



## Wilo Packaged Booster Systems

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- Pressure Regulating Valve (PRV)
- Electrical Bypass Circuit and Switch
- Shaft Grounding Ring
- Weather Hood
- Booster Expansion Tank

**Following cut sheets are typical representations of listed options. Actual components may vary according to custom requirements.**

# WORLD TOWER LIGHTS



## SERIES WTL PRODUCT PROFILE

The c3controls **Series WTL World Tower Lights** offer reliability for all your signaling needs. The space saving design is stackable to allow up to five (5) modules in a single assembly. Easy to assemble and disassemble with low power consumption integrated LEDs—no complicated center posts. c3controls Series WTL World Tower Lights will help you reduce your total installed costs and enhance the features and performance of your equipment.



### FEATURES AND BENEFITS

- Tower light assemblies provide the convenience of a single catalog number.
- Heavy-duty polycarbonate construction for excellent durability, impact resistance, superior corrosion resistance, moisture rejection and electrical insulation.
- Available in 24V AC/DC, 120V AC, and 240V AC.
- Lenses are available in five colors as well as the option of clear lenses and integrated color LEDs for a clean, modern look. Three styles of module illumination are available: continuous, flashing and rotary.
- Polycarbonate mounting bases are available in three versions: 50mm direct mount eliminates the need for drilling and reduces installation and our 50mm short and 50mm tall bases secure to the panel utilizing a 4-hole mounting pattern.



### ADVANTAGES

#### Easy Maintenance and Assembly

- No tools required—simply line up the module marking and arrow and turn; 25° clockwise to tighten and 25° counter clockwise to loosen.
- Wiring is made simple with our integrated heavy-duty polycarbonate bases. No complicated center post required for construction—just wire to the terminals.

#### Modular Space Saving Design

- Stackable design to allow up to five (5) modules in a single assembly.

#### Consistent Visibility

- c3controls selects the highest quality raw materials to ensure our products outlast the competition, including Lexan™ plastic for our lenses—improving visibility and resistance to high impact for reliable performance, even in high ambient temperatures.

#### Environmentally Secure

- Rated Type 1, 2, 3, 3R, 4/4X, 12, 13 and IP65 for watertight and corrosion resistance.

#### Energy Savings

- Our low power consumption sound modules are available in continuous or intermittent with 80dB or 100dB output, and our LED lamps last 100,000 hours—that's 11.4 years!

#### Cost Savings

- Typically 25-30% less when compared to other assemblies.
- Shipped pre-assembled—reduce time spent on the floor and improving profitability.

### APPLICATIONS

- c3controls Series WTL World Tower Lights provide visual and audible status of a machine, process or system. Their features, performance and ease of installation make them ideal for baggage handlers, conveyors, and assembly lines.

LIFETIME WARRANTY SAME-DAY SHIPPING ADVANTAGE PRICING

c3controls®

PO Box 496 • Beaver, PA 15009  
724.775.7926 • www.c3controls.com

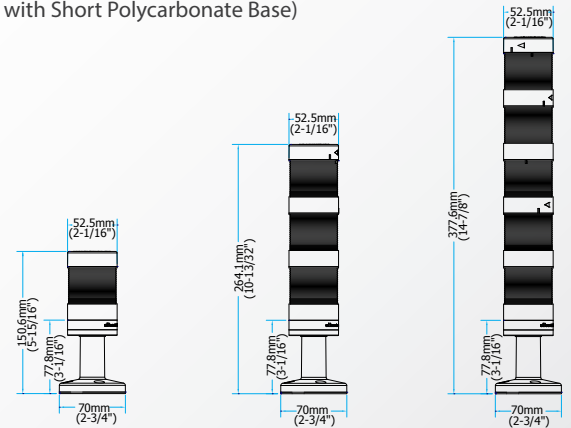
## SPECIFICATIONS

	UNITS	Light Module	Sound Module
<b>ELECTRICAL GENERAL</b>			
Rated Operating Voltage		24V AC/DC 120V AC, 240V AC	24V AC/DC 120V 60Hz/110V 50Hz 240V 60Hz/220V 50Hz
Color		Amber Blue Green Red White	Grey
Lumens	mcd	150 ~ 1500	N/A
Sound Output	dB	N/A	80 ~ 100
Design Life	Hrs.	100k	100k
Current Draw	mA	5 ~ 80	5 ~ 20
Lamp Type		LED	N/A
Shock & Vibration		Excellent	Excellent
Electrical Leakage Protection	mA	< 5	< 5
Dielectric Strength (Mechanical Contacts)		1500V for 1 Minute	
<b>ENVIRONMENTAL</b>			
Ingress Protection		Type 1, 2, 3, 3R, 4/4X, 12 and 13	
	IP	65 (as per IEC 60529)	
Ambient Operating Temperature	°C/°F	-30 to +60° C (-22 to +140° F)	
Ambient Storage Temperature	°C/°F	-30 to +70° C (-22 to +158° F)	
<b>TERMINAL CONSTRUCTION</b>			
Wire Size			
Copper only, stranded	mm <sup>2</sup>	0.3255 ~ 1.2	
	AWG	22 ~ 16	
<i>NOTE: Only one wire permitted per termination</i>			
Tightening Torque	Nm	0.5 ~ 0.9	
	Lb-in.	5 ~ 8	
<b>ROHS COMPLIANCE</b> For RoHS compliance documentation by product, refer to <a href="http://www.c3controls.com">www.c3controls.com</a> .			

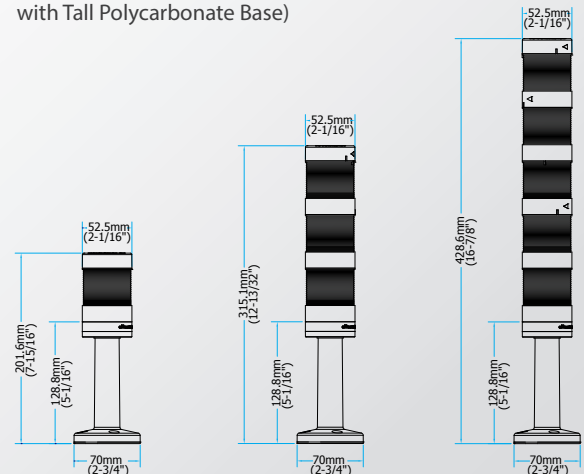
For complete ratings and detailed specifications refer to [www.c3controls.com](http://www.c3controls.com).

## DIMENSIONS

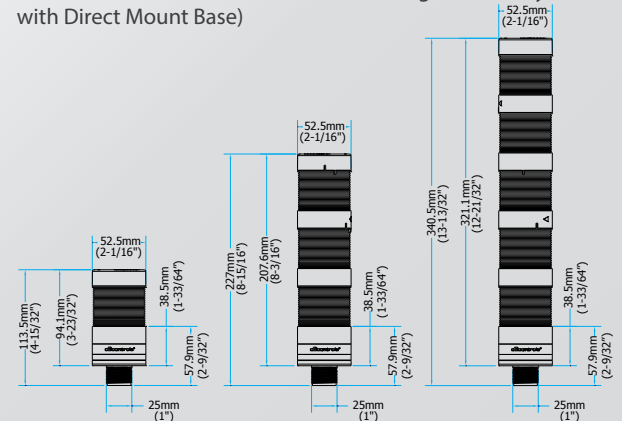
Series WTL-50P1 (50mm Diameter Tower Light Assembly with Short Polycarbonate Base)



Series WTL-50P2 (50mm Diameter Tower Light Assembly with Tall Polycarbonate Base)

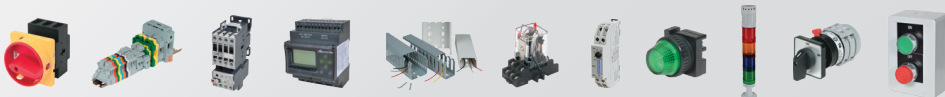


Series WTL-50P3 (50mm Diameter Tower Light Assembly with Direct Mount Base)



## CERTIFICATIONS

For information on certifications please contact Customer First at 724.775.7926 or email [info@c3controls.com](mailto:info@c3controls.com)

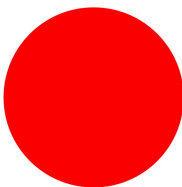
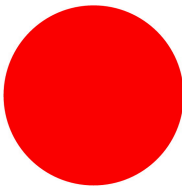
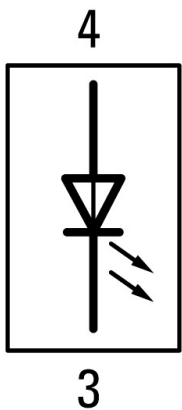




Indicator light, Flat, Screw connection, Lens Red, LED Red, 24 V AC/DC

**Part no.** C22-L-R-24  
**Catalog No.** 121627  
**Alternate Catalog No.** C22-L-R-24

### Delivery program

Product range			RMQ Compact
Basic function			Indicator lights
Single unit/Complete unit			Complete unit
Design			Flat
Connection type			Screw connection
<b>Colour</b>			
Lens			Red
Lens			
LED			
LED			Red
Rated operational voltage LED			24 V AC/DC
Degree of Protection			IP66, IP67, IP69
Connection to SmartWire-DT			no
Contact sequence			

### Technical data

<b>General</b>			
Standards			IEC/EN 60947-5-1 VDE 0660
Climatic proofing			Damp heat, constant, to IEC 60068-2-78 Damp heat, cyclic, to IEC 60068-2-30
Degree of Protection			IP66, IP67, IP69
Ambient temperature			
Open		°C	-25 - +70
Storage		°C	- -30 - + 80
Mounting position			As required

Terminal capacities		mm <sup>2</sup>	
Solid		mm <sup>2</sup>	2 x 0.5 - 1.5_x
Flexible with ferrule		mm <sup>2</sup>	2 x 0.5 - 1.5_x
Tightening torque for terminal screw		Nm	0.8

## Contacts

Rated impulse withstand voltage	U <sub>imp</sub>	V AC	4000
Rated insulation voltage	U <sub>i</sub>	V	250
Rated conditional short-circuit current	I <sub>q</sub>	kA	1
Overvoltage category/pollution degree			III/3

## Design verification as per IEC/EN 61439

Technical data for design verification			
Operating ambient temperature min.		°C	-25
Operating ambient temperature max.		°C	70

## Technical data ETIM 7.0

Low-voltage industrial components (EG000017) / Indicator light complete (EC000272)

