX - ADS	124
Graphics+ Features	GGT - Graphic Generator Tool	132
Metasys Export Utility	MEU	135
System Configuration Tool	SCT	137
Generator Express	VMD	140
Controller Configuration Tool	CCT	141
Central Plant Optimization™	CPO10	143

## BAS NETWORK AUTOMATION

### Supervisory Controllers

<i>Metasys®</i>		
Network Automation Engine	NAE	145
Network Integration Engine	NIEx9	151
Network Integration Engine Software	NIE89 Software	155
Network Integration Engine	NxE to NIE Migration kit	158
Network Control Engine	NCE	160

### Network Displays

<i>Mobile Access Portal Gateway</i>		
	MAP Gateway	Available in Spring 2016 163
<i>Field Advanced Display</i>		
	FAD	166

## BAS CONTROLLERS

### Field Controllers

<i>Metasys® Controllers</i>		
Field Equipment Controllers	FEC - FAC	168
Variable Air Volume Modular Assembly	VMA16	173
VAV Controllers for the Field Replacement of the obsolete VMA14	VMA18	176
Input/Output Modules	IOM	179
	Romutec	182
<i>Terminal Unit Controllers</i>		
Configurable Terminal Unit Controller	TUC03	186

## REFRIGERATION COMPONENTS

### Temperature Controls

<i>Mechanical Thermostats</i>			PAGE
Freeze Protection	IP30	270XT	188
	IP30	A19	189
Capillary and Space Thermostat	IP65	A19	191
2-Stage Capillary and Space Thermostat	IP30 / IP65	A28	193
3- or 4-Stage Thermostat		A36	195
Stage Room Thermostat, Line Voltage	IP20	T22 - T25	196
Rod and Tube Sensing Element	IP30	A25	197

### Float and Flow Controls

<i>Mechanical Liquid Flow Switch</i>		
Flow Switch for Liquid	F61	198
	F261	199
<i>Mechanical Air Flow Switch</i>		
Air Flow Switch	F62	201
	F262	202
<i>Mechanical Liquid Level Switch</i>		
Liquid Level Float Switch	F63	204
	F263	205

### Pressure Controls

<i>Adjustable Differential Pressure Switch</i>		
Sensitive Differential	P232	207
	P233	208
Differential Pressure	P74	210
<i>Adjustable Pressure Switch</i>		
For Air-Conditioning and Heat Pump Applications	P20	211
Single Pressure	P735	213
Dual Pressure	P736	215
Single Pressure	IP54 P77	217
Dual Pressure	IP54 P78	219
<i>Fixed Setting Pressure Switch</i>		
Direct Mount Pressure Switch	P100	221
<i>Pressure Switches Accessories</i>		
Synthetic Flexible Hose	H735	225
<i>Adjustable Oil Protection Switch</i>		
Oil Protection	P28	226
	P45	228
<i>Adjustable Steam Pressure Switch</i>		
Steam Pressure	P48	229

## Modulating Water Valves

### Pressure Actuated Water Valves

		PAGE
Regulating Valves	V43/V243	230
2-way Pressure Actuated Water Valves - Commercial Applications	V46	233
Pressure Actuated Water Valves, Low Flow	V46SA	239
3-way Pressure Actuated Water Valves	V48	240
Water Regulating Valves for High Pressure Refrigerants	V246 - V248	242

### Temperature Actuated Water Valves

	V47	245
--	-----	-----

## Humidity Controls

### Mechanical Humidity Stat

Room Humidistats	W43	247
------------------	-----	-----

## Fan Speed Controllers

### 1-phase Condenser Fan Speed Control

Direct-Mount Single Phase Controller	P215PR	248
Remote-Mount Single Phase Controller	P215RM	249
Pressure Actuated Single Phase Controller	P215	250
Condenser Fan Speed Controller	P216	252
Pressure Actuated Single Phase Digital Controller	P266	253
Direct-Mount Pressure Actuated for EC Motors	P315PR	255

## Field Controllers

### Modular Electronic Control System

Modular Electronic Controls	System 450™	256
-----------------------------	-------------	-----

### Electronic Control Devices

Electronic Refrigeration Line	ER Line	258
-------------------------------	---------	-----

### Multi-Stages Control Devices

General purpose and Multi Stages	MS Line	262
----------------------------------	---------	-----

## Transducers and Sensors

### Pressure Transducer

Electronic Pressure Transducer	P499	264
--------------------------------	------	-----

### Mechanical Pressure Transducer

	P35	266
--	-----	-----

## Leak Detection

	Leak Detectors	271
--	----------------	-----



## SECURITY PRODUCTS

### P2000

#### P2000 SMS

		PAGE
Version 3.14	P2000 Security Management System	272

Available  
Soon

#### P2000 Controllers

Dual Door Network Controller	S321-IP	274
High-Speed High-Traffic Network Controller	CK721-A	275

#### P2000 Readers Modules

2 Door Module	S300-DIN-RDR2SA	276
8 Door Module	S300-DIN-RDR8S	277

#### P2000 I/O modules

8 Input and 4 Output Module	S300-DIN-I8O4	278
32 Input and 16 Output Module	S300-DIN-I32O16	279

#### P2000 SPA

Pre-wired, Preassembled Control Panel	Security Panel Assembly	280
---------------------------------------	-------------------------	-----

#### P2000 Security Enclosure

Enclosures and Spare Parts	Security Enclosure	281
----------------------------	--------------------	-----

#### P2000 VMS

Version 6.13	Video Management System	282
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## HVAC CONTROL PRODUCTS

### Valves

## Valves and Actuators Combinations

### Control valve selection

	VFB	VG1000	V5000	VG6000	VG7000	VGS800	VG9000	VG8000	VG8300
2-way	•	•	•	•	•	•	•	•	•
3-way mixing valve		•	•	•	•	•	•	•	
3-way diverting valve		•	•	•				•	
Electric actuator	•	•	•	•	•	•	•	•	•
Pneumatic actuator					•			•	•
Kvs 0,16									
Kvs 0,25									
Kvs 0,4									
Kvs 0,63									
Kvs 1									
Kvs 1,6									
Kvs 1,7									
Kvs 2,5									
Kvs 2,6									
Kvs 3,5									
Kvs 4									
Kvs 4,5									
Kvs 5									
Kvs 6,3									
Kvs 10									
Kvs 16									
Kvs 25									
Kvs 40									
Kvs 52									
Kvs 63									
Kvs 72									
Kvs 100									
Kvs 124									
Kvs 126									
Kvs 150									
Kvs 160									
Kvs 180									
Kvs 243									
Kvs 250									
Kvs 350									
Kvs 397									
Kvs 721									
Kvs 1083									
Kvs 1591									
Kvs 2852									
Kvs 4670									
Kvs 6946									
Kvs 9063									
Kvs 12044									
Kvs 14804									
Kvs 19212									

## HVAC CONTROL PRODUCTS

### Valves

## Terminal Unit Valves

### V5000

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:

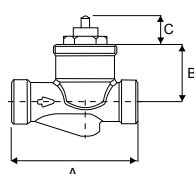
VA-707x ON/OFF thermal;

VA-709x thermal 0...10 VDC;

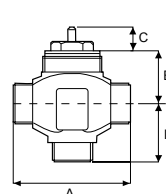
VA-748x floating and proportional electric.

### Features

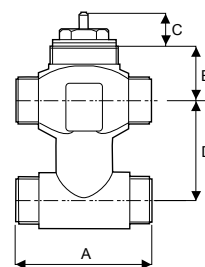
- Forged brass body, stainless steel stem and spring
- $K_{VS}$  0.16...5
- 2-way PDTC (normally open), 3-way mixing and 3-way diverting and 3-way mixing and 3-way diverting with built-in bypass configurations
- Fluid temperature 2...120 °C
- BSP and compression fitting body connections
- Inherent flow 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	1/2"	60	27.5	15.5	---
DN15	3/4"	65	33.7		
DN20	1"				
3-way Mixing/Diverting Configuration					
DN10	1/2"	60	27	15.2	30
DN15	3/4"				
DN20	1"				
3-way Mixing/Diverting with built-in bypass Configuration					
DN10	1/2"	60	27	15.2	40
DN15	3/4"				50
DN20	1"				

## HVAC CONTROL PRODUCTS

### Valves

#### Terminal Unit Valves

#### V5000

Ordering Codes*	Compression fitting kit**	Body Size	Kvs (Control port)	Kvs (By-pass port)	Close-off Pressure (kPa)
2-way configuration					
V5210ZC	---	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

## HVAC CONTROL PRODUCTS

### Valves

## Terminal Unit Valves

### VG6000

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-7070 ON/OFF thermal;

VA-709x thermal 0...10 VDC;

VA-748x floating and proportional electric.



VG6000 2-way

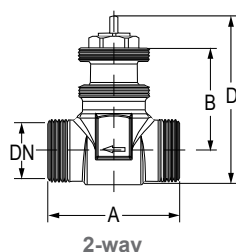
VG6000 3-way

VG6000 3-way  
+ Bypass

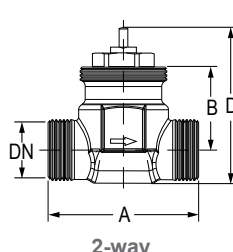
### Features

- Forged brass body
- $K_{VS}$  0.4...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
- BSP threaded body connection
- Inherent flow characteristic: quick opening
- High close off pressure model up to 5 bar

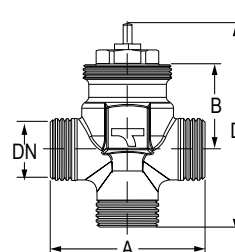
### High Close off Pressure Model



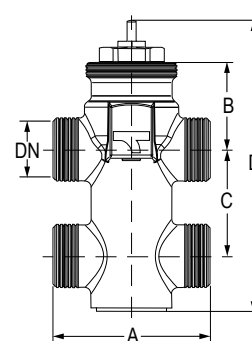
2-way



2-way



3-way



3-way + By-pass

### Dimensions in mm

Ordering Codes	Body Size	Dimensions in mm		
		A	B	D
2-way PDTC Configuration				
VG6210BC	DN15	52	29	51
VG6210CC				
VG6210DC				
VG6210EC				
VG6210JC	DN20	56	28	56
VG6210KC				69
VG6210LC	DN25	82	30.5	77.5
VG6310BC	DN15	52	44.7	70
VG6310CC				
VG6310DC				
VG6310EC				
VG6310JC	DN20	56	43.7	72
VG6310LC	DN25	82	46.2	78

Ordering Codes	Body Size	Dimensions in mm				
		A	B	C	D	
3-way Mixing and Diverting with built-in by-pass						
VG6510BC	DN15	52	29	---	102.5	
VG6510CC						
VG6510DC						
VG6510EC						
VG6510JC	DN20	56	28	---	104.5	
VG6510KC					114.5	
VG6510LC	DN25	82	38		---	142
3-way Mixing and Diverting Configuration						
VG6810BC	DN15	52	29	13.5	68.5	
VG6810CC						
VG6810DC						
VG6810EC						
VG6810JC	DN20	56	28	13.5	69.5	
VG6810KC					86	
VG6810LC	DN25	82	30.5		---	92.5

## HVAC CONTROL PRODUCTS

### Valves

#### Terminal Unit Valves

#### VG6000

Ordering Codes	Body Size	Connection Size	Kvs (Control port)	Kvs (By-pass port)	Close-off pressure (kPa)		
2-way PDTC Configuration							
VG6210BC	DN15	1/2"	0.4	---	250		
VG6210CC			0.63				
VG6210DC			1.0				
VG6210EC			1.7				
VG6210JC	DN20	3/4"	2.6		150		
VG6210KC			4.0				
VG6210LC	DN25	1"	4.5		70		
2-way PDTC Configuration							
VG6310BC	DN15	1/2"	0.4	---	500		
VG6310CC			0.63				
VG6310DC			1.0				
VG6310EC			1.7				
VG6310JC	DN20	3/4"	2.6			100	
VG6310LC	DN25	1"	4.5				
3-way Mixing and Diverting with built-in by-pass							
VG6510BC	DN15	1/2"	0.4			0.35	200
VG6510CC			0.63	0.56			
VG6510DC			1.0	0.86			
VG6510EC			1.7	1.2			
VG6510JC	DN20	3/4"	2.5	1.6	100		
VG6510KC			4.0	1.7			
VG6510LC	DN25	1"	4.5	3.1	70		
3-way Mixing and Diverting Configuration							
VG6810BC	DN15	1/2"	0.4	0.35	200		
VG6810CC			0.63	0.56			
VG6810DC			1.0	0.86			
VG6810EC			1.7	1.2			
VG6810JC	DN20	3/4"	2.5	1.6	100		
VG6810KC			4.0	1.7			
VG6810LC	DN25	1"	4.5	3.1	70		

## HVAC CONTROL PRODUCTS Valves

### Plant Valves

## VGS800

DN15...50, PN16

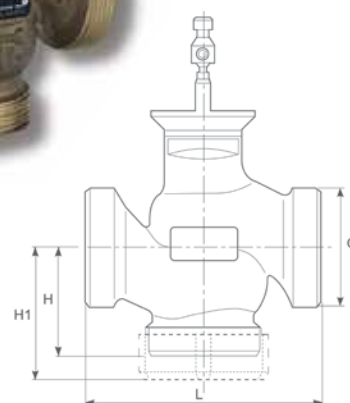
These valves are primarily designed to regulate the flow of water in response to the demand of a controller in zone and terminal unit applications.

Following electric actuators are available:

VA-77xx and VA78xx electric valve actuators.

### Features

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



### 3-way mixing configuration

Ordering Codes	Body Size	$K_{VS}$	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

### Dimensions in mm

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

#### Note

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

### Pipe muffles

Ordering Codes	Muffles
121 4935 151	DN15 / Rp 1/2
121 4935 201	DN20 / Rp 3/4
121 4935 251	DN25 / Rp 1
121 4935 321	DN32 / Rp 1 1/4
121 4935 401	DN40 / Rp 1 1/2
121 4935 501	DN50 / Rp 2

#### Note

3 pipe muffles are needed for the mixing valves

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

Ordering Codes	Mod kit for:
121 4930 151	DN15 / Rp 1/2
121 4930 201	DN20 / Rp 3/4
121 4930 251	DN25 / Rp 1
121 4930 321	DN32 / Rp 1 1/4
121 4930 401	DN40 / Rp 1 1/2
121 4930 501	DN50 / Rp 2

#### Note

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

## HVAC CONTROL PRODUCTS

### Valves

## Plant Valves

### VG7000

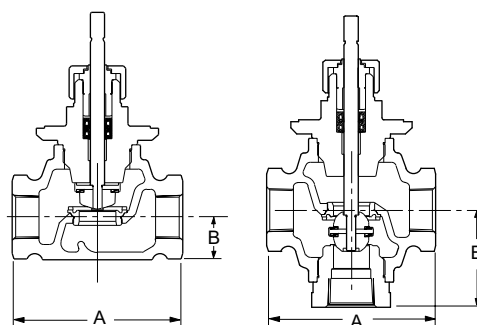
DN15...50, PN16

VG7000 Series Bronze Control Valves are designed primarily to regulate the flow of water and steam in response to the demand of a controller in Heating, Ventilating and Air Conditioning (HVAC) systems.

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

#### Features

- DN15 through DN50 bronze valves, in two-way PDTC, PDTO and three-way mixing configurations
- Wide range of electric actuators available for all valves
- Every valve tested for tight shutoff
- Uses Standard Johnson Controls U-cup Packing
- Flexible features-and-options ordering template
- Standard Bonnet and stem design
- Leakage
  - Brass Trim: 0.01% of Maximum Flow per EN60534-4, Class IV
  - Stainless Steel Trim: 0.05% of Maximum Flow
- Inherent Flow Characteristics
  - Equal Percentage: 2-way Valves
  - Linear: 3-way Valves in compliance with EN 600534
- Rangeability
  - 25:1 at 0.25...1 kvs and 100:1 at 1.6...40 kvs
  - In accordance with EN 60534-2-4
- Maximum Recommended Operating Pressure Drop
  - 240 kPa for DN15 and DN32 - 200 kPa for DN40 to DN50
- Fluid Temperature Operating Limits
  - Valves with Brass Trim:
    - With V-3801 and VA-731x Actuators: 2 °C to 120 °C water / 100 kPa Saturated Steam
    - With all other Actuators: 2 °C to 140 °C water / 260 kPa Saturated Steam
  - Valves with Stainless Steel Trim: 2 to 170 °C / 690 kPa Saturated Steam



#### Dimensions in mm

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



## HVAC CONTROL PRODUCTS Valves

### Plant Valves

#### VG7000

#### Ordering Codes for Valve Bodies

VG7

#### Stem Type

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

#### Size

#### Flow Coefficient $K_{VS}$

<b>A</b>	DN15	0.25
<b>B</b>	DN15	0.4
<b>C</b>	DN15	0.63
<b>D</b>	DN15	1.0
<b>E</b>	DN15	1.6
<b>F</b>	DN15	2.5
<b>G</b>	DN15	4.0
<b>L</b>	DN20	6.3
<b>N</b>	DN25	10
<b>P</b>	DN32	16
<b>R</b>	DN40	25
<b>S</b>	DN50	40

#### Body Configuration

#### Trim Type

#### Inherent Flow Characteristics

<b>1</b>	2-way	Brass trim	Equal percentage
<b>2</b>	3-way mixing	Brass trim	Linear in both ports
<b>3</b>	2-way	Stainless steel trim	Equal percentage
<b>4</b>	3-way mixing	Stainless steel trim	Linear in both ports
<b>5</b>	3-way mixing	Brass trim	Equal percentage in control port, linear in bypass port (only available for VG7x1... valves with BSPP male connection)

#### End Connection

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

#### Body Configuration

<b>2</b>	2-way PDTC (Normally Open)
<b>4</b>	2-way PDTO (Normally Closed)
<b>8</b>	3-way Mixing

## HVAC CONTROL PRODUCTS

### Valves

#### Plant Valves

#### VG7000

##### *Maximum Close-off Pressures (in kPa), for Valves with Brass Trim and Electric Actuators*

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

##### *Maximum Close-off Pressures (in kPa), for Valves with Stainless Steel Trim and Electric Actuators*

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

## HVAC CONTROL PRODUCTS

### Valves

#### Plant Valves

#### VG7000

*Maximum Close-off Pressures (in kPa), for Valves with Brass Trim and Pneumatic Actuators*

Actuator	Valves	2-way PDTC or 3-way Valves with 138 kPa air supply		2-way PDO or 3-way Valves with 0 kPa air supply	
	Size	Spring Range kPa *			
		21 to 42	63 to 91	21 to 42	63 to 91
V-3801	DN15	1600	1600	580	1600
	DN15	1180	530	165	715
	DN15	670	300	90	405
	DN20	430	190	55	255
V-3000	DN15	1600	1600	1430	1600
	DN15	1600	1100	405	1450
	DN15	1310	620	230	820
	DN20	835	390	145	525
	DN25	520	240	85	315
	DN32	320	145	50	195
	DN40	200	95	35	125
	DN50	130	60	20	85
V-400	DN25	1600	985	400	1275
	DN32	1220	600	240	780
	DN40	785	385	160	495
	DN50	500	250	95	315

## HVAC CONTROL PRODUCTS

### Valves

#### Plant Valves

#### VG7000

*Maximum Close-off Pressures (in kPa), for Valves with Stainless Steel Trim and Pneumatic Actuators*

Actuator	Valves	2-way PDTC or 3-way Valves with 138 kPa air supply		2-way PDTO or 3-way Valves with 0 kPa air supply	
	Size	Spring Range kPa *			
		21 to 42	63 to 91	21 to 42	63 to 91
V-3000	DN15	1600	1600	1090	1600
	DN15	1600	825	300	1085
	DN15	980	470	170	615
	DN20	630	295	110	395
	DN25	385	180	60	240
	DN32	240	110	35	145
V-400	DN15	1600	1600	1600	1600
	DN15	1600	1600	1345	1600
	DN15	1600	1600	760	1600
	DN20	1600	1175	485	1520
	DN25	1510	740	295	960
	DN32	925	450	185	585
	DN40	595	290	115	370
	DN50	380	185	75	240

**Note**

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

## HVAC CONTROL PRODUCTS

### Valves

## Plant Valves

### VG9000

DN15...100, PN6 and PN10

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

Following electric actuators are available:

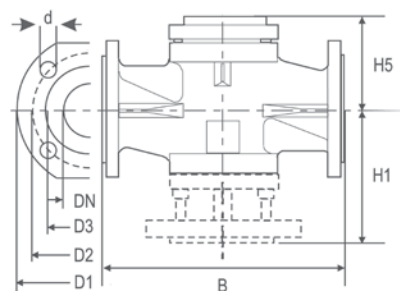
VA-7700 for DN15...50 valves

VA7810 for DN15...65 valves

VA1000 for DN65...100 valves.

### Features

- Nodular cast iron body
- $K_{VS}$  0.63...160
- 2-way 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

## HVAC CONTROL PRODUCTS Valves

### Plant Valves

#### VG9000

#### PN6 Series (VG9xxxS1K)

Ordering Codes*	Body Size	K <sub>VS</sub>	Close-off Pressure kPa					
			RA-3000-732x 3000 N	VA-1x20-GGA-1** 2000 N	VA-1125-GGA-1** 2500 N	VA-77xx-820x 500 N	VA78xx-xxx-12 1000 N	
2-way PDT0 (Normally Closed) Configuration								
VG94A5S1K	DN15	0.63	---	---	---	600	600	
VG94A4S1K		1.0						
VG94A3S1K		1.6						
VG94A2S1K		2.5						
VG94A1S1K		4.0						
VG94B1S1K	DN20	6.3				590	600	
VG94C1S1K	DN25	10						
VG94E2S1K	DN32	16						
VG94E1S1K	DN40	25					190	480
VG94F1S1K	DN50	40					100	290
VG94G1S1K	DN65	63				470	620	---
VG94H1S1K	DN80	100	510	300	400	---		
VG94J1S1K	DN100	160	320	180	240	---		
3-way Mixing Configuration								
VG98A5S1K	DN15	0.63	---	---	---	600	600	
VG98A4S1K		1.0						
VG98A3S1K		1.6						
VG98A2S1K		2.5						
VG98A1S1K		4.0						
VG98B1S1K	DN20	6.3				490	600	
VG98C1S1K	DN25	10						
VG98E2S1K	DN32	16						
VG98E1S1K	DN40	25					130	440
VG98F1S1K	DN50	40					60	260
VG98G1S1K	DN65	63				470	620	---
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.

## HVAC CONTROL PRODUCTS

### Valves

#### Plant Valves

#### VG9000

#### PN10 Series (VG9xxxS1L)

Ordering Codes*	Body Size	K <sub>VS</sub>	Close-off Pressure kPa							
			RA-3000-732x 3000 N	VA-1x20-GGA-1** 2000 N	VA-1125-GGA-1** 2500 N	VA-77xx-820x 500 N	VA78xx-xxx-12 1000 N			
2-way PDTO (Normally Closed) Configuration										
VG94A5S1L	DN15	0.63	---	---	---	1000	1000			
VG94A4S1L		1.0								
VG94A3S1L		1.6								
VG94A2S1L		2.5								
VG94A1S1L		4.0								
VG94B1S1L	DN20	6.3				980				
VG94C1S1L	DN25	10						640		
VG94E2S1L	DN32	16							400	
VG94E1S1L	DN40	25								210
VG94F1S1L	DN50	40								
VG94G1S1L	DN65	63				470				
VG94H1S1L	DN80	100	300							
VG94J1S1L	DN100	160		180						
					510		320	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	
VG98E1S1L	DN40	25								110
VG98F1S1L	DN50	40								
VG98G1S1L	DN65	63				470				
VG98H1S1L	DN80	100	300							
VG98J1S1L	DN100	160		180						
					510		320	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.

## HVAC CONTROL PRODUCTS

### Valves

## Plant Valves

### VG8000N

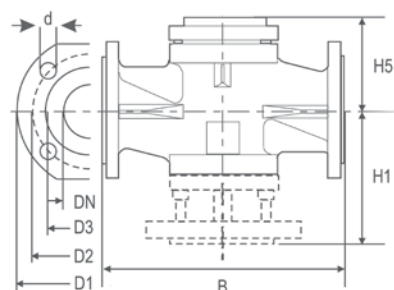
DN15...150, PN16

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

A variety of electric and pneumatic actuators are available.

#### Features

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



#### Dimensions in mm

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



## HVAC CONTROL PRODUCTS Valves

### Plant Valves

#### VG8000N

#### 2-way PDTC (Normally Open) Configuration

Ordering Codes*	Body Size	K <sub>VS</sub>	Close-off Pressure kPa						
			FA-2000-741x 2400 N	FA-2000-751x 2200 N	FA-3300 6000 N	RA-3100-8226 2700 N	VA1x20** 2000 N	VA1125** 2500 N	VA78xx 1000 N
VG82A4S1N	DN15	1.0	---	---	---	---	1600	1600	1600
VG82A3S1N		1.6							
VG82A2S1N		2.5							
VG82A1S1N		4.0							
VG82B1S1N	DN20	6.3	---	---	---	---	1600	1600	1600
VG82C1S1N	DN25	10							
VG82D1S1N	DN32	16							
VG82E1S1N	DN40	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.

## HVAC CONTROL PRODUCTS

### Valves

#### Plant Valves

#### VG8000N

#### 3-way Mixing Configuration

Ordering Codes*	Body Size	K <sub>VS</sub>	Close-off Pressure kPa						
			FA-2000-741x 2400 N	FA-2000-751x 2200 N	FA-3300 6000 N	RA-3100-8226 2700 N	VA1x20** 2000 N	VA1125** 2500 N	VA78xx 1000 N
VG88A4S1N	DN15	1.0	---	---	---	---	1600	1600	1600
VG88A3S1N		1.6							
VG88A2S1N		2.5							
VG88A1S1N		4.0							
VG88B1S1N	DN20	6.3	---	---	---	---	---	---	---
VG88C1S1N	DN25	10							
VG88D1S1N	DN32	16							
VG88E1S1N	DN40	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.

## HVAC CONTROL PRODUCTS Valves

### Plant Valves

### VG8000N

#### 3-way Diverting Configuration

Ordering Codes*	Body Size	K <sub>VS</sub>	Close-off Pressure kPa						
			FA-2000-741x 2400 N	FA-2000-751x 2200 N	FA-3300 6000 N	RA-3100-8226 2700 N	VA1x20** 2000 N	VA1125** 2500 N	VA78xx 1000 N
VG89A4S1N	DN15	1.0	---	---	---	---	1600	1600	1600
VG89A3S1N		1.6							
VG89A2S1N		2.5							
VG89A1S1N		4.0							
VG89B1S1N	DN20	6.3							
VG89C1S1N	DN25	10							1570
VG89D1S1N	DN32	16							770
VG89E1S1N	DN40	25							440
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.

## HVAC CONTROL PRODUCTS

### Valves

## Plant Valves

### VG8000H

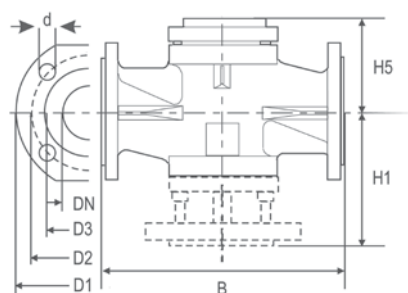
DN15...150, PN25

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

A variety of electric and pneumatic actuators are available.

#### Features

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



#### Dimensions in mm

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

## HVAC CONTROL PRODUCTS

### Valves

### Plant Valves

#### VG8000H

#### 2-way PDTC (Normally Open) Configuration

Ordering Codes*	Body Size	K <sub>VS</sub>	Close-off Pressure kPa							
			FA-2000-741x 2200 N	FA-2000-751x 2400 N	FA-3300-741x 6000 N	RA-3000-732x 3000 N	RA-3100-8226 1700 N	VA1x20** 2000 N	VA1125** 500 N	VA78xx 1000 N
VG82A4S1H	DN15	1.0	---	---	---	---	---	2500	2500	2500
VG82A3S1H		1.6								
VG82A2S1H		2.5								
VG82A1S1H		4.0								
VG82B1S1H	DN20	6.3								2030
VG82C1S1H	DN25	10								1360
VG82D1S1H	DN32	16								660
VG82E1S1H	DN40	25						1550	2000	370
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.

## HVAC CONTROL PRODUCTS

### Valves

#### Plant Valves

#### VG8000H

#### 3-way Mixing Configuration

Ordering Codes*	Body Size	K <sub>VS</sub>	Close-off Pressure kPa							
			FA-2000-741x 2200 N	FA-2000-751x 2400 N	FA-3300-741x 6000 N	RA-3000-732x 3000 N	RA-3100-8226 1700 N	VA1x20** 2000 N	VA1125** 500 N	VA78xx 1000 N
VG88A4S1H	DN15	1.0	---	---	---	---	---	2500	2500	2500
VG88A3S1H		1.6								
VG88A2S1H		2.5								
VG88A1S1H		4.0								
VG88B1S1H	DN20	6.3								2030
VG88C1S1H	DN25	10								1360
VG88D1S1H	DN32	16								660
VG88E1S1H	DN40	25						1550	2000	370
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.

## HVAC CONTROL PRODUCTS

### Valves

#### Plant Valves

#### VG8000H

#### 3-way Diverting Configuration

Ordering Codes*	Body Size	K <sub>VS</sub>	Close-off Pressure kPa										
			FA-2000-741x 2200 N	FA-2000-751x 2400 N	FA-3300-741x 6000 N	RA-3000-732x 3000 N	RA-3100-8226 1700 N	VA1x20** 2000 N	VA1125** 500 N	VA78xx 1000 N			
VG89A4S1H	DN15	1.0	---	---	---	---	---	2500	2500	2500			
VG89A3S1H		1.6											
VG89A2S1H		2.5											
VG89A1S1H		4.0											
VG89B1S1H	DN20	6.3									2030		
VG89C1S1H	DN25	10										1360	
VG89D1S1H	DN32	16											660
VG89E1S1H	DN40	25											
VG89F1S1H	DN50	40				---							
VG89G1S1H	DN65	63					920						
VG89H1S1H	DN80	100						710					
VG89J1S1H	DN100	160							330				
VG89K1S1H	DN125	250	720										
VG89L1S1H	DN150	350		290									
					450								
						170							
			100										
				---									
					80								
						120							
			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.

## HVAC CONTROL PRODUCTS

### Valves

## Plant Valves

### VG8300N

DN40...150, PN16 Pressure Balanced

These pressure balanced flanged valves are primarily designed to regulate the flow of water and steam in response to the demand of a controller, in heating, ventilating and air conditioning systems.

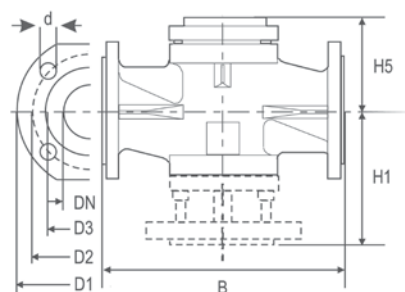
These valves have a specially designed plug, which through specific balancing of pressures allows higher close-off pressures with standard actuator combinations.

A variety of electric and pneumatic actuators are available.



### Features

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



### Dimensions in mm

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

Ordering Codes*	Body Size	K <sub>VS</sub>	Close-off Pressure kPa						
			Spring Return		Non Spring Return				
			FA-2000-741x 2200 N	VA1x20** 2000 N	RA-3100-8126 1200 N	RA-3100-8226 1700 N	VA1125** 2500 N	VA78xx 1000 N	
VG83E1S1N	DN40	25	---	1600	1600	---	1600	1600	
VG83F1S1N	DN50	40			---	1600		---	1600
VG83G1S1N	DN65	63							
VG83H1S1N	DN80	100							
VG83J1S1N	DN100	160	1600	1500	---	1600	---	---	
VG83K1S1N	DN125	250		1400					1500
VG83L1S1N	DN150	350		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.



## HVAC CONTROL PRODUCTS

### Valves

## Plant Valves

### VG1000 Flanged

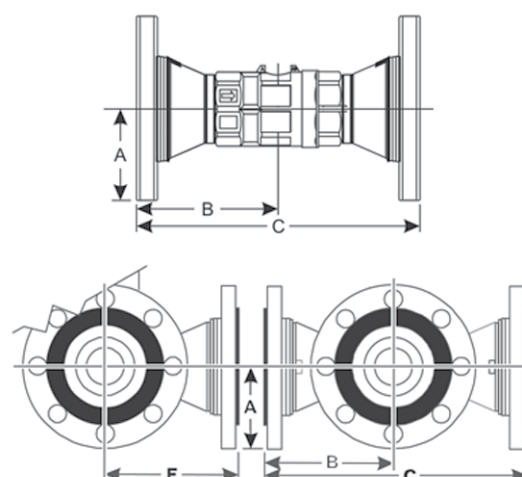
DN65...100, PN16

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

They are operated by remote mounted Spring Return and Non Spring Return actuators.

#### Features

- 2-way & 3-way mixing
- Body Rating PN 16
- Hot water, chilled water, 50/50 glycol solutions and 172 kPa Saturated Steam for HVAC Systems
- Valve Fluid Temperature Limits -18 to 140 °C
- Maximum Closeoff Pressure  
2-way: 689 kPa / 3-way: 345 kPa
- Maximum Recommended Operating Pressure Drop  
207 kPa for quiet service
- Flow Characteristics  
2-way: Equal Percentage (according EN60534-2-4)  
3-way: Equal Percentage (according EN60534-2-4) Flow Characteristics of Inline Port (Coil) and Linear Percentage Flow Characteristics of Angle Port (Bypass)
- Rangeability Greater than 500:1
- Leakage  
2 and 3-way: 0.01% of Maximum Flow, Control port, ANSI/FCI 70-2, Class 4  
3-way: 1% of Maximum Flow, Bypass Port



#### Dimensions in mm

Valve Size	A	B	C	F	Holes for Flange	Holes Diameters	Bolt
DN65	92.5	145	290	149	4	19	M16x60
DN80	100	155	310	159	8	19	M16x65
DN100	110	175	350	179	8	19	M16x70

## HVAC CONTROL PRODUCTS

### Valves

#### Plant Valves

#### VG1000 Flanged

#### Assemblies of Valves with Proportional Actuators

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

#### Ordering Codes

Valve Code	Body Size	K <sub>VS</sub> (Control Port)	K <sub>VS</sub> (Bypass Port)	Valid combinations of valves, linkages and actuators			
2-way Models							
VG12E5GT	DN65	63	---	●	●	●	●
VG12E5GU		100	---	●	●	●	●
VG12E5HU	DN80	100	---	●	●	●	●
VG12E5HW		180	---	●	●	●	●
VG12E5JV	DN100	150	---	●	●	●	●
3-way Models							
VG18E5GT	DN65	63	40	●	●	●	●
VG18E5GU		100	63	●	●	●	●
VG18E5HU	DN80	100	63	●	●	●	●
VG18E5HW		180	75	●	●	●	●
VG18E5JV	DN100	150	75	●	●	●	●

## HVAC CONTROL PRODUCTS

### Valves

### Plant Valves

#### VG1000 Flanged

#### Assemblies of Valves with Floating and ON/OFF Actuators

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

#### Ordering Codes

Valve Code	Body Size	K <sub>VS</sub> (Control Port)	K <sub>VS</sub> (Bypass Port)	Valid combinations of valves, linkages and actuators									
2-way Models													
VG12E5GT	DN65	63	---	●	●	●	●	●	●	●	●	●	●
VG12E5GU		100	---	●	●	●	●	●	●	●	●	●	●
VG12E5HU	DN80	100	---	●	●	●	●	●	●	●	●	●	●
VG12E5HW		180	---	●	●	●	●	●	●	●	●	●	●
VG12E5JV	DN100	150	---	●	●	●	●	●	●	●	●	●	●
3-way Models													
VG18E5GT	DN65	63	40	●	●	●	●	●	●	●	●	●	●
VG18E5GU		100	63	●	●	●	●	●	●	●	●	●	●
VG18E5HU	DN80	100	63	●	●	●	●	●	●	●	●	●	●
VG18E5HW		180	75	●	●	●	●	●	●	●	●	●	●
VG18E5JV	DN100	150	75	●	●	●	●	●	●	●	●	●	●

## HVAC CONTROL PRODUCTS

### Valves

## Plant Valves

### VG1000 Threaded

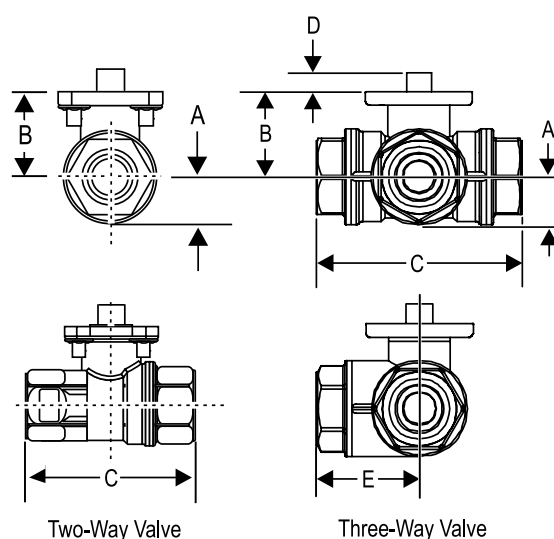
DN15...50, PN40

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

They are operated by direct or remote mounted Spring Return and Non Spring Return actuators.

#### Features

- Forged brass body
- $K_{VS}$  1...63
- 2-way, 3-way mixing and diverting configurations
- Inherent Equal Percentage Flow Characteristic in the in-line port of all valves
- BSPP female threaded body connections
- **Service**  
Hot and cold water:  
-30...140°C with 8 Nm Non Spring Return  
-30...95°C with 4 Nm Non Spring Return (140°C with M9000-561 Thermal Barrier)  
-30...100°C with 3 Nm and 8 Nm Spring Return (140°C with M9000-561 Thermal Barrier)  
Water with glycol to max 50% volume  
Steam to max 103 kPa at 121°C with 8 Nm Non Spring Return  
Steam to max 103 kPa at 121°C with 4 Nm Non Spring Return, 3 Nm and 8 Nm Spring Return with Thermal Barrier
- 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

## HVAC CONTROL PRODUCTS Valves

### Plant Valves VG1000 Threaded

#### Assemblies of Valves with Proportional Actuators

Spring Return Function	---			●			
Supply Voltage	24 VAC						
Torque	4 Nm	8 Nm	3 Nm	8 Nm			
Running Time	72 s	30 s	90 sec	170 sec			
Spring Return Time Power Off	---			16 sec	22 sec		
Control Signal	VDC:	0 - 10 / 2 - 10					
	mA:	0 - 20 / 4 - 20					
Switches	---	2 x SPDT	---	1 x SPDT	---	2 x SPDT	
Feedback	VDC:	0 - 10 / 2 - 10					
Actuator Code	VA9104-GGA-1S	M9108-GGA-5	M9108-GGC-5	VA9203-GGA-1Z	VA9203-GGB-1Z	VA9208-GGA-1	VA9208-GGC-1
Linkage Code	---	M9000-525-5		---			
Ordering Code Suffix for Assemblies	+5A4GGA +6A4GGA*	+5A8GGA	+5A8GGC	Spring Opens Configuration			
				+533GGA +633GGA*	+533GGB +633GGB*	+538GGA +638GGA*	+538GGC +638GGC*
				Spring Close Configuration			
				+553GGA +653GGA*	+553GGB +653GGB*	+558GGA +658GGA*	+558GGC +658GGC*

#### Ordering Codes

Valve Code**	Body Size	K <sub>VS</sub> (Control Port)	K <sub>VS</sub> (Bypass Port)***	Disc	Valid combinations of valves, linkages and actuators						
VG1x05AD	DN15	1.0	0.63	•	•	•	•	•	•	---	---
VG1x05AE		1.6	1.0		•	•	•	•	•	---	---
VG1x05AF		2.5	1.6		•	•	•	•	•	---	---
VG1x05AG		4.0	2.5		•	•	•	•	•	---	---
VG1x05AL		6.3	4.0		•	•	•	•	•	---	---
VG1x05AN	DN20	10	5.0	---	•	•	•	•	•	---	---
VG1x05BL		6.3	4.0	•	•	•	•	•	•	---	---
VG1x05BN		10	5.0	---	•	•	•	•	•	---	---
VG1x05CN	DN25	10	6.3	•	•	•	•	•	•	---	---
VG1x05CP		16	8.0	---	•	•	•	•	•	---	---
VG1x05DP	DN32	16	10.0	•	---	•	•	---	---	•	•
VG1x05DR		25	12.5	---	---	•	•	---	---	•	•
VG1x05ER	DN40	25	16	•	---	•	•	---	---	•	•
VG1x05ES		40	20	---	---	•	•	---	---	•	•
VG1x05FS	DN50	40	25.0	•	---	•	•	---	---	•	•
VG1x05FT		63	31.5	---	---	•	•	---	---	•	•

#### Notes:

\* = M9000-561 Thermal Barrier Included

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

\*\*\* = Only 3-way valves

## HVAC CONTROL PRODUCTS

### Valves

#### Plant Valves

#### VG1000 Threaded

#### Assemblies of Valves with Floating and ON/OFF Actuators

Spring Return Function	---						●			
Supply Voltage	24 VAC	100-230 VAC	24 VAC		230 VAC		24 VAC			
Torque	4 Nm		8 Nm				3 Nm		8 Nm	
Running Time	72 s		30 s				90 s		150 s	
Spring Return Time Power Off	---						16 s		22 s	
Control Signal	Floating with time-out & ON/OFF						Floating & ON/OFF			
Switches	---		2 x SPDT	---	2 x SPDT	---	1 x SPDT	---	2 x SPDT	
Feedback	---									
Actuator Code	VA9104-IGA-1S	VA9104-IUA-1S	M9108-AGA-5	M9108-AGC-5	M9108-ADA-5	M9108-ADC-5	VA9203-AGA-1Z	VA9203-AGB-1Z	VA9208-AGA-1	VA9208-AGC-1
Linkage Code	---		M9000-525-5				---			
Ordering code suffix for assemblies							Spring Opens Configuration			
	+5A4IGA +6A4IGA*	+5A4IUA +6A4IUA*	+5A8AGA	+5A8AGC	+5A8ADA	+5A8ADC	+533AGA +633AGA*	+533AGB +633AGB*	+538AGA +638AGA*	+538AGC +638AGC*
	Spring Close Configuration									
	+553AGA +653AGA*	+553AGB +653AGB*	+558AGA +658AGA*	+558AGC +658AGC*						

#### Ordering Codes

Valve Code**	Body Size	K <sub>VS</sub> (Control Port)	K <sub>VS</sub> (Bypass Port)***	Disc	Valid combinations of valves, linkages and actuators									
VG1x05AD	DN15	1.0	0.63	•	•	•	•	•	•	•	•	•	---	---
VG1x05AE		1.6	1.0		•	•	•	•	•	•	•	•	---	---
VG1x05AF		2.5	1.6		•	•	•	•	•	•	•	•	---	---
VG1x05AG		4.0	2.5		•	•	•	•	•	•	•	•	---	---
VG1x05AL		6.3	4.0		•	•	•	•	•	•	•	•	---	---
VG1x05AN		10	5.0		•	•	•	•	•	•	•	•	---	---
VG1x05BL	DN20	6.3	4.0	•	•	•	•	•	•	•	•	•	---	---
VG1x05BN		10	5.0	---	•	•	•	•	•	•	•	•	---	---
VG1x05CN	DN25	10	6.3	•	•	•	•	•	•	•	•	•	---	---
VG1x05CP		16	8.0	---	•	•	•	•	•	•	•	•	---	---
VG1x05DP	DN32	16	10.0	•	---	---	•	•	•	•	---	---	•	•
VG1x05DR		25	12.5	---	---	---	•	•	•	•	---	---	•	•
VG1x05ER	DN40	25	16	•	---	---	•	•	•	•	---	---	•	•
VG1x05ES		40	20	---	---	---	•	•	•	•	---	---	•	•
VG1x05FS	DN50	40	25.0	•	---	---	•	•	•	•	---	---	•	•
VG1x05FT		63	31.5	---	---	---	•	•	•	•	---	---	•	•

#### Notes

\* = M9000-561 Thermal Barrier Included

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

\*\*\* = Only 3-way valves

## HVAC CONTROL PRODUCTS

### Valves

### Plant Valves

#### VG1000 Threaded

#### Assemblies of Valves with ON/OFF Actuators

Spring Return Function	•							
Supply Voltage	24 V AC/DC				100...240 V AC		230 VA	
Torque	3 Nm		8 Nm		3 Nm		8 Nm	
Running Time	60 s		60 s		60 s		60 s	
Spring Return Time Power Off	22 s		21 s		22 s		21 s	
Control Signal	ON/OFF							
Switches	---	1 x SPDT	---	2 x SPDT	---	1 x SPDT	---	2 x SPDT
Feedback	---							
Actuator Code	VA9203-BGA-1	VA9203-BGB-1	VA9208-BGA-1	VA9208-BGC-1	VA9203-BUA-1	VA9203-BUB-1	VA9208-BDA-1	VA9208-BDC-1
Linkage Code	---							
Ordering code suffix for assemblies	Spring Opens Configuration							
	+533BGA +633BGA*	+533BGB +633BGB*	+538BGA +638BGA*	+538BGC +638BGC*	+533BUA +633BUA*	+533BUB +633BUB*	+538BDA +638BDA*	+538BDC +638BDC*
	Spring Close Configuration							
	+553BGA +653BGA*	+553BGB +653BGB*	+558BGA +658BGA*	+558BGC +658BGC*	+553BUA +653BUA*	+553BUB +653BUB*	+558BDA +658BDA*	+558BDC +658BDC*

#### Ordering Codes

Valve Code**	Body size	Kvs (Control Port)	Kvs (Bypass Port)***	Disc	Valid combinations of valves, linkages and actuators							
VG1x05AD	DN15	1.0	0.63	•	•	•	---	---	•	•	---	---
VG1x05AE		1.6	1.0		•	•	---	---	•	•	---	---
VG1x05AF		2.5	1.6		•	•	---	---	•	•	---	---
VG1x05AG		4.0	2.5		•	•	---	---	•	•	---	---
VG1x05AL		6.3	4.0		•	•	---	---	•	•	---	---
VG1x05AN	DN20	10	5.0	---	•	•	---	---	•	•	---	---
VG1x05BL		6.3	4.0	•	•	•	---	---	•	•	---	---
VG1x05BN		10	5.0	---	•	•	---	---	•	•	---	---
VG1x05CN	DN25	10	6.3	•	•	•	---	---	•	•	---	---
VG1x05CP		16	8.0	---	•	•	---	---	•	•	---	---
VG1x05DP	DN32	16	10.0	•	---	---	•	•	---	---	•	•
VG1x05DR		25	12.5	---	---	---	•	•	---	---	•	•
VG1x05ER	DN40	25	16	•	---	---	•	•	---	---	•	•
VG1x05ES		40	20	---	---	---	•	•	---	---	•	•
VG1x05FS	DN50	40	25.0	•	---	---	•	•	---	---	•	•
VG1x05FT		63	31.5	---	---	---	•	•	---	---	•	•

#### Notes

\* = M9000-561 Thermal Barrier Included

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

\*\*\* = Only 3-way valves

## Plant Valves

### VFB Butterfly Valves

DN25...500, PN16

VFB Butterfly Valves Series are specifically designed for a wide range of Heating, Ventilating, and Air Conditioning (HVAC) applications, including two-position and modulating control of hot, chilled, or condenser water, and 50/50 glycol solutions.

All valves are factory tested for bubble-tight shutoff at 100% of the fully-rated pressure.

These valves are also bidirectional, allowing positive shutoff with the flow in either direction.

#### Features

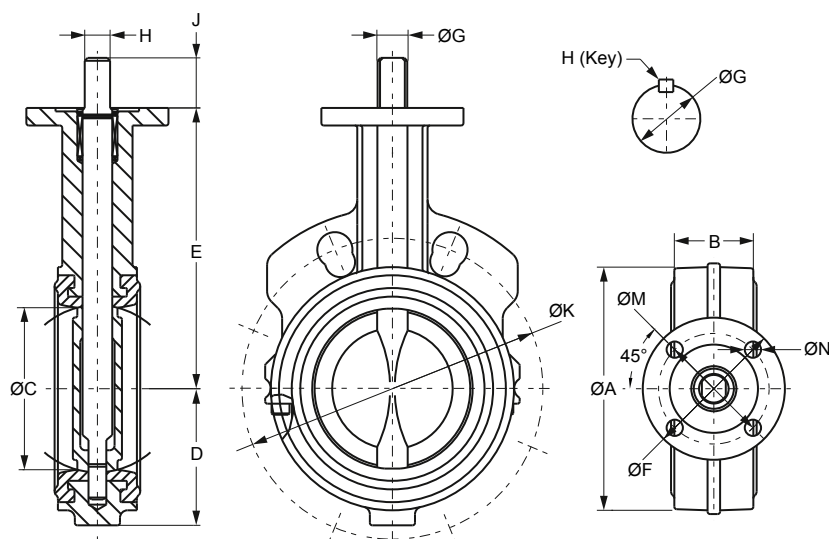
- Low Seating/Unseating Torques  
Reduce actuator torque and size requirements, particularly with lower-pressure rated valves
- Bubble-Tight Shutoff  
Ensures positive closure when needed
- Broad Range of Pre-Assembled Actuators  
Offers a wide selection for new and replacement electric and pneumatic actuators
- High-Integrity Components  
Provide quality valve assemblies, combining long cycle life with optimal engineered functional designs
- Fluid Temperature Limits  
-29 °C to 121 °C
- Flow Characteristics  
Modified Equal Percentage





## HVAC CONTROL PRODUCTS Valves

### Plant Valves VFB Butterfly Valves



### Two-Way Valve Dimensions (in mm)

Valve Size (mm)	Valve Size (inch)	A	B	C	D	E	F	M	N	G	H	J	Valve Net Weight** (kg)	Top Flange ISO 5211	K* Number of holes on Flange	K* Number of holes on Flange	K* Number of holes on Flange
															PN6	PN10	PN16
25	1	60	30	32	43	25	65	50	7	10	8	25	1	F05	75 4 x M10	85 4 x M12	85 4 x M12
32	1-¼	70	32	41	53	25	65	50	7	10	8	25	1,15	F05	90 4 x M12	100 4 x M16	100 4 x M16
40	1-½	80	32	47	55	25	65	50	7	10	8	25	2.75	F05	100 4 x M12	110 4 x M16	110 4 x M16
50	2	94	42	51	56	140	90	70	10	14	10	32	3.05	F07	110 4 x M12	125 4 x M16	125 4 x M16
65	2-½	106	45	64	63	152	90	70	10	14	10	32	4.05	F07	130 4 x M12	145 4 x M16	145 4 x M16
80	3	124	45	76	71	159	90	70	10	14	10	32	4.3	F07	150 4 x M16	160 8 x M16	160 8 x M16
100	4	154	51	102	87	178	90	70	10	16	11	32	4.85	F07	170 4 x M16	180 8 x M16	180 8 x M16
125	5	179	55	127	102	190	90	70	10	19	13	32	7.2	F07	200 8 x M16	210 8 x M16	210 8 x M16
150	6	206	55	146	115	203	90	70	10	19	13	32	9.5	F07	225 8 x M16	240 8 x M20	240 8 x M20
200	8	267	59	197	146	241	150	125	14	22	16	32	12	F07	280 8 x M16	295 8 x M20	295 12 x M20
250	10	324	67	248	181	273	150	125	14	30	22	51	17	F12	335 12 x M16	350 12 x M20	355 12 x M24
300	12	378	77	298	206	311	150	125	14	30	22	51	20	F12	395 12 x M20	400 12 x M20	410 12 x M24
350	14	433	78	337	238	346	150	125	14	35	10x10***	51	23	F12	445 12 x M20	460 16 x M20	470 16 x M24
400	16	488	102	387	273	375	150	125	14	35	10x10***	51	27	F12	495 16 x M20	515 16 x M24	525 16 x M27
450	18	536	114	438	305	406	210	165	21	50	10x12***	64	30	F16	---	565 20 x M24	585 20 x M27
500	20	591	127	489	356	436	210	165	21	50	10x12***	64	33	F16	---	650 20 x M24	650 20 x M30

#### Note

\* Disc chordal dimension at valve face.

\*\* Net weight is for valve only (no actuator).

\*\*\* Key: the key is needed to link the actuator. It is inside the package of the valve. Dimensions in mm (high x width).

## HVAC CONTROL PRODUCTS

### Valves

#### Plant Valves

#### VFB Butterfly Valves

#### Ordering Codes

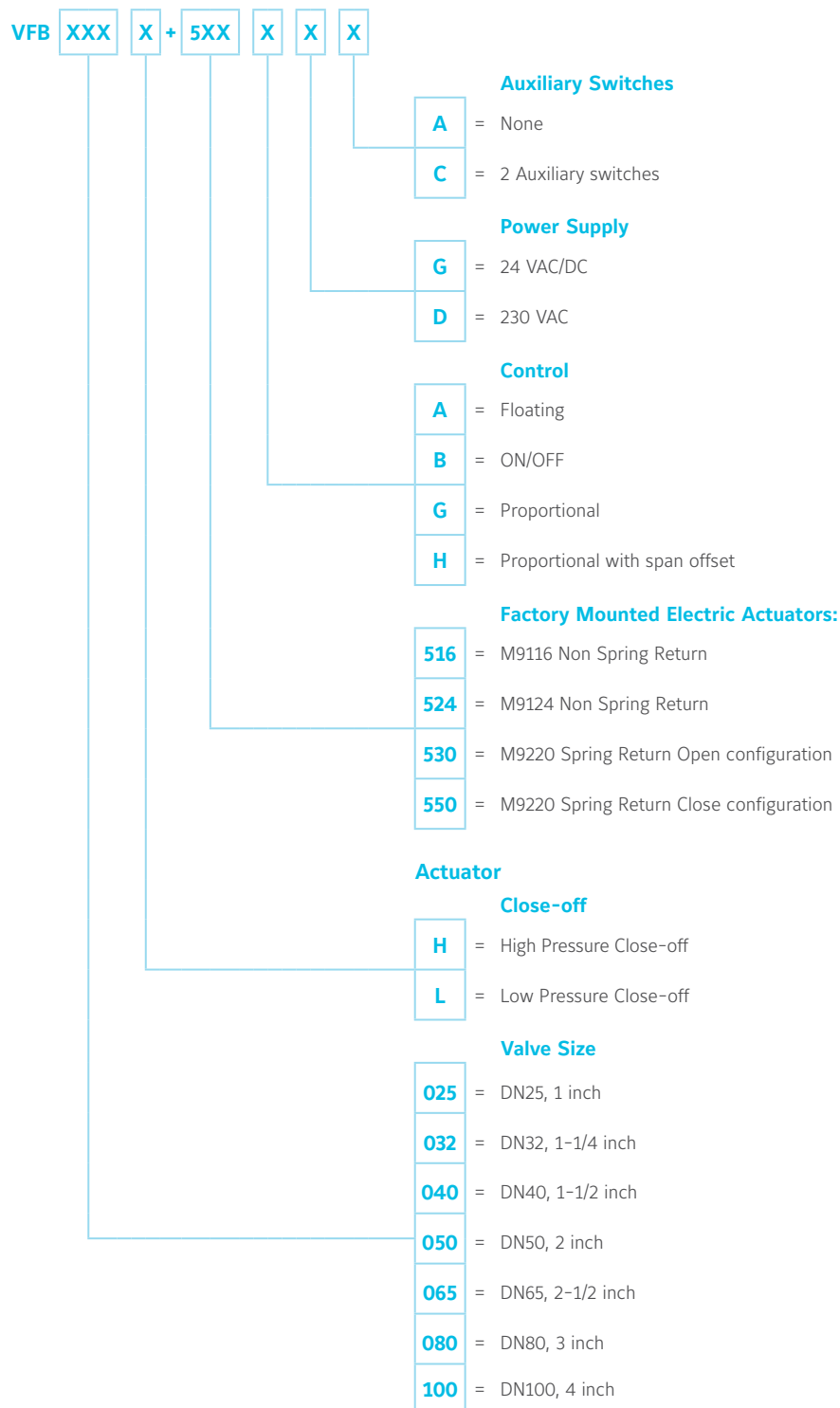
Codes	Body Size	Valve Size (inch)	K <sub>VS</sub> Value	Max Δp (kPa) Close-off Pressure
High Pressure Close-off (12 Bar from DN50 to DN300, 10 Bar all other sizes)				
VFB025H	DN25	1	52	1000
VFB032H	DN32	1 ¼	72	
VFB040H	DN40	1 ½	126	
VFB050H	DN50	2	124	1200
VFB065H	DN65	2 ½	243	
VFB080H	DN80	3	397	
VFB100H	DN100	4	723	
VFB125H	DN125	5	1083	
VFB150H	DN150	6	1591	
VFB200H	DN200	8	2852	
VFB250H	DN250	10	4670	
VFB300H	DN300	12	6946	
VFB350H	DN350	14	9063	1000
VFB400H	DN400	16	12044	
VFB450H	DN450	18	14804	
VFB500H	DN500	20	19212	
Low Pressure Close-off (3,5 Bar from DN100 to DN500)				
VFB100L	DN100	4	723	350
VFB125L	DN125	5	1083	
VFB150L	DN150	6	1591	
VFB200L	DN200	8	2852	
VFB250L	DN250	10	4670	
VFB300L	DN300	12	6946	
VFB350L	DN350	14	9063	
VFB400L	DN400	16	12044	
VFB450L	DN450	18	14804	
VFB500L	DN500	20	19212	

## HVAC CONTROL PRODUCTS Valves

### Plant Valves

### VFB Butterfly Valves

#### Ordering Codes with M9000 Actuators Assembly



## HVAC CONTROL PRODUCTS

### Valves

#### Plant Valves

#### VFB Butterfly Valves

#### Available Combination:

#### *VBF Valves with M9000 Actuators and necessary linkage code*

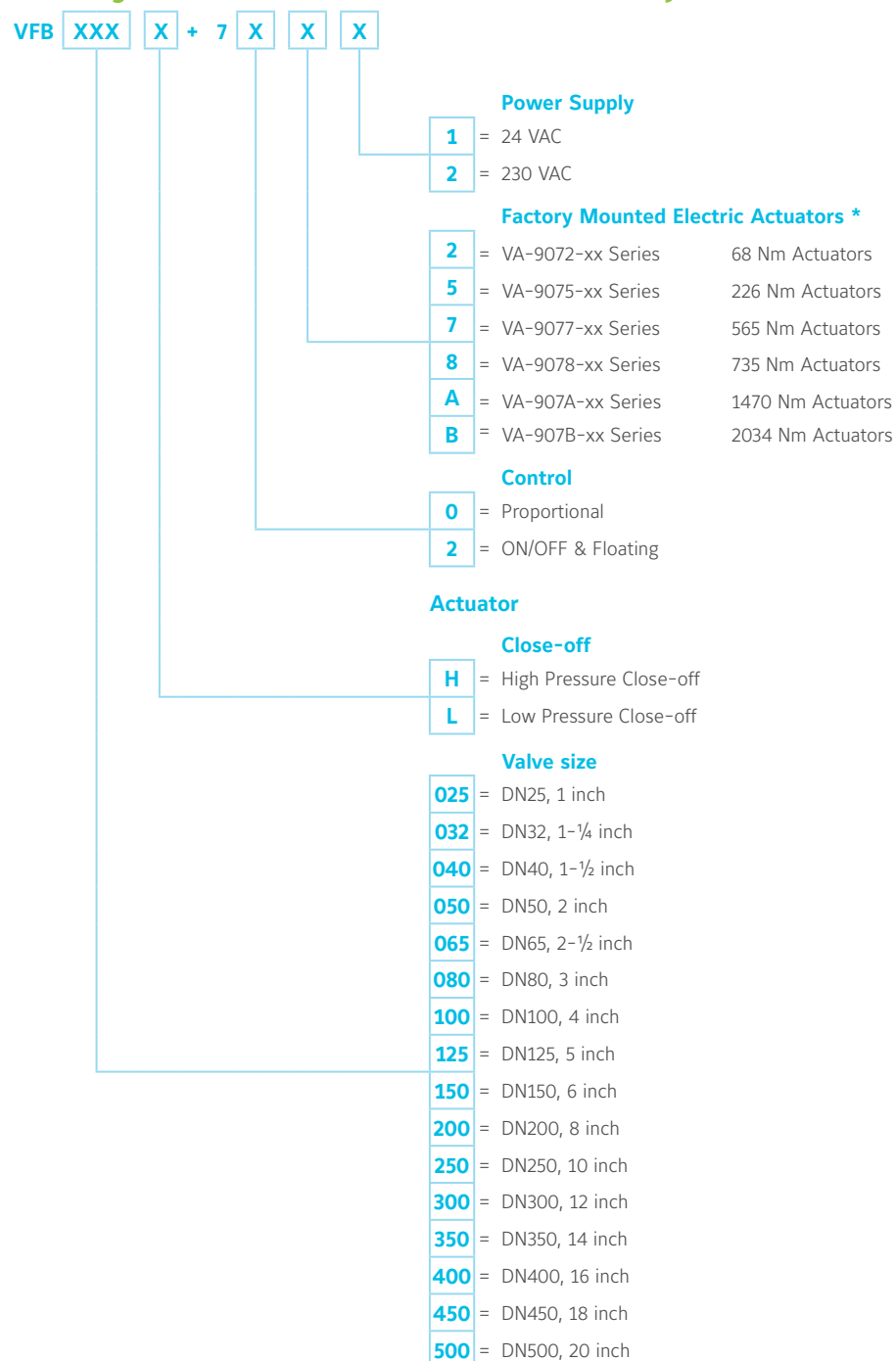
JCI VFB Valves				Non Spring Return		Spring Return
				Torque (Nm)		
				16	24	20
Ordering Codes Valves	DN	Inches	MAX Close-off Pressure (bar)	M9116	M9124	M9220
VFB025H	25	1"	12	M9100-100A	---	M9200-100A
VFB032H	32	1-1/4"	12	M9100-100A		M9200-100A
VFB040H	40	1-1/2"	12	M9100-100A		M9200-100A
VFB050H	50	2"	12	M9100-100B		M9200-100B
VFB065H	65	2-1/2"	12	M9100-100B		M9200-100B
VFB080H	80	3"	12	---	M9100-100B	M9200-100B
VFB100L	100	4"	3.5		M9100-100C	M9200-100C

## HVAC CONTROL PRODUCTS Valves

### Plant Valves

### VFB Butterfly Valves

#### Ordering Codes with VA-9070 Actuators Assembly



\* See VA-9070 Product Bulletin for more details

## HVAC CONTROL PRODUCTS

### Valves

Plant Valves  
VFB Butterfly Valves

Available combination:

*VBF Valves with VA-9070 Series Actuators*

JCI VFB Valves				Power Supply 230 VAC					Power Supply 24 VAC		
				Torque (Nm)							
				68	226	735	1470	2034	68	226	565
Ordering Codes Valves	DN	Inches	MAX Close-off Pressure (bar)	VA-9072	VA-9075	VA-9078	VA-907A	VA-907B	VA-9072	VA-9075	VA-9077
VFB025H	25	1	12	●	---	---	---	---	●	---	---
VFB032H	32	1-¼	12	●	---	---	---	---	●	---	---
VFB040H	40	1-½	12	●	---	---	---	---	●	---	---
VFB050H	50	2	12	●	---	---	---	---	●	---	---
VFB065H	65	2-½	12	●	---	---	---	---	●	---	---
VFB080H	80	3	12	●	---	---	---	---	●	---	---
VFB100H	100	4	12	●	---	---	---	---	●	---	---
VFB125H	125	5	12	●	---	---	---	---	●	---	---
VFB150H	150	6	12	●	---	---	---	---	●	---	---
VFB200H	200	8	12	---	●	---	---	---	---	●	---
VFB250H	250	10	12	---	---	●	---	---	---	---	●
VFB300H	300	12	10	---	---	●	---	---	---	---	●
VFB350H	350	14	10	---	---	●	---	---	---	---	---
VFB400H	400	16	10	---	---	---	●	---	---	---	---
VFB450H	450	18	10	---	---	---	●	---	---	---	---
VFB500H	500	20	10	---	---	---	---	●	---	---	---
VFB100L	100	4	3.5	●	---	---	---	---	●	---	---
VFB125L	125	5	3.5	●	---	---	---	---	●	---	---
VFB150L	150	6	3.5	●	---	---	---	---	●	---	---
VFB200L	200	8	3.5	---	●	---	---	---	---	●	---
VFB250L	250	10	3.5	---	●	---	---	---	---	●	---
VFB300L	300	12	3.5	---	---	●	---	---	---	---	●
VFB350L	350	14	3.5	---	---	●	---	---	---	---	●
VFB400L	400	16	3.5	---	---	●	---	---	---	---	●
VFB450L	450	18	3.5	---	---	●	---	---	---	---	●
VFB500L	500	20	3.5	---	---	●	---	---	---	---	---

See VA-9070 Product Bulletin for more details.

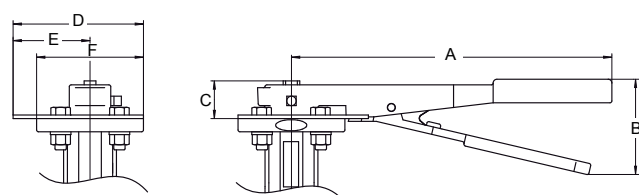
## HVAC CONTROL PRODUCTS

### Valves

#### Plant Valves

#### VFB Butterfly Valves

##### Dimensions for Ten-Position Manual Handle

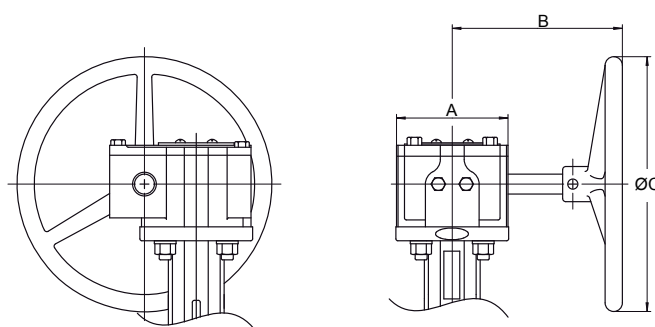


Valve Size (mm)	Valve Size (inch)	Code Number*	A	B	C
25 to 40	1/2" to 1-1/2"	VF-998-100	196	60	25
50 to 80	2" to 3"	VF-998-101	270	80	32
100	4"	VF-998-102	270	80	32
125 to 150	5" to 6"	VF-998-103	270	80	32
200	8"	VF-998-104	298	80	32
250 to 300	10" to 12"	VF-998-105	298	80	51

#### Note

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

##### Dimensions for Gear-Operated Manual Hand Wheel



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

## HVAC CONTROL PRODUCTS Valves

### Pressure Independent Valves

#### VP1000

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

VP1000 Pressure Independent Control Valve is a combination of a differential pressure regulator and a regulating valve for flow adjustment.

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

VP1000 Valves offer a remarkable adjustment flexibility.

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

Since VP1000 Valve performs the functions of two valves (balancing and adjustment), the installation costs are considerably reduced. The automatic flow rate limitation eliminates system adjustment costs. Since adjustment is very easy to perform, design flow rates can be modified at any time and at low costs.

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

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

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

#### Features

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



VP1000 Valve

VP1000 Ball Valve

#### Ordering Codes

VP1 0 X X XX

AA	= 150 l/h (DN15)
AE	= 600 l/h (DN15)
AG	= 780 l/h (DN15)
AJ	= 1000 l/h (DN20)
AN	= 1500 l/h (DN20)
AU	= 2200 l/h (DN25)
AW	= 2700 l/h (DN25 or DN32)
AY	= 3000 l/h (DN32)
BB	= 6000 l/h (DN40)
BC	= 9000 l/h (DN40)
BD	= 11000 l/h (DN40) or 12000 l/h (DN50)
BF	= 18000 l/h (DN50)

A	= 1/2"
B	= 3/4"
C	= 1"
D	= 1" 1/4
E	= 1" 1/2
F	= 2"
G	= 2" 1/2

0	= Pressure Port Included*
1	= No Pressure Port Included*
0	= Thread BSPP

#### Note

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



## HVAC CONTROL PRODUCTS

### Valves

### Pressure Independent Valves

#### VP1000

#### Technical Specifications for Axial Models

##### VP1000 Axial DN15 - DN20

	VP10xAAA	VP10xAAE	VP10xAAG	VP10xBAJ	VP10xBAN
Flow rate max.	150 l/h - 0,042 l/s	600 l/h - 0,167 l/s	780 l/h - 0,217 l/s	1000 l/h - 0,278 l/s	1500 l/h - 0,417 l/s
Accuracy 0 ÷ 1 bar	± 5%				
Start-up max.	20 kPa - 0,20 bar			25 kPa - 0,25 bar	
ΔP max.	600 kPa - 6 bar				
Leakage	Class IV IEC 60534-4				
Temperature	-10 ÷ 120 °C				
Working pressure max.	2500 kPa - 25 Bar				
Fittings	Female BSPP Rp ½" EN 10226-1			Female BSPP Rp ¾" EN 10226-1	

##### VP1000 Axial DN25 - DN32

	VP100CAU	VP100CAW	VP100DAW	VP100DAY
Flow rate max.	2200 l/h - 0,611 l/s	2700 l/h - 0,750 l/s		3000 l/h - 0,833 l/s
Accuracy 0 ÷ 1 bar	± 5%			
Start-up max.	25 kPa - 0,25 bar			
ΔP max.	600 kPa - 6 bar			
Leakage	0,01% of Flow Rate			
Temperature	-10 ÷ 120 °C			
Working pressure max.	2500 kPa - 25 Bar			
Fittings	Female BSPP Rc 1" EN 10226-1		Female BSPP Rc 1 ¼" EN 10226-1	

### Assembly Codes

Following actuators are available

VA-707x ON/OFF Thermal \*;

VA-709x Thermal 0...10 VDC \*;

VA-748x Floating and Proportional Electric.

#### Note

\* : (VA-707x and VA-709x are suitable for valves DN15 and DN20 only)

## HVAC CONTROL PRODUCTS

### Valves

#### Pressure Independent Valves

#### VP1000

#### Technical Specifications for Ball Valves Models

#### VP1000 Ball Valves DN40 - DN50

	VP101DBB	VP101EBB	VP101EBC	VP101EBD	VP101FBD	VP101FBF	VP101GBF
Flow Rate max.	6000 l/h – 1,667 l/s		9000 l/h – 2,5 l/s	11000 l/h – 3,056 l/s	12000 l/h – 3,33 l/s	18000 l/h – 5,00 l/s	
Accuracy 0 ÷ 1 bar	± 5%						
Start-up max.	30 kPa – 0,30 bar		25 kPa – 0,25 bar	30 kPa – 0,30 bar		35 kPa – 0,35 bar	
ΔP max.	600 kPa – 6 bar				400 kPa – 4 bar		
Leakage	Class VI IEC 60534-4						
Temperature	-10 ÷ 120 °C						
Working Pressure max.	1600 kPa – 16 bar						
Fittings	Rc 1 ¼" Union Female EN 10226-1	Rc 1 ½" Union Female EN 10226-1		Rc 2" Union Female EN 10226-1			Rc 2 ½" Male EN 10226-1

#### Assembly Codes

Valves Codes	Description
<b>+5A8GGA *</b>	M9108-GGA-5, 8 Nm Non Spring Return Actuator, 24 V AC/DC, Proportional Control
<b>+5A8GGC *</b>	M9108-GGA-5, 8 Nm Non Spring Return Actuator, 24 V AC/DC, Proportional Control, two auxiliary switches
<b>+538GGA</b>	VA9208-GGA-1, 8 Nm Spring Return Actuator, 24 V AC/DC, Proportional Control, assembled in Spring Open Valve configuration.
<b>+538GGC</b>	VA9208-GGA-1, 8 Nm Spring Return Actuator, 24 V AC/DC, Proportional Control, two auxiliary switches, assembled in Spring Open Valve configuration.
<b>+558GGA</b>	VA9208-GGA-1, 8 Nm Spring Return Actuator, 24 V AC/DC, Proportional Control, assembled in Spring Close Valve configuration.
<b>+558GGC</b>	VA9208-GGA-1, 8 Nm Spring Return Actuator, 24 V AC/DC, Proportional Control, two auxiliary switches, assembled in Spring Close Valve configuration.

