



NS Series Network Sensors (Continued)

Network Zone Sensor Ordering Information — CO₂ Models

Product Code Number	Size (mm), Height x Width	Vertical Wallbox-Mounted (WB), or Surface-Mounted (SM)	LCD Display	CO ₂ Measurement Range	Johnson Controls Logo	Screw Terminals (ST), or Modular Jack (MJ)	Sensor Addressing
NS-BCN7004-0	120 x 80	WB, SM	No	0 to 2,000 ppm	Yes	ST, MJ	DIP Switch (212 to 219)
NS-BCN7004-2	120 x 80	WB, SM	No	0 to 2,000 ppm	No	ST, MJ	DIP Switch (212 to 219)

Network Zone Sensor Ordering Information — Flush-Mount Temperature Only Models

Product Code Number	Faceplate Dimensions, Height x Width	Mounting	LCD Display	Temperature Measurement Range	Johnson Controls Logo	Terminations	Sensor Addressing
NS-FTN7003-0	4-1/2 in. x 2-3/4 in. (114 mm x 70 mm)	Flush-Mount	No	32.0°F/0.0°C to 104.0°F/40.0°C	Yes	Screw Terminal Block	DIP Switch (200 to 203)
NS-FTN7003-2	4-1/2 in. x 2-3/4 in. (114 mm x 70 mm)	Flush-Mount	No	32.0°F/0.0°C to 104.0°F/40.0°C	No	Screw Terminal Block	DIP Switch (200 to 203)

Network Discharge Air Sensor Ordering Information

Product Code Number	Dimensions, Height x Width x Depth	Temperature Probe Length	10 ft (305 cm) Wiring Lead Included	Terminations	Sensor Addressing
NS-DTN7043-0	3 in. x 3 in. x 2 in. (76 mm x 76 mm x 51 mm)	4 in. (102 mm)	Yes	Screw Terminal Block	DIP Switch (204 to 211)
NS-DTN7083-0	3 in. x 3 in. x 2 in. (76 mm x 76 mm x 51 mm)	8 in. (203 mm)	Yes	Screw Terminal Block	DIP Switch (204 to 211)

Technical Specifications

NS Series Network Zone Sensors — Temperature Only Models and Temperature and Humidity Models (Part 1 of 2)	
Supply Voltage	9.8 to 16.5 VDC; 15 VDC Nominal (From SA Bus)
Current Consumption	Temperature Only Models with LCD Display: 21 mA Maximum (Non-transmitting)
	Temperature Only Models without LCD Display: 13 mA Maximum (Non-transmitting)
	Temperature and Humidity Models with LCD Display: 25 mA Maximum (Non-transmitting)
	Temperature and Humidity Models without LCD Display: 17 mA Maximum (Non-transmitting)
Terminations	Modular Jack or Screw Terminal Block
Sensor Addressing	NS-AHx7003-0, NS-APB7003-0, NS-ATx7003-0, NS-BHx7003-0, NS-BPB7003-0, NS-BTB7003-0, NS-BTN7003-0, and NS-BTP7003-0 Models: DIP Switch Set from 200 to 203; Factory Set at 203 All Other Models: Fixed Address of 199
Wire Size	Modular Jack Models: 24 or 26 AWG (0.5 or 0.4 mm Diameter) Recommended; Three Twisted Pair (Six Conductors) Screw Terminal Block Models: 18 to 22 AWG (1.0 to 0.6 mm Diameter); 22 AWG (0.6 mm Diameter) Recommended
Communication Rate	Auto-Detect: 9.6k, 19.2k, 38.4k, or 76.8k bps
Mounting	Surface-Mounted: 80 x 80 mm
	Surface-Mounted or Vertical Wallbox-Mounted: 120 x 80 mm
Temperature Measurement Range	32.0°F/0.0°C to 104.0°F/40.0°C
Humidity Measurement Range	Full Range: 0 to 100% RH
	Calibrated Range: 10 to 90% RH
Temperature Sensor Type	Local 1k ohm Platinum Resistance Temperature Detector (RTD); Class A per IEC 60751
Humidity Sensor Type	Thin Film Capacitive Sensor
Temperature Resolution (Models with LCD)	±0.5F°/±0.5C°
Temperature Accuracy	NS Series Network Zone Sensor: ±1.0F°/±0.6C°
	Temperature Element Only: 0.35F° at 70°F (0.19C° at 21°C)
Humidity Element Accuracy	NS-APx700x-0 and NS-BPB700x-0 Models: ±2% RH for 20 to 80% RH; ±4% RH for 10 to 20% and 80 to 90% RH
	NS-AHx700x-0, NS-BHx700x-0, and NS-MHL700x-0 Models: ±3% RH for 20 to 80% RH; ±6% RH for 10 to 20% and 80 to 90% RH
Time Constant	10 Minutes Nominal at 10 fpm Airflow
Default Temperature Setpoint Adjustment Range	With LCD Display: 50.0°F/10.0°C to 86.0°F/30.0°C in 0.5° Increments
	Without LCD Display: ±5.0F°/±3.0C°
PIR Occupancy Sensor Motion Detection (Models with PIR Occupancy Sensor)	Minimum 94 Angular Degrees up to a Distance of 15 ft (4.6 m); Based on a Clear Line of Sight

NS Series Network Sensors (Continued)

NS Series Network Zone Sensors — Temperature Only Models and Temperature and Humidity Models (Part 2 of 2)		
Ambient Conditions		Operating: 32 to 104°F (0 to 40°C); 10 to 90% RH, Noncondensing; 85°F (29°C) Maximum Dew Point Storage with LCD Display: -4 to 140°F (-20 to 60°C); 5 to 95% RH, Noncondensing Storage without LCD Display: -40 to 158°F (-40 to 70°C); 5 to 95% RH, Noncondensing
Compliance 	BACnet International	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Smart Sensor (B-SS) Note: Excludes the NS-ATV700x-0 and NS-BTV700x-0 models.
	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 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
Accessory (Order Separately)		NS-WALLPLATE-0: Adapts an 80 x 80 mm NS Series Network Zone Sensor to a Standard 80 x 120 mm Wallbox
Shipping Weight		NS-Axx7xxx-0 Models: 0.20 lb (0.09 kg) NS-Bxx7xxx-0 and NS-Mxx700x-0 Models: 0.25 lb (0.11 kg)

NS Series Network Zone Sensors — Motion Detection Only Models (No Temperature or Humidity Sensing)		
Supply Voltage		9.8 to 16.5 VDC; 15 VDC Nominal (From SA Bus)
Current Consumption		13 mA Maximum (Non-transmitting)
Terminations		Modular Jack or Screw Terminal Block
Sensor Addressing (NS-MNN7003-0 Model)		DIP Switch Set from 200 to 203; Factory Set at 203
Wire Size		Modular Jack Model: 24 AWG or 26 AWG (0.5 or 0.4 mm Diameter) Recommended; Three Twisted Pair (Six Conductors) Screw Terminal Block Model: 18 to 22 AWG (1.0 to 0.6 mm Diameter); 22 AWG (0.6 mm Diameter) Recommended
Communication Rate		Auto-Detect: 9.6k, 19.2k, 38.4k, or 76.8k bps
Mounting		Surface-Mounted or Vertical Wallbox-Mounted: 120 x 80 mm
PIR Occupancy Sensor Motion Detection		Minimum 94 Angular Degrees up to a Distance of 15 ft (4.6 m); Based on a Clear Line of Sight
Ambient Conditions		Operating: 32 to 104°F (0 to 40°C); 10 to 90% RH, Noncondensing; 85°F (29°C) Maximum Dew Point Storage: -40 to 158°F (-40 to 70°C); 5 to 95% RH, Noncondensing
Compliance 	BACnet International	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Smart Sensor (B-SS)
	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 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
Shipping Weight		0.25 lb (0.11 kg)

NS Series Network Zone Sensor — CO ₂ Models (Part 1 of 2)		
Supply Voltage		Non-isolated: 20 to 30 VAC (18 to 30 VDC), Class 2 or Safety Extra-Low Voltage (SELV) Isolated: 9.8 to 16.5 VDC; 15 VDC Nominal (From SA Bus)
Current Consumption		Non-isolated: 22 mA Average at 24 VAC; 28 mA Average at 24 VDC Isolated: 5 mA Maximum, Non-transmitting (From SA Bus)
Power Consumption		Non-isolated: Less Than 0.7 W Average
Terminations		Non-isolated Supply: Screw Terminal Block SA Bus: Modular Jack or Screw Terminal Block
Sensor Addressing		DIP Switch Set from 212 to 219; Factory Set at 212
Wire Size		Modular Jack: 24 or 26 AWG (0.5 or 0.4 mm Diameter) Recommended; Three Twisted Pair (Six Conductors) Screw Terminal Block: 18 to 22 AWG (1.0 to 0.6 mm Diameter); 22 AWG (0.6 mm Diameter) Recommended
Communication Rate		Auto-Detect: 9.6k, 19.2k, 38.4k, or 76.8k bps
CO₂ Measurement Range		0 to 2,000 ppm

NS Series Network Sensors (Continued)

NS Series Network Zone Sensor — CO ₂ Models (Part 2 of 2)	
CO ₂ Sensing Accuracy	Plus or Minus the Sum of 50 ppm and 3.0% of the CO ₂ Reading at 77°F (25°C) and 978 hPa or an Altitude of 1,000 ft/300 m Note: All accuracy specifications reflect the testing of the device using high-grade certified gases. This device is intended for an altitude range of 0 ft/0 m to 2,000 ft/600 m above sea level without compensation.
	Temperature Dependence of Output: -0.35% of the CO ₂ Reading per 1.8F°/1C° Typical Pressure Dependence of Output: +0.15% of the CO ₂ Reading per 1 hPa Typical
CO ₂ Sensing Resolution	1 ppm
CO ₂ Sensing Response Time	1 Minute (0 to 90%)
CO ₂ Sensing Warm-Up Time	Less Than 1 Minute; Less Than 10 Minutes for Full Accuracy
CO ₂ Sensing Long-Term Stability	Less Than ±100 ppm Over 5 Years
Mounting	Surface-Mounted or Vertical Wallbox-Mounted: 120 x 80 mm
Ambient Conditions	Operating: 32 to 104°F (0 to 40°C); 10 to 90% RH, Noncondensing; 85°F (29°C) Maximum Dew Point; 700 to 1,200 hPa
	Storage: -40 to 158°F (-40 to 70°C); 0 to 95% RH, Noncondensing
Compliance	BACnet International BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Smart Sensor (B-SS)
	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 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
Supply Voltage	0.35 lb (0.16 kg)

NS Series Network Zone Sensor — Flush-Mount Temperature Only Models	
Supply Voltage	9.8 to 16.5 VDC; 15 VDC Nominal (From SA Bus)
Current Consumption	12 mA Maximum (Non-transmitting) per Flush-Mount Network Sensor
Terminations	Screw Terminal Block Note: Wire leads are field supplied and are not tinned.
Sensor Addressing	DIP Switch Set from 200 to 203; Factory Set at 203
Wire Size	18 to 22 AWG (1.0 to 0.6 mm Diameter); 22 AWG (0.6 mm Diameter) Recommended; 10 ft (304.8 cm) Wiring Lead Included with the Unit
Communication Rate	Auto-Detect: 9.6k, 19.2k, 38.4k, or 76.8k bps
Temperature Measurement Range	32.0°F/0.0°C to 104.0°F/40.0°C
Temperature Sensor Type	Local 1k ohm Platinum Resistance Temperature Detector (RTD); Class A per IEC 60751
Temperature Accuracy	NS Series Network Zone Sensor: ±1.0F°/±0.6C°
	Temperature Element Only: 0.35F° at 70°F (0.19C° at 21°C)
Ambient Conditions	Operating: 32 to 104°F (0 to 40°C); 10 to 90% RH, Noncondensing; 85°F (29°C) Maximum Dew Point
	Storage: -40 to 158°F (-40 to 70°C); 5 to 95% RH, Noncondensing
Compliance	BACnet International BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Smart Sensor (B-SS)
	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 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
Shipping Weight	0.25 lb (0.11 kg)

NS Series Network Discharge Air Sensors (Part 1 of 2)	
Supply Voltage	9.8 to 16.5 VDC; 15 VDC Nominal
Current Consumption	12 mA Maximum (Non-transmitting) per Discharge Air Sensor
Terminations	Four Color-Coded Wiring Leads, Stripped and Tinned; Factory-Installed at the Discharge Air Sensor Screw Terminal Block
Sensor Addressing	DIP Switch Set from 204 to 211; Factory Set at 204

NS Series Network Sensors (Continued)

NS Series Network Discharge Air Sensors (Part 2 of 2)		
Wire Size	18 to 22 AWG (1.0 to 0.6 mm Diameter); 22 AWG (0.6 mm Diameter) Recommended; 10 ft (305 cm) Wiring Lead Included with the Unit	
Communication Rate	Auto-Detect: 9.6k, 19.2k, 38.4k, or 76.8k bps	
Mounting	Duct-Mounted: 4 or 8 in. (102 or 203 mm) Temperature Probe Length	
Temperature Measurement Range	14°F/-10°C to 140°F/60°C	
Temperature Sensor Type	Local 1k ohm Platinum Resistance Temperature Detector (RTD); Class A per IEC 60751	
Temperature Accuracy	NS Series Network Discharge Air Sensor: $\pm 1.0F^{\circ}/\pm 0.6C^{\circ}$ Temperature Element Only: 0.35F° at 70°F (0.19C° at 21°C)	
Ambient Conditions	Operating: 14 to 140°F (-10 to 60°C); 10 to 90% RH, Noncondensing; 85°F (29°C) Maximum Dew Point Storage: -40 to 158°F (-40 to 70°C); 5 to 95% RH, Noncondensing	
Compliance 	BACnet International	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Smart Sensor (B-SS)
	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 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
Shipping Weight	NS-DTN7043-0: 1.15 lb (0.52 kg) NS-DTN7083-0: 1.17 lb (0.53 kg)	

TE-6700

2nd Generation Temperature Elements

Description

The TE-6700 Series is our 2nd Generation of temperature elements. These attractively styled, feature-packed temperature sensing products offer ease of installation, user friendliness, and application flexibility in one package.

