CONTROLS, HVAC & REFRIGERATION PRODUCTS

The European Products Catalogue 2013

Johnson Controls

A more comfortable,
safe and sustainable world

Johnson Controls


Johnson
Controls

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.


Johnson
Controls

HVAC CONTROL PRODUCTS

Valves

Terminal Unit Valves

Plant Valves

Actuators

Sensors

Thermostats

Pneumatic & Transducers

BAS SYSTEM SOFTWARE

MSEA

BAS NETWORK AUTOMATION

MSEA

BAS CONTROLLERS

Field Controllers

MSEA Controllers

Integrated Room Control

Terminal Unit Controllers

REFRIGERATION COMPONENTS

Temperature Controls

Mechanical Thermostats

Float and Flow Controls

Mechanical Liquid Flow Switch

Mechanical Air Flow Switch

Mechanical Liquid Level Switch

Pressure Controls

Adjustable Differential Pressure Switch

Adjustable Pressure Switch

Fixed Setting Pressure Switch

Pressure Switches Accessories

Adjustable Oil Protection Switch

Adjustable Steam Pressure Switch

Modulating Water Valves

Pressure Actuated Water Valves

Temperature Actuated Water Valves

Humidity Controls

Mechanical Humidity Stat

Fan Speed Controllers

1-phase Condenser Fan Speed Control

Field Controllers

Modular Electronic Control System

Electronic Control Devices

Multi-Stages Control Devices

Transducers & Sensors

Pressure Transducer

Mechanical Pressure Transducer

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:

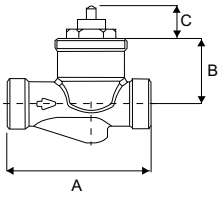
VA-707x ON/OFF thermal;

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

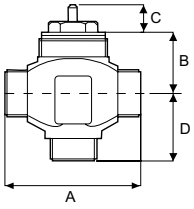
VA-748x floating and proportional electric.

Features

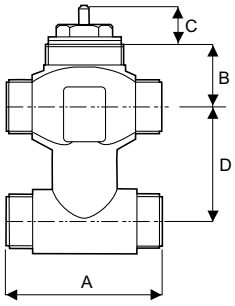
- Forged brass body, stainless steel stem and spring
- Kvs 0.16...5
- 2-way PDTC (normally open), 3-way mixing and 3-way diverting and 3-way mixing and 3-way diverting with built-in bypass configurations
- Fluid temperature 2...120 °C
- BSPP and compression fitting body connections
- Inherent flow characteristic: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



2-way valve



3-way valve



3-way bypass valve

Dimensions in mm

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

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					
V52x0ZC	---	DN10	0.16	---	400
V52x0BC			0.4		
V52x0CC			0.63		
V52x0DC			1		
V52x0EC			1.6		
V5210JC	•	DN15	2.5		110
V5210KC			3.5		
V5210MC		DN20	4.5		
3-way Mixing/Diverting Configuration					
V5810BC	---	DN10	0.4	0.3	120
V5810CC			0.63	0.4	
V5810DC			1	0.63	
V5810EC			1.6	1	
V5810JC		DN15	2.5	1.6	150
V5810KC			4	2.5	
V5810MC		DN20	5	3.5	110
3-way Mixing/Diverting with built-in bypass Configuration					
V55x0BC	---	DN10	0.4	0.3	180
V55x0CC			0.63	0.4	
V55x0DC			1	0.63	
V55x0EC			1.6	1	
V5510JC	•	DN15	2.5	1.6	150
V5510KC			4	2.5	
V5510MC		DN20	5	3.5	110

Notes

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

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

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-7030 ON/OFF thermal;

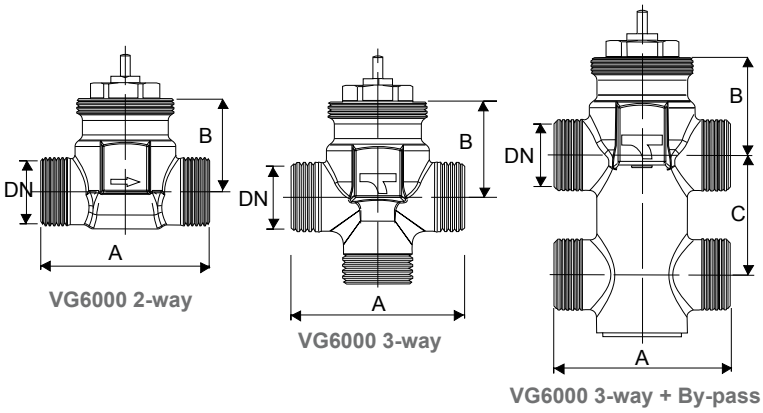
VA-709x thermal 0...10 VDC;

VA-748x floating and proportional electric.

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

Features

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



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

Terminal Unit Valves

VP1000

DN15...32, PN25

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

VP1000 valves offer a remarkable adjustment flexibility. They can be accurately 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.

VP1000 valve maximum adjustment matches the maximum flow rate allowed by the pipe size, on the basis of the values established by international standards.

Following actuators are available:

VA-707x ON/OFF thermal *;

VA-709x thermal 0...10 VDC *;
* (VA-707x and VA-709x are suitable for valves DN15 and DN20 only)

VA-748x floating and proportional electric.

Features

- Kvs calculation in 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

Ordering Codes *	Body Size	Connection Size	l/h
VP10xAAA	DN15	1/2"	150
VP10xAAE	DN15	1/2"	600
VP10xAAG	DN15	1/2"	780
VP10xBAJ	DN20	3/4"	1000
VP10xBAN	DN20	3/4"	1500
VP100CAU	DN25	1"	2200
VP100CAW	DN25	1"	2700
VP100DAW	DN32	1 1/4"	2700
VP100DAY	DN32	1 1/4"	3000

Note:
*** x =** **0 =** Pressure Port Included
1 = No Pressure Port Included

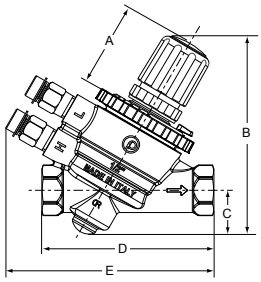
Technical specifications

	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.	400 kPa - 4 bar				
Leakage	0,01% of Flow Rate				
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	

	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.	400 kPa - 4 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	

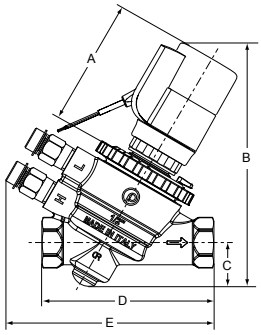
Terminal Unit Valves
VP1000

Dimensional data DN15 - DN20 (in mm)



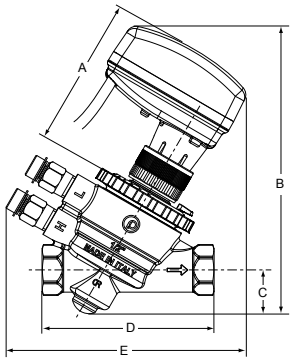
Manual valve

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



Valve with thermal actuator VA-707x / VA-709x

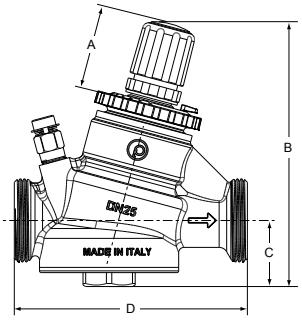
Size	A	B	C	D	E
DN15	75	143	25	99	127
DN20	75	143	25	108	127



Valve with motorized actuator VA-748x

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

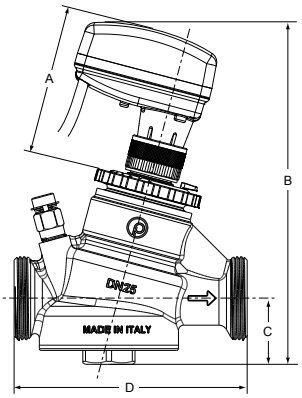
Dimensional data DN25 - DN32 (in mm)



Manual valve

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

* Dimensional data without fittings



Manual valve

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

* Dimensional data without fittings

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:

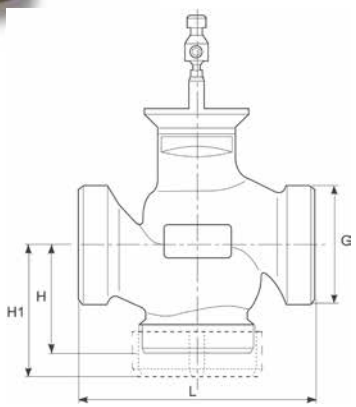
VA-77xx and VA78xx electric valve actuators.

Features

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

Dimensions in mm

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



3-way mixing configuration

Ordering Codes	Body Size	Kvs	Nominal Stroke (mm)	Close-off Pressure kPa	
				VA-77x820x 500 N	VA-78xx-xxx-12 1000 N
VGS8A5W1N	DN15	0.63	13	958	1600
VGS8A4W1N		1.0			
VGS8A3W1N		1.6			
VGS8A2W1N		2.5			
VGS8A1W1N		4.0			
VGS8B1W1N	DN20	6.3		605	1600
VGS8C1W1N	DN25	10		280	1046
VGS8D1W1N	DN32	16		176	744
VGS8E1W1N	DN40	25		54	369
VGS8F1W1N	DN50	40		---	208

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

Pipe muffles

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

Note
3 pipe muffels are needed for the mixing valves

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

Ordering Codes	Mod kit for:
121 4930 151	DN15 / Rp ½
121 4930 201	DN20 / Rp ¾
121 4930 251	DN25 / Rp 1
121 4930 321	DN32 / Rp 1 ¼
121 4930 401	DN40 / Rp 1 ½
121 4930 501	DN50 / Rp 2

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

Plant Valves

VG7000

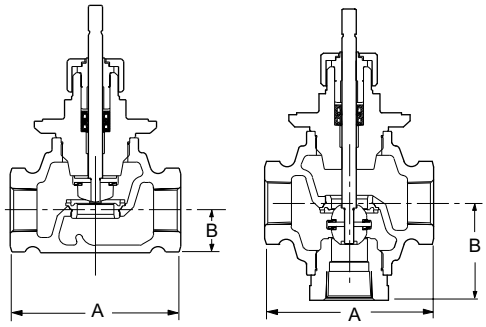
DN15...50, PN16

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

Plant Valves
VG7000

Ordering Codes for Valve Bodies

VG7 ☐ ☐ ☐ ☐ ☐

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

	Size	Flow Coefficient K_{vs}
A	DN15	0.25
B	DN15	0.4
C	DN15	0.63
D	DN15	1.0
E	DN15	1.6
F	DN15	2.5
G	DN15	4.0
L	DN20	6.3
N	DN25	10
P	DN32	16
R	DN40	25
S	DN50	40

	Body Configuration	Trim Type	Inherent Flow Characteristics
1	2-way	Brass trim	Equal percentage
2	3-way mixing	Brass trim	Linear in both ports
3	2-way	Stainless steel trim	Equal percentage
4	3-way mixing	Stainless steel trim	Linear in both ports
5	3-way mixing	Brass trim	Equal percentage in control port, linear in bypass port (only available for VG7x1... valves with BSPP male connection)

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

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

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	

Plant Valves
VG7000

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

Actuator	Valves Size	2-way PDTC or 3-way Valves with 138 kPa air supply		2-way PDTO or 3-way Valves with 0 kPa air supply	
		Spring Range kPa *			
		21 to 42	63 to 91	21 to 42	63 to 91
V-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

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

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

Note

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

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:

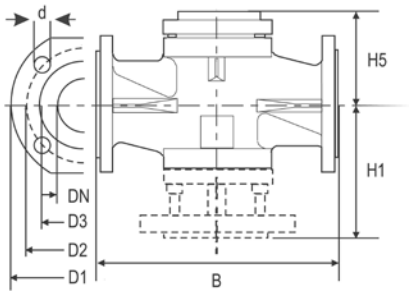
VA-7700 for DN15...50 valves

VA7810 for DN15...65 valves

VA1000 for DN65...100 valves.

Features

- Nodular cast iron body
- Kvs 0.63...160
- 2-way PDTO (normally closed) and 3-way mixing configurations
- Fluid temperature 2...140 °C
- DIN flanged



Dimensions in mm

	PN6							PN10						
Body Size	**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

Plant Valves
VG9000
PN6 Series (VG9xxxS1K)

Ordering Codes*	Body Size	Kvs	Close-off Pressure kPa				
			RA-3000-732x 3000 N	VA-1x20-GGA-1** 2000 N	VA-1125-GGA-1** 2500 N	VA-77xx-820x 500 N	VA78xx-xxx-12 1000 N
2-way PDTO (Normally Closed) Configuration							
VG94A5S1K	DN15	0.63	---	---	---	600	600
VG94A4S1K		1.0					
VG94A3S1K		1.6					
VG94A2S1K		2.5					
VG94A1S1K		4.0					
VG94B1S1K	DN20	6.3					
VG94C1S1K	DN25	10				590	600
VG94E2S1K	DN32	16				360	
VG94E1S1K	DN40	25				190	480
VG94F1S1K	DN50	40				100	290
VG94G1S1K	DN65	63		470	620	---	150
VG94H1S1K	DN80	100	510	300	400		---
VG94J1S1K	DN100	160	320	180	240		---
3-way Mixing Configuration							
VG98A5S1K	DN15	0.63	---	---	---	600	600
VG98A4S1K		1.0					
VG98A3S1K		1.6					
VG98A2S1K		2.5					
VG98A1S1K		4.0					
VG98B1S1K	DN20	6.3					
VG98C1S1K	DN25	10				490	600
VG98E2S1K	DN32	16				280	
VG98E1S1K	DN40	25				130	440
VG98F1S1K	DN50	40				60	260
VG98G1S1K	DN65	63		470	620	---	130
VG98H1S1K	DN80	100	510	300	400		---
VG98J1S1K	DN100	160	320	180	240		---

Notes

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

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

Plant Valves
VG9000
PN10 Series (VG9xxxS1L)

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

Notes

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

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

Plant Valves

VG8000N

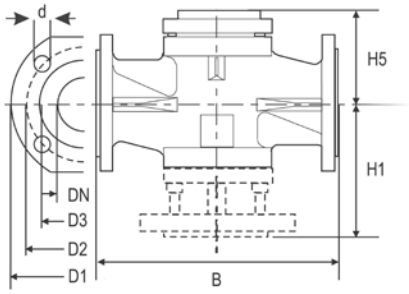
DN15...150, PN16

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
- Kvs 0.1...350
- 2-way PDTC (normally open), 3-way mixing and 3-way diverting configurations
- Fluid temperature 0...180 °C with Glycerine cup -10...180 °C
- DIN flanged



Dimensions in mm

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

Plant Valves
VG8000N

2-way PDTC (Normally Open) Configuration

Ordering Codes*	Body Size	Kvs	Close-off Pressure kPa						
			FA-2000-741x 2400 N	FA-2000-751x 2200 N	FA-3300 6000 N	RA-3100-8226 2700 N	VA1x20** 2000 N	VA1125** 2500 N	VA78xx 1000 N
VG82A4S1N	DN15	1.0	---	---	---	---	1600	1600	1600
VG82A3S1N		1.6							
VG82A2S1N		2.5							
VG82A1S1N		4.0							
VG82B1S1N	DN20	6.3							
VG82C1S1N	DN25	10							1570
VG82D1S1N	DN32	16							770
VG82E1S1N	DN40	25							440
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.

Plant Valves
VG8000N

3-way Mixing Configuration

Ordering Codes*	Body Size	Kvs	Close-off Pressure kPa						
			FA-2000-741x 2400 N	FA-2000-751x 2200 N	FA-3300 6000 N	RA-3100-8226 2700 N	VA1x20** 2000 N	VA1125** 2500 N	VA78xx 1000 N
VG88A4S1N	DN15	1.0	---	---	---	---	1600	1600	1600
VG88A3S1N		1.6							
VG88A2S1N		2.5							
VG88A1S1N		4.0							
VG88B1S1N	DN20	6.3							
VG88C1S1N	DN25	10							1570
VG88D1S1N	DN32	16							770
VG88E1S1N	DN40	25							440
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.

Plant Valves
VG8000N

3-way Diverting Configuration

Ordering Codes*	Body Size	Kvs	Close-off Pressure kPa						
			FA-2000-741x 2400 N	FA-2000-751x 2200 N	FA-3300 6000 N	RA-3100-8226 2700 N	VA1x20** 2000 N	VA1125** 2500 N	VA78xx 1000 N
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.

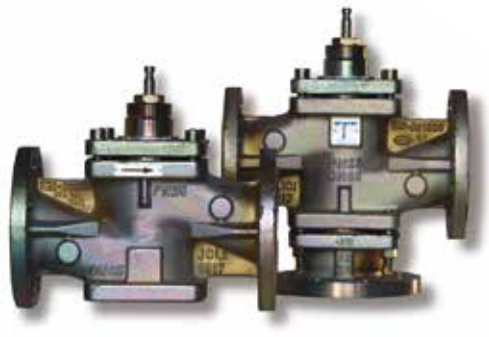
Plant Valves

VG8000H

DN15...150, PN25

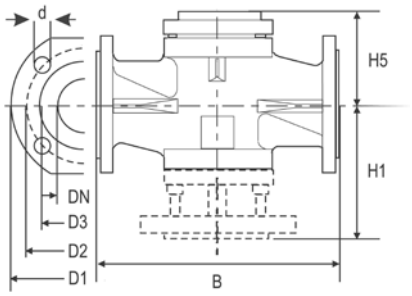
These flanged valves are primarily designed to regulate the flow of water and steam in response to the demand of a controller, in heating, ventilating and air conditioning systems.

A variety of electric and pneumatic actuators are available.



Features

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



Dimensions in mm

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

Plant Valves
VG8000H

2-way PDTC (Normally Open) Configuration

Ordering Codes*	Body Size	Kvs	Close-off Pressure kPa							
			FA-2000-741x 2200 N	FA-2000-751x 2400 N	FA-3300-741x 6000 N	RA-3000-732x 3000 N	RA-3100-8226 1700 N	VA1x20** 2000 N	VA1125** 500 N	VA78xx 1000 N
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.

Plant Valves
VG8000H

3-way Mixing Configuration

Ordering Codes*	Body Size	Kvs	Close-off Pressure kPa							
			FA-2000-741x 2200 N	FA-2000-751x 2400 N	FA-3300-741x 6000 N	RA-3000-732x 3000 N	RA-3100-8226 1700 N	VA1x20** 2000 N	VA1125** 500 N	VA78xx 1000 N
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.

Plant Valves
VG8000H

3-way Diverting Configuration

Ordering Codes*	Body Size	Kvs	Close-off Pressure kPa							
			FA-2000-741x 2200 N	FA-2000-751x 2400 N	FA-3300-741x 6000 N	RA-3000-732x 3000 N	RA-3100-8226 1700 N	VA1x20** 2000 N	VA1125** 500 N	VA78xx 1000 N
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						1550	2000	370
VG89F1S1H	DN50	40		920		1300	600	750	1020	---
VG89G1S1H	DN65	63		710		1010	450	580	750	
VG89H1S1H	DN80	100		330		480	200	260	370	
VG89J1S1H	DN100	160	180	---	720	290	100	140	210	
VG89K1S1H	DN125	250	100		450	170	---	80	120	
VG89L1S1H	DN150	350	50		270	100		40	70	

Notes

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

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

Plant Valves

VG8300N

DN40...150, PN16 Pressure Balanced

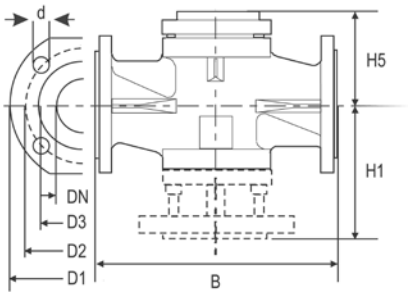
These pressure balanced flanged valves are primarily designed to regulate the flow of water and steam in response to the demand of a controller, in heating, ventilating and air conditioning systems.

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

Notes

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

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

Plant Valves

VG1000 Flanged

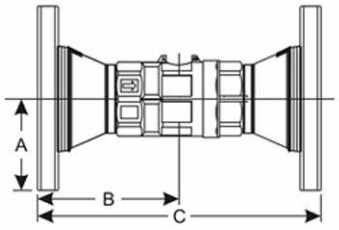
DN65...100, PN16

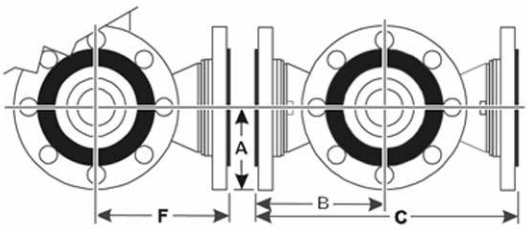
The VG1000 series control ball valves are used for the water control of air treatment systems in ventilation and air conditioning units as well as heating system.

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	156	4	17.5	M16x60
DN80	100	155	310	180	8	17.5	M16x65
DN100	110	175	350	225	8	17.5	M16x70

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) **+ 550HGA** (Spring Closes)	**+ 530HGC** (Spring Opens) **+ 550HGC** (Spring Closes)

Ordering Codes

Valve Code	Body Size	Kvs (Control Port)	Kvs (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	•	•	•	•

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) **+550AGA** (Spring Closes)	**+530AGC** (Spring Opens) **+550AGC** (Spring Closes)	**+530BGA** (Spring Opens) **+550BGA** (Spring Closes)	**+530BGC** (Spring Opens) **+550BGC** (Spring Closes)	**+530BDA** (Spring Opens) **+550BDA** (Spring Closes)	**+530BDC (Spring Opens)** **+550BDC** (Spring Closes)

Ordering Codes

Valve code	Body size	Kvs (Control Port)	Kvs (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	•	•	•	•	•	•	•	•	•	•

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.

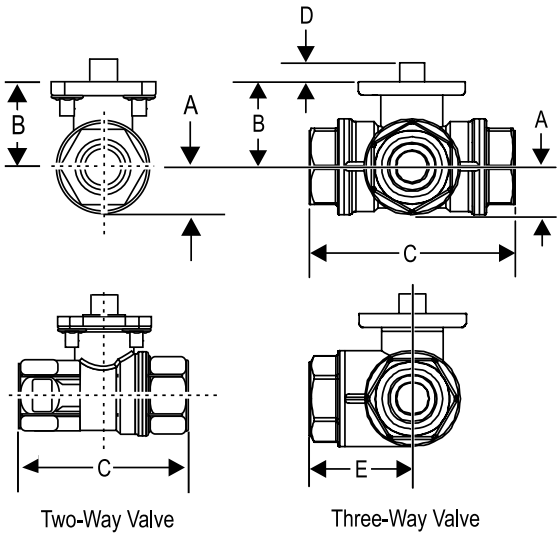
They are operated by direct or remote mounted Spring Return and Non Spring Return actuators.

Features

- Forged brass body
- Kvs 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



Two-Way Valve Three-Way Valve

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

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	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		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

Plant Valves
VG1000 Threaded

Assemblies of valves with FLOATING and ON/OFF ACTUATORS

Spring Return Function	---					•			
Supply Voltage	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**	**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	**+5A4IGA +6A4IGA***	**+5A8AGA**	**+5A8AGC**	**+5A8ADA**	**+5A8ADC**	**Spring Opens Configuration**			
						+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	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		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

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		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

Terminal Unit Valve Actuators

VA-7030

ON/OFF Control

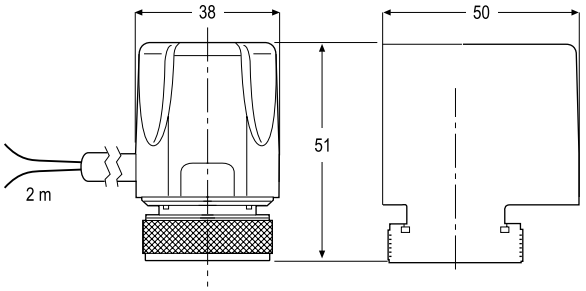
The VA-703x electrothermic actuator provides a two position (open/closed) control in HVAC applications.

The compact design of this actuator makes it suitable for installation in confined spaces, such as fan coil applications.

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

Features

- 24 VAC/VDC and 230 VAC power supply
- ON/OFF or DAT Control
- Models for Direct Action and Models for Reverse Action
- Threaded mounting nut M30 x 1.5
- Factory mounted cable 2 m



Dimensions in mm

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Force	Stroke	Full Stroke Time*	Protection Class	Power Consumption	
							Continuous	Start-up
VA-7030-21NO	24 VAC / VDC	ON/OFF Stem extends when energized	80 N	3.5 mm	5 min	IP44	2.5 W	6 W
VA-7030-21NC		ON/OFF Stem retracts when energized	100 N					
VA-7030-23NO	230 VAC	ON/OFF Stem extends when energized	80 N		3 min		2.5 W	95 W
VA-7030-23NC		ON/OFF Stem retracts when energized	100 N					

Note
***** At ambient temperature 20 °C

Terminal Unit Valve Actuators

VA-7070

ON/OFF Control

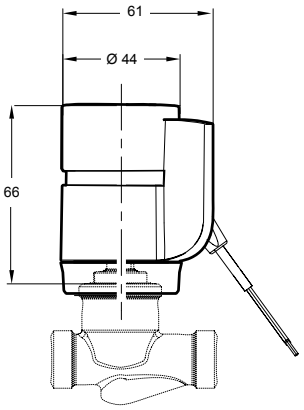
The VA-707x series terminal unit valve actuators provide ON/OFF and DAT control in HAVC application.

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

The VA-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

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-7071-01D	24 VAC/VDC				**Normally Closed** (stem retracts when energized) Cable not included. Must be ordered separately	M28x1.5		Bulk pack 50 pcs	3 W	6 W (220 mA) max
VA-7078-01D						M30x1.5				
VA-7071-03D	230 VAC					M28x1.5			2.5 W	36 W (150 mA) max
VA-7078-03D						M30x1.5				
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-7070-01D	24 VAC/VDC				**Normally Open** (stem extends when energized) Cable not included. Must be ordered separately	M28x1.5		Bulk pack 50 pcs	3 W	6 W (220 mA) max
VA-7077-01D						M30x1.5				
VA-7070-03D	230 VAC					M28x1.5			2.5 W	36 W (150 mA) max
VA-7077-03D						M30x1.5				

Terminal Unit Valve Actuators
VA-7070

Accessories (order separately)

Ordering Codes	Description	Single Packaged
0550602801	Cable kit 0.8 m	Carton Box
0550602011	Cable kit 1 m	
0550602021	Cable kit 2 m	
0550602032	Cable kit 3 m	Plastic Bag
0550602042	Cable kit 4 m	
0550602052	Cable kit 5 m	
0550602062	Cable kit 6 m	
0550602072	Cable kit 7 m	
0550602102	Cable kit 10 m	
0550602152	Cable kit 15 m	
0550602023	Cable kit 2 m – Halogen free	
0550602053	Cable kit 5 m – Halogen free	
0550602103	Cable kit 10 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	
0550484111	Kit auxiliary switch (Normally Closed) 1 m cable	Carton Box
0550484121	Kit auxiliary switch (Normally Closed) 2 m cable	Plastic Bag
0550484211	Kit auxiliary switch (Normally Open) 1 m cable	Carton Box
0550484221	Kit auxiliary switch (Normally Open) 2 m cable	Plastic Bag

Terminal Unit Valve Actuators

VA-7090

0...10 V Control

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

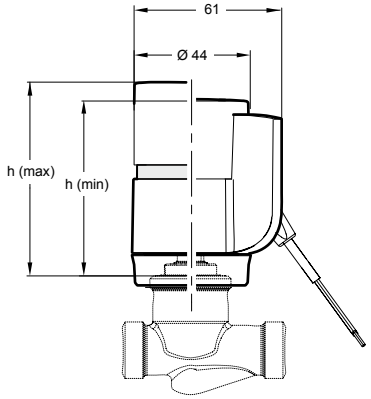
The compact design of these actuators make them suitable for installations in confined spaces, such as fan-coil applications.

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 energized)
- Easy mounting solution
- Factory mounted cable 2 m



Dimensions in mm

	h (max)	h (min)
Normally Closed	66	59
Normally Open	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 separatel)

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	

Terminal Unit Valves Actuators

VA-7480

Floating and Proportional Control

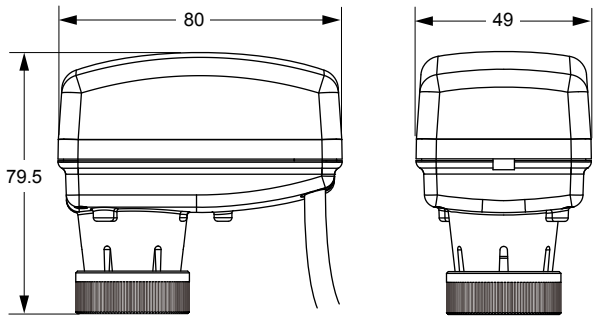
The VA-748x series provides floating or proportional control in HVAC applications. The compact design of this actuator makes it suitable for installation in confined spaces, such as fan coil, chilled ceiling, manifolds, etc.

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
- Factory mounted cable 1.5 m
- Self calibrating
- Configurable to direct and reverse action
- Configurable analog inputs
- Actuator stroke: 6.3 mm



Dimensions in mm

Ordering Codes	Power Supply	Control Type	Factory Electrical Stroke Setting	Nominal Force	Mounting Thread Nut Connection	Actuator Speed	Protection Class	Power Consumption	Upper Mechanical End Stroke
VA-7480-0011	24 VAC	Floating	---	120 N	M28x1,5	13 sec/mm	IP43	2.5 VA	16.3 mm
VA-7481-0011						8 sec/mm			
VA-7480-0013	230 VAC					13 sec/mm		6.5 VA	
VA-7481-0013						8 sec/mm			
VA-7482-0011	24 VAC/VDC	Proportional				8 sec/mm		2.5 VA	
VA-7480-0001	24 VAC	Floating			M30x1,5	13 sec/mm		2.5 VA	
VA-7481-0001						8 sec/mm			
VA-7480-0003	230 VAC					13 sec/mm		6.5 VA	
VA-7481-0003						8 sec/mm			
VA-7482-1001	24 VAC/VDC	Proportional	3.2 mm					2.5 VA	
VA-7482-2001			4.3 mm						
VA-7482-3001			6.0 mm						
VA-7480-4001	24 VAC	Floating	---			13 sec/mm			14.5 mm
VA-7480-4003	230 VAC							6.5 VA	
VA-7482-5001	24 VAC/VDC	Proportional	2.8 mm			8 sec/mm		2.5 VA	
VA-7482-6001			5.3 mm						
VA-7482-7001			5.8 mm						

Non Spring Return Plant Valve Actuators

VA-7150

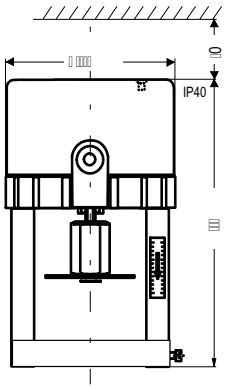
Floating and Proportional Controls

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

Non Spring Return Plant Valve Actuators

VA-7200

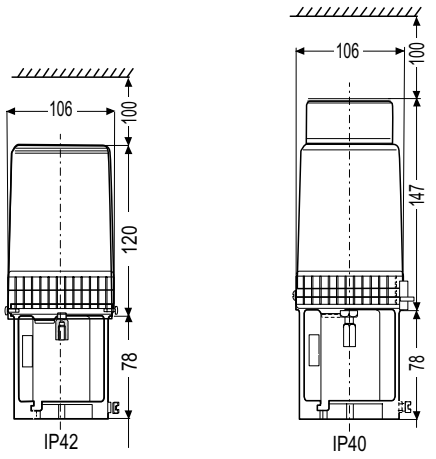
Floating and Proportional Controls

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		

Non Spring Return Plant Valve Actuators

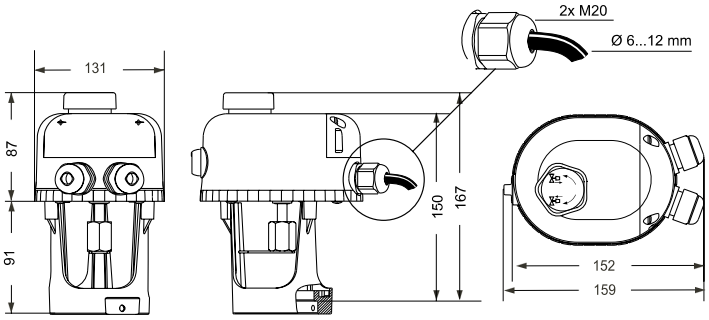
VA-7700

Floating and Proportional Controls

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

Features

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



Dimensions in mm

Mounting onto VG7000 Series Valves

Ordering Codes	Supply Voltage (50/60Hz)	Action Control	Force	Stroke	Full Stroke Time	Protection Class	Power Consumption
VA-7700-1001	24 VAC	Floating	500 N	20 mm	190 s	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							

Non Spring Return Plant Valve Actuators

VA7810

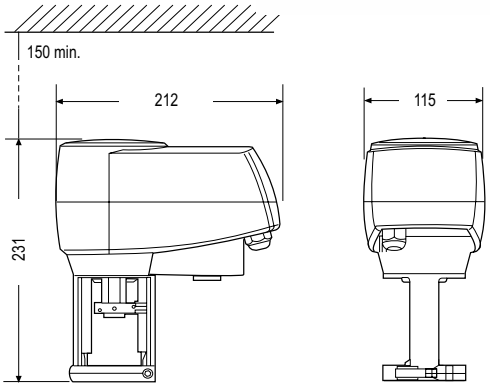
Floating and Proportional Control

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 kΩ 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-11	230 VAC	ON/OFF or Floating	1000 N	25 mm	150 s	IP 54	8 VA	---	---
VA-7810-ADC-11									2 aux switches
VA-7810-AGA-11	24 VAC						3 VA		---
VA-7810-AGC-11									2 aux switches
VA-7810-AGH-11									2 KΩ pot
VA-7810-GGA-11		ON/OFF, Floating or Proportional			150 s (selectable 75 s)		6 VA		---
VA-7810-GGC-11									2 aux switches

Note
*** : xx = 11** Actuator with threaded coupler for VG1000 Valves
12 Actuator with clamp coupler for VG8000, VG9000, VGS800 Valves

Non Spring Return Plant Valve Actuators

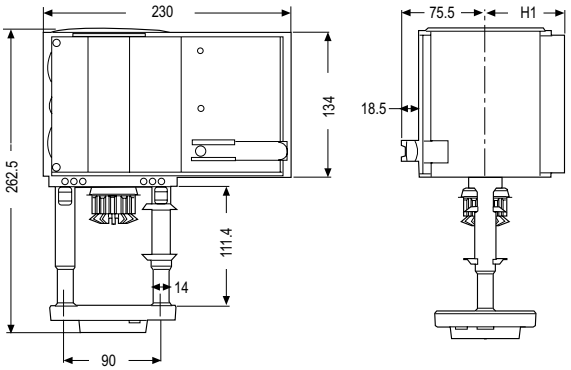
VA1000

Floating and Proportional Controls

The VA1000 valve actuators are used to control valves in HVAC systems. They are of modular construction so that the required type of control signal is achieved simply by fitting a module with the required function in-situ. It can be mounted onto VG8000, 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 in-situ installation

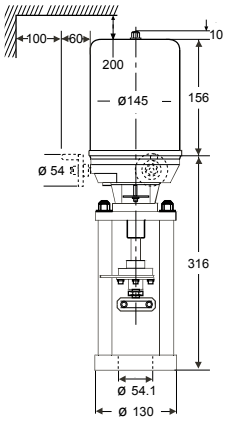
VA1000-M230N	AC 230V module
VA1000-M100N	AC 100V module
VA1000-P2	2 KΩ feedback potentiometer
VA1000-S2	2 SPDT aux. switches
VA1000-SRU	Split range unit module for proportional actuators only
VA1000-EP	Extension kit for applications with temperatures greater than 140°C up to 200°C

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.