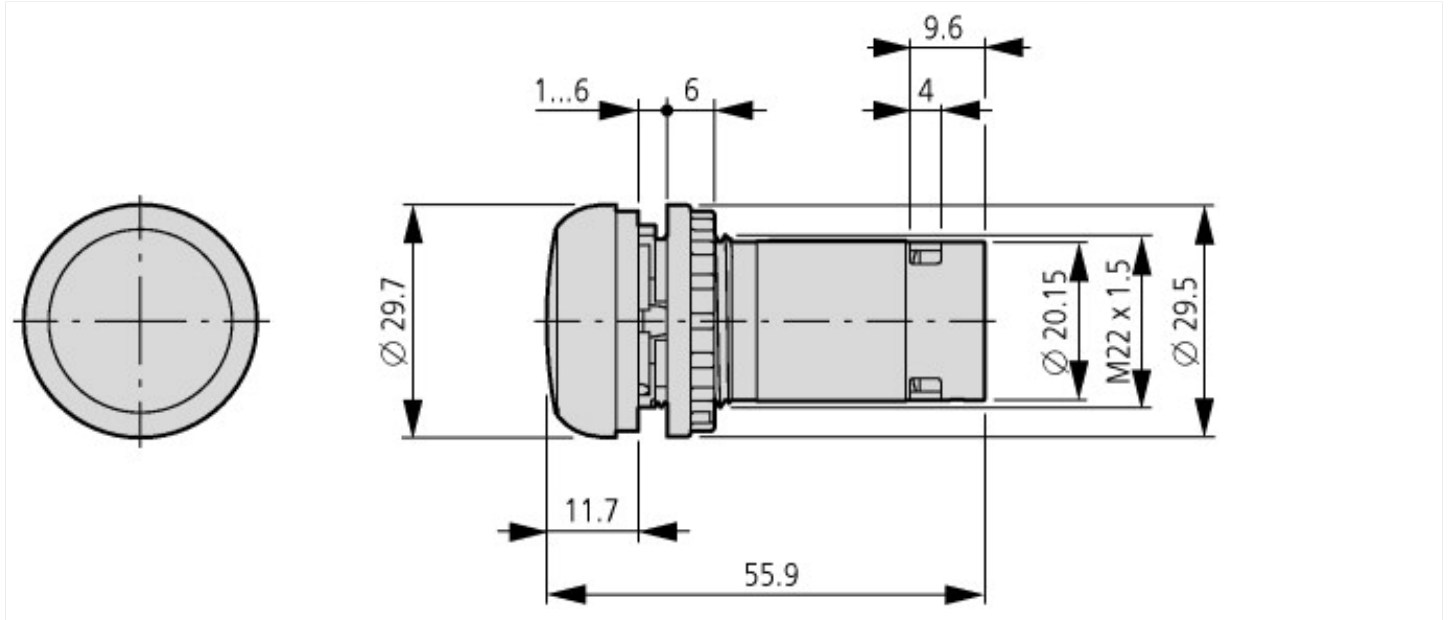
Electric engineering, automation, process control engineering / Low-voltage switch technology / Command and alarm device / Indicator light complete (ecl@ss10.0.1-27-37-12-23 [AKF041014])

Number of indicator lights			1
Colour lens			Red
Type of lamp socket			LED
With light source			Yes
Rated operating voltage U <sub>e</sub>		V	24 - 24
Voltage type			AC/DC
Type of electric connection			Screw connection
Construction type lens			Round
Type of lens			Flat
Hole diameter		mm	22.5
Width opening		mm	0
Height opening		mm	0
With front ring			Yes
Material front ring			Plastic
Colour front ring			Other
Degree of protection (IP)			Other
Degree of protection (NEMA)			

## Approvals

Product Standards			IEC/EN 60947-5-1; UL 508; CAN/CSA-C22.2 No. 14-05 und 94-M91; CE marking
UL File No.			E29184
UL Category Control No.			NKCR
CSA File No.			165628
CSA Class No.			321103
North America Certification			UL listed, CSA certified
Degree of Protection			1,3R,4X,12,13

## Dimensions

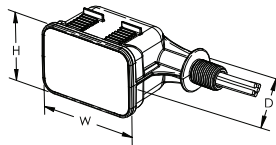


# Service Entrance Suppressor(P), 40 kA – SES40P4803P



The nVent ERICO SES40P Series of Surge Protective Devices (SPD) provide economical protection against damaging transients and surge events. These Type 1 devices are UL® Listed to UL 1449 Edition 4 and cUL® Listed to CAN/CSA C233.1. This allows installations on the line or load side (Type 1 or Type 2) of the service panel in accordance with the NEC® 2014 or CAN/CSA C233.1 without the requirement for additional circuit breakers or fuses. Primary applications are service entrance, branch, commercial, industrial, and residential. Other applications include OEM panels, solar combiner boxes, UL 96A lightning protection installations and light pole applications. The housing is constructed of UV-stabilized thermoplastic and meets the UL 50 Type 4x rating, making it ideal for both indoor and outdoor applications. All of the models have a 20kA nominal discharge current rating, the highest level recognized under the UL 1449 Edition 4 standard.

- Compact design can be directly mounted to panel or installed in a small space
- Front-facing design eases installation and performance monitoring
- 40 kA 8/20  $\mu$ s maximum surge rating per mode
- UL® 50 Type 4X
- Optional Flush Mounting Plate



Part Number	SES40P4803P
Nominal System Voltage (Un)	277/480 VAC
Distribution System	3Ph 4W+G 3Ph $\Delta$ 3W+G
Max Continuous Operating Voltage (Uc)	340/590 VAC
Frequency	0 – 100 Hz
Short Circuit Current Rating (SCCR)	200 kA
Nominal Discharge Current (In), Per Mode	20 kA 8/20 $\mu$ s
Max Discharge Current (Imax), Per Mode	40 kA 8/20 $\mu$ s
Voltage Protection Rating (VPR), L-L	2,500 V
Voltage Protection Rating (VPR), L-N	1,500 V
Voltage Protection Rating (VPR), L-PE	2,500 V
Voltage Protection Rating (VPR), N-PE	1,500 V
Status Indication	Blue LED
Technology	MOV with thermal disconnect
Lead Length	36"
Lead Size	#12
Temperature	-40 to 176 °F

Part Number	SES40P4803P
Enclosure Material	UL® 94V-0 Thermoplastic
Enclosure Rating	NEMA®-4X IP 65
Mounting	1/2" straight nipple
Unit Weight	0.85 lb
Certification Details	UL® 1449 Edition 4 Type 1/2, 20 kA Mode
Complies With	ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C
Depth (D)	3"
Height (H)	2 3/4"
Width (W)	4 3/4"
Certifications	cULus
Standard Packaging Quantity	1 pc
UPC	78285685913

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**WARNING**

nVent products shall be installed and used only as indicated in nVent's product instruction sheets and training materials. Instruction sheets are available at [www.erico.com](http://www.erico.com) and from your nVent customer service representative. Improper installation, misuse, misapplication or other failure to completely follow nVent's instructions and warnings may cause product malfunction, property damage, serious bodily injury and death and/or void your warranty.

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## Appendix B. Reference

## Appendix B.1. Specifications



	GW-BAC1
<b>Electrical Connections</b>	One 6-pin Phoenix connector, one RS-485 +/- ground port, power +/- frame ground port One 3-pin RS-485 Phoenix connector, one RS-485 +/- ground port One Ethernet-10/100 Ethernet port
<b>Approvals:</b>	CE Certified; TUV approved to UL 916, EN 60950-1, EN 50491-3 and CSA C22-2 standards; FCC Class A Part 15; DNP3 Conformance Tested; OPC Self-tested for Compliance; RoHS Compliant; CSA 205 Approved BTL Marked
<b>Power Requirements</b>	Multi-mode power adapter: 9-30VDC or 12 - 24VAC
<b>Physical Dimensions</b>	11.5 cm L x 8.3 cm W x 4.1 cm H (4.5 x 3.2 x 1.6 in.)
<b>Weight:</b>	0.2 kg (0.4 lbs)
<b>Operating Temperature:</b>	-40°C to 75°C (-40°F to 167°F)
<b>Surge Suppression</b>	EN61000-4-2 ESD EN61000-4-3 EMC EN61000-4-4 EFT
<b>Humidity:</b>	5 - 90% RH (non-condensing)
(Specifications subject to change without notice)	

Figure 36: Specifications

## Appendix B.2. Compliance with UL Regulations

For UL compliance, the following instructions must be met when operating GW-BAC1.

- The units shall be powered by listed LPS or Class 2 power supply suited to the expected operating temperature range.
- The interconnecting power connector and power cable shall:
  - Comply with local electrical code.
  - Be suited to the expected operating temperature range.
  - Meet the current and voltage rating for GW-BAC1/Net
- Furthermore, the interconnecting power cable shall:
  - Be of length not exceeding 3.05m (118.3")
  - Be constructed of materials rated VW-1 or FT-1 or better
- If the unit is to be installed in an operating environment with a temperature above 65 °C, it should be installed in a Restricted Access Area requiring a key or a special tool to gain access
- This device must not be connected to a LAN segment with outdoor wiring.



## AMHMI142CCL

14"x12" HMI Cover Kit with hinged clear cover and stainless-steel snap latch

**Availability:**

Delivery may take longer than normal. For up-to-date delivery on this product, please contact us at 1-800-722-2679 or [sales@alliedmoulded.com](mailto:sales@alliedmoulded.com)

**Cover Type:** Clear Polycarbonate

**Closure Type:** Metal Snap Latch

**Mounting Description:** 10 Screws

**Box Features:**

**Installation Type:**

**Height:** 13.95 in

**Width:** 12.07 in

**Depth:** 0.96 in

**Usable Depth:** 2.2 in

**Volume:** 370 cu in

## Product Info

**UPC:** 85339991960

**UNSPSC:** 39121302

**Carton Quantity:** 1

**Carton. Weight:** 5 lbs

**Carton Length:** 5 in

**Carton Width:** 16 in

**Carton Height:** 16 in

**Country of Origin:** United States of America

**Color:** Gray (RAL 7035) with clear cover

**Material:** Polycarbonate frame and clear polycarbonate cover

**Additional Materials:** 316 stainless steel external hardware, Polyurethane (FIP) Formed-In-Place gasket system

**Features:**

Non-corrosive, non-conductive, light weight with lower installation cost and longer life cycle cost compared to steel. Rigid design with a gasket system encased in a continuous channel on the cover and frame. Open back frame design with an opening size of 12.49" x 10.71" and is a UL recognized component for use with NEMA 4X enclosures. \*Will fit Allied Moulded enclosure sizes 16"x14" and larger.

**Application:**

Cover and protect electrical and electronic controls including HMI (Human Machine Interface) instruments, touch pad controllers and pushbuttons mounted on the surface of NEMA 4X enclosures. No need to open the enclosure to view electronics or perform maintenance, decreasing arc flash risks and safety hazards.

**Standards:**

Meets Requirements: ANSI/UL50, ANSI/UL50E, and ANSI/UL508A; [File No. E487574](#)

UL® listed and recognized component for use with CSA® listed enclosure products Types 1, 2, 3, 3R, 4, 4X, 12 and 13.