The TE-6700 Series Temperature Elements supersede the TE-6400 Series for space sensing applications. The 2nd Generation elements are designed for use with most Johnson Controls controllers, and now work directly with the VMA1200 and VMA1400 Series controllers.

IMPORTANT: The Printed Circuit Board (PCB) is retained with a tamper-resistant mechanism. Removal of the PCB from the plastic housing will void the product warranty.

Features

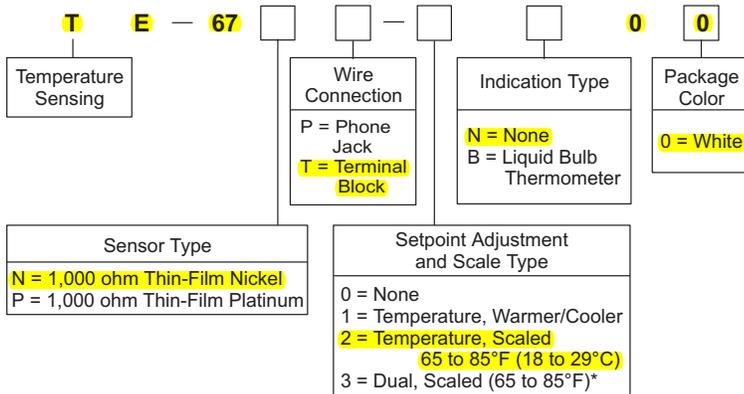
- temperature sensor Time Response Improvement (TRI) provides better temperature local control, increases employee comfort, and reduces energy consumption
- controller configuration switch allows users to choose occupancy features that match the application and controller
- occupancy Light-Emitting Diode (LED) indicator displays the controller's current operating mode
- manual override pushbutton (PB) signals the controller that the space is occupied; this overrides time-of-day scheduling
- globally scaled units include setpoint and bulb indicator (both optional) that measure Fahrenheit and Celsius ranges, 65 to 85°F (19 to 29°C)
- universal mounting — ships with wallbox and surface mounting plate (all installation hardware included)



TE-6700 Series Temperature Elements

- single or dual setpoint adjustment allows for separate heating and cooling settings; this makes setpoint viewing and adjustment easier
- Analog Profile and Starfield Display compatible — analyzes heating and cooling efficiency with the M-Series Workstation

Selection Charts



* These models do not have a functioning LED, but all models have the manual override PB.

Example 1: To order a nickel sensor with a phone jack, a warmer/cooler temperature setpoint, and a liquid bulb thermometer, specify Product Code Number TE-67NP-1B00.

Example 2: To order a platinum sensor with a terminal block, a scaled temperature setpoint, and no indication, specify Product Code Number TE-67PT-2N00.

te-6700select.eps

Accessories for TE-6700 Series

Code Number	Description
ACC-DWCLIP-0	Drywall Clip Mounting Kit (10 per bag)
ACC-INSL-0 ¹	Foam Pad Kit for Wallbox Mounting (10 per package)
ACC-INSL-1 ¹	Foam Pad Kit for Surface Mounting (10 per package)
GRD10A-608	Plastic Guard with Baseplate and Mounting Ring
T-4000-119	Allen-Head Adjustment Tool (30 per bag)
TE-67L-600	Fahrenheit Label Replacement Kit
TE-67L-601	Celsius Label Replacement Kit
TE-67MB-600	Mounting Base Kit
TE-67D0-601 ²	Door Replacement Kit with a Johnson Controls Logo (10 per box)
TE-67D0-602 ²	Door Replacement Kit without a Logo (10 per box)

1. These foam pads will prevent drafts from entering the unit through the wall, and make installation easier when mounting on an uneven surface.
2. Contains 10 original style and 10 new style doors

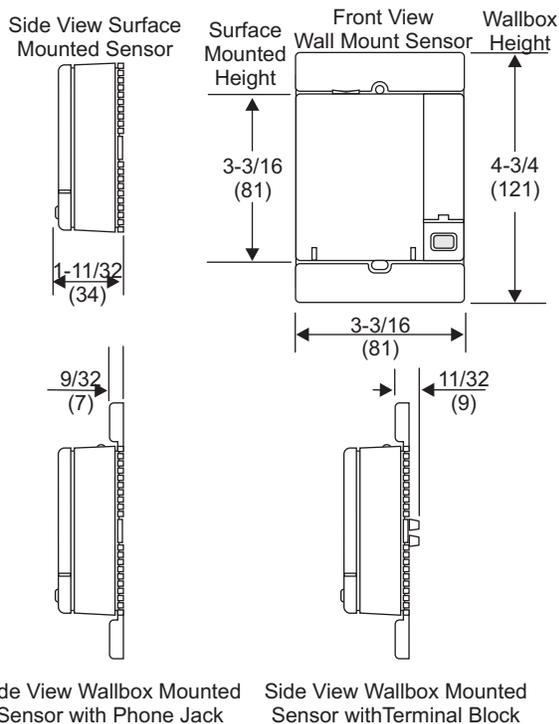
Technical Specifications

TE-6700 2nd Generation Temperature Elements (Part 1 of 2)		
Nickel Sensor	Temperature Sensor	1,000 ohm thin-film nickel
	Temperature Coefficient	Approximately 3 ohms per F° (5.4 ohms per C°)
	Reference Resistance	1,000 ohms at 70°F (21°C)
	Accuracy:	±0.34F° at 70°F (±0.18C° at 21°C)
Platinum Sensor	Temperature Sensor	1,000 ohm thin-film platinum
	Temperature Coefficient	Approximately 2 ohms per F° (5.4 ohms per C°)
	Reference Resistance	1,000 ohms at 32°F (0°C)
	Accuracy	±0.65F° at 70°F (±0.36C° at 21°C)

The performance specifications are nominal and conform to acceptable industry standards. For applications at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products. © 2012 Johnson Controls, Inc. www.johnsoncontrols.com

TE-6700 2nd Generation Temperature Elements (Continued)

TE-6700 2nd Generation Temperature Elements (Part 2 of 2)		
Temperature Indicator	Type	Liquid filled bulb thermometer
	Range	40 to 90°F or 5 to 30°C
	Resolution	Fahrenheit scale graduated at 10F° intervals; Celsius scale and graduated at 5C° intervals.
Setpoint	Single Adjustment	Warmer/cooler, red/blue visual scale, or temperature – scaled °F/°C
	Dual Adjustment	Heating and cooling, graduated scale 65 to 85°F (Fahrenheit only: no Celsius scale)
	Resistance	Nominal 1.5k ohm
	Resolution	Fahrenheit scale graduated at 5F° intervals; Celsius scale at 2C° intervals
Sensor Response Time		One time constant = 8 minutes ±2 minutes at 10 feet per minute (fpm) airflow rate
Field Connections	Phone Jack	8-pin connector for 8-conductor 24 AWG phone cable
	Terminal Block	Screw type terminals for 18 to 24 AWG wire
Zone Bus Access		6-pin connector with front access for a laptop with HVAC PRO™ software, PalmPilot™ with VMA Balancing Tool (VBT) software, or a Zone Terminal (ZT).
Manual Override		Integral momentary pushbutton (DIP switch selectable)
LED Display	Red LED indicates three modes of operation (application and controller type dependent).	
Ambient Operating Conditions		32 to 131°F (0 to 55°C) 0 to 100% RH, noncondensing; 85°F (29°C) maximum dew point
Ambient Storage Conditions		-40 to 160°F (-40 to 71°C) 0 to 100% RH, noncondensing; 85°F (29°C) maximum dew point
Mounting Style		Standard base for both surface and U.S. wallbox mounting, including hardware
Materials		White PC/ABS plastic case and mounting base
Dimensions (H x W x D)		3.2 x 3.2 x 1.4 in. (81 x 81 x 36 mm)
Shipping Weight		1 lb (0.5 kg)



TE-6700 Temperature Element
Dimensions, in (mm)

Repair Information

If the TE-6700 Temperature Element fails to operate within its specifications, replace the unit. For a replacement element, contact the nearest Johnson Controls® representative.

te-6700dim.eps

TE-6300 Series Temperature Sensors

Description

The TE-6300 Temperature Sensor line provides economical solutions for a wide variety of temperature sensing needs, including wall-mount, outdoor-air, duct, strap-mount, well-insertion, duct-averaging, and Variable Air Volume (VAV) flange-mount duct-probe applications. The TE-6300 line offers both a metal and a plastic enclosure for the most popular models.

Sensors are available in the following types:

- 1k ohm thin-film nickel
- 1k ohm nickel averaging
- 1k ohm thin-film platinum
- 100 ohm platinum equivalent averaging
- 1k ohm platinum equivalent averaging
- 2.2k (2,252) ohm thermistor
- 10k ohm thermistor, Johnson Controls® Type II

Each sensor is packaged with the necessary mounting accessories to maximize ordering and installation ease and reduce both commissioning time and cost.

Refer to the *TE-6300 Temperature Sensors Product Bulletin (LIT-216320)* for important product application information.

Features

- full line of versatile sensors — supports all your temperature sensing needs from a single supplier: wall mount, outdoor air, duct probe, duct averaging, strap-mount, well insertion, and flange mount duct probe
- single assembly ordering — simplifies ordering; provides a complete assembly in one box
- models featuring an integral NPT Adaptor — increase sensor connection strength, which eliminates the need for a special adaptor
- models with a stainless steel sensor probe — protect the sensor while increasing corrosion resistance
- metal enclosure (TE-63xxM Models only) — meets plenum requirements
- models featuring a retainer for the sensor holder — allow you to lock the sensor holder into the conduit box
- brushed stainless steel mounting plate — offers a durable, aesthetically-pleasing design
- low profile flush mount design — provides a tamper-proof installation ideally suited for schools, sporting complexes, retailers, prisons, and more

All TE-6300 series sensors are two-wire, passive, resistance output devices.

TE-63xxA Models

The TE-63xxA (adjustable length) models:

- provide a thermoplastic mounting flange and gland nut to adjust the length of the probe

- include two hex-head self-drilling screws for mounting
- come equipped with a 10 ft (3 m) plenum-rated cable with 1/4 in. (6.35 mm) female insulated quick-connect terminations on leads

TE-63xxF Models

The TE-63xxF (flush mount) models:

- provide a low profile when installed in an electrical box
- feature thermally isolated sensor from the wall with a foam pad
- offer a rugged stainless steel cover
- provide 22 AWG lead wires with low voltage installation

TE-63xxM Models

The TE-63xxM (metal enclosure) models:

- come with a corrosion-protected steel enclosure with a 0.88 in. (22 mm) hole for a 1/2 in. (12.7 mm) conduit fitting
- include two hex-head self-drilling screws for mounting the duct and duct averaging models
- offer (well models only) either a direct mount or 1/2-14 NPT threaded well sensor holder for mounting in TE-6300W Series thermal wells (Order the thermal well separately.)
- provide optional well sensor holders (order separately) to mount duct models in thermal wells.
- meet UL 1995 plenum use requirements
- offer optional accessory kit (order separately) to replace plastic hole plug and wiring bushing to meet International Mechanical Code (IMC) requirements

TE-63xxP Models

The TE-63xxP (plastic enclosure) models:

- provide a thermoplastic conduit box with 1/2-14 NPT female thread for connecting to conduit
- provide aluminum mounting plate and 1/2-14 NPT threaded hub mounting options for the duct and duct averaging models
- use the 1/2-14 NPT female thread to mount the Outdoor Air models directly to ridged conduit
- provide optional sensor holders (order separately) to mount duct models in thermal wells
- offer an optional accessory metal cover kit (order separately) to replace the plastic cover to meet UL 1995 plenum use requirements
- include a replaceable sensing probe on duct probe, outdoor air, and well insertion models



TE-6300 Series Temperature Sensors

TE-63x4P Wall Mount Models

The TE-63x4P (plastic enclosure) models:

- come with a white thermoplastic ventilated cover with a brushed aluminum face plate and a steel mounting plate for surface mounting
- include faceplates for both horizontal and vertical mounting
- offer an accessory mounting kit for mounting to a standard electrical box
- offer optional covers

TE-63xS Models

The TE-63xS (Strap-Mount) models:

- provide a 1/4 in. (6.35 mm) diameter stainless steel probe without an enclosure
- include three cable ties for mounting to pipe up to 2-5/8 in. (67 mm) diameter
- come equipped with a 10 ft (3 m) plenum rated cable
- meet UL 1995 plenum use requirements
- offer an accessory mounting kit for mounting to a pipe up to 11 in. (280 mm) diameter

TE-63xxV Models

The TE-63xxV (VAV flange mount) models:

- provide a stainless steel mounting flange with two hex-head self-drilling mounting screws
- come equipped with a 10 ft (3 m) plenum rated cable with 1/4 in. (6.35 mm) female insulated quick-connect terminations on leads
- meet UL 1995 plenum use requirements

Repair Information

If the TE-6300 Series Temperature Sensor fails to operate within its specifications, refer to the *TE-6300 Series Temperature Sensors Product Bulletin (LIT-216320)* for a list of repair parts available.