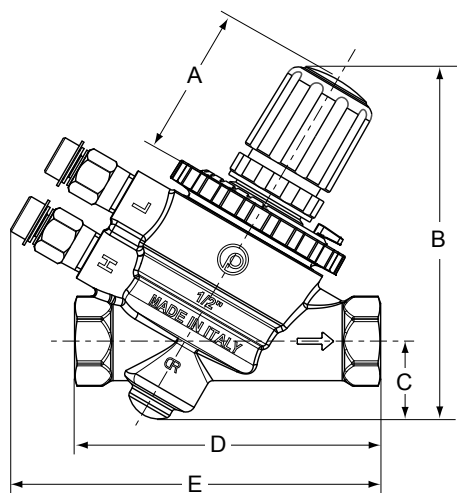
#### Note

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

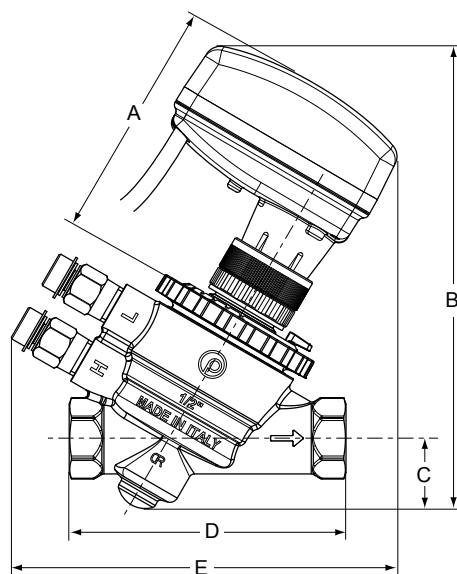
## HVAC CONTROL PRODUCTS Valves

### Pressure Independent Valves VP1000

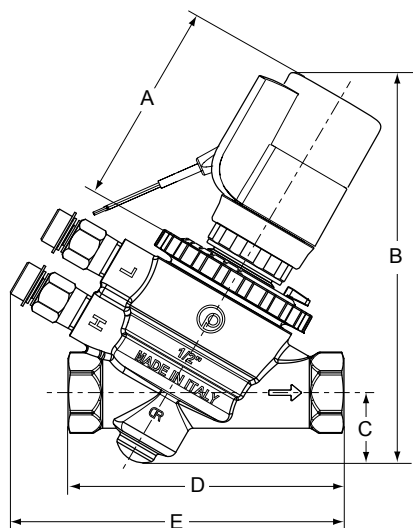
#### Dimensional data DN15 - DN20 (in mm)



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



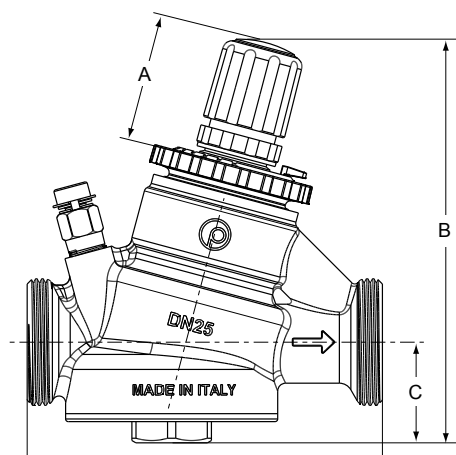
Size	A	B	C	D	E
DN15	80	166	25	99	130
DN20				108	



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

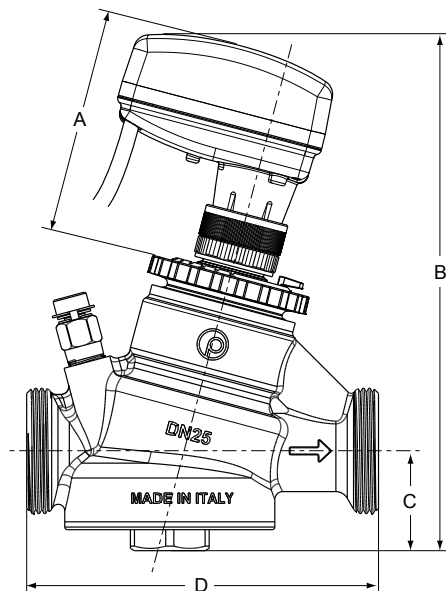
## HVAC CONTROL PRODUCTS Valves

### Dimensional data DN25 - DN32 (in mm)



Size	A	B	C	D *
DN25	47	152	38	134
DN32				

\* Dimensional data without fittings

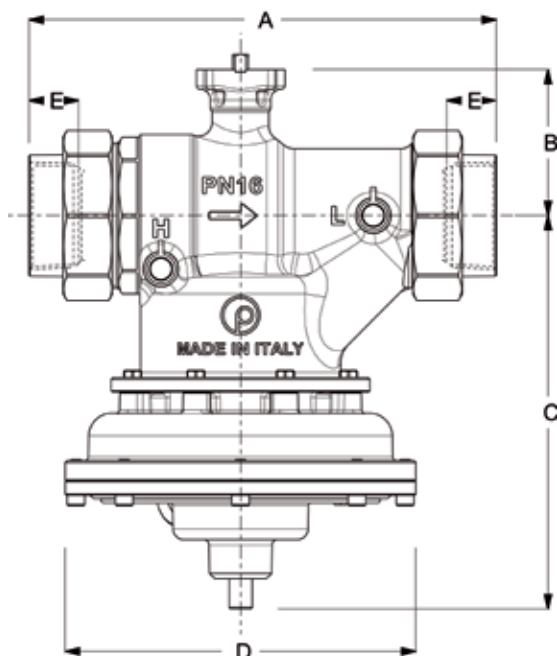


Size	A	B	C	D *
DN25	80	193	38	134
DN32				

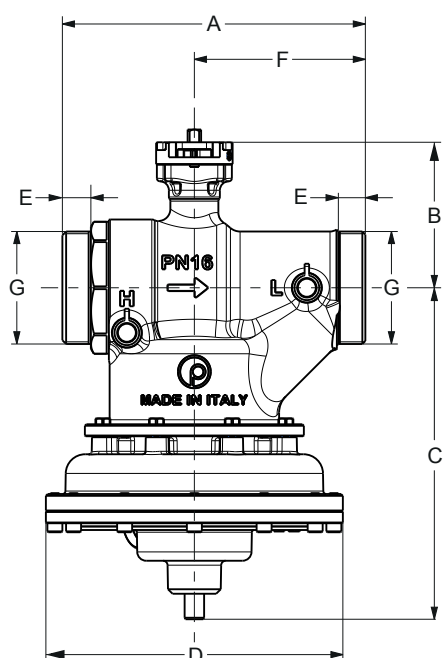
\* Dimensional data without fittings

## HVAC CONTROL PRODUCTS Valves

### Dimensional data DN40 - DN50 (in mm)



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



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

## HVAC CONTROL PRODUCTS

### Valves

## Pressure Independent Valves

### VPA

DN50...150, PN16

VPA Pressure Independent Control Valve is a combination of a differential pressure regulator and a regulating valve for flow adjustment.

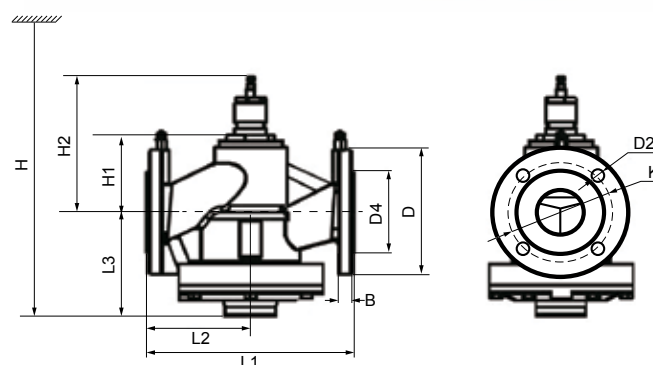
VPA Valves offer a remarkable adjustment flexibility. In combination with VAP actuators they can be set to a specific flow rate value and they allow precise modulating control. The valves always guarantee a suitable flow rate, therefore avoiding too high energy consumption.

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

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

#### Features

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



#### Dimensions in mm

DN	B	D	D2	D4	K	L1	L2	L3	H1	H	Weight kg
50	20	Ø165	4-Ø18	Ø99	Ø125	230	115	136	95	461	19
65	20	Ø185	4-Ø18	Ø118	Ø145	290	145	155	115	500	28
80	20	Ø200	8-Ø18	Ø132	Ø160	310	155	167	148	698	36
100	22	Ø220	8-Ø18	Ø156	Ø180	350	181	181	150	710	54
125	22	Ø250	8-Ø18	Ø184	Ø210	400	200	197	158	745	68
150	24	Ø285	8-Ø22	Ø211	Ø240	480	240	222	198	810	89

## HVAC CONTROL PRODUCTS

### Valves

#### Pressure Independent Valves

#### VPA

#### Ordering Codes VPA Series balancing Valve

Valve Model	DN (mm)	in.	PN	Closing pressure (bar)	Flow Rate			Stroke (mm)	Actuator	ΔP Range (kPa)
					m <sup>3</sup> /h	l/s	GPM			
VPA050-C	50	2"	16	16	13	3.64	57	20	VAP1000-24-C	35-400
VPA065-C	65	2-1/2"	16	16	21	5.8	92	20	VAP1000-24-C	35-400
VPA080-C	80	3"	16	16	28	7.8	123	40	VAP3000-24-C	35-400
VPA100-C	100	4"	16	16	50	13.9	219	40	VAP3000-24-C	35-400
VPA125-C	125	5"	16	16	90	25.0	396	40	VAP3000-24-C	35-400
VPA150-C	150	6"	16	16	145	40.3	638	40	VAP3000-24-C	35-400

#### Note

Valve closes when valve stem retracts.

## Terminal Unit Valve Actuators

### VA-7070

#### *Thermal ON/OFF Control*

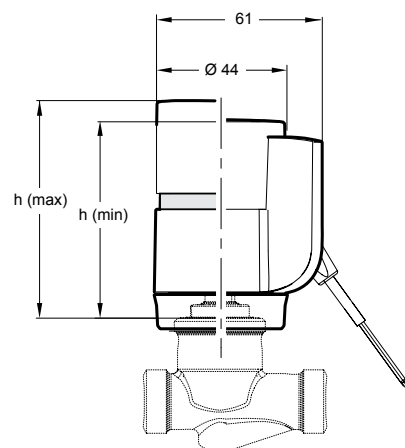
The VA-707x series terminal unit valve actuators provide ON/OFF and DAT control in HVAC application.

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

The VA-707x actuators are designed for field mounting onto all Johnson Controls terminal unit valves: VG6000, V5000, VP1000 (see pertinent bulletins).

#### Features

- 24 VAC/DC and 230 VAC power supply
- ON/OFF or DAT Controls
- NC version (stem retracts when energized)
- NO version (stem extends when energized)
- Easy mounting solution
- Factory mounted cable 2 m



Dimensions in mm

	h (max)	h (min)
<b>Normally Closed</b>	66	59
<b>Normally Open</b>	64	59



## HVAC CONTROL PRODUCTS

### Actuators

#### Terminal Unit Valve Actuators

##### VA-7070

Ordering Codes	Supply Voltage	Action Control	Force	Stroke	Factory Setting	Mounting Thread	Protection Class	Packaging	Power Consumption					
									Continuous	Start-up				
VA-7071-21	24 VAC/ VDC	ON/OFF or DAT	125 N	4.5 mm	Normally Closed (stem retracts when energized) 2 m cable lenght	M28x1.5	IP54	Single packaged in carton box	3 W	6 W (220 mA) max				
VA-7078-21						M30x1.5								
VA-7071-23	230 VAC					M28x1.5			2.5 W	36 W (150 mA) max				
VA-7078-23						M30x1.5								
VA-7078-01D	24 VAC/ VDC				Normally Closed (stem retracts when energized) Cable not included. Must be ordered separately	M30x1.5		Bulk pack 50 pcs	3 W	6 W (220 mA) max				
VA-7078-03D	230 VAC					M30x1.5			2.5 W	36 W (150 mA) max				
VA-7070-21	24 VAC/ VDC				Normally Open (stem extends when energized) 2 m cable lenght	M28x1.5		Single packaged in carton box	3 W	6 W (220 mA) max				
VA-7077-21						M30x1.5								
VA-7070-23	230 VAC					M28x1.5			2.5 W	36 W (150 mA) max				
VA-7077-23						M30x1.5								
VA-7077-01D	24 VAC/ VDC				Normally Open (stem extends when energized) Cable not included. Must be ordered separately	M30x1.5		Bulk pack 50 pcs	3 W	6 W (220 mA) max				

#### Accessories (order separately)

Ordering Codes	Description	Single Packaged
0550602021	Cable kit 2 m	Carton Box
0550602052	Cable kit 5 m	Plastic Bag
0550602102	Cable kit 10 m	
0550602023	Cable kit 2 m – Halogen free	
0550390001	Threaded nut M30x1.5 with normal and short pin	
0550390101	Threaded nut M28x1.5 with normal and short pin	
0550390201	Threaded nut M30x1 with normal and short pin	
0550484121	Kit auxiliary switch (Normally Closed) 2 m cable	
0550484221	Kit auxiliary switch (Normally Open) 2 m cable	

## HVAC CONTROL PRODUCTS

### Actuators

## Terminal Unit Valve Actuators

### VA-7090

*Thermal 0...10 V Control*

The VA-709x series terminal unit valve actuators provides proportional control in HAVC application.

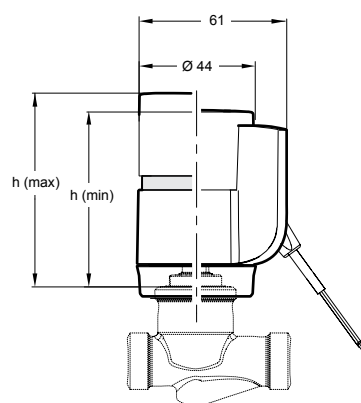
The compact design of these actuators make them suitable for installations in confined spaces, such as fan-coil applications.

The VA-709x actuators are designed for field mounting onto all Johnson Controls terminal unit valves: VG6000, V5000, VP1000 (*see pertinent bulletins*).

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

#### Features

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



Dimensions in mm

	h (max)	h (min)
<b>Normally Closed</b>	66	59
<b>Normally Open</b>	64	59

Ordering Codes	Supply Voltage	Action Control	Force	Stroke	Factory Setting	Mounting Thread	Protection Class	Packaging	Power Consumption	
									Continuous	Start-up
VA-7090-21	24 VAC	0...10 V	125 N	4.5 mm	Normally Open	M28x1.5	IP54	Single packaged in carton box	2 W	250 mA
VA-7091-21					Normally Closed					
VA-7097-21					Normally Open	M30x1.5				
VA-7098-21					Normally Closed					

#### Accessories (order separately)

Ordering Codes	Description	Packaging
0550390001	Elevated Bayonet Nut M30x1.5 with normal and short insert	Single packaged in Plastic Bag
0550390101	Elevated Bayonet Nut M28x1.5 with normal and short insert	
0550390201	Elevated Bayonet Nut M30x1 with normal and short insert	

## HVAC CONTROL PRODUCTS

### Actuators

## Terminal Unit Valves Actuators

### VA-7480

#### Motorized Floating and Proportional Control

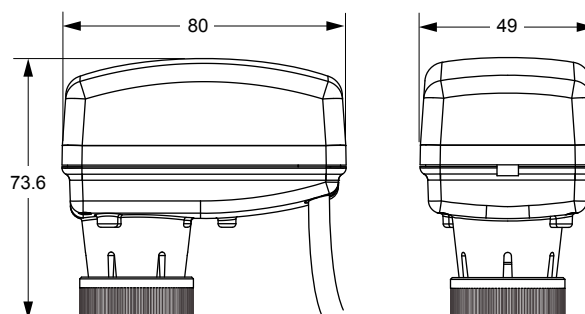
The VA-748x series provides floating or proportional control in HVAC applications. The compact design of this actuator makes it suitable for installation in confined spaces, such as fan coil, chilled ceiling, manifolds, etc.

The VA-748x series actuator is designed for field mounting onto VG6000, V5000 and VP1000 terminal unit valves (*see pertinent bulletin*).

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

#### Features

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



Dimensions in mm

Ordering Codes	Control Type	Power Supply	Running Time	Nominal Force	Factory Stroke Configuration	Cable Length	Mounting Thread nut	Upper Mechanical End Stroke
VA-7480-0011	Floating	24 VAC	13 sec/mm	120 N	---	1.5 m (PVC)	M28x1.5	16.3
VA-7481-0011			8 sec/mm					
VA-7480-0001			13 sec/mm				M30x1,5	14.5
VA-7481-0001			8 sec/mm					
VA-7480-4001			13 sec/mm					
VA-7480-4003		230 VAC	13 sec/mm				16.3	
VA-7480-0013			13 sec/mm					
VA-7481-0013			8 sec/mm					
VA-7480-0003			13 sec/mm					
VA-7481-0003			8 sec/mm					
VA-7482-0011	Proportional	24 VAC/VDC	8 sec/mm	160 N	Auto stroke detection	2 m (Halogen Free)	M30x1,5	14.5
VA-7482-1001								
VA-7482-2001								
VA-7482-3001								
VA-7482-5001								
VA-7482-6001								
VA-7482-7001								
VA-7482-8201								
VA-7482-9201								

#### Note:

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

## HVAC CONTROL PRODUCTS

### Actuators

## Non Spring Return Plant Valve Actuators

### VA-7150

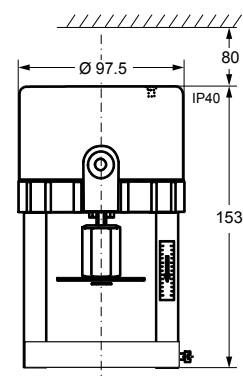
#### *Floating and Proportional Control*

The VA-7150 series synchronous motor driven actuator provides floating or proportional control of valves with up to 19 mm stroke in heating, ventilation and air conditioning applications.

This compact, non-spring return actuator has 500 N nominal thrust and responds to a variety of input signals. The VA-7150 series can be easily installed on site or ordered pre-fitted to VG7000, 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	IP40	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-7152-8201				Slotted

## HVAC CONTROL PRODUCTS

### Actuators

## Non Spring Return Plant Valve Actuators

### VA-7200

#### *Floating and Proportional Control*

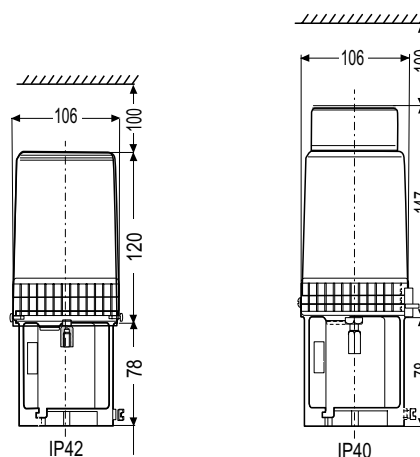
The VA-720x Series synchronous motor driven actuator provides floating or proportional control of valves, with up to 19 mm stroke in heating, ventilation and air conditioning applications.

This compact, non-spring return actuator has a 1000N nominal force and responds to a variety of input signals.

The VA-7200 Series can be easily field mounted or ordered factory coupled to VG7000, VG8000, 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)	Control	Motor Rating	Protection Class
For VG7000 Series Valves				
VA-7200-1001	24 VAC	Floating	5 W	IP42
VA-7202-1001		Proportional 0...10 VDC / 0(4)...20 mA		
For VG8000 / VG9000 / VGS8000				
VA-7200-8201	24 VAC	Floating	5 W	IP42
VA-7202-8201		Proportional 0...10 VDC / 0(4)...20 mA		

## HVAC CONTROL PRODUCTS

### Actuators

## Non Spring Return Plant Valve Actuators

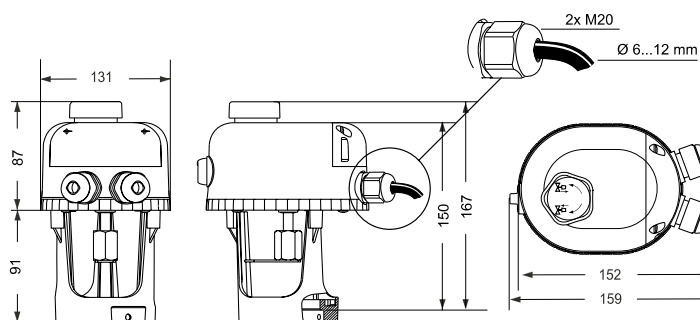
### VA-7700

#### Floating and Proportional Control

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

#### Features

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



Dimensions in mm

#### 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	IP54	2.4 VA
VA-7700-1003	230 VAC						
VA-7740-1001	24 VAC						
VA-7740-1003	230 VAC						
VA-7706-1001	24 VAC	Proportional					4.4 VA
VA-7746-1001							

#### Mounting onto VGS8000 and VG9000 Series Valves

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							

## HVAC CONTROL PRODUCTS

### Actuators

## Non Spring Return Plant Valve Actuators

### VA7810

#### *Floating and Proportional Control*

The VA7810 Non Spring Return actuator with 1000 N thrust for valves in heating, ventilation and air conditioning applications is available for floating (3-point) control or proportional control. All models have manual override as standard and provide stroke capabilities of 7 mm to 25 mm.

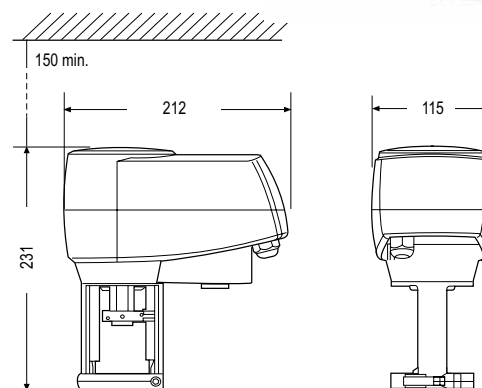
Proportional models are self-calibrating.

The actuator is intended for use with Johnson Controls VG7000 and VGS800 threaded valves as well as VG9000, VG8000 and VG8300 flanged valves. All valves should be fitted in accordance with the maximum close-off pressure ratings specified.

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

#### Features

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



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-xx	230 VAC	ON/OFF or Floating	1000 N	25 mm	150 s	IP 54	8 VA	---	---					
VA-7810-ADC-xx									2 aux switches					
VA-7810-AGA-xx	24 VAC						3 VA		---					
VA-7810-AGC-xx									2 aux switches					
VA-7810-AGH-xx	ON/OFF, Floating or Proportional				150 s (selectable 75 s)		6 VA		2 KΩ pot					
VA-7810-GGA-xx									---					
VA-7810-GGC-xx										2 aux switches				

#### Note

- \* : xx = 11 Actuator with threaded coupler for VG7000 Valves  
 12 Actuator with clamp coupler for VG8000, VG9000, VGS800 Valves

## HVAC CONTROL PRODUCTS

### Actuators

## Non Spring Return Plant Valve Actuators

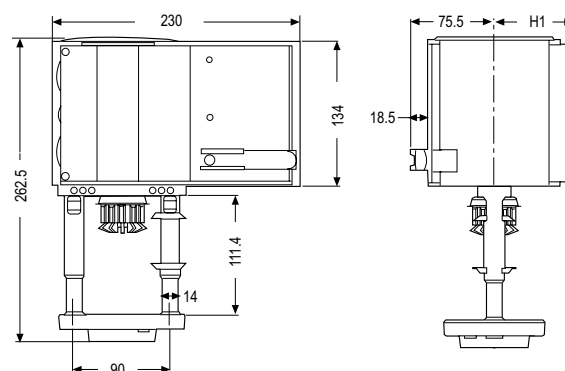
### VA1000

#### *Floating and Proportional Control*

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, VG8300 and VG9000 series valves.

#### Features

- 24 VAC and 230 VAC power supply
- Floating and Proportional control
- Manual override
- Automatic stem coupling
- Actuator fixed to valve with one ring nut
- Self adjusting, automatic stroke adjustment, calibrated pressure control at the end positions
- 2 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	IP66	49 mm

#### Accessories modules for on site installation

Ordering Codes	Description
VA1000-M230N	AC 230V module
VA1000-M100N	AC 100V module
VA1000-P2	2 K $\Omega$ 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



## HVAC CONTROL PRODUCTS

### Actuators

## Non Spring Return Plant Valve Actuators

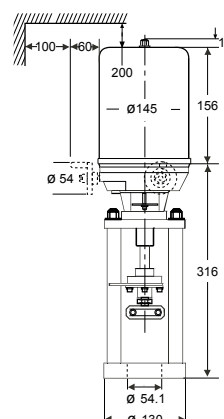
### FA-3000

#### *Floating and Proportional Control*

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	IP65	37 VA	---
FA-3303-7416								2 aux switches and 2 KΩ pot
FA-3304-7416		Proportional					135 Ω pot	
FA-3341-7416							2 aux switches	
FA-3300-7411	230 VAC	Floating	6000 N	42 mm (max 45)	150 s	IP65	37 VA	---
FA-3303-7411								2 aux switches and 2 KΩ pot
FA-3304-7411								135 Ω pot

## HVAC CONTROL PRODUCTS

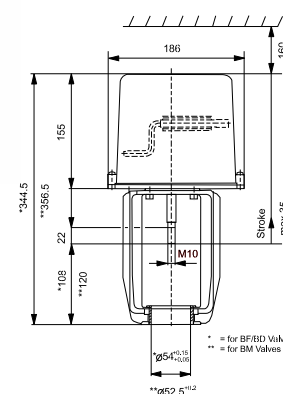
## Non Spring Return Plant Valve Actuators

# RA-3000

## 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	IP54	
RA-31xx-7126	●		230 V, 50/60 Hz			
RA-30xx-7127	---					
RA-31xx-7127	●					
RA-30xx-7226	---	1800 N		24 V, 50/60 Hz		25 mm
RA-31xx-7226	●		230 V, 50/60 Hz			
RA-30xx-7227	---					
RA-31xx-7227	●					
RA-30xx-7325	---	3000 N		24 V, 60 Hz		42 mm
RA-31xx-7325	●		24 V, 50 Hz			
RA-30xx-7326	---			230 V, 50 Hz		
RA-31xx-7326	●					
RA-30xx-7327	---					
RA-31xx-7327	●					
RA-30xx-7328	---					
RA-31xx-7328	●					

### Note

- \* : xx = 00** None  
**03** 2 auxiliary switches and 2 KW feedback potentiometer  
**05** 2 auxiliary switches and 135  $\Omega$  feedback potentiometer  
**41** Built-in positioner 0...10 VDC and 2 auxiliary switches (only 24 VAC models)

## HVAC CONTROL PRODUCTS

### Actuators

## Non Spring Return Plant Valve Actuators

### VA9104-xGA-1S

(Joventa BAD1.4 / BAD1 / BMD1.2)

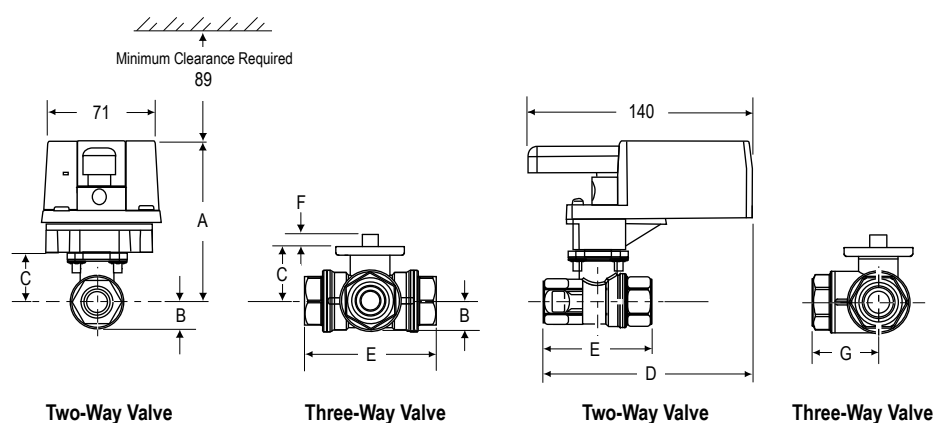
4 Nm, ON/OFF, Floating and Proportional Control  
Rotary Actuators for Ball Valves

The electric Actuator series have been developed for operation of ball valves.

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

#### Features

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



Dimensions in mm

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

Ordering Codes		Running Time	Control Signals	Supply Voltage (50/60Hz)
Johnson Controls	Joventa			
VA9104-AGA-1S	BAD1.4	72 s	Floating without Timeout	24 VAC
VA9104-IGA-1S	BAD1		ON/OFF and Floating with Timeout	AC 100 to 240 V
VA9104-IUA-1S	BAD2			
VA9104-GGA-1S	BMD1.2		Proportional 0(2)...10 VDC 0(4)...20 mA	24 VAC

## HVAC CONTROL PRODUCTS

### Actuators

## Rotary Actuators for Ball Valves

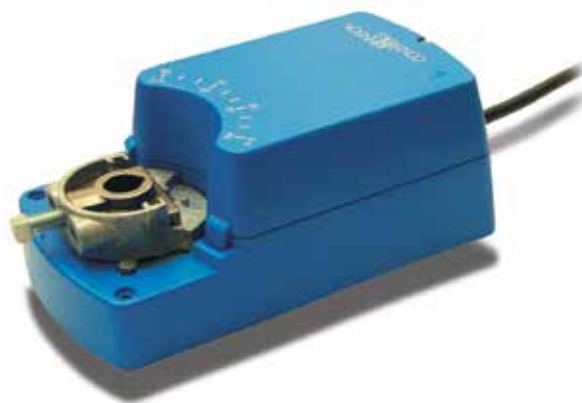
### M9108-xxx-5

(Joventa BAS1 / BAS2 / BMS1.1)

8 Nm, ON/OFF, Floating and Proportional Control  
Rotary Actuators for Ball Valves

The M9108-xxx-5 electric actuator series have been developed for operating VG1000 series ball valves.

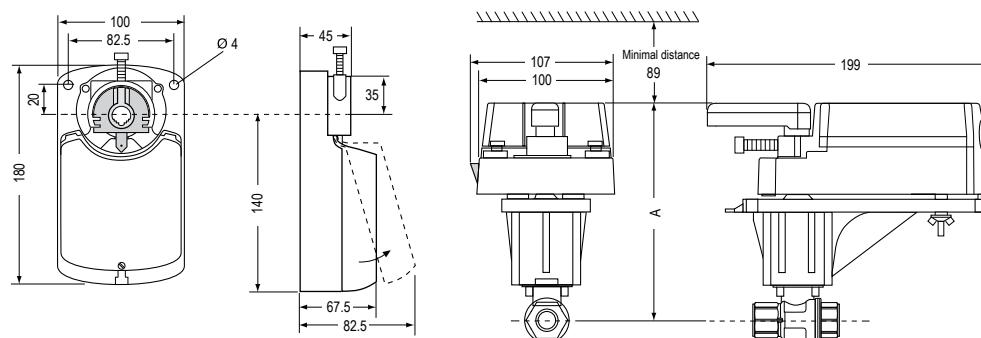
The actuators can be mounted onto the valves by the means of the M9000-525-5 linkage kit.



#### 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 adjustment 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

	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				---	
M9108-ADC-5	BAS2.S			Modulating	•	230 VDC
M9108-GGA-5	BMS1.1				---	
M9108-GGC-5	BMS1.1S				•	

## Non Spring Return Plant Valve Actuators

### M9310-HGA-VA1

Available  
Soon

(Joventa BMS1.10)

10 Nm, ON/OFF, Floating and Proportional Control  
Rotary Actuators for Ball Valves

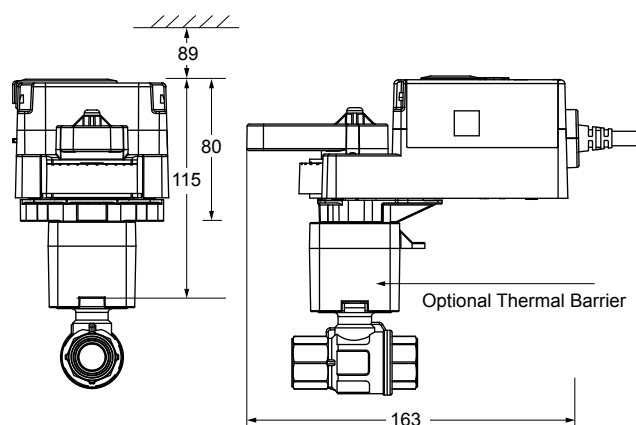
The M9310 electric Actuator series have been developed for operation of ball valves. It's used to provide accurate positioning on VG1000 series DN32, DN40 and DN50 ball valves.

The model includes an all-in-one On/Off, Floating Point, and proportional control with 24 V power.

An optional line voltage auxiliary switch kit can be field installed to indicate an end-stop position to perform switching functions within the selected rotation range. Optional potentiometric feedback kits are available as well to be mount on field.

#### Features

- Universal model: On/Off, floating and proportional
- Optional Kits with One and Two auxiliary switches and different potentiometer feedback.
- Electronic Stall Detection
- CLASS III insulation rating
- Microprocessor-controlled Brushless DC Motor
- Mode Selection Switch to select reversal logic, calibration and span/offset signal adjustment
- Integral Cables with Colored and Numbered
- Underwriters Laboratories Inc.® (UL), CE Mark, and C-Tick Compliance
- Manufactured under International Standards Organization (ISO) 9001 Quality Control Standards
- 5-Year Warranty



Dimensions in mm

## HVAC CONTROL PRODUCTS

### Actuators

#### Non Spring Return Plant Valve Actuators

##### M9310-HGA-VA1

(Joventa BMS1.10)

Ordering Codes		Running Time	Control Signals	Supply Voltage (50/60Hz)
Johnson Controls	Joventa			
M9310-HGA-VA1	BMS1.10	35 s	ON/OFF, Floating, Proportional 0(2)...10 VDC /0(4)...20 mA	24 VAC/DC

#### Accessories (order separately)

Ordering Codes	Description
M9300-1	Auxiliary Switch Kit (Single Pole, double-Throw)
M9300-2	Auxiliary Switch Kit (Two Single Pole, double-Throw)
M9300-140	Feedback Potentiometer 140 ohms
M9300-1k	Feedback Potentiometer 1k ohms
M9300-2k	Feedback Potentiometer 2k ohms
M9300-10k	Feedback Potentiometer 10k ohms
M9000-200	Commissioning Tool that provides a control signal to drive 24 V On/Off, Floating, Proportional, and Resistive Electric Actuators (quantity 1)
M9000-342	Weather Shield Kit for VG1000 Series Ball application of VA9104, M9310-xxx-V, VA9203, and VA9208 Series Electric Non-Spring Return Actuators (quantity 1)
M9000-561	Thermal Barrier Kit. Extends the VA9104, M9310-xxx-V, VA9203, and VA9208 Series Electric Non-Spring Return Actuators applications to include low pressure steam (quantity 1)
M9300-100	Threaded Conduit Adapters for 1/2 in. electrician's fittings

## HVAC CONTROL PRODUCTS

### Actuators

## Rotary Actuators for Butterfly Valves

### VA-9070

68 - 2430 Nm, ON/OFF, Floating and Proportional Control  
Rotary Actuators for Butterfly Valves

The actuator is specially developed for use with VFB butterfly valves in the HVAC industry.

These bidirectional actuators are direct mounted on VFB valves without any linkage. A single VA-9070 provides 68, 226, 565, 735, 1470 and 2034 Nm torque depending on the model.

With a power supply of 24 Vac or 230 Vac the actuators can be controlled in 2-point, 3-point (floating) or proportional configuration.

Two isolated auxiliary switches and an electrical heater are standard in these series.

The protection class is IP65 to ensure a dust-proof and shower-proof from all angles.

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

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



### Features

- Exact positioning ensures precise flow control
- Complete opening and closing from 100% to 0
- Range from 68 Nm to 2034 Nm
- Self-regulating heater as standard
- Construction optimized for operation with butterfly valves.
- Two isolated auxiliary switches as standard

### Ordering Codes

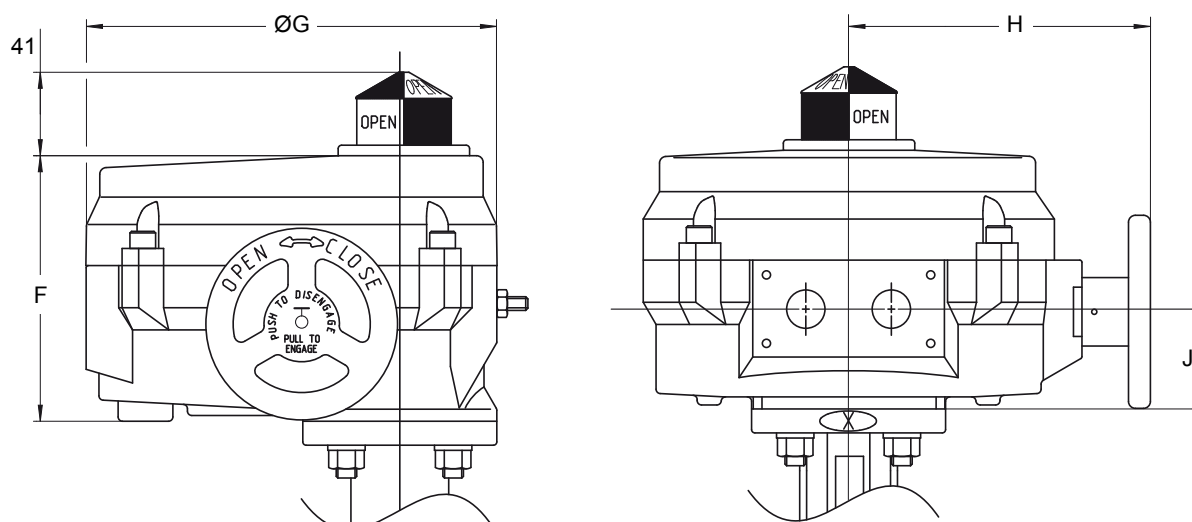
VA-907	X	-	X	X	
				3	= Modulating Control
				4	= ON/OFF & Floating Control
			1		= 24 VAC
			2		= 230 VAC
		2			= 68 Nm Actuators
		5			= 226 Nm Actuators
		7			= 565 Nm Actuators
		8			= 735 Nm Actuators
		A			= 1470 Nm Actuators
		B			= 2034 Nm Actuators

## HVAC CONTROL PRODUCTS

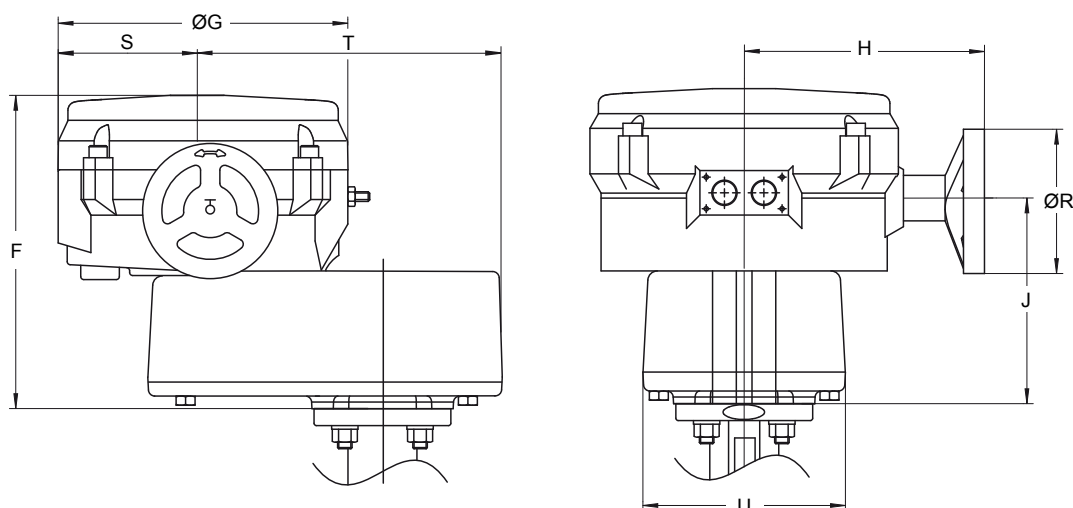
### Actuators

#### Rotary Actuators for Butterfly Valves VA-9070

##### Two-Way VFB Series Actuated with VA-9072 / VA-9075 / VA-9077 / VA-9078 Actuators



##### Two-Way VFB Series Actuated with VA-907A / VA-907B Actuators



##### Two-Way VFB Series Actuated with VA-907x Actuator - Dimensions in mm

Actuator Model	F	G	H	J	S	T	R	U	Top Flange
VA-9072	130	191	142	48	-	-	-	-	F07
VA-9075	165	257	198	64	-	-	-	-	F07/F12
VA-9077 / VA-9078	183	307	241	74	-	-	-	-	F12/F16
VA-907A / VA-907B	317	307	241	206	155	323	305	203	F12/F16



## HVAC CONTROL PRODUCTS

### Actuators

## Non Spring Return Plant Valve Actuators

### VAP1000 - VAP3000

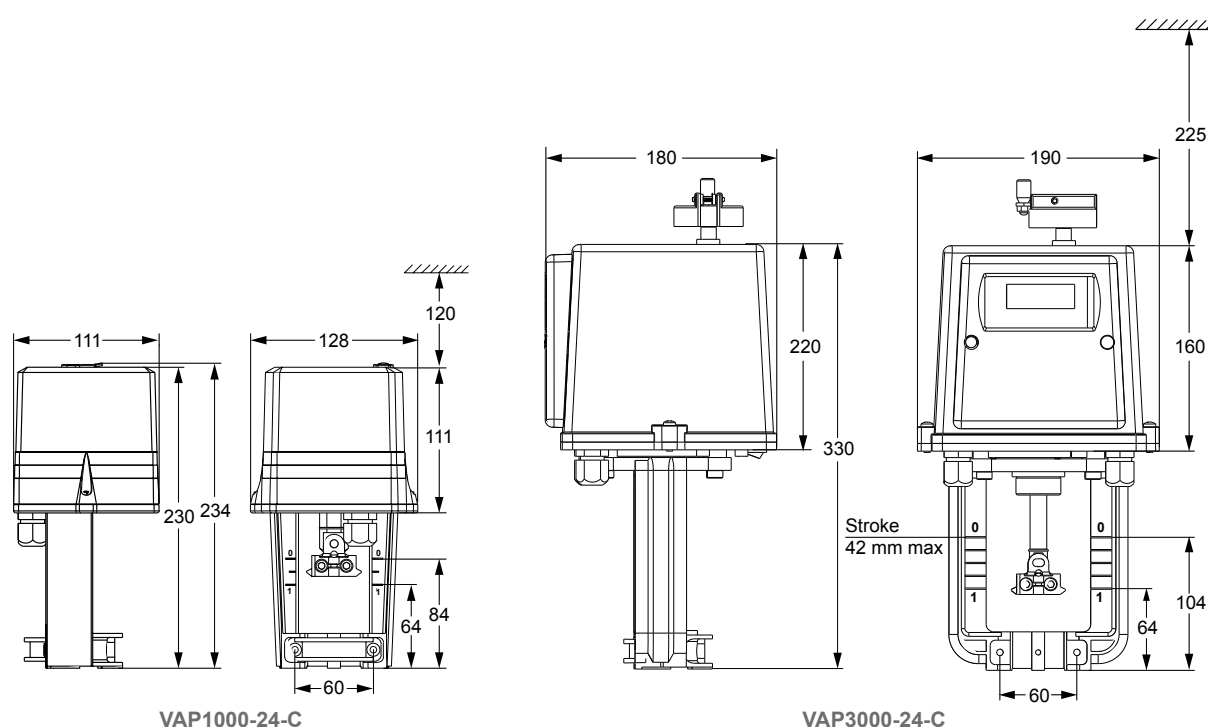
*VAP Linear Actuators for VPA Pressure Independent Flanged Valves*

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

They provide 1000N or 3000N according with the valve dimensions. The actuators are used to control the valve and to set the maximum desired flow.

#### Features

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



Dimensions in mm

#### Ordering Codes

Actuator Model	Force	Power Supply	Control Signal	Manual Override	Running speed	Weight (kg)
VAP1000-24-C	1000N	24 VAC	0(2)~10V,0(4)~20mA	Yes	3.85s/mm (50Hz)	1.7
VAP3000-24-C	3000N	24 VAC	0(2)~10V,0(4)~20mA	Yes	3.2s/mm (50Hz)	5.2

## HVAC CONTROL PRODUCTS

### Actuators

## Spring Return Plant Valve Actuators

### VA7820 - VA7830

#### *Floating and Proportional Control*

The VA78x0 spring return actuator with 1000 N thrust for valves in heating, ventilation and air conditioning applications is available for floating (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.

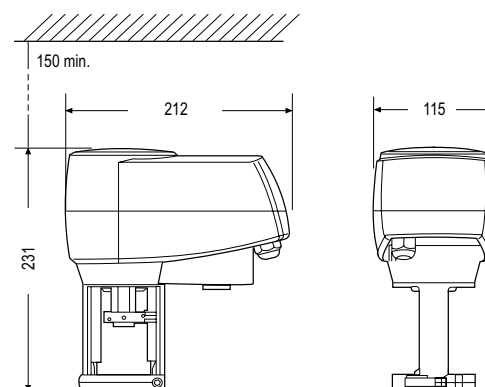
The actuator is intended for use with Johnson Controls VG7000 and VGS800 threaded valves as well as VG9000, VG8000 and VG8300 flanged valves. All valves should be fitted in accordance with the maximum close-off pressure ratings specified.

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



#### Features

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



Dimensions in mm

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-xx	24 VAC	ON/OFF, Floating or Proportional	1000 N	25 mm	150 s (selectable 75 s)	IP54	11 VA	Actuator stem retracts	---
VA7820-GGC-xx									2 aux switches
VA7830-GGA-xx								Actuator stem extend	---
VA7830-GGC-xx									2 aux switches

#### Note

- \* : **xx** = **11** Actuator with threaded coupler for VG7000 Valves  
**12** Actuator with clamp coupler for VG8000, VG9000, VGS800 Valves

## HVAC CONTROL PRODUCTS

### Actuators

## Spring Return Plant Valve Actuators

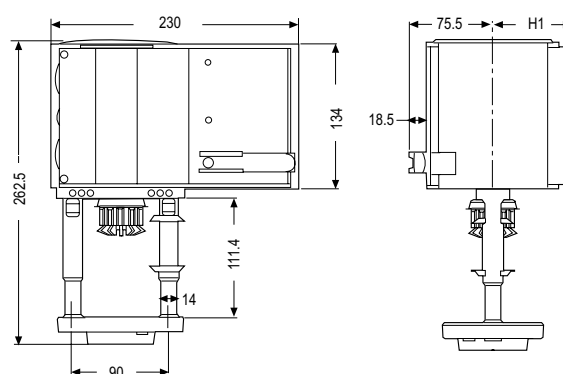
### VA1000

#### *Floating and Proportional Control*

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, VG8300 and VG9000 series valves.

#### Features

- 24 VAC and 230 VAC power supply
- Floating and Proportional control
- Manual override
- Automatic stem coupling
- Actuator fixed to valve with one ring nut
- Self adjusting, automatic stroke adjustment, calibrated pressure control at the end positions
- 2 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
VA1220-GGA-1	2000N; Spring return retracts	17 VA	IP66	49 mm
VA1420-GGA-1	2000N; Spring return extends	17 VA		

#### Accessories modules for in-situ installation

Ordering Codes	Description
VA1000-M230N	AC 230V module
VA1000-M100N	AC 100V module
VA1000-P2	2 K $\Omega$ 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

## HVAC CONTROL PRODUCTS

### Actuators

## Spring Return Plant Valve Actuators

### 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):

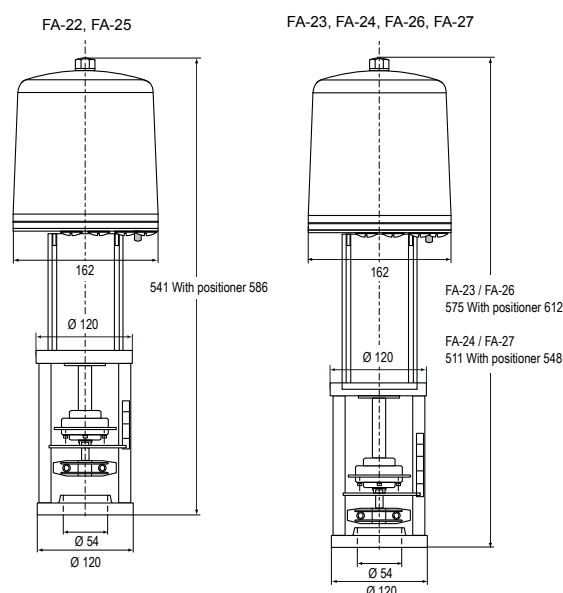
this model pair has a stroke of 13 mm and 2000 N minimum thrust.

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
<a href="#">FA-22xx-7516</a>	24 VAC	Floating and Proportional	Stem fully extended	2.4 kN	25 mm	IP54	6.1 VA	≤ 81
<a href="#">FA-25xx-7516</a>			Stem fully retracted					
<a href="#">FA-23xx-7416</a>			Stem fully extended	2.2 kN	42 mm			≤ 201
<a href="#">FA-26xx-7416</a>			Stem fully retracted					
<a href="#">FA-24xx-7116</a>			Stem fully extended	2 kN	13 mm			≤ 51
<a href="#">FA-27xx-7116</a>			Stem fully retracted					

#### Note

\* xx = 00 None

01 2 Auxiliary switches

02 2 K $\Omega$  feedback potentiometer

03 2 K $\Omega$  feedback potentiometer and 2 auxiliary switches

04 135  $\Omega$  feedback potentiometer

40 Built-in electronic positioner 0...10 V / 0(4)...20 mA

41 Built-in electronic positioner 0...10 V / 0(4)...20 mA and 2 auxiliary switches

## HVAC CONTROL PRODUCTS

### Actuators

## Rotary Actuators for Ball Valves

### VA9203

(Joventa BxFx.03SZ)

3 Nm, ON/OFF, Floating and Proportional Control  
Rotary Actuators for Ball Valves

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

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

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

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

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

The series includes the following control options:

ON/OFF, 24 V AC/DC, 100 to 240 VAC power

ON/OFF and Floating Point, 24 V AC/DC power

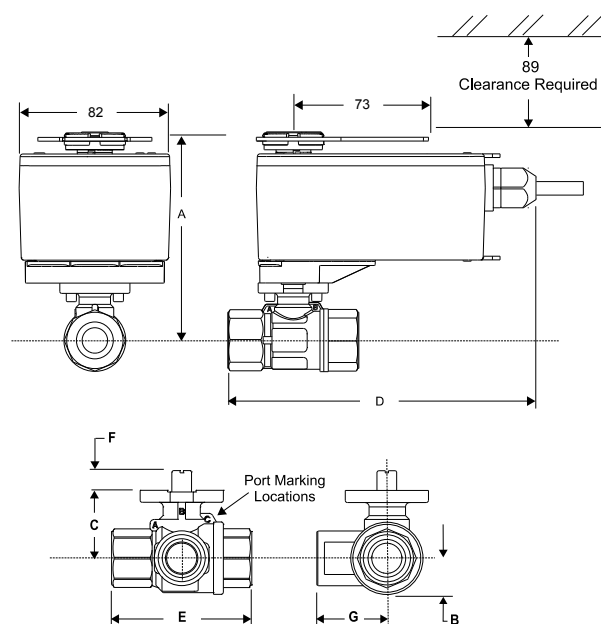
Proportional, 24 V AC/DC power, for 0(2) to 10 VDC or 0(4) to 20 mA Control.

### Features

- 3 Nm Rated Torque
- Mechanical Spring Return System
- Direct-Coupled Design
- Reversible Mounting
- Rugged IP54 Rated Enclosure
- Electronic Stall Detection
- Double-Insulated Construction
- Microprocessor Controlled Brushless DC Motor (-AGx and -GGx Models)
- External Mode Selection Switch (-AGx and -GGx Models)
- Integral Cables with Colored and Numbered Conductors
- Optional Integrated Auxiliary Switch
- Override Control (Proportional Models Only)
- UL, CE, and C-Tick Compliance
- Manufacturing under International Standards Organization (ISO) 9001 Quality Control Standards.



VA9203 mounted on VG1000



Dimensions in mm

Valve Size mm (DN)	A	B	C	D	E	F	G
DN15	117	17	31	167	67	9	33
DN20	117	17	31	171	75	9	38
DN25	119	19	33	180	92	9	46

## HVAC CONTROL PRODUCTS

### Actuators

#### Rotary Actuators for Ball Valves

**VA9203**

*(Joventa BxFx.03SZ)*

Ordering Codes		
Johnson Controls	Joventa	Description
<b>VA9203-GGA-1Z</b>	<b>BMF1.03Z</b>	3 Nm Spring Return Actuator for Valves, Proportional, 24 V AC/DC
<b>VA9203-GGB-1Z</b>	<b>BMF1.03SZ</b>	3 Nm Spring Return Actuator for Valves, Proportional, 24 V AC/DC, 1 Switch
<b>VA9203-AGA-1Z</b>	<b>BBF1.03Z</b>	3 Nm Spring Return Actuator for Valves, Floating & ON/OFF, 24 V AC/DC
<b>VA9203-AGB-1Z</b>	<b>BBF1.03SZ</b>	3 Nm Spring Return Actuator for Valves, Floating & ON/OFF, 24 V AC/DC, 1 Switch
<b>VA9203-BGA-1</b>	<b>BAF1.03</b>	3 Nm Spring Return Actuator for Valves, ON/OFF, 24 V AC/DC
<b>VA9203-BGB-1</b>	<b>BAF1.03S</b>	3 Nm Spring Return Actuator for Valves, ON/OFF, 24 V AC/DC, 1 Switch
<b>VA9203-BUA-1</b>	<b>BAF2.03</b>	3 Nm Spring Return Actuator for Valves, ON/OFF, 100 to 230 V AC
<b>VA9203-BUB-1</b>	<b>BAF2.03S</b>	3 Nm Spring Return Actuator for Valves, ON/OFF, 100 to 230 V AC, 1 Switch

#### Accessories (order separately)

Ordering Codes	Description
<b>M9000-200</b>	Commissioning Tool that Provides a Control Signal to Drive 24 V On/Off, Floating, Proportional and/or Resistive Electric Actuators
<b>M9000-560</b>	Ball Valve Linkage Kit for applying M9203 and M9208 Series Actuators to VG1000 Series Valves (quantity 1)
<b>M9000-561</b>	Thermal Barrier Extends M(VA)9104, M(VA)9203 and M(VA)9208 Series Electric Spring Return Actuator applications to include low pressure steam (quantity 1)
<b>M9000-341</b>	Weathershield Kit for VG1000 Series Ball Valve application of M(VA)9104, M(VA)9203 and M(VA)9208 Series Electric Spring Return Actuators (quantity 1)
<b>M9000-607</b>	Position Indicator for VG1000 Series Ball Valve Applications (Quantity 5)

## HVAC CONTROL PRODUCTS

### Actuators

## Rotary Actuators for Ball Valves

### VA9208

*(Joventa BxFx.08S)*

8 Nm, ON/OFF, Floating and Proportional Control  
Rotary Actuators for Ball Valves

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

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

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

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

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

The series includes the following control options:

ON/OFF, 24 V AC/DC, 230 V AC power

ON/OFF and Floating Point, 24 V AC/DC power

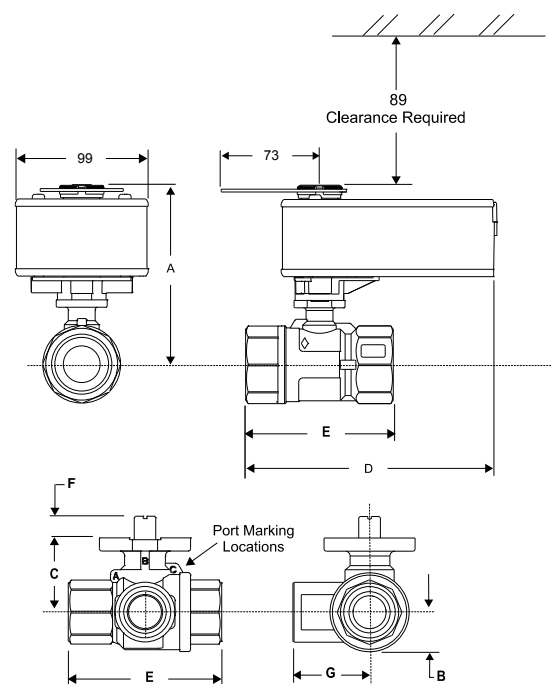
Proportional, 24 V AC/DC power, for 0(2) to 10 VDC or 0(4) to 20 mA Control

### Features

- 8 Nm Rated Torque
- Mechanical Spring Return System
- Direct-Coupled Design
- Reversible Mounting
- Rugged IP54 Rated Enclosure
- Electronic Stall Detection
- Double-Insulated Construction
- Microprocessor Controlled Brushless DC Motor (-AGx and -GGx Models)
- External Mode Selection Switch (-AGx and -GGx Models)
- Integral Cables with Colored and Numbered Conductors
- Optional Integrated Auxiliary Switches
- UL, CE, and C-Tick Compliance
- Manufacturing under International Standards Organization (ISO) 9001 Quality Control Standards.



VA9208 mounted on VG1000



Dimensions in mm

Valve Size mm (DN)	A	B	C	D	E	F	G
DN32	195	26	44	184	109	9	54
DN40	200	29	48	189	119	9	59
DN50	204	37	53	195	139	9	74



## HVAC CONTROL PRODUCTS

### Actuators

#### Rotary Actuators for Ball Valves

##### VA9208

(Joventa BxFx.08S)

Ordering Codes		
Johnson Controls	Joventa	Description
VA9208-GGA-1	BMF1.08	8 Nm Spring Return Actuator for Valves, Proportional, 24 V AC/DC
VA9208-GGC-1	BMF1.08S	8 Nm Spring Return Actuator for Valves, Proportional, 24 V AC/DC, 2 Switch
VA9208-AGA-1	BBF1.08	8 Nm Spring Return Actuator for Valves, Floating & ON/OFF, 24 V AC/DC
VA9208-AGC-1	BBF1.08S	8 Nm Spring Return Actuator for Valves, Floating & ON/OFF, 24 V AC/DC, 2 Switch
VA9208-BGA-1	BAF1.08	8 Nm Spring Return Actuator for Valves, ON/OFF, 24 V AC/DC
VA9208-BGC-1	BAF1.08S	8 Nm Spring Return Actuator for Valves, ON/OFF, 24 V AC/DC, 2 Switch
VA9208-BDA-1	BAF2.08	8 Nm Spring Return Actuator for Valves, ON/OFF, 230 V AC
VA9208-BDC-1	BAF2.08S	8 Nm Spring Return Actuator for Valves, ON/OFF, 230 V AC, 2 Switch

#### Accessories (order separately)

Ordering Codes	Description
M9000-200	Commissioning Tool that Provides a Control Signal to Drive 24 V ON/OFF, Floating, Proportional and/or Resistive Electric Actuators
M9000-560	Ball Valve Linkage Kit for applying M9203 and M9208 Series Actuators to VG1000 Series Valves (quantity 1)
M9000-561	Thermal Barrier Extends M(VA)9104, M(VA)9203 and M(VA)9208 Series Electric Spring Return Actuator applications to include low pressure steam (quantity 1)
M9000-341	Weathershield Kit for VG1000 Series Ball Valve application of M(VA)9104, M(VA)9203 and M(VA)9208 Series Electric Spring Return Actuators (quantity 1)
M9000-607	Position Indicator for VG1000 Series Ball Valve Applications (quantity 5)



## HVAC CONTROL PRODUCTS

### Actuators

## Non Spring Return Damper Actuators

### M910x-xGA-xS

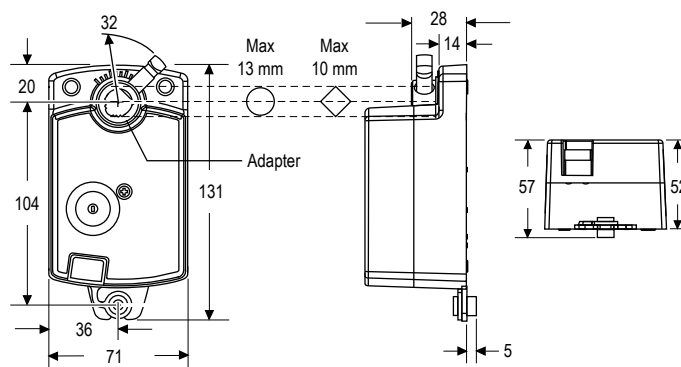
(Joventa DAB / DAD / DMD)

2 and 4 Nm, ON/OFF, Floating and Proportional Control

The Small Family electric damper actuator series have been developed to operate small air dampers in ventilation and air conditioning systems. The compact design make this actuator highly versatile.

#### Features

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



Dimensions in mm

Ordering Codes		Torque	Running Time	Damper Size	Control Signals	Supply Voltage (50/60Hz)	Connection
Johnson Controls	Joventa						
M9102-AGA-1S	DAB1.4	2 Nm	36 s	0.4 m <sup>2</sup>	Floating without timeout	AC 24 V	PVC-cable
M9102-AGA-5S	DAB1.4C				ON/OFF and Floating with timeout		Terminal block
M9102-IGA-1S	DAB1						PVC-cable
M9102-IGA-5S	DAB1C						Terminal block
M9104-AGA-1S	DAD1.4	4 Nm	72 s	0.8 m <sup>2</sup>	Floating without timeout		PVC-cable
M9104-AGA-5S	DAD1.4C				ON/OFF and Floating with timeout		Terminal block
M9104-IGA-1S	DAD1					PVC-cable	
M9104-IGA-5S	DAD1C					Terminal block	
M9104-IUA-5S	DAD2				AC 100 to 240 V	PVC-cable	
M9104-GGA-1S	DMD1.2				AC 24 V	PVC-cable	
M9104-GGA-5S	DMD1.2C					Terminal block	

## Non Spring Return Damper Actuators

### M9304-xxx-1N

(Joventa DAN / DAN2 / DMN)

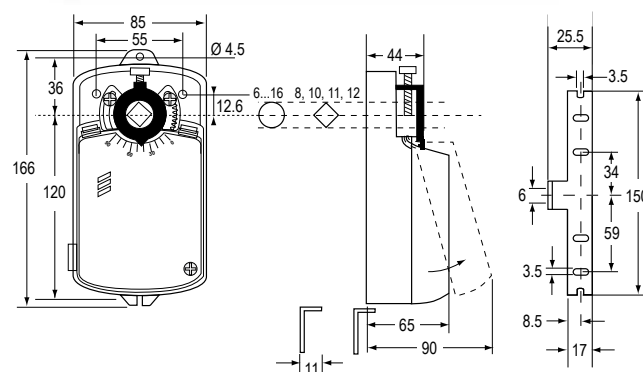
4 Nm, ON/OFF, Floating and Proportional Control

The Silence electric damper actuator series have been developed to operate small and medium air dampers in ventilation and air conditioning systems. The compact design and universal adapter fitted with limitation of rotation angle make this actuator highly versatile.

A key feature of the design is the Johnson Controls stem adapter which also incorporates angle-of-rotation limiting and position indication.

#### Features

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



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 m <sup>2</sup>	ON/ OFF and Floating	---	24 VAC/DC
M9304-AGC-1N	DAN1.SN					•	
M9304-ADA-1N	DAN2N					---	230 VAC
M9304-ADC-1N	DAN2.SN					•	
M9304-AGA-1N	DAN5N					---	48 VDC
M9304-AGC-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)

## HVAC CONTROL PRODUCTS

### Actuators

## Non Spring Return Damper Actuators

### M9310-HGA-DA1

(Joventa DM1.10)

Available  
Soon

10 Nm, ON/OFF, Floating and Proportional Control

The M9310 Series Electric Non-Spring Return Actuators are used to control of dampers in HVAC systems. The actuator provides 10 Nm rated torque.

The model includes an all-in-one On/Off, Floating Point, and proportional control with 24 V power.

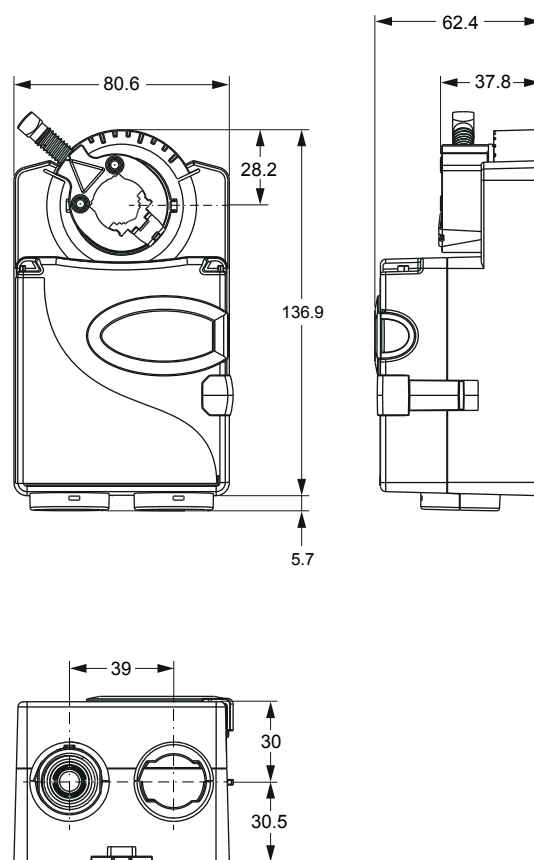
It can be mounted directly to a round damper shaft from 9.5 to 19 mm diameter or square shaft from 9.5 to 15 mm with a universal clamp.

An optional line voltage auxiliary switch kit can be field installed to indicate an end-stop position or perform switching functions within the selected rotation range.

Optional potentiometric feedback kits are available as well to be mount on field.

#### Features

- Universal model: On/Off, floating and proportional
- Optional Kits with One and Two auxiliary switches and different potentiometer feedback.
- Self-Calibrating to Adjust Stroke
- Electronic Stall Detection
- CLASS III insulation rating
- Microprocessor-controlled Brushless DC Motor
- Mode Selection Switch to select reversal logic, calibration and span/offset signal adjustment
- Integral Cables with Colored and Numbered
- Underwriters Laboratories Inc.® (UL), CE Mark, and C-Tick Compliance
- Manufactured under International Standards Organization (ISO) 9001 Quality Control Standards
- 5-Year Warranty



## HVAC CONTROL PRODUCTS

### Actuators

#### Non Spring Return Damper Actuators

##### M9310-HGA-DA1

(Joventa DM1.10)

Ordering Codes		Torque	Running Time	Damper Size	Control Signals	Supply Voltage (50/60Hz)
Johnson Controls	Joventa					
M9310-HGA-DA1	DM1.10	10 Nm	35 s	2 m <sup>2</sup>	ON/OFF, Floating, Proportional 0(2)...10 VDC / 0(4)...20 mA	24 VAC/DC

#### Accessories (order separately)

Ordering Codes	Description
M9300-140	Feedback Potentiometer 140 ohms
M9300-1k	Feedback Potentiometer 1k ohms
M9300-2k	Feedback Potentiometer 2k ohms
M9300-10k	Feedback Potentiometer 10k ohms
M9000-200	Commissioning Tool that provides a control signal to drive 24 V On/Off, Floating, Proportional, and Resistive Electric Actuators (quantity 1)
M9000-322	NEMA 4x Weathershield Kit for Damper Application of M9104, M9310-xxx-D, M9203, and M9208 Series Electric Actuators (quantity 1)
M9000-342	Weather Shield Kit for VG1000 Series Ball application of VA9104, M9310-xxx-V, VA9203, and VA9208 Series Electric Non-Spring Return Actuators (quantity 1)
M9000-400	Jackshaft Linkage Adapter Kit (quantity 1)
M9310-500	Ball Valve Linkage Kit for applying M9310-xxx-D Series Electric Actuators to VG1000 Series Valves (quantity 1)
M9000-561	Thermal Barrier Kit. Extends the VA9104, M9310-xxx-V, VA9203, and VA9208 Series Electric Non-Spring Return Actuators applications to include low pressure steam (quantity 1)
M9000-604	Replacement Anti-Rotation Bracket Kit for M9310, M9203, M9208, M9210, and M9220 Series Electric Actuators
M9000-606	Position Indicator for Damper Applications (quantity 5) M9300-2 Auxiliary Contact Kit
M9300-100	Threaded Conduit Adapters for 1/2 in. electrician's fittings
M9310-100	Remote Mounting Kit with Crankarm Kit (quantity 1)
M9310-600	Coupler

## HVAC CONTROL PRODUCTS

### Actuators

## Non Spring Return Damper Actuators

### M9100

(Joventa DAS-DMS / DA-DM / DAL-DML / DAG-DMG)

8, 16, 24 and 32 Nm, ON/OFF, Floating and Proportional Control

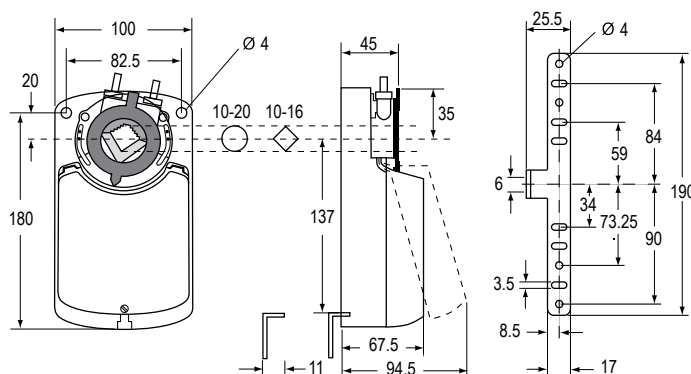
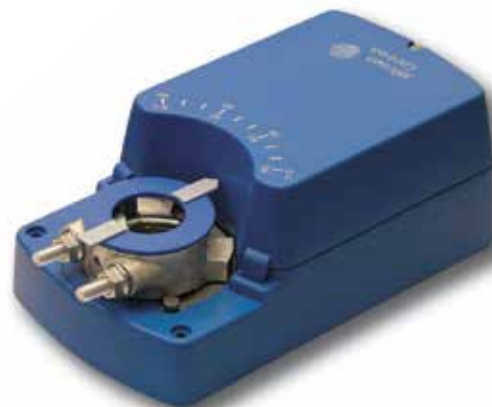
The M9100 Series Electric Actuators are direct-mount actuators. These bidirectional actuators do not require a damper linkage, and are easily installed on round shafts or square shafts using the standard shaft clamp included with the actuator.

A single M9100 Series Electric Non Spring Return Actuator provides 8, 16, 24 or 32 Nm torque depending on the model. Two integral line voltage auxiliary switches, available only on the M91xx-xxC models, indicate end stop position or performs switching functions within the selected rotation range.

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

#### Features

- Direct-Coupled Design
- Selectable direction of rotation
- Electronic Stall Detection
- Double-Insulated Construction
- Load independent
- Optional Integrated Auxiliary Switches
- Manufactured under International Standards Organization (ISO) 9001 Quality Control Standards



Dimensions in mm

## HVAC CONTROL PRODUCTS

### Actuators

#### Non Spring Return Damper Actuators

#### M9100

(Joventa DAS-DMS / DA-DM / DAL-DML / DAG-DMG)

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-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				---	---	100 ... 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				---	---	100 ... 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)

## HVAC CONTROL PRODUCTS

### Actuators

#### Non Spring Return Damper Actuators

##### M9100

(Joventa DAS-DMS / DA-DM / DAL-DML / DAG-DMG)

Ordering Codes		Running Time	Damper Size	Control Signals	2 x Auxiliary Contacts	Feedback Potentiometer	Supply Voltage (50/60Hz)
Johnson Controls	Joventa*						
24 Nm							
M9124-AGA-1N	DAL1	125 s	4.5 m <sup>2</sup>	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				---	---	100 ... 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 m <sup>2</sup>	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				---	---	100 ... 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-GDA-1N	DMG2.2			Proportional 0(2)...10 VDC	---	---	230 VAC
M9132-GDC-1N	DMG2.2S				●	---	
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)



## HVAC CONTROL PRODUCTS

### Actuators

## Spring Return Damper Actuators

### M9203

*(Joventa DxF1.03S-Z)*

3 Nm, ON/OFF, Floating and Proportional Control

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

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

A single M9203 Series Electric Spring Return Actuator provides 3 Nm running and spring return torque.

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

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

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

The series includes the following control options:

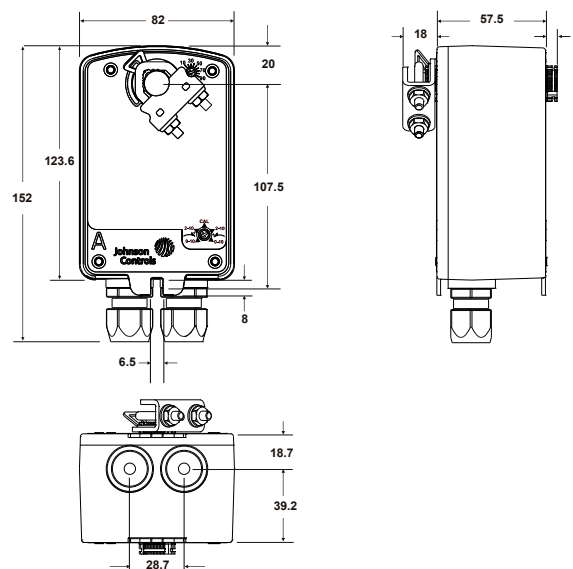
ON/OFF, 24 V, 100 to 240 VAC power

ON/OFF and Floating Point, 24 V power

Proportional, 24 V power, for 0(2) to 10 VDC or 0(4) to 20 mA Control Signal.