Complies With:

1. EN / IEC 60204-1 and 60529 Type IP66
2. RoHS directive





## SHADE AIDE™ Allows You to View HMI Screen in Any Weather Conditions

The Patent Pending **SHADE AIDE™** by Smith & Loveless blocks harmful rays, allowing you to view your HMI screen on non S&L controllers in any weather condition.

The **SHADE AIDE™** comes completely assembled. Simply match drill on the front of the control panel to the **SHADE AIDE™**'s installation template, install the gas tight sealing washers and sealing gasket when you install the screws and nuts and you easily maintain your NEMA 4X control panel rating. The **SHADE AIDE™** collapses when not in use and is fully lockable. It also protects your display from the harmful effects of constant UV ray exposure. Start viewing your display - no matter how bright the sun!

### SHADE AIDE™ (PART DESCRIPTION)

### PART #

<b>SHADE AIDE™</b> Kit, Small (covers HMI Screen 9.5" W x 7" H x 2.25" D)	H87A379
<b>SHADE AIDE™</b> Kit, Small Stainless Steel (covers HMI Screen 9.5" W x 7" H x 2.25" D)	H87A379B
<b>SHADE AIDE™</b> Kit, Large (covers HMI Screen 15" W x 11" H x 2.25" D)	H87A485
<b>SHADE AIDE™</b> Kit, Large Stainless Steel (covers HMI Screen 15" W x 11" H x 2.25" D)	H87A485A
<b>SHADE AIDE™</b> Kit, Extra Large (covers HMI Screen 19.875" W x 14" H x 2.25" D)	H87A503A
<b>SHADE AIDE™</b> Kit, Extra Large Stainless Steel (covers HMI Screen 19.875" W x 14" H x 2.25" D)	H87A503B

## Omron HMI Part #

## SHADE AIDE™

## SHADE AIDE™ Stainless Steel

NA5-12W101B  
NA5-12W101S  
NA5-15W101B  
NA5-15W101S  
NA5-7W001B  
NA5-7W001S  
NA5-9W001B  
NA5-9W001S

H87A485  
H87A485  
H87A485A  
H87A503A  
H87A379  
H87A379  
H87A503A  
H87A503A

H87A485A  
H87A485A  
H87A503B  
H87A503B  
H87A379B  
H87A379B  
H87A503B  
H87A503B

NS10-TV00B-V2  
NS12-TS00B-V2  
NS12-TS01B-V2  
NS15-TX01B-V2  
NS5-SQ00B-V2  
NS5-SQ01B-V2  
NS5-TQ00B-V2  
NS5-TQ01B-V2  
NS8-TV00B-V2  
NS8-TV01B-V2  
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H87A379B



Allen Bradley	Model	Screen Type	SHADE AIDE™ PN
2711 Panel View Standard Terminal	600	Key/Touch	H87A485
2711 Panel View Standard Terminal	600	Touch	H87A379
2711C Panel View Component Terminal	C600	Touch	H87A379
2711C Panel View Component Terminal	C1000	Touch	H87A485
2711P Panel View Plus, Plus CE, Plus Compact	400	Key/Touch	H87A379
2711P Panel View Plus, Plus CE, Plus Compact	600	Key/Touch	H87A485
2711P Panel View Plus, Plus CE, Plus Compact	600	Touch	H87A379
2711 Panel View Plus, Plus CE	700	Key/Touch	H87A485
2711P Panel View Plus, Plus CE, Plus Compact	1000	Touch	H87A485



Your Enclosure Source®

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

## SCE-30EL2410SSLP



## Product Specifications:

**Part Number:** SCE-30EL2410SSLP  
**Description:** S.S. EL Enclosure  
**Height:** 30.00"  
**Width:** 24.00"  
**Depth:** 10.00"  
**Price Code:** S5  
**Catalog Page:** 272  
**Est. Ship Weight:** 68.00 lbs

### Construction

- \* 0.075 In. stainless steel Type 304.
- \* 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.
- \* Stainless steel concealed hinges.
- \* Removable and interchangeable doors.
- \* Black quarter turn latches.
- \* Latches are opened or closed with a screwdriver (optional tamper-resistant inserts are available).
- \* 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.

### Application

Designed to house electrical and electronic controls, instruments and components in areas which may be regularly hosed down or are in very wet conditions. Provides protection from dust, dirt, 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](http://www.saginawcontrol.com/instman/considerations.pdf)

### Options

Optional mounting feet available. Door hardware available.

### Finish

#4 brushed finish on all exterior surfaces. Optional sub-panels are powder coated white.

### Industry Standards - (IS6)

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

### Notes

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.

### Optional Accessories

SCE-30P24 Subpanel, Bent  
SCE-30P24GALV Subpanel, Bent Galvanized  
SCE-BVK Breather Vent  
SCE-DF30EL24LP Panel, Dead Front (Wall Mount)  
SCE-DS24SS Shield, S.S. Drip  
SCE-ELFM24WSS S.S. EL Flush Mount Frame  
SCE-ELFM30HSS S.S. EL Flush Mount Frame  
SCE-ELMFK4 Foot Kit, EL Mounting (4pc.)  
SCE-ELSP3 KIT, Swing-Out Panel (20 High & Up)  
SCE-RD30EL24SS Door, Replacement

### Similar Part Numbers

SCE-20EL1606SSLPS.S. EL Enclosure  
SCE-20EL1608SSLPS.S. EL Enclosure  
SCE-20EL1610SSLPS.S. EL Enclosure  
SCE-20EL2006SSLPS.S. EL Enclosure  
SCE-20EL2008SSLPS.S. EL Enclosure  
SCE-20EL2010SSLPS.S. EL Enclosure  
SCE-20EL2012SSLPS.S. EL Enclosure  
SCE-20EL2408SSLPS.S. EL Enclosure  
SCE-24EL1608SSLPS.S. EL Enclosure  
SCE-24EL2006SSLPS.S. EL Enclosure

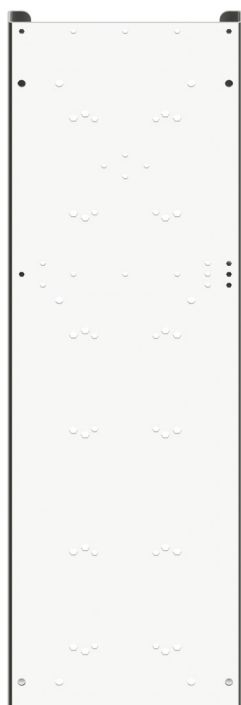
### Installation Information

- \* Mounting Foot Kit for Enviroline Enclosures
- \* EL Flush Mount Frame
- \* Drip Shield Kit Assembly
- \* Dead Front Wall Mount Installation Instructions
- \* Swing Panel Assembly for Enviroline Enclosures
- \* Dead Front Wall Mount < 20 In Height Installation Instructions
- \* Swing Panel ELSP3 for Encl. Height > 16
- \* Swing Panel ELSP for Encl. Height <= 16
- \* Sealing Washer Specifications
- \* Enviroline Series Single Door Enclosure

## 304 Stainless Steel Baseplate



- **304 Stainless Steel**
- **Enhanced anti-corrosion**
- **0.25" Thick Rolled/Formatted**
- **Efficient Space Saving Design**
- **Design fit for best per pump space utilization**
- **Ideally suited for narrow entranceways and installation footprints**



## The TDHTT Series Low Cost Industrial Temperature Transducer



### SERIES: TDHTT

#### APPLICATIONS

- Hydraulic / Mobile Hydraulic
- Automated Systems
- Energy and water management
- Anywhere Accurate Temperature Measurement of fluids is required

#### DESCRIPTION

The TDHTT series temperature transducer is built using dependable thermistor based sensing technology with industry standard voltage or current outputs.

Perfect for a wide range of applications, this solution is perfect for communicating accurate temperature measurements to panel mount displays, PLC's, or data acquisition systems.

#### FEATURES

- Low Cost
- Wide Temperature Measurement Range
- Industry Standard Analog Outputs
- 316 Stainless Steel Wetted Parts
- Excellent Long Term Stability
- OEM Tested and Approved

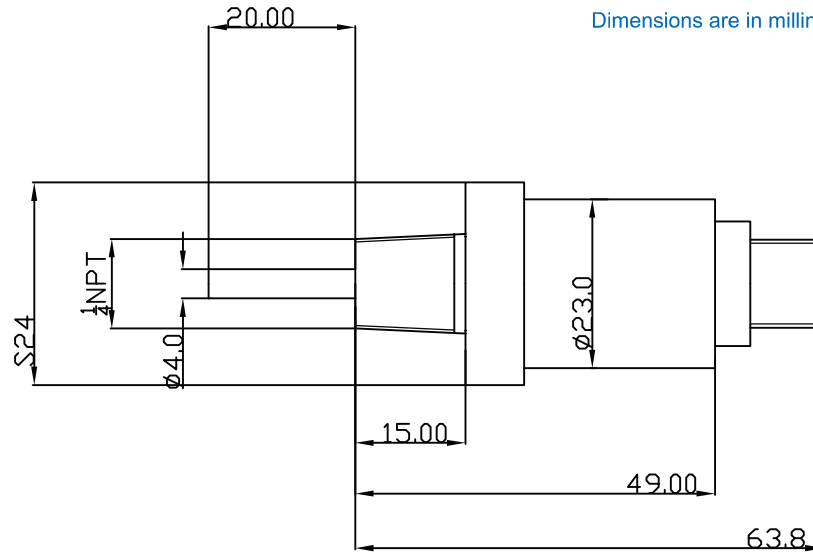
#### ELECTRICAL CONNECTIONS

Signal	Function	Color	Pin
0.5-4.5V	Supply V +	Brown	1
0-5V	Output +	White	2
0-10V	Com	Blue	3
4-20mA	Supply V +	Brown	1
	Output	Blue	3

M12



## DIMENSIONS



Dimensions are in millimeters and for reference only

## SPECIFICATIONS

### Performance @ 25°C (77 °F)

Accuracy	1% FS
Stability	0.2% FS
Measuring Temperature Range	-40 to 200° C (-40 to 392° F)
Max Continuous Temperature	250° C (482° F) (media)
Operating Temperature Range	-40 to 85° C (-40 to 185° F) (electronics)
Current Consumption	23mA for 4-20mA 8mA for 0-5V 11mA for 0-10V
Max Pressure for 4mm Diameter Probe	70 bar (1015 psi)
Max Pressure for 6mm Diameter Probe	300 bar (4351 psi)
Max Pressure for 8mm Diameter Probe	500 bar (7252 psi)

### Input

Supply Voltage / (Output)	9-32 VDC / (4-20mA)
	12-32 VDC / (0-5 VDC)
	12-32 VDC / (0-10 VDC)
	5 VDC / (0.5-4.5 VDC) ratiometric
	7-32 VDC (0.5-4.5 VDC) non-ratiometric

### Mechanical Configuration

Probe Lengths	50mm, 100mm, 150mm *
Process Connection	1/4 NPT (standard) *
Electrical Connection	4-pin M12 *
Ingress Rating	IP67 with T-Direct standard M12 cable
Housing	304 stainless steel
Wetted Parts	316SS

TRANSUCERS  
direct®

For best performance use shielded cables.

