

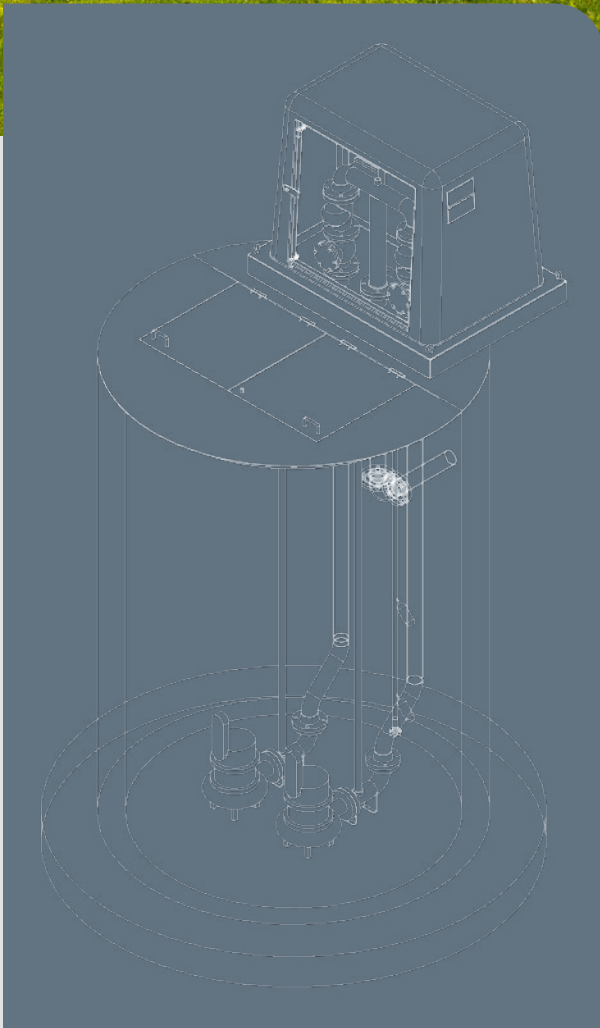
**USEMCO TOP VAULT
SUBMITTAL**

PLEASE NOTE

The enclosed material, being submitted for your approval, was prepared with our best interpretation of your requirements.

Without an approval of this submittal, USEMCO cannot order the equipment used in this station. If it can be at all avoided, we urge you not to request a resubmittal. USEMCO can do the best job of providing a timely delivery of this station if we are able to proceed with ordering of equipment. If this submittal cannot be approved in its entirety, then the explicit approval of certain equipment with long lead times is needed. The items with the longest lead times are: pumps & motors, valves, flowmeters, gas detectors, air conditioners, telemetry items and other electrical equipment. The explicit approval can be written in the returned submittal or by a letter. Return one copy of the submittal.

Your cooperation in this matter is sincerely appreciated.



TOPVAULT

Pre-engineered compact solution for a duplex submersible lift stations.



Comprehensive Controls

Constant level monitoring with a full-featured control panel that is easily accessible.



Aluminum Construction

Lightweight aluminum ensures maximum efficiency for shipping and installation.



Configuration Options

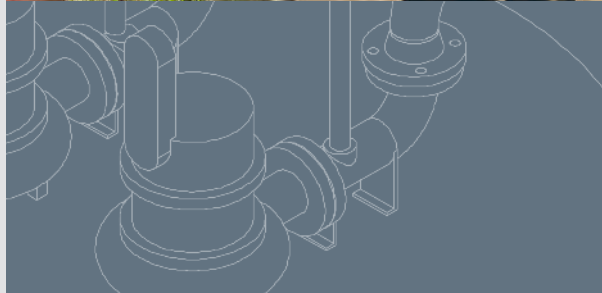
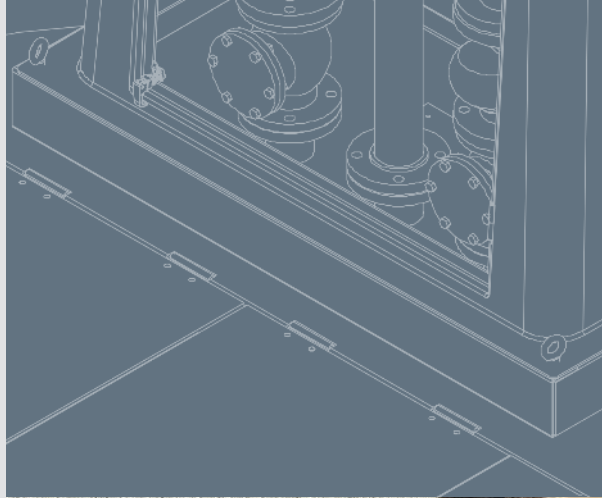
In-house modular design options to better meet your delivery needs.



REPRESENTED BY

Contact Information

Wastewater Product Manager
608.372.5911
sales@usemco.com
usemco.com



TOPVAULT

Like USEMCO's industry trend setting PumpMate, Top Vault is an above grade wet well mounted valve and control station. Engineered with a lightweight compact Aluminum construction to provide benefits for shipping and installation without compromising on quality and durability. The valves and USEMCO NEMA 1 PowerPack Control Panel are housed in a one-piece fiberglass enclosure with hinged access doors.

Top Vault can be configured for applications with 48", 60", and 72" wet wells with piping sizes ranging from 2" to 4". With a modular design, USEMCO is able to inventory all parts and provide a competitive price and short lead times.

Standard Features:

- Duplex Pump Station
- Lightweight Aluminum Modular Construction
- Aluminum Wetwell Access Doors for Pump Removal
- Fiberglass Housing with Access Doors for Controls and Valves (*Removable if needed*)
- Pre-engineered
- Compact
- Full Featured Controls to eliminate blind automation
- Manufactured ECO friendly with a small carbon footprint

Specifications:

- 2", 3", 4" Pipe and Valve Sizes
- 48", 60", 72" Wetwell Diameters
(4" Piping in 60" and 72" Wetwell Diameters Only)
- 300 PSF Rated
- Heated and Ventilated Rated R7
- USEMCO NEMA 1 Powerpack Control Panel, UL698A with Intrinsically Safe Extensions
- USEMCO "Sentry" Lite Touch Screen Controller
- Submersible Transducer with Backup Floats
- Horsepower's up to 10 at 230-volt/ 20 at 460-volt 3 Phase 28 FLA maximum, 1 Phase Available
- 12" High x 10" Wide x 10" Deep Space for Customers Dialer or USEMCO Web Station
- Seal Fail Relays Available for many Pump Manufacturers
- Quick Shipments.... Consult Factory



REPRESENTED BY

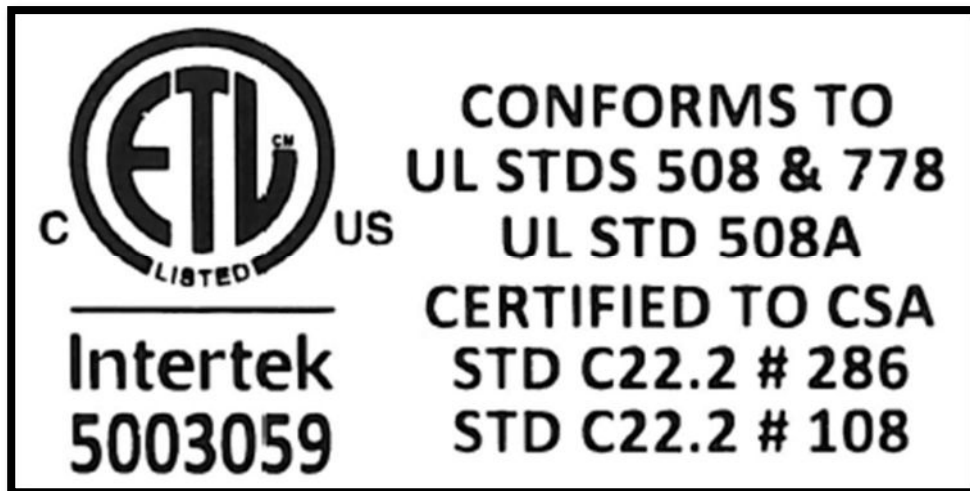
Contact Information

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usemco.com

Company: USEMCO, INC. – Tomah, WI USA

Product Information: Packaged Pumping System.

Evaluated to the following: A representative sample of the listed devices have been tested, investigated, and found to comply with the requirements of the Standard(s) for Motor Operated Water Pumps (UL-778), Industrial Control Equipment (UL-508), Industrial Control Panels (UL-508A), Industrial Control Equipment (CAN/CSA-C22.2 No. 14), Liquid Pumps (CAN/CSA-C22.2 No. 108), Electrically-Equipped Machine Tools (CAN/CSA-C22.2 No. 73) and are identified with the ETL Listed Mark.





USEMCO INCORPORATED
USEMCO[®]
UNIVERSAL SANITARY EQUIPMENT MANUFACTURING COMPANY

Warranty Certificate

USEMCO, Inc., Tomah, Wisconsin, manufacturer of the factory built pump station, guarantees the station to be free from defects in material and workmanship for a period of up to one year commencing from the date the pump station is placed into operation by USEMCO's authorized personnel, but in no event is the pump station guaranteed for longer than 18 months from date of invoice. This guarantee is contingent upon start up by USEMCO's authorized personnel and shall become void if start up is performed by anyone else.

USEMCO will be a single source of responsibility to the owner for the guarantee of the pump station and components provided by USEMCO. During the guarantee period, if any part is defective or fails to perform as specified when operating at design conditions and if station has been protected prior to start up and has been installed, operated and maintained in accordance with the written instructions provided by USEMCO, USEMCO shall exchange free of charge a replacement for the defective part. The owner shall return the defective part, if so requested.

During the guarantee period, USEMCO will provide without charge such labor as may be required to replace, repair or modify the following major components only: The pumps, pump motors, the structure, flowmeter, valves and cast iron piping. Labor costs or other expenses resulting from the replacement of defective parts or from the installation of parts other than those listed above shall be at the expense of the owner.

USEMCO shall not assume responsibility for the cost of any repairs or alterations to the pump station structure or its components.

The replacement of parts normally consumed in service such as pump shaft seals, light bulbs, grease, oil, packing, etc., items considered as part of routine maintenance are not eligible for free of charge replacements under this warranty.

USEMCO makes no other warranty either expressed or implied and is not responsible for contingent liability or consequential damages of any nature resulting from defects in design, materials, workmanship, or delays in delivery, replacement or otherwise.

CORROSION PROTECTION DATA SHEET

Shot blast all steel surfaces to SSPC-SP10 for near white blasting.

METAL COATING:

Steel Surfaces: Apply two coats epoxy finish, 3 mils each total 6 mils dry.

Manufacturer: Tnemec

Product: Series N69

Color: Cadet Blue – 14BL

Color for fiberglass cover is Tan.



HI-BUILD EPOXOLINE® II SERIES N69

PRODUCT PROFILE

GENERIC DESCRIPTION	Polyamidoamine Epoxy
COMMON USAGE	An advanced generation epoxy for protection and finishing of steel and concrete. It has excellent resistance to abrasion and is suitable for immersion as well as chemical contact exposure. Contact your local Tnemec representative for a list of chemicals. This product can also be used for lining storage tanks that contain demineralized, deionized or distilled water.
COLORS	Refer to Tnemec Color Guide. Note: Epoxies chalk with extended exposure to sunlight. Lack of ventilation, incomplete mixing, miscatalyzation or the use of heaters that emit carbon dioxide and carbon monoxide during application and initial stages of curing may cause yellowing to occur.
FINISH	Satin
SPECIAL QUALIFICATIONS	This product is part of a coating system tested in accordance with ISO 12944-6 (2018). Contact your Tnemec representative for coating system test results.

COATING SYSTEM

SURFACER/FILLER/PATCHER	Series 215, 217, 218
PRIMERS	Steel: Self-priming or Series 1, 27, 27WB, 37H, 66, L69, L69F, N69F, V69F, 90E-92, 90-97, H90-97, 90G-1K97, 90-98, 91-H ₂ O, 94-H ₂ O, 135, 161, 394, V530 Galvanized Steel and Non-Ferrous Metal: Self-priming or Series 66, L69, L69F, N69F, V69F, 161 Concrete: Self-priming or Series 27WB, 130, 1254 CMU: Self-priming or 130, 1254
TOPCOATS	Series 22, 27WB, 46H-413, 66, L69, L69F, N69, N69F, V69, V69F, 72, 73, 104, 113, 114, 118, 141, 156, 157, 161, 180, 181, 262, 265, 287, 740, 750, 1026, 1028, 1029, 1070, 1070V, 1071, 1071V, 1072, 1072V, 1074, 1074U, 1075, 1075U, 1077, 1078, 1078V, 1080, 1081, 1094, 1095, 1096, 1224. Note: The following recoat times apply for Series N69: Immersion Service—Surface must be scarified after 60 days. Atmospheric Service—After 60 days, scarification or an epoxy tie-coat is required. When topcoating with Series 740 or 750, recoat time for N69 is 21 days for atmospheric service. Contact your Tnemec representative for specific recommendations.

SURFACE PREPARATION

STEEL	Immersion Service: SSPC-SP10/NACE 2 Near-White Blast Cleaning or ISO Sa 2 1/2 Very Thorough Blast Cleaning with a minimum angular anchor profile of 1.5 mils. Non-Immersion Service: SSPC-SP6/NACE 3 Commercial Blast Cleaning or ISO Sa 2 Thorough Blast Cleaning with a minimum angular anchor profile of 1.5 mils. Note: Commercial Blast Cleaning generally produces the best coating performance for this exposure. If conditions will not permit this, in moderate exposures Series N69 may be applied to SSPC-SP2 or SP3 Hand or Power Tool Cleaned surfaces (SSPC Rust Grade Condition C).
GALVANIZED STEEL & NON-FERROUS METAL	Surface preparation recommendations will vary depending on substrate and exposure conditions. Contact your Tnemec representative or Tnemec Technical Services.
CAST/DUCTILE IRON	All external surfaces of ductile iron pipe and fittings shall be delivered to the application facility without asphalt or any other protective lining on the exterior surface. All oils, small deposits of asphalt paint, grease, and soluble deposits should be removed and uniformly abrasive blasted using angular abrasive in accordance with NAF 500-03-04: External Pipe Surface condition. When viewed without magnification, the exterior surfaces shall be free of all visible dirt, dust, loose annealing oxide, rust, mold coating and other foreign matter. Any area where rust reappears before application shall be reblasted. The surface shall contain a minimum angular anchor profile of 1.5 mils (38.1 microns) (Reference NACE RP0287 or ASTM D 4417, Method C).
CONCRETE	Allow new cast-in-place concrete to cure a minimum of 28 days at 75°F (24°C). Verify concrete dryness in accordance with ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride" (moisture vapor transmission should not exceed three pounds per 1,000 square feet in a 24 hour period), F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes" (relative humidity should not exceed 80%), or D 4263 "Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method" (no moisture present). Prepare concrete surfaces in accordance with NACE No. 6/SSPC-SP13 Joint Surface Preparation Standards and ICRI Technical Guidelines. Abrasive blast, shot-blast, water jet or mechanically abrade concrete surfaces to remove laitance, curing compounds, hardeners, sealers and other contaminants and to provide an ICRI-CSP 2-3 surface profile. Large cracks, voids and other surface imperfections should be filled with a recommended filler or surfacer.
CMU	Allow mortar to cure for 28 days. Level protrusions and mortar spatter.
PAINTED SURFACES	Non-Immersion Service: Ask your Tnemec representative for specific recommendations.
PRIMED SURFACES	Immersion Service: Scarify the Series N69 prime coat surface by abrasive-blasting with a fine abrasive before topcoating if: (a) the Series N69 prime coat has been in exterior exposure for 60 days or longer and Series 66, 46H-413, L69, L69F, N69, N69F, V69, V69F or 161 is the specified topcoat; (b) the Series N69 prime coat has been in exterior exposure for 14 days or longer and Series 104 is the specified topcoat; (c) the Series N69 prime coat has been in exterior exposure for 7 days or longer and Series 262 or 265 is the specified topcoat.
ALL SURFACES	Must be clean, dry and free of oil, grease, chalk and other contaminants.

TECHNICAL DATA

VOLUME SOLIDS	67.0 ± 2.0% (mixed) †
RECOMMENDED DFT	2.0 to 10.0 mils (50 to 255 microns) per coat. Note: The number of coats and thickness requirements will vary with substrate, application method and exposure. Contact your Tnemec representative.

HI-BUILD EPOXOLINE® II | SERIES N69

CURING TIME AT 5 MILS DFT

Without 44-700 Accelerator

Temperature	To Handle	To Recoat	Immersion
90°F (32°C)	5 hours	7 hours	7 days
80°F (27°C)	7 hours	9 hours	7 days
70°F (21°C)	9 hours	12 hours	7 days
60°F (16°C)	16 hours	22 hours	9 to 12 days
50°F (10°C)	24 hours	32 hours	12 to 14 days

Curing time varies with surface temperature, air movement, humidity and film thickness. **Note:** For faster curing and low-temperature applications, add No. 44-700 Epoxy Accelerator; see separate product data sheet for cure information.

VOLATILE ORGANIC COMPOUNDS

Unthinned: 2.40 lbs/gallon (285 grams/litre)
Thinned 10% (No. 4 Thinner): 2.80 lbs/gallon (334 grams/litre)
Thinned 10% (No. 60 Thinner): 2.80 lbs/gallon (335 grams/litre)

HAPS

Unthinned: 2.40 lbs/gal solids
Thinned 10% (No. 4 Thinner): 3.25 lbs/gal solids
Thinned 10% (No. 60 Thinner): 2.40 lbs/gal solids

THEORETICAL COVERAGE

1,074 mil sq ft/gal (26.4 m²/L at 25 microns). See APPLICATION for coverage rates. †

NUMBER OF COMPONENTS

Two: Part A (amine) and Part B (epoxy) — One (Part A) to one (Part B) by volume.

PACKAGING

	Part A	Part B	Yield (mixed)
Large Kit	5 gallon pail	5 gallon pail	10 gallons (37.9 L)
Small Kit	1 gallon can	1 gallon can	2 gallons (7.6 L)

NET WEIGHT PER GALLON

13.67 ± 0.25 lbs (6.10 ± .11 kg) (mixed) †

STORAGE TEMPERATURE

Minimum 20°F (-7°C) Maximum 110°F (43°C)

TEMPERATURE RESISTANCE

(Dry) Continuous 250°F (121°C) Intermittent 275°F (135°C)

SHELF LIFE

Part A: 24 months; Part B: 12 months at recommended storage temperature.

FLASH POINT - SETA

Part A: 82°F (28°C) Part B: 93°F (34°C)

HEALTH & SAFETY

Paint products contain chemical ingredients which are considered hazardous. Read container label warning and Material Safety Data Sheet for important health and safety information prior to the use of this product.
Keep out of the reach of children.

APPLICATION

COVERAGE RATES

	Dry MILS (Microns)	Wet MILS (Microns)	Sq Ft/Gal (m ² /Gal)
Suggested (1)	6.0 (150)	9.0 (230)	179 (16.6)
Minimum	2.0 (50)	3.0 (75)	537 (49.9)
Maximum	10.0 (250)	15.0 (375)	107 (10.0)

Dense Concrete & Masonry: From 100 to 150 sq ft (9.3 to 13.9 m²) per gallon.

CMU: From 75 to 100 sq ft (7.0 to 9.3 m²) per gallon.

(1) Note for Steel: Roller or brush application requires two or more coats to obtain recommended film thickness. Also, Series N69 can be spray applied to an optional high-build film thickness range of 8.0 to 10.0 dry mils (205 to 255 dry microns) or 11.5 to 14.5 wet mils (209 to 370 wet microns). Allow for overspray and surface irregularities. Film thickness is rounded to the nearest 0.5 mil or 5 microns. Application of coating below minimum or above maximum recommended dry film thicknesses may adversely affect coating performance. †

MIXING

Start with equal amounts of Series N69 Parts A and B. Power mix contents of each container separately, making sure no pigment remains on the bottom. Pour a measured amount of Part B into a clean container large enough to hold both components. If Series 44-700 is not being used, proceed with mixing and add an equal volume of Part A to Part B while under agitation. Continue agitation until the two components are thoroughly mixed. **Note:** Both components must be above 50°F (10°C) prior to mixing. For optimum mixing and application properties, the material should be above 60°F (16°C).

If using Series 44-700 accelerator, slowly add four (4) fluid ounces of 44-700 per gallon to Series N69 Part A material while under agitation and proceed with adding Part B. **Note:** The use of more than the recommended amount of 44-700 will adversely affect performance.

Thin by volume and thoroughly mix. Failure to thoroughly mix the Part A and Part B components prior to thinning can affect product's gloss and performance. Do not use mixed material beyond pot life limits. **Note:** For application of the unaccelerated version to surfaces between 50°F to 60°F (10°C to 16°C) or the accelerated version to surfaces between 35°F to 50°F (2°C to 10°C), allow mixed material to stand 30 minutes and stir before using.

THINNING

Use No. 4 or No. 60 Thinner. For air spray, thin up to 10% or 3/4 pint (380 mL) per gallon. For airless spray, roller or brush, thin up to 5% or 1/4 pint (190 mL) per gallon.

POT LIFE

Without 44-700: 6 hours at 50°F (10°C) 4 hours at 75°F (24°C) 1 hour at 100°F (38°C)
 With 44-700: 2 hours at 50°F (10°C) 1 hour at 75°F (24°C) 30 minutes at 100°F (38°C)

SPRAY LIFE

Without 44-700: 1 hour at 75°F (24°C) With 44-700: 30 minutes at 75°F (24°C)
Note: Spray application after listed times will adversely affect ability to achieve recommended dry film thickness.

PIPING AND VALVE DATA SHEET

STATION INLET:

Size: 2"

Material: Schedule 40 – 6061-T6 Aluminum

Connection: Plain End with Restraint Tabs

Check Valve:

Type: Ball

Manufacturer: Flowmatic

Description: 2", Threaded, Sinking Ball, Model 208

Discharge Shut Off Valve:

Type: Plug

Manufacturer: Dezurik

Description: 2", Flanged, Lever Operator, Model PEC

STATION DISCHARGE

Size: 2"

Material: Schedule 40 – 6061-T6 Aluminum

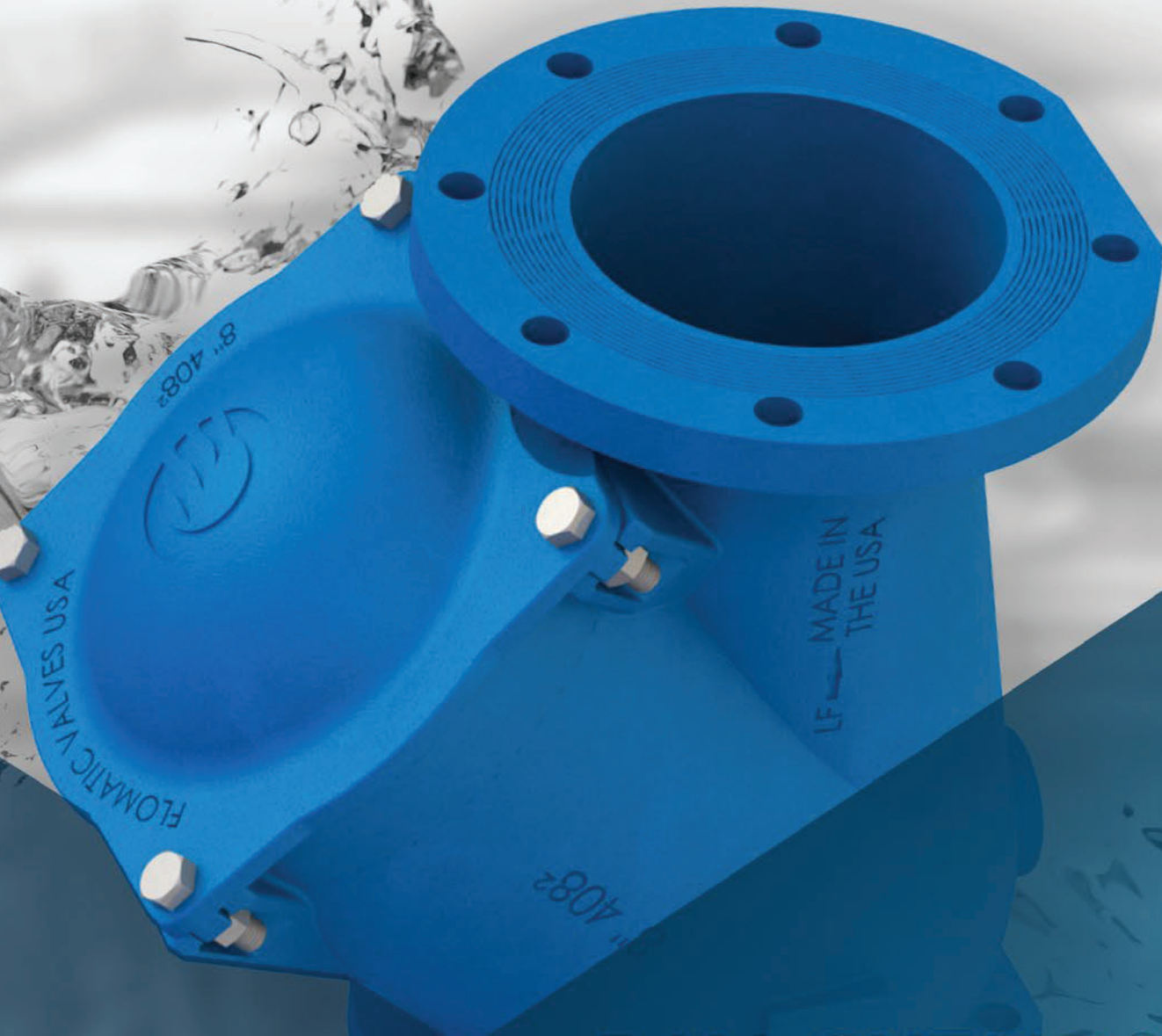
Connection: Plain End with Restraint Tabs

Other Features: ¾" manual air release ball valve and piping to wetwell.



FLOMATIC® VALVES

High Quality Valves Built To Last...



BALL CHECK VALVES

THREADED MODELS SERIES 208
FLANGED MODELS SERIES 408
THREADED/FLANGED SERIES 508

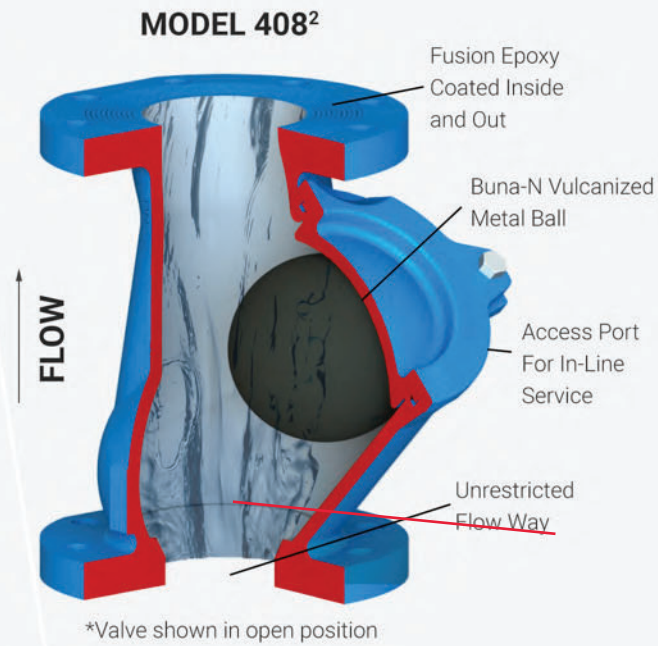
Manufacturer under certified ISO 9001-2015 and
ISO 14001-2015 quality and environmental systems

FEATURES & BENEFITS

Flomatic® offers one of the most complete lines of Ball Check Valves, which are especially designed for demanding wastewater lift stations.

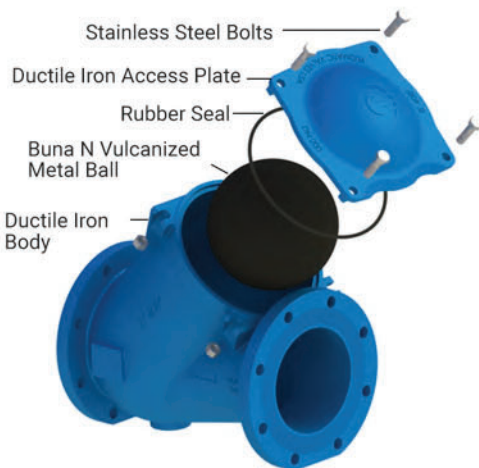
Flomatic® Ball Check Valves have no moving parts except for the ball which automatically moves out of the path of flow minimizing head loss and maximizing efficiency. The random seating of the ball also allows for a longer life.

- Low maintenance cost
- Flow efficient
- Easy serviceability
- Random position seating of the ball
- Valves that end clogging and are self-cleaning
- Vacuum relief feature available
- American Iron and Steel Act (AIS) models available



AVAILABLE IN DUCTILE IRON, 316 STAINLESS STEEL, AND/OR PVC IN 3 DIFFERENT MODELS

**FLANGED
MODEL 408²**



→ **THREADED
MODEL 208**



**THREADED/FLANGED
MODEL 508**



MODELS 208, 208B & 208T



Model 208 Epoxy coated Cast Iron body, features a NITRILE (Buna-N) "Sinking Ball" and E-Z access port for cleaning or backflush.

Vacuum relief feature to reduce water hammer and noise in pipe lines available.

* Model 208B has optional bosses for rail mounting systems.

TEMP MAX: 180°F (80°C) PRESSURE MAX: 150 PSI SIZES: 1 1/4", 1 1/2", 2"

Model 208T has a corrosion resistant PVC body, a threaded female x female NPT connection, and a Nitrile (Buna-N) Ball. It is also available with a PVC socket weld Model 208S.

TEMP MAX: 150°F (65°C) PRESSURE MAX: 100 PSI SIZES: 1", 1 1/4", 1 1/2", 2"



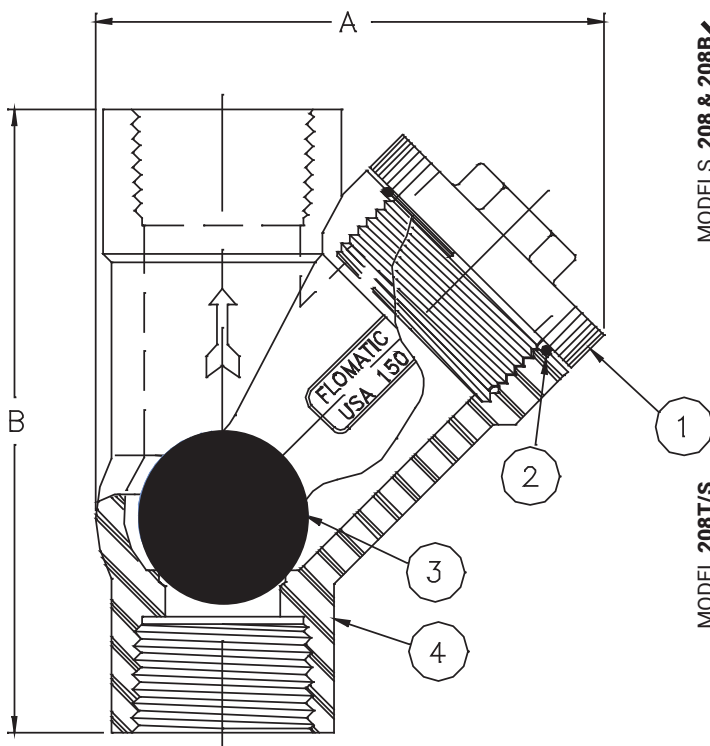
MODEL 208

MODEL 208B

*MODEL 208T

*This model is not for ground burial

DIMENSIONS



MODELS 208 & 208B

SIZE (in.)	PART #	A MAXIMUM WIDTH	B MAXIMUM	BALL DIAMETER	WGT. (Lbs.)
1 1/4"	2141	4 33/64"	5 1/16"	1 5/8"	4.5
1 1/2"	2142-0	6 3/16"	6 3/4"	2 1/2"	9.5
2"	2142	6 3/16"	6 3/4"	2 1/2"	9

MODEL 208T/S

ITEM	QTY.	DESCRIPTION	MATERIAL	ASTM#
1	1	Valve Body (Epoxy Coated)	Cast Iron	A126 Class B
2	1	Ball (Sinking)	Buna-N	-----
3	1	Cap	Cast Iron	A126 Class B
4	1	O-Ring	Buna-N	-----

"A" - Size	PART #	A MAXIMUM WIDTH	B MAXIMUM	BALL DIAMETER	WGT. (Lbs.)
1" - NPT	2131T	6 27/32"	4 1/2"	1 1/2"	1.0
1" - Socket	2131S	6 25/32"	4 1/2"	1 1/2"	1.0
1 1/4" - NPT	2132T	5 21/32"	4 1/2"	1 1/2"	1.0
1 1/4" - Socket	2132S	5 5/8"	4 1/2"	1 1/2"	1.0
1 1/2" - NPT	2133T	8 13/64"	6 11/32"	2 1/2"	1.5
1 1/2" - Socket	2133S	8 13/64"	6 11/32"	2 1/2"	1.5
2" - NPT	2134T	7 1/16"	6 11/32"	2 1/2"	1.5
2" - Socket	2134S	7 1/16"	6 11/32"	2 1/2"	1.5

**For 2" Piping Configuration*

DEZURIK .5-3" (15-80MM) PEC ECCENTRIC PLUG VALVES

Time-Tested Quality

In thousands of installations worldwide, DeZURIK Eccentric Plug Valves have a proven record of long-term reliability. A wide variety of value-added design features and unmatched economy have made it the preferred choice of engineering, operations and maintenance personnel.

Designed for Demanding Applications

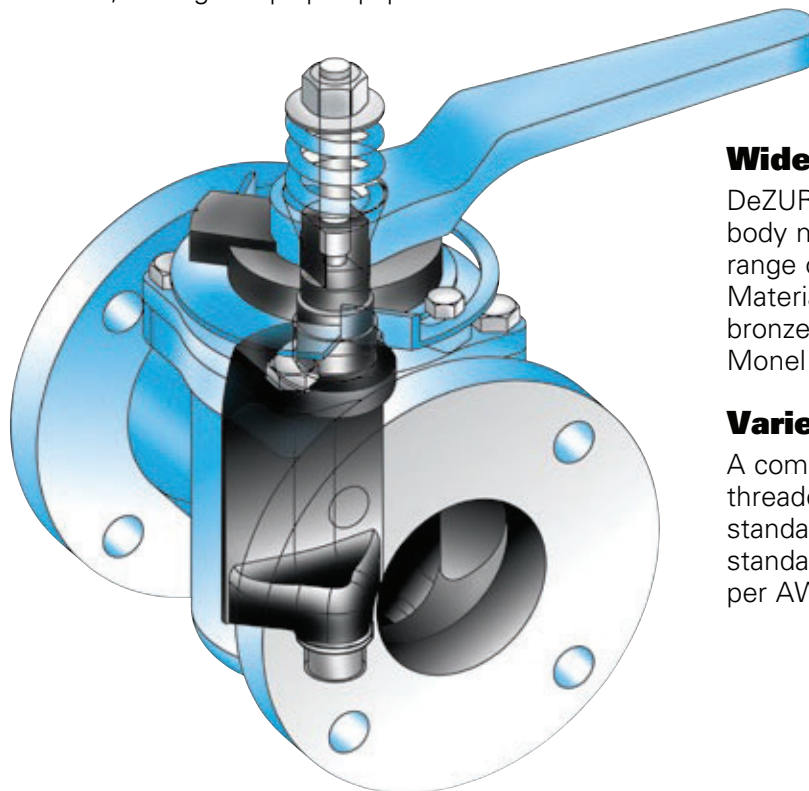
DeZURIK Eccentric Plug Valves are used to handle clean and dirty liquids, sludge, slurries and gases. They can be used for either isolation/shutoff or throttling/control services. Eccentric plug valves are used in water treatment, wastewater treatment, power, chemical, mining and pulp & paper.