Dimensions in mm

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

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								135 Ω pot
FA-3341-7416		Proportional					42 VA	2 aux switches
FA-3300-7411	230 VAC	Floating					37 VA	---
FA-3303-7411								2 aux switches and 2 KΩ pot
FA-3304-7411								135 Ω pot

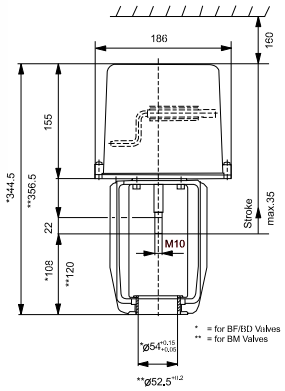
Non Spring Return Plant Valve Actuators

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	IP 54
RA-31xx-7126	•				
RA-30xx-7127	---		230 V, 50/60 Hz		
RA-31xx-7127	•				
RA-30xx-7226	---	1800 N	24 V, 50/60 Hz	25 mm	
RA-31xx-7226	•				
RA-30xx-7227	---		230 V, 50/60 Hz		
RA-31xx-7227	•				
RA-30xx-7325	---	3000 N	24 V, 60 Hz	42 mm	
RA-31xx-7325	•				
RA-30xx-7326	---		24 V, 50 Hz		
RA-31xx-7326	•				
RA-30xx-7327	---		230 V, 50 Hz		
RA-31xx-7327	•				
RA-30xx-7328	---		230 V, 60 Hz		
RA-31xx-7328	•				

Note

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

Non Spring Return Plant Valve Actuators

VA9104-xGA-1S

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

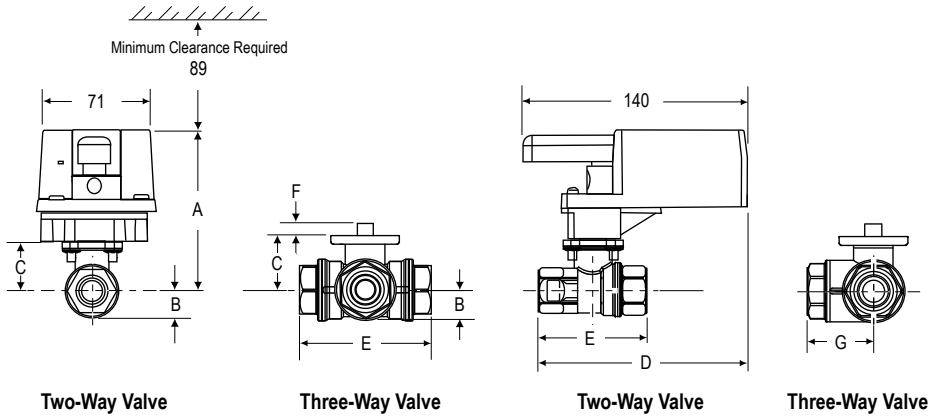
4 Nm, ON/OFF, Floating and Proportional Control

The electric Actuator series have been developped 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 runnin time
- Up to 5 actuators in parallel operation possible
- Manual release button
- 1.2 m PVC cable
- Selectable direction of rotation
- Automathic shut-off at end position



Two-Way Valve | Three-Way Valve | Two-Way Valve | Three-Way Valve

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-IGA-1S	BAD1	72 s	ON/OFF and Floating with Timeout	24 VAC
VA9104-GGA-1S	BMD1.2		Proportional 0(2)...10 VDC 0(4)...20 mA	

Non Spring Return Plant Valve Actuators

M9108-xxx-5

(Joventa BAS1 / BAS2 / BMS1.1)

8 Nm, ON/OFF, Floating and Proportional Control

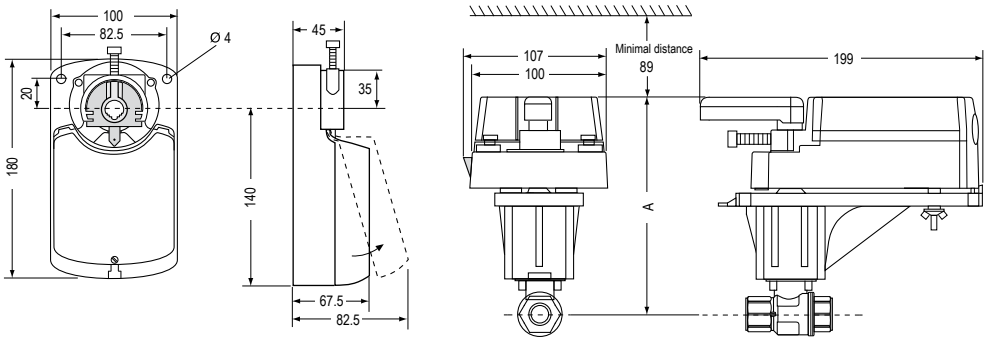
The M9108-xxx-5 electric actuator series have been developed for operating VG1000 series ball valves.

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

Features

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

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



Dimensions in mm

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

Spring Return Plant Valve Actuators

VA7820 and VA7830

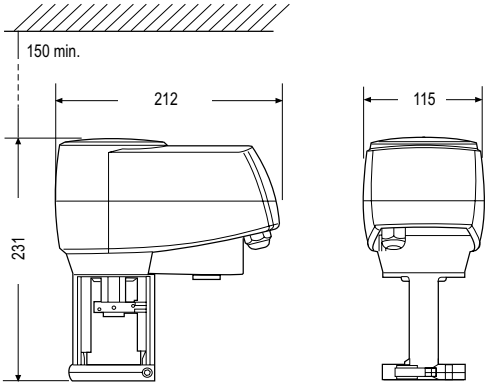
Floating and Proportional Controls

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

Spring Return Plant Valve Actuators

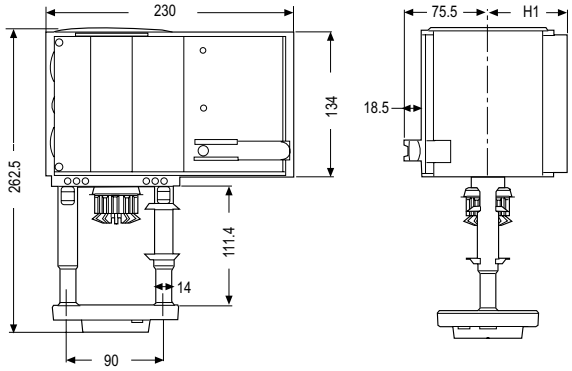
VA1000

Floating and Proportional Controls

The VA1000 valve actuators are used to control valves in HVAC systems. They are of modular construction so that the required type of control signal is achieved simply by fitting a module with the required function in-situ. It can be mounted onto VG8000, 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

VA1000-M230N	AC 230V module
VA1000-M100N	AC 100V module
VA1000-P2	2 KΩ feedback potentiometer
VA1000-S2	2 SPDT aux. switches
VA1000-SRU	Split range unit module for proportional actuators only
VA1000-EP	Extension kit for applications with temperatures greater than 140°C up to 200°C

Spring Return Plant Valve Actuators

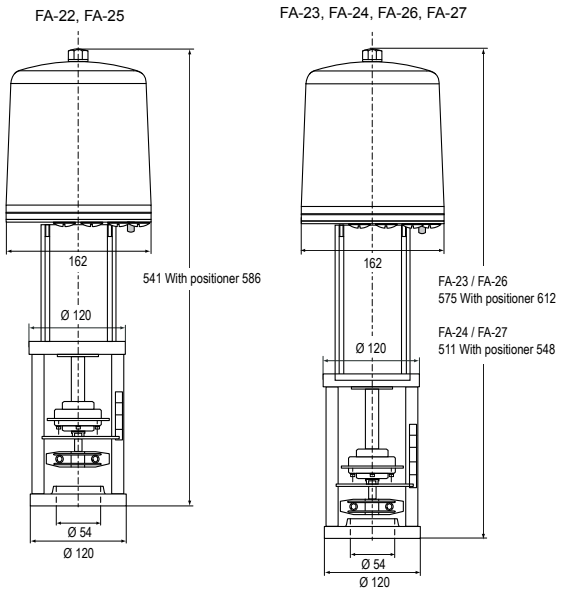
FA-2000

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

Note

* **xx =** **00** None
01 2 Auxiliary switches
02 2 KΩ feedback potentiometer
03 2 KΩ feedback potentiometer and 2 auxiliary switches
04 135 Ω feedback potentiometer
40 Built-in electronic positioner 0...10 V / 0(4)...20 mA
41 Built-in electronic positioner 0...10 V / 0(4)...20 mA and 2 auxiliary switches

Spring Return Plant Valve Actuators

VA9203

(Joventa BxFx.03SZ)

3 Nm, ON/OFF, Floating and Proportional Control

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.

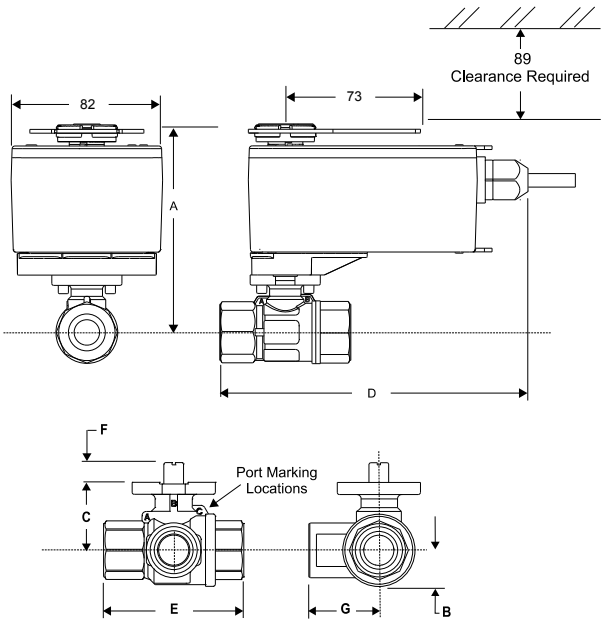
The series includes the following control options:

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.

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

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.

Spring Return Plant Valve Actuators
VA9203
(Joventa BxFx.03SZ)

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

Spring Return Plant Valve Actuators

VA9208

(Joventa BxFx.08S)

8 Nm, ON/OFF, Floating and Proportional Control

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

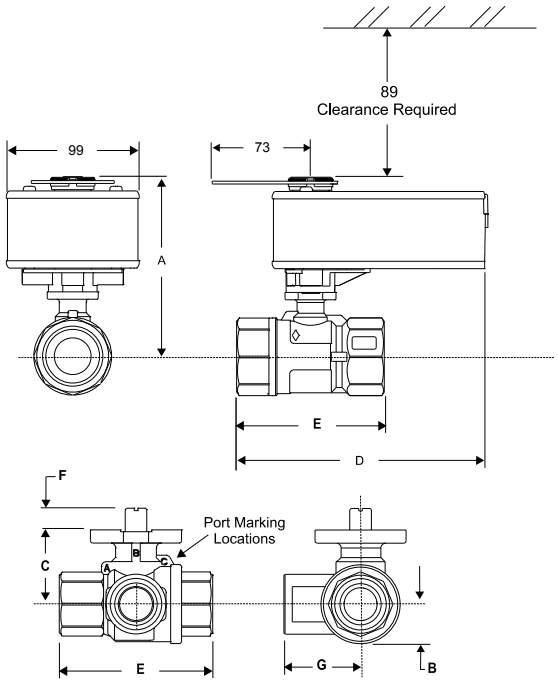
ON/OFF and Floating Point, 24 V AC/DC power

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

VA9208 mounted on VG1000

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.



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

Spring Return Plant Valve Actuators
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)

Non Spring Return Damper Actuators

M910x-xGA-xS

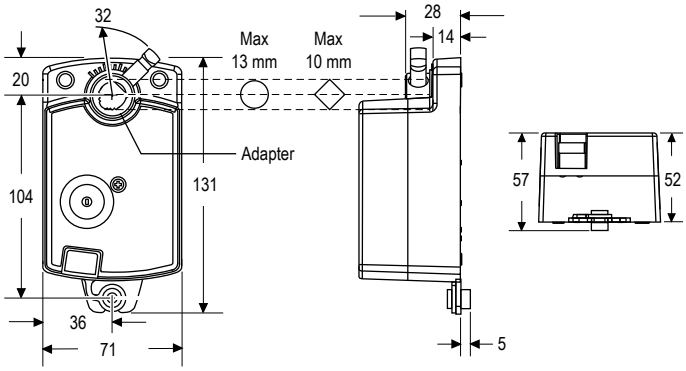
(Joventa DAB / DAD / DMD)

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 Ø 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 m²	Floating without timeout	AC 24 V	PVC-cable
M9102-AGA-5S	DAB1.4C						Terminal block
M9102-IGA-1S	DAB1				ON/OFF and Floating with timeout		PVC-cable
M9102-IGA-5S	DAB1C						Terminal block
M9104-AGA-1S	DAD1.4	4 Nm	72 s	0.8 m²	Floating without timeout		PVC-cable
M9104-AGA-5S	DAD1.4C						Terminal block
M9104-IGA-1S	DAD1				ON/OFF and Floating with timeout		PVC-cable
M9104-IGA-5S	DAD1C						Terminal block
M9104-GGA-1S	DMD1.2				Proportional 0...10 VDC		PVC-cable
M9104-GGA-5S	DMD1.2C						Terminal block

Non Spring Return Damper Actuators

M9304-xxx-1N

(Joventa DAN / DAN2 / DMN)

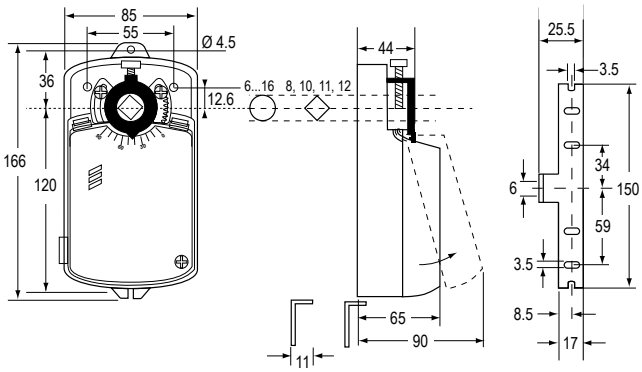
4 Nm, ON/OFF, Floating and Proportional Control

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 m²	ON/OFF and Floating	---	24 VAC/DC
M9304-AGC-1N	DAN1.SN					•	
M9304-ADA-1N	DAN2N					---	230 VAC
M9304-ADC-1N	DAN2.SN					•	
M9304-AKA-1N	DAN5N					---	48 VDC
M9304-AKC-1N	DAN5.SN					•	
M9304-BDA-1N	DAN2.C					---	230 VAC
M9304-BDC-1N	DAN2.SC					•	
M9304-GGA-1N	DMN1.2N				DC 1...10 V	---	24 VAC/DC
M9304-GKA-1N	DMN5.2N					---	48 VAC/DC

Note

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

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

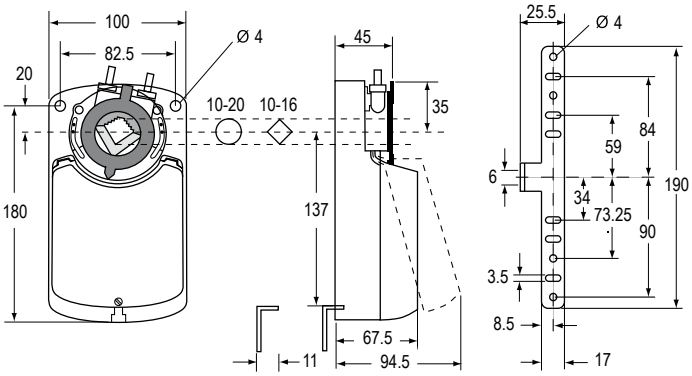
The M9100 Series Electric Actuators are direct-mount actuators. These bidirectional actuators do not require a damper linkage, and are easily installed on round shafts or square shafts using the standard shaft clamp included with the actuator.

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

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)

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 Potentiiometer	Supply Voltage (50/60Hz)
Johnson Controls	Joventa*						
24 Nm							
M9124-AGA-1N	DAL1	125 s	4.5 m²	ON/OFF and Floating	---	---	24 VAC/DC
M9124-AGC-1N	DAL1.S				•	---	
M9124-AGE-1N	DAL1.P1				---	1 KOhm	
M9124-AGD-1N	DAL1.P2				---	140 Ohm	
M9124-AGF-1N	DAL1.P4				---	2 KOhm	
M9124-ADA-1N	DAL2				---	---	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 m²	ON/OFF and Floating	---	---	24 VAC/DC
M9132-AGC-1N	DAG1.S				•	---	
M9132-AGE-1N	DAG1.P1				---	1 KOhm	
M9132-AGD-1N	DAG1.P2				---	140 Ohm	
M9132-AGF-1N	DAG1.P4				---	2 KOhm	
M9132-ADA-1N	DAG2				---	---	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)

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:

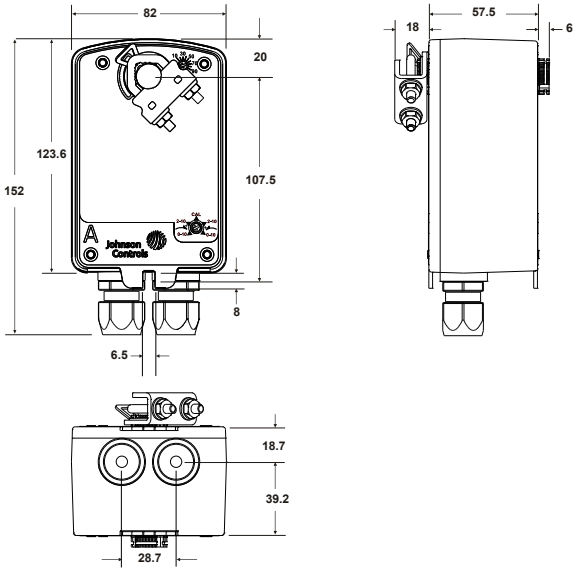
ON/OFF, 24 V, 100 to 240 VAC power

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

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)

Spring Return Damper Actuators

M9208-xxx-1

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

8 Nm, 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.

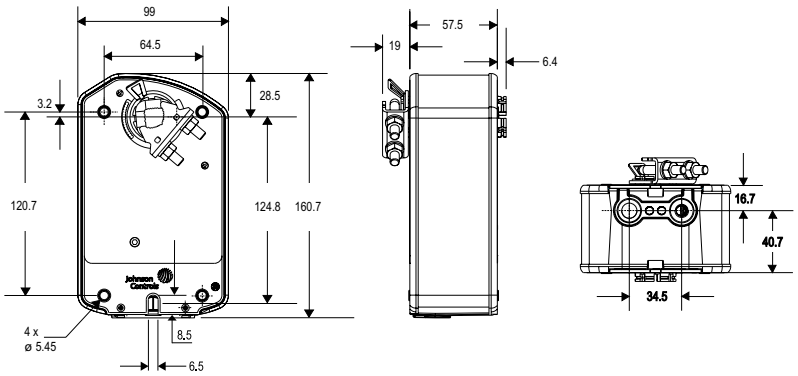
When the control signal is applied the actuator drives the damper to the operational position, while evenly tensioning the integrated spring. After a power failure the stored energy in the spring immediately brings the damper to the safety position.

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					•	
M9208-BGA-1	DAF1.08N		55...71 s	13...26 s	ON/OFF	---	24 VAC
M9208-BGC-1	DAF1.08SN					•	
M9208-BDA-1	DAF2.08N		55...71 s			---	230 VAC
M9208-BDC-1	DAF2.08SN					•	
M9208-GGA-1	DMF1.08N		150 s	17...25 s	Proportional 0...10 VDC 2...10 VDC	---	24 VAC / 24 VDC
M9208-GGC-1	DMF1.08SN					•	

Spring Return Damper Actuators

M9220-xxx-1

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

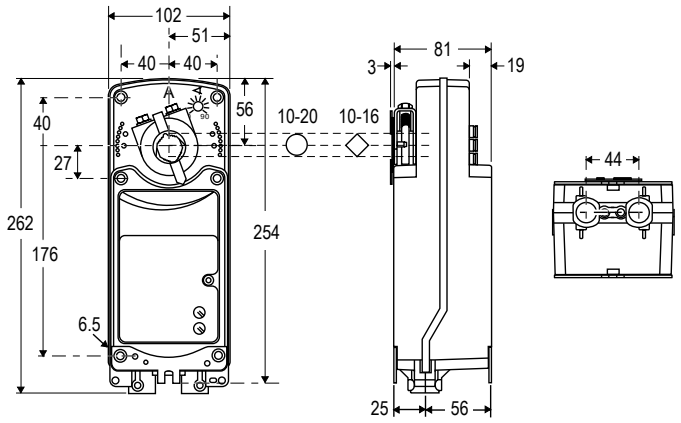
20 Nm, ON/OFF, Floating and Proportional Control

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						---	AC/DC 24 V
M9220-BGC-1	DAF1.20S						•	
M9220-GGA-1	DMF1.20		150 s	26 s		Proportional 0(2)...10 VDC	---	
M9220-GGC-1	DMF1.20S						•	
M9220-HGA-1	DHF1.20					Proportional 0(2)...10 VDC with Span offset	---	
M9220-HGC-1	DHF1.20S						•	

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.

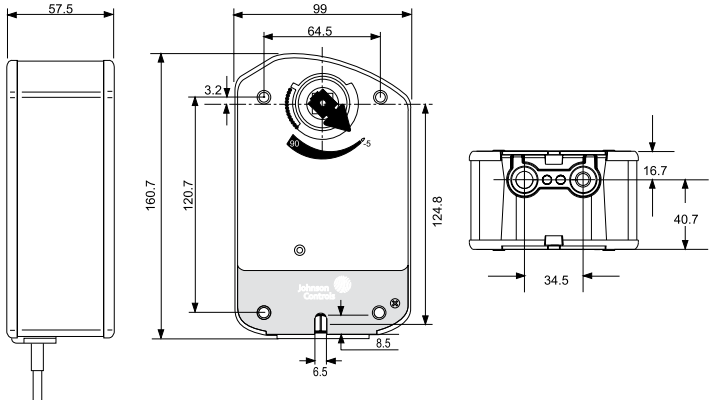
When the control signal is applied the actuator drives the damper to the operational position, while evenly tensioning the integrated spring.

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

Pneumatic Valve Actuators

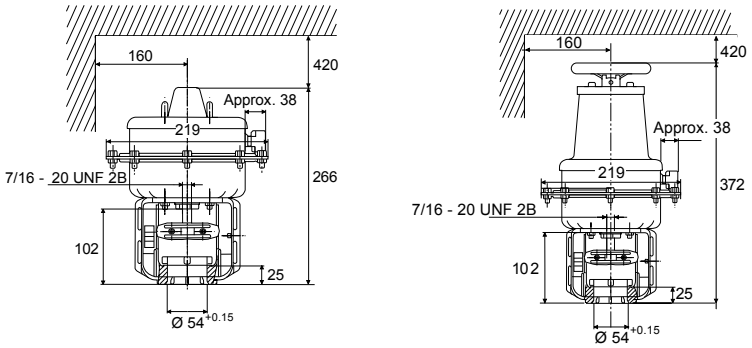
MP8000

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
MP822C50-20	None
MP822C60-20	DA positioner
MP822C70-20	DA positioner and hand wheel
MP822C80-20	Hand wheel
MP832C50-20	None
MP832C60-20	DA positioner
MP832C70-20	DA positioner and hand wheel
MP832C80-20	Hand wheel

Pneumatic Valve Actuators

PA-2000

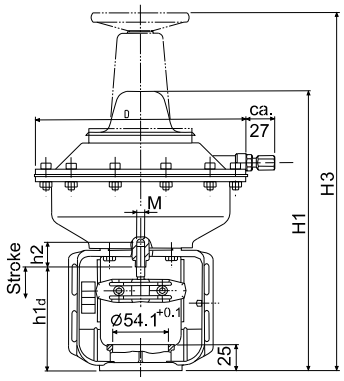
The PA-2000 Pneumatic Valve Actuators Series is available for ON/OFF Control.

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



Dimensions in mm

Ordering Codes*	Handwheel	Spring Range	Diaphram Area	Stroke
PA-20x0-32y2	---	20 - 50 kPa	150 cm²	13 mm
PA-21x0-32y7	•	70 - 100 kPa		
PA-20x0-33y2	---	20 - 50 kPa	300 cm²	25 mm
PA-21x0-33y7	•	70 - 100 kPa		
PA-20x0-36y2	---	20 - 50 kPa	600 cm²	42 mm
PA-21x0-36y7	•	70 - 100 kPa		
PA-20x0-37y2	---	20 - 50 kPa		25 mm
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

Carbon Dioxide

CD-Pxx

Duct Mount

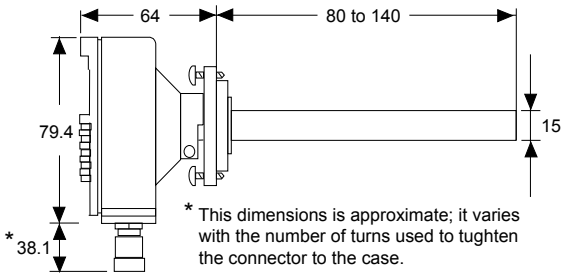
The CD-Pxx series duct mount CO_2 sensors feature a carbon Dioxide (CO_2) transmitter for measuring and transmitting CO_2 levels, ranging from 0 to 2,000 parts per million (ppm), within Heating Ventilating and Air Conditioning (HVAC) CO_2 applications.

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

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: ± 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_2 transmitter
CD-PR0-00-0	Duct mount CO_2 transmitter with relay

Replacement Parts

Ordering Codes	Description
ACC-CD-R	Relay output module for use in CD-P00-00-0 or CD-PR0-00-0
ACC-CD-CFK1	Conduit adaptor kit

Accessories

Ordering Codes	Description
ACC-CD-S	Relay setpoint software kit; includes software and interface cable to reset the on and off relay setpoints for CD-PR0-00-0

Carbon Dioxide

CD-W00

Wall Mount

The CD-W00 series wall mount CO_2 sensors feature a carbon dioxide (CO_2) transmitter for measuring and transmitting CO_2 levels, ranging from 0 to 2,000 parts per million (ppm), within heating ventilating, and air conditioning (HVAC) CO_2 applications.

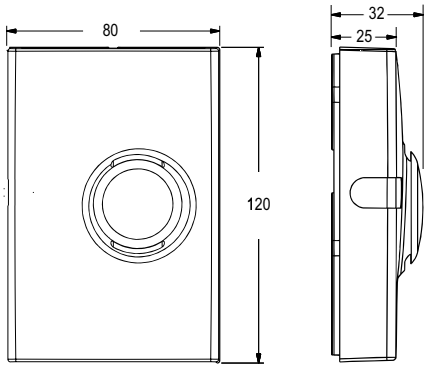
Specific HVAC CO_2 applications include Demand Control Ventilation (DCV), fresh air and Indoor Air Quality (IAQ), and rooftop air handling economizer controls system.

This compact devices produces 0 to 10 V (default), 0 to 20 mA and 4 to 20 mA signals.

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

Features

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



Dimensions in mm

Ordering Codes	Description
CD-W00-00-1	Wall mount CO_2 transmitter

Accessories

Ordering Codes	Description
ACC-DWCLIP-0	Drywall spring-clip mounting kit

Carbon Dioxide

CD-WAx and CD-WRx

Wall Mount

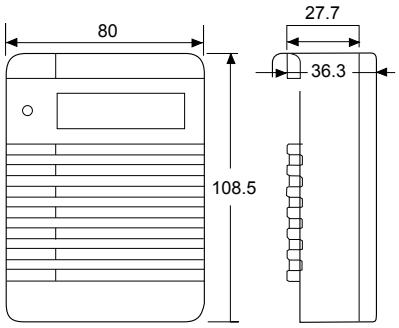
The CD-WAx and CD-WRx series wall mount CO_2 sensors feature a carbon dioxide (CO_2) transmitter for measuring and transmitting CO_2 levels, ranging from 0 to 2,000 parts per million (ppm), within Heating Ventilating and Air Conditioning (HVAC) CO_2 applications.

Specific HVAC CO_2 applications include Demand Control Ventilation (DCV), fresh air and indoor Air Quality (IAQ), and rooftop air handling Economizer controls system. This compact devices produces 0 to 10 V (default), 0 to 20 mA and 4 to 20 mA signals.

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

Features

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



Dimensions in mm

Ordering Codes	Description
CD-WA0-00-0	Transmitter with analog temperature output
CD-WR0-00-0	Transmitter with relay
CD-WRD-00-0	Transmitter with relay and display

Replacement Parts

Ordering Codes	Description
ACC-CD-A	Analog temperature module for CD-WA0-00-0 only
ACC-DWCLIP-0	Drywall spring-clip mounting kit
ACC-CD-DR	Replacement relay and display module for CD-WRD-00-0 only
ACC-CD-R	Relay output module for CD-WR0-00-0

Accessories

Ordering Codes	Description
ACC-CD-S	Relay setpoint software kit; includes software and interface cable to reset the on and off relay setpoints for CD-WR0-00-0 or CD-WRD-00-0

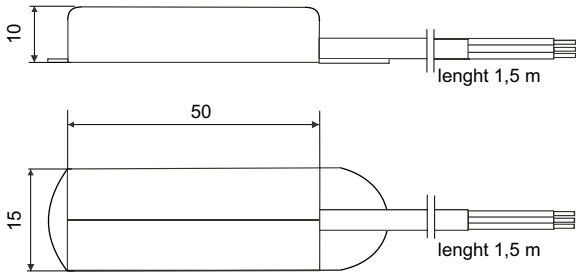
Dew Point
HX-9100

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



Dimensions in mm

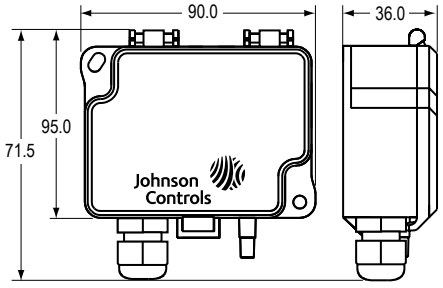
Ordering Codes	Action	Output at Condensation	Power Supply
HX-9100-8001	ON/OFF	Open collector closed, 0.5 VDC max	15 VDC ±10%
HX-9100-9001	0...10 VDC	≤ +0.5 VDC	

Differential Pressure
DP2500 and 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		0...25 0...50 0...100 0...250 -25...+25 -50...+50 -100...+100 -150...+150		---				
DP0250-R8-AZ-01	Bulk			•				
DP0250-R8-AZ-D	Single		•	---				
DP0250-R8-AZS				•				•
DP0250-R8-AZ-DS				---				

Plant Humidity

HT-9000

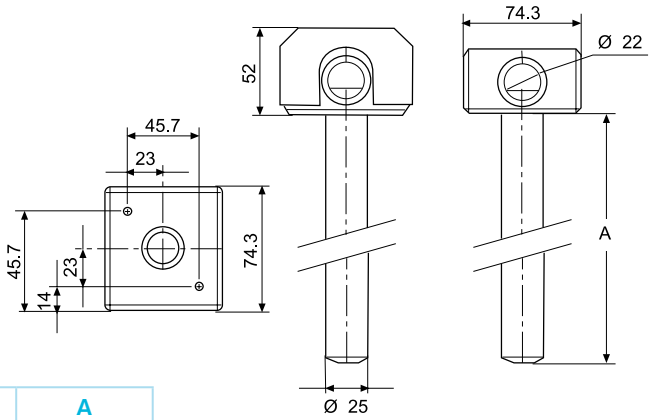
Duct Mount

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

This range also includes models with an integrated temperature sensing elements.

Features

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



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

Dimensions in mm

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

Plant Temperature

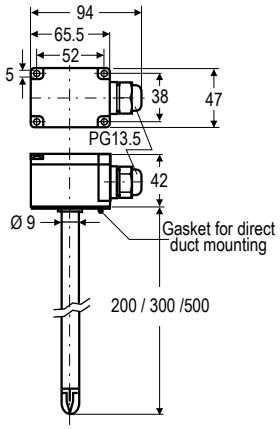
TE-9100 and TS-9100

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

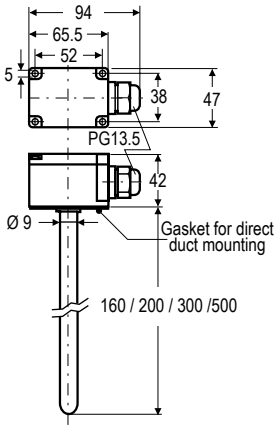
They provide either a 0...10 VDC signal directly proportional to the sensed temperature, or a passive resistive NTC, Pt1000 or Pt100 signal.

Features

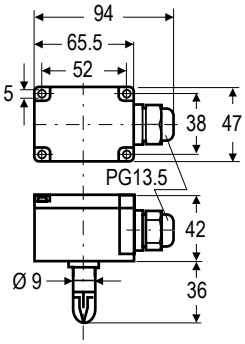
- Wide range of enclosures and signal outputs
- For immersion applications, well can be mounted before rod sensor is mounted
- Various lengths of tubes and wells for duct and immersion applications
- IP54 enclosure



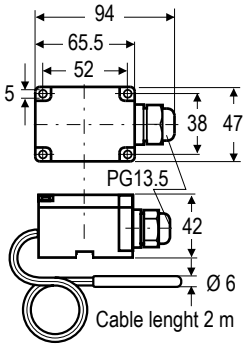
Rod fast response sensor



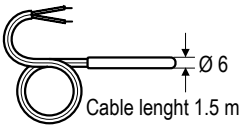
Rod sensor



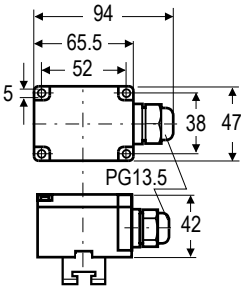
Ceiling sensor
TS-910x-870x



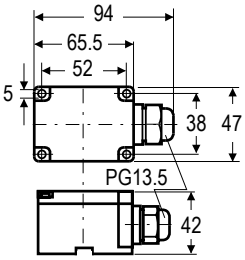
Remote sensor
TS-9101-810x



Cable sensor
TE-910x-850x



Strap-on sensor
TS-910x-860x



Outdoor Sensor
TS-910x-840x

Dimensions in mm

Plant Temperature
TE-9100 and TS-9100

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

Plant Temperature
TE-9100 and TS-9100

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

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

Plant Temperature
TE-9100 and TS-9100

Accessories (order separately)

Ordering Codes	Description
TS-9100-8950	Duct mounting flange

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

Pressure

PT-5217

Transmitter

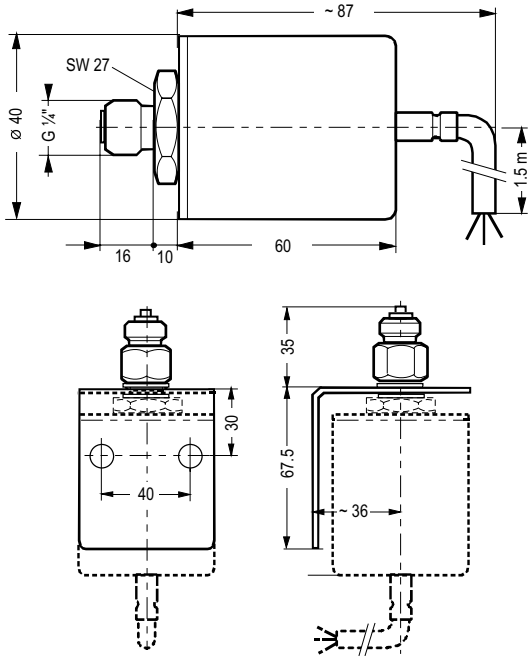
The PT-5217 pressure transmitter accurately measures pressure and converts the measurement into a 0...10 V signal.