Mating connectors and cable assemblies sold separately.

\* Consult factory for further OEM options.

## ORDERING

Series TDHTT	Output B	Electrical Connection Q	Probe Length 50	Pressure Port 03	Temperature Range 0-200° F
	B = 4-20mA (2 wire) C = 0-5VDC (3 wire) **	Q = 4-pin M12 **	50mm 100mm 150mm **	03 = 1/4" NPT Male **	-40-392° F

\*\* = Consult factory for further OEM options

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use. While we provide application assistance personally, through our literature and the Transducers Direct web site, it is up to the customer to determine the suitability of the product in the application.



# ECONO/HAT-RA

## PUMP THERMAL RELIEF

### BENEFITS

- Protects pump and pump seals from over-temperature damage
- Prevents potentially scalding water from being distributed to users
- Self-operating, no power or signal required
- Completely mechanical thermal relief for booster pumps and cooling jackets
- Temperature response is unaffected by pressure variations
- Wrench flats for easy installation

### DESIGN FEATURES

- Exclusive **Thermoloid**® thermal actuator
- Compact, low mass
- Corrosion resistant, long service life
- Ram-type plug for tight, reliable shutoff
- Narrow temperature band

### APPLICATIONS

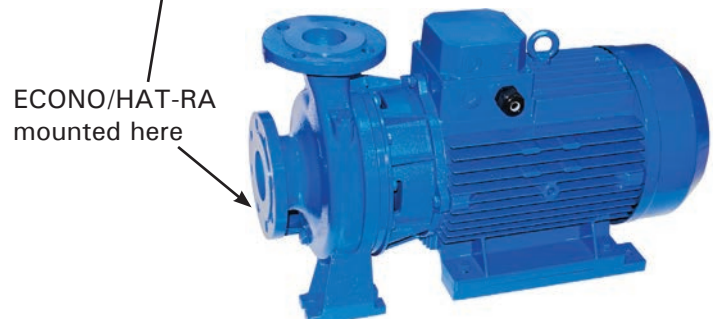
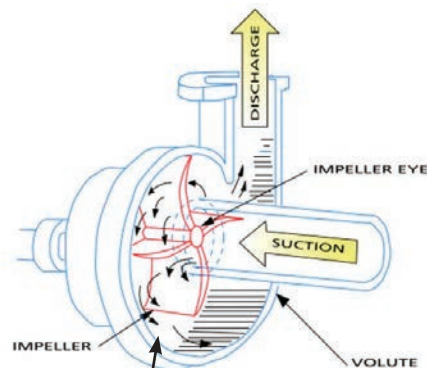
The **ECONO/HAT-RA** valve is perfect for thermal relief of booster pumps, controlling cooling water outlet temperature, and controlling flow of cooling water, glycol or other cooling media in applications requiring economical removal of heat from equipment or a process. Since the **ECONO/HAT-RA** valves open on rising temperatures, they can be used in many other thermal relief valve applications.

### OPERATION

As the fluid temperature increases to within the operating range of the **ECONO/HAT-RA**, the thermal actuator modulates the valve open. If the fluid temperature is above the acceptable range, the valve will continue to modulate open allowing additional fluid discharge. As the outlet temperature falls slightly, the valve then modulates toward the closed position, reducing flow. This modulating action maintains a relatively constant fluid temperature even as operating conditions vary.



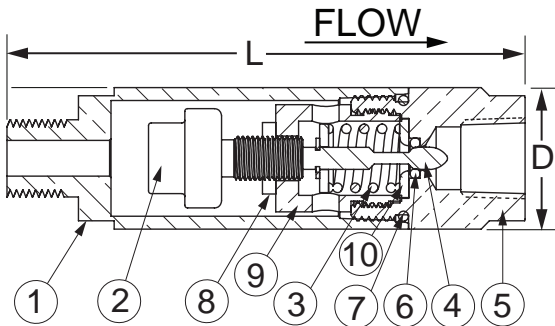
### SAMPLE APPLICATION



# ECONO/HAT-RA

## PUMP THERMAL RELIEF VALVE

### PARTS & MATERIALS



ITEM	DESCRIPTION	MATERIAL
1	VALVE BODY	Brass or 300 Series SS
2	THERMAL ACTUATOR	Brass or 300 Series SS
3	OPERATING SPRING	300 Series SS
4	RAM-TYPE PLUG	300 Series SS
5	SEAT FITTING	Brass or 300 Series SS
6	SEAT SEAL	PTFE
7	BODY SEAL	BUNA (NSF-61 Certified)
8	CALIBRATION LOCKNUT	300 Series SS
9	SEAT RETAINER	Brass or 300 Series SS
10	SEAT INSERT	Brass or 300 Series SS

### DIMENSIONS & CAPACITIES

SIZE (NPT)	D		L		Weight		C <sub>v</sub>	Maximum Operat- ing Pressure	Maximum Temperature
	in	mm	in	mm	Lb	Kg			
1/4" Brass	1.0	25	3.6	89	0.4	0.2	0.5	300 PSIG (20.7 BAR)	250°F (121°C)
1/4" SS								400 PSIG (27.6 BAR)	

### ORDERING

Part Number	Description
242 - 000000 - XXX	1/4" ECONO/HAT-RA M/F
242 - 010000 - XXX	1/4" ECONO/HAT-RA M/F SS

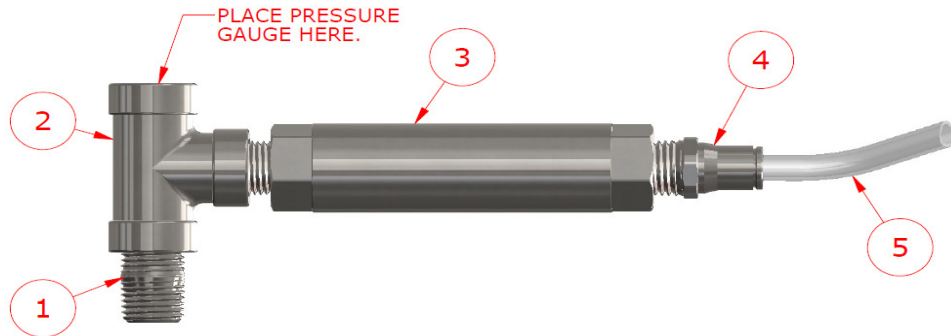
### NOTES

1. Full open temperatures "XXX" available: 040°F, 045°F, 050°F, 060°F, 070°F, 075°F, 085°F, 095°F, 100°F, 105°F, 110°F, 115°F, 120°F, 125°F, 130°F, 140°F, 150°F, 160°F, 170°F, 175°F, 180°F, 190°F, 200°F and 210°F.
2. Note: Closing temperature is typically 10°F below opening temperature.
3. A #20 mesh strainer is recommended.
4. Warranty information disclosed at [www.thermomegatech.com/terms-conditions/](http://www.thermomegatech.com/terms-conditions/)

**Kit Allows for draining blow-down water away from assembly**

**Includes: - Thermal Relief Valve - Tube Fitting - 10 ft coil of tubing**

### SUCTION MANIFOLD RELIEF VALVE ASSEMBLY



**ASSEMBLY INSTRUCTIONS**

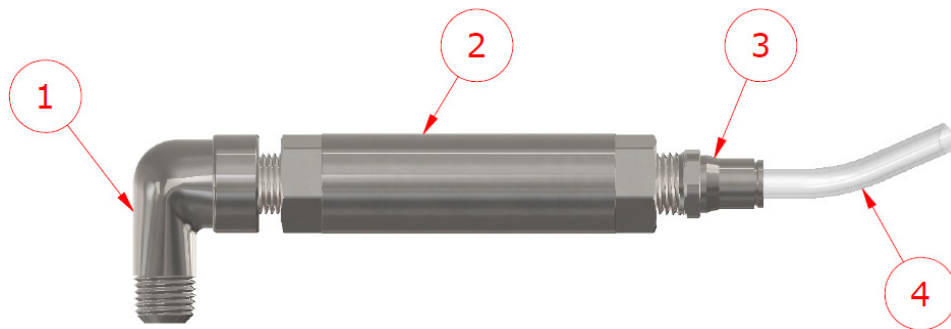
NOTE: USE TEFLON TAPE ON ALL MALE THREADS

- 1) REMOVE PRESSURE GAUGE FROM BALL VALVE ON SUCTION MANIFOLD.
- 2) ASSEMBLE CLOSE NIPPLE (ITEM #1) INTO BALL VALVE OPENING.
- 3) ASSEMBLE THE REMAINDER OF THE RELIEF VALVE COMPONENTS AS SHOWN ABOVE.
- 4) REINSTALL PRESSURE GAUGE AS SHOWN ABOVE.
- 5) SECURE TUBING TO FRAME USING CABLE TIES AND MOUNTING PADS.

**NOTE: ONE RELIEF VALVE REQUIRED PER BOOSTER ASSEMBLY.**  
**TEMPERATURE RATING: 190°F**

Item #	Part #	Description	Qty
1	2704137	1/4" MNPT STAINLESS CLOSE NIPPLE	1
2	2704136	1/4" FNPT STAINLESS TEE	1
3	2704026	1/4" MNPT X 1/4" FNPT STAINLESS THERMAL RELIEF VALVE	1
4	2704027	1/4" MNPT X 1/4" STAINLESS COMPRESSION TUBE FITTING	1
5	2704029	1/4" NYLON TUBING	10 FT
6	2704034	6" CABLE TIES (NOT SHOWN)	4
7	2704035	CABLE TIE MOUNTING PAD (NOT SHOWN)	4

### PUMP RELIEF VALVE ASSEMBLY



**ASSEMBLY INSTRUCTIONS**

NOTE: USE TEFLON TAPE ON ALL MALE THREADS

- 1) REMOVE 1/4" NPT PIPE PLUG FROM VOLUTE.
- 2) ASSEMBLE STREET ELBOW (ITEM #1) IN VOLUTE WHERE PIPE PLUG WAS REMOVED.
- 3) ASSEMBLE THE REMAINDER OF THE RELIEF VALVE COMPONENTS AS SHOWN ABOVE.
- 4) SECURE TUBING TO FRAME USING CABLE TIES AND MOUNTING PADS.

