

MODEL 4003
CLASS I APPLICATIONS
 90 Cubic Feet Maximum
 2.54 Cubic Meters Maximum

MODEL 4004
CLASS I APPLICATIONS
 250 Cubic Feet Maximum
 7.08 Cubic Meters Maximum

SERIES 4000

TYPE X & Ex[p]

RAPID EXCHANGE® PURGING SYSTEM INSTALLATION & OPERATION MANUAL



Model 4003-FA-CI-VML
 Vertical Mount Configuration



Model 4003-FA-CI-HMT
 Horizontal Mount Configuration



Model 4003-FA-CI-CK
 Component Kit Configuration



Model EPV-3-SA-00-SM
 Required Accessory
 Enclosure Protection Vent
 w/ Model VSM-3
 Vent Sensor Module installed



Pepperl+Fuchs® Inc. • Telephone (330) 486-0002 • FAX (330) 425-4607 • E-mail: sales@us.pepperl-fuchs.com • www.bebcoeps.com

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Purpose

The Pepperl+Fuchs Series 4000 Type X Enclosure Protection System's purpose is to allow the use of general purpose or non-rated electrical or electronic devices, with exception to devices which produce excessive heat, utilize combustible gas, or expose arcing contacts to the hazardous atmosphere, in Type 4 or 12 enclosures in the place of explosion proof Type 7 enclosures. Other purposes include heat, moisture and dust contamination prevention.

Description

Series 4000 is a Rapid Exchange® purging assembly which operates on a supply of compressed instrument air or inert gas. It is designed to regulate and monitor pressure within one or more sealed (protected) enclosures, in order to rapidly remove and prevent flammable vapor accumulation within the enclosure(s). The system is designed to accomplish the required air exchanges and maintain a "safe" pressure on one or more enclosures. An EPV-SM Enclosure Protection Vent with Sensor Module is required for proper operation. This process reduces the hazardous (classified) area rating within the enclosure(s), in accordance with the NEC - NFPA 70, Article 500, NFPA 496, ISA 12.4 and EN 50016.

Important Notes

One (1) permanent file copy and one (1) operations copy of this Manual must be studied and retained by the operator of this system. User's Agents are responsible for transferring this Manual to the user, prior to start-up.

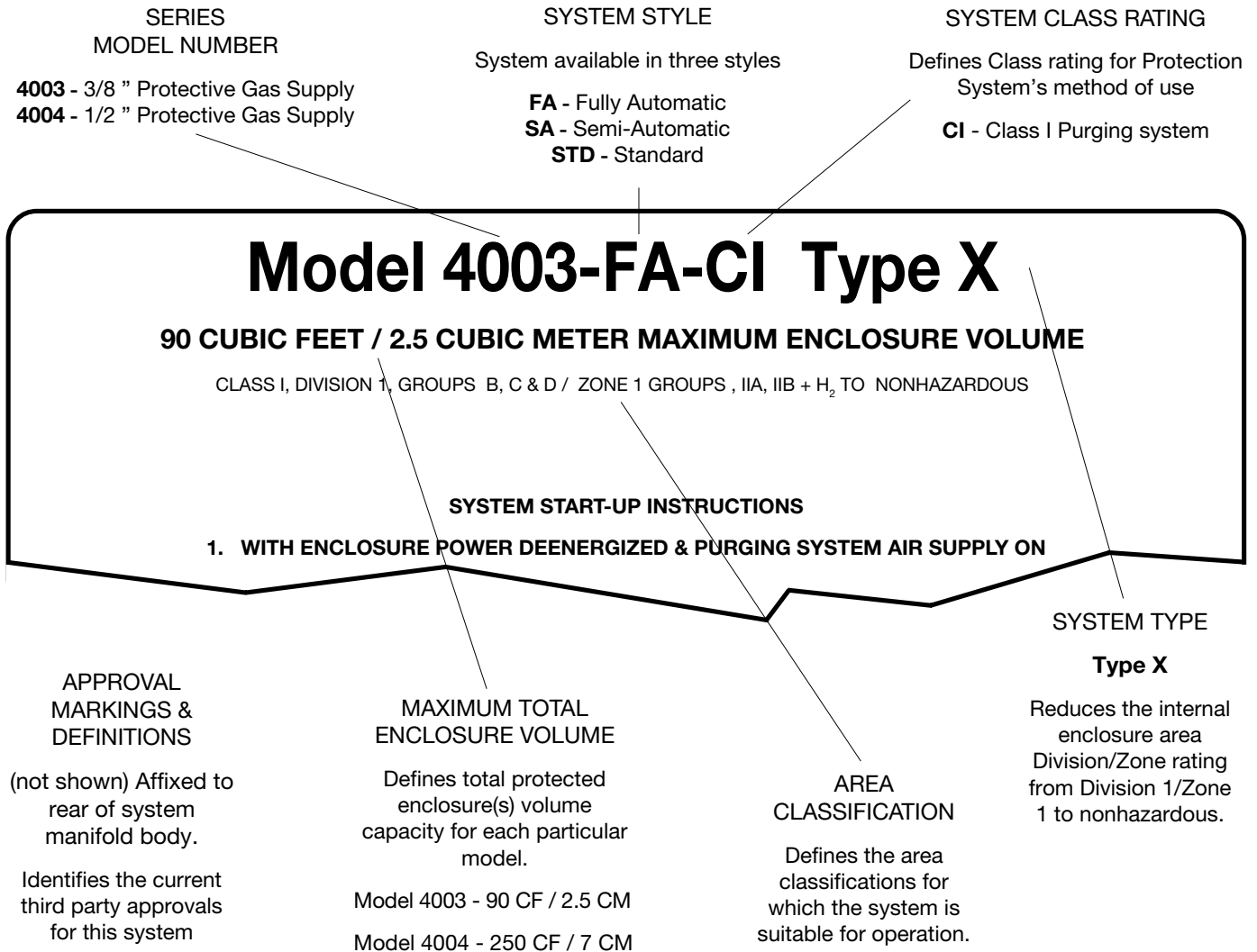
The contents of this manual have been arranged to allow the use of this product as a stand-alone device on equipment and enclosures supplied by the user or its agents. The Manual's parameters encompass a combination of both National Fire Protection Association (NFPA) requirements and Pepperl+Fuchs, Inc. requirements. Pepperl+Fuchs therefore acknowledges the use of NFPA 496 as a guideline, that we have enhanced certain NFPA requirements and that additional information has been compiled to complete this document. The Manual is intended as a complete guide and must be considered, unless specifically stated otherwise, that all directives contained herein are Pepperl+Fuchs requirements for safe, practical and efficient use of this product.