The PT-5215 is especially adapted to measure air, water and inert gases pressure.

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

Features

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



Dimensions in mm

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

Accessories (order separately)

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

Room Humidity

HT-1000

Wall Mount

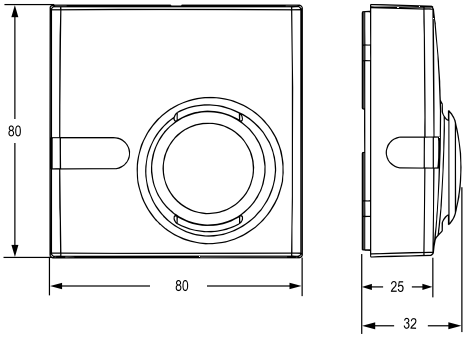
The HT-1000 series room humidity sensors provide active sensing of relative humidity and on specific models, also active/passive sensing of temperature in HVAC applications.

It features a polymer capacitance humidity sensing element and provides within either ±2% or ±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	±2%	0...40°C	0...10 VDC	12 to 30 VDC 24 VAC ±15%
HT-1300-UR			±4%	---	---	
HT-1301-UR				0...40°C	0...10 VDC	
HT-1303-UR					NTC K2	
HT-1306-UR				0...60°C	Pt1000	

Room Temperature

RS-1100

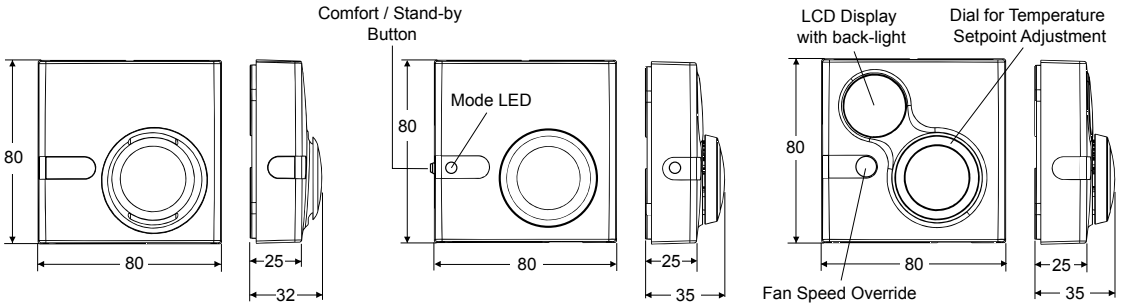
Room Command Module

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



Dimensions in mm

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

Accessories (order separately)

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

Room Temperature

TE-7000

Room Command Module

The TE-7000 room command module is designed for use with the VMA1400 series VAV Modular Assembly.

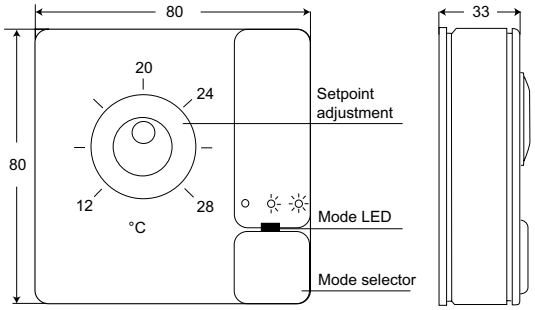
The module has an NTC temperature sensor, a dial for setpoint adjustment within the range of 12 to 28°C or -3 to +3K, and an occupancy button with an LED indicator.

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
TE-7000-8002	Off-White / Gray Base	12 to 28 °C
TE-7000-8002-W	White / White Base	
TE-7000-8003	Off-White / Gray Base	-3 to +3 K
TE-7000-8003-W	White / White Base	

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

Accessories (order separately)

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

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.

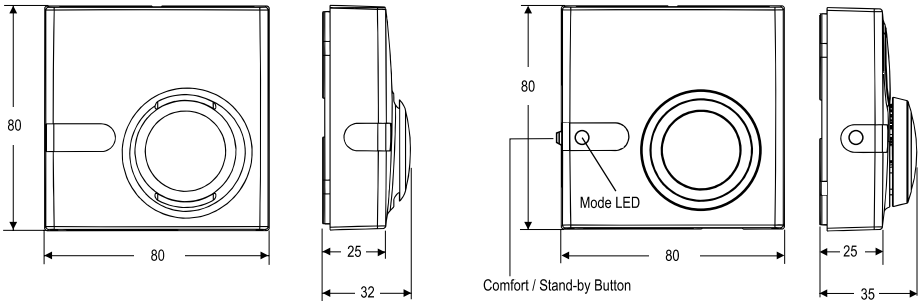
The setpoint dial enables the room occupant to adjust the working set point of the controller within the range of 12...28 °C or -3...+3°, according to the model number.

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

Accessories (order separately)

Ordering Codes	Description
TM-1100-8931	Plastic base for surface mount
TE-9100-8501	Unit Mount NTC K2 Temperature Sensor (1.5 m Cable)
TM-9100-8900	Special Tool for opening enclosure

Room Temperature

TM-2100

Room Command Module

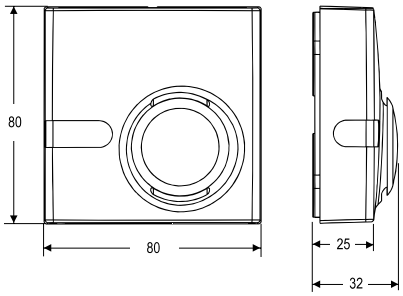
The TM-2100 series of room command modules are designed for use with the FCC and Facility Explorer series of DDC terminal unit controllers. The setpoint dial enables the room occupant to adjust the working set point of the controller within the range of 12...28 °C or -3...+3°, according to the model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

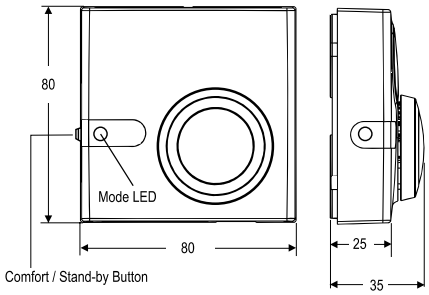
A LED indicator shows the current operating mode.
A Room Command Module with a 3-speed fan override adjuster is available.

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

Room Temperature

TM-3100

Room Command Module

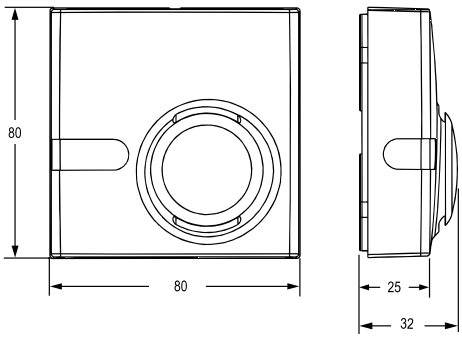
The TM-3100 series room temperature sensor provide passive sensing of temperature in HVAC application.

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

Room Temperature

NS

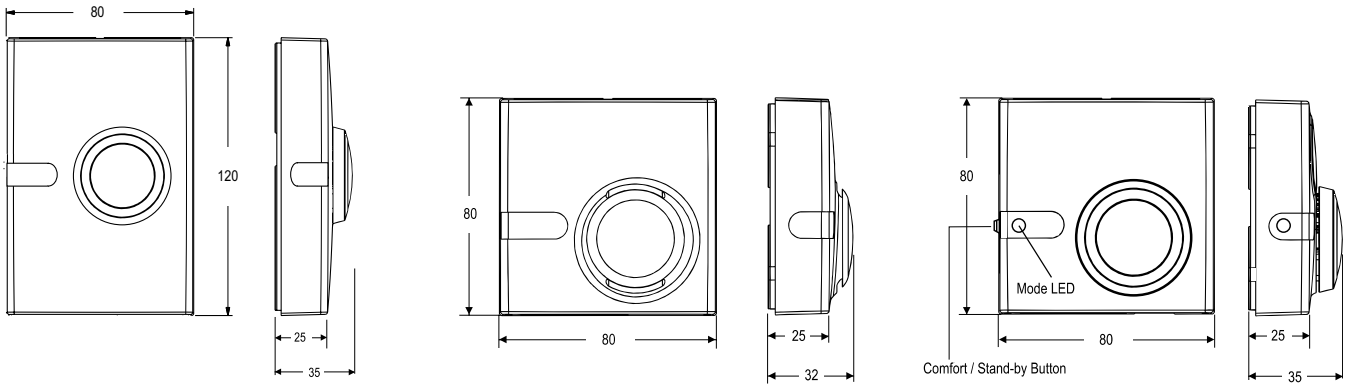
Network Room Command Module

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_2), 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

Room Temperature
NS Series Network Room Command Module

Selection Charts - Network Zone Sensor Ordering Information
Surface Mounted - Temperature Only Models

Ordering Codes	LDC 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	•	•
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	---	---

Room Temperature
NS Series Network Room Command Module

Selection Charts - Network Zone Sensor Ordering Information

Surface Mounted - Temperature and Humidity Models without RH Display

Ordering Codes	LDC 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-AHP7001-0	---	---	3%	W/C	•	---	---	MJ	---
NS-AHN7001-2	---	---	3%	---	---	---	---	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	LDC 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	---

Room Temperature
NS Series Network Room Command Module

Selection Charts - Network Zone Sensor Ordering Information

Surface Mounted - Temperature and Humidity Models without RH Display

Ordering Code	CO_2 Measurement Range	Screw Terminals (ST) or Modular Jack (MJ)	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)

Selection Charts - Network Zone Sensor Ordering Information

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

Ordering Codes	LDC 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

Wireless Room Sensor

WRS

Proprietary Wireless Protocol

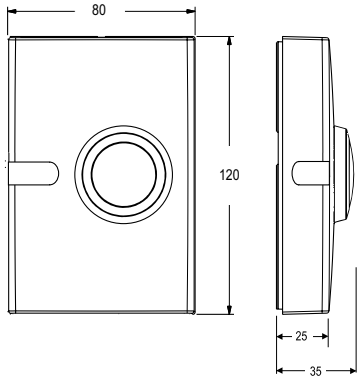
The WRS Many-to-One and TE-7800 One-to-One wireless room temperature sensing system are designed to gather temperature and zone data from multiple wireless room temperature sensors, and distribute that data to multiple field controllers on a Metasys® network.

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.



Dimensions in mm

Features

- Power supply: 24 VAC
- RF band: 2.4 GHZ ISM Bands
- Transmission range: 114 m max indoor line-of-sight 50 m practical average indoor
- Transmissions: every 60 seconds
- Ambient operating temperature: 0 to 50 °C
- Ambient operating humidity: 0 to 95% RH

Ordering Codes	Description	Transmission Power
WRS-RTN0000-1	Receiver for Many-to-One wireless room temperature sensing system, includes omnidirectional antenna	10 dBm (CE Mark)
TE-7820-1	Receiver with Zone Bus Interface for One-to-One wireless room temperature sensing system, interfaces with VMA1400 series controllers (only). Includes 1.8 m Zone Bus Interface cable and omnidirectional antenna	
TE-7830-1	Receiver with Analog Interface for One-to-One wireless room temperature sensing system, Interfaces with Specified Analog Digital controllers (Johnson Controls AS-AHU, AS-UNT, AS-VAV, DX-9100 or FXxx Series Controllers). Includes 1.8 m Analog Interface cable and omnidirectional antenna.	
WRS-TTP0000-1	Wireless Room Temperature sensor, warmer/cooler (+/-) set point adjustment	
WRS-TTR0000-1	Wireless Room Temperature sensor, no set point adjustment	
WRS-TTS0000-1	Wireless Room Temperature sensor, set point adjustment scale: 13 to 29°C	

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.

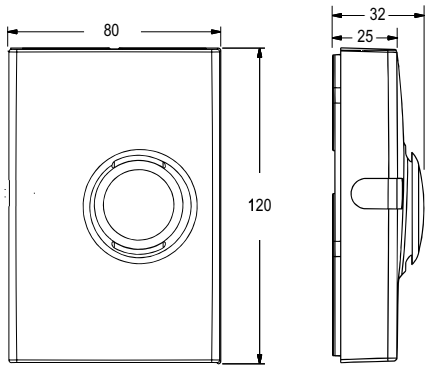
In a ZFR1800 Series Wireless Field Bus System application, the sensors communicate with FEC16 Series, FEC26 Series and VMA16 Series Controllers by means of the ZFR1811 Router.

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.



Dimensions in mm

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

Wireless Room Sensor
WRZ

Product Codes	Description
WRZ-THB0000-0	Wireless Room Temperature and Humidity Sensor with Display, Warmer/Cooler (+/-) Setpoint Adjustment or Setpoint Adjustment Scale: 13 to 27°C, F/C Button, Relative Humidity (RH) Button, and Manual Occupancy Override Button
WRZ-THN0000-0	Wireless Room Temperature and Humidity Sensor with Battery Level/Signal Strength LED and Manual Occupancy Override Button
WRZ-THP0000-0	Wireless Room Temperature and Humidity Sensor with Warmer/Cooler (+/-) Setpoint Adjustment and Manual Occupancy Override Button
WRZ-TTB0000-0	Wireless Room Temperature Sensor with Display, F/C Button, and Manual Occupancy Override Button
WRZ-TTD0000-0	Wireless Room Temperature Sensor with Display, F/C Button, Fan Speed Control, and Manual Occupancy Override Button
WRZ-TTP0000-0	Wireless Room Temperature Sensor with Warmer/Cooler (+/-) Setpoint Adjustment, Battery Level/Signal Strength LED and Manual Occupancy Override Button
WRZ-TTR0000-0	Wireless Room Temperature Sensor with Battery Level/Signal Strength LED, Manual Occupancy Override Button and No Setpoint Adjustment
WRZ-TTS0000-0	Wireless Room Temperature Sensor with Setpoint Adjustment Scale: 55 to 80°F (13 to 27°C), Battery Level/Signal Strength LED and Manual Occupancy Override Button
WRZ-MNN0100-0	Wireless Zigbee™ Sensor, Occupancy (PIR)
WRZ-MTN0100-0	Wireless Zigbee™ Sensor, Occupancy (PIR), Temperature, no Display
WRZ-MHN0100-0	Wireless Zigbee™ Sensor, Occupancy (PIR), Temperature, 3% Relative Humidity, no Display
WRZ-MTB0100-0	Wireless Sensor, Occupancy (PIR), Temperature, Display, Warmer/Cooler Dial, Fahrenheit/Celsius Pushbutton, Occupancy Override
WRZ-SST-110	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*
WRZ-THB0000-0	•	•	•	•	---	•	---	CONFIG
WRZ-THN0000-0	•	•	---	---	---	•	---	NO DIAL
WRZ-THP0000-0	•	•	---	---	---	•	---	W/C
WRZ-TTB0000-0	•	---	•	•	---	•	---	CONFIG
WRZ-TTD0000-0	•	---	•	•	•	•	---	CONFIG
WRZ-TTP0000-0	•	---	---	---	---	•	---	W/C
WRZ-TTR0000-0	•	---	---	---	---	•	---	NO DIAL
WRZ-TTS0000-0	•	---	---	---	---	•	---	SCALED
WRZ-MNN0100-0	---	---	---	---	---	---	•	NO DIAL
WRZ-MTN0100-0	•	---	---	---	---	---	•	NO DIAL
WRZ-MHN0100-0	•	•	---	---	---	---	•	NO DIAL
WRZ-MTB0100-0	•	---	•	•	---	•	•	W/C

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

Electromechanical Modulating

TC-8900 and PM-8900

Room Thermostat

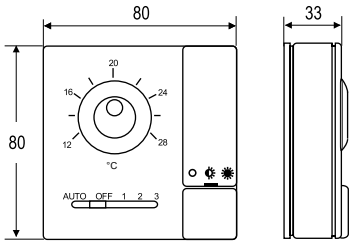
TC-8900 is a family of analogue controllers designed for control of fan coils with 2-pipe, 2-pipe with change-over, 2-pipe with electrical coil or 4-pipe configurations.

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

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

Features

- 2-pipe, 2-pipe with change-over, 2-pipe with electrical coil or 4-pipe configurations with and withoput 3-speed fan override
- 80 x 80 mm room enclosures
- Temperature dial ranges 12...28 °C, +/-
- 24 VAC power supply for the TC-8900 controls, 230 VAC in connection the the PM-8900 power module



Dimensions in mm

TC-890x Stand Alone Controllers

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

Electromechanical Modulating
TC-8900 and 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	

Electromechanical Modulating

T125-E

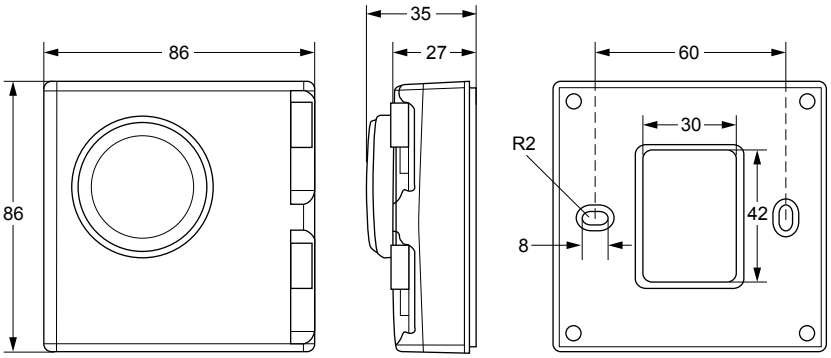
Fan Coil Thermostat

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

TC-890x Stand Alone Controllers

Ordering Codes	Built-in NTC	Setpoint Range	Input 0...10 V	Fan Output	Outputs	
					PAT	On/Off
T125BAC-JS0-E	•	10...30 °C	•	---	•	•
T125FAC-JS0-E			---	•	---	•

Programmeable Stand Alone

T5000-E

Fan Coil Thermostat

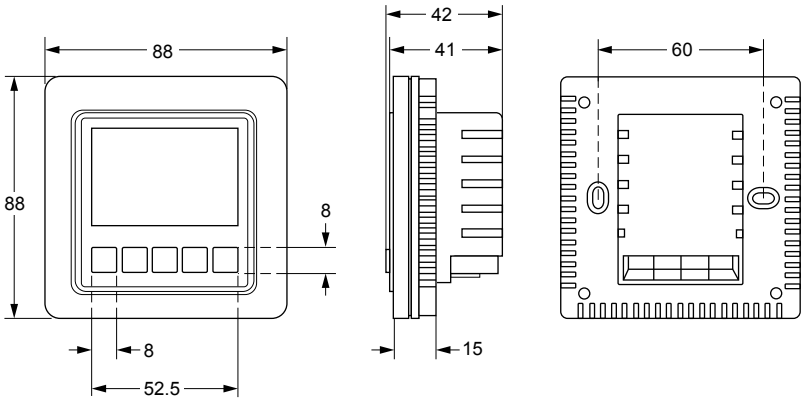
T5000 LCD Digital Fan Coil Thermostats are designed to control heating, cooling, or year round air conditioning unit in Commercial, Industrial and Residential Installation. Typical Application includes the control of fan coil units, packaged terminal airconditioners and combination heating and cooling 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		---		---	•	---	•

Programmable Networked

TEC2000

Room Thermostat

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

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

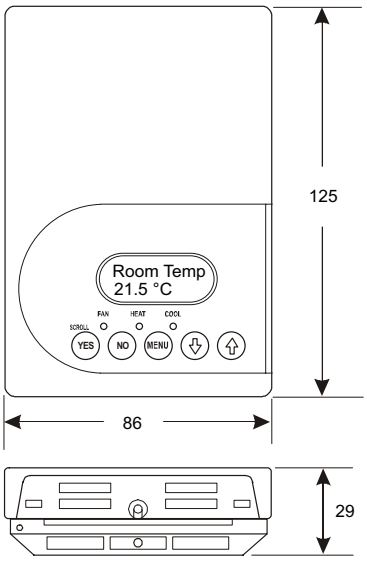
The TEC2x45, TEC2xx6 and TEC2xx7 series controllers are available for commercial and hospitality applications, including cabinet unit heaters, perimeter heating/cooling, zoning and fan coil units.

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

All TEC2000 models have two configurable binary inputs for advanced functions and features over 20 configurable parameters, which enable the thermostat to be customized for any application.

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

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



Dimensions in mm

Programmeable Networked
TEC2000

Room Thermostat

Ordering Codes	Control Output	Fan Control	Application
for BACnet® MS/TP Communication			
TEC2626-4	2 Outputs ON/OFF or Floating	1, 2 or 3 Speed	Commercial
TEC2646-4	2 Outputs 0...10 VDC		
TEC2646H-4			Hospitality
TEC2646H-4+PIR			
TEC2627-4	2 Outputs ON/OFF or Floating	---	Commercial Non programmable
TEC2647-4	2 Outputs 0...10 VDC		
TEC2601-4+PIR	Single Stage	On, Off or Auto	
TEC2656H-4	2 Outputs 0...10 VDC	1, 2 or 3 Speed	Hospitality
for N2 Open Communication			
TEC2145-4	1 Output 0...10 VDC	1 Speed	Commercial
TEC2126-4	2 Outputs ON/OFF or Floating	1, 2 or 3 Speed	
TEC2146-4	2 Outputs 0...10 VDC		
TEC2126H-4	2 Outputs ON/OFF or Floating		Hospitality
TEC2146H-4+PIR	2 Outputs 0...10 VDC		
TEC2127-4	2 Outputs ON/OFF or Floating	---	Commercial Non programmable
TEC2147-4	2 Outputs 0...10 VDC		
TEC2101-4	Single Stage	On, Off or Auto	
TEC2104-4	Economizer		
for LonWorks® Communication			
TEC2261-4	Single stage	---	Commercial LonWorks 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

Heating Applications

ER65-DRW

Controller

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

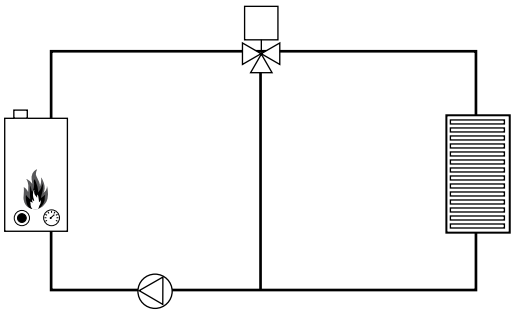
It covers water and air heating applications.

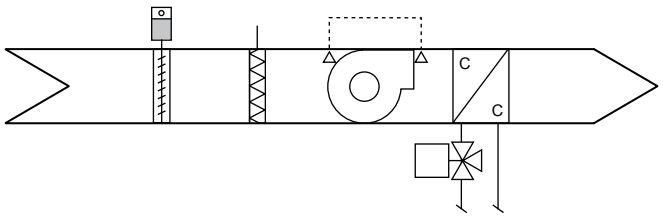
All-in-one design allows full flexibility to apply a single controller to many small heating applications.

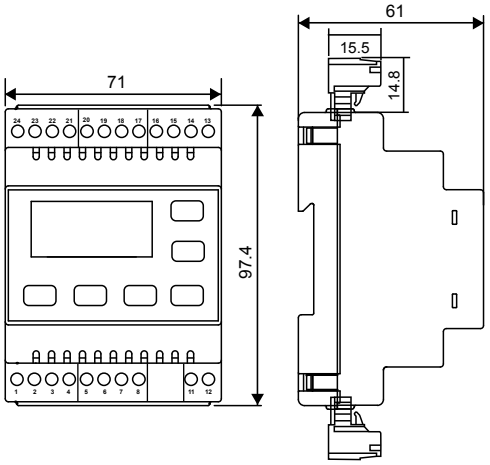
The controller incorporates a comprehensive energy saving application, and can be connected to a supervisory system via its on board communications port.

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

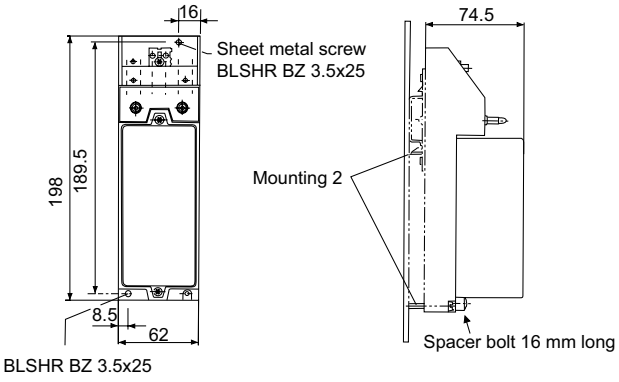
Ordering Code	Description
ER65-DRW-501C	Heating controller, sensor not included, compatible with the ER-NTC sensor line, Modbus communication

Electro-Pneumatic Transducers

EP-1110

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

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



Dimensions in mm

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

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.

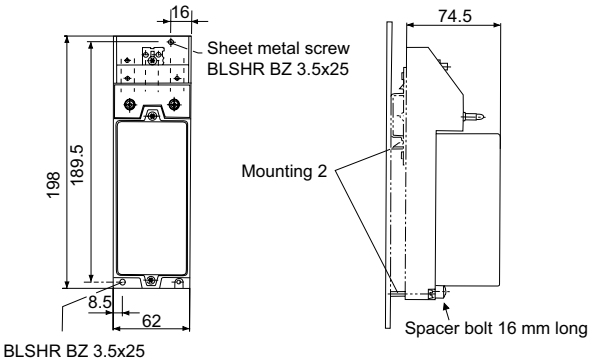
The instrument is suitable for connection of electrical incremental controllers with pneumatic devices or for electrical remote adjustement of the set point of pneumatic controllers.

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 kΩ 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 kΩ potentiometer	230 V
EP-2000-7024			24 V

Electro-Pneumatic Transducers

EP-8000

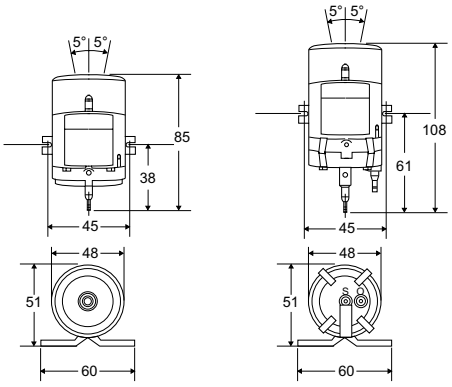
EP-8000 series electro-pneumatic transducers convert a voltage or current signal from an electronic controller into a pneumatic output pressure signal. An increase or decrease in the input signal proportionally increases or decreases (respectively) the output pressure signal from the EP-8000.

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 ¼ inch O.D. polytubing.
Sequencing of pneumatic valve or damper actuators can be accomplished using a Johnson Controls V-9502 (valve) or D-9502 (damper) actuator positioner.

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

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

MSEA

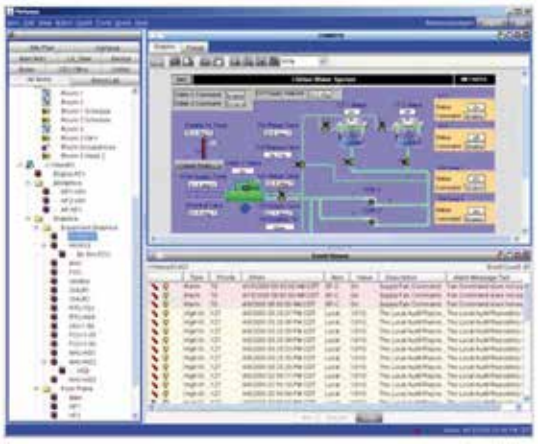
ADX, ADS and ADS-Lite

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 computer platform and supports up to 5 users. The ADX is a large 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 10, 25, or 50 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 User Interface (UI) of the ADS/ADX operates in a Web browser to provide 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. An optional user interface called the Ready Access Portal provides an intuitive, task-based user experience designed for building tenants and other specialized users. The Ready Access Portal is available on a computer or handheld platform and requires only a Web browser. For the ADX, the Metasys Advanced Reporting System and Energy Essentials report on system configuration performance, energy usage, demand, and cost. In this document, the term engine refers to NAEs, NCEs and NIEs, unless otherwise noted.

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

An ADS-Lite is used when:

- The number of engines becomes larger than a single engine can handle efficiently as Site Director
- Long-term historical data storage needs exceed the capacity of a typical engine
- The number of simultaneous users logging on exceeds the capacity of a single engine. The ADS supports up to 5 simultaneous users.

An ADS is used when:

- More than five engines are installed
- NxE55 or NxE85 are included on the project

An ADX is used 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 10, 25, or 50 users.
- Any one of your data storage or access requirements is not met by an ADS

Ordering Codes *	Description
MS-ADSLE5U-0	ADS-Lite-E new project software for up to 5 concurrent users. The ADS-Lite-E is available for purchase and use in Europe and Africa.
MS-ADS05U-0	ADS new project software for up to 5 concurrent users
MS-ADX10U-0	ADX new project software for up to 10 users
MS-ADX10SQL-0	ADX new project software for up to 10 users Includes Microsoft® SQL Server™ 2008 software with a Processor License for unlimited users/devices.
MS-ADXSWO-0	ADX new project software for up to 25 users
MS-ADXSWOSQL-0	ADX new project software for up to 25 users Includes Microsoft SQL Server 2008 software with a Processor License for unlimited users/devices.
MS-ADX50U-0	ADX new project software for up to 50 users
MS-ADX50SQL-0	ADX new project software for up to 50 users Includes Microsoft SQL Server 2008 software with a Processor License for unlimited users/devices.

ADX, ADS and ADS-Lite

Application and Data Server

ADS and ADS-Lite - Technical Specifications

Recommended Computer Platform *	2.8 GHz Pentium® 4 processor with 80 GB hard disk (2.0 GHz Pentium 4 processor with 40 GB hard disk minimum) 20 GB free space on the hard disk (drive C) after installing all prerequisite software and before installing the ADS-Lite software DVD drive **Note:** Prerequisite software includes the supported OS, database software, .NET Framework, and any other software or service packs required for your ADS-Lite configuration.
Recommended Memory	2 GB RAM minimum
Supported Operating Systems ** and Database Software	**Windows® 7 OS Professional, Enterprise, and Ultimate Editions with SP1 (32-bit or 64-bit)** (Includes Microsoft IIS Version 7.5) Supports Microsoft SQL Server™ 2008 R2 Express software with SP2 (32-bit or 64-bit) or SQL Server 2008 Express software with SP3 (32-bit)
	Windows XP® OS Professional Edition with SP3 (32-bit) (Includes Microsoft IIS Version 5.1) Supports Microsoft SQL Server 2008 R2 Express software with SP2 (32-bit) or SQL Server 2008 Express software with SP3 (32-bit)
Required Web Browser Software for Metasys Client Computers	**Windows Internet Explorer® Version 8.0 or 9.0** (Other browsers, such as Google Chrome and Mozilla Firefox®, may also be used but are not fully supported.) **Note:** 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 on to the Metasys UI.
Network Communication	Ethernet network interface card (100 or 1000 Mbps) **Note:** The ADS supports only one network interface card.
Additional Software Included with the ADS-Lite	CCT software Export Utility software Metasys Database Manager software Microsoft .NET Framework Version 3.5 SP1 Microsoft SQL Server 2008 R2 Express software with SP2 Microsoft SQL Server 2008 Express software with SP3 Ready Access Portal software SCT software SCT Manager software Launcher software **Note:** The Windows 7 OS includes Microsoft .NET Framework Version 3.5.1. No separate software installation is necessary.
Optional Hardware	Any network or local printer supported by the qualified Windows operating system

Notes

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

** 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.

ADX, ADS and ADS-Lite

Application and Data Server

Unified ADX - Technical Specifications

Recommended Server Platform *	2.8 GHz Pentium® 4 processor with 160 GB hard disk (2.0 GHz Pentium 4 processor with 80 GB hard disk minimum) 40 GB free space on the hard disk (drive C) after installing the prerequisite software and before installing the ADX software DVD drive Note: ADX prerequisite software includes the Windows OS and SQL Server software, Windows .NET Framework, Java Runtime Environment software, and any other software or SPs required by your ADX configuration.
Recommended Memory	4 GB RAM minimum
Supported Operating Systems ** and Database Software *	**Microsoft Windows Server 2008 R2 OS (64-bit)** (Includes Microsoft IIS Version 7.5) Supports Microsoft SQL Server™ 2008 R2 Standard and Enterprise software (64-bit) or Microsoft SQL Server 2008 Standard or Enterprise software with SP1 (64-bit)
	Microsoft Windows Server 2008 OS (32-bit) with SP2 (Includes Microsoft IIS Version 7.0) Supports Microsoft SQL Server 2008 R2 Standard and Enterprise software (32-bit), SQL Server™ 2008 Standard and Enterprise software with SP2 (32-bit), or SQL Server™ 2005 Standard and Enterprise software with SP3 (32-bit)
	Microsoft Windows Server 2003 R2 OS (32-bit) with SP2 (Includes Microsoft IIS Version 6.0) Supports Microsoft SQL Server 2008 R2 Standard and Enterprise software (32-bit), SQL Server™ 2008 Standard and Enterprise software with SP2 (32-bit), or SQL Server™ 2005 Standard and Enterprise software with SP3 (32-bit)
Required Web Browser Software for Metasys Client Computers	Microsoft Internet Explorer® Version 6.x, 7.0, or 8.0 Java® Runtime Environment (JRE) 1.6.0_23 **Note:** When browsing to the UI of a Metasys system device, the OS on the client computer must be supported by the Metasys release loaded on the device. You may be unable to browse to Metasys system devices if the client OS is not supported. *Refer to the Requirements for Site Management Portal Client Computer section of the Metasys System Extended Architecture Overview Technical Bulletin (LIT-1201527) for more information.*
Network Communication	Ethernet network interface card 10/100/1000 Mbps (100 Mbps or better recommended) **Note:** The ADX supports only one network interface card.
Additional Software Included with the ADX	CCT software **** Export Utility software Metasys Advanced Reporting System Metasys Database Manager software Microsoft .NET Framework Version 3.5 SP1 or 3.5.1 (Windows Server 2008 R2 software) Ready Access Portal software SCT software SCT Manager software **Note:** The Metasys Advanced Reporting System requires an ADX. The SCT software must be installed on the ADX.
Optional Hardware	Any network or local printer supported by the qualified Windows operating system

Notes

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

** 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.

*** 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.

**** We support CCT software on 32-bit operating systems only (excludes Windows Server 2008 R2 OS [64-bit]).

ADX, ADS and ADS-Lite

Application and Data Server

Split ADX - Technical Specifications

Recommended Server Platform *	Web/Application Server 2.8 GHz Pentium® 4 processor with 160 GB hard disk (2.0 GHz Pentium 4 processor with 80 GB hard disk minimum) DVD drive 200 MB free space on the hard disk (drive C) after installing the prerequisite software ** and before installing the ADX software
	Database Server 2.8 GHz Pentium 4 processor with 160 GB hard disk (2.0 GHz Pentium 4 processor with 80 GB hard disk minimum) DVD drive 40 GB free space on the hard disk (drive C) after installing the prerequisite software **
	SCT Computer In a split configuration, you cannot install SCT software on either the Web/Application Server computer or the Database Server computer. *Refer to the System Configuration Tool Catalog Page (LIT-1900198) for current SCT computer requirements.*
Recommended Memory	4 GB RAM minimum
Supported Operating Systems *, **** with Supported Database Software *****	**Microsoft Windows Server 2008 R2 OS (64-bit)** (Includes Microsoft IIS Version 7.5) Supports Microsoft SQL Server™ 2008 R2 Standard and Enterprise software (64-bit) or Microsoft SQL Server 2008 Standard or Enterprise software with SP1 (64-bit)
	Microsoft Windows Server 2008 OS (32-bit) with SP2 (Includes Microsoft IIS Version 7.0) Supports Microsoft SQL Server 2008 R2 Standard and Enterprise software (32-bit), SQL Server™ 2008 Standard and Enterprise software with SP2 (32-bit), or SQL Server™ 2005 Standard and Enterprise software with SP3 (32-bit)
	Microsoft Windows Server 2003 R2 OS (32-bit) with SP2 (Includes Microsoft IIS Version 6.0) Supports Microsoft SQL Server 2008 R2 Standard and Enterprise software (32-bit), SQL Server™ 2008 Standard and Enterprise software with SP2 (32-bit), or SQL Server™ 2005 Standard and Enterprise software with SP3 (32-bit)
Required Web Browser Software for Metasys Client Computers	Microsoft Internet Explorer® Version 6.x, 7.0, or 8.0 Java® Runtime Environment (JRE) 1.6.0_23 **Note:** When browsing to the UI of a Metasys system device, the OS on the client computer must be supported by the Metasys release loaded on the device. You may be unable to browse to Metasys system devices if the client OS is not supported. *Refer to the Requirements for Site Management Portal Client Computer section of the Metasys System Extended Architecture Overview Technical Bulletin (LIT-1201527) for more information.*
Network Communication	Ethernet network interface card 10/100/1000 Mbps (100 Mbps or better recommended) **Note:** The ADX supports only one network interface card.
Additional Software Included with the ADX	CCT software ****** Export Utility software Metasys Advanced Reporting System Metasys Database Manager software Microsoft .NET Framework Version 3.5 SP1 Ready Access Portal software SCT software SCT Manager software **Note:** 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

Notes

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

** ADX prerequisite software includes the Windows OS 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 OS installed.

**** 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.

***** 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.

****** We support CCT software on 32-bit operating systems only (excludes Windows Server 2008 R2 OS [64-bit]).

MSEA

RAP

Ready Access Portal

The Ready Access Portal software provides a natural, complementary extension of the Metasys® Site Management Portal User Interface (UI). The Ready Access Portal UI provides an intuitive, task-based interface that can be tailored to meet the needs of building tenants and other specialized users. Available on a computer or handheld platform, the Ready Access Portal UI requires only a Web browser.