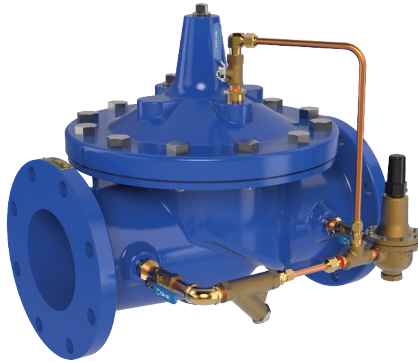
**NOTE: ONE RELIEF VALVE REQUIRED PER PUMP.**  
**TEMPERATURE RATING: 190°F**

Item #	Part #	Description	Qty
1	3350871	1/4" MNPT X 1/4" FNPT STAINLESS STREET ELBOW	1
2	2704026	1/4" MNPT X 1/4" FNPT STAINLESS THERMAL RELIEF VALVE	1
3	2704027	1/4" MNPT X 1/4" STAINLESS COMPRESSION TUBE FITTING	1
4	2704029	1/4" NYLON TUBING	10 FT
5	2704034	6" CABLE TIES (NOT SHOWN)	4
6	2704035	CABLE TIE MOUNTING PAD (NOT SHOWN)	4



# MODEL 90-01

## Pressure Reducing Valve



- Sensitive and Accurate Pressure Control
- Easy Adjustment and Maintenance
- Optional Check Feature
- Fully Supported Frictionless Diaphragm
- Meets National Lead Reduction Mandate

The Cla-Val Model 90-01 Pressure Reducing Valve automatically reduces a higher inlet pressure to a steady lower downstream pressure, regardless of changing flow rate and/or varying inlet pressure. This valve is an accurate, pilot-operated regulator capable of holding downstream pressure to a pre-determined limit. When downstream pressure exceeds the pressure setting of the control pilot, the main valve and pilot valve close drip-tight.

### Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X58 Restriction Fitting
3	CRD Pressure Reducing Control

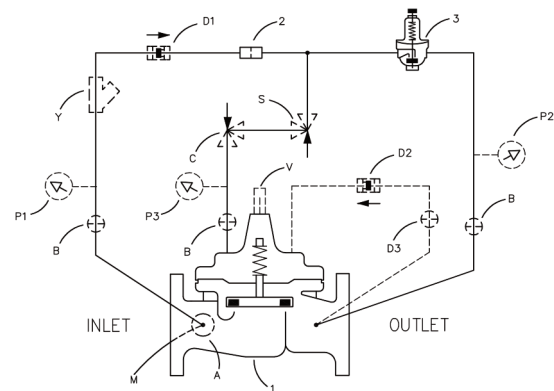
If a check feature is added, and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber, closing the valve to prevent return flow.

For space savings, see Cla-Val Model 90-48 or 90-99 with integral Low Flow Bypass Pressure Regulator.

### Optional Features

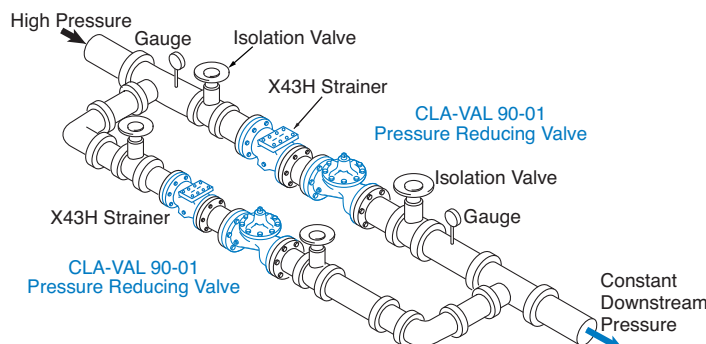
Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)*
D	Check Valves with Isolation Valve
M	X144 e-FlowMeter
P	X141 Pressure Gauge
S	CV Flow Control (Opening)
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer

\*The closing speed control (optional) on this valve should always be open at least three (3) turns off its seat.

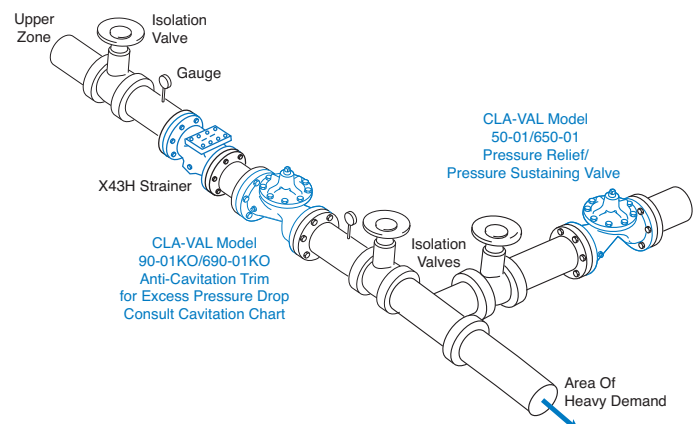


### Typical Applications

Typical applications include pressure reducing valve station using Model 90-01 and Model 90-01 in parallel to handle wide range of flow rates. Larger Model 90-01 valve meets requirements of peak loads and smaller Model 90-01 handles low flows. A downstream pressure relief valve is also recommended for this type of application.



Cla-Val Model 90-01KO Pressure Reducing Valve with Anti-Cavitation Trim provides for optimum downstream pressure control while reducing noise and eliminating damage associated with cavitation. See Cavitation Guide to determine if the valve is a candidate for the KO Anti-Cavitation Trim. A downstream pressure relief valve is recommended for this type of application.



## Model 90-01 (Uses 100-01 Hytrol Main Valve)

### Pressure Ratings (Recommended Maximum Pressure - psi)

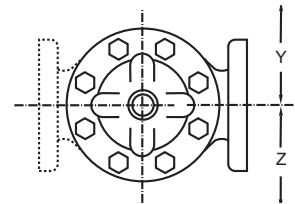
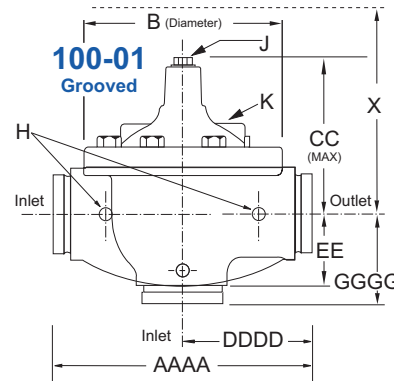
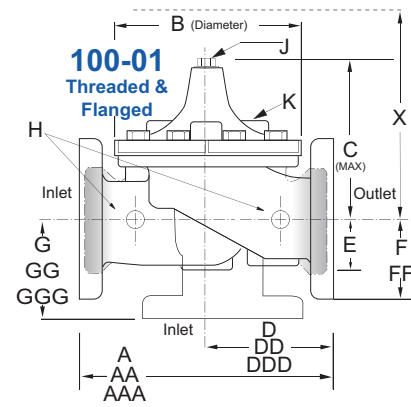
Valve Body & Cover		Pressure Class				
		Flanged			Grooved	Threaded
Grade	Material	ANSI Standards*	150 Class	300 Class	300 Class	End‡ Details
ASTM A536	Ductile Iron	B16.42	250	400	400	400
ASTM A216-WCB	Cast Steel	B16.5	285	400	400	400
UNS 87850	Bronze	B16.24	225	400	400	400

Note: \* ANSI standards are for flange dimensions only.  
 Flanged valves are available faced but not drilled.  
 ‡ End Details machined to ANSI B2.1 specifications.  
**Valves for higher pressure are available; consult factory for details**

### Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	1" - 36" 25 - 900mm	1" - 16" 25 - 400mm	1" - 16" 25 - 400mm
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze
Trim: Disc Guide, Seat & Cover Bearing	Bronze is Standard Stainless Steel is Optional		
Disc	Buna-N® Rubber		
Diaphragm	Nylon Reinforced Buna-N® Rubber		
Stem, Nut & Spring	Stainless Steel		

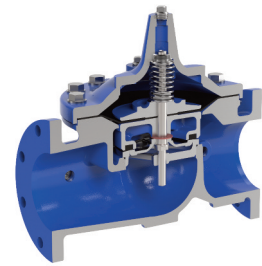
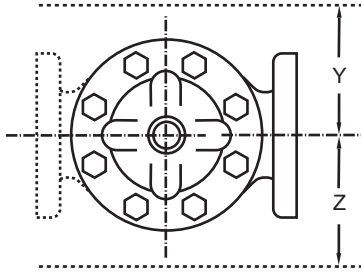
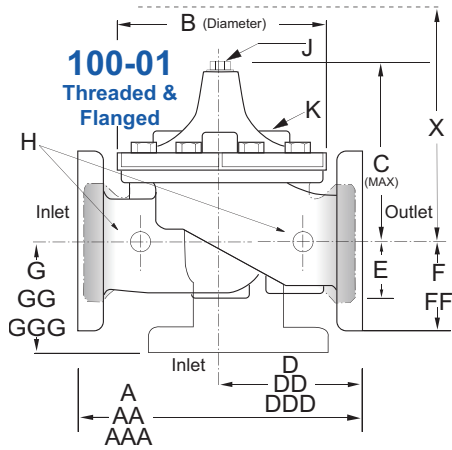
For material options not listed, consult factory.  
 Cla-Val manufactures valves in more than 50 different alloys.