This system is not intended for use to protect enclosures or devices which contain ignitable concentrations of gases or vapors. This exclusion generally applies to process or product analyzing systems equipment.

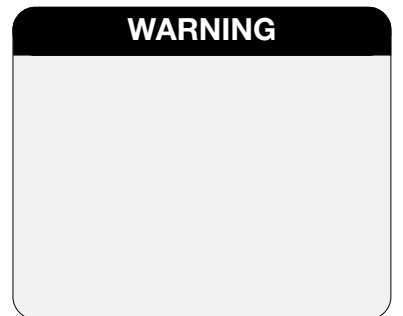
All specifications are subject to change without notice.

Identifying Your System

This Enclosure Protection System is offered in various configurations. For proper installation and operation, examine the System markings to identify the System Style, Area Classifications, Zone Ratings and Types, as noted below.



To assist you through the installation and operation of your pressurization / purge system, Pepperl+Fuchs, Incorporated has provided the following information boxes throughout this manual. This information is intended to clarify certain differences between the model styles and configurations and to warn the user / installer of potential dangers of electrical shock or enclosure over pressurization.



General Information

System Specifications

System Dimensions:	See Page 7
Shipping Weights:	15 - 22 lbs. (7 - 10 kg)
Operating Temperature Range:	-4° F - 104° F (-20°C to +40°C)
Supply Pressure Range:	80 - 120 psi max. (5.5 - 8.3 bar)
Supply Requirements:	* Clean Air or Inert Gas
Safe Pressure Setpoint:	0.5" (12.7 mm) @ Safe Pressure
Safe Pressure Flowrate:	** 0.1 - 3.5 SCFH (2.8 - 99 l/hr)
Maximum Exchange Pressure:	** 3" - 5" (76 - 127 mm)
Minimum Exchange Flowrate:	
Model 4003:	*** 12 SCFM/720 SCFH (340 l/min / 20400 l/hr)
Model 4004:	*** 30 SCFM/1800 SCFH (850 l/min / 50940 l/hr)
Exchange Times:	
Model 4003:	
4 Volume Exchanges:	1 Minute/3.0 Cubic Ft. (85 l/min)
Model 4004:	
4 Volume Exchanges:	1 Minute/7.5 Cubic Ft. (212 l/min)
System Supply Port:	
Model 4003:	1/4" FPT
Model 4004:	1/2" FPT
Enclosure Supply Port:	1/2" FPT
Enclosure Reference Fitting:	1/4" Tube
EPCU Conduit Port Size:	3/4" FPT
EPCU Power Requirements:	85-240 VAC 50-60 Hz 1Ø
EPCU Power Consumption:	500 mA
Power Relay Contacts:	10 Amps @ 240 VAC 10 Amps @ 28 VDC
Alarm Relay N.O. Contact:	10 Amps @ 240 VAC 10Amps @ 28 VDC
Alarm Relay N.C. Contact:	10 Amps @ 240 VAC 10 Amps @ 28 VDC
SAE	240 VAC, 28 VDC