Features

- Intuitive user interface to key Metasys system functions and tasks
- Access to alarm, summary, schedule, and trend data
- Monitor and control through the use of textual and animated graphical displays
- Flexible UI focus based on security privileges, Dashboard assignment, and user views
- Support for up to 100 concurrent users (if Ready Access Portal is installed on a stand-alone computer without Extended Application and Data Server [ADX])
- Secure Sockets Layer (SSL) support

Ordering Codes *	Description
MS-RAP-0	Ready Access Portal software; System Configuration Tool (SCT) and Metasys Export Utility included
MS-RAP-6	Ready Access Portal software **(upgrade)**; SCT, Metasys Export Utility, and all supervisory engine images included (excluding NxE8500)

Note

***** Ready Access Portal software also ships with Application and Data Server (ADS)/ADX software.
Refer to the Application and Data Server (ADS/ADX) Product Bulletin (LIT-1201525) for ADS/ADX code numbers.

RAP

Ready Access Portal

Technical Specifications

Ordering Codes *	**MS-RAP-0 (new software)** **MS-RAP-6 (upgrade software)**
Metasys System Site Director Requirements	The Metasys Site Director: • Must be at the same release version as the Ready Access Portal software • Can be any Metasys system device with Site Director status: ADS/ADX, Network Automation Engine (NAE)/Network Integration Engine (NIE) 85, NAE55/NIE55, NIE59, NAE45, NAE35, or Network Control Engine (NCE) 25
Supported Operating Systems and Database Software for the Computer Running Ready Access Portal Software	The computer running the Ready Access Software can be one of the following five Operating System (OS) platforms: • **Windows® 7 OS Professional, Enterprise, or Ultimate Editions (32- or 64-bit) with SP1** (Includes Microsoft® Internet Information Services [IIS] Version 7.5), .NET Framework Version 3.5.1, supports Microsoft SQL Server™2008 R2 Express software with SP1 or SQL Server 2008 Express software with SP3 • **Windows XP® OS Professional Edition (32-bit) with SP3** (Includes Microsoft IIS Version 5.1), .NET Framework Version 3.5 SP1, supports Microsoft SQL Server 2008 R2 Express software with SP2 or SQL Server 2008 Express software with SP3 • **Windows Server® 2008 R2 OS (64-bit) with SP1** (Includes IIS Version 7.5), .NET Framework Version 3.5.1, supports SQL Server 2008 R2 Software (64-bit) with SP2 or SQL Server 2008 (64-bit) with SP3 • **Windows Server 2008 OS (32-bit) with SP2** (Includes IIS Version 7.0), .NET Framework Version 3.5 SP1, supports Microsoft SQL Server 2008 R2 software (32-bit) with SP2 or SQL Server 2008 (32-bit) with SP3 Consider the following when choosing a computer for the Focused Ready Access Portal software: • The platform of the computer running Ready Access Portal software and the type of Site Director you have impact the number of users who can browse to the Ready Access Portal UI at the same time. • As a general rule, the computer running Ready Access Portal software should have the same or better processor speed and memory as the Site Director. • Ready Access Portal software can be installed on a stand-alone computer or a computer running ADS/ADX (Site Director only), SCT, or other Metasys system software. Ready Access Portal software is not supported on an NxE85.
Web Browser Requirements for Ready Access Portal Client Computers and Handheld Devices	**Computer:** The computer must be running Windows Internet Explorer® web browser Version 8.0 or 9.0 in Compatibility view. Additionally, Microsoft Silverlight™ Version 5.0 or later must be installed on each client computer if graphics are being used on the site. **Handheld Device:** • The handheld device must be running Internet Explorer Mobile for Windows Mobile Version 5 or Version 6 OS; or Apple® iPhone® and iPod touch® OS Version 3.0 or greater. Other Web browsers may display the UI but the functionality is not guaranteed. • We recommend a screen size of at least 240 pixels wide by 320 pixels high (quarter Video Graphics Array [VGA]). The minimal width of 240 pixels is optimal for horizontal scrolling.

Note

* Ready Access Portal software does not support Metasys for Validated Environments (MVE), extended architecture, electronic signature or electronic signature annotation requirements. If you install Ready Access Portal software on an MVE site, use the appropriate operating procedures and user/role permissions to ensure that Ready Access Portal users have view only access to the system.

MSEA

GGT - Graphic Generator Tool

Graphics+ Feature

The Johnson Controls® Graphics+ feature lets you monitor and control the Building Automation System (BAS) through a graphical display. This feature is made up of two main components: the Graphic Generation Tool (GGT) and the Graphics+ Viewer.

The Graphic Generation Tool lets you create and modify Graphics+ objects using your computer. You can save these graphics directly to a supported Metasys® Host, such as a Site Director or a System Configuration Tool (SCT) archive database. The tool includes an extensive library of pre-built dynamic elements and templates that help you create system and floor plan graphics. The GGT also lets you bind the dynamic elements directly to Metasys objects quickly and easily.

The Graphics+ Viewer (displayed within the Site Management Portal UI, SCT UI, and the Ready Access Portal UI) shows Graphics+ objects using real-time controller field point data and lets you command and update points. These graphical displays give you 3-D views into the inner workings of your facility, offering an intuitive and alternative way to manage the daily events of your building or campus.

With 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. Clicking any one of these spaces or systems shows you 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 4 points at once for system diagnosis and comparison purposes. Lastly, 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.

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 Aides
- Ability to Quickly and Easily Switch from Tabular to Graphical Views
- Stand-Alone Graphic Generation Tool
- Extensive Library of Prebuilt Dynamic Elements and Templates
- HVAC Library Elements Pre-Populated with Aliased Binding Strings
- Historical Trend Information Available Directly Within a Graphic
- Computer Aided Drafting (CAD) File Import Capability
- Comprehensive Representation of Facility Support Systems
- Many Different Language Translations Available

MS-GGT-0

Graphics+ Feature

Graphic Generation Tool System Requirements - Technical Specifications

Product	MS-GGT-0 (new Graphic Generation Tool software)
Recommended Computer Platform*	Intel® Core™ 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum) 100 MB recommended free hard disk space available DVD drive
Memory	2 GB RAM recommended (1 GB RAM minimum)
Operating System	Microsoft® Windows® 7 Professional, Enterprise or Ultimate OS with SP1 (32-bit) Microsoft Windows XP® Professional OS with SP3 Microsoft Windows Server 2008 OS (32-bit) with SP2 Microsoft Windows Server 2003 R2 OS (32-bit) with SP2
Other Software	Microsoft .NET Framework 4.0 (required for creating Graphics+ graphics; included on the GGT product disk)
Communication	Ethernet network interface card 10/100/1,000 Mbps (100 Mbps network recommended)

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.

Graphics+ Viewer System Requirements - Technical Specifications

Product	Graphics+ Viewer built into Site Management Portal UI, SCT UI, and Ready Access Portal UI
Recommended Computer Platform	Intel® Core™ 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum)
Memory	2 GB RAM recommended (1 GB RAM minimum)
Operating System	Microsoft® Windows® 7 Professional, Enterprise or Ultimate OS (32-bit) with SP1 Microsoft Windows XP® Professional OS with SP3 Microsoft Windows Server 2008 OS (32-bit) with SP2 Microsoft Windows Server 2008 R2 OS (64-bit) with SP1 Microsoft Windows Server 2003 R2 OS (32-bit) with SP2
Other Software	Microsoft Internet Explorer® Version 6.x, 7.0, 8.0, or 9.0 Microsoft Silverlight® 5.0 or higher (available as a free download from Microsoft Corporation.)
Communication	Ethernet network interface card 10/100/1,000 Mbps (100 Mbps network recommended)

MSEA

MEU

Metasys Export Utility

The Metasys® system extended architecture 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, users can easily sort, compare, and archive data in spreadsheets and databases.

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

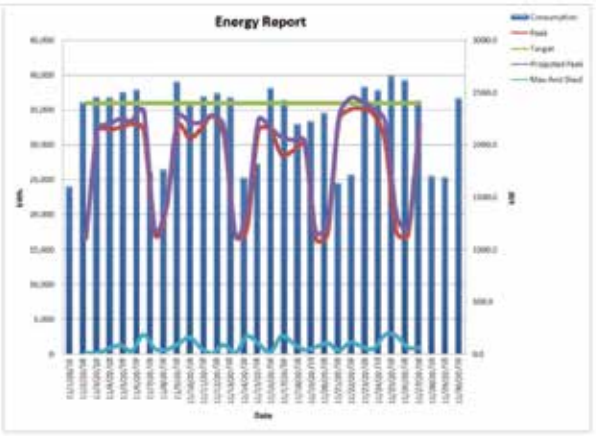
Conveniently, the scheduling capability of the Export Utility allows you to extract the selected data immediately or to schedule an extraction at a convenient time or interval.

When the base set of reports provided with the Export Utility is not enough, functionality is included that allows you to create a program that customizes reports to fit your needs.

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

MEU

Metasys Export Utility

Technical Specifications

Ordering Code	MS-EXPORT-0, Export Utility Software
Recommended Computer/ Server Platform *	Intel® Core™ 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum) 20 GB free hard disk space available (600 MB minimum) DVD drive When Export Utility is installed on an ADS/ADX, follow the requirements for an ADS/ADX. *Refer to the Application and Data Server (ADS/ADX) Product Bulletin (LIT-1201525), the Application and Data Server (ADS) Lite for Europe (E) Product Bulletin (LIT-12011690), or the Application and Data Server (ADS) Lite for Asia (A) System Product Bulletin (LIT-12011694).*
Recommended Memory *	Computer Platforms: 2 GB RAM (1 GB RAM minimum) Server Platforms: 4 GB RAM (2 GB RAM minimum)
Supported Operating Systems	• **Microsoft® Windows® 7 OS Professional, Enterprise and Ultimate Editions (32-bit) with SP1** (Includes Microsoft IIS Version 7.5) • **Microsoft Windows XP® OS Professional Edition (32-bit) with SP3** (Includes Microsoft IIS Version 5.1) • **Microsoft Windows Server 2008 R2 OS (64-bit)** (Includes Microsoft IIS Version 7.5) • **Microsoft Windows Server 2008 OS (32-bit) with SP2** (Includes Microsoft IIS Version 7.0) • **Microsoft Windows Server 2003 R2 OS (32-bit) with SP2** (Includes Microsoft IIS Version 6.0)
Additional Software Included on the Product Disks	Microsoft .NET Framework Version 3.5 SP1 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-12011689).* **Note:** The Microsoft Windows 7 OS and Windows Server 2008 R2 OS include Microsoft .NET Framework Version 3.5.1, which is built into the operating system (no separate software installation is necessary).
Additional Requirements (Order Separately)	Microsoft Office 2007 software to generate reports **Note:** To extract data to Microsoft Excel or Microsoft Access software, you must have the respective software installed on the computer running the Export Utility.

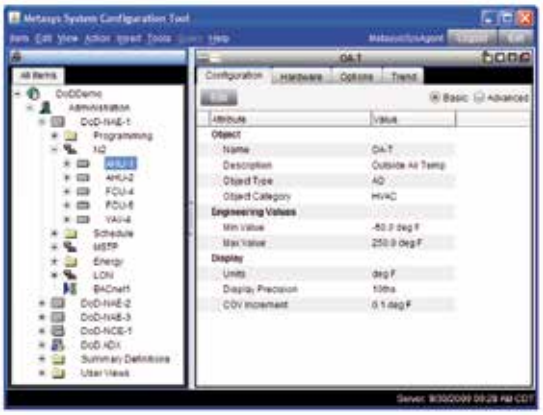
Note

* 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.

MSEA

SCT

System Configuration Tool



As an integral part of the Metasys® system extended architecture, the System Configuration Tool (SCT) supports the engineering, installing, and commissioning of your building automation system. The SCT software package enables offline generation of the complete supervisory and user interface part of the system, including point naming; schedule and trend log definition; integration of N1, N2, BACnet®, and LonWorks® networks; 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. The SCT maintains the archive database for the site. An offline simulation feature can test user navigation trees, user graphics, and programmed sequence logic in SCT prior to starting up the system on site.

The SCT also manages the downloading of the archive database into the Network Automation Engine (NAE), Network Control Engine (NCE), Network Integration Engine (NIE), Application and Data Server (ADS), and Extended Application and Data Server (ADX). 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 or ADS/ADX that has the same Web browser-based user interface that was used for the offline data generation in the SCT.

SCT comes bundled with a copy of the M-Tool software and the Controller Configuration Tool (CCT).

Features

- Offline system generation and simulation
- Same user interface design as in online system
- Wizards -- system configuration guides
- Software packaging options

Ordering Codes	Description
MS-SCTSWO-0	System Configuration Tool Software. Includes a copy of M-Tool and CCT. New Project Software
MS-SCTSWO-6	System Configuration Tool Software. Includes a copy of M-Tool and CCT. Upgrade Software

SCT

System Configuration Tool

Technical Specifications

Product Code	**MS-SCTSWO-0**
Recommended Computer/ Server Platform *	Intel® Core™ 2 Duo E6700 or better (Intel Core 2 Duo E4300 minimum) 20 GB free hard disk space available (600 MB minimum) DVD drive
Recommended Memory *	
Computer Platforms:	2 GB RAM (1 GB RAM minimum)
Server Platforms:	4 GB RAM (2 GB RAM minimum)
Supported Operating Systems and Database Software **	**Microsoft® Windows® 7 OS Professional, Enterprise and Ultimate Editions (32-bit) with SP1** (Includes Microsoft IIS Version 7.5) Supports Microsoft SQL Server™2008 R2 Express software, SQL Server™2008 Express software with SP2, or SQL Server™ 2005 Express software with SP3 **Microsoft Windows XP® OS Professional Edition (32-bit) with SP3** (Includes Microsoft IIS Version 5.1) Supports Microsoft SQL Server™2008 R2 Express software, SQL Server™2008 Express software with SP2, or SQL Server™ 2005 Express software with SP3 **Microsoft Windows Server 2008 R2 OS (64-bit) ***** (Includes Microsoft IIS Version 7.5) Supports Microsoft SQL Server™ 2008 R2 Standard and Enterprise software (64 bit) **Microsoft Windows Server 2008 OS (32-bit) with SP2 ***** (Includes Microsoft IIS Version 7.0) Supports Microsoft SQL Server 2008 R2 Standard and Enterprise software, SQL Server™ 2008 Standard and Enterprise software with SP2, or SQL Server™ 2005 Standard and Enterprise software with SP3 (32 bit) **Microsoft Windows Server 2003 R2 OS (32-bit) with SP2** (Includes Microsoft IIS Version 6.0) Supports Microsoft SQL Server 2008 R2 Standard and Enterprise software, SQL Server 2008 Standard and Enterprise software with SP2, or SQL Server 2005 Standard and Enterprise software with SP3 (32 bit)
Required Web Browser Software for Metasys Client Computers	**Microsoft Internet Explorer® Version 6.x, 7.0, or 8.0** Java® Runtime Environment (JRE) 1.6.0_23 When browsing to the UI of a Metasys system device, the OS on the client computer must be supported by the Metasys release loaded on the device. You may be unable to browse to Metasys system devices, if the client OS is not supported. *Refer to the Requirements for Site Management Portal Client Computer section of the Metasys System Extended Architecture Overview Technical Bulletin (LIT-1201527) for more information.*
Network Communication	Ethernet network interface card 10/100 Mbps (100 Mbps network recommended) The computer hosting the SCT application supports only one network interface card.
Optional Software Packaging	The ADS, ADX, and Ready Access Portal software include SCT software.

Notes

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

** Refer to the Network and IT Guidance for the BAS Professional Technical Bulletin (LIT-12011279) for specific Microsoft Windows OS settings that may be required for your Metasys system configuration.

*** M-Tool is not supported on any of the Microsoft Windows Server 2008 operating systems.

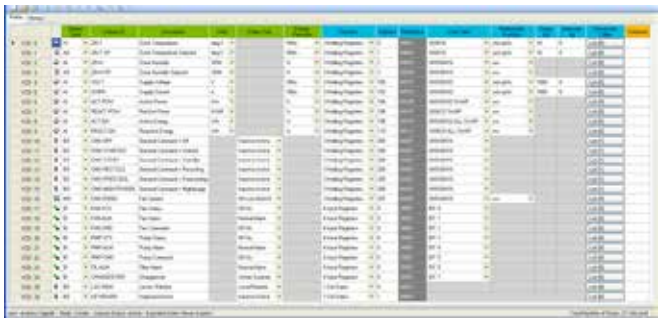
MSEA
VMD Generator Express

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's 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 DVD. 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.

MSEA

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.

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

NAE55 Network Automation Engine

NAE45 Network Automation Engine

NAE85 Network Automation Engine

NAE

Network Automation Engine

NAE35

Ordering Codes	Description
MS-NAE35xx-xxx (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.
MS-NAE3510-2	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.
MS-NAE3511-2	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.
MS-NAE3514-2	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.
MS-NAE3515-2	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.
MS-NAE3520-2	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.
MS-NAE3521-2	Supports one LonWorks trunk, includes an internal modem. Supports up to 64 devices on the LonWorks port.
MS-NAE3524-2	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.
MS-NAE3525-2	Supports one LonWorks trunk, features Basic Access support, and includes an internal modem. Supports up to 64 devices on the LonWorks trunks.

Note
For repair parts, add -702 after the code number.

NAE45

Ordering Codes	Description
MS-NAE45xx-xxx (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.
MS-NAE4510-2	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.
MS-NAE4511-2	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.
MS-NAE4520-2	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.
MS-NAE4521-2	Supports one LonWorks trunk, includes an internal modem; supports up to 127 devices on the LonWorks port.

Note
For repair parts, add -702 after the code number.

NAE

Network Automation Engine

NAE55

Ordering Codes	Description
MS-NAE55xx-x (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.
MS-NAE5510-2E	Supports two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk).
MS-NAE5511-2E	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.
MS-NAE5520-2E	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.
MS-NAE5521-2E	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.

Note
For the European versions of the NAE55 add an E after the code number. For repair parts, add -701 after the code number.

NAE85

Ordering Codes	Description
MS-NIE8500-0 *	NxE85 model with 1U chassis for mounting in a server rack. **Note:** 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.
MS-NxE85SW-0	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
MS-BAT1010-0	Replacement data protection battery for NAE55 and NIE55. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of 3 to 5 years at 21°C (70°F)
MS-BAT1020-0	Replacement data protection battery for NAE35, NAE45, and NCE25. Rechargeable NiMH battery: 3.6 V 500 mAh, with a typical life of 10 years at 21°C (70°F)
MS-15KUPG-0	15,000 object upgrade for NxE85
MS-MULTENGSW-6	Contains ToggleTunnel utility for converting an NAE55/NIE55 to an NAE55 model with the N2 Tunneling features enabled. Not for use with MS-NAE5510-OU or MS-NIE5510-OU.
MS-RAP-0	Ready Access Portal Server provides a user interface that is a natural, complementary extension of the Metasys Site Management Portal user interface. **Note:** This option is not necessary for sites that have an ADS/ADX that is the Site Director because Ready Access Portal Server is provided with the ADS/ADX solution.
MS-EXPORT-0	Export Utility extracts historical trend, alarm, and audit data from the system and presents the historical data in a variety of formats. **Note:** 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.
AS-XFR100-1	Power transformer (Class 2, 24 VAC, 92 VA maximum output), with enclosure
AS-XFR010-1	Power transformer (Class 2, 24 VAC, 92 VA maximum output), no enclosure
SC450RM1U (OEM Part No.)	Recommended Uninterruptable 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

NAE

Network Automation Engine

NAE35 and NAE45 - Technical Specification

Power Requirement	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)
Power Consumption	25 VA maximum
Ambient Operating Conditions	0 – 50°C; 10 – 90% RH, 30°C maximum dew point
Ambient Storage Conditions	-40 – 70°C; 5 – 95% RH, 30°C maximum dew point
Data Protection	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0
Processor	192 MHz Renesas™ SH4 7760 RISC processor
Memory	128 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 128 MB Synchronous Dynamic Random Access Memory (DRAM) for operations data dynamic memory
Operating System	Microsoft® Windows® CE embedded
Network and Serial Interfaces	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.)
Housing	
Plastic housing material:	ABS + polycarbonate UL94-5VB
Protection:	IP20 (IEC 60529)
Mounting	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
Dimensions (H x W x D)	131 x 270 x 62 mm Minimum space for mounting NAE35 and NAE45: 210 x 350 x 110 mm
Shipping Weight	1.2 kg
Compliance	
United States:	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
Canada:	UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003
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 2004/108/EC.
Australia and New Zealand:	C-Tick Mark, Australia/NZ Emissions Compliant
BACnet International:	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)

NAE

Network Automation Engine

NAE55xx-2 - Technical Specification

Power Requirement	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)
Power Consumption	50 VA maximum
Ambient Operating Conditions	0 – 50°C; 10–90% RH, 30°C maximum dew point
Ambient Storage Conditions	-40 – 70°C; 5–95% RH, 30°C maximum dew point
Data Protection Battery	Supports data protection on power failure. Rechargeable gel cell battery: 12 V, 1.2 Ah with a typical life of 3 to 5 years at 21°C; Product Code Number: MS-BAT1010-0
Clock Battery	Maintains real-time clock through a power failure. Onboard cell; typical life 10 years at 21°C
Processor	1.6 GHz Intel® AtomTM processor
Memory	4 GB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 1 GB Synchronous Dynamic Random Access Memory (DRAM) for operations data dynamic memory for all models
Operating System	Microsoft® Windows® Embedded Standard (WES) 2009
Network and Serial Interfaces	One Ethernet port; connects at 10 Mbps, 100 Mbps, or 1 Gbps; 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)
Housing	
Plastic housing:	With internal metal shield
Plastic material:	ABS + polycarbonate; Protection: IP20 (IEC 60529)
Mounting	On flat surface with screws on four mounting feet or on dual DIN rail
Dimensions (H x W x D)	226 x 332 x 96.5 mm including mounting feet Minimum space for mounting: 303 x 408 x 148 mm
Shipping Weight	2.9 kg
Compliance	
United States:	UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment FCC Compliant to CFR47, Part 15, Subpart B, Class A
Canada:	UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003
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 2004/108/EC.
Australia and New Zealand:	C-Tick Mark, Australia/NZ Emissions Compliant
BACnet International:	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)

NAE
Network Automation Engine

NAE85 - Technical Specification

Computer Type	Dell® PowerEdge® R410
Power Requirement	100–240 VAC 50/60 Hz
Power Supply	480 W
Ambient Operating Conditions	10 – 35°C; 20 – 80% RH, noncondensing (twmax=29C)
Ambient Storage Conditions	-40 – 65°C; 5 – 95% RH, noncondensing (twmax=38C)
Data Protection	Recommended Uninterruptable Power Supply (UPS): American Power Conversion (APC®) Smart-UPS SC 450 VA, 280 W, 120 VAC input/output, NEMA 5-15R output connections, OEM Part No. SC450RM1U
Processor	Intel® Xeon® E5506, 2.13 GHz, 4 MB Cache
Memory	2 GB DDR2, 1066 MHz, 2 x 1 GB, Single Ranked UDIMMs for 1 Processor
Hard Disk	2 x 160 GB 7.2K RPM Serial Advanced Technology Attachment (SATA), 8.9 cm Cabled 3 Gbps, RAID 1 configuration with add-in SAS6/iR (SATA/SAS Controller)
Internal Optical Drive	DVD ROM, SATA
Operating System	Microsoft Windows Web Server 2008 R2 Operating System (64-bit)
AntiVirus Software	Symantec® AntiVirus Corporate Edition Version 11
Network and Serial Interfaces	2 RJ45 1-Gbps Ethernet ports, Port 2 is disabled 2 video ports; 1 front, 1 back 1 9-pin Serial port 4 USB ports (2 front, 2 back)
Dimensions (H x W x D)	4.3 x 43.4 x 62.7 cm
Mounting	Mount in an EIA-310D compatible server cabinet
Shipping Weight	15.9 kg
Compliance	
Europe:	CE Mark (Record Holder: www.dell.com/regulatory_compliance)
BACnet International:	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)

NAE85 Software System Requirements for Installation/Upgrade

Product Code	MS-NxE85SW-0 NxE85 software for 10,000 objects (new projects only software)
Recommended Computer Platform	Intel® Xeon® E5506, 2.13 GHz, 4 MB Cache 2 x 160 GB 7.2K RPM Serial Advanced Technology Attachment (SATA), 8.9 cm Cabled 3 Gbps, RAID 1 configuration with add-in SAS6/iR (SATA/SAS Controller) DVD ROM, SATA
Memory	1 GB RAM minimum
Hard Disk	160 GB minimum
Supported Operating Systems and Software	**Microsoft® Windows® Web Server 2008 R2 OS (64-bit)** IIS Version 7.5, Microsoft .NET Framework Version 3.5.1 **Microsoft Windows Web Server 2008 OS with SP1 (32-bit)** IIS Version 7.0, Microsoft .NET Framework Version 3.5 with SP1 **Microsoft Windows 2003 Web Edition OS * with SP2 (32-bit)** IIS Version 6.0, Microsoft .NET Framework Version 3.5 with SP1
Network Communication	Network Interface Single 1 Gbps Ethernet network interface card connects at 10 Mbps, 100 Mbps or 1Gbps; (100 Mbps or better recommended)
Data Protection	Recommended Uninterruptible Power Supply (UPS): American Power Conversion (APC®) Smart-UPS SC 450VA, 280 W, 120 VAC input/output, NEMA 5-15R output connections, OEM Part No. SC450RM1U
Compliance	
BACnet International:	BACnet Testing LaboratoriesTM (BTL) 135-2004 Listed BACnet Building Controller

Note
***** We support the 32-bit version only. We do not support the 64-bit version

MSEA

NIEx9

Network Integration Engine

Network Integration Engines (NIEx9s) for 3rd 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 3rd 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 3rd Party Integrations Product Bulletin (LITSIS0011) for important product application information.

NIE29

NIE39/NIE49

NIE59

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 3rd party protocols
- Multiple connection options for data access

NIEx9

Network Integration Engine

NIE29

Ordering Codes	Description
MS-NIE29xx-x (Base Features of Each NIE29)	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. **Note:** 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)
MS-NIE2910-0E	Supports one 3rd party trunk (RS-232 or Ethernet TCP/IP). The number of devices depends on protocol. Supports one N2 Bus trunk with up to 32 N2 devices.
MS-NIE2916-0E	Supports one 3rd party trunk (RS-232 or Ethernet TCP/IP). The number of devices depends on protocol. Supports one N2 Bus trunk with up to 32 N2 devices. Includes integral display screen
MS-NIE2920-0E	Supports one 3rd party trunk (RS-232 or Ethernet TCP/IP). The number of devices depends on protocol. Supports one LonWorks Network trunk with up to 32 LonWorks devices.
MS-NIE2926-0E	Supports one 3rd party trunk (RS-232 or Ethernet TCP/IP). The number of devices depends on protocol. Supports one LonWorks Network trunk with up to 32 LonWorks devices. Includes integral display screen
MS-NIE2960-0E	Supports one 3rd party trunk (RS-232 or Ethernet TCP/IP). The number of devices depends on protocol. Supports one FC Bus trunk with up to 32 MS/TP devices.
MS-NIE2966-0E	Supports one 3rd party trunk (RS-232 or Ethernet TCP/IP). The number of devices depends on protocol. Supports one FC Bus trunk with up to 32 MS/TP devices. Includes integral display screen

Technical Specification

Power Requirement	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)
Power Consumption	25 VA maximum **Note:** The 25 VA rating does not include any power supplied by the NIEx9 to devices connected at the NIEx9 Binary Outputs (BOs). BO devices connected to and powered by an NIEx9 can require an additional 125 VA (maximum).
Ambient Operating Conditions	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
Ambient Storage Conditions	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
Data Protection	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0
Processor	192 MHz Renesas™ SH4 7760 RISC processor
Memory	128 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 128 MB Synchronous Dynamic Random Access Memory (DRAM) for operations data dynamic memory
Operating System	Microsoft® Windows® CE embedded
Network and Serial Interfaces	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; with pluggable keyed 4-position terminal block One USB serial port with standard USB connector
Housing	Plastic housing
Plastic material:	ABS and polycarbonate
Protection:	IP20 (IEC60529)
Mounting	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
Dimensions (H x W x D)	155 x 270 x 64 mm Minimum mounting space required: 250 x 370 x 110 mm
Shipping Weight	1.2 kg
Compliance	
Europe:	CE Mark, EMC Directive 2004/108/EEC, in accordance with EN 61000-6-3 Generic Emission Standard for Residential and Light Industry and EN 61000-6-2 Generic Immunity Standard for Heavy Industrial Environment
BACnet International:	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)

NIEx9

Network Integration Engine

NIE39

Ordering Codes	Description
MS-NIE39xx-x (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. **Note:** 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)
MS-NIE3910-2E	Supports one 3rd party trunk (RS-232 or Ethernet TCP/IP). The number of devices depends on protocol. Supports up to 50 devices on the N2 or BACnet MS/TP trunk.
MS-NIE3920-2E	Supports one 3rd party trunk (RS-232 or Ethernet TCP/IP). The number of devices depends on protocol. Supports one LonWorks Network trunk with up to 64 LonWorks devices.

NIE49

Ordering Codes	Description
MS-NIE49xx-x (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. **Note:** 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)
MS-NIE4910-2E	Supports one 3rd party trunk (RS-232 or Ethernet TCP/IP). The number of devices depends on protocol. Supports up to 100 devices on the N2 or BACnet MS/TP trunk.
MS-NIE4920-2E	Supports one 3rd party trunk (RS-232 or Ethernet TCP/IP). The number of devices depends on protocol. Supports one LonWorks Network trunk with up to 128 LonWorks devices.

Technical Specifications

Power Requirement	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)
Power Consumption	25 VA maximum
Ambient Operating Conditions	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
Ambient Storage Conditions	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
Data Protection	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0
Processor	192 MHz Renesas™ SH4 7760 RISC processor
Memory	128 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 128 MB Synchronous Dynamic Random Access Memory (DRAM) for operations data dynamic memory
Operating System	Microsoft® Windows® CE embedded
Network and Serial Interfaces	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 NIE3901 and NIE4901 models only) One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (available on NIIE3920 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; with pluggable keyed 4-position terminal block (1 for integration bus and 1 for a diagnostic port) One USB serial port with standard USB connector that supports an optional, user-supplied external modem.
Housing	Plastic housing material: ABS + polycarbonate UL94-5VB
Protection:	IP20 (IEC 60529)
Mounting	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
Dimensions (H x W x D)	131 x 270 x 62 mm Minimum space for mounting: 210 x 350 x 110 mm
Shipping Weight	1.2 kg
Compliance	
Europe:	CE Mark, EMC Directive 2004/108/EC, in accordance with EN 61000-6-3 Generic Emission Standard for Residential and Light Industry and EN 61000-6-2 Generic Immunity Standard for Heavy Industrial Environment
BACnet International:	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)

NIEx9
Network Integration Engine

NIE59

Ordering Codes	Description
MS-NIE59xx-x (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. **Note:** 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)
MS-NIE5960-2E	Supports one 3rd party trunk (RS-232 or Ethernet TCP/IP). The number of devices depends on protocol. Supports up to 100 devices on the N2 or BACnet MS/TP trunk.
MS-NIE5920-2E	Supports one 3rd party trunk (RS-232 or Ethernet TCP/IP). The number of devices depends on protocol. Supports up to 100 devices on the N2 or BACnet MS/TP trunk and one LonWorks Network trunk with up to 255 LonWorks devices.