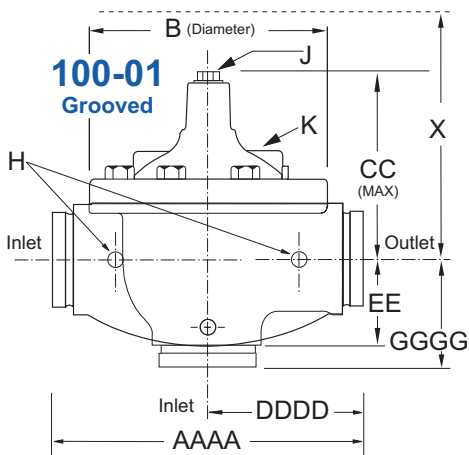
### Model 90-01 Dimensions (In Inches)

Valve Size (Inches)	1	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30	36
A Threaded	7.25	7.25	7.25	9.38	11.00	12.50	—	—	—	—	—	—	—	—	—	—	—	—
AA 150 ANSI	—	—	8.50	9.38	11.00	12.00	15.00	20.00	25.38	29.75	34.00	39.00	41.38	46.00	52.00	61.50	63.00	72.75
AAA 300 ANSI	—	—	9.00	10.00	11.62	13.25	15.62	21.00	26.38	31.12	35.50	40.50	43.50	47.64	53.62	63.24	64.50	74.75
AAAA Grooved End	—	—	8.50	9.00	11.00	12.50	15.00	20.00	25.38	—	—	—	—	—	—	—	—	—
B Diameter	5.62	5.62	5.62	6.62	8.00	9.12	11.50	15.75	20.00	23.62	28.00	32.75	35.50	41.50	45.00	53.16	56.00	66.00
C Maximum	5.50	5.50	5.50	6.50	7.56	8.19	10.62	13.38	16.00	17.12	20.88	24.19	25.00	39.06	41.90	43.93	54.60	59.00
CC Maximum Grooved End	—	—	4.75	5.75	6.88	7.25	9.31	12.12	14.62	—	—	—	—	—	—	—	—	—
D Threaded	3.25	3.25	3.25	4.75	5.50	6.25	—	—	—	—	—	—	—	—	—	—	—	—
DD 150 ANSI	—	—	4.00	4.75	5.50	6.00	7.50	10.00	12.69	14.88	17.00	19.50	20.81	—	—	30.75	—	—
DDD 300 ANSI	—	—	4.25	5.00	5.88	6.38	7.88	10.50	13.25	15.56	17.75	20.25	21.62	—	—	31.62	—	—
DDDD Grooved End	—	—	—	4.75	—	6.00	7.50	—	—	—	—	—	—	—	—	—	—	—
E	1.12	1.12	1.12	1.50	1.69	2.06	3.19	4.31	5.31	9.25	10.75	12.62	15.50	12.95	15.00	17.75	21.31	24.56
EE Grooved End	—	—	2.00	2.50	2.88	3.12	4.25	6.00	7.56	—	—	—	—	—	—	—	—	—
F 150 ANSI	—	—	2.50	3.00	3.50	3.75	4.50	5.50	6.75	8.00	9.50	10.50	11.75	15.00	16.50	19.25	22.50	28.50
FF 300 ANSI	—	—	3.06	3.25	3.75	4.13	5.00	6.25	7.50	8.75	10.25	11.50	12.75	15.00	16.50	19.25	24.00	30.00
G Threaded	1.88	1.88	1.88	3.25	4.00	4.50	—	—	—	—	—	—	—	—	—	—	—	—
GG 150 ANSI	—	—	4.00	3.25	4.00	4.00	5.00	6.00	8.00	8.62	13.75	14.88	15.69	—	—	22.06	—	—
GGG 300 ANSI	—	—	4.25	3.50	4.31	4.38	5.31	6.50	8.50	9.31	14.50	15.62	16.50	—	—	22.90	—	—
GGGG Grooved End	—	—	—	3.25	—	4.25	5.00	—	—	—	—	—	—	—	—	—	—	—
H NPT Body Tapping	0.375	0.375	0.375	0.375	0.50	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
J NPT Cover Center Plug	0.25	0.25	0.25	0.50	0.50	0.50	0.75	0.75	1.00	1.00	1.25	1.50	2.00	1.00	1.00	1.00	2.00	2.00
K NPT Cover Tapping	0.375	0.375	0.375	0.375	0.50	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
Stem Travel	0.40	0.40	0.40	0.60	0.70	0.80	1.10	1.70	2.30	2.80	3.40	4.00	4.50	5.10	5.63	6.75	7.50	8.50
Approx. Ship Weight (lbs)	15	15	15	35	50	70	140	285	500	780	1165	1600	2265	2982	3900	6200	7703	11720
Approx. X Pilot System	11	11	11	13	14	15	17	29	31	33	36	40	40	43	47	68	79	85
Approx. Y Pilot System	9	9	9	9	10	11	12	20	22	24	26	29	30	32	34	39	40	45
Approx. Z Pilot System	9	9	9	9	10	11	12	20	22	24	26	29	30	32	34	39	42	47

## Model 90-01 Metric Dimensions (Uses 100-01 Hytrol Main Valve)



Model 100-01 Full Port Hytrol Main Valve



### Other 90 Series Products

- 90-01KO - Model 90-01 supplied with with KO Anti-Cavitation Trim
- 90-01H - Model 90-01 supplied with X43H Strainer
- 90-01KOH - Model 90-01 supplied with KO Trim & X43H Strainer
- 690-01 - Reduced Port Pressure Reducing Valve
- 690-01KO - Reduced Port Pressure Reducing Valve with KO Trim
- 690-01H - Reduced Port Pressure Reducing Valve with X43H Strainer
- 690-01KOH - Reduced Port Pressure Reducing Valve with KO Trim and X43H Strainer

## Model 90-01 Dimensions (In mm)

Valve Size (mm)	25	32	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750	900
A Threaded	184	184	184	238	279	318	—	—	—	—	—	—	—	—	—	—	—	—
AA 150 ANSI	—	—	216	238	279	305	381	508	645	756	864	991	1051	1168	1321	1562	1600	1848
AAA 300 ANSI	—	—	229	254	295	337	397	533	670	790	902	1029	1105	1210	1326	1606	1638	1899
AAAA Grooved End	—	—	216	228	279	318	381	508	645	—	—	—	—	—	—	—	—	—
B Diameter	143	143	143	168	203	232	292	400	508	600	711	832	902	1054	1143	1350	1422	1676
C Maximum	140	140	140	165	192	208	270	340	406	435	530	614	635	992	1064	1116	1387	1499
CC Maximum Grooved End	—	—	120	146	175	184	236	308	371	—	—	—	—	—	—	—	—	—
D Threaded	83	83	83	121	140	159	—	—	—	—	—	—	—	—	—	—	—	—
DD 150 ANSI	—	—	102	121	140	152	191	254	322	378	432	495	528	—	—	781	—	—
DDD 300 ANSI	—	—	108	127	149	162	200	267	337	395	451	514	549	—	—	803	—	—
DDDD Grooved End	—	—	—	121	—	152	191	—	—	—	—	—	—	—	—	—	—	—
E	29	29	29	38	43	52	81	110	135	235	273	321	394	329	381	451	541	624
EE Grooved End	—	—	52	64	73	79	108	152	192	—	—	—	—	—	—	—	—	—
F 150 ANSI	—	—	64	76	89	95	114	140	171	203	241	267	298	381	419	489	572	724
FF 300 ANSI	—	—	78	83	95	105	127	159	191	222	260	292	324	381	419	489	610	762
G Threaded	48	48	48	83	102	114	—	—	—	—	—	—	—	—	—	—	—	—
GG 150 ANSI	—	—	102	83	102	102	127	152	203	219	349	378	399	—	—	560	—	—
GGG 300 ANSI	—	—	102	89	110	111	135	165	216	236	368	397	419	—	—	582	—	—
GGGG Grooved End	—	—	—	83	—	108	127	—	—	—	—	—	—	—	—	—	—	—
H NPT Body Tapping	0.375	0.375	0.375	0.375	0.50	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
J NPT Cover Center Plug	0.25	0.25	0.25	0.50	0.50	0.50	0.75	0.75	1.00	1.00	1.25	1.50	2.00	1.00	1.00	1.00	2.00	2.00
K NPT Cover Tapping	0.375	0.375	0.375	0.375	0.50	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
Stem Travel	10	10	10	15	18	20	28	43	58	71	86	102	114	130	143	171	190	216
Approx. Ship Weight (kgs)	7	7	7	16	23	32	64	129	227	354	528	726	1027	1353	1769	2812	3494	5316
Approx. X Pilot System	280	280	280	331	356	381	432	737	788	839	915	1016	1016	1093	1194	1728	2007	2159
Approx. Y Pilot System	229	229	229	229	254	280	305	508	559	610	661	737	762	813	864	991	1016	1143
Approx. Z Pilot System	229	229	229	229	254	280	305	508	559	610	661	737	762	813	864	991	1067	1194

90-01 Valve Selection	100-01 Pattern: Globe (G), Angle (A), End Connections: Threaded (T), Grooved (GR), Flanged (F) Indicate Available Sizes																		
	Inches	1	1½	1½	2	2½	3	4	6	8	10	12	14	16	18	20	24	30	36
	mm	25	32	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750	900
Main Valve 100-01	Pattern	G, A	G, A	G, A	G, A	G, A	G, A	G, A	G, A	G, A	G, A	G, A	G, A	G, A	G	G	G, A	G	G
	End Detail	T	T	T, F, Gr*	T, F, Gr	T, F, Gr*	T, F, Gr	F, Gr	F, Gr*	F, Gr*	F	F	F	F	F	F	F	F	F
Suggested Flow (gpm)	Maximum	55	93	125	210	300	460	800	1800	3100	4900	7000	8400	11000	14000	17000	25000	42000	50000
	Maximum Intermittent	68	120	160	260	370	580	990	2250	3900	6150	8720	10540	13700	17500	21700	31300	48000	62500
	Minimum	1	1	1	1	2	2	4	10	15	35	50	70	95	120	150	275	450	650
Suggested Flow (Liters/Sec)	Maximum	3.5	6	8	13	19	29	50	113	195	309	442	530	694	883	1073	1577	2650	3150
	Maximum Intermittent	4.3	7.6	10	16	23	37	62	142	246	387	549	664	863	1104	1369	1972	3028	3940
	Minimum	.03	.03	.03	.06	.09	0.13	0.25	0.63	0.95	2.2	3.2	4.4	6.0	7.6	9.5	17.4	28.4	41.0

100-01 Series is the full internal port Hytrol.

For Lower Flows Consult Factory

\*Globe Grooved Only

**Notes:**

- For sizes 18 through 36-inches / 450 mm though 900 mm, consult Factory
- Many factors should be considered in sizing pressure reducing valves including inlet pressure, outlet pressure and flow rates.
- For sizing questions or cavitation analysis, consult Cla-Val with system details.

**Pilot System Specifications**



**Adjustment Ranges**

- 2 to 30 psi
- 15 to 75 psi
- 20 to 105 psi
- 30 to 300 psi\*
- 150 to 600 psi (CRD-18)

\*Supplied unless otherwise specified

**Temperature Range**  
Water: to 180°F

**When Ordering, Specify:**

1. Catalog No. 90-01
2. Valve Size
3. Pattern - Globe or Angle
4. Pressure Class
5. Threaded, Flanged or Grooved
6. Trim Material
7. Adjustment Range
8. Desired Options
9. When Vertically Installed

**Main Valve Options**

**EPDM Rubber Parts**

Optional diaphragm, disc and o-ring fabricated with EPDM synthetic rubber

**Viton® Rubber Parts - suffix KB**

Optional diaphragm, disc and o-ring fabricated with Viton® synthetic rubber

**Epoxy Coating - suffix KC**

NSF/ANSI 61 Fusion Bonded Epoxy

**Dura-Kleen® Stem - suffix KD**

Fluted design prevents dissolved minerals build-up on the stem

**LFS Trim**

Designed to regulate precisely and smoothly at typical flow rates as well as lower than the industry standard of 1 fps, without decreasing the valve's capacity

**Valve Options**

X141 Pressure Gauge



X101AR Valve Position Indicator with Air Release



X101 Valve Position Indicator



X144 e-FlowMeter



X43H Strainer



Stainless Steel Pilot

**Materials**

Standard Pilot System Materials

- Pilot Control: Low Lead Bronze
- Trim: Stainless Steel Type 303
- Rubber: Buna-N® Synthetic Rubber

Optional Pilot System Materials

Pilot Systems are available with optional Stainless Steel or Monel materials.