TE-6300 Series Temperature Sensors (Continued)

Selection Charts

Sensor	Mounting Style	Probe Length in. (mm)	Product Code Number	
Nickel (1k ohm)	Adjustable ¹	8 (203)	TE-6311A-1	
		Averaging	8 ft (2.4 m)	TE-6315M-1
				TE-6315V-2 ¹
		17 ft (5.2 m)	TE-6316M-1	
			TE-6316V-2 ¹	
	Duct	4 (102)		TE-631GM-1
			8 (203)	TE-6311M-1
		18 (457)		TE-6311P-1
				TE-631JM-1
	Flange	4 (102)	TE-631GV-2	
		8 (203)	TE-6311V-2	
	Flush	N/A		TE-6310F-0
				TE-6310F-1
	Outdoor Air	3 (76)	TE-6313P-1	
	Strap-Mount	3 (76)	TE-631S-1	
	Wall ²	N/A	TE-6314P-1	
	Well	6 (152)		TE-631AM-2
			8 (203)	TE-631AP-1
			8 (203)	TE-6351-A
	Platinum (1k ohm)	Adjustable	8 (203)	TE-6351-A
Duct			4 (102)	TE-635GM-1
			8 (203)	TE-6351M-1
				TE-6351P-1
18 (457)			TE-635JM-1	
		Flange	4 (102)	TE-635GV-2
8 (203)			TE-6351V-2	
Flush		N/A		TE-6350F-0
				TE-6350F-1
Strap-Mount		3 (76)	TE-635S-1	
Outdoor Air		3 (76)	TE-6353P-1	
Wall ²		N/A	TE-6324P-1	
Well		6 (152)	TE-635AM-2	
		8 (203)	TE-6352M-1	

Sensor	Mounting Style	Probe Length in. (mm)	Product Code Number	
Platinum Equivalent	1k ohm Averaging ¹	10 ft (3 m)	TE-6327P-1	
		20 ft (6.1 m)	TE-6328P-1	
	100 ohm Averaging ¹	10 ft (3 m)	TE-6337P-1	
		20 ft (6.1 m)	TE-6338P-1	
Thermistor (2.2k ohm)	Adjustable	8 (203)	TE-6341A-1	
	Duct	8 (203)	TE-6341P-1	
		4 (102)	TE-634GV-2	
	Flange	8 (203)	TE-6341V-2	
		3 (76)	TE-6343P-1	
	Outdoor Air	3 (76)	TE-6343P-1	
	Wall ²	N/A	TE-6344P-1	
	Well	8 (203)	TE-6342M-1	
		6 (152)	TE-634AM-2	
	Thermistor (10k ohm) Type II	Adjustable	8 (203)	TE-6361A-1
Duct		4 (102)	TE-636GM-1	
		8 (203)	TE-6361M-1	
			TE-6361P-1	
		18 (457)	TE-636JM-1	
Flange		4 (102)	TE-636GV-2	
		8 (203)	TE-6361V-2	
Flush		N/A		TE-6360F-0
				TE-6360F-1
Outdoor Air		3 (76)	TE-6363P-1	
Strap-Mount		3 (76)	TE-636S-1	
Well		6 (152)	TE-636AM-2	
		8 (203)	TE-6362M-1	

- Two TE-6001-8 Element Holders come with the platinum equivalent averaging sensors. Order separately to use with a nickel averaging sensor.
- Order the TE-1800-9600 Mounting Hardware separately to mount the wall unit to a wallbox.

Optional Accessories

Product Code Number	Description
F-1000-182	Thermal Conductive Grease for element wells (8 oz.)
T-4000-xxxx	Wall Mount Cover
T-4000-119	Allen Head Tool for Wall Mount Cover Screws (order in multiples of 30)
TE-1800-9600	Mounting Hardware for mounting the wall mount unit to a wall box
TE-6001-8	Element Holder for mounting an averaging sensor (order in multiples of 10)
TE-6001-13	Metal Cover and Gasket Kit (5 per package)
TE-6300-101	12 in. (305 mm) (1k ohm) Nickel Probe (cut to an appropriate length) ¹
TE-6300-105	12 in. (305 mm) (1k ohm) Platinum Class A Probe (cut to an appropriate length) ¹
TE-6300-103	1/2-14 NPT Plastic Sensor Holder without retainer (order in multiples of 10)
TE-6300-104	12 in. (305 mm) (2.2k ohm) Thermistor Probe (cut to an appropriate length) ¹
TE-6300-613	IMC Kit, Metal Knockout Plug, Metal Clamp Connector (order in multiples of 10)
TE-6300-614	Cable Tie Mounting Kit, 0.50 to 2.625 in. (12.7 to 66.7 mm) Bundle Diameter (10 per package)
TE-6300-615	Cable Tie Mounting Kit, 11 in. (280 mm) Max Bundle Diameter
TE-6300-616	8 in. (203 mm) 1k ohm Platinum Class A Probe
TE-6300-617	3 in. (76 mm) 1k ohm Platinum Class A Probe
TQ-6000-1	4 to 20 mA Output Transmitter for use with the 100 ohm platinum sensor
TE-6300W-102	6 in. (152 mm) Stainless Steel Well (direct mount)
TE-6300W-101	6 in. (152 mm) Brass Well (direct mount with thermal grease included)
TE-6300W-110	8 in. (203 mm) Stainless Steel Well

1. Cut 12 in. probes to a minimum of 3 in. (76 mm).

TE-6300 Series Temperature Sensors (Continued)

T-4000 Covers Available for the Wall Mount TE-63x4P Series

Product Code Number	Horizontal Johnson Controls Logo	Vertical Johnson Controls Logo	Thermometer, with °F/°C Scale	Faceplate/Cover Color
T-4000-2138 ¹				Brushed Aluminum/Beige
T-4000-2139	■			
T-4000-2140	■		■	
T-4000-2144		■		
T-4000-2639	■			Brown and Gold/Beige
T-4000-2640	■		■	
T-4000-2644		■		
T-4000-3139	■			Brushed Aluminum/White
T-4000-3140	■		■	
T-4000-3144		■		

1. Without Johnson Controls logo

Technical Specifications

TE-6300 Series Temperature Sensors (Part 1 of 2)		
Sensor Reference Resistance	1k ohm Nickel	1k ohms at 70°F (21°C)
	1k ohm Nickel Averaging	
	1k ohm Platinum	1k ohms at 32°F (0°C)
	100 ohm Platinum Averaging	100 ohms at 32°F (0°C)
	1k ohm Platinum Averaging	1k ohms at 32°F (0°C)
	2.2k ohm Thermistor	2,252 ohms at 77°F (25°C)
	10k ohm Thermistor	10.0k ohms at 77°F (25°C)
Sensor Accuracy	1k ohm Nickel	±0.34F° at 70°F (±0.19C° at 21°C)
	1k ohm Nickel Averaging	±3.4F° at 70°F (±1.9C° at 21°C)
	1k ohm Platinum Class A	±0.35F° at 70°F (±0.19C° at 21°C), DIN Class A
	1k ohm Platinum Class B	±0.73F° at 70°F (±0.41C° at 21°C), DIN Class B
	100 ohm Platinum Averaging	±1.0F° at 70°F (± 0.58C° at 21°C)
	1k ohm Platinum Averaging	
	10k ohm Thermistor	±0.9F° (±0.5C°) in the range: 32 to 158°F (0 to 70°C)
Sensor Temperature Coefficient	1k ohm Nickel	Approximately 3 ohms/F° (5.4 ohms/C°)
	1k ohm Nickel Averaging	
	1k ohm Platinum	Approximately 2 ohms/F° (3.9 ohms/C°) 3850 ppm/K
	100 ohm Platinum Averaging	Approximately 0.2 ohms/F° (0.39 ohms/C°)
	1k ohm Platinum Averaging	Approximately 2 ohms/F° (3.9 ohms/C°)
	10k ohm Thermistor	Nonlinear NTC, Johnson Controls Type II
Electrical Connection	TE-63xxM	22 AWG (0.6 mm diameter) x 6 in. (152 mm) long
	TE-63xxP	
	TE-63xxF	22 AWG (0.6 mm diameter) x 12 ft (3 m) braided-copper wires, low voltage insulation, half-stripped ends
	TE-63xxP Nickel Averaging	18 AWG (1.0 mm diameter) x 6 in. (152 mm) long
	TE-63xS	22 AWG (0.6 mm diameter) x 10 ft (3 m) long plenum-rated cable
	TE-63xxA, TE-63xxV	22 AWG (0.6 mm diameter) x 10 ft (3 m) long plenum-rated cable with 0.25 in. (6.35 mm) female quick-connect terminals

TE-6300 Series Temperature Sensors (Continued)

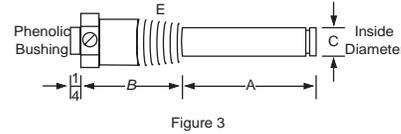
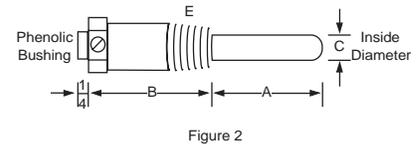
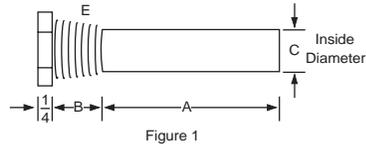
TE-6300 Series Temperature Sensors (Part 2 of 2)		
Materials	Probes	Nickel Averaging: 0.094 in. (2.4 mm) Outside Diameter (O.D.) copper tubing Nickel Averaging Adaptor: 0.25 in. (6.35 mm) O.D. Brass Platinum Averaging Probe: 0.19 in. (4.8 mm) Aluminum tubing All others (except Averaging): 0.25 in. (6.35 mm) O.D. Stainless Steel
	TE-63xxA	Mounting Adapter Plate and Gland: Thermoplastic
	TE-63xxF	Flush Mount: Stainless Steel
	TE-63xxM	Enclosure: Corrosion-Protected Steel Well Sensor Holder: 0.875 in. (22.2 mm) Hex Brass
	TE-63xxP	Conduit box and Shield: Rigid Thermoplastic Mounting Plate: Aluminum Sensor Holder: Rigid Thermoplastic Wall Mount Base Plate: Corrosion-Protected Steel Wall Mount Cover: Rigid Thermoplastic (White) Wall Mount Face Plate: Brushed Aluminum
	TE-63xxV	Mounting Flange: Stainless Steel
Operating Conditions	TE-63xxA	-50 to 140°F (-46 to 60°C)
	TE-63xxF	32 to 104°F (0 to 40°C)
	TE-63xxM	-50 to 220°F (-46 to 104°C)
	TE-63xxP	Enclosure: -50 to 122°F (-46 to 50°C) Sensor Probe: -50 to 220°F (-46 to 104°C)
	TE-63xS	Sensor Probe: -50 to 220°F (-46 to 104°C)
	TE-63xxV	Wire Harness: -50 to 122°F (-46 to 50°C)
Shipping Weight	TE-63xxA	0.2 lb (0.09 kg)
	TE-63xxF	0.25 lb (113.4 kg)
	TE-63xxM	Duct Averaging: 0.9 lb (0.41 kg) Duct Mount: 0.4 lb (0.18 kg) Well Insertion: 0.5 lb (0.23 kg)
	TE-63xxP	Duct Averaging: 0.5 lb (0.23 kg) Duct Mount: 0.4 lb (0.18 kg) Outdoor Air: 0.5 lb (0.23 kg) Wall Mount: 0.2 lb (0.09 kg) Well Insertion: 0.35 lb (0.16 kg)
	TE-63xS	Strap-Mount: 0.2 lb (0.09 kg)
	TE-63xxV	Duct Averaging: 0.7 lb (0.32 kg) Duct Mount: 0.2 lb (0.09 kg)
Dimensions (H x W x D)	TE-63xxA	2.17 in. (55 mm) diameter plus 4 or 8 in. (102 or 203 m) element
	TE-63xxF	Flush Mount: 4-1/2 x 2-3/4 in. (114 x 70 mm)
	TE-63xxM	Duct Averaging: 1.87 x 1.87 x 1.80 in. (47.5 x 47.5 x 45.8 mm) plus 8 or 17 ft (2.4 or 5.2 m) element Duct Mount: 1.87 x 1.87 x 1.80 in. (47.5 x 47.5 x 45.8 mm) plus 4, 8, or 18 in. (102, 203, or 457 mm) element Well Insertion: 1.87 x 1.87 x 1.80 in. (47.5 x 47.5 x 45.8 mm) plus 6 or 8 in. (152 or 203 mm) element
	TE-63xxP	Duct Averaging: 5.97 x 1.38 x 2.75 in. (152 x 35 x 70 mm) plus 8, 10, 17, or 20 ft (2.4, 3.0, 5.2, or 6.1 m) element Duct Mount: 5.97 x 1.38 x 2.75 in. (152 x 35 x 70 mm) plus 6 or 8 in. (152 or 203 mm) probe Outdoor Air: 5.97 x 3.47 x 4.46 in. (152 x 88 x 113 mm) Wall Mount: 2.09 x 3.12 x 1.80 in. (53 x 79 x 46 mm) Well Insertion: 5.97 x 1.38 x 2.75 in. (152 x 35 x 70 mm) plus 6 or 8 in. (152 or 203 mm) probe
	TE-63xS	Strap-Mount: 0.25 in. (6.35 mm) diameter x 3.00 in. (76 mm.) long
	TE-63xxV	Duct Averaging: 2.25 x 1.50 in. (57 x 38 mm) plus 8 or 17 ft (2.4 or 5.2 m) element Duct Mount: 2.25 x 1.50 in. (57 x 38 mm) plus 4 or 8 in. (102 or 203 m) element

Bulb Wells

Description

Bulb Wells are used in conjunction with Remote Bulb Temperature Controls where bulb insertion into a vessel or container to sense temperature is required. WZ Series Wells are used with TE-6000 and TE-6300 sensors.

A variety of shapes, sizes, and materials are available for a wide range of applications. Refer to the appropriate temperature control for the exact bulb well required.

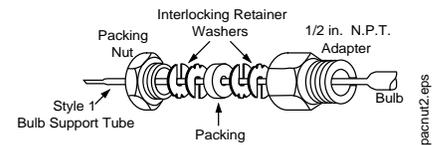


WEL Series Bulb Wells

Accessories

The Code No. FTG13A-600R packing nut assembly is used in applications where the temperature does not fall below -35°F (-37°C). The maximum liquid pressure limit is

150 PSIG (1034 kPa). Use with Style 1, 3/8 in. diameter bulb for direct immersion application. A19s require models with support tube; A70s and A72s do not need support tubes.