NIE59xx-2 - Technical Specifications

Power Requirement	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)
Power Consumption	50 VA maximum
Ambient Operating Conditions	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
Ambient Storage Conditions	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
Data Protection	Supports data protection on power failure. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of 3 to 5 years at 21°C; Product Code Number: MS-BAT1010-0
Clock Battery	Maintains real-time clock through a power failure. Onboard cell; typical life 10 years at 21°C
Processor	1.6 GHz Intel® Atom™ processor
Memory	4 GB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 1 GB Synchronous Dynamic Random Access Memory (DRAM) for operations data dynamic memory for all models
Operating System	Microsoft® Windows® Embedded Standard (WES) 2009
Network and Serial Interfaces	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 One RS-232-C serial port, with standard 9-pin sub-D connector, that support all standard baud rates (used as integration bus or diagnostic port) One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (available on NIIE5920 model only) Two USB serial ports, standard USB connectors, one operating as a diagnostic logging port.
Housing	Plastic housing with internal metal shield
Plastic material	ABS + polycarbonate UL94-5VB Protection: IP20 (IEC 60529)
Mounting	On flat surface with screws on four mounting feet or on dual DIN rail
Dimensions (H x W x D)	226 x 332 x 96.5 mm including mounting feet Minimum space for mounting: 303 x 408 x 148 mm
Shipping Weight	2.9 kg
Compliance	
Europe:	CE Mark, EMC Directive 2004/108/EC, in accordance with EN 61000-6-3 Generic Emission Standard for Residential and Light Industry and EN 61000-6-2 Generic Immunity Standard for Heavy Industrial Environment
BACnet International:	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)

Accessories

Ordering Codes	Description
MS-BAT1010-0	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
MS-BAT1020-0	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

MSEA

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

- Uses commonly accepted Information Technology (IT) standards at the automation and enterprise level
- 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

NCE

Network Control Engine

Ordering Codes	Description
MS-NCE25xx-x (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.
MS-NCE2500-0	Base features with no physical field controller trunk connection.
MS-NCE2506-0	Base features with no physical field controller trunk connection. Includes integral display screen.
MS-NCE2510-0	Supports one N2 Bus trunk with up to 32 N2 devices.
MS-NCE2511-0	Supports one N2 Bus trunk with up to 32 N2 devices. Includes internal modem.
MS-NCE2516-0	Supports one N2 Bus trunk with up to 32 N2 devices. Includes integral display screen.
MS-NCE2517-0	Supports one N2 Bus trunk with up to 32 N2 devices. Includes integral display screen and internal modem.
MS-NCE2520-0	Supports one LonWorks network trunk with up to 32 LonWorks devices.
MS-NCE2521-0	Supports one LonWorks network trunk with up to 32 LonWorks devices. Includes internal modem.
MS-NCE2526-0	Supports one LonWorks network trunk with up to 32 LonWorks devices. Includes integral display screen.
MS-NCE2527-0	Supports one LonWorks network trunk with up to 32 LonWorks devices. Includes integral display screen and internal modem.
MS-NCE2560-0	Supports one FC Bus trunk with up to 32 MS/TP devices.
MS-NCE2561-0	Supports one FC Bus trunk with up to 32 MS/TP devices. Includes internal modem.
MS-NCE2566-0	Supports one FC Bus trunk with up to 32 MS/TP devices. Includes integral display screen.
MS-NCE2567-0	Supports one FC Bus trunk with up to 32 MS/TP devices. Includes integral display screen and internal modem.

Note
For repair parts, add -700 after the code number.

Accessories

Ordering Codes	Description
MS-BAT1020-0	Replacement data protection battery for NAE35, NAE45, and NCE25. Rechargeable NiMH battery: 3.6 V 500 mAh, with a typical life of 10 years at 21°C (70°F)
MS-BTCVT-1	Wireless commissioning converter, with Bluetooth® technology, for configuring and commissioning the NCE field controller and the devices on the NCE SA Bus
MS-DIS1710-0	Local controller display connects to NCE on SA Bus and provides menu display and navigation keypad for monitoring status and controlling parameters on the NCE's integral field controller. **Note:** A DIS1710 display does not operate on NCE models that have an integral controller display.
AS-XFR100-1	Power transformer (Class 2, 24 VAC, 92 VA maximum output), with enclosure
AS-XFR010-1	Power transformer (Class 2, 24 VAC, 92 VA maximum output), no enclosure
MS-RAP-0	Ready access portal server, which provides a user interface that is a natural, complementary extension of the Metasys site management Portal UI. **Note:** 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.
MS-EXPORT-0	Metasys export utility, which extracts historical trend, alarm, and audit data from the system and presents the historical data in a variety of formats. **Note:** 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.

NCE

Network Control Engine

Technical Specification

Power Requirement	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)
Power Consumption	25 VA maximum **Note:** The 25 VA rating does not include any power supplied by the NIEx9 to devices connected at the NIEx9 Binary Outputs (BOs). BO devices connected to and powered by an NIEx9 can require an additional 125 VA (maximum).
Ambient Operating Conditions	0 to 50°C; 10 to 90% RH, 30°C maximum dew point
Ambient Storage Conditions	-40 to 70°C; 5 to 95% RH, 30°C maximum dew point
Data Protection	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C; Product Code Number: MS-BAT1020-0
Processor	192 MHz Renesas™ SH4 7760 RISC processor
Memory	128 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 128 MB Synchronous Dynamic Random Access Memory (DRAM) for operations data dynamic memory
Operating System	Microsoft® Windows® CE embedded
Network and Serial Interfaces	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; with pluggable keyed 4-position terminal block One USB serial port with standard USB connector
Housing	Plastic housing
Plastic material:	ABS and polycarbonate
Protection:	IP20 (IEC60529)
Mounting	On flat surface with screws on three mounting clips or a single 35 mm DIN rail
Dimensions (H x W x D)	155 x 270 x 64 mm Minimum mounting space required: 250 x 370 x 110 mm
Shipping Weight	1.2 kg
Compliance	
Europe:	CE Mark, EMC Directive 2004/108/EEC, in accordance with EN 61000-6-3 Generic Emission Standard for Residential and Light Industry and EN 61000-6-2 Generic Immunity Standard for Heavy Industrial Environment
BACnet International:	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)

MSEA Controllers

FEC/FAC

Field Equipment Controller

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 FEC1600 and the 17-point FEC2600, as well as I/O expandability and VAV application specific controllers, all seamlessly integrated 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.

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 a 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	FEC/FAC2611	FAC2612
Universal Input (UI)	Analog input, voltage mode, 0–10 VDC Analog input, current mode, 4–20 mA Analog input, resistive mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A99B SI), NTC (10k type L, 2.252k type 2) Binary input, dry contact maintained mode	2	6	5
Binary Input (BI)	Dry contact maintained mode Pulse counter/accumulator mode (high speed), 100 Hz	1	2	4
Analog Output (AO)	Analog output, voltage mode, 0–10 VDC Analog output, current mode, 4–20 mA	0	2	0
Binary Output (BO)	24 VAC triac	3	3	0
Configurable Output (CO)	Analog output, voltage mode, 0–10 VDC Binary output mode, 24 VAC triac	4	4	4
Relay Outputs (RO)	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	5 (2 x SPDT) (3 x SPST)

Note:
Analog input, current mode is set by hardware for the FEC/FAC26 and as software for the FEC16.

FEC/FAC
Field Equipment Controller

Ordering Codes	Description
MS-FEC1611-0	10-Point Field Equipment Controller with 2 UI, 1 BI, 3 BO and 4 CO; 24 VAC; SA Bus
MS-FEC1621-0	10-Point Field Equipment Controller with 2 UI, 1 BI, 3 BO and 4 CO; 24 VAC; SA Bus; Integral display
MS-FEC2611-0	17-Point Field Equipment Controller with 6 UI, 2 BI, 3 BO, 2 AO and 4 CO; 24 VAC; SA Bus
MS-FEC2621-0	Field Equipment Controller Cover with 6 UI, 2 BI, 3 BO, 2 AO and 4 CO; 24 VAC; SA Bus; Integral display
MS-FAC2611-0	17-Point Advanced Application Field Equipment Controller with 6 UI, 2 BI, 2 AO, 3 BO and 4 CO; 24 VAC; SA Bus
MS-FAC2612-1	18-Point Advanced Application Field Equipment Controller with 5 UI, 4 BI, 4 CO and 5 RO; 24 VAC; SA Bus; Pluggable Terminals
MS-FAC2612-2	18-Point Advanced Application Field Equipment Controller with 5 UI, 4 BI, 4 CO and 5 RO; 100-250 VAC; SA Bus; Pluggable Terminals

Accessories

Ordering Codes	Description
MS-DIS1710-0	Local Controller Display for FEC1611, FEC2611, FAC2611 and FAC2612 Models
MS-BTCVT-1	BlueTooth wireless commissioning adaptor
MS-BTCVTCBL-700	Cable replacement Set for the MS-BTCVT-1 includes retractable 5 m cable
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router. Includes 1.8m Cable and 1.5 m Ethernet cable
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-TBKLV03-0	FAC2612, 3 Position Line Voltage Terminal Block. Includes 3 pieces (Grey)
MS-TBKRO02-0	FAC2612, 2 Position Relay Output Terminal Block. Includes 9 pieces, 3 of each position (Red)
MS-TBKRO03-0	FAC2612, 3 Position Relay Output Terminal Block. Includes 6 pieces, 3 of each position (Red)
MS-TBKCO04-0	FAC2612, 4 Position Configurable Output Terminal Block. Includes 6 pieces, 3 of each position (Black)
MS-TBKUI04-0	FAC2612, 4 Position Universal Input Terminal Block. Includes 9 pieces, 3 of each position (White)
MS-TBKUI05-0	FAC2612, 5 Position Universal Input Terminal Block. Includes 3 pieces (White)
MS-ZFR1810-0	Wireless Field Bus Coordinator, 10 mW Transmission Power. Functions with NAE35xx, NAE45xx, NAE55xx, and NCE25xx models.
MS-ZFR1811-0	Wireless Field Bus Router, 10 mW Transmission Power. Functions with Metasys BACnet FECs, VMA1600s, and WRZ-TTx Series Wireless Mesh Room Temperature Sensors.
MS-ZFRCBL-0	Wire Harness for use with ZFR1811 Router. Allows ZFR1811 Router to function with FEC1621; and with FEC1611, VMA1610, or VMA1620 controllers in conjunction with NS Series Sensors. Wireless Commissioning Converter, or DIS1710 Local Controller Display.

FEC/FAC
Field Equipment Controller

FEC - Technical Specifications

Supply Voltage	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV) (Europe)
Power Consumption	14 VA maximum for FEC1611 and FEC2611 (no integral display) 20 VA maximum for FEC1621 and FEC2621 (with integral display) **Note:** VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 84 VA (maximum).
Ambient Conditions	
Operating:	0 to 50°C; 10 to 90% RH noncondensing
Storage Temperature:	-40 to 80°C; 5 to 95% RH noncondensing
Controller Addressing	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.)
Communications Bus	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.
Processor	H8SX/166xR Renesas® microcontroller
Memory	1 MB flash memory and 512 KB Random Access Memory (RAM)
Input and Output Capabilities	
FEC16 Models:	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
FEC26 Models:	6 - Universal inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm or binary dry contact 2 - Binary inputs: Defined as dry contact maintained or pulse counter/accumulator mode 3 - Binary outputs: Defined as 24 VAC triac (selectable internal or external source power) 4 - Configurable outputs: Defined as 0–10 VDC or 24 VAC triac BO 2 - Analog outputs: Defined as 0–10 VDC or 4–20 mA
Analog Input/Analog Output Resolution and Accuracy	Analog input: 16-bit resolution Analog output: 16-bit resolution and ±200 mV in 0–10 VDC applications
Terminations	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
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)	
FEC16 Models:	150 x 164 x 53 mm including terminals and mounting clips
FEC26 Models:	150 x 190 x 53 mm including terminals and mounting clips
	Note: Mounting space for FEC16 and FEC26 models requires an additional 50 mm space on top, bottom, and front face of controller for easy cover removal, ventilation and wire terminations.
Weight	
FEC16 Models:	0.4 kg
FEC26 Models:	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 Industry and EN 61000-6-2 (2005) Generic Immunity Standard for Heavy Industrial Environment **Note:** For FEC26 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)

FEC/FAC

Field Equipment Controller

FAC - Technical Specifications

Supply Voltage	
FAC2611-0 and FAC2612-1	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV) (Europe)
MS-FAC2612-2	100 to 250 VAC, 50/60 Hz
Power Consumption	25 VA maximum **Note:** VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 84 VA (maximum).
Ambient Conditions	
Operating:	0 to 50°C; 10 to 90% RH noncondensing
Storage:	-40 to 80°C; 5 to 95% RH noncondensing
Controller Addressing	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)
Communications Bus	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.
Processor	H8SX/166xR Renesas® microcontroller
Memory	4 MB Flash Memory and 1 MB Random Access Memory (RAM)
Input and Output Capabilities	
FAC2611-0:	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 2 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA 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
FAC2612-1 and FAC2612-2:	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 4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO 2 - Relay Outputs: (Single-Pole, Double-Throw) Rated as: 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 3 - Relay Outputs: (Single-Pole, Single-Throw) Rated as: 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
Analog Input/Analog Output Resolution and Accuracy	Analog Input: 16-bit resolution Analog Output: 16-bit resolution and ±200 mV in 0–10 VDC applications
Terminations	Input/Output: Fixed Screw Terminal Blocks (FAC2611) 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
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)	
FAC2611-0:	150 x 190 x 53 mm including terminals and mounting clips
FAC2612-x:	150 x 164 x 53 mm including terminals and mounting clips
	Note: Mounting space for FAC26 models requires an additional 50 mm space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.
Weight	0.5 kg
Compliance	
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 2004/108/EC.
BACnet International:	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Advanced Application Controller (B-AAC)

MSEA Controllers

VMA (BACnet)

Variable Air Volume

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_2) 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 VMA1615 and VMA1630 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

VMA

Variable Air Volume

Ordering Codes	Description
MS-VMA1615-0	32-Bit Integrated BACnet VAV Controller/Actuator/Pressure Sensor (Cooling only) 3 UI and 2 BO, 24 VAC
MS-VMA1630-0	32-Bit Integrated BACnet VAV Controller/Actuator/Pressure Sensor (Cooling with Reheat and Fan Control) 3 UI, 3 BO, and 2 CO, 24 VAC

VMA Selection Charts

Point Types	Signals Accepted	VMA1615	VMA1630
Modular Jacks	Not Applicable	6-pin SA Bus with four communicating sensors and 6- pin FC Bus for tool support	
Universal Input (UI)	Analog Input, Voltage Mode, 0–10 VDC 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	3	3
Binary Output (BO)	24 VAC triac	2	3
Configurable Output (CO)	Analog output, voltage mode, 0 – 10 VDC Binary output mode, 24 VAC triac	0	2
Integrated Actuator	Internal	1	1
Integrated Flow Sensor	Internal	1	1
Zone Sensor Input	On SA Bus *	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:
* 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
MS-DIS1710-0	Local Controller Display: Refer to Local Controller Display Product Bulletin (LIT-12011273) for more information.
MS-BTCVT-1	Wireless Commissioning Converter with Bluetooth® Technology
MS-ZFR1810-0	Wireless Field Bus Coordinator, 10 mW Transmission Power. Functions with NAE35xx, NAE45xx, NAE55xx, and NCE25xx Models
MS-ZFR1811-0	Wireless Field Bus Router, 10 mW Transmission Power. Functions with Metasys BACnet FECs, VMA16s, and WRZ-TTx Series Wireless Mesh Room Temperature Sensors
MS-BTCVTCBL-700	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.
WRZ Series Sensors	WRZ Series Wireless Room Sensors: Refer to the WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653) for specific sensor model descriptions.
NS Series Sensors	NS Series Network Sensors: Refer to the NS Series Network Sensors Product Bulletin (LIT-12011574) for specific sensor model descriptions.
AP-TBK1002-0	2-Position Screw Terminal that Plugs onto VMA Output Point Spade Lug
AP-TBK1003-0	3-Position Screw Terminal that Plugs onto VMA Output Point Spade Lugs
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown, Bulk Pack
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
TL-BRTRP-0	Portable BACnet IP to MS/TP Router
WRZ-7860-0	Many-to-One ZigBee Wireless Receiver for Wireless Sensor Only Applications
WRZ-SST-100	Wireless Sensing System Tool Kit
ZFR-USBHA-0	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.

VMA
Variable Air Volume

Technical Specifications

Product Code Numbers	**MS-VMA1615-0:** Cooling Only VMA **MS-VMA1630-0:** Cooling with Reheat and Fan Control VMA
Power Requirement	
Voltage:	24 VAC (nominal, 20 VAC minimum / 30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV) (Europe)
Consumption:	10 VA typical, 14 VA maximum **Note:** VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO for a possible total consumption of an additional 60 VA (maximum).
Ambient Conditions	
Operating:	0 to 50°C
Storage Temperature:	-40 to 70°C
Terminations	Inputs/Outputs: 6.3 mm Spade Lugs
FC Bus, SA Bus, and Supply Power:	4-wire and 2-wire pluggable screw terminal blocks
FC and SA Bus Modular Ports:	RJ-12 6-pin modular jacks
Controller Addressing	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)
Communications Bus	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.
Processor	RX630 32-bit Renesas® microcontroller
Memory	1 MB Flash Memory and 512 KB Random Access Memory (RAM)
Input and Output Capabilities	
Universal Input:	Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact
Binary Outputs:	Defined as 24 VAC Triac (internal power source)
Configurable Outputs:	Defined as 0–10 VDC or 24 VAC Triac BO
Analog Input/Analog Output Accuracy	
Analog Input:	15-bit resolution on UIs
Analog Output:	0–10 VDC ± 200 mV
Air Pressure Differential Sensor	Range: -1.5 inches to 1.5 inches H20 (-374pa to 374pa)
Performance Characteristics:	Total Error Band: ±1.3% Full Span Maximum Accuracy: ±0.25% Full Scale Best Fit
Mounting	Mounts to damper shaft using single set screw and to duct with single mounting screw.
Actuator Rating:	4 Nm minimum shaft length = 44 mm
Dimensions (H x W x D)	165 x 125 x 73 mm Center of Output Hub to Center of Captive Spacer: 135 mm
Weight	0.65 kg
Compliance	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.
BACnet International:	BACnet Testing Laboratories (BTL) 135-2010 Protocol Revision 7 Listed BACnet Application Specific Controller (B-ASC)

MSEA Controllers

VMA (N2)

Variable Air Volume

VMA1832s (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 VMA1832 controller features 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_2) level, setpoint adjustments, and discharge air temperatures.
The VMA1832 controller's 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 (Available at a future date).
  This functionality provides a differentiated and cost-effective platform upgrade path for existing VMA14xx customers who are looking for a gradual upgrade strategy.

VMA

Variable Air Volume

Ordering Codes	Description
MS-VMA1832-0	Replacement Integrated VAV Controller/Actuator/Pressure Sensor, N2/FC Bus, and SA Bus (32-bit Processor) – Replaces AP-VMA14xx models.

VMA Selection Charts

Point Types	Signals Accepted	VMA1832
Modular Jacks	Not Applicable	8-pin SA Bus supports analog non-communicating sensor
Universal Input (UI)	Analog Input, Voltage Mode, 0–10 VDC 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	3
Binary Output (BO)	24 VAC triac	3
Configurable Output (CO)	Analog output, voltage mode, 0 – 10 VDC Binary output mode, 24 VAC triac	2
Integrated Actuator	Internal	1
Integrated Flow Sensor	Internal	1
Zone Sensor Input	On SA Bus*	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:
* A total of 10 SA bus addresses maximum can be used in a single VMA controller.

Accessories

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

VMA
Variable Air Volume

Technical Specifications

Product Code Numbers	**MS-VMA1832-0:** Cooling with Reheat and Fan Control VMA
Power Requirement	
Voltage:	24 VAC (nominal, 20 VAC minimum / 30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV) (Europe)
Consumption:	10 VA typical, 14 VA maximum **Note:** VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 60 VA (maximum).
Ambient Conditions	
Operating:	0 to 50°C
Storage Temperature:	-40 to 70°C
Terminations	Inputs/Outputs, SA bus, and Supply Power: 6.3 mm Spade Lugs
Supply Power:	N2/FC Bus Pluggable Screw Terminal Block
TSTAT Modular Port:	RJ-12 6-pin modular jacks
Controller Addressing	DIP switch set
N2 Open Protocol:	Valid field controller device addresses 1–253
BACnet MS/TP Protocol:	Valid field controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid field controller addresses)
Communications Bus	
N2 Open Protocol:	N2/FC Bus: 1.5 mm (18 AWG) standard 3-wire, twisted, shielded cable recommended between the supervisory controller and field controllers*
BACnet MS/TP Protocol:	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
Processor	RX630 32-bit Renesas® microcontroller
Memory	1 MB Flash Memory and 512 KB Random Access Memory (RAM)
Input and Output Capabilities	
Universal Input:	Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact
Binary Outputs:	Defined as 24 VAC triac (internal power source)
Configurable Outputs:	Defined as 0–10 VDC or 24 VAC Triac BO
Analog Input/Analog Output Accuracy	
Analog Input:	15-bit resolution on UIs
Analog Output:	0–10 VDC ± 200 mV
Air Pressure Differential Sensor	Range: -1.5 inches to 1.5 inches H20 (-374pa to 374pa)
Performance Characteristics:	Total Error Band: ±1.3% Full Span Maximum Accuracy: ±0.25% Full Scale Best Fit
Mounting	Mounts to damper shaft using single set screw and to duct with single mounting screw.
Actuator Rating:	4 Nm minimum shaft length = 44 mm
Dimensions (H x W x D)	165 x 125 x 73 mm - Center of Output Hub to Center of Captive Spacer: 135 mm
Weight	0.65 kg
Compliance	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.
BACnet International:	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).

MSEA Controllers

IOM

Input/Output Module Series

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
Universal Input (UI)	Analog Input, Voltage Mode, 0 - 10 VDC Analog Input, Current Mode, 4 - 20 mA Analog Input, Resistive Mode, 0 - 2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A99B SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	0	2	4	6	8	0	0
Binary Input (BI)	Dry Contact Maintained Mode Pulse Counter Mode (High Speed), 100 Hz	4	0	0	2	0	16	8
Analog Output (AO)	Analog Output, Voltage Mode, 0 - 10 VDC Analog Output, Current Mode, 4 - 20 mA	0	0	0	2	2	0	0
Binary Output (BO)	24 VAC Triac	0	0	0	3	0	0	8
Universal Output (UO)	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
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	0	0	0	4	0	0	0
Relay Output	120/240 VAC	0	2	4	0	0	0	0

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

IOM
Input/Output Module Series

Technical Specifications

Supply Voltage	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV) Europe
Power Consumption	14 VA maximum **Note:** 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).
Ambient Conditions	
Operating:	0 to 50°C; 10 to 90% RH noncondensing
Storage Temperature:	-40 to 80°C; 5 to 95% RH noncondensing
Controller Addressing	DIP switch set; valid field controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid IOM addresses.)
Communications Bus	BACnet® MS/TP, RS-485: 3-wire FC Bus between the supervisory controller and 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*.
Processor	H8SX/166xR Renesas® 32-bit microcontroller
Memory	1 MB Flash Memory and 512 KB Random Access Memory (RAM)
IOM17, IOM27, and IOM37 Models:	640 KB Flash Memory and 128 KB Random Access Memory (RAM)
IOM47 Models:	1 MB Flash Memory and 512 KB RAM
Input and Output Capabilities	Analog Input: 16-bit resolution Analog Output: 16-bit resolution and ±200 mV in 0–10 VDC applications
IOM1711:	4 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode
IOM2711:	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: 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
IOM2721:	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
IOM3711:	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: 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
IOM3721:	16 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode
IOM3731:	8 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 8 - Binary Outputs: Defined as 24 VAC Triac **Note:** Binary Outputs (BOs) on MS-IOM3731 controllers do not supply power for the outputs; the BOs require external low-voltage (< 30 VAC) power sources.
IOM4711:	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...

IOM
Input/Output Module Series

Technical Specifications

Analog Input/Analog Output Resolution and Accuracy	
Analog Input:	16-bit resolution
Analog Output:	16-bit resolution and ±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)

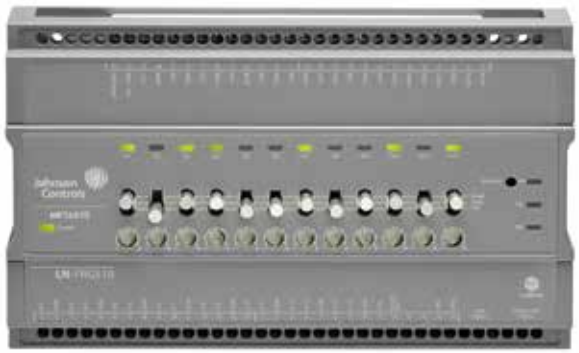
Accessories

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 FEC1611 and FEC2611 Models
MS-BTCVT-1	Wireless Commissioning Converter, with BluetoothR technology
MS-BTCVTCBL-700	Cable replacement Set for the MS-BTCVT-1 or the NS-ATV7003-0; includes one 5-foot retractable cable

MSEA Controllers

LN

LON Controller



The LN series free programmable controllers are microprocessor based free programmable controllers, designed to control various Heating, Ventilating and Air Conditioning (HVAC) applications.

The Metasys® system LN series free programmable controllers product family is built to meet rigorous quality standards. The complete family of Metasys system LN series controllers is designed for use with any LonWorks® network open and interoperable system.

Features

- Configurable software
  Features an LNS® plug-in that provides the ability to easily configure inputs, outputs, and sequence options. You can use either LN GPI software or LN Builder to configure your controller
- Robust hardware
  Features a fire retardant plastic enclosure, a 128K Flash memory or the configuration and trending of up to 12,000 events, and a status indicator on each output
- Powerful control option
  Allows you to easily configure all features, including, input types, output types, heating and cooling stages, variable airflow, and Proportional plus Integral plus Derivative (PID) loops. The controller supports four input types: space temperature; setpoint adjustment; duct temperature; and occupancy, bypass, or window contacts
- Wireless Functionality
  Features an optional EnOcean® wireless receiver that you can use with a variety of wireless sensors and switches. The wireless receiver supports up to 28 wireless inputs which allow you to create wire-free installations

Ordering Codes	Description
LN-PRG203-2	LonMark certified Programmable Controller with 6 Universal Inputs (UIs), 5 Digital Outputs (DOs), 3 Universal Outputs (UOs), and LNS plug-in, 24 VAC, EnOcean® Wireless adaptor
LN-PRG300-2	LonMark certified Programmable Controller with 10 UI, 10 UO, and LNS plug-in, 24 VAC, EnOcean® Wireless adaptor
LN-PRG400-2	LonMark certified Programmable Controller with 12 UI, 12 UO, and LNS plug-in, 24 VAC, EnOcean® Wireless adaptor
LN-PRG410-2	LonMark certified Programmable Controller with 12 UI, 12 UO, Hands-Off-Auto (HOA) Switches, and LNS plug-in, 24 VAC, EnOcean® Wireless adaptor
LN-PRG600-2	LonMark Certified Programmable Controller with 16 Universal Inputs (UI), 12 Universal Outputs (UO), and LNS Plug-in, 24 VAC, EnOcean® Wireless adaptor
LN-PRG610-2	LonMark Certified Programmable Controller with 16 UI, 12 UO, Hands-off-Auto (HOA) Switches, and LNS Plug-in, 24 VAC, EnOcean® Wireless adaptor

Accessories

Ordering Codes	Description
LN-BLDSW-0	LN-Builder 3.2 Installation CD, LN Series & LonWorks set-up software tool

LN
LON Controller

LN-PRG203-2 - Technical Specifications

Power Requirement	
Voltage:	24 VAC/DC; ±15%, 50/60 Hz, Class 2
Protection:	1.85 A auto-reset fuse
Consumption:	5 VA
Maximum Consumption:	18 VA
Ambient Conditions	
Operating:	0 to 70°C; 0 to 90% RH noncondensing
Storage Temperature:	-20 to 70°C; 0 to 90% RH noncondensing
General	
Processor:	Neuron® 3150®, 8 bits, 10 MHz
Memory:	Nonvolatile Flash 64k (APB application); Nonvolatile Flash 128K (storage)
Media Channel:	TP/FT-10; 78 Kbps
Communication:	LonTalk® protocol
Transceiver:	FT-X1
Status Indicator:	Green LED - power status and LON TX, Orange LED - service and LON RX
Communication Jack:	LON audio jack mono 3.5 mm
Wireless:	EnOcean® Wireless adaptor
Enclosure	
Material:	ABS type PA-765A
Dimensions (with screws):	144.8 x 119.4 x 50.8 mm
Shipping Weight:	0.44 kg
Electromagnetic Compatibility	
CE Emission:	EN61000-6-3: 2001; Generic standards for residential, commercial and light-industrial
CE Immunity:	EN61000-6-1: 2001; Generic standards for residential, commercial and light-industrial
Agency	
UL Listed:	UL916 Energy management equipment
Material:	UL94-5VA
6 Inputs	
Digital Inputs:	Voltage free contacts

Analog Inputs:

Sensor Types	Range	Accuracy
0 to 20 mA with 249 ohms external resistor (wired in parallel)	0 to 10 VDC	±0.5%
Type 2 and type 3: 10k ohms	-40 to 150°C	
PT1000: 1k ohm		
PT100: 100 ohms	-40 to 135°C	

8 Outputs	Auto reset fuse Maximum load 600 ohms Output Resolution: 10-bit digital/analog converter
5 Digital Outputs:	24 VAC Triac, digital (on/off) or PWM 0.75 A @ 70°C 1A @ 40°C PWM control: adjustable period from 2 seconds to 15 minutes
3 Universal Outputs:	0-10 VDC, digital 0-12 VDC (on/off) or PWM PWM control: adjustable period from 2 seconds to 15 minutes 20 mA maximum @ 12 VDC (60°C)
Wireless Receiver	**Communication:** EnOcean® Wireless standard **Number of Wireless Inputs:** 282 **Supported Wireless Receivers:** LN-WMOD315-0 and LN-WMOD868-0 **Telephone Cord Cable:** Connector: 4P4C modular jack, Length: 1 m

LN
LON Controller

LN-PRG300-2 - Technical Specifications

Power Requirement	
Voltage:	24 VAC/DC; ±15%, 50/60 Hz, Class 2
Protection:	1.85 A auto-reset fuse
Consumption:	5 VA
Maximum Consumption:	18 VA
Ambient Conditions	
Operating:	0 to 70°C; 0 to 90% RH noncondensing
Storage Temperature:	-20 to 70°C; 0 to 90% RH noncondensing
General	
Standard:	LonMark® functional profile: SCC-VAV Controller #8502
Processor:	Neuron® 3150®, 8 bits, 10 MHz
Memory:	Nonvolatile Flash 64k (APB application); Nonvolatile Flash 128K (storage)
Media Channel:	TP/FT-10; 78 Kbps
Communication:	LonTalk® protocol
Clock:	Real-time clock chip, CR2032 lithium battery (for clock)
Status Indicator:	Green LED - power status and LON TX, Orange LED - service and LON RX
Communication Jack:	LON audio jack mono 3.5 mm
Wireless:	EnOcean® Wireless adaptor
Enclosure	
Material:	ABS type PA-765A
Dimensions (with screws):	144.8 x 119.4 x 50.8 mm
Shipping Weight:	0.39 kg
Electromagnetic Compatibility	
CE Emission:	EN61000-6-3: 2001; Generic standards for residential, commercial and light-industrial
CE Immunity:	EN61000-6-1: 2001; Generic standards for residential, commercial and light-industrial
Agency	
UL Listed:	UL916 energy management equipment
Material:	UL94-5VA
10 Inputs	
Digital Inputs:	Voltage free contacts

Analog Inputs:

Sensor Types	Range	Accuracy
4 to 20 mA with 249 ohms external resistor (wired in parallel)	0 to 10 VDC	±0.5%
Type 2 and type 3: 10k ohms	-40 to 150°C	
RTD: 1k ohm		±1%
PT100: 100 ohms	-40 to 135°C	

8 Analog Outputs	0 to 10 VDC, digital 0 to 12 VDC (on/off) or PWM PWM output: adjustable period from 2 seconds to 15 minutes 60 mA maximum @ 12 VDC (60°C) maximum load 200 ohms Auto-reset fuse: 60 mA @ 60°C; 100 mA @ 20°C Output resolution: 10 bits digital/analog converter
Wireless Receiver	**Communication:** EnOcean® Wireless standard **Number of Wireless Inputs:** 282 **Supported Wireless Receivers:** LN-WMOD315-0 and LN-WMOD868-0 **Telephone Cord Cable:** Connector: 4P4C modular jack, Length: 1 m

LN
LON Controller

LN-PRG410-2 and LN-PRG400-2 - Technical Specifications

Power Requirement	
Voltage:	24 VAC/DC; ±15%, 50/60 Hz, class 2
Protection:	2.5 A auto-reset fuse
Consumption:	5 VA
Maximum Consumption:	18 VA
Power Supply:	15 VDC output used to power 4 to 20 mA inputs
Ambient Conditions	
Operating:	0 to 70°C; 0 to 90% RH noncondensing
Storage Temperature:	-20 to 70°C; 0 to 90% RH noncondensing
General	
Standard:	LonMark® functional profile: SCC-VAV controller #8502
Processor:	Neuron® 3150®, 8 bits, 10 MHz
Memory:	Nonvolatile Flash 64k (APB application); Nonvolatile Flash 128K (storage)
Media Channel:	TP/FT-10; 78 Kbps
Communication:	LonTalk® protocol
Clock:	Real-time clock chip, CR2032 lithium battery (for clock)
Status Indicator:	Green LED - power status and LON TX, Orange LED - service and LON RX
Communication Jack:	LON audio jack mono 3.5 mm
Wireless:	EnOcean® Wireless adaptor
Enclosure	
Material:	ABS type PA-765A
Dimensions (with screws):	195.6 x 119.4 x 50.8 mm
Shipping Weight:	0.39 kg
Electromagnetic Compatibility	
CE Emission:	EN61000-6-3: 2001; Generic standards for residential, commercial and light-industrial
CE Immunity:	EN61000-6-1: 2001; Generic standards for residential, commercial and light-industrial
Agency	
UL Listed:	UL916 Energy management equipment
Material:	UL94-5VA
12 Inputs	
Digital Inputs:	Voltage free contacts

Analog Inputs:

Sensor Types	Range	Accuracy
4 to 20 mA with 249 ohms external resistor (wired in parallel)	0 to 10 VDC	±0.5%
Type 2 and type 3: 10k ohms	-40 to 150°C	
RTD: 1k ohm		±1%
PT100: 100 ohms	-40 to 135°C	

12 Analog Outputs	0 to 10 VDC, digital 0 to12 VDC (on/off) or PWM PWM output: adjustable period from 2 seconds to 15 minutes 60 mA maximum @ 12 VDC (60°C) maximum load 200 ohms Auto-reset fuse: 60 mA @ 60°C; 100 mA @ 20°C Output resolution: 10 bits digital/analog converter
Wireless Receiver	**Communication:** EnOcean® Wireless standard **Number of Wireless Inputs:** 282 **Supported Wireless Receivers:** LN-WMOD315-0 and LN-WMOD868-0 **Telephone Cord Cable:** Connector: 4P4C modular jack, Length: 1 m

LN
LON Controller

LN-PRG600-2 and LN-PRG610-2 - Technical Specifications 1/2

Power Requirement	
Voltage:	24 VAC/DC; ±15%, 50/60 Hz, Class 2
Protection:	3.0A user-replaceable fuse
Consumption:	22 VA typical plus all output loads
Maximum Consumption:	65 VA
Ambient Conditions	
Operating:	0 to 50°C; 0 to 90% RH noncondensing
Storage Temperature:	-20 to 50°C; 0 to 90% RH noncondensing
General	
Processor:	STM32 (ARM Cortex™ M3) MCU, 32 bit
Processor Speed:	72 MHz
Memory:	1 MB Nonvolatile Flash (applications), 2 MB Nonvolatile Flash (storage) 96 kB RAM
Media Channel:	TP/FT-10; 78 Kbps
Communication:	LonTalk® protocol
Status Indicator:	Green LED - power status and LAN TX, Orange LED - service and LAN RX
Communication Jack:	TP/FT-10; 78 Kbps, 3.5 mm
LonMark Interoperability:	Version 3.4
Device Class:	Static Programmable Device
LonMark Functional Profile:	Input Objects: Open-Loop Sensor #1, Output Objects: Open - Loop Sensor #3, Real Time Clock: Real Time Keeper #3300, Scheduler: Scheduler #20020, Calendar: Calendar #20030, Programmable Device: Static Programmable Device #410
Enclosure	
Material:	FR/ABS
Dimensions (with screws):	195.6 x 119.4 x 50.8 mm
Shipping Weight:	0.53 kg
Electromagnetic Compatibility	
CE Emission:	EN61000-6-3: 2007 Generic standards for residential, commercial, and light-industrial environments
CE Immunity:	EN61000-6-1: 2007; Generic standards for residential, commercial, and light-industrial environments

LN
LON Controller

LN-PRG600-2 and LN-PRG610-2 - Technical Specifications 2/2

Inputs	Universal software configurable
Voltage:	0 to 10 VDC (40k ohm input impedance) 0 to 5 VDC (high input impedance)
Current:	0 to 20 mA with 249 ohm jumper configurable internal resistor, Digital: dry contact
Pulse:	UI1 to UI4; 50 Hz maximum; Minimum 10 ms On/10 ms Off, dry contact UI5 to UI6: 1 Hz maximum; Minimum 500 ms On/500 ms Off, dry contact
Resistor Support:	0 to 350k ohms. All thermistor types that operate within this range are supported. The following temperature sensors are pre-configured: **Thermistor:** Type 2 and Type 3 10k ohm (10k ohm at 25°C) **Platinum:** PT1000 1k ohm (1k ohm at 0°C) **Nickel:** RTD Ni1000 (1k ohm at 0°C) RTD Ni1000 (1k ohm at 21°C) **Input Resolution:** 16-bit analog/digital converter
Outputs	Universal: 0-10 VDC linear, digital 0 to12 VDC (on/off), PWM, floating, or 0 to 20 mA (jumper configurable to 4 to 20 mA); software configurable. Built-in snubbing diode to protect against back EMF, for example when used with a 12 VDC relay.
PWM control:	Adjustable period from 2 seconds to 15 minutes **Floating control:** minimum plus on/off: 500 ms adjustable drive time period Hands-off-Auto (HOA) **Switch (when equipped):** hand position potentiometer **Range:** 0 to 12.5 VDC 60 mA maximum at 12 VDC (60°C)
Load Resistance:	Minimum resistance 200 ohms for 0 to 10 VDC and 0 to 12.5 VDC, maximum 500 ohm for 0 to 20 mA output Auto reset fuse 60mA at 60°C 100mA at 20°C
Output Resolution:	10-bit digital/does analog converter
Wireless Receiver	**Communication:** EnOcean® Wireless standard **Number of Wireless Inputs:** 282 **Supported Wireless Receivers:** LN-WMOD315-0 and LN-WMOD868-0 **Telephone Cord Cable:** Connector: 4P4C modular jack, Length: 1 m
Compliance	
United States:	UL Listed, File E107041, CCN PAZX, Under UL 916, Energy Management Equipment FCC Compliant to CFR 47, Part 15, Subpart B, Class A
Canada:	UL Listed, File E107041, CCN PAZX7, Under CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada, ICES-003
Europe:	CE Mark – Johnson Controls, Inc., declares that the products are in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC

MSEA Controllers

LN-VAV

LON Controller

The LN-VAV controllers use the latest technology to provide more flexibility and reliability. The freely programmable LN-VAVCF controller is designed to meet the requirements of singleduct Variable Air Volume (VAV) applications.