Note: Available with remote sensing control.



Powering Business Worldwide

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## M22 Modular Selector Switch Operator

M22S-WK3

UPC:786685280813

### Dimensions:

- **Height:** 1.06 IN
- **Length:** 1.17 IN
- **Width:** 1.17 IN

**Weight:**.995 LB

**Notes:**Includes contact block mounting adapter.  
Can be converted in the field to maintained operation with the removal of a color coded adapter.

### Warranties:

- Eaton Selling Policy 25-000, one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.

### Specifications:

- **Type:** Selector switch
- **Action:** Momentary
- **Actuator:** Knob
- **Bezel:** Black
- **Environmental Rating:** IP66, NEMA 4X, 13
- **Illumination:** Non-illuminated
- **Number Of Positions:** Three-position
- **Operating Cycles:** 100,000 operations
- **Size:** 22.5 mm
- **Series:** M22

### Supporting documents:

- [Eatons Volume 7-Logic Control, Operator Interface and Connectivity Solutions](#)
- [M22\(S\)\(M\)-WKV AutoCAD 2D Footprint](#)
- [M22\(S\)\(M\)-WKV 2D Drawing Xchange](#)
- [M22\(S\)\(M\)-WKV 3D Inventor](#)





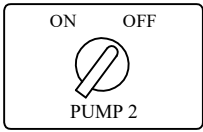
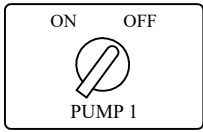
- [M22\(S\)\(M\)-WKV 2D PDF](#)
- [M22\(S\)\(M\)-WKV 3D Model Xchange](#)
- [M22\(S\)\(M\)-WKV AutoCAD 2D Footprint \(mm\)](#)
- [M22 Pilot Devices](#)
- [Eaton Specification Sheet - M22S-WK3](#)
- [Global Data Sheet - M22S-WK3](#)

**Certifications:**

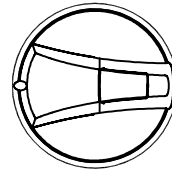
- CSA Certified
- CCC Marked
- Lloyd's Register Certified

**Product compliance:**

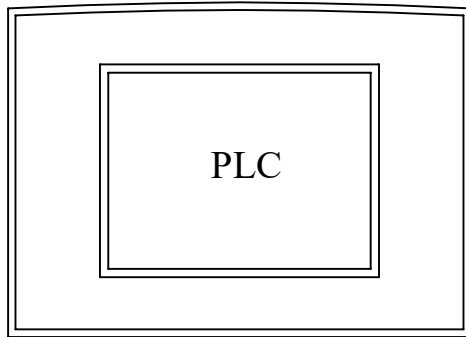
- Bureau Veritas
- GoST-R
- CE Marked



VFD BYPASS



MAIN  
DISCONNECT



## AEGIS® Shaft Grounding Rings Provide Both Contact and Noncontact Grounding The Only Product of its Kind

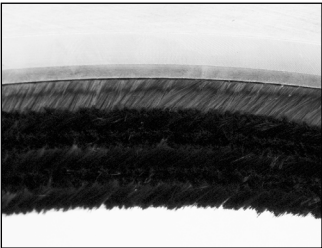


**AEGIS® Shaft Grounding Ring uses Revolutionary Nanogap Technology**

- Unique contact/non-contact design
- 360 degrees circumferential conductive microfiber ring
- Multiple row design – greatest reliability
- Ensures unmatched shaft grounding and performance

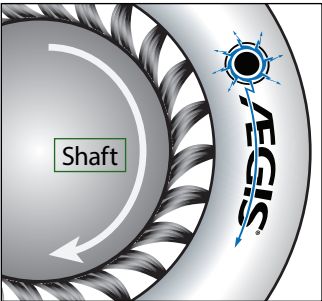


The AEGIS® Shaft Grounding Ring's patented Nanogap Technology ensures effective electrical contact even when physical contact is broken. Only AEGIS® Nanogap Technology provides both maintenance-free contact and noncontact bearing protection for the normal service life of the motor's bearings as well as the most reliable operation of any shaft grounding technology.



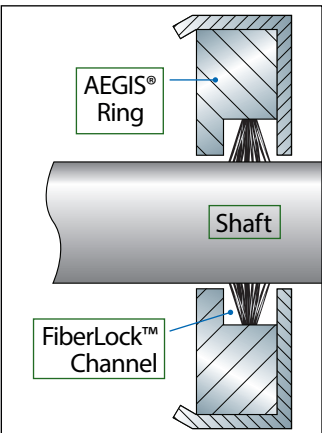
### Proprietary Conductive Microfibers Last for the Service Life of the Motor

The AEGIS® Shaft Grounding Ring's unique design features hundreds of thousands to millions of specially engineered conductive microfibers that encircle the motor shaft. With so many electrical transfer points the ring provides continuous electrical contact, whether its fibers are physically touching the shaft or not. This patented "nanogap" technology enables both contact and noncontact shaft grounding — 100% of the time.



### Specially Designed Microfibers Flex Without Breaking

Designed with specific mechanical and electrical characteristics that minimize wear and maintain conductivity, AEGIS® microfibers will last for the life of the motor. Based on wear of less than 0.001" [0.025mm] during 10,000 hours of testing, proven to withstand over 200,000 hours of continuous operation.



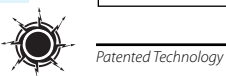
### Wear-to-Fit™ Design

Through our patented design, AEGIS® conductive microfibers are a wear-to-fit design which ensures that the fibers don't "wear out" during the bearing's life. They exhibit minimal wear with the ability to flex without breaking. During the life of the ring the minimal wear characteristics ensure that the fibers only wear to the exact diameter of the motor's shaft and no further, maintaining the nanogap contact which allows the AEGIS® Shaft Grounding Rings to continue to operate effectively and protect the motor's bearings. In testing, they were proven to withstand 2 million direction reversals (to 1800 RPM) with no fiber fatigue or breakage.

### Patented FiberLock™ Channel Secures and Protects Fibers

AEGIS's patented, protective FiberLock™ channel locks the ring's conductive microfibers securely in place around the motor shaft, allowing them to flex without breaking. The channel also helps protect the fibers from excessive dirt, oil, grease, and other contaminants.

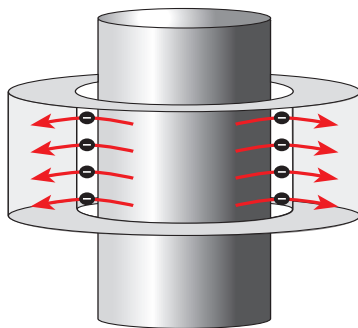
In severe duty environments install the AEGIS® Rings inside the motors or add a protective O-ring or V-slinger against the AEGIS® Ring's face (see page 33). For large motors or medium voltage motors specify the AEGIS® PROSLR (page 23) which incorporates an O-ring barrier built into the shaft grounding ring to protect against dirt or debris.



## Ensures Unmatched Grounding With or Without Shaft Contact

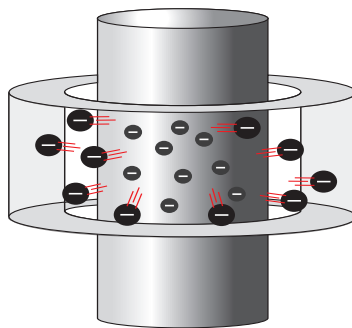
At any point in time, the AEGIS® microfibers are in mechanical contact with the shaft and those that aren't are in nanogap proximity due its unique design. Thanks to the patented Electron Transport Technology™, all of the ring's fibers remain in electrical contact with the motor shaft providing unmatched grounding 100% of the time. This technology ensures electrical contact for the life of the motor through mechanical contact and three simultaneous nanogap noncontact current transfer processes. These processes ensure effective grounding regardless of the motor's speed. No other product works with and without contacting the motor shaft to provide the long term and maintenance-free bearing protection of the AEGIS® Ring.

Tunneling of Electrons



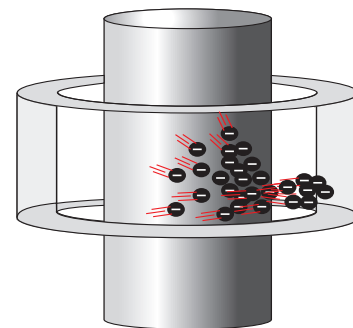
This mechanism is based on the ability of electrons to “tunnel” across an insulating barrier, and works for gaps smaller than 2 nm.

Field Emissions of Electrons



Field emission is a form of quantum tunneling whereby electrons move through a barrier in the presence of a high electric field. It provides grounding across gaps of 2 nm to 5 μm. The electric field from the shaft voltage creates the conditions for the AEGIS® ring fibers to take advantage of field emission electron transfer from the shaft.

Townsend Avalanche of Gaseous Ions



This process results from the cascading effect of secondary electrons released by collisions and the impact ionization of gas ions accelerating across gaps greater than 5 μm. This ionization creates negative and positive ions which neutralize the shaft voltage.

## AEGIS® Shaft Grounding Ring vs. Contact-Only Brush

The chart below compares the design and performance characteristics of AEGIS® Rings to those of conventional and discrete-point grounding brushes that work only through contact with the motor shaft. Due to its patented design and proprietary conductive microfibers, the AEGIS® Ring maintains electrical contact with the motor shaft even if mechanical contact is broken. No other shaft grounding brush provides such exceptional bearing protection.

Performance Characteristic	AEGIS® Ring	Contact-Only Brush
Continuous circumferential ring design	Yes	No
Contact and Noncontact electrical shaft grounding	Yes	No
Protective fiber channel	Yes	No
Ultra-low wear fibers / wear-to-fit fiber design	Yes	No
Maintenance-free	Yes	No
Effective in presence of dust, dirt, oil, and grease	Yes	No



## AEGIS® SGR for Low Voltage and AEGIS® PRO Series for Medium Voltage Motors

### LOW VOLTAGE MOTORS UP TO 500HP (375kW)

Supply voltage: 600 VAC or less  
Recommended Technology: AEGIS® SGR

- ! Motors over 100 HP - recommend isolation of one bearing and AEGIS® SGR on the opposite bearing.