An Exceptional Control Valve

DeZURIK Eccentric Plug Valve provides excellent throttling control and accuracy. Permanently lubricated bearings and eccentric action reduces stiction, allowing for small incremental and controllable steps. The one-piece cast plug and shaft effectively eliminates mechanical backlash and hysteresis. In addition, the firm coupling connecting the valve to the actuator increases measurable accuracy.

High Flow Capacity

Clean interior design and straight-through flow allow high maximum capacity with minimum pressure drop.



Wide Selection of Body Materials

DeZURIK offers the most complete line of eccentric body materials to meet the requirements of a broad range of applications up to 285 psi (1965 kPa). Materials available include cast iron, acid-resistant bronze, carbon steel, stainless steel, Alloy 20, Monel and Hastelloy C.

Variety of End Styles

A complete choice of end styles includes threaded to ASME Class 150, DIN, BS or JIS standards; flange-drilled to ASME Class 125/150 standards; mechanical joint (3" only); and grooved per AWWA C606.

.5-3" Eccentric Plug Valves

*For 2" Piping Configuration

One-Piece Cast Plug

Eccentric Plug Valves in sizes .5-3" (15-80mm), feature a plug with upper and lower shaft in a one-piece casting. The straight plug face allows for inherent linear flow characteristic.

The plug rotates completely out of flow, allowing high, straight-through flow capacity. Because the plug is out of the flow path, it provides increased plug life in abrasive applications.

Resilient Plug Facings for Dead-Tight Shutoff

Eccentric Plug Valves are available with a variety of resilient plug facings suitable for temperatures up to 450° F (232° C).

Resilient-faced plugs provide dead-tight shutoff without the use of sealing lubricants. Even if small solids are trapped between the plug and seat, the resilient facing provides tight shutoff and prevents seat damage. The resilient plug design provides drip-tight shutoff on wet-service applications up to the full pressure rating of the valve with pressure in either direction.

Materials available include chloroprene (CR), acrylonitrile-butadiene (NBR), hard natural rubber (NRH), chloro-isobutene isoprene (CIIR), hard rubber with chloroprene overlay (NRCR) and fluoro rubber (FKM).

All-metal plugs are also available for high-temperature or throttling applications where dead-tight shutoff is not required.



Bolted Bonnet

All .5-3" (15-80mm) valves have a rugged, one-piece bolted bonnet for maximum strength. It houses upper bearing and shaft seals to increase cycle life. If maintenance is ever required, its easy disassembly allows access to internal components.

Corrosion-Resistant Bearings

Heavy-duty bearings resist corrosion to prevent binding and assure lasting easy valve operation without lubrication. These rugged stainless steel bearings are furnished in the bonnet and body of all valves.

Long-Life Stem Seals

A variety of stem-seal materials provides maintenance-free sealing that matches valve performance and ensures long life and reliability. Grit Excluders prevent entry of media into the upper and lower journals.

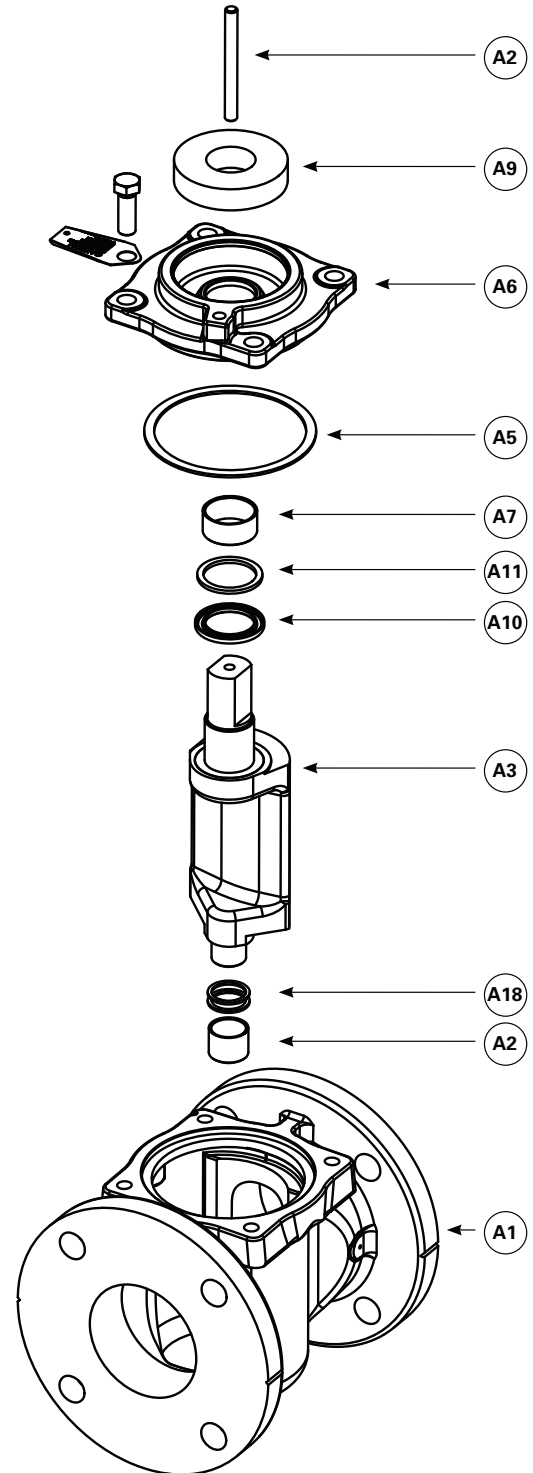
Materials of Construction

Materials of Construction

Item	Description	Material
A1	Body	Cast Iron, ASTM A126, Class B
		Ductile Iron, ASTM A536
		Acid Resistant Bronze, ASTM B427 Alloy C90800
		Carbon Steel, ASTM A216, Grade WCB
		316 Stainless Steel, ASTM A743, Grade CF-8M
		Alloy 20
		Hastelloy C
		Monel
A2	Bearing	316L Stainless Steel, Sintered Stainless Steel
A3	Plug	Metal (same metal as valve body except Cast Iron and Carbon Steel which have 316 Stainless Steel Plug)
		Rubber Faced (same metal as valve body except Carbon Steel which has 316 Stainless Steel Plug)
	Plug Facing	CR Chloroprene
		NBR Acrylonitrile-Butadiene
		NRH Hard Natural Rubber
		CIIR Chloro-Isobutene Isoprene
		NRCR Hard Rubber with Chloroprene Overlay
		FKM Fluoro Rubber
		NBRD Acrylonitrile-Butadiene
	3" NRCR Plugs and CIS bodies only	CR Chloroprene
A5	Gasket	Non-asbestos filler in Styrene-Butadiene Rubber binder
A6	Bonnet	Same material as body
A7	Bearing	316L Stainless Steel, Sintered Stainless Steel
A8	Bonnet Screws	Carbon Steel, Grade 2, Zinc Plated (CI, ABZ, NR Body Materials)
		Carbon Steel, Grade 5, Zinc Plated (CS Body Material)
		18-8 Stainless Steel (S2, AA, HC, ML Body Materials)
A9	Felt Washer (Lever, MNA and NT actuators only)	SAE F-7
A10	Grit Excluder Stem Seal	NBR Acrylonitrile-Butadiene, PTFE and NBR Rubber
		FKM Fluorinated Hydrocarbon, PTFE and FKM Rubber
		PTFE
		Flexible Graphite
A11	U-Ring Filler	FKM and NBR only
A12	Stud, Plug	Carbon Steel, Grade 2, Zinc Plated
A18	Grit Excluder	PTFE (Not included on CIS valves)

*Indicates transfer molded process

*For 2" Piping Configuration



Valve Selection

*For 2" Piping Configuration

Applicable Standards

DeZURIK .5-3" (15-80mm) Eccentric Plug Valves are designed and/or tested to meet the following standards.	
AWWA C517-16	Valves conform to AWWA Standard AWWA C517-16 Eccentric Plug Valves
ASME B16.1, ASME B16.5, ASME B16.42	ASME flange drilling conforms to ASME B16.1 Class 125 and ASME B16.5 Class 150, and ASME B16.42 Class 150.
ASME B1.20.1	ASME threaded end connections conform to the NPT requirements of ASME B1.20.1.
AWWA C111/A21.11	Mechanical-joint end connections conform to AWWA C111/A21.11.
AWWA C606	Grooved joint end connections conform to AWWA C606.
ISO 2084 British Standard 4504 German Standard DIN 2532	Metric 10 bar flange drilling conforms to the NP 10 requirements of International Standard ISO 2084, to the 10 bar requirements of British Standard 4504, and to the NP 10 requirements of German Standard DIN 2532. Metric 16 bar flange drilling conforms to the NP 16 requirements of International Standard ISO 2084, to the 16 bar requirements of British Standard 4504, and to the NP 16 requirement of German Standard DIN 2533.
DIN 259	DIN parallel threaded end connections conform to German Standard DIN 259.
British Standard BS 10	British Table D flange drilling and Table E flange drilling conform to British Standard BS 10.
British Standard BS 21	British tapered thread end connections conform to British Standard BS 21.
JIS B 0203	Japanese 10 bar flange drilling conforms to Japanese Industrial Standard JIS B 0203.
JIS B 0203	Japanese tapered threaded end connections conform to Japanese Industrial Standard JIS B 0203.
NFPN E 03-004	French tapered threaded end connections conform to French Standard NFPN E 03-004.

Pressure Ratings

C.W.P. non-shock working pressure ratings

Cast Iron	175 psi (1207 kPa)
Ductile Iron***	285 psi (1965 kPa)
Acid Resisting Bronze	200 psi (1379 kPa)
Aluminum	150 psi (1034 kPa)
Carbon Steel**	285 psi (1965 kPa)
Stainless Steel** and Other Alloys	275 psi (1896 kPa)
Hard and Soft Rubber Lined Cast Iron* Body	175 psi (1207 kPa)

* Cast Iron conforms to ANSI B16.1 Class 125 Hydrostatic Test.

** Carbon Steel and 316 Stainless Steel conform to ANSI B16.5 Class 150.

*** Ductile Iron conforms to ASME B16.42 Class 150 hydrostatic test.

Valve Weights

Valve Size	Body Material lb (kg)									
	Cast Iron & Ductile Iron		Bronze, Acid Bronze		Aluminum		Carbon Steel		Stainless Steel	
	Flanged	Threaded	Flanged	Threaded	Flanged	Threaded	Flanged	Threaded	Flanged	Threaded
.5" (15mm)	8 (4)	5 (2)	8 (4)	5 (2)	4 (2)	3 (1)	7 (3)	5 (2)	7 (3)	5 (2)
.75" (20mm)	8 (4)	5 (2)	8 (4)	5 (2)	4 (2)	3 (1)	8 (4)	5 (2)	8 (4)	5 (2)
1" (25mm)	8 (4)	5 (2)	9 (4)	5 (2)	4 (2)	3 (1)	9 (4)	5 (2)	9 (4)	5 (2)
1.25" (32mm)	12 (5)	8 (4)	13 (6)	9 (4)	6 (3)	4 (2)	11 (5)	8 (4)	11 (5)	8 (4)
1.5" (40mm)	13 (6)	8 (4)	14 (6)	9 (4)	6 (3)	4 (2)	12 (5)	8 (4)	12 (5)	8 (4)
2" (50mm)	20 (9)	12 (5)	23 (10)	13 (6)	10 (5)	7 (3)	21 (10)	12 (5)	21 (10)	12 (5)
2.5" (65mm)	29 (13)	19 (9)	34 (15)	20 (9)	14 (6)	10 (5)	32 (15)	19 (9)	32 (15)	19 (9)
3" (80mm)	42 (19)	31 (14)	45 (20)	32 (15)	21 (10)	16 (7)	45 (20)	31 (14)	45 (20)	31 (14)

Note: Weight includes levers. Weight added for adapters: 1 lb. /.5 kg

Valve Selection

*For 2" Piping Configuration

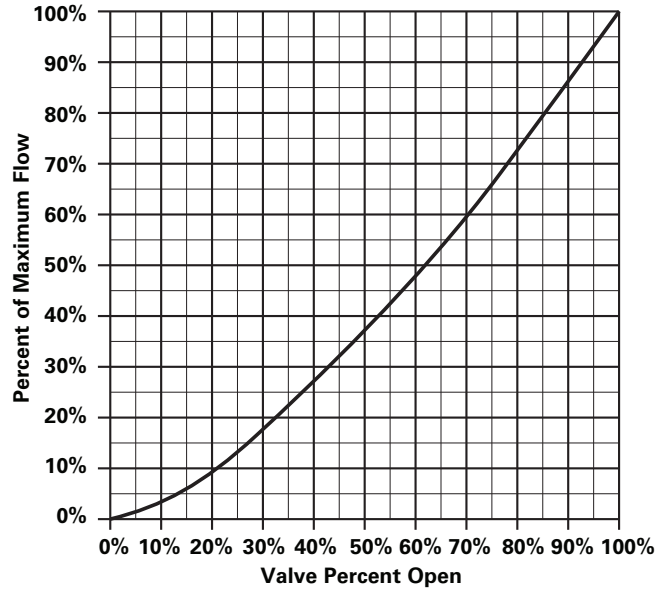
Cv/Kv Values

Valve Size	Port Area %	Cv/Kv
.5" (15mm)	204	10/9
.75" (20mm)	117	20/17
1" (25mm)	72	33/29
1.25" (32mm)	115	74/64
1.5" (40mm)	84	74/64
2" (50mm)	91	148/128
2.5" (65mm)	99	236/204
3" (80mm)	80	330/285

*Cv Values = Flow in GPM of water at 1 psi pressure drop.
Kv Values = Flow in m³/hr of water at 100 kPa pressure drop.

Note: Cv/Kv Values will be slightly higher for valves with threaded end and for metal seated valves. Sizing data is based on discharge into conduit rather than atmosphere.

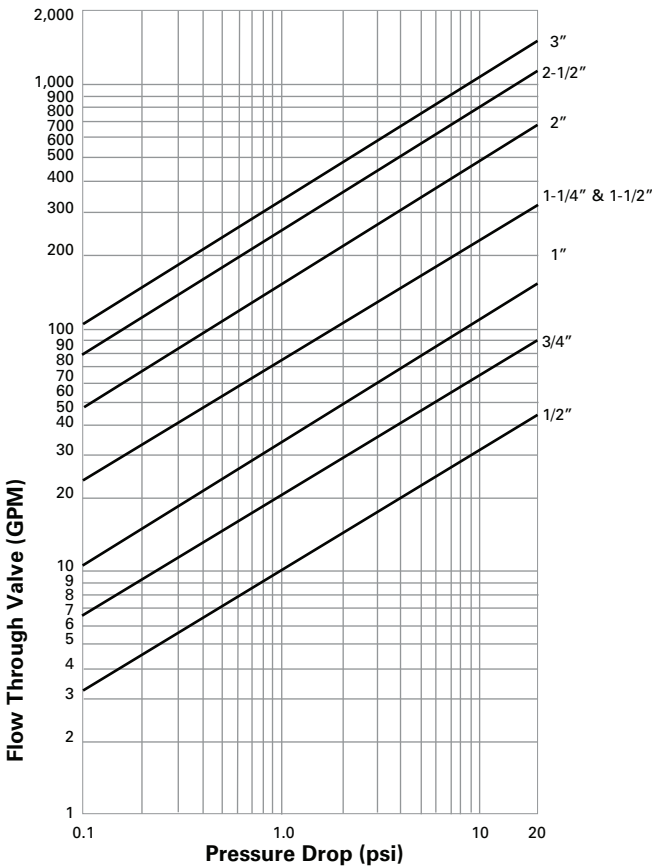
Flow Characteristic



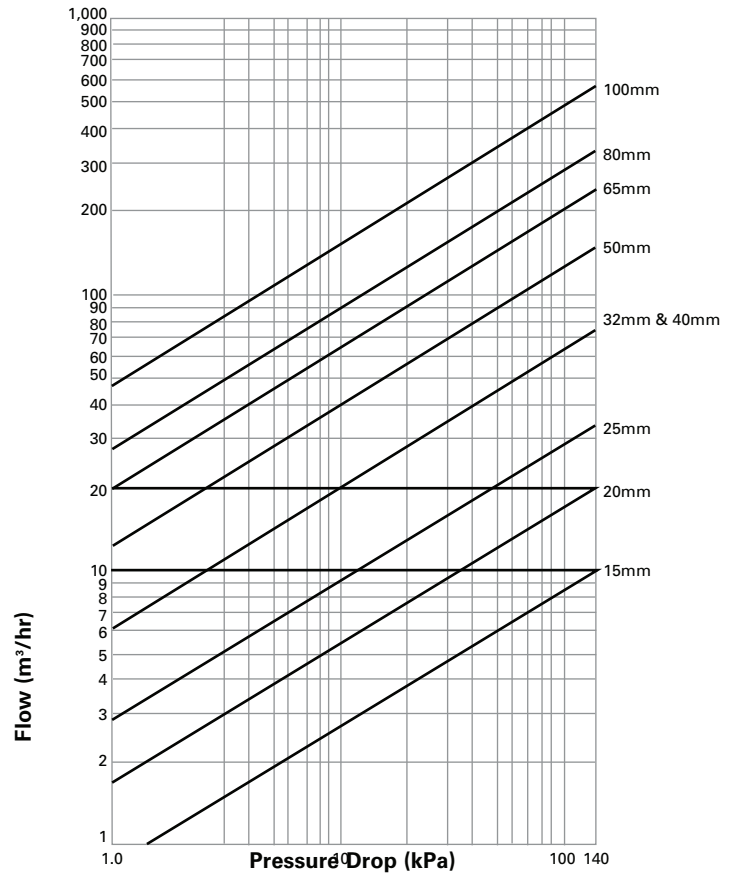
Valve Sizing

Flow Charts

Valve Fully Open



Valve Fully Open - Metric



Ordering

To order, simply complete the valve order code from the information shown.

Valve Style

Give valve style code as follows:

PEC = Eccentric Plug

Valve Size

Give valve size code as follows:

.5 = .5" (15mm)	1.5 = 1.5" (40mm)
.75 = .75" (20mm)	2 = 2" (50mm)
1 = 1" (25mm)	2.5 = 2.5" (65mm)
1.25 = 1.25" (32mm)	3 = 3" (80mm)

End Connection

F1 = Flanged, ANSI Class 125/150 (except .5-1.5" (15-40mm) Cast Iron)
F110 = Flanged, Class 150 DIN 10 or BS4504/10
F116 = Flanged, Class 150 DIN 16 or BS4504/16
T1 = Threaded, ANSI Class 150
F1D = Flanged, Class 150 BS Table D Drilling
F1E = Flanged, Class 150 BS Table E Drilling
F1J1 = Flanged, Class 150 JIS 10 Drilling
GS = DIN Threaded (Parallel)
HS = BS Threaded (Taper)
JS = JIS Threaded (Taper)
MJ = Mechanical-Joint (3" (80mm) Cast Iron only)

Body Material

Give body material code as follows:

CI = Cast Iron
CIH = Cast Iron, Hard Rubber Lined (3" Flanged only)
CIN = Cast Iron, Nickel Welded Seat (3" only)
CIS = Cast Iron, Soft Rubber Lined (3" Flanged only)
DI = Ductile Iron
DIN = Ductile Iron, Nickel Welded Seat (3" only)
DIS = Ductile Iron, Soft Rubber Lined (3" Flanged only)
ABZ = Acid Bronze
CS = Carbon Steel (2-3" only)
S2 = 316 Stainless Steel
AA = Alloy 20
HC = Hastelloy C
ML = Monel

Ordering Example:

PEC,2,F1,CI,NBR,CR,*LV

Packing

Give packing code as follows:

NBR = Acrylonitrile-Butadiene Reinforced filler in a PTFE U-ring .5"-3" (15-80mm) all resilient faced plugs except FKM and except 3" with CIH body material. -20 to 180° F (-29 to 83° C)
FKM = Fluorinated Hydrocarbon filler in a PTFE U-ring .5"-3" (15-80mm) all metal and FKM plugs -20 to 450° F (-29 to 232° C)
T = Solid PTFE .5"-3" (15-80mm) all metal plugs. Must be used with CIS or DIS body material, -20 to 450° F (-29 to 232° C)
G2 = Flexible Graphite, -20 to 1000° F (-29 to 538° C) .5-3" all metal plugs

Plug Facing

Give plug facing code as follows:

M = Metal
CR = Chloroprene, -20 to 180° F (-29 to 83° C)
NBR = Acrylonitrile-Butadiene, -20 to 180° F (-29 to 83° C) For petroleum applications
NBRD = Acrylonitrile-Butadiene, -20 to 180° F (-29 to 83° C) For chemical and dry applications
NRH = Hard Natural Rubber, -20 to 180° F (-29 to 83° C) Use on 3" CIH Body only
CIIR = Chloro-Isobutene Isoprene -20 to 250° F (-29° to 121° C)
NRCR = Hard Rubber with Chloroprene Overlay Use on CIH body only -20 to 180° F (-29 to 83° C)
FKM = Fluoro Rubber -20 to 450° F (-29 to 232° C) used with FKM or T packing only
EPDM = Terpolymer of Ethylene Propylene & A Diene -20 to 250° F (-29 to 121° C)

Note:

The limiting factor in valve selection is the lowest temperature limit of the packing or plug facing.

Options

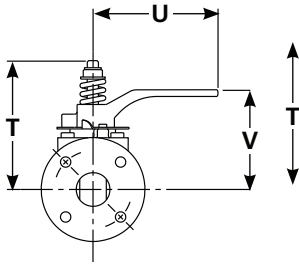
Give options codes as follows:

AIS = Valves conform to H.R. 3547 Consolidated Appropriations Act, 2014 Section 436. Available with CI, CIH, CIS, CS, DI, DIS, S2 Body Materials only.
BAA = Buy American Act
CMC = Certificate of Material Conformance
ST3 = Pennsylvania Steel Procurement Act
BV1 = Balancing Valve with 1/8" air valve fittings. Available with CI or DI Body Material & F1 or T1 End Connection.
BV2 = Balancing Valve with 1/8" quick disconnect couplings. Available with CI or DI Body Material & F1 or T1 End Connection.
DST = Dry Seat Test
DTR = DeZURIK Standard Certified Production Hydrostatic Shell & Seat Test Report
PD = 1/8" Pipe Tap Downstream
PU = 1/8" Pipe Tap Upstream
PDU = 1/8" Pipe Tap Upstream & Downstream. Available with CI Body Material and F1 & T1 End Connection only.
S2 = 316 Stainless Steel Plug (Resilient plugs only)
GR = Grease Fittings in Body (except Rubber Lined Valves CIH, CIS & DIS)
TB = Certified Seat Leak Test Both Directions per AWWA C517
TD_ = Certified Seat Leak Test Direct Pressure per AWWA C517
TR_ = Certified Seat Leak Test Reverse Pressure per AWWA C517

Dimensions

*For 2" Piping Configuration

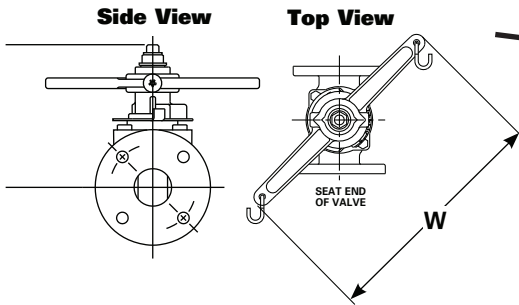
Lever



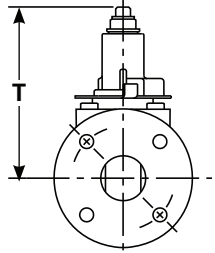
Manual Actuators

Valve Size	T			U	V	W
	Lever	HLA Adapter	MNA Adapter			
.5" 15mm	4.50 114	4.50 114	6.12 155	4.00 102	4.06 103	9.00 229
.75" 20mm	4.50 114	4.50 114	6.12 155	4.00 102	4.06 103	9.00 229
1" 25mm	4.50 114	4.50 114	6.12 155	4.00 102	4.06 103	9.00 229
1.25" 32mm	4.88 124	4.88 124	6.50 165	5.00 127	4.53 115	11.00 279
1.5" 40mm	4.88 124	4.88 124	6.50 165	5.00 127	4.53 115	11.00 279
2" 50mm	6.19 157	6.19 157	7.75 197	6.50 165	5.22 133	14.00 356
2.5" 65mm	7.00 178	7.00 178	9.50 241	7.50 191	5.69 145	14.50 368
3" 80mm	7.75 197	7.75 197	9.50 241	9.00 229	6.38 162	19.00 483

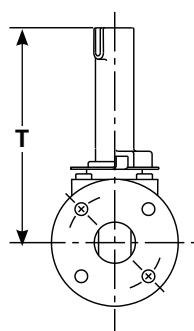
HLA Adapter w/Chain Handle



HLA Adapter



MNA Adapter



Sales and Service

For information about our worldwide locations, approvals, certifications and local representative:

Web Site: www.dezurik.com E-Mail: info@dezurik.com



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DeZURIK, Inc. reserves the right to incorporate our latest design and material changes without notice or obligation. Design features, materials of construction and dimensional data, as described in this bulletin, are provided for your information only and should not be relied upon unless confirmed in writing by DeZURIK, Inc. Certified drawings are available upon request.

PIPING AND VALVE DATA SHEET

STATION INLET:

Size: 3"

Material: Schedule 40 – 6061-T6 Aluminum

Connection: Plain End with Restraint Tabs

Check Valve:

Type: Ball

Manufacturer: Szuster

Description: 3", Flanged, Sinking Ball, Model ESL II

Discharge Shut Off Valve:

Type: Plug

Manufacturer: Milliken

Description: 3", Flanged, Lever Operator, Series 601N1

STATION DISCHARGE

Size: 3"

Material: Schedule 40 – 6061-T6 Aluminum

Connection: Plain End with Restraint Tabs

Other Features: 3/4" manual air release ball valve and piping to wetwell.

PIPING AND VALVE DATA SHEET

STATION INLET:

Size: 4"

Material: Schedule 40 – 6061-T6 Aluminum

Connection: Plain End with Restraint Tabs

Check Valve:

Type: Ball

Manufacturer: Szuster

Description: 4", Flanged, Sinking Ball, Model ESL II

Discharge Shut Off Valve:

Type: Plug

Manufacturer: Milliken

Description: 4", Flanged, Lever Operator, Series 601N1

STATION DISCHARGE

Size: 4"

Material: Schedule 40 – 6061-T6 Aluminum

Connection: Plain End with Restraint Tabs

Other Features: $\frac{3}{4}$ " manual air release ball valve and piping to wetwell.

IN-LINE BALL CHECK VALVES

Technical data

*For 3" & 4" Piping Configurations

- Range of available diameters: 1 1/4" – 8".
- Pressure rated to 230 PSI (all valves are tested to 145 PSI leak test / 230 PSI hydrostatic shell test).
- Medium temperature: max 104°F (temporarily to 140°F).
- Flanges complying with ANSI/ASME B16.1 Class 125.
- API 598 tests and requirements.
- Painted with a coat of epoxy paint, RAL 5015.
- Patent no.: US 8,146,618 B2.



Type ESL



Type ESL

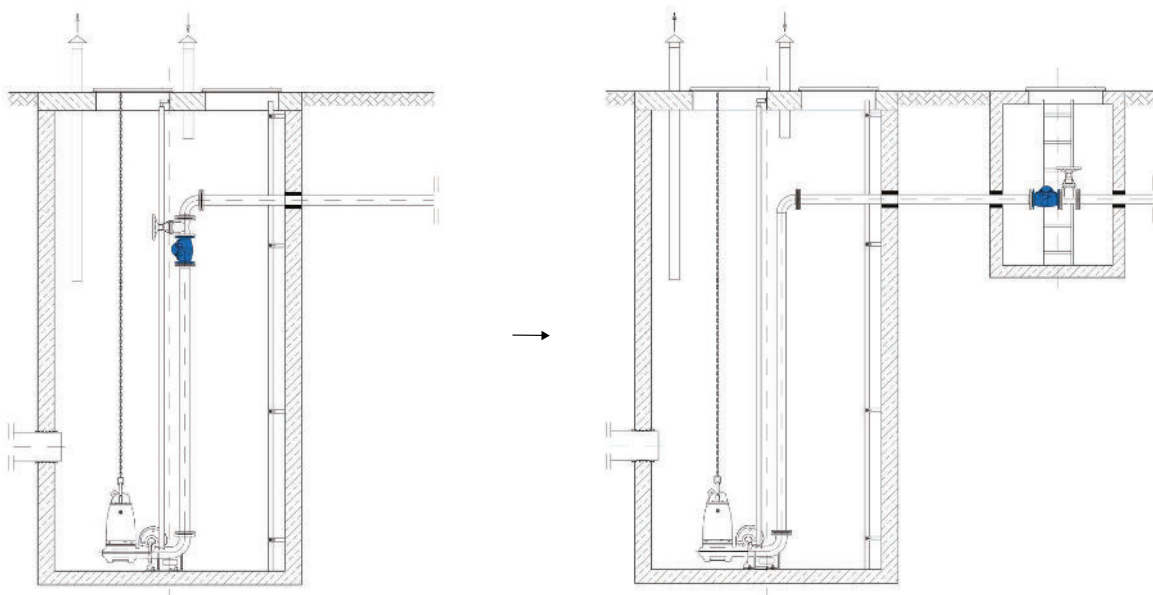
Advantages

➤ For Lift Stations

1. Quick replacement time – customers can quickly replace valve balls themselves without damaging equipment.
2. Easy access to valves interior and the ball which enables placing the cover in the so-called servicing position.
3. Reducing energy consumption for sewage pumping due to the smaller resistance of the valve design (relative to standard ball check valves).

➤ For Engineers

1. Fully open position and constant factor K starting from the flow rate of 2.3 fps.
2. Reduction of vibrations making a system work more quietly.



IN-LINE BALL CHECK VALVES

Additional options

*For 3" & 4" Piping Configurations

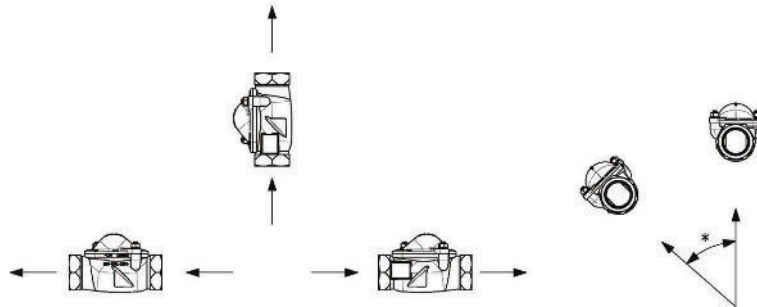
Type of check valve	Characteristics	Application examples
Version with floating ball (F)	The valve in F version is equipped with a ball, so-called „floating“ ball, with a specific weight of approx 49.9 lb/ft³.	Backwater protection (valve is fully opened with the velocity of 0.66 fps).
Version with quasi ball (Q)	The valve in Q version is equipped with a quasi floating ball with a specific weight of approx 63.7 lb/ft ³ .	Lift stations, pumps with inverter.

Table of options

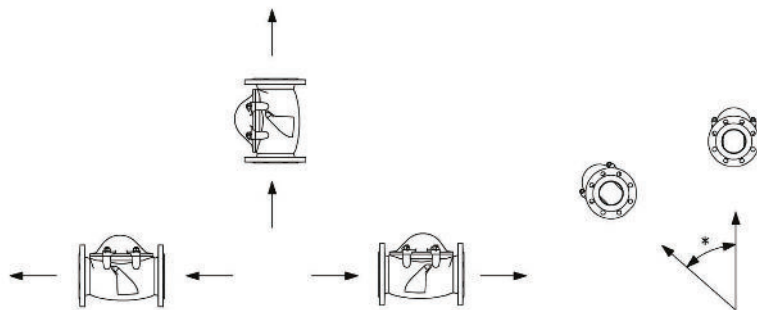
Type	DN	Size	Ductile Iron	Floating Ball (F)	Quasi Ball (Q)
Type ESL 01 - threaded					
ESL 01	32	1 1/4"	regular	n/a	n/a
ESL 01	40	1 1/2"	regular	n/a	n/a
ESL 01	50	2"	regular	option	n/a
Type ESL 11 - flanged					
ESL 11	50	2"	regular	regular	n/a
ESL 11	65	2 1/2"	regular	regular	n/a
ESL 11	80	3"	regular	regular	option
ESL 11	100	4"	regular	regular	option
ESL 11	125	5"	regular	regular	option
ESL 11	150	6"	regular	regular	option
ESL 11	200	8"	regular	regular	option

In-line ball check valves installation method

ESL 01



ESL 11



*Vertical deviation in the range:

0 – 10° – when used with solids as gravel and sand

0 – 45° – when used with drinking water

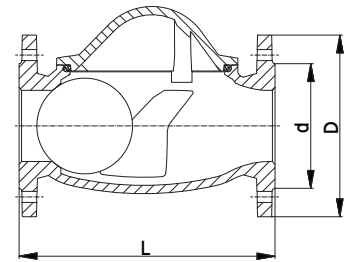
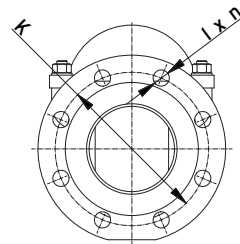
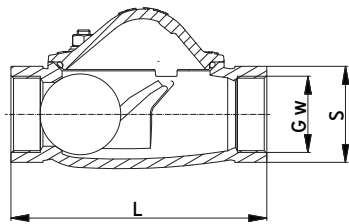
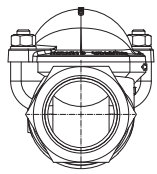
IN-LINE BALL CHECK VALVES

ESL ball check valves dimensions in accordance with the standard ANSI/ASME B16.1-2005 Class 125

ESL 01

→ ESL 11

*For 3" & 4" Piping Configurations

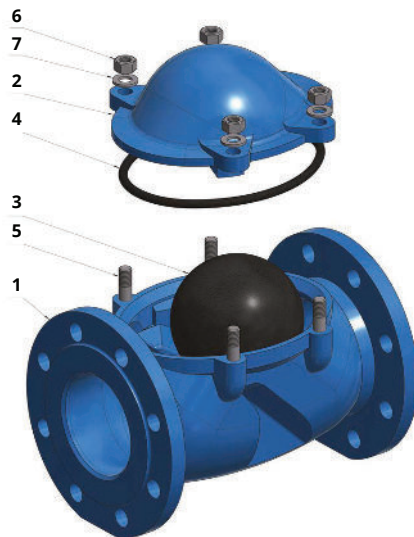
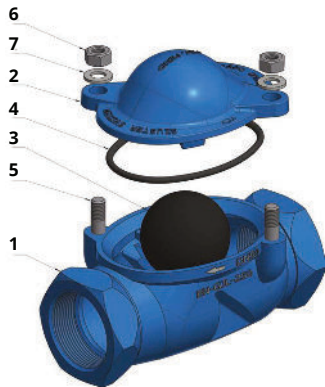


Type	DN	NPS	L	D	d	K	l x n	S	Gw	Weight
					[inch]					[lb]
ESL 01	40	1 1/2"	5 7/8	-	-	-	-	2 3/8	1 1/2	5.3
ESL 01	50	2"	7 7/8	-	-	-	-	2 15/16	2	9.0
ESL 11	50	2"	7 7/8	6 1/2	4	4 15/16	3/4" x 4	-	-	17.6
ESL 11	65	2 1/2"	9 7/16	7 1/4	4 13/16	5 11/16	3/4" x 4	-	-	25.4
ESL 11	80	3"	10 1/4	7 7/8	5 7/16	6 5/16	3/4" x 8	-	-	39.7
ESL 11	100	4"	11 13/16	8 5/8	6 1/4	7 1/8	3/4" x 8	-	-	59.5
ESL 11	125	5"	13 13/16	9 7/8	7 3/8	8 1/4	3/4" x 8	-	-	83.8
ESL 11	150	6"	15 3/4	11 1/4	8 3/8	9 7/16	7/8" x 8	-	-	105.8
ESL 11	200	8"	19 11/16	13 3/8	10 9/16	11 5/8	7/8" x 8	-	-	172.0

ESL ball check valves constructions

ESL 01

→ ESL 11



No.	Part	Material*
1	Body	Cast iron, ASTM A126 Class B (for sizes 1 1/4" - 2"); Ductile iron, ASTM A536 Grade 65-45-12 (for sizes 3"-12")
2	Cover	Cast iron, ASTM A126 Class B (for sizes 1 1/4" - 2"); Ductile iron, ASTM A536 Grade 65-45-12 (for sizes 3"-12")
3	Ball	Rubber NBR / EPDM
4	Gasket	Rubber NBR / EPDM
5	Screw cap	Stainless steel, ASTM A240 Grade 304
6	Nut	Stainless steel, ASTM A240 Grade 304
7	Washer	Stainless steel, ASTM A240 Grade 304

*Types of materials may be subject to change.