### Features

- 3 Nm Rated Torque
- Direct-Coupled Design
- Reversible Mounting
- Electronic Stall Detection
- Double-Insulated Construction
- Microprocessor-controlled Brushless DC Motor (-AGx and GGx types)
- External Mode Selection Switch (-AGx and -GGx types)
- Integral Cables with Colored and Numbered Conductors
- Optional Integrated Auxiliary Switch
- Override Control (Proportional Models Only)
- Manufactured under International Standards Organization (ISO) 9001 Quality Control Standards



Dimensions in mm



## HVAC CONTROL PRODUCTS

### Actuators

### Spring Return Damper Actuators

#### M9203

(Joventa DxF1.03S-Z)

Ordering Codes		
Johnson Controls	Joventa	Description
M9203-AGA-1	DBF1.03	3 Nm, 24 V AC/DC Floating and ON/OFF, 150 sec. running time
M9203-AGB-1	DBF1.03S	3 Nm, 24 V AC/DC Floating and ON/OFF, 150 sec. running time, 1 auxiliary switch
M9203-AGA-1Z	DBF1.03Z	3 Nm, 24 V AC/DC Floating and ON/OFF, 90 sec. running time
M9203-AGB-1Z	DBF1.03SZ	3 Nm, 24 V AC/DC Floating and ON/OFF, 90 sec. running time, 1 auxiliary switch
M9203-BGA-1	DAF1.03	3 Nm, 24 V AC/DC ON/OFF, 60 sec. running time
M9203-BGB-1	DAF1.03S	3 Nm, 24 V AC/DC ON/OFF, 60 sec. running time, 1 auxiliary switch
M9203-BUA-1	DAF2.03	3 Nm, 100-240 V AC ON/OFF, 60 sec. running time
M9203-BUB-1	DAF2.03S	3 Nm, 100-240 V AC ON/OFF, 60 sec. running time, 1 auxiliary switch
M9203-BUA-1Z	DAF2.03Z	3 Nm, 100-240 V AC ON/OFF, 27 sec. running time
M9203-BUB-1Z	DAF2.03SZ	3 Nm, 100-240 V AC ON/OFF, 27 sec. running time, 1 auxiliary switch
M9203-GGA-1	DMF1.03	3 Nm, 24 V AC/DC Proportional, 150 sec. running time
M9203-GGB-1	DMF1.03S	3 Nm, 24 V AC/DC Proportional, 150 sec. running time, 1 auxiliary switch
M9203-GGA-1Z	DMF1.03Z	3 Nm, 24 V AC/DC Proportional, 90 sec. running time
M9203-GGB-1Z	DMF1.03SZ	3 Nm, 24 V AC/DC Proportional, 90 sec. running time, 1 auxiliary switch

### Accessories (order separately)

Ordering Codes	Description
M9000-321	Weathershield Kit for Damper Application of M9203 and M9208 Series Electric Spring Return Actuators (quantity 1)
M9000-341	Weathershield Kit for VG1000 Series Ball Valve application of M(VA)9104, M(VA)9203, and M(VA)9208 Series Electric Spring Return Actuators (quantity 1)
M9000-400	Jackshaft Linkage Adapter Kit (quantity 1)
M9000-560	Ball Valve Linkage Kit for applying M9203, and M9208 Series Electric Actuators to VG1000 Series Valves (quantity 1)
M9000-561	Thermal Barrier Kit for M9000-560 Ball Valve Linkage. Extends M(VA)9104, M(VA)9203, and M(VA)9208 Series Electric Spring Return Actuators applications to include low pressure steam (quantity 1)
M9000-604	Replacement Anti-Rotation Bracket Kit for M9203, M9208, M9210, and M9220 Series Electric Spring Return Actuators (quantity 1)
M9000-606	Position Indicator for Damper Applications (quantity 5)
M9000-607	Position Indicator for VG1000 Series Ball Valve Applications (quantity 5)
M9203-100	Remote Mounting Kit with Crankarm Kit (quantity 1)
M9203-110	Universal Mounting Kit without Crankarm Kit (quantity 1)
M9203-115	Universal Mounting Kit with Crankarm Kit (quantity 1)
M9203-150	Crankarm Kit (quantity 1)
M9203-250	Remote Mounting Kit with Crankarm Kit and Damper Linkage for D1300 Dampers (quantity 1)
M9203-601	Replacement Standard Coupler Kit (with Retainer) for Mounting M9203 Series Electric Spring Return Actuators (quantity 1)
M9203-602	Replacement Retainer for M9203 Series Electric Spring Return Actuators (quantity 5)
M9203-603	Adjustable Stop Kit for M9203 Series Electric Spring Return Actuators (quantity 1)

## HVAC CONTROL PRODUCTS

### Actuators

## Spring Return Damper Actuators

### M9208-xxx-1

(Joventa DBF1.08 / DAFx.08 / DMF1.08)

8 Nm, ON/OFF, Floating and Proportional Control

The spring return electric damper-actuator series has been specially developed for the motorized operation of air dampers in air conditioning systems.

When the control signal is applied the actuator drives the damper to the operational position, while evenly tensioning the integrated spring. After a power failure the stored energy in the spring immediately brings the damper to the safety position.

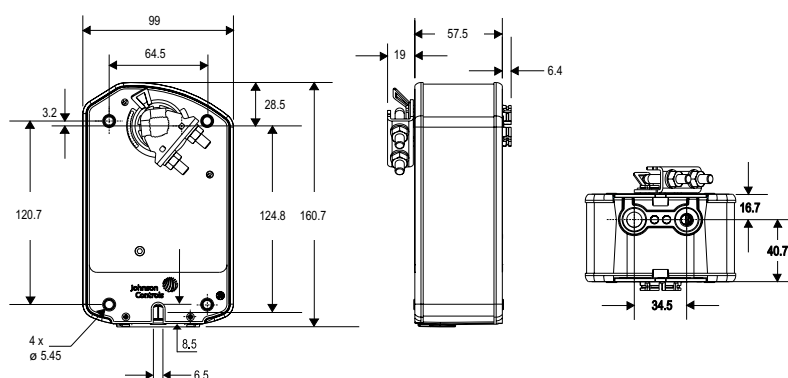
Manual operation is automatically cancelled when the actuator is in electrical operation.

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



### Features

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



Dimensions in mm

Ordering Codes		Torque	Running Time		Control Signals	2 x Auxiliary contacts	Supply Voltage (50/60Hz)
Johnson Controls	Joventa		Motor	Spring			
M9208-AGA-1	DBF1.08N	8 Nm	150 s	17...25 s	ON/OFF or Floating	---	24 VAC / 24 VDC
M9208-AGC-1	DBF1.08SN		55...71 s	13...26 s	ON/OFF	•	24 VAC
M9208-BGA-1	DAF1.08N					•	230 VAC
M9208-BGC-1	DAF1.08SN					•	24 VAC / 24 VDC
M9208-BDA-1	DAF2.08N		55...71 s	13...26 s	ON/OFF	•	24 VAC / 24 VDC
M9208-BDC-1	DAF2.08SN		55...71 s			•	24 VAC / 24 VDC
M9208-GGA-1	DMF1.08N		150 s	17...25 s	Proportional 0...10 VDC	---	24 VAC / 24 VDC
M9208-GGC-1	DMF1.08SN		150 s	17...25 s	Proportional 2...10 VDC	•	24 VAC / 24 VDC

## HVAC CONTROL PRODUCTS

### Actuators

## Spring Return Damper Actuators

### M9220-xxx-1

(Joventa DAFx.20 / DBF1.20 / DMF1.20)

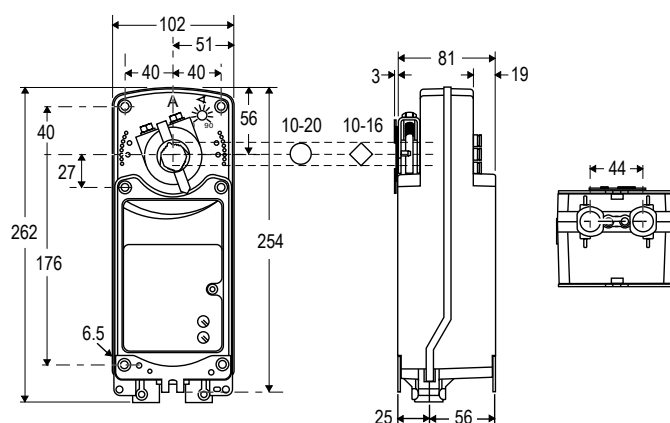
20 Nm, ON/OFF, Floating and Proportional Control

The M9220 Series Actuators are direct mount, spring return electric that provide reliable control of dampers and valves in Heating, Ventilating, and Air Conditioning (HVAC) systems.

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

#### Features

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



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				
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						---	
M9220-BGC-1	DAF1.20S						●	
M9220-GGA-1	DMF1.20						---	
M9220-GGC-1	DMF1.20S		●					
M9220-HGA-1	DHF1.20		150 s	26 s		Proportional 0(2)...10 VDC	---	
M9220-HGC-1	DHF1.20S				Proportional 0(2)...10 VDC with Span offset	●		

## HVAC CONTROL PRODUCTS

### Actuators

## Safety Damper Actuators

### S9208-BxC-33x

(Joventa SAFx.08Sx/12)

8 Nm, ON/OFF Control

The S9208 Security Fire electric, Spring Return damper actuator series has been specially developed for the motorized operation of fire protection dampers.

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

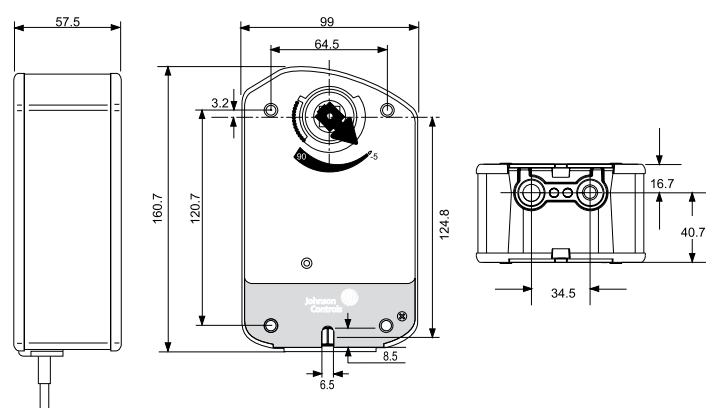
After a power failure the stored energy in the spring immediately brings the damper to the safety position.

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



### Features

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



Dimensions in mm

Ordering Codes		Supply Voltage (50-60Hz)	Description
Johnson Controls	Joventa		
S9208-BGC-33	SAF1.08S/12	24 VAC / VDC	Without sensor
S9208-BGC-33A	SAF1.08SA/12		With ambient thermosensor
S9208-BGC-33B	SAF1.08SB/12		With duct sensor
S9208-BGC-33C	SAF1.08SC/12		With duct and ambient sensors
S9208-BDC-33	SAF2.08S/12	230 VAC	Without sensor
S9208-BDC-33A	SAF2.08SA/12		With ambient thermosensor
S9208-BDC-33B	SAF2.08SB/12		With duct sensor
S9208-BDC-33C	SAF2.08SC/12		With duct and ambient sensors

## HVAC CONTROL PRODUCTS

### Actuators

## Pneumatic Valve Actuators

### MP8000

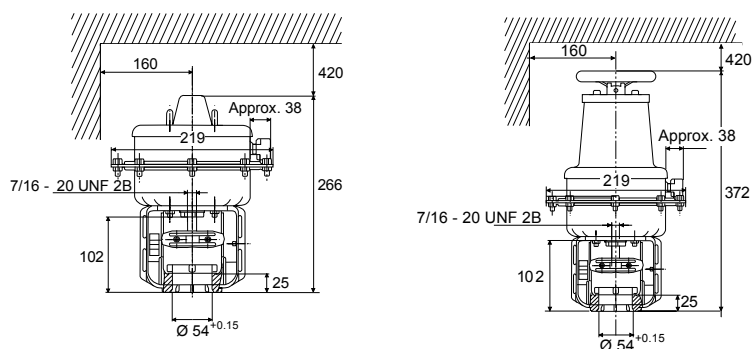
The MP8000 series pneumatic valve-actuators are designed to accurately position valve plugs in larger chilled water, hot water and steam applications in response to a pneumatic signal from a controller. A pneumatic positioner is also available for use in applications where sequential operation is desired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

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



#### Features

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



Dimensions in mm

Ordering Codes	Positioner and hand wheel
<b>MP822C50-20</b>	None
<b>MP822C60-20</b>	DA positioner
<b>MP822C70-20</b>	DA positioner and hand wheel
<b>MP822C80-20</b>	Hand wheel
<b>MP832C50-20</b>	None
<b>MP832C60-20</b>	DA positioner
<b>MP832C70-20</b>	DA positioner and hand wheel
<b>MP832C80-20</b>	Hand wheel

## HVAC CONTROL PRODUCTS

### Actuators

## Pneumatic Valve Actuators

### PA-2000

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

The actuator can be combined with VG8000 and VG8300 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.

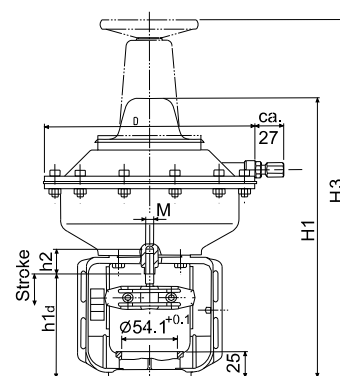
#### Features

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

Ordering Codes*	Handwheel	Spring Range	Diaphragm Area	Stroke
PA-20x0-32y2	---	20 - 50 kPa	150 cm <sup>2</sup>	13 mm
PA-21x0-32y7	●	70 - 100 kPa		
PA-20x0-33y2	---	20 - 50 kPa	300 cm <sup>2</sup>	25 mm
PA-21x0-33y7	●	70 - 100 kPa		
PA-20x0-36y2	---	20 - 50 kPa	600 cm <sup>2</sup>	42 mm
PA-21x0-36y7	●	70 - 100 kPa		25 mm
PA-20x0-37y2	---	20 - 50 kPa		
PA-21x0-37y7	●	70 - 100 kPa		

#### Notes

- \* = **x:** 0 = Without Positioner  
3 = With Positioner (PR10)
- y:** 1 = DA Actuator stem extends  
2 = RA Actuator stem retracts



Dimensions in mm

## Carbon Dioxide

### CD-2xx-E00-00

Wall Mount - CO<sub>2</sub> and Temperature Transmitter

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

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

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

This compact wall-mounted device produces 0 to 10 V or 4 to 20 mA signals.

It is designed to work:

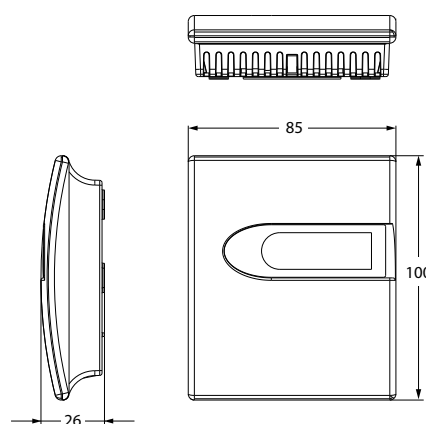
- in stand-alone mode
- as part of any integrated Building Automation System (BAS)

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



#### Features

- Power Supply 15...35 VDC / 24 VAC
- 0...10 V or 4...20 mA CO<sub>2</sub> and Temperature Output
- Models with Display
- Snap-on Enclosure
- Outstanding long-term stability
- CO<sub>2</sub> Factory Calibration Certificate



Dimensions in mm

Ordering Code	CO <sub>2</sub> Output	CO <sub>2</sub> Working Range	Temperature Output	Temperature Working Range	Display	Calibration Certificate
CD-200-E00-00	0...10V	0...2000 ppm	0...10V	0...50 °C	---	●
CD-201-E00-00					●	●
CD-220-E00-00	4...20mA		4...20mA		---	●
CD-221-E00-00					●	●



## HVAC CONTROL PRODUCTS

### Sensors

## Carbon Dioxide

### CD-3xx-E00-00

*Wall Mount - CO<sub>2</sub>, Relative Humidity and Temperature Transmitter*

The CD-3xx-E00-00 series is a wall mount transmitter for measuring the CO<sub>2</sub> levels, the relevant humidity and the temperature within Heating, Ventilation and Air Conditioning (HVAC) applications.

The CD-3xx Series incorporates a single beam dual wavelength NDIR CO<sub>2</sub> sensor, which compensates for ageing effects, is highly insensitive to pollution and offers outstanding long term stability.

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

It is designed to work:

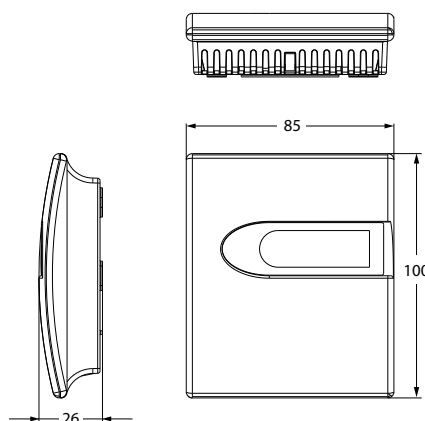
- in stand-alone mode
- as part of any integrated Building Automation System (BAS)

This new CO<sub>2</sub> transmitter is easy to install and requires no maintenance or field calibration.



### Features

- Power Supply 15...35 VDC / 24 VAC
- 0...10 V CO<sub>2</sub> and Relative Humidity Output
- 0...10 V and Pt1000 Temperature Output on the same device
- Models with Display
- Snap-on Enclosure
- Outstanding long-term stability
- CO<sub>2</sub> Factory Calibration Certificate



Dimensions in mm

Item Code	CO <sub>2</sub> Output	CO <sub>2</sub> Working Range	RH% Output	RH% Working Range	Temperature Output	Temperature Working Range	Display	Calibration Certificate
CD-310-E00-00	0...10V	0...2000 ppm	0...10V	10...90 % RH	0...10V and Pt 1000	0...50 °C (active model)	---	•
CD-311-E00-00							•	•



## HVAC CONTROL PRODUCTS

### Sensors

## Carbon Dioxide

### CD-Pxx

#### Duct Mount

The CD-Pxx series duct mount CO<sub>2</sub> sensors feature a carbon Dioxide (CO<sub>2</sub>) transmitter for measuring and transmitting CO<sub>2</sub> levels, ranging from 0 to 2,000 parts per million (ppm), within Heating Ventilating and Air Conditioning (HVAC) CO<sub>2</sub> applications.

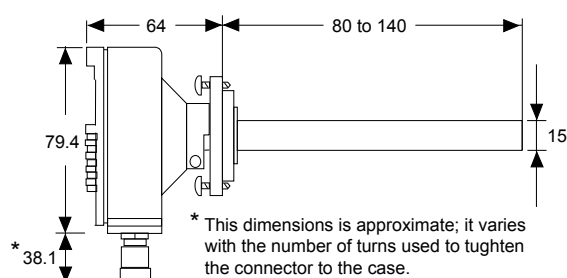
Specific HVAC CO<sub>2</sub> applications include Demand Control Ventilation (DCV), fresh air and indoor Air Quality (IAQ), and rooftop air handling economizer controls system.

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



#### Features

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



Dimensions in mm

Ordering Codes	Description
CD-P00-00-0	Duct mount CO <sub>2</sub> transmitter
CD-PR0-00-0	Duct mount CO <sub>2</sub> 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

## HVAC CONTROL PRODUCTS

### Sensors

## Dew Point

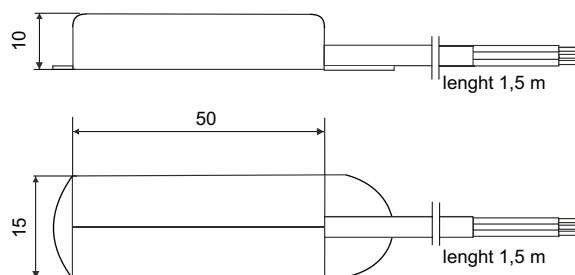
# HX-9100

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  $\pm$  10%
- Action: ON/OFF or 0...10 VDC
- Hysteresis: 1%
- Output: open collector closed: 0.5 VDC max or  $\leq$  + 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 $\pm$ 10%
HX-9100-9001	0...10 VDC	$\leq$ +0.5 VDC	

## HVAC CONTROL PRODUCTS

### Sensors

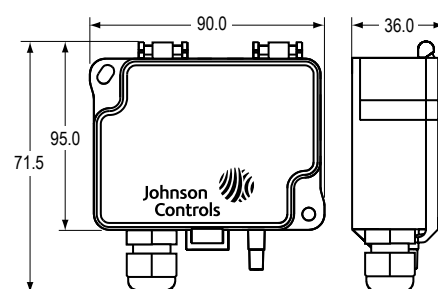
## Differential Pressure

### DP2500 – DP0250

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

#### Features

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



Dimensions in mm

Ordering Codes	Packaging	Operating Range (Pa)	Auto Zero	Display	Output Signal	Enclosure	Supply Voltage	Span Point Adjustment
DP2500-R8	Single	-100...+100 0...100 0...250 0...500 0...1000 0...1500 0...2000 0...2500	---	---	0...10 VDC or 4...20 mA	IP54	24 VAC / VDC	---
DP2500-R8-01	Bulk		●					
DP2500-R8-AZ	Single							
DP2500-R8-AZ-01	Bulk							
DP2500-R8-D	Single	---	●					
DP2500-R8-AZ-D								
DP0250-R8-AZ								
DP0250-R8-AZ-01	Bulk	●	---					
DP0250-R8-AZ-D	Single		●					
DP0250-R8-AZS			---					
DP0250-R8-AZ-DS			●					
			---					

## HVAC CONTROL PRODUCTS

### Sensors

## Plant Humidity

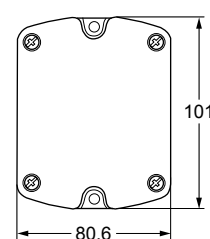
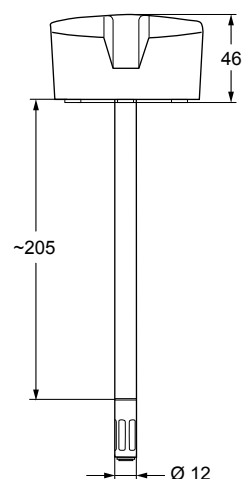
### HT-1300

#### Duct Mount

Specially designed for HVAC, the HT-1300 Duct Mount Humidity Sensor is a cost effective, highly accurate and reliable solution for measuring relative air humidity and temperature.

#### Features

- Power supply 15...35 VDC / 24 VAC  $\pm$ 20%
- Humidity range 0...100%
- Humidity output 0...10 VDC
- Humidity accuracy 2,5% from 10 to 95% RH
- Temperature outputs 0...10 VDC, Pt 1000
- Duct probes length 200 mm
- Protection class: IP65
- Inspection Certificate according EN 10204:2004



Dimensions in mm

Ordering Codes	Humidity Range	Humidity Output	Temperature Range	Temperature Output	Calibration Certificate	Supply Voltage
HT-1301-UD1	0 to 100% RH	0 to 10 VDC	-15...60 °C	0...10 VDC	•	15 to 35 VDC 24 VAC $\pm$ 20%
HT-1302-UD1			0...40 °C		•	
HT-1306-UD1			-15...60 °C	Pt1000 DIN A	•	

Available  
Soon

## HVAC CONTROL PRODUCTS

### Sensors

## Plant Temperature

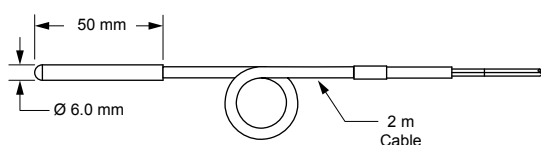
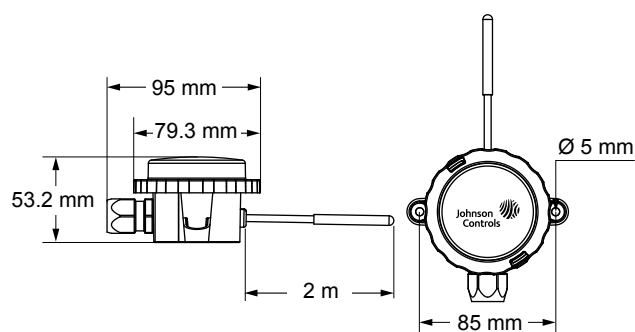
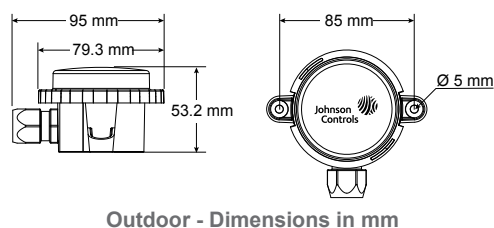
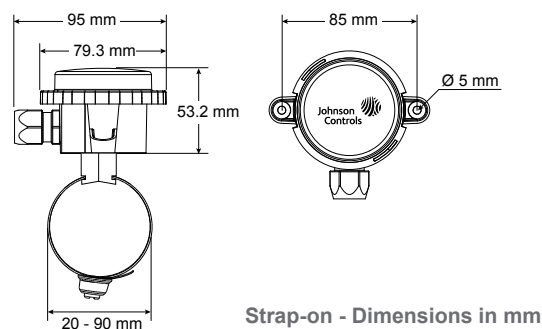
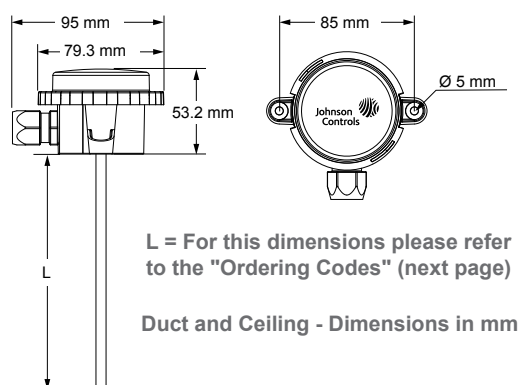
### TS-6300

The TS-6300 series temperature sensors provide a passive signal that corresponds to the air or water temperature in heating, ventilating and air conditioning applications.

They are passive resistive signal NTC K2, NTC K10, Pt100 or Pt1000 related to the sensed temperature. The TS-6300 temperature sensor series has been designed to work with Metasys and System91 field controllers.

#### Features

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



## HVAC CONTROL PRODUCTS

### Sensors

## Plant Temperature

### TS-6300

#### Ordering Codes

Ordering Codes	Output	Mounting Type	Lenght (mm)	Temperature Range
TS-6370D-A11	0...10VDC	Duct / Immersion	138 mm	-40...+50 °C
TS-6370D-B11			192 mm	
TS-6370D-C11			290 mm	
TS-6370D-D11			446 mm	
TS-6370D-A12			138 mm	-20...+40 °C
TS-6370D-B12			192 mm	
TS-6370D-C12			290 mm	
TS-6370D-D12			446 mm	
TS-6370D-A13			138 mm	0...+40 °C
TS-6370D-B13			192 mm	
TS-6370D-C13			290 mm	
TS-6370D-D13			446 mm	
TS-6370D-A14			138 mm	0...+100 °C
TS-6370D-B14			192 mm	
TS-6370D-C14			290 mm	
TS-6370D-D14			446 mm	
TS-6330D-A10	2K2 NTC	Duct / Immersion	138 mm	-40...+120 °C
TS-6330D-B10			192 mm	
TS-6330D-C10			290 mm	
TS-6330D-D10			446 mm	
TS-6340D-A10	10K NTC		138 mm	
TS-6340D-B10			192 mm	
TS-6340D-C10			290 mm	
TS-6340D-D10			446 mm	
TS-6350D-A10	Pt100		138 mm	
TS-6350D-B10			192 mm	
TS-6350D-C10			290 mm	
TS-6350D-D10			446 mm	
TS-6360D-A10	Pt1000		138 mm	
TS-6360D-B10			192 mm	
TS-6360D-C10			290 mm	
TS-6360D-D10			446 mm	
TS-6370R-F01	0...10VDC	Remote Sensor	2 m cable lenght	-40...+50 °C
TS-6370R-F03				0...+40 °C
TS-6370R-F04				0...+100 °C
TS-6330K-F00	2K2 NTC	Cable Sensor	2 m cable lenght	-40...+100 °C
TS-6340K-F00	10K NTC			
TS-6360K-F00	Pt1000			
TS-6370E-001	0...10VDC	Outdoor	---	-40...+50 °C
TS-6370E-002				-20...+40 °C
TS-6330E-000	2K2 NTC	Outdoor	---	-40...+70 °C
TS-6340E-000	10K NTC			
TS-6350E-000	Pt100			
TS-6360E-000	Pt1000			
TS-6370S-002	0...10VDC	Strap-on	---	-20...+40 °C
TS-6370S-004				0...+100 °C
TS-6330S-000	2K2 NTC	Strap-on	---	-40...+100 °C
TS-6340S-000	10K NTC			
TS-6350S-000	Pt100			
TS-6360S-000	Pt1000			
TS-6370C-E13	0...10VDC	Ceiling	36 mm	0...+40 °C
TS-6330C-E10	2K2 NTC	Ceiling	36 mm	-40...+70 °C
TS-6340C-E10	10K NTC			
TS-6350C-E10	Pt100			
TS-6360C-E10	Pt1000			

## HVAC CONTROL PRODUCTS

### Sensors

#### Plant Temperature

#### TS-6300

#### Accessories - Ordering Codes

Ordering Codes	Material	Mounting Thread	Lenght (mm)
TS-6300W-E200	Brass/Copper	R 1/2"	50
TS-6300W-F200			120
TS-6300W-G200			150
TS-6300W-H200			200
TS-6300W-I200			260
TS-6300W-E300	Stainless Steel	R 1/2"	50
TS-6300W-F300			120
TS-6300W-G300			150
TS-6300W-H300			200
TS-6300W-I300			260
TS-6300W-E400		G 1/2"	50
TS-6300W-F400			120
TS-6300W-G400			150
TS-6300W-H400			200
TS-6300W-I400			260
TS-6300D-000	Duct Flange Kit		
TS-6300W-900	Retrofitting Thermowell Adapter Kit		

## HVAC CONTROL PRODUCTS

### Sensors

## Pressure

### PT-5217

*Liquid or Air Pressure Transmitter*

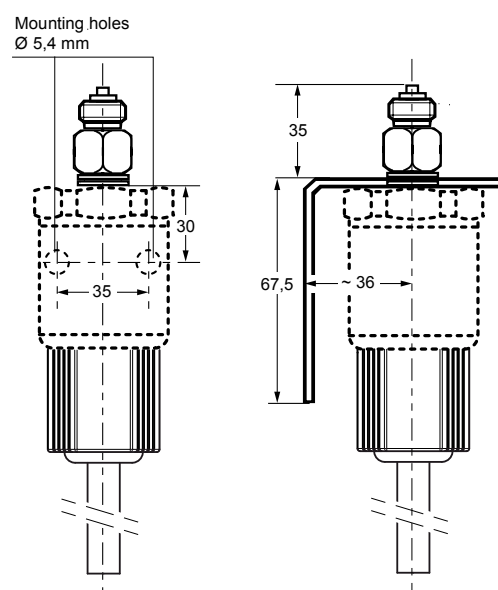
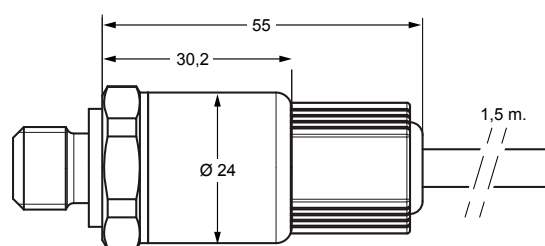
The PT-5217 pressure transmitter accurately measures pressure and converts the measurement into a standard proportional 0...10 V signal.

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

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

#### Features

- Compact, rugged construction
- Negligible temperature influence on accuracy
- Low hysteresis
- High accuracy
- Direct mounting, 1,5 m cable included
- Splash proof enclosure



Dimensions in mm

Ordering Codes	Operating Range	Enclosure	Supply Voltage
PT-5217-7011	0...100 kPa	IP67	24 VAC +15% / -15%, 50/60 Hz or 12...33 VDC, < 7 mA
PT-5217-7101	0...1000 kPa		

#### Accessories (order separately)

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



## HVAC CONTROL PRODUCTS

### Sensors

## Room Humidity

### HT-1000

#### Wall Mount

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

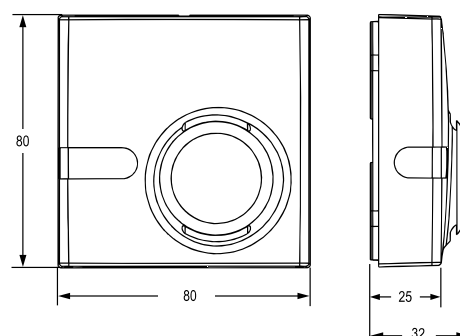
It features a polymer capacitance humidity sensing element and provides within either  $\pm 2\%$  or  $\pm 4\%$  accuracy a voltage output signal proportional 0 to 100% relative humidity.

The HT-1000 series room humidity sensors are designed for use with Johnson Controls System 91 and Facility Explorer controllers or for other systems having compatible input and output voltages.



#### Features

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



Dimensions in mm

Ordering Codes	Humidity Range	Humidity Output	Humidity Accuracy	Temperature Range	Temperature Output	Supply Voltage
HT-1201-UR	0...100% RH	0...10 VDC	$\pm 2\%$	0...40°C	0...10 VDC	12 to 30 VDC 24 VAC $\pm 15\%$
HT-1300-UR			$\pm 4\%$	---	---	
HT-1301-UR				0...40°C	0...10 VDC	
HT-1303-UR					NTC K2	
HT-1306-UR				0...60°C	Pt1000	

## HVAC CONTROL PRODUCTS

### Sensors

## Room Temperature

### RS-1100

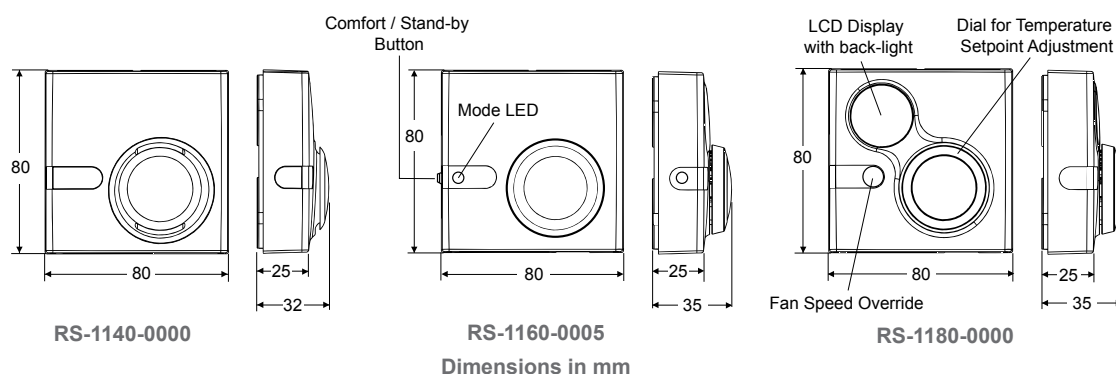
#### Room Command Module

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.

#### Features

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



Ordering Codes	Temperature Output	LCD Display	Setpoint Dial Scale	Temporary Occupancy Override Function	Fan speed Override
RS-1140-0000	0...10 VDC	---	---	---	---
RS-1160-0000		---	12...28 °C	Pushbutton	---
RS-1160-0005		---	+/-		---
RS-1180-0000		●	12...28 °C	Integrated	---
RS-1180-0005		●	+/-		---
RS-1190-0000		---	12...28 °C	---	---
RS-1190-0005		---	+/-		---
RS-1180-0002		●	12...28 °C	Integrated	●
RS-1180-0007		●	+/-	Integrated	●

#### Accessories (order separately)

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

## HVAC CONTROL PRODUCTS

### Sensors

## Room Temperature

### TE-7000

#### 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.

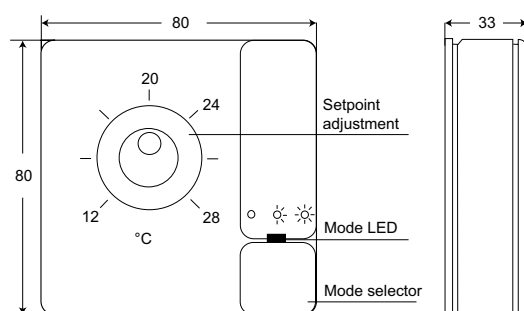
If the VAV controller is not already in occupied mode, as shown by the LED indicator, the occupant may press the occupancy button to obtain comfort control for a set period of time, normally defaulted to one hour.

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.



#### Features

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



Dimensions in mm

Ordering Codes	Color	Setpoint Dial Range
<b>TE-7000-8002</b>	Off-White / Gray Base	12 to 28 °C
<b>TE-7000-8002-W</b>	White / White Base	
<b>TE-7000-8003</b>	Off-White / Gray Base	-3 to +3 K
<b>TE-7000-8003-W</b>	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
<b>TE-7000-8900</b>	Service tool connector cable (1.5 m) (for use with IU-9100 converter)
<b>TM-9100-8900</b>	Special tool (to open module)
<b>TM-9100-8901</b>	Dial-Stop screws kit (bag of 100 self-tapping screws)
<b>TM-9100-8902</b>	Serrated knob kit (bag of 10 knobs) - Off-white
<b>TM-9100-8902-W</b>	Serrated knob kit (bag of 10 knobs) - white

## HVAC CONTROL PRODUCTS

### Sensors

## Room Temperature

### TM-1100

#### Room Command Module

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

The setpoint dial enables the room occupant to adjust the working set point of the controller within the range of 12...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.

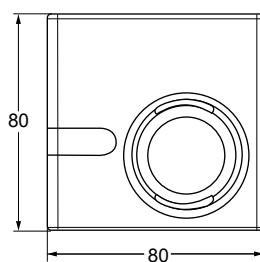
A LED indicator shows the current operating mode.

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

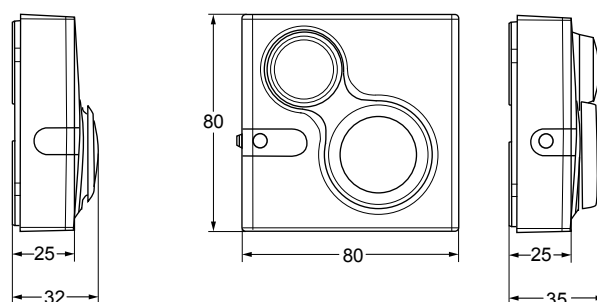


#### Features

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



TM-1140-0000



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		12-28°C		•
TM-1160-0000		+/-		
TM-1160-0005		12-28°C		
TM-1160-0002		12-28°C		
TM-1160-0007	Without	+/-	3-Speed Fan Override	
TM-1170-0005			---	
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

## HVAC CONTROL PRODUCTS

### Sensors

## Room Temperature

### TM-2100

#### Room Command Module

The TM-2100 series of room command modules are designed for use with the FCC and Facility Explorer series of DDC terminal unit controllers. The setpoint dial enables the room occupant to adjust the working set point of the controller within the range of 12...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.

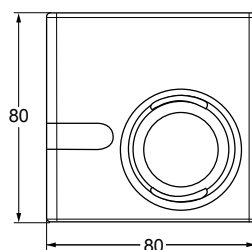
A LED indicator shows the current operating mode.

A Room Command Module with a 3-speed fan override adjuster is available.

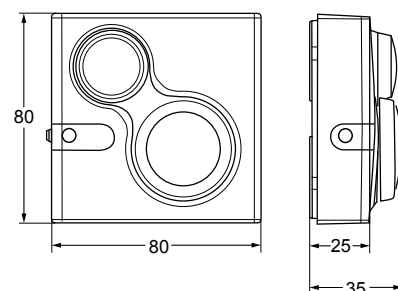


#### Features

- Passive Sensor
- NTC 10K Temperature Output
- Remote Temperature Setpoint adjustment
- 3-speed fan override
- Occupancy override button
- Room enclosures 80 x 80 mm
- Protection class: IP30



TM-2140-0000



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		+/-		
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

## HVAC CONTROL PRODUCTS

### Sensors

## Room Temperature

### TM-3100

#### Room Command Module

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

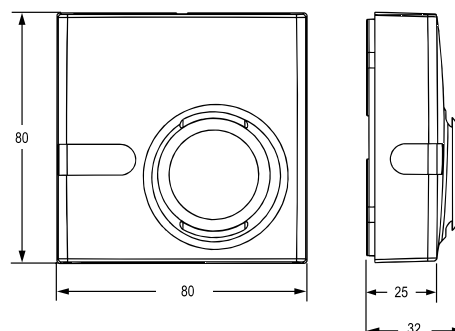
The TM-3100 is equipped with a Pt1000 class A sensing element and provides an output proportional signal to the measured ambient temperature.

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



#### Features

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



Dimensions in mm

Ordering Codes	Built-in Sensing Element	Temperature Setpoint Dial Scale	Fan Speed Override	Occupancy Button
TM-3140-0000	Pt 1000	---	---	---

#### Accessories (order separately)

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

## HVAC CONTROL PRODUCTS

### Sensors

## Room Temperature

### NS

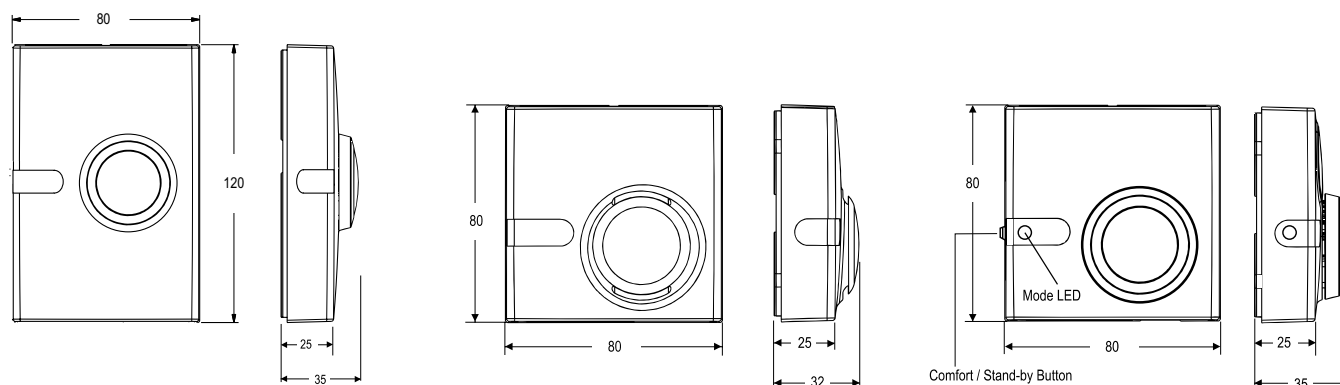
#### Network Room Command Module

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

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

#### Features

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



Dimensions in mm

## HVAC CONTROL PRODUCTS

### Sensors

#### Room Temperature NS

#### Selection Charts - Network Zone Sensor Ordering Information

##### Surface Mounted - Temperature Only Models

Ordering Codes	LCD Display	Temperature Adjustment: Setpoint (Set) or Warmer/Cooler Dial (W/C)	Occupancy Override Button	PIR Occupancy Sensor	F/C Scale Toggle	Fan Control	Screw Terminals (ST) or Modular Jack (MJ)	Address Switches	VAV Balancing Feature
Size - Height x Width (mm): 80 x 80									
NS-ATA7001-0	•	Set	•	---	---	---	MJ	---	---
NS-ATA7002-0	•	Set	•	---	---	---	ST	---	---
NS-ATA7003-0	•	Set	•	---	---	---	ST	•	---
NS-ATB7001-0	•	Set	•	---	•	---	MJ	---	---
NS-ATB7002-0	•	Set	•	---	•	---	ST	---	---
NS-ATB7003-0	•	Set	•	---	•	---	ST	•	---
NS-ATC7001-0	•	Set	•	---	---	•	MJ	---	---
NS-ATC7002-0	•	Set	•	---	---	•	ST	---	---
NS-ATD7001-0	•	Set	•	---	•	•	MJ	---	---
NS-ATD7002-0	•	Set	•	---	•	•	ST	---	---
NS-ATF7001-0	•	W/C	•	---	•	---	MJ	---	---
NS-ATF7002-0	•	W/C	•	---	•	---	ST	---	---
NS-ATN7001-0	---	---	---	---	---	---	MJ	---	---
NS-ATN7001-2	---	---	---	---	---	---	MJ	---	---
NS-ATN7003-0	---	---	---	---	---	---	ST	•	---
NS-ATN7003-2	---	---	---	---	---	---	ST	•	---
NS-ATP7001-0	---	W/C	•	---	---	---	MJ	---	---
NS-ATP7001-2	---	W/C	•	---	---	---	MJ	---	---
NS-ATP7002-0	---	W/C	•	---	---	---	ST	---	---
NS-ATP7003-0	---	W/C	•	---	---	---	ST	•	---
NS-ATP7003-2	---	W/C	•	---	---	---	ST	•	---
NS-ATV7001-0	•	Set	•	---	•	---	MJ	•	•
NS-ATV7002-0	•	Set	•	---	•	---	ST	•	•
NS-ATV7003-0									
Size - Height x Width (mm): 120 x 80									
NS-MTB7001-0	•	Set	---	•	•	---	MJ	---	---
NS-MTB7002-0	•	Set	---	•	•	---	ST	---	---
NS-MTL7001-0	---	---	•	•	---	---	MJ	---	---
NS-MTL7002-0	---	---	•	•	---	---	ST	---	---

#### Handheld VAV Balancing Tool

Ordering Codes	Description
NS-ATV7003-0	Handheld VAV Balancing Tool



## HVAC CONTROL PRODUCTS

### Sensors

#### Room Temperature NS

#### Selection Charts - Network Zone Sensor Ordering Information

##### Surface Mounted - Temperature and Humidity Models without RH Display

Ordering Codes	LCD Display	RH Display	Humidity Element Accuracy	Temperature Adjustment: Setpoint (Set) or Warmer / Cooler Dial (W/C)	Occupancy Override Button	PIR Occupancy Sensor	F/C Scale Toggle	Screw Terminals (ST) or Modular Jack (MJ)	Address Switches
Size - Height x Width (mm): 80 x 80									
NS-AHA7001-0	•	---	3%	Set	•	---	---	MJ	---
NS-AHA7002-0	•	---	3%	Set	•	---	---	ST	---
NS-AHB7001-0	•	---	3%	Set	•	---	•	MJ	---
NS-AHB7002-0	•	---	3%	Set	•	---	•	ST	---
NS-AHB7003-0	•	---	3%	Set	•	---	•	ST	•
NS-AHN7001-0	---	---	3%	---	---	---	---	MJ	---
NS-AHN7001-2	---	---	3%	---	---	---	---	MJ	---
NS-AHP7001-0	---	---	3%	W/C	•	---	---	MJ	---
NS-APA7001-0	•	---	2%	Set	•	---	---	MJ	---
NS-APA7002-0	•	---	2%	Set	•	---	---	ST	---
NS-APB7001-0	•	---	2%	Set	•	---	•	MJ	---
NS-APB7002-0	•	---	2%	Set	•	---	•	ST	---
NS-APB7003-0	•	---	2%	Set	•	---	•	ST	•

#### Selection Charts - Network Zone Sensor Ordering Information

##### Surface Mounted - Temperature and Humidity Models with Temperature or RH Display (Field Selectable Default Display)

Ordering Codes	LCD Display	RH Display	Humidity Element Accuracy	Temperature Adjustment: Setpoint (Set) or Warmer / Cooler Dial (W/C)	Occupancy Override Button	PIR Occupancy Sensor	F/C Scale Toggle	Screw Terminals (ST) or Modular Jack (MJ)	Address Switches
Size - Height x Width (mm): 80 x 80									
NS-AHR7101-0	•	•	3%	Set	•	---	•	MJ	---
NS-AHR7102-0	•	•	3%	Set	•	---	•	ST	---
NS-AHR7103-0	•	•	3%	Set	•	---	•	ST	•
NS-APR7101-0	•	•	2%	Set	•	---	•	MJ	---
NS-APR7102-0	•	•	2%	Set	•	---	•	ST	---
Size - Height x Width (mm): 120 x 80									
NS-MHL7001-0	---	---	3%	---	•	•	---	MJ	---
NS-MHL7002-0	---	---	3%	---	•	•	---	ST	---

## HVAC CONTROL PRODUCTS

### Sensors

## Room Temperature

### NS

#### Selection Charts - Network Zone Sensor Ordering Information

##### Surface Mounted - Temperature and Humidity Models without RH Display

Ordering Code	CO <sub>2</sub> Measurement Range	Screw Terminals (ST) or Modular Jack (MJ)	Johnson Controls Logo	Sensor Addressing
Size - Height x Width (mm): 120 x 80				
NS-BCN7004-0	0 to 2,000 ppm	ST / MJ	•	DIP switch (212 to 219)
NS-BCN7004-2			---	DIP switch (212 to 219)

#### Selection Charts - Network Zone Sensor Ordering Information

##### Surface Mounted - Motion Detection Only Models (No Temperature or Humidity Sensing)

Ordering Codes	LCD Display	PIR Occupancy Sensor	Screw Terminals (ST) or Modular Jack (MJ)	Address Switches
Size - Height x Width (mm): 120 x 80				
NS-MNN7001-0	---	•	MJ	---
NS-MNN7003-0	---	•	ST	•

#### Network Discharge Air Sensor

Product Codes	Description
NS-DTN7043-0	102 mm probe length, Screw terminal, Address switches
NS-DTN7083-0	203 mm probe length, Screw terminal, Address switches

#### Network Sensor Flush-Mount Temperature Only

Product Codes	Faceplate Dimensions (H x W)	Mounting	LCD Display	Temperature Measurement Range	Johnson Controls Logo	Terminations	Sensor Addressing
NS-FTN7003-0	114 x 70 mm	Flush-Mount	---	0°C to 40°C	•	Screw Terminal Block	DIP Switch (200 to 203)
NS-FTN7003-2					---		

## HVAC CONTROL PRODUCTS

### Sensors

## Wireless Room Sensor

### WRS

#### Proprietary Wireless Protocol

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.

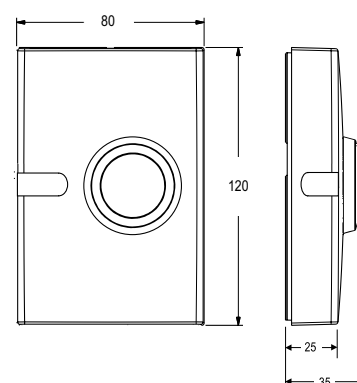
The receivers collect wireless temperature, zone, and battery-condition data messages and route that data over Ethernet to a Network Automation Engine (NAE) or a Network Control Engine (NCE).

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.

#### 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



Dimensions in mm

Ordering Codes	Description	Transmission Power
<b>WRS-RTN0000-1</b>	Receiver for Many-to-One wireless room temperature sensing system, includes omnidirectional antenna	10 dBm (CE Mark)
<b>TE-7820-1</b>	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	
<b>TE-7830-1</b>	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.	
<b>WRS-TTP0000-1</b>	Wireless Room Temperature sensor, warmer/cooler (+/-) set point adjustment	
<b>WRS-TTR0000-1</b>	Wireless Room Temperature sensor, no set point adjustment	
<b>WRS-TTS0000-1</b>	Wireless Room Temperature sensor, set point adjustment scale: 13 to 29°C	

## HVAC CONTROL PRODUCTS

### Sensors

## Wireless Room Sensor

### WRZ

#### *ZigBee Wireless Protocol*

The WRZ Series Wireless Room Sensors are designed to sense room/zone temperature and transmit wireless temperature control data. Some models also sense and transmit relative humidity.

In a ZFR1800 Series Wireless Field Bus System application, the sensors communicate with FEC16 Series, FEC26 Series and VMA16 Series Controllers by means of the ZFR1811 Router.

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

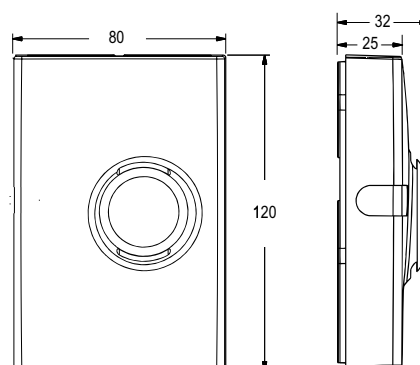
WRZ Series sensor models are available with or without a Liquid Crystal Display (LCD). Depending on the sensor model, the WRZ Series Sensor can transmit sensed temperature, setpoint temperature, sensed humidity, occupancy status & PIR occupancy sensor and low battery conditions to an associated router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

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

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

#### Features

- Wireless RF Design
- Integral Wireless Signal Strength Testing Built into the Sensor
- Easy Installation and Relocation
- Easily-Applicable Data Types
- Simple, Field Adjustable DIP Switches
- Optional, Battery-Powered WRZ-SST-110 Wireless System Survey Tool
- High Resistance to RF Interference from Other Radio Devices or RF Noise Sources
- User Selectable Default Display for Humidity Models
- Display Models
- Three Temperature Setpoint Range Options



Dimensions in mm

## HVAC CONTROL PRODUCTS

### Sensors

#### Wireless Room Sensor

#### WRZ

Product Codes	Description
<b>WRZ-THB0000-0</b>	Wireless Room Temperature and Humidity Sensor with Display, Warmer/Cooler (+/-) Setpoint Adjustment or Setpoint Adjustment Scale: 13 to 27°C, F/C Button, Relative Humidity (RH) Button, and Manual Occupancy Override Button
<b>WRZ-THN0000-0</b>	Wireless Room Temperature and Humidity Sensor with Battery Level/Signal Strength LED and Manual Occupancy Override Button
<b>WRZ-THP0000-0</b>	Wireless Room Temperature and Humidity Sensor with Warmer/Cooler (+/-) Setpoint Adjustment and Manual Occupancy Override Button
<b>WRZ-TTB0000-0</b>	Wireless Room Temperature Sensor with Display, F/C Button, and Manual Occupancy Override Button
<b>WRZ-TTD0000-0</b>	Wireless Room Temperature Sensor with Display, F/C Button, Fan Speed Control, and Manual Occupancy Override Button
<b>WRZ-TTP0000-0</b>	Wireless Room Temperature Sensor with Warmer/Cooler (+/-) Setpoint Adjustment, Battery Level/Signal Strength LED and Manual Occupancy Override Button
<b>WRZ-TTR0000-0</b>	Wireless Room Temperature Sensor with Battery Level/Signal Strength LED, Manual Occupancy Override Button and No Setpoint Adjustment
<b>WRZ-TTS0000-0</b>	Wireless Room Temperature Sensor with Setpoint Adjustment Scale: 55 to 80°F (13 to 27°C), Battery Level/Signal Strength LED and Manual Occupancy Override Button
<b>WRZ-MNN0100-0</b>	Wireless Zigbee™ Sensor, Occupancy (PIR)
<b>WRZ-MTN0100-0</b>	Wireless Zigbee™ Sensor, Occupancy (PIR), Temperature, no Display
<b>WRZ-MHN0100-0</b>	Wireless Zigbee™ Sensor, Occupancy (PIR), Temperature, 3% Relative Humidity, no Display
<b>WRZ-MTB0100-0</b>	Wireless Sensor, Occupancy (PIR), Temperature, Display, Warmer/Cooler Dial, Fahrenheit/Celsius Pushbutton, Occupancy Override
<b>WRZ-SST-120</b>	Wireless System Survey Tool

#### WRZ Sensor Model Comparison

Sensor Model	Temperature	3% Humidity	Display	F/C Button	Fan Control	Occupancy Override	PIR Occupancy Sensor	Setpoint Adjustment Dial*
<b>WRZ-THB0000-0</b>	•	•	•	•	---	•	---	CONFIG
<b>WRZ-THN0000-0</b>	•	•	---	---	---	•	---	NO DIAL
<b>WRZ-THP0000-0</b>	•	•	---	---	---	•	---	W/C
<b>WRZ-TTB0000-0</b>	•	---	•	•	---	•	---	CONFIG
<b>WRZ-TTD0000-0</b>	•	---	•	•	•	•	---	CONFIG
<b>WRZ-TTP0000-0</b>	•	---	---	---	---	•	---	W/C
<b>WRZ-TTR0000-0</b>	•	---	---	---	---	•	---	NO DIAL
<b>WRZ-TTS0000-0</b>	•	---	---	---	---	•	---	SCALED
<b>WRZ-MNN0100-0</b>	---	---	---	---	---	---	•	NO DIAL
<b>WRZ-MTN0100-0</b>	•	---	---	---	---	---	•	NO DIAL
<b>WRZ-MHN0100-0</b>	•	•	---	---	---	---	•	NO DIAL
<b>WRZ-MTB0100-0</b>	•	---	•	•	---	•	•	W/C

**Note**

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

## HVAC CONTROL PRODUCTS

### Thermostats

## Electric Fan Coil Thermostat

### T125-E

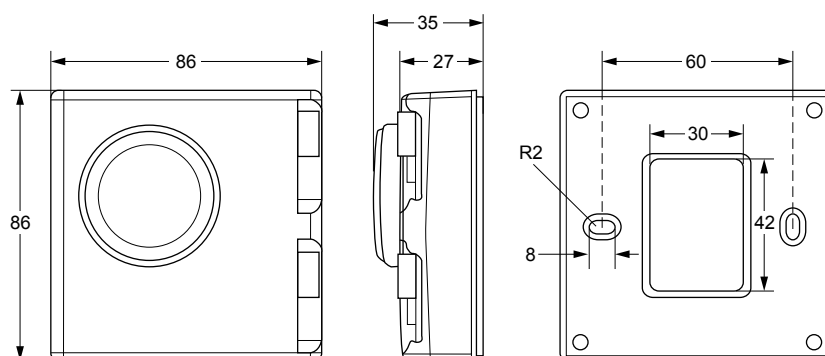
#### Analog Fan Coil Thermostats

T125 Electric Fan Coil Thermostats are designed to control heating, cooling, or air conditioning unit in Commercial, Industrial and Residential Installation.

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

#### Features

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



Dimensions in mm

Ordering Codes	Built-in NTC	Setpoint Range	2 pipes (Heating or Cooling)	4 pipes (Heating and Cooling)	Outputs	
					PAT	On/Off
T125BAC-JS0-E	•	10...30 °C	•	---	•	•
T125FAC-JS0-E			---	•	---	•

## HVAC CONTROL PRODUCTS

### Thermostats

## Electric Fan Coil Thermostat

### T5200-E

#### LCD Digital Fan Coil Thermostats

T5200-E LCD Digital Fan Coil Thermostats are designed to control heating, cooling, or year round air conditioning unit in Commercial, Industrial and Residential Installation. Typical Application includes the control of fan coil units, packaged terminal airconditioners and combination heating and cooling equipment. As part of the system that consists of a two-way or three-way valve and a multi-speed line voltage fan. These aesthetic design thermostat features with Backlit Liquid Crystal Display (LCD); an attractive white color in a compact size complements any decor.

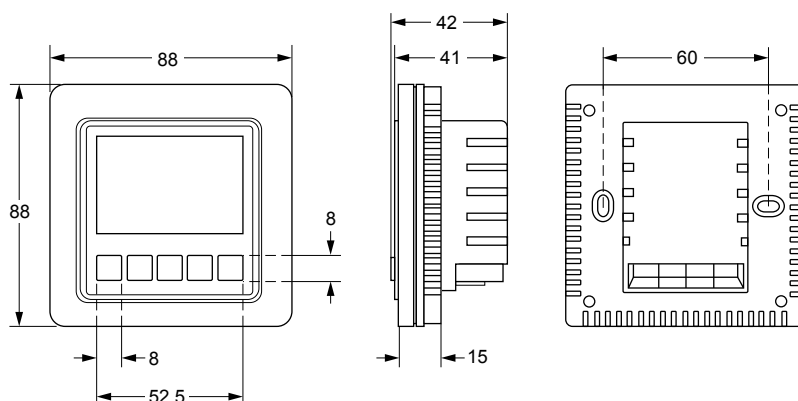
The thermostat does not require any battery backup as setpoint and other parameters are stored in nonvolatile memory.

The intuitive operation makes the thermostat very user-friendly.



#### Features

- 85...260 VAC power supply
- Heating and Cooling mode
- 2-4 pipes configuration
- 3-speed fan override
- 88 x 88 mm room enclosures
- Setpoint Temperature 10...30 °C
- °C & °F Changeable
- Relay output max. 5A
- Occupancy Mode



Dimensions in mm

Ordering Codes	Built-in NTC	Occupancy Mode	Setpoint Range	2 pipes (Heating or Cooling)	4 pipes (Heating and Cooling)	Outputs	
						PAT	On/Off
T5200-TB-9JS0-E	•	•	10...30°C	•	---	•	•
T5200-TF-9JS0-E		---		---	•	---	•

## HVAC CONTROL PRODUCTS

### Thermostats

## Electric Fan Coil Thermostat

### T8200

#### Touch Screen Thermostats





T8200-Txx0-9JS0/9JR0 Touch Screen Thermostats, are designed to control heating and cooling through air conditioning unit in Commercial, Industrial and Residential Installation.

Typical applications include the control of fan coil units, packaged terminal air conditioners and combination of heating and cooling equipment. As part of the system, T8000 controls a two-way or three-way valve and a multi-speed line voltage fan.

T8000 features with large LCD screen display, and displays the status of work mode (cooling / floor, heating / heating / floor, heating & heating / air venting), fan speed, indoor temperature and set temperature etc..

Capacitance touch screen enhances the fluency on operation.

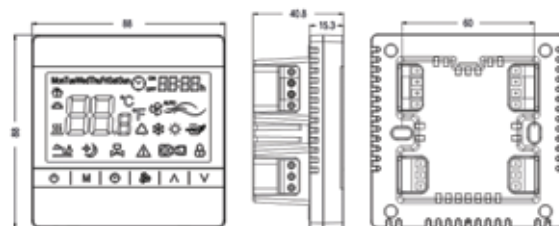
Keypad includes: Power on/off  Mode selection ,

Fan Speed Selection , Clock/Timer  and two Adjustment buttons  & .

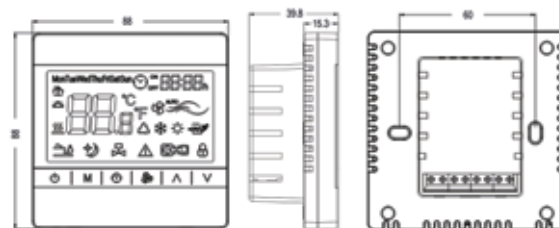


#### Features

- Touch screen
- Backlit Liquid Crystal Display (LCD)
- 6 Function Keys
- Appearance
- Energy Saving
- Installation, Service and Maintenance



T8200-TF20-9JR0 / T8200-TF20-9JS0



Dimensions in mm

Ordering Codes	Built-in NTC	Occupancy Mode	Setpoint Range	2 pipes (Heating or Cooling)	4 pipes (Heating and Cooling)	On/Off
T8200-TBE0-9JR0	•	---	5...35 °C	•	---	•
T8200-TBE0-9JS0	•	•		•	---	•
T8200-TFE0-9JR0	•	---		---	•	•
T8200-TFE0-9JS0	•	•		---	•	•



## Programmable Networked

### TEC2000

#### Room Thermostats

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.

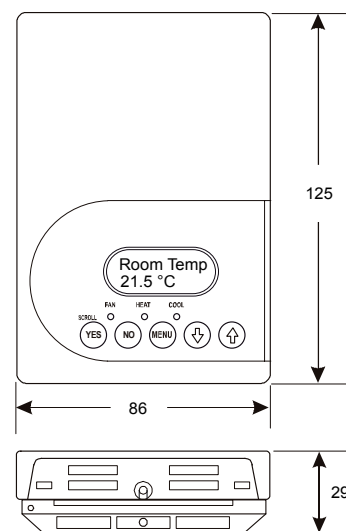
The TEC2x45, TEC2xx6 and TEC2xx7 series controllers are available for commercial and hospitality applications, including cabinet unit heaters, perimeter heating/cooling, zoning and fan coil units.

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 thermostat 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

## HVAC CONTROL PRODUCTS

### Thermostats

#### Programmable Networked TEC2000

##### TEC2000 for BACnet® MS/TP Communication

Ordering Codes	Control Output	Onboard Occupancy Sensor	Dehumidification Capability	Application / Note
TEC2601-4+PIR	Single Stage	•	---	Fan Coil Units, Unit Heaters and Single-Stage Packaged Heating / Cooling Equipment
TEC2616-4	2 Outputs ON/OFF	---	---	Commercial Market
TEC2626-4	2 Outputs ON/OFF or Floating	---	---	
TEC2627-4		---	---	
TEC2636H-4+PIR		•	•	Hospitality Market
TEC2645-4	Two-Pipe Proportional 0...10 VDC	---	---	Control of Two-Pipe Fan Coils, Cabinet Unit Heaters, or Other Equipment Using a Proportional 0...10 VDC Control Input and One-Speed Fan Control
TEC2646-4	Two Proportional 0...10 VDC	---	---	Commercial Market
TEC2646H-4	Two Proportional 0...10 VDC	---	---	Hospitality Market
TEC2646H-4+PIR	Two Proportional 0...10 VDC	•	---	
TEC2647-4	Two Proportional 0...10 VDC	---	---	
TEC2656H-4	2 Outputs 0...10 VDC	---	---	Hospitality Market

##### for N2 Open Communication

Ordering Codes	Control Output	Onboard Occupancy Sensor	Dehumidification Capability	Application / Note
TEC2101-4	Single Stage	---	---	Unit Heaters and Single Stage Packaged Heating / Cooling Equipment
TEC2102-4	Heat Pump	---	---	Heat Pumps with up to 3 Heating / 2 Cooling
TEC2103-4	Multi Stage	---	---	Multi Stage Packaged Heating / Cooling Equipment
TEC2104-4	Multi Stage Economizer	---	---	Economizer Operation for Single and Multi Stage Unitary Rooftop Equipment
TEC2126-4	2 Outputs ON/OFF or Floating	---	---	Commercial Market
TEC2126H-4	2 Outputs ON/OFF or Floating	---	---	Hospitality Market
TEC2127-4	2 Outputs ON/OFF or Floating	---	---	
TEC2145-4	Two-Pipe Proportional 0...10 VDC	---	---	Cabinet Unit Heaters, or Other Equipment Using a Proportional 0...10 VDC Control Input and One-Speed Fan Control
TEC2146-4	Two Proportional 0...10 VDC	---	---	Commercial Market
TEC2146H-4+PIR	Two Proportional 0...10 VDC	•	---	Hospitality Market
TEC2147-4	Two Proportional 0...10 VDC	---	---	

## HVAC CONTROL PRODUCTS

### Thermostats

#### Programmable Networked TEC2000

##### *TEC2000 for LonWorks® Communication*

Ordering Codes	Control Output	Application / Note
TEC2227-4	2 Outputs ON/OFF or Floating	
TEC2247-4	Two Proportional 0...10 VDC	
TEC2261-4	Single stage	Unit Heaters and Single Stage Packaged Heating / Cooling Equipment Programmable

##### *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

## HVAC CONTROL PRODUCTS

### Thermostats

## Analog Room Controller

### TC-8900 – PM-8900

#### Room Thermostats

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

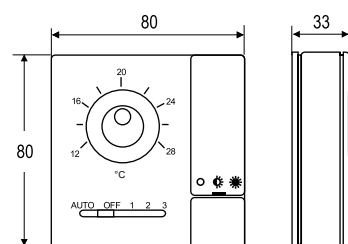
For applications without fan speed control the family includes stand alone units (TC-890x), local controllers (TC-893x) with remote setpoint module (ES-8930) and local controllers (TC-894x) with central setpoint module (ES-8940).

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



#### Features

- 2-pipe, 2-pipe with change-over, 2-pipe with electrical coil or 4-pipe configurations with and without 3-speed fan override
- 80 x 80 mm room enclosures
- Temperature dial ranges 12...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	---				0...40 °C	---	---	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	---	---	---	

## HVAC CONTROL PRODUCTS

### Thermostats

#### Analog Room Controller

#### TC-8900 - PM-8900

#### 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	

## Electronic Heating Controller

### ER65-DRW

*Digital Controller Hot Water and Air Unit*

The controller is a digital device for domestic or residential heating units.

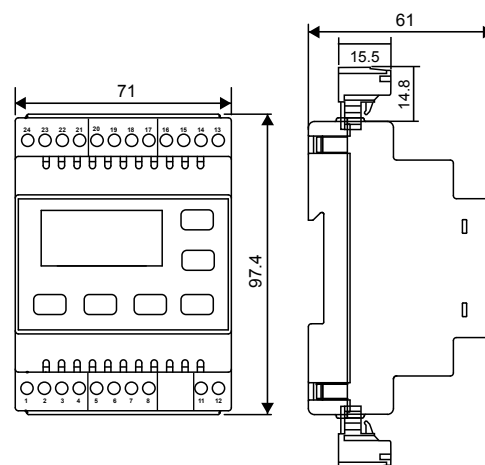
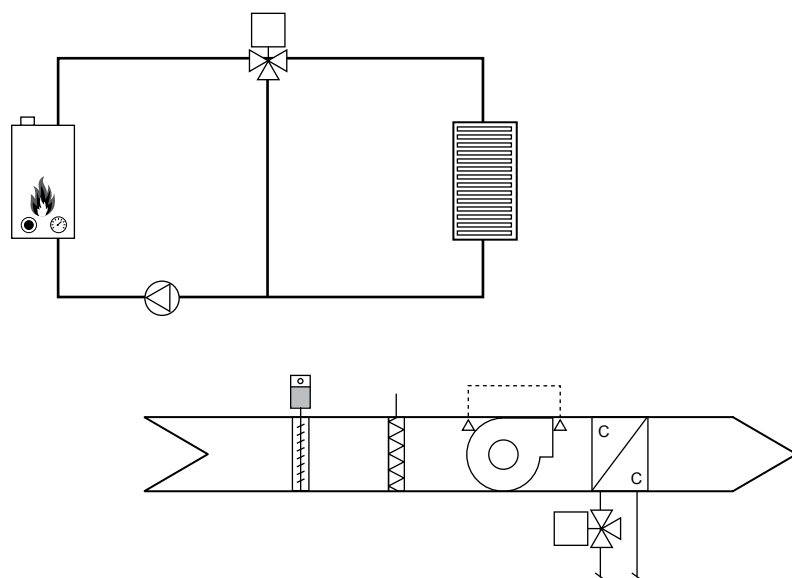
It covers water and air heating applications.

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

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

#### Features

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



Dimensions in mm

#### Ordering Code

Ordering Code	Description
ER65-DRW-501C	Heating controller, sensor not included, compatible with the ER-NTC sensor line, Modbus communication

## HVAC CONTROL PRODUCTS

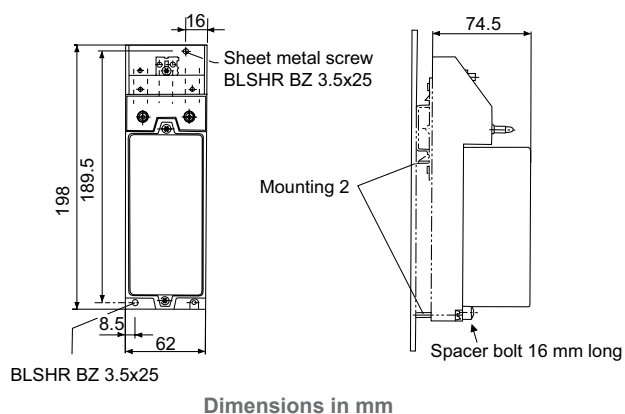
### Pneumatic and Transducers

## Electro-Pneumatic Transducers

### EP-1110

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

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



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

## HVAC CONTROL PRODUCTS

### Pneumatic and Transducers

## Electro-Pneumatic Transducers

### EP-2000

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

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

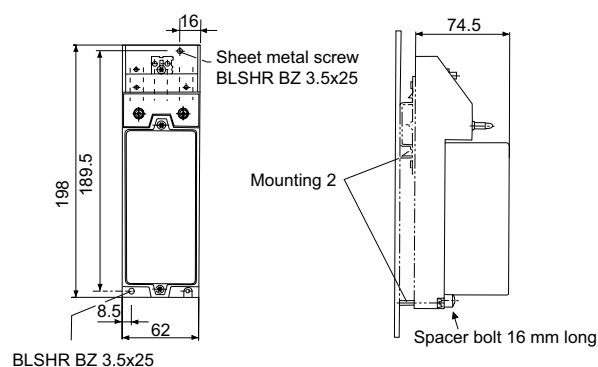
A reversible synchronous motor drives a cam disk over a gear box. The direction of travel of the cam disk is transformed by a leaf spring into a change of force, which by a pneumatic force comparison system is converted into a control pressure change.