FTG13A-600R Packing Nut Assembly

Selection Charts

WEL Series Bulb Wells

Code Number	See Figure	Dimension In.			Pipe Thread In.		Material		Maximum Temp °F	Maximum Pressure PSIG	Type of Solder Joint	Plating	See Note
		A	B	C	Inside D	Outside E	Connector	Tube					
WEL11A-601R	2	2-3/8	2-5/16	.299	—	1/2	Brass	Copper	250	300	Soft	—	1
WZ-1000-2	1	5-1/4	1-1/4	.500	1/2	1/2	Stainless steel	Stainless steel	300	400	—	—	3
WZ-1000-4	1	5-1/4	1-1/4	.500	1/2	1/2	Stainless steel	Stainless steel	600	400	—	—	—
WZ-1000-5	2	2-3/8	2-5/16	.299	—	1/2	Malleable	Brass	250	300	—	—	3
WEL14A-600R ¹	3	4-3/4	1-13/16	.444	—	1/2	Monel	Monel	700	1000	TIG weld	—	2
WEL14A-601R ¹	3	7-9/16	1-13/16	.430	—	1/2	Brass	Copper	250	300	Silver	Brite-Dip	2
WEL14A-602R ¹	3	4-15/16	1-13/16	.430	—	1/2	Brass	Copper	250	300	Silver	Brite-Dip	2
WEL14A-603R ¹	3	5 13/16	1 13/16	.430	—	1/2	Brass	Copper	250	300	Silver	Brite-Dip	2
WEL16A-600R	2	2-3/8	1-5/16	.299	—	1/2	Brass	Copper	250	300	Soft	—	1
WEL16A-601R	2	2-13/16	1-13/16	.375	—	1/2	Brass	Copper	250	300	Soft	—	2
WEL17A-600R ²	1	10-7/16	3/4	.763	1/2	3/4	Malleable	Copper	250	250	Silver	Tin	—
WEL17A-601R ²	1	8-11/16	3/4	.763	1/2	3/4	Malleable	Copper	250	250	Silver	Tin	—
WEL17A-602R ²	1	10-7/16	3/4	.753	1/2	3/4	Malleable	Steel	250	540	Silver	Tin	—
WEL17A-604R ²	1	14-13/32	3/4	.763	1/2	3/4	Malleable	Copper	250	250	Silver	Tin	—
WEL18A-600R ²	1	3-1/2	3/4	.773	1/2	3/4	Malleable	Steel	250	150	Silver	Tin	—
WEL18A-602R ²	1	3-1/2	3/4	.773	1/2	3/4	Malleable	Brass	250	150	Silver	Tin	—

1. For 3/8 in. style 1 bulbs.

2. For 11/16 in. diameter style 4 bulbs. Style 1 can be used, but is not fastened into well

Note 1: With phenolic bushing; 0.093 in. slot.

Note 2: With phenolic bushing; 0.125 in. slot.

Note 3: Includes thermal compound.

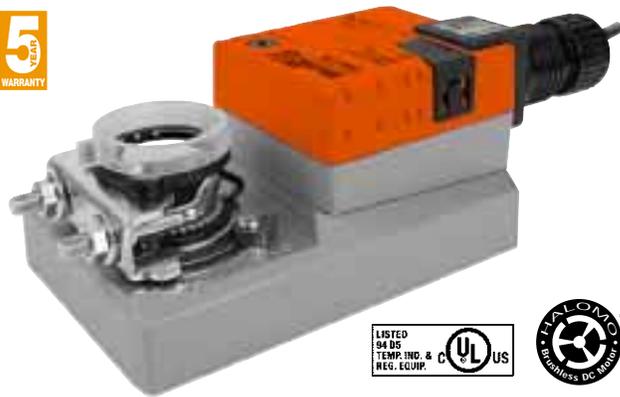
T-800 Wells

Code Number	Description
T-800-1605	Brass well, 6-1/2 inch
T-800-1606	Stainless steel well, 5-1/4 inch
T-800-1618	Brass well, 9-1/2 inch

T-800 Wells (Continued)

Code Number	Description
T-800-1620	Brass well, 9-1/2 inch
T-800-1624	Dual brass well, 6-1/2 inch

Proportional Control, Non-Spring Return, Direct Coupled, 24V, for 2 to 10 VDC and 4 to 20 mA



Technical Data	AMB24-SR
Power Supply	24 VAC \pm 20% 50/60 Hz 24 VDC \pm 10%
Power Consumption	2.5 W (0.4 W)
Transformer Sizing	5 VA (Class 2 power source)
Electrical Connection	3 ft, 18 GA plenum rated cable 1/2" conduit connector
Overload Protection	electronic throughout 0 to 95° rotation
Operating Range Y	2 to 10 VDC, 4 to 20 mA
Input Impedance	100 k Ω (0.1 mA), 500 Ω
Feedback Output U	2 to 10 VDC (max 0.5 mA)
Angle of Rotation	max. 95°, adjust. with mechanical stop
Torque	180 in-lb [20 Nm]
Direction of Rotation	reversible with \curvearrowright / \curvearrowleft switch. Actuator will move: \curvearrowright =CCW with decreasing control signal (10 \rightarrow 2V) \curvearrowleft =CW with decreasing control signal (10 \rightarrow 2V)
Position Indication	reflective visual indicator (snap-on)
Manual Override	external push button
Running Time	95 seconds, constant independent of load
Humidity	5 to 95% RH non condensing (EN 60730-1)
Ambient Temperature	-22°F to +122°F [-30°C to +50°C]
Storage Temperature	-40°F to +176°F [-40°C to +80°C]
Housing	NEMA 2/IP54
Housing Material	UL94-5VA
Agency Listings†	cULus acc. to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE acc. to 89/336/EEC
Noise Level	<45dB(A)
Servicing	maintenance free
Quality Standard	ISO 9001
Weight	2.2 lbs [1000 Kg]

†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Torque min. 180 in-lb for control of damper surfaces up to 45 sq ft.

Application

For proportional modulation of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications.

The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp, 1/2" self-centered default. A crankarm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

The actuator operates in response to a 2 to 10 VDC, or with the addition of a 500 Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. A 2 to 10 VDC feedback signal is provided for position indication or master-slave applications.

Operation

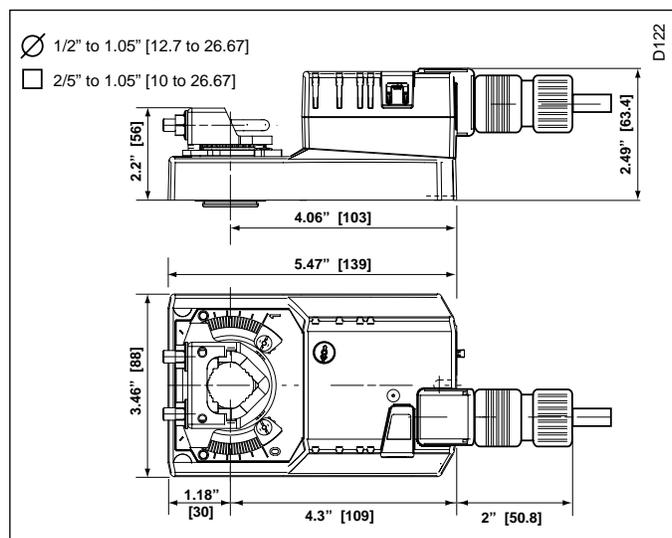
The actuator is not provided with and does not require any limit switches, but is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement.

The AMB series provides 95° of rotation and a visual indicator indicates position of the actuator. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged with a button on the actuator cover.

The AMB24-SR... actuators use a sensorless Brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator's rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in holding mode.

Add on auxiliary switches or feedback potentiometers are easily fastened directly onto the actuator body for signaling and switching functions

Dimensions (All numbers in brackets are in millimeters.)



Accessories

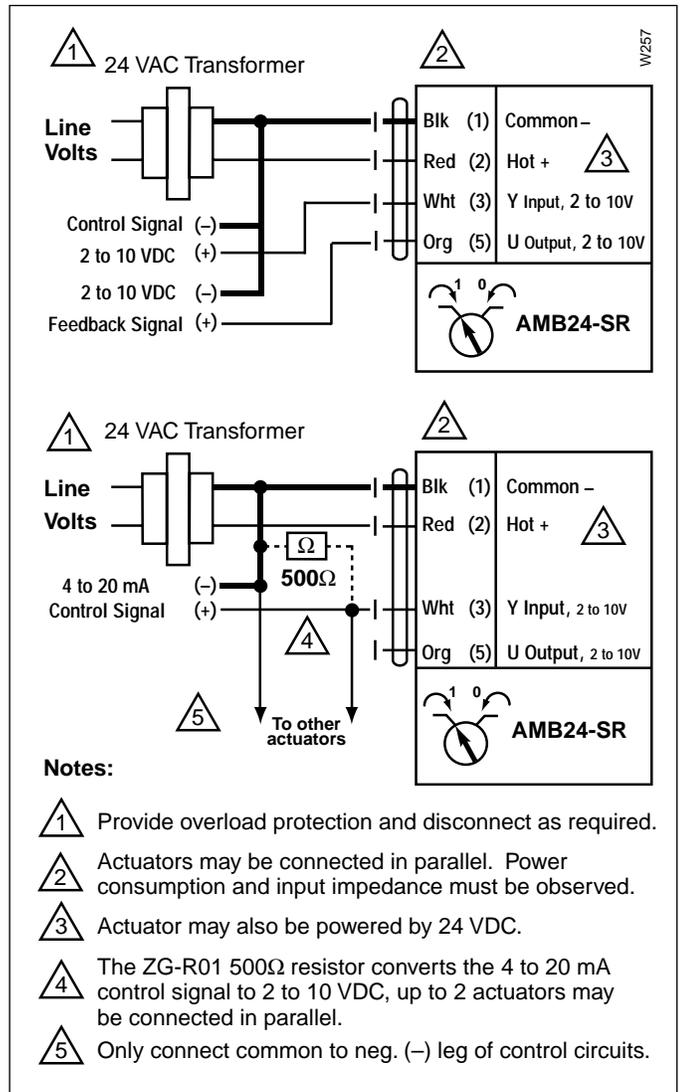
K-SA	Reversible Clamp
ZG-100	Universal Mounting Bracket
ZG-101	Universal Mounting Bracket
ZG-103	Universal Mounting Bracket
ZG-104	Universal Mounting Bracket
Z-SMA	AM/SM to AM Retrofit Mounting Bracket
ZG-NMA	Crankarm Adaptor Kit
AV8-25	Universal Shaft Extension
ZG-JSA (-1, 2, 3)	Jackshaft Adaptors for Hollow Jackshafts
ZS-100	Weather Shield - Steel
ZS-150	Weather Shield - Polycarbonate
ZS-260	Explosion Proof Housing
ZS-300 (-1) (-5)	NEMA 4X Housing
Tool-06	8 mm & 10 mm Wrench
S1A, S2A	Auxiliary Switch (es)
P370	Shaft Mount Auxiliary Switch
P...A	Feedback Potentiometers
SGA24	Min positioners in NEMA 4 housing
SGF24	Min positioners for flush panel mounting
PTA-250	Pulse Width Modulation Interface
IRM-100	Input Rescaling Module
ADS-100	Analog to Digital Switch
ZG-R01	Resistor for 4 to 20 mA Conversion
NSV24 US	Battery Back-Up Module
ZG-X40	Transformer

Note: When using AMB24-SR... actuators, only use accessories listed on this page.

AMB24-SR - Typical Specification:

Proportional control damper actuators shall be electronic direct-coupled type, which require no crankarm and linkage and be capable of direct mounting to a shaft up to 1.05" diameter. Actuators must provide proportional damper control in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall have Brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover. Run time shall be constant and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position indication. Actuators shall be cULus listed, have a 5-year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagram



2 to 10 VDC and 4 to 20 mA control of AMB24-SR

LMB24-SR (-T)



Proportional Control, Non-Spring Return, Direct Coupled, 24V, for 2 to 10 VDC and 4 to 20 mA



Torque min. 45 in-lb for control of damper surfaces up to 11 sq ft.

LMB24-SR LMB24-SR.1 (bulk)
LMB24-SR-T LMB24-SR-T.1 (bulk)

Application

For proportional modulation of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications.

The actuator is mounted directly to a damper shaft from 1/4" up to 5/8" in diameter by means of its universal clamp. Shafts up to 3/4" diameter can be accommodated by an accessory clamp.

The actuator operates in response to a 2 to 10 VDC, or with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. A 2 to 10 VDC feedback signal is provided for position indication or master-slave applications.

Operation

The actuator is not provided with and does not require any limit switches, but is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement.

The LMB series provides 95° of rotation and a visual indicator indicates position of the actuator. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged with a button on the actuator cover.

The LMB24-SR... actuators use a sensorless Brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator's rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in holding mode.

Add on auxiliary switches or feedback potentiometers are easily fastened directly onto the actuator body for signaling and switching functions

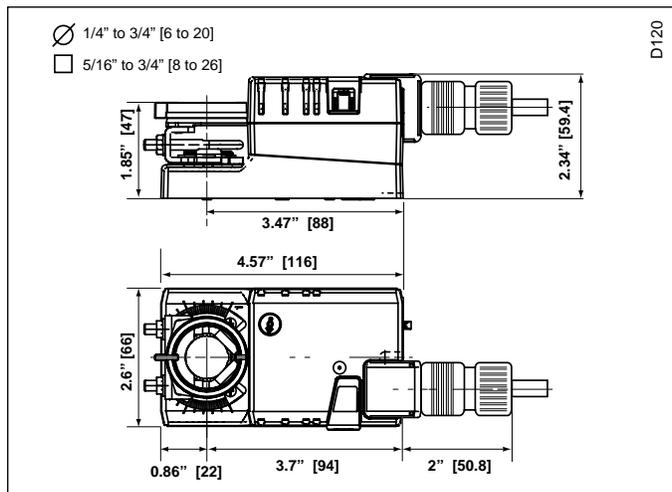
Technical Data	LMB24-SR
Power Supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power Consumption	1.5 W (0.4 W)
Transformer Sizing	3 VA (Class 2 power source)
Electrical Connection	3 ft, 18 GA plenum rated cable 1/2" conduit connector
Overload Protection	electronic throughout 0 to 95° rotation
Operating Range Y	2 to 10 VDC, 4 to 20 mA
Input Impedance	100 kΩ (0.1 mA), 500Ω
Feedback Output U	2 to 10 VDC (max 0.5 mA)
Angle of Rotation	max. 95°, adjust. with mechanical stop
Torque	45 in-lb [5 Nm]
Direction of Rotation	reversible with / switch. Actuator will move: =CCW with decreasing control signal (10→2V) =CW with decreasing control signal (10→2V)
Position Indication	reflective visual Indicator (snap-on)
Manual Override	external push button
Running Time	95 seconds, constant independent of load
Humidity	5 to 95% RH non condensing (EN 60730-1)
Ambient Temperature	-22°F to +122°F [-30°C to +50°C]
Storage Temperature	-40°F to +176°F [-40°C to +80°C]
Housing	NEMA 2/IP54
Housing Material	UL94-5VA
Agency Listings†	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE acc. to 89/336/EEC
Noise Level	<35dB(A)
Servicing	maintenance free
Quality Standard	ISO 9001
Weight	1.1 lbs [0.5 Kg]

LMB24-SR-T

Electrical connection	Screw terminal (for 26 to 14 GA wire)
Housing	NEMA 1/IP20

†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Dimensions (All numbers in brackets are in millimeters.)