*For 3" & 4" Piping Configurations

MILLIKEN[®]

a **MUELLER** brand

MILLCENTRIC[®]

Plug Valve



MUELLER

SCOPE OF LINE

The Milliken® criteria of quality, reliability, safety and value are embodied in the Millcentric® plug valve, setting higher standards for dependable performance with excellent features achieved by the utilization of the very latest design and manufacturing techniques.

- Computer aided design
- High integrity casting
- CNC manufacturing delivers consistent sizes on all components

All complemented by rigorous Quality Control System

BODY

Conforming to AWWA C517 wall thickness, the Millcentric® plug valve body casting is in ASTM A126 CL B cast iron using high pressure molding techniques. Alternative flanged, grooved or mechanical joint ends are available.

Flange diameter, thickness and drilling conform to ANSI B16.1 Class 125 or 250.

Grooved ends meet AWWA C-606 for ductile or steel pipe. Mechanical joints to AWWA C111 (ANSI A21.11).

SEAT

The Millcentric® plug valve incorporates as standard, on 3" and larger, a 1/8" thick welded 99% nickel seat for corrosion and erosion resistance specifically profiled for low torque and extended seat life.

STEM SEAL

High integrity sealing by combining the advantages of a resilient and abrasion resistant U-Cup seal. From vacuum to high pressure, the self-adjusting sealing system (per AWWA C504) gives positive, trouble-free service and is retained independently of the plug stem or external torque device, thereby eliminating periodic maintenance.

BEARINGS

The plug rotates in permanently lubricated 316 grade stainless steel bearings, located in the body and bonnet, along with upper and lower PTFE thrust washers, which ensure consistently low operating torque.

PLUG

Supported on integral trunnions, the plug is totally encapsulated with an elastomer that is molded on 2-1/2" – 48" and vulcanized on 54" and larger to the casting providing tight shut off even under vacuum conditions. High integrity corrosion-free sealing is achieved by a variety of abrasion resistant elastomers which protect the plug right up to the trunnions. When assembled, the light compression of the elastomers onto PTFE thrust washers, prevents entry of abrasive materials into the bearings.

BONNET SEAL

Superior "O" ring sealing with metal / metal contact means lower bolting stresses compared with compression gaskets.

FLOW

The port design (round on 2-1/2" – 12" and rectangular on 14" and larger) with streamlined internal contours gives the highest industry capacity straight through flow in the full open position, reducing turbulence and pressure drop and the effect of erosive media. Handling of sludges and slurries is therefore enhanced.

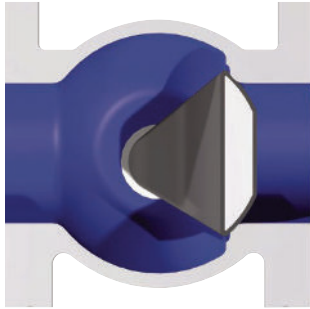
INTERCHANGEABLE

Because of the common face to face dimension with wedge gate valves (3" – 12"), fitting the tight shut-off rotary Millcentric® plug valve into existing systems is accomplished without pipeline modifications.

TRAVEL STOPS

Adjustable open and closed travel stops are fitted as standard on both wrench and gear operated Millcentric® plug valves.

SUGGESTED SPECIFICATIONS



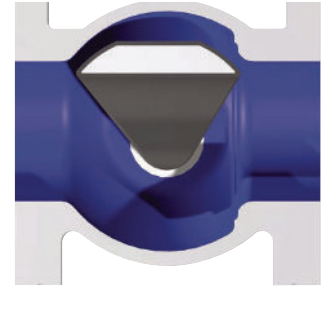
- Valve in closed position for bubble tight shut-off
- Normal flow direction gives pressure assisted sealing
- Torques are low even in reverse flow



- Plug rotates away from the seat for instant opening
- Seat wear and operating torque reduced
- No further seat contact until valve is closed again



- Design of Millcentric® plug valve allows modulating control over the full 90° travel
- Ideally suited for balancing service
- Standard rotary valve provides control and tight shut off in one valve



- Plug is out of flow path when fully open
- Straight through, uninterrupted smooth flow
- Round port reduces turbulence and erosion, lowers pumping costs and can be “pigged” to clean the pipeline

INSTALLATION

The Millcentric plug valve is suitable for flow and shut-off in either direction. Seat end downstream is the preferred orientation and any reverse flow requirement should be stated at the time of order. For use on fluids with suspended solids, it is recommended that the valve should be installed with the seat upstream and the valve stem horizontal with plug rotation to the top of the valve ensuring smooth operation.

IN-LINE MAINTENANCE

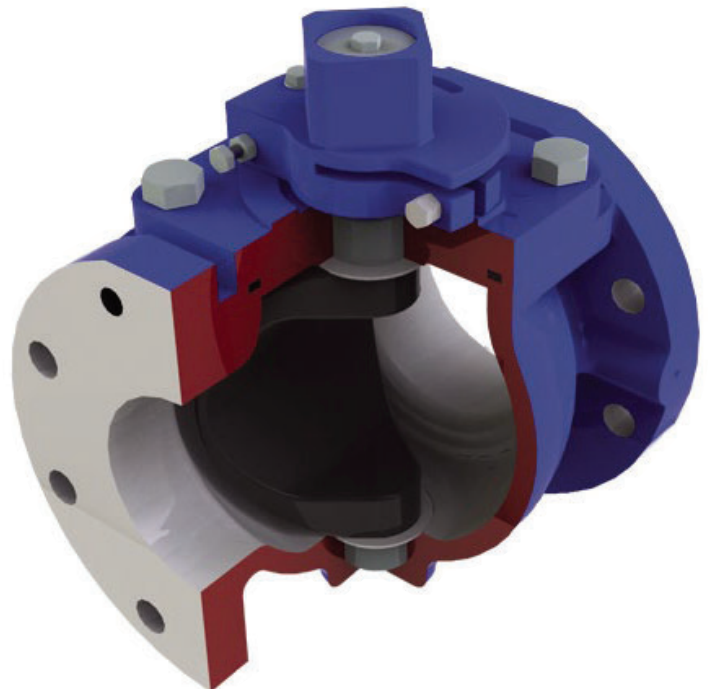
In the unlikely event of stem leakage, the stem seals can be easily replaced without removing the bonnet. Access to the body for cleaning or inspection does not require removal from the line.

MODULAR CONSTRUCTION

Design of the bonnet and stem allows for on-site adaption of gear operators, power actuators, or extension devices on to standard valves. Conversion can be easily undertaken without removing the valve bonnet, thereby minimizing downtime.

POWER OPERATION

Pneumatic, electric or hydraulic operation is available, complete with accessories such as limit switches, solenoid valves and positioners when required.



DIMENSIONAL DATA

ORDERING INFORMATION

VALVE TYPES	DESIGNATION
Mechanical Joint Cast Iron	600
Mechanical Joint Ductile Iron	620
ANSI 125 Flanged Cast Iron Flat Face	601
ANSI 125 Flanged Ductile Iron Flat Face	611
ANSI 150 Flanged Ductile Iron Raised Face	621
ANSI 250 Flanged Ductile Iron Raised Face	602
ANSI 125 Grooved for Steel Pipe	606S
ANSI 125 Grooved for Ductile Pipe	606D
ANSI 150 Flanged 316SS	601S
SEAT	
Nickel (3" & Larger)	N
Epoxy (2-1/2" ONLY)	E
316SS (On Stainless Steel Valve ONLY)	S
Rubberlined	RL
Glasslined	GL
ELASTOMER TRIM	
EPDM	0
Buna-Nitrile	1
Viton	2
Neoprene	3
Natural	4
MANUAL OPERATORS	
Above Ground Gear and Handwheel	AGHW
Above Ground Gear with 2" Nut	AGNUT
Buried Gear with 2" Nut	BG
Memory Stop Gear with Handwheel	MGHW
Lever / Wrench (8" & smaller)	L
Direct Nut (8" & smaller)	TC

Example: 4" 601N3AGHW = 4" ANSI 125 Flanged, Nickel Seat, Neoprene plug with Above Ground Gear and Handwheel.

Valves are only tested for bi-directional shut-off if specified at time of order. Contact factory for bi-directional ratings.

Note: We recommend mechanical joint or buried flanged valves to have gear operators.

Note: We recommend valves for bi-directional service to have gear operators.

PRESSURE RATING

Size	ANSI Rating	Pressure (psi)
12" and Smaller	ANSI 125	175 psi
14" and Larger	ANSI 125	150 psi
14" and Larger	ANSI 150	235 psi
20" and Smaller	ANSI 150	285 psi
12" and Smaller	ANSI 250	400 psi
14" and Larger	ANSI 250	300 psi

Body Hydrotest = 150% of Rated Pressure / Seat Test = 100% of Rated Pressure Testing per AWWA C517

ELASTOMER SELECTION CHART

SERVICE	ELASTOMER	AVERAGE USEFUL TEMP. RANGE	SERVICE	ELASTOMER	AVERAGE USEFUL TEMP. RANGE	SERVICE	ELASTOMER	AVERAGE USEFUL TEMP. RANGE
Acetone	EPDM	-35°F to 250°F	Cement Slurry	EPDM	-35°F to 250°F	Oil, Animal	Nitrile	-20°F to 212°F
Alcohol AMYL	EPDM	0°F to 212°F	Copper Sulphate	EPDM	-35°F to 250°F	Oil, Mobil Therm Light	Viton	10°F to 250°F
Alcohol Aromatic	Viton	10°F to 250°F	Creosote (Coal)	Nitrile	-20°F to 212°F	Oil, Mobil Therm 600	Viton	10°F to 250°F
Alcohol Butyl	Neoprene	-20°F to 225°F	Coal Slurry	Nitrile	-20°F to 212°F	Oil, Mobil Therm 603	Nitrile	-20°F to 212°F
Alcohol Denatured	Nitrile	-20°F to 212°F	Diesel Fuel No. 3	Nitrile	-20°F to 212°F	Oil, Lubricating	Nitrile	-20°F to 212°F
Alcohol Ethyl	EPDM	-20°F to 250°F	Diethylene Glycol	EPDM	-35°F to 250°F	Oil, Vegetable	Nitrile	-20°F to 212°F
Alcohol Grain	Nitrile	-20°F to 212°F	Ethylene Glycol	EPDM	-35°F to 250°F	Paint, Latex	Nitrile	-20°F to 212°F
Alcohol Isopropyl	Neoprene	-20°F to 212°F	Fatty Acid	Nitrile	-20°F to 212°F	Phosphate Ester	EPDM	-35°F to 250°F
Alcohol Methyl	EPDM	-20°F to 250°F	Fuel Oil No. 2	Nitrile	-20°F to 212°F	Propane	Nitrile	-20°F to 212°F
Ammonia Anhydrous	Neoprene	-20°F to 225°F	Fertilizer Liquid H ₂ N ₂ O ₂	EPDM	-35°F to 250°F	Rape Seed Oil	EPDM	-35°F to 250°F
Ammonium Nitrate	EPDM	-20°F to 250°F	Gasoline Keg	Nitrile	-20°F to 212°F	Sewage with Oils	Nitrile	-20°F to 212°F
Ammonia, Water	EPDM	-20°F to 250°F	Gas Natural	Nitrile	-20°F to 212°F	Sodium Hydroxide 20%	EPDM	-35°F to 250°F
Animal Fats	Nitrile	-20°F to 212°F	Glue, Animal	Nitrile	-20°F to 212°F	Starch	EPDM	-35°F to 250°F
Black Liquor	EPDM	-20°F to 250°F	Green Liquor	EPDM	-20°F to 212°F	Steam to 250°F	EPDM	-35°F to 250°F
Blast Furnace Gas	Neoprene	-20°F to 225°F	Hydraulic Oil (Petro)	Nitrile	-20°F to 212°F	Stoddard, Solvent	Nitrile	-20°F to 80°F
Butane	Nitrile	-20°F to 212°F	Hydrogen	Nitrile	-20°F to 212°F	Sulphuric Acid 10% 50%	Neoprene	-20°F to 158°F
Bunker Oil "C"	Nitrile	-20°F to 212°F	JF4, JP5	Viton	-20°F to 212°F	Sulphuric Acid 100%	Viton	10°F to 300°F
Calcium Chloride	EPDM	-20°F to 250°F	Kerosene	Nitrile	0°F to 212°F	Trichloroethylene Dry	Viton	10°F to 300°F
Carbon Dioxide	EPDM	-20°F to 250°F	Ketone	EPDM	-35°F to 250°F	Triethanol Amine	EPDM	-35°F to 250°F
Carbon Monoxide (Cold)	Neoprene	-20°F to 150°F	Lime Slurry	EPDM	-35°F to 250°F	Varnish	Viton	10°F to 300°F
Carbon Monoxide (Hot)	Viton	10°F to 300°F	Methane	Nitrile	-20°F to 212°F	Water, Fresh	EPDM	-35°F to 250°F
Carbon Tetrachloride	Viton	10°F to 300°F	Methyl Ethyl Ketone	EPDM	-35°F to 250°F	Water, Salt	EPDM	-35°F to 250°F
Caustic Soda	EPDM	-35°F to 250°F	Naphtha (Berzin)	Nitrile	-20°F to 212°F	Xylene	Viton	10°F to 300°F

Note: Above elastomer / temperature chart are guidelines only. Contact factory for specific applications.

ELASTOMERS AVAILABLE FOR MILLCENTRIC®

PLUG VALVE

Natural rubber is also available.

NITRILE

A general purpose material sometimes referred to as BUNA-N or HYCAR with a -20°F to 212°F temperature range. Used on sewage, water, hydrocarbon and mineral oils.

EPDM

An excellent polymer for use on chilled water through to LP steam applications having a temperature range of -35°F to 250°F. Resistance to many acids, alkalis, detergents, phosphate esters, alcohols and glycols is an added benefit.

NEOPRENE

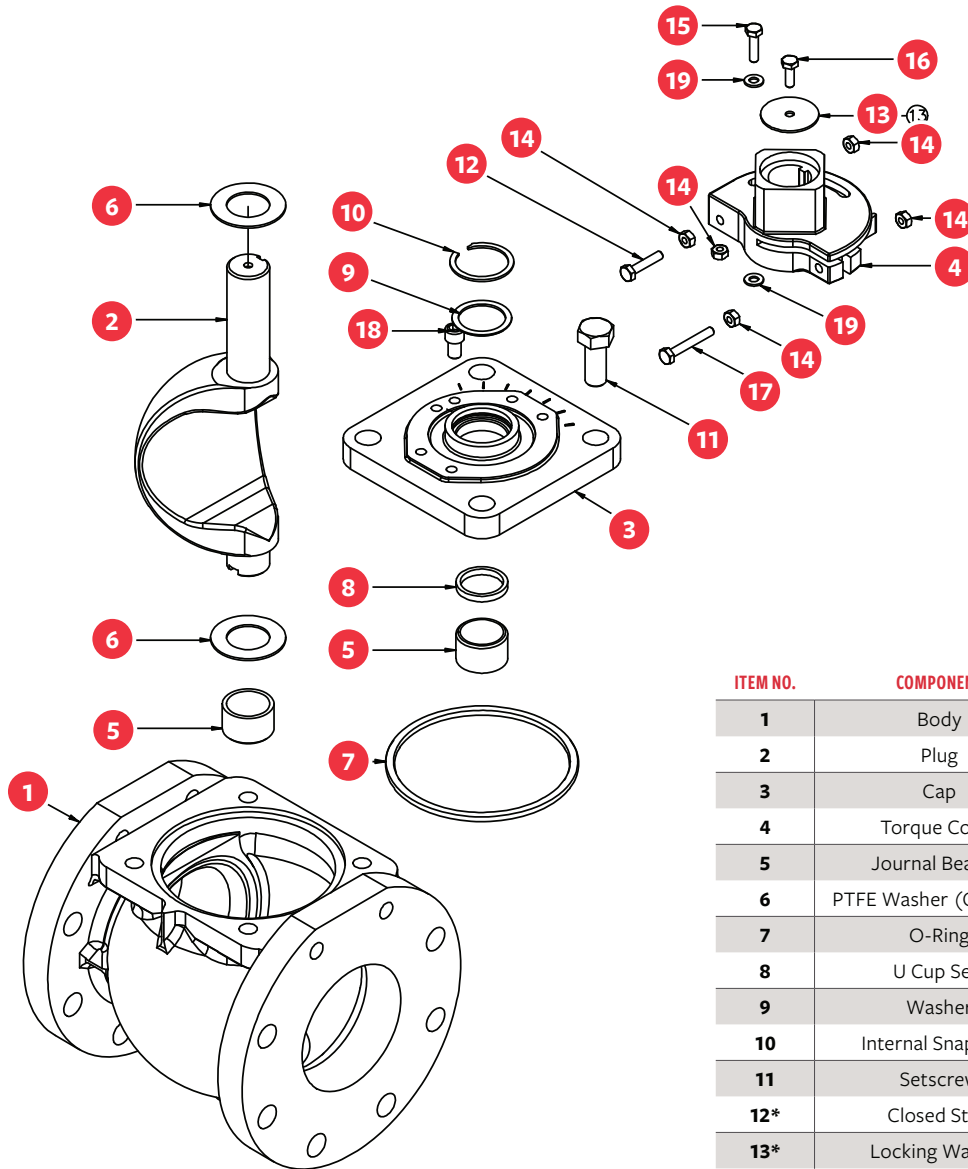
This versatile material shows outstanding resistance to abrasion and ozone. Chemical resistance to a wide range of petroleum base products and dilute acids and alkalis. Temperature range -20°F to 225°F.

VITON

Retention of mechanical properties at high temperature is an important feature of this elastomer: temperature range is -10°F to 300°F. It also has excellent resistance to oils, fuels, lubricants and most mineral acids and aromatic hydrocarbons.

Note: Not for water or steam applications.

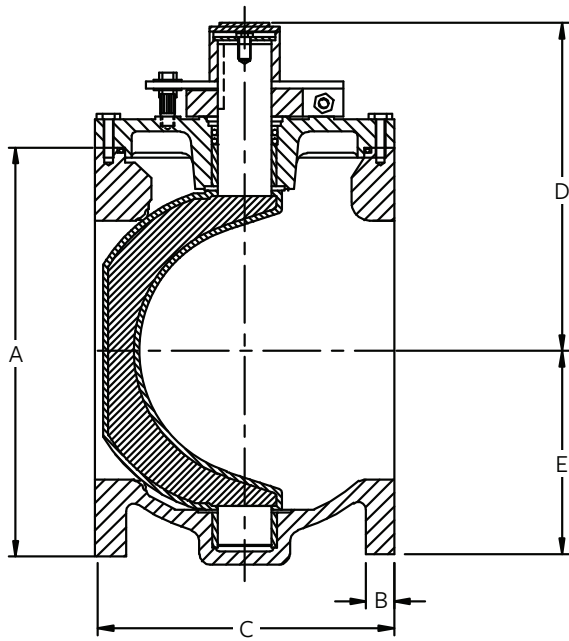
STANDARD MATERIALS OF CONSTRUCTION, FIG. 601 / 600, 12" & SMALLER



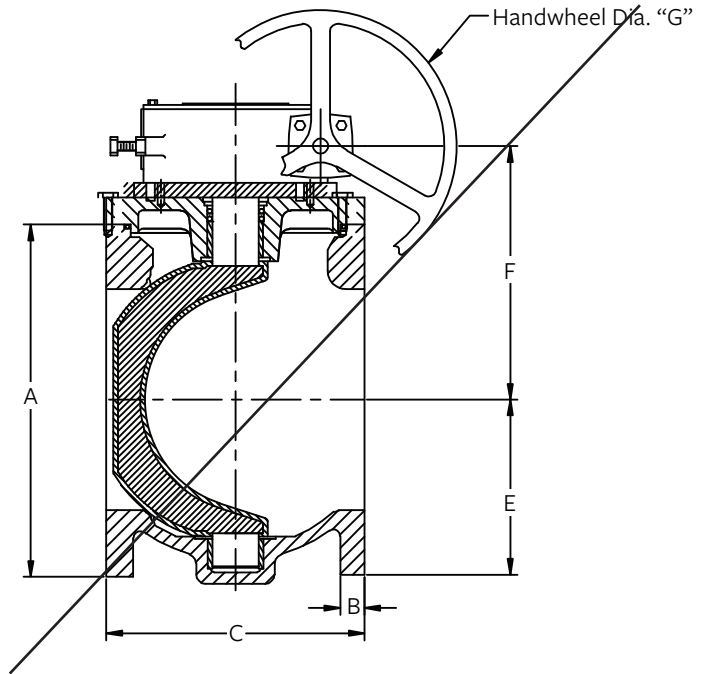
ITEM NO.	COMPONENT	MATERIAL
1	Body	Cast Iron A126 Class B
2	Plug	Rubber Coated Ductile Iron ASTM A536
3	Cap	Cast Iron A126 Class B
4	Torque Collar	Ductile Iron ASTM A536
5	Journal Bearing	Stainless Steel — ANSI 316
6	PTFE Washer (Grit Seal)	PTFE
7	O-Ring	Elas. as Spec.
8	U Cup Seal	Elas. as Spec.
9	Washer	Brass — ASTM B-138-675
10	Internal Snap Ring	Spring Steel
11	Setscrew	Steel (Zinc Plated)
12*	Closed Stop	Steel (Zinc Plated)
13*	Locking Washer	Steel
14*	Nut	Steel (Zinc Plated)
15*	Open Stop	Steel (Zinc Plated)
16*	Setscrew	Steel (Zinc Plated)
17*	Torque Bolt	Steel (Zinc Plated)
18*	Travel Stop	Steel
19*	Washer	Steel

*Note: Torque Collar Assembly on 8" and Smaller

FIG. 601 CAST IRON / 611 DUCTILE IRON – FLANGED END (175 PSI) / 621 DUCTILE IRON RAISED FACE (285 PSI) 2-1/2" – 12"



2-1/2" – 8" VALVES ONLY



2-1/2" – 12" VALVES

FLANGED END – ANSI 125

SIZE	2.50	3	4	5	6	8	10*	12*
A	7.00	7.50	9.00	10.00	11.00	13.50	16.00	19.00
B	0.69	0.75	0.94	0.94	1.00	1.13	1.19	1.25
C	7.50	8.00	9.00	10.00	10.50	11.50	13.00	14.00
D	6.19	6.19	7.25	8.38	8.38	10.69	—	—
E	3.50	3.75	4.50	5.75	5.75	7.63	8.88	10.00
F	5.35	5.35	6.31	7.56	7.56	9.63	11.13	12.81
G	6.00	6.00	6.00	6.00	6.00	12.00	12.00	12.00
WEIGHT (approx.)	30	40	70	105	115	190	345**	440**

*10" & above have gear operators as standard

**Weight includes gear operator

Note: Drawings are for information purposes only; please request certified drawings before preparing piping diagrams

STATION ACCESSORY DATA SHEET

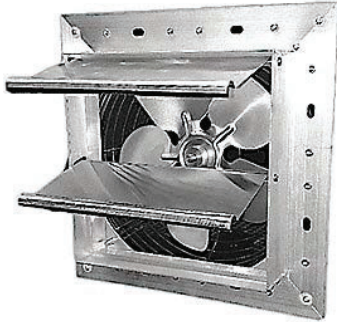
Exhaust Fan:

Number of Units: 1
Manufacturer: Dayton
Model: 484X36
Capacity: 254 cfm

Heater:

Number Of Units: 1
Manufacturer: King
Model: W1210
Capacity: 500 watts
Power: Volts - 120 Phase - 1

Dayton Shutter Mount Exhaust Fan, Blade 7" Dia.



- Item # 484X36
- Mfr. Model # 484X36

Technical Specs

- Item: Shutter Mount Exhaust Fan
- Blade Dia.: 7"
- Fan Voltage: 115 VAC
- 250 CFM @ 0.000-In. SP
- Exhaust/Supply Fan Motor HP: 1/25
- Square Opening Required: 8-1/2"
- Exhaust/Supply Fan Item: Exhaust Fan
- 110 CFM @ 0.250-In. SP
- Motor RPM: 1550
- Hz: 60
- Phase: 1
- Full Load Amps: 0.4
- Motor Type: PSC
- Motor Enclosure: Totally Enclosed Air-Over
- Motor Insulation: Class B
- Bearing Type: Ball
- Height: 11-1/8"
- Width: 11-1/8"
- Max. Depth: 8"
- Frame Material: Steel
- Frame Finish: Aluminum
- Blade Material: Aluminum
- Guard Material: Steel
- Wire Guard Finish: Powder Coated
- Speed Control Item Number: 48C172
- Number of Blades: 5
- Thermal Protection: Auto
- Standards: UL and C-UL Listed. OSHA-compliant gray polyester powder-coated wire guards
- Includes: Intake Guard

Wall Heater W Series


Model Code:

W	12	10	-T2
A	B	C	D
A: Series			
B: 12 - 120V 24 - 240V			
20 - 208V			
C: Watts (500 to 2000)			
D: Thermostat (optional)			



- Nichrome Open-Coil element
- C-Frame motor
- 4-Blade aluminum fan
- Patented Smart Limit Protection®
- 20 gauge powder-coated grill
- Standard color: white (Almond color optional)
- 20 gauge electro-galvanized steel recess can
- Wall can with QuickSet™ stud alignment tabs
- Dual wattage & available in 120, 208, 240 Volts
- 1-year limited warranty



The "W" Wall Heater

The W Heater was designed to be the highest quality economy heater on the market. It is commonly used in apartment construction or as supplemental heat in single family homes. By combining an efficient impeller style fan with a NiChrome heating element, the W heater delivers instant heat in even the draftiest locations. For use with a wall thermostat or in-built thermostat. A powder-coated, surface mounted wall-can may be purchased separately. The wall can shall be 20 gauge electro-galvanized steel and contain knockouts through which power leads are brought. The wall can shall be able to mount directly to wall studs in new or existing construction. The wall can shall be provided with QuickSet™ stud alignment tabs, used for maintaining proper depth during new installation. The wall can shall be supplied with a factory installed ground wire. Clearance: 6" to a side wall, 4" from floor minimum.

Ordering Information *Add suffix -W for White Grill or -A for Almond Grill

	BASE MODEL	VOLTS	WATTS	AMPS	SHIP WEIGHT lbs
120V	W1210	120	1000 or 500	8.3 or 4.2	8
	W1212	120	1200 or 600	5 or 2.5	8
	W1215	120	1500 or 750	12.5 or 6.3	8
208V	W2010	208	1000 or 500	4 or 2.4	8
	W2015	208	1500 or 750	7.2 or 3.6	8
	W2020	208	2000 or 1000	9.6 or 4.8	8
240V	W2410	240	1000 or 500	4.1 or 2.1	8
	W2412	240	1200 or 600	5 or 2.5	8
	W2415	240	1500 or 750	6.25 or 3.1	8
	W2420	240	2000 or 1000	8.3 or 4.2	8

Factory Installed Options

ADD SUFFIX	DESCRIPTION	SHIP WEIGHT lbs
-W	White Color	8
-A	Almond Color	8
H	Heatbox Interior Only (No Can or Grill)	6
-T	Factory Installed Single Pole Thermostat Kit	8
-T2	Factory Installed Double Pole Thermostat Kit	8
-DS15	Factory Installed Double Pole Disconnect (10A/ 240V / 15A/120V)	8

NOTE: Not all configurations listed above are stock items (A+ or A stock code). Refer to price book for the Stock code. For non-stock items refer to the table below to order heater parts separately.

Order A'la Carte Follow steps 1, 2 and 3 below to order a heater from separate parts.

STEP 1: Order Heatbox Interior

ADD SUFFIX	DESCRIPTION	SHIP WEIGHT lbs
-I	Heatbox Interior and Grill	6
-H	Heatbox Interior	6

Wall Heater W Series

STEP 2: Order Wall Can

MODEL	UPC	DESCRIPTION	SHIP WEIGHT lbs
UIC	12640	Recess Wall Can	3.5
UICF	12540	Recess Can with Flange (remodel)	4
WSC	19202	Surface Can - White 13.5" L x 10" W x 4"H	4
WSC-A	19203	Surface Can - Almond 13.5" L x 10" W x 4"H	4

STEP 3: Order Grill (not required for -I models)

MODEL	UPC	DESCRIPTION	SHIP WEIGHT lbs
WG-W	11914	Grill - White	4
WG-A	12785	Grill - Almond	4
WOG	19200	10" W x 17" H Retrofit Grill	3
WOG-A	18605	10" W x 17" H Retrofit Grill - Almond	3
WOG-XL-W	18606	14" W x 13.5" H Retrofit Grill - White	3

NOTE: This is the quickest option when the factory installed heaters options are not in stock.

Accessories

MODEL	UPC	DESCRIPTION	SHIP WEIGHT lbs
TKIT-1BW	20654	Built-in Single Pole Single Throw Thermostat Kit, Bright White	0.5
TKIT-2BW	20655	Built-in Double Pole Single Throw Thermostat Kit, Bright White	0.5
TKIT-1A	11058	Built-in Single Pole Single Throw Thermostat Kit, Almond	0.5
TKIT-2A	11059	Built-in Double Pole Single Throw Thermostat Kit, Almond	0.5

Engineering Specifications

Contractor shall supply and install W Series in-wall mounted forced-air electric heaters manufactured by King Electrical Mfg. Company.

Heaters shall be of the wattage and voltage as indicated on the plans.

Ratings: Wattages of 500 to 2,000 at 120, 208 or 240 Volts are available. Heaters shall provide air movement at 85 CFM.

Fan and Motor: Motor shall be shaded pole, permanently lubricated, C-frame type with impedance protection and sealed bearings. Motors shall be the same voltage as the heater. The motor and all wiring shall be totally isolated from the heating chamber for protection from heated air. The motor shall be equipped with a dynamically balanced four-blade aluminum impeller fan, located in the upper portion of the heat box, and shall provide a down-flow heating pattern.

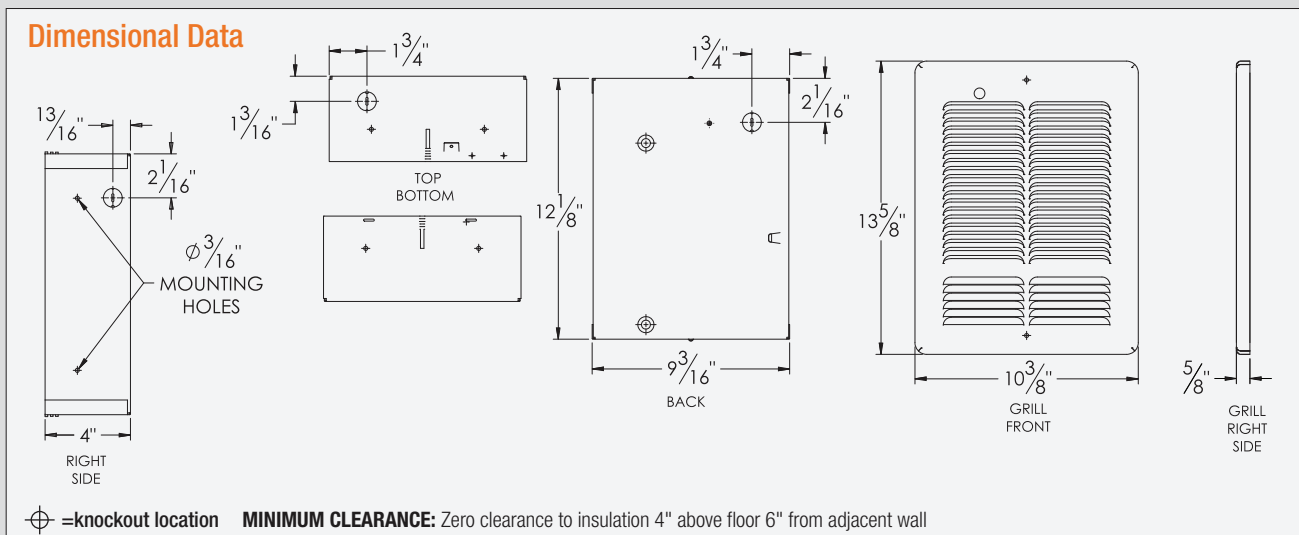
Elements: Assemblies shall be constructed of coiled Nickel Chromium alloy, corrosion-resistant wire strung through a minimum of four rows of mica insulator. Element assemblies shall have factory provided connection to allow field modification to 50% wattage at time of installation.

Smart Limit Thermal Protection: Turns off heater during any unsafe temperatures on inlet or outlet and will only reset if power is interrupted for 10 minutes. Simply turning thermostat down below set point will reset. Exclusive King design and patented for US and Canada under #6,748,163 B2 and #2,393,882

Wall Can with QuickSet™ stud alignment tabs: The wall can shall be 20 gauge electro-galvanized steel and contain knockouts through which power leads are brought. The wall can shall be able to mount directly to wall studs in new or existing construction. The wall can shall be provided with QuickSet™ stud alignment tabs, used for maintaining proper depth during new installation. The wall can shall be supplied with a factory installed ground wire. Clearance: 6" to a side wall, 4" from floor minimum.

Grill: The grill shall be a louvered, one-piece design with rounded edges on all four sides, with rounded corners to prevent snags from contact with other materials. The grill shall be epoxy powder-coated in the color specified by manufacturer.