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



#### Features

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



Dimensions in mm

Ordering Codes	Limit switch and 2 k $\Omega$ feedback potentiometer	Accessories	Voltage Supply (50/60 Hz)
EP-2000-7001	120 seconds	None	230 V
EP-2000-7004			24 V
EP-2000-7021		2 k $\Omega$ potentiometer	230 V
EP-2000-7024			24 V



## HVAC CONTROL PRODUCTS

### Pneumatic and Transducers

## Electro-Pneumatic Transducers

### EP-8000

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

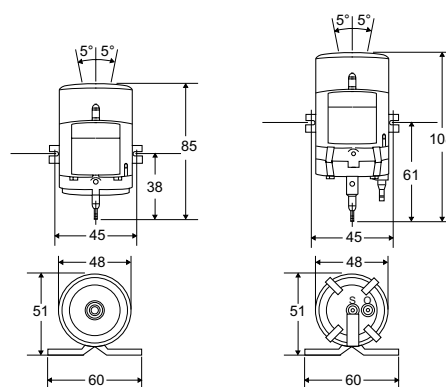
It is designed to output a proportional pneumatic control signal in response to an electronic control signal. All units feature barbed air connections for 5/32 or 1/4 inch O.D. polytubing.

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

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

#### Features

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



Dimensions in mm

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

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys®

### ADS-Lite

#### *Application and Data Server-Lite*

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

The Site Management Portal UI of the ADS-Lite provides flexible system navigation, user graphics, comprehensive alarm management, trend analysis, and summary reporting capabilities. With the Site Management Portal UI, you can efficiently manage occupant comfort and energy usage, quickly respond to critical events, and optimize control strategies. The ADS-Lite includes an Open Database Connectivity (ODBC) compliant database package for secure storage of historical and configuration data.

An optional interface called the Ready Access Portal UI provides an intuitive, task-based user experience designed for building tenants and other specialized users.

The Ready Access Portal UI is in the exit phase of its product life cycle. Ready Access Portal functionality will be available in the new mobile optimized Metasys UI.

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

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

#### Features

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



## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys® ADS-Lite

#### Ordering Information

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

#### Note

\* Availability: The ADS-Lite is available for purchase and use in Europe, Africa and Latin America. For information on the NIE29, NIE39, and NIE49, contact Johnson Controls® Systems Integration Services (SIS).  
Refer to ADS Lite Product Bulletin (LIT-12011690) for important product application information.

#### Technical Specifications

The following table lists by operating system the Microsoft® SQL Server® software editions that have been fully qualified by Johnson Controls for Release 7.0. You can select other combinations, but we recommend that you select from the following pairings.

#### Recommended Operating System and SQL Server Combinations

Operating System	Database Software			
	SQL Server 2014 Express (64-bit)	SQL Server 2012 Express SP2 (64-bit)	SQL Server 2008 Express R2 SP2 (64-bit)	SQL Server 2008 Express R2 SP2 (32-bit)
Windows® 8.1 Pro and Windows 8.1 Enterprise (64-bit)	•	•	•	---
Windows 8 Pro and Windows 8 Enterprise (64-bit)	•	•	•	---
Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit)	•	•	•	---
Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (32-bit)	---	---	---	•

#### Note

To use SQL Server 2014 with Metasys products, you must install Microsoft cumulative package 3 (KB2984923) for SQL Server 2014. To download the update package, visit <http://support.microsoft.com/kb/2984923/>.

## BAS SYSTEM SOFTWARE

### Supervisor Software and Tools

Metasys®

ADS-Lite

#### Application and Data Server-Lite System Requirements (5 Users)

<b>Recommended Computer Platform <sup>1</sup></b>	Intel Core I7 processor, 4 <sup>th</sup> generation or later 2 x 320 GB hard disk (RAID 1) <sup>2</sup> with 40 GB free space after installation of all prerequisite software and before installation of ADS-Lite software. Configure RAID 1 (mirroring) with disk write-caching turned on. DVD drive Graphics card (1 GB RAM, ATI® Technologies or NVIDIA® Corporation, 64-bit compatible [for 64-bit operating systems], Small Form Factor [SFF] if required) <sup>3</sup>
<b>Recommended Memory <sup>4</sup></b>	4 GB RAM (32-bit systems) 8 to 16 GB RAM (64-bit systems)
<b>Supported Operating Systems <sup>5</sup> and Database Software</b>	<p><b>Windows® 8.1 Pro and Windows 8.1 Enterprise Editions (64-bit)</b> Supports Microsoft SQL Server® 2014 Express (64-bit) <sup>6</sup>, Microsoft SQL Server 2012 Express with SP2 (64-bit), or Microsoft SQL Server 2008 R2 Express with SP2 (64-bit)</p> <p><b>Windows 8 Pro and Windows 8 Enterprise Editions (64-bit)</b> Supports Microsoft SQL Server® 2014 Express (64-bit) <sup>5</sup>, Microsoft SQL Server 2012 Express with SP2 (64-bit), or Microsoft SQL Server 2008 R2 Express with SP2 (64-bit)</p> <p><b>Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (32-bit or 64-bit)</b> Supports Microsoft SQL Server 2014 Express (32-bit or 64-bit) <sup>5</sup>, Microsoft SQL Server 2012 Express with SP2 (32-bit or 64-bit), or Microsoft SQL Server 2008 R2 Express with SP2 (32-bit or 64-bit) <b>Note:</b> The OS and software must both be 32-bit or 64-bit.</p>
<b>Supported Operating Systems for Metasys Site Management Portal Client Computer</b>	<p>Windows 8.1 Pro or Windows 8.1 Enterprise Windows 8 Pro or Windows 8 Enterprise Windows 7 Professional, Enterprise, or Ultimate Edition with SP1 (32-bit or 64-bit) Windows XP® Professional with SP3 Apple® OS X® 10.9 Mavericks Apple OS X 10.8 Mountain Lion <b>Note:</b> In OS X, you cannot view Graphics in the Site Management Portal UI. <b>Note:</b> Windows XP and Apple operating systems are supported for Metasys client computers only.</p>

#### Application and Data Server-Lite System Requirements (5 Users)

<b>Supported Web Browser Software for Metasys Site Management Portal Client Computers</b>	Windows Internet Explorer® version 8, 9, 10, and 11 <b>Note:</b> In Internet Explorer 11, select the Use Microsoft compatibility lists option, found under Tools > Compatibility View Settings, to ensure that websites appear and function correctly. Apple Safari® version 6.0.5 and 7.0 Other browsers, such as Google® Chrome® and Mozilla® Firefox®, may also be used but are not fully supported. <b>Note:</b> You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to the Site Management Portal (SMP) user interface.										
<b>Supported Virtual Environments</b>	Microsoft Hyper-V™, VMware®										
<b>Supported User Interfaces</b>	Site Management Portal (SMP) Metasys UI Ready Access Portal										
<b>Additional Software Included with the ADS</b>	<table> <tr> <td>CCT software</td><td>Launcher software</td></tr> <tr> <td>Export Utility software</td><td>Microsoft SQL Server 2012 Express software with SP2 (64-bit)</td></tr> <tr> <td>Metasys Database Manager software</td><td>Microsoft SQL Server 2008 R2 Express software with SP2 (32-bit and 64-bit)</td></tr> <tr> <td>Ready Access Portal software</td><td>Microsoft .NET Framework Version 3.5 SP1</td></tr> <tr> <td>SCT software</td><td>Metasys UI6</td></tr> </table>	CCT software	Launcher software	Export Utility software	Microsoft SQL Server 2012 Express software with SP2 (64-bit)	Metasys Database Manager software	Microsoft SQL Server 2008 R2 Express software with SP2 (32-bit and 64-bit)	Ready Access Portal software	Microsoft .NET Framework Version 3.5 SP1	SCT software	Metasys UI6
CCT software	Launcher software										
Export Utility software	Microsoft SQL Server 2012 Express software with SP2 (64-bit)										
Metasys Database Manager software	Microsoft SQL Server 2008 R2 Express software with SP2 (32-bit and 64-bit)										
Ready Access Portal software	Microsoft .NET Framework Version 3.5 SP1										
SCT software	Metasys UI6										
<b>Optional Hardware</b>	Any network or local printer supported by the qualified Windows operating system										
<b>Optional Software</b>	Graphic Generation Tool										

#### Note

- Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for more information regarding computer/server recommendations.
- For best performance, use Serial Attached SCSI (SAS) hard drives, not small Computer System Interface (SCSI) hard drives.
- For improved performance only when ADS and Ready Access Portal share the same computer.
- Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.
- To use SQL Server 2014 with Metasys products, you must install Microsoft cumulative update package 3 (KB2984923) for SQL Server 2014. To download the update package, visit <http://support.microsoft.com/kb/2984923/>.
- For more information on the Metasys UI, refer to the Metasys UI Installation Instructions (LIT-12011952)

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys®

## ADX - ADS

### Application and Data Server

The Application and Data Server (ADS) and Extended Application and Data Server (ADX) are optional components of the Metasys system that manage the collection and presentation of large amounts of trend data, event messages, operator transactions, and system configuration data. The ADS is an entry-level server that runs on personal computers and supports up to 5 users. The ADX is a larger scale system that runs on a server operating system to provide extended historical archiving and reporting capabilities. The ADX is offered in several models to support up to 10, 25, 50, or 100 users. As Site Director, the ADS/ADX provides secure communication to a network of Network Automation Engines (NAEs), Network Control Engines (NCEs), and Network Integration Engines (NIEs).

The Site Management Portal UI of the ADS/ADX provides flexible system navigation, user graphics, comprehensive alarm management, trend analysis, and summary reporting capabilities. With the Site Management Portal UI, you can efficiently manage occupant comfort and energy usage, quickly respond to critical events, and optimize control strategies. The ADS/ADX includes an Open Database Connectivity (ODBC) compliant database package for secure storage of historical and configuration data.

The new Metasys UI is designed to enhance our customers' productivity and effectiveness. It allows users to navigate by space to view summaries, trends, and activities, emulating the way they work every day. The new user interface is also optimized for all devices, enabling our customers to work smarter from any device and any location.

This release is the first in a series of enhancements that will consolidate existing Metasys user interface products into a single, dramatically improved experience that is accessible from any device. The ADS and ADX support virtual environments, including VMware® and Microsoft® Hyper-V™. Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for more information.

The Metasys system can communicate with cloud-based applications easily and securely. To make this connection, the Metasys system requires minor programming and setup by Johnson Controls. When you are connected, you can access multiple cloud-based applications and features. To learn more, please visit the Building Management page located on the Johnson Controls website. For the ADX, the Metasys Advanced Reporting System and Energy Essentials report on system configuration performance, energy usage, demand and cost.

#### Note

In this document, the term network engine refers to NAEs, NCEs and NIEs, unless otherwise noted. Refer to the ADS Product Bulletin (LIT-1201525) for important product application information.



### Features

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

### Applications

#### Use an ADS when:

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

#### Use an ADX when:

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

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys® ADX - ADS

#### Ordering Information

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

#### ADS/ADX Ordering Information for New or Upgrade Software

New Software Ordering Codes	Product Description	Upgrade Software Product Code Number	Migration Software Product Code Number
<b>MS-ADS05U-0</b>	Application and Data Server For up to 5 users	<b>MS-ADS05U-6</b>	<b>MS-ADS05U-8</b>
<b>MS-ADX10U-0</b>	Extended Application and Data Server For up to 10 users	<b>MS-ADX10U-6</b>	<b>MS-ADX10U-8</b>
<b>MS-ADX10SQL-0</b>	Extended Application and Data Server For up to 10 users Includes Microsoft® SQL Server® 2012 software with core license	<b>MS-ADX10SQL-6</b>	<b>MS-ADX10U-8</b>
<b>MS-ADXSWO-0</b>	Extended Application and Data Server For up to 25 users	<b>MS-ADXSWO-6</b>	<b>MS-ADXSWO-8</b>
<b>MS-ADXSWOSQL-0</b>	Extended Application and Data Server For up to 25 users Includes Microsoft SQL Server 2012 software with core license	<b>MS-ADXSWOSQL-6</b>	<b>MS-ADXSWOSQL-8</b>
<b>MS-ADX50U-0</b>	Extended Application and Data Server For up to 50 users	<b>MS-ADX50U-6</b>	<b>MS-ADX50U-8</b>
<b>MS-ADX50SQL2-0</b>	Extended Application and Data Server For up to 50 users For use on server with dual processors or 8 cores <sup>1</sup> Includes Microsoft SQL Server 2012 software with core license	<b>MS-ADX50SQL2-6</b>	<b>MS-ADX50SQL2-8</b>
<b>MS-ADX50SQL-0</b>	Extended Application and Data Server For up to 50 users For use on server with single processor or 4 cores Includes Microsoft SQL Server 2012 software with core license	<b>MS-ADX50SQL-6</b>	<b>MS-ADS50SQL-8</b>
<b>MS-ADX100U-0</b>	Extended Application and Data Server For up to 100 users	<b>MS-ADX100U-6</b>	<b>MS-ADX100U-8</b>
<b>MS-ADX100SQL2-0</b>	Extended Application and Data Server For up to 100 users For use on server with dual processors or 8 cores <sup>1</sup> Includes Microsoft SQL Server 2012 software with core license	<b>MS-ADX100SQL2-6</b>	<b>MS-ADX100SQL2-8</b>

#### Note

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



## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys® ADX - ADS

#### Operating Systems and SQL Server Combinations

The following table lists by operating system the Microsoft® SQL Server® software editions that have been fully qualified by Johnson Controls for Release 7.0. You can select other combinations, but we recommend that you select from the following pairings.

#### Recommended Operating System and SQL Server Combinations

Operating System	Database Software								
	ADS					ADX			
	SQL 2014 Express, 64-bit	SQL 2012 Express SP2, 64-bit	SQL 2008 R2 Express SP2, 64-bit	SQL 2008 R2 Express SP2, 32-bit	SQL 2008 Express SP3, 32-bit	SQL 2014, 64-bit	SQL 2012 SP2, 64-bit	SQL 2008 R2 SP2, 64-bit	SQL 2008 R2 SP2, 32-bit
Windows® 8.1 Pro and Windows 8.1 Enterprise (64-bit)	•	•	•	---	---	---	---	---	---
Windows 8 Pro and Windows 8 Enterprise (64-bit)	•	•	•	---	---	---	---	---	---
Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit)	•	•	•	---	---	---	---	---	---
Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (32-bit)	---	---	---	•	•	---	---	---	---
Windows Server® 2012 R2 Standard Edition (64-bit)	---	---	---	---	---	•	•	•	---
Windows Server 2012 Standard Edition (64-bit)	---	---	---	---	---	•	•	•	---
Windows Server 2008 R2 Standard and Enterprise Editions with SP1 (64-bit)	---	---	---	---	---	•	•	•	---
Windows Server 2008 Standard and Enterprise Editions with SP2 (32-bit)	---	---	---	---	---	---	---	---	•

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys® ADX - ADS

#### Technical Specifications

#### Application and Data Server (ADS) System Requirements (5 Users)

Recommended Computer Platform <sup>1</sup>	3.4 GHz Intel® Core™ Quad processor 2 x 500 GB hard disk (RAID 1) <sup>2</sup> with 40 GB free space after installation of all prerequisite software and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on. DVD drive	
	<b>Note:</b> Prerequisite software includes the supported operating system, database software, .NET Framework, and any other software or service packs required for your ADS configuration.	
Recommended Memory <sup>4</sup>	Graphics card (1 GB RAM, ATI® Technologies or NVIDIA® Corporation, 64-bit compatible [for 64-bit operating systems], Small Form Factor [SFF] if required) <sup>3</sup>	
	8 to 16 GB RAM (64-bit systems) 4 GB RAM (32-bit systems)	
Supported Operating Systems <sup>5</sup> and Database Software	<b>Windows® 8.1 Pro and Windows 8.1 Enterprise Editions (64-bit)</b> Supports Microsoft SQL Server® 2014 Express (64-bit) <sup>6</sup> , Microsoft SQL Server 2012 Express with SP2 (64-bit), or Microsoft SQL Server 2008 R2 Express with SP2 (64-bit)	
	<b>Windows 8 Pro and Windows 8 Enterprise Editions (64-bit)</b> Supports Microsoft SQL Server® 2014 Express (64-bit) <sup>6</sup> , Microsoft SQL Server 2012 Express with SP2 (64-bit), or Microsoft SQL Server 2008 R2 Express with SP2 (64-bit)	
	<b>Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (32-bit or 64-bit)</b> Supports Microsoft SQL Server 2014 Express (32-bit or 64-bit) <sup>6</sup> , Microsoft SQL Server 2012 Express with SP2 (32-bit or 64-bit), or Microsoft SQL Server 2008 R2 Express with SP2 (32-bit or 64-bit)	
	<b>Note:</b> The OS and software must both be 32-bit or 64-bit.	
Supported Virtual Environments	Microsoft Hyper-V™, VMware®	
Supported User Interfaces	Site Management Portal (SMP) Metasys UI Ready Access Portal	
Additional Software Included with the ADS	CCT software	Launcher software
	Export Utility software	Microsoft SQL Server 2012 Express software with SP2 (64-bit)
	Metasys Database Manager software	Microsoft SQL Server 2008 R2 Express software with SP2 (32-bit and 64-bit)
	SCT software	Microsoft .NET Framework Version 3.5 SP1
Optional Hardware	Any network or local printer supported by the qualified Windows operating system	
Optional Software	Graphic Generation Tool	

#### Note

- Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for more information regarding computer/server recommendations.
- For best performance, use Serial Attached SCSI (SAS) hard drives, not Small Computer System Interface (SCSI) hard drives.
- For improved performance in configurations where ADS and Ready Access Portal share the same computer.
- For best performance, use the maximum amount of memory that the computer allows.
- Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.
- To use SQL Server 2014 with Metasys products, you must install Microsoft cumulative update package 3 (KB2984923) for SQL Server 2014. To download the update package, visit <http://support.microsoft.com/kb/2984923/>.



## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys® ADX - ADS

#### Extended Application and Data Server System Requirements (Unified ADX Systems, 10 or 25 Users)

<b>Recommended Server Platform</b> <sup>1</sup>	2.20 GHz E5 Series Intel Xeon® Quad Core single processor or better 2 x 600 GB hard disk (RAID 1) <sup>2</sup> with 40 GB free space after installation of all prerequisite software and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on. DVD drive <b>Note:</b> ADX prerequisite software includes the Windows operating system, SQL Server software, Windows .NET Framework, and any other software or SPs required by your ADX configuration.	
<b>Recommended Memory</b> <sup>3</sup>	16 GB RAM (10 or 25 user ADX)	
<b>Supported Operating Systems</b> <sup>4</sup> <b>and Database Software</b>	<b>Windows Server® 2012 R2 (64-bit)</b> <sup>5</sup> Supports Microsoft SQL Server 2014 (64-bit) <sup>6</sup> , Microsoft SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 with SP2 (64-bit)	
	<b>Windows Server 2012 (64-bit)</b> <sup>5</sup> Supports Microsoft SQL Server 2014 (64-bit) <sup>6</sup> , Microsoft SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 with SP2 (64-bit)	
	<b>Windows Server 2008 R2 with SP1 (64-bit)</b> <sup>7</sup> Supports Microsoft SQL Server 2014 (64-bit) <sup>6</sup> , Microsoft SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 with SP2 (64-bit)	
	<b>Windows Server 2008 with SP2 (32-bit)</b> <sup>7</sup> Supports Microsoft SQL Server 2008 R2 with SP2 (32-bit) <b>Note:</b> A 32-bit operating system only supports a maximum of 4 GB memory. For best performance, use a 64-bit operating system.	
<b>Supported Virtual Environments</b>	Microsoft Hyper-V™, VMware®	
<b>Supported User Interfaces</b>	Site Management Portal (SMP) Metasys UI Ready Access Portal	
<b>Additional Software Included with the ADX</b>	CCT software	Microsoft SQL Server 2012 software with SP2 (64-bit) <sup>8</sup>
	Export Utility software	SCT software
	Metasys Database Manager software	Microsoft .NET Framework Version 3.5 SP1
	Launcher software	
	<b>Note:</b> The Metasys Advanced Reporting System requires an ADX. The SCT computer must be online and accessible to the ADX at all times.	
<b>Optional Hardware</b>	Any network or local printer supported by the qualified Windows operating system	
<b>Optional Software</b>	Energy Essentials Graphic Generation Tool	

#### Note

- Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable.  
*Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for more information regarding computer/server recommendations.*
- For best performance, use SAS hard drives (not SATA hard drives) that use RAID controllers with write caching enabled.
- For best performance, use the maximum amount of memory. An ADX with 16 GB RAM has much greater performance than an ADX with only 4 GB RAM.  
A 32-bit operating system does not support more than 4 GB of RAM.
- Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.*
- For SQL Server 2014 software or SQL Server 2012 software, you must purchase a SQL Server software license for each individual processor core (with a minimum of four core licenses). For example, if you have a single processor with dual cores, purchase four core licenses (the minimum) for SQL Server 2014 software or SQL Server 2012 software.
- To use SQL Server 2014 with Metasys products, you must install Microsoft cumulative update package 3 (KB2984923) for SQL Server 2014.  
To download the update package, visit <http://support.microsoft.com/kb/2984923/>.
- For SQL Server 2008 R2 software, you must purchase a SQL Server software license for each individual processor you have. You do not need to purchase multiple licenses if you have a single processor divided into multiple cores. For example, if you have a single processor with dual cores, purchase one license for SQL Server software.
- SQL Server software is only included with the MS-ADX10SQL product.

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys® ADX - ADS

#### Extended Application and Data Server System Requirements (Unified ADX Systems, 50 or 100 Users)

<b>Recommended Server Platform</b> <sup>1</sup>	<p>Two processors: 2.20 GHz Intel Xeon® Dual Processors with a minimum of 4 cores each 6 x 300 GB 15,000 RPM hard disk (RAID 5) <sup>2</sup> with 50 GB free space after installation of all prerequisite software and before installation of ADS software. Configure RAID 5 with disk write-caching turned on.</p> <p>RAID Controller-PERC H710 with 512 NV Cache</p> <p>DVD drive</p> <p><b>Note:</b> ADX prerequisite software includes the Windows operating system, SQL Server software, Windows .NET Framework, and any other software or SPs required by your ADX configuration.</p>	
<b>Recommended Memory</b>	32 GB RAM	
<b>Supported Operating Systems</b> <sup>3</sup> <b>and Database Software</b>	<p><b>Windows Server® 2012 R2 (64-bit)</b> <sup>4</sup></p> <p>Supports Microsoft SQL Server 2014 (64-bit) <sup>6</sup>, Microsoft SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 with SP2 (64-bit)</p> <hr/> <p><b>Windows Server 2012 (64-bit)</b> <sup>4</sup> <b>Supports Microsoft SQL Server 2014 (64-bit)</b> <sup>6</sup></p> <p>Microsoft SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 with SP2 (64-bit)</p> <hr/> <p><b>Windows Server 2008 R2 with SP1 (64-bit)</b> <sup>5</sup></p> <p>Supports Microsoft SQL Server 2014 (64-bit) <sup>6</sup>, Microsoft SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 with SP2 (64-bit)</p>	
<b>Supported Virtual Environments</b>	Microsoft Hyper-V™, VMware®	
<b>Supported User Interfaces</b>	Site Management Portal (SMP) Metasys UI Ready Access Portal	
<b>Additional Software Included with the ADX</b>	CCT software	Microsoft SQL Server 2012 software with SP2 (64-bit) <sup>7</sup>
	Export Utility software	Microsoft .NET Framework Version 3.5 SP1
	Metasys Database Manager software	SCT software
	Launcher software	
	<p><b>Note:</b> The Metasys Advanced Reporting System requires an ADX.</p> <p>The SCT computer must be online and accessible to the ADX at all times.</p>	
<b>Optional Hardware</b>	Any network or local printer supported by the qualified Windows operating system	
<b>Optional Software</b>	Energy Essentials	
	Graphic Generation Tool	

#### Note

- Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable.  
Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for more information regarding computer/server recommendations.
- For best performance, use SAS hard drives (not SATA hard drives) that use RAID controllers with write caching enabled.
- Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for specific Microsoft Windows operating system settings that may be required for your Metasys® system configuration.
- For SQL Server 2014 software or SQL Server 2012 software, you must purchase a SQL Server software license for each individual processor core (with a minimum of four core licenses). For example, if you have a single processor with dual cores, purchase four core licenses (the minimum) for SQL Server 2014 software or SQL Server 2012 software.
- For SQL Server 2008 R2 software, you must purchase a SQL Server software license for each individual processor you have. You do not need to purchase multiple licenses if you have a single processor divided into multiple cores. For example, if you have a single processor with dual cores, purchase one license for SQL Server software.
- To use SQL Server 2014 with Metasys products, you must install Microsoft cumulative update package 3 (KB2984923) for SQL Server 2014.  
To download the update package, visit <http://support.microsoft.com/kb/2984923/>.
- SQL Server software is only included with the MS-ADX50SQL product.

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys® ADX - ADS

#### Extended Application and Data Server System Requirements (Split ADX Systems, 10 or 25 Users)

<b>Recommended Server Platform</b> <sup>1</sup>	<b>Web/Application Server</b> 2.20 GHz E5 Series Intel Xeon® Quad Core single processor or better. 2 x 600 GB hard disk (RAID 1) <sup>2</sup> with 40 GB free space after installation of all prerequisite software <sup>4</sup> and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on. DVD drive <b>Note:</b> Metasys UI must reside on the ADX web/application server.	
	<b>Database Server</b> 2.20 GHz E5 Series Intel Xeon® Quad Core single processor or better. 2 x 600 GB hard disk (RAID 1) with 40 GB free space after installation of all prerequisite software <sup>4</sup> and before installation of ADS software. Configure RAID 1 (mirroring) with disk write-caching turned on. DVD drive	
	<b>SCT Computer</b> In a split configuration, you cannot install SCT or Ready Access Portal software on either the ADX web/application server computer or the ADX database server computer. <i>Refer to the System Configuration Tool Catalog Page (LIT-1900198) for current SCT computer requirements.</i>	
<b>Recommended Memory</b> <sup>3</sup>	16 GB RAM (web/application server and database server for 10 or 25 user ADX)	
<b>Supported Operating Systems</b> <sup>5,6</sup> <b>with Supported Database Software</b>	<b>Windows Server® 2012 R2 (64-bit)</b> <sup>7</sup> Supports Microsoft SQL Server 2014 (64-bit) <sup>9</sup> , Microsoft SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 with SP2 (64-bit)	
	<b>Windows Server 2012 (64-bit)</b> <sup>7</sup> Supports Microsoft SQL Server 2014 (64-bit) <sup>9</sup> , Microsoft SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 with SP2 (64-bit)	
	<b>Windows Server 2008 R2 with SP1 (64-bit)</b> <sup>8</sup> Supports Microsoft SQL Server 2014 (64-bit) <sup>9</sup> , Microsoft SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 with SP2 (64-bit)	
	<b>Windows Server 2008 with SP2 (32-bit)</b> <sup>8</sup> Supports Microsoft SQL Server 2008 R2 with SP2 (32-bit) <b>Note:</b> A 32-bit operating system only supports a maximum of 4 GB memory. For best performance, use a 64-bit operating system.	
<b>Supported Virtual Environments</b>	Microsoft Hyper-V™, VMware®	
<b>Supported User Interfaces</b>	Site Management Portal (SMP) Metasys UI Ready Access Portal	
<b>Additional Software Included with the ADX</b>	CCT software	Microsoft SQL Server 2012 software with SP2 (64-bit) <sup>10</sup>
	Export Utility software	Microsoft .NET Framework Version 3.5 SP1
	Metasys Database Manager software	SCT software
	Launcher software	
	<b>Note:</b> The Metasys Advanced Reporting System requires an ADX. The SCT computer must be online and accessible to the ADX at all times.	
<b>Optional Hardware</b>	Any network or local printer supported by the qualified Windows operating system	
<b>Optional Software</b>	Energy Essentials Graphic Generation Tool	

#### Note

- Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable.  
*Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for more information regarding computer/server recommendations.*
- For best performance, use SAS hard drives (not SATA hard drives) that use RAID controllers with write caching enabled.
- For best performance, use the maximum amount of memory. An ADX with 16 GB RAM has much greater performance than an ADX with only 4 GB RAM. Also, a 32-bit operating system only supports a maximum of 4 GB of RAM.
- ADX prerequisite software includes the Windows operating system and SQL Server software, Windows .NET Framework, and any other software or service packs required for your ADX configuration.
- The web/application and database servers must have the same operating system installed.
- Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.
- For SQL Server 2014 software or SQL Server 2012 software, you must purchase a SQL Server software license for each individual processor core (with a minimum of four core licenses). For example, if you have a single processor with dual cores, purchase four core licenses (the minimum) for SQL Server 2014 software or SQL Server 2012 software.
- For SQL Server 2008 R2 software, you must purchase a SQL Server software license for each individual processor you have. You do not need to purchase multiple licenses if you have a single processor divided into multiple cores. For example, if you have a single processor with dual cores, purchase one license for SQL Server software.
- To use SQL Server 2014 with Metasys products, you must install Microsoft cumulative update package 3 (KB2984923) for SQL Server 2014. To download the update package, visit <http://support.microsoft.com/kb/2984923/>.
- SQL Server software is only included with the MS-ADX10SQL product.

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys® ADX - ADS

#### Extended Application and Data Server System Requirements (Split ADX System, 50 or 100 Users)

Recommended Server Platform <sup>1</sup>	<b>Web/Application Server</b> Two processors: 2.20 GHz Intel Xeon® Dual Processors with a minimum of 4 cores each 6 x 300 GB 15,000 RPM hard disk (RAID 5) <sup>2</sup> with 50 GB free space after installation of all prerequisite software <sup>4</sup> and before installation of ADS software. Configure RAID 5 with disk write-caching turned on. RAID Controller-PERC H710 with 512 NV Cache DVD drive <b>Note:</b> ARS and Energy Essentials can reside on the ADX web/application server. <b>Note:</b> Metasys UI must reside on the ADX web/application server.	
	<b>Database Server</b> Two processors: 2.20 GHz Intel Xeon® Dual Processors with a minimum of 4 cores each 6 x 300 GB 15,000 RPM hard disk (RAID 5) with 50 GB free space after installation of all prerequisite software <sup>4</sup> and before installation of ADS software. Configure RAID 5 with disk write-caching turned on. RAID Controller-PERC H710 with 512 NV Cache DVD drive	
	<b>SCT Computer</b> In a split configuration, you cannot install SCT or Ready Access Portal software on either the ADX web/application server computer or the ADX database server computer. <i>Refer to the System Configuration Tool Catalog Page (LIT-1900198) for current SCT computer requirements.</i>	
	32 GB RAM	
Recommended Memory <sup>3</sup>		
	<b>Supported Operating Systems <sup>5,6</sup> with Supported Database Software</b>	
	<b>Windows Server® 2012 R2 (64-bit) <sup>7</sup></b> Supports Microsoft SQL Server 2014 (64-bit) <sup>9</sup> , Microsoft SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 with SP2 (64-bit)	
	<b>Windows Server 2012 (64-bit) <sup>7</sup></b> Supports Microsoft SQL Server 2014 (64-bit) <sup>9</sup> , Microsoft SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 with SP2 (64-bit)	
	<b>Windows Server 2008 R2 with SP1 (64-bit) <sup>8</sup></b> Supports Microsoft SQL Server 2014 (64-bit) <sup>9</sup> , Microsoft SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 with SP2 (64-bit)	
	Microsoft Hyper-V™, VMware®	
Supported Virtual Environments		
Supported User Interfaces	Site Management Portal (SMP) Metasys UI Ready Access Portal	
Additional Software Included with the ADX	CCT software	Microsoft SQL Server 2012 software with SP2 (64-bit) <sup>10</sup>
	Export Utility software	Microsoft .NET Framework Version 3.5 SP1
	Metasys Database Manager software	SCT software
	Launcher software	
	<b>Note:</b> The Metasys Advanced Reporting System requires an ADX. The SCT computer must be online and accessible to the ADX at all times.	
Optional Hardware	Any network or local printer supported by the qualified Windows operating system	
Optional Software	Energy Essentials Graphic Generation Tool	

#### Note

- Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for more information regarding computer/server recommendations.
- For best performance, use SAS hard drives (not SATA hard drives) that use RAID controllers with write caching enabled.
- For best performance, use the maximum amount of memory. An ADX with 32 GB RAM has much greater performance than an ADX with only 16 GB RAM. A 32-bit operating system does not support more than 4 GB of RAM.
- ADX prerequisite software includes the Windows operating system and SQL Server software, Windows .NET Framework, and any other software or service packs required for your ADX configuration.
- The web/application and database servers must have the same operating system installed.
- Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for specific Microsoft Windows operating system settings that may be required for your Metasys system configuration.
- For SQL Server 2014 software or SQL Server 2012 software, you must purchase a SQL Server software license for each individual processor core (with a minimum of four core licenses). For example, if you have a single processor with dual cores, purchase four core licenses (the minimum) for SQL Server 2014 software or SQL Server 2012 software.
- For SQL Server 2008 R2 software, you must purchase a SQL Server software license for each individual processor you have. You do not need to purchase multiple licenses if you have a single processor divided into multiple cores. For example, if you have a single processor with dual cores, purchase one license for SQL Server software.
- To use SQL Server 2014 with Metasys products, you must install Microsoft cumulative update package 3 (KB2984923) for SQL Server 2014. To download the update package, visit <http://support.microsoft.com/kb/2984923/>.
- SQL Server software is only included with the MS-ADX50SQL product.

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

Metasys®

### GGT - Graphic Generator Tool

#### Graphics+ Feature

Graphics+ is a data visualization software package designed for Metasys system customers who are looking for a quick way to create interactive building data representations, thus empowering them to visualize, analyze, and respond to problems faster. The Graphics+ software package comprises two components: the Graphic Generation Tool (GGT) and the Graphics+ Viewer.

The Graphic Generation Tool is a simple yet powerful diagramming tool that helps designers create compelling representations of their building equipment and floor plans and bind them to Metasys data objects. The tool includes an extensive library of pre-built symbols and templates, shortcut keys, and right-click functions, giving designers the ability to assemble graphics faster. The tool also provides flexibility to create customized graphics using a rich set of effects known as behaviors. Behaviors allow users to command, navigate, change color, apply flash, set visibility, and display a context menu for bound Metasys objects. You can save these graphics directly to a supported Metasys Host, such as a Site Director or a System Configuration Tool (SCT) archive database.

With the GGT, you can easily create a graphic of status summaries for each monitored system or space (for example, building, floor, or floor group). The graphic uses color to summarize the overall condition of monitored points. In one quick glance, you can view the number of warnings, alarms, or offline items across your entire facility or campus.

By clicking any one of these spaces or systems, you can see a detailed view of the monitored equipment. You can also open historical data for any trended point within the graphic using the Trend Module.

The Trend Module can show trend data for up to four points at once for system diagnosis and comparison purposes. Additionally, using the predefined set of gauges, you can create an energy dashboard graphic that quickly conveys the current state of energy savings in your facility.

The Graphics+ Viewer is integrated with the Site Management Portal (SMP), SCT, and Ready Access Portal, allowing users to show, command, or update in real time all the data linked objects that were created in the GGT. The graphical display gives you a three-dimensional view of your facility, offering an intuitive way to manage the daily events of your buildings or campus.

Refer to the *Graphics+ Feature Product Bulletin (LIT-12011698)* for important product application information.



#### Features

- Thermographic Display of Temperature Conditions of a Floor
- Easy and Consistent Access to Room Information
- Summary Data of Multiple Buildings in a Single Graphical View with Navigational Aids
- Ability to Quickly and Easily Switch from Tabular to Graphical Views
- Stand-Alone Graphic Generation Tool
- Extensive Library of Prebuilt Dynamic Symbols and Templates
- Dynamic Symbol Capabilities, Including Commanding, Flashing, Changing Color, Showing and Hiding Elements, Navigation, and Context Menus, for Enhanced User Experience
- HVAC Library Elements Pre-Populated with Aliased Binding Strings
- Historical Trend Information Available Directly within a Graphic
- Computer Aided Drafting (CAD) File Import Capability
- Right-Click Functions, Short-Cut Keys, and User-Configurable Symbols Properties
- Comprehensive Representation of Facility Support Systems
- Multiple Language Support
- Optimal Graphics Display Performance

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

Metasys®

GGT - Graphic Generator Tool

### Technical Specifications

#### System Requirements

<b>Product</b>	<b>MS-GGT-0</b> (new Graphic Generation Tool software) <b>MS-GGT-6</b> (upgrade Graphic Generation Tool software)
<b>Recommended Computer Platform</b> <sup>1</sup>	Intel® Core™ 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum) 100 MB recommended free hard disk space available DVD drive
<b>Memory</b>	4 GB RAM recommended (2 GB RAM minimum)

#### Graphic Generation Tool System Requirements

<b>Operating System</b>	Windows® 8.1 and Windows 8.1 Enterprise Editions (64-bit) Windows 8 and Windows 8 Enterprise Editions (64-bit) Windows 7 Professional, Enterprise, or Ultimate Editions with SP1 (32-bit and 64-bit) Windows Server 2012 R2 (64-bit) Windows Server 2012 (64-bit) Windows Server 2008 R2 with SP1 (64-bit) Windows Server 2008 with SP2 (32-bit)
<b>Other Software</b>	Microsoft .NET Framework 4.0 (required for creating Graphics+ graphics; included on the GGT product disk) <b>Note:</b> We recommend you install the full version of Microsoft .NET Framework 4.0.
<b>Communication</b>	Ethernet network interface card 10/100/1,000 Mbps (100 Mbps network recommended) <b>Note:</b> We recommend a wired connection. Wireless 802.11 connection.

#### Note

- <sup>1</sup> Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable.  
Refer to the *Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279)* for more information regarding computer/server recommendations.



## BAS SYSTEM SOFTWARE Supervisor Software and Tools

Metasys®

GGT - Graphic Generator Tool

### Graphics+ Viewer System Requirements

<b>Product</b>	Graphics+ Viewer built into Site Management Portal UI, SCT UI, and Ready Access Portal UI
<b>Recommended Computer Platform</b> <sup>1,2</sup>	Intel Core™ 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum)
<b>Memory</b>	4 GB RAM recommended (2 GB RAM minimum)
<b>Operating System</b>	<p>Windows® 8.1 and Windows 8.1 Enterprise Editions (64-bit)</p> <p>Windows 8 and Windows 8 Enterprise Editions (64-bit)</p> <p>Windows 7 Professional, Enterprise, or Ultimate Editions with SP1 (32-bit and 64-bit)</p> <p>Windows Server 2012 R2 (64-bit) Windows Server 2012 (64-bit)</p> <p>Windows Server 2008 R2 with SP1 (64-bit)</p> <p>Windows Server 2008 with SP2 (32-bit)</p> <p>Apple® OS X® 10.8 Mountain Lion</p> <p>Apple OS X 10.9 Mavericks</p> <p><b>Note:</b> Apple operating systems are supported for Metasys client computers only.</p> <p><b>Note:</b> In OS X, you cannot view Graphics+ graphics in the Site Management Portal UI.</p>
<b>Other Software</b>	<p>Windows Internet Explorer® Version 8, 9, 10, or 11</p> <p><b>Note:</b> In Internet Explorer 11, select the Use Microsoft compatibility lists option, found under Tools &gt; Compatibility View Settings, to ensure that websites appear and function correctly. Microsoft Silverlight 5.0 or higher (available as a free download from Microsoft Corporation.) Apple® Safari version 6.0.5 and 7.0 (Other browsers, such as Google® Chrome and Mozilla Firefox, may also be used but are not fully supported.)</p>
<b>Communication</b>	<p>Ethernet network interface card 10/100/1,000 Mbps (100 Mbps network recommended)</p> <p><b>Note:</b> We recommend a wired connection. Wireless 802.11 connection.</p>

#### Note

- 1 For large graphics, rendering the image is CPU intensive. In general, a higher performing CPU with multiple cores is recommended.
- 2 Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable.  
Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for more information regarding computer/server recommendations.

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys®

### MEU

#### Metasys Export Utility

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

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

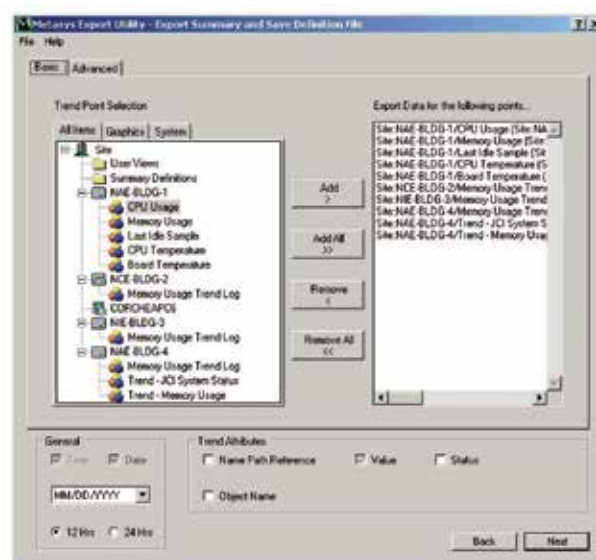
The scheduling capability of Export Utility allows you to extract the selected data immediately, or to schedule an extraction at a convenient time or interval.

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

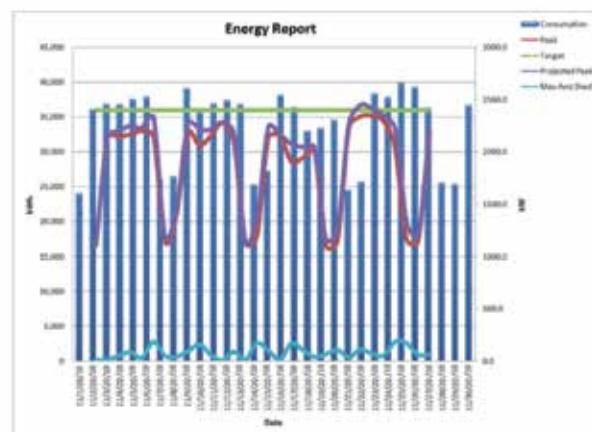
Refer to the *Metasys Export Utility Product Bulletin (LIT-1201800)* for important product application information.

#### Features

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



Export Utility User Interface



Export Utility DLL Example File

#### Ordering Information

##### Export Utility Selection Charts

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

#### Note

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



## BAS SYSTEM SOFTWARE

### Supervisor Software and Tools

Metasys®  
MEU

## Technical Specifications

### Export Utility System Requirements

<b>Product Code</b>	<b>MS-EXPORT-0, MS-EXPORT-6</b>
<b>Recommended Computer/Server Platform <sup>1</sup></b>	<p>Intel® Core™ 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum)</p> <p>20 GB free hard disk space available (600 MB minimum)</p> <p>DVD drive</p> <p>When Export Utility is installed on an Application and Data Server/Extended Application and Data Server (ADS/ADX) or Open Data Server (ODS), follow the requirements for an ADS/ADX or ODS.</p> <p><i>Refer to the Application and Data Server (ADS/ADX) Product Bulletin (LIT-1201525), the Application and Data Server (ADS) Lite Product Bulletin (LIT-12011690 or the Open Data Server Product Bulletin (LIT-12011943).</i></p>
<b>Recommended Memory <sup>1</sup></b>	<p>Computer Platforms: 2 GB RAM (1 GB RAM minimum)</p> <p>Server Platforms: 4 GB RAM (2 GB RAM minimum)</p>
<b>Supported Operating Systems</b>	<p>Windows® 8.1 Pro and Windows 8.1 Enterprise Editions (64-bit)</p> <p>Windows 8 Pro and Windows 8 Enterprise Editions (64-bit)</p> <p>Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit)</p> <p>Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (32-bit)</p> <p>Windows Server 2012 R2</p> <p>Windows Server 2012</p> <p>Windows Server 2008 R2 with SP1</p> <p>Windows Server 2008 with SP2</p>
<b>Additional Software Included on the Product Disks</b>	<p>Microsoft .NET Framework version 3.5 SP1 or version 4.0</p> <p>For steps on installing .NET Framework version 3.5 SP1, refer to the ADS, ADX, and SCT Installation and Upgrade Instructions Wizard Content (LIT-12011331) or the ADS-Lite Installation and Upgrade Instructions Wizard Content (LIT-12011688).</p> <p><b>Note:</b> The Windows 8.1, Windows 8, Windows 7, Windows Server 2012 R2, Windows Server 2012, and Windows Server 2008 R2 operating systems include Microsoft .NET Framework version 3.5/3.5.1. These applications are built into the operating system (no separate software installation is necessary). We recommend you also install Microsoft.NET Framework version 4.5 if you are using Windows 8.1, Windows 8, Windows Server 2012 R2, or Windows Server 2012.</p>
<b>Additional Requirements (Order Separately)</b>	<p>Microsoft Office Professional 2013, Microsoft Office Enterprise 365, Microsoft Office Professional 2010, or Microsoft Office Professional 2007 software to generate reports.</p> <p><b>Note:</b> To extract data to Microsoft Excel or Microsoft Access software, you must have the respective software installed on the computer running Export Utility.</p> <p><b>Note:</b> Export Utility can extract data to 32-bit and 64-bit versions of Microsoft Office. However, the DLL file and example files used to create custom reports are compatible only with 32-bit versions of Microsoft Office. Microsoft Office Professional 2013 and Microsoft Office 2010 do not support custom DLL files.</p>

#### Note

- 1** Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable. Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for more information regarding computer/server recommendations.

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

Metasys®

SCT

System Configuration Tool

The System Configuration Tool (SCT) supports the engineering, installation, and commissioning of your building automation system.

The SCT application enables offline generation of the complete site and user interface creation of the system, including point naming; schedule trend log definition; integration of N1, N2, BACnet®, and LONWORKS® networks; integration of Modbus, M-Bus, and KNX third-party protocols; integration of local and remote Master-Slave/Token-Passing (MS/TP) devices; definition of tailored summaries and user views; and the creation of custom control logic using a graphical user interface.

SCT also manages the maintenance of the archive database for the Network Automation Engine (NAE), Network Control Engine (NCE), Network Integration Engine (NIE), Application and Data Server/Extended Application and Data Server (ADS/ADX) and Open Data Server (ODS).

To keep the archive database current, the user can set up the SCT to schedule regular uploads from the devices on the site.

When the system is operational, you can make online changes to the database at the engine, ADS/ADX, or ODS with the same user interface that was used for the offline data generation in SCT.

Lastly, SCT offers productivity features such as database import and export, supervisory device code download, field controller upload, and site discovery. For example, with site discovery, you can rebuild the entire archive database from the online system, a useful option if the original archive is missing or was never maintained. SCT also lets you fully manage a mixed release site for a Metasys system at Release 5.2 or later.

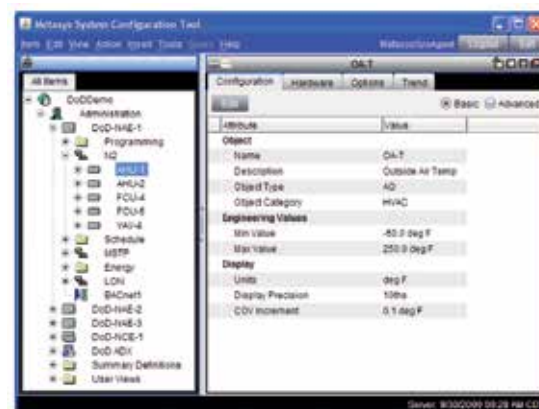
Refer to the SCT Technical Bulletin (LIT-1201534) for details.

### SCT Selection Chart

Code Number	Description
MS-SCTSWO-0	System Configuration Tool Software for local installations. Includes a copy of N2 Configuration Tools <sup>1</sup> and CCT. New project software for sites that do not have a previous version of SCT installed.
MS-SCTSWO-6	System Configuration Tool Software for local installations. Includes a copy of N2 Configuration Tools <sup>1</sup> and CCT. Upgrade software for previous SCT versions being upgraded to the latest release.

#### Note

<sup>1</sup> N2 Configuration Tools are supported only on non-server-based 32-bit platforms.



### Features

- Generate and simulate the system in offline mode (simulation is available in the local version only)
- Use step-by-step wizards to assist with system configuration
- Quickly and easily recreate the Site's archive database with Site Discovery if the archive is missing, corrupt, or was never maintained
- Conveniently import and export the archive database for databases at Release 5.2 or later
- Download the software image (code) of a supervisory device without the NAE/NIE Update Tool
- Apply patches to NxE55 and NxE59 devices at Release 6.5 or later
- Copy the Security database of the SCT to supervisory devices
- Create spaces and define equipment for use with the Metasys UI
- Upload the controller application files (.caf) from online field controllers into the archive database
- Maintain controller application files (.caf) seamlessly by exporting them from one or all field controllers connected to a field bus to the computer's hard drive

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys® SCT

#### Technical Specifications

The following table describes the recommended and minimum computer requirements for a computer on which you are installing a stand-alone SCT.

For applications where SCT is installed on an ADS/ADX, refer to the specifications in the Application and Data Server (ADS/ADX) Product Bulletin (LIT-1201525).

For applications where SCT is installed on an ODS, refer to the specifications in the Open Data Server (ODS) Product Bulletin (LIT-12011943).

#### SCT-Local System Requirements (1/2)

<b>Product Codes</b>	<b>MS-SCTSWO-0:</b> New User Software <b>MS-SCTSWO-6:</b> Upgrade software	
<b>Recommended Computer/Server Platform <sup>2</sup></b>	<b>Full Server Platform</b>	Intel® Core™ 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum) 20 GB minimum free hard disk space available 4 GB RAM (2 GB RAM minimum) 20 GB free hard disk space available (600 MB minimum) DVD drive <b>Note:</b> SCT prerequisite software includes the Windows operating system, SQL Server software, Windows .NET Framework, and any other software or SPs required by your SCT configuration.
	<b>Desktop Computer Platform</b>	Intel Core 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum) 20 GB minimum free hard disk space available 2 GB RAM (1 GB RAM minimum) <b>Note:</b> A 32-bit operating system only supports a maximum of 4 GB memory. For best performance, use a 64-bit operating system. DVD drive <b>Note:</b> Prerequisite software includes the supported operating system, database software, .NET Framework, and any other software or service packs required for your SCT configuration.
<b>Supported Operating Systems Full Server Platforms and Database Software <sup>2</sup></b>	<b>Full Server Platforms</b>	<b>Windows Server® 2012 R2 <sup>4</sup></b> Supports Microsoft SQL Server 2014 (64-bit) <sup>5</sup> , SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 Standard with SP2 (64-bit)
		<b>Windows Server 2012 <sup>4</sup></b> Supports Microsoft SQL Server 2014 (64-bit) <sup>5</sup> , SQL Server 2012 with SP2 (64-bit), or Microsoft SQL Server 2008 R2 Standard with SP2 (64-bit)
		<b>Windows Server 2008 R2 with SP1</b> Supports Microsoft SQL Server 2012 with SP2 (64-bit) or Microsoft SQL Server 2008 R2 Standard with SP2 (64-bit) <b>Note:</b> The OS and software must both be 32-bit or 64-bit.
		<b>Windows Server 2008 with SP2 (32-bit)</b> Supports Microsoft SQL Server 2008 R2 with SP2 (32-bit) <b>Note:</b> A 32-bit operating system only supports a maximum of 4 GB memory. For best performance, use a 64-bit operating system.
	<b>Desktop Computer Platform</b>	<b>Windows® 8.1 and Windows 8.1 Pro (64-bit)</b> Supports Microsoft SQL Server 2014 Express (64-bit) <sup>5</sup> , SQL Server 2012 Express with SP2 (64-bit), or Microsoft SQL Server 2008 R2 Express with SP2 (64-bit)
		<b>Windows 8 and Windows 8 Pro (64-bit)</b> Supports Microsoft SQL Server 2014 Express (64-bit) <sup>5</sup> , SQL Server 2012 Express with SP2 (64-bit), or Microsoft SQL Server 2008 R2 Express with SP2 (64-bit)
		<b>Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (32-bit or 64-bit)</b> Supports Microsoft SQL Server 2014 Express (32-bit or 64-bit) <sup>3</sup> , SQL Server 2012 Express with SP2 (64-bit), or Microsoft SQL Server 2008 R2 Express with SP2 (32-bit or 64-bit) <b>Note:</b> The OS and software must both be 32-bit or 64-bit.

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## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys® SCT

#### SCT-Local System Requirements (2/2)

<b>Supported Operating Systems for Metasys System Configuration Tool Client Computer</b>	<p>Windows 8.1. or Windows 8.1 Pro (64-bit)</p> <p>Windows 8 or Windows 8 Pro (64-bit)</p> <p>Windows 7 Professional, Enterprise, or Ultimate Edition with SP1 (64-bit or 32-bit)</p> <p>Windows XP® Professional with SP3</p> <p>Apple® OS X® 10.9 Mavericks</p> <p>Apple OS X 10.8 Mountain Lion</p> <p><b>Note:</b> In OS X, you cannot view Graphics+ graphics in the Site Management Portal UI.</p> <p><b>Note:</b> Windows XP and Apple operating systems are supported for Metasys client computers only.</p>
<b>Supported Web Browser Software for Metasys System Configuration Tool Client Computers</b>	<p>Windows Internet Explorer® version 8, 9, 10, and 11</p> <p><b>Note:</b> In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under Tools &gt; Compatibility View Settings, to ensure that websites appear and function correctly.</p> <p>Apple Safari® version 6.0.5 and 7.0</p> <p>Other browsers, such as Google® Chrome® and Mozilla® Firefox®, may also be used but are not fully supported.</p> <p><b>Note:</b> You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to SCT.</p>
<b>Network Communication for Metasys System Configuration Tool Client Computers</b>	<p>Ethernet network interface card 10/100/1000 Mbps (100 Mbps network or better recommended)</p> <p><b>Note:</b> The computer hosting the SCT application supports only one network interface card.</p>
<b>Optional Software Packaging</b>	<p>The ADS, ADX, ODS, and Ready Access Portal software include SCT software.</p>

#### Note

- 1 Our computer platform and memory recommendations are not meant to imply that older or slower machines are not usable.  
*Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for more information regarding computer/server recommendations.*
- 2 *Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-1201279) for specific Microsoft Windows OS settings that may be required for your Metasys system configuration.*
- 3 Match the bit versions of the operating system and SQL Server software. For example, use the 32-bit version of the operating system with a 32-bit version of SQL Server software, and a 64-bit version of operating system with a 64-bit version of SQL Server software.
- 4 For SQL Server 2012 software, you must purchase a SQL Server software license for each individual processor core (with a minimum of four core licenses). For example, if you have a single processor with dual cores, purchase four core licenses (the minimum) for SQL Server 2012 software.
- 5 To use SQL Server 2014 with Metasys products, you must install Microsoft cumulative update package 3 (KB2984923) for SQL Server 2014.  
To download the update package, visit <http://support.microsoft.com/kb/2984923/>.

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys®

### VMD

#### Generator Express

VMD Generator Express (VGE) is software designed to support the creation of the Vendor Model Definition (VMD) files, used by the Modbus RTU and TCP integration on NIEx9 for third party integrations platform.

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

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

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



#### Features

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

Ordering Codes	Description
TL-NIE-DVD	VMD Generator Express software. It does not include the license

#### Note

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

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

Metasys®

### CCT

#### Controller Configuration Tool

The Controller Configuration Tool (CCT) is used to configure, simulate and commission the Field Equipment Controllers (FECs), Advanced Application Field Equipment Controllers (FACs), Network Control Engines (NCEs), Input/Output Modules (IOMs), and Variable Air Volume (VAV) Modular Assembly (VMA16s). You can also configure N2 VMAs using the System Section Wizard or using pre-built applications that cover the most common VMA configurations.

CCT operates in three modes that provide key functionality for your system: Configuration, Simulation, and Commissioning.

The Configuration mode allows you to select a wide variety of mechanical and control logic options through system selection trees for typical air handling, terminal unit, central plant and VAV box mechanical systems. When required you can customize the standard logic provided by the system selection process to meet your specialized control logic requirements. A comprehensive CCT Help (press F1) is provided to assist you as you make selections in the System Selection Tree and build and customise your applications. The Simulation mode allows you to review the application logic as if you were commissioning the system. You can make adjustments to setpoints, inputs, or sensors during a simulation session to validate the logic before assigning the configuration to a specific controller.

The Commissioning mode manages the downloading of files to the FECs through three different network connection points. You can connect using a Wireless Commissioning Converter (MS-BTCVT-1) or BACnet® router (TL-BRTRP-0) between your laptop and the MS/TP bus, using a USB adapter with ZigBee™ driver for your laptop computer, or using the Ethernet Passthru mode. After downloading the controllers, you can use the Commissioning mode to validate the application and adjust setpoints and setup parameters.

For VAV applications, CCT includes an optional box flow test to automatically exercise all the VAV boxes to ensure correct mechanical installation and proper configuration of the key flow setup parameters. In addition, the Commissioning mode has a Balancer tab for VAV applications that guides you through the typical steps of setting the flow constants. The ZFR Checkout Tool (ZCT) is available to validate the wireless connectivity and health of your wireless mesh network.

A Commissioning mode-only version of the CCT software is available for which is restricted to commissioning tasks only. The Configuration and Simulation modes are disabled in the CCT Commissioning mode only software.



#### Features

- Capability to customize standard control system logic that is created from simple system selection trees
- Consistent user interface across the Configuration, Simulation and Commissioning modes.
- Flexible connection capabilities for loading and commissioning controller
- Ability to download, upload, and upgrade multiple controllers at once
- Wireless commissioning via optional Bluetooth® adaptor
- Select required protocol for FEC/FAC and VMA controllers, BACnet mstp or N2 (CCT10.1 or later)



## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys® CCT

#### CCT Ordering Information

Ordering Code	Description
MS-CCT-0	CCT Media for the full and commissioning only versions

#### Technical Specifications

<b>Product Code</b>	<b>MS-CCT-0</b>
<b>Recommended Platform</b>	Intel® Core™ 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum) 20 GB free hard disk available (600 MB minimum) DVD drive
<b>Recommended Memory</b>	Computer Platforms: 2 GB RAM recommended (1 GB RAM minimum) Server Platforms: 4 GB RAM recommended (2 GB RAM minimum)
<b>Supported Operating Systems Full Server Platforms and Database Software</b>	<p><b>Windows® 8.1 Pro and Windows 8.1 Enterprise Editions (64-bit)</b> Supports Microsoft® SQL Server® 2014 Express (64-bit) <sup>1</sup>, Microsoft SQL Server 2012 Express with SP2 (64-bit), or Microsoft SQL Server 2008 R2 Express with SP2 (64-bit)</p> <p><b>Windows 8 Pro and Windows 8 Enterprise Editions (32-bit or 64-bit)</b> Supports Microsoft SQL Server 2014 Express (32-bit or 64-bit) <sup>1</sup>, Microsoft SQL Server 2012 Express with SP2 (32-bit or 64-bit), or Microsoft SQL Server 2008 R2 Express with SP2 (32-bit or 64-bit) <b>Note:</b> A 32-bit operating system only supports a maximum of 4 GB memory. For best performance, use a 64-bit operating system. <b>Note:</b> The OS and software must both be 32-bit or 64-bit. Note: cTool applications (for example, HVACPro or GX) cannot be installed on 64-bit platforms. <b>Note:</b> We recommend Windows 8 for users that need cTools.</p> <p><b>Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (32-bit or 64-bit)</b> Supports Microsoft SQL Server 2014 Express (32-bit or 64-bit) <sup>1</sup>, Microsoft SQL Server 2012 Express with SP2 (32-bit or 64-bit), or Microsoft SQL Server 2008 R2 Express with SP2 (32-bit or 64-bit) <b>Note:</b> A 32-bit operating system only supports a maximum of 4 GB memory. For best performance, use a 64-bit operating system. <b>Note:</b> The OS and software must both be 32-bit or 64-bit. <b>Note:</b> cTool applications (for example, HVACPro or GX) cannot be installed on 64-bit platforms.</p>
<b>Required Web Browser Software for Metasys Client Computers</b>	<p><b>Windows Internet Explorer® version 8, 9, 10, and 11</b> <b>Note:</b> In Internet Explorer 11, select the Use Microsoft compatibility lists option, found under Tools &gt; Compatibility View Settings, to ensure that websites appear and function correctly. <b>Note:</b> Web browser software is required if you want to view the Controller Tool Help (LIT-12011147) online. However, you can also access this help system as a PDF from the software.</p>
<b>Network Communication for Metasys CCT Client Computers</b>	Ethernet network interface card 10/100/1000 Mbps (100 Mbps network or better recommended)
<b>Software Optionally Installed During CCT Install</b>	Microsoft .NET Framework version 3.5 with SP1 or 3.5.1 Microsoft SQL Server 2008 Express software with SP2
<b>Optional Hardware</b>	Any network or local printer supported by the qualified Windows operating system

#### Note

- 1** To use SQL Server 2014 with Metasys products, you must install Microsoft cumulative update package 3 (KB2984923) for SQL Server 2014. To download the update package, visit <http://support.microsoft.com/kb/2984923/>.

#### Accessories

Ordering Codes	Description
BT-CVTVT-1	Bluetooth® commissioning adaptor
TL-BRTRP-0	Portable BACnet/IP to MSTP Router, includes a 1.8M USB cable and a 1.5M Ethernet cable
ZFR-USBHA-0	USB Dongle with ZigBee™ Driver provides a wireless connection through the CCT to allow wireless commissioning of the wirelessly enabled FEC and VMA16 field controllers. Also allows use of the ZCT in CCT.

## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys®

### CPO10

#### Central Plant Optimization™

Johnson Controls has combined expertise from designing YORK® chillers and Metasys controls to bring the best world-class program to operate your chiller plant. The result is Johnson Controls Central Plant Optimization™ 10, which saves energy and improves reliability in your facility. A facility's central chiller plant uses a significant portion of the HVAC energy, typically 35%. Managing this load, while still maintaining occupant comfort is a primary strategy for overall energy management. CPO 10, which is powered by the Metasys system, provides such a strategy. The Metasys CPO 10 application uses field-proven, factory-tested and fully documented best practices to select the most efficient combination of chillers, pumps, heat exchangers and cooling towers needed to match the building load. The application then commands the selected devices to the appropriate state or speed, providing the necessary sequencing of pumps, isolation valves and main equipment, while observing all the timing delays for safe and stable operation of the central chiller plant.



#### Features

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



## BAS SYSTEM SOFTWARE Supervisor Software and Tools

### Metasys® CPO10

#### *The CPO10 Application Supports:*

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

The CPO10 application offers a variety of primary control strategies including measuring building chilled-water flow and differential temperature, the chillers' kW load and flow through a decoupler pipe in a primary/secondary system, or differential temperature only in a constant speed chilled water pump system. You can also select dozens of secondary strategies, such as open loop control of the cooling towers (as defined by the American Society of Heating, Refrigerating and Air-Conditioning Engineers [ASHRAE]) or closed loop control of condenser-water setpoint. The CPO10 application supports 24 sequences through any combination of the following chilled water systems and condenser water systems:

#### Chilled Water Systems

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

#### Condenser Water Systems

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

## BAS NETWORK AUTOMATION Supervisory Controllers

Metasys®

### NAE

#### Network Automation Engine

Network Automation Engines (NAEs) enable Internet Protocol (IP) connectivity and web-based access to Metasys Building Management Systems (BMSs).

NAEs leverage standard building management communication technologies, including BACnet® protocol, LONWORKS® network, and N2 Bus protocol to monitor and supervise a wide variety of Heating, Ventilating and Air Conditioning (HVAC); lighting, security, fire and access control equipment.

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

NAEs feature an embedded site management portal user interface, support multiple concurrent web browser sessions with password and permission access control and provide the protection of industry standard Information Technology (IT) security.

NAE55 models support a comprehensive set of supervisory features and functions for large facilities and technically advanced buildings and complexes.

The NAE35/NAE45 models enable cost-effective NAE connectivity and control in smaller facilities, and can extend NAE supervisory functions in larger facilities.

The NAE85 is a high-capacity NAE that allows integration of large BACnet IP systems and can take the place of multiple NAEs.



NAE55 Network Automation Engine



NAE45 Network Automation Engine

#### Features

- Communication using commonly accepted IT standards at the automation and enterprise level
- Web-based user interface
- Site director function
- Support for web services at the automation network level
- User interface and online system configuration software embedded in NAE
- Supervision of field controller networks including BACnet MS/TP, N2 Bus, LONWORKS Network and BACnet IP Devices
- Multiple connection options for data access

## BAS NETWORK AUTOMATION Supervisory Controllers

Metasys®

NAE

### NAE35

Ordering Codes	Description
<b>MS-NAE35xx-xxx</b> (Base Features of Each NAE35)	NAE35 Network Automation Engines: Requires a 24 VAC power supply. Each model includes one RS-232-C serial port, one USB serial port, one Ethernet port, and an MS-BAT1020-0 data protection battery.
<b>MS-NAE3510-2</b>	Supports one N2 or BACnet MS/TP (RS-485) trunk; includes an additional RS-232-C serial port for optional external modem; supports up to 50 devices on the N2 or BACnet MS/TP trunk.
<b>MS-NAE3511-2</b>	Supports one N2 or BACnet MS/TP (RS-485) trunk (RS-485 port); includes an internal modem; supports up to 50 devices on the N2 or BACnet MS/TP trunk.
<b>MS-NAE3514-2</b>	Supports one N2 or BACnet MS/TP (RS-485) trunk; features basic access support; includes an additional RS-232-C serial port for optional external modem; supports up to 50 devices on the N2 or BACnet MS/TP trunk.
<b>MS-NAE3515-2</b>	Supports one N2 or BACnet MS/TP (RS-485) trunk; features basic access support; includes an internal modem; supports up to 50 devices on the N2 or BACnet MS/TP trunk.
<b>MS-NAE3520-2</b>	Supports one LonWorks trunk, includes an additional RS-232-C serial port for optional external modem. Supports up to 64 devices on the LonWorks port.
<b>MS-NAE3521-2</b>	Supports one LonWorks trunk, includes an internal modem. Supports up to 64 devices on the LonWorks port.
<b>MS-NAE3524-2</b>	Supports one LonWorks trunk, features Basic Access support, and includes an additional RS-232-C serial port for optional external modem. Supports up to 64 devices on the LonWorks trunks.
<b>MS-NAE3525-2</b>	Supports one LonWorks trunk, features Basic Access support, and includes an internal modem. Supports up to 64 devices on the LonWorks trunks.

### NAE45

Ordering Codes	Description
<b>MS-NAE45xx-xxx</b> (Base Features of Each NAE45)	NAE45 Network Automation Engines: Requires a 24 VAC power supply. Each model includes one RS-232-C serial port, one USB serial port, one Ethernet port, and an MS-BAT1020-0 data protection battery.
<b>MS-NAE4510-2</b>	Supports one N2 or BACnet MS/TP (RS-485) trunk; includes an additional RS-232-C serial port for optional external modem; supports up to 100 devices on the N2 or BACnet MS/TP trunk.
<b>MS-NAE4511-2</b>	Supports one N2 or BACnet MS/TP (RS-485) trunk; includes an internal modem; supports up to 100 devices on the N2 or BACnet MS/TP trunk.
<b>MS-NAE4520-2</b>	Supports one LonWorks trunk, includes an additional RS-232-C serial port for optional external modem; supports up to 127 devices on the LonWorks port.
<b>MS-NAE4521-2</b>	Supports one LonWorks trunk, includes an internal modem; supports up to 127 devices on the LonWorks port.

## BAS NETWORK AUTOMATION Supervisory Controllers

Metasys®

NAE

### NAE55

Ordering Codes	Description
<b>MS-NAE55xx-x</b> (Base Features of Each NAE55)	NAE55 Network Automation Engines: Requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, two USB serial ports, two RS-485 ports, one Ethernet port and one MS-BAT1010-0 Data Protection Battery. Supports up to 100 devices on each N2 or BACnet MS/TP trunk.
<b>MS-NAE5510-2E</b>	Supports two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk).
<b>MS-NAE5511-2E</b>	Supports two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk); includes an internal modem.
<b>MS-NAE5520-2E</b>	Supports a LonWORKS trunk, and two N2 trunks or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk). Supports up to 255 devices on the LonWORKS trunk.
<b>MS-NAE5521-2E</b>	Supports a LonWORKS trunk, and two N2 trunks or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk); includes an internal modem. Supports up to 255 devices on the LonWORKS trunk.

### NAE85

Ordering Codes	Description
<b>MS-NIE8500-0 *</b>	NxE85 model with 1U chassis for mounting in a server rack. <b>Note:</b> The NAE85 models ship as MS-NIE8500-0 models. Use the ChangeModel utility in the NxE85 Metasys software to change an NIE85 to an NAE85.
<b>MS-NxE85SW-0</b>	NxE85 software for 10,000 objects (new projects only software).

#### Note

\* Standard NxE85 models supports 10,000 objects; an upgrade is available to support an additional 15,000 objects.