The configurable LN-VAVLF-2, LN-VAVLN-2 and LN-VVTLF-2 controllers are designed to meet the requirements of single duct Variable Air Volume (VAV) or Variable Air Volume and Temperature (VVT) applications. All the LN-VAV controllers are based on LonWorks® technology for interoperability and peer-to-peer communication between controllers without any intermediary, but also integrate seamlessly into the Metasys® system.

Features

- Robust communication object – complies with LonWorks technology for peer-to-peer communication between controllers without the necessity of intermediary agents
- Free programmable object (LN-VAVCF only) - allows you to view all internal Points using 10 UNVT and 15 values of each object. The LN-VAVCF controller offers many programming tools like Proportional plus Integral plus Derivative (PID), timers and optimum start
- Hardware - allows you to use any commercially available thermistor type (100 ohms to 100k ohms) and setpoint potentiometer type. Features extremely accurate onboard air flow sensor for pressure independent single duct VAV applications
- Software (LN-VAVCF only) - features 18 Network Variable Inputs and Outputs (NVI/NVOs) with changeable types and lengths, supports fan-in binding for zoning applications, and all objects (programming, schedule, realtime clock) are configurable through their own LNS® plug-in
- Wireless Functionality - Features an optional EnOcean® wireless receiver that you can use with a variety of wireless sensors and switches. The wireless receiver supports up to 28 wireless inputs which allow you to create wire-free installations.

Ordering Codes	Description
LN-VAVCF-2	Programmable VAV controller, actuator with feedback, flow sensor, 10 I/O (4 U/Is, 4 triac DOs, 2 UOs) and LNS Plug-in. EnOcean® Wireless adaptor
LN-VAVLF-2	Configurable VAV controller, actuator w/feedback, flow sensor, 10 I/O (4 UIs4 triac DOs, 2 UO) and LNS® plug-in. EnOcean® Wireless adaptor
LN-VAVLN-2	Configurable VAV controller, flow sensor, 10 I/O (4 UIs, 4 triac DOs, 2 UO) and LNS Plug-in. No actuator. EnOcean® Wireless adaptor
LN-VVTLF-2	Configurable VAV controller, actuator w/feedback, 10 I/O (4 UIs, 4 triac DOs, 2 UO) and LNS Plug-in. No flow sensor. EnOcean® Wireless adaptor

Accessories

Ordering Codes	Description
LN-VSTAT-1	Communicating sensor for use with LN-Vxxxx-1 controllers, 2-line display, balancer mode

LN-VAV
LON Controller

LV-VAVCF Controllers - Technical Specifications

Power Requirement

Voltage:	24 VAC/DC; ±15%, 50/60 Hz, Class 2
Protection:	3A removable fuse for triac when using the internal power supply
Consumption:	5 VA
Maximum Consumption:	10 VA (normal), or 85 VA if internal power supply is used for triac (special application)

Ambient Conditions

Operating:	0 to 70°C; 0 to 90% RH noncondensing
Storage Temperature:	-20 to 70°C; 0 to 90% RH noncondensing

General

Processor:	Neuron® 3150®, 8 bits, 10 MHz
Memory:	Non-volatile Flash 128k (storage) (APB application, Non-volatile Flash 64k (APB application)
Media Channel:	TP/FT-10; 78 Kbps
Communication:	LonTalk® protocol
Transceiver:	Echelon® FTT-10
Wireless:	EnOcean® Wireless adaptor

Enclosure

Material:	FR/ABS Resin
Dimensions (with screws):	124 x 226 x 63 mm
Shipping Weight:	1.05 kg

Electromagnetic Compatibility

CE Emission:	EN61000-6-3: 2001; Generic standards for residential, commercial and light-industrial
CE Immunity:	EN61000-6-1: 2001; Generic standards for residential, commercial and light-industrial

Agency

UL Listed:	UL916 Energy management equipment
Material:	UL94-5VA

4 Inputs — Universal software configurable

Digital Inputs: Voltage free contacts

Analog Inputs:

Sensor Types	Range	Accuracy
4 to 20 mA with 249 ohms external resistor (wired in parallel)	0 to 10 VDC	±0.5%
Type 2 and Type 3: 10k ohms	-40 to 125°C	
RTD: 1k ohm		±1%
PT100: 100 ohms	-40 to 135°C	

6 Hardware Outputs

4 Digital Outputs:	Triac 0.75 A @ 24 VAC, external or internal power supply
2 Universal Outputs:	0-10 VDC linear, digital 0-10 VDC linear, digital 0-12 VDC
	(Analog or Digital) or PWM 20 mA max, Maximum load 600 W Output resolution: 10 bits digital/analog converter

Damper Actuator

Torque:	35 in·lb, 4 N·m Angle of rotation: 95° adjustable Fits shaft diameter: 8.5 mm to 18.2 mm Power supply: from controller

LN-VAV
LON Controller

LN-VAVLF-2. LN-VAVLN-2, LN-VVTLF-2 Controllers - Technical Specifications

Power Requirement

Voltage:	24 VAC/DC; ±15%, 50/60 Hz, Class 2
Protection:	3A removable fuse for triac when using the internal power supply
Consumption:	5 VA
Maximum Consumption:	10 VA (normal), or 85 VA if internal power supply is used for triac (special application)

Ambient Conditions

Operating:	0 to 70°C; 0 to 90% RH noncondensing
Storage Temperature:	-20 to 70°C; 0 to 90% RH noncondensing

General

Processor:	Neuron® 3150®, 8 bits, 10 MHz
Memory:	Non-volatile Flash 128k (storage) (APB application, Non-volatile Flash 64k (APB application)
Media Channel:	TP/FT-10; 78 Kbps
Communication:	LonTalk® protocol
Transceiver:	Echelon® FTT-10

Enclosure

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Agency

UL Listed:	UL916 energy management equipment
Material:	UL94-5VA

4 Inputs

Universal software configurable

Digital Inputs: Voltage free contacts

Analog Inputs:

Sensor Types	Range	Accuracy
4 to 20 mA with 249 ohms external resistor (wired in parallel)	0 to 10 VDC	±0.5%
Type 2 and Type 3: 10k ohms	-40 to 125°C	
RTD: 1k ohm		±1%
PT100: 100 ohms	-40 to 135°C	

6 Hardware Outputs

4 Digital Outputs:	Triac 0.75 A @ 24 VAC, external or Internal power supply
2 Universal Outputs:	0-10 VDC linear, digital 0-10 VDC linear, digital 0-12 VDC
	(Analog or Digital) or PWM 20 mA max, Maximum load 600 W Output resolution: 10 bits digital/analog converter

Damper Actuator

Torque: 35 in·lb, 4 N·m
Angle of rotation: 95° adjustable
Fits shaft diameter: 8.5 mm to 18.2 mm
Power supply: from controller

Wireless Receiver

Communication: EnOcean® Wireless standard
Number of Wireless Inputs: 282
Supported Wireless Receivers: LN-WMOD315-0 and LN-WMOD868-0
Telephone Cord Cable: Connector: 4P4C modular jack, Length: 1 m

MSEA Controller

LN Input/Output

Input/Output Controller

The LN series Input/Output (I/O) controller extends the capability of the LN series system as well as monitors and controls various Heating, Ventilating and Air Conditioning (HVAC) applications.

The LN series remote Input/Output (I/O) controllers (LN-IOxxx) are based on LonWorks® technology for interoperability and peer-to-peer communication between controllers without any intermediary but also integrate seamlessly into the Metasys® system.

The LN I/O Extension modules (LN-IOExxx) are designed to be used exclusively with the LN-PRG6x0 controllers.

Features

- Interoperability - features peer-to-peer communication between controllers based on LonWorks technology.
  The I/O controllers are LonMark® certified according to the Interoperability Guidelines Version 3.4
- Robust hardware - features a light-weight fire retardant plastic enclosure, software configurable universal inputs, Pulse Width Modulation (PWM) or digit triac outputs, a status indicator on each output and a fuse-protected power supply
- Configurable software - features an LNS® plug-in that provides the ability to easily configure inputs and outputs.
  You can also configure input and output properties and hardware Simple Network Variable Types (SNVTs)

Ordering Codes	Description
LN-IO301-1	Controller features 8 inputs, 8 digital outputs, and a 12-bit digital/analog converter for output resolution.
LN-IO401-1	Controller features 12 inputs, 12 digital outputs, and a 12-bit digital/analog converter for output resolution.
LN-IO520-1	Controller features 16 inputs and an LNS Plug-in
LN-IOE400-0	I/O Extension Module for LN-PRG6x0-2 with 12 UI, 12 UO, 24 VAC
LN-IOE410-0	I/O Extension Module for LN-PRG6x0-2 with 12 UI, 12 UO, 24 VAC, HOA Switches
LN-IOE420-0	I/O Extension Module for LN-PRG6x0-2 with 12 UI, 24 VAC

LN Series – Displays, Scheduler and Sensors

LN-DSWSC1-0	Displays up to 258 network variables. Incorporates powerful scheduler for daily, weekly, and yearly scheduling. Supports all types of network variables. Standard plastic enclosure (wall mount and DIN Rail), LNS Plug-In
LN-DSWSC2-0	LN-DSWSC1-0 with scheduler, but with flush mount back plate
LN-SCHEDL-0	Powerful scheduler for daily, weekly, and yearly scheduling. 16 schedules with 6 events each. Supports all types of network variables. Standard plastic enclosure (wall mount and DIN Rail), LNS Plug-In
LN-SENSOR-0	Room sensor - No set point
LN-SENSLO-0	Room sensor with LED and override push button
LN-SENOCW-0	Room sensor with LED, override push button and set point adjustment (cool/warm)
LN-SENOSC-0	Room sensor with LED, override push button and set point adjustment (°C)
LN-SENOSF-0	Room sensor with LED, override push button and set point adjustment (°F)
LN-SENAV1-0	Room sensor containing 4 thermistors. Jumper configurable for averaging up to a maximum of 4 sensors connected in parallel. No set point
LN-SENAV2-0	Room Sensor containing 4 thermistors. Jumper configurable for averaging up to a maximum of 4 sensors connected in parallel. With LED and override push button. No set point

LN Input/Output
Input/Output Controller

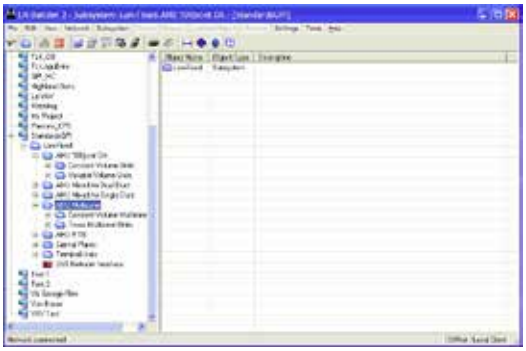
LN-IOE400-0, LN-IOE410-0 and LN-IOE420-0 - Technical Specifications

Power Requirement	
Voltage:	24 VAC/DC; ±15%, 50/60 Hz, Class 2
Protection:	3.0A user-replaceable fuse
Consumption:	400/410: 50 VA maximum, 22 VA typical on all loads 420
Maximum Consumption:	16 VA maximum, 10 VA typical on all loads
Ambient Conditions	
Operating:	0 to 50°C; 0 to 90% RH noncondensing
Storage Temperature:	-20 to 50°C; 0 to 90% RH noncondensing
General	
Processor:	STM32 (ARM Cortex M3) MCU, 32 bit, 64 MHz
Memory:	64 kB non-volatile Flash (applications and storage), 20 kB RAM
Status Indicator:	Green LEDs - power status and Sub-Network TX, Orange LEDs - service and Sub-Network RX
Enclosure	
Material:	FR/ABS
Dimensions (with screws):	195.6 x 119.4 x 50.8 mm
Shipping Weight:	0.53 kg
Electromagnetic Compatibility	
CE Emission:	EN61000-6-3: 2007 Generic standards for residential, commercial, and light-industrial environments
CE Immunity:	EN61000-6-1: 2007; Generic standards for residential, commercial, and light-industrial environments
Inputs	Universal; software configurable
Voltage:	to 10 VDC (40k ohms input impedance), 0 to 5 VDC (high input impedance)
Current:	0 to 20 mA with 249 ohms jumper configurable internal resistor
Digital:	dry contact Pulse: 1 Hz maximum 500 ms On/500 ms Off, dry contact Resistor
Support:	0 to 350k ohms All thermistor types that operate in this range are supported. The following temperature sensors are pre-configured: **Thermistor:** Type II and Type III 10k ohm (10k ohms at 25°C) **Platinum:** PT1000 1k ohm (1k ohms at 0°C [32°F]) **Nickel:** RTD Ni1000 (1k ohm at 0°C [32°F]) RTD Ni1000 (1k ohms at 21°C) **Input Resolution:** 16-bit analog/digital converter **Power Supply Output:** 15VDC; maximum 240mA (12 inputs x 20mA each)
Outputs (LN-IOE400-0 and LN-IOE410-0 Only)	Universal: 0-10 VDC linear, digital 0-12 VDC (on/off), PWM, floating, or 0 to 20 mA (jumper configurable); software configurable PWM control or 0 to 20 mA (jumper configurable): software configurable. Built-in snubbing diode to protect against back EMF, for example when used with a 12 VDC relay.
PWM control:	Adjustable period from 2 seconds to 15 minutes Floating control: minimum plus on/off: 500 ms adjustable drive time period Hands-Off-Auto (HOA) switch (when equipped): hand position potentiometer range 0 to 12.5 VDC 60 mA maximum @ 12 VDC (60°C)
Load Resistance:	minimum resistance 200 ohms for 0 to 10 VDC and 0 to 12 VDC outputs, maximum 500 k Ohms for 0 to 20 mA output reset fuse 60mA @ 60°C (140°F) 100mA @ 20°C (68°F)
Output Resolution:	10-bit digital/analog converter
Compliance	
United States:	UL Listed, File E107041, CCN PAZX, Under UL 916, Energy Management Equipment FCC Compliant to CFR 47, Part 15, Subpart B, Class A
Canada:	UL Listed, File E107041, CCN PAZX7, Under CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada, ICES-003
Europe:	CE Mark – Johnson Controls, Inc., declares that the products are in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.

MSEA Controllers

LN-Builder 3.2

Accessory



LN-Builder 3.2 is an innovative software tool that allows you to quickly set up an LN series system in a cost efficient manner.
LN-Builder 3.2 can be used to manage multi-vendor open-source control system networks based on interoperable LonWorks® technology. This intuitive, yet sophisticated tool provides network integrators with advanced features and all the resources necessary to install, operate, and maintain LonWorks networks.
The program is based on the LNS® TURBO Edition network operating system, which means that it can open databases, register plug-ins, or browse devices up to 10 times faster than previous generation network management tools.
LN-Builder 3.2 also supports legacy LNS systems.

LN-Builder 3.2 is a tree-view oriented program with a user-friendly interface that is designed to make it easy to navigate through networks with a high device count. Through context sensitive menus and dynamically enabled toolbars, all device, channel, subsystem, functional object, and Network Variable (NV) operations can be easily set up and maintained. Advanced features allow moving and copying devices or entire subsystems in one simple operation. The program includes multiple modular applications such as the Johnson Controls® Browser. The Johnson Controls Browser monitors Network Variable and Configuration Property (CP) values during operation, allowing for quick and easy troubleshooting.

LN-Builder 3.2 also includes new features like the Binding Manager, which creates network connections between devices. The Binding Manager uses filters to automatically determine which devices and network variables are compatible and can be connected.

Features

- Allows you to simultaneously manage multiple LonWorks networks
- Supports LNS standard plug-in applications that allow easy integration of Johnson Controls controllers
- Allows you to create dynamic network variables

Ordering Codes	Description
LN-BLDSW-0	LN-Builder 3.2 Installation CD

Technical Specifications

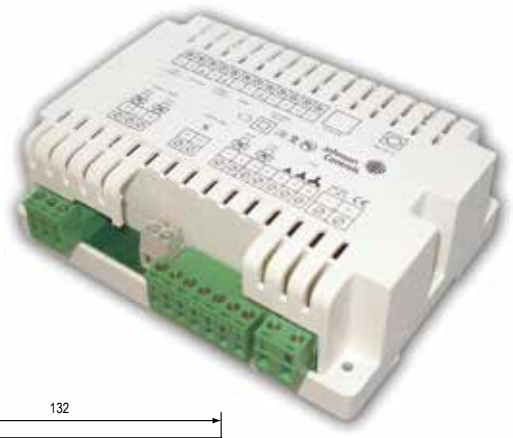
Operating System	Microsoft® Windows XP® Operating System (OS), Microsoft Vista™ Home Premium OS, Microsoft Vista Business OS, or Microsoft Vista Ultimate OS
Processor	Windows XP OS: 500 MHz or higher Vista OS: 1 GHz or higher
Memory	Windows XP OS: 256 MB RAM minimum Vista OS: 1 GB RAM minimum
Hard Disk	Windows XP OS: 500 MB minimum free disk space Vista OS: 40 GB minimum free disk space
Display	Windows XP OS: Minimum 800 x 600 Super Video Graphics Array (SVGA), recommended SVGA: 1024 x 768 Vista OS: minimum of 128 MB video card
Accessories	CD-ROM drive, mouse, or other Microsoft Windows OS compatible pointing device

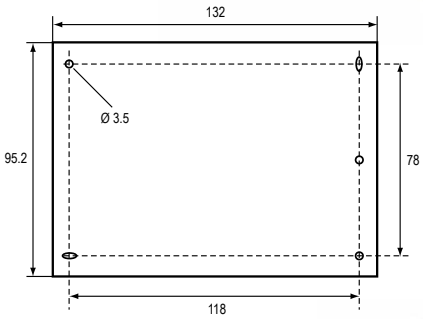
Integrated Room Control

AD-IRC 2nd Edition

Integrated Room Control Solution

The Integrated Room Control Solution provides the control of the heating, cooling, lighting and sunblinds within an occupied space, such as an office or small conference room, in one coordinated control system with a single point of control interface for the occupant.
The AD-IRC Integrated Room Controller is a LonWorks® network compatible device that is the master device in the system.
The AD-IRC provides direct digital control of terminal unit applications with heating and/or cooling coils, an electric heater, air quality devices and a three-speed or variable speed fan. These applications include radiators, close control units, fan coil units, unit ventilators and chilled beams or chilled ceiling beam installations. It is mounted within the unit or other protective enclosure. One or two zones of lighting in the space and optionally sunblinds are controlled by AD-IRL, AD-IRS and AD-ILS slave modules that can be mounted directly in the ceiling void.
The space comfort set point, occupancy mode and fan speed may be adjusted from the wide range of room sensor modules with options for a digital display and IR remote command. From the RJ connected digital modules the occupant can switch and adjust the lighting level and operate the sunblinds. The controller complies with the LonMark® interoperability guidelines for sharing data with other network sensors and devices. Operating data can be monitored and controlled from a LonWorks compatible supervisory system, including the Metasys® NCM Network Control Module and NAE Network Automation Engine that connect the integrated room control system into a facility-wide building management network.





Dimensions in mm

AD-IRL
Integrated Lighting control module

AD-ILS
Integrated Lighting and Sunblind

Features

- Single point of control for environmental comfort in the room for the occupants – temperature, air quality, lighting and sunblinds
- Attractively styled wall-mounted room command module with back-lit digital display and control buttons for HVAC, lighting and sunblind
- Modular configuration of hardware for HVAC, lighting and sunblind control with simple serial bus interconnection
  - Automatic daylight control
  - DALI Bus Add-On module
- Each control module is separately powered by 230 VAC
- HVAC controller for FCU or chilled ceiling
- Variable speed fan control
- Indoor air quality control
- Configuration and commissioning using any LonMark compatible LonWorks network or commissioning tool
- All configuration parameters in LonMark network profile
- Multiple modes of operation for various occupancy conditions
- Single point of interface from integrated room control system to LonWorks network
- LonMark Space Comfort Controller Profile
- LonWorks network connection to Metasys network controller
- Standalone operation with default parameters
- Nonvolatile memory (Flash and E²PROM)

AD-IRC Room Command Accessories

AD-IRC 2nd Edition

Integrated Room Control Solution

Ordering Codes	Description
	Integrated Room Controllers
AD-IRC4205-2	IRC HVAC Controller 2nd Edition with LonWorks Interface and Serial Bus I/F 230VAC Power Supply, 4 x 0-10VDC for Heating/Cooling Valves or Variable Fan Speed or Fresh Air Damper, Relay outputs for Electric Heater (2kW), Relay Outputs for 3-speed fan control (3A)
AD-IRC4245-2	IRC HVAC Controller 2nd Edition with LonWorks Interface and Serial Bus I/F 230VAC Power Supply, 2 x 0-10 VDC for Heating/Cooling Valves or Variable Fan Speed or Fresh Air Damper, 2 x Triac for Heating/Cooling Valves, Outputs for Relay outputs for Electric Heater (2kW), Relay Outputs for 3-speed fan control (3A)
	Add-On Modules
AD-IRL1025-0	IRC lighting module with serial bus I/F (to HVAC controller), 230 VAC power supply, 2 x lighting on/off outputs (230 VAC)
AD-IRL2025-0	IRC lighting module with serial bus I/F (to HVAC controller), 230 VAC power supply, 2 x lighting outputs (230 VAC) with Dimming Control
AD-DAL1045-0	IRC DALI Bus Lighting Module with Serial Bus I/F, 230Vac Power Supply, 4 x Lighting Groups, 16 x Lamps with DALI Ballasts
AD-ILS1035-0	IRC lighting and sunblind module with serial bus I/F (to HVAC controller), 230 VAC power supply, 2 x lighting on/off and 1 x sunblind outputs (230 VAC)
AD-IRS1035-0	IRC sunblind module with serial bus I/F (to HVAC controller), 230 VAC power supply, 3 x sunblind outputs (230 VAC)
	Room Command Modules with Temperature Sensors
AD-IRM1005-0	Integrated room command module with serial bus I/F (to HVAC controller) – HVAC only (80 mm x 80 mm)
AD-IRM1015-0	Integrated room command module with serial bus I/F (to HVAC controller) – 2 lighting control buttons (80 mm x 120 mm)
AD-IRM1025-0	Integrated room command module with serial bus I/F (to HVAC controller) – 2 x lighting + 1 x sunblind control buttons (80 mm x 120 mm)
AD-IRM1035-0	Integrated room command module with serial bus I/F (to HVAC controller) – 2 lighting + 2 x sunblind control buttons (80 mm x 120 mm)
AD-LCD1005-0	Digital room sensor device with LCD screen with Serial Bus I/F - HVAC + 2 Lighting Zones + 2 Sunblind Zones
AD-RCL1005-0	Hand-held IR Remote Command - HVAC + 2 Lighting Zones + 2 Sunblind Zones
	Room Module with Temperature Sensors
TM-2140-0000	Room module, NTC 10K sensor
TM-2150-0000	Room module, NTC 10K sensor, occupancy button
TM-2160-0000	Room module, NTC 10K sensor, setpoint dial 12 - 28 °C, occupancy button
TM-2160-0002	Room module, NTC 10K sensor, setpoint dial 12 - 28 °C, 3-speed fan override, occupancy button
TM-2160-0005	Room module, NTC 10K sensor, setpoint dial +/-, occupancy button
TM-2160-0007	Room module, NTC 10K sensor, setpoint dial +/-, 3-speed fan override, occupancy button
TM-2190-0000	Room module, NTC 10K sensor, setpoint dial 12 - 28 °C
	Accessories
AD-IPL1005-0	Multi-sensor with integrated IR Receiver with Serial Bus I/F
AD-RIR1005-0	Transparent IR Receiver with Serial Bus I/F
TE-9100-8502	Unit mount NTC 10k temperature sensor
AD-IRL1025CK-0	Connector kit for AD-IRL1025-0 (power + 2 x lighting circuit)
AD-IRL2025CK-0	Connector kit for AD-IRL2025-0 (power + 2 x lighting/dimming circuit)
AD-IRS1035CK-0	Connector kit for AD-IRS1035-0 (power + 3 x sunblind circuit)
AD-ILS1035CK-0	Connector kit for AD-ILS1035-0 (power + 2 x lighting + sunblind circuit)
AD-IRCBL911S-0	Serial bus cable RJ9 to RJ11 – length 30 cm
AD-IRCBL911L-0	Serial bus cable RJ9 to RJ11 – length 6 m
AD-IRCBL99S-0	Serial bus cable RJ9 to RJ9 – length 30 cm
AD-IRCBL99L-0	Serial bus cable RJ9 to RJ9 – length 6 m
AD-IRCKJ09-0	Connectors RJ9 - pack of 50
AD-IRCKJ11-0	Connectors RJ11 - pack of 50

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.

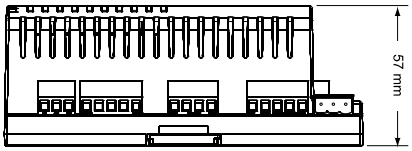
These applications include close control units, fan coil units, unit ventilators and chilling or heating ceiling beam installations.

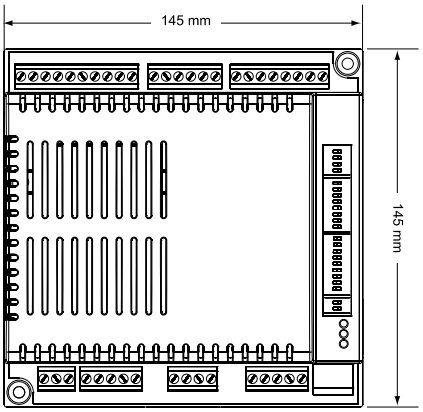
The device can be configured by the installer, without the need of a PC and software tool, using a set of on-board dip-switches.

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.





Dimensions in mm

Features

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

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

TUC03

Configurable Terminal Unit Controller

Ordering Codes	Description
Room Sensor Modules with LCD Display and Integrated IR Receiver	
LP-RSM003-000C	Room Sensor Module, wall mount
LP-RSM003-001C	Room Sensor Module, horizontal flush mount
LP-RSM003-003C	IR receiver w/ integrated temperature sensor
LP-RSM003-004C	IR hand held remote control unit
Room Sensor Modules without Display - 80 mm x 80 mm	
TM-2140-0000	Room sensor module, temperature sensor only
TM-2150-0000	Room sensor module, occupancy button and LED
TM-2160-0000	Room sensor module, 12-28° C setpoint dial, occupancy button and LED
TM-2160-0002	Room sensor module, 12-28° C setpoint dial, occupancy button and LED, fan speed override
TM-2160-0005	Room sensor module, +/- setpoint dial, occupancy button and LED
TM-2160-0007	Room sensor module, +/- setpoint dial, occupancy button and LED, fan speed override
TM-2190-0000	Room sensor module, 12-28° C setpoint dial
TM-2190-0005	Room sensor module, +/- setpoint dial
Room Sensor Modules with Backlit LCD Display - 80 mm x 80 mm	
RS-1180-0000	Room Sensor module, 12-28° C setpoint dial
RS-1180-0005	Room Sensor module, +/- setpoint dial
RS-1180-0002	Room Sensor module, 12-28° C setpoint dial, fan speed override
RS-1180-0007	Room Sensor module, +/- setpoint dial, fan speed override
Accessories	
LP-KIT003-010C	Remote temperature sensor, NTC 50k Ω, bulb, 80 cm leads
LP-KIT003-011C	Remote temperature sensor, NTC 50k Ω, wall mount, decorative box
LP-KIT003-012C	Remote temperature sensor, NTC 50k Ω, duct mount
LP-KIT003-013C	Remote temperature sensor, NTC 50k Ω, wall mount, decorative box
HX-9100-8001	Condensation (dew point) sensor
TE-9100-8502	Remote temperature sensor, NTC 10k Ω, bulb, 150 cm leads
TS-9104-8700	Remote temperature sensor, NTC 10k Ω, ceiling

LP-RSM003-000C

RS Series

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

LP-RSM003-001C

TM Series

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.

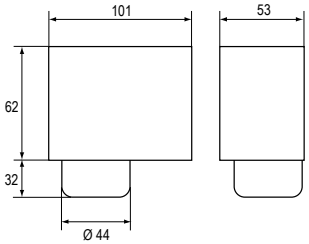
SPDT change over contacts permit the use of an alarm signal.

Features

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

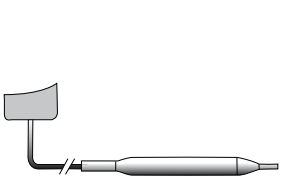
Application

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

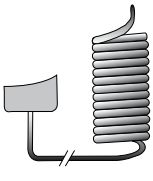


Dimensions in mm

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



Style 1b



Style 9

Mechanical Thermostats

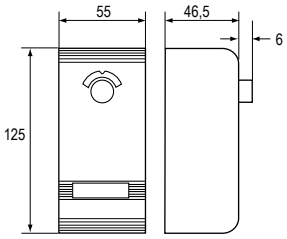
A19

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 equiped with IP50 enclosure.



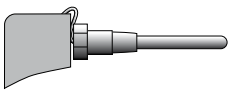
Dimensions in mm

Features

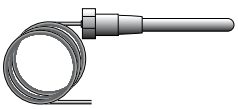
- Liquid filled sensing element
- Dust tight Penn switch
- Trip free manual reset
- Front adjustment

Application

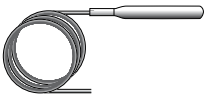
These thermostats are designed for refrigeration, cooling, heating, ventilation and air-conditioning applications. Standard models are provided for remote sensing or room sensing. Models with manual reset are available for low or high limit functions.



Style 2



Style 4H



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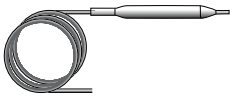

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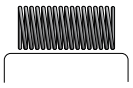


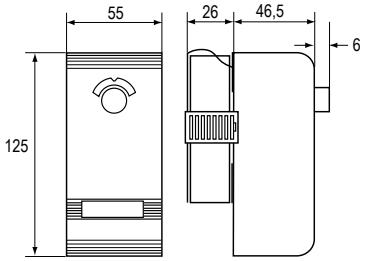
Style 3

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			80	SPDT Open Low	Bulb diam. 9.3 mm
A19AAC-9124	-5 to +28	2	1b	5	135		---
A19AAC-9127	1 to 60	1.5		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	---

A19

Capillary and Space Thermostats, IP30



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		SPDT Open Low	---
A19ABC-9104	-5 to +28	2 to 8		2	135		
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			135		
A19ACC-9103				5			
A19ACC-9105	-35 to +10	6		3.5	110		Low limit stop set at 2 °C
A19ACC-9107	-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					
A19BAC-9251	-5 to +28	2				SPDT Open Low	
A19BBC-9275	-35 to +40	2.8 to 8				SPDT Open Low, 5A	
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

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

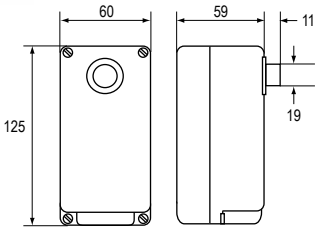
- Liquid filled sensing element
- Dust tight Penn switch
- IP65 protection class
- Front adjustment

Application

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

Four types are available:

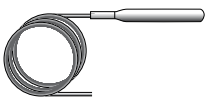
- Types A19ARC are general purpose capillary thermostats.
- Types A19BRC and A19BQC are space thermostats with coiled element to be used as farm control, outdoor thermostats or in cold storage rooms.
- Types A19AQF is specially designed for milkcool-tank applications.
- Type A19AQC-9101 is specially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



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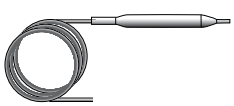
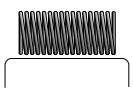


Style 1b



Style 3

A19
Capillary and Space Thermostat, IP65

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

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 by considered as cross-ambient, capillary and cup temperature variations affect the operating point only slightly due to the small amount of fill they contain.