Accessories

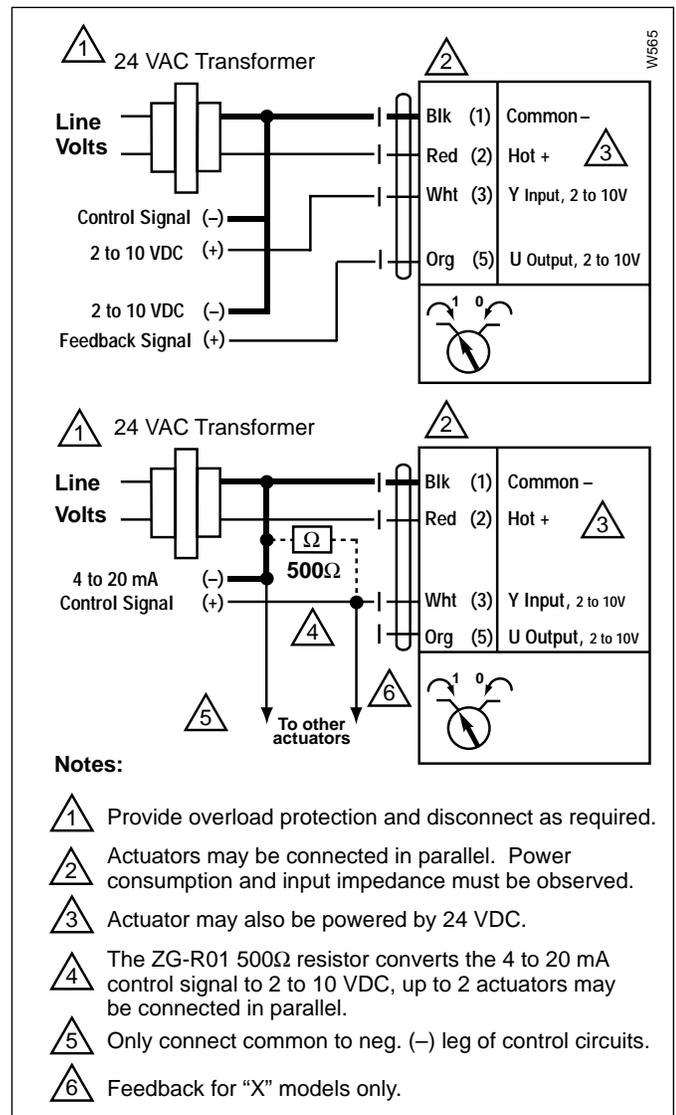
K-LM20	3/4" [20 mm] Shaft Clamp
AV6-20	Shaft Extension
ZG-LMSA	Shaft Adaptor for 1/2" Diameter Shafts
ZG-LMSA-1	Shaft Adaptor for 3/8" Diameter Shafts
ZS-T	Terminal Cover for NEMA 2
ZS-100	Weather Shield - Steel
ZS-150	Weather Shield - Polycarbonate
Tool-06	8 mm & 10 mm Wrench
S1A, S2A	Auxiliary Switch (es)
P370	Shaft Mount Auxiliary Switch
P...A	Feedback Potentiometers
SGA24	Min positioners in NEMA 4 housing
SGF24	Min positioners for flush panel mounting
PTA-250	Pulse Width Modulation Interface
IRM-100	Input Rescaling Module
ADS-100	Analog to Digital Switch
ZG-R01	Resistor for 4 to 20 mA Conversion
NSV24 US	Battery Back-Up Module
ZG-X40	Transformer

Note: When using LMB24-SR... actuators, only use accessories listed on this page.

LMB24-SR... - Typical Specification:

Proportional control damper actuators shall be electronic direct-coupled type, which require no crankarm and linkage and be capable of direct mounting to a shaft from 1/4" to 5/8". Shafts up to 3/4" diameter can be accommodate with an accessory clamp. Actuators must provide proportional damper control in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall have Brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover. If required, actuator will be provided with screw terminal strip for electrical connections (LMB24-SR-T). Run time shall be constant and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position indication. Actuators shall be cULus listed, have a 5-year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagram



2 to 10 VDC and 4 to 20 mA control of LMB24-SR

Current Switches: Adjustable Trip Point

Detect Belt Loss, Coupling Shear, And Mechanical Failure



DESCRIPTION

Hx08 Series and H701 adjustable current switches offer high performance, with a wide array of amperage range options. These products can accurately detect belt loss, coupling shear, or other mechanical failure on loads from 1/5 to 100 HP.

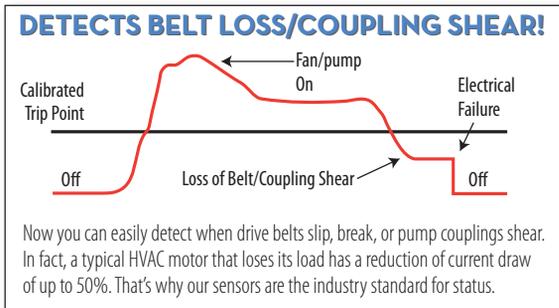
APPLICATIONS

- Detecting belt loss, coupling shear, and mechanical failure
- Verifying lighting circuit and other electrical service run times
- Monitoring status of industrial process equipment
- Monitoring status of critical motors (compressor, fuel, etc.)

FEATURES

- High performance devices in split- and solid-core housings
- Adjustable trip point...precise current trip point setting
- Minimum trip point as low as 0.5A (H608)...eliminates the need for multiple wraps of the conductor through the sensor even on loads as small as 1/5 HP
- Small size...fits easily inside small enclosures
- Self-gripping iris on the split-core housing for easy installation
- Status LEDs available for easy setup and local indication
- Bracket on H908 can be installed in three different configurations...installation flexibility in tight spaces
- 1 Amp status output...increased application flexibility
- All devices are 100% solid state for high reliability and polarity insensitive for trouble-free installation, with a 5-year warranty

CURRENT MONITORING



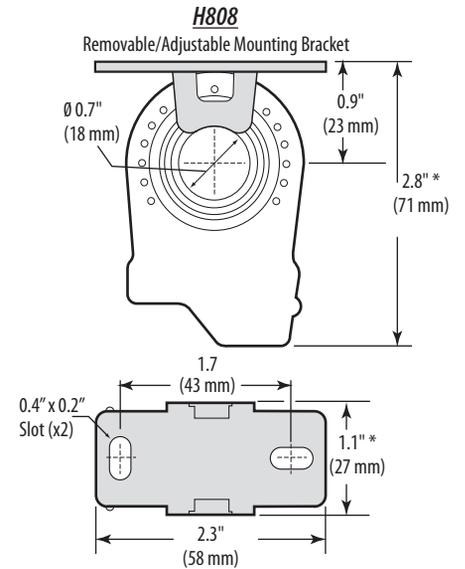
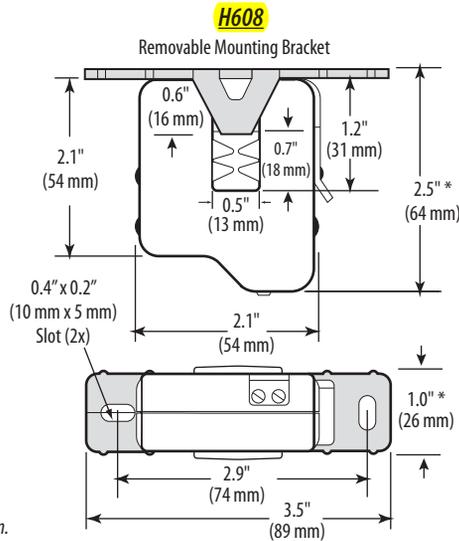
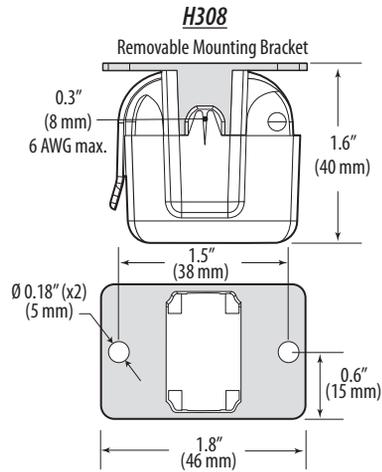
SPECIFICATIONS



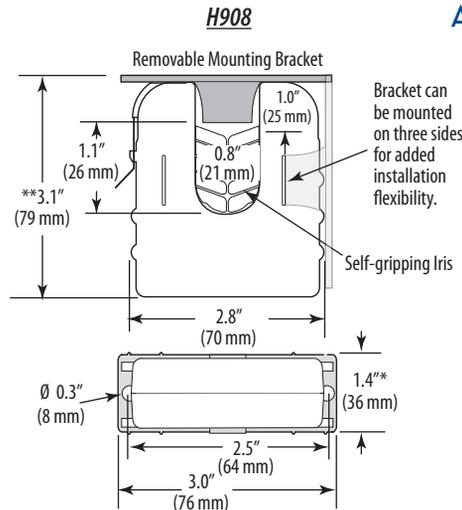
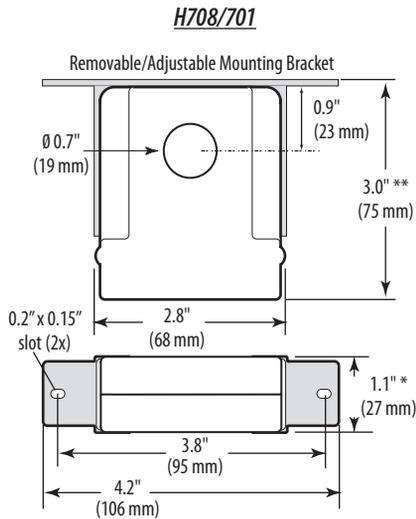
Sensor Power	Induced from monitored conductor
Insulation Class	600VAC RMS (UL), 300VAC RMS (CE)
Frequency Range	50/60 Hz
Temperature Range	-15° to 60°C (5° to 140°F)
Humidity Range	10-90% RH, non-condensing
Hysteresis	10% (typical)
Terminal Block Maximum Wire Size	14 AWG (16 AWG for H308)
Terminal Block Torque (nominal)	4 in-lbs (7 in-lbs for H308)

UL 508 open device listing; CE: EN61010-1:2001-02, CAT III, deg. 2, basic insulation
Do not use the LED status indicators as evidence of applied voltage.

DIMENSIONAL DRAWINGS



* Terminal block may extend up to 1/8" over the height dimensions shown.

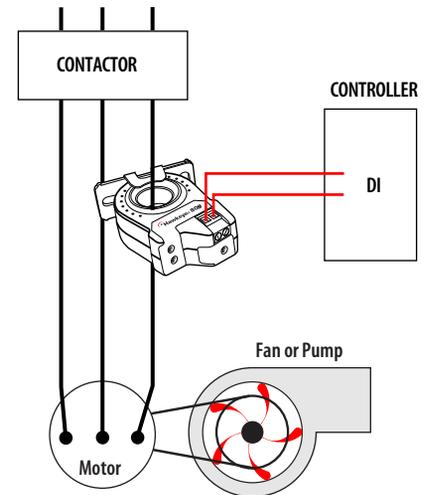


Bracket can be mounted on three sides for added installation flexibility.

Self-gripping Iris

APPLICATION/WIRING DIAGRAM

Monitoring Fan / Pump Motors for Positive Proof of Flow



ORDERING INFORMATION



MODEL	AMPERAGE RANGE	STATUS OUTPUT (max.)	MIN. TRIP POINT	HOUSING	STATUS LED	UL	CE	RoHS
H308	0.75 - 50A	N.O. 1.0A@30VAC/DC	0.75A or less	Split-Core	●	●	● ²	●
H608	0.5 - 175A		0.5A or less	Split-Core	●	● ¹	●	●
H701	1 - 135A		1.0A or less	Solid-Core	●	●	●	●
H708	1 - 135A		1.0A or less	Solid-Core	●	●	●	●
H808	0.75 - 50A		0.75A or less	Solid-Core	●	●	●	●
H908	2.5 - 135A		2.5A or less	Split-Core	●	●	●	●

For high voltage outputs, see page 26.

¹ Listed for use on 75°C insulated conductors.

² Product provides functional insulation only.

ACCESSORIES

DIN Rail Clip Set (AH01, AH27)
DIN Rail (AV01) and DIN Stop Clip (AV02)



Eclipse Series - NEMA 4, 12

Single Door Enclosures



Single Door with quarter turns



Single Door with 3 point latching handle



Application

- Designed to enclose electrical and/or electronic equipment and protect against harsh, industrial environments for wallmount applications.
- Impressive styling features like hidden hinges, attractive latching systems make the Eclipse a suitable addition to any high-tech equipment installation.
- A wide range of sizes and practical accessories make this product line a complete package.
- For high temperature applications, a gasket retainer may be required, please refer to factory.

Standards

- UL 508 Type 3R, 4, 12 and 13
- CSA Type 3R, 4, 12 and 13
- **Complies with**
 - NEMA Type 3R, 4, 12 and 13
 - IEC 529, IP65

Construction

- Formed 14 or 16 gauge steel.
- Smooth, continuously welded seams ground smooth.
- Door stiffeners are provided where required for increased strength and rigidity - designed to also permit additional mounting options.
- Formed lip on enclosure to exclude flowing liquids and contaminants.
- Door latches feature the added safety of quarter turn slot requiring use of tool for opening.
- Doors may be easily removed for modifications and are interchangeable.
- Oil resistant gaskets are permanently secured.
- Collar studs provided for mounting inner panel.
- Includes hardware kit with panel mounting nuts and sealing washers for wall mounting holes.
- Bonding stud provided on door and grounding stud installed in enclosure.
- Hinges are constructed from 304 stainless steel.
- Hinge pins are stainless steel.
- Quarter turn latches formed from mild steel diecast key lockable handle with black epoxy finish on 3 point latch.