### Accessories

Ordering Codes	Description
<b>MS-BAT1010-0</b>	Replacement data protection battery for NAE55 and NIE55. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of 3 to 5 years at 21°C (70°F)
<b>MS-BAT1020-0</b>	Replacement data protection battery for NAE35, NAE45, and NCE25. Rechargeable NiMH battery: 3.6 V 500 mAh, with a typical life of 10 years at 21°C (70°F)
<b>MS-15KUPG-0</b>	15,000 object upgrade for NxE85
<b>MS-MULTENGSW-6</b>	Network Engine Image Upgrade for all NAE/NIE/NCE Engines on a Site, Excluding NxE85
<b>MS-EXPORT-0</b>	Export Utility extracts historical trend, alarm, and audit data from the system and presents the historical data in a variety of formats. <b>Note:</b> This option is not necessary for sites that have an ADS/ADX that is the Site Director because Export Utility is provided with the ADS/ADX solution.
<b>SC450RM1U</b> (OEM Part No.)	Recommended Uninterruptible Power Supply (UPS) for NxE85 model: American Power Conversion (APC®) Smart-UPS SC 450VA, 280 W 120 VAC input/output with NEMA 5-15R output connections

## BAS NETWORK AUTOMATION Supervisory Controllers

### Metasys® NAE

#### NAE35 and NAE45 - Technical Specification

<b>Power Requirement</b>	Dedicated nominal 24 VAC, Class 2 power supply (North America), Safety Extra- Low Voltage (SELV) power supply (Europe), at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
<b>Power Consumption</b>	25 VA maximum
<b>Ambient Operating Conditions</b>	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
<b>Ambient Storage Conditions</b>	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
<b>Data Protection</b>	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0
<b>Processor</b>	192 MHz Renesas™ SH4 7760 RISC processor
<b>Memory</b>	128 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 128 MB Synchronous Dynamic Random Access Memory (SDRAM) for operations data dynamic memory
<b>Operating System</b>	Microsoft® Windows® CE embedded
<b>Network and Serial Interfaces</b>	One Ethernet port; connects at 10 or 100 Mbps; 8-pin RJ-45 connector One optically isolated RS-485 port; 9.6k, 19.2k, 38.4k, or 76.8k baud (depending on protocol); with a pluggable and keyed 4-position terminal block (FC Bus available on NAE351x and NAE451x models only) One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (LonWorks port available on NAE352x-x and NAE452x models only) One RS-232-C serial port with standard 9-pin sub-D connector that supports standard baud rates. A second serial port, on models without an internal modem, that supports an optional, user-supplied external modem. One USB serial port with standard USB connector that supports an optional, user-supplied external modem. Option: One telephone port for internal modem; up to 56 Kbps; 6-pin modular connector (NAE models with an optional internal modem have one RS-232-C serial port only.)
<b>Housing</b>	
<i>Plastic Housing Material</i>	ABS + polycarbonate UL94-5VB
<i>Protection</i>	IP20 (IEC 60529)
<b>Mounting</b>	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
<b>Dimensions (H x W x D)</b>	131 x 270 x 62 mm Minimum space for mounting NAE35 and NAE45: 210 x 350 x 110 mm
<b>Shipping Weight</b>	1.2 kg
<b>Compliance</b>	
<i>United States</i>	UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment UL Listed, File S4977, UUKL 864 - 9th Edition, Smoke Control Equipment (MS-NAE3510-2U and MS-NAE4510-2U models only); FCC Compliant to CFR47, Part 15, Subpart B, Class A
<i>Canada</i>	UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003
<i>Europe</i>	CE Mark - Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
<i>Australia and New Zealand</i>	C-Tick Mark, Australia/NZ Emissions Compliant
<i>BACnet International</i>	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)

## BAS NETWORK AUTOMATION Supervisory Controllers

### Metasys® NAE

#### NAE55xx-2 - Technical Specification

<b>Power Requirement</b>	Dedicated nominal 24 VAC, Class 2 power supply (North America); Safety Extra-Low Voltage (SELV) power supply (Europe), at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
<b>Power Consumption</b>	50 VA maximum
<b>Ambient Operating Conditions</b>	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
<b>Ambient Storage Conditions</b>	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
<b>Data Protection Battery</b>	Supports data protection on power failure. Rechargeable gel cell battery: 12 V, 1.2 Ah with a typical life of 3 to 5 years at 21°C; Product Code Number: MS-BAT1010-0
<b>Clock Battery</b>	Maintains real-time clock through a power failure. Onboard cell; typical life 10 years at 21°C
<b>Processor</b>	1.6 GHz Intel® Atom™ processor
<b>Memory</b>	4 GB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 1 GB Synchronous Dynamic Random Access Memory (SDRAM) for operations data dynamic memory for all models
<b>Operating System</b>	Microsoft® Windows® Embedded Standard (WES) 2009
<b>Network and Serial Interfaces</b>	One Ethernet port; connects at 10/100 Mbps; 8-pin RJ-45 connector Two optically isolated RS-485 ports; 9.6k, 19.2k, 38.4k, or 76.8k baud; pluggable and keyed 4 position terminal blocks Two RS-232-C serial ports, with standard 9-pin sub-D connectors, that support all standard baud rates Two USB serial ports; standard USB connectors support an optional, user-supplied external modem Options: One telephone port for internal modem; up to 56 Kbps; 6-pin modular connector One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (LonWorks port available on NAE552x-x models only)
<b>Housing</b>	
<i>Plastic Housing</i>	With internal metal shield
<i>Plastic Material</i>	ABS + polycarbonate; Protection: IP20 (IEC 60529)
<b>Mounting</b>	On flat surface with screws on four mounting feet or on dual DIN rail
<b>Dimensions (H x W x D)</b>	226 x 332 x 96.5 mm including mounting feet Minimum space for mounting: 303 x 408 x 148 mm
<b>Shipping Weight</b>	2.9 kg
<b>Compliance</b>	
<i>United States</i>	UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment FCC Compliant to CFR47, Part 15, Subpart B, Class A
<i>Canada</i>	UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003
<i>Europe</i>	CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
<i>Australia and New Zealand</i>	C-Tick Mark, Australia/NZ Emissions Compliant
<i>BACnet International</i>	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)

## BAS NETWORK AUTOMATION Supervisory Controllers

### Metasys® NAE

#### NAE85 Software System Requirements for Installation/Upgrade

<b>Product Code</b>	<b>MS-NxE85SW-0:</b> NxE85 software for 10,000 objects (new projects only software)
<b>Recommended Computer Platform</b>	Intel Xeon®E5506, 2.13 GHz, 4 MB Cache 2 x 160 GB 7.2K , 8.9 cm (3.5 in.) Cabled 3 Gbps, RAID 1 configuration with add-in SAS6/iR (SATA/SAS Controller)
<b>Hard Disk</b>	160 GB minimum
<b>Recommended Memory</b>	2 GB RAM minimum
<b>Supported Operating Systems (OS) and Software</b>	<b>Windows Server® 2012 R2 Editions</b> Microsoft .NET Framework Version 3.5 Service Pack (SP) <sup>1</sup> <b>Windows Server 2012 Editions</b> Microsoft .NET Framework Version 3.5 SP <b>Windows Server 2008 R2 Standard and Enterprise Editions with SP1</b> Microsoft .NET Framework Version 3.5 SP <b>Windows Server 2008 R2 Web Edition with SP1</b> Microsoft .NET Framework Version 3.5 SP <b>Windows Server 2008 Standard and Enterprise Editions with SP2 (32-bit)</b> <b>Note:</b> Microsoft .NET Framework Version 3.5 SP 1 is required for each operating system.
<b>Internal Optical Drive</b>	DVD ROM, SATA
<b>Supported Operating Systems for Metasys Client Computers</b>	Windows 8.1 Pro and Windows 8.1 Enterprise Editions (64-bit) Windows 8 Pro and Windows 8 Enterprise Editions (64-bit) Windows 7 Professional, Enterprise, and Ultimate Editions with SP1 (32-bit or 64-bit) Apple® OS X® 10.8 Mountain Lion Apple OS X 10.9 Mavericks <b>Note:</b> Apple operating systems are supported for Metasys client computers only. <b>Note:</b> In Apple OS X, you cannot view Graphics+ graphics in the Site Management Portal UI.
<b>Recommended Antivirus Software</b>	Symantec Endpoint Protection Version 12
<b>Supported Virtual Environments</b>	Microsoft Hyper-V™, VMWare®
<b>Network Communication</b>	Network interface Single Ethernet network interface card 10/100/1000 Mbps (100 Mbps or better recommended)
<b>Recommended Data Protection</b>	Uninterruptible power supply (UPS) Smart-UPS SC 450VA, 280 W, 120 VAC input/output, NEMA 5-15R output connections, OEM Part No. SC450RM1U



## BAS NETWORK AUTOMATION Supervisory Controllers

### Metasys®

### NIEx9

#### Network Integration Engine

Network Integration Engines (NIEx9s) for 3<sup>rd</sup> party integrations enable Internet Protocol (IP) connectivity and Web-based access to Metasys Building Management Systems (BMSs).

NIEx9s leverage standard building management communication technologies, including BACnet® protocol, LONWORKS® network and N2 Bus protocol, Modbus, MBus, KNX and 3<sup>rd</sup> party proprietary protocols to monitor and supervise a wide variety of Heating, Ventilating and Air Conditioning (HVAC); lighting; security; fire; electrical and thermal measuring and access control equipment.

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

NIEx9s feature an embedded Site Management Portal user interface, support multiple concurrent Web browser sessions with password and permission access control and provide the protection of industry standard Information Technology (IT) security.

NIE59 models support a comprehensive set of supervisory features and functions for large facilities and technically advanced buildings and complexes.

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

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

*Refer to the Network Integration Engine for 3<sup>rd</sup> Party Integrations Product Bulletin (LIT-12011923) for important product application information.*

#### Features

- Communication using commonly accepted IT standards at the automation and enterprise level Web-based user interface
- Site Director function
- Support for Web services at the automation
- Network level
- User interface and online system
- Configuration software embedded in NAE supervision of field controller networks including N2 Bus, LONWORKS network, BACnet Master-Slave/Token-Passing (MS/TP), BACnet IP devices, Modbus RTU, Modbus IP, M-Bus, KNX and other 3<sup>rd</sup> party protocols
- Multiple connection options for data access



NIE29



NIE39/NIE49



NIE59



## BAS NETWORK AUTOMATION Supervisory Controllers

Metasys®

NIEx9

NIE29

Ordering Codes	Description
<b>MS-NIE29xx-x (Base Features of Each NIE29)</b>	Requires a 24 VAC power supply and includes one RS-232-C serial port, one RS-485 optically isolated SA Bus port, one USB serial port, one Ethernet port and an MSBAT1020-0 Data Protection Battery. Each NIE29 Series model has 33 integral I/O points and supports up to 128 additional I/O points on the SA Bus. <b>Note:</b> Only one port can be defined for 3rd party integration. The other ports have to be defined in order to use standard protocols (N2, BACnet or LON)
<b>MS-NIE2910-0</b>	Supports one third-party trunk (Modbus RTU or TCP/IP, M-Bus, or KNX) and one N2 Bus. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported.
<b>MS-NIE2916-0</b>	Supports one third-party trunk (Modbus RTU or TCP/IP, M-Bus, or KNX) and one N2 Bus. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported. Includes integral display screen.
<b>MS-NIE2920-0</b>	Supports one third-party trunk (Modbus RTU or TCP/IP, M-Bus, or KNX) and one LonWorks Network trunk. The number of supported devices on the third-party trunk depends on the protocol. For the LonWorks network, up to 32 devices are supported.
<b>MS-NIE2926-0</b>	Supports one third-party trunk (Modbus RTU or TCP/IP, M-Bus, or KNX) and one LonWorks Network trunk. The number of supported devices on the third-party trunk depends on the protocol. For the LonWorks network, up to 32 devices are supported. Includes integral display screen.
<b>MS-NIE2960-0</b>	Supports one third-party trunk (Modbus RTU or TCP/IP, M-Bus, or KNX) and one BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the BACnet MS/TP trunk, up to 32 devices are supported.
<b>MS-NIE2966-0</b>	Supports one third-party trunk (Modbus RTU or TCP/IP, M-Bus, or KNX) and one BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the BACnet MS/TP trunk, up to 32 devices are supported. Includes integral display screen.

### Technical Specification

<b>Power Requirement</b>	Dedicated nominal 24 VAC, Class 2 power supply (North America), Safety Extra Low Voltage (SELV) power supply (Europe), at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
<b>Power Consumption</b>	25 VA maximum <b>Note:</b> The 25 VA rating does not include any power supplied by the NIE29 to devices connected at the NIE29 Binary Outputs (BOs). BO devices connected to and powered by an NIE29 can require an additional 125 VA (maximum).
<b>Ambient Operating Conditions</b>	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
<b>Ambient Storage Conditions</b>	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
<b>Data Protection</b>	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0
<b>Processor</b>	192 MHz Renesas™ SH4 7760 RISC processor
<b>Memory</b>	128 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 128 MB Synchronous Dynamic Random Access Memory (SDRAM) for operations data dynamic memory
<b>Operating System</b>	Microsoft® Windows® CE embedded
<b>Network and Serial Interfaces</b>	One Ethernet port; 10/100 MB; 8-pin RJ-45 connector One optically isolated RS-485 port SA Bus; with a pluggable and keyed 4-position terminal block (on all NIE29 models) One optically isolated RS-485 port; with a pluggable and keyed 4-position terminal block (available on NIE2910, NIE2916, NIE2960 and NIE2966 models only) One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (available on NIE2920 and NIE2926 models only) One RS-232-C serial port with standard 9-pin sub-D connector that supports standard baud rates: 9600, 19.2k, 38.4k, or 76.8k baud. One USB serial port with standard USB connector
<b>Housing</b>	Plastic housing
<b>Plastic Material</b>	ABS and polycarbonate
<b>Protection</b>	IP20 (IEC60529)
<b>Mounting</b>	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
<b>Dimensions (H x W x D)</b>	155 x 270 x 64 mm Minimum mounting space required: 250 x 370 x 110 mm
<b>Shipping Weight</b>	1.2 kg
<b>Compliance</b>	<b>Europe</b> CE Mark - Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC. <b>BACnet International</b> BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)

## BAS NETWORK AUTOMATION Supervisory Controllers

Metasys®

NIE39

NIE39

Ordering Codes	Description
<b>MS-NIE39xx-x</b> (Base Features of Each NIE39)	Requires a 24 VAC power supply. Each model includes two RS-232-C serial port, one USB serial port, one Ethernet port and an MS-BAT1020-0 Data Protection Battery. <b>Note:</b> Only one port can be defined for 3rd party integration. The other ports have to be defined in order to use standard protocols (N2, BACnet or LON)
<b>MS-NIE3910-2</b>	Supports one third-party trunk (Modbus RTU or TCP/IP, M-Bus, or KNX) and one N2 Bus or one BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or BACnet MS/TP trunk, up to 50 devices are supported.
<b>MS-NIE3920-2</b>	Supports one third-party trunk (Modbus RTU or TCP/IP, M-Bus, or KNX) and one LONWORKS trunk. The number of supported devices on the third-party trunk depends on the protocol. For the LONWORKS network, up to 64 devices are supported.

NIE49

Ordering Codes	Description
<b>MS-NIE49xx-x</b> (Base features of each NIE49)	Requires a 24 VAC power supply. Each model includes two RS-232-C serial port, one USB serial port, one Ethernet port and an MS-BAT1020-0 Data Protection Battery. <b>Note:</b> Only one port can be defined for 3rd party integration. The other ports have to be defined in order to use standard protocols (N2, BACnet or LON)
<b>MS-NIE4910-2</b>	Supports one third-party trunk (Modbus RTU or TCP/IP, M-Bus, or KNX) and one N2 Bus or one BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or BACnet MS/TP trunk, up to 100 devices are supported.
<b>MS-NIE4920-2</b>	Supports one third-party trunk (Modbus RTU or TCP/IP, M-Bus, or KNX) and one LONWORKS trunk. The number of supported devices on the third-party trunk depends on the protocol. For the LONWORKS trunk, up to 127 devices are supported.

### Technical Specifications

<b>Power Requirement</b>	Dedicated nominal 24 VAC, Class 2 power supply (North America), Safety Extra Low Voltage (SELV) power supply (Europe), at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
<b>Power Consumption</b>	25 VA maximum
<b>Ambient Operating Conditions</b>	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
<b>Ambient Storage Conditions</b>	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
<b>Data Protection</b>	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0
<b>Processor</b>	192 MHz Renesas™ SH4 7760 RISC processor
<b>Memory</b>	128 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 128 MB Synchronous Dynamic Random Access Memory (DRAM) for operations data dynamic memory
<b>Operating System</b>	Microsoft® Windows® CE embedded
<b>Network and Serial Interfaces</b>	One Ethernet port; 10/100 Mbps; 8-pin RJ-45 connector (Metasys communications & integration bus) One optically isolated RS-485 port; 9600, 19.2k, 38.4k, or 76.8k baud (depending on protocol); with a pluggable and keyed 4-position terminal block (available on NIE3910 and NIE4910 models only) One LONWORKS port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (available on NIE3920 and NAE4920 models only) Two RS-232-C serial port with standard 9-pin sub-D connector that supports standard baud rates: 9600, 19.2k, 38.4k, or 76.8k baud. One USB serial port with standard USB connector that supports an optional, user-supplied external modem.
<b>Housing</b>	Plastic housing material: ABS + polycarbonate UL94-5VB
<b>Protection</b>	IP20 (IEC 60529)
<b>Mounting</b>	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
<b>Dimensions (H x W x D)</b>	131 x 270 x 62 mm Minimum space for mounting: 210 x 350 x 110 mm
<b>Shipping Weight</b>	1.2 kg
<b>Compliance</b>	<p><b>Europe</b> CE Mark - Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.</p> <p><b>BACnet International</b> BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)</p>

## BAS NETWORK AUTOMATION Supervisory Controllers

Metasys®

NIE59

### NIE59

Ordering Codes	Description
<b>MS-NIE59xx-x</b> (Base features of each NIE59)	Requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, two USB serial ports, two RS-485 ports, one Ethernet port and one MS-BAT1010-0 Data Protection Battery. Supports up to 100 devices on each N2 or BACnet MS/TP trunk. <b>Note:</b> Only one port can be defined for 3rd party integration. The other ports have to be defined in order to use standard protocols (N2, BACnet or LON)
<b>MS-NIE5960-2</b>	Supports one third-party trunk (Modbus RTU or TCP/IP, M-Bus, or KNX) and one N2 or BACnet MS/TP (RS-485) trunk. The number of supported devices depends on third-party protocol. For the N2 or BACnet MS/TP (RS-485) trunk, up to 100 devices are supported.
<b>MS-NIE5920-2</b>	Supports one third-party trunk (Modbus RTU or TCP/IP, M-Bus, or KNX) and one LONWORKS Network trunk. The number of supported devices depends on protocol. For the LONWORKS trunk, up to 255 devices are supported.

### NIE59xx-2 - Technical Specifications

<b>Power Requirement</b>	Dedicated nominal 24 VAC, Class 2 power supply (North America), Safety Extra-Low Voltage (SELV) power supply (Europe), at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
<b>Power Consumption</b>	50 VA maximum
<b>Ambient Operating Conditions</b>	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
<b>Ambient Storage Conditions</b>	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
<b>Data Protection</b>	Supports data protection on power failure. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of 3 to 5 years at 21°C; Product Code Number: MS-BAT1010-0
<b>Clock Battery</b>	Maintains real-time clock through a power failure. Onboard cell; typical life 10 years at 21°C
<b>Processor</b>	1.6 GHz Intel® Atom™ processor
<b>Memory</b>	4 GB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 1 GB Synchronous Dynamic Random Access Memory (SDRAM) for operations data dynamic memory for all models
<b>Operating System</b>	Microsoft® Windows® Embedded Standard (WES) 2009
<b>Network and Serial Interfaces</b>	One Ethernet port; 10/100 Mb; 8-pin RJ-45 connector (Metasys® communications & integration bus) One optically isolated RS-485 ports; 9600, 19.2K, 38.4K or 76.8K baud; pluggable and keyed 4 position terminal blocks Two RS-232-C serial ports, with standard 9-pin sub-D connector, that support all standard baud rates One LONWORKS port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (available on NIE5920 model only) Two USB serial ports; standard USB connectors support an optional, user-supplied external modem
<b>Housing</b>	Plastic housing with internal metal shield
<b>Plastic material</b>	ABS + polycarbonate UL94-5VB Protection: IP20 (IEC 60529)
<b>Mounting</b>	On flat surface with screws on four mounting feet or on dual DIN rail
<b>Dimensions (H x W x D)</b>	226 x 332 x 96.5 mm including mounting feet. Minimum space for mounting: 303 x 408 x 148 mm
<b>Shipping Weight</b>	2.9 kg
<b>Compliance</b>	<p><b>Europe</b> CE Mark - Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.</p> <p><b>BACnet International</b> BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)</p>

### Accessories

Ordering Codes	Description
<b>MS-BAT1010-0</b>	Replacement data protection battery for NIE59. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of 3 to 5 years at 21°C
<b>MS-BAT1020-0</b>	Replacement data protection battery for NIE29, NIE39, and NIE49. Rechargeable NiMH battery: 3.6 V 500 mAh, with a typical life of 10 years at 21°C

## BAS NETWORK AUTOMATION Supervisory Controllers

### Metasys®

## NIE89 Software

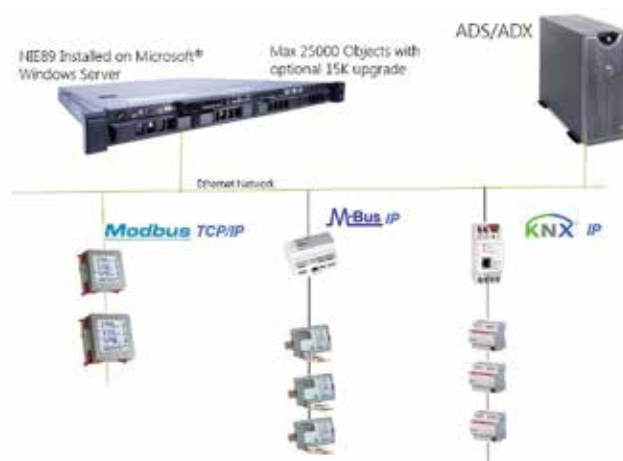
### Network Integration Engine Software

The Metasys NIE89 is high-capacity server model for the integration of large third-party networks into the Metasys network.

The NIE89 software is supplied for installation on a Microsoft® Windows server computer. The NIE89 supports 10,000 objects with an optional upgrade available to increase the capacity to 25,000 objects.

The NIE89 supervisory engines can integrate power and energy meters, lighting, HVAC, security, access control, and many proprietary systems that communicate over various protocols. NIE89s provide comprehensive equipment monitoring and control, scheduling, alarm and event management, energy management, data exchange, data trending, and data storage. These engines feature the same embedded Site Management Portal user interface, support multiple concurrent web browser sessions with password and permission access control, and provide the protection of industry-standard IT security.

Upto 8 third-party integration trunks are supported on an NIE89, for example four M-bus trunks and four Modbus trunks each using a specific TCP/IP port. One licensed driver per defined protocol will be required.



### Features

- Support for up to four supervisory devices when configured as a Site Director
- A web-based user interface using HTTP
- Web services for access to data and services at the automation network level
- Routing of event and alarm notifications to an ADS or ADX (ADS-Lite does not support the NIE89)
- The capability to send event and alarm notifications to pager and email destinations directly
- Data collection, trend sampling, and audit trail logging
- Standard protocol clients:
  - Simple Network Management Protocol (SNMP) for network device management
  - Simple Network Time Protocol (SNTP) for time and date synchronization
  - Dynamic Host Configuration Protocol (DHCP) for dynamic IP address assignment
  - Simple Mail Transfer Protocol (SMTP) for sending email notification of alarms and events

## BAS NETWORK AUTOMATION Supervisory Controllers

### Metasys® NIE89 Software

Ordering Code	Description
<b>MS-NIE89SW-0</b>	Network Integration Engine software for installation on a Microsoft® Windows server computer: supports up to 8 third-party trunks (Modbus RTU or TCP/IP, M-Bus, or KNX) and a total of 10,000 objects
<b>MS-NIE89SW-6</b>	Upgrade NIE89 software; for existing NIE89s
<b>MS-MODBUSN89-0</b>	Modbus driver for NIE89
<b>MS-MBUSN89-0</b>	M-Bus driver for NIE89
<b>MS-KNXN89-0</b>	KNX driver for NIE89
<b>MS-15KUPG-0</b>	15,000 object expansion upgrade for NIE89 (one expansion only per NIE89)

### Computer recommendations for NIE89 installation

<b>Recommended Computer Platform</b>	Intel® Quad-Core Processor 2.0 GHz minimum
<b>Hard Disk</b>	160 GB minimum
<b>Recommended Memory</b>	8 GB RAM minimum
<b>Supported Operating Systems (OS) and Software</b>	Windows Server® 2012 R2 Windows Server 2012 Windows Server 2008 R2 Standard with SP1 Windows Server 2008 R2 Web with SP1 Windows Server 2008 Standard with SP2 (32-bit) <b>Note:</b> Microsoft .NET Framework 3.5 Service Pack (SP) 1 is required for each operating system.
<b>Internal Optical Drive</b>	DVD ROM, SATA
<b>Supported Web Browser Software for Metasys Site Management Portal Cloud-based Client Computers</b>	Windows Internet Explorer® version 8, 9, 10, and 11 <b>Note:</b> In Internet Explorer 11, select the <b>Use Microsoft compatibility lists</b> option, found under Tools > Compatibility View Settings, to ensure that websites appear and function correctly. Apple Safari® version 7.0 and 6.0.5 Other browsers, such as Google® Chrome® and Mozilla® Firefox®, may also be used but are not fully supported. <b>Note:</b> You use the web browser to download the Launcher application. After you install the Launcher application, you use the Launcher, not the web browser, to log in to the Site Management Portal UI.
<b>Supported Virtual Environments</b>	Microsoft Hyper-V™, VMWare®
<b>Network Communication</b>	Network interface Single Ethernet network interface card 10/100/1000 Mbps (100 Mbps or better recommended)
<b>Recommended Data Protection</b>	Uninterruptible power supply (UPS) Smart-UPS SC 450VA, 280 W, 120 VAC input/output, NEMA 5-15R output connections, OEM Part No. SC450RM1U

### Accessories (M-BUS)

Ordering Code	Description
<b>SIS-MBUSNCLH-0E</b>	M-Bus level converter for up to 100 units loads, 230 VAC (TCP connected)
<b>SIS-MBUSNCLL-0E</b>	M-Bus level converter for up to 100 units loads, 24 VAC/DC (TCP connected)
<b>SIS-MBUSRPLH-0E</b>	M-Bus repeater for up to 100 units loads, 230 VAC
<b>SIS-MBUSRPLL-0E</b>	M-Bus repeater for up to 100 units loads, 24 VAC/DC
<b>SIS-MBUSSCLL-0E</b>	M-Bus level converter for up to 100 units loads, 24 VAC/DC (RS232 connection)
<b>SIS-MBUSSCSL-0E</b>	M-Bus level converter for up to 6 units loads, 24 VAC/DC (RS232 connection)
<b>INT-DX-KAB01</b>	Optional connection cable SUB-D to RJ-12 for use with SIS-MBUSSCLL-0E

## BAS NETWORK AUTOMATION Supervisory Controllers

Metasys®

NIE89 Software

### NIE89 Accessories (KNX)

Ordering Code	Description	Features
<b>SIS-KNXNIXL-0E</b>	KNX IP Tunneler Module	<ul style="list-style-type: none"> <li>Connects NIE to a single KNX line</li> <li>Max No. of NIE per Interface: <b>5</b></li> <li>Max Group Addresses per NIE: <b>1000</b></li> </ul> Max KNX Networks per NIE89, NIE59, NIE49: <b>5</b> per NIE39, NIE29: <b>3</b>
<b>SIS-KNXNRXL-0E</b>	KNX IP Router Module	<ul style="list-style-type: none"> <li>KNX Router acts as Area / Line Coupler over Ethernet</li> <li>NIE connects to a "KNX Network"</li> <li>Max Group Addresses per NIE: <b>1000</b></li> </ul> Max KNX Networks per NIE89, NIE59, NIE49: <b>5</b> per NIE39, NIE29: <b>3</b>

### NIE89 Tools

Item	Description
<b>VMD Generator Express Tool</b>	<p>The VMD Generator Express Tool is required to manage the creation of the 3<sup>rd</sup> party integrations on the NIE platform. The usage of the VMD Generator Express Tool requires a certification, which is achieved by attending a training course. For more information please contact your local technical support team.</p>

## BAS NETWORK AUTOMATION Supervisory Controllers

Metasys®

### NxE to NIE Migration kit

*Network Integration Engine*

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

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

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

#### Features

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

#### Benefits

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



## BAS NETWORK AUTOMATION Supervisory Controllers

Metasys®

### NxE to NIE Migration kit

Ordering Code	Description
<b>SIS-NIEX9LIC-0E</b>	NxE to NIE Migration kit. Includes NIE license and 'Engineered Connectivity' sticker to identify migrated device

### Tools

Item	Description
<b>VMD Generator Express Tool</b>	The VMD Generator Express Tool is required to manage the creation of the 3 <sup>rd</sup> party integrations on the NIE platform. The usage of the VMD Generator Express Tool requires a certification, which is achieved by attending a training course. For more information please contact your local technical support team.

### NxE to NIE Product Code Migration

Standard NxE		Migration Kit		NIE equivalent
MS-NCE2510-0	Apply	SIS-NIEX9-LIC-0E	Makes	MS-NIE2910-0
MS-NCE2516-0				MS-NIE2916-0
MS-NCE2520-0				MS-NIE2920-0
MS-NCE2526-0				MS-NIE2926-0
MS-NCE2560-0				MS-NIE2960-0
MS-NCE2566-0				MS-NIE2966-0
MS-NAE3510-2				MS-NIE3910-2
MS-NAE3520-2				MS-NIE3920-2
MS-NAE4510-2				MS-NIE4910-2
MS-NAE4520-2				MS-NIE4920-2
MS-NAE5510-2E				MS-NIE5960-2
MS-NAE5520-2E				MS-NIE5920-2



## BAS NETWORK AUTOMATION Supervisory Controllers

### Metasys®

### NCE

#### Network Control Engine

The Metasys Network Control Engine (NCE) series controllers combine the network supervisor capabilities and Internet Protocol (IP) network connectivity of a Network Automation Engine (NAE) with the Input/Output (I/O) point connectivity and direct digital control capabilities of a Field Equipment Controller (FEC).

NCEs provide a cost-effective solution designed for integrating central plants and large built-up air handlers into your Metasys networks.

All NCE models provide IP Ethernet network connectivity, the Metasys site management portal User Interface (UI) and the network supervisory capabilities featured on NAE35/NAE45 series network automation engines.

All NCE models provide connectivity to and supervisory control of a specified field bus trunk with up to 32 field controllers. Depending on the model, an NCE25 supports either a BACnet® Master-Slave/Token-Passing (MS/TP) trunk, an N2 Bus trunk, or a LONWORKS® network trunk.

All NCE models feature 33 integral I/O points and a Sensor Actuator (SA) Bus, which allow you to increase the NCE's I/O field point capacity and also integrate NS series Network Sensors and Variable Frequency Drives (VFDs) into your NCE application.

Some NCE models feature an integral field controller display screen with a navigation keypad. In addition, some NCE models feature an internal modem that supports standard dial-up capabilities.



NCE25 Network Control Engine

### Features

- Communication using commonly accepted IT standards at the automation and enterprise level Web-based user interface
- Web-based User Interface
- Supervision of either an N2 Bus, LONWORKS Network or BACnet MS/TP Bus field controller trunk
- Multiple connection options for data access
- Integral field controller with 33 I/O points
- Expandable I/O point capacity, NS sensor connectivity and VFD control on field controller SA Bus

## BAS NETWORK AUTOMATION Supervisory Controllers

### Metasys® NCE

Ordering Codes	Description
<b>MS-NCE25xx-x</b> (Base Features on Each NCE25)	Each NCE25 series model requires a 24 VAC power supply and includes one RS-232-C serial port, one RS-485 optically isolated SA Bus port, one USB serial port, one Ethernet port, and an MS-BAT1020-0 data protection battery. Each NCE25 series model has 33 integral I/O points and supports up to 128 additional I/O points on the SA Bus.
<b>MS-NCE2500-0</b>	Base features with no physical field controller trunk connection.
<b>MS-NCE2506-0</b>	Base features with no physical field controller trunk connection. Includes integral display screen.
<b>MS-NCE2510-0</b>	Supports one N2 Bus trunk with up to 32 N2 devices.
<b>MS-NCE2511-0</b>	Supports one N2 Bus trunk with up to 32 N2 devices. Includes internal modem.
<b>MS-NCE2516-0</b>	Supports one N2 Bus trunk with up to 32 N2 devices. Includes integral display screen.
<b>MS-NCE2517-0</b>	Supports one N2 Bus trunk with up to 32 N2 devices. Includes integral display screen and internal modem.
<b>MS-NCE2520-0</b>	Supports one LonWORKS network trunk with up to 32 LonWORKS devices.
<b>MS-NCE2521-0</b>	Supports one LonWORKS network trunk with up to 32 LonWORKS devices. Includes internal modem.
<b>MS-NCE2526-0</b>	Supports one LonWORKS network trunk with up to 32 LonWORKS devices. Includes integral display screen.
<b>MS-NCE2527-0</b>	Supports one LonWORKS network trunk with up to 32 LonWORKS devices. Includes integral display screen and internal modem.
<b>MS-NCE2560-0</b>	Supports one FC Bus trunk with up to 32 MS/TP devices.
<b>MS-NCE2561-0</b>	Supports one FC Bus trunk with up to 32 MS/TP devices. Includes internal modem.
<b>MS-NCE2566-0</b>	Supports one FC Bus trunk with up to 32 MS/TP devices. Includes integral display screen.
<b>MS-NCE2567-0</b>	Supports one FC Bus trunk with up to 32 MS/TP devices. Includes integral display screen and internal modem.

### Accessories

Ordering Codes	Description
<b>MS-BAT1020-0</b>	Replacement data protection battery for NAE35, NAE45, and NCE25. Rechargeable NiMH battery: 3.6 V 500 mAh, with a typical life of 10 years at 21°C (70°F)
<b>MS-BTCVT-1</b>	Wireless commissioning converter, with Bluetooth® technology, for configuring and commissioning the NCE field controller and the devices on the NCE SA Bus
<b>MS-DIS1710-0</b>	Local controller display connects to NCE on SA Bus and provides menu display and navigation keypad for monitoring status and controlling parameters on the NCE's integral field controller. <b>Note:</b> A DIS1710 display does not operate on NCE models that have an integral controller display.
<b>MS-EXPORT-0</b>	Metasys export utility, which extracts historical trend, alarm, and audit data from the system and presents the historical data in a variety of formats. <b>Note:</b> This option is not necessary for sites that have an ADS/ADX as the site director because it is provided with the ADS/ADX solution.

## BAS NETWORK AUTOMATION Supervisory Controllers

### Metasys® NCE

#### Technical Specification

<b>Power Requirement</b>	Dedicated nominal 24 VAC, Class 2 power supply (North America), Safety Extra Low Voltage (SELV) power supply (Europe), at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
<b>Power Consumption</b>	25 VA maximum <b>Note:</b> The 25 VA rating does not include any power supplied by the NCE29 to devices connected at the NCE29 Binary Outputs (BOs). BO devices connected to and powered by an NCE29 can require an additional 125 VA (maximum).
<b>Ambient Operating Conditions</b>	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
<b>Ambient Storage Conditions</b>	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
<b>Data Protection</b>	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0
<b>Processor</b>	192 MHz Renesas™ SH4 7760 RISC processor
<b>Memory</b>	128 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 128 MB Synchronous Dynamic Random Access Memory (SDRAM) for operations data dynamic memory
<b>Operating System</b>	Microsoft® Windows® CE embedded
<b>Network and Serial Interfaces</b>	One Ethernet port; 10/100 MB; 8-pin RJ-45 connector One optically isolated RS-485 port SA Bus; with a pluggable and keyed 4-position terminal block (on all NCE29 models) One optically isolated RS-485 port; with a pluggable and keyed 4-position terminal block (available on NCE2910, NCE2916, NCE2960 and NCE2966 models only) One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (available on NCE2920 and NCE2926 models only) One RS-232-C serial port with standard 9-pin sub-D connector that supports standard baud rates: 9600, 19.2k, 38.4k, or 76.8k baud. One USB serial port with standard USB connector
<b>Housing</b>	Plastic housing
<b>Plastic Material</b>	ABS and polycarbonate
<b>Protection</b>	IP20 (IEC60529)
<b>Mounting</b>	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
<b>Dimensions (H x W x D)</b>	155 x 270 x 64 mm Minimum mounting space required: 250 x 370 x 110 mm
<b>Shipping Weight</b>	1.2 kg
<b>Compliance</b>	
<b>Europe</b>	CE Mark - Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
<b>BACnet International</b>	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)

## BAS NETWORK AUTOMATION Network Displays

### Mobile Access Portal Gateway

## MAP Gateway

Available  
in Spring 2016

The Mobile Access Portal (MAP) Gateway is a pocket-sized web server that provides a wireless mobile user interface to Smart Equipment and Johnson Controls branded system controllers and thermostats.

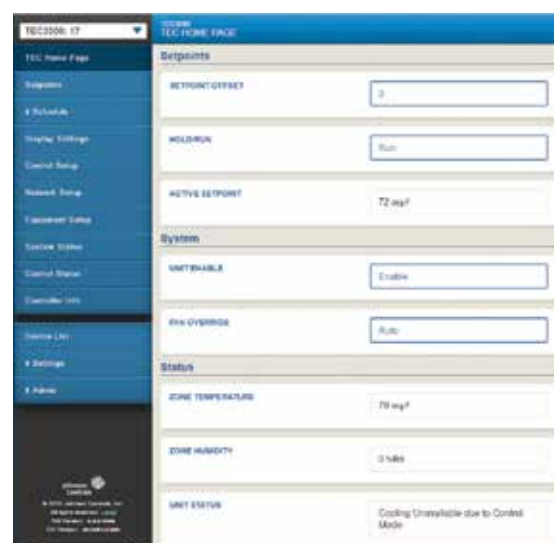
The MAP Gateway can be used to see trunk devices on Metasys® systems. It supports Johnson Controls branded Field Controllers, including FEC, FAC, VMA and TEC3000 (when available).

Offering many-to-one, multi-client connectivity, the MAP Gateway gives you access to any supported device that is on a connected BACnet® Master-Slave/Token-Passing (MS/TP) field bus. The MAP Gateway solution is conveniently sized and has a built-in wireless access point. The MAP Gateway provides an intuitive, browser-based user interface to access advanced features like alarms and point configuration.



### Features

- Multi-Client Connectivity - Provides access to all identifiable supported devices connected to the BACnet® MS/TP trunk
- Browser-based Interface - Offers a local display replacement solution that allows you to access device information through any supported web browser
- Wi-Fi Connectivity - Lets you commission, configure, and access building automation equipment using Wi-Fi-enabled smart devices or laptops
- Advanced Features - Allows you to view alarms, events, and trends. Also to modify schedules and commission devices
- Browser-based Remote Building Management - Allows remote management of building systems
- Portable Size and Mobility - Allows for options to permanently mount or carry the unit from site to site
- Configurable Home Pages for Devices - Allows you to customize your work processes using the Display Object in the Controller Tool
- Easy-to-use Intuitive User Interface - Uses color coded bars on point listings to enable you to quickly get the most important statuses from a long list of points



## BAS NETWORK AUTOMATION

### Network Displays

#### Mobile Access Portal Gateway

#### MAP Gateway

Ordering Codes	Description
<b>TL-MAP1810-0Px *</b>	Portable MAP Gateway – includes MAP Gateway, RJ-12 cable, protective shell, and lanyard
<b>TL-MAP1810-0Sx *</b>	Stationary MAP Gateway – includes MAP Gateway, field bus adapter, mounting bracket, and AC power supply (Adapters for the power supply may vary by country.)

#### Note

\* Last digit (x) represents non-US country requirements.

#### Accessories

Ordering Codes	Description
<b>MP-PRTKIT-0P</b>	Portable Kit – includes RJ-12 cable, shell, and lanyard
<b>MP-STAKIT-0</b>	Stationary Mounting Cradle only – includes mounting bracket and field bus adapter
<b>MP-STAKIT-0H</b>	Stationary Cradle Kit – includes mounting bracket, field bus adapter, and AC power supply
<b>MP-STAFBA-0</b>	Field Bus Adapter – RJ-12 to 4-position Terminal Block Adapter. Used for connecting directly to MS/TP Field Bus



Portable Kit



Stationary Mounting Cradle

## BAS NETWORK AUTOMATION

### Network Displays

## Mobile Access Portal Gateway

### MAP Gateway

### Technical Specifications

<b>Product Codes</b>	<b>TL-MAP1810-0Px:</b> Portable MAP Gateway - includes MAP Gateway, RJ-12 cable, bumper guard, and lanyard. <b>TL-MAP1810-0Sx:</b> Stationary MAP Gateway - includes MAP Gateway, field bus adapter, mounting bracket, and AC power supply. (Adapters for the power supply may vary by country.)	
<b>Power Consumption</b>	From SA/FC bus: 15 VDC at 2.7 VA maximum	
<b>Ambient Temperature Conditions</b>		
<i>Operating</i>	0 to 50°C	
<i>Operating Survival</i>	-30 to 60°C	
<i>Storage</i>	-40 to 70°C	
<b>Ambient Humidity Conditions</b>		
<i>Storage</i>	-40 to 70°C; 5 to 95% RH 30°C maximum dew point conditions	
<i>Operating</i>	0-50°C; 5 to 95% RH, 30°C maximum dew point conditions	
<b>Transmission Power (Typical)</b>	<b>Wireless Local Area Network (WLAN) Transmission Power:</b> +14.5 dBm, 54 Mbps +12.5 dBm, 65 Mbps	
<b>WLAN Receiver Sensitivity (Typical)</b>	-76 dBm, 10% packet error rate (PER), 54 Mbps -73 dBm, 10% PER, 65 Mbps	
<b>Transmission Speeds</b>		
<i>Wireless Communication</i>	2.4 GHz ISM bands, 802.11 b/g/n, 11/22/54 Mbps	
<i>Serial Communication (SA/FC Bus)</i>	9600, 19.2k, 38.4k, or 115.2k bps	
<i>Ethernet Communication</i>	10, 100 Mbps	
<b>Transmission Range (Typical)</b>		
<i>Wireless Communication</i>	30 m line-of-sight indoors 90 m line-of-sight outdoors	
<i>WLAN Range Performance</i>	0 - 15 m = Excellent 15 - 30 m = Good 30 - 90 m = Weakest, approaching out of range	
<b>Wireless Security</b>	WPA2-PSK TKIP (Wi-Fi Protected Access Pre-Shared Key mode Temporal Key Integrity Protocol)	
<b>Network and Serial Interfaces</b>	One SA/FC port (6-pin port; connects with 1.5 m RJ-12 field bus cable) One USB port (Micro-B port; 2.0; supports Open Host Controller Interface [Open HCI] specification)	
<b>Dimensions (H x W x D)</b>		
<i>Unit alone</i>	120 x 70 x 24.5 mm (when used vertically)	
<i>Unit in shell</i>	128 x 75 x 29.5 mm (when used vertically)	
<b>Housing</b>	White Acrylonitrile butadiene styrene (ABS) bracket Black silicone shell	
<b>Weight</b>		
<i>Unit alone</i>	0.10 kg	
<i>Unit in shell</i>	0.15 kg	
	<b>Note:</b> Weights do not include any peripheral components such as cables, lanyard, or an external power supply.	
<b>Web Browser Requirements for Computers and Handheld Devices</b>		
<i>Computer</i>	Windows® Internet Explorer® 10 and Windows Internet Explorer 11, Apple® Safari® 6.1 and later, or Google® Chrome™	
<i>Handheld Device</i>	The handheld device must be running either Internet Explorer Mobile for Windows Mobile version 5 or version 6 operating system (OS); Apple® iPhone® and iPod touch® iOS version 7.0 or greater; or Android™ 4.0.3, 4.0.4, and 4.1+, or Google Chrome. Other web browsers may display the UI, but the functionality is not guaranteed.	
<b>Compliance</b>		
<i>Europe</i>	CE Mark - Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the R&TTE Directive 1999/05/EC and EMC Directive 2004/108/EC. IC: RSS-210	
<i>CE Emission</i>	EN61000-6-3: 2007; Generic standards for residential, commercial, and light-industrial Environments. ETSI EN 301 489-1:2001-09, ETSI EN301 489-3:2001-11 (Class 2), IEC 60950-1/ EN 60950-1	

## BAS NETWORK AUTOMATION Network Displays

### Field Advanced Display

### FAD

The Field Advanced Display (FAD) is a user friendly operator interface featuring BACnet® communication and a colorful, graphic display with touch-screen interface.

The solution is specifically designed to enable user interaction with a BACnet MS/TP-based Building Automation Control System through a convenient, comprehensive and intuitive user interface. The FAD is delivered with a factory programmed application for ease of use and to reduce and simplify its set-up.

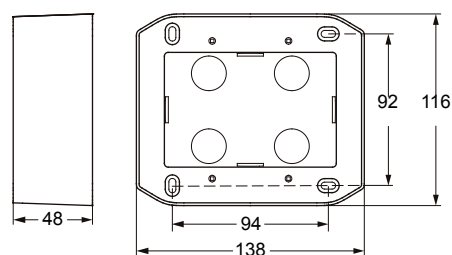
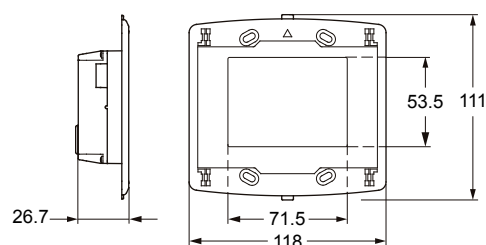
Its flexible, attractive and intuitive graphical interface allows any user type to navigate the Building Automation Control System to view useful information such as temperatures, adjust parameters as set-points, program schedules and calendars and monitor dynamic information such as alarms and events. The access authority to information is managed through a series of optional user passwords.

The FAD offers various options to configure. It can be configured directly without the need of a PC or software tool, using its own user interface or it can be conveniently prepared off-line using a PC. The device configuration can be easily archived, exported or imported with a widely supported file format (CSV) through the embedded USB port.

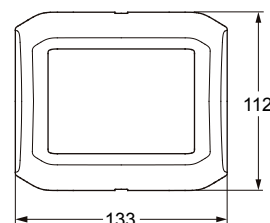
Its compact dimensions, IP protection ratings and multiple mounting options, together with its modern and discrete design, allow the FAD to properly adapt its style to any type of room and user's preference.

#### Features

- Factory Programmed Application
- BACnet® MS/TP Communication
- Portable configurations and easily upgradeable
- Compact and neutral design



Wall Mount Box (WMB0351-0)



Plastic Frame (WPF0351-0 and BPF0351-0)

Dimensions in mm



## BAS NETWORK AUTOMATION

### Network Displays

#### Field Advanced Display

#### FAD

##### Ordering Codes

Codes	Description
<b>FAD0351-0</b>	3.5" Field Advanced Display
<b>WMB0351-0</b>	Wall Mounting Box
<b>FMB0351-0</b>	Flush Mounting Box
<b>IPG0351-0</b>	IP65 Gasket
<b>WPF0351-0</b>	White Plastic Frame
<b>BPF0351-0</b>	Black Plastic Frame
<b>USB0351-0</b>	USB Cable, 0,5 m
<b>USB0351-1</b>	USB Cable, 2 m

#### Controllers with Display packaged solutions

A series of bundle packages are available to facilitate and optimize ordering and logistics operations.

These bundles are including the selected Field Controller and a Field Advanced Display to offer a convenient solution.

##### Ordering Codes

Codes	Description
<b>FED2611-0</b>	Field Equipment Controller, 24 Vac, 17-Points with FAD Display
<b>FCD2612-1</b>	Field Advanced Controller, 24 Vac, 18-Points with FAD Display
<b>FCD2612-2</b>	Field Advanced Controller, 230 Vac, 18-Points with FAD Display
<b>FCD2611-0</b>	Field Advanced Controller, 24 Vac, 17-Points with FAD Display
<b>FCD3611-0</b>	Field Advanced Controller, 24 Vac, 26-Point with FAD Display



## BAS CONTROLLERS

### Field Controllers

## Metasys® Controllers

### FEC – FAC

#### Field Equipment Controllers

The Metasys Field Equipment Controllers (FEC) are a complete family of BACnet® compatible field controllers and accessories designed with the flexibility to meet a wide range of your HVAC control applications. Built on the ASHRAE standard for building automation system control and communication, these controllers support Johnson Controls commitment to open communication standards and greater control options for you.

The FEC family includes the 10-point FEC16, 16-point FEC25 and the 17-point FEC26 field controllers, as well as I/O expandability. All seamlessly integrate with the Metasys building management system. FEC controllers are available with optional LCD display.

FAC Series controllers feature an integral real-time clock and support time-based tasks, which enables these field controllers to monitor and control schedules, calendars, alarms and trends.

All FEC and FAC controllers feature selectable N2 or BACnet® MS/TP communication protocol, this allows them to be used as functional replacements for legacy N2 controllers.



#### Features

- Supports peer-to-peer communications
- Continuous tuning adaptive control provides more efficient control and reduces level of manual intervention
- Advanced diagnostics for failure detection, resolution and prevention
- Standard packaging and terminations simplify installation

- Field Equipment Controllers have been tested by the BACnet Testing Labs (BTL) and are certified as BACnet application specific controllers
- FAC models feature an integral real time clock with on-board time schedules, calendars, trends and alarms and are BTL certified as BACnet Advanced Application Controllers (B-AAC)

#### Point Type Counts per Model

Point Types	Signals Accepted	FEC16	FEC25	FEC2611 & FAC2611	FAC2612	FAC3611
<b>Universal Input (UI)</b>	Analog input, voltage mode, 0–10 VDC Analog input, current mode, 4–20 mA Analog input, resistive mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A99B SI), NTC (10k type L, 2.252k type 2) Binary input, dry contact maintained mode	2	4 <sup>1</sup>	6	5	8
<b>Binary Output (BI)</b>	Dry contact maintained mode Pulse counter/accumulator mode (high speed) 100 Hz (50 Hz – FEC25, FAC36)	1	6	2	4	6
<b>Analog Output (AO)</b>	Analog output, voltage mode, 0–10 VDC Analog output, current mode, 4–20 mA	0	2 <sup>2</sup>	2	0	6
<b>Binary Output (BO)</b>	24 VAC triac	3	2	3	0	6
<b>Configurable Output (CO)</b>	Analog output, voltage mode, 0–10 VDC Binary output mode, 24 VAC triac	4	2	4	4	0
<b>Relay Outputs (RO)</b>	240 VAC maximum voltage 1/3 hp 125 VAC, 1/2 hp 250 VAC 400 VA Pilot Duty at 240 VAC 200 VA Pilot Duty at 120 VAC 3 A Noninductive 24–240 VAC	0	0	0	5 (2 x SPDT) (3 x SPST)	0

#### Note

- <sup>1</sup> Does not support 4–20 mA input  
<sup>2</sup> Does not support 4–20 mA output

## BAS CONTROLLERS Field Controllers

### Metasys® Controllers FEC - FAC

Available  
in Summer 2016

Ordering Code	Description
<b>MS-FEC1611-1</b>	10-Point Field Equipment Controller with 2 UI, 1 BI, 3 BO and 4 CO; 24 VAC; SA Bus
<b>MS-FEC1611-1ET</b>	10-Point Field Equipment Controller with 2 UI, 1 BI, 3 BO and 4 CO; 24 VAC; SA Bus, Extended operating temperature
<b>MS-FEC1621-1</b>	10-Point Field Equipment Controller with 2 UI, 1 BI, 3 BO and 4 CO; 24 VAC; SA Bus; Integral display
<b>MS-FEC2511-0</b>	16-Point Field Equipment Controller with 4 UI, 6 BI, 2 BO, 2 AO and 2 CO; 24 VAC; SA Bus
<b>MS-FEC2611-0</b>	17-Point Field Equipment Controller with 6 UI, 2 BI, 3 BO, 2 AO and 4 CO; 24 VAC; SA Bus
<b>MS-FEC2611-0ET</b>	17-Point Field Equipment Controller with 6 UI, 2 BI, 3 BO, 2 AO and 4 CO; 24 VAC; SA Bus, Extended operating temperature
<b>MS-FEC2621-0</b>	17-point Field Controller with 6 UI, 2 BI, 3 BO, 2 AO and 4 CO; 24 VAC; SA Bus; Integral display
<b>MS-FAC2611-0</b>	17-Point Advanced Application Field Equipment Controller with 6 UI, 2 BI, 2 AO, 3 BO and 4 CO; 24 VAC; SA Bus
<b>MS-FAC2612-1</b>	18-Point Advanced Application Field Equipment Controller with 5 UI, 4 BI, 4 CO and 5 RO; 24 VAC; SA Bus; Pluggable Terminals
<b>MS-FAC2612-2</b>	18-Point Advanced Application Field Equipment Controller with 5 UI, 4 BI, 4 CO and 5 RO; 100-250 VAC; SA Bus; Pluggable Terminals
<b>MS-FAC3611-0</b>	26-point Advanced Application Field Controller with 8 UI, 6 BI, 6 AO and 6 BO; 24 VAC; SA Bus

### Accessories

Ordering Codes	Description
<b>MS-DIS1710-0</b>	Local Controller Display for FEC and FAC Models
<b>MS-BTCVT-1</b>	Bluetooth wireless commissioning adaptor
<b>MS-BTCVTCBL-700</b>	Cable replacement Set for the MS-BTCVT-1 includes retractable 5 m cable
<b>TL-BRTRP-0</b>	Portable BACnet/IP to MS/TP Router. Includes 1.8m Cable and 1.5 m Ethernet cable
<b>AP-TBK4SA-0</b>	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown, Bulk Pack
<b>AP-TBK4FC-0</b>	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue, Bulk Pack
<b>AP-TBK3PW-0</b>	Replacement Power Terminal, 3-Position Connector, Grey, Bulk Pack
<b>MS-TBKLV03-0</b>	FAC2612, 3 Position Line Voltage Terminal Block. Includes 3 pieces (Grey)
<b>MS-TBKRO02-0</b>	FAC2612, 2 Position Relay Output Terminal Block. Includes 9 pieces, 3 of each position (Red)
<b>MS-TBKRO03-0</b>	FAC2612, 3 Position Relay Output Terminal Block. Includes 6 pieces, 3 of each position (Red)
<b>MS-TBKCO04-0</b>	FAC2612, 4 Position Configurable Output Terminal Block. Includes 6 pieces, 3 of each position (Black)
<b>MS-TBKUI04-0</b>	FAC2612, 4 Position Universal Input Terminal Block. Includes 9 pieces, 3 of each position (White)
<b>MS-TBKUI05-0</b>	FAC2612, 5 Position Universal Input Terminal Block. Includes 3 pieces (White)
<b>MS-ZFR1810-1</b>	Wireless Field Bus Coordinator, 10 mW Transmission Power. Functions with NAE35xx, NAE45xx, NAE55xx, and NCE25xx models.
<b>MS-ZFR1811-1</b>	Wireless Field Bus Router, 10 mW Transmission Power. Functions with Metasys BACnet FECs, VMA1600s, and WRZ-TTx Series Wireless Mesh Room Temperature Sensors.
<b>ZFR-USBHA-0</b>	USB Dongle with ZigBee™ Driver provides a wireless connection through CCT to allow wireless commissioning of the wireless enabled FEC, FAC, IOM, and VMA16 field controllers. Also allows use of the ZFR Checkout Tool (ZCT) in CCT

## BAS CONTROLLERS

### Field Controllers

## Metasys® Controllers

### FEC – FAC

#### FEC – Technical Specifications

<b>Supply Voltage</b>	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV) (Europe)
<b>Power Consumption</b>	14 VA maximum for FEC models with no integral display 20 VA maximum for FEC models with integral display <b>Note:</b> VA ratings do not include any power supplied to the peripheral devices connected to Binary outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 84 VA (maximum).
<b>Ambient Conditions</b>	
<b>Operating</b>	0 to 50°C; 10 to 90% RH noncondensing (–xET models –40 to 70°C; 10 to 90% RH noncondensing)
<b>Storage Temperature</b>	–40 to 80°C; 5 to 95% RH noncondensing
<b>Controller Addressing</b>	DIP switch set; valid field controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid field controller addresses.)
<b>Communications Bus</b>	Selectable N2 or BACnet® MS/TP RS-485: 3-wire FC Bus between the supervisory controller and field controllers 4-wire SA Bus between field controller, network sensors, and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from field controller) to bus devices.
<b>Processor</b>	H8SX/166xR Renesas® microcontroller
<b>Memory</b>	1 MB flash memory and 512 KB Random Access Memory (RAM)
<b>Input and Output Capabilities</b>	
<b>FEC16 Model</b>	2 – Universal inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm or binary dry contact 1 – Binary inputs: Defined as dry contact maintained or pulse counter/accumulator mode 3 – Binary outputs: Defined as 24 VAC triac (selectable internal or external source power) 4 – Configurable outputs: Defined as 0–10 VDC or 24 VAC triac BO
<b>FEC25 Model</b>	4 – Universal inputs: Defined as 0–10 VDC, 0–600k ohm or binary dry contact 6 – Binary inputs: Defined as dry contact maintained or pulse counter/accumulator mode 2 – Binary outputs: Defined as 24 VAC triac (external source power only) 2 – Configurable outputs: Defined as 0–10 VDC or 24 VAC triac BO 2 – Analog outputs: Defined as 0–10 VDC only
<b>FEC26 Model</b>	6 – Universal inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm or binary dry contact 2 – Binary inputs: Defined as dry contact maintained or pulse counter/accumulator mode 3 – Binary outputs: Defined as 24 VAC triac (selectable internal or external source power) 4 – Configurable outputs: Defined as 0–10 VDC or 24 VAC triac BO 2 – Analog outputs: Defined as 0–10 VDC or 4–20 mA
<b>Analog Input/Analog Output Resolution and Accuracy</b>	Analog input: 16-bit resolution Analog output: 16-bit resolution and $\pm 200$ mV in 0–10 VDC applications
<b>Terminations</b>	Input/output: Fixed screw terminal blocks FC Bus, SA Bus and power supply: 3-wire and 4-wire pluggable screw terminal blocks FC Bus and SA Bus: RJ-12 6-pin modular jacks
<b>Mounting</b>	Horizontal on single 35 mm DIN rail mount (preferred) or screw mount on flat surface with three integral mounting clips on controller
<b>Housing</b>	Enclosure material: ABS and polycarbonate UL94 5VB; Self-extinguishing, plenum-rated protection class: IP20 (IEC529)
<b>Dimensions (H x W x D)</b>	
<b>FEC16/25 Model</b>	150 x 164 x 53 mm including terminals and mounting clips
<b>FEC2611 Model</b>	150 x 190 x 53 mm including terminals and mounting clips <b>Note:</b> Mounting space for FAC models requires an additional 50 mm space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.
<b>Weight</b>	
<b>FEC16/25 Model</b>	0.4 kg
<b>FEC2611 Model</b>	0.5 kg
<b>Compliance</b>	
<b>Europe</b>	CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC
<b>BACnet International</b>	BACnet Testing Laboratories (BTL) 135-2004 Listed BACnet Application Specific Controller (B-ASC)

## BAS CONTROLLERS Field Controllers

### Metasys® Controllers FEC - FAC

#### FAC - Technical Specifications (1/2)

<b>Supply Voltage</b>	
<i>FAC2611-0/FAC3611-0 and FAC2612-1</i>	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV) (Europe)
<i>MS-FAC2612-2</i>	100 to 250 VAC, 50/60 Hz
<b>Power Consumption</b>	
	14 VA maximum for FxC models with no integral display <b>Note:</b> VA ratings do not include any power supplied to the peripheral devices connected to Binary outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 84 VA (maximum).
<b>Ambient Conditions</b>	
<i>Operating</i>	0 to 50°C; 10 to 90% RH noncondensing
<i>Storage</i>	-40 to 80°C; 5 to 95% RH noncondensing
<b>Controller Addressing</b>	
	DIP switch set; valid field controller device addresses 4-127 (Device addresses 0-3 and 128-255 are reserved and not valid field controller addresses)
<b>Communications Bus</b>	
	Selectable N2 or BACnet® MS/TP RS-485: 3-wire FC Bus between the supervisory controller and field controllers. 4-wire SA Bus between field controller, network sensors, and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from field controller) to bus devices.
<b>Processor</b>	
<i>FAC26 Models</i>	H8SX/166xR Renesas® 32-bit microcontroller
<i>FAC36 Model</i>	RS630 32-Bit Renesas® microcontroller
<b>Memory</b>	
	4 MB Flash Memory and 1 MB Random Access Memory (RAM)
<b>Input and Output Capabilities</b>	
<i>FAC2611 Model</i>	6 - Universal inputs: Defined as 0-10 VDC, 4-20 mA, 0-600k ohm or binary dry contact 2 - Binary inputs: Defined as dry contact maintained or pulse counter/accumulator mode 3 - Binary outputs: Defined as 24 VAC triac (selectable internal or external source power) 4 - Configurable outputs: Defined as 0-10 VDC or 24 VAC triac BO 2 - Analog outputs: Defined as 0-10 VDC or 4-20 mA
<i>FAC2612 Models</i>	5 - Universal inputs: Defined as 0-10 VDC, 4-20 mA, 0-600k ohm or binary dry contact 4 - Binary inputs: Defined as dry contact maintained or pulse counter/accumulator mode 5 - Relay outputs: Defined as maximum 3A noninductive at 24-240VAC, 2 x SPDT and 3 x SPST 4 - Configurable outputs: Defined as 0-10 VDC or 24 VAC triac BO
<i>FAC3611 Model</i>	8 - Universal inputs: Defined as 0-10 VDC, 4-20 mA, 0-600k ohm or binary dry contact 6 - Binary inputs: Defined as dry contact maintained or pulse counter/accumulator mode 6 - Binary outputs: Defined as 24 VAC triac (selectable internal or external source power) 6 - Analog outputs: Defined as 0-10 VDC or 4-20 mA
<b>Analog Input/Analog Output Resolution and Accuracy</b>	
	Analog Input: 16-bit resolution Analog Output: 16-bit resolution and ±200 mV in 0-10 VDC applications
<b>Terminations</b>	
	Input/Output: Fixed Screw Terminal Blocks (FAC2611 & FAC3611) Pluggable Terminal Blocks (FAC2612) FC Bus, SA Bus, and Supply Power: 3-Wire and 4-Wire Pluggable Screw Terminal Blocks FC Bus and SA Bus: RJ-12 6-Pin Modular Jacks

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## BAS CONTROLLERS

### Field Controllers

## Metasys® Controllers

### FEC – FAC

### FAC – Technical Specifications (2/2)

<b>Mounting</b>	Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller
<b>Housing</b>	Enclosure material: ABS and polycarbonate UL94 5VB; Self-extinguishing, Plenum Rated. Protection Class: IP20 (IEC529)
<b>Dimensions (H x W x D)</b>	
<i>FAC2611-0</i>	150 x 190 x 53 mm including terminals and mounting clips
<i>FAC2612-x</i>	150 x 164 x 53 mm including terminals and mounting clips
<i>FAC3611-0</i>	150 x 220 x 57.5 mm including terminals and mounting clips
	<b>Note:</b> Mounting space for FAC models requires an additional 50 mm space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.
<b>Weight</b>	0.5 kg
<b>Compliance</b>	
<i>Europe</i>	CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
<i>BACnet International</i>	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Advanced Application Controller (B-AAC)

## BAS CONTROLLERS

### Field Controllers

## Metasys® Controllers

### VMA16

#### Variable Air Volume Modular Assembly

VMA16s (32-bit) are programmable digital controllers tailored for VAV applications that communicate via the BACnet Master-Slave/Token-Passing (MS/TP) protocol. The VMA16 (32-bit) controllers feature an integral digital pressure sensor, an integral damper actuator, and a 32-bit microprocessor. The controllers' small package size facilitates quick field installation and efficient use of space, while not compromising high-tech control performance. The VMA16 (32-bit) controllers connect easily to the NS-Series Network Sensors for zone and discharge air temperature sensing.

These features make the VMA16 (32-bit) the product of choice for VAV systems. The wide variety of network sensor models provides options for measuring and displaying zone temperature, occupancy detection, duct temperature, zone humidity and dewpoint determination, carbon dioxide (CO<sub>2</sub>) level, setpoint adjustments, VAV box fan speed control, and discharge air temperatures.

#### Features

- **Standard BACnet® Protocol.**  
Provides interoperability with other Building Automation System (BAS) products that use the widely accepted BACnet standard.
- **Standard Hardware and Software Platform.**  
Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows. Also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.
- **ZigBee™ Wireless Field Controller (FC)/Sensor/Actuator (SA) Bus Interface.**  
Provides a wireless alternative to hard-wired Metasys system counterparts, providing application flexibility and mobility with minimal disruption to building occupants.
- **Bluetooth® Wireless Commissioning Interface** - Provides an easy-to-use connection to the configuration and commissioning tool.
- **Auto Tuned Control Loops.**  
Reduce commissioning time, eliminate change-of-season re-commissioning, and reduce wear and tear on mechanical devices.
- **Universal Inputs, Configurable Outputs, and Point Expansion Modules.**  
Allow multiple signal options to provide input/output flexibility.
- **Optional Local User Interface Display.**  
Allows convenient monitoring and adjusting capabilities at the local device.
- **BACnet Testing Laboratories™ (BTL) Listing.**  
Ensures interoperability with other BTL-listed devices. BTL is a third-party agency which validates that BAS vendor products meet the BACnet industry-standard protocol.
- **32-bit microprocessor ensures optimum performance and meets industry specifications.**
- **BACnet Automatic Discovery support enables easy controller integration into Metasys BAS.**
- **Integral End-of-Line (EOL) switch enables field controller as a terminating device on the communications bus.**
- **Pluggable communications bus and supply power terminal blocks expedite installation and troubleshooting.**
- **Wireless capabilities via a ZFR1800 Series Wireless Field Bus System enable wireless mesh connectivity between Metasys field controllers to WRZ Series Wireless Room Temperature Sensors and to supervisory controllers, facilitating easy initial location and relocation.**
- **Patented proportional adaptive control (P-Adaptive) and Pattern Recognition Adaptive Control (PRAC) technologies provide continuous loop tuning.**
- **Writable flash memory allows standard or customized applications to be downloaded from the Controller Configuration Tool (CCT) and enables persistent application data.**
- **Large product family provides a wide range of point mix to meet application requirements and allows the addition of one or more Input/Output Module (IOM)s and/or Network Sensors to provide even more application capacity.**
- **A state-of-the-art digital non-flow pressure sensor to provide 14-bit resolution with bidirectional flow operation that supports automatic correction for polarity on high- and low-pressure DP tube connections; this pressure sensor eliminates high- and low-pressure connection mistakes**
- **Two additional Universal Inputs over the previous models (VMA1610 & VMA1620), that provides more low-cost sensor options**
- **A 33 percent smaller package than the earlier VMA1610 and VMA1620s (16-bit) models.**
- **The phone jack-style connector on the FC Bus and SA Bus of the VMA16 series to support quick connection to the BTCVT Wireless Commissioning Converter, ZFR1811 wireless router, and network sensors**
- **A fast response actuator that drives the damper from full open to full closed (90°) in 60 seconds to reduce commissioning time**





## BAS CONTROLLERS

### Field Controllers

## Metasys® Controllers

### VMA16

Ordering Code	Description
<b>MS-VMA1615-0</b>	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI and 2 BO; 24 VAC; Field Controller (FC) Bus, and Sensor/Actuator (SA) Bus
<b>MS-VMA1626-0</b>	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (This model is not fitted with the Differential Pressure Transducer)
<b>MS-VMA1628-0</b>	32-bit, Integrated VAV Controller and DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (This model is not fitted with the Actuator)
<b>MS-VMA1630-0</b>	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus

### VMA Selection Charts

Point Types	Signals Accepted	VMA1615	VMA1626	VMA1628	VMA1630
<b>Modular Jacks</b>		6-pin SA Bus with four communicating sensors and 6-pin FC Bus for tool support			
<b>Universal Input (UI)</b>	Analog Input, Voltage Mode, 0–10 VDC Analog Input, Resistive Mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	3	3	3	3
<b>Binary Output (BO)</b>	24 VAC Triac	2	3	3	3
<b>Configurable Output (CO)</b>	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	0	2	2	2
<b>Integrated Actuator</b>	Internal	1	1	0	1
<b>Integrated Differential Pressure Transducer</b>	Internal	1	0	1	1
<b>Zone Sensor Input</b>	On SA Bus1	Up to 4 NS Series Network Zone Sensors Up to 9 WRZ sensors when using the ZFR1811 Wireless router configuration and up to 5 WRZ Sensors when using the one-to-one WRZ-78xx wireless configuration			

#### Note

1. A total of 10 MS/TP master addresses (IOMs), not including sensor addresses (MS/TP slaves), can be used in a single VMA controller.

### Accessories

Ordering Codes	Description
<b>MS-DIS1710-0</b>	Local Controller Display: Refer to Local Controller Display Product Bulletin (LIT-12011273) for more information.
<b>MS-BTCVT-1</b>	Wireless Commissioning Converter with Bluetooth® Technology
<b>MS-ZFR1810-1</b>	Wireless Field Bus Coordinator, 10 mW Transmission Power. Functions with NAE35xx, NAE45xx, NAE55xx, and NCE25xx Models
<b>MS-ZFR1811-1</b>	Wireless Field Bus Router, 10 mW Transmission Power. Functions with Metasys BACnet FECs, VMA16s, and WRZ-TTx Series Wireless Mesh Room Temperature Sensors
<b>MS-BTCVTCBL-700</b>	Cable Replacement Set for the MS-BTCVT-1 or the NS-ATV7003-0; Includes One 5 ft (1.5 m) Retractable Cable WRZ Series Wireless Room Sensors: Refer to the WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653) for specific sensor model descriptions.
<b>WRZ Series Sensors</b>	WRZ Series Wireless Room Sensors: Refer to the WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653) for specific sensor model descriptions.
<b>NS Series Sensors</b>	NS Series Network Sensors: Refer to the NS Series Network Sensors Product Bulletin (LIT-12011574) for specific sensor model descriptions.
<b>AP-TBK1002-0</b>	2-Position Screw Terminal that Plugs onto VMA Output Point Spade Lug
<b>AP-TBK1003-0</b>	3-Position Screw Terminal that Plugs onto VMA Output Point Spade Lugs
<b>AP-TBK4SA-0</b>	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown, Bulk Pack
<b>AP-TBK4FC-0</b>	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue, Bulk Pack
<b>AP-TBK3PW-0</b>	Replacement Power Terminal, 3-Position Connector, Grey, Bulk Pack
<b>TL-BRTRP-0</b>	Portable BACnet IP to MS/TP Router
<b>WRZ-7860-0</b>	Many-to-One ZigBee Wireless Receiver for Wireless Sensor Only Applications
<b>WRZ-SST-100</b>	Wireless Sensing System Tool Kit
<b>ZFR-USBHA-0</b>	USB dongle with ZigBee driver to provide a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled FEC, FAC, IOM, and VMA16 controllers. The dongle is used with the ZFR Checkout Tool to troubleshoot and validate ZFR wireless meshes using a laptop computer.

## BAS CONTROLLERS

### Field Controllers

## Metasys® Controllers

### VMA16

### Technical Specifications

<b>Product Code Numbers</b>	<b>MS-VMA1615-0:</b> Integrated VAV Controller/Actuator/DPT, 3 UI and 2 BO <b>MS-VMA1626-0:</b> Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO (No DPT) <b>MS-VMA1628-0:</b> Integrated VAV Controller and DPT, 3 UI, 3 BO, and 2 CO (No Actuator) <b>MS-VMA1630-0:</b> Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, and 2 CO
<b>Power Requirement</b>	<p><b>Voltage</b> 24 VAC (nominal, 20 VAC minimum / 30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV) (Europe)</p> <p><b>Consumption</b> 10 VA typical, 14 VA maximum  <b>Note:</b> VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO for a possible total consumption of an additional 60 VA (maximum).</p>
<b>Ambient Conditions</b>	<p><b>Operating</b> 0 to 50°C</p> <p><b>Storage Temperature</b> -40 to 70°C</p>
<b>Terminations</b>	Inputs/Outputs: 6.3 mm Spade Lugs
<b>FC Bus, SA Bus, and Supply Power</b>	4-wire and 2-wire pluggable screw terminal blocks
<b>FC and SA Bus Modular Ports</b>	RJ-12 6-pin modular jacks
<b>Controller Addressing</b>	DIP switch set; valid field controller device addresses 4-127 (Device addresses 0-3 and 128-255 are reserved and not valid field controller addresses)
<b>Communications Bus</b>	Selectable N2 or BACnet® MS/TP RS-485: 3-wire FC Bus between the supervisory controller and field controllers 4-wire SA Bus from the VMA controller, network sensors, and other sensor/actuator devices, includes a terminal to source 15 VDC supply power from VMA to SA Bus devices.
<b>Processor</b>	RX630 32-bit Renesas® microcontroller
<b>Memory</b>	1 MB Flash Memory and 512 KB Random Access Memory (RAM)
<b>Input and Output Capabilities</b>	<p><b>Universal Input</b> Defined as 0-10 VDC, 4-20 mA, 0-600k ohm, or Binary Dry Contact</p> <p><b>Binary Outputs</b> Defined as 24 VAC Triac (internal power source)</p> <p><b>Configurable Outputs</b> Defined as 0-10 VDC or 24 VAC Triac BO</p>
<b>Analog Input/Analog Output Accuracy</b>	<p><b>Analog Input</b> 15-bit resolution on UIs</p> <p><b>Analog Output</b> 0-10 VDC ± 200 mV</p>
<b>Air Pressure Differential Sensor</b>	Range: -1.5 inches to 1.5 inches H2O (-374pa to 374pa)
<b>Performance Characteristics</b>	Total Error Band: ±1.3% Full Span Maximum Accuracy: ±0.25% Full Scale Best Fit
<b>Mounting</b>	Mounts to damper shaft using single set screw and to duct with single mounting screw.
<b>Actuator Rating</b>	4 Nm minimum shaft length = 44 mm
<b>Dimensions (H x W x D)</b>	165 x 125 x 73 mm Center of Output Hub to Center of Captive Spacer: 135 mm
<b>Weight</b>	0.65 kg
<b>Compliance</b>	<p><b>Europe</b> Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.</p> <p><b>BACnet International</b> BACnet Testing Laboratories (BTL) 135-2010 Protocol Revision 7 Listed BACnet Application Specific Controller (B-ASC)</p>



## Metasys® Controllers

### VMA18

*VAV Controllers for the Field Replacement of the obsolete VMA14*

VMA18 series (32-bit) are programmable digital controllers tailored for VAV applications that communicate via the N2 protocol, which can be integrated to any supervisory controller capable of managing N2 Open networks and devices, such as the Network Communication Module (NCM) and Network Automation Engine (NAE).

The VMA18 series controllers feature an advanced design that provides optimum performance and easy access to power, network, and field terminations. These controllers come with 32-bit microprocessors that meet and exceed ever demanding industry standards.

Our wide variety of network sensor models provides options for measuring and displaying zone temperature, occupancy detection, duct temperature, zone humidity, carbon dioxide (CO<sub>2</sub>) level, setpoint adjustments, and discharge air temperatures.

The VMA18 series controllers embedded capabilities, in addition to its modular accessories, make it well-suited as a replacement for legacy VMA14xx Series Controllers.