Approvals: cULus (E41422)



USEMCO TopVault ELECTRICAL BILL OF MATERIALS

* 420419.0 - RESET BUTTON WEG CSW-BHF437	2
* 421370.04 - CONTACTOR ABB AF30-30-00-13 50 AMP MAX	2
421390.05K - BREAKER ABB 1P 5A SU201M-K5	1
421390.08K - BREAKER ABB 1P 8A SU201M-K8	1
421390.10K - BREAKER ABB 1P 10A SU201M-K10	1
421390.15K - BREAKER ABB 1P 15A SU201M-K15	1
421395.15 - BREAKER ABB 2P 15A SU202M-K15	1
421399 - BUSBAR ABB 2 PHASE 6 POLE PS2/6/16BP	1
421494.07 - BAR GROUND KIT SQD PK7GTA	1
422305.00 - RELAY PROBE MACROMATIC #SFP120B100	2
422309.94 - RELAY INT. SAFE MACROMATIC ISEUR1	2
422339.565 - RELAY 6A 24VDC IDEC DPDT #RV8H-2L-D24	3
422339.566 - RELAY 6A 120VAC IDEC DPDT #RV8H-2L-AD110	4
422352.222 - RELAY PH MNTR SYMCOM MODEL 460-14	1
422367.3 - BARRIER INT. SAFE PEPPERL+FUCHS #Z787	1
423370 - POWER SUPPLY IDEC 15W 24VDC #PS5R-VB24	1
* 423385.19 - ARRESTER SURGE 3PH SQD 480V D #SDSA4040D (3P3W)	1
423418 - BLOCK TERMINAL ABB-GRAY #1SNK506010R0000	13
423418.0 - BLOCK TERMINAL ABB-BLUE #1SNK506020R0000	16
423418.1 - BLOCK TERMINAL ABB-YELLOW #1SNK506060R0000	4
423418.4 - END SECTION COVER ABB SNK #1SNK505910R0000	3
423418.5 - END STOP ABB-GRAY SNK #1SNK900001R0000	6
423418.7 - JUMPER 2 POLE ABB SNK #1SNK906302R0000	2
423418.70 - JUMPER 3 POLE ABB SNK #1SNK906303R0000	1
* 423440.01 - BLOCK 1PL LINE #2 LOAD #10 MARATHON #1411400	1
423441.0 - BLOCK 3PL LINE #2/0 LOAD #4 MARATHON #1423570	1
423481.2 - SOCKET RD 11 PIN IDEC SR3P-06	2
424177.2 - CONTACT AUX ABB CA4-10 1 NORMALLY OPEN	2
425013.01 - TIMER DIVERSIFIED UNIVERSAL #175MU	2
426211.0001 - FUSE 600V FAST-ACTING 1 AMP	3
426522.1 - BLOCK FUSE ABB #E93/30CC	1
428905.2 - WIRE DUCT BASE 1" X 2"	2
428905.25 - WIRE DUCT BASE 1" X 3"	7.5
428908.2 - WIRE DUCT COVER 1"	9.5
429084.001 - LABEL CAUTION (YELLOW)	1
429084.003 - LABEL INFORMATION (WHITE)	1
429084.004 - LABEL INFORMATION (WHITE)	1
429084.005 - LABEL CAUTION (YELLOW)	1
429084.006 - LABEL UL ISR INFORMATION	1
429094.02 - DECAL USEMCO 2 7/16" X 7 1/8"	1
429096.1 - LABEL U.L. INDUSTRIAL PANEL UL-698A	1
429105 - DECAL USEMCO LIMITED WARRANTY 1 YEAR	1
429118.43 - LABELS "WARNING" BRADY B30-25-595-ANSIWA	2

432500.200 - PLC / HMI RENU FLEXIPANEL FP2043TN-E	1
432500.26 - PLC / HMI RENU COMBO IN/OUT FPEM-1210RP-A0201L	1
460491 - CNCTR 2-SCREW REGAL 6623 3/8"	3
460496 - CNCTR CORD GRIP T&B 2690 1/2"	1
462018.00 - COVER SS 2X4 P&S LEGRAND #SS7	1
462319 - RECEPT SGL 15A 125V A-H #5261 BROWN	1
462357 - RECEPT GFCI 15A 125V P&S 1597-I	1
462620.150 - ENCL SAGINAW SCE-30EL2410LPLG	1
463213.30 - ENCL BP SAGINAW SCE-30P24	1
463371.2 - ENCL PADLOCK WING KNOB LATCH #SCE-PLWKB	1
463442.51 - TEMP SWITCH DIGITAL DWYER TSS2-2100	1
463442.52 - PROBE DWYER TS-51	1
463502.1 - ENCL MTG KIT SAGINAW SCE-ELMFK4	1
469004 - LUG ALUM SOLDERLESS MAX. #2	3
470501.88 - SWITCH PB MOMENTARY BLACK ABB #CP1-10B-11	1
470620.88 - SWITCH SEL 3 POS ABB COMPACT #C3SS1-10B-20	2
480148.088 - LIGHT COMPACT ABB RED LED #CL2-513R	2
480148.188 - LIGHT COMPACT ABB GREEN LED #CL2-513G	2

* PARTS MARKED WITH AN * ARE ONLY FOR THREE PHASE PANELS.

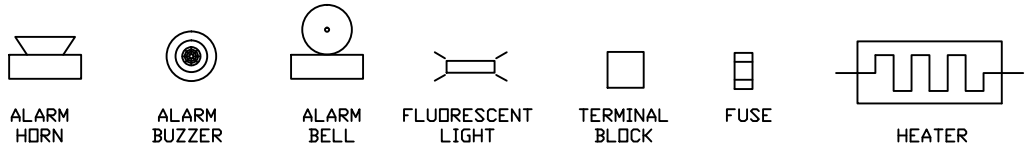
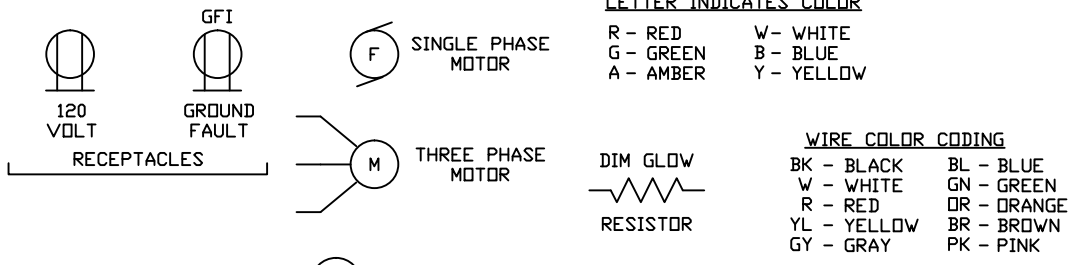
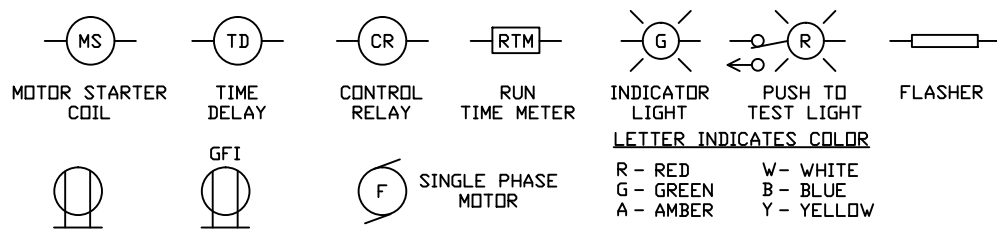
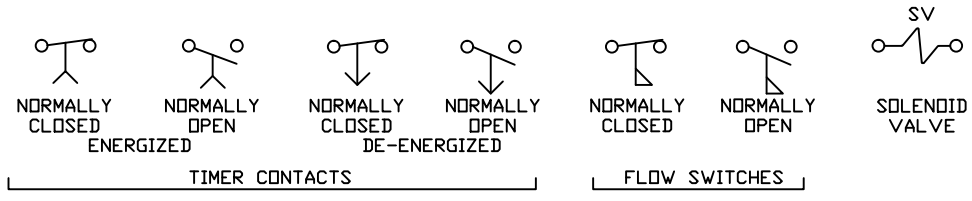
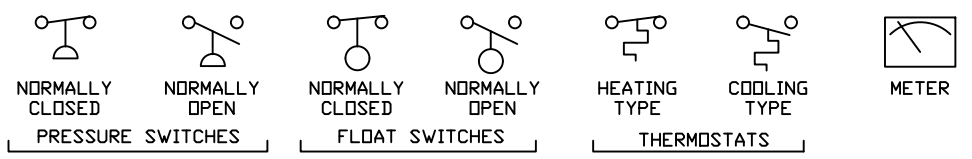
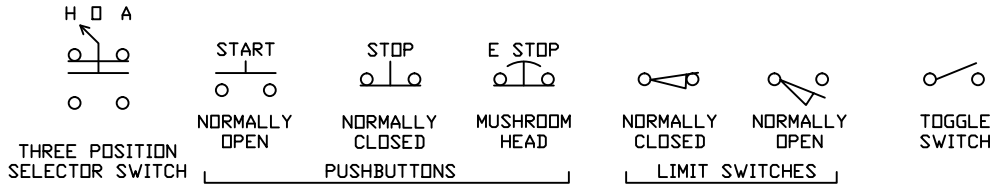
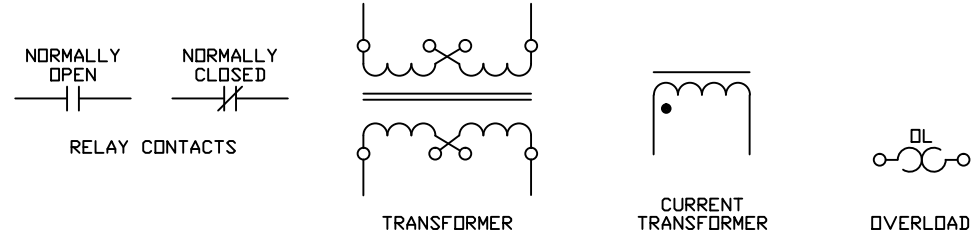
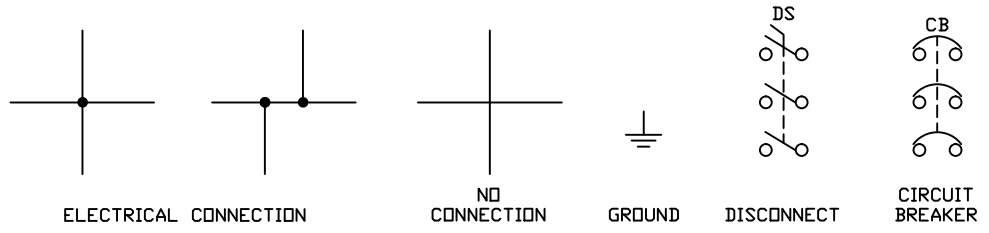
CIRCUIT BREAKERS, OVERLOADS, & CORD GRIPS
DEPEND ON PUMP MANUFACTURER, HORSEPOWER & VOLTAGE.

SEAL FAIL RELAYS MAY CHANGE DEPENDING ON PUMP MANUFACTURER.

OPTIONAL EQUIPMENT FOR 1 PHASE CONVERSION PANELS

420367.0100 - VFD 3HP 240V 10A MITSUBISHI #FR-D720S-100-NA	2
423384.2 ARRESTER SURGE 1PH SQD #SDSA1175	1

ELECTRIC CONTROL SYMBOLS



USEMCO U

USEMCO INCORPORATED

P.O. BOX 550 (608) 372-5911 TOMAH, WI 54660

SYMBOLS

SCE-30EL2410LPLG




Product Specifications:

Part Number: SCE-30EL2410LPLG
Description: EL Enclosure
Height: 30.00"
Width: 24.00"
Depth: 10.00"

Construction

- * 0.075 In. carbon steel.
- * Seams continuously welded and ground smooth.
- * Flange trough collar around all sides of door opening.
- * Pour in place oil & water resistant gasket
- * Collar studs 3/8-16 provided for mounting optional panels.
- * Concealed hinges.
- * Removable and interchangeable doors.
- * Black quarter turn latches.
- * Latches are opened or closed with a screwdriver.
- * Mounting holes in back of enclosure.
- * Mounting hardware, sealing washer and hole plug included.
- * Removable print pocket furnished if height and width of enclosure is greater than 12 inches.
- * Ground studs on door and body.

Optional Accessories

- 
- SCE-30P24 Subpanel, Bent
 - SCE-30P24GALV Subpanel, Bent Galvanized
 - SCE-BVK Breather Vent
 - SCE-DF30EL24LP Panel, Dead Front (Wall Mount)
 - SCE-DS24N4LG Shield, Drip
 - SCE-ELFM24W EL Flush Mount Frame
 - SCE-ELFM30H EL Flush Mount Frame
 - SCE-ELMFK4 Foot Kit, EL Mounting (4pc.)
 - SCE-ELSP3 KIT, Swing-Out Panel (20 High & Up)

Application

Designed to house electrical and electronic controls, instruments and components. Provides protection from dust, oil and water. For outdoor application a drip shield and drain vent is recommended.

For details about the design, performance expectations, applications and design suggestions - See Design Considerations
www.saginawcontrol.com/instman/considerations.pdf

Options

- Optional tamper-resistant inserts are available. - Optional mounting feet available. - Door hardware available. - Interchangeable latches and handles available in the accessory section.

Finish

RAL 7035 gray powder coating inside and out. Optional sub-panels are powder coated white.

Industry Standards - (IS4)

- * NEMA Type 3R, 4, 12 and Type 13
- * UL Listed Type 3R, 4 and 12
- * CSA Type 3R, 4 and 12
- * IEC 60529
- * IP 66

Notes

Provision for Lifting Lugs will be included on enclosures with Height >48" and with Depth >16". The Lifting Lug assembly will be included with the enclosure bolt pack.

Special Instructions apply for IS3, IS4 and IS6 to maintain the environmental rating of Type 3R for these parts. Instructions are located on the enclosure door. Drip shield is required on IS3, drip shield is recommended on IS4 and IS6. Drain holes are required on all.



Saginaw Control and Engineering
95 Midland Road Saginaw, MI 48638-5770
(800) 234-6871 - Fax: (989) 799-4524
SCE@SaginawControl.com

SCE-PLWKB

Product Specifications:



Part Number: SCE-PLWKB

Description: Padlocking Wingknob Door Latch (Black) - Bulk

Height: 13.00"

Width: 20.00"

Depth: 3.00"

Application

Designed to replace black quarter turn latches when additional security is required.

Industry Standards - (IS17)

- * NEMA Not Applicable
- * UL Not Applicable
- * CSA N/A

Installation Information

- * [Door Hardware Hole Layout](#)

SDSA 3-Phase SPDs Features

Superior Performance

Square D brand Surgelocic SDSA 3-Phase SPDs utilize high-energy suppression circuitry that can be located at any point in the electrical system. They have the flexibility to be used with or without an Overcurrent Protective Device (OCPD).

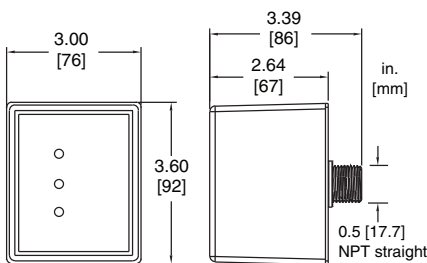
SDSA 3-Phase SPDs provide surge suppression for equipment from severe transient activity. Each metal oxide varistor (MOV) is individually fused and the products carry a NEMA Type 4X rating suitable for installing indoors, outdoors, or in other harsh environments.

Easy Installation

Surgelocic SDSA 3-Phase SPDs are some of the most versatile, yet compact devices available on the market today. This compact package can be mounted on an electrical panel, meter socket, or inside electrical control cabinets.

Warranty

The SDSA 3-Phase SPD warranty is 2 years.



SDSA 3-Phase SPDs



Performance

Surge Current Rating per Phase	40kA
Short Circuit Current Rating	200kA
Modes of Protection	6
Fusing	Individually fused MOVs
Thermal Fusing	Yes
Overcurrent Fusing	Yes
Operating Frequency	50/60 Hz

Mechanical Description

Enclosure	Non-Metallic
NEMA Rating	NEMA Type 4X
Connection Method	#12 AWG
Weight	1.63 lbs (0.738 kg)
Mounting Method	Close Nippled, Back Mounted
Operating Altitude	Sea Level-12,000' (3,658 m)
Storage Temperature	-31° F to +176° F (-35° C to +80° C)
Operating Temperature	-31° F to +176° F (-35° C to +80° C)
Operating Humidity	0 to 95% non-condensing

Diagnostics

Green status LED

Listings and Performance

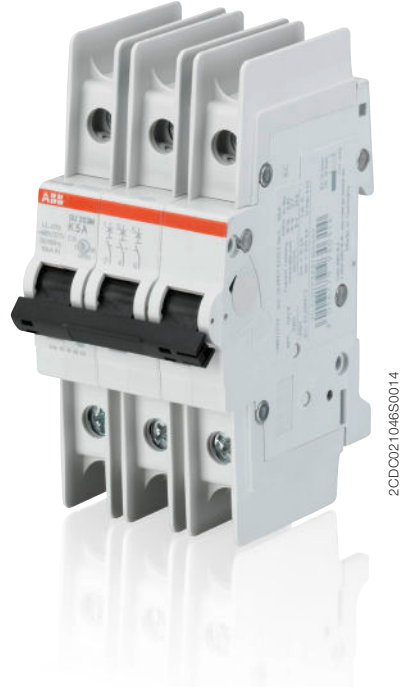
cULus Listed per UL 1449 4th Edition Type 1 SPD, CSA C22.2 No. 269.1-14

The SDSA2040, SDSA4040, and SDSA3650 is a four-wire surge suppressor designed for use on solidly grounded systems. The SDSA2040D, SDSA4040D, and SDSA3650D is a three-wire surge suppressor designed for delta applications.

Voltage	Surge Current per Phase	Modes of Protection	Configuration	Model Number	MCOV	SCCR	I _n	VPR			
								L-N	L-G	L-L	N-G
208Y/120V ¹	40kA	6	3 Ø, 4-wire	SDSA2040	180V L-N 360V L-L	200kA	10kA	700V	N/A	1200V	N/A
240V Delta ²	40kA	3	3 Ø, 3-wire	SDSA2040D	360V L-L	200kA	10kA	N/A	N/A	1200V	N/A
480Y/277V ³	40kA	6	3 Ø, 4-wire	SDSA4040	420V L-N 840V L-L	200kA	10kA	1500V	N/A	2500V	N/A
480V Delta	40kA	3	3 Ø, 3-wire	SDSA4040D	840V L-L	200kA	10kA	N/A	N/A	2500V	N/A
600Y/347V	40kA	6	3 Ø, 4-wire	SDSA3650	510V L-N 1020V L-L	200kA	10kA	1800V	N/A	3000V	N/A
600V Delta	40kA	3	3 Ø, 3-wire	SDSA3650D	1020V L-L	200kA	10kA	N/A	N/A	3000V	N/A

1 Applicable voltages: 220Y/127V, 208Y/120V
 2 Applicable voltages: 240V Delta, 240/120V High-Leg Delta
 3 Applicable voltages: 480Y/277V, 415Y/240V, 400Y/230V, 380Y/220V

System pro M compact® Miniature Circuit Breaker SU200 M for branch circuit protection acc. to UL 489



The miniature circuit breaker SU200 M is ABB's solution for UL 489 branch circuit protection up to 480 Y/277 V AC and 96 V DC. This circuit breaker is an all-round device for AC and DC applications for universal use in North American and global markets due to its approvals acc. to the international standards UL, CSA and IEC. Moreover, SU200 M is fully compatible with System pro M compact® UL 489 accessories.

Features

- High performance MCB with 10 kA interrupting capacity acc. to UL 489 / CSA 22.2 No. 5 and 15 kA breaking capacity acc. to IEC/EN 60947-2
- Certified up to $I_n = 40$ A at 480 Y/277 V AC acc. to UL 489 / CSA 22.2 No. 5
- Certified for AC and DC use acc. to UL and CSA
- 40 °C reference temperature acc. to UL and CSA
- Current limiting acc. to UL 489
- Clear contact position indication in red/green ("real CPI")

Standards and approvals

Standards

UL 489
CSA 22.2 No. 5
IEC/EN 60947-2

Approvals

UL 489	US
CSA 22.2 No. 5	CA
VDE	DE
CCC	CN

Miniature Circuit Breaker SU200 M

Technical data

General Data	
Standards	UL 489, CSA 22.2 No. 5, IEC/EN 60947-2
Poles	1P, 2P, 3P, 4P
Tripping characteristics	C, K, Z
Rated current I_n	0.2 - 63 A
Rated frequency f	50 / 60 Hz, DC (0 Hz)
Rated insulation voltage $U_{acc.}$ to IEC/EN 60664-1	250 V AC (phase to ground), 440 V AC (phase to phase)
Overvoltage category	III
Pollution degree	3
IEC/EN 60947-2	
Rated operational voltage U_n	1P: 230 V AC; 2P, 3P, 4P: 400 V AC
Max. power frequency recovery voltage U_{max}	AC 1P: 253 V AC; 2P, 3P, 4P: 440 V AC
Min. operating voltage	12 V AC, 12 V DC
Rated ultimate short-circuit breaking capacity I_{cu}	15 kA
Rated service short-circuit breaking capacity I_{cs}	≤ 40 A: 11.25 kA > 40 A: 7.5 kA
Rated impulse withstand voltage U_{imp} (1.2/50µs)	4 kV (test voltage 6.2 kV at sea level, 5 kV at 2,000 m)
Dielectric test voltage	2 kV (50 / 60Hz, 1 min.)
Reference temperature for tripping characteristics	30 °C
Electrical endurance	$I_n < 30$ A: 20,000 ops (AC), $I_n \geq 30$ A: 10,000 ops. (AC); 1 cycle (2 s - ON, 13 s - OFF, $I_n \leq 32$ A), 1 cycle (2 s - ON, 28 s - OFF, $I_n > 32$ A)
UL / CSA	
Rated voltage	AC 1P: 277 V AC up to 40 A for C, Z char., AC 277 V AC up to 35 A for K char., 240 V AC AC 2P, 3P, 4P: 480 Y / 277 V AC up to 40 A for C, Z char., AC 480 Y / 277 V AC up to 35 A for K char., 240 V AC DC 1P: 48 V DC; 2P: 96 V DC (2p in series)
Rated interrupting capacity acc. to UL 1077	-
Short-circuit current rating acc. to UL 489	10 kA
Application	-
Reference temperature for tripping characteristics	40 °C
Electrical endurance	6,000 ops (AC), 6,000 ops. (DC); 1 cycle (1 s - ON, 9 s - OFF)
Mechanical data	
Housing	Insulation group II, RAL 7035
Toggle	Insulation group II, black, sealable
Contact position indication	Real CPI (green OFF / red ON)
Protection degree acc. to DIN EN 60529	IP20*, IP40 in enclosure with cover
Mechanical endurance	20,000 ops.
Shock resistance acc. to IEC/EN 60068-2-27	25 g - 2 shocks - 13 ms
Vibration resistance acc. to IEC/EN 60068-2-6	5g - 20 cycles at 5...150...5 Hz with load 0.8 I_n
Environmental conditions (damp heat cyclic) acc. to IEC/EN 60068-2-30	28 cycles with 55°C/90-96% and 25°C/95-100%
Ambient temperature	-25 ... +55°C
Storage temperature	-40 ... +70 °C
Installation	
Terminal	Failsafe bi-directional cylinder-lift terminal
Cross-section of conductors (top/bottom)	solid, stranded: 35 mm ² / 35 mm ² flexible: 25 mm ² / 25 mm ² 18 - 4 AWG
Cross-section of busbars (top/bottom)	10 mm ² / 10 mm ² 18 - 8 AWG
Torque	2.8 Nm AWG 18-16: 13.3 in-lbs. AWG 14-10: 17.7 in-lbs. AWG 8-4: 39.8 in-lbs.
Screwdriver	No. 2 Pozidrive
Mounting	On DIN rail 35 mm acc. to EN 60715 by fast clip
Mounting position	any
Supply	optional
Dimensions and weight	
Mounting dimensions acc. to DIN 43880	Mounting dimension 3
Pole dimensions (H x D x W)	111 x 69 x 17.5 mm
Pole weight	approx. 125 g
Combination with auxiliary elements	
Auxiliary contact	Yes
Signal contact	Yes
Shunt trip	Yes

* Also fulfilling the requirements acc. to the protection degree IPXXB

Miniature Circuit Breaker SU200 M

Ordering data characteristic K



Number of poles	Rated current I_n A	Type	Order code	Weight per PCE kg	Packing unit PCE
1	0.2	SU201M-K0,2	2CDS271337R0087	0.125	10
	0.3	SU201M-K0,3	2CDS271337R0117	0.125	10
	0.5	SU201M-K0,5	2CDS271337R0157	0.125	10
	0.75	SU201M-K0,75	2CDS271337R0187	0.125	10
	1	SU201M-K1	2CDS271337R0217	0.125	10
	1.6	SU201M-K1,6	2CDS271337R0257	0.125	10
	2	SU201M-K2	2CDS271337R0277	0.125	10
	3	SU201M-K3	2CDS271337R0317	0.125	10
	4	SU201M-K4	2CDS271337R0337	0.125	10
	5	SU201M-K5	2CDS271337R0357	0.125	10
	6	SU201M-K6	2CDS271337R0377	0.125	10
	8	SU201M-K8	2CDS271337R0407	0.125	10
	10	SU201M-K10	2CDS271337R0427	0.125	10
	13	SU201M-K13	2CDS271337R0447	0.125	10
	15	SU201M-K15	2CDS271337R0457	0.125	10
	16	SU201M-K16	2CDS271337R0467	0.125	10
	20	SU201M-K20	2CDS271337R0487	0.125	10
	25	SU201M-K25	2CDS271337R0517	0.125	10
	30	SU201M-K30	2CDS271337R0527	0.125	10
	32	SU201M-K32	2CDS271337R0537	0.125	10
	35	SU201M-K35	2CDS271337R0547	0.125	10
	40	SU201M-K40	2CDS271337R0557	0.125	10
	50	SU201M-K50	2CDS271337R0577	0.125	10
60	SU201M-K60	2CDS271337R0587	0.125	10	
63	SU201M-K63	2CDS271337R0607	0.125	10	
2	0.2	SU202M-K0,2	2CDS272337R0087	0.250	5
	0.3	SU202M-K0,3	2CDS272337R0117	0.250	5
	0.5	SU202M-K0,5	2CDS272337R0157	0.250	5
	0.75	SU202M-K0,75	2CDS272337R0187	0.250	5
	1	SU202M-K1	2CDS272337R0217	0.250	5
	1.6	SU202M-K1,6	2CDS272337R0257	0.250	5
	2	SU202M-K2	2CDS272337R0277	0.250	5
	3	SU202M-K3	2CDS272337R0317	0.250	5
	4	SU202M-K4	2CDS272337R0337	0.250	5
	5	SU202M-K5	2CDS272337R0357	0.250	5
	6	SU202M-K6	2CDS272337R0377	0.250	5
	8	SU202M-K8	2CDS272337R0407	0.250	5
	10	SU202M-K10	2CDS272337R0427	0.250	5
	13	SU202M-K13	2CDS272337R0447	0.250	5
	15	SU202M-K15	2CDS272337R0457	0.250	5
	16	SU202M-K16	2CDS272337R0467	0.250	5
	20	SU202M-K20	2CDS272337R0487	0.250	5
	25	SU202M-K25	2CDS272337R0517	0.250	5
	30	SU202M-K30	2CDS272337R0527	0.250	5
	32	SU202M-K32	2CDS272337R0537	0.250	5
	35	SU202M-K35	2CDS272337R0547	0.250	5
	40	SU202M-K40	2CDS272337R0557	0.250	5
	50	SU202M-K50	2CDS272337R0577	0.250	5
60	SU202M-K60	2CDS272337R0587	0.250	5	
63	SU202M-K63	2CDS272337R0607	0.250	5	

Miniature Circuit Breaker SU200 M

Ordering data characteristic K



2CDC021046S0014



2CDC021047S0014

Number of poles	Rated current I_n A	Type	Order code	Weight per PCE kg	Packing unit PCE
3	0.2	SU203M-K0,2	2CDS273337R0087	0.375	3
	0.3	SU203M-K0,3	2CDS273337R0117	0.375	3
	0.5	SU203M-K0,5	2CDS273337R0157	0.375	3
	0.75	SU203M-K0,75	2CDS273337R0187	0.375	3
	1	SU203M-K1	2CDS273337R0217	0.375	3
	1.6	SU203M-K1,6	2CDS273337R0257	0.375	3
	2	SU203M-K2	2CDS273337R0277	0.375	3
	3	SU203M-K3	2CDS273337R0317	0.375	3
	4	SU203M-K4	2CDS273337R0337	0.375	3
	5	SU203M-K5	2CDS273337R0357	0.375	3
	6	SU203M-K6	2CDS273337R0377	0.375	3
	8	SU203M-K8	2CDS273337R0407	0.375	3
	10	SU203M-K10	2CDS273337R0427	0.375	3
	13	SU203M-K13	2CDS273337R0447	0.375	3
	15	SU203M-K15	2CDS273337R0457	0.375	3
	16	SU203M-K16	2CDS273337R0467	0.375	3
	20	SU203M-K20	2CDS273337R0487	0.375	3
	25	SU203M-K25	2CDS273337R0517	0.375	3
	30	SU203M-K30	2CDS273337R0527	0.375	3
	32	SU203M-K32	2CDS273337R0537	0.375	3
35	SU203M-K35	2CDS273337R0547	0.375	3	
40	SU203M-K40	2CDS273337R0557	0.375	3	
50	SU203M-K50	2CDS273337R0577	0.375	3	
60	SU203M-K60	2CDS273337R0587	0.375	3	
63	SU203M-K63	2CDS273337R0607	0.375	3	
4	0.2	SU204M-K0,2	2CDS274337R0087	0.500	2
	0.3	SU204M-K0,3	2CDS274337R0117	0.500	2
	0.5	SU204M-K0,5	2CDS274337R0157	0.500	2
	0.75	SU204M-K0,75	2CDS274337R0187	0.500	2
	1	SU204M-K1	2CDS274337R0217	0.500	2
	1.6	SU204M-K1,6	2CDS274337R0257	0.500	2
	2	SU204M-K2	2CDS274337R0277	0.500	2
	3	SU204M-K3	2CDS274337R0317	0.500	2
	4	SU204M-K4	2CDS274337R0337	0.500	2
	5	SU204M-K5	2CDS274337R0357	0.500	2
	6	SU204M-K6	2CDS274337R0377	0.500	2
	8	SU204M-K8	2CDS274337R0407	0.500	2
	10	SU204M-K10	2CDS274337R0427	0.500	2
	13	SU204M-K13	2CDS274337R0447	0.500	2
	15	SU204M-K15	2CDS274337R0457	0.500	2
	16	SU204M-K16	2CDS274337R0467	0.500	2
	20	SU204M-K20	2CDS274337R0487	0.500	2
	25	SU204M-K25	2CDS274337R0517	0.500	2
	30	SU204M-K30	2CDS274337R0527	0.500	2
	32	SU204M-K32	2CDS274337R0537	0.500	2
35	SU204M-K35	2CDS274337R0547	0.500	2	
40	SU204M-K40	2CDS274337R0557	0.500	2	
50	SU204M-K50	2CDS274337R0577	0.500	2	
60	SU204M-K60	2CDS274337R0587	0.500	2	
63	SU204M-K63	2CDS274337R0607	0.500	2	

AF09 ... AF38 3-pole Contactors

AC / DC Operated - with Screw Terminals

Catalogue Page 1SBC 101 060 S0201



Application

AF09 ... AF38 contactors are used for controlling power circuits up to 690 V AC and 220 V DC. They are mainly used for controlling 3-phase motors, non-inductive or slightly inductive loads.

Description

- **AF09 ... AF38** contactors include an electronic coil interface accepting a wide control voltage U_c min. ... U_c max. Only four coils cover control voltages between 24...500 V 50/60 Hz or 20...500 V DC
- **AF** contactors can manage large control voltage variations. One coil (e.g. 100...250 V 50/60 Hz - DC) can be used for different control voltages used worldwide without any coil change
- **AF.Z** contactors equipped with a Z coil type allow direct control by 24 V DC 500 mA PLC-output and obtain a reduced holding coil consumption.
- **AF.Z** contactors withstand short dips and voltage interruptions (SEMI F47-0706 compliance)
- **AF** contactors have built-in surge protection and do not require additional surge suppressors
- The built-in N.C. auxiliary contact is a mirror contact in compliance with annex F of IEC 60947-4-1.

Ordering Details

IEC Rated power 400 V AC-3 kW	UL/CSA 3-phase motor rating 480 V hp	Control voltage U_c min. ... U_c max.		Auxiliary contacts fitted	Type	Order code	Weight Pack ⁽ⁱⁿ⁾ 1 piece kg	
		V 50/60 Hz	V DC					
4	5	24...60	20...60	1 0	AF09Z-30-10-21	1SBL 136 001 R2110	0.310	
		24...60	20...60	0 1	AF09Z-30-01-21	1SBL 136 001 R2101	0.310	
		48...130	48...130	1 0	AF09-30-10-12	1SBL 137 001 R1210	0.270	
		48...130	48...130	0 1	AF09-30-01-12	1SBL 137 001 R1201	0.270	
		100...250	100...250	1 0	AF09-30-10-13	1SBL 137 001 R1310	0.270	
		100...250	100...250	0 1	AF09-30-01-13	1SBL 137 001 R1301	0.270	
		250...500	250...500	1 0	AF09-30-10-14	1SBL 137 001 R1410	0.310	
		250...500	250...500	0 1	AF09-30-01-14	1SBL 137 001 R1401	0.310	
	5.5	7.5	24...60	20...60	1 0	AF12Z-30-10-21	1SBL 156 001 R2110	0.310
			24...60	20...60	0 1	AF12Z-30-01-21	1SBL 156 001 R2101	0.310
			48...130	48...130	1 0	AF12-30-10-12	1SBL 157 001 R1210	0.270
			48...130	48...130	0 1	AF12-30-01-12	1SBL 157 001 R1201	0.270
			100...250	100...250	1 0	AF12-30-10-13	1SBL 157 001 R1310	0.270
			100...250	100...250	0 1	AF12-30-01-13	1SBL 157 001 R1301	0.270
250...500			250...500	1 0	AF12-30-10-14	1SBL 157 001 R1410	0.310	
250...500			250...500	0 1	AF12-30-01-14	1SBL 157 001 R1401	0.310	
7.5	10	24...60	20...60	1 0	AF16Z-30-10-21	1SBL 176 001 R2110	0.310	
		24...60	20...60	0 1	AF16Z-30-01-21	1SBL 176 001 R2101	0.310	
		48...130	48...130	1 0	AF16-30-10-12	1SBL 177 001 R1210	0.270	
		48...130	48...130	0 1	AF16-30-01-12	1SBL 177 001 R1201	0.270	
		100...250	100...250	1 0	AF16-30-10-13	1SBL 177 001 R1310	0.270	
		100...250	100...250	0 1	AF16-30-01-13	1SBL 177 001 R1301	0.270	
		250...500	250...500	1 0	AF16-30-10-14	1SBL 177 001 R1410	0.310	
		250...500	250...500	0 1	AF16-30-01-14	1SBL 177 001 R1401	0.310	
11	15	24...60	20...60	0 0	AF26Z-30-00-21	1SBL 236 001 R2100	0.350	
		48...130	48...130	0 0	AF26-30-00-12	1SBL 237 001 R1200	0.310	
		100...250	100...250	0 0	AF26-30-00-13	1SBL 237 001 R1300	0.310	
		250...500	250...500	0 0	AF26-30-00-14	1SBL 237 001 R1400	0.350	
15	20	24...60	20...60	0 0	AF30Z-30-00-21	1SBL 276 001 R2100	0.350	
		48...130	48...130	0 0	AF30-30-00-12	1SBL 277 001 R1200	0.310	
		100...250	100...250	0 0	AF30-30-00-13	1SBL 277 001 R1300	0.310	
		250...500	250...500	0 0	AF30-30-00-14	1SBL 277 001 R1400	0.350	
18.5	20	24...60	20...60	0 0	AF38Z-30-00-21	1SBL 296 001 R2100	0.350	
		48...130	48...130	0 0	AF38-30-00-12	1SBL 297 001 R1200	0.310	
		100...250	100...250	0 0	AF38-30-00-13	1SBL 297 001 R1300	0.310	
		250...500	250...500	0 0	AF38-30-00-14	1SBL 297 001 R1400	0.350	

Thermal overload relay TF42



Thermal overload relays are economic electromechanical protection devices for the main circuit. They are used mainly to protect motors against overload and phase failures. Starter combinations are setup together with contactors.