Finish

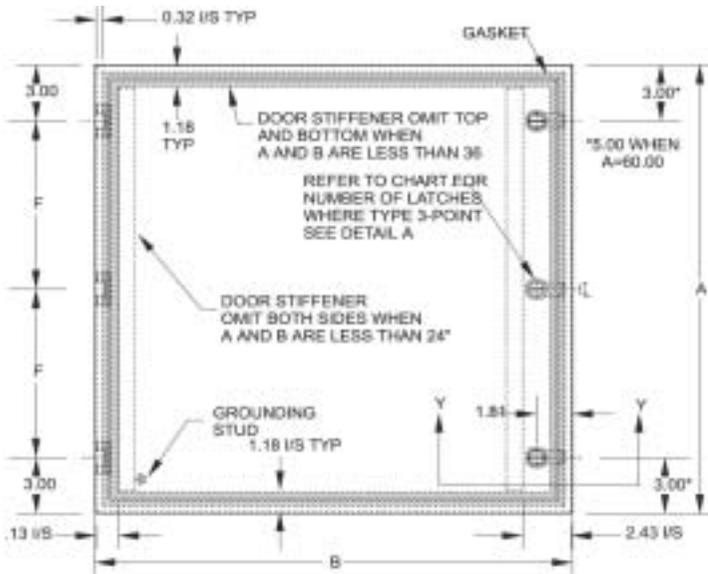
- Cover and enclosure are finished in recoatable smooth ANSI/ASA 61 gray powder coating.

Accessories

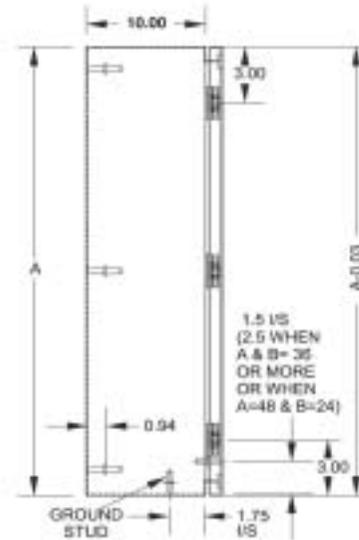
- Air conditioners...see page **348-357**
- Blowers...see page **359**
- Breather kits...see page **374**
- DIN rails...see page **35**
- DIN rail mounting kit...see page **35**
- Door stop kit...see page **393**
- Filter fans...see page **360-367**
- Heaters...see page **369-371**
- Handles...see page **36**
- Inner panel...see page **34**
- Quarter turn inserts and keys...see page **36**
- Literature pocket...see page **397**
- Mounting foot kit...see page **36**
- Swing panel...see page **35**
- Swing frame...see page **34**
- Replacement hinge pins...see page **34**
- Replacement quarter turn assemblies...see page **36**
- Thermostats...see page **374**
- Touch up paint...see page **396**
- UL/CSA approved hardware kit...see page **382**
- Padlock Adapter (EPA)...see page **382**

Eclipse Series - NEMA 4, 12 Single Door Enclosures

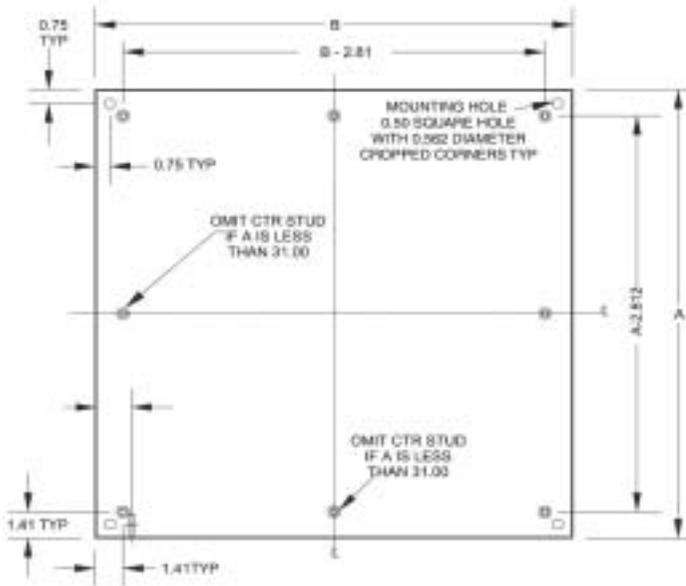
Industrial Enclosures
Wallmount Enclosures



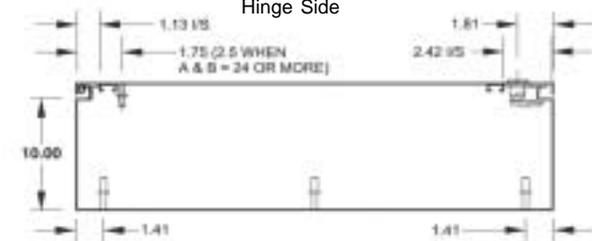
Front View



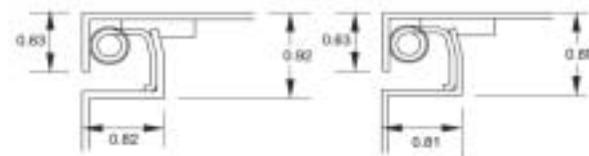
Side View
Hinge Side



Front Section
(Door and Body Flange removed)

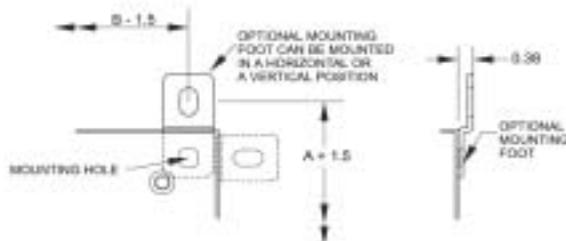


End View

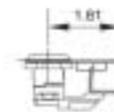


Cross Section of 14 Gauge Body & Door

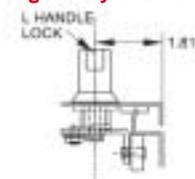
Cross Section of 16 Gauge Body & Door



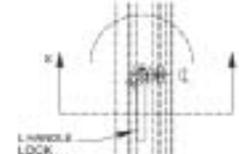
Mounting Detail
Door & Body Flange Removed



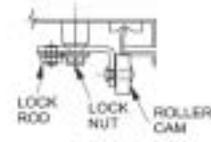
Quarter Turn Lock Section Y-Y



L Handle Lock Section X-X



Detail A



Cross Section Through End View

Door Cam Typ 2 pls when L handle is used

Refer to part number and dimension chart on previous page
Technical references and DXF downloads available at www.hammfg.com

All dimensions in inches unless specified otherwise

Eclipse Series - NEMA 4, 12 Single Door Enclosures

Industrial Enclosures
Wallmount Enclosures

Part No.	Overall Dimensions			Door/Body Gauge	Latches		Opt. Panel Part No.	Panel Size		# Hinges	Ship Wt.	
	A	B	C		Qty	Type		D	E		F	lbs.
EN4SD12126GY	12	12	6	16	1	Qtr Turn	EP1212	10.2	10.2	2	6	12
EN4SD16126GY	16	12	6	16	1	Qtr Turn	EP1612	14.2	10.2	2	10	16
EN4SD16166GY	16	16	6	16	1	Qtr Turn	EP1616	14.2	14.2	2	10	19
EN4SD16206GY	16	20	6	16	1	Qtr Turn	EP1620	14.2	18.2	2	10	22
EN4SD20166GY	20	16	6	16	1	Qtr Turn	EP2016	18.2	14.2	2	14	22
EN4SD20206GY	20	20	6	16	1	Qtr Turn	EP2020	18.2	18.2	2	14	26
EN4SD24166GY	24	16	6	16	1	Qtr Turn	EP2416	22.2	14.2	2	18	26
EN4SD24206GY	24	20	6	16	1	Qtr Turn	EP2420	22.2	18.2	2	18	30
EN4SD24246GY	24	24	6	14	2	Qtr Turn	EP2424	22.2	22.2	2	18	37
EN4SD16128GY	16	12	8	16	1	Qtr Turn	EP1612	14.2	10.2	2	10	16
EN4SD16168GY	16	16	8	16	1	Qtr Turn	EP1616	14.2	14.2	2	10	21
EN4SD16208GY	16	20	8	16	1	Qtr Turn	EP1620	14.2	18.2	2	10	25
EN4SD20168GY	20	16	8	16	1	Qtr Turn	EP2016	18.2	14.2	2	14	25
EN4SD20208GY	20	20	8	16	1	Qtr Turn	EP2020	18.2	18.2	2	14	28
EN4SD20248GY	20	24	8	16	1	Qtr Turn	EP2024	18.2	22.2	2	14	32
EN4SD24168GY	24	16	8	16	1	Qtr Turn	EP2416	22.2	14.2	2	18	26
EN4SD24208GY	24	20	8	16	1	Qtr Turn	EP2420	22.2	18.2	2	18	32
EN4SD24248GY	24	24	8	14	2	Qtr Turn	EP2424	22.2	22.2	2	18	40
EN4SD24308GY	24	30	8	14	2	Qtr Turn	EP2430	22.2	28.2	2	18	48
EN4SD30208GY	30	20	8	14	2	Qtr Turn	EP3020	28.2	18.2	3	12	42
EN4SD30248GY	30	24	8	14	2	Qtr Turn	EP3024	28.2	22.2	3	12	46
EN4SD30308GY	30	30	8	14	2	Qtr Turn	EP3030	28.2	28.2	3	12	67
EN4SD36248GY	36	24	8	14	2	Qtr Turn	EP3624	34.2	22.2	3	15	55
EN4SD36308GY	36	30	8	14	2	Qtr Turn	EP3630	34.2	28.2	3	15	77
EN4SD36368GY	36	36	8	14	2	Qtr Turn	EP3636	34.2	34.2	3	15	94
EN4SD161210GY	16	12	10	16	1	Qtr. Turn	EP1612	14.2	10.2	2	10	18
EN4SD161610GY	16	16	10	16	1	Qtr. Turn	EP1616	14.2	14.2	2	10	23
EN4SD162010GY	16	20	10	16	1	Qtr. Turn	EP1620	14.2	18.2	2	10	28
EN4SD201610GY	20	16	10	16	1	Qtr. Turn	EP2016	18.2	14.2	2	14	28
EN4SD202010GY	20	20	10	16	1	Qtr. Turn	EP2020	18.2	18.2	2	14	31
EN4SD202410GY	20	24	10	16	1	Qtr. Turn	EP2024	18.2	22.2	2	14	36
EN4SD241610GY	24	16	10	16	1	Qtr. Turn	EP2416	22.2	14.2	2	18	30
EN4SD242010GY	24	20	10	16	1	Qtr. Turn	EP2420	22.2	18.2	2	18	36
EN4SD242410GY	24	24	10	14	2	Qtr. Turn	EP2424	22.2	22.2	2	18	45
EN4SD243010GY	24	30	10	14	2	Qtr. Turn	EP2430	22.2	28.2	2	18	53
EN4SD302010GY	30	20	10	14	2	Qtr. Turn	EP3020	28.2	18.2	3	12	47
EN4SD302410GY	30	24	10	14	2	Qtr. Turn	EP3024	28.2	22.2	3	12	53
EN4SD303010GY	30	30	10	14	2	Qtr. Turn	EP3030	28.2	28.2	3	12	75
EN4SD362410GY	36	24	10	14	2	Qtr. Turn	EP3624	34.2	22.2	3	15	70
EN4SD363010GY	36	30	10	14	2	Qtr. Turn	EP3630	34.2	28.2	3	15	84
EN4SD363610GY	36	36	10	14	2	Qtr. Turn	EP3636	34.2	34.2	3	15	100
EN4SD423610GY	42	36	10	14	1	3-point	EP4236	40.2	34.2	4	12	117
EN4SD482410GY	48	24	10	14	1	3-point	EP4824	46.2	22.2	4	14	95
EN4SD483610GY	48	36	10	14	1	3-point	EP4836	46.2	34.2	4	14	125
EN4SD603610GY	60	36	12	14	1	3-point	EP6036	58.2	34.2	4	18	150
EN4SD202012GY	20	20	12	16	1	Qtr Turn	EP2020	18.2	18.2	2	14	34
EN4SD242012GY	24	20	12	16	1	Qtr Turn	EP2420	22.2	18.2	2	18	38
EN4SD242412GY	24	24	12	14	2	Qtr Turn	EP2424	22.2	22.2	2	18	47
EN4SD302412GY	30	24	12	14	2	Qtr Turn	EP3024	28.2	22.2	3	12	57
EN4SD303012GY	30	30	12	14	2	Qtr Turn	EP3030	28.2	28.2	3	12	80
EN4SD362412GY	36	24	12	14	2	Qtr Turn	EP3624	34.2	22.2	3	15	62
EN4SD363012GY	36	30	12	14	2	Qtr Turn	EP3630	34.2	28.2	3	15	91

Technical references and DXF downloads available at www.hamfmg.com

All dimensions in inches unless specified otherwise

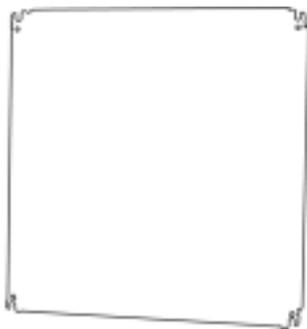
Eclipse Series - NEMA 4, 12 Single Door Enclosures

Continued from previous page.