### Features

- N2 Open Communications Protocol
- Standard Hardware and Software Platform
- Bluetooth® Wireless Commissioning Interface.  
Provides an easy-to-use connection to the configuration and commissioning tool.
- Auto Tuned Control Loops.  
Reduce commissioning time, eliminate change-of-season re-commissioning, and reduce wear and tear on mechanical devices.
- Universal Inputs, Configurable Outputs, and Point Expansion Modules.  
Allow multiple signal options to provide input/output flexibility.
- Optional Local User Interface Display.  
Allows convenient monitoring and adjusting capabilities at the local device.
- 32-bit microprocessor ensures optimum performance and meets industry specifications
- Pluggable communications bus and supply power terminal blocks expedite installation and troubleshooting
- Can be converted to BACnet Master-Slave/Token-Passing MS/TP protocol with a software download. This functionality provides a differentiated and cost-effective platform upgrade path for existing VMA14xx customers who are looking for a gradual upgrade strategy.

## BAS CONTROLLERS Field Controllers

### Metasys® Controllers

#### VMA18

#### VMA18 Ordering Information

Ordering Codes	Description
<b>MS-VMA1826-0</b>	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus; (This model is not fitted with the Differential Pressure Transducer). Use for VMA14xx retrofits. Includes cable adapters for use when replacing VMA14xx Series controllers.
<b>MS-VMA1832-0</b>	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus. Use for VMA14xx retrofits. Includes cable adapters for use when replacing VMA14xx Series controllers.

#### VMA18 Selection Charts

Point Types	Signals Accepted	VMA1826	VMA1832
<b>Modular Jacks</b>		6-pin SA Bus with four communicating sensors and 6-pin FC Bus for tool support	
<b>Universal Input (UI)</b>	Analog Input, Voltage Mode, 0–10 VDC Analog Input, Resistive Mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	3	3
<b>Binary Output (BO)</b>	24 VAC Triac	3	3
<b>Configurable Output (CO)</b>	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	2	2
<b>Integrated Actuator</b>	Internal	1	1
<b>Integrated Differential Pressure Transducer</b>	Internal	0	1
<b>Zone Sensor Input</b>	On SA Bus <sup>1</sup>	Up to 4 NS Series Network Zone Sensors Up to 9 WRZ sensors when using the ZFR1811 Wireless router configuration and up to 5 WRZ Sensors when using the one-to-one WRZ-78xx wireless configuration	

#### Note

<sup>1</sup> A total of 10 MS/TP master addresses (IOMs), not including sensor addresses (MS/TP slaves), can be used in a single VMA controller.

#### Accessories

Ordering Code	Description
<b>MS-DIS1710-0</b>	Local Controller Display: Refer to Local Controller Display Product Bulletin (LIT-12011273) for more information.
<b>MS-BTCVT-1</b>	Wireless Commissioning Converter with Bluetooth® Technology
<b>AS-CBLVMA-1</b>	Cable Adapter, 8-pin Female Socket to 6-Pin Male Jack (Bulk Pack of 10)
<b>AS-CBLVMA-2</b>	Cable Adapter, 8-pin Female Socket to 8-pin Male Jack with 6-Pin Female Socket for Wireless Commissioning Converter (Bulk Pack of 10)
<b>MS-BTCVTCBL-700</b>	Cable Replacement Set for the MS-BTCVT-1 or the NS-ATV7003-0; Includes One 5 ft (1.5 m) Retractable Cable WRZ Series Wireless Room Sensors: Refer to the WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653) for specific sensor model descriptions.
<b>NS Series Sensors</b>	NS Series Network Sensors: Refer to the NS Series Network Sensors Product Bulletin (LIT-12011574) for specific sensor model descriptions.
<b>AP-TBK1002-0</b>	2-Position Screw Terminal that Plugs onto VMA Output Point Spade Lug
<b>AP-TBK1003-0</b>	3-Position Screw Terminal that Plugs onto VMA Output Point Spade Lugs
<b>AP-TBK4SA-0</b>	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown, Bulk Pack
<b>AP-TBK4FC-0</b>	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue, Bulk Pack
<b>AP-TBK3PW-0</b>	Replacement Power Terminal, 3-Position Connector, Grey, Bulk Pack
<b>TL-BRTRP-0</b>	Portable BACnet IP to MS/TP Router

## BAS CONTROLLERS

### Field Controllers

## Metasys® Controllers

### VMA18

### Technical Specifications

<b>Product Code Numbers</b>		<b>MS-VMA1826-0:</b> Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; (No DPT) <b>MS-VMA1832-0:</b> Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, 2 CO; 24 VAC;
<b>Power Requirement</b>		
	<b>Voltage</b>	24 VAC (nominal, 20 VAC minimum / 30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV) (Europe)
	<b>Consumption</b>	10 VA typical, 14 VA maximum <b>Note:</b> VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 60 VA (maximum).
<b>Ambient Conditions</b>		
	<b>Operating</b>	0 to 50°C
	<b>Storage Temperature</b>	-40 to 70°C
<b>Terminations</b>		Inputs/Outputs, SA bus, and Supply Power: 6.3 mm Spade Lugs
	<b>Supply Power</b>	N2/FC Bus Pluggable Screw Terminal Block
	<b>TSTAT Modular Port</b>	RJ-12 6-pin modular jacks
<b>Controller Addressing</b>		DIP switch set
	<b>N2 Open Protocol</b>	Valid field controller device addresses 1–253
	<b>BACnet MS/TP Protocol</b>	Valid field controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid field controller addresses)
<b>Communications Bus</b>		
	<b>N2 Open Protocol</b>	N2/FC Bus: 1.5 mm (18 AWG) standard 3-wire, twisted, shielded cable recommended between the supervisory controller and field controllers*
	<b>BACnet MS/TP Protocol</b>	SA Bus: 0.6 mm (22 AWG) stranded, 4-wire (2-twisted pairs) shielded cable recommended from the VMA controller for network sensors and other sensor/actuator devices; includes a terminal to source 15 VDC supply power from VMA to SA Bus devices
<b>Processor</b>		RX630 32-bit Renesas® microcontroller
<b>Memory</b>		1 MB Flash Memory and 512 KB Random Access Memory (RAM)
<b>Input and Output Capabilities</b>		
	<b>Universal Input</b>	Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact
	<b>Binary Outputs</b>	Defined as 24 VAC triac (internal power source)
	<b>Configurable Outputs</b>	Defined as 0–10 VDC or 24 VAC Triac BO
<b>Analog Input/Analog Output Accuracy</b>		
	<b>Analog Input</b>	15-bit resolution on UIs
	<b>Analog Output</b>	0–10 VDC ± 200 mV
<b>Air Pressure Differential Sensor</b>		Range: -1.5 inches to 1.5 inches H2O (-374pa to 374pa)
	<b>Performance Characteristics</b>	Total Error Band: ±1.3% Full Span Maximum Accuracy: ±0.25% Full Scale Best Fit
<b>Mounting</b>		Mounts to damper shaft using single set screw and to duct with single mounting screw.
	<b>Actuator Rating</b>	4 Nm minimum shaft length = 44 mm
<b>Dimensions (H x W x D)</b>		165 x 125 x 73 mm – Center of Output Hub to Center of Captive Spacer: 135 mm
<b>Weight</b>		0.65 kg
<b>Compliance</b>		
	<b>Europe</b>	Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
	<b>BACnet International</b>	BACnet Testing Laboratories (BTL) 135-2010 Protocol Revision 7 Listed BACnet Application Specific Controller (B-ASC)

**Note:**

\* For more information, refer to the N2 Communications Bus Technical Bulletin (LIT-636018).

## BAS CONTROLLERS Field Controllers

# Metasys® Controllers

## IOM

### Input/Output Modules

A range of Input/Output modules compatible with Metasys. IOMs can serve in one of two capacities depending on where they are installed on the Metasys system. When installed on the Sensor Actuator (SA) Bus of an Field Equipment Controller (FEC), the IOMs expand the point count of these controllers. When installed on the Field Controller (FC) Bus as point multiplexers, IOMs allow a Network Automation Engine (NAE) or Network Controller Engine (NCE) to monitor and control supervisory points directly. A full range of FEC/FAC models combined with the IOM models can be applied to a wide variety of building applications ranging from simple fan coil or heat pump control, to advanced central plant management.



### Features

- Expands controllers for larger applications
- Flexible configurations: 4, 6, 10, 12, 16 and 17-point expandability
- Integrates at both field and supervisory levels
- Models with 16 inputs for monitoring applications

### Point Type Counts per Model

Point Types	Signals Accepted	IOM17	IOM27	IOM37	IOM47	IOM2721	IOM3721	IOM3731
<b>Universal Input (UI)</b>	Analog Input, Voltage Mode, 0 – 10 VDC Analog Input, Current Mode, 4 – 20 mA Analog Input, Resistive Mode, 0 – 2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A99B SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	0	2	4	6	8	0	0
<b>Binary Input (BI)</b>	Dry Contact Maintained Mode Pulse Counter Mode (High Speed), 100 Hz	4	0	0	2	0	16	8
<b>Analog Output (AO)</b>	Analog Output, Voltage Mode, 0 – 10 VDC Analog Output, Current Mode, 4 – 20 mA	0	0	0	2	2	0	0
<b>Binary Output (BO)</b>	24 VAC Triac	0	0	0	3	0	0	8
<b>Universal Output (UO)</b>	Analog Output, Voltage Mode, 0 – 10 VDC Binary Output Mode, 24 V AC/DC FET Analog Output, Current Mode, 4 – 20 mA	0	2	4	0	0	0	0
<b>Configurable Output (CO)</b>	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	0	0	0	4	0	0	0
<b>Relay Output</b>	Maximum voltage 24 VAC (240VAC; –2 models only)	0	2	4	0	0	0	0

Ordering Codes	Description
<b>MS-IOM1711-0</b>	Input Module, 4 Binary Inputs
<b>MS-IOM2711-2</b>	Input/Output Module, 2 Universal Inputs, 2 Relay Outputs (Max 240 VAC), 2 Universal Outputs
<b>MS-IOM3711-2</b>	Input/Output Module, 4 Universal Inputs, 4 Relay Outputs (Max 240 VAC), 4 Universal Outputs
<b>MS-IOM4711-0</b>	Input/Output Module, 6 Universal Inputs, 2 Binary Inputs, 3 Binary Outputs, 4 Configurable Outputs, 2 Analog Outputs
<b>MS-IOM2721-0</b>	Input Output Module with 8 Universal Inputs and 2 Analog Outputs, 24 VAC
<b>MS-IOM3721-0</b>	Input Output Module with 16 Binary Inputs, 24 VAC
<b>MS-IOM3731-0</b>	Input Output Module with 8 Binary Inputs and 8 Binary Outputs, 24 VAC

## BAS CONTROLLERS Field Controllers

### Metasys® Controllers IOM

#### Technical Specifications (1/2)

<b>Supply Voltage</b>	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV) Europe
<b>Power Consumption</b>	14 VA maximum <b>Note:</b> VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 84 VA (maximum).
<b>Ambient Conditions</b>	
<b>Operating</b>	0 to 50°C; 10 to 90% RH noncondensing
<b>Storage Temperature</b>	-40 to 80°C; 5 to 95% RH noncondensing
<b>Controller Addressing</b>	DIP switch set; valid field controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid IOM addresses.)
<b>Communications Bus</b>	BACnet® MS/TP, RS-485: 3-wire FC Bus between the supervisory controller and field devices 4-wire SA Bus between field controller, network sensors, and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from field controller) to bus devices*.
<b>Processor</b>	H8SX/166xR Renesas® 32-bit microcontroller
<b>Memory</b>	1 MB Flash Memory and 512 KB Random Access Memory (RAM)
<b>IOM17, IOM27, and IOM37 Models</b>	640 KB Flash Memory and 128 KB Random Access Memory (RAM)
<b>IOM47 Models</b>	1 MB Flash Memory and 512 KB RAM
<b>Input and Output Capabilities</b>	Analog Input: 16-bit resolution Analog Output: 16-bit resolution and ±200 mV in 0–10 VDC applications
<b>IOM1711</b>	4 – Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode
<b>IOM2711</b>	2 – Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 – Universal Outputs: Analog Output mode – 0–10 VDC, Binary Output Mode – 24 VAC/VDC Field-effect Transistor 2 – Relay Outputs (Single-Pole, Double-Throw) Rate as: 24 VAC Maximum Voltage 3A Non-inductive 24 VAC 6(4)A 240 VAC Maximum Voltage; MS-IOM2711-2 Model only
<b>IOM2721</b>	8 – Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 – Analog Outputs: Defined as 0–10 VDC or 4–20 mA
<b>IOM3711</b>	4 – Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 4 – Universal Outputs: Analog Output mode – 0–10 VDC, Binary Output Mode – 24 VAC/VDC Field-effect Transistor 4 – Relay Outputs (Single-Pole, Double-Throw) Rate as: 24 VAC Maximum Voltage 3A Non-inductive 24 VAC 6(4)A 240 VAC Maximum Voltage; MS-IOM3711-2 Model only
<b>IOM3721</b>	16 – Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode
<b>IOM3731</b>	8 – Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 8 – Binary Outputs: Defined as 24 VAC Triac <b>Note:</b> Binary Outputs (BOs) on MS-IOM3731 controllers do not supply power for the outputs; the BOs require external low-voltage (< 30 VAC) power sources.
<b>IOM4711</b>	6 – Universal Inputs: Defined as 0–VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 – Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 3 – Binary Outputs: Defined as 24 VAC Triac (selectable internal or external source power) 4 – Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO 2 – Analog Outputs: Defined as 0–10 VDC or 4–20 mA

...Continued...

## BAS CONTROLLERS Field Controllers

### Metasys® Controllers IOM

#### Technical Specifications (2/2)

##### Analog Input/Analog Output Resolution and Accuracy

*Analog Input* 16-bit resolution

*Analog Output* 16-bit resolution and  $\pm 200$  mV in 0–10 VDC applications

##### Terminations

Input/Output: Fixed Screw Terminal Blocks  
SA/FC Bus and Supply Power: 4-Wire and 3-Wire Pluggable Screw Terminal Blocks  
SA/FC Bus Port: RJ-12 6-Pin Modular Jacks

##### Mounting

Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller

##### Housing

Enclosure material: ABS and polycarbonate UL94 5VB; Self-extinguishing, Plenum-rated Protection Class: IP20 (IEC529)

##### Dimensions (H x W x D)

*IOM17xx and IOM271x Models* 150 x 120 x 53 mm including terminals and mounting clips

*IOM272x, IOM372x and IOM373x Models* 150 x 164 x 53 mm including terminals and mounting clips

*IOM37 and IOM47 Models* 150 x 190 x 53 mm including terminals and mounting clips

**Note:** For all models, mounting space requires an additional 50 mm space on top, bottom, and front face of controller for easy removal, ventilation, and wire terminations.

##### Weight

0.5 Kg

##### Compliance

*Europe* CE Mark, EMC Directive 2004/108/EC, in accordance with EN 61000-6-3 (2007) Generic Emission Standard for Residential and Light Industrial and EN 61000-6-2 (2005) Generic Immunity Standard for Heavy Industrial Environment

**Note:** For IOM17/IOM27/IOM37, Low Voltage Directive 73/23/EEC in accordance with EN 60730-1:2000/A2:2008 Automatic electrical controls for household and similar use.

**Note:** For IOM47 Models, Conducted RF Immunity within EN 61000-6-2 meets performance criteria B.

*BACnet International* BACnet Testing Laboratories (BTL) 135-2004 Listed BACnet Application Specific Controller (B-ASC)

#### Accessories

Ordering Codes	Description
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown, Bulk Pack
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue, Bulk Pack
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Grey, Bulk Pack
MS-DIS1710-0	Local Controller Display for FEC and FAC Models
MS-BTCVT-1	Wireless Commissioning Converter, with Bluetooth® technology
MS-BTCVTCBL-700	Cable replacement Set for the MS-BTCVT-1 or the NS-ATV7003-0; includes one 5-foot retractable cable



## BAS CONTROLLERS Field Controllers

### Metasys® Controllers

### Romutec

#### Input/Output Modules

Romutec Input/Output Modules are designed to integrate seamlessly into the Metasys system. They are installed on the BACnet MS/TP Sensor Actuator (SA) Bus of a Network Control Engine (NCE) or on the SA Bus of a Field Equipment Controller (FEC/FAC) and expand the point count of these controllers. A full range of FEC/FACs, NCEs and Romutec IO Modules allow various combinations, which will meet the requirements from simple to advanced building applications.

Romutec Input/Output modules can be used when manual overrides are required or when control panel space is limited and a small footprint is needed.

Five models of IO modules are offered with different combinations of BI's, BO's, AI's and AO's. In addition to the standard models optional manual override modules are available. Manual override modules come in two versions, one which can be used inside a control cabinet (DIN rail mounting) and the other for fixing on the cabinet door (front panel mounting). The manual override modules are connected with a USB type cable directly to their corresponding host IO Module.

They are preconfigured so setting up requires nothing more than selecting the appropriate DIP switch settings.

Five additional models are also available to meet the requirement for DIN rail mounted IO modules with integral overrides.



#### Features

- Small footprint, compared with the Metasys® Input/Output Module (IOM) series.
- Manual overrides available as an option. Integral Manual overrides for AO and BO on selected models.
- Models available for indicating the status of binary inputs with LED's.
- Supports BI, BO, AI and AO objects.
- Easy engineering as supported by CCT (Controller Configuration Tool).
- Quick engineering for manual overrides as all modules are preconfigured.
- Connected to the SA Bus of the FEC/FAC or NCE controller as an MSTP slave device.
- Equipped with fault and status LED's for troubleshooting.
- Pluggable terminals with spring clamp for quick and simple wire termination without special tools.

## BAS CONTROLLERS

### Field Controllers

## Metasys® Controllers

### Romutec

#### Ordering Information

Ordering Codes	Description
<b>JDB8410</b>	12-Point Romutec IOM with 8 BI, 4 BO and SA Bus Support (four 1-state drives)
<b>JDB8420</b>	Optional manual override module for JDB8410, Front Panel mounting
<b>JDB8430</b>	Bundle of JDB8410 (Base module), JDB8420 (Override module, panel) and 3,0 m USB-cable
<b>JDB8440</b>	Optional manual overrides for JDB8410, DIN Rail mounting
<b>JDB8450</b>	Bundle of JDB8410 (Base module), JDB8440 (Override module, DIN rail) and 0,1 m USB-cable
<b>JDB6410</b>	10-Point Romutec IOM with 6 BI, 4 BO and SA Bus Support (two 2-state drives)
<b>JDB6420</b>	Optional manual override module for JDB6410, Front Panel mounting
<b>JDB6430</b>	Bundle of JDB6410 (Base module), JDB6420 (Override module, panel) and 3,0 m USB-cable
<b>JDB6440</b>	Optional manual overrides for JDB6410, DIN Rail mounting
<b>JDB6450</b>	Bundle of JDB6410 (Base module), JDB6440 (Override module, DIN rail) and 0,1 m USB-cable
<b>JDB8010</b>	8-Point Romutec IOM with 8 BI and SA Bus Support
<b>JDB8020</b>	Optional LED's for indicating the BI status of JDB8010, Front Panel mounting
<b>JDB8030</b>	Bundle of JDB8010 (Base module), JDB8020 (LED module, panel) and 3,0 m USB-cable
<b>JDB8040</b>	Optional LED module for indicating the BI status of JDB8010, DIN Rail mounting
<b>JDB8050</b>	Bundle of JDB8010 (Base module), JDB8040 (LED module, DIN rail) and 0,1 m USB-cable
<b>JAB0410</b>	4-Point Romutec IOM with 4 AO and SA Bus Support
<b>JAB0420</b>	Optional manual overrides for JAB0410, Front Panel mounting
<b>JAB0430</b>	Bundle of JDB8010 (Base module), JAB0420 (Override module, panel) and 3,0 m USB-cable
<b>JAB0440</b>	Optional manual overrides for JAB0410, DIN Rail mounting
<b>JAB0450</b>	Bundle of JAB0410 (Base module), JAB0440 (Override module, DIN rail) and 0,1 m USB-cable
<b>JAB6610</b>	12-Point Romutec IOM with 2 BI, 2 BO, 4 AI, 4 AO and SA Bus Support (Points only, no overrides or input status LED's), DIN rail mounting
<b>JDB8451</b>	12-Point Romutec IOM with 8 BI, 4 BO (four 1-state drives) and SA Bus Support with Integral overrides and status LED's, DIN rail mounting
<b>JDB6451</b>	10-Point Romutec IOM with 6 BI, 4 BO (two 2-state drives) and SA Bus Support with integral overrides and status LED's, DIN rail mounting
<b>JDB8051</b>	8-Point Romutec IOM with 8 BI and SA Bus Support with integral status LED's, DIN rail mounting
<b>JAB0451</b>	4-Point Romutec IOM with 4 AO and SA Bus Support with integral overrides and status LED's, DIN rail mounting
<b>JAB6651</b>	12-Point Romutec IOM with 2 BI, 2 BO, 4 AI, 4 AO and SA Bus Support (Points only, no overrides or input status LED's), DIN rail mounting, Part of integral family



## BAS CONTROLLERS Field Controllers

### Metasys® Controllers Romutec

#### Romutec Point types, functions and ratings

Point Types	Function	Signal/Rating
<b>Analog IN</b>	Analog Input, Voltage Mode	Accepts a 0–10VDC input signal, internal 75kΩ pull-down
	Analog Input, Current Mode	Accepts a 0–20 mA input signal, internal 100Ω load impedance
	Analog Input, Resistive Mode	Accepts a 0–600 kΩ input signal, internal 12V, 15kΩ pull-up RTD:1k Nickel [L & G], 1k Nickel [DIN], 1k Platinum, A99B Silicon Temperature Sensor
<b>Binary IN</b>	Binary Input, Dry Contact Maintained Mode	0.01s minimum pulse width (50Hz at 50% duty cycle) Internal 35V, 2.7kΩ pull-up
<b>Analog OUT</b>	Analog Output, Voltage mode, sources 0–10 VDC output voltage	External 1kΩ minimum load required 10 VDC maximum output voltage, 10 mA maximum output current
<b>Binary OUT</b>	Binary Output, up to 250VAC Relay Contact Connects NO to Common when activated	Characteristics (Resistive Load): Initial contact resistance 100mΩ (at 1A / 24VDC) Rated load 5A at 250VAC, 5A at 30VDC, 10A at 125VAC Max. switching voltage 277VAC, 30VDC Max. switching capacity 1250VA (AC), 150W (DC) Endurance 1x10 <sup>5</sup> ops (Rated Load), 1x10 <sup>7</sup> ops (no Load)
	Binary Output, up to 250VAC Relay Contact Disconnects NC from Common when activated	Characteristics (Resistive Load): Initial contact resistance 100mΩ (at 1A / 24 VDC) Rated load 3A at 250VAC, 5A at 30VDC, 10A at 125VAC Max. switching voltage 277VAC, 30VDC Max. switching capacity 1250VA (AC), 150W (DC) Endurance 1x10 <sup>5</sup> ops (Rated Load), 1x10 <sup>7</sup> ops (no Load)


#### Romutec Accessories

Ordering Codes	Description
<b>USB-A-B-0.1</b>	USB-cable A-B type, 0,1 m
<b>USB-A-B-3.0</b>	USB-cable A-B type, 3,0 m
<b>USB-A-B-5.0</b>	USB-cable A-B type, 5,0 m
<b>JD-RTR4084</b>	19"-rack 4HE/84TE, plastic (GRP), for mounting of 10 front panels
<b>JD-RTR4084S</b>	Same as JD-RTR4084, but with transparent lockable cover and IP54 protection class
<b>JD-RTR7050</b>	19"-rack 7HE/50TE, plastic (GRP), for mounting of 12 front panels
<b>JD-RTR7050S</b>	Same as JD-RTR7050, but with transparent lockable cover and IP54 protection class
<b>JDL8000</b>	Cover 3HE/8TE , colour blue, for unused slots
<b>JD-JUMPER</b>	Three-pole jumper, needed for coding the colour of a LED to orange

## BAS CONTROLLERS Field Controllers

### Metasys® Controllers Romutec

#### Technical Specifications

Product Code Numbers	JDB8010	JDB8020 JDB8420 JDB6420 JAB0420	JDB8040 JDB8440 JDB6440 JAB0440	JDB8451 JDB6451 JDB8051 JAB0451 JAB6651
	JDB8410			
	JDB6410			
	JAB0410			
	JAB6610			
Supply Voltage	24 VAC ± 10% at 50 or 60 Hz	5 VDC ± 5%, provided by the I/O-Module via USB		24 VAC ± 10% at 50 or 60 Hz
Power Consumption	12 VA maximum incl. Front Panel Load	1 VA maximum, provided by I/O-Module		12 VA maximum
Ambient Conditions				
Operating	0 to 50°C; 10 to 90% RH non-condensing			
Storage	0 to 70°C; 10 to 90% RH non-condensing			
Terminations	Spring-type terminals for I/O's, power supply and MS/TP Bus	USB type B for the connection to the I/O Module		Spring-type terminals for I/O's, power supply and MS/TP Bus
Device Addressing	DIP switch set (128-254). Addresses 0-127, 255 are reserved	Not Required		DIP switch set (128-254). Addresses 0-127, 255 are reserved
Communications Bus	BACnet® MS/TP; 4-wire SA Bus (3 wires used)	USB connection to host module		BACnet® MS/TP; 4-wire SA Bus (3 wires used)
Mounting	35 mm DIN rail	Panel front 19" Rack	35 mm DIN rail	
Dimensions	116 x 32 x 166 mm	129 x 40.5 x 43 mm	116 x 32 x 166 mm	92 x 72 x 70 mm
Housing				
Plastic Housing, Plastic Material	PA6.6 25%GF	ABS + Polycarbonate UL94 5VB	PA6.6 25%GF	PC-GF10
Protection	IP20 (IEC529)			
Weight	JDB8010: 0.180 kg	JDB8020: 0.075 kg	JDB8040: 0.132 kg	JDB8451: 0.21 kg
	JDB8410: 0.240 kg	JDB8420: 0.105 kg	JDB8440: 0.135 kg	JDB6451: 0.20 kg
	JDB6410: 0.232 kg	JDB6420: 0.089 kg	JDB6440: 0.133 kg	JDB8051: 0.15 kg
	JAB0410: 0.180 kg	JAB0420: 0.102 kg	JAB0440: 0.143 kg	JAB0451: 0.240 kg
	JAB6610: 0.222 kg			JAB6651: 0.190 kg
Compliance  Johnson Controls, Inc., declares that these products are in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC and Low Voltage Directive 2006/95/EC.				

## BAS CONTROLLERS

### Field Controllers

## Terminal Unit Controllers

### TUC03

#### Configurable Terminal Unit Controller

The TUC03 configurable Terminal Unit Controller is designed specifically to provide direct digital control of terminal unit applications with heating and/or cooling coils, an electric heater and a three-speed or variable speed fan.

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

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

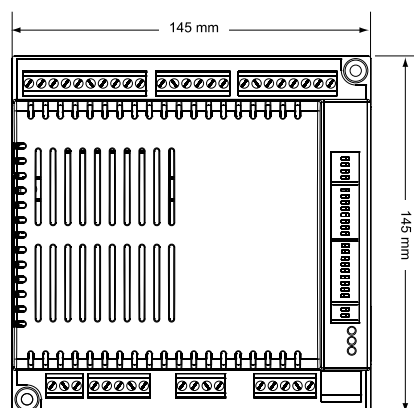
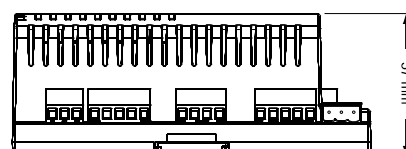
The controller is designed for field installation in a panel or enclosure or for mounting by original equipment manufacturers (OEMs) on DIN-rail or directly on a surface.

The space comfort set point, occupancy mode and fan speed may be adjusted from a wide range of room sensor modules with options for a digital display.

Communication options are available to enable the controller to be integrated into an N2 Open or BACnet® network of a building automation system. The BACnet interface of the controller complies with the ANSI/ASHRAE Standard 135-2004 for sharing data other devices on the network.

#### Features

- Field Selectable application type, communication protocol and room module, via dip-switches on controller
- 230 VAC power supply
- 5 VDC / 15 VDC / 24 VAC power supply for field devices, directly provided by the controller
- Modular range of room sensor modules
- Network communications options - N2 Open and BACnet MS/TP
- BACnet MS/TP with peer to peer communication
- Configurable using standard tools



Dimensions in mm

Ordering Codes	Description
TUC0301-2	230 VAC N2 / BACnet Terminal Unit Controller, No Cover
TUC0311-2	230 VAC N2 / BACnet Terminal Unit Controller

## BAS CONTROLLERS

### Field Controllers

### Terminal Unit Controllers

#### TUC03

Ordering Codes	Description
<b>Room Sensor Modules with LCD Display and Integrated IR Receiver</b>	
<b>LP-RSM003-000C</b>	Room Sensor Module, wall mount
<b>LP-RSM003-001C</b>	Room Sensor Module, horizontal flush mount
<b>LP-RSM003-003C</b>	IR receiver w/ integrated temperature sensor
<b>LP-RSM003-004C</b>	IR hand held remote control unit
<b>Room Sensor Modules without Display - 80 mm x 80 mm</b>	
<b>TM-2140-0000</b>	Room sensor module, temperature sensor only
<b>TM-2150-0000</b>	Room sensor module, occupancy button and LED
<b>TM-2160-0000</b>	Room sensor module, 12-28° C setpoint dial, occupancy button and LED
<b>TM-2160-0002</b>	Room sensor module, 12-28° C setpoint dial, occupancy button and LED, fan speed override
<b>TM-2160-0005</b>	Room sensor module, +/- setpoint dial, occupancy button and LED
<b>TM-2160-0007</b>	Room sensor module, +/- setpoint dial, occupancy button and LED, fan speed override
<b>TM-2190-0000</b>	Room sensor module, 12-28° C setpoint dial
<b>TM-2190-0005</b>	Room sensor module, +/- setpoint dial
<b>Room Sensor Modules with Backlit LCD Display - 80 mm x 80 mm</b>	
<b>RS-1180-0000</b>	Room Sensor module, 12-28° C setpoint dial
<b>RS-1180-0005</b>	Room Sensor module, +/- setpoint dial
<b>RS-1180-0002</b>	Room Sensor module, 12-28° C setpoint dial, fan speed override
<b>RS-1180-0007</b>	Room Sensor module, +/- setpoint dial, fan speed override
<b>Accessories</b>	
<b>LP-KIT003-010C</b>	Remote temperature sensor, NTC 50k $\Omega$ , bulb, 80 cm leads
<b>LP-KIT003-011C</b>	Remote temperature sensor, NTC 50k $\Omega$ , wall mount, decorative box
<b>LP-KIT003-012C</b>	Remote temperature sensor, NTC 50k $\Omega$ , duct mount
<b>LP-KIT003-013C</b>	Remote temperature sensor, NTC 50k $\Omega$ , wall mount, decorative box
<b>HX-9100-8001</b>	Condensation (dew point) sensor
<b>TS-6340K-F00</b>	Remote temperature sensor, NTC 10k $\Omega$ , bulb, 200 cm leads
<b>TS-6340C-E10</b>	Remote temperature sensor, NTC 10k $\Omega$ , ceiling



LP-RSM003-000C



RS Series



LP-RSM003-001C



TM Series



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

## REFRIGERATION COMPONENTS

### Temperature Controls

## Mechanical Thermostats

### 270XT

*Freeze Protection, IP30*

Sensing element is 3 or 6 meters long to permit attaching across the surface of a coil to guard against freezing at any point.

When any 30 cm or more of this element senses a temperature as low as the control setpoint, it will "switch off".

A special version is available with bulb and 2 m capillary, range 24/+18 °C for clamp on or immersion purposes.

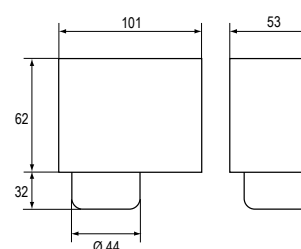
SPDT change over contacts permit the use of an alarm signal.

#### Features

- Dust tight Pennswitch
- SPDT contacts
- 270XTAN provided with trip-free manual reset
- Controls have adjustable range

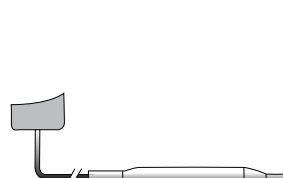
#### Application

These controls are designed for protection against freeze up of hydronic heating coils, cooling coils and similar application.

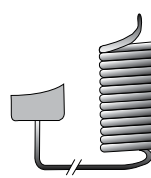


Dimensions in mm

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	1b	2	9.5 x 80		Manual Reset
270XTAN-95008	-10 to +12	---	9	---	3.2 x 6000		
270XTAN-95088					3.2 x 3000		
270XTAN-95048	-24 to +18	---	1b	2	9.5 x 80		



Style 1b



Style 9

## REFRIGERATION COMPONENTS

### Temperature Controls

## Mechanical Thermostats

### A19

Capillary and Space Thermostats, IP30

These thermostats are available with fixed or adjustable differential. The various control ranges cover a broad range of temperature applications with a minimum number of models.

On request a built-in high or low limit stop is possible and can be adjusted quickly and easily in the field. All models have a universal way of adjustment. For this purpose a knob and sealing cap are enclosed.

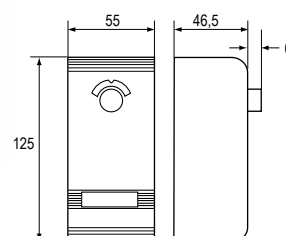
All are equipped with IP50 enclosure.

#### Features

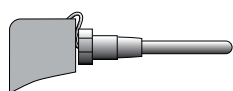
- Liquid filled sensing element
- Dust tight Penn switch
- Trip free manual reset
- Front adjustment

#### Application

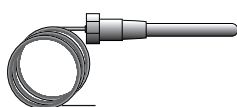
These thermostats are designed for refrigeration, cooling, heating, ventilation and air-conditioning applications. Standard models are provided for remote sensing or room sensing. Models with manual reset are available for low or high limit functions.



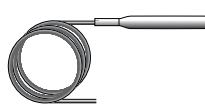
Dimensions in mm



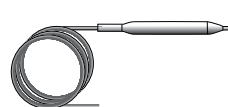
Style 2



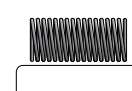
Style 4H



Style 1a



Style 1b



Style 3

### A19A Capillary Thermostats

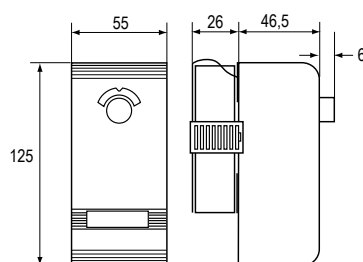
Ordering Codes	Range (°C)	Diff. (K) Fixed	Style	Cap. Length (m)	Bulb Size (mm)	Switch 8A Auto Recycle	Additional Features
A19AAC-9005	-5 to +28	2	1b	2	135	SPDT Open Low	---
A19AAC-9009	40 to 120	3.5			100	SPDT Open High	
A19AAC-9102	-35 to +10	2.5			110		
A19AAC-9107	35 to 150	4	1a		265		Diam. 5 mm bulb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

## REFRIGERATION COMPONENTS

### Temperature Controls

#### Mechanical Thermostats

#### A19



Dimensions in mm

Ordering Codes	Range (°C)	Diff. (K) Fixed	Style	Cap. Length (m)	Bulb Size (mm)	Switch 8A Auto Recycle	Additional Features		
A19A Capillary Thermostats									
A19ABC-9011	40 to 120	3 to 13	2	---	---	SPDT Open High	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		
A19ABC-9037	-35 to +40			3.5		---			
A19ABC-9103	-35 to +10	2.8 to 11		2	135	SPDT Open Low	---		
A19ABC-9104	-5 to +28	2 to 8		2					
A19ABC-9106	10 to 95	3.5 to 14	1a	3.5	75	SPDT Open High	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		
A19ABC-9117				5					
A19AGF-9101*	0 to 13	1.5 fixed	1a	2	80		3 A switch (see bull. 3545), No enclosure, Cal. pointer with dial, Screwdriver slot, Case compensation, Bulb diam. 9.3 mm, Bulk pack		
A19ACC Capillary Thermostat, lock-out low with Manual Reset									
A19ACC-9100	-35 to +10	6	1b	2	110	SPDT Open Low	---		
A19ACC-9101	-5 to +28	4			5			135	
A19ACC-9103				-35 to +10			6		3.5
A19ACC-9105	-5 to +28	4		3	135		---		
A19ACC-9111	-35 to +10	6		5	110		Low limit stop set at 2 °C		
A19ACC-9116				6.5			Low limit stop set at 3 °C, Universal replacement		
A19ADC Capillary Thermostat, lock-out high with Manual Reset									
A19ADC-9200	40 to 120	7		2	---		---	SPDT Open High	1/2-14 NPT connector
A19B Space Thermostats									
A19BAC-9001	0 to 43	2	3	---	---	SPDT Open High	Vinyl coated element		
A19BAC-9250	-35 to +10	2.5				SPDT Open Low			
A19BAC-9251	-5 to +28	2				SPDT Open Low, 5A			
A19BBC-9275	-35 to +40	2.8 to 8							
A19D Strap-On Thermostats									
A19DAC-9001	40 to 120	4.5	20	---	---	SPDT Open High	8 A Switch, NEMA 1 enclosure, Universal adjustment, Including mounting strap		
A19DAF-9001	92 to 116	2	20				3 A Switch, Universal adjustment, Including mounting strap		

**Note:** \* Quantity orders only

## REFRIGERATION COMPONENTS

### Temperature Controls

## Mechanical Thermostats

### A19

*Capillary and Space Thermostat, IP65*

These thermostats are available with fixed or adjustable differential. The various control ranges cover a broad range of temperature applications with a minimum number of models.

SPDT contacts are standard on all models.

#### Features

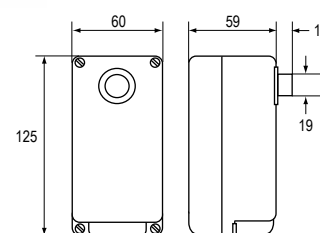
- Liquid filled sensing element
- Dust tight Penn switch
- IP65 protection class
- Front adjustment

#### Application

These thermostats are designed for applications where a splash-proof and/or dust-tight enclosure is required.

Four types are available:

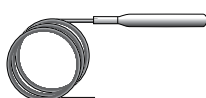
- Types A19ARC are general purpose capillary thermostats.
- Types A19BRC and A19BQC are space thermostats with coiled element to be used as farm control, outdoor thermostats or in cold storage rooms.
- Types A19AQF is specially designed for milkcool-tank applications.
- Type A19AQC-9101 is specially designed for ice-bank application.



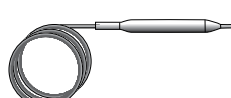
Dimensions in mm

### A19A Capillary Thermostats

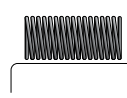
Ordering Codes	Range (°C)	Diff. (K) Adjust.	Style	Cap. Length (m)	Bulb Size (mm)	Switch 8A Auto Recycle	Additional Features
A19ARC-9100	-35 to +10	2.8 to 11	1b	2	110	SPDT Open Low	---
A19ARC-9101	-5 to +28	2 to 8	1b	2	135		---
A19ARC-9104	-20 to +65	3.5 to 13	1a	3.5	75		Diam. 7.4 mm bulb
A19ARC-9105	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
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		---



Style 1a



Style 1b



Style 3



## REFRIGERATION COMPONENTS

### Temperature Controls

#### Mechanical Thermostats

#### A19

Ordering Codes	Range (°C)	Diff. (K) Adjust.	Style	Cap. Length (m)	Bulb Size (mm)	Switch 8A Auto Recycle	Additional Features
A19A Capillary Thermostats							
A19AQC-9101	-5 to +5	2 fixed	1a	2	80	SPDT Open Low	5 A switch, Ice bank control, bulb 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
A19BRC-9251	0 to 43	2 to 8	3				
A19BRC-9252	-35 to +10	2.8 to 11	3				
A19BRC-9253	-35 to +40	2.8 to 11	3				
A19BQC-9252	-5 to +25	2 fixed	3				Concealed scale, screwdriver adjustment

## REFRIGERATION COMPONENTS

### Temperature Controls

## Mechanical Thermostats

### A28

*2-stage Capillary and Space Thermostat, IP30 / IP65*

Controls are compact with fixed differential per stage and (on most models) adjustable differential between stages. Liquid filled element provides wide range, constant differential over whole range and no influence from barometric pressure.

Since the bulb contains the major portion of the total fill the thermostat may be considered as cross-ambient, capillary and cup temperature variations affect the operating point only slightly due to the small amount of fill they contain.

For quantity orders it is possible to have the below stated optional constructions:

- Without case and cover for panel mounting
- Close differential per stage
- Different capillary lengths

All standard IP30 enclosure models have a universal way of adjustment. For this purpose a knob and sealing cap are enclosed.

### Features

- Liquid filled sensing element
- Dust tight Penn switch
- IP65 protection class models available
- Front adjustment

### Application

These thermostats are designed for various types of heating, cooling, ventilation, or air-conditioning applications. All models have two SPDT switches providing the following control possibilities:

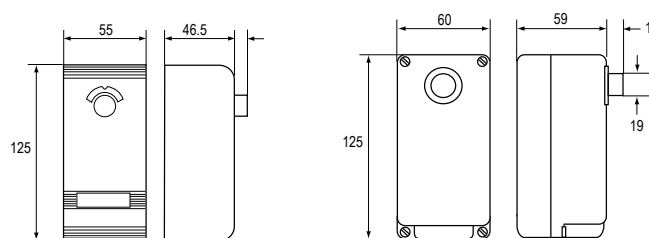
- 2 stage heating
- 2 stage cooling
- Heating/cooling with automatic changeover



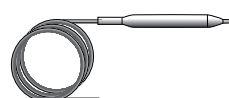
IP30



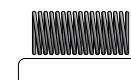
IP65



Dimensions in mm



Style 1b



Style 3

## REFRIGERATION COMPONENTS

### Temperature Controls

#### Mechanical Thermostats

#### A28

Ordering Codes	Range (°C)	Diff. (K)		Style	Cap. Length (m)	Bulb Size (mm)	Switch 5A Auto Recycle	Additional Features NEMA 1 Enclosure			
		stage	betw								
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			5	135					
A28AA-9106											
A28AA-9113	0 to 43	2		3	---	---	SPDT Open High	Bulb stainless steel, general purpose			
A28AA-9118	1 to 60	2		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		1 to 4					3	---	---	---
A28QA-9111	-5 to +28	1.5			2	135					---
A28QA-9114	-35 to +40	2			3.5	110					---
A28QA-9113	0 to 43	1.5	3	---	---	SPDT Open High	Bulb stainless steel				
A28QA-9115	1 to 60	2	1b	3	115		---				
A28QA-9117	20 to 40	1.5	3	---	---		Bulb stainless steel				
A28QJ-9100	10 to 95		1 to 5	1b	3	100	SPDT Open Low	3 A Switch			

## REFRIGERATION COMPONENTS

### Temperature Controls

## Mechanical Thermostats

### A36

#### 3- or 4- Stage Thermostat

Models are available in 'open' construction for panel mounting. Single knob adjustment moves the entire staging band up and down within the range of the control. The differential on each stage and sequencing between stages are factory set.

This permits the OEM to completely engineer the cycling of their equipment without the hazard of field mis-adjustments and erratic sequencing.

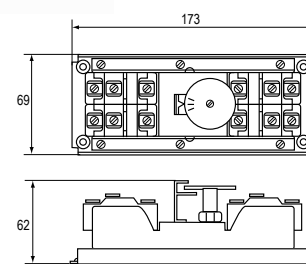
#### Features

- Dust-tight SPDT switches
- Cushion mounted
- Operation from a single, liquid filled element
- Case compensation standard on all models

#### Application

Designed for multi-stage thermostatic operation of electrically controlled equipment such as:

- Packaged liquid chillers
- Heat pumps
- Electric duct heaters
- Computer room airconditioners



Dimensions in mm

Ordering Codes	Range (°C)	Adjustment Code	Cap. Length (m)	Bulb Size (mm)	Switch Auto Recycle	Additional Features
<b>A36 Series, 3-Stage Thermostats</b>						
<b>A36AGA-9101</b>	-18 to +20	B1	5	125	5 A	Armored PVC capillary
<b>A36AGA-9102</b>			3.5	140		
<b>A36AGA-9103</b>	15 to 35	C1		125	3 A	
<b>A36AGB-9103</b>	-18 to +20	B2				
<b>A36 Series, 4-Stage Thermostats</b>						
<b>A36AHA-9105</b>	-18 to +20	B1	3.5	125	5 A	Armored PVC capillary
<b>A36AHA-9107</b>	-16 to +20		5	140		
<b>A36AHA-9108</b>	15 to 35	C1	3.5	100		
<b>A36AHB-9103</b>	10 to 95	D2	3	125	3 A	Max. bulb temp. 115 °C
<b>A36AHB-9104</b>	-18 to +20	B2	3.5	110		Armored PVC capillary
<b>A36AHB-9105</b>			5			Braided copper capillary
<b>A36AHB-9109</b>	-15 to +30		5			Max. bulb temp. 75 °C

## REFRIGERATION COMPONENTS

### Temperature Controls

## Mechanical Thermostats

### T22 - T25

*Stage Room Thermostat, Line Voltage, IP20*

These thermostats with a sturdy steel cover are provided with a liquid filled sensing element. This element is formed to achieve maximum sensitivity to surrounding air temperature changes. Coupled with a highly efficient diaphragm and leverage mechanism, the element operates a totally enclosed Penn switch contact with a close differential switching action without the use of "heat or cool" anticipators.

#### Features

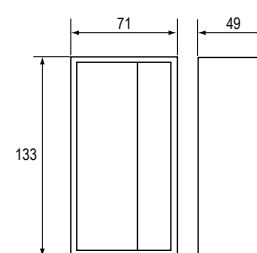
- Liquid filled elements
- Dust tight Penn switch
- Small differential
- 2-Stage Thermostats with dead band and automatic change over

#### Application

These room thermostats are designed to control heating and/or cooling equipment, in commercial industrial or residential installations. Typical uses are for unit heaters, fan coils, cooling rooms etc. Type T22SRX can be used for either heating or cooling.

Type T25B (2 stages) can be used for:

- 2-Stages heating
- 2-Stages cooling
- Heating/cooling with dead band and automatic change over



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

## REFRIGERATION COMPONENTS

### Temperature Controls

## Mechanical Thermostats

### A25

*Limit Control Manual Reset, IP30*

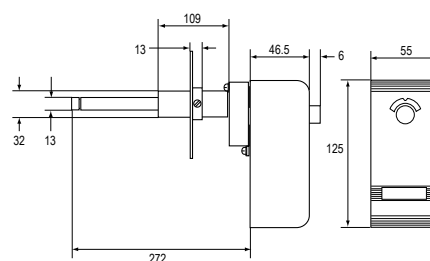
A rod and tube type sensing element actuate the switch contacts. Main contacts (1 - 2) are normally closed, and open when the temperature at the element rises to the dial setpoint. Contacts are re-closed only by operation of the reset lever. The reset lever is "trip-free" and cannot be used to block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

## REFRIGERATION COMPONENTS

### Float and Flow Controls

## Mechanical Liquid Flow Switch

### F61

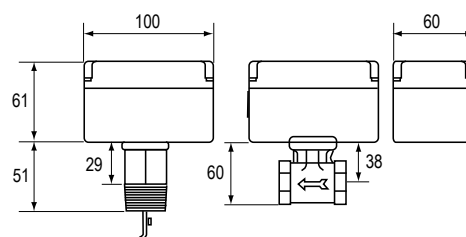
#### Flow Switch for Liquid

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

The switches have SPDT contacts and can be wired to energise one device and de-energise another when liquid flow either exceeds or drops below the set flow rate. Pipe insert models and the T-body types for low-flow applications are available.

The IP43 versions can be used for liquid temperatures above dewpoint (for use in other environments see the Product Data Sheet).

Typical applications are to shut down the compressor on liquid chiller systems, to prove flow on electric immersion heaters and to give a signal or alarm when the pump on condenser cooling system shuts down.



Dimensions in mm

#### Features

- T-body and Pipe-insert types available
- Polycarbonate IP43 enclosure
- Vapour tight IP67 enclosure
- Stainless steel Pipe-insert type
- Large wiring space
- Range screw easy accessible.

#### 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~	4 paddles 1", 2", 3", 6" St.St. AISI 301
F61SD-9150	0,04 dm³/s - 0,07 dm³/s	½ -14 NPTF	T-body		---
F61SD-9175		¾ -14 NPTF			

#### IP67

Ordering Codes	Range	Connection		Switch Action	Additional Features
<b>F61TB-9100</b>	0,15 dm <sup>3</sup> /s – 46 dm <sup>3</sup> /s	R1" DIN2999	(ISO R7)	SPDT contacts, 15(8) amp 220 V~	4 paddles, 1", 2", 3" and 6" St.St. AISI 301
<b>F61TB-9104</b>				SPDT contacts, 0,4 Amp 15 V~	Lowenergy gold flashcontacts 4 paddles, 1", 2", 3" and 6" St.St. AISI 301
<b>F61TB-9200</b>				SPDT contacts, 15(8) Amp 220 V~	Stainless steel body, bellows, rod, 3 St.St. AISI 304 paddles 1",2",3"
<b>F61TD-9150</b>	0,04 dm <sup>3</sup> /s – 0,07 dm <sup>3</sup> /s	½ -14 NPTF	T-body	---	---

#### Accessories for Flow Switches

Ordering Codes	Description
<b>PLT69-11R</b>	F61 – 6" stainless steel AISI 301 paddle
<b>KIT21A602</b>	F61 – 4 paddles 1", 2", 3" and 6" St.St. AISI 301

## REFRIGERATION COMPONENTS

### Float and Flow Controls

## Mechanical Liquid Flow Switch

### F261

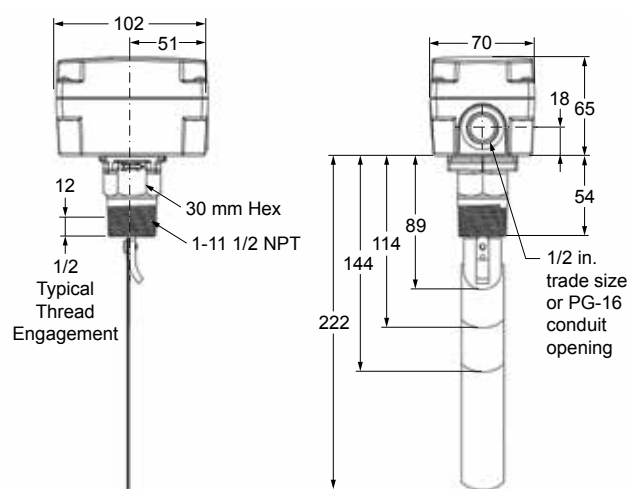
#### Flow Switch for Liquid

The F261 Series Flow Switches respond to fluid flow in lines carrying water, ethylene glycol, or other nonhazardous fluids. These models also work in applications with swimming pool water and lubricating oils.

F261 Series Standard Flow Switches use a variety of paddle sizes to respond to fluid flow rates in applications with 1 inch trade size (or greater) pipe.

#### Features

- Type 3R (NEMA) or Type 4 (NEMA) Polycarbonate Enclosure
- Viton® Diaphragm
- Gold-Plated Contacts on Selected Models
- Maximum Fluid Pressure of 290 psig (20 bar)



F261 Standard Flow Switch, Dimensions in mm

#### F261 Series Standard Model Flow Switches

Ordering Codes	Description
<b>F261KAH-V01C</b>	Standard model flow switch with Type 3R (NEMA) enclosure; 1 in., 2 in., 3 in., and 6 in. stainless steel paddles, lock-tooth washer, and stainless steel paddle screw supplied uninstalled
<b>F261MAH-V01C</b>	Standard model flow switch with Type 4 (NEMA) enclosure; 1 in., 2 in., 3 in., and 6 in. stainless steel paddles, lock-tooth washer, and stainless steel paddle screw supplied uninstalled

#### Replacement Paddle Parts

Ordering Codes	Description
<b>KIT21A-600</b>	Stainless steel 3-piece paddle (3 in., 2 in., and 1 in. segments)
<b>KIT21A-601</b>	Stainless steel 6 in. paddle
<b>PLT52A-600R</b>	Stainless steel 3-piece paddle (3 in., 2 in., and 1 in. segments) and Stainless steel 6 in. paddle



## REFRIGERATION COMPONENTS

### Float and Flow Controls

#### Mechanical Liquid Flow Switch

#### F261

#### Technical Specifications

#### F261xxH Series Standard Controls Electrical Ratings

Volts, 50/60 Hz	UL60730/UL1059				EN60730	
	24	120	208	240	24	230
Horsepower	---	1	1	1	---	---
Full Load Amperes	---	16	10	10	---	8
Locked Rotor Amperes	---	96	60	60	---	48
Resistive Amperes	16	16	10	10	16	16
Pilot Duty VA	125	720	720	720	77	720

#### UL Conformity Declaration Information

Purpose of Control	F261 Fluid Flow Switch
Construction of Control	Electronic independently mounted control
Number of Cycles	100,000 cycles
Method of Mounting Control	Mounting to sensed media vessel/orientation
Type 1 or Type 2 Action	Type 1.C (Microinterruption)
External Pollution Situation	Pollution degree 4
Internal Pollution Situation	Pollution degree 2
Rated Impulse Voltage	4,000 VAC
Ball Pressure Temperature	
Enclosure	130°C
Switch Component	122°C
Control Adjustment Instruction	---
Field Wiring Rating	<b>Wire/Cord Temperature Ratings:</b> 60°C only permitted when ambient air and media are less than 45°C 75°C only permitted when ambient air and media are less than 60°C 90°C only permitted when ambient air is less than 60°C and media is less than 75°C 150°C permitted when ambient air is less than 60°C and media is less than 121°C
Vessel Pressure	F261 Fluid Flow Switch: 290 psi (20 Bar)

#### F261 Series Fluid Flow Switches

Switch	SPDT
Enclosure	
	<b>UL</b> Type 3R or Type 4 <b>CE</b> IP43 (IP23 with drain hole plug removed) or IP67
Wiring Connections	Three color-coded screw terminals and one ground terminal
Conduit Connection	One 22 mm hole for 1/2 in. trade size (or PG16) conduit
Pipe Connector	Standard: 1 in. 11-1/2 NPT Threads
Maximum Fluid Pressure	290 psi (20 bar)
Minimum Fluid Temperature <sup>1</sup>	-29°C
Maximum Fluid Temperature <sup>2</sup>	121°C
Ambient Conditions	-40 to 60°C

#### Compliance

##### North America

cULus Listed; UL 60730, File E6688;  
 FCC Compliant to CFR47, Part 15, Subpart B, Class B  
 Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits

##### Europe



CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive.

##### Australia/New Zealand

Mark RCM Compliant

#### Note

- 1 Ensure that the low liquid temperature combined with the low ambient temperature does not lead to the freezing the liquid inside the body (or bellows, where appropriate). Please observe the liquid freezing point.
- 2 At higher ambient temperatures, the maximum allowed liquid temperature becomes lower. The temperature of the electrical switch inside should not exceed 70°C.

## REFRIGERATION COMPONENTS

### Float and Flow Controls

## Mechanical Air Flow Switch

### F62

#### Air Flow Switch

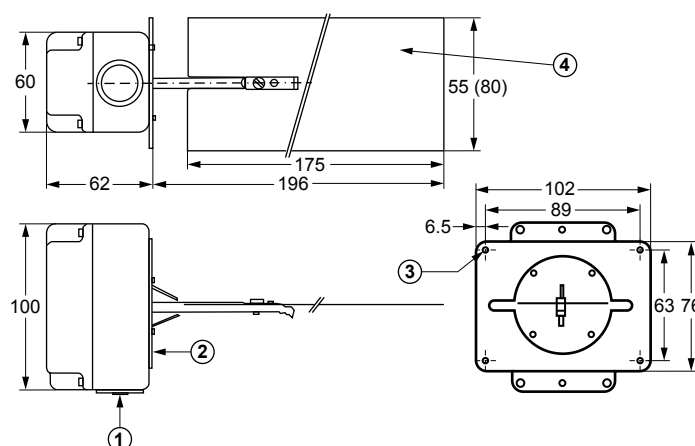
The F62 airflow switch detects air flow or the absence of air flow by responding only to the velocity of air movement within a duct. The control can be wired to open one circuit and close a second circuit (SPDT) for either signaling or interlock purposes.

Failure of air flow during normal operation of air handling systems may cause over-heating, coil icing and other conditions that may be detrimental to the equipment.

Typical applications include make-up air systems, air cooling or heating processes and exhaust systems.

#### Features

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



Dimensions in mm

1	Cable Inlet hole Ø 22.7 mm; Dust cup is installed
2	Mounting plate gasket 0.2 mm thick neoprene cell rubber
3	Four mounting holes Ø 5 mm.
4	One paddle 55 mm wide (mounted) One paddle 80 mm wide (packed with the control)

#### 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 IP43	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

## REFRIGERATION COMPONENTS

### Float and Flow Controls

## Mechanical Air Flow Switch

### F262

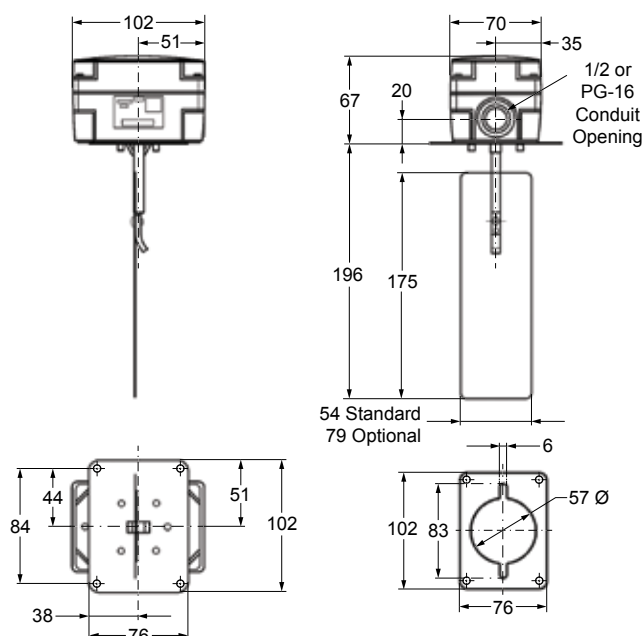
#### Air Flow Switch

The F262 Series Airflow Switches detect airflow or the absence of airflow by responding only to the velocity of air movement within a duct. The single-pole, doublethrow (SPDT) switch can be wired to open one circuit and close a second circuit for either signaling or interlock purposes.

Airflow failure during the normal operation of air handling systems may cause overheating, coil icing, or other conditions that may be detrimental to the equipment.

#### Features

- Type 3R (NEMA) Polycarbonate enclosure
- Dependable dust-protected SPDT snap-acting PENNswitch
- Large wiring space
- Easily accessible range adjustment screw



Ordering Code	Description
<b>F262KDH-01C</b>	Airflow switch with a 2-1/8 in. wide x 6-7/8 in. long (54 mm x 175 mm) paddle installed and a 3-1/8 in. wide x 6-7/8 in. long (79 mm x 175 mm) paddle supplied with the control

#### Replacement Paddle Kits for F262 Switch

Ordering Code	Description
<b>PLT112-1R</b>	2-1/8 in. wide x 6-7/8 in. long (54 mm x 175 mm) paddle
<b>PLT112-2R</b>	3-1/8 in. wide x 6-7/8 in. long (79 mm x 175 mm) paddle

## Technical Specifications

### F262 Switch Electrical Ratings

Volts 50/60 Hz	UL60730				EN60730	
	24	120	208	240	24	230
Horsepower	---	1	1	1	---	---
Full Load Amperes	---	16	10	10	---	8
Locked Rotor Amperes	---	96	60	60	---	48
Resistive Amperes	16	16	10	10	16	16
Plot Duty VA	125	720	720	720	125	720


## REFRIGERATION COMPONENTS

### Float and Flow Controls

#### Mechanical Air Flow Switch

F262

#### Technical Specifications

Switch	SPDT
Enclosure	
	<b>UL</b> Type 3R
	<b>CE</b> IP43
Wiring Connections	Three color-coded screw terminals and one ground terminal
Conduit Connection	One 22 mm hole for 1/2 in. trade size (or PG16) conduit
Paddle Material	0.15 mm stainless spring steel
Maximum Air Velocity	2,000 FPM (10.16 m/sec)
Maximum Duct Air Temperature	80°C
Ambient Conditions	0 to 40°C
Compliance	
	<b>North America</b> cULus Listed; UL 60730, File E6688; FCC Compliant to CFR47, Part 15, Subpart B, Class B Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits
	<b>Europe</b>  CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive.
	<b>Australia/New Zealand</b> Mark: RCM Compliant

#### UL Conformity Declaration Information

Purpose of Control	<b>F262 Series Airflow Switch</b>
Construction of Control	Electronic independently mounted control
Number of Cycles	100,000 cycles
Method of Mounting Control	Mounting to sensed media vessel/orientation
Type 1 or Type 2 Action	Type 1.C (Microinterruption)
External Pollution Situation	Pollution degree 4
Internal Pollution Situation	Pollution degree 2
Rated Impulse Voltage	4,000 VAC
Ball Pressure Temperature	
Enclosure	266°F (130°C )
Switch Component	252°F (122°C)
Control Adjustment Instruction	---
Field Wiring Rating	<b>Wire/Cord Temperature Ratings:</b> 60°C only permitted when ambient air and media are less than 45°C 75°C only permitted when ambient air and media are less than 60°C 90°C only permitted when ambient air is less than 140°F (60°C) and media is less than 75°C 150°C permitted when ambient air is less than 60°C and media is less than 121°C

## REFRIGERATION COMPONENTS

### Float and Flow Controls

## Mechanical Liquid Level Switch

### F63

#### Liquid Level Float Switch

The F63 Liquid Level Switch is designed to maintain a liquid level in indoor or outdoor closed tanks holding water, Chlorinated water, Ethylene Glycol or other non-corrosive liquids.

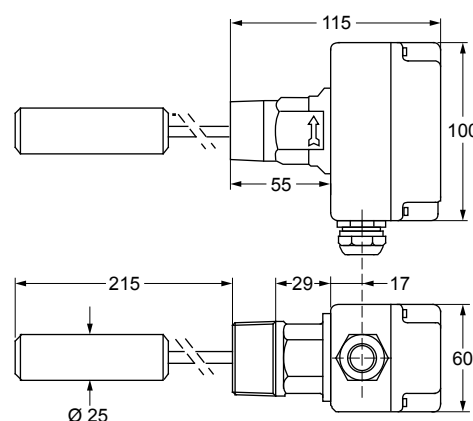
The switch has SPDT contacts and can be wired to close one circuit and open a second circuit when the liquid level rises above or falls below the required level.

The switch maintains the liquid level within (approx.) 13 mm.

The float switch should not be used for liquids lighter than water (density less than 0.95 kg/dm<sup>3</sup>).

#### Features

- Solid polycarbonate float
- Vapour tight IP67 enclosure
- Convenient wiring terminals



Dimensions in mm

Ordering Codes	Connection	Switch Action	Enclosure	Additional Features
F63BT-9102	1-11½ NPT	SPDT Contacts 15(8) A, 230 V~	Plastic enclosure IP67	Plastic float, VITON diaphragm

#### Accessories

Ordering Codes	Description
FLT001N001R	F63 - Float

## REFRIGERATION COMPONENTS

### Float and Flow Controls

## Mechanical Liquid Level Switch

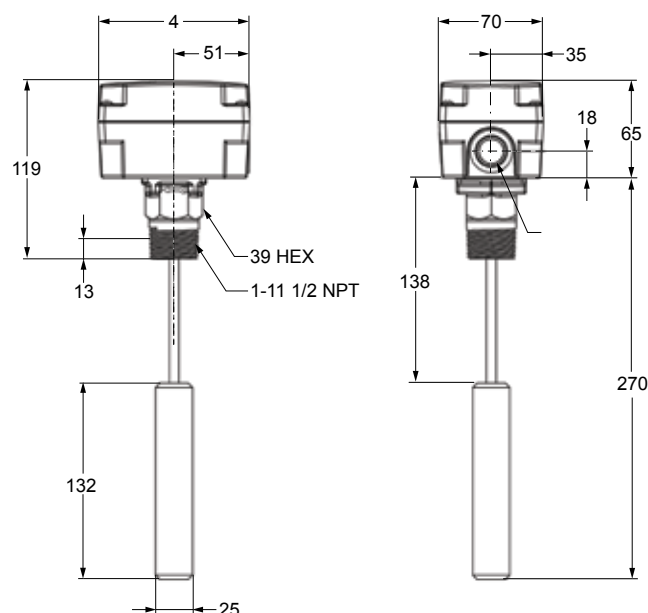
### F263

#### Liquid Level Float Switch

The F263 Series Liquid Level Float Switches are designed to maintain a liquid level in indoor or outdoor closed tanks that hold water or other nonhazardous liquids. When the liquid level in the tank rises above or falls below the required level, the single-pole, double-throw (SPDT) switch closes one circuit and opens a second circuit.

#### Features

- Viton® Diaphragms
- Single-Pole, Double-Throw Switch
- Sturdy Type 4 (NEMA) Enclosure
- Solid Polycarbonate Float



Ordering Codes	Description
F263MAP-V01C	SPDT float switch with Type 4 (NEMA) enclosure and polycarbonate float for liquid temperatures -29 to 100°C; maximum liquid pressure 150 psig (1,035 kPa)

## REFRIGERATION COMPONENTS

### Float and Flow Controls

#### Mechanical Liquid Level Switch


#### F263

#### Technical Specifications

##### F263 Switch Electrical Ratings

Volts 50/60 Hz		UL60730				EN60730	
	24	120	208	240		24	230
Horsepower	---	1	1	1		---	---
Full Load Amperes	---	16	10	10		---	8
Locked Rotor Amperes	---	96	60	60		---	48
Resistive Amperes	16	16	10	10		16	16
Plot Duty VA	125	720	720	720		125	720

Switch	Single-Pole, Double-Throw (SPDT)					
Enclosure	<ul style="list-style-type: none"> <li>UL Type 4 (NEMA)</li> <li>CE IP67</li> </ul>					
Wiring Connections	Three color-coded screw terminals and one ground terminal					
Conduit Connection	One 22 mm hole for 1/2 in. trade size (or PG16) conduit					
Pipe Connector	1 in. 11-1/2 NPT threads					
Minimum Tank Diameter	229 mm					
Maximum Liquid Pressure	150 psig (1,035 kPa)					
Liquid Temperature Range	<ul style="list-style-type: none"> <li>Minimum -29°C or liquid freezing point</li> <li>Maximum 100°C</li> </ul>					
Ambient Conditions	<ul style="list-style-type: none"> <li>Minimum -40°C</li> <li>Maximum 60°C</li> </ul>					
Compliance	<ul style="list-style-type: none"> <li>North America cULus Listed; UL 60730, File E6688; FCC Compliant to CFR47, Part 15, Subpart B, Class B; Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits</li> <li>Europe  CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive.</li> <li>Australia/New Zealand Mark RCM Compliant</li> </ul>					

## REFRIGERATION COMPONENTS

### Pressure Controls

## Adjustable Differential Pressure Switch

### P232

#### *Sensitive Differential*

This switch senses a change in the differential pressure (either velocity pressure or pressure drop across a restriction) as the air flow changes. The pressure, as sensed by two sensing ports, is applied to the two sides of a diaphragm in the control. The spring loaded diaphragm moves and actuates the switch.

The series P232 can also be used to detect small positive gauge pressure by using only the high pressure connection and leaving the low pressure connector open, or to detect a vacuum by using only the low pressure connection and leaving the high pressure connector open to ambient pressure.

#### Features

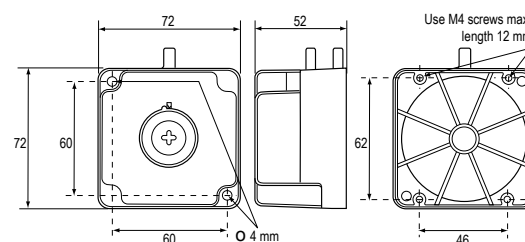
- Easy to read Setpoint scale
- Large wiring space
- Versatile mounting options

#### Application

- This (differential) pressure switch is used to sense flow of air, single or differential air pressure

Typical applications include:

- Clogged filter detection
- Detection of frost on air conditioning coils and initiation of defrost cycle
- Air proving in heating or ventilation ducts
- Maximum air flow controller for variable air volume system



Dimensions in mm

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

#### Note

Other models on request, range up to 20 inWC



## REFRIGERATION COMPONENTS

### Pressure Controls

## Adjustable Differential Pressure Switch

### P233

#### *Sensitive Differential*

This switch senses a change in the (differential) pressure as the airflow changes. The (differential) pressure is applied to the two sides of a diaphragm in the control.

The spring-loaded diaphragm moves and actuates the switch. The series P233A/F can also be used to detect small positive gauge pressure or to detect a vacuum.

#### Features

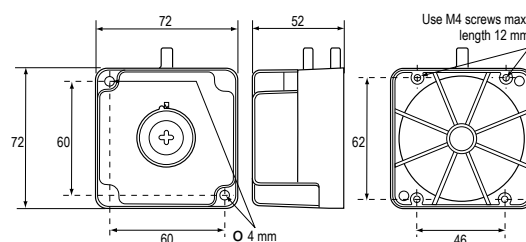
- One switch to measure relative pressure, vacuum or differential pressure
- Various accessories available
- Compact and durable construction
- Easy mounting and wiring, various mounting possibilities
- Standard PG 11 nipple and optional DIN 43650 connector
- Accurate and stable switch point
- SPDT contact standard

#### Application

- This (differential) pressure switch is used to sense flow of air, single or differential air pressure

Typical applications include:

- Detect clogged filter
- Detect frost or ice build-up on air conditioning coils
- Air proving in heating or ventilation ducts
- Maximum airflow controller for variable air volume system
- Detect blocked flue or vent
- Monitor fan operation



Dimensions in mm

## REFRIGERATION COMPONENTS

### Pressure Controls

#### Adjustable Differential Pressure Switch

#### P233

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 + BKT024N002R
P233A-4-PAD*	50 to 400 Pa			Bulk	Scale in Pa
P233A-4-PAC				Ind.	---
P233A-4-PHC					Scale in Pa, GMT008N600R + BKT024N002R
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-AAC	0,5 to 6			Bulk	---
P233A-6-AAD*					---
P233A-10-AAC	1,4 to 10	< 0.5	Ind.	---	
P233A-10-AHC	140 to 1000 Pa			GMT008N600R + BKT024N002R	
P233A-10-PAC				---	
P233A-10-PKC				Scale in Pa, FTG015N602R (2x) + 2 m tube 4/7 mm	
P233A-10-AAD*	1,4 to 10		Bulk	---	
P233-10-AKC	6 to 50		Ind.	FTG015N602R (2x) + 2 m tube 4/7 mm	
P233A-50-AAC		Scale in Pa, GMT008N600R + BKT024N002R			
P233A-10-PHC	140 to 1000 Pa	< 0,5			

#### Notes

\* : Quantity orders only

\*\* : Switching differential is maximum value mid-range

## REFRIGERATION COMPONENTS

### Pressure Controls

## Adjustable Differential Pressure Switch

### P74

#### Differential Pressure

The P74 series of differential pressure switches incorporate two opposing pressure elements and an adjustable range setpoint spring with a calibrated scale.

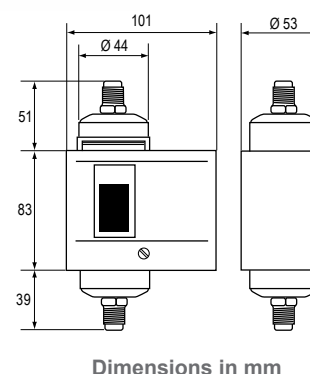
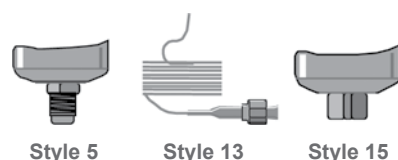
The control switches at the indicated setpoint on an increase in differential pressure and switches back to the normal position when the different pressure decreases to the setpoint less the mechanical switching differential.

#### Features

- Heavy duty pressure elements.
- These controls may be used in combination with series P28 lube oil protection control on two compressor, single motor units.

#### Application

These controls are designed to sense pressure differences between two points and may be used as operating or limit controls. Typical applications are to detect flow across a chiller or water cooled condenser, to detect flow in a heating system and sensing lube oil pressure differential on refrigeration compressors.



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

## REFRIGERATION COMPONENTS

### Pressure Controls

## Adjustable Pressure Switch

### P20

*For Air-Conditioning and Heat Pump Applications*

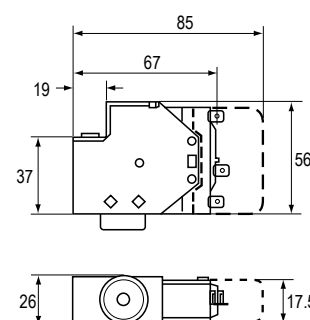
The P20 series high and low limit (cut-out) controls for all non-corrosive refrigerants are compact pressure controls ideally suited for commercial or residential packaged air conditioning units, heat pumps, small water chillers, ice cube machines and other applications where a semi fixed setting is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

The P20 series includes auto reset as well as manual reset models and is factory set.