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

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

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

IP30

IP65

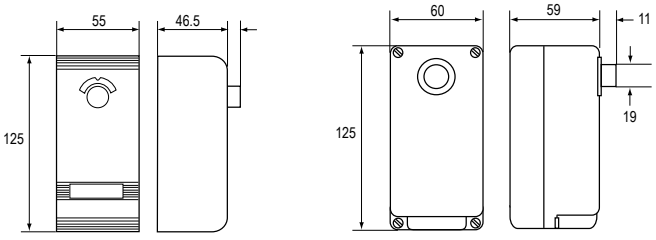
Features

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

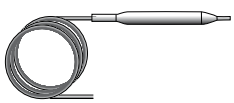
Application

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



Dimensions in mm



Style 1b

Style 3

A28

2-stage Capillary and Space Thermostat, IP30 / IP65

Ordering Codes	Range (°C)	Diff. (K) stage	Diff. (K) betw	Style	Cap. Length (m)	Bulb Size (mm)	Switch 5A Auto Recycle	Additional Features NEMA 1 Enclosure
A28 Capillary and Space Thermostats, IP30								
A28AA-9006	-35 to +10	2	1 to 4	1b	2	110	SPDT Open Low	General purpose
A28AA-9007	-5 to +28	1.5				135		
A28AA-9106					5			
A28AA-9113	0 to 43			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					---
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

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.

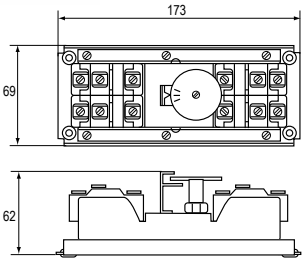
Features

- 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
A36 Series, 3-Stage Thermostats						
A36AGA-9101	-18 to +20	B1	5	125	5 A	Armored PVC capillary
A36AGA-9102			3.5			
A36AGA-9103	15 to 35	C1		140		
A36AGB-9103	-18 to +20	B2		125	3 A	
A36 Series, 4-Stage Thermostats						
A36AHA-9105	-18 to +20	B1	3.5	125	5 A	Armored PVC capillary
A36AHA-9107	-16 to +20		5			
A36AHA-9108	15 to 35	C1	3.5	140		
A36AHB-9103	10 to 95	D2	3	100	3 A	Max. bulb temp.115 °C
A36AHB-9104	-18 to +20	B2	3.5	125		Armored PVC capillary
A36AHB-9105			5			Braided copper capillary
A36AHB-9109	-15 to +30		5	110		Max. bulb temp. 75 °C

Mechanical Thermostats

T22 and 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

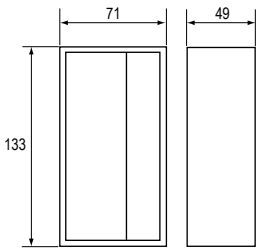
- Liquid filled elements
- Dust tight Penn switch
- Small differential
- 2-Stage Thermostats with dead band and automatic change over

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
T25B-9103			Knob	---		With 220 VAC signal lamp to be wired separately

Mechanical Thermostats

A25

Rod and Tube Sensing Element, IP30

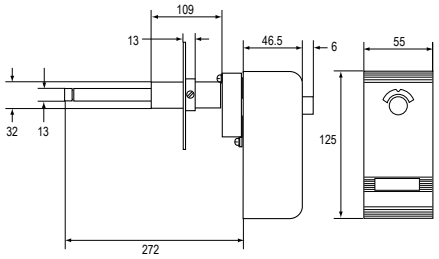
A rod and tube type sensing element actuate the switch contacts.
Main contacts (1 - 2) are normally closed, and open when the temperature at the element rises to the dial setpoint.
Contacts are re-closed only by operation of the reset lever.
The reset lever is "trip-free" and cannot be used to block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

Features

- Rod and tube type of element
- Adjustable duct mounting flange
- Trip-free manual reset
- Dust-tight Penn switch

Application

These warm air limit controls "lock out" on a temperature increase to the control setpoint. Manual reset is required to re-close the electrical contacts. A typical application is to stop air-conditioning or ventilating fans in the event of excessive return air temperature, as from a fire.



Dimensions in mm

Ordering Codes	Range (°C)	Switch 8A Manual Reset	Additional Features
A25CN-9001	0 to 100	SPDT Open High	Visible scale, Knob adjustment, NEMA 1 enclosure,with flange for duct mounting

Mechanical Liquid Flow Switch

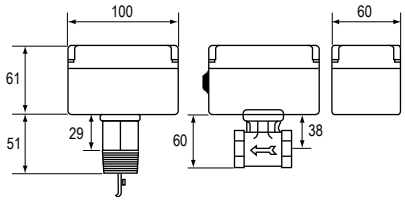
F61

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
F61TB-9100	0,15 dm³/s - 46 dm³/s	R1" DIN2999	(ISO R7)	SPDT contacts, 15(8) amp 220 V~	4 paddles, 1", 2", 3" and 6" St.St. AISI 301
F61TB-9104				SPDT contacts, 0,4 Amp 15 V~	Lowenergy gold flashcontacts
F61TB-9200				SPDT contacts, 15(8) Amp 220 V~	Stainless steel body, bellows, rod, 3 St.St. AISI 304 paddles 1",2",3"
F61TD-9150	0,04 dm³/s - 0,07 dm³/s	½ -14 NPTF	T-body		---

Accessories for Flow Switches

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

Mechanical Air Flow Switch

F62

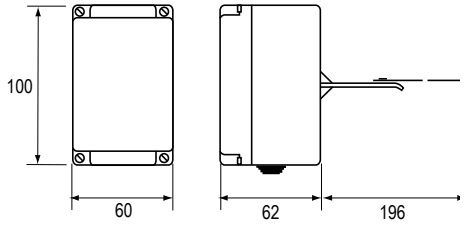
Air Flow Switch

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

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

Mechanical Liquid Level Switch

F63

Liquid Level Float Switch

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

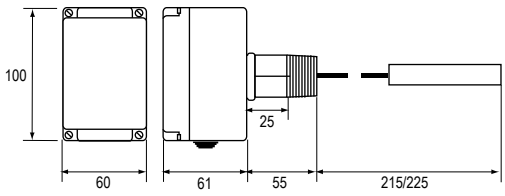
The switches have SPDT contacts and can be wired to close one circuit and open a second circuit when the liquid level rises above or falls below the required level.

The switch maintains the liquid level within (approx.) 13 mm.

There are three different types available. The phosphor bronze bellows version for use in applications where the liquid is not corrosive to phosphor bronze. The stainless steel bellows version for use in environments like cooling towers (water with high calcium content) and a complete stainless steel AISI 316L version. These float switches should not be used for liquids lighter than water (density less than 0.95 kg/dm^3).

Features

- Solid polycarbonate float
- Vapour tight IP67 enclosure
- Convenient wiring terminals



Dimensions in mm

Ordering Codes	Connection	Switch Action	Enclosure	Additional Features
F63BT-9101	1–11½ NPT	SPDT Contacts 15(8) A, 230 V~	Plastic enclosure IP67	Plastic float, brass body, phosphor bronze bellows
F63BT-9102				Plastic float, stainless steel bellows
F63BT-9200	R1" DIN2999 (ISO R7)			Plastic float, stainless steel 316 L body, rod, bellows

Accessories

Ordering Codes	Description
FLT001N001R	F63 - Float

Adjustable Differential Pressure Switch

P232

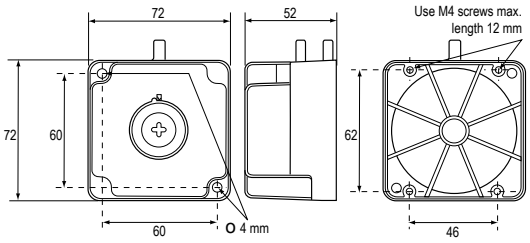
Sensitive Differential

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
- Wide range (1 to 125 mm W.C.)
- Small differential (1 mm W.C.) at bottom of range
- Large wiring space
- Versatile mounting options



Dimensions in mm

Application

- This (differential) pressure switch is used to sense flow of air, single or differential air pressure

Typical applications include:

- Clogged filter detection
- Detection of frost on air conditioning coils and initiation of defrost cycle
- Air proving in heating or ventilation ducts
- Maximum air flow controller for variable air volume system

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

Adjustable Differential Pressure Switch

P233

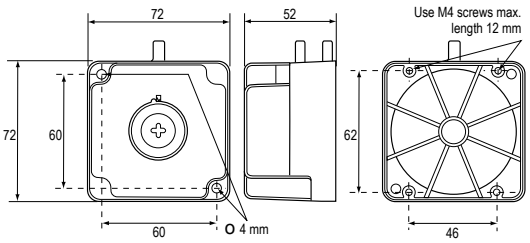
Sensitive Differential

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



Dimensions in mm

Application

- This (differential) pressure switch is used to sense flow of air, single or differential air pressure

Typical applications include:

- Detect clogged filter
- Detect frost or ice build-up on air conditioning coils
- Air proving in heating or ventilation ducts
- Maximum airflow controller for variable air volume system
- Detect blocked flue or vent
- Monitor fan operation

P233

Sensitive Differential

Ordering Codes	Switch point Range (mbar)	Switching Differential (mbar) **	Contacts	Pack	Additional Features
P233F-P3-AAC	0,3 fixed	< 0.3	SPDT contacts, Contact rating 5(2) A 250 VAC	Ind.	---
P233A-4-AAC	0,5 to 4				---
P233A-4-AAD*				Bulk	---
P233A-4-AHC				Ind.	GMT008N600R + BKT024N001R
P233A-4-PAD*	50 to 400 Pa			Bulk	Scale in Pa
P233A-4-PAC				Ind.	---
P233A-4-PHC					Scale in Pa, GMT008N600R + BKT024N001R
P233A-4-PKC					Scale in Pa, FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-4-AKC	0,5 to 4				FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-6-AAC	0,5 to 6			Bulk	---
P233A-6-AAD*					
P233A-10-AAC	1,4 to 10	< 0.5		Ind.	---
P233A-10-AHC					GMT008N600R + BKT024N001R
P233A-10-PAC	140 to 1000 Pa				---
P233A-10-PKC					Scale in Pa, FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-10-AAD*	1,4 to 10			Bulk	---
P233-10-AKC				Ind.	FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-50-AAC	6 to 50	< 1			
P233A-10-PHC	140 to 1000 Pa	< 0,5			Scale in Pa, GMT008N600R + BKT024N001R

Notes
* : Quantity orders only
** : Switching differential is maximum value mid-range

Adjustable Differential Pressure Switch

P74

Differential Pressure

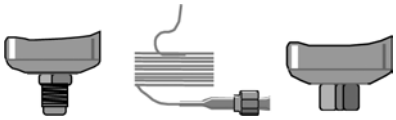
The P74 series of differential pressure switches incorporate two opposing pressure elements and an adjustable range setpoint spring with a calibrated scale.
The control switches at the indicated setpoint on an increase in differential pressure and switches back to the normal position when the different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

Features

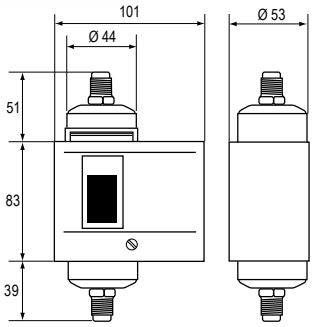
- Heavy duty pressure elements.
- These controls may be used in combination with series P28 lube oil protection control on two compressor, single motor units.

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.



Style 5 Style 13 Style 15



Dimensions in mm

Ordering Codes	Range (bar)	Mech. Differential (bar)	Style	Switch Action	Additional Features
P74DA-9300	0.6 to 4.8	0.7 to 2 adj.	5	DPST, 10A, contacts Open Low	---
P74DA-9600			13		
P74EA-9300		0.3 fix.	5	SPDT, 5 A, contact Open High	
P74EA-9600			13		
P74EA-9700			15		For NH3
P74EA-9701					Set 1 bar, concealed adjustment, for NH3
P74FA-9700	0 to 1	0.1 fix.		SPDT, 3 A, contact Open High	For water
P74FA-9701	2 to 8	0.7 fix.			For NH3

Adjustable Pressure Switch

P20

For Air-conditioning and Heat pump Applications

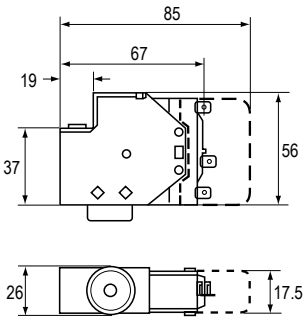
The P20 series high and low limit (cut-out) controls for all non-corrosive refrigerants are compact pressure controls ideally suited for commercial or residential packaged air conditioning units, heat pumps, small water chillers, ice cube machines and other applications where a semi fixed setting is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

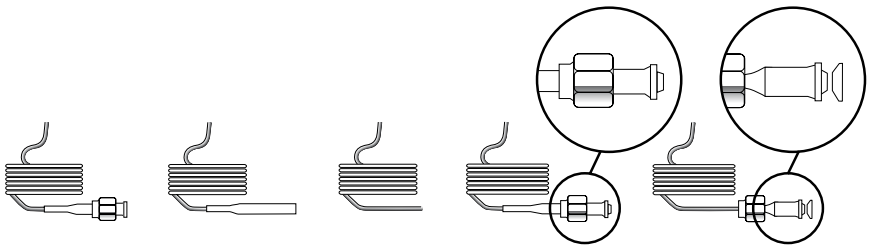
A special setting tool is available while also field (screwdriver) adjustable models can be chosen.

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



Style 13 | Style 34 | Style 35 | Style 45A | Style 50

P20

For Air-conditioning and Heat pump Applications

Ordering Codes	Range (bar)	Differential fixed	Set at (bar)	Style	Capillary Length	Switch Action	PED approval
P20EA-9610C	0.5 to 10	0.9	1.5	13	90 cm	SPDT, 8 A, Open Low, Auto Reset	---
P20EA-9611D			2		120 cm		
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		SPDT, 8 A, Open High, Manual Reset
P20GA-9651U			25			
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					•
P20FA-9510FC	0.5 to 10		3	50		SPDT, 8 A, Manual Reset	Open Low	---
P20FA-9610FC				13				
P20GA-9550XC	7 to 29		28	50			Open High	•
P20GA-9650XC				13				
P20GL-9650TC	14 to 42		37					

Adjustable Pressure Switch

P735

Single Pressure

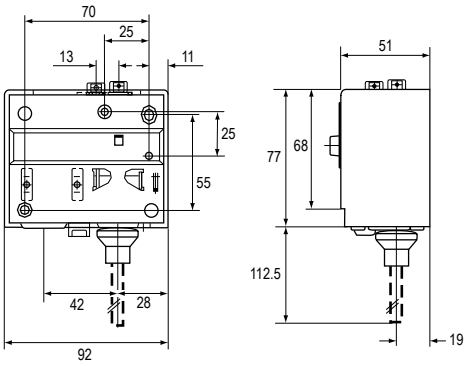
The P735 series pressure controls may be used for control functions or limit functions, depending on model number.
All models are provided with alarm contacts.
All standard models have phosphor bronze bellows and brass pressure connections. Models for use with ammonia are provided with stainless steel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

Features

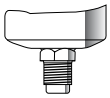
- Generous wiring space
- SPDT contacts are provided as standard on single pressure controls
- Trip-free manual reset

Application

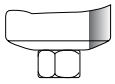
These pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure.
Models supplied have a "whole range" design, enabling them to be used with all non-corrosive refrigerants which are within the operating range of the control.
They may also be used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



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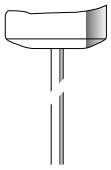
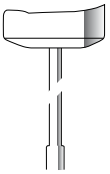


Style 28



Style 30

P735
Single Pressure

For Water

Ordering Code	Range (bar)	Differential (bar)	Switch Action (wire diag.)	Max. Bellows Pressure	Special Pressue Connection G¼" female
					Ind. Pack.
P735AAA	-0,2 to 10	1 to 4,5	1	15	-9200
	-0,5 to 7	0,6 to 3	1	14	-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	14	-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	14	-9300	---		
P735BEA	3 to 30	Man. res.*	3	33	-9350	-9370		

Notes
* : Resetable at 3 bar below cut-out point
** : Resetable at 0.5 bar above cut-out point

For Non-Corrosive Refrigerants (including lock plate assy)

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	14	-9300	-9320	-9800	---
	3 to 30	3.5 to 12	2	33	-9350	-9370	-9850	•
P735BCB	-0.5 to 7	Man. res.**	1	14	-9300	---	---	---
P735BEB	3 to 30	Man. res.*	3	33	-9350	-9370	-9850	•

Notes
* : Resetable at 3.5 bar below cut-out point
** : Resetable at 0.5 bar above cut-out point

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.

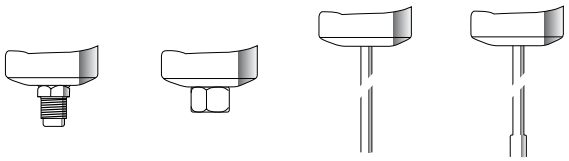
Features

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

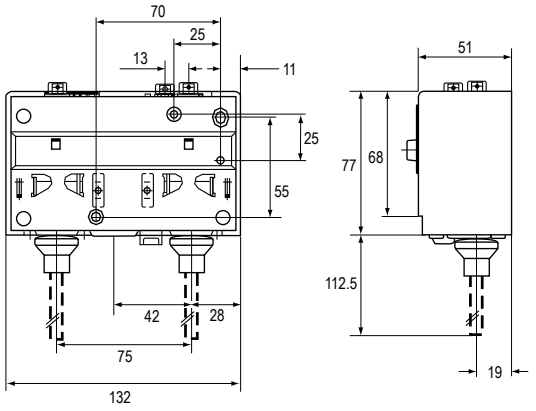
Application

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.



Style 5 | Style 15 | Style 28 | Style 30



Dimensions in mm

P736
Dual Pressure

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: 14 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

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: 14 bar HP: 33 bar	-9300	-9320	-9800	•
P736MCB	-0.5 to 7	0.6 to 3	3 to 30	Man. Res.**		-9300	****		
P736MCS	-0.5 to 7	0.6 to 3	3 to 30	Man. Res.**		-9300	****	---	
P736PGB	-0.5 to 7	Man. Res.*	3 to 30	Man. Res.**		---	****	---	

Manual Reset HP/HP, TÜV-Begrenzer + Sicherheitsbegrenzer

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

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.

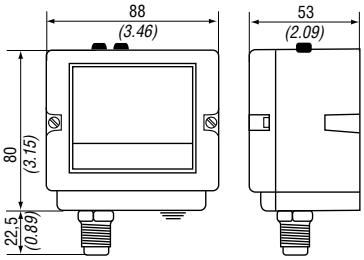
Their IP54 classification means that these pressure controls are suitable for almost all applications.

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_2 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

P77
Single Pressure

For Non-corrosive Refrigerants

Family Code	Style 5		Style 28	Style 30	Range (bar)	Diff. (bar)	Max Bellows Pressure
	Ind. Pack.	Bulkpack	Bulkpack	Ind. Pack.			
P77AAA	-9300	-9320	-9800	-9400	-0.5 to 7	0.6 to 3	14
	-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	3 to 30	3 to 12	33
	-9351	-9371	---	-9451	3.5 to 21	2.1 to 5.5	30
P77BCA	-9300	-9320	---	-9400	-0.5 to 7	Man. res.**	14
P77BEA	-9350	-9370	---	-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 (Wächter, Begrenzer, Sicherheitsdruckbegrenzer including lockplate assy)

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	14	---
	-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. **	14	---
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, (Wächter, Begrenzer, Sicherheitsdruckbegrenzer including lockplate assy)

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:
** Resetable at 0.5 bar above cut-out point
* Resetable at 3.5 bar below cut-out point

100 kPa = 1 bar ≈ 14.5 psi

Adjustable Pressure Switch

P78

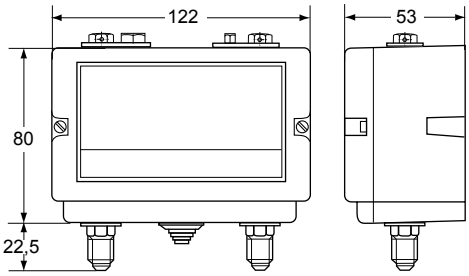
Dual Pressure, IP54

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

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

Features

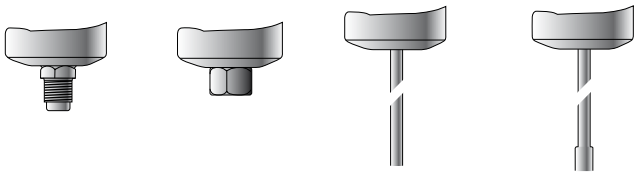
- Gold plated contacts
- Generous wiring space
- Splash-proof enclosure (IP54)
- Trip-free manual reset
- Patented separate alarm contacts for both low pressure and high pressure cut-out (except P78ALA)



Dimensions in mm

Application

These pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure.
Models supplied have a “whole range” design, enabling them to be used with refrigerants R22, R134A, R404A, R410A and all other non-corrosive refrigerants which are within the operating range of the control.
They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program. Also models tested and approved to PED 97/23/EC Cat. IV (supersedes DIN and TUV approval) are included in the program.



Style 5 | Style 15 | Style 28 | Style 30

P78
Dual Pressure

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.**	

Notes
**** Can be set-up for quantity orders
** Resetable at 3 bar below cut-out point
* Resetable 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: 20 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.**	

Notes
**** Can be set-up for quantity orders
** Resetable at 3 bar below cut-out point
* Resetable 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: 33 bar

Notes
**** Can be set-up for quantity orders

100 kPa = 1 bar ≈ 14.5 psi

For Non-corrosive Refrigerants (Wächter, Begrenzer, Sicherheitsdruckbegrenzer including lockplate assy) - (Except P78PGB-)*

Family Code	Pressure Connection			Left Side		Right Side		Construction LP/HP (max. press.)	Approved according to PED 97/23EC 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: 20 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.**		

Notes
**** Can be set-up for quantity orders
** Resetable at 3.5 bar below cut-out point
* Resetable at 0.5 bar above cut-out point

Fixed Setting Pressure Switch

P100

Direct Mount Pressure Switch

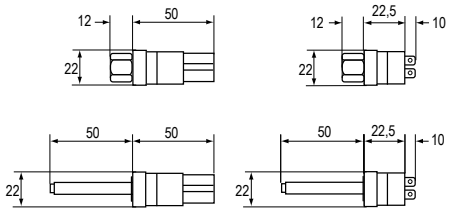
The P100 series are encapsulated, non-adjustable, direct mount pressure controls typically used for low and high-pressure cut-outs for OEM applications. The P100 series are produced according to switchpoint requirements of customers. The small dimensions, weight and protection class makes the P100 series 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 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

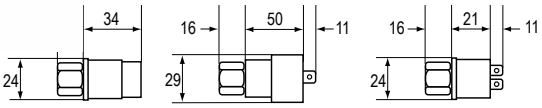
Ordering Codes	Application	Refrigerant	P (bar) Open	P (bar) Close	P open ± (bar) tolerance	P close ± (bar) tolerance	Connection "1/4" "SAE Fem Flare"	Connection 50 mm straight, 6 mm dia. x 7 mm reduced end, copper clad brazing tube (TIF5)	Electr. Termination	Switch
P100AP-300D	Low Pressure Auto Reset Normally Open	R134A	2,5	4	0,5	0,5	•	---	2 Mt.	SPST
P100AP-301D							---	•		
P100AP-302D		R407C	4	6			•	---		
P100AP-306D		R404A	0,3	2,8	0,4	0,4				
P100AP-308D		---	0,5	1,5	0,3	0,3			FASTON	
P100AP-309D			0,7	2,2					1.2 Mt.	
P100AP-310D									3 Mt.	
P100CP-102D	High Pressure Auto Reset Normally Closed	R134A	16	11	0,7	1,4			2 Mt	
P100CP-103D							---	•		
P100CP-104D		R407C	24	18			•	---		
P100CP-106D		R404A	28	23		0,7				
P100CP-107D							---	•		
P100CP-108D		R410A	38	28			•	---		
P100CP-110D		---	27,6	20,7					FASTON	
P100CP-111D			26	20					2 Mt.	

P100

Direct Mount Pressure Switch

Features

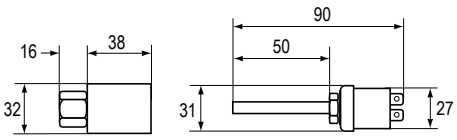
- Compact size and light weight
- Encapsulated, dust tight switch IP67
- Manual reset models have a trip-free design
- Models with gold-plated contacts available
- Broad variety of electrical and pressure connections



Dimensions in mm

Manual Reset Models

Ordering Codes	Application	Refrigerant	P (bar) Open	P (bar) Close	P open ± (bar) tolerance	P close ± (bar) tolerance	Connection "1/4" "SAE Fem Flare"	Connection 50 mm straight, 6 mm dia. x 7 mm reduced end, copper clad brazing tube (TIF5)	Electr. Termination (Mt)	Switch
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				•		2	
P100DA-76D			42				---	•		



Dimensions in mm

P100 Heavy Duty Pressure Controls - Auto Reset

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

Pressure Switches Accessories

Ordering Codes	Description	Minimum order qty.
BKT034N602R	Mounting bracket + screws for P35AC transducer	1
BKT275-1	Mounting bracket dual for P20	
210-25R	Mounting bracket for P20/P35 (single)	
WRN12-1	Wrench P20/P21	
210-604R	Terminal cover P20/P21	50
BKT024N002R	Mounting bracket for P233	1
FTG015N602R	Duct mounting kit "staight"	
FTG015N603R	Duct mounting kit "bent"	
GMT008N600R	Duct kit for P233, self locking grommet and tubing	
CNR003N001R	Connector 6 mm for P77/P78, P735/P736	
CNR003N002R	Connector 8 mm for P77/P78, P735/P736	
CNR012N001R	Adapter R3/8 female to 1/4-18 NPT male for P48	
CNR013N001R	Adapter R 3/8 female to 1/4-18 NPT female for P48	
KIT023N600	Locking kit for P48, P77/P78, P735/P736 - for field installation	
KIT031N600	Valve depressors for conversion style 13 - style 45a	100 (1 box)
KIT031N601	Valve depressors for conversion style 51 - style 50	
KIT034N600	Seal rings for style 50/51	250 (1 box)
271-51L	Mounting bracket for P28, P45, P48, P74, P77/P78, P735/P736	50

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		

Pressure Switches Accessories

H735

Syntetic Flexible Hose

The synthetic hoses consist of a seamless PA compound inner layer reinforced with a braided layer of high performance synthetic fibre.

This reinforcement is protected by an oil, weather and abrasion resistant Polyester Elastomer Compound.

The standard assembly length is 0,9 meter with one straight and one elbow 90 degree hose fitting.

The fitting connection is 1/4" metal tube with 7/16"-20 UNF swivel nut connection suitable for 1/4" SAE male flare.
Other lengths and/or fitting connections configurations (Style 50, 51 straight or elbow) are available on request (quantity orders only).

Features

- Very flexible
- Low minimum bend radius (30 mm)
- One straight and one 90° elbow pressure connection
- Polyester Elastomer Compound construction
- High pressure safety ratio
- Low effusion

Application

These synthetic hoses are designed for pressure measuring connections.
They provide, for example, a very flexible connection between a refrigerant compressor and pressure controls. The hoses can be used for all non-corrosive refrigerants including R134a, R22, R404a, R407c and R410A with pressures within the maximum pressure range of the hose. Hoses are tested with common compressor oils in combination with above mentioned refrigerants.

Ordering 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

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.

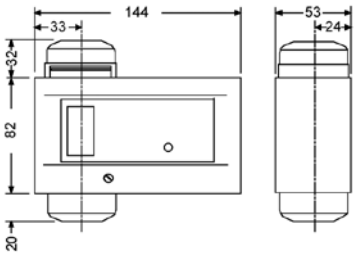
When the compressor is started, the time delay switch is energised. If the net oil pressure does not build up within the required time limit, the time delay switch trips to stop the compressor. If the net oil pressure rises within the required time after the compressor starts, the time delay switch is 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

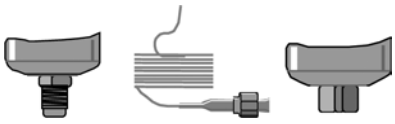
- Heavy duty pressure elements
- Safety lock-out with trip-free manual reset
- Ambient compensated timing
- Dust-tight Penn switch



Dimensions in mm

Application

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



Style 5 Style 13 Style 15

P28
Oil Protection

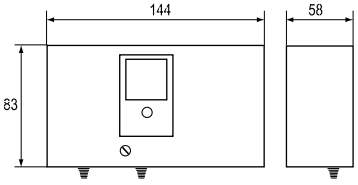
Ordering Codes	Range (bar)	Style	Time Delay (s)	Voltage	Switch Action	Refrigerant	Additional Features
P28DA-9341	0.6 to 4.8	5	50	115/230	15(8) A, 230 VAC, Open Low, Alarm and Safe Light Contacts	non-corr.	incl 2 flare nuts 7/16"-20 UNF
P28DA-9660		13	90				---
P28DJ-9360		5	90	230			IP66 enclosure
P28DJ-9861		15	90			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							Concealed adjustment, set 0.65 bar
P28DP-9640		13	50				---
P28DP-9660			90				---
P28DP-9680			120				---
P28DP-9840		15	50			NH3	---
P28DP-9860	---		90		---		---
P28DN-9750	---		50	115/230	---		Concealed adjustment, set 1,5 bar

Adjustable Oil Protection Switch

P45

Oil Protection

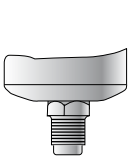
The series P45 controls are designed to give protection against low lube-oil pressure on pressure lubricated refrigeration compressors. The controls measure the pressure differential (net oil pressure) between the pressure generated by the oil pump and the refrigerant pressure at the crankcase. A built-in time delay switch allows pressure build-up during start and avoids nuisance shut-down on pressure drops of short duration during the running cycle.



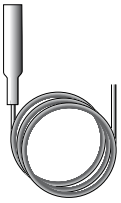
Dimensions in mm

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



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			

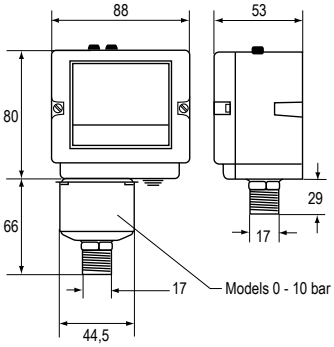
Adjustable Steam Pressure Switch

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 ¼"-18 NPT female to R3/8 male.



Dimensions in mm

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).

Ordering Codes	Range (bar)	Differential (bar)	Pressure Connection	Style	Switch Action	Aditional Features	Approved According to PED 97/23/ EC Cat IV
P48AAA-9110	0 to 1	0.16 to 0.55	G 3/8" male	29a	~16(10)A 400 V ... 220 V DC, 12 W (pilot duty only) SPDT, Open High	Automatic Reset	•
P48AAA-9120	0.2 to 4	0.25 to 0.8					
P48AAA-9130	-0.2 to 10	1 to 4.5					
P48AAA-9140	1 to 16	1.3 to 2.5					
P48AAA-9150	3 to 30	3 to 12				Automatic Reset, stainless steel bellows	---
P48BEA-9140	4 to 16	---				Manual Reset	•

Pressure Actuated Water Valves

V46

2-way Pressure Actuated Water Valves –
Commercial Applications

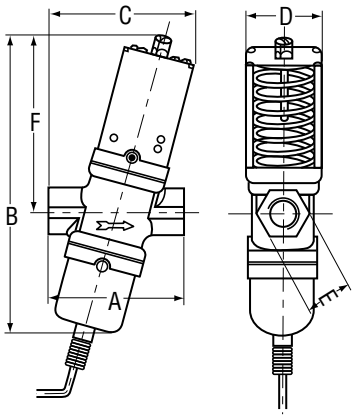
These pressure actuated modulating valves control the quantity of water to a condenser by directly sensing pressure changes in a refrigerant circuit.

The valves can be used in non-corrosive refrigerant systems. Ammonia power elements and valves designed for salt-water applications are available.

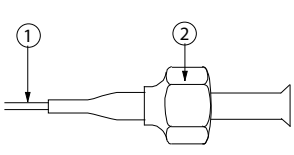
The valves have a quick opening characteristic and open on pressure increase (direct acting).
Reverse acting (close on pressure increase) is possible.