1SBC101247F0010

Description

- Overload protection – trip class 10
- Phase loss sensitivity
- Temperature compensation from -25 ... +60 °C
- Adjustable current setting for overload protection
- Automatic or manual reset selectable
- Suitable for three- and single-phase application
- Trip-free mechanism
- Status indication
- STOP and TEST function
- Direct mounting onto block contactors
- Sealable operating elements

Approvals

-  cULus UL 508
-  CB scheme
-  CCC
-  GOST-R
-  ABS
-  RINA
-  DNV
-  Lloyd's Register

Marks

CE CE

Order data

TF42 screw terminal
For AF contactors



Setting range	Type	Order code	Packing unit	Weight per PCE
A			PCE	kg
0.10 ... 0.13	TF42-0.13	1SAZ721201R1005	1	0.130
0.13 ... 0.17	TF42-0.17	1SAZ721201R1008	1	0.130
0.17 ... 0.23	TF42-0.23	1SAZ721201R1009	1	0.130
0.23 ... 0.31	TF42-0.31	1SAZ721201R1013	1	0.130
0.31 ... 0.41	TF42-0.41	1SAZ721201R1014	1	0.130
0.41 ... 0.55	TF42-0.55	1SAZ721201R1017	1	0.130
0.55 ... 0.74	TF42-0.74	1SAZ721201R1021	1	0.130
0.74 ... 1.00	TF42-1.0	1SAZ721201R1023	1	0.130
1.00 ... 1.30	TF42-1.3	1SAZ721201R1025	1	0.130
1.30 ... 1.70	TF42-1.7	1SAZ721201R1028	1	0.130
1.70 ... 2.30	TF42-2.3	1SAZ721201R1031	1	0.130
2.30 ... 3.10	TF42-3.1	1SAZ721201R1033	1	0.130
3.10 ... 4.20	TF42-4.2	1SAZ721201R1035	1	0.130
4.20 ... 5.70	TF42-5.7	1SAZ721201R1038	1	0.130
5.70 ... 7.60	TF42-7.6	1SAZ721201R1040	1	0.130
7.60 ... 10.0	TF42-10	1SAZ721201R1043	1	0.130
10.0 ... 13.0	TF42-13	1SAZ721201R1045	1	0.130
13.0 ... 16.0	TF42-16	1SAZ721201R1047	1	0.130
16.0 ... 20.0	TF42-20	1SAZ721201R1049	1	0.145
20.0 ... 24.0	TF42-24	1SAZ721201R1051	1	0.145
24.0 ... 29.0	TF42-29	1SAZ721201R1052	1	0.145
29.0 ... 35.0	TF42-35	1SAZ721201R1053	1	0.145
35.0 ... 38.0/40.0	TF42-38	1SAZ721201R1055	1	0.145

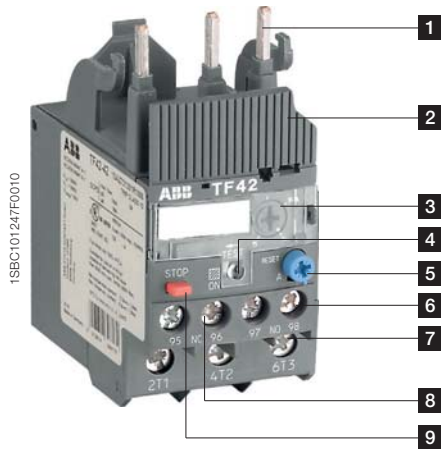
Suitable for mounting on:

AF09 ... AF16
AF26 ... AF38

Power and productivity
for a better world™



Functional description



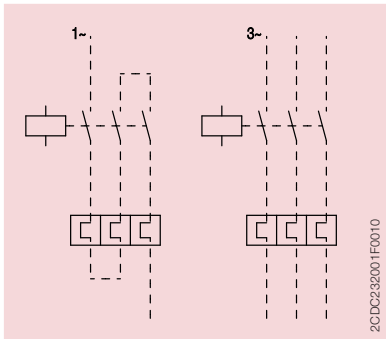
- 1** Terminals (1L1, 3L2, 5L3)
- 2** Sealable operating elements
- 3** Current setting range
Adjustable current setting for overload protection
- 4** Status indication
- 5** RESET button
Automatic or manual reset selectable
- 6** Signaling contacts 97-98
- 7** Terminals 2T1, 4T2, 6T3
- 8** Tripping contacts 95-96
- 9** STOP button

Application / internal function

The thermal overload relays are three pole relays with bimetal tripping elements (1 per pole). The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements become bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98). The contact 95-96 is used to control the load contactor.

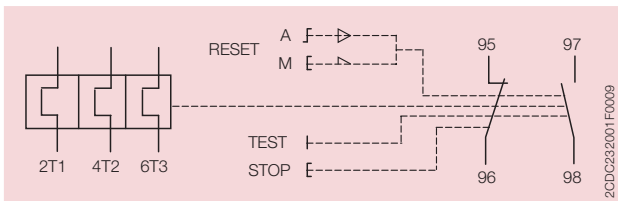
The overload relays have a setting scale in Amperes, which allows the direct adjusting of the relay without any additional calculation. In compliance with international and national standards, the setting current is the rated current of the motor and not the tripping current (no tripping at $1.05 \times I$, tripping at $1.2 \times I$; I = setting current). The relays are constructed in way that they protect themselves in the event of an overload. The overload relay has to be protected against short-circuit. The appropriate short-circuit protection devices are shown in the table.

Operation mode



	Contact 95-96	Contact 97-98	Status indication	Comment
Trip state	open	closed		
RESET state	closed	open	ON	
TEST manual reset mode	open	closed		
TEST auto reset mode	open	closed		while TEST is operated
STOP while device is in trip state	open	closed		STOP button has no function
STOP while device is in RESET state	open	open		while STOP button is pressed

Wiring diagram



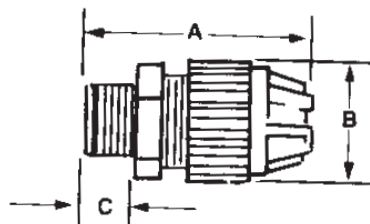
Flexible Cords and Cable Fittings — Non-Metallic

Rugged, weather-stabilized nylon construction!

Non-Metallic Liquidtight Strain Relief Connector — Straight



T&B Fittings



- UL 94-V2 flammability rated
- Temperature rating: -34° C to +105° C
- Meets Coast Guard CG293

CAT. NO.	TRADE OR HUB SIZE	THROAT DIAM. (IN.)	CORD RANGE (IN.)	DIMENSIONS (IN.)		
				A	B	C
2671	3/8"	0.33	.125-.275	2.0	.90	.46
2690	1/2"	0.33	.125-.275	2.3	.90	.60
2672	1/2"	0.55	.250-.400	2.6	1.27	.60
2673*	1/2"	0.55	.400-.560	2.6	1.27	.60
2691*	1/2"	0.54	.560-.690	3.0	1.57	.60
2692*	1/2"	0.54	.660-.780	3.0	1.57	.60
2693	3/4"	0.55	.250-.400	2.7	1.27	.62
2694*	3/4"	0.55	.400-.560	2.7	1.27	.62
2674	3/4"	0.79	.560-.690	3.0	1.57	.62
2675	3/4"	0.79	.660-.780	3.0	1.57	.62
2696*	3/4"	0.76	.770-.895	3.2	1.89	.62
2676	1"	0.98	.660-.780	3.3	1.89	.77
2677	1"	0.98	.770-.895	3.3	1.89	.77
2678*	1"	0.98	.870-1.020	3.3	1.89	.77
2699	1"	0.98	.890-1.090	4.2	2.58	.77
2702	1 1/4"	1.25	.890-1.090	4.2	2.58	.80
2703	1 1/4"	1.25	1.080-1.280	4.0	2.58	.80
2704	1 1/4"	1.25	1.270-1.470	4.0	2.58	.80
2705-TB	1 1/2"	1.47	.890-1.150	4.2	2.95	.82
2706	1 1/2"	1.47	1.140-1.400	4.3	2.95	.82
2707	1 1/2"	1.47	1.390-1.650	4.3	2.95	.82
2708	2"	1.89	1.190-1.530	5.1	3.50	.84
2709	2"	1.89	1.520-1.860	4.9	3.50	.84
2710*	2"	1.89	1.850-2.190	4.9	3.50	.84

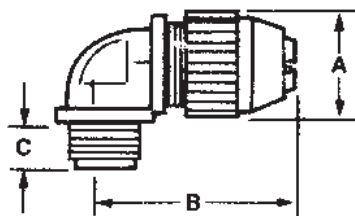
*Remove sufficient outer covering of cable to permit conductors to pass thru connector body.

UL File No. E 13938
CSA File No. 52391

All items shown on this page are suitable for use in hazardous location where general purpose equipment is specifically permitted by the NEC. Class I, Div. 2. Class II, Div. 1 & 2. Class III, Div. 1 & 2. NEC 501-4(b), 502-4(a)(b), 503-3(a)(b).

90° angle with a standard-size body!

Non-Metallic Liquidtight Strain Relief Connector — 90° Elbow



- Weather-stabilized nylon construction
- UL 94-V2 flammability rated
- Temperature rating: -34° C to +105° C
- Meets Coast Guard CG293

CAT. NO.	TRADE OR HUB SIZE	THROAT DIAM. (IN.)	CORD RANGE (IN.)	DIMENSIONS (IN.)		
				A	B	C
2680	3/8"	.33	.125-.275	2 3/2	1 1/4	.460
2681	1/2"	.55	.250-.400	—	—	—
2682*	1/2"	.55	.400-.560	—	—	—
2683	3/4"	.78	.560-.690	—	—	—
2684	3/4"	.78	.660-.780	—	—	—
2688	1"	.98	.560-.690	1 7/2	3/4	.770
2685	1"	.98	.660-.780	1 7/2	3/4	.770
2686	1"	.98	.770-.895	1 7/2	3 1/8	.770
2687*	1"	.98	.870-1.020	1 7/2	3	.770

*Remove sufficient outer covering of cable to permit conductors to pass thru connector body. 90° angle, standard size body.

UL File No. E 13938
CSA File No. 52391

All items shown on this page are suitable for use in hazardous locations where general purpose equipment is specifically permitted by the NEC. Class I, Div. 2. Class II, Div. 1 & 2. Class III, Div. 1 & 2. NEC 501-4(b), 502-4(a)(b), 503-3(a)(b).

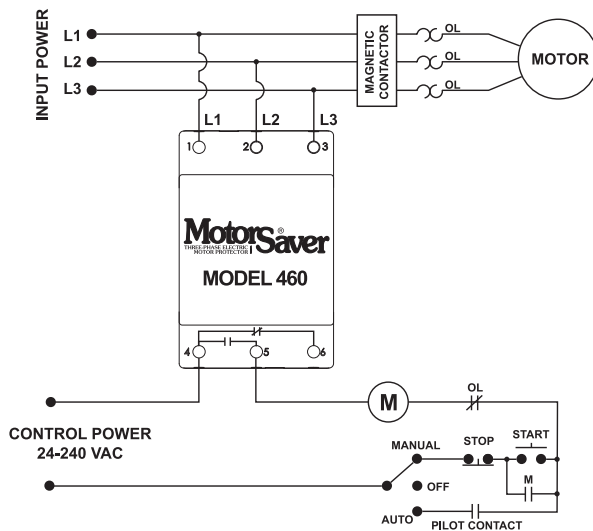
460 SERIES

3-Phase Voltage Monitor



Wiring Diagram

TYPICAL WIRING DIAGRAM FOR MODEL 460 WITH MOTOR CONTROL



Description

The 460 is a 3-phase voltage monitor that protects 190-480VAC or 475-600V, 50/60Hz motors regardless of size. The product provides a user selectable nominal voltage setpoint and the voltage monitor automatically senses line voltage.

This unique microcontroller-based voltage and phase-sensing device constantly monitors the 3-phase voltages to detect harmful power line conditions such as low, high, and unbalanced voltage, loss of any phase, and phase reversal. When a harmful condition is detected, the MotorSaver[®] output relay is deactivated after a specified trip delay. The output relay reactivates after power line conditions return to an acceptable level for a specified amount of time (restart delay). The trip and restart delays prevent nuisance tripping due to rapidly fluctuating power line conditions.

All 460 models feature adjustable 1-30 second trip delay, 1-500 second restart delay, 2-8% voltage unbalance trip point, and one form C contact except where noted below.

Features & Benefits

FEATURES	BENEFITS
Auto-sensing wide voltage range	Automatically senses system voltage between 190 - 480VAC or 475-600VAC. Saves set-up time
Adjustable trip & restart delay settings	Prevent nuisance tripping due to rapidly fluctuating power line conditions
Microcontroller based circuitry	Improved accuracy and higher reliability
Advanced LED diagnostics	Quick visual indicator for cause of trip and relay status
Adjustable voltage unbalance trip setting	Provides reliable protection when regenerative voltage is present

Ordering Information

MODEL	VOLTAGE	DESCRIPTION
460	190-480VAC	Automatically senses line voltage, adjustable 1-30 second trip delay, 1-500 second restart delay, and 2-8% voltage unbalance trip point
460-L	190-480VAC	Fixed 4 second trip delay and 1 second for single-phase faults, and fixed 6% voltage unbalance trip point
460-14	190-480VAC	Equipped with 2 sets of contacts: Form A (NO) and Form B (NC). Used for applications requiring 2 different voltages such as 5VDC for a PLC input and 115VAC for an alarm
460-575	475-600VAC	Commonly used in Eastern Canada and on generator units that generate 600 VAC power
460-575-14	475-600VAC	Commonly used in Eastern Canada and on generator units that generate 600 VAC power. Equipped with 2 sets of contacts: Form A and Form B
460-15	190-480VAC	Equipped with 2 sets of Form A (NO) contacts. Used on applications where two different units are to be controlled at once such as a unit that has separate contacts for a compressor and a fan
460-MR	190-480VAC	Equipped with a 2-prong connection for a normally open push button mounted outside the panel. Used in applications requiring an external manual reset button
460-VBM	190-480VAC	Fixed 6% voltage unbalance trip point. User adjustable low and high voltage trip points
460-400HZ	190-480VAC	For use with 400Hz power supply
460-OEM	190-480VAC	Bulk package of 460, 20 units
460L-OEM	190-480VAC	Bulk package of 460-L, 20 units

460 SERIES

Specifications

Frequency	50/60Hz
Low Voltage (% of setpoint)	
Trip	90% ±1%
Reset	93% ±1%
High Voltage (% of setpoint)	
Trip	110% ±1%
Reset	107% ±1%
Voltage Unbalance (NEMA)	
Trip	2-8% adjustable
Reset	Trip setting minus 1% (5-8%) Trip setting minus 0.5% (2-4%)
460L	6% UB fixed (4.5% reset)
Trip Delay Time	
Low, High and Unbalanced Voltage	1-30 seconds adjustable
460L	4 seconds fixed
Single-Phase Faults (>15% UB)	1 second fixed
Restart Delay Time	
After a Fault	1-500 seconds adjustable
After a Complete Power Loss	1-500 seconds adjustable
Output Contact Rating	
Form C	
Pilot Duty	480VA @ 240VAC, B300
General Purpose	10A @ 240VAC
Form A & Form B	
Pilot Duty	360VA @ 240VAC, B300
General Purpose	8A @ 240VAC

Ambient Temperature Range

Operating	-20° to 70°C (-4° to 158°F)
Storage	-40° to 80°C (-40° to 176°F)
Maximum Input Power	6 W
Class of Protection	IP20, NEMA 1 (finger safe)
Relative Humidity	10-95%, non-condensing per IEC 68-2-3
Terminal Torque	4.5 in.-lbs.
Wire Type	Stranded or solid 12-20 AWG, one per terminal
Standards Passed	
Electrostatic Discharge (ESD)	IEC 61000-4-2, Level 3, 6kV contact, 8kV air
RFI, Radiated	150 MHz, 10V/m
Fast Transient Burst	IEC 61000-4-4, Level 3, 3.5kV input power and controls

Surge

IEC	IEC 61000-4-5, Level 3, 4kV line-to-line; Level 4, 4kV line-to-ground
ANSI/IEEE	C62.41 Surge and Ring Wave Compliance to a level of 6kV line-to-line
Hi-potential Test	Meets UL508 (2 x rated V +1000V for 1 minute)

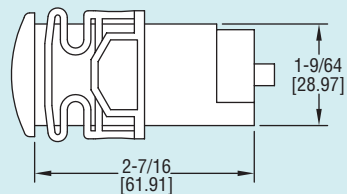
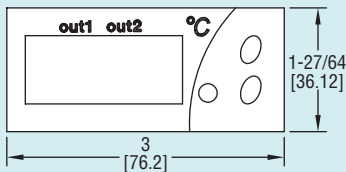
Safety Marks

UL	UL508 (File #E68520)
CE	IEC 60947-6-2
Enclosure	Polycarbonate
Dimensions	H 88.9 mm (3.5"); W 52.9 mm (2.08"); D 59.69 mm (2.35")
Weight	0.7 lb. (11.2 oz., 317.51 g)
Mounting Method	35 mm DIN rail or Surface Mount (#6 or #8 screws)
460-MR (manual reset)	External NO pushbutton required.

Series
TSS2

Dual Stage Temperature Switch

Two Independent Relay Outputs, Heating or Cooling Control



Panel Cutout 2-51/64 x 1-9/64 (71 x 29)

Regulate temperatures for heating or cooling control with the Series TSS2 Dual Stage Temperature Switch. The Series TSS2 is designed to accept two inputs with independent relays output for dual stage temperature control.

The Series TSS2 offers 34 programmable parameters to customize control functions. Access to all parameters, except setpoint, can be secured with a password code.

Model	Voltage Supply	Unit
TSS2-2100	115 VAC	°F
TSS2-2110	115 VAC	°C
TSS2-2210	230 VAC	°C
TSS2-2300	12 VAC/DC	°F
TSS2-2400	24 VAC/DC	°F

SPECIFICATIONS

Probe Range: -58 to 302°F (-50 to 150°C).

Input: PTC thermistor (1000Ω @ 25°C).

Outputs: One 16A SPDT relay @ 250 VAC, resistive; One 8A SPDT relay @ 250 VAC resistive.

Horsepower Rating (HP): 1 HP.

Power Requirements: 12 VAC/DC, 24 VAC/DC, 115 VAC, 230 VAC depending on model.

Accuracy: 1% of full-scale.

Display: 3-digit and sign, red LED.

Resolution: 0.1° (< 100°); 1° (≥ 100°).

Memory Backup: Nonvolatile memory.

Temperature Limit: Ambient: 32 to 158°F (0 to 70°C).

Storage Temperature: -4 to 176°F (-20 to 80°C).

Dimensions: 3 x 1-27/64 x 2-7/16 in.

Front Panel Rating: IP64.

Weight: 2.3 oz (65 g).

Agency Approvals: CE, cUR, UR.

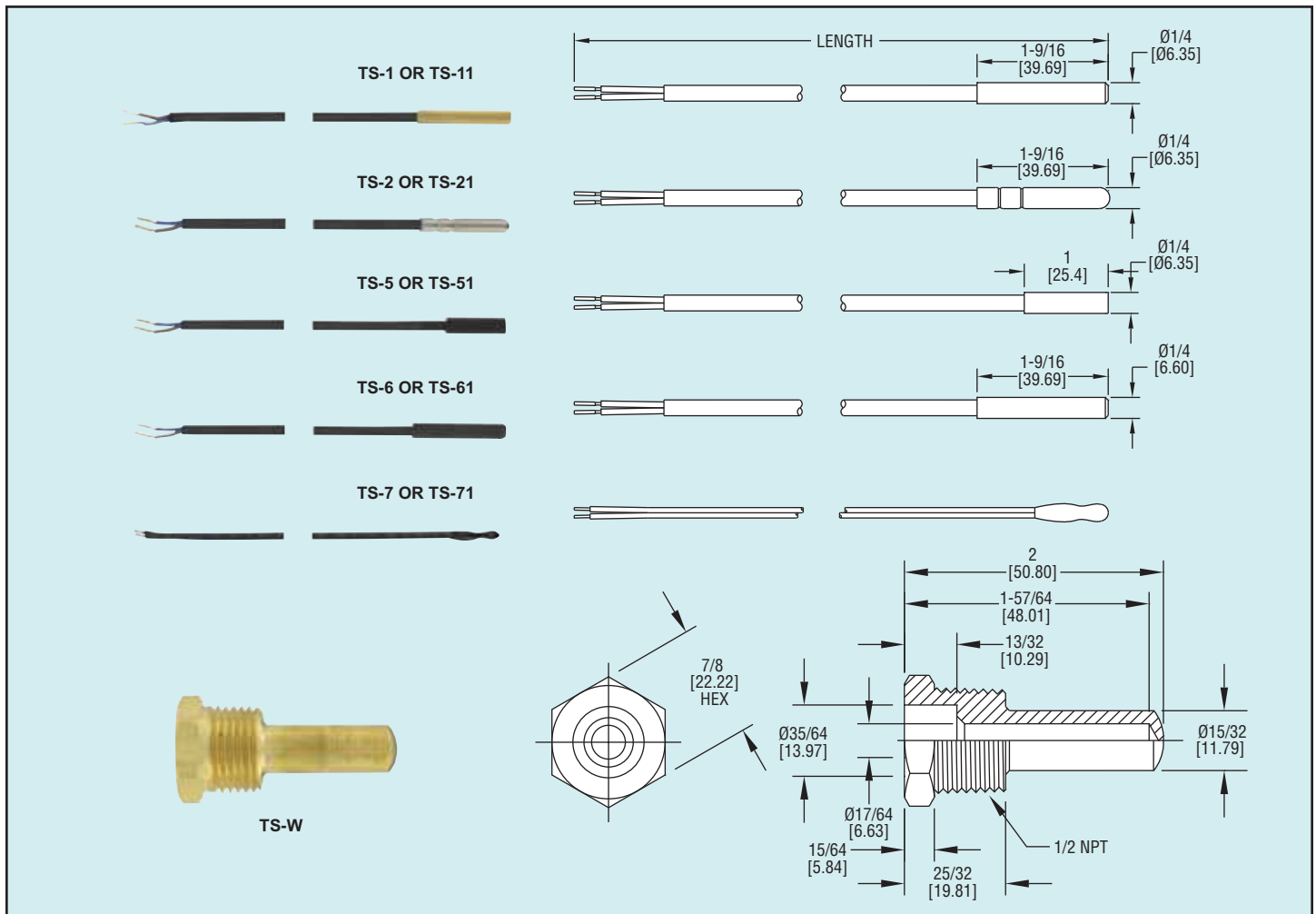
ACCESSORIES

See Series TS probes



Digital Temperature Switch Probes

Probes to Be Used with TS, TS2, TSX, TSS2, and TSWB



Model	Sensor	Cap Material	Length ft (m)
TS-1	PTC	Brass	5 (1.5)
TS-11	PTC	Brass	10 (3)
TS-2	PTC	Stainless Steel	5 (1.5)
TS-21	PTC	Stainless Steel	10 (3)
TS-5	PTC	PVC	5 (1.5)
TS-51	PTC	PVC	10 (3)
TS-6	PTC	Polyamide Resin Coated Brass	5 (1.5)
TS-61	PTC	Polyamide Resin Coated Brass	10 (3)
TS-7	NTC	None	5 (1.5)
TS-71	NTC	None	10 (3)

SPECIFICATIONS

Sensor: PTC or NTC (depending on model).

Operating Temperature:

TS-1, TS-2, TS-6: -58 to 302°F (-50 to 150°C);
TS-5, TS-7: -58 to 221°F (-50 to 105°C).

Accuracy: ±2°C at 25°C.

Response Time: 15 seconds (in air).

Cable: PVC or silicone (depending on model).

Protection: IP67.

ACCESSORIES

TS-W, Brass Thermowell (for use with TS-1, TS-11, TS-2, TS-21)

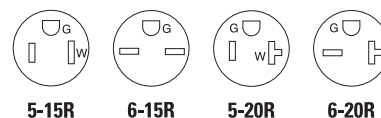
TS2-K, Configuration Key

Premium industrial grade straight blade receptacles

Project Name:	Prepared By:
Project Number:	Date:
Catalog Number:	Type:

Description

2-Pole, 3-Wire Grounding
 15A 125V; 15A 250V
 20A 125V; 20A 250V
 NEMA 5-15, 5-20, 6-15, 6-20



AH5262



AH5362



5461

Design features

- Exclusive screw terminal guards provide fast, easy insulation from conductive surfaces (duplex only)
- Exclusive five-leaf solid brass line contacts provides consistent performance and superior plug retention (duplex only)
- Rigid, glass reinforced nylon base lends ultimate strength and superior high heat resistance in contact carrier (duplex only)
- 0.05" (1.27mm) solid brass mounting strap with non-riveted, integral one-piece grounding system for highest durability – assures superior ground integrity under heaviest use (duplex only)
- High impact and chemical-resistant nylon face
- Tapered lead-in slots on back wiring holes assist in gathering stranded wires for faster, more secure connections
- All terminal and mounting screws triple combination (slot/Phillips/Robertson) head for maximum installer flexibility
- Long, broad mounting strap helps reach large panel cutouts for code compliance
- Automatic grounding system eliminates need for bonding jumper in grounded metal enclosure, provides redundant measure of ground continuity where jumper used
- Screw-Catch feature on duplex devices speeds mounting of wallplates

Table 1. Premium Industrial Grade Duplex Receptacles, Back & Side Wire

Catalog No.	Description	Amps	Volts	Color Suffix
<input type="checkbox"/> AH5262__	NEMA 5-15R Premium Duplex Receptacle, Back & Side Wire	15	125	B, BK, GY, RD, V, W
<input type="checkbox"/> 5261__	NEMA 5-15R Premium Single Receptacle, Back & Side Wire	15	125	B, GY, RD, V, W
<input type="checkbox"/> AH5362__	NEMA 5-20R Premium Duplex Receptacle, Back & Side Wire	20	125	B, BK, GY, LA, RD, V, W
<input type="checkbox"/> 5361__	NEMA 5-20R Premium Single Receptacle, Back & Side Wire	20	125	B, BK, GY, RD, V, W
<input type="checkbox"/> AH5662__	NEMA 6-15R Premium Duplex Receptacle, Back & Side Wire	15	250	B, V, W
<input type="checkbox"/> 5661__	NEMA 6-15R Premium Single Receptacle, Back & Side Wire	15	250	B, V, W
<input type="checkbox"/> AH5462__	NEMA 6-20R Premium Duplex Receptacle, Back & Side Wire	20	250	B, GY, V, W
<input type="checkbox"/> 5461__	NEMA 6-20R Premium Single Receptacle, Back & Side Wire	20	250	B, GY, V, W



Powering Business Worldwide

Compliances, specifications and availability are subject to change without notice.

Project Name:	Prepared By:
Project Number:	Date:
Catalog Number:	Type:

Applications

Industrial grade receptacles are challenged on a daily basis to provide consistent, reliable means of connectivity in a wide variety of environments and need to stand up to a high degree of abuse. The applications vary greatly by environment and provide challenges from impact and chemical resistance to environmental extremes such as heat and moisture. The breadth of Arrow Hart line of premium industrial grade straight blade receptacles provides solutions to all environments and applications. High impact and chemical resistant nylon faces withstand abuse to maintain structural integrity. The durable contact designs provide long life blade retention. When the job calls for receptacles that can stand up to the test of an industrial environment, turn to Arrow Hart's line of premium industrial grade receptacles.

Table 2. Specifications

Catalog No.	AH5262, AH5362, AH5462, AH5662 Series	5261, 5361, 5461, 5661 Series
Device Type	Industrial Grade Premium Duplex Receptacles	Industrial Grade Premium Single Receptacles
Wiring Type	Back & side wire	Back & side wire
Testing & Code Compliance	<ul style="list-style-type: none"> • cULus Listed to UL 498, file no. E15058 • UL verified to Federal Spec. WC-596G • CSA certified to C22.2, no. 42 • NOM certified 	<ul style="list-style-type: none"> • Listed to UL 498, file no. E15058 • UL verified to Federal Spec. WC-596G • CSA certified to C22.2, no. 42, file no. 6914 (6233-01) • NOM certified
Environmental Specifications	Flammability: Meets UL 94 requirements; V2 rated Temperature Rating: -20°C to 70°C (-4°F to 158°F)	Flammability: Meets UL 94 requirements; V2 rated Temperature Rating: -20°C to 60°C (-4°F to 140°F)
Electrical Specifications	Dielectric Voltage: Withstands 2000V per UL 498 Current Interrupting: Yes, at full-rated current Temperature Rise: Max. 30°C (86°F) after 250 cycles of overload @ 200% of rated current (DC)	Dielectric Voltage: Withstands 2000V per UL 498 Current Interrupting: Yes, at full-rated current Temperature Rise: Max. 30°C (86°F) after 250 cycles of overload @ 200% of rated current (DC)
Mechanical Specifications	Terminal Accommodation: #14 - 10 AWG Voltage Ratings: Permanently marked on device	Terminal Accommodation: #14 - 10 AWG Voltage Ratings: Permanently marked on device

Table 3. Materials

Catalog No.	AH5262, AH5362, AH5462, AH5662 Series	5261, 5361, 5461, 5661 Series
Face	Nylon	Nylon
Base	Glass-filled nylon	Nylon
Strap	0.05" thick brass	0.05" thick steel, zinc plated
Auto Ground	Brass clip	Phosphor bronze staple
Line Contacts	0.031" thick 5-leaf 688 grade high-performance brass	0.037" thick 3-leaf brass
Ground Contact	Integral	Riveted
Terminal Screws	#8-32 brass, neutral screw nickel plated	#8-32 brass, neutral screw nickel plated
Ground Screw	#8-32 steel, zinc plated (green)	#8-32 steel (green)
Screw Terminal Guards	PVC hinged doors	N/A

Table 4. Color Ordering Information

For ordering devices, include Cat. No. followed by the color code: B (Brown), BK (Black), GY (Gray) LA (Light Almond), RD (Red), V (Ivory), W (White)

B	BK	GY	LA	RD	V	W
Brown	Black	Gray	Lt. Almond	Red	Ivory	White



Trademaster®/Spec 15A Self-Test Duplex GFCI, Ivory

15971



Conducts an automatic test every three seconds, ensuring it's always ready to protect. If the device fails the test, the indicator light flashes to signal that the GFCI should be replaced. It also has our proven SafeLock™ Protection feature: if critical components are damaged and protection is lost, power to the receptacle is disconnected.

features & benefits

- Conducts an automatic test every three seconds, ensuring it's always ready to protect. If the device fails the test, the indicator light flashes to signal that the GFCI should be replaced. It also has our proven SafeLock protection feature: if critical components are damaged and protection is lost, power to the receptacle is disconnected.
- Thinner than competitors' GFCI Receptacles: leaves more room for wires in the box.
- Auto-Ground clip assures a positive ground to metal box.
- Meets 2015 UL requirements.
- Feed-thru wiring configuration allows GFCI to protect downstream receptacles.
- Prevents line-load reversal miswire: no power to the face or downstream receptacles if wired incorrectly.
- Exceeds UL 943 voltage surge requirements; survives 100x the required UL 3kA/6kV voltage surge test cycles.
- FSUL Listed (Federal Specification WC596).
- Trip indicator light (red LED)
- Side or internal screw-pressure-plate back wire with #10-#14 AWG solid or stranded copper wire.
- Two back-wire holes per terminal.
- Ground screw has back-wire clamp for easy installation.
- 10kA short circuit rating.
- Mounting screws are shipped captive in the device and wall plate for easier installation.
- High-impact-resistant thermoplastic construction.
- Extra-long strap.
- Button colors match the device face.
- Dual-direction test and reset buttons.
- Class A rated GFCI.
- Supplied with matching TP wall plate.

Switching Power Supplies

PS5R-V Series



STANDARDS COMPLIANCE

Applicable Standards	Mark	File No. or Organization
UL508 UL1310 ¹ ANSI/ISA 12.12.01 CSA C22.2 No.107.1 CSA C22.2 No.213 CSA C22.2 No.223 ¹		UL/c-UL Listed File No. E467154, E177168
EN60950-1 EN50178 EN61204-3 EN50581	 	TÜV SÜD ² EU Low Voltage Directive EMC Directive RoHS Directive
SEMI F47	—	EPRI

Note 1: PS5R-VA/VB/VC/VD/VE only

Note 2: EN60950-1, EN50178 only

POWER SUPPLY PART NUMBERS

Output Capacity	Part Number	Input Voltage	Output Voltage	Output Current
7.5W	PS5R-VA05	100 to 240V AC (Voltage range: 85 to 264V AC / 100 to 370V DC)	5V	1.5A
	PS5R-VA12		12V	0.6A
	PS5R-VA24		24V	0.3A
10W	PS5R-VB05		5V	2.0A
	PS5R-VB12		12V	1.3A
15W	PS5R-VB24		24V	0.65A
	PS5R-VC12		12V	2.5A
30W	PS5R-VC24		24V	1.3A
	PS5R-VD24		24V	2.5A
60W	PS5R-VE24		24V	3.75A
90W	PS5R-VE24	24V	3.75A	
120W	PS5R-VF24	24V	5.0A	
240W	PS5R-VG24	24V	10.0A	

Part Number Structure

PS5R - V □ □

Output Voltage

05: 5V³
12: 12V⁴
24: 24V

Output Capacity

A: 7.5W
B: 10W/15W
C: 30W
D: 60W
E: 90W
F: 120W
G: 240W

Note 3: PS5R-VA/VB only

Note 4: PS5R-VA/VB/VC only

Use only for interpreting part numbers.

Do not use for developing part numbers.