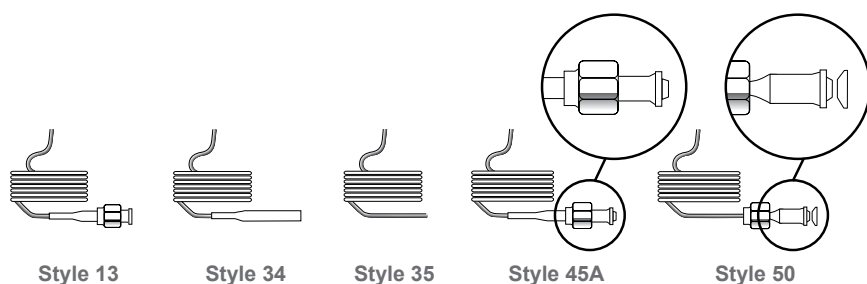
A special setting tool is available while also field (screwdriver) adjustable models can be chosen.

#### Features

- Field proven reliability
- Reset tab must be released before restart (Trip free manual reset)
- Compact design
- Enclosed dust-tight switch
- SPDT contact with special terminals
- Test pressure 53 bar
- Designed for at least 300000 cycles



Dimensions in mm



## REFRIGERATION COMPONENTS

### Pressure Controls

#### Adjustable Pressure Switch

##### P20

Ordering Codes	Range (bar)	Differential fixed	Set at (bar)	Style	Capillary Length	Switch Action	PED approval
P20EA-9611D	0.5 to 10	0.9	2	13	120 cm	SPDT, 8 A, Open Low, Auto Reset	---
P20EA-9620D		1.5			90 cm		
P20EA-9621D					120 cm		
P20EA-9160L	7 to 29	3.1	17	45A	90 cm	SPDT, 8 A, Open High, Auto Reset	●
P20EA-9561K		1.2	16	50			

#### High Pressure Control

Ordering Codes	Range (bar)	Differential fixed	Set at (bar)	Style	Capillary Length	Switch Action
P20EA-9670X	7 to 29	5.2	28	13	90 cm	SPDT, 8 A, Open High, Auto Reset
P20EA-9681T		7.1	24	13	120 cm	
P20EA-9950C		1.1	10	34	90 cm	
P20EA-9950K		1.2	16			
P20GA-9650X		---	28	13		
P20GA-9650T			24			

#### Low and High Pressure Control Universal Replacements

Ordering Codes	Range (bar)	Differential fixed	Set at (bar)	Style	Capillary Length	Switch Action	Additional Features	PED Approval	
P20EA-9530FC	0.5 to 10	2.1	3	50	90 cm	SPDT, 8 A, Auto Reset	Open Low	---	
P20EA-9630FC		2.1	3	13					
P20EA-9570XC	7 to 29	5.2	28	50			Open High	●	
P20EA-9670XC		5.2	28	13					●
P20EL-9670TC	14 to 42	6.5	37	50		SPDT, 8 A, Manual Reset	Open Low	---	
P20FA-9510FC	0.5 to 10		3						13
P20FA-9610FC				7 to 29			28		50
P20GA-9550XC	14 to 42		37						13
P20GA-9650XC									
P20GL-9650TC									

## REFRIGERATION COMPONENTS

### Pressure Controls

## Adjustable Pressure Switch

### P735

#### Single Pressure

The P735 series pressure controls may be used for control functions or limit functions, depending on model number.

All models are provided with alarm contacts.

All standard models have phosphor bronze bellows and brass pressure connections. Models for use with ammonia are provided with stainless steel bellows and connectors.

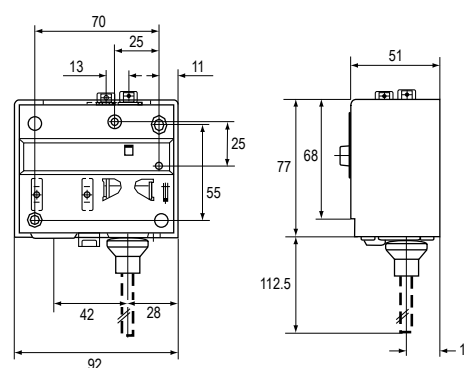
#### Features

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

#### Application

These pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure. Models supplied have a "whole range" design, enabling them to be used with all non-corrosive refrigerants which are within the operating range of the control.

They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program.



Dimensions in mm



Style 5



Style 28



Style 30

## REFRIGERATION COMPONENTS

### Pressure Controls

#### Adjustable Pressure Switch

#### P735

##### For Water

Ordering Code	Range (bar)	Differential (bar)	Switch Action (wire diag.)	Max. Bellows Pressure	Special Pressure Connection G $\frac{1}{4}$ " female
					Ind. Pack.
P735AAA	-0,2 to 10	1 to 4,5	1	15	-9200
	-0,5 to 7	0,6 to 3	1	22	-9201

##### For Non-Corrosive Refrigerants

Ordering Codes	Range (bar)	Differential (bar)	Switch Action (wire diag.)	Max. Bellows Pressure	Style 5		Style 28	Style 30
					Ind. Pack.	Bulkpack	Ind. Pack.	Ind. Pack.
P735AAA	-0.5 to 7	0.6 to 3	1	22	-9300	-9320	-9800	-9400
	-0.2 to 10	1 to 4.5	1	15	-9301	---	---	---
	3 to 30	3 to 12	2	33	-9350	-9370		
	3.5 to 21	2.1 to 5.5	2	30	-9351	---		
P735BCA	-0.5 to 7	Man. res.**	1	22	-9300	---	---	---
P735BEA	3 to 30	Man. res.*	3	33	-9350	---		

##### Notes

\* : Resetable at 3 bar below cut-out point

\*\* : Resetable at 0.5 bar above cut-out point

##### For Non-Corrosive Refrigerants type approved pressure limiter/pressure cut out

Ordering Codes	Range (bar)	Differential (bar)	Switch Action (wire diag.)	Max. Bellows Pressure	Style 5		Style 28	PED Approval
					Ind. Pack.	Bulkpack	Ind. Pack.	
P735AAW	-0.5 to 7	0.6 to 3	1	22	-9300	-9320	-9800	---
	3 to 30	3.5 to 12	2	33	-9350	-9370	-9850	●
P735BCB	-0.5 to 7	Man. res.**	1	22	-9300	---	---	---
P735BEB	3 to 30	Man. res.*	3	33	-9350	-9370	---	●

##### Notes

\* : Resetable at 3.5 bar below cut-out point

\*\* : Resetable at 0.5 bar above cut-out point

## REFRIGERATION COMPONENTS

### Pressure Controls

## Adjustable Pressure Switch

### P736

#### Dual Pressure

The P736 series pressure controls may be used for control functions or limit functions, depending on model number.

All models are provided with alarm contacts (except P736ALA).

All standard models have phosphor bronze bellows and brass pressure connections.

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

#### Features

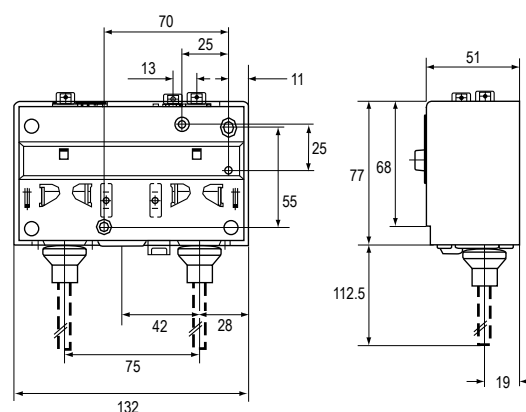
- Generous wiring space
- Trip-free manual reset
- Separate alarm contacts for both low pressure and high pressure cut-out (except P736ALA)

#### Application

These dual pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure.

Models supplied have a "whole range" design, enabling them to be used all non-corrosive refrigerants which are within the operating range of the control.

They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program.



Dimensions in mm



Style 5

Style 28

Style 30



## REFRIGERATION COMPONENTS

### Pressure Controls

#### Adjustable Pressure Switch

#### P736

#### For Non-corrosive Refrigerants

Ordering Codes	Left Side		Right Side		Contruction LP/HP (max. press.)	Style 5		Style 30
	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		Ind. Pack.	Bulkpack	Ind. Pack.
P736LCA	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 22 bar HP: 33 bar	-9300	-9320	-9400
P736MCA	-0.5 to 7	0.6 to 3	3 to 30	Man. Res.**		-9300	-9320	---
P736PGA	-0.5 to 7	Man. Res.*	3 to 30	Man. Res.**		-9300	---	

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

Ordering Codes	Left Side		Right Side		Contruction HP/HP (max. press.)	Style 5		Style 30
	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		Ind. Pack.	Bulkpack	Ind. Pack.
P736ALA	3.5 to 21	1.8 (fixed)	3.5 to 21	1.8 (fixed)	30 bar	-9351	****	---

#### For Non-Corrosive Refrigerants type approved pressure limiter/pressure cut out

Ordering Codes	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	****	-9800	

#### Manual Reset HP/HP, type approved pressure cut out/ safety pressure cut out

Ordering Codes	Left Side		Right Side		Contruction HP/HP (max. press.)	Style 5		Style 30
	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		Ind. Pack.	Bulkpack	Ind. Pack.
P736PLM	3 to 30	Man. Res.*	3 to 30	Man. Res.**	30 bar	---	-9370	---

#### Notes

- \* : 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

## REFRIGERATION COMPONENTS

### Pressure Controls

## Adjustable Pressure Switch

### P77

*Single Pressure, IP54*

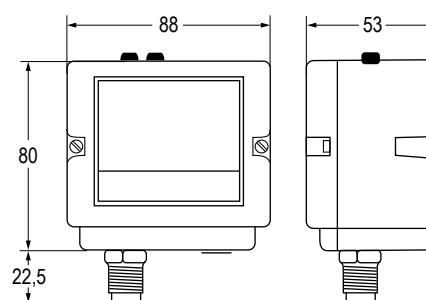
The P77 series pressure controls may be used for control functions or limit functions, depending on model number. All models are provided with alarm contacts. All standard models have phosphor bronze bellows and brass pressure connections. Models for use with ammonia are provided with stainless steel bellows and connectors. Devices conforming to PED 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.

#### Features

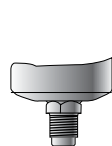
- Generous wiring space
- Splash-proof enclosure (IP54)
- SPDT contacts are provided as standard on single pressure controls.
- Trip-free manual reset

#### Application

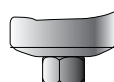
These pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure. Models supplied have a "whole range" design, enabling them to be used with refrigerants R22, R134A, R404A, R410A, CO<sub>2</sub> and all other non-corrosive refrigerants which are within 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.



Dimensions in mm



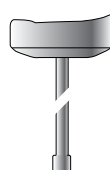
Style 5



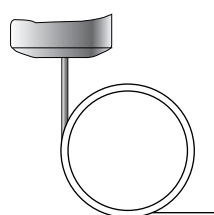
Style 15



Style 28



Style 30



Style 35

## REFRIGERATION COMPONENTS

### Pressure Controls

#### Adjustable Pressure Switch P77

##### For Non-corrosive Refrigerants

Family Code	Style 5		Style 28	Style 30	Style 35	Range (bar)	Diff. (bar)	Max Bellows Pressure
	Ind. Pack.	Bulkpack	Bulkpack	Ind. Pack.	Ind. Pack.			
P77AAA	-9300	-9320	-9800	-9400	-9500	-0.5 to 7	0.6 to 3	22
	-9301	---	---	---	---	-0.2 to 10	1 to 4.5	15
	-9302	---	---	---	---	-0.3 to 2	0.4 to 1.5	4
	-9350	-9370	-9850	-9450	-9550	3 to 30	3 to 12	33
	-9351	-9371	---	-9451	---	3.5 to 21	2.1 to 5.5	30
P77BCA	-9300	---	---	-9400	---	-0.5 to 7	Man. res.**	22
P77BEA	-9350	---	---	-9450	---	3 to 30	Man. res.*	33

##### For Ammonia and Non-corrosive Refrigerants

Family Code	Style 15		Range (bar)	Diff. (bar)	Max Bellows Pressure
	Ind. Pack.	Bulkpack			
P77AAA	-9700	---	-0.5 to 7	0.6 to 3	14
	-9750	---	3 to 30	3.5 to 12	33
P77BCA	-9700	---	-0.5 to 7	Man. res.**	14
P77BEA	-9750	---	3 to 30	Man. res.*	33

##### For Non-corrosive Refrigerants, type approved pressure limiter/pressure cut out/safety pressure cut out

Family Code	Style 5		Style 28	Range (bar)	Diff. (bar)	Max Bellows Pressure	Approved according to PED 97/23/EC Cat. IV
	Ind. Pack.	Bulkpack	Ind. Pack.				
P77AAW	-9300	-9320	-9800	-0.5 to 7	0.6 to 3	22	---
	-9350	-9370	-9850	3 to 30	3.5 to 12	33	•
	-9355	---	-9855	3 to 42	5 to 15	47.6	
P77BCB	-9300	---	-9800	-0.5 to 7	Man. res. **	22	---
P77BEB	-9350	-9370	-9850	3 to 30	Man. res. *	33	•
	-9355	---	-9855	3 to 42	Man. res. *	47.6	
P77BES	-9350	-9370	-9850	3 to 30	Man. res. *	33	

##### For Ammonia and Non-corrosive Refrigerants, type approved pressure limiter/pressure cut out/safety pressure cut out

Family Code	Style 15		Range (bar)	Diff. (bar)	Max Bellows Pressure	Approved according to PED 97/23/EC Cat. IV
	Ind. Pack.	Bulkpack				
P77AAW	-9700	---	-0.5 to 7	0.6 to 3	14	---
	-9750	---	3 to 30	3.5 to 12	33	•
P77BEB	-9750	---	3 to 30	Man. res.*	33	
P77BES	-9750	---	3 to 30	Man. res.*	33	

#### Note:

\*\* Resettable at 0.5 bar above cut-out point

\* Resettable at 3.5 bar below cut-out point

100 kPa = 1 bar ≈ 14.5 psi

## REFRIGERATION COMPONENTS

### Pressure Controls

## Adjustable Pressure Switch

### P78

*Dual Pressure, IP54*

The P78 series pressure controls may be used for control functions or limit functions, depending on model number. All models are provided with alarm contacts (except P78ALA). All standard models have phosphor bronze bellows and brass pressure connections. Models for use with ammonia are provided with stainless steel bellows and connectors. Devices conforming to PED 97/23/EC Cat. IV have a double bellows on the high pressure versions. Their IP54 classification means that these pressure controls are suitable for almost all applications.

#### Features

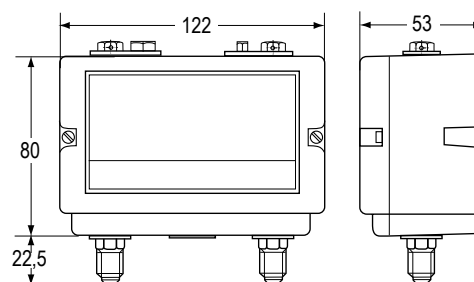
- High refrigerant pressure. Suitable for R410A and CO<sub>2</sub> subcritical applications
- Gold plated contacts
- Generous wiring space
- Splash-proof enclosure (IP54)
- Trip-free manual reset
- Patented separate alarm contacts for both low pressure and high pressure cut-out (except P78ALA)

#### Application

These pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure.

Models supplied have a "whole range" design, enabling them to be used with refrigerants R22, R134A, R404A, R410A, CO<sub>2</sub> and all other non-corrosive refrigerants which are within the operating range of the control.

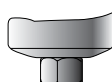
They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program. Also models tested and approved to PED 97/23/EC Cat. IV (supersedes DIN and TUV approval) are included in the program.



Dimensions in mm



Style 5



Style 15



Style 28



Style 30

## REFRIGERATION COMPONENTS

### Pressure Controls

#### Adjustable Pressure Switch

#### P78

#### Dual Pressure Controls for Non-corrosive Refrigerants

Family Code	Pressure Connection			Left Side		Right Side		Construction LP/HP (max. press.)
	Style 5		Style 30	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)	
	Ind. Pack.	Bulkpack	Ind. Pack.					
P78LCA	-9300	-9320	-9400	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 22 bar HP: 33 bar
P78MCA	-9300	-9320	-9400	-0.5 to 7	0.6 to 3	3 to 30	Man. Res.**	
P78PGA	-9300	****	-9400	-0.5 to 7	Man. Res *	3 to 30	Man. Res.**	

\*\*\*\* Can be set-up for quantity orders

\*\* Resettable at 3 bar below cut-out point

\* Resettable at 0.5 bar above cut-out point

#### For Ammonia and Non-corrosive Refrigerants

Family Code	Pressure Connection		Left Side		Right Side		Construction LP/HP (max. press.)
	Style 15		Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)	
	Ind. Pack.	Bulkpack					
P78LCA	-9700	****	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 14 bar HP: 33 bar
P78MCA	-9700	****	-0.5 to 7	0.6 to 3	3 to 30	Man. Res.**	
P78PGA	-9700	****	-0.5 to 7	Man. Res *	3 to 30	Man. Res.**	

\*\*\*\* Can be set-up for quantity orders

\*\* Resettable at 3 bar below cut-out point

\* Resettable at 0.5 bar above cut-out point

#### Fan Cycling Controls for Air-Cooled Condensers (Non-corrosive Refrigerants)

Family Code	Pressure Connection			Left Side		Right Side		Construction HP (max. press.)
	Style 5		Style 30	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)	
	Ind. Pack.	Bulkpack	Ind. Pack.					
P78ALA	-9351	****	-9451	3.5 to 21	1.8 (fixed)	3.5 to 21	1.8 (fixed)	HP: 30 bar

\*\*\*\* Can be set-up for quantity orders

100 kPa = 1 bar ≈ 14.5 psi

#### For Non-corrosive Refrigerants, type approved pressure limiter/pressure cut out/safety pressure cut out - (Except P78PGB-\*)

Family Code	Pressure Connection			Left Side		Right Side		Construction LP/HP (max. press.)	Approved according to PED 97/23/EC Cat. IV
	Style 5		Style 28	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		
	Ind. Pack.	Bulkpack	Ind. Pack.						
P78LCW	-9300	-9320	-9800	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 22 bar HP: 33 bar	●
P78MCB	-9300	-9320	-9800	-0.5 to 7	0.6 to 3	3 to 30	Man. Res.**		
P78MCS	-9300	---	---	-0.5 to 7	0.6 to 3	3 to 30	Man. Res.**		
P78PGB	-9300	****	-9800	-0.5 to 7	Man. Res.*	3 to 30	Man. Res.**		
P78PLM	-9350	****	-9850	3 to 30	Man. Res.**	3 to 30	Man. Res.**		

\*\*\*\* Can be set-up for quantity orders

\*\* Resettable at 3.5 bar below cut-out point

\* Resettable at 0.5 bar above cut-out point

#### Dual pressure controls for Non-corrosive Refrigerants, type approved pressure limiter/pressure cut out/safety pressure cut out

Family Code	Pressure Connection	Left Side		Right Side		Construction LP/HP (max. press.)	Approved according to PED 97/23/EC Cat. IV
	Style 5	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		
	Ind. Pack.						
P78LCW	-9355	-0.2 to 10	1 to 4.5	3 to 42	4 (fixed)	LP: 15 bar HP: 47.6 bar	●
P78MCB	-9355	-0.2 to 10	1 to 4.5	3 to 42	Man. Res.*		
P78PLM	-9355	3 to 42	Man. Res.*	3 to 42	Man. Res.*		

\* Resettable at 4 bar below cut-out point

## REFRIGERATION COMPONENTS

### Pressure Controls

## Fixed Setting Pressure Switch

### P100

#### Direct Mount Pressure Switch

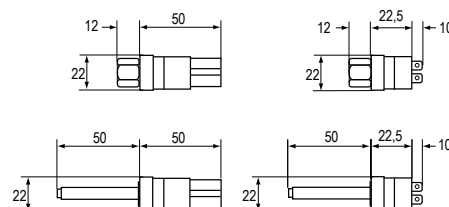
The P100 series are encapsulated, non-adjustable, direct mount pressure controls typically used for low and high-pressure cut-outs for OEM applications. The P100 series are produced according to switchpoint requirements of customers. The small dimensions, weight and protection class makes the P100 series applicable for use without the need of additional mounting brackets. The P100 series can be used for all non-corrosive refrigerants like R134a; R22; R404, R410A, R290, R600, HFO1234, R744 and others.

#### Features

- Compact size and light weight
- Encapsulated, dust tight switch IP67
- Broad variety of electrical and pressure connections

#### Application

- Computer room air conditioning
- Refrigeration/Air conditioning condensers
- Commercial refrigeration
- Ice machines
- Food service equipment



Dimensions in mm

#### 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	R134A	2,5	4	0,5	0,5	●	---	2 Mt.	SPST
P100AP-301D		R407C	4	6			---	●		
P100AP-302D					R404A	0,3	2,8	0,4		
P100AP-306D		Normally Open	---	0,5	1,5	0,3	0,3			
P100AP-308D	0,7			2,2						
P100AP-309D										
P100AP-310D										
P100CP-102D	High Pressure Auto Reset	R134A	16	11	0,7	1,4	---	●	2 Mt.	
P100CP-103D		R407C	24	18			●	---		
P100CP-104D		R404A	28	23		---	●			
P100CP-106D						R410A	38	28		
P100CP-107D	Normally Closed	---	27,6	20,7	0,7	0,7	●	---	FASTON	
P100CP-108D			26	20					2 Mt.	
P100CP-110D										
P100CP-111D	CO <sub>2</sub> Transcritical	R744	140	100	6,9	6,9	---	●	2 Mt.	
P100CP-170D										

## REFRIGERATION COMPONENTS

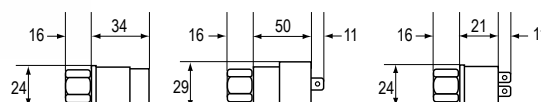
### Pressure Controls

#### Fixed Setting Pressure Switch

##### P100

##### Features

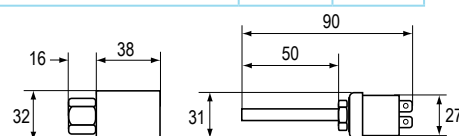
- Compact size and light weight
- Encapsulated, dust tight switch IP67
- Manual reset models have a trip-free design
- Models with gold-plated contacts available
- Broad variety of electrical and pressure connections



Dimensions in mm

#### Manual Reset Models

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



Dimensions in mm

#### P100 Heavy Duty Pressure Controls - Auto Reset

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

## REFRIGERATION COMPONENTS

### Pressure Controls

## Pressure Switches Accessories

Ordering Codes	Description	Minimum order qty.
<b>BKT034N602R</b>	Mounting bracket + screws for P35AC transducer	1
<b>BKT275-1</b>	Mounting bracket dual for P20	
<b>210-25R</b>	Mounting bracket for P20/P35 (single)	
<b>WRN12-1</b>	Wrench P20/P21	
<b>210-604R</b>	Terminal cover P20/P21	50
<b>BKT024N002R</b>	Mounting bracket for P233	1
<b>FTG015N602R</b>	Duct mounting kit "staight"	
<b>FTG015N603R</b>	Duct mounting kit "bent"	
<b>GMT008N600R</b>	Duct kit for P233, self locking grommet and tubing	
<b>CNR003N001R</b>	Connector 6 mm for P77/P78, P735/P736	
<b>CNR003N002R</b>	Connector 8 mm for P77/P78, P735/P736	
<b>CNR012N001R</b>	Adapter R3/8 female to 1/4-18 NPT male for P48	
<b>CNR013N001R</b>	Adapter R 3/8 female to 1/4-18 NPT female for P48	
<b>KIT023N600</b>	Locking kit for P48, P77/P78, P735/P736 - for field installation	100 (1 box)
<b>KIT031N600</b>	Valve depressors for conversion style 13 - style 45a	
<b>KIT031N601</b>	Valve depressors for conversion style 51 - style 50	250 (1 box)
<b>KIT034N600</b>	Seal rings for style 50/51	
<b>271-51L</b>	Mounting bracket for P28, P45, P48, P74, P77/P78, P735/P736	50



## REFRIGERATION COMPONENTS

### Pressure Controls

## Pressure Switches Accessories

### Capillary kit

Ordering Codes	Length	Style	Minimum order qty.
SEC002N600	90 cm	2x style 13	100
SEC002N602	90 cm	style 13 - style 45a	
SEC002N606	200 cm	style 13 - style 45a	75
SEC002N607	200 cm	2x style 13	
SEC002N617	100 cm	style 13 - style 13	100
SEC002N621	90 cm	style 34 - style 34	
SEC002N622	90 cm	style 50 - style 50	
SEC002N624	200 cm	style 50 - style 50	75
SEC002N626	90 cm	style 50 - style 51	100
SEC002N627	200 cm	style 50 - style 51	
SEC002N628	300 cm	style 50 - style 51	75

### 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		

## REFRIGERATION COMPONENTS

### Pressure Controls

## Pressure Switches Accessories

### H735

#### *Synthetic Flexible Hose*

The synthetic hoses consist of a seamless PA compound inner layer reinforced with a braided layer of high performance synthetic fibre.

This reinforcement is protected by an oil, weather and abrasion resistant Polyester Elastomer Compound.

The standard assembly length is 0,9 meter with one straight and one elbow 90 degree hose fitting.

The fitting connection is 1/4" metal tube with 7/16"-20 UNF swivel nut connection suitable for 1/4" SAE male flare.

Other lengths and/or fitting connections configurations (Style 50, 51 straight or elbow) are available on request (quantity orders only).



#### Features

- Very flexible
- Low minimum bend radius (30 mm)
- One straight and one 90° elbow pressure connection
- Polyester Elastomer Compound construction
- High pressure safety ratio
- Low effusion

#### Application

These synthetic hoses are designed for pressure measuring connections.

They provide, for example, a very flexible connection between a refrigerant compressor and pressure controls. The hoses can be used for all non-corrosive refrigerants including R134a, R22, R404a, R407c and R410A with pressures within the maximum pressure range of the hose. Hoses are tested with common compressor oils in combination with above mentioned refrigerants.

Ordering Codes	Pressure Connection	Fitting Connection	Length (cm)	Additional Features
H735AA-30C	Straight x 90° elbow	1/4" metal tube with 7/16"-20 UNF swivel nut connection suitable for 1/4" SAE male flare	30	All models bulk packed
H735AA-40C			40	
H735AA-50C			50	
H735AA-70C			70	
H735AA-90D			90	
H735AA-100C			100	
H735AA-150C			150	
H735AA-200C			200	

#### Note

Minimum shipping quantity 100 pieces

## REFRIGERATION COMPONENTS

### Pressure Controls

## Adjustable Oil Protection Switch

### P28

#### *Oil Protection*

These controls measure the pressure differential between the pressure generated by the oil pump and the refrigerant pressure at the crankcase.

A built-in time delay switch allows for pressure-pick up on start and avoids nuisance shutdowns on pressure drops of short duration during the running cycle.

When the compressor is started, the time delay switch is energised. If the net oil pressure does not build up within the required time limit, the time delay switch trips to stop the compressor. If the net oil pressure rises within the required time after the compressor starts, the time delay switch is automatically de-energised and the compressor continues to operate normally. If the net oil pressure should drop below setting (scale pointer) during the running cycle, the time delay switch is energised and, unless the net oil pressure returns to cut-in point within the time delay period, the compressor will be shut down, and have to be manual reset.

The compressor can never run longer than the predetermined time on low oil pressure.

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

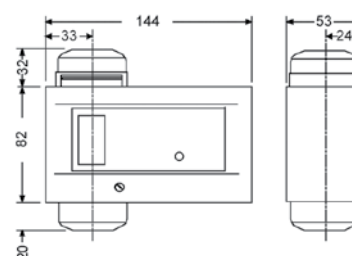


#### Features

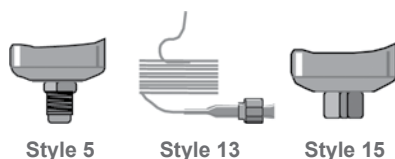
- Heavy duty pressure elements
- Safety lock-out with trip-free manual reset
- Ambient compensated timing
- Dust-tight Penn switch

#### Application

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



Dimensions in mm



## REFRIGERATION COMPONENTS

### Pressure Controls

#### Adjustable Oil Protection Switch

P28

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 2 flare nuts 7/16"–20 UNF			
P28DA-9660		13	90				---			
P28DJ-9360		5	90				IP66 enclosure			
P28DJ-9861		15	90	230		NH3	IP66 enclosure, Incl. 2 connectors CNR003N001			
P28DP-9300		5	---			non-corr.	Without time delay			
P28DP-9340			50				---			
P28DP-9360			90				---			
P28DP-9380			120				---			
P28DP-9381		13					Concealed adjustment, set 0.65 bar			
P28DP-9640							---			
P28DP-9660							---			
P28DP-9680							---			
P28DP-9840		15	50			NH3	---			
P28DP-9860			90	---						
P28DN-9750			50	115/230	---		Concealed adjustment, set 1,5 bar			

## REFRIGERATION COMPONENTS

### Pressure Controls

## Adjustable Oil Protection Switch

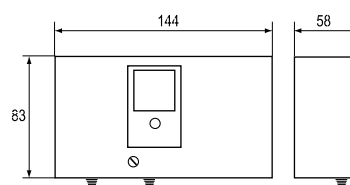
### P45

#### Oil Protection

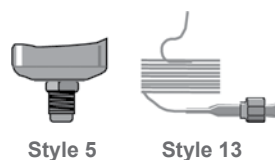
The series P45 controls are designed to give protection against low lube-oil pressure on pressure lubricated refrigeration compressors. The controls measure the pressure differential (net oil pressure) between the pressure generated by the oil pump and the refrigerant pressure at the crankcase. A built-in time delay switch allows pressure build-up during start and avoids nuisance shut-down on pressure drops of short duration during the running cycle.

#### Features

- Several million in use today
- Heavy duty pressure elements
- Key specifications match/exceed other brands
- Accurate 0.2 bar switch differential standard
- Adjustable or fixed setpoint
- Safelight output standard
- Trip-free manual reset
- High current rated output
- Ambient compensated timing



Dimensions in mm



Style 5

Style 13

Ordering 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			

## REFRIGERATION COMPONENTS

### Pressure Controls

## Adjustable Steam Pressure Switch

### P48

#### Steam Pressure

The P48 series have been developed for special applications where pressure must be controlled.

All models have an adjustable differential depending on the range (see type number selection table).

The P48AAA-9110 and P48AAA-9120 has the power element outside the case.

All the models have phosphor bronze bellows and brass pressure connections except the P48AAA-9150. This model has a stainless steel bellows and pressure connection and is provided with a brass adapter 1/4"-18 NPT female to R3/8 male.

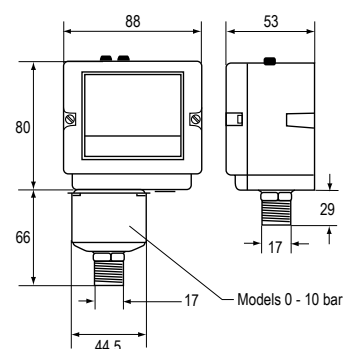
#### Features

- Generous wiring space provided
- Splash-proof enclosure (IP54)
- SPDT contacts are provided as standard on single pressure control
- Trip-free manual reset

#### Application

The series P48 pressure controls are designed as operating or high/low cut-out control on steam, air or (hot) water applications.

Also for non-combustible gases which are not harmful to the materials in contact with these mediums. On steam applications a steam trap is recommended (see Accessories).



Dimensions in mm

Ordering Codes	Range (bar)	Differential (bar)	Pressure Connection	Style	Switch Action	Additional 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				Automatic Reset, stainless steel bellows	---
P48AAA-9140	1 to 16	1.3 to 2.5					
P48AAA-9150	3 to 30	3 to 12					
P48BEA-9140	4 to 16	---				Manual Reset	•

## REFRIGERATION COMPONENTS

### Modulating Water Valves

## Pressure Actuated Water Valves

### V43/V243

#### Regulating Valves

The V43/V243 Pressure-Actuated Water-Regulating Valves are designed to regulate water flow through the condenser of large refrigerated cooling systems. These pilot-operated valves open on an increase in refrigerant head pressure and provide modulating operation.

The V43/V243 water-regulating valves are available for commercial and maritime applications.

V43 valves are available for non-corrosive low- and medium-pressure refrigerants such as R-134A, R-404A, R-502, and R-507. Specially designed V43 valves are also available for ammonia service (R-717).

V243 valves are available for non-corrosive high-pressure refrigerants such as R410A.

Commercial V43/V243 valves are constructed with a cast iron body, brass internal parts, and bronze seat material.

To resist the corrosive action of sea water, the V43/V243 maritime and navy models are constructed with a red brass body, bronze and monel interior parts, and monel seat material.



#### Features

- Built-in Pilot Valve
- Easy Adjustment
- Drain Plug
- Mesh Monel Screen

#### Dimensions in mm

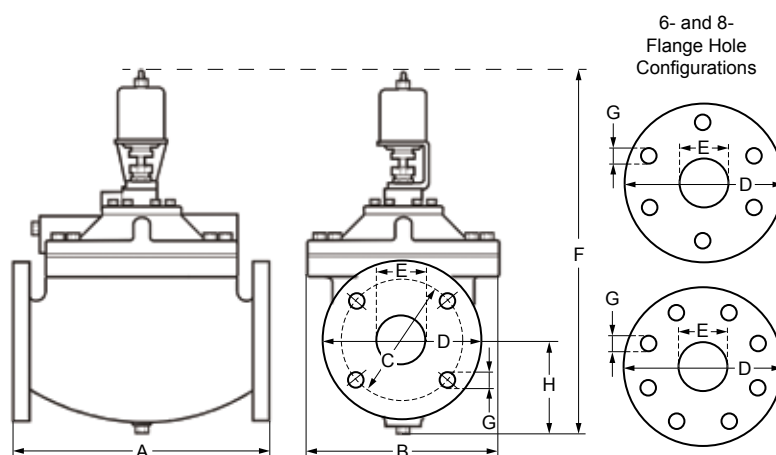
	2 Inch	2 ½ Inch	3 Inch	4 Inch
<b>A</b> <sup>1</sup>	241	273	298	356
<b>B</b>	191	203	229	273
<b>C</b>	121	140	152	191
<b>D</b>	152	178	191	229
<b>E</b>	54	67	80	105
<b>F</b> <sup>2</sup>	387	395	421	462
<b>F</b> <sup>3</sup>	404	412	437	479
<b>G</b>	19.05 - Ø 4	19.05 - Ø 4	19.05 - Ø 4	19.05 - Ø 8
<b>H</b>	92	100	108	128 mm

#### Note

<sup>1</sup> Flange face to flange face.

<sup>2</sup> These are the measurements for the V43 valves.

<sup>3</sup> These are the measurements for the V243 valves.



## REFRIGERATION COMPONENTS

### Modulating Water Valves

#### Adjustable Steam Pressure Switch

#### V43/V243

#### V43 Series Pressure Actuated Water Valves (except NAVSEA valves, see table below)

Ordering Codes	Pipe Size (in.)	Inlet and Outlet	Opening Point Adjustment Range psig (kPa)	Ship Weight. Kg
<b>Commercial Type – Non-Corrosive Refrigerants (R)</b>				
V43AT-2C	2 ½	4 Hole ASME Flanged	140 to 260 (1,103 to 1,793)	29.48
V43AW-2C	4	8 Hole ASME Flanged	160 to 260 (1,103 to 1,793)	64.41
<b>Maritime Type – Non-Corrosive Refrigerants (R)</b>				
V43BT-7C	2 ½	4 Hole ASME Flanged	140 to 260 (1,103 to 1,793)	29.48
V43BV-7C	3			40.82

#### V43 Series Pressure Actuated Water Valves, Navy NAVSEA Certified

Ordering Codes	Pipe Size (in.)	Inlet and Outlet	Pressure Connector	Opening Point Adjustment Range – psig (kPa)	Ship Weight. Kg
<b>Navy NAVSEA Certified – Non-Corrosive Refrigerants (R)</b>					
V43BW-7C	4	8 Hole ASME Flange	1/4 in. Male Flared Conn.	70 to 150 (483 to 1,034)	64.41
V43BW-2C				140 to 260 (1,103 to 1,793)	

#### V243 Series Pressure Actuated Water Valves

Ordering Codes	Pipe Size (in.)	Inlet and Outlet	Opening Point Adjustment Range – psig (kPa)	Ship Weight. Kg
<b>Commercial Type – High Pressure Refrigerants</b>				
V243HW-1C	4	8 Hole ASME Flange	200 to 400 (1,379 to 2,758)	64.41



## REFRIGERATION COMPONENTS

### Modulating Water Valves

#### Adjustable Steam Pressure Switch

#### V43/V243

#### Technical Specifications

Maximum Water Supply Pressure	150 psig (1,034 kPa)
V43 Maximum Head Pressure	300 psig (2,068 kPa)
V243 Maximum Head Pressure	630 psig (4,344 kPa)
Head Pressure Range (Opening Points)	
V43	<b>Low Pressure Refrigerants:</b> R-134A – 70 to 150 psig (482 to 1,034 kPa) <b>Medium Pressure Refrigerants:</b> R-22, R-502, R404A – 160 to 260 psig (1,103 to 1,793 kPa) <b>Ammonia:</b> 160 to 260 psig (1,103 to 1,793 kPa)
V243	<b>High Pressure:</b> R410A – 200 to 400 psig (1,379 to 2,758 kPa)
Factory Settings *	
V43	<b>Low Pressure Refrigerants:</b> 90 psig (621 kPa) <b>Medium Pressure Refrigerants:</b> 180 psig (1,241 kPa) <b>Ammonia:</b> 180 psig (1,241 kPa)
V243	<b>High Pressure:</b> 200 psig (1,379 kPa)
Maximum Water Supply Temperature	71°C
Valve Body Material	
Commercial	Cast Iron
Maritime	Red Brass
Internal Parts Material	
Commercial	Brass
Maritime	Bronze, Monel
Seat Material	
Pilot	Monel
Main Valve	Commercial – Bronze, Maritime – Monel
Seat Disc Material	Buna N™
Packing – Bellows Assembly	Brass Stem, Stainless Steel Spring, Synthetic Rubber Boot
Pressure Connection Refrigerant Side	
Non-corrosive	1/4 in. SAE Male Flare
Ammonia	1/4 in. FNPT

#### Note

\* Factory setpoint for the valve is adjustable.

## REFRIGERATION COMPONENTS

### Modulating Water Valves

## Pressure Actuated Water Valves

### V46

#### 2-way Pressure Actuated Water Valves - Commercial Applications

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

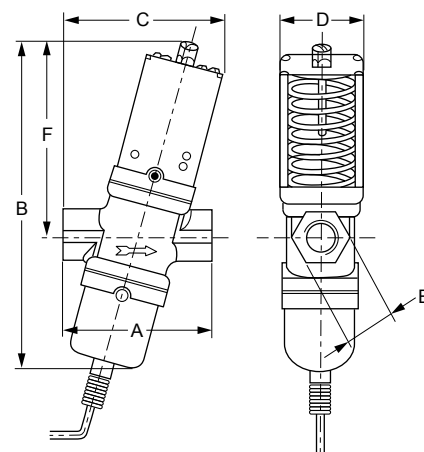
The valves can be used in non-corrosive refrigerant systems. Ammonia power elements and valves designed for salt-water applications are available.

The valves have a quick opening characteristic and open on pressure increase (direct acting).

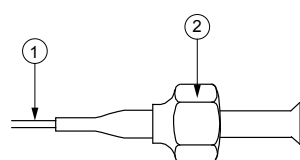
Reverse acting (close on pressure increase) is possible.

#### Features

- Pressure balanced valve design
- Pressure actuated
- 3/8, 1/2, 3/4" are angled body type valves with high 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



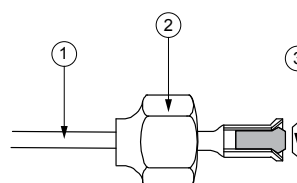
Valve Size	Dimensions in mm					
	A	B	C	D	E	F
3/8"	70	150	75	41	24	92
1/2"	80	166	86	51	27	98
3/4"	90	181	97	55	36	110



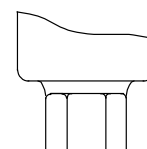
**Style 13**  
(excl. valve depressor)  
1: 75 cm capillary  
2: 7/16-20 UNF flare nut



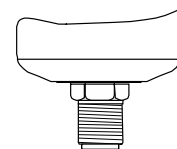
**Style 34**  
1: 75 cm capillary  
2: 1/4" tube for braze connection



**Style 50**  
(incl. valve depressor mounted into machined flare)  
1: 75 cm capillary  
2: 1/4" tube for braze connection  
3: copper searing



**Style 15**  
1/4-18NPT (female)



**Style 5**  
7/16-20 UNF

## REFRIGERATION COMPONENTS

### Modulating Water Valves

#### Pressure Actuated Water Valves

#### V46

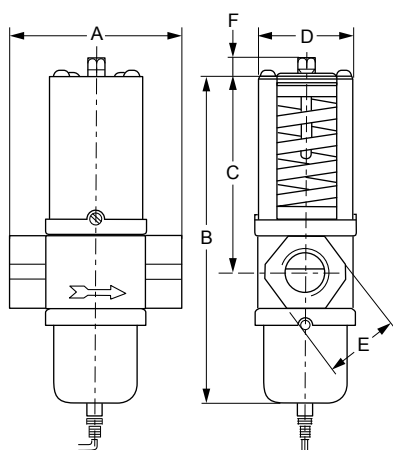
Ordering Codes	Range (bar)	Body Style	Size Thread according to ISO 228	Style	Capillary Length (cm)	Additional Features It is possible to change Style 13 into Style 45A by ordering KIT031N600
V46AA -9600	5...18	Angled	3/8"	13	75	---
V46AA -9608						With special washer to prevent waterhammer at low flow capacity
V46AA -9602					100	Nickel plated seat/longer capillary
V46AA -9950			1/2"	34	75	Nickel plated seat/solder connection
V46AA -9951						.040" i.d.cap./solder connection
V46AB -9600				13		---
V46AB -9950			3/4"	34		Solder connection/"062" id.cap
V46AC -9600				13		---
V46AC -9951				34		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			1/2"			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		Solder connection, high range
V46AB -9510			3/4"	50		High range
V46AC -9300				5		---
V46AC -9605				13		Nickel plated seat, high range
V46AC -9510				50		High range

## REFRIGERATION COMPONENTS

### Modulating Water Valves

#### Pressure Actuated Water Valves

V46



Valve Size	Dimension in mm					
	A	B	C	D	E	F
1"	124	233	138	71	48	13
1 1/4"	126	242	144		57	

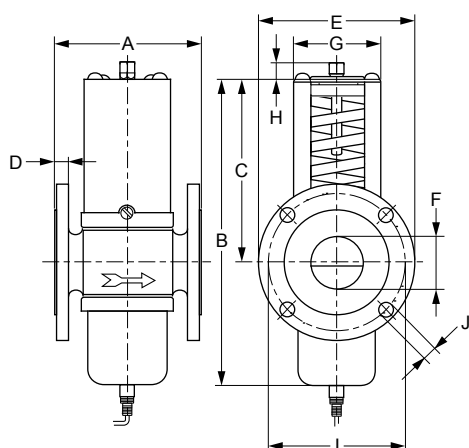
Ordering Codes	Range (bar)	Body Style	Size Thread according to ISO 7-Rc	Style	Capillary Length	Additional Features It is possible to change Style 13 into Style 45A by ordering KIT031N600
V46AD -9300	5...18	Straight	1"	5	---	---
V46AD -9510				50	75	
V46AD -9600				13		
V46AE -9300			1¼"	5	---	
V46AE -9510				50	75	
V46AE -9600				13	75	
V46AD -9511	10...23		1"	50	75	High range
V46AE -9512			1¼"			

## REFRIGERATION COMPONENTS

### Modulating Water Valves

#### Pressure Actuated Water Valves

#### V46



Valve Size	Dimensions in mm									
	A	B	C	D	E	F	G	H	I	J
1½"	137	242	144	18	150	47	67	13	110	18
2"	168	299	164	20	165	57	89	16	125	
2½"	172				185	70			145	

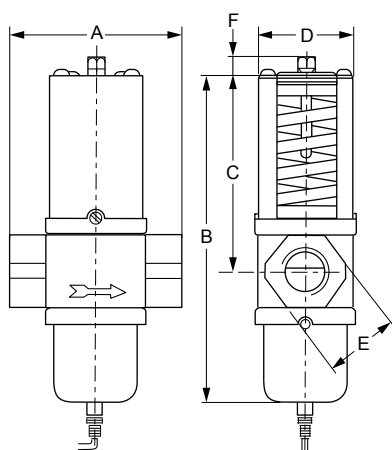
Ordering Codes	Range (bar)	Body Style	Size DIN2533 Flang Connections	Style	Capillary Length	Additional Features It is possible to change Style 13 into Style 45A by ordering KIT031N600			
V46AR-9300	5...18	Straight	1½ "	5	---	---			
V46AR-9600				13	75				
V46AS-9300	5...11.5		2"	5	---	---			
V46AS-9301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

## REFRIGERATION COMPONENTS

### Modulating Water Valves

#### Pressure Actuated Water Valves

V46



Valve Size	Dimension in mm					
	A	B	C	D	E	F
3/8"	67	136	79	41	24	10
1/2"	80	153	86	51	29	
3/4"	86	163	96	55	35	
1"	124	233	138	71	52	13
1 1/4"		242	144		62	

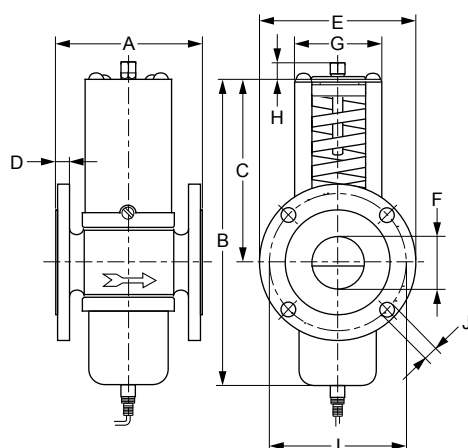
Ordering Codes	Range (bar)	Body Style	Size thread according to ISO 228	Style	Capillary Length	Additional Features It is possible to change Style 13 into Style 45A by ordering KIT031N600
V46BA-9600	5...18	Straight	3/8"	13	75	---
V46BB-9600			1/2"			
V46BC-9600			3/4"			
V46BD-9600			1"			
V46BE-9510			1¼"	50		
V46BE-9600				13		
V46BA-9510	5 ...23		3/8"	50	140	Longer capillary
V46BB-9510			1/2"			
V46BC-9510			3/4"			
V46BC-9511						
V46BD-9510	10...23		1"		75	---
V46BE-9511			1¼"		150	Longer capillary

## REFRIGERATION COMPONENTS

### Modulating Water Valves

#### Pressure Actuated Water Valves

#### V46



Valve Size	Dimensions in mm									
	A	B	C	D	E	F	G	H	I	J
1½"	135	242	144	14	150	47	67	13	110	18
2"	162	299	164	16	165	57	89	16	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						

## REFRIGERATION COMPONENTS

### Modulating Water Valves

## Pressure Actuated Water Valves

### V46SA

#### Pressure Actuated Water Valves, Low Flow

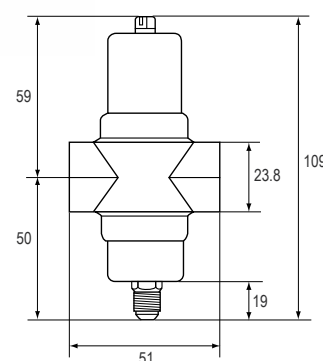
The V46SA is a direct acting, "all range", pressure actuated modulating valve, used to control the waterflow to a condenser by directly sensing pressure changes in a non-corrosive refrigerant circuit.

The V46SA is specially designed for use on equipment requiring a low condenser waterflow such as icemakers, small heatpumps and watercoolers. The springhousing and power element are rolled to the valve body.

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

The valve can be ordered style 5 (without capillary), style 13, style 34 and style 50 (incl. 75 cm capillary).

The capillary part will be delivered separated from the valve.



Dimensions in mm

#### 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

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



## REFRIGERATION COMPONENTS

### Modulating Water Valves

## Pressure Actuated Water Valves

### V48

#### 3-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.

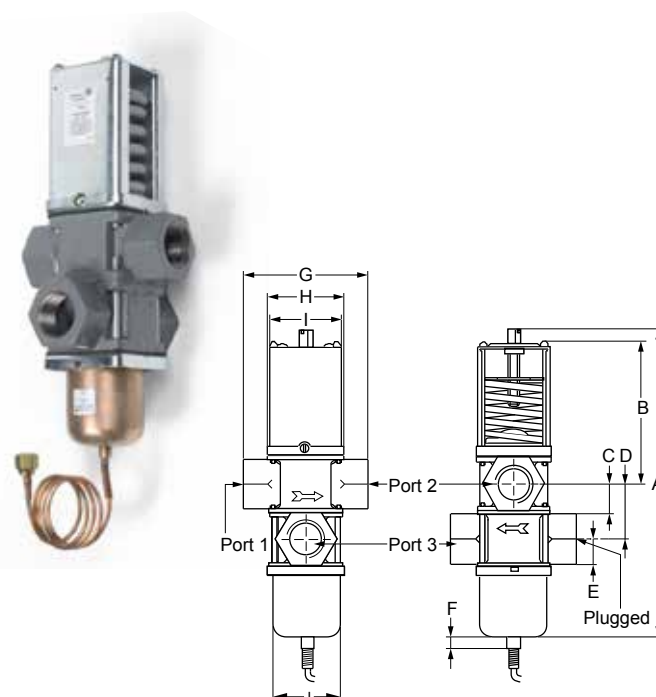
The type V48 valve senses the compressor head pressure and allows cooling water to flow to the condenser, to by-pass the condenser, or to allow waterflow to both condenser and by-pass line in order to maintain correct refrigerant head pressure.

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



Valve Size	Dimensions in mm									
	A	B	C	D	E	F	G	H	I	J
Commercial type										
1/2"	201	86	24	38	29	8	81	51	47	45
3/4"	218	96	27	45	35		86	55	52	48
1"	296	138	29	51	48		124	71	67	59
1¼"	315	144	32	60	57		126			59
Maritime type										
3/4"	218	96	27	45	35	8	86	55	52	48

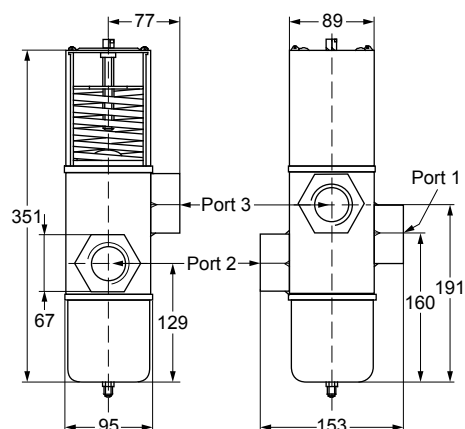
Ordering Codes	Range (bar)	Body Style	Size Thread	Style	Capillary Length	Additional Features It is possible to change Style 13 into Style 45A by ordering KIT031N600
Commercial type						
V48AB -9510	4...20	Straight	1/2" according to ISO 7-Rc	50	75	---
V48AB -9600	4...16			13		
V48AC -9510	4...20		3/4" according to ISO 7-Rc	50		
V48AC -9600	4...16			13		
V48AD -9510	6...20	Straight	1" according to ISO 7-Rc	50	75	---
V48AD -9600	4...16			13		Bodies in line (port 3 below port 2)
V48AD -9602	4...16		1¼ " according to ISO 7-Rc	50		---
V48AE -9510	6...20			13		
V48AE -9600	4...16					
Maritime types						
V48BC -9600	4...16	Straight	3/4" according to ISO 228	13	75	Seawater resistant

## REFRIGERATION COMPONENTS

### Modulating Water Valves

#### Pressure Actuated Water Valves

#### V48



#### Commercial types

Ordering Codes	Range (bar)	Body Style	Size Thread according to ISO 7-Rc	Style	Additional Features It is possible to change Style 13 into Style 45A by ordering KIT031N600
V48AF-9300	6...14	Straight	1 1/2"	5	---

## REFRIGERATION COMPONENTS

### Modulating Water Valves

## Pressure Actuated Water Valves

### V246 - V248

*Water Regulating Valves for High Pressure Refrigerants*

The V246 - V248 Series 2-way and 3-Way Pressure Actuated Water Regulating Valves for High-Pressure Refrigerants regulate water flow and control refrigerant head pressure in systems with single or multiple watercooled condensers.

These valves have an adjustable opening point in a refrigerant pressure range of 200 to 400 psig (13.8 to 27.6 bar).

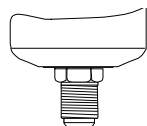
These Series valves are designed specifically for condensing units cooled either by atmospheric or forced draft cooling towers. They are used on single or multiple condenser hook-ups to the tower to provide the most economical and efficient use of the tower.

V246 - V248 valves may be used with standard non-corrosive or ammonia refrigerants.

For applications where the coolant may be corrosive to the internal parts, maritime models are available, which have nickel copper (Monel®) internal parts.

#### Features

- No Close Fitting or Sliding Parts in Water Passages
- Accessible Range Spring
- Take-Apart Construction
- Pressure-Balanced Design
- Corrosion-Resistant Material for Internal Parts



**Style 5**  
7/16-20 UNF



#### Standard Production Models - Range 13.8 to 27.6 bar

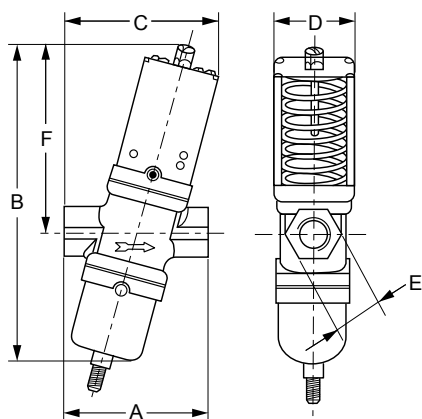
Product Codes	Construction	Valve Size and Connection	Element Style	Shipping Weight (kg)
V246GA1A001C	Direct Acting, Commercial	3/8 in. BSPP Screw, ISO 228	Style 5	1.86
V246GB1A001C		1/2 in. BSPP Screw, ISO 228		1.4
V246GC1A001C		3/4 in. BSPP Screw, ISO 228		1.7
V246GD1B001C		1 in. BSPT Screw, ISO 7		4.2
V246GE1B001C		1-1/4 in. BSPT Screw, ISO 7		4.5
V246GR1B001C		1-1/2 in. Flange, DIN2533		6.2
V246GS1B001C		2 in. Flange, DIN2533		12.3
V246HA1B001C	Direct Acting, Maritime	3/8 in. BSPP Screw, ISO 228		1.86
V246HB1B001C		1/2 in. BSPP Screw, ISO 228		1.4
V246HC1B001C		3/4 in. BSPP Screw, ISO 228		2.0
V246HD1B001C		1 in. BSPT Screw, ISO 228		4.3
V246HE1B001C		1-1/4 in. BSPT Screw, ISO 228		4.7
V246HR1B001C		1-1/2 in. Flange, DIN86021		6.2
V246HS1B001C		2 in. Flange, DIN86021		12.3

## REFRIGERATION COMPONENTS

### Modulating Water Valves

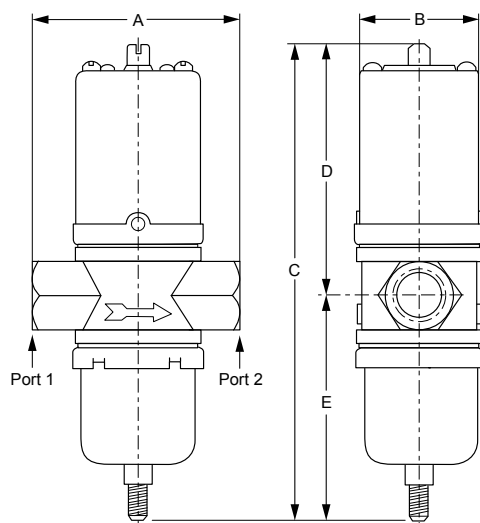
#### Pressure Actuated Water Valves

##### V246



#### V246 Screw Connection Valves Commercial Service - Dimensions

Valve Size	Dimension in mm					
	A	B	C	D	E	F
3/8"	70	176	75	41	24	92
1/2"	80	191	86	51	27	98
3/4"	90	217	97	55	36	110



#### V246 Screw Connection Valves Commercial Service - Dimensions

Valve Size	Dimension in mm				
	A	B	C	D	E
1"	124	71	267	151	116
1-1/4"	126		276	156	121

#### V246 Screw Connection Valves Maritime Service - Dimensions

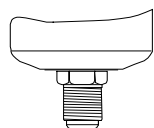
Valve Size	Dimension in mm				
	A	B	C	D	E
3/8"	67	41	166	89	77
1/2"	78	51	182	96	86
3/4"	86	55	203	106	98
1"	124	71	267	151	116
1-1/4"	126		276	156	121

## REFRIGERATION COMPONENTS

### Modulating Water Valves

#### Pressure Actuated Water Valves

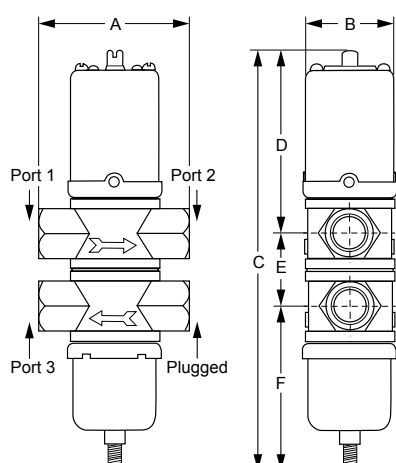
#### V248



Style 5  
7/16-20 UNF

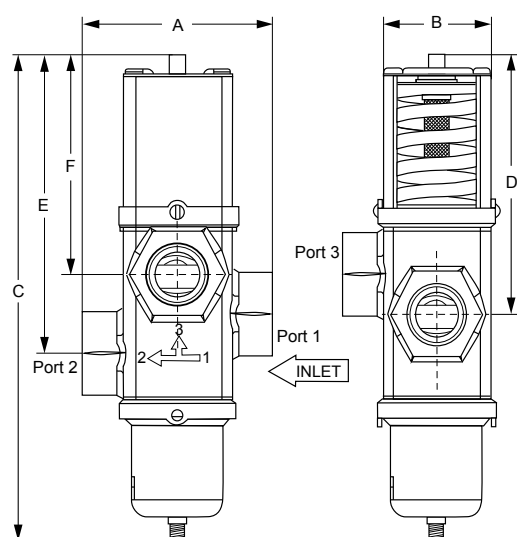
#### Standard Production Models - Range 13.8 to 27.8 bar

Product Codes	Construction	Valve Size and Connection	Element Style	Shipping Weight (kg)
V248GB1B001C	Direct Acting, Commercial	1/2 in. BSPT Screw, ISO 7	Style 5	2.3
V248GC1B001C		3/4 in. BSPT Screw, ISO 7		3.0
V248GD1B001C		1 in. BSPT Screw, ISO 7		5.5
V248GE1B001C		1-1/4 in. BSPT Screw, ISO 7		5.0
V248GF1B001C		1-1/2 in. BSPT Screw, ISO 7		11.3
V248HC1B001C	Direct Acting, Maritime	3/4 in. BSPP Screw, ISO 228		3.0



#### 1/2 in. through 1-1/4 in. - Dimensions

Valve Size	Dimensions in mm					
	A	B	C	D	E	F
1/2 in.	79	51	220	96	38	86
3/4 in.	86	55	248	106	45	98
1 in.	124	71	318	151	52	115
1-1/4 in.	126		336	156	60	121



#### 1 1/2 in. - Dimensions

Valve Size	Dimensions in mm					
	A	B	C	D	E	F
1-1/2 in.	152	89	387	206	237	175

## REFRIGERATION COMPONENTS

### Modulating Water Valves

## Temperature Actuated Water Valves

### V47

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

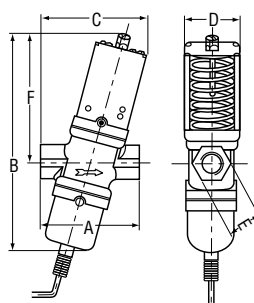
The valve opens at increasing bulb temperature.

The bulb must be mounted pointing downwards up to horizontal.

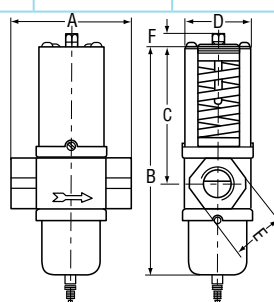
#### Features

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

Valve Size	Dimension in mm					
	A	B	C	D	E	F
3/8"	70	150	75	41	24	92
1/2"	80	166	86	51	27	98
3/4"	90	181	97	55	36	110



Ordering 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	138	72	48	13
1 1/4"	125	243	144		57	

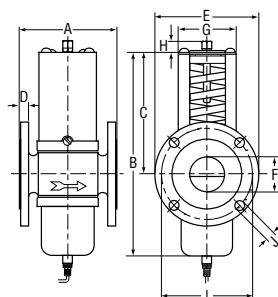
Ordering Codes	Range °C	Body Style	Size thread according to ISO 7-Rc	Capillary Length	Bulb Style 4 Length mm
V47AD -9160	24...57	Straight	1"	1.8 m arm.	152
V47AD -9161	46...82				
V47AE -9160	24...57				
V47AE -9161	46...82				

## REFRIGERATION COMPONENTS

### Modulating Water Valves

#### Temperature Actuated Water Valves

**V47**



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

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

## REFRIGERATION COMPONENTS

### Humidity Controls

## Mechanical Humidity Stat

### W43

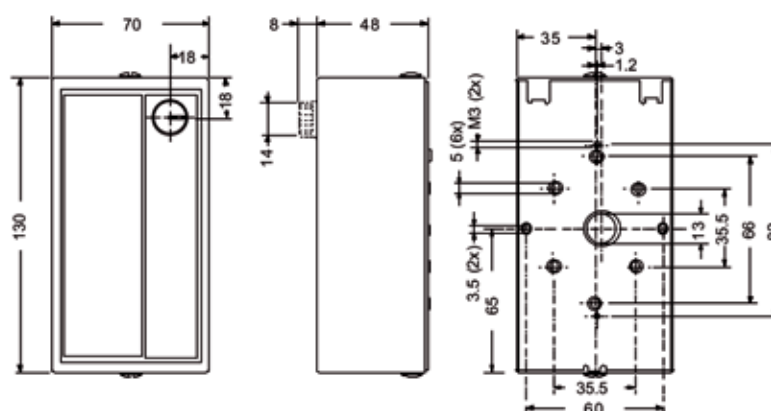
#### Room Humidistats

These room humidistats are designed to control humidification or dehumidification equipment. It provides SPDT control.

The sensing element consists of carefully selected and processed human hair, proven to be the most sensitive and stable material known for this application. Under normal conditions these controls retain their sensitivity and accuracy for many years.

#### Features

- Wide range 0 to 90% R.H.
- Dust tight Penn switch
- SPDT Contacts
- Field adjustable high and low limit stops
- Separate mounting plate



Dimensions in mm

Ordering Code	Operating Range	Differential	Adjustment	Contact Function
W43C-9100	0 to 90% R.H.	≈ 4% R.H. (fixed)	External Knob	SPDT contacts in dust-tight enclosure



## REFRIGERATION COMPONENTS

### Fan Speed Controllers

## 1-phase Condenser Fan Speed Control

### P215PR

#### Direct-Mount Single Phase Controller

These Direct Mount pressure actuated condenser fan speed controllers are designed for speed variation of single-phase motors.

Head pressure control of a refrigeration system, through speed variation of the fan on an air-cooled condenser, results in optimum performance throughout the year.

A pressure actuated device, gives the most direct and fastest response to pressure variations in the refrigerant system. The controller varies the supply voltage to the motor from 30% to at least 95% over the proportional band using the phase cutting principle.

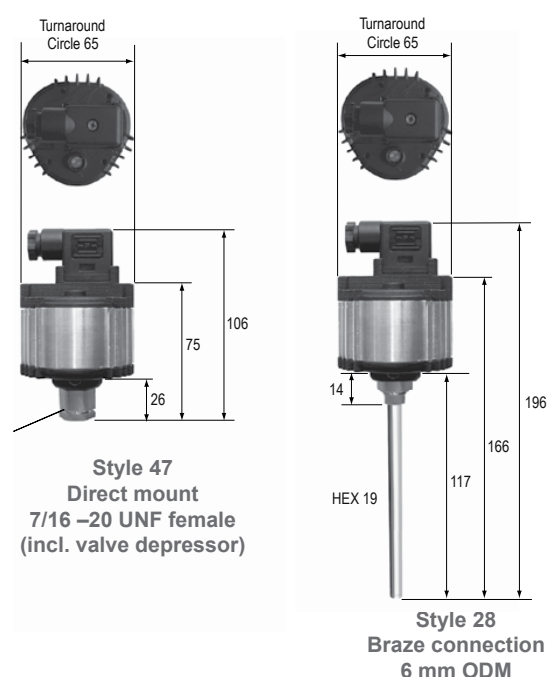
This provides speed variation of permanent split capacitor or shaded pole motors that do not draw more than 4 A (rms) full load current.

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

The controllers can be used in non-corrosive refrigerant systems.

#### Features

- Condenser pressure control by fan speed variation
- Pressure input
- Direct mount
- Setpoint screw on top
- Built-in suppression filter
- IP65
- Compact design
- Attractive styling
- Quick connector plug included
- CE
- New range 5-15 bar for R134a



Dimensions in mm

Ordering Codes	Range (bar)	Element Style	Setpoint (bar)	Prop. band (bar)	Supply Voltage 50/60 Hz	Rating	Controller Mode	Extra Features
P215PR-9200	10 to 25	47	19	4.5	230 VAC	4 Amp	Cut-off	---
P215PR-9202	22 to 42		26	5.5				
P215PR-9203	5 to 15		9	2.5				
P215PR-9800	10 to 25	28	19	4.5				Bulk Pack
P215PR-9230			26	5.5				
P215PR-9232			9	2.5				
P215PR-9233	5 to 15	47	19	4.5				Bulk Pack, 2 m cable connector incl.
P215PR-9250	10 to 25							

#### Note

For a 4 Amp rating and UL approval please contact your sales representative.

## REFRIGERATION COMPONENTS

### Fan Speed Controllers

## 1-phase Condenser Fan Speed Control

### P215RM

#### Remote-Mount Single Phase Controller

The new P215RM ( Remote Mount ) is an addition model to our very successful P215PR Direct Mount FSC which is in program since 2004.

We have designed the P215RM for situations where mounting space is limited or if the refrigeration line is too thin so it cannot carry the weight off the P215PR. Also new on this product is the all-in bracket design which is part of the complete Aluminium housing.

The P215RM can be screwed to a side panel and connected to the refrigeration line by using a flexible hose or a copper capillary.



#### Features

- Quick and easy to install due to integral mounting bracket
- Easy mounting with style 5 pressure connection
- No need to use a male / male adaptor between P215RM and Flex Hose
- Three ranges available 5 - 15 bar, 10 - 25 bar, 22 - 42 bar
- Output current maximum 4A at 55 °C Operating ambient temperature
- Global design CE approval



Dimensions in mm

Ordering Codes	Range (bar)	Element Style	Setpoint (bar)	Prop. band (bar)	Supply Voltage 50/60 Hz	Rating	Controller Mode	Extra Features
P215RM-9700	10 to 25	5	19	4.5	230 VAC	4 Amp	Cut-off	---
P215RM-9702	22 to 42		26	5.5				
P215RM-9703	5 to 15		9	2.5				

## REFRIGERATION COMPONENTS

### Fan Speed Controllers

## 1-phase Condenser Fan Speed Control

### P215

#### Pressure Actuated Single Phase Controller

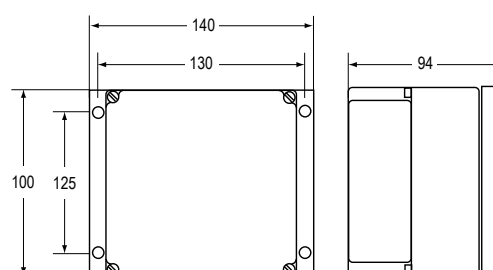
These controllers are designed for speed variation of single phase motors, especially for fan speed control on air cooled condensers. Head pressure control of a refrigeration system, through speed variation of the fan on an air-cooled condenser, results in optimum performance throughout the year. Using a pressure transducer as the input device to the fan speed controller, gives the most direct and fastest response to pressure variations in the refrigerant system. The controller varies the supply voltage to the motor from 45% to at least 95% over the proportional band using the phase cutting principle. 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.

#### 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
- Heatpump input available (P215SH)
- IP54 enclosure



P215SH/ST



Dimensions in mm

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

## REFRIGERATION COMPONENTS

### Fan Speed Controllers

#### 1-phase Condenser Fan Speed Control

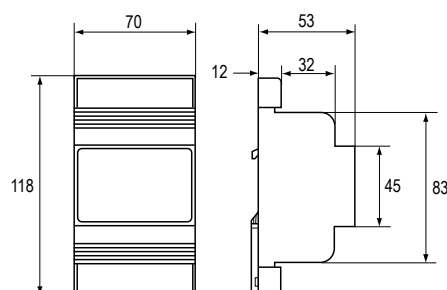
##### P215

The P215LR is a single 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  $\geq 95\%$  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.

#### 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)
- Motor speed action can be reversed by interchanging only two wires
- Small dimensions
- DIN rail mounted



Dimensions in mm

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

## REFRIGERATION COMPONENTS

### Fan Speed Controllers

## 1-phase Condenser Fan Speed Control

### P216

#### Condenser Fan Speed Controller

These controllers are designed for speed variation of single phase motors, especially for fan speed control on air cooled condensers. Head pressure control of a refrigeration system, through speed variation of the fan on an air-cooled condenser, results in optimum performance throughout the year.

Using a pressure transducer as the input device to the fan speed controller, gives the most direct and fastest response to pressure variations in the refrigerant system. The controller varies the supply voltage to the motor from 45% to at least 95% over the proportional band using the phase cutting principle.

If the pressure drops below the adjusted setpoint minus the proportional band, the output to the motor is zero volt or the adjusted min. speed setting. This provides speed variation of permanent split capacitor or shaded pole motors which do not draw more than 12 A (rms) full load current.

The controller used for dual pressure input varies the fan speed by directly sensing the pressure changes of two separate refrigerant circuits. The setpoint of each pressure transducer can be separately adjusted. The controller selects the input with the greatest cooling demand to control the fan speed.

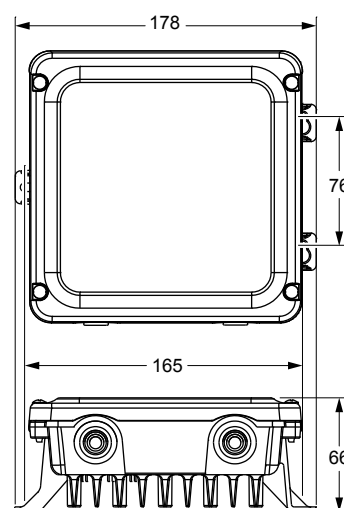
The transducers can be used in non-corrosive refrigerant systems.

The motor manufacturer should have approved his product for this speed control principle. It is recommended to confirm with the electric motor manufacturer, that the motor can be used with a controller, using the phase cutting principle for speed variation.

You can also provide a copy of this P216 product data sheet to the motor manufacturer/supplier for review.

#### Features

- The new benchmark in standard FSC
- Easy to Install and Easy to operate
- Output Range: 0,5 to 12 Amp (1 phase)
- Input 0-10 Vdc
- Including 0-50 bar pressure transducer P499VCS-405C
- Heatpump mode
- Reverse operation mode
- Master / Slave mode
- Fixed pressure ranges for direct replacement (P215)
- Setpoint and Min speed potmeters



Dimensions in mm

#### Ordering Codes

Product Codes	Description
<b>P216EEA-1K</b>	Wall Mount FSC P216EEA-100C + P499VCS-405C pressure transducer
<b>P216EEA-100C</b>	Wall Mounted FSC
<b>P499VCS-405C</b>	Pressure Transmitter with range 0-50 bar, Output 0-10V. 2 meter fixed cable. Pressure connection 7/16-20UNF female thread

## REFRIGERATION COMPONENTS

### Fan Speed Controllers

## 1-phase Condenser Fan Speed Control

### P266

#### *Pressure Actuated Single Phase Digital Controller*

The P266 Pressure Actuated Single Phase Digital Controller is a cost-effective, weather-resistant, durable motor speed control. The P266 control is designed for approved single-phase, Permanent Split-Capacitor (PSC) motors commonly used in a wide variety of refrigeration and air conditioning condenser fan applications.