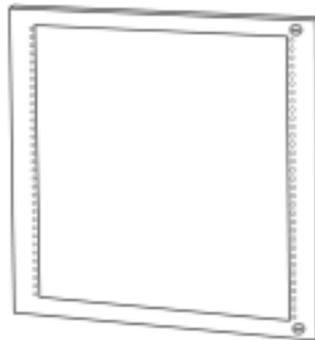
Part No.	Overall Dimensions			Door/Body Gauge	Latches		Opt. Panel Part No.	Panel Size		# Hinges	Ship Wt.	
	A	B	C		Qty	Type		D	E		F	lbs.
EN4SD363612GY	36	36	12	14	2	Qtr Turn	EP3636	34.2	34.2	3	15	104
EN4SD423612GY	42	36	12	14	1	3-point	EP4236	40.2	34.2	4	12	121
EN4SD482412GY	48	24	12	14	1	3-point	EP4824	46.2	22.2	4	14	98
EN4SD483612GY	48	36	12	14	1	3-point	EP4836	46.2	34.2	4	14	148
EN4SD603612GY	60	36	12	14	1	3-point	EP6036	58.2	34.2	4	18	165
EN4SD242416GY	24	24	16	14	2	Qtr Turn	EP2424	22.2	22.2	2	18	66
EN4SD363016GY	36	30	16	14	2	Qtr Turn	EP3630	34.2	28.2	3	15	102
EN4SD483616GY	48	36	16	14	1	3-point	EP4836	46.2	34.2	4	14	148
EN4SD242420GY	24	24	20	14	2	Qtr Turn	EP2424	22.2	22.2	2	18	70
EN4SD302420GY	30	24	20	14	2	Qtr Turn	EP3024	28.2	22.2	3	12	82
EN4SD363020GY	36	30	20	14	2	Qtr Turn	EP3630	34.2	28.2	3	15	117

Refer to drawing on following page

Optional Accessories



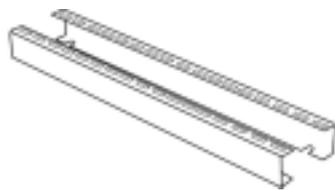
Inner panel...see page 34



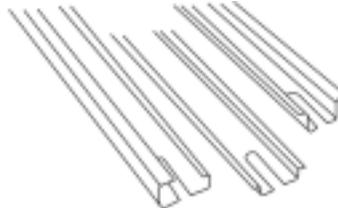
Swing frame...see page 34



Swing panel...see page 35



DIN rail mounting kit...see page 35



DIN rails...see page 35



Handles...see page 36



Quarter turn inserts and keys...see page 36



Mounting foot kit...see page 36



Replacement hinge pins...see page 34

Technical references and DXF downloads available at www.hamfmfg.com

All dimensions in inches unless specified otherwise

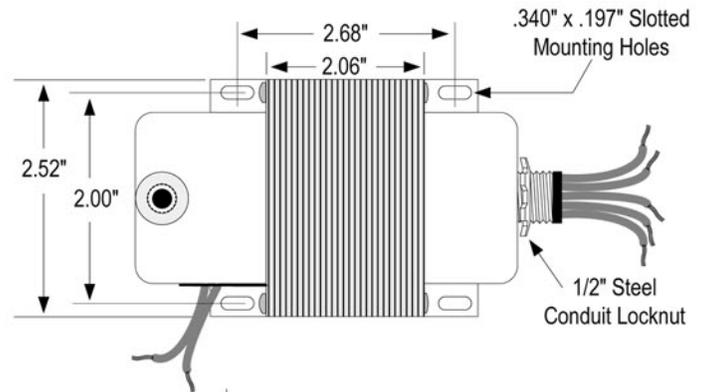
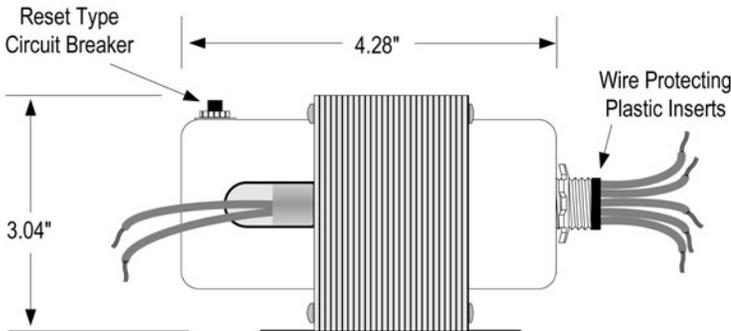
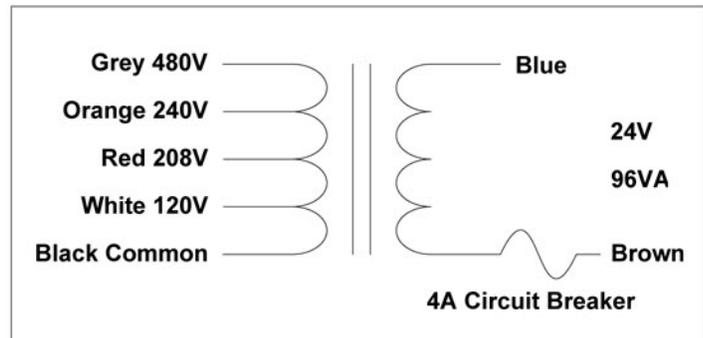
MUA-024-100-TF50-CB

Catalog # LE15022



the source

Enclosed Control Transformer



SPECIFICATIONS

Input:	120/208/240/480 Vac
Output:	24 Vac
VA Rating:	96VA
Frequency:	50/60Hz
Circuit Protection:	Manual Reset Circuit Breaker
Configuration:	Enclosed Split Bobbin Design with Steel End Bells
Mounting(s):	Slotted Foot Mounts & Threaded Flange Hubs
Primary Connections:	UL 1015 Insulated 18AWG Lead Wires, 9.5" Long, .375" ends Stripped & Tinned
Secondary Connections:	UL 1015 Insulated 18AWG Lead Wires, 9" Long, .375" ends Stripped & Tinned
Insulation System:	UL 1446 Recognized Component Class B Insulation System PG125 (130°C, 266°F)
Agency Approvals:	UL 1585 / UL 5085-1 / UL 5085-3 Listed for USA & Canada. Class 2, Class 3 Transformer



V-9999-HW1 Mounting Kit to Mount VA-715x or VA-720x Series Electric Actuators to Honeywell® V5011A, F, and G, 1/2 through 3 inch Single-Seated and V5013F Three-Way Valves

The V-9999-HW1 Mounting Kit is designed to mount a VA-715x or VA-720x Series Electric Actuator to a Honeywell valve (up to a maximum stroke of 3/4 inch). Refer to the *VA-715x Electric Valve Actuator* or the *VA-720x Electric Valve Actuator* product/technical bulletins in the *Valve and Actuator Manual (FAN 977)* for complete actuator setup and calibration instructions.

Note: When mounting M100 Series Actuators to Honeywell valves, refer to the *Y20EBA Linkage Kit, M100 Motor Actuator to Honeywell Valves Technical Bulletin* in the *Valve and Actuator Manual (FAN 977)* for the appropriate linkage kit code number.

Kit Includes (See Figure 1)

- bonnet adaptor
- two 1/4-28 x 0.5 inch socket head cap screws
- one jam nut
- instruction sheet

Tools Required

- 3/16 inch Allen wrench

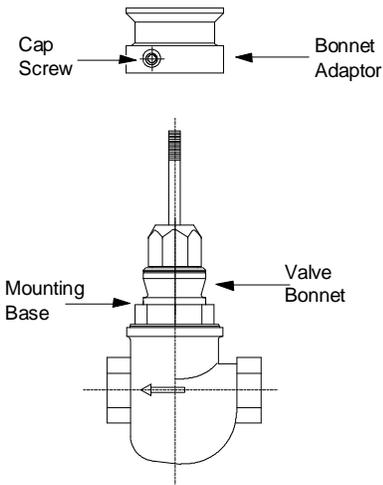


Figure 1: Exploded View of Mounting Kit Assembly to a Honeywell Valve

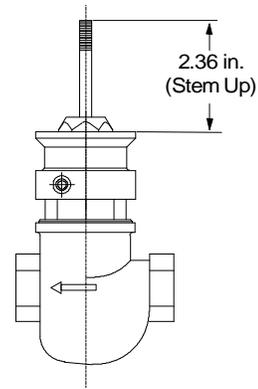


Figure 2: Mounting Kit Assembly Dimensions

Assembly Procedures

1. Slide bonnet adaptor over the valve's bonnet until it rests firmly on the mounting base.
2. Tighten set screws 1/8 to 1/4 turn clockwise beyond finger tight.
3. To correctly mount the actuator to the valve, refer to the appropriate actuator bulletin which corresponds to the selected actuator.
4. The adaptor kit and the actuator have now been correctly assembled to the valve.

VA-720x Series Electric Valve Actuator

Description

The VA-720x Series Electric Actuator provides incremental or proportional control of valves with up to a 3/4 in. stroke in heating, ventilating, and air conditioning applications.

The VA-720x is a non-spring return, synchronous, motor-driven electric actuator featuring a 180 lb (800 N) minimum seating force in a compact, easy-to-install package. It accepts incremental control from a three-wire 24 VAC control signal or a proportional DC control signal (up to 10 volts maximum). The VA-7203 also contains a 2000 ohm position feedback potentiometer.

The VA-720x Series can be easily field-mounted to VBC Series Bronze Cage Trim Valves and factory or field mounted to VG7000 Series Bronze Control Valves.

Features

- compact unit provides 180 lb force (800 N) output covering a wide range of applications with just one actuator
- magnetic clutch provides constant output force for positive closeoff of valves and protects motor in stall conditions
- durable construction provides longer cycle life
- unique yoke design enables easy field mounting to valves, reducing installation and stroke adjustment time
- selectable direct and reverse action simplifies setup and installation
- built-in resistor for current control provides greater application flexibility



VA-720x Electric Valve Actuator

Selection Charts

VA-720x Series Actuators

Code Number	Description
VA-7200-1001	Three-Wire Incremental
VA-7203-1001	Three-Wire Incremental with Position Feedback
VA-7202-1001	Proportional: 0 to 10 VDC; 0 to 20 mA

Accessories for VA-720x Series

Code Number	Description
V-9999-HW1	Mounting Kit to mount VA-715x or VA-720x Series Electric Actuators to Honeywell® V75011A, F, G, 1/2 through 3 in. Single-Seated and V5013F Three-Way Valves
V-9999-BC1	Mounting Kit to mount VA-715x or VA-720x Series Electric Actuators to Barber-Colman® 1/2 through 1-1/4 in. VB-9xxx Valve Bodies
VG7000-1016	Bonnet Adapter for VA7200 Series Electric Actuator on 1 to 2 in. VG7000 Series Valves

Applications

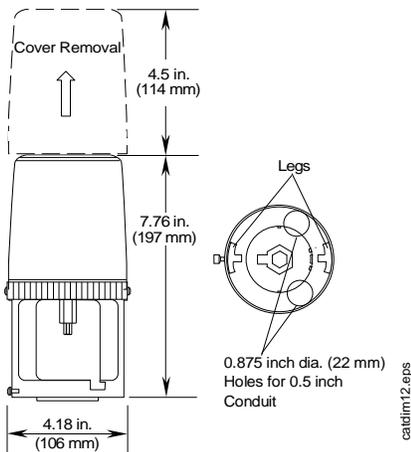
The VA-720x Series Actuator is used in conjunction with VG7000, VT, Flare, and Bronze Cage Trim Valves for hot water and chilled water systems. For VG7000 Series Valve factory mounted options, refer to *VG7000 Series Brass Trim Globe Valves with VA720x Series Electric Actuators Catalog Page (LIT-1900085)* and *VG7000 Series Stainless Steel Trim Globe Valves with VA-720x Series Electric Actuators Catalog Page (LIT-1900091)*. For field mounting options refer to *VG7000 Series Bronze Globe Valves for Assembly in the Field Catalog Page*.

Repair Information

If the VA-720x Series Actuator fails to operate within its specifications, replace the unit. For a replacement valve, contact the nearest Johnson Controls® representative.

Technical Specifications

VA-720x Series Electric Valve Actuator	
Power Requirements	24 VAC (20 to 30 VAC), 50/60 Hz
Input Signal	Incremental: 24 VAC, 50/60 Hz Proportional: 0 to 10 VDC or 0 to 20 mA (Jumper Selectable)
Input Signal Adjustments (Proportional)	Offset: Adjustable 0 to 8 VDC / 0 to 16 mA Span: 2 to 10 VDC or 4 to 20 mA Action: Drive Up (DA) or Drive Down (DA) on Signal Increase Factory Setting: 0 to 10 VDC, Drive Up (DA), 3/4 in. (19 mm) Stroke
Input Impedance (Proportional)	Voltage: 100,000 Ohms Current: 500 Ohms
Feedback Signal	Proportional: 0 to 2000 Ohm ± 25%, 1/4 Watt, Over 25/32 in. (20 mm) Stroke
Mechanical Output	180 lb Force (800 N) Minimum
Stroke Range	25/32 in. (20 mm) Maximum
Nominal Stroke Timing	50 Hz: 50 Seconds 1/2 in. (13 mm) Stroke 74 Seconds 3/4 in. (19 mm) Stroke 60 Hz: 42 Seconds 1/2 in. (13 mm) Stroke 62 Seconds 3/4 in. (19 mm) Stroke
Media Temperature	280°F (138°C) Maximum
Electrical Connection	Screw Terminals: VA-7200: 24 to 14 AWG VA-7203: 24 to 16 AWG VA-7202: 24 to 16 AWG
Mechanical Connection	For 1/4 - 28 UNF-2B Thread for Valve Stem Connection
Enclosure	NEMA 2, IP42
Ambient Conditions	Operating: 23 to 131°F (-5 to 55°C), 5 to 90% RH Non-Condensing 86°F (30°C) Maximum Dew Point Storage: -4 to 150°F (-20 to 65°C); 5 to 95% RH, 86°F (30°C) Max. Dew Point
Agency Listings	UL 873 Listed, File E27734 CSA C22.2 No. 139 Certified, File LR850853



Dimensions in. (mm)

VG1000 Two-Way, Plated Brass Trim, NPT End Connections Ball Valves with Non-Spring Return Electric Actuators

Description

VG1000 Series Ball Valves are designed to regulate the flow of hot or chilled water and, for some models, low pressure steam in response to the demand of a controller in Heating, Ventilating, and Air Conditioning (HVAC) systems. Available in sizes 1/2 through 2 in. (DN15 through DN50), this family of two- and three-way forged brass valves is factory or field mounted to Johnson Controls® VA9104, M9106, M9109, and M9100 Series Non-Spring Return Series Spring Return Electric Actuators for on/off, floating, or proportional control.

Refer to the *VG1000 Series Forged Brass Ball Valves Product Bulletin (LIT-977132)* for important product application information.