PRODUCT DESCRIPTION

DIN-rail mount switching power supplies with global approvals for both industrial and hazardous locations

KEY FEATURES

- Compact size preserves panel space
- Slim size (width):
22.5mm (10W/15W/30W)
36mm (60W/90W)
45mm (7.5W)
46mm (120W)
60mm (240W)
- Universal Voltage Input:
85-264V AC/100-370V DC
- Wide operating temperature range
- Spring-up terminals accept ring & fork terminals
- Approved for use in Class I Division 2 hazardous locations
- Can be installed in 6 directions
- 7.5W ~ 90W meet NEC Class 2 output ratings
- Overcurrent protection with auto-reset
- Meets SEMI F47 Sag Immunity (208V AC input)
- RoHS compliant
- Five-year factory warranty



SPECIFICATIONS

Model	5V DC output	PS5R-VA05	PS5R-VB05	-	-	-	-	-	
	12V DC output	PS5R-VA12	PS5R-VB12	PS5R-VC12	-	-	-	-	
	24V DC output	PS5R-VA24	PS5R-VB24	PS5R-VC24	PS5R-VD24	PS5R-VE24	PS5R-VF24	PS5R-VG24	
Output Capacity		7.5W	15W (5V Model is 10W)	30W	60W	90W	120W	240W	
Rated Input Voltage (Single-phase two-wire) ¹		100 to 240V AC (Voltage range: 85 to 264V AC/100 to 370V DC) (Load ≤ 80% at 100-105V DC)							
Frequency		50/60 Hz							
Input	Input Current (Typ.)	100V AC	5V: 0.20A 12V, 24V: 0.18A	5V: 0.25A 12V, 24V: 0.35A	0.7A	1.3A	1.1A	1.4A	2.7A
		230V AC	5V: 0.12A 12V, 24V: 0.10A	5V: 0.14A 12V, 24V: 0.19A	0.3A	0.8A	0.6A	0.7A	1.2A
	Inrush Current (Typ.) (Ta=25°C, cold start)	100V AC	15A			18A			14A
		230V AC	36A		45A			41A	30A
	Leakage Current	120V AC	0.5mA max.						
		230V AC	1.0mA max.						
	Efficiency (Typ.) (at rated output) ²	100V AC	5V: 74%, 12V: 79%, 24V: 80%	5V: 77%, 12V: 82%, 24V: 84%	12V: 83%, 24V: 85%	86%		88% 89%	89%
		230V AC	5V: 73%, 12V: 77%, 24V: 76%	5V: 73%, 12V: 80%, 24V: 81%	12V: 85%, 24V: 87%	86%			90%
Power Factor (Typ.)	100V AC	—	—	—	—	—	0.99	—	
	230V AC	—	—	—	—	0.86	0.92	0.96	
Rated Voltage/Current		5V/1.5A, 12V/0.6A, 24V/0.3A	5V/2.0A ³ , 12V/1.3A, 24V/0.65A	12V/2.5A, 24V/1.3A	24V/2.5A	24V/3.75A	24V/5A	24V/10A	
Adjustable Voltage Range		±10%							
Output Holding Time (Typ.) (at rated output)	100V AC	5V: 45ms, 12V: 45ms, 24V: 47ms	5V: 53ms, 12V: 34ms, 24V: 36ms	12V: 13ms, 24V: 15ms	13ms	20ms	30ms		
	230V AC	5V: 289ms 12V: 294ms 24V: 282ms	5V: 330ms 12V: 215ms 24V: 230ms	12V: 110ms 24V: 110ms	105ms	30ms	33ms	40ms	
Start Time (at rated input and output)		450ms max.	500ms max.	600ms max.	800ms max.	700ms max.	800ms max.		
Rise Time (at rated input and output)		220ms max	5V, 12V: 200ms max. 24V: 250ms max.	200ms max.					
Output	Input Fluctuation		0.4% max.						
	Load Fluctuation		5V: 2.5% max. 12V, 24V: 1.0% max.						
	Temperature Change		0.04%/°C max. (-10 to +65°C)	0.05%/°C max. (-10 to +65°C)	12V: 0.05%/°C max. (-10 to +50°C) 24V: 0.05%/°C max. (-10 to +55°C)	0.05%/°C max. (-10 to +55°C)	0.05%/°C max. (-10 to +50°C)	0.05%/°C max. (-25 to +55°C)	0.05%/°C max. (-25 to +50°C)
	Regulation	Ripple (including noise)	5V: 8% p-p max. (-25 to -10°C) 12V: 6% p-p max. (-25 to -10°C) 24V: 4% p-p max. (-25 to -10°C)	5V: 8% p-p max. (-25 to -10°C) 12V: 6% p-p max. (-25 to -10°C) 24V: 4% p-p max. (-25 to -10°C)	12V: 6% p-p max. (-25 to -10°C) 24V: 4% p-p max. (-25 to -10°C)	4% p-p max. (-25 to -10°C)			
			5V: 5% p-p max. (-10 to +0°C) 12V: 2.5% p-p max. (-10 to +0°C) 24V: 1.5% p-p max. (-10 to +0°C)	5V: 5% p-p max. (-10 to +0°C) 12V: 2.5% p-p max. (-10 to +0°C) 24V: 1.5% p-p max. (-10 to +0°C)	12V: 2.5% p-p max. (-10 to +0°C) 24V: 1.5% p-p max. (-10 to +0°C)	1.5% p-p max. (-10 to +0°C)			
			5V: 2.5% p-p max. (0 to +65°C) 12V: 1.5% p-p max. (0 to +65°C) 24V: 1% p-p max. (0 to +65°C)	5V: 2.5% p-p max. (0 to +65°C) 12V: 1.5% p-p max. (0 to +65°C) 24V: 1% p-p max. (0 to +65°C)	12V: 1.5% p-p max. (0 to +50°C) 24V: 1% p-p max. (0 to +55°C)	1% p-p max. (0 to +55°C)	1% p-p max. (0 to +50°C)	1% p-p max. (0 to +55°C)	1% p-p max. (0 to +50°C)
Overcurrent Protection		105% min. (auto reset)				101% min. (auto reset)	105% min. (auto reset)		
Operation Indicator		LED (green)							
Dielectric Strength	Between input and output terminals		3,000V AC, 1 minute						
	Between input and ground terminals		2,000V AC, 1 minute						
	Between output and ground terminals		500V AC, 1 minute						
Insulation Resistance		Between input and output terminals: 100MΩ min. (500V DC megger) Between input and ground terminals: 100MΩ min. (500V DC megger)							
Operating Temperature ⁴ (No freezing)		-25 to +75°C			-25 to +70°C		-25 to +65°C		
Operating Humidity		20 to 90% RH (no condensation)							
Storage Temperature (No freezing)		-25 to +75°C							
Storage Humidity		20 to 90% RH (no condensation)							
Vibration Resistance		10 to 55Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with BNL6 end clips)			10 to 55Hz, amplitude 0.33mm, 2 hours each in 3 axes (when used with BNL6 end clips)	10 to 55Hz, amplitude 0.21mm, 2 hours each in 3 axes (when used with BNL6 end clips)	10 to 55Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with part no. BNL6 mounting clips)		
Shock Resistance		300 m/s ² (30G), 3 times each in 6 directions							
Expected Life ⁵		8 years minimum (at the rated input, 50% load, operating temperature +40°C, standard mounting direction)							
EMC	EMI	EN61204-3 (Class B)							
	EMS	EN61204-3 (industrial)							
Safety Standards		UL508 (Listing), UL1310 Class 2, ANSI/ISA-12.12.01 CSA C22.2 No. 107.1, 213, 223 EN60950-1, EN50178				UL508 (Listing) ANSI/ISA-12.12.01 107.1, 213 EN60950-1, EN50178			CSA C22.2 No.
Other Standard		SEMI F47 (at 208V AC input only)							
Degree of Protection		IP20 (EN60529)							
Dimensions (mm)		75H × 45W × 70D	90H × 22.5W × 95D	95H × 36W × 108D	115H × 46W × 121D	125H × 60W × 125D			
Weight (approx.)		130g	140g	150g	260g	310g	470g	960g	
Terminal Screw		M3.5							

*At normal temperature and humidity unless otherwise specified. Notes: 1: DC input voltage is not subject to safety standards. When using on DC input, connect a fuse to the input terminal for DC input protection. 2: Under stable state. 3: PS5R-VB05 (5V DC/2.0A) is 10W (Up to 3.0A at Ta = 0 to 40°C. Not subject to safety standards above 2.0A.) 4: See the output derating curves on page 3. 5: Calculation of the expected life is based on the actual life of the aluminum electrolytic capacitor. The expected life depends on operating conditions.

The *SENTRY Lite*™ pump controller by USEMCO Inc. is designed with simplicity in-mind. This controller uses state-of-the-art components and incorporates control feature envied by others in the industry. All this is packaged into one unit. Up front is a bright LCD color touch-screen that can produce over 32,000 different colors. Each screen is individually designed to provide the user with the maximum amount of feedback and information. Navigation through the different screens is simple and easy to understand.

Alarm monitoring is critical and done with ease by the *SENTRY Lite*™ pump controller. Note that every alarm event is time-and-date stamped and placed in one area for easy access and viewing.

Setup is simple and requires little to no training. Field adjustable parameters like transducer rating & offset, set points and timer-delays allow the user to custom fit this controller to the pumping system.

Hardware Specifications:

Power:	24VDC +/- 10%, 8W max	Ports: 2	Serial:	RS232/RS485 (DB9)
Bezel:	IP 66 / (NEMA 4)		USB:	Prog/SCADA/device
Screen:	4.3" 480 x 272 pixel		Ethernet (opt.):	Modbus TCP/IP, Prog.
LCD Type:	TFT Color Touch screen		Operating Temperature:	0C to 50C
Colors:	32,000		Approvals:	CE, UL (Class 1 Div 2),
Backlight:	LED			RoHS compliant
Mounting:	Front Panel Mounting, IP66, N4/4X rated			

Digital Inputs: 12 DC inputs, Bi-directional (2 high-speed)
 24 VDC (Max 30 VDC)
 H/S Max input frequency 200 KHz

Digital Outputs: 8 Relay outputs
 2 PNP

Analog Inputs: 2 (0-5V / 0-10V / 4-20mA / 0-20mA)
 16-bit resolution

Analog Outputs: 1 (4-20mA / 0-20mA / 0-5V / 0-10V)
 12-bit resolution

Features

- 2-channel
- DC version, positive polarity
- Working voltage 26.5 V at 10 μ A
- Series resistance max. 327 Ω
- Fuse rating 50 mA
- DIN rail mounting
- With diode return

Function

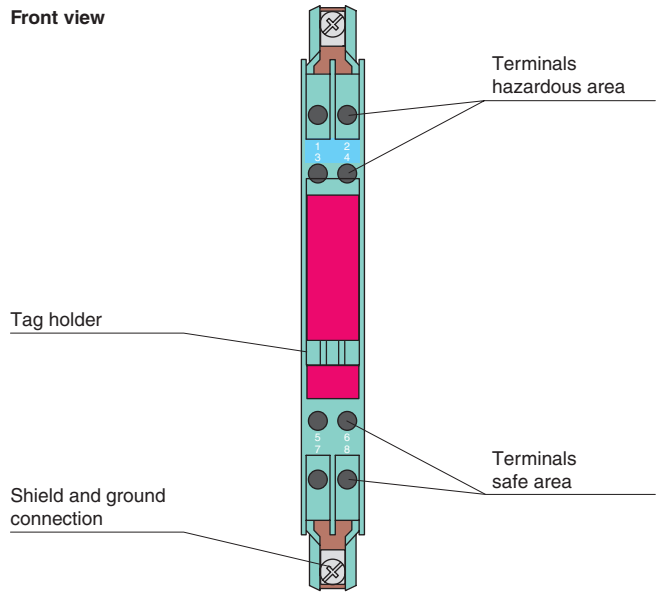
The Zener Barrier prevents the transfer of unacceptably high energy from the safe area into the hazardous area.

The zener diodes in the Zener Barrier are connected in the reverse direction. The breakdown voltage of the diodes is not exceeded in normal operation. If this voltage is exceeded, due to a fault in the safe area, the diodes start to conduct, causing the fuse to blow. The Zener Barrier has a positive polarity, i. e. the anodes of the zener diodes are grounded.

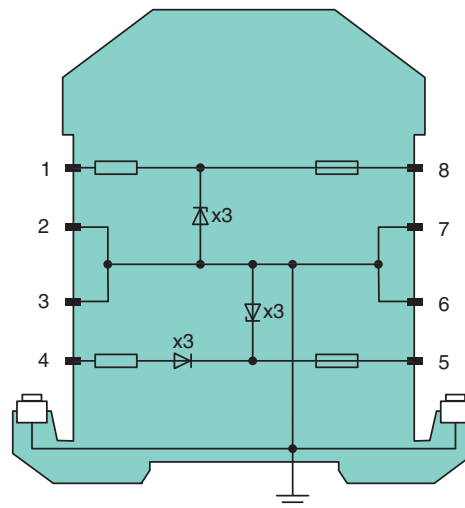
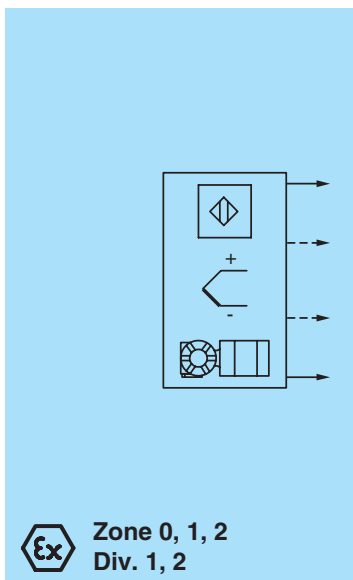
The Zener Barrier is for evaluation of signals from the hazardous area. The diodes of diode return prevent a current into the hazardous area, therefore the current assumption for intrinsic safety calculations is zero.

Depending on the application, increased or decreased intrinsic safety parameters apply for serial or parallel connection. For the detailed parameters refer to the Zener Barrier certificate. Application examples can be found in the system description of the Zener Barriers.

Assembly



Connection



**Zone 2
Div. 2**

Release date 2015-08-10 15:15 Date of issue 2015-08-10 071816_eng.xml

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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Singapore: +65 6779 9091
pa-info@sg.pepperl-fuchs.com

General specifications		
Type		DC version, positive polarity
Electrical specifications		
Nominal resistance		300 Ω
Series resistance		terminals 1 and 8 : max. 327 Ω
Voltage drop		terminals 4 and 5 : 1.2 V + (36 Ω x signal current)
Fuse rating		50 mA
Hazardous area connection		
Connection		terminals 1, 2; 3, 4
Safe area connection		
Connection		terminals 5, 6; 7, 8
Working voltage		max. 27 V , 26.5 V at 10 μA
Conformity		
Degree of protection		IEC 60529
Ambient conditions		
Ambient temperature		-20 ... 60 °C (-4 ... 140 °F)
Storage temperature		-25 ... 70 °C (-13 ... 158 °F)
Relative humidity		max. 75 % , without moisture condensation
Mechanical specifications		
Degree of protection		IP20
Connection		screw terminals , max. core cross-section 2 x 2.5 mm ²
Mass		approx. 150 g
Dimensions		12.5 x 115 x 110 mm (0.5 x 4.5 x 4.3 in)
Construction type		modular terminal housing , see system description
Mounting		on 35 mm DIN mounting rail acc. to EN 60715:2001
Data for application in connection with Ex-areas		
EC-Type Examination Certificate		BAS 01 ATEX 7005 , for additional certificates see www.pepperl-fuchs.com
Group, category, type of protection		⊕ II (1)GD, I (M1) [Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I (-20 °C ≤ T _{amb} ≤ 60 °C) [circuit(s) in zone 0/1/2]
Voltage U _o		28 V
Current I _o		93 mA
Power P _o		650 mW
Supply		
Maximum safe voltage U _m		250 V
Series resistance		min. 301 Ω
Statement of conformity		TÜV 99 ATEX 1484 X , observe statement of conformity
Group, category, type of protection, temperature class		⊕ II 3G Ex nA IIC T4 Gc [device in zone 2]
Directive conformity		
Directive 94/9/EC		EN 60079-0:2012, EN 60079-11:2012 , EN 60079-15:2010
International approvals		
FM approval		
Control drawing		116-0118
UL approval		
Control drawing		116-0139
CSA approval		
Control drawing		116-0119
IECEX approval		IECEX BAS 09.0142
Approved for		[Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I
General information		
Supplementary information		EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity, Attestation of Conformity and instructions have to be observed where applicable. For information see www.pepperl-fuchs.com .

Release date 2015-08-10 15:15 Date of issue 2015-08-10 07:18:16_eng.xml



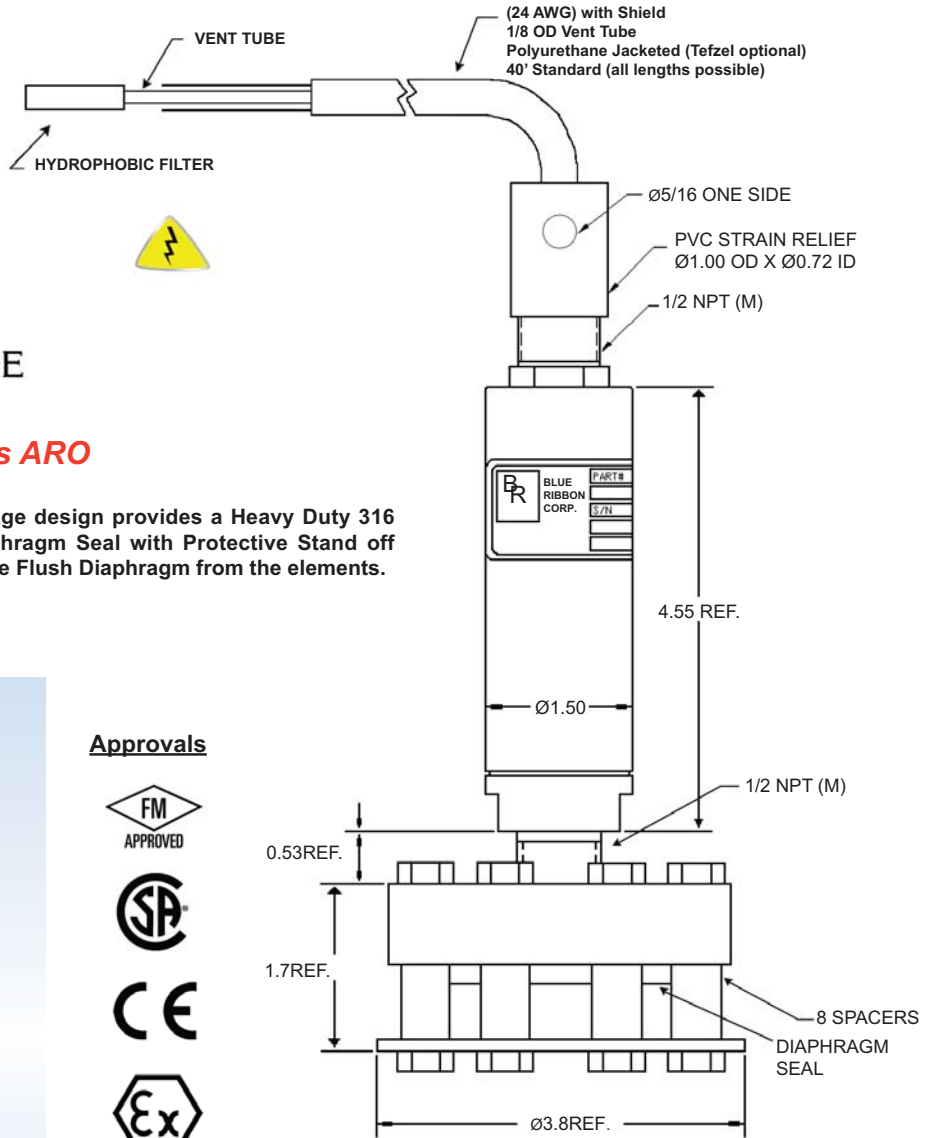
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SUBMERSIBLE / LEVEL TRANSMITTER MODEL BC001 - BIRDCAGE® SERIES

LIFE-TIME SURGE WARRANTY REPLACEMENT PROGRAM

(Consult factory for details)



Ships 1-3 days ARO

The Patented Birdcage design provides a Heavy Duty 316 Stainless Steel Diaphragm Seal with Protective Stand off plate that protects the Flush Diaphragm from the elements.

APPLICATIONS:

- Lift / Pump Station Sewage Level
- Sludge Level
- Oil and Gas Industry

FEATURES:

- Life-Time Surge Warranty Replacement Program when partnered with the **BCP3000 Surge Protector**
- Enhanced Internal Surge & Lightning Protection
- 2.5" Sensing Diaphragm with Dual Internal Diaphragm
- Corrosion Resistant, 316 SS Rugged, Welded Construction
- 4-20 mA, (0-5 VDC optional upon request)
- Glycerine-filled, other fluids available
- ** FM, CSA, CE, and/or ATEX/IEC
- ** Approval Available Upon Request
- Optional 4-20 mA Temperature Output

Approvals



Blue Ribbon reserves the right to make product improvements and amendments to the product specifications stated throughout this brochure without prior notification. Please contact the factory on all critical dimensions and specifications for verification.



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Standard Specifications listed below. Consult factory for further options, which may change the overall dimensions.

Output (at 70°F)	Model BC001 4-20mA 9.0 – 36 VDC Excitation 0-5 VDC 9.0 – 40 VDC Excitation - Optional		
Accuracy	Static Accuracy 0.5% FSO BFSL (0.2% optional)	1 Year Stability 0.20% FSO	Error Band (with temp.) 1.0% BFSL FSO
Pressure Ranges	0-5 PSI to 0-100 PSI		
Zero Balance (at 70°F)	± 1% FSO		
Range Calibration Signal	Internal Calibration Resistor set to 100 ±0.5% FSO unless otherwise specified		
Insulation Resistance	>10 megohms @ 50 VDC & @ 70°F		
Temperature Limits	Compensated +35°F to +125°F	Operating 0°F to +140°F	Storage -40°F to +250°F
Temperature Compensation (Standard)	Zero / Span Less than ±2% FSO/100°F at FSPR and/or URL		
Electricals	Load Impedance 1350 ohms maximum at 36 VDC and 750 ohms maximum at 24 VDC RFI Protection Voltage Surge Suppression Lightning Protection		
Electrical Connection	Polyurethane or Tefzel Reinforced Cable with Integral vent tube and Hydrophobic filter (40 Ft. Standard – other lengths available upon request)		
Mechanicals	Proof Pressure 3X FSPR (or URL)	Burst Pressure 5X FSPR (or URL)	
Pressure Response	≤ 5 ms to 90%		
Weight	5.5 lbs.		
Wetted Material	Case 316 Stainless Steel 2.75" diameter Sensing Diaphragm - 316 SS	Cable Polyurethane or Tefzel Reinforced Cable with Integral vent tube and Hydrophobic filter (40 Ft. Standard – other lengths available upon request)	
Accessories	BCP3000 Surge Protector LIFE-TIME SURGE WARRANTY PROGRAM FOR BC001 BCP3005 Pluggable Surge Replacement BCH2000 Cable Hanger		

ORDERING GUIDE FOR MODEL 01:

PART #	PRESSURE RANGE	CABLE LENGTH
●	●	●/●/●

→ **PART #: 01**

PRESSURE RANGE:

ORDER CODE	PSI or	FT. WC
001	5	11.53
002	10	23.07
004	15	36.60
017.5	17.5	40.37
020	20	46.14
025	25	57.67
030	30	69.21
100	100	230.70

WIRING CODE

WIRE COLOR	BC001
RED	+ EXC./SIGNAL
BLACK	- EXC./SIGNAL
SHIELD	OPEN

→ **CABLE LENGTH:**

AA	40' Polyurethane Cable (Standard)
AA-CZ	Alternate Length of Cable (in feet optional)
AA/CT	40' Tefzel Cable
AA/VDC	0-5 VDC
AA/FM	Intrinsically Safe - FM

(Custom lengths of cable available upon request)

EXAMPLE: 01001AA

5 PSI with 40' CABLE

14mm Interface Relays: RV8 Series



Screw Terminal



Only 70mm in height from DIN rail

Spring Clamp Terminal



Only 70mm in height from DIN rail

SPECIFICATIONS

Number of Poles	1-pole	2-pole
Contact Configuration	1C (SPDT)	2C (DPDT)
Contact Material	AgNi	AgNi (Au-plated)
Degree of Protection	IP20	IP20
Dielectric strength	Between contact and coil	5,000V AC for 1 minute
	Between contacts of the same pole	1,000V AC for 1 minute
	Between contact sets	-
Vibration Resistance	Operating extremes	10 to 55Hz, amplitude 0.75mm (NO contact), 0.175mm (NC contact)
	Damage limits	10 to 55Hz, amplitude 0.75mm (NO contact), 0.175mm (NC contact)
Shock Resistance	Operating extremes	98m/s ² (NO)
	Damage limits	980m/s ²
Electrical Life - Screw terminal	AC load:30,000 operations minimum (250V AC, 16A resistive load, operation frequency 360 operation per hour)	AC load:100,000 operations minimum (250V AC, 8A resistive load, operation frequency 360 operation per hour)
Electrical Life - Spring Clamp terminal	AC load:30,000 operations minimum (250V AC, 12A resistive load, operation frequency 360 operation per hour)	AC load:100,000 operations minimum (250V AC, 6A resistive load, operation frequency 360 operation per hour)
Mechanical Life (no load)	10,000,000 operations minimum (Operation frequency 18,000 operations per hour)	10,000,000 operations minimum (Operation frequency 18,000 operations per hour)
Operating Temperature	RV8H-1L1-D6, D9, D12, D18, D24, AD12, AD18, AD24, AD48, AD60, AD110 : -40 to +70°C (Contact current 12A max, 6A per terminal) no freezing : -40 to +55°C (Contact current 16A max, 8A per terminal) no freezing	RV8H-2L-D6, D9, D12, D18, D24, AD12, AD18, AD24, AD48, AD60, AD110 : -40 to +70°C (Contact current 6A max) no freezing : -40 to +55°C (Contact current 8A max) no freezing
	RV8H-1L1- AD220 : -40 to +55°C (Contact current 16A max, 8A per terminal) no freezing	RV8H-2L- AD220 : -40 to +55°C (Contact current 8A max) no freezing
	RV8H-1S1-D6, D9, D12, D18, D24, AD12, AD18, AD24, AD48, AD60, AD110 : -40 to +70°C (Contact current 12A max, 6A per terminal) no freezing	RV8H-2S-D6, D9, D12, D18, D24, AD12, AD18, AD24, AD48, AD60, AD110 : -40 to +70°C (Contact current 6A max) no freezing
	RV8H-1S1- AD220 : -40 to +55°C (Contact current 12A max, 6A per terminal) no freezing	RV8H-2S- AD220 : -40 to +55°C (Contact current 6A max) no freezing
Operating Humidity	5 to 85% (no condensation)	5 to 85% (no condensation)
Weight	Screw Terminal: Approx. 52g Spring Clamp Terminal: Approx. 49g	Screw Terminal: Approx. 52g Spring Clamp Terminal: Approx. 49g

PRODUCT DESCRIPTION

With the addition of a 14mm version, IDEC offers a complete line of RV8 interface relays. Ideal for panels with limited room, these low-profile relays provide up to a 40% reduction in DIN rail space when compared with standard plug-ins. RV8 relays are good for higher load switching applications, panels with high I/O content and commercial HVAC panels. UL listed when paired with a corresponding socket, it's easy to save space with new RV8 models.

KEY FEATURES

- Space-saving 14mm width.
- Universal AC/DC socket with built-in surge suppression and green LED Indicator
- Gold plated contacts (2-pole model only)
- Pre-assembled relay and DIN mount socket
- Universal screw terminals (flat and Philips) or spring clamp terminals
- Only 70 mm in height from DIN rail
- Release lever for easy locking and removal of relay
- Wide input voltage range: 6 to 240V
- High dielectric strength and impulse withstand voltages.
- Reverse polarity protected
- RoHS compliant

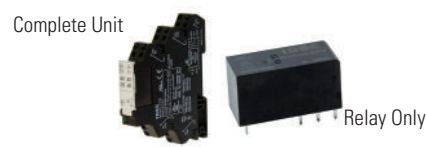


PART NUMBERS

Screw Terminals



Spring Clamp Terminals



Input voltage	1-pole		2-pole		1-pole		2-pole		
	Complete Part Number	Replacement (Relay Only)	Complete Part Number	Replacement (Relay Only)	Complete Part Number	Replacement (Relay Only)	Complete Part Number	Replacement (Relay Only)	
DC	6V	RV8H-1L1-D6	RV2H-1HG1-D5	RV8H-2L-D6	RV2H-2G-D5	RV8H-1S1-D6	RV2H-1HG1-D5	RV8H-2S-D6	RV2H-2G-D5
	9V	RV8H-1L1-D9	RV2H-1HG1-D9	RV8H-2L-D9	RV2H-2G-D9	RV8H-1S1-D9	RV2H-1HG1-D9	RV8H-2S-D9	RV2H-2G-D9
	12V	RV8H-1L1-D12	RV2H-1HG1-D12	RV8H-2L-D12	RV2H-2G-D12	RV8H-1S1-D12	RV2H-1HG1-D12	RV8H-2S-D12	RV2H-2G-D12
	18V	RV8H-1L1-D18	RV2H-1HG1-D18	RV8H-2L-D18	RV2H-2G-D18	RV8H-1S1-D18	RV2H-1HG1-D18	RV8H-2S-D18	RV2H-2G-D18
	24V	RV8H-1L1-D24	RV2H-1HG1-D24	RV8H-2L-D24	RV2H-2G-D24	RV8H-1S1-D24	RV2H-1HG1-D24	RV8H-2S-D24	RV2H-2G-D24
AC/DC	12V	RV8H-1L1-AD12	RV2H-1HG1-D12	RV8H-2L-AD12	RV2H-2G-D12	RV8H-1S1-AD12	RV2H-1HG1-D12	RV8H-2S-AD12	RV2H-2G-D12
	18V	RV8H-1L1-AD18	RV2H-1HG1-D18	RV8H-2L-AD18	RV2H-2G-D18	RV8H-1S1-AD18	RV2H-1HG1-D18	RV8H-2S-AD18	RV2H-2G-D18
	24V	RV8H-1L1-AD24	RV2H-1HG1-D24	RV8H-2L-AD24	RV2H-2G-D24	RV8H-1S1-AD24	RV2H-1HG1-D24	RV8H-2S-AD24	RV2H-2G-D24
	48V	RV8H-1L1-AD48	RV2H-1HG1-D48	RV8H-2L-AD48	RV2H-2G-D48	RV8H-1S1-AD48	RV2H-1HG1-D48	RV8H-2S-AD48	RV2H-2G-D48
	60V	RV8H-1L1-AD60	RV2H-1HG1-D60	RV8H-2L-AD60	RV2H-2G-D60	RV8H-1S1-AD60	RV2H-1HG1-D60	RV8H-2S-AD60	RV2H-2G-D60
	110V - 125V	RV8H-1L1-AD110	RV2H-1HG1-D110	RV8H-2L-AD110	RV2H-2G-D110	RV8H-1S1-AD110	RV2H-1HG1-D110	RV8H-2S-AD110	RV2H-2G-D110
	220V - 240V	RV8H-1L1-AD220	RV2H-1HG1-D110	RV8H-2L-AD220	RV2H-2G-D110	RV8H-1S1-AD220	RV2H-1HG1-D110	RV8H-2S-AD220	RV2H-2G-D110

RATINGS

Coil Ratings

Rated Voltage	Operating Characteristics (Against Rated Voltage)						Power Consumption (W)		
	Minimum Pickup Voltage (at 23°C)	Dropout Voltage (at 23°C)	Maximum Allowable Voltage (at 23°C)	Maximum Continuous Applied Voltage (Note 1)	Operation time	Release time	DC	AC (50Hz)	AC (60Hz)
DC	6V	80% max	7% min	120%	15ms max	15ms max	0.45	-	-
	9V						0.40	-	-
	12V						0.38	-	-
	18V						0.43	-	-
	24V						0.48	-	-
AC/DC	12V	80% max	7% min	110% (Note 2)	15ms max	15ms max	0.38	0.35	0.35
	18V						0.43	0.43	0.43
	24V						0.48	0.50	0.50
	48V						0.36	0.43	0.43
	60V						0.46	0.54	0.54
	110V - 125V						0.64	0.73	0.73
220V - 240V	1.10	1.25	1.32						

Note 1: At rated operating temperature

Note 2: Rated Voltage AC/DC 240V : 106%

Contact Ratings

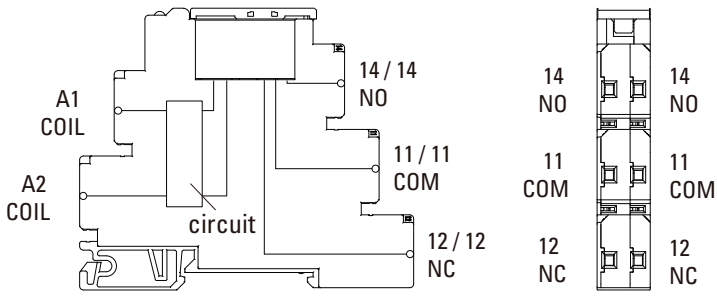
Allowable contact power	Resistive load	Screw Terminal	Spring Clamp Terminal
		1-pole 4,000VA 2-pole 2,000VA	1-pole 3,000VA 2-pole 1,500VA
Rated Load	Inductive load	B300 (pilot duty)	B300 (pilot duty)
		1-pole 250V AC, 16A (8A per terminal) at 55°C, 12A (6A per terminal) at 70°C 2-pole 250V AC, 8A at 55°C, 6A at 70°C	1-pole 250V AC, 12A (6A per terminal) at 70°C 2-pole 250V AC, 6A at 70°C
Allowable Switching Current	Resistive load	B300 (pilot duty)	B300 (pilot duty)
		1-pole 16A (8A per terminal) at 55°C, 12A (6A per terminal) at 70°C 2-pole 8A at 55°C, 6A at 70°C	1-pole 12A (6A per terminal) at 70°C 2-pole 6A at 70°C
Allowable Switching Power	Inductive load	1-pole 4,000VA 2-pole 2,000VA	1-pole 3,000VA 2-pole 1,500VA
		1-pole 6VDC 100mA 2-pole 5VDC 10mA	1-pole 6VDC 100mA 2-pole 5VDC 10mA

UL Ratings

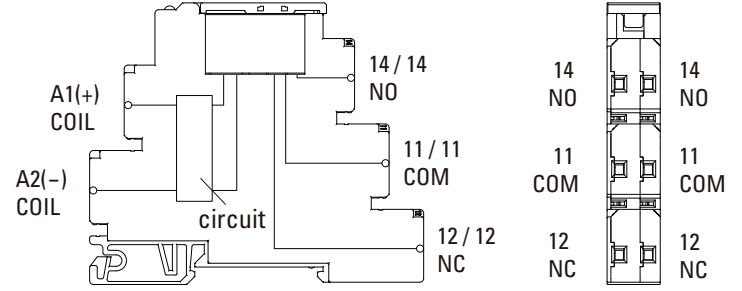
	Voltage	Screw Terminal		Spring Clamp Terminal	
		1-Pole	2-Pole	1-Pole	2-Pole
Resistive	250V AC	16A (8A per terminal) at 55°C	8A at 55°C	-	-
		12A (6A per terminal) at 70°C	6A at 70°C	12A (6A per terminal) at 70°C	6A at 70°C

INTERNAL CONNECTIONS

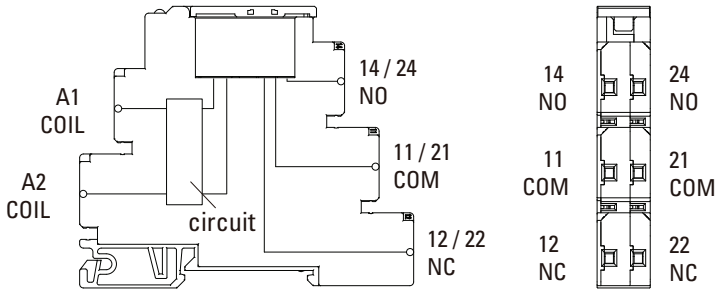
AC/DC Type (1-Pole)