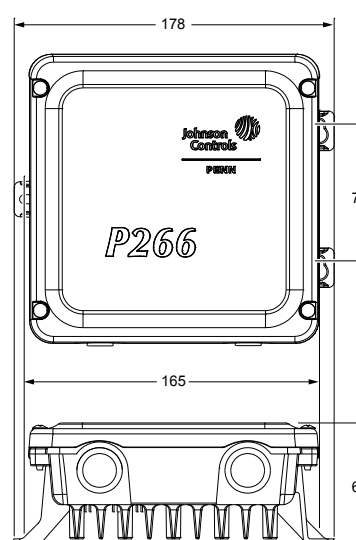
The P266 Series controls are designed to replace the Johnson Controls® P66 Series and P215 Series fan speed controls, providing additional features and flexibility, greater energy efficiency, and longer motor life in a compact, rugged, weather-resistant package.

P266 models are available for 208 to 240 VAC and 440 to 575 VAC range applications. P266 controls have current ratings from 4 to 12 A depending on the voltage and model.

Some P266 models provide optional control of up to three auxiliary (fixed-speed) fans or fan stages. Also, some models provide two additional high-voltage triacs, which allow you to split the source power to the main and auxiliary windings, and connect a low-speed capacitor to increase efficiency at low speed operation.

#### Features

- Global design CE / UL / CSA / C-tick
- Microprocessor based
- Field Programmable, Digital setting
- One or two Electronic Pressure Transducers (P266SNR)
- Pressure range 0 - 35 bar or 0 - 52 bar
- Patented design
- Output 8 or 12 Amp at 60°C ambient temperature
- Robust aluminium IP54 enclosure with integral heatsink
- Multi triac control providing energy savings up to 25%
- Optional auxiliary (vernier) control
- Auto selection 50 / 60 Hz



Dimensions in mm

## REFRIGERATION COMPONENTS

### Fan Speed Controllers

#### 1-phase Condenser Fan Speed Control

#### P266

Ordering Codes	Description	Transducer Model Included in Kit	Voltage Range (in VAC)	Maximum Output (Ampères)	High VAC Triacs	Available Auxiliary Fan Control Circuits
P266EAA-1K*	P266 Fan Speed Control with Internal Transformer and one P266 Pressure Transducer and one 2 m cable	P266SNR-1C 0-35 bar (0-508 psi)	208 to 240	8	3	---
P266EAA-3K*		P266SNR-2C 0-52 bar (0-754 psi)				---
P266EBA-1K*		P266SNR-1C 0-35 bar (0-508 psi)			1	3
P266EBA-3K*		P266SNR-2C 0-52 bar (0-754 psi)				---
P266ECA-1K*		P266SNR-1C 0-35 bar (0-508 psi)		12	1	3
P266ECA-3K		P266SNR-2C 0-52 bar (0-754 psi)				---
P266EDA-1K*		P266SNR-1C 0-35 bar (0-508 psi)			1	3
P266EDA-3K*		P266SNR-2C 0-52 bar (0-754 psi)				---
P266EEA-1K*		P266SNR-1C 0-35 bar (0-508 psi)			1	3
P266EFA-3K*		P266SNR-2C 0-52 bar (0-754 psi)				---

#### Note

Factory default settings: Start Voltage is set to 40% of the supply line-voltage. End Voltage is set to 95% of the supply line-voltage. Start Pressure is set to 44% of the P266 transducer's total pressure range. End Pressure is set to 51% of the P266 transducer's total pressure range.

#### P266SNR Electronic Pressure Transducers

Ordering Codes	Description
P266SNR-1C	Electronic Pressure Transducer: 0 to 35 bar total range with a 1/4 in. SAE Female Flare connection and a 2 meter cable.
P266SNR-2C	Electronic Pressure Transducer: 0 to 52 bar total range with a 1/4 in. SAE Female Flare connection and a 2 meter cable.
P266PRM-1K	P266 Utility Com. Tool Kit. Communication Software Package to program and monitor P266 Control parameters.



## REFRIGERATION COMPONENTS

### Fan Speed Controllers

## 1-phase Condenser Fan Speed Control

### P315PR

*Direct-Mount Pressure Actuated for EC Motors*

The direct mount pressure actuated condenser fan speed controllers are designed for speed variation of electronically commutated (EC) motors. Head pressure control of a refrigeration system, through speed variation of the fan on an air-cooled condenser, results in optimum performance throughout the year.

The controllers can be used in non-corrosive refrigerant systems.

A pressure actuated device provides the most direct and fastest response to pressure variations in the refrigerant system.

The controller varies the supply voltage to the motor from 5% to at least 95% over the proportional band.

#### Features

- Fan Speed Variation Condenser Pressure Control
- Pressure input
- Direct Mount Option
- Setpoint Screw Location on Top of Device
- IP65 Enclosure
- Compact Design
- Attractive Styling
- Quick Connector Plug Included
- Suitable to control 1 or 3 phase EC motor



Dimensions in mm

#### Ordering Codes

Ordering Codes	Range (bar)*	Element Style	Setting (bar)	Prop. Band (bar)	Controller Mode**	Minimum Shipping Qty	Additional Features
P315PR-9200C	8 to 25	47	16	4	N/A	1	---
P315PR-9200D						25	Bulk Pack
P315PR-9202C	22 to 42		26	5		1	---
P315PR-9203C	5 to 15		6	4		25	Bulk Pack
P315PR-9203D							

#### Note

\* 1 bar = 100 kPa ≈ 14.5 psi

\*\* Minimum speed.



## REFRIGERATION COMPONENTS

### Field Controllers

## Modular Electronic Control System

### System 450™

#### Modular Electronic Controls

System 450™ is a family of modular, digital electronic controls that is easily assembled and set up to provide reliable temperature, pressure, and humidity control for a wide variety of Heating, Ventilating, Air Conditioning, and Refrigeration (HVACR) and commercial/industrial process applications.

The System 450 control system is designed to replace System 350™ control system and System 27, and provide many additional features and benefits with less than a dozen model variations.

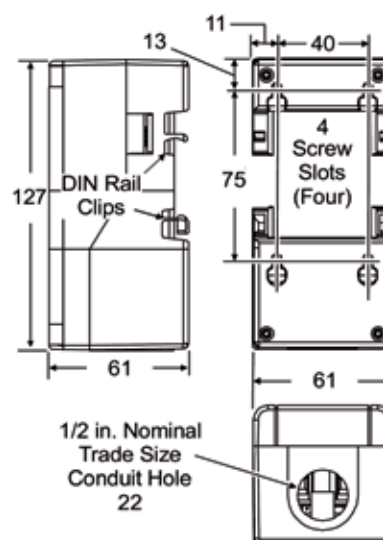
All System 450 control modules are multipurpose and field configurable out-of-the-box; each module is designed for use in temperature, pressure, and humidity systems. A System 450 control system can be easily assembled and configured to monitor and control temperature, pressure, and humidity simultaneously.

A single C450 control module can be set up as a stand-alone control or connected to expansion modules to control up to ten outputs based on any of the three available inputs.

A control system may consist of relay outputs (Single-Pole, Double-Throw [SPDT]), analog outputs (0–10 VDC or 4–20 mA), or any combination of relay and analog outputs.

#### Features

- Durable, Compact Modular Design with Plug-Together Connectors and DIN Rail or Direct Wall Mount Capability
- Multipurpose, Field-Configurable Modules Designed for Global Use
- Backlit Liquid Crystal Display (LCD) and Four-Button Touchpad User Interface
- Up to Three Inputs and up to Ten Outputs (Relay or Analog)
- Versatile, All-in-One, Stand-Alone Control Modules
- An Extensive Suite of Compatible Temperature and Humidity Sensors as well as Pressure Transducers
- High Input Signal Selection
- Differential Control
- Adjustable User-Defined Reset Setpoint (C450R Only)
- Adjustable Minimum and Maximum Setpoint Temperature (C450R Only)
- Selectable Warm Weather Shutdown Temperature (C450R Only)
- Adjustable Setback Temperature (C450R Only)



Dimensions in mm

## REFRIGERATION COMPONENTS

### Field Controllers

#### Modular Electronic Control System

#### System 450™

System 450 Control Modules are capable of monitoring up to three input sensors and controlling up to ten outputs that can be any combination of relay and analogue outputs (provided by expansion modules).

Ordering Codes	Description
<b>C450 Control Module Types</b>	
<b>C450CBN-3C</b>	Control Module 1 Stage
<b>C450CCN-3C</b>	Control Module 2 Stage
<b>C450CEN-1C</b>	Control Module with Ethernet Communications, LCD, and Four-Button Touchpad UI. (No onboard outputs available on control modules with network communications capabilities.)
<b>C450CRN-1C</b>	Control Module with RS485 Modbus Communications, LCD, and Four-Button Touchpad UI. (No onboard outputs available on control modules with network communications capabilities.)
<b>C450CPN-3C</b>	Control Module 1 Analog Output (PI)
<b>C450CQN-3C</b>	Control Module 2 Analog Output (PI)
<b>C450RBN-1C</b>	Reset Control Module 1 relay stage
<b>C450RCN-1C</b>	Reset Control Module 2 relay stage
<b>C450RBN-3C</b>	Reset Control Module with LCD, Four-Button Touchpad UI, and SPDT relay output; provides one SPDT output relay. One A99BC-25C temperature sensor with 0.25 m silicon leads and one A99BC-300C temperature sensor with 3 m silicon leads are included in the box with the Reset Control Module.
<b>C450RCN-3C</b>	Reset Control Module with LCD, Four-Button Touchpad UI, and SPDT relay output; provides two SPDT output relays. One A99BC-25C temperature sensor with 0.25 m silicon leads and one A99BC-300C temperature sensor with 3 m silicon leads are included in the box with the Reset Control Module.
<b>C450 Expansion Module Types</b>	
<b>C450SBN-3C</b>	Expansion Module 1 relay stage
<b>C450SCN-3C</b>	Expansion Module 2 relay stage
<b>C450SPN-1C</b>	Expansion Module 1 Analog Output (PI)
<b>C450SQN-1C</b>	Expansion Module 2 Analog Output (PI)
<b>C450 Power Module</b>	
<b>C450YNN-1C</b>	Power Module 230 / 24 VAC 50 / 60 Hz

Ordering Codes	Description
<b>C450 Sensor Types</b>	
<b>A99</b>	Temperature Sensors, all models, Range -40 / 120 °C
<b>P499RCP-401C</b>	Pressure Transmitter, Range -1 / 8 bar
<b>P499RCP-402C</b>	Pressure Transmitter, Range -1 / 15 bar
<b>P499RCP-404C</b>	Pressure Transmitter, Range 0 / 30 bar
<b>P499RCP-405C</b>	Pressure Transmitter, Range 0 / 50 bar
<b>HE-67S3-0N00P</b>	Humidity Transmitter Duct Mount (include A99)
<b>HE-67S3-0N0BP</b>	Humidity Transmitter Wall Mount (include A99)
<b>DPT2650-0R5D-AB</b>	Delta P Transmitter 0 to 1 mbar
<b>DPT2650-0I0D-AB</b>	Delta P Transmitter 0 to 25 mbar

#### Specifications SPDT relay output contacts

- AC Motor ratings at 208/240 Vac
- Full-Load Amperes: 4,9 Amp
- Locked-Rotor Amperes: 29,4 Amp
- Non-Inductive Load at 24/240 Vac: 10 Amp
- Pilot Duty at 24/240 Vac: 125 VA



<b>A99</b>	All A99 models can be used on the C450	
<b>P499</b>	<b>P499RCP-401C</b>	Range -1 to 8 bar
	<b>P499RCP-402C</b>	Range -1 to 15 bar
	<b>P499RCP-404C</b>	Range 0 to 30 bar
	<b>P499RCP-405C</b>	Range 0 to 50 bar
<b>HE</b>	<b>HE-67S3-0N00P</b>	Hum transmitter duct mount (include A99)
	<b>HE-67S3-0N0BT</b>	Hum transmitter wall mount (include A99)
<b>DTP</b>	<b>DPT2650-0R5D-AB</b>	Delta P transmitter 0 to 0,5 INWC (or 0 to 1 mbar)
	<b>DPT2650-0I0D-AB</b>	Delta P transmitter 0 to 10 INWC (or 0 to 25 mbar)

## REFRIGERATION COMPONENTS

### Field Controllers

## Electronic Control Devices

### ER Line

#### Electronic Refrigeration Line

Devices are designed to be incorporated in refrigerated display cases and cold storage rooms.

ER Line proposes progressive offer from basic controls to advanced controls including real time clock, energy saving and network communication to be integrated with monitoring system. It also introduces specific products for supermarkets (e.g. compressor rack).

#### Hardware Features

- Robust front panel for durability and long term usage
- Direct 230V supply, no external transformer required
- Up to 5 relays in a single package
- NTC or PTC (A99) sensors
- Removable plug connectors for quick mounting and wiring
- Embedded real time clock, no additional clock card required
- Embedded RS485 port, no additional communication card required

#### Application Features

- Positive or negative temperature units with a single product
- Minimum and maximum temperature monitoring
- Comprehensive controls
- Light and standby switching
- Energy saving (2<sup>nd</sup> setpoint)



Product	Type	Mounting	Wiring	Compressor Relays	Fan Relays	Defrost Relays	Auxiliary Relays	Real Time Clock	RS485
ER54	Evaporator Control	Panel	Removable plug connectors	•	•	•	•	•	•
ER55-DR	Cold Room Control	Din Rail	Removable plug connectors	•	•	•	• (2 Relays)	•	•
ER55-SM	Cold Room Control	Split	Fixed screw connectors	•	•	•	• (2 Relays)	•	•
ER65	Rack Control	Din Rail	Removable plug connectors	• (4 Relays)			•		•

Please refer to product bulletins for complete information

#### Accessories

Ordering Codes	Description	Applied Products
ER-NTC-0C	NTC sensor, cable 2 m, universal replacement	All ER products
ER-COM-1C	RS485 cable, 1.5 m, plug connector	ER54, ER55-SM
ER-COM-2C	RS485 cable, 1.5 m, RJ connector	ER55-DR
P499Axx-xxx	Pressure transducer, 4-20 mA (See also P499 catalogue section)	ER65

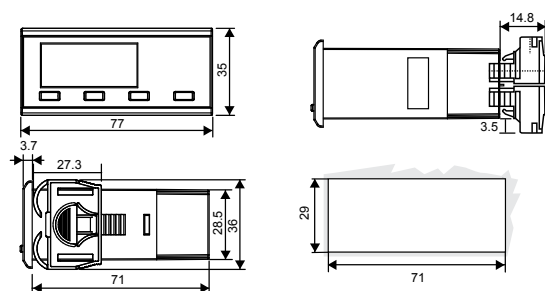
## REFRIGERATION COMPONENTS

### Field Controllers

#### Electronic Control Devices

#### ER Line

#### Evaporator Controllers



#### ER54

*Panel mount controller, cool thermostat, comprehensive controls, RS485, real time clock, plug connectors*

Delivered with one NTC sensor

Ordering Codes	RS485	Power Supply	Protection Class	Temperature Range	Display	Inputs	Outputs
ER54-PMW-501C	MODBUS	230 VAC, +/-10% Consumption 3W	IP55 (front) IP20 (back)	-40 to 70°C Accuracy: +/-0.3°C	• LED 3 digits • Decimal displaying	• 3 temperatures • 2 voltage free contacts	<ul style="list-style-type: none"> <li>• Compressor: SPST 12(5)A</li> <li>• Fan: SPST 7(2)A</li> <li>• Defrost: SPST 7(2)A</li> <li>• Auxiliary: SPST 7(2)A</li> </ul>
ER54-PMW-001C	N2 Open						

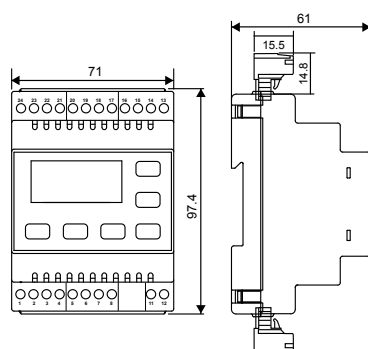
## REFRIGERATION COMPONENTS

### Field Controllers

#### Electronic Control Devices

#### ER Line

#### Cold Room Controllers

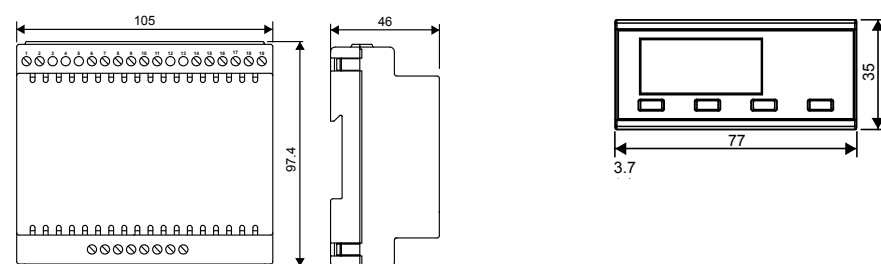


#### ER55

**DIN rail mounting controller, cool thermostat, comprehensive controls, RS485, real time clock, plug connectors**

Delivered with one NTC sensor

Ordering Codes	RS485	Power Supply	Protection Class	Temperature Range	Display	Inputs	Outputs
<b>ER55-DR230-501C</b>	MODBUS	230 VAC, +/-10% Consumption 3W	IP20	-40 to 70°C Accuracy: +/-0.3°C	• LED 3 digits • Decimal displaying	• 3 temperatures • 2 voltage free contacts	<ul style="list-style-type: none"> <li>Compressor: SPST 7(2)A</li> <li>Fan: SPST 7(2)A</li> <li>Defrost: SPST 16(4)A</li> <li>Auxiliary 1: SPDT 7(2)A</li> <li>Auxiliary 2: SPST 7(2)A</li> </ul>
<b>ER55-DR230-001C</b>	N2 Open						



#### ER55

**Split mounting controller, cool thermostat, comprehensive controls, RS485, real time clock, plug connectors**

Delivered with two NTC sensors

Ordering Codes	RS485	Power Supply	Protection Class	Temperature Range	Display	Inputs	Outputs
<b>ER55-SM230-501C</b>	MODBUS	230 VAC, +/-10% Consumption 3W	IP20	-40 to 70°C Accuracy: +/-0.3°C	<ul style="list-style-type: none"> <li>Remote</li> <li>LED 3 digits</li> <li>Decimal displaying</li> </ul>	• 3 temperatures • 2 voltage free contacts	<ul style="list-style-type: none"> <li>Compressor: SPST 16(8)A</li> <li>Fan: SPST 8(3)A</li> <li>Defrost: SPST 16(4)A</li> <li>Auxiliary 1: SPST 7(2)A</li> <li>Auxiliary 2: SPST 7(2)A</li> </ul>
<b>ER55-SM230-001C</b>	N2 Open						

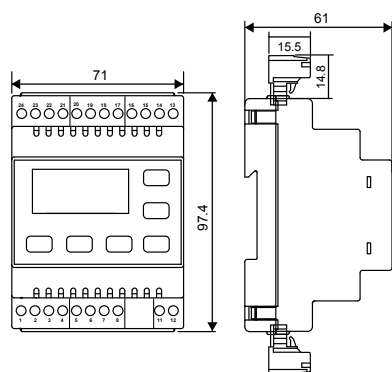
## REFRIGERATION COMPONENTS

### Field Controllers

#### Electronic Control Devices

#### ER Line

#### Rack Controllers



**DIN rail mounting controller, pressure or temperature control, 4 compressors or fans sequencer, RS485, plug connectors**

Sensor to be ordered separately, see also P499 pressure transducer section.

Ordering Codes	RS485	Power Supply	Protection Class	Temperature Range	Display	Inputs	Outputs
<b>ER65-RK230-501C</b>	MODBUS	230 VAC, +/-10% Consumption 3W	IP20	-40 to 70°C Accuracy: +/-0.3°C	<ul style="list-style-type: none"> <li>• LED 3 digits</li> <li>• Decimal displaying</li> </ul>	<ul style="list-style-type: none"> <li>• 1 temperature</li> <li>• 1 pressure</li> <li>• 2 voltage free contacts</li> <li>• 3 supplied contacts (230 V)</li> </ul>	<ul style="list-style-type: none"> <li>• Stages (x4): SPST 5(1)A</li> <li>• Alarm: SPDT 7(2)A</li> </ul>
<b>ER65-RK230-001C</b>	N2 Open						

## REFRIGERATION COMPONENTS

### Field Controllers

## Multi-Stages Control Devices

### MS Line

*General purpose and Multi Stages*

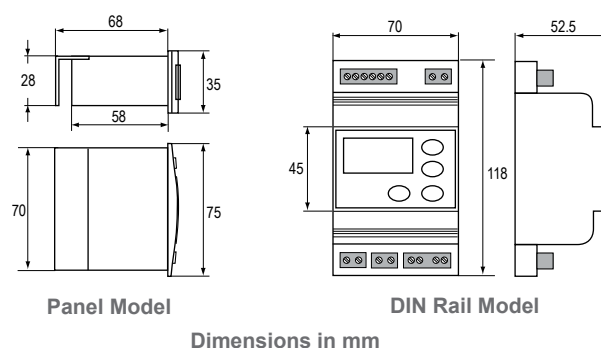
This range of versatile controls is intended for single or multistage (2 or 4 stages) applications such as heating, cooling but also humidity or pressure depending on the input type.

This range incorporates all control functions as required by modern applications and it exists in both panel mount and DIN rail enclosures. Particular attention has been given to its style in order to better suit your machine design.

This complete range of microprocessor based controls offers innovative features and "state of the art" technology.

#### Features

- Attractive Panel mount and DIN rail mount enclosure
- Up to 4 relays in panel mount enclosure
- 230 Volt power supply models available
- Accept temperature (A99) and 0-10 Volts sensor signal depending on models
- Power supply to sensors on 0-10 Volts models available from controller
- Accurate and interchangeable IP68 sensor
- Wide range of enclosures for sensors available
- Keyboard lock
- SMD technology



### 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	<ul style="list-style-type: none"> <li>• Accuracy: <math>\pm 1</math> Unit</li> <li>• Power Consumption: 1.5 VA 50/60 Hz</li> </ul>
DIS230T-1C		230 VAC				
DIS12V-1C	0 to +100% (Rh)	12 VAC		0-10 V from humidity sensor (not Incl.)		
DIS230V-1C		230 VAC				

### MS1 One-stage Control

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	<ul style="list-style-type: none"> <li>• Accuracy: <math>\pm 1</math> Unit</li> <li>• Power Consumption: 2 VA 50/60 Hz</li> </ul>
MS1PM230T-1C		230 VAC			SPDT 8(3)A		IP20	
MS1DR230T-1C		230 VAC	DIN rail		SPST 8(3)A		Overall IP20 Front IP54	
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		IP20	
MS1DR230V-1C		230 VAC	DIN rail		SPST 8(3)A			

## REFRIGERATION COMPONENTS

### Field Controllers

#### Multi-Stages Control Devices

#### MS Line

#### MS2 Two-stage Control

Ordering Codes	Range	Power Supply	Enclosure	Input	Output Rating 250 VAC	Protection Class	Additional Features
					Each Stage (1-2)		
MS2PM12RT-1C	-40 to +70 °C	12 VAC/DC	Panel	A99 sensor (incl.)	SPST 8(3)A	Overall IP20 Front IP54	<div>• Accuracy: ±1 °C</div> <div>• Power Consumption: 2 VA 50/60 Hz</div>
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	Protection Class	Additional Features
					Each Stage (1 to 4)		
MS4PM12RT-1C	-40 to +70 °C	12 VAC/DC	Panel	A99 sensor (incl.)	SPST 8(3)A	Overall IP20 Front IP54	• 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			SPDT 8(3)A	IP20	



## REFRIGERATION COMPONENTS

### Transducers and Sensors

## Pressure Transducer

### P499

#### Electronic Pressure Transducer

The P499 Series is a new global Pressure Transducer with an excellent price performance ratio.

The P499 exceeds the latest industrial CE/UL requirements including surge protection, and is over voltage protected in both positive and reverse polarity.

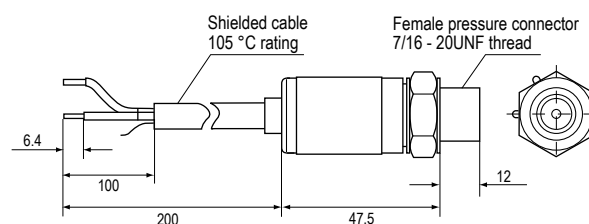
The P499 is designed to produce a linear analogue signal based on the sensed pressure.

The pressure port is machined from a solid piece of 17-4PH stainless steel. There are no O-rings or welds that are exposed to the pressure media.

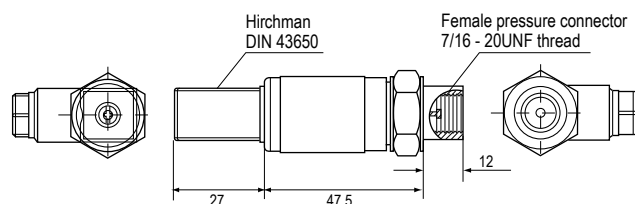
This results in a leak proof, all metal sealed pressure system which withstand more than 10 million pressure cycles without failure.

#### Features

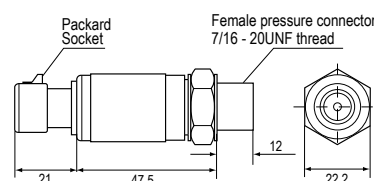
- Single-piece machined steel pressure port
- Environmentally Sealed Electronics
- Reliable, Repeatable Performance and Long Operating Life
- Slender Body Design
- Available in several pressure ranges up to 50 bar.



**Shielded cable Female**  
Dimensions in mm



**Hirschman Female**  
Dimensions in mm



**Packard Female**  
Dimensions in mm

## REFRIGERATION COMPONENTS

### Transducers and Sensors

#### Pressure Transducer

#### P499

#### 2 meter cable Connections Models

Ordering Codes	Press. Connection	Output
P499ABS-401C	Male	0.4 to 20 mA
P499ABS-404C		
P499ACS-401C	Female	
P499ACS-404C		
P499ACS-405C		
P499VBS-401C	Male	DC 0 V - 10 V
P499VBS-404C		
P499VCS-401C	Female	
P499VCS-404C		
P499VCS-405C		

#### Hirschmann DIN connector

Ordering Codes	Press. Connection	Output
P499ABH-401C	Male	0.4 to 20 mA
P499ABH-402C		
P499ABH-404C		
P499ACH-401C	Female	
P499ACH-402C		
P499ACH-404C		
P499RCH-401C		
P499RCH-404C		0.5 - 4.5 V
P499VBH-401C	Male	0 - 10 V
P499VBH-404C		
P499VCH-401C	Female	
P499VCH-404C		

#### Packard connector

Ordering Codes	Press. Connection	Output
P499ACP-401C	Female	0.4 to 20 mA
P499ACP-402C		
P499ACP-403C		
P499ACP-404C		
P499ACP-405C		0.5 - 4.5 V
P499RCP-401C		
P499RCP-402C		
P499RCP-404C		
P499RCP-405C		0 - 10 V
P499VCP-404C		

## REFRIGERATION COMPONENTS

### Transducers and Sensors

## Mechanical Pressure Transducer

### P35

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.

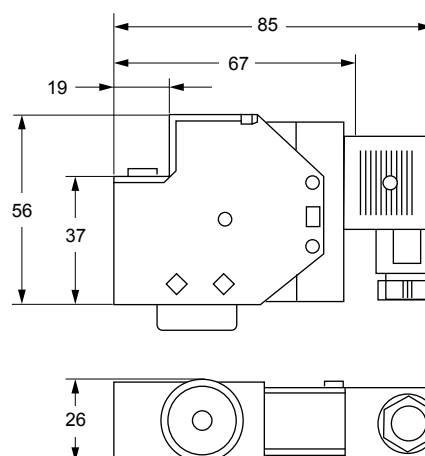
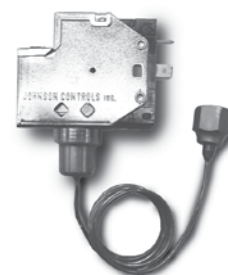
The setpoint of each pressure transducer can be separately adjusted.

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  $\geq 95\%$  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

## REFRIGERATION COMPONENTS

### Transducers and Sensors

#### Mechanical Pressure Transducer

#### P35

#### Replacement Pressure transducers for P215 version (300 KOhm)

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 KOhm)

Ordering Codes	Range	Setting (bar)	Style	Cap Length (m)	Additional Features (Style 50 is allowed on the Dutch market)
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

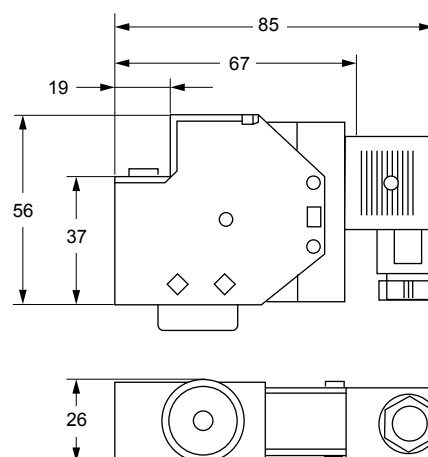
#### Replacement Pressure transducers for P215LR-9120 model 400 Vac (500 KOhm)

Ordering Codes	Range	Setting (bar)	Style	Cap Length (m)	Additional Features (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

## REFRIGERATION COMPONENTS

### Transducers and Sensors

#### Mechanical Pressure Transducer P35



Dimensions in mm

#### Replacement Press. transducers for P215 versions (300 KOhm)

Ordering Codes	Range	Setting (bar)	Style	Cap. Length (m)	Additional Features <i>Note: Style 50 is allowed on the Dutch market!</i>
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 (100 KOhm)

Ordering Codes	Range	Setting (bar)	Style	Cap. Length (m)	Additional Features <i>Note: Style 50 is allowed on the Dutch market!</i>
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 (500 KOhm)

Ordering Codes	Range	Setting (bar)	Style	Cap. Length (m)	Additional Features <i>Note: Style 50 is allowed on the Dutch market!</i>
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

## REFRIGERATION COMPONENTS

### Transducers and Sensors

#### Mechanical Pressure Transducer

#### P35

#### Accessories

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

## REFRIGERATION COMPONENTS

### Transducers and Sensors

#### Accessories for Temperature Controls

Ordering Codes	Description	Primary Usage	Inner Ø x Tube Length Bulb well (mm)	Inside & Outside connector (NPT)	Material Connector Pocket
<b>FTG13A-600R</b>	Closed tank connector Style 1b elements, Max. 10 bar, 120 °C, Min. -40 °C	A19/28/36	---	---	---
<b>KIT012N600</b>	Capillary brackets (6 pieces)	270XT			
<b>WEL003N602R</b>	Bulb well, Max. pressure 70 bar, Temp. 370 °C	---	9.8 x 125	1/2 - 14	Stainless steel
<b>WEL11A601R</b>	Bulb well, Max. pressure 20 bar, Temp. 120 °C, USA item	A19	7.3 x 60	1/2 - 14	Brass/Copper
<b>WEL14A-600R</b>	Bulb well, Max. pressure 69 bar, Temp. 370 °C, USA item	A19/28/36	11.2 x 120	1/2 - 14	Monel/Monel
<b>WEL14A602R</b>	Bulb well, Max. pressure 20 bar, Temp. 120 °C, USA item	A19/28/36	9.8 x 125	1/2 - 14	Brass/Copper
<b>WEL14A603R</b>	Bulb well, Max. pressure 20 bar, Temp. 120 °C, USA item	A19/28/36	9.8 x 147	1/2 - 14	Brass/Copper
<b>WEL16A-601R</b>	Bulb well, Max. pressure 20 bar, Temp. 120 °C, USA item	A19/28/36	9.5 x 71	1/2 - 14	Brass/Copper

## REFRIGERATION COMPONENTS

### Leak Detection

## Leak Detectors

The JCI product range offers Leak Detectors (in order to comply to the EU F-gas Directive) for the following gases:


- Ammonia (NH<sub>3</sub>)
- Synthetic refrigerants HFC (R134a, R410a etc) as shown in this catalogue
- Carbon dioxide (CO<sub>2</sub>)
- Hydro Carbons (R290, R600)


The MPU multi point units need to be used in combination with the MP series of detectors.


The GD/GS series of detectors are standalone detectors and have 3 alarm relays that are factory calibrated depending on the gas type.


#### Factory-set alarm levels (by experience appropriate alarm levels and ranges)


Detector type	Range	Alarm levels
NH <sub>3</sub> -1000	0-1000 ppm	150 / 300 / 500 ppm
NH <sub>3</sub> -4000	0-4000 ppm	150 / 300 / 3000 ppm
NH <sub>3</sub> -10000	0-10000 ppm	500 / 3000 / 8000 ppm
HFC	0-4000 ppm	100 / 1000 / 2000 ppm
CO <sub>2</sub>	0-10000 ppm	2000 / 5000 / 8000 ppm
Flammable / explosive gas	0-40% LEL	5 / 10 / 20% LEL

Ordering Codes	Model	Details
	<b>GD</b>	Room mounting Ambient temperature: -40 °C..+50 °C Humidity: 0..95% Rh (non condensing) IP21
	<b>GD24-HFC-4000</b>	0-4000 ppm, 12..24V AC/DC, max 2 W
	<b>GD230-HFC-4000</b>	0-4000 ppm, 230V AC, max 2 W

	<b>GS</b>	Splash proof, room mounting Ambient temperature: -40 °C..+50 °C Humidity: 0..95% Rh (non condensing) IP54
	<b>GS24-HFC-4000</b>	0-4000 ppm, 12..24V AC/DC, max 2 W
	<b>GS230-HFC-4000</b>	0-4000 ppm, 230V AC, max 2 W

	<b>MP-D</b>	Room mounting Ambient temperature: -40 °C..+50 °C Humidity: 0..95% Rh (non condensing) IP21
<b>38-220</b>	<b>MP-D-HFC-4000</b>	0-4000 ppm

	<b>MP-DS</b>	Splash proof, room mounting Ambient temperature: -40 °C..+50 °C Humidity: 0..95% Rh (non condensing) IP54
<b>38-420</b>	<b>MP-DS-HFC-4000</b>	0-4000 ppm

	<b>MPU</b>	Ambient temperature: 0 °C..+50 °C Humidity: 10..95% Rh (non condensing) IP66
<b>20-310</b>	<b>MPU2C</b>	2 channels, 230V AC / 24V DC, max 10 W
<b>20-300</b>	<b>MPU4C</b>	4 channels, 230V AC / 24V DC, max 10 W
<b>20-305</b>	<b>MPU6C</b>	6 channels, 230V AC / 24V DC, max 10 W
<b>60-300</b>	---	Custom preset alarm levels. Price per channel/detector



## P2000 SMS

# P2000 Security Management System

Version 3.14

The Johnson Controls® P2000 Security Management System (SMS) represents the latest technology in integrated security solutions. Using Microsoft® Windows® Operating Systems (OSs), users can easily configure and use the P2000 software. An underlying Microsoft SQL Server™ database engine offers high performance without high overhead. The enhanced graphical user interface (GUI) provides operators access to interactive real-time facility maps featuring dynamic icons, to monitor and control major facility systems and functions. Authorized operators can create cardholder records, define hardware components, and control access using badging, Closed Circuit Television (CCTV), Digital Video Recorders (DVR), area control, mustering, and elevator control to name a few, as well as monitor local and remote transactions and alarm activity in real time.

The version 3.14 enables the advanced Web UI HTML5 interface through: Geo location mapping, Case management, ONVIF Video viewer and Alarm management options. Scalable, the P2000 is available in three editions: Express, Professional and Corporate.

Available  
Soon



### COMMON OPTIONS to all P2000 Editions

- Map for real time monitoring
- Alarm management + response
- Cardholder management
- Web Visitor management
- Cardholders DB sharing (MIS)
- Security Threat levels
- Area Control
- Hour on site reporting
- Evacuation control (Mustering)
- Guard Tour
- Elevators low level interface
- Cabinet Control
- BAS integration (METASYS)
- P2000 VMS integration

### EXPRESS EDITION main Feature and Integration options

- 1 Workstation, 32 doors and 10.000 Cardholders
- P2000 VMS Integration
- Other Video System Integration
- Video Badging Station Option
- HID® Edge EVO® / Assa Abloy® Aperio® Options
- Intercom Option
- Fire / Intrusion OPC Options
- Server Virtualization (HA) Option
- Advanced HTML5 Web UI
- Mobile Application for Apple iOS® and Android®

### PROFESSIONAL EDITION adds to Express the following features

- Up to 5 Workstations, 128 doors
- 25.000 Cardholders
- DB Partitioning
- Archive Report Server options
- Elevators Option
- Enterprise (WAN Participant)

### CORPORATE EDITION adds to Professional the following features

- 5 Workstations upgradable to 40
- 25.000 Cardholders upgradable to 10 Millions
- Up to 2.048 doors .
- Enterprise (WAN Central site)
- FDA Cfr 21 P11 Option for Pharmaceutical ind.

## SECURITY PRODUCTS

### P2000

#### P2000 SMS

#### P2000 Security Management System

Ordering Codes	Description
<b>P2K-SW-EXP314</b>	P2000 Express up to 32 readers, 1 user client and up to 10 K cards
<b>P2K-SW-PRO314</b>	P2000 Professional 128 readers, 5 client user max, 25 K cards
<b>P2K-SW-COR314</b>	P2000 Corporate 2.048 readers, from 5 to 40 clients and from 25 K to 10 ML cards

#### Corporate Software Options

Ordering Codes	Description
<b>P2K-SW-C25K314</b>	Upgrades the Corporate Edition cardholder database capacity by 25,000 cardholder records. Available in increments of 25,000.
<b>P2K-SW-5USR314</b>	Upgrades the Corporate Edition to allow an additional 5 concurrent user connections. Available in increments of 5.
<b>P2K-SW-ENT314</b>	P2000 Enterprise Access Management option. This option enables two or more existing P2000 installations to form an enterprise system. One P2K-SW-ENT313 required for each participating P2000. Central site must be a Corporate Edition system.
<b>P2K-SW-CGTRK314</b>	P2000 Change Tracking option for Food and Drug Administration (FDA) Title 21 Code of Federal Regulations (CFR) Part 11 compliance.

#### Corporate and Professional Software Options

Ordering Codes	Description
<b>P2K-SW-ARS314</b>	P2000 Archive Report Server software option
<b>P2K-ELV-CMPS314</b>	P2000 Otis® Compass® destination elevator system interface
<b>P2K-ELV-KONE314</b>	P2000 KONE® high-level elevator IP system interface
<b>P2K-ELV-OTIS314</b>	P2000 Otis EMS high-level elevator serial system interface
<b>P2K-ELV-TK314</b>	P2000 ThyssenKrupp high-level elevator serial interface
<b>P2K-SW-ENT314</b>	P2000 Enterprise Access Management option. This option enables two or more existing P2000 installations to form an enterprise system. One P2K-SW-ENT313 required for each participating P2000. Central site must be a Corporate Edition system.

#### All Editions Software Options

Ordering Codes	Description
<b>P2K-SW-VI314</b>	P2000 Video Badging license. One license required per P2000 video imaging station.
<b>P2K-SW-AEM314</b>	P2000 WEB UI and Mobile Alarm and Event Management
<b>P2K-SW-EMAP314 *</b>	P2000 Web UI enhanced geo location mapping application
<b>P2K-SW-CMGR314 *</b>	P2000 Web UI Case management
<b>P2K-SW-SA314 *</b>	P2000 Web UI Situational Awareness pack
<b>P2K-SW-VID314 *</b>	P2000 Web UI ONVIF Video Viewer (1 connection)
<b>P2K-SW-HA314</b>	P2000 High Availability option – for Server virtualization
<b>P2K-DV-PVMS314</b>	Johnson Controls, P2000VMS Integration
<b>P2K-DV-AMTS314</b>	P2000 Aimetis® Symphony® VMS Integration option
<b>P2K-DV-AVGN314</b>	P2000 Avigilon® Control Center VMS Integration option
<b>P2K-DV-CISCO314</b>	P2000 Cisco Video Surveillance Manager option
<b>P2K-DV-BVMS314</b>	P2000 Bosch® VMS Integration option
<b>P2K-DV-GNTEC314</b>	P2000 Genetec® integration option
<b>P2K-DV-MILE314</b>	P2000 Milestone XProtect® integration option
<b>P2K-DV-NICE314</b>	P2000 NICE® integration option
<b>P2K-DV-NXTVA314</b>	P2000 Verint® Nextiva® integration option
<b>P2K-DV-ONSSI314</b>	P2000 OnSSI® integration option
<b>P2K-DV-PAN314</b>	P2000 Panasonic® integration option
<b>P2K-DV-RPEYE314</b>	P2000 Honeywell® Rapid Eye® integration option
<b>P2K-DV-XPRT314</b>	P2000 Pelco® X-portal integration option
<b>P2K-P-EDGE314</b>	P2000 HID Edge® and Edge EVO (1 license every 8 readers)
<b>P2K-P-MERC314</b>	P2000 Authentic Mercury panel interface option
<b>P2K-P-ASSA314</b>	P2000 ASSA ABLOY IP controller interface (8 readers)
<b>P2K-IA-GE314</b>	P2000 OPC intrusion interface (Europe only)
<b>P2K-FA-NOTE314</b>	P2000 OPC fire interface (1 connection – Europe only)
<b>P2K-CS-SIA314</b>	P2000 SIA interface to Bosch D6600 (1 connection)
<b>P2K-INT-CMD314</b>	P2000 Commend® intercom interface
<b>P2K-INT-ZEN314</b>	P2000 Zenitel intercom interface

#### Note

\* New Options introduced by Version 3.14

## P2000 Controllers

### S321-IP

#### Dual Door Network Controller

The S321-IP is an advanced, intelligent, network controller capable of monitoring and controlling one or two fully-configured doors for small-to-large security installations.

The S321-IP can be used as a standalone device, with all cardholders and configuration data saved locally at the controller, or can be seamlessly integrated with the P2000. S321-IP host communications use a standard TCP/IP network protocol and are easily integrated into the P2000 Security Management System.

The controller can be programmed either from its own user interface from any network-connected computer and standard browser, or through the P2000 interface.

The S321-IP controller can store locally up to 5,000 Cardholders and manage 40 holidays and 64 time zones.



S321-IP

#### Features

- Interfaces to one or two readers
- 8 inputs, 4 outputs
- Four-state (supervised) inputs and two-state (unsupervised) inputs
- Up to 5,000 cardholder badges
- 4 MB flash memory
- 10/100Base-T network connection
- Up to 128-bit badge numbers, 2 schedules per badge
- RTC with 40 holidays and 64 schedules
- Can be updated remotely using File Transfer Protocol (FTP)
- Browser-based Graphical User Interface (GUI)
- Expandable modular design
- Input Voltage +12 to +24 VDC; 16 to 24 VAC
- Mounting: DIN rail or Flat surface
- Dimensions: 14.4cm x 15cm x 5.5cm



SPC1000-1A10

## Security Panel Assembly

### SPC10000-1A10

Security control panel with S321-IP controller and power supply

Ordering Codes	Description
S321-IP	Dual Door Network Controller
SPC10000-1A10	Security Panel with S321 and Power Supply

#### Features

- S321-IP pre-Assembled in a Security Panel
- Power supply: 1 module 24V@5 Amp, nominal Input: 85/240 VAC
- Dimensions : 40,6 cm W x 40,6 cm H x 16,8 cm D
- Battery brackets for 2 x S300-BAT (12V 7Ah)
- Key lock and Tamper switch

## P2000 Controllers

### CK721-A

#### *High-Speed High-Traffic Network Controller*

The CK721-A is an advanced, intelligent, network controller capable of handling high volume, high-speed traffic with host security management systems. The controller is able to perform manual and automatic control functions using add-on modules to connect readers, monitor 2- or 4-state inputs, and add output points. Communication between the CK721-A and modules is achieved via an RS485 connection. The Expandable modular design allows an unlimited number of CK721-A controllers to be connected via Ethernet. Each CK721-A can support up to 64 readers; for a total capacity of 2,048 readers in a network with the P2000 Security Management System.

CK721-A host communications use a standard TCP/IP on a 10/100Base-T network and are easily integrated into the P2000 security management system. The controller can be programmed by using its own user interface or by using the Microsoft® Windows® based P2000 interface. Its easy integration with P2000 software allows the CK721-A to take advantage of all the P2000 software features, including alarm monitoring, history reporting, input/output linking, card and system activated events and local, central or shared operation; history and event transactions are uploaded to the host for storage and report generation.

The CK721-A/P2000 server encrypted communications provides secure network communications between the CK721-A controller and the P2000 server using the Advanced Encryption Standard (AES256)



#### Features

##### The CK721-A supports the following functional capacity:

- Embedded 32-bit processor
- 128 MB flash memory
- 10/100Base-T network connection, encrypted
- DB9 port for configuration, commissioning, and service maintenance
- Up to 64 readers per controller
- Storage capacity for up to 200,000 cardholders
- Supports OSDP Version 1.1
- Accepts up to 128-bit badge numbers
- 12 facility codes per reader (768 per controller)
- 40 holidays
- 64 time zones
- 32 access group/time zone pairs per badge
- Supports Wiegand® interface, proximity, magnetic stripe, smart card, most biometric readers and bar code card technologies. Custom Card engineered formats are also accepted.
- RS485 expansion Bus supports Reader module: S300-DIN-RDR2SA and S300-DIN-RDR8S and auxilliary I/O modules: S300-DIN-I8O4 and S300-DIN-I32O16
- Mounting DIN rail or Flat surface
- Dimensions: 13.1 x 27.0 x 6.2 cm

#### Expansion modules

##### Readers and I/O boards

Communication between the CK721-A and modules is achieved via an RS485 connection:

Ordering Codes	Description
<b>S300-DIN-RDR2SA</b>	The Two-door module RDR2SA provides two doors full control connecting Cards Readers through Wiegand ports or via OSDP in RS485.
<b>S300-DIN-RDR8S</b>	The Eight-door module RDR8SA provides eight doors full control connecting Cards Readers through Wiegand ports or via a single RS485 multidrop ( OSDP).
<b>S300-DIN-I8O4</b>	The I8O4 module provides, on a limited footprint, up to 8 Supervised inputs, plus power fails and Tamper inputs, and 2 Relay plus 2 Open- Collector outputs.
<b>S300-DIN-I32O16</b>	The I32O16 module provides up to 16 supervised inputs, plus power fails and Tamper inputs, and 16 Relay plus 16 Open- Collector outputs.

## P2000 Readers Modules

### S300-DIN-RDR2SA

#### 2 Door Module

The S300-DIN-RDR2SA module provides interface control for access and security devices associated with up to two doors. The module connects up to 2 readers via Wiegand Ports or in RS485 with Open Supervised Device Protocol (OSDP) Version 1.1.

The RDR2SA provides inputs and outputs for interface and command two doors, supervised inputs for: Door Status, Aux inputs and Exit Buttons. Two additional inputs are dedicated to Power Failure and Enclosure Tamper status. Any points not used for the door can be configured as general purpose I/O points, possibly eliminating the need to purchase additional I/O modules for certain installations.

The RDR2SA provides power for the card reader hardware, and output relays for the doors. The door locking hardware is powered locally.

The RDR2SA uses standard RS485 communications and can interface the following controllers: CK722, CK721-A, and the legacy controller: CK721, CK720 and CK705.

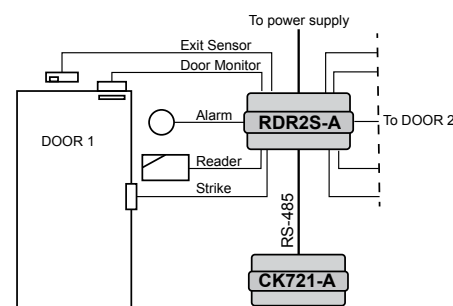
Please note, the CK721-A using firmware versions earlier than 3.0, CK721 controllers, and CK720/705 controllers are not supported by P2000 Version 3.13 and later.

In the RDR2SA, each of the 2 door interfaces consists of:

- Wiegand® Data0 and Data1 interface or RS485 OSDP V. 1.1
- Supervised door monitor switch input, normally open or normally closed, based on wired configuration
- Supervised Auxiliary input
- Supervised "request to exit" switch input, normally open
- Door strike relay, Single Pole Double Throw (SPDT)
- Alarm shunt relay, SPDT
- Red lamp driver (open collector)
- Green lamp driver (open collector)
- +12 VDC 250 mA per reader power supply

In addition, each module has the following common inputs:

- Calibration resistor input
- Supervised power fail input
- Supervised panel tamper input



#### Features

- 2 Reader Interfaces: 2-wire Wiegand interfaces or two RS485 bus ODSP Version 1.1.
- 4 Open collectors for readers Green and Red LED indicators (max 12 VDC / 100 mA)
- 8 Supervised Inputs with calibration
- 4 Relay (Lock+Shunt) Outputs 1 A maximum, 24 VDC, 25 VA maximum
- Communication bus to CK controller: RS485 at 9.600 or 19.200 Baud
- Input Voltage Power 12 to 24 VDC or 16 to 24 VAC at 24 W
- Power to reader: 12 VDC, 250 mA (typical)
- Mounting Specifications DIN rail or flat surface
- Dimensions 14.4 cm x 15.0 cm x 5.5 cm



## P2000 Readers Modules

### S300-DIN-RDR8S

#### 8 Door Module

The S300-DIN-RDR8S module provides interface control for access and security devices associated with up to eight doors. The module connects up to 8 readers via Wiegand Ports or in RS485 with Open Supervised Device Protocol (OSDP) Version 1.1.

The RDR8S provides inputs and outputs for interface and command each of the 8 doors, supervised inputs for: Door Status, Aux inputs and Exit Buttons. Two additional inputs are dedicated to Power Failure and Enclosure Tamper status. Any points not used for the door can be configured as general purpose I/O points, possibly eliminating the need to purchase additional I/O modules for certain installations.

The RDR8S provides power for the card reader hardware, and output relays for the doors. The door locking hardware is powered locally.

The RDR8S uses standard RS485 communications and can interface with the following controllers: CK722 and CK721-A version 3.0 and higher.

In the RDR8S each of the 8 door interfaces consists of:

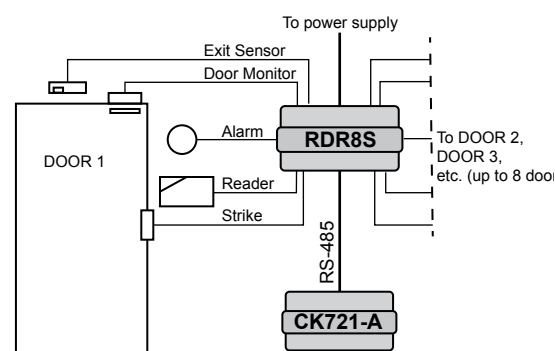
- Wiegand® Data0 and Data1 interface or RS485 OSDP V. 1.1
- Supervised door monitor switch input, normally open or normally closed, based on wired configuration
- Supervised Auxiliary inputs
- Supervised "request to exit" switch input, normally open
- Supervised tamper input
- Supervised spare input
- Door strike relay, Single Pole Double Throw (SPDT)
- Alarm shunt relay, SPDT
- Red lamp driver (open collector)
- Green lamp driver (open collector)
- +12 VDC 250 mA per reader power supply

In addition, each module has the following common inputs :

- Calibration resistor input
- Supervised power fail input
- Supervised panel tamper input

#### Features

- 8 Reader Interface: 2-wire Wiegand interfaces or multidrop bus RS485 OSDP Version 1.1
- 16 Open collectors for readers Green and Red LED indicators (max 12 VDC / 100 mA)
- 16 Supervised Inputs with calibration
- 16 Relay Outputs 1 A maximum, 24 VDC, 25 VA maximum
- Communication bus to CK controller: RS485 at 9.600 or 19.200 Baud
- Input Voltage Power 12 to 24 VDC or 16 to 24 VAC at 24 W
- Power to reader: 12 VDC, 250 mA (typical)
- Mounting Specifications DIN rail or flat surface
- Dimensions 13.07 cm x 26.88 cm x 6.36 cm



## P2000 I/O modules

### S300-DIN-I8O4

#### 8 Input and 4 Output Module

The S300-DIN-I8O4 module provides auxiliary Inputs and Outputs to monitor and control other systems installed in the building.

The supervised 8 inputs, 4 relays and 4 Open collectors, are organized into 2 Terminals. The outputs can be used for light activation or to open multiple doors in rack. Using the event process of the P2000 SMS inputs can be used for special activation or to monitor status and alarms. Two additional inputs are dedicated to Power Failure and Enclosure Tamper status.

The I8O4 uses standard RS485 communications and can interface with the following controllers: CK722, CK721-A and with legacy controller: CK721, CK720 and CK705.

In the I8O4 module each of the two I/O Terminals consists of:

- 4 Supervised inputs
- 2 Relay Outputs
- 2 Open Collector Outputs

In addition each module has:

- 1 Calibration resistor input
- 1 Supervised power fail input
- 1 Supervised panel tamper input



#### Features

- 8 Supervised Inputs with calibration
- 4 Relay Outputs 1 A maximum, 24 VDC, 25 VA maximum
- 4 Open collectors (max 12 VDC / 100 mA)
- Communication bus to CK controller: RS485 at 9.600 or 19.200 Baud
- Input Voltage Power 12 to 24 VDC or 16 to 24 VAC at 24 W
- Mounting Specifications DIN rail or flat surface
- Dimensions 13.07 cm x 26.88 cm x 6.36 cm

## P2000 I/O modules

### S300-DIN-I32O16

*32 Input and 16 Output Module*

The S300-DIN-I32O16 module provides auxiliary Inputs and Outputs to interface difference services in the plants.

The supervised 8 inputs, the 4 relay and the 4 Open collectors are organized into 8 Terminals. The outputs can be used for light activation or to open multiple doors in rack. Using the event process of the P2000 SMS inputs can be used for special activation or to monitor status and alarms. Other two inputs are dedicated to Power Failure and Enclosure Tamper status.

The I32O16 uses standard RS485 communications and can interface with the following controllers: CK722, CK721-A and with legacy controller: CK721, CK720 and CK705.

In the I32O16 module, each of the eight I/O Terminals consists of:

- 4 Supervised inputs
- 2 Relay Outputs
- 2 Open Collector Outputs

In addition each module has:

- 1 Calibration resistor input
- 1 Supervised power fail input
- 1 Supervised panel tamper input



### Features

- 8 Supervised Inputs with calibration
- 4 Relay Outputs 1 A maximum, 24 VDC, 25 VA maximum
- 4 Open collectors (max 12 VDC / 100 mA)
- Communication bus to CK controller: RS485 at 9.600 or 19.200 Baud
- Input Voltage Power 12 to 24 VDC or 16 to 24 VAC at 24 W
- Mounting Specifications DIN rail or flat surface
- Dimensions 13.07 cm x 26.88 cm x 6.36 cm



## P2000 SPA

# Security Panel Assembly

*Pre-wired, Preassembled Control Panel*

The Security Panel Assembly is a pre-wired, preassembled standard control panel and enclosure that contains a single or a combination of controllers and modules. These pre-designed solution save both time and money. Various models are available to accommodate a variety of common applications.

The control panel is shipped complete, mounted in a steel enclosure. The panel is equipped with the required number of 24 VDC power supplies. The power supply has Uninterruptible Power Supply (UPS) capability with the addition of factory-wired gel cell batteries (S300-BAT), which are sold separately.

These enclosures are designed specifically for security control requirements, with battery brackets that do not need to be removed to install the batteries, a lift-off door, a pre-wired door tamper switch, and a lockable door with key. Space is reserved on specific models for the addition of future components.



Security Panel	Dimension	Doors	Controller		Doors Moules		Power Supply	Battery
Item Code	L x H x D 168 mm	q.	CK721-A	S321-IP	S300-DIN-RDR2SA	S300-DIN-RDR8S	S300-DIN-L-PS	S300-BAT
SPC10000-1A10	410 x 410	2	---	1	---	---	1	2 *
SPA10000-1A10	410 x 410	0	1	---	0	0	1	2 *
SPA1B100-1A10	400 x 400	2	1	---	1	0	1	2 *
SPB10000-1A10	400 x 400	2	---	---	1	0	1	2 *
SPA1B100-1B10	510 x 610	2	1	---	1	0	1	2 *
SPA1B200-1B10	510 x 610	4	1	---	2	0	1	2 *
SPA1B100-1C10	610 x 610	2	1	---	1	0	1	2 *
SPA1B200-1C10	610 x 610	4	1	---	2	0	1	2 *
SPA1B300-2C10	610 x 610	6	1	---	3	0	2	4 *
SPA1B100-1D10	610 x 760	2	1	---	1	0	1	2 *
SPA1B200-1D10	610 x 760	4	1	---	2	0	1	2 *
SPA1B300-2D10	610 x 760	6	1	---	3	0	2	4 *
SPA1B400-2D10	610 x 760	8	1	---	4	0	2	4 *
SPA0D100-1G10	510 x 760	8	---	---	0	1	1	2 *
SPA1D100-1G10	510 x 760	8	1	---	0	1	1	2 *
SPA1B400-2E10	510 x 1071	8	1	---	4	0	2	4 *
SPA0D200-2F10	510 x 1070	16	1	---	0	2	2	4 *
SPA1D200-2F10	510 x 1070	16	1	---	0	2	2	4 *

**Note:**

S300-DIN-L-PS Power Supply switching, output: 24V@5 Amp, Input: 85/240 vac

S300-BAT Lead acid battery for security application, 12 VDC, 7 Ah - \* Not included in the Security Panel

## P2000 Security Enclosure

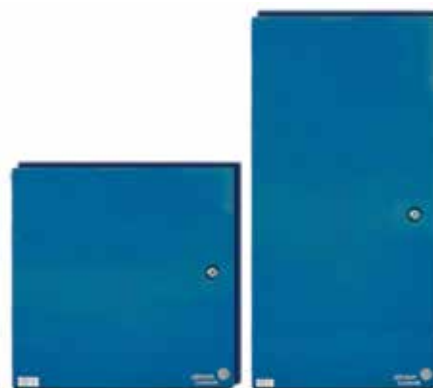
### Security Enclosure

#### Enclosures and Spare Parts

Panels and components can be ordered separately for field installation of security enclosures or as replacement items for Security Panel Assemblies. In addition to the complete enclosure with door, and optional mounted subpanel, we offer individual components such as Battery Bracket and Tamper Switch Kits that can be ordered separately or as spare parts.

The enclosures, designed specifically for security control requirements, come with pre-engineered and pre-mounted studs for field installation of the battery brackets, as well as standard electrical conduit knockouts.

The lift-off door comes with a lock and key.



#### SEC-ENC Security Enclosure

Item Code	L x H x D 168 mm	Enclosure, battery brackets and Tamper switch not included	Battery Brackets kit for S300-BAT
<a href="#">SEC-ENC1616WD</a>	410 x 410	Security Enclosure with Door	Up to 1 max
<a href="#">SEC-ENC2024WD</a>	510 x 610	Security Enclosure with Door	Up to 1 max
<a href="#">SEC-ENC2424WD</a>	610 x 610	Security Enclosure with Door	Up to 2 max
<a href="#">SEC-ENC2430WD</a>	610 x 760	Security Enclosure with Door	Up to 2 max
<a href="#">SEC-ENC3042WD</a>	760 x 1070	Security Enclosure with Door	Up to 3 max
<a href="#">SEC-ENC1616WDP</a>	410 x 410	Security Enclosure with Door and Perforated Subpanel	Up to 1 max
<a href="#">SEC-ENC2024WDP</a>	510 x 610	Security Enclosure with Door and Perforated Subpanel	Up to 1 max
<a href="#">SEC-ENC2424WDP</a>	610 x 610	Security Enclosure with Door and Perforated Subpanel	Up to 2 max
<a href="#">SEC-ENC2430WDP</a>	610 x 760	Security Enclosure with Door and Perforated Subpanel	Up to 2 max
<a href="#">SEC-ENC3042WDP</a>	760 x 1070	Security Enclosure with Door and Perforated Subpanel	Up to 3 max

#### SEC-ENC security enclosure spare parts and kits

Item code	L x H x D 168 mm	Spare parts and kits
<a href="#">SEC-ENC1616SDR</a>	410 x 410	Security Enclosure Replacement Door
<a href="#">SEC-ENC2024SDR</a>	510 x 610	Security Enclosure Replacement Door
<a href="#">SEC-ENC2424SDR</a>	610 x 610	Security Enclosure Replacement Door
<a href="#">SEC-ENC2430SDR</a>	610 x 760	Security Enclosure Replacement Door
<a href="#">SEC-ENC3042SDR</a>	760 x 1070	Security Enclosure Replacement Door
<a href="#">PAN-ENC1616PSP</a>	410 x 410	Security Enclosure Replacement Subpanel
<a href="#">PAN-ENC2024PSP</a>	510 x 610	Security Enclosure Replacement Subpanel
<a href="#">PAN-ENC2424PSP</a>	610 x 610	Security Enclosure Replacement Subpanel
<a href="#">PAN-ENC2430PSP</a>	610 x 760	Security Enclosure Replacement Subpanel
<a href="#">PAN-ENC3042PSP</a>	760 x 1070	Security Enclosure Replacement Subpanel
<a href="#">SEC-ENCBATBRK</a>	---	Security Enclosure Battery Bracket Kit (kit contains brackets for two batteries)
<a href="#">SEC-ENCTMPRSW</a>	---	Security Enclosure Tamper Switch Kit

## P2000 VMS

# Video Management System

Version 6.13

The Johnson Controls® P2000 Video Management System is an intelligent video security solution that offers a single, innovative, open IP video platform for video management, video analytics, system integration, and alarm management.

P2000 VMS provides a feature-rich, easy-to-use interface that installs on standard commercial-off-the-shelf hardware and software platforms, that incorporates IT-friendly features to make administration simple.

With support for hundreds of IP cameras and analog camera encoders, from several manufacturers, P2000 VMS makes it easy to find the right camera without compatibility worries.

With three software Editions the P2000 VMS has a solution for every topology and size of installation. Licensing a camera has never been so simple. P2000 VMS allows you to add licenses one at a time, limited only by the server hardware. No additional charge for servers and clients or the P2000VMS.

P2000VMS is natively integrated in the P2000 Security Management System. This allows operators to control all their security platforms from a single location, such as access control, intercom, intrusion detection, and video.



## STANDARD EDITION

### Single site, single server recording system

- Multiple Web Clients
- Low to Medium camera counts
- Easy migration from DVN5000 or other DVR systems
- Mobile Bridge to Android and iOS Apps Option
- Video Analytics Options
- P2000 SMS native integration

## PROFESSIONAL EDITION

### Single or multisite, multiserver system

Professional includes all Standard edition features and:

- Medium to high cameras counts
- Highly scalable, advanced functionality
- Active Directory Support
- Alarm Management
- Server Farms and Virtualization
- Videowall management

## ENTERPRISE EDITION

### Multiserver with Fail-Over back up

Enterprise includes all Professional edition features and:

- Medium to very high cameras counts
- Redundancy and Failover recording
- Business Intelligence reports

### Video Analytics included in all P2000 VMS editions are:

- Camera signal loss Detection
- Camera covered, painted or moved
- Motion Detection

## LEGACY DVN5000

When a DVN unit, with firmware version 2.10 or higher, is implemented in a P2000VMS system, the driver supports Pan, Tilt and Zoom (PTZ) and I/O operation. Images are recorded at P2000 VMS server at resolution max 4CIF and up to 30 FPS.

## P2000 VMS Video Management System

### Optional Video Analytics

The following video analytic can be added at any camera, at any time and at any of the three P2000 VMS editions.

#### Area Alarms and Restricted Zones

- Area alarms or restricted zones refers to the ability to highlight multiple zones in a field of view and alert on activity in any one of them while ignoring activity in unselected areas.

#### Automatic License Plate Recognition

- Available in four and eight camera pack, this analytic provides out-of-the-box Automatic License Plate Recognition (ALPR) functionality. It can be used for parking applications. License plates and their corresponding images are stored and can be easily searched. Various alarm scenarios can be achieved by using white or black lists.

#### Automatic PTZ Tracking

- The auto-PTZ tracking function will automatically control PTZ cameras when relevant activity or a rule- break is detected.

#### Dwell Time and Loitering

- The loitering/dwell time function recognizes how long a particular target stays in a defined field of view. In security applications, this analytic can help with identifying potential threat by detecting loitering people or vehicles. It support business intelligence.

#### Item Left Behind and Removed Detection

- The left/removed item function alerts on background image changes due to new or removed objects in the field of view.

#### Motion Tracking

- The motion tracking function compares relevant pixel changes between images and alerts on relevant foreground motion while ignoring irrelevant motion.

#### Object Classification

- The object classification functionality is able to segment objects between people, vehicles and unknown objects.

#### People and Vehicle Counting

- The counting functionality counts objects entering and leaving a field of view or crossing a virtual fence. This analytic is great for tracking attendance in large venues and counting vehicles in parking garages.

#### Virtual Fence and Tripwire

- A virtual fence refers to an invisible digital fence or tripwire that can send an alert when an object crosses in one or both directions. Especially useful in perimeter security.

#### Wrong Direction

- The wrong direction function will alert on motion going against the specified flow of traffic.

## SECURITY PRODUCTS

### P2000

## P2000 VMS

### Video Management System

### Feature Summary

#### Notification

Features	Standard	Professional	Enterprise
E-mail Notification	•	•	•
Android & Apple smartphones or tablets	Add On	Add On	Add On

#### Video Analytics

Features	Standard	Professional	Enterprise
Camera Loss Detection (e.g. Cord Cut)	•	•	•
Camera Obstructed/Moved (Scene Change)	•	•	•
Basic Video Motion Detection (VMD)	•	•	•
Indoor People Tracking	Add On	Add On	Add On
Outdoor People & Vehicle Tracking	Add On	Add On	Add On
Left & Removed Item Detection	Add On	Add On	Add On
Left & Removed Item Detection with	Add On	Add On	Add On
Outdoor Automatic PTZ Tracking	Add On	Add On	Add On
Automatic License Plate Recognition	Add On	Add On	Add On

#### Client Features

Features	Standard	Professional	Enterprise
Supported Operating System	Windows 7, 8, and Server 2008+ (32 or 32 bits)		
Number of Concurrent Server Connections	Unlimited	Unlimited	Unlimited
Customizable User Interface	•	•	•
Graphical Timeline	•	•	•
View Multiple Timelines	•	•	•
Hierarchical Site Map Navigation	•	•	•
Camera List Navigation	•	•	•
Cameras from Multiple Servers and Sites	•	•	•
Multi-Monitor Support	•	•	•
Camera Sequence	•	•	•
Panoramic (360-degree) Support	•	•	•
Manually Trigger Outputs	•	•	•
Integrated Messenger	•	•	•
Alarm Console	•	•	•
Video Export	•	•	•
Bookmark Events	•	•	•
Integrated Alarm Log	•	•	•
Integrated Remote Support Module	•	•	•

## P2000 VMS Video Management System

### Feature Summary

#### *Difference between the three P2000 VMS Editions*

Core Features	Standard	Professional	Enterprise
Max Cameras per server	Unlimited <sup>1</sup>	Unlimited	Unlimited
Max Servers per system	1	Unlimited	Unlimited
Server Redundancy	---	---	•
Failover Recording	---	---	•
Redundant Recording	---	---	•
Edge storage (failover)	•	•	•
Active Directory support	---	•	•
Prevent concurrent user logons	---	•	•
Supervisor logon mode	---	•	•
Map	•	•	•
Video wall	---	---	Add-on
Mobile Client	Add-on (Mobile Bridge Server)		
Web Client	•	•	•
Alarm Management	•	•	•
3rd party access control integration	---	•	•
2-way Audio	•	•	•
Multicast video	•	•	•
Dynamic stream switching	•	•	•
Client side 360 dewarp <sup>2</sup>	•	•	•
Camera support	More than 30 Brands + ONVIF		

#### Note

<sup>1</sup> Depending on server hardware capability, it can be limited up to 300 cameras.

<sup>2</sup> Dewarp supports 360 degree cameras

Management Features	Standard	Professional	Enterprise
Automatic Camera Detection	•	•	•
Centralized Device Management	•	•	•
Automatic Configuration Backups	•	•	•
Uninterrupted Configuration Changes	•	•	•
Remote Diagnostics	•	•	•
SNMP health monitoring	---	•	•
CPU Overload Protection	---	•	•
Guard Tours	•	•	•
Manual Control	•	•	•
Preset on event	•	•	•
OPC option	---	•	•

## SECURITY PRODUCTS

### P2000

## P2000 VMS

### Video Management System

### Feature Summary

#### Client Features

Features	Standard	Professional	Enterprise
Multilanguage *	•	•	•
Manual Movement Control	•	•	•
Point and Click Control	•	•	•
Zoom on Marked Area	•	•	•
Go to Preset Positions	•	•	•
Joystick Support	•	•	•
Customizable Multi-Camera Layouts	•	•	•
Configurable Display Options (fixed)	•	•	•
Configurable Display Options (motion)	•	•	•
Configurable Display Options (alarm)	•	•	•

#### User Access to Clients

Features	Standard	Professional	Enterprise
Microsoft Active Directory Integrated	---	•	•
User Monitoring	•	•	•
Permissions Per User	•	•	•
Permissions Per User Group	•	•	•
Security Profiles	•	•	•
Support for Cross Domain Authentication	---	•	•

#### Reports

Features	Standard	Professional	Enterprise
Login Report	•	•	•
Alarm Counts and Statistics	•	•	•
Object Count Reports (e.g. People, Vehicles)	•	•	•
Heat Map, Report with highest and lowest traffic areas	•	•	•

#### Note

\* Supported languages: English, French, Spanish, Portuguese and German (partial)

## P2000 VMS

### Video Management System

#### *P2000 Video Management Software Standard Edition*

Ordering Codes	Description
<b>P2K-SV-SL-S</b>	Standard Edition license per video channel
<b>P2K-SV-EU-SP</b>	Edition Upgrade - Standard to Professional
<b>P2K-SV-EU-SE</b>	Edition Upgrade - Standard to Enterprise
<b>P2K-VU-S</b>	Version Upgrade - Standard Edition

#### *P2000 Video Management Software Professional Edition*

Ordering Codes	Description
<b>P2K-SV-SL-P</b>	Professional Edition license per video channel
<b>P2K-SV-EU-PE</b>	Edition Upgrade - Professional to Enterprise
<b>P2K-VU-P</b>	Version Upgrade - Professional Edition

#### *P2000 Video Management Software Enterprise Edition*

Ordering Codes	Description
<b>P2K-SV-SL-E</b>	Enterprise Edition license per video channel
<b>P2K-VU-E</b>	Version Upgrade - Enterprise Edition

#### *P2000 Video Management System Options*

Ordering Codes	Description
<b>P2K-VW</b>	Video Wall license for Enterprise or Professional edition
<b>P2K-MBS</b>	Mobile Bridge license suitable to any editions

#### *Software License - Video Analytics (VA)*

Ordering Codes	Description
<b>P2K-VA-01</b>	Indoor People Tracking This analytic is used indoors for a variety of applications such as area alarm and restricted zone, people counting, dwell (loitering) detection, motion detection & tracking, virtual fence (trip wire) and wrong direction detection.
<b>P2K-VA-02</b>	Outdoor People & Vehicle Tracking License per camera This analytic is used outdoors for applications such as object classification (people/vehicle/others), area alarm and restricted zone, dwell (loitering) detection, motion detection & tracking, virtual fence (trip wire), and wrong direction detection.
<b>P2K-VA-03</b>	Left & Removed Item Detection Used to detect items left and removed in a user defined alarm area.
<b>P2K-VA-04</b>	Left & Removed Item Detection with Indoor People Tracking Combines P2K-VA-03 features with P2K-VA-01.
<b>P2K-VA-05</b>	Outdoor Automatic PTZ Tracking License per device Automatically tracks moving objects using a PTZ camera. Includes P2K-VA-02
<b>P2K-VA-06</b>	Automatic License Plate Recognition License per 4 cameras Used to detect Vehicle license plates. Also includes P2K-VA-02.
<b>P2K-VA-07</b>	Automatic License Plate Recognition License per 8 cameras Used to detect Vehicle license plates. Also includes P2K-VA-02.

#### **Note**

Licenses are per video channel  
 Video Analytics can be added at any P2000 VMS Software editions.