Features

- forged brass body — provides 580 psig static pressure rating

- 200 psi closeoff pressure rating — provides tight shutoff
- graphite-reinforced Polytetrafluoroethylene (PTFE) seats — include 15% graphite-reinforced ball seals, providing better wear resistance
- chrome-plated brass ball and stem assembly standard — handles both chilled and hot water applications with a fluid temperature range of 23 to 203°F (-5 to 95°C)
- 500:1 rangeability — provides accurate control under all load conditions

Repair Information

If the VG1000 Series Ball Valve fails to operate within its specifications, replace the unit. For a replacement valve, contact the nearest Johnson Controls representative.



VG1000 Series Two-Way Non-Spring Return Plated Brass Ball and Stem Ball Valve Assemblies

Selection Charts

Two-Way Plated Brass Trim Valves, Non-Spring Return, ~~VA9104~~ Electric Actuators without Switches

Fluid Temperatures: 23 to 203°F (-5 to 95°C) Not Rated for Steam Service				24 VAC		
				On/Off (Floating) without Timeout ¹	On/Off (Floating) with Timeout	DC 0 to 10 V Proportional
Valve	Size, in.	Cv	Closeoff psig	Actuators with M3 Screw Terminals		
				VA9104-AGA-3S	VA9104-IGA-3S	VA9104-GGA-3S
VG1241AD	1/2	1.2 ²	200	VG1241AD+9T4AGA	VG1241AD+9T4IGA	VG1241AD+9T4GGA
VG1241AE		1.9 ²		VG1241AE+9T4AGA	VG1241AE+9T4IGA	VG1241AE+9T4GGA
VG1241AF		2.9 ²		VG1241AF+9T4AGA	VG1241AF+9T4IGA	VG1241AF+9T4GGA
VG1241AG		4.7 ²		VG1241AG+9T4AGA	VG1241AG+9T4IGA	VG1241AG+9T4GGA
VG1241AL		7.4 ²		VG1241AL+9T4AGA	VG1241AL+9T4IGA	VG1241AL+9T4GGA
VG1241AN		11.7		VG1241AN+9T4AGA	VG1241AN+9T4IGA	VG1241AN+9T4GGA
VG1241BG	3/4	4.7 ²	200	VG1241BG+9T4AGA	VG1241BG+9T4IGA	VG1241BG+9T4GGA
VG1241BL		7.4 ²		VG1241BL+9T4AGA	VG1241BL+9T4IGA	VG1241BL+9T4GGA
VG1241BN		11.7		VG1241BN+9T4AGA	VG1241BN+9T4IGA	VG1241BN+9T4GGA
VG1241CL	1	7.4 ²	200	VG1241CL+9T4AGA	VG1241CL+9T4IGA	VG1241CL+9T4GGA
VG1241CN		11.7 ²		VG1241CN+9T4AGA	VG1241CN+9T4IGA	VG1241CN+9T4GGA
VG1241CP		18.7		VG1241CP+9T4AGA	VG1241CP+9T4IGA	VG1241CP+9T4GGA
Valve	Size, in.	Cv	Closeoff psig	Actuators with 48 in. (1.2 m) 18 AWG Plenum Cable		
				VA9104-AGA-2S	VA9104-IGA-2S	VA9104-GGA-2S
VG1241AD	1/2	1.2 ²	200	VG1241AD+9A4AGA	VG1241AD+9A4IGA	VG1241AD+9A4GGA
VG1241AE		1.9 ²		VG1241AE+9A4AGA	VG1241AE+9A4IGA	VG1241AE+9A4GGA
VG1241AF		2.9 ²		VG1241AF+9A4AGA	VG1241AF+9A4IGA	VG1241AF+9A4GGA
VG1241AG		4.7 ²		VG1241AG+9A4AGA	VG1241AG+9A4IGA	VG1241AG+9A4GGA
VG1241AL		7.4 ²		VG1241AL+9A4AGA	VG1241AL+9A4IGA	VG1241AL+9A4GGA
VG1241AN		11.7		VG1241AN+9A4AGA	VG1241AN+9A4IGA	VG1241AN+9A4GGA
VG1241BG	3/4	4.7 ²	200	VG1241BG+9A4AGA	VG1241BG+9A4IGA	VG1241BG+9A4GGA
VG1241BL		7.4 ²		VG1241BL+9A4AGA	VG1241BL+9A4IGA	VG1241BL+9A4GGA
VG1241BN		11.7		VG1241BN+9A4AGA	VG1241BN+9A4IGA	VG1241BN+9A4GGA
VG1241CL	1	7.4 ²	200	VG1241CL+9A4AGA	VG1241CL+9A4IGA	VG1241CL+9A4GGA
VG1241CN		11.7 ²		VG1241CN+9A4AGA	VG1241CN+9A4IGA	VG1241CN+9A4GGA
VG1241CP		18.7		VG1241CP+9A4AGA	VG1241CP+9A4IGA	VG1241CP+9A4GGA

1. To avoid excessive wear or drive time on the motor for the AGA models, use a controller or software that provides a timeout function to remove the signal at the end of rotation (stall).
2. Cv has a characterizing disk.



VG1000 Two-Way, Plated Brass Trim, NPT End Connections Ball Valves with Non-Spring Return Electric Actuators (Continued)

Two-Way Plated Brass Trim Ball Valves, **Non-Spring Return, M9106/M9109** Electric Actuators without Switches

Fluid Temperatures: 23 to 203°F (-5 to 95°C) Not Rated for Steam Service				AC 24 V		
Valve	Size, in.	Cv	Closeoff psig	On/Off (Floating) without Timeout ¹	On/Off (Floating) with Timeout	DC 0 to 10 V Proportional
				M9106-AGA-2 M9109-AGA-2	M9106-IGA-2	M9106-GGA-2 M9109-GGA-2
VG1241AD	1/2	1.2 ²	200	VG1241AD+906AGA	VG1241AD+906IGA	VG1241AD+906GGA
VG1241AE		1.9 ²		VG1241AE+906AGA	VG1241AE+906IGA	VG1241AE+906GGA
VG1241AF		2.9 ²		VG1241AF+906AGA	VG1241AF+906IGA	VG1241AF+906GGA
VG1241AG		4.7 ²		VG1241AG+906AGA	VG1241AG+906IGA	VG1241AG+906GGA
VG1241AL		7.4 ²		VG1241AL+906AGA	VG1241AL+906IGA	VG1241AL+906GGA
VG1241AN		11.7		VG1241AN+906AGA	VG1241AN+906IGA	VG1241AN+906GGA
VG1241BG	3/4	4.7 ²	200	VG1241BG+906AGA	VG1241BG+906IGA	VG1241BG+906GGA
VG1241BL		7.4 ²		VG1241BL+906AGA	VG1241BL+906IGA	VG1241BL+906GGA
VG1241BN		11.7		VG1241BN+906AGA	VG1241BN+906IGA	VG1241BN+906GGA
VG1241CL	1	7.4 ²	200	VG1241CL+906AGA	VG1241CL+906IGA	VG1241CL+906GGA
VG1241CN		11.7 ²		VG1241CN+906AGA	VG1241CN+906IGA	VG1241CN+906GGA
VG1241CP		18.7		VG1241CP+906AGA	VG1241CP+906IGA	VG1241CP+906GGA
VG1241DN	1-1/4	11.7 ²	200	VG1241DN+906AGA	VG1241DN+906IGA	VG1241DN+906GGA
VG1241DP		18.7 ²		VG1241DP+906AGA	VG1241DP+906IGA	VG1241DP+906GGA
VG1241DR		29.2		VG1241DR+906AGA	VG1241DR+906IGA	VG1241DR+906GGA
VG1241EP	1-1/2	18.7 ²	200	VG1241EP+906AGA	VG1241EP+906IGA	VG1241EP+906GGA
VG1241ER		29.2 ²		VG1241ER+906AGA	VG1241ER+906IGA	VG1241ER+906GGA
VG1241ES		46.8		VG1241ES+906AGA	VG1241ES+906IGA	VG1241ES+906GGA
VG1241FR	2	29.2 ²	200	VG1241FR+909AGA	—	VG1241FR+909GGA
VG1241FS		46.8 ²		VG1241FS+909AGA	—	VG1241FS+909GGA
VG1241FT		73.7		VG1241FT+909AGA	—	VG1241FT+909GGA

1. To avoid excessive wear or drive time on the motor for the AGA models, use a controller or software that provides a timeout function to remove the signal at the end of rotation (stall).
2. Cv has a characterizing disk.

VG1000 Two-Way, Plated Brass Trim, NPT End Connections Ball Valves with Non-Spring Return Electric Actuators (Continued)

Two-Way Plated Brass Trim Ball Valves, Non-Spring Return, M9106/M9109 Electric Actuators with Switches

Fluid Temperatures: 23 to 203°F (-5 to 95°C) Not Rated for Steam Service				AC 24 V		
Valve	Size, in.	Cv	Closeoff psig	On/Off (Floating) without Timeout ¹	On/Off (Floating) with Timeout	DC 0 to 10 V Proportional
				M9106-AGC-2 M9109-AGC-2	M9106-IGC-2	M9106-GGC-2 M9109-GGC-2
VG1241AD	1/2	1.2 ²	200	VG1241AD+906AGC	VG1241AD+906IGC	VG1241AD+906GGC
VG1241AE		1.9 ²		VG1241AE+906AGC	VG1241AE+906IGC	VG1241AE+906GGC
VG1241AF		2.9 ²		VG1241AF+906AGC	VG1241AF+906IGC	VG1241AF+906GGC
VG1241AG		4.7 ²		VG1241AG+906AGC	VG1241AG+906IGC	VG1241AG+906GGC
VG1241AL		7.4 ²		VG1241AL+906AGC	VG1241AL+906IGC	VG1241AL+906GGC
VG1241AN		11.7		VG1241AN+906AGC	VG1241AN+906IGC	VG1241AN+906GGC
VG1241BG	3/4	4.7 ²	200	VG1241BG+906AGC	VG1241BG+906IGC	VG1241BG+906GGC
VG1241BL		7.4 ²		VG1241BL+906AGC	VG1241BL+906IGC	VG1241BL+906GGC
VG1241BN		11.7		VG1241BN+906AGC	VG1241BN+906IGC	VG1241BN+906GGC
VG1241CL	1	7.4 ²	200	VG1241CL+906AGC	VG1241CL+906IGC	VG1241CL+906GGC
VG1241CN		11.7 ²		VG1241CN+906AGC	VG1241CN+906IGC	VG1241CN+906GGC
VG1241CP		18.7		VG1241CP+906AGC	VG1241CP+906IGC	VG1241CP+906GGC
VG1241DN	1-1/4	11.7 ²	200	VG1241DN+906AGC	VG1241DN+906IGC	VG1241DN+906GGC
VG1241DP		18.7 ²		VG1241DP+906AGC	VG1241DP+906IGC	VG1241DP+906GGC
VG1241DR		29.2		VG1241DR+906AGC	VG1241DR+906IGC	VG1241DR+906GGC
VG1241EP	1-1/2	18.7 ²	200	VG1241EP+906AGC	VG1241EP+906IGC	VG1241EP+906GGC
VG1241ER		29.2 ²		VG1241ER+906AGC	VG1241ER+906IGC	VG1241ER+906GGC
VG1241ES		46.8		VG1241ES+906AGC	VG1241ES+906IGC	VG1241ES+906GGC
VG1241FR	2	29.2 ²	200	VG1241FR+909AGC	—	VG1241FR+909GGC
VG1241FS		46.8 ²		VG1241FS+909AGC	—	VG1241FS+909GGC
VG1241FT		73.7		VG1241FT+909AGC	—	VG1241FT+909GGC

1. To avoid excessive wear or drive time on the motor for the AGC models, use a controller or software that provides a timeout function to remove the signal at the end of rotation (stall).
2. Cv has a characterizing disk.

VG1000 Two-Way, Plated Brass Trim, NPT End Connections Ball Valves with Non-Spring Return Electric Actuators (Continued)

Technical Specifications

VG1000 Two-Way, Plated Brass Trim Ball Valves with Non-Spring Return Electric Actuators		
Service ¹		Hot Water, Chilled Water, or 50/50 Glycol Solutions for HVAC Systems
Valve Fluid Temperature Limits	Water	23 to 203°F (-5 to 95°C)
	Steam	Not Rated for Steam Service
Maximum Actuator Fluid Temperature Limit	203°F (95°C)	VA9104 Series Non-Spring Return Actuators M9104 Series Non-Spring Return Actuators with M9000-550 Linkage M9106 or M9109 Series Non-Spring Return Actuators with M9000-520 Linkage
Valve Body Pressure Rating	Water	580 psig (3,999 kPa) (PN40)
	Steam	Not Rated for Steam Service
Maximum Closeoff Pressure		200 psig (1,378 kPa)
Maximum Recommended Operating Pressure Drop		50 psi Maximum Differential Pressure for Valves with Characterized Flow Control Disk and 30 psi Maximum for Quiet Service Ball Valves
Flow Characteristics	Two-Way	Equal Percentage
Rangeability ²		Greater than 500:1
Minimum Ambient Operating Temperature		-4°F (-20°C)
Maximum Ambient Operating Temperature ³ (Limited by the Actuator and Linkage)	140°F (60°C)	VA9104 Series Non-Spring Return Actuators M9104 Series Non-Spring Return Actuators with M9000-550 Linkage
	125°F (52°C)	M9106 and M9109 Series Non-Spring Return Actuators with M9000-520 Linkage
Leakage		0.01% of Maximum Flow per ANSI/FCI 70-2, Class 4
End Connections		National Pipe Thread (NPT)
Materials	Body	Forged Brass
	Ball	Chrome Plated Brass
	Blowout-Proof Stem	Nickel Plated Brass
	Seats	Graphite-Reinforced PTFE with Ethylene Propylene Diene Monomer (EPDM) O-Ring Backing
	Stem Seals	EPDM Double O-Rings
	Characterizing Disk	Amodel® AS-1145HS Polyphthalamide Resin

1. Proper water treatment is recommended; refer to the VDI 2035 Standard.

2. Rangeability is defined as the ratio of maximum controllable flow to minimum controllable flow.

3. In steam applications, install the valve with the stem horizontal to the piping, and wrap the valve and piping with insulation.