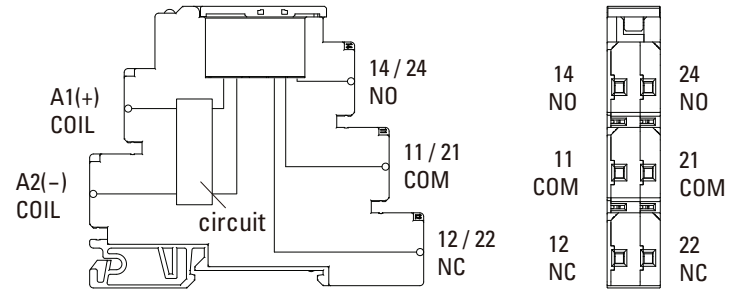
DC Type (1-Pole)



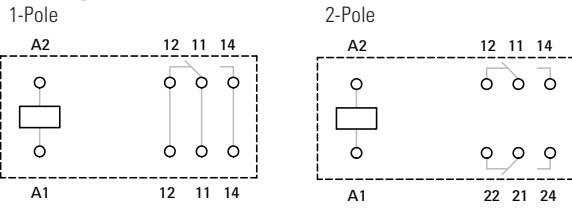
AC/DC Type (2-Pole)



DC Type (2-Pole)

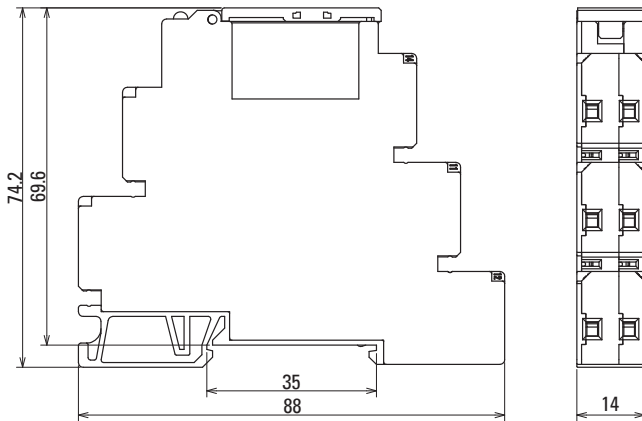


RV2H Replacement Relay

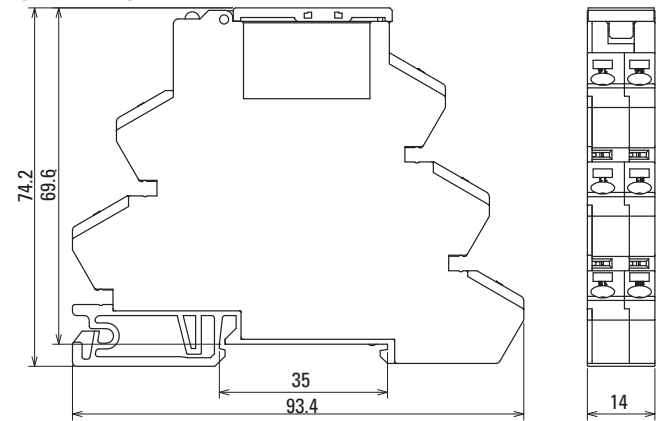


DIMENSIONS (mm)

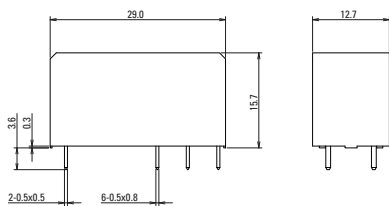
Screw Terminals



Spring Clamp Terminals

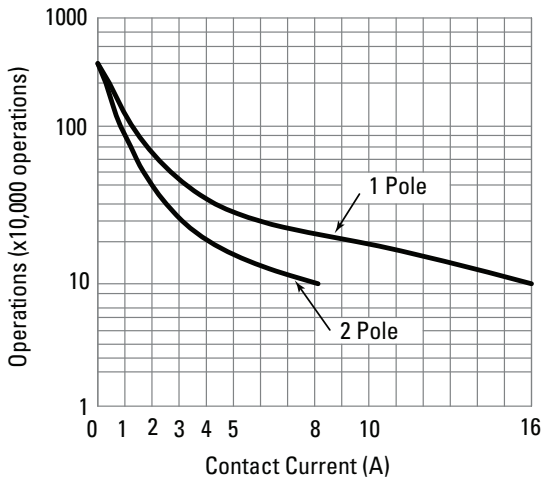


RV2H Replacement Relay (mm)



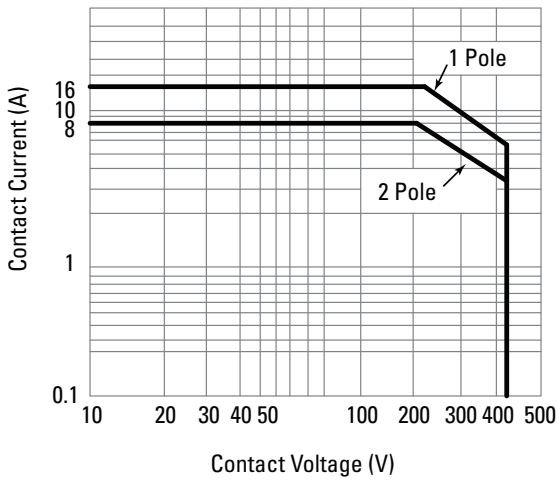
CHARACTERISTICS

Electrical Life Curve (AC Load)

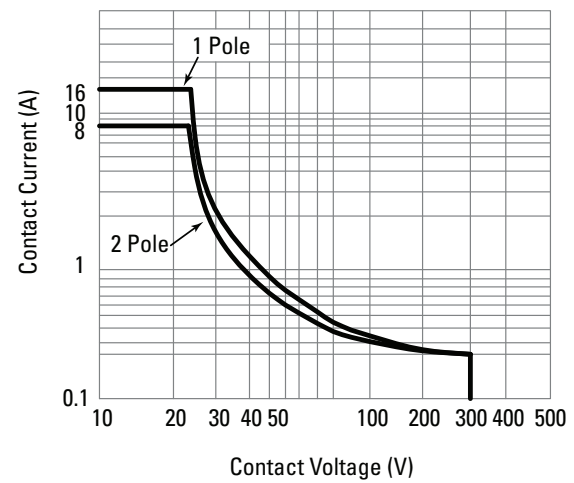


Contact Rating

AC



DC





Features:

- ✍ 13 Functions
- ✍ 10 Time Ranges
- ✍ Front knobs for Time Range, Time Scale & Mode Setting
- ✍ Slim, Space Saving Design
- ✍ DIN Rail Mount

Size: DIN 17.5mm

Certifications:



Technical Specifications

Input Specifications

Accuracy	Setting: $\pm 5\%$ of F.S. Repeat: $\pm 0.5\%$ (F.S. = Full Scale)
Reset	Reset time < 100 msec

Output Specifications

Output Contact	SPDT (1 C/O)
Contact Rating	NO/5A, NC/3A@250V AC

Functional Specifications

Modes	On delay (A) Interval (B) Cyclic equal OFF first (C) Cyclic equal ON first (Ci) Pulse output, 500ms fixed (D) Delay on break (E) Delay on make / Delay on break (F) Interval after break (H) Single shot (I) Retriggerable Single shot (J) Latching relay (K) Delay with Totalise (Ai) Interval with totalise (Bi)
Time Ranges	0.1 - 1 sec, 0.3 - 3 sec, 1 - 10 sec, 3 - 30 sec 0.1 - 1 min, 0.3 - 3 min, 1 - 10 min, 3 - 30 min 0.1 - 1 hr, 0.3 - 3 hr

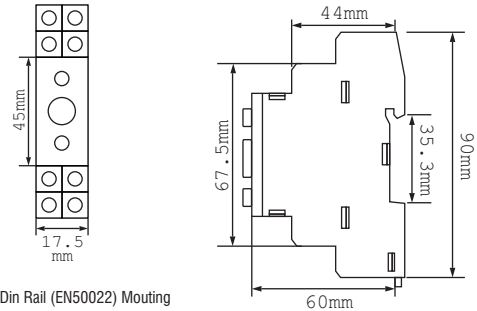
Supply Voltage

Supply Voltage	20-240V AC 12-240V DC AC : (50 / 60 Hz)
Power Consumption	3.2VA max

Environmental Specifications

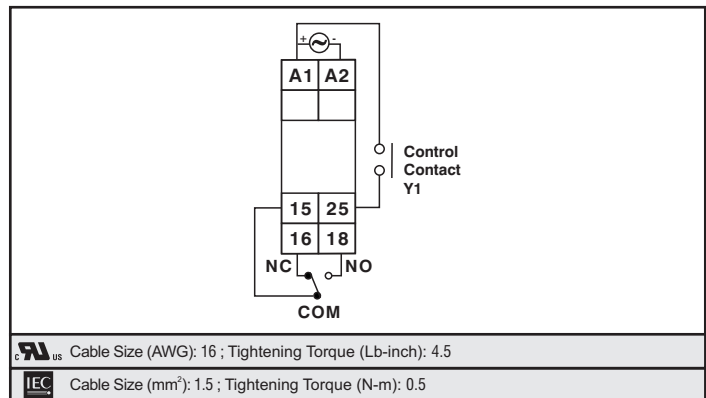
Temperature	Operating: 0 to 50°C (32 to 122°F) Storage: -20 to 75°C (-4 to 167°F)
Humidity (non-condensing)	95% RH
Weight	2.257 oz.
Protection Level	NEMA 12

Dimensions



Symmetrical 35mm Din Rail (EN50022) Mounting

Terminal Connections



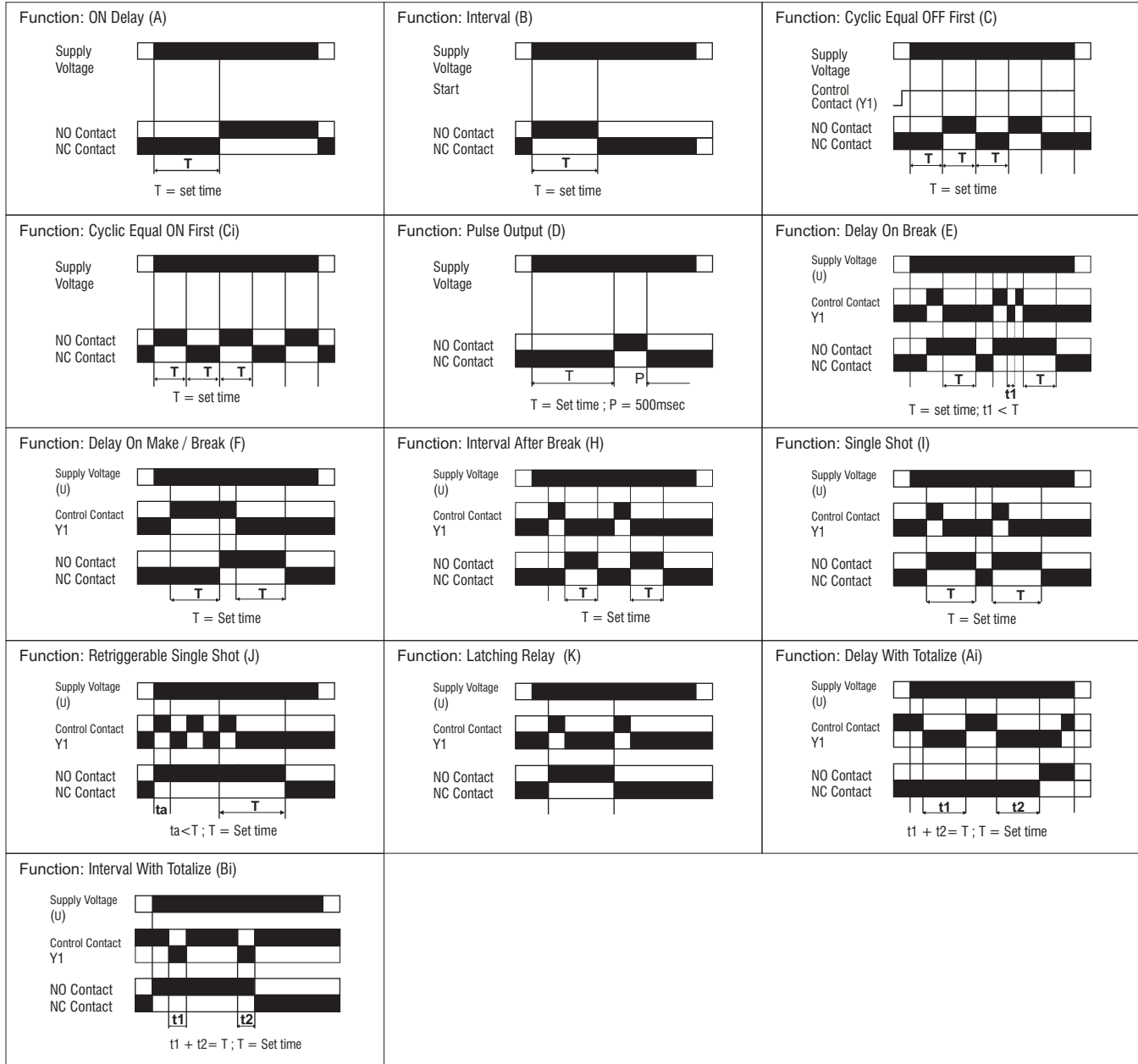
Cable Size (AWG): 16 ; Tightening Torque (Lb-inch): 4.5

Cable Size (mm²): 1.5 ; Tightening Torque (N-m): 0.5

Ordering Information

Part No.	Supply Voltage	Certification	
		CE	UL
175MU	20-240V AC 12-240V DC	■	■

Timing Diagram



C3SS1-10B-20



SELECTOR SWITCH#C3SS1-10B-20

General Information

Extended Product Type	C3SS1-10B-20
Product ID	1SFA619210R1026
EAN	7320500246726
Catalog Description	SELECTOR SWITCH#C3SS1-10B-20
Long Description	Compact Selector Switch - 3-pos Fixed A&B&C - Short handle - Black - Non-illuminated - Black plastic - 2NO

Ordering

EAN	7320500246726
Minimum Order Quantity	10 piece
Customs Tariff Number	8536501999

Dimensions

Product Net Width	0.030 m
Product Net Height	0.030 m
Product Net Depth / Length	0.072 m
Product Net Weight	0.024 kg

Container Information

Package Level 1 Units	10 piece
Package Level 1 Width	0.1 m
Package Level 1 Height	0.03 m
Package Level 1 Depth / Length	0.1 m
Package Level 1 Gross Weight	0.024 kg
Package Level 2 Units	10

Environmental

Ambient Air Temperature	Storage -30 ... +85 °C Operation -25 ... +70 °C
RoHS Status	Following EU Directive 2002/95/EC August 18, 2005 and amendment

Additional Information

Actuator Type	Short handle
Bezel Material	Black plastic
Block	2NO
Color	Black
Degree of Protection	Front IP69K Terminals IP20
Function	Maintained
Illumination	Non-illuminated
Maintained Positions	A, B, C
Mechanical Durability	0.5 million
Number of Auxiliary Contacts NO	2
Product Main Type	C3SS1
Product Name	Selector Switch
Product Range	Compact
Product Type	C3SS
Rated Frequency (f)	Supply Circuit 50 Hz Supply Circuit 60 Hz
Rated Operational Current AC-15 (I_{θ})	(24 / 127 V) 1.5 A (220 / 240 V) 1 A
Rated Operational Current DC-13 (I_{θ})	(24 V) 0.3 A (125 V) 0.2 A
RoHS Date	0626 5
Sub-Function	3-position

Certificates and Declarations (Document Number)

Data Sheet, Technical Information	1SFC151005C0201
Declaration of Conformity - CE	1SFA1-70
Environmental Information	1SFC151009D0201
Instructions and Manuals	1SFC151005C0201
RoHS Information	1SFC151012D0202

Classifications

E-nummer	3711306
ETIM 4	EC002024 - Accessories for control circuit devices
ETIM 5	EC001029 - Selector switch, complete
ETIM 6	EC001029 - Selector switch, complete
ETIM 7	EC001029 - Selector switch, complete
Object Classification Code	S
UNSPSC	39121500
WEEE Category	5. Small Equipment (No External Dimension More Than 50 cm)

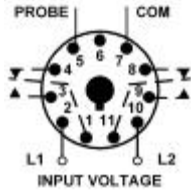
Categories

Low Voltage Products and Systems → Control Products → Pilot Devices → Pilot Devices - Compact Range



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Use socket: 70170-D

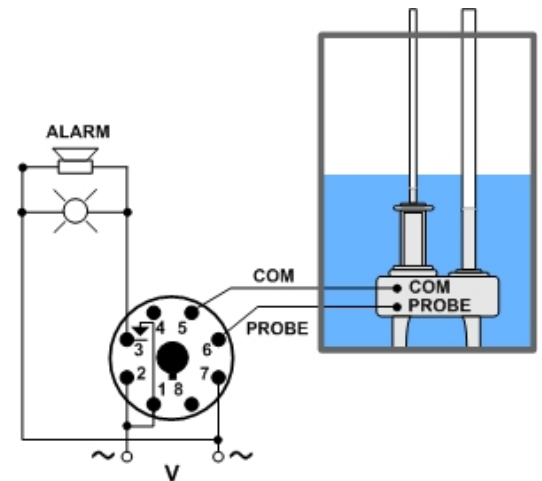
Family: SEAL LEAKAGE RELAY
Function: SINGLE CHANNEL
Sensitivity Range: Sensitivity Range: 4.7K - 100K Ohms
Input Voltage: 120V AC
Output: 7A DPDT

Image may not be exact product—for reference only.

Description of function:

SF Series Pump Seal Failure Relays are designed to monitor the shaft seals of submersible pumps. A resistive-measuring probe is installed in the pump seal cavity. With input voltage applied, the LED is Green ON. If the seal starts to leak, contaminating fluid enters the seal cavity, which lowers the resistance between the internal probe & the common connection. When the resistance drops below the user-adjustable sensitivity set-point of the relay, the output relay energizes & the LED turns Red ON. The relay output can be used to give an alarm indication of a leaking seal. These products will automatically reset when the fault condition clears. Probes are pulsed with a DC voltage to prevent electroplating.

Function Chart:

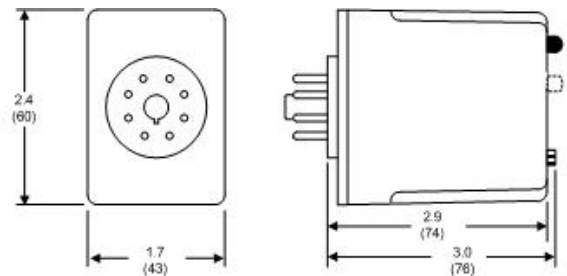


Application Information

- **Voltage Tolerance:** AC Operation: +10/-15% of nominal at 50/60 Hz.
- **Load (Burden):** 3 VA
- **Indicator LEDs:** Green ON with input voltage applied; Red ON when seal leak detected & relay is energized.
- **Probe Voltage:** 5V DC Pulsed
- **Response Time:** Pick-up & Drop-out: 1 Second
- **Output Contacts:** 7A @ 240V AC/7A @ 28V DC, 1/4HP @ 120V AC (N.O.)
- **Life:** Mechanical: 10,000,000 operations; Full Load: 100,000 operations
- **Temperature:** -28° to 65° C (-18° to 149° F)

Approvals: LISTED with Appropriate Macromatic Socket

Dimensions Inches (Millimeters)



CL2-513R



Compact Pilot Light Red LED 110-130V AC

General Information

Extended Product Type	CL2-513R
Product ID	1SFA619403R5131
EAN	7320500475638
Catalog Description	Compact Pilot Light Red LED 110-130V AC
Long Description	Compact Pilot Light - Pilot light head - Red - Illuminated - Lamptype: LED 110-130V AC

Ordering

EAN	7320500475638
Minimum Order Quantity	10 piece
Customs Tariff Number	8536619090

Dimensions

Product Net Width	0.030 m
Product Net Height	0.030 m
Product Net Depth / Length	0.052 m
Product Net Weight	0.1 kg

Additional Information

Color	Red
Degree of Protection	Front IP69K Terminals IP20
Product Main Type	CL2
Product Name	Pilot Light
Product Range	Compact
Rated Operational Voltage	110-130 V AC

Certificates and Declarations (Document Number)

Data Sheet, Technical Information	1SFC151005C0201
Declaration of Conformity - CE	1SFA1-70
Environmental Information	1SFC151009D0201
Instructions and Manuals	1SFC151005C0201

CL2-513G



Compact Pilot Light Green LED 110-130V AC

General Information

Extended Product Type	CL2-513G
Product ID	1SFA619403R5132
EAN	7320500475645
Catalog Description	Compact Pilot Light Green LED 110-130V AC
Long Description	Compact Pilot Light - Pilot light head - Green - Illuminated - Lamptype: LED 110-130V AC

Ordering

EAN	7320500475645
Minimum Order Quantity	10 piece
Customs Tariff Number	8536619090

Dimensions

Product Net Width	0.030 m
Product Net Height	0.030 m
Product Net Depth / Length	0.052 m
Product Net Weight	0.1 kg

Additional Information

Color	Green
Degree of Protection	Front IP69K Terminals IP20
Product Main Type	CL2
Product Name	Pilot Light
Product Range	Compact
Rated Operational Voltage	110-130 V AC

Certificates and Declarations (Document Number)

Data Sheet, Technical Information	1SFC151005C0201
Declaration of Conformity - CE	1SFA1-70
Environmental Information	1SFC151009D0201
Instructions and Manuals	1SFC151005C0201

17.5 MM INTRINSICALLY SAFE BARRIER RELAYS

ISE SERIES



- ◆ Approved for use in these Hazardous Locations:
Class I, Div 1 (Zones 0 and 1 Canada), Groups A, B, C, D
Class II, Div 1 (Zones 20 and 21 Canada), Group E, F, G
Class III, Div 1
- ◆ 1-Channel
- ◆ Terminals support 2-wire inputs
- ◆ Isolated 5A relay output
- ◆ Universal input voltage of 102-132V AC & 10-125V DC
- ◆ Compact 17.5mm wide enclosure for both DIN-rail or panel-mount
- ◆ Standard and Inverse Logic
- ◆ LED status indicator



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The ISE Series of Intrinsic Safe Barrier relays provide a safe and reliable method to control a single load (motor starters, relays, etc.) with a single input device (switches, sensors, etc.) located in a hazardous area.

The compact 17.5mm wide enclosure can be both mounted on 35mm DIN rail or panel-mounted with two screws. Terminals for the input devices from the Hazardous area are on the bottom for easy access in the enclosure to incoming field wiring from the hazardous area.

Operation

Each ISE Series relay consists of an intrinsically safe input, a corresponding normally-open relay output, and a bi-color LED for status indication. With input voltage applied, the LED will be ON (GREEN) to indicate power is applied. When the output contact is closed, the LED is ON (ORANGE). The ISE series comes in Standard and Inverted configurations.

Configurations

Standard Logic (ISEUR1):

When the input device is closed, the corresponding output contact is closed. When the input device is open, the corresponding output contact is open.

Inverse Logic (ISEUR1V):

When the input device is open, the corresponding output contact is closed. When the input device is closed, the corresponding output contact is open.

INPUT VOLTAGE	NUMBER OF CHANNELS	CONFIGURATION	CATALOG NUMBER	WIRING
102-132V AC (50/60Hz) and 10-125V DC	1	STANDARD LOGIC	ISEUR1	<p>DIAGRAM 811</p>
		INVERSE LOGIC	ISEUR1V	

17.5 MM INTRINSICALLY SAFE BARRIER RELAYS

ISE SERIES

APPLICATION DATA

Input Voltage: 102-132V AC (50/60Hz.) & 10-125V DC

Load (Burden): 2VA Maximum

Input Switch Open Circuit Voltage: 10V DC

Output Contacts:

SPST-NO (Form A) 3A Resistive @ 125V AC @ 60°C & 30V DC Resistive, Pilot Duty Rating D300

SPST-NO (Form A) 5A Resistive @ 125V AC @ 40°C & 30V DC Resistive, Pilot Duty Rating D300

Life:

Electrical: 50,000 Closures @ Full Load AC

Mechanical: 5 Million Closures @ No Load

Response Times: < 50ms

Temperature:

Operating: -28° to + 60° C (-18° F to +140° F)

Storage: -55° to +85° C (-67° to 185° F)

LED Indication:

Standard Logic, ON (Green) - Input voltage; ON (Orange) - Input closed and output contact closed;

Inverse Logic (V-suffix), ON (Green) - Input voltage; ON (Orange) - Input open and output contact closed

Insulation Voltage:

1500 V AC between coil & contacts

750 V AC between open contacts

1500 V AC between hazardous and safe circuits

Wire Sizes:

One #14-24 AWG Conductor or

Two #16 or 18 AWG Conductors

Mounting:

Mounts on 35mm DIN-rail or panel-mounted with two #8 screws when DIN-rail clips are fully extended from under the enclosure.

Control Drawing:

See Instruction Sheet 901-0000-329, which includes Control Drawing ISD2A01.

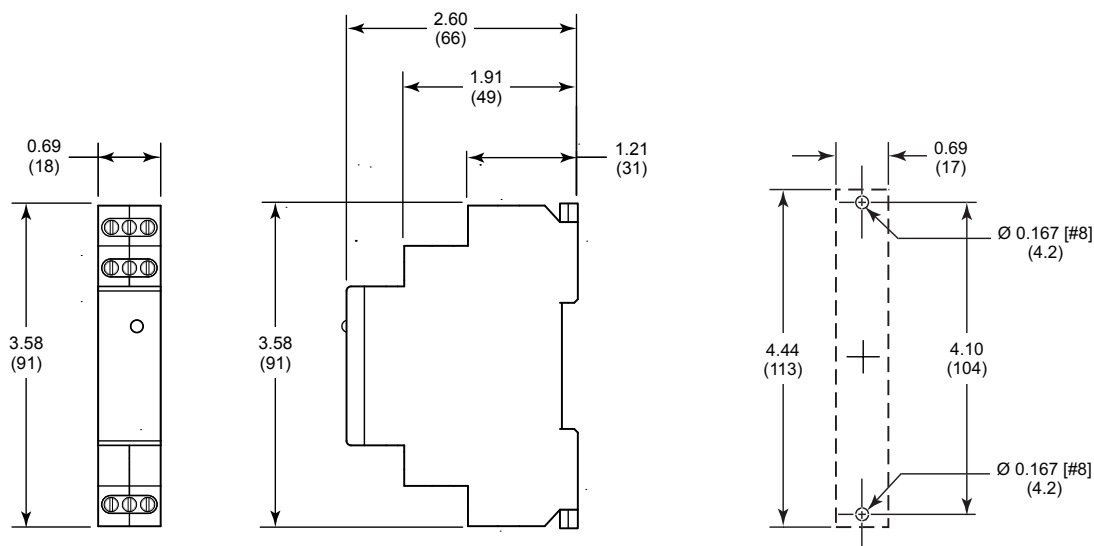
Approvals:



E318075

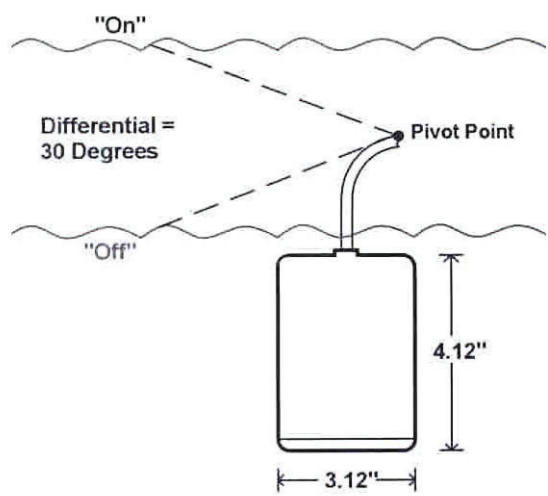


DIMENSIONS



All Dimensions in Inches (Millimeters)

Panel Mount Template



ECO-FLOAT

Eco-Float

Description

The Eco-Float, (G style), is a mercury-free level switch for controlling liquid levels in a variety of applications. A snap action switch is activated by a ball rolling back and forth within a switching tube. The entire assembly is enclosed in a plastic float housing. There is a minimum differential between 'on' and 'off' of approximately 3.5 inches. Greater differentials can be achieved when the pipe mounted, (GP), or externally weighted, (GSE), versions are used. Various cable lengths, mounting styles, and circuit configurations are available and in stock.

Features

- Mercury Free
- Variety of Mounting Styles
- Variety of Circuit Configurations
- Replaces Mercury Float and Diaphragm Switches
- Differential Between 'On' and 'Off'

Applications

The Eco-Float can be used in a variety of liquid level monitoring applications, including lift stations, sumps, sewage ejectors, septic tanks, vaults, and tanks. Eco-Floats are ruggedly constructed of corrosion resistant material, which enable them to be used in a variety of different liquids. Some applications are subject to additional requirements described in the National Electric Code.

Specifications

Cable.....18-2 or 18-3 SJOW 90° C. 41 x #34 copper .29D- 18-2; .31D- 18-3
 Housing & Clamp.....Polypropylene 3" x 4.25"
 Electrical Rating.....Standard 7A@ 120Vac; 3A @ 230Vac Std.

Temp Limit.....60° C. (water)

Ordering Information:

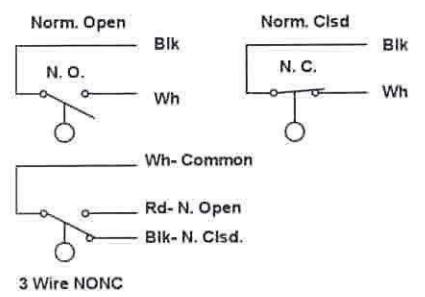
Specify

- Model Series **G**
- Mounting Style **SE** Suspended, External weight
SI Suspended, Internal weight
P Pipe mounted
- Cable Length **10, 15, 20, 30, 40, 50, 60 Ft.**
 Custom lengths available.
- Circuit configurations **NO** Normally open (SPST)
NC Normally closed (SPST)
NONC Normally open/closed (SPDT)

Example:

GS120NO

Eco-Float Suspended, Internally weighted, 20 ft. of cable. Normally open contacts.



CP1-10B-11



PUSHBUTTON#CP1-10B-11

General Information

Extended Product Type	CP1-10B-11
Product ID	1SFA619100R1076
EAN	7320500241042
Catalog Description	PUSHBUTTON#CP1-10B-11
Long Description	Compact Pushbutton - Momentary - Flush - Black - Non-illuminated - Black plastic - 1NO+1NC

Ordering

EAN	7320500241042
Minimum Order Quantity	10 piece
Customs Tariff Number	8536501999

Dimensions

Product Net Width	0.030 m
Product Net Height	0.030 m
Product Net Depth / Length	0.055 m
Product Net Weight	0.022 kg

Container Information

Package Level 1 Units	10 piece
Package Level 1 Width	0.1 m
Package Level 1 Height	0.03 m
Package Level 1 Depth / Length	0.1 m
Package Level 1 Gross Weight	0.022 kg
Package Level 2 Units	10

Environmental

RoHS Status	Following EU Directive 2002/95/EC August 18, 2005 and amendment
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Additional Information

Actuator Type	Flush
---------------	-------

Bezel Material	Black plastic
Block	1NO+1NC
Color	Black
Degree of Protection	Front IP69K Terminals IP20
Function	Momentary
Illumination	Non-illuminated
Mechanical Durability	0.5 million
Number of Auxiliary Contacts NC	1
Number of Auxiliary Contacts NO	1
Product Main Type	CP1
Product Name	Pushbutton
Product Range	Compact
Product Type	CP
Rated Frequency (f)	Supply Circuit 60 Hz Supply Circuit 50 Hz
Rated Operational Current AC-15 (I_{θ})	(24 / 127 V) 1.5 A (220 / 240 V) 1 A
Rated Operational Current DC-13 (I_{θ})	(24 V) 0.3 A (125 V) 0.2 A
RoHS Date	0626 5

Certificates and Declarations (Document Number)

Data Sheet, Technical Information	1SFC151005C0201
Declaration of Conformity - CE	1SFA1-70
Environmental Information	1SFC151009D0201
Instructions and Manuals	1SFC151005C0201
RoHS Information	1SFC151012D0202

Classifications

E-nummer	3711280
ETIM 4	EC002024 - Accessories for control circuit devices
ETIM 5	EC001028 - Push button, complete
ETIM 6	EC001028 - Push button, complete
ETIM 7	EC001028 - Push button, complete
Object Classification Code	S
UNSPSC	39121512
WEEE Category	5. Small Equipment (No External Dimension More Than 50 cm)

Categories

Low Voltage Products and Systems → Control Products → Pilot Devices → Pilot Devices - Compact Range

Horn/Strobe Electronic 860 Series

Edwards 860 Series xenon strobe beacons with horns are bright, low current, high decibel, combination signals designed for use where a distinctive visual or audible signal is required. The housing is made of gray, engineered thermoplastic. The strobe and horn can be operated independently.

The 867STR (indoor) and 868STR (outdoor) Series can be surface mounted on the supplied surface box. The 869STR and 869DSTR Series beacons can be flush mounted. They are designed to mount in a standard 4" (102mm) square electrical box with extension ring (total min. depth of 3" (76mm) not supplied.)

The 869DSTR Series is Diode Polarized for use in electrically supervised circuits.

Features and Specifications

- Xenon strobe light source with horn
- Flash rate 60 fpm
- 100dB at 1 meter/90dB at 10ft. (measured in anechoic chamber)
- Low current draw
- Terminals for easy wiring
- Gray, engineered thermoplastic housing
- Diode Polarized for use in electrically supervised circuits (869DSTR)
- Versions suitable for indoor and outdoor applications
- Operating indoor temperature range: 85% relative humidity at 86°F (30°C), 32°F to 120°F (0 to 49°C) variable ambient temperature.
- Operating outdoor temperature range: 95% relative humidity at 86°F (30°C), -31°F to 150°F (-35°C to 66°C) variable ambient temperature.



5 1/2"



Ordering Information

Description	Cat. No.	Operating Voltage ¹	Strobe Current ²	Horn Current ²	Lens Color	Effective Light Output UL 1638	Operating Environment
AC - Indoor Rated Surface Mount	867STRA-N5	120V AC	0.115 A (RMS)	0.033 A	Amber	90 cd	Indoor: 85% relative humidity at 86°F (30°C); 32°F to 120°F (0° to 49°C) variable ambient
	867STRB-N5	120V AC		0.033 A	Blue	20 cd	
	867STRC-N5	120V AC		0.033 A	Clear	150 cd	
	867STRG-N5	120V AC		0.033 A	Green	70 cd	
	867STRR-N5	120V AC		0.033 A	Red	21 cd	
AC/DC - Indoor Rated Surface Mount	867STRA-AQ	24V AC	0.370 A	0.072 A	Amber	90 cd	Indoor: 85% relative humidity at 86°F (30°C); 32°F to 120°F (0° to 49°C) variable ambient
		24V DC	0.390 A	0.022 A			
	867STRB-AQ	24V AC	0.370 A	0.072 A	Blue	20 cd	
		24V DC	0.390 A	0.022 A			
	867STRC-AQ	24V AC	0.370 A	0.072 A	Clear	150 cd	
		24V DC	0.390 A	0.022 A			
	867STRG-AQ	24V AC	0.370 A	0.072 A	Green	70 cd	
		24V DC	0.390 A	0.022 A			
	867STRR-AQ	24V AC	0.370 A	0.072 A	Red	21 cd	
		24V DC	0.390 A	0.022 A			

¹Operating voltage: -20% to +10% of nominal voltage.