Features

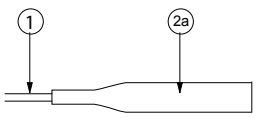
- Pressure balanced valve design
- Pressure actuated
- 3/8, 1/2, 3/4" are angled body type valves with high Kv value
- 3/8" up to 2" pressure valves "all range" types
- Quick opening valve characteristics
- No close fitting or sliding parts in water passages
- Easy to disassemble. All parts can be replaced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



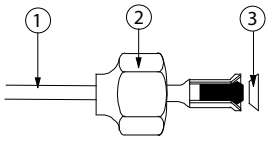
Valve Size	Dimensions in mm					
	A	B	C	D	E	F
3/8"	69	153	66	43	18	89
1/2"	80	170	86	51	27	100
3/4"	91	183	95	55	36	110



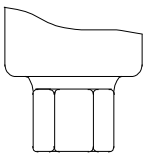
Style 13
(excl. valve depressor)
1: 75 cm capillary
2: 7/16-20 UNF flare nut



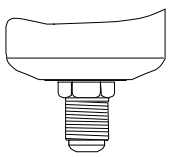
Style 34
1: 75 cm capillary
2: 1/4" tube for braze connection



Style 50
(incl. valve depressor mounted into machined flare)
1: 75 cm capillary
2: 1/4" tube for braze connection
3: copper sealring



Style 15
1/4-18NPT (female)



Style 5
7/16-20 UNF

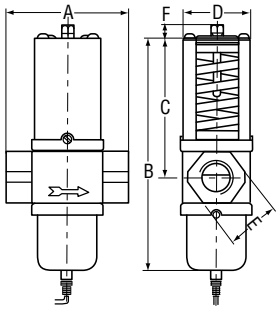
V46

*2-way Pressure Actuated Water Valves - **Commercial Applications***

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				34	75	Nickel plated seat/solder connection
V46AA -9951						.040" i.d.cap./solder connection
V46AB -9600			1/2"	13		---
V46AB -9950				34		Solder connection/".062" id.cap
V46AC -9600			3/4"	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						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				50		High range
V46AC -9300			3/4"	5		---
V46AC -9605				13		Nickel plated seat, high range
V46AC -9510				50		High range

V46

*2-way Pressure Actuated Water Valves - **Commercial Applications***

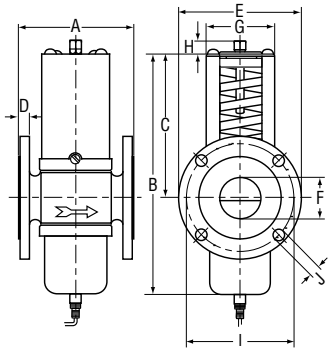


Valve Size	Dimension in mm					
	A	B	C	D	E	F
1"	124	233	139	72	50	13
1¼"	125	243	145	72	58	13

Ordering Codes	Range (bar)	Body Style	Size Thread according to ISO 7-Rc	Style	Capillary Length	Additional Features It is possible to change Style 13 into Style 45A by ordering KIT031N600
V46AD -9300	5...18	Straight	1"	5	---	---
V46AD -9510				50	75	
V46AD -9600				13		
V46AE -9300			1¼"	5	---	
V46AE -9510				50	75	
V46AE -9600				13	75	
V46AD -9511	10...23		1"	50	75	High range
V46AE -9512			1¼"			

V46

*2-way Pressure Actuated Water Valves - **Commercial Applications***

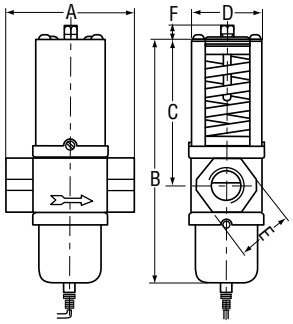


Valve Size	Dimensions in mm									
	A	B	C	D	E	F	G	H	I	J
1½"	137	244	144	18	150	47	67	13	110	18
2"	168	304	164	20	165	57	90	18	125	
2½"	172				185	70			145	

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

V46

*2-way Pressure Actuated Water Valves - **Maritime Applications***

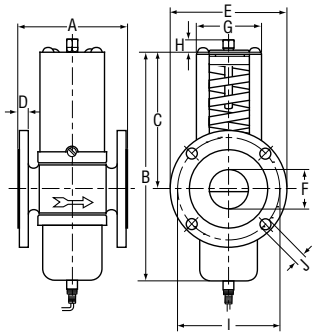


Valve Size	Dimension in mm					
	A	B	C	D	E	F
3/8"	68	161	80	42	32	10
1/2"	79	165	86	52	29	
3/4"	86	175	96	55	35	
1"	124	246	139	71	39	13
1¼"		254	144		48	

Ordering Codes	Range (bar)	Body Style	Size thread according to ISO 228	Style	Capillary Length	Additional Features It is possible to change Style 13 into Style 45A by ordering KIT031N600
V46BA-9600	5...18	Straight	3/8"	13	75	---
V46BB-9600			1/2"			
V46BC-9600			3/4"			
V46BD-9600			1"			
V46BE-9510			1¼"	50		
V46BE-9600				13		
V46BA-9510	5 ...23		3/8"	50		
V46BB-9510			1/2"			
V46BC-9510			3/4"			
V46BC-9511					140	Longer capillary
V46BD-9510	10...23		1"		75	---
V46BE-9511			1¼"		150	Longer capillary

V46

*2-way Pressure Actuated Water Valves - **Maritime Applications***



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

Ordering Codes	Range (bar)	Body Style	Size DIN 86021 flange connections	Style	Capillary Length
V46BR-9510	5...18	Straight	1½"	50	75
V46BR-9600				13	
V46BS-9300	5...11.5		2"	5	---
V46BS-9301	11...18				
V46BT-9300	5...11.5		2½"		
V46BT-9301	11...18				

Pressure Actuated Water Valves

V46SA

Pressure Actuated Water Valves, Low Flow

The V46SA is a direct acting, "all range", pressure actuated modulating valve, used to control the waterflow to a condenser by directly sensing pressure changes in a non-corrosive refrigerant circuit.

The V46SA is specially designed for use on equipment requiring a low condenser waterflow such as icemakers, small heatpumps and watercoolers. The springhousing and power element are rolled to the valve body.

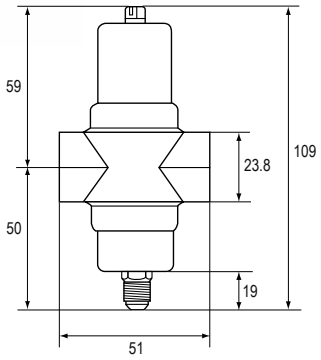
Rubber diaphragms seal the water away from the range spring and bellows part so these are not submerged in water where they would be subject to sedimentation and corrosion.

The valve can be ordered style 5 (without capillary), style 13, style 34 and style 50 (incl. 75 cm capillary).

The capillary part will be delivered separated from the valve.

Features

- Valve designed for low flow
- "All range" power element and spring housing
- Small dimensions
- Pressure actuated
- Various pressure connection style
- High refrigerant pressure resistant bellows



Dimensions in mm

Ordering 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

Pressure Actuated Water Valves

V48

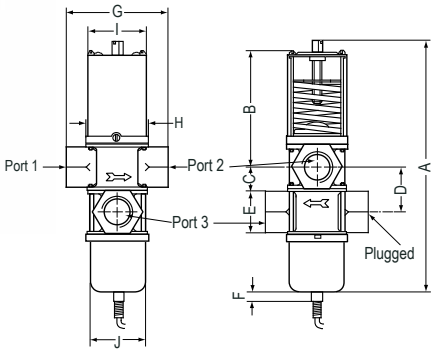
3-way Pressure Actuated Water Valves

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

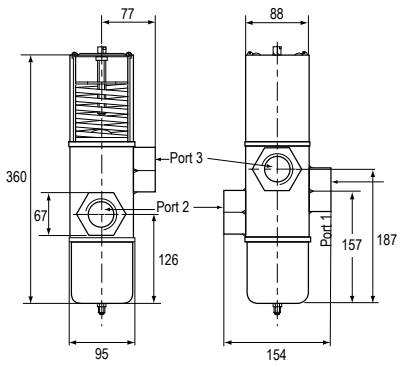
- Pressure balanced design
- Free movement of all parts
- Easy manual flushing
- High Kv values
- Pressure actuated
- Can be used as mixing or diverting valve

Valve Size	Dimensions in mm									
	A	B	C	D	E	F	G	H	I	J
Commercial type										
1/2"	192	91	19	41	30	8	82	52	48	52
3/4"	208	100	23	45	36		88	56	52	56
1"	287	142	25	51	50		124	71	67	72
1¼"	296	141	31	61	58		127			71
Maritime type										
3/4 "	203	97	22	45	35	9	95	55	52	55

Ordering Codes	Range (bar)	Body Style	Size Thread	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		
V48AD -9602	4...16					Bodies in line (port 3 below port 2)
V48AE -9510	6...20		1¼ " according to ISO 7-Rc	50		---
V48AE -9600	4...16			13		
Maritime types						
V48BC -9600	4...16	Straight	3/4" according to ISO 228	13	75	Seawater resistant

V48

3-way Pressure Actuated Water Valves



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	---

Pressure Actuated Water Valves

V246 and 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.

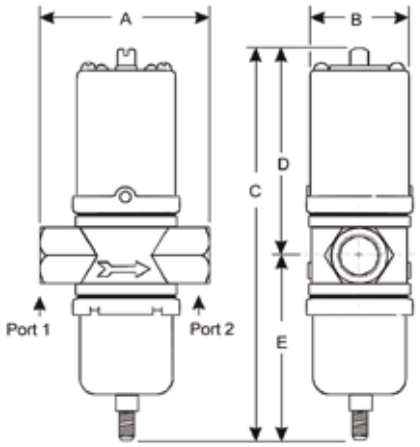
For applications where the coolant may be corrosive to the internal parts, maritime models are available, which have nickel copper (Monel®) internal parts.

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

V246 Screw Connection Valves Dimensions

Valve Size	Dimensions in mm				
	A	B	C	D	E
3/8 in.	67	41	166	89	77
1/2 in.	78	51	182	96	86
3/4 in.	86	55	203	106	98
1 in.	121	71	267	151	116
1-1/4 in.			276	156	121

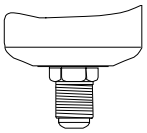


V246

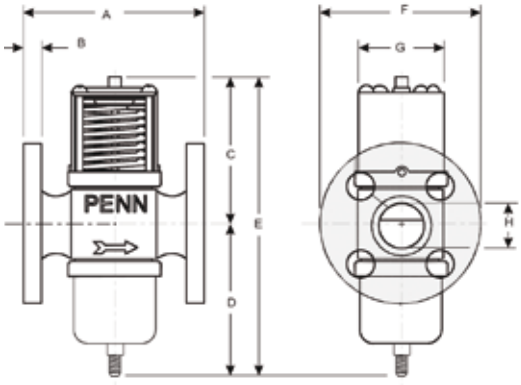
Water Regulating Valves for High Pressure Refrigerants

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



Style 5
7/16-20 UNF



V246 Flange Valve, Commercial Service - Dimensions

Valve Size	Dimensions in mm							
	A	B	C	D	E	F	G	H
1-1/2 in.	137	18	144	100	244	150	67	47
2 in.	168	20	164	140	304	165	90	57

V246 Flange Valve, Commercial Service - Flange Specifications (European, DIN2533 Flanges)

Valve Size	Number of Holes	Hole Size	Bolt Circle
1-1/2 in.	4	18	110
2 in.			125

V246 Flange Valve, Maritime Service - Dimensions

Valve Size	Dimensions in mm							
	A	B	C	D	E	F	G	H
1-1/2 in.	135	14	144	100	244	150	67	47
2 in.	162	16	164	140	304	165	90	57

V246 Flange Valve, Maritime Service - Flange Specifications (European, DIN86021 Flanges)

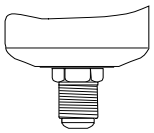
Valve Size	Number of Holes	Hole Size	Bolt Circle
1-1/2 in.	4	18	110
2 in.			125

V248

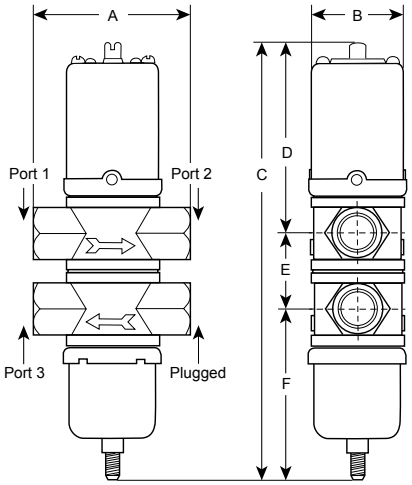
Water Regulating Valves for High Pressure Refrigerants - Screw Connection

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

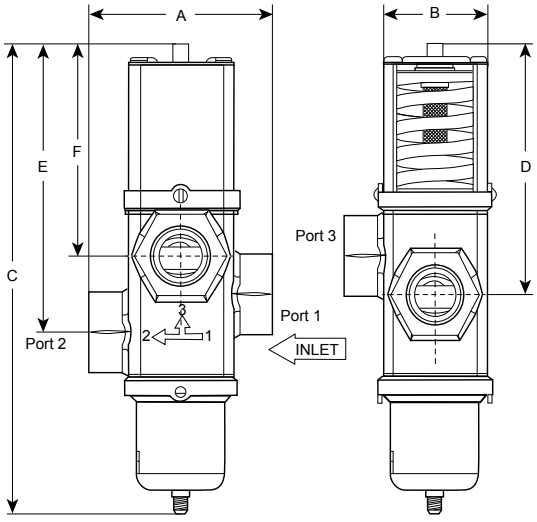


Style 5
7/16-20 UNF



1/2 in. through 1-1/4 in. - Dimensions

Valve Size	Dimensions in mm					
	A	B	C	D	E	F
1/2 in.	78	51	220	96	38	86
3/4 in.	86	55	248	106	44	98
1 in.	121	71	318	151	52	114
1-1/4 in.			336	156	60	121



1/2 in. - Dimensions

Valve Size	Dimensions in mm					
	A	B	C	D	E	F
1-1/2 in.	152	89	382	203	237	175

Temperature Actuated Water Valves

V47

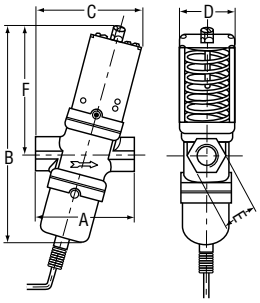
These modulating water valves can be used for heating applications.
It does have an heating element which means that the bulb temperature always must be higher than the valve body (power element).

The valve opens at increasing bulb temperature.

The bulb must be mounted pointing downwards up to horizontal.

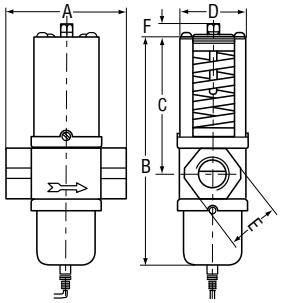
Features

- 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"	69	153	66	43	18	89
1/2"	80	170	86	51	27	100
3/4"	91	183	95	55	36	110

Ordering Codes	Range °C	Body Style	Size Thread according to ISO 228	Capillary Length	Bulb Style 4 Length mm
V47AA -9161	46...82	Angled	3/8"	1.8 m plain	82
V47AB -9160	24...57		1/2"		
V47AC -9160			3/4"		

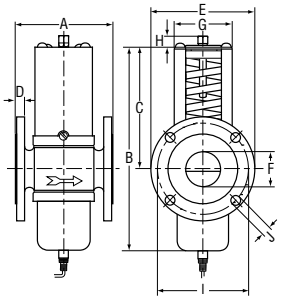


Valve Size	Dimensions in mm					
	A	B	C	D	E	F
1"	124	233	139	72	50	13
1¼"	125	243	145		58	

Ordering Codes	Range °C	Body Style	Size thread according to ISO 7-Rc	Capillary Length	Bulb Style 4 Length mm
V47AD -9160	24...57	Straight	1"	1.8 m arm.	152
V47AD -9161	46...82				
V47AE -9160	24...57		1¼"		
V47AE -9161	46...82				

V47

Temperature Actuated Water Valves



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
V47AR -9160	24...57	Straight	1½"	1.8 m arm.	152
V47AR -9161	46...82				

Mechanical Humidity Stat

W43

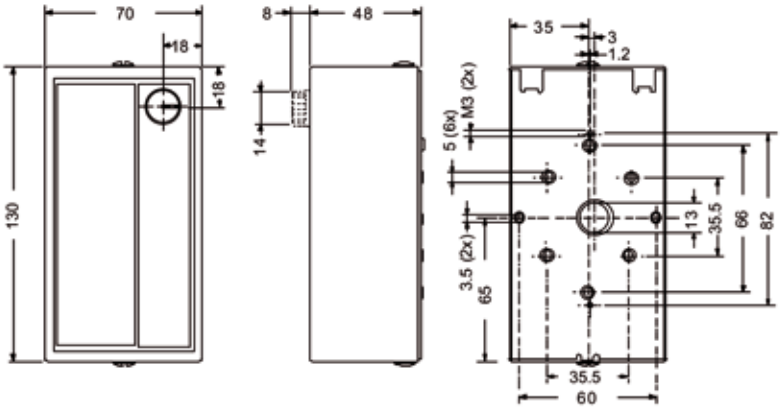
Room Humidistats

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

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.

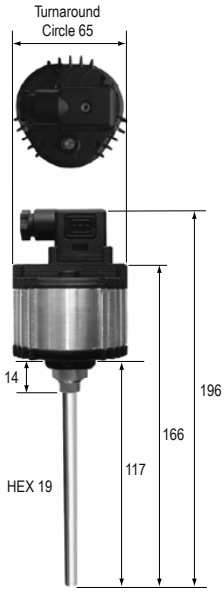
Cut-off models (fan stops at low pressure) as well as minimum speed models (fan keeps running at 30%) are available.

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 R123a and R1234yf

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



Style 28
Braze connection
6 mm ODM

Dimensions in mm

Ordering Codes	Range (bar)	Element Style	Setpoint (bar)	Prop. band (bar)	Supply Voltage 50/60 Hz	Rating	Controller Mode	Extra Features
P215PR-9200	10 to 25	47	19	4.5	230 VAC	4 Amp	Cut-off	---
P215PR-9202	22 to 42		26	5.5				
P215PR-9203	5 to 15		9	2.5				
P215PR-9800	10 to 25	28	19	4.5				
P215PR-9230		47						Bulk Pack
P215PR-9232	22 to 42		26	5.5				
P215PR-9233	5 to 15		9	2.5				
P215PR-9250	10 to 25		19	4.5				Bulk Pack, 2 m cable connector incl.

Note
For a 4 Amp rating and UL approval please contact your sales representative.

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 to 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				

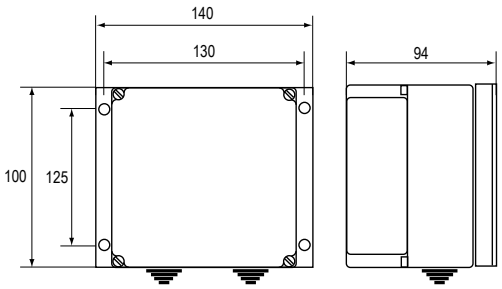
1-phase Condenser Fan Speed Control

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.

P215DP/SH/ST



Dimensions in mm

Features

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

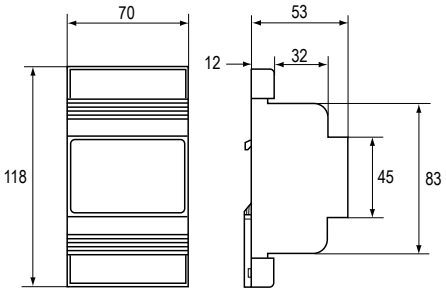
Ordering Codes	Range (bar)	Prop. band (bar)	Setpoint (bar)	Pressure Connection	Supply Voltage 50/60 Hz	Rating	Additional Features *Note: Style 50 is allowed on the Dutch market!*
P215DP-9100	14 to 24	4	16	90 cm cap. st. 50	230 VAC	8 Amp	Single/dual input. For dual input a second separate transducer has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

P215

Pressure Actuated Single Phase Controller

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 ≥95% of the supplied voltage using the phase cutting principle. It is recommended to confirm with the electric motor manufacturer if a controller using the phase cutting principle for speed variation can be used. If the pressure drops below the adjusted setpoint minus the proportional band, the output to the motor is zero volt or the adjusted min. speed setting.



Dimensions in mm

Features

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

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

1-phase Condenser Fan Speed Control

P266

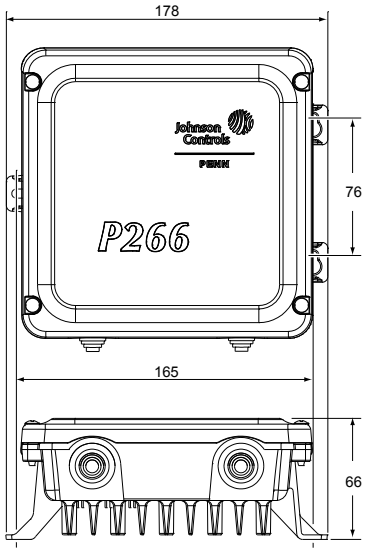
Pressure Actuated Single Phase Digital Controller

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.



Dimensions in mm

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

P266

Pressure Actuated Single Phase Digital Controller

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)				3
P266EBA-3K*		P266SNR-2C 0-52 bar (0-754 psi)				
P266ECA-1K*		P266SNR-1C 0-35 bar (0-508 psi)			1	---
P266ECA-3K		P266SNR-2C 0-52 bar (0-754 psi)				
P266EDA-1K*		P266SNR-1C 0-35 bar (0-508 psi)				3
P266EDA-3K*		P266SNR-2C 0-52 bar (0-754 psi)				
P266EEA-1K*		P266SNR-1C 0-35 bar (0-508 psi)		12		---
P266EFA-3K*		P266SNR-2C 0-52 bar (0-754 psi)				3

Note
Factory default settings: Start Voltage is set to 40% of the supply line-voltage. End Voltage is set to 95% of the supply line-voltage.
Start Pressure is set to 44% of the P266 transducer's total pressure range. End Pressure is set to 51% of the P266 transducer's total pressure range.

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.

Modular Electronic Control System

System 450™

Modular Electronic Controls

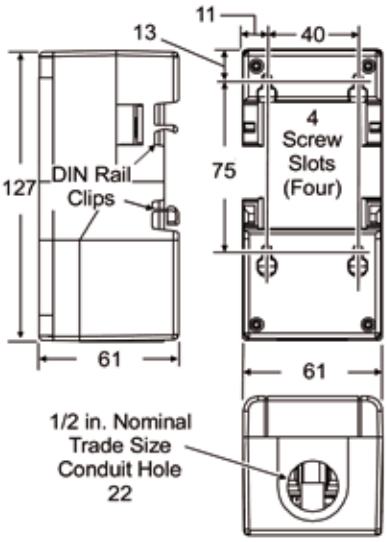
System 450™ is a family of modular, digital electronic controls that is easily assembled and set up to provide reliable temperature, pressure, and humidity control for a wide variety of Heating, Ventilating, Air Conditioning, and Refrigeration (HVACR) and commercial/industrial process applications.

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.



Dimensions in mm

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)

System 450™

Modular Electronic Controls

System 450 Control Modules are capable of monitoring up to three input sensors and controlling up to ten outputs that can be any combinationof relay and analogue outputs (provided by expansion modules).

Ordering Codes	Description
C450 Control Module Types	
C450CBN-3C	Control Module 1 Stage
C450CCN-3C	Control Module 2 Stage
C450CPN-3C	Control Module 1 Analog Output (PI)
C450CQN-3C	Control Module 2 Analog Output (PI)
C450RBN-1C	Reset Control Module 1 relay stage
C450RCN-1C	Reset Control Module 2 relay stage
C450 Expansion Module Types	
C450SBN-3C	Expansion Module 1 relay stage
C450SCN-3C	Expansion Module 2 relay stage
C450SPN-1C	Expansion Module 1 Analog Output (PI)
C450SQN-1C	Expansion Module 2 Analog Output (PI)
C450 Power Module	
C450YNN-1C	Power Module 230 / 24 VAC 50 / 60 Hz
C450 Sensor Types	
A99	Temperature Sensors, all models, Range -40 / 120 °C
P499RCP-401C	Pressure Transmitter, Range -1 / 8 bar
P499RCP-402C	Pressure Transmitter, Range -1 / 15 bar
P499RCP-404C	Pressure Transmitter, Range 0 / 30 bar
P499RCP-405C	Pressure Transmitter, Range 0 / 50 bar
HE-67S3-0N00P	Humidity Transmitter Duct Mount (include A99)
HE-67S3-0N0BP	Humidity Transmitter Wall Mount (include A99)
DPT2650-0R5D-AB	Delta P Transmitter 0 to 1 mbar
DPT2650-0I0D-AB	Delta P Transmitter 0 to 25 mbar

Specifications SPDT relay output contacts

- AC Motor ratings at 208/240 Vac
- Full-Load Amperes: 4,9 Amp
- Locked-Rotor Amperes: 29,4 Amp
- Non-Inductive Load at 24/240 Vac: 10 Amp
- Pilot Duty at 24/240 Vac: 125 VA

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 (2nd 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)			•		•

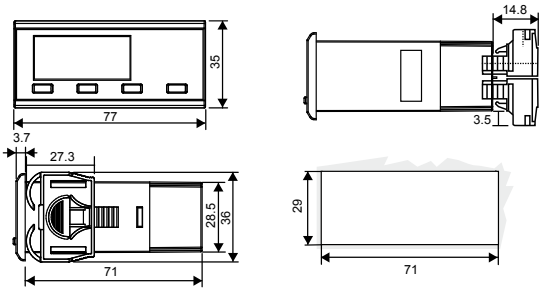
Please refer to product bulletins for complete information

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
P499-Axx-xxx	Pressure transducer, 4-20 mA (See also P499 catalogue section)	ER65

ER Line
Electronic Refrigeration Line

EVAPORATOR CONTROLLERS



ER54

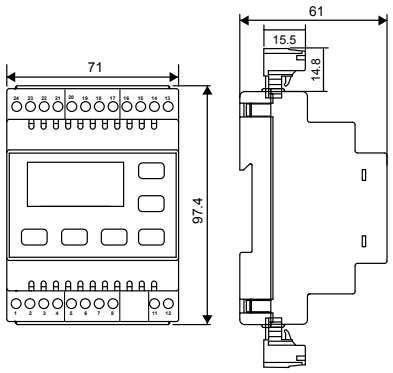
Panel mount controller, cool thermostat, comprehensive controls, RS485, real time clock, plug connectors

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	Compressor: SPST 12(5)A Fan: SPST 7(2)A Defrost: SPST 7(2)A Auxiliary: SPST 7(2)A
ER54-PMW-001C	N2 Open						

ER Line
Electronic Refrigeration Line

COLD ROOM CONTROLLERS

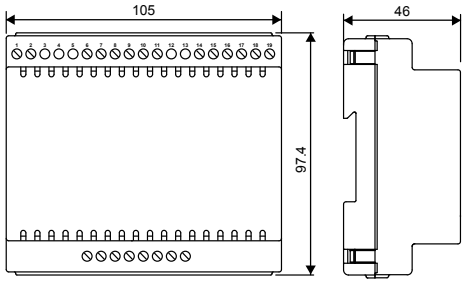


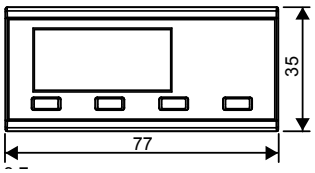
ER55

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
ER55-DR230-501C	MODBUS	230 VAC, +/-10% Consumption 3W	IP20	-40 to 70°C Accuracy: +/-0.3°C	LED 3 digits Decimal displaying	3 temperatures 2 voltage free contacts	Compressor: SPST 7(2)A Fan: SPST 7(2)A Defrost: SPST 16(4)A Auxiliary 1: SPDT 7(2)A Auxiliary 2: SPST 7(2)A
ER55-DR230-001C	N2 Open						





ER55

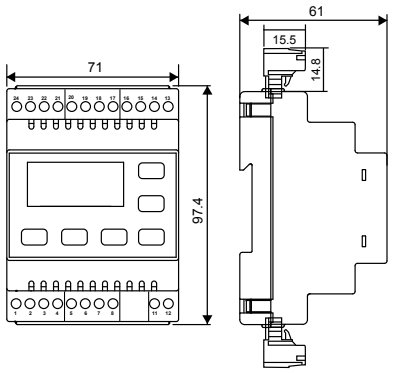
Split mounting controller, cool thermostat, comprehensive controls, RS485, real time clock, plug connectors

Delivered with two NTC sensors

Ordering Codes	RS485	Power Supply	Protection Class	Temperature Range	Display	Inputs	Outputs
ER55-SM230-501C	MODBUS	230 VAC, +/-10% Consumption 3W	IP20	-40 to 70°C Accuracy: +/-0.3°C	Remote LED 3 digits Decimal displaying	3 temperatures 2 voltage free contacts	Compressor: SPST 16(8)A Fan: SPST 8(3)A Defrost: SPST 16(4)A Auxiliary 1: SPST 7(2)A Auxiliary 2: SPST 7(2)A
ER55-SM230-001C	N2 Open						

ER Line
Electronic Refrigeration 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
ER65-RK230-501C	MODBUS	230 VAC, +/-10% Consumption 3W	IP20	-40 to 70°C Accuracy: +/-0.3°C	LED 3 digits Decimal displaying	1 temperature 1 pressure 2 voltage free contacts 3 supplied contacts (230 V)	Stages (x4): SPST 5(1)A Alarm: SPDT 7(2)A
ER65-RK230-001C	N2 Open						

Multi-Stages Control Devices

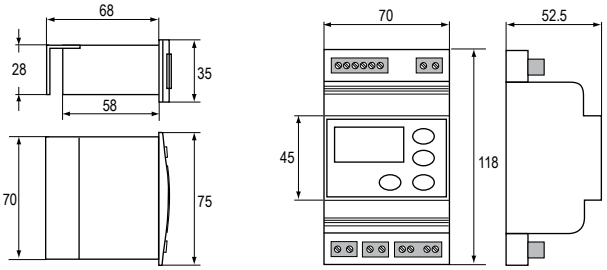
MS Line

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.



Panel Model DIN Rail Model

Dimensions in mm

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	Accuracy: ±1 Unit Power Consumption: 1.5 VA 50/60 Hz
DIS230T-1C		230 VAC				
DIS12V-1C	0 to +100% (Rh)	12 VAC		0-10 V from humidity sensor (not Incl.)		
DIS230V-1C		230 VAC				

MS1 One-stage Control

Ordering Codes	Range	Power Supply	Enclosure	Input	Output Rating 250 VAC	Alarm Output	Protection Class	Additional Features
MS1PM12RT-1C	-40 to +70 °C	12 VAC/DC	Panel	A99 sensor (incl.)	SPST 8(3)A	Open Collector 40 VDC/100 mA	Overall IP20 Front IP54	Accuracy: ±1 Unit Power Consumption: 2 VA 50/60 Hz
MS1PM230T-1C		230 VAC			SPDT 8(3)A			
MS1DR230T-1C		230 VAC	DIN rail		SPST 8(3)A		IP20	
MS1PM12RV-1C	-40 to +100	12 VAC	Panel	0-10 V	SPST 8(3)A		Overall IP20 Front IP54	
MS1PM230V-1C		230 VAC			SPDT 8(3)A			
MS1DR230V-1C		230 VAC	DIN rail		SPST 8(3)A		IP20	

MS Line

General purpose and Multi Stages

MS2 Two-stage Control

Ordering Codes	Range	Power Supply	Enclosure	Input	Output Rating 250 VAC Each Stage (1-2)	Protection Class	Additional Features
MS2PM12RT-1C	-40 to +70 °C	12 VAC/DC	Panel	A99 sensor (incl.)	SPST 8(3)A	Overall IP20 Front IP54	Accuracy: ±1 °C Power Consumption: 2 VA 50/60 Hz
MS2DR230T-1C		230 VAC	DIN rail		SPST 8(3)A	IP20	
MS2DR48DT-1C		12-24 VAC/DC 48 VDC			SPDT 8(3)A		
MS2PM12RV-1C	-40 to +100	12 VAC	Panel	0-10 V	SPST 8(3)A	Overall IP20 Front IP54	
MS2DR230V-1C		230 VAC	DIN rail		SPST 8(3)A	IP20	

MS4 Four-stage Control

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

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.

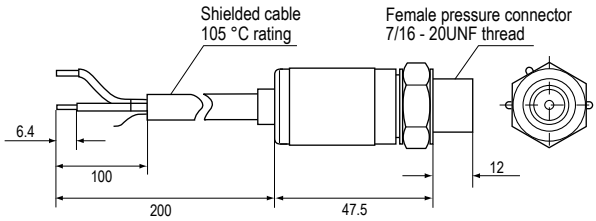
The P499 is designed to produce a linear analogue signal based on the sensed pressure.

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.

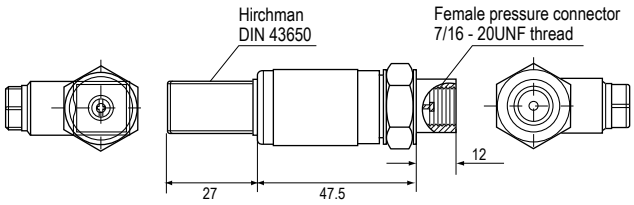
This results in a leak proof ,all metal sealed pressure system which withstand more than 10 million pressure cycles without failure.

Features

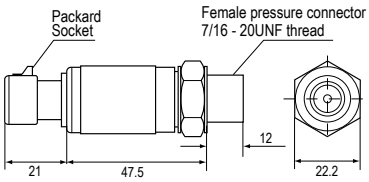
- Single-piece machined steel pressure port
- Environmentally Sealed Electronics
- Reliable, Repeatable Performance and Long Operating Life
- Slender Body Design
- Available in several pressure ranges up to 50 bar.



Shielded cable Female
Dimensions in mm



Hirchman Female
Dimensions in mm



Packard Female
Dimensions in mm

P499
Electronic Pressure Transducer

2 meter cable Connections Models

Ordering Codes	Press. Connection	Output
P499-ABS-401C	Male	0.4 to 20 mA
P499-ABS-404C		
P499-ACS-401C	Female	
P499-ACS-404C		
P499-ACS-405C		
P499-VBS-401C	Male	DC 0 V - 10 V
P499-VBS-404C		
P499-VCS-401C	Female	
P499-VCS-404C		
P499-VCS-405C		

Hirschmann DIN connector

Ordering Codes	Press. Connection	Output
P499-ABH-401C	Male	0.4 to 20 mA
P499-ABH-402C		
P499-ABH-404C		
P499-ACH-401C	Female	
P499-ACH-402C		
P499-ACH-404C		
P499-RCH-401C		0.5 - 4.5 V
P499-RCH-404C		
P499-VBH-401C	Male	0 - 10 V
P499-VBH-404C		
P499-VCH-401C	Female	
P499-VCH-404C		

Packard connector

Ordering Codes	Press. Connection	Output
P499-ACP-401C	Female	0.4 to 20 mA
P499-ACP-402C		
P499-ACP-403C		
P499-ACP-404C		
P499-ACP-405C		
P499-RCP-401C		0.5 - 4.5 V
P499-RCP-402C		
P499-RCP-404C		
P499-RCP-405C		
P499-VCP-404C		0 - 10 V

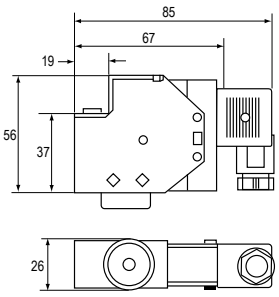
Mechanical Pressure Transducer

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 ≥ 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.



Dimensions in mm

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

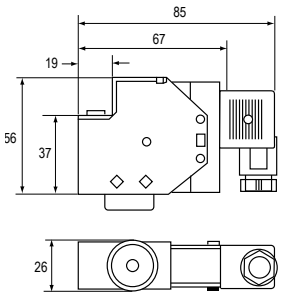
P35
Mechanical Pressure Transducer

Replacement Pressure transducers for P215 version (300 ohm)

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

P35

Mechanical Pressure Transducer



Dimensions in mm

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

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

Replacement Press. transducers P255 versions (100K ohm)

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

Replacement Press. transducers P255 versions (500K ohm)

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

P35
Mechanical Pressure Transducer

Accessories

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

Accessories for Temperature Controls

Ordering Codes	Description	Primary Usage	Inner Ø x Tube Length Bulb well (mm)	Inside & Outside connector (NPT)	Material Connector Pocket
FTG13A-600R	Closed tank connector Style 1b elements, Max. 10 bar, 120 °C, Min. -40 °C	A19/28/36	---	---	---
KIT012N600	Capillary brackets (6 pieces)	270XT			
WEL003N602R	Bulb well, Max. pressure 70 bar, Temp. 370 °C	---	9.8 x 125	1/2 - 14	Stainless steel
WEL11A601R	Bulb well, Max. pressure 20 bar, Temp. 120 °C, USA item	A19	7.3 x 60	1/2 - 14	Brass/Copper
WEL14A-600R	Bulb well, Max. pressure 69 bar, Temp. 370 °C, USA item	A19/28/36	11.2 x 120	1/2 - 14	Monel/Monel
WEL14A602R	Bulb well, Max. pressure 20 bar, Temp. 120 °C, USA item	A19/28/36	9.8 x 125	1/2 - 14	Brass/Copper
WEL14A603R	Bulb well, Max. pressure 20 bar, Temp. 120 °C, USA item	A19/28/36	9.8 x 147	1/2 - 14	Brass/Copper
WEL16A-601R	Bulb well, Max. pressure 20 bar, Temp. 120 °C, USA item	A19/28/36	9.5 x 71	1/2 - 14	Brass/Copper

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