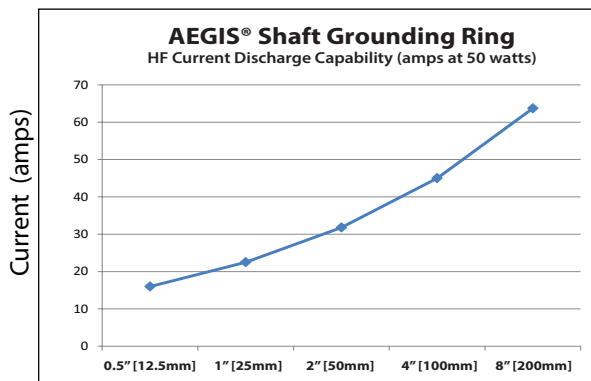
#### Description:

- Design Type: AEGIS® SGR
- Circumferential Conductive MicroFiber rows in FiberLock™ Channel
- Rows of fiber: 2
- Fiber overlaps shaft 0.030" [0.76mm]
- OAL: 0.295" [7.5mm]
- OD: listed in AEGIS® Parts List

#### Mounting:

- Internal or External
- Select based on shaft diameter
- Split and Solid versions available
- Custom brackets optional

### AEGIS® SGR Current Capability Chart



### MEDIUM VOLTAGE MOTORS AND LOW VOLTAGE MOTORS > 500HP (375kW)

Recommended Technology: AEGIS® PRO Series

- ! Recommend isolation of one bearing and AEGIS® PRO Series on the opposite bearing.



6 rows of Conductive MicroFiber

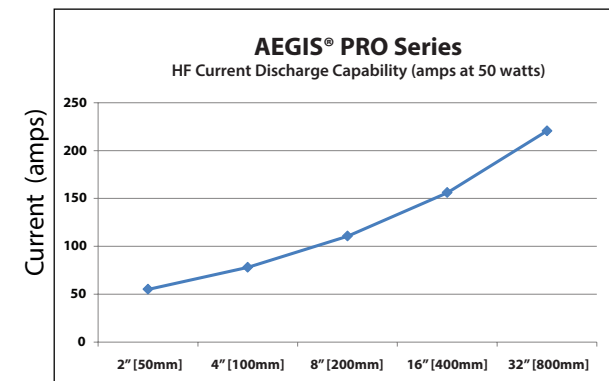
#### Description:

- Design Type: AEGIS® PRO Series
- Circumferential Conductive MicroFiber rows in FiberLock™ Channel
- Rows of fiber: 6
- Fiber overlaps shaft 0.030" [0.76mm]
- Varies by PRO Ring style
- OD: Shaft + (refer to drawing)

#### Mounting:

- Internal or External
- Select based on shaft diameter
- Split and Solid versions available
- Custom brackets optional

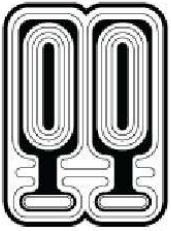
### AEGIS® PRO Series Current Capability Chart



## Weather Hood



- **304 Stainless Steel Weather Hood**
- **Enhanced protection from local environment**
- **Fully covers the tops and partially covers the sides of booster system motorpumps**
- **Integrated into the skid system design, allows for fully serviceability motorpumps**
- **Fabricated 304 SS sheet stock with stainless hardware**



SINCE 1908  
**wessels**  
 company

SUBMITTAL

**FXA-SERIES**

WATER WELL & PRESSURE BOOSTER  
 EXPANSION TANKS

Models: FXA-35 to FXA-800L

Submittal Sheet No. C-1004C Rev. 2 1/28/2019

Job Name _____	Submitted By _____	Date _____
Location _____	Approved By _____	Date _____
_____	Order No. _____	Date _____
Engineer _____	Notes _____	_____
Contractor _____	_____	_____
Sales Rep. _____	_____	_____

**Description:**

Wessels patented type FXA tanks are ASME replaceable bladder type pre-charged water well & pressure booster expansion tanks for commercial and industrial well and water systems, booster systems, or other potable water applications. They are designed to deliver water under pressure between pump cycles to provide sufficient flow to meet demands. The water is contained in a butyl bladder. All FXA hydro-pneumatic tanks can be installed vertically or horizontally. Products comply with NSF/ANSI Standard 61.

**Construction:**

Shell: Carbon Steel  
 Heads: Carbon Steel  
 Exterior: Carbocoat 140 - Harvester Red  
 Bladder: Heavy Duty Butyl  
 FDA Approved  
 NSF 61 Listed  
 System Connection: Epoxy lined

**Design Parameters:**

Maximum Design Pressure: 125 PSIG\*  
 Temperature Range: -20°F to 240°F

\*150, 200 & 250 PSIG available

Model Number	Part Number	Tank Volume (Gallons)	Tagging Information	Quantity
FXA-35	21010035	10		
FXA-50	21010050	13		
FXA-85	21010085	23		
FXA-130	21010130	35		
FXA-200	21010200	53		
FXA-300	21010300	79		
FXA-400	21010400	106		
FXA-500	21010500	132		
FXA-600	21010600	158		
FXA-800L	21010805	211		

**Typical Specification**

Furnish and install, as shown on plans, a \_\_\_\_\_ gallon \_\_\_\_\_" diameter X \_\_\_\_\_" (high) pre-charged steel water well & pressure booster expansion tank with replaceable heavy-duty butyl bladder. The tank shall have NPT epoxy lined system connections and a 0.302"-32 charging valve connection (standard tire valve) to facilitate the on-site charging of the tank to meet system requirements, a pressure gauge, and bladder integrity monitor. The tank must be constructed in accordance with most recent addendum of Section VIII Division 1 of the ASME Boiler and Pressure Vessel Code. Products comply with NSF/ANSI Standard 61.

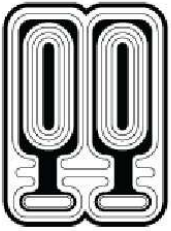
Each tank shall be Wessels model number FXA-\_\_\_\_\_ or approved equal.

E-mail



SINCE 1908  
**wessels**  
 company

101 Tank Street Greenwood, IN 46143  
 P: 317-888-9800 F: 317-865-7411  
 www.westank.com



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**wessels**  
 company

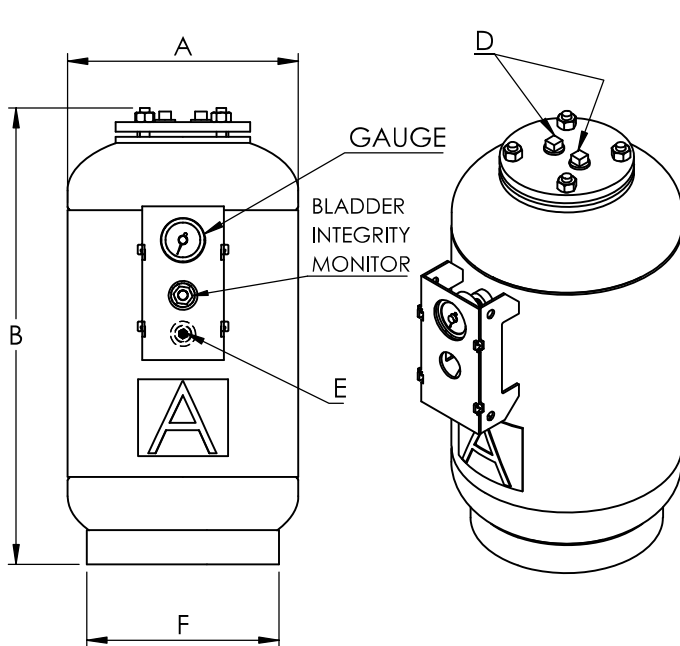
SUBMITTAL

# FXA-SERIES

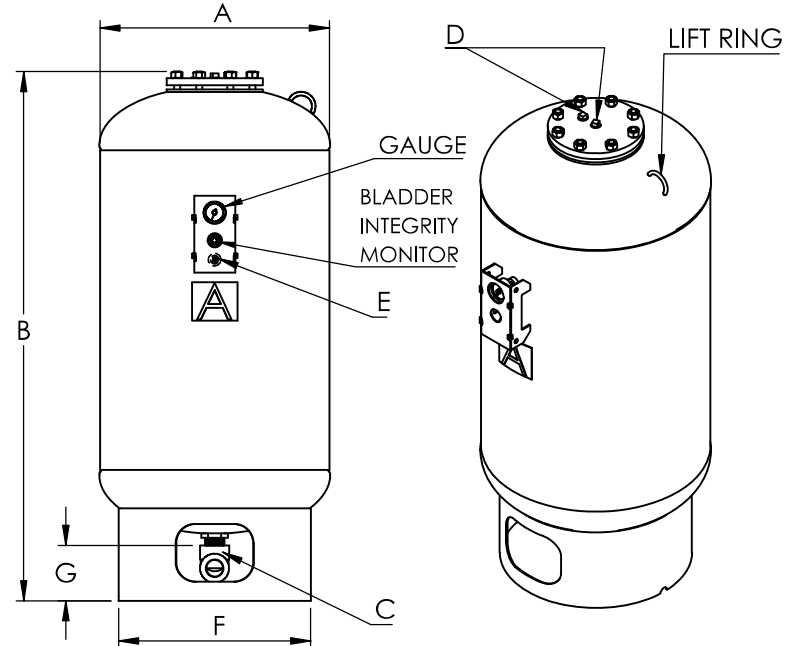
WATER WELL & PRESSURE BOOSTER  
 EXPANSION TANKS

Models: FXA-35 to FXA-800L

Submittal Sheet No. C-1004C Rev. 2 1/28/2019



FXA-35 & FXA 50



FXA-85 TO FXA-800L

## Dimensions & Weights:

Model Number	Dimensions in Inches						Approx. Shipping Weight (lbs)	
	A	B	System Connection		Charging Valve	F		G
			C	D	E			
FXA-35	12	23 1/2	-	3/4 NPT	0.302" - 32NC	10	-	40
FXA-50	14	24				50		
FXA-85	16	37	1 NPT	3/4 NPT	0.302" - 32NC	12	5 1/2	90
FXA-130	20					125		
FXA-200	24	43	1 1/2 NPT	3/4 NPT	0.302" - 32NC	20	5 1/4	210
FXA-300		55						225
FXA-400	30	49	2 NPT	3/4 NPT	0.302" - 32NC	24	5 1/4	300
FXA-500		57						335
FXA-600		65						360
FXA-800L	32	76				28		475

## Notes:

- Tanks are factory pre-charged at 40 psig and field adjustable.
- California code-sight glass is available upon request.
- Both top and bottom connections (C & D) access the bladder.
- Bottom connection C is intended to be used for main water supply connection. Top connection D can be used for auxiliary gauge, pressure switch, etc.
- Mounting clips are available upon request.
- U.S. Patent No. 8,633,825 B2



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 company

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