²Horn and strobe currents are additive when connected in parallel.



Horn/Strobe Electronic 860 Series

Ordering Information							
Description	Cat. No.	Operating Voltage ¹	Strobe Current ²	Horn Current ²	Lens Color	Effective Light Output UL 1638	Operating Environment
AC - Outdoor Rated Surface Mount	868STRA-N5	120V AC	0.115 A	0.033 A	Amber	90 cd	Indoor: 85% relative humidity at 86°F (30°C); 32°F to 120°F (0° to 49°C) variable ambient Outdoor: 95% relative humidity at 86°F (30°C) -31°F to 150°F (-35°C to 66°C) variable ambient
	868STRB-N5	120V AC	0.115 A	0.033 A	Blue	20 cd	
	868STRC-N5	120V AC	0.115 A	0.033 A	Clear	150 cd	
	868STRG-N5	120V AC	0.115 A	0.033 A	Green	70 cd	
	868STRR-N5	120V AC	0.115 A	0.033 A	Red	21 cd	
AC/DC - Outdoor Rated Surface Mount	868STRA-AQ	24V AC	0.370 A	0.072 A	Amber	90 cd	
		24V DC	0.390 A	0.022 A			
	868STRB-AQ	24V AC	0.370 A	0.072 A	Blue	20 cd	
		24V DC	0.390 A	0.022 A			
	868STRC-AQ	24V AC	0.370 A	0.072 A	Clear	150 cd	
		24V DC	0.390 A	0.022 A			
	868STRG-AQ	24V AC	0.370 A	0.072 A	Green	70 cd	
		24V DC	0.390 A	0.022 A			
	868STRR-AQ	24V AC	0.370 A	0.072 A	Red	21 cd	
		24V DC	0.390 A	0.022 A			
AC - Indoor Rated Flush Mount	869STRA-N5	120V AC	0.115 A	0.033 A	Amber	90 cd	
	869STRB-N5	120V AC	0.115 A	0.033 A	Blue	20 cd	
	869STRC-N5	120V AC	0.115 A	0.033 A	Clear	150 cd	
	869STRG-N5	120V AC	0.115 A	0.033 A	Green	70 cd	
	869STRR-N5	120V AC	0.115 A	0.033 A	Red	21 cd	
AC/DC - Indoor Rated Flush Mount	869STRA-AQ	24V AC	0.370 A	0.072 A	Amber	90 cd	
		24V DC	0.390 A	0.022 A			
	869STRB-AQ	24V AC	0.370 A	0.072 A	Blue	20 cd	
		24V DC	0.390 A	0.022 A			
	869STRC-AQ	24V AC	0.370 A	0.072 A	Clear	150 cd	
		24V DC	0.390 A	0.022 A			
	869STRG-AQ	24V AC	0.370 A	0.072 A	Green	70 cd	
		24V DC	0.390 A	0.022 A			
	869STRR-AQ	24V AC	0.370 A	0.072 A	Red	21 cd	
		24V DC	0.390 A	0.022 A			
DC - Diode Polarized Indoor Rated Surface Mount	869DSTRA-G1	24V DC	0.320 A	0.048 A	Amber	90 cd	
	869DSTRB-G1	24V DC	0.320 A	0.048 A	Blue	20 cd	
	869DSTRC-G1	24V DC	0.320 A	0.048 A	Clear	150 cd	
	869DSTRG-G1	24V DC	0.320 A	0.048 A	Green	70 cd	
	869DSTRR-G1	24V DC	0.320 A	0.048 A	Red	21 cd	

¹Operating voltage: -20% to +10% of nominal voltage.

²Horn and strobe currents are additive when connected in parallel.

Horn/Strobe Electronic 860 Series

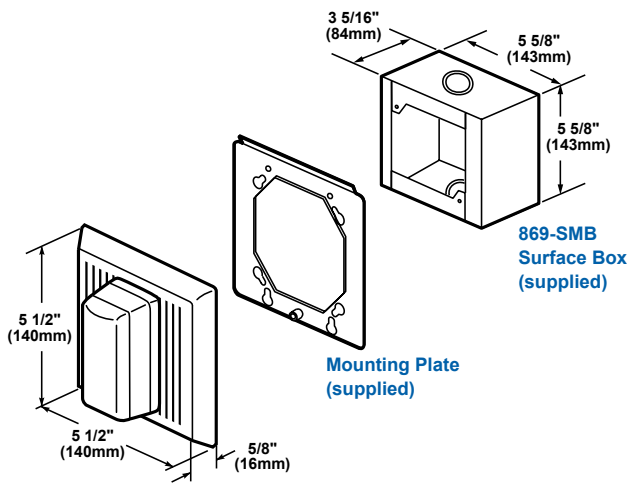
Accessories

Description	Cat. No.
Surface Mount Box, Outdoor Applications	869-WPB

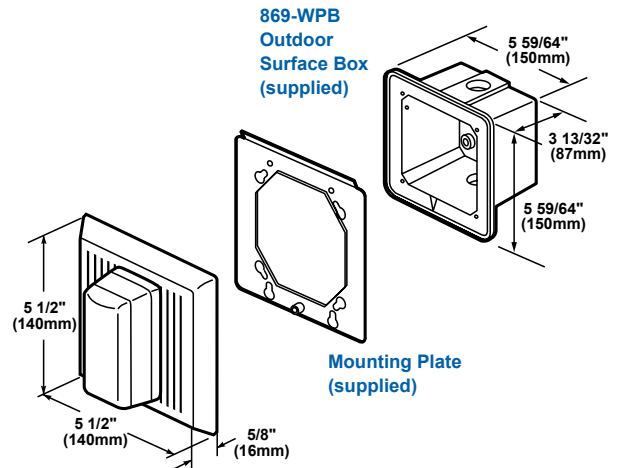
Weights and Dimensions

Cat. No.	Approx. Shipping Weight (lb.)
867STR*-N5	3.90
867STR*-AQ	3.90
868STR*-N5	3.60
868STR*-AQ	3.60
869STR*-N5	1.40
869STR*-AQ	1.40
869DSTR*-G1	1.40
869-WPB	2.10

*Letter in this position designates lens color: A - amber, B - blue, C - clear, G - green or R - red

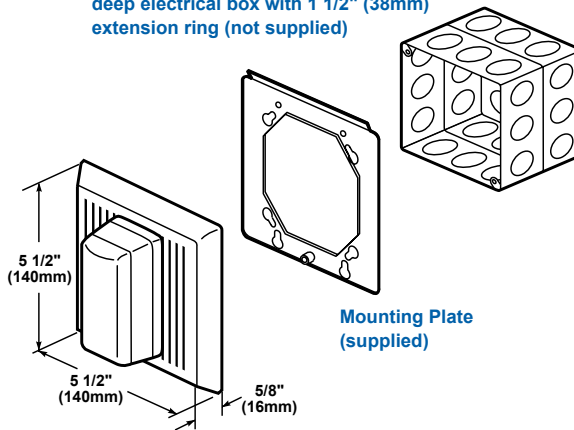


867STR Series



868STR Series

Standard North American
4" (102mm) sq. x 1 1/2" (38mm)
deep electrical box with 1 1/2" (38mm)
extension ring (not supplied)



869STR and
869DSTR Series



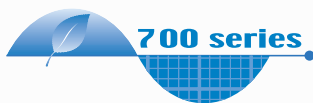
for a greener tomorrow

FACTORY AUTOMATION

INVERTER FR-D700

Global standard

OPTIONAL VARIABLE FREQUENCY
DRIVES FOR SINGLE PHASE
CONVERSION.



- Pursuing the easy operation
- Long life and simple maintenance
- Compact and space-saving
- Supporting various applications

GLOBAL IMPACT OF MITSUBISHI ELECTRIC



Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following

Energy and Electric Systems

A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices

A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliance

Dependable consumer products like air conditioners and home entertainment systems.

Information and Communication Systems

Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems

Maximizing productivity and efficiency with cutting-edge automation technology.

GLOBAL STANDARD

1 New standard of inverter

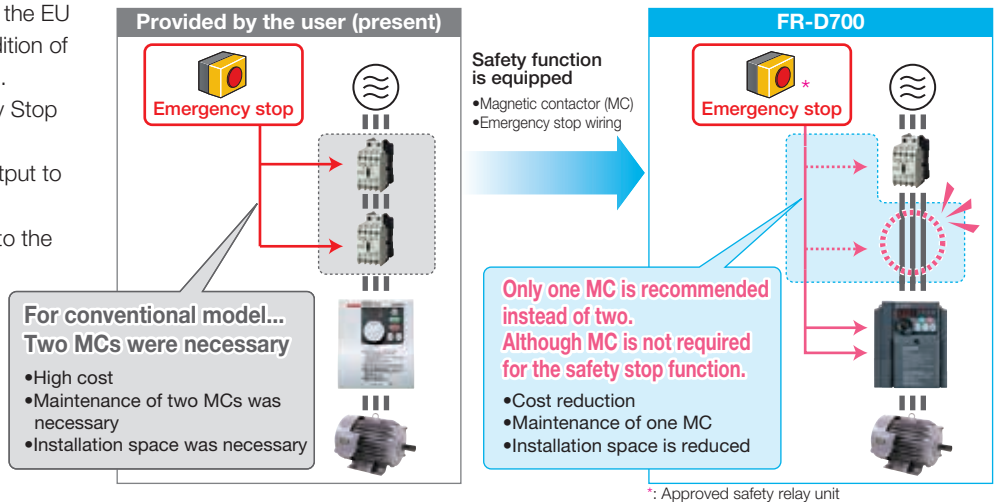
Highly reliable inverter!

(1) Safety stop function

The FR-D700 series is compliant to the EU Machinery Directive without the addition of previously required external devices. Operation of an external Emergency Stop device results in a highly reliable immediate shutoff of the D700's output to the motor. This safety stop function conforms to the following standards.

EN ISO 13849-1 Category 3 / PLD

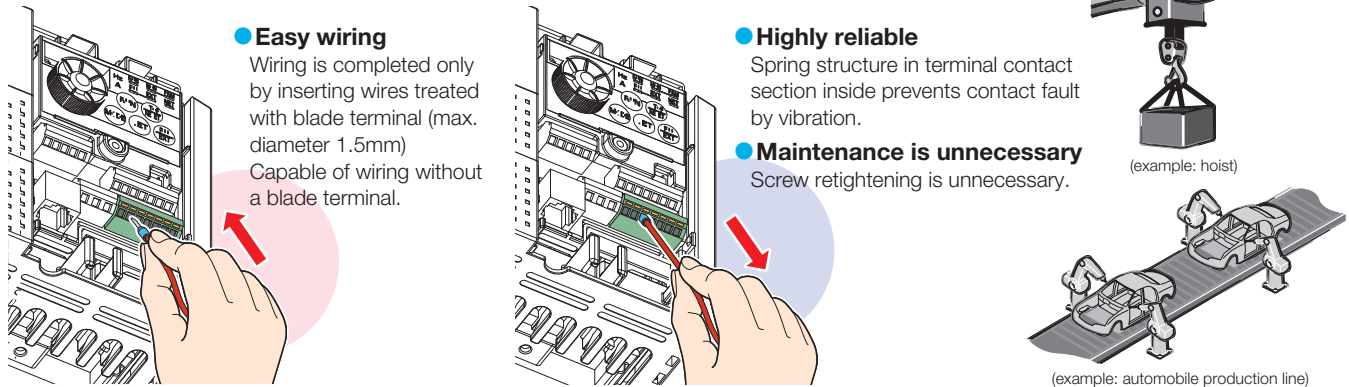
EN62061 / IEC61508 SIL2



(2) Spring clamp terminal (control circuit terminal)

With spring clamp terminals*, the wiring became easier and more secure.

*: Main circuit terminal is screw terminal.



(3) Long-life design

- The design life of the cooling fan has been extended to 10 years*¹. The life of the fan can be further extended utilizing the it's ON/OFF control.
- The design life of the capacitors has been extended to 10 years*¹*² by adopting a capacitor that endures about 5000 hours at 105°C surrounding air temperature.

*¹: Surrounding air temperature : annual average 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt) Since the design life is a calculated value, it is not a guaranteed value.

*²: Output current : 80% of the inverter rated current

- Estimated service lifespan of the long-life parts

Components	Estimated lifespan of the FR-D700	Guideline of JEMA
Cooling fan	10 years	2 to 3 years
Main circuit smoothing capacitor	10 years	5 years
Printed board smoothing capacitor	10 years	5 years

*³: Excerpts from "Periodic check of the transistorized inverter" of JEMA (Japan Electrical Manufacture's Association)

(4) Leading life check function

- Degrees of deterioration of main circuit capacitor, control circuit capacitor, and inrush current limit circuit can be monitored.
- Trouble can be avoided with the self-diagnostic alarm*⁴ that is output when the life span is near.

*⁴: If any one of main circuit capacitor, control circuit capacitor, inrush current restriction circuit or cooling fan reaches the output level, an alarm is output. Capacity of the main circuit capacitor can be measured by setting parameter at a stop and turning the power from off to on. Measuring the capacity enables alarm to be output. The cooling fan outputs alarm by using fan speed detection.

(5) Password function

Registering a 4-digit password can limit parameter read/write. It is effective for parameter setting protection.



2 Mitsubishi's new standard (As of April 2008)

Compact yet equipped with highest level of function/performance!!

(1) 150%/1Hz high starting torque by General-purpose magnetic flux vector control

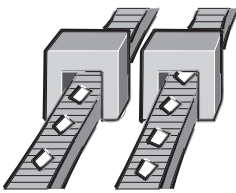
General-purpose magnetic flux vector control and auto tuning function are available.

It ensures operation that requires high starting torque, such as transfer machine including conveyer, hoist, lift, etc., washing machine, and agitators.

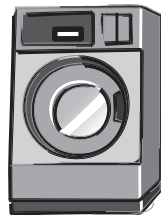
- High torque of 150%/1Hz and 200%/3Hz (3.7K or less) is realized (when the slip compensation function is valid).

- Auto tuning

Many kinds of motors can be optimally controlled with Mitsubishi original "non-rotation" auto tuning function. (R1 constants tuning)



(example: conveyer)

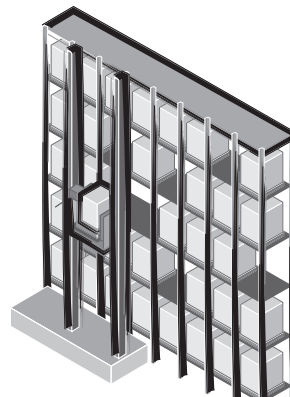


(example: industrial washing machine)

(2) Brake resistor can be connected

A brake transistor is built-in to the 0.4K or more. Connecting an optional brake resistor increases regeneration capability.

It is useful for deceleration time reduction of a machine with a large inertia, such as fan, and operation of lift, etc.



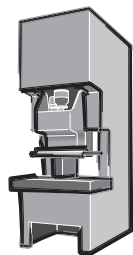
(example: automated storage)

(3) Enhanced function

New functions and useful functions from superior models support all sorts of applications.

• Regeneration avoidance function

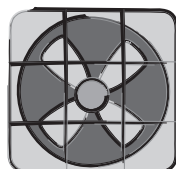
For a pressing machine and fan rotated faster than the set speed due to the effect of another fan, a trip is less likely to occur by automatically increasing frequency at regeneration.



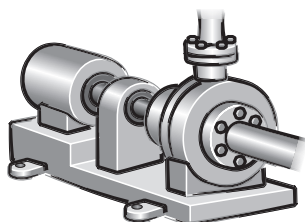
(example: pressing machine)

• Optimum excitation control

This control enables the motor efficiency to its optimum. More energy saving is possible in applications with variable load torque characteristic such as fan and pump.



(example: air-conditioning fan)

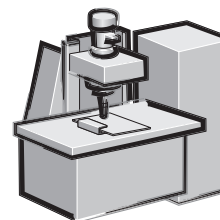


(example: pump)

• Power failure-time deceleration-to-stop function

The motor can be decelerated to a stop when a power failure or undervoltage occur to prevent the motor from coasting.

For fail-safe of machine tool, etc., it is effective to stop the motor when a power failure occurs.



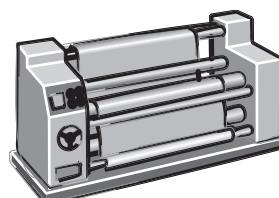
(example: spindle)

• Dancer control

Entering position detection signal of dancer roll to use PID control enables tension control by dancer roll.

• Traverse function

Traverse function for wind-up drum of spinning machine and wiredrawing machine prevents unevenness and deformation at thread winding.



(example: textile machine)



(example: wiredrawing machine)

- Features

- Standard specifications

- Outline dimension drawings

- Terminal connection diagram
- Terminal specification explanation

- Operation panel
- Parameter unit

- Parameter list

- Protective functions

- Option and peripheral devices

- Precautions for operation/selection
- Precautions for peripheral device selection

- FR-D700 Series Specification Difference List

- Warranty
- International FA Center

3 Easy use and time saving built-in as standard

(1) Quick setup with the setting dial

Setting dial is the feature of Mitsubishi inverters.

- Displayed numbers can be jumped by turning the setting dial quickly, and numbers can be changed one by one by turning it slowly, enabling speedy parameter setting.
- The nonslip setting dial is easier to turn.



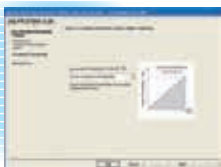
(2) Easy setting from a personal computer using the FR Configurator (option)

Connecting a personal computer and the inverter via RS-485 communication enables setting with wizard (interactive) function of the FR Configurator (inverter setup software).

In addition, a parameter setting can be converted from the FR-S500 series to the FR-D700 series by "Convert" function. "Graph" function displays monitor data in waveform.



Setting wizard function (example: acceleration/deceleration time setting)



Acceleration/deceleration pattern setting



Acceleration/deceleration time setting



Parameter list display

(3) Enclosure surface operation panel FR-PA07 (option)

Optional enclosure surface operation panel (FR-PA07) can be connected. In addition, an operation panel for the FR-E500 series can be connected.

The operation panel of the inverter can not be removed. A parameter unit connection cable (FR-CB20□) is separately necessary.



(4) Parameter unit FR-PU07 (option)

An optional parameter unit (FR-PU07) can be connected as well. A parameter unit connection cable (FR-CB20□) is separately necessary.

- Setting such as direct input method with a numeric keypad, operation status indication, and help function are usable. Eight languages can be displayed.
- Parameter setting values of maximum of three inverters can be stored.



(5) Enhanced communication function

• Mitsubishi inverter protocol and MODBUS®RTU

Communication speed of RS-485 has been improved (communication at 38.4kbps is available)

"Multi command mode" has been added to Mitsubishi inverter protocol (data processing time of the inverter has been reduced to 1/4)
Supports MODBUS®RTU

4 Compact and space saving

(1) Easily replaceable compact body

Installation size is the same as that of the FR-S500 series which is the smallest model of the Mitsubishi inverter.



FR-D740-0.4K

FR-S540E-0.4K

(2) Side by side installation saves space

Space can be saved by side by side no clearance installation*.

*: Use the inverter at the surrounding air temperature of 40°C or less.



Introducing the Mitsubishi magnetic contactor

- Offers a selection of small frames
- Supports small loads (auxiliary contact)
- Offers a line-up of safety contactors
- Supports many international regulations as standard



Refer to page 28 for the selection.

5 Easy maintenance

(1) Easy replacement of cooling fan

A cooling fan is provided on top of the inverter of all capacities requiring a cooling fan (1.5K or more).

A cooling fan can be easily replaced without disconnecting main circuit wires.



(2) Combed shaped wiring cover

Since a cover can be fitted after wiring, wiring work is easily done.



6 Environment consciousness in global standard

(1) EU RoHS Directive compliant

Human and environment-friendly inverter in compliant with RoHS Directive.

RoHS Directive requires member nations to guarantee that new electrical and electronic equipment sold in the market after July 1, 2006 do not contain lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants.

<G> mark indicating RoHS Directive compliance is printed on the package.

(2) Filterpack FR-BFP2 (option)

Power factor improving DC reactor, zero phase reactor, and capacitive filter (radio noise filter), are frequently-used units for an air conditioning application. The filterpack combines those three units are available as an option.

(3) EMC Directive compliant noise filter

Compliance to the EMC Directive of European Norm is easier.

- Noise filter option which is compatible with EMC Directive (EN61800-3 2nd Environment Category C3) is available.

(4) Compliance with a variety of standards

Complies with UL, cUL, and EC Directives (CE marking), and the Radio Waves Act (South Korea) (KC marking). It is also certified as compliant with the Eurasian Conformity (EAC).



The single-phase 100V power input model is not compliant with the EMC Directive.

7 Lineup

The lineup of three phase 200V/400V class goes to 15K.

- For a use in harsh environment, special unit with board coating is also available. Please contact our sales representative.
- For the FR-D700 series, North American (NA), EU (EC), and Chinese (CHT) specifications also are supported.

*: This catalog explains based on the Japanese specifications. Consult our sales office for specifications of each country.

FR-D740-0.4K

Symbol	Voltage
1	100V class
2	200V class
4	400V class

Symbol	Number of Power Phases
None	Three-phase input
S	Single-phase input
W	Single-phase input (double voltage output)

Symbol	Inverter Capacity
0.1K to 15K	Indicate capacity "kW".

Power Supply	Inverter Model	0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Three phase 200V	FR-D720-□K	●	●	●	●	●	●	●	●	●	●	●
Three phase 400V	FR-D740-□K	—	—	●	●	●	●	●	●	●	●	●
Single phase 200V*	FR-D720S-□K	●	●	●	●	●	●	—	—	—	—	—
Single phase 100V*	FR-D710W-□K	●	●	●	●	—	—	—	—	—	—	—

*: Output of the single-phase 200V and single-phase 100V input models is three-phase 200V.

●: Available models

—: Not available

Standard specifications

Rating

● Three-phase 200V power supply

Model FR-D720-□K		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Model FR-D720-□-NA		008	014	025	042	070	100	165	238	318	—	—
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2	0.3	0.6	1.0	1.7	2.8	4.0	6.6	9.5	12.7	17.9	23.1
	Rated current (A)	0.8	1.4	2.5	4.2	7.0	10.0	16.5	23.8	31.8	45.0	58.0
	Overload current rating*3	150% 60s, 200% 0.5s (inverse-time characteristics)										
	Rated voltage*4	Three-phase 200 to 240V										
	Regenerative braking torque*5	150%			100%			50%			20%	
Power supply	Rated input AC voltage/frequency	Three-phase 200 to 240V 50Hz/60Hz										
	Permissible AC voltage fluctuation	170 to 264V 50Hz/60Hz										
	Permissible frequency fluctuation	±5%										
	Power supply capacity (kVA)*6	0.4	0.7	1.2	2.1	4.0	5.5	9.0	12.0	17.0	20.0	27.0
Protective structure (JEM1030)		Enclosed type (IP20)										
Cooling system		Self-cooling					Forced air cooling					
Approximate mass (kg)		0.5	0.5	0.8	1.0	1.4	1.4	1.8	3.6	3.6	6.5	6.5

● Three-phase 400V power supply

Model FR-D740-□K		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	
Model FR-D740-□-NA		012	022	036	050	080	120	160	—	—	
Model FR-D740-□(SC)-EC		012	022	036	050	080	120	160	—	—	
Model FR-D740-□K-CHT		0.4	0.75	1.5	2.2	3.7	5.5	7.5	—	—	
Applicable motor capacity (kW)*1		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	
Output	Rated capacity (kVA)*2	0.9	1.7	2.7	3.8	6.1	9.1	12.2	17.5	22.5	
	Rated current (A)	1.2	2.2	3.6	5.0	8.0	12.0	16.0	23.0	29.5	
	Overload current rating*3	150% 60s, 200% 0.5s (inverse-time characteristics)									
	Rated voltage*4	Three-phase 380 to 480V									
	Regenerative braking torque*5	100%			50%			20%			
Power supply	Rated input AC voltage/frequency	Three-phase 380 to 480V 50Hz/60Hz									
	Permissible AC voltage fluctuation	325 to 528V 50Hz/60Hz									
	Permissible frequency fluctuation	±5%									
	Power supply capacity (kVA)*6	1.5	2.5	4.5	5.5	9.5	12.0	17.0	20.0	28.0	
Protective structure (JEM1030)		Enclosed type (IP20)									
Cooling system		Self-cooling				Forced air cooling					
Approximate mass (kg)		1.3	1.3	1.4	1.5	1.5	3.3	3.3	6.0	6.0	

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.

*2 The rated output capacity indicated assumes that the output voltage is 230V for three-phase 200V class and 440V for three-phase 400V class.

*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.

*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.

*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque. When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. (The option brake resistor cannot be used for 0.1K and 0.2K.) A brake unit (FR-BU2) may also be used.

*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).

● Single-phase 200V power supply

Model FR-D720S-□K		0.1	0.2	0.4	0.75	1.5	2.2
Model FR-D720S-□-NA		008	014	025	042	070	100
Model FR-D720S-□(SC)-EC		008	014	025	042	070	100
Model FR-D720S-□K-CHT		0.1	0.2	0.4	0.75	1.5	2.2
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75	1.5	2.2
Output	Rated capacity (kVA)*2	0.3	0.6	1.0	1.7	2.8	4.0
	Rated current (A)	0.8	1.4	2.5	4.2	7.0	10.0
	Overload current rating*3	150% 60s, 200% 0.5s (inverse-time characteristics)					
	Rated voltage*4	Three-phase 200 to 240V					
	Regenerative braking torque*5	150%		100%		50% 20%	
Power supply	Rated input AC voltage/frequency	Single-phase 200 to 240V 50Hz/60Hz					
	Permissible AC voltage fluctuation	170 to 264V 50Hz/60Hz					
	Permissible frequency fluctuation	±5%					
	Power supply capacity (kVA)*6	0.5	0.9	1.5	2.3	4.0	5.2
Protective structure (JEM1030)		Enclosed type (IP20)					
Cooling system		Self-cooling				Forced air cooling	
Approximate mass (kg)		0.5	0.5	0.9	1.1	1.5	2.0

● Single-phase 100V power supply

Model FR-D710W-□K		0.1	0.2	0.4	0.75
Model FR-D710W-□-NA		008	014	025	042
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75
Output	Rated capacity (kVA)*2	0.3	0.6	1.0	1.7
	Rated current (A)	0.8	1.4	2.5	4.2
	Overload current rating*3	150% 60s, 200% 0.5s (inverse-time characteristics)			
	Rated voltage	Three-phase 200 to 230V*7, *8			
	Regenerative braking torque*5	150%		100%	
Power supply	Rated input AC voltage/frequency	Single-phase 100 to 115V 50Hz/60Hz			
	Permissible AC voltage fluctuation	90 to 132V 50Hz/60Hz			
	Permissible frequency fluctuation	±5%			
	Power supply capacity (kVA)*6	0.5	0.9	1.5	2.5
Protective structure (JEM1030)		Enclosed type (IP20)			
Cooling system		Self-cooling			
Approximate mass (kg)		0.6	0.7	0.9	1.4

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.

*2 The rated output capacity indicated assumes that the output voltage is 230V.

*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load. If the automatic restart after instantaneous power failure function (Pr: 57) or power failure stop function (Pr: 261) is set and power supply voltage is low while load becomes bigger, the bus voltage decreases to power failure detection level and load of 100% or more may not be available.

*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.

*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque. When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. (The option brake resistor cannot be used for 0.1K and 0.2K.) A brake unit (FR-BU2) may also be used.

*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).

*7 For single-phase 100V power input model, the maximum output voltage is twice the amount of the power supply voltage and cannot be exceeded.

*8 In a single-phase 100V power input model, the output voltage may fall down when the load is heavy, and larger output current may flow compared to a three-phase input model. Use the motor with less load so that the output current is within the rated motor current range.

Features

Standard Specifications

Outline Dimension Drawings

Terminal Connection Diagram Terminal Specification Explanation

Operation panel Parameter unit

Parameter List

Protective Functions

Options

Instructions

FR-D700 Series Specification Difference List

Warranty International FA Center

Common specifications

Control specifications	Control method		Soft-PWM control/high carrier frequency PWM control (V/F control, General-purpose magnetic flux vector control, and Optimum excitation control are available)
	Output frequency range		0.2 to 400Hz
	Frequency setting resolution	Analog input	0.06Hz/60Hz (terminal2, 4: 0 to 10V/10 bits) 0.12Hz/60Hz (terminal2, 4: 0 to 5V/9 bits) 0.06Hz/60Hz (terminal4: 0 to 20mA/10 bits)
		Digital input	0.01Hz
	Frequency accuracy	Analog input	Within ±1% of the max. output frequency (25°C ±10°C)
		Digital input	Within 0.01% of the set output frequency
	Voltage/frequency characteristics		Base frequency can be set from 0 to 400Hz. Constant-torque/variable torque pattern can be selected
	Starting torque		150% or more (at 1Hz)...when General-purpose magnetic flux vector control and slip compensation is set
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0.1 to 3600s (acceleration and deceleration can be set individually), Linear and S-pattern acceleration/deceleration modes are available.
DC injection brake		Operation frequency (0 to 120Hz), operation time (0 to 10s), and operation voltage (0 to 30%) can be changed	
Stall prevention operation level		Operation current level (0 to 200%), and whether to use the function or not can be selected	
Operation specifications	Frequency setting signal	Analog input	Two terminals Terminal 2: 0 to 10V and 0 to 5V are available Terminal 4: 0 to 10V, 0 to 5V, and 4 to 20mA are available
		Digital input	The signal is entered from the operation panel or parameter unit. Frequency setting increment can be set.
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signal (five terminals)		The following signals can be assigned to Pr.178 to Pr.182 (input terminal function selection): multi-speed selection, remote setting, second function selection, terminal 4 input selection, JOG operation selection, PID control valid terminal, external thermal input, PU-External operation switchover, V/F switchover, output stop, start self-holding selection, forward rotation, reverse rotation command, inverter reset, PU-NET operation switchover, External-NET operation switchover, command source switchover, inverter operation enable signal, and PU operation external interlock.
	Operational functions		Maximum/minimum frequency setting, frequency jump operation, external thermal relay input selection, automatic restart after instantaneous power failure operation, forward/reverse rotation prevention, remote setting, second function, multi-speed operation, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning function, PID control, computer link operation (RS-485), Optimum excitation control, power failure stop, speed smoothing control, MODBUS RTU
	Output signal		The following signals can be assigned to Pr.190, Pr.192 and Pr.197 (output terminal function selection): inverter operation, up-to-frequency, overload alarm, output frequency detection, regenerative brake pre-alarm, electronic thermal relay function pre-alarm, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, fan alarm*1, heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, PID output interruption, safety monitor output, safety monitor output 2, during retry, life alarm, current average value monitor, remote output, alarm output, fault output, fault output 3, and maintenance timer alarm.
Indication	Operation panel	Operating status	The following signals can be assigned to Pr.54 FM terminal function selection: output frequency, output current (steady), output voltage, frequency setting, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, converter output voltage peak value, reference voltage output, motor load factor, PID set point, PID measured value, output power, PID deviation, motor thermal load factor, and inverter thermal load factor. Pulse train output (1440 pulses/s/full scale)
		Operating status	The following signals can be assigned to Pr.190, Pr.192 and Pr.197 (output terminal function selection): inverter operation, up-to-frequency, overload alarm, output frequency detection, regenerative brake pre-alarm, electronic thermal relay function pre-alarm, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, fan alarm*1, heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, PID output interruption, safety monitor output, safety monitor output 2, during retry, life alarm, current average value monitor, remote output, alarm output, fault output, fault output 3, and maintenance timer alarm.
	For meter	Pulse train output (MAX 2.4kHz: one terminal)	The following signals can be assigned to Pr.54 FM terminal function selection: output frequency, output current (steady), output voltage, frequency setting, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, converter output voltage peak value, reference voltage output, motor load factor, PID set point, PID measured value, output power, PID deviation, motor thermal load factor, and inverter thermal load factor. Pulse train output (1440 pulses/s/full scale)
Indication	Parameter unit (FR-PU07)	Fault record	The following operating status can be displayed: output frequency, output current (steady), output voltage, frequency setting, cumulative energization time, actual operation time, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, motor load factor, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, output power, cumulative power, motor thermal load factor, inverter thermal load factor, and PTC thermistor resistance.
		Interactive guidance	Fault record is displayed when a fault occurs. Past 8 fault records (output voltage/current/frequency/cumulative energization time right before the fault occurs) are stored.
		Interactive guidance	Function (help) for operation guide *2
Protective/warning function		Protective function	Overcurrent during acceleration, overcurrent during constant speed, overcurrent during deceleration, overvoltage during acceleration, overvoltage during constant speed, overvoltage during deceleration, inverter protection thermal operation, motor protection thermal operation, heatsink overheat, input phase loss *3 *4, output side earth (ground) fault overcurrent at start*3, output short circuit, output phase loss, external thermal relay operation *3, PTC thermistor operation*3, parameter error, PU disconnection, retry count excess *3, CPU fault, brake transistor alarm, inrush resistance overheat, analog input error, stall prevention operation, output current detection value exceeded *3, safety circuit fault
		Warning function	Fan alarm*1, overcurrent stall prevention, overvoltage stall prevention, PU stop, parameter write error, regenerative brake pre-alarm *3, electronic thermal relay function pre-alarm, maintenance output *3, undervoltage, operation panel lock, password locked, inverter reset, safety stop
Environment	Surrounding air temperature		-10°C to +50°C maximum (non-freezing) *5
	Ambient humidity		90%RH or less (non-condensing)
	Storage temperature*6		-20°C to +65°C
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt etc.)
	Altitude/vibration		Maximum 1000m above sea level, 5.9m/s ² or less at 10 to 55Hz (directions of X, Y, Z axes)

*1 As the 0.75K or lower are not provided with the cooling fan, this alarm does not function.

*2 This operation guide is only available with option parameter unit (FR-PU07).

*3 This protective function is not available in the initial status.

*4 This protective function is available with the three-phase power input specification model only.

*5 When using the inverters at the surrounding air temperature of 40°C or less, the inverters can be installed closely attached (0cm clearance).

*6 Temperatures applicable for a short time, e.g. in transit.



OPTIONAL SINGLE PHASE SURGE
ARRESTOR

Main

Product or component type	Surge protection device
Range of product	Square D

Complementary

Surge current	36 KA per phase
[Ue] rated operational voltage	120/240 V AC
Phase	1 phase
Wiring configuration	3-wire
[Uc] maximum continuous operating voltage	150 V
Nominal discharge current	10 KA
Short-circuit protection	25 KA
Local signalling	Status LED green normal operation
Height	2.25 In (57.15 mm)
Width	2.25 In (57.15 mm)
Depth	2.7 In (68.58 mm)
Cable length	24 In (609.60 mm)

Environment

NEMA degree of protection	NEMA 4X
Enclosure material	Black plastic
Standards	UL 1449:ed. 4 type I NEC 285 CSA C22.2 No 8
Ambient air temperature for operation	149 °F (65 °C)