- * Protective gas supply must be filtered to 40 microns min.
- ** Enclosure integrity determines actual flow and pressure
- *** With regulator set at 60 psi (4.14 bar) min. during rapid exchange

Material Specifications

Regulator Body:	Zinc w/ Enamel Finish
Regulator Handle:	Polycarbonate
Enclosure Pressure Gauge:	Alum. w / Enamel Finish
Rapid Exchange® Gauge:	Poly Case & Nickel Plated Tube
Tube Fittings:	316 SS Forged Body
Tubing:	316 SS 1/4" .035 Welded
Fastener Hardware:	Aluminum & Stainless Steel
Manifold Body:	Anodized Aluminum
Manifold Valves:	316 Stainless Steel
Manufacturer ID Nameplate:	Photo Anodized Aluminum
System Start Up Instructions :	Silkscreened Lexan®
System Face Plate:	316 14 Ga SS Tumble Finish
System Mounting Flanges:	316 SS Tumble Finish
EPCU:	Epoxy Painted Cast Aluminum
Enclosure Warning Nameplate:	Silkscreened SS

Lexan® is a registered trademark of the General Electric Company

Recommended Spare Parts

Qty	Description	Part # (supercedes)
1	Enclosure Pressure Indicator-CI	510024 (001001)
1	System Regulator (Model 4003)	510056 (002037)
1	System Regulator (Model 4004)	510073 (002137)
1	Filtered Regulator (Model 4003-VMF)	510057 (002040)
1	Filtered Regulator (Model 4004-VMF)	510074 (002140)
1	Rapid Exchange® Pressure Gauge	510079 (002305)
1	T-Bar Valve Key	510092 (002740)
1	Installation & Operation Manual	129-0218

Please call and reference part number above for current spare parts pricing. Immediate pricing is available to all confirmed customers.

Installation Tools & Testing Equipment

1/2" chuck drill, Complete set of drill bits
 Complete set of tubing, conduit bending, instrument fitting and electrical craftsman hand tools
 0-10" differential pressure indicator or monometer (connected to the protected enclosure to measure maximum pressure)
 Model 4003:
 1/2" & 1 1/4" conduit knockouts or
 0.875" & 1.6875" hole saws
 Model 4004:
 1/2" & 1 1/2" conduit knockouts or
 0.875" & 2.0" hole saws

Series 4000 System Accessories

Enclosure Protection Vents

ONE REQUIRED WITH EACH SYSTEM

For use with Model 4003:	
EPV-3-SA-00-SM	Straight w/ Sensor Module
EPV-3-SA-90-SM	Rt Angle w/ Sensor Module
For use with Model 4004:	
EPV-4-SA-00-SM	Straight w/ Sensor Module
EPV-4-SA-90-SM	Rt Angle w/ Sensor Module

Additional Items

SMK-3	System Mounting Kit - Flange
SMK-8m	System Mounting Kit - Frame
PMK-3	Pipe Mounting Kit
ILF-4	1/4" In-Line Filter
ILF-8	1/2" In-Line Filter
RCF-4	1/4" Remote Mount Cube Filter
RCF-8	1/2" Remote Mount Cube Filter
GCK	Gauge Conversion Kit
RAH	Div. 1 Remote Alarm Horn
RAB-1	Div. 1 Remote Alarm Beacon
LCK	L Fitting Conduit Kit
TCK	T Fitting Conduit Kit
WH-IS-4	EPCU Intrinsic Safe Wiring Harness
WH-HW-4	EPCU Hard Wire Wiring Harness
WH-AX-4	EPCU Auxiliary Wiring Harness
SRM-4000	Switch Resistor Module
EWN-1	Enclosure Warning Nameplate-Class I
ETW	Enclosure Temperature Warning Nameplate
GSWN	Protective Gas Supply Warning Nameplate
CG-8	1/2" Cable Gland Fitting

Enclosure & Device Design

Enclosure Design Requirements

1. All windows must be shatterproof and sized as small as possible.
2. All required markings must be placed on or near **all** enclosure doors and covers.
3. The enclosure must withstand an internal pressure of ten (10) inches of water without sustaining permanent deformation and resist all corrosive elements in the surrounding atmosphere.
4. All lightweight objects in the enclosure, such as paper or insulation, must be firmly secured.
5. The enclosure should be constructed from materials such as metal or anti-static polycarbonate to meet or exceed Type 4 or 12 performance requirements, but does not require third party approval.
6. The installation of obstructions or other barriers which block or impede the flow of protective gas must be avoided.
7. The creation of air pockets or other areas which trap flammable gases within the enclosure or devices must be avoided.
8. The enclosure should be located in an area where impact hazards are minimal.
9. If the enclosure is nonmetallic and contains equipment which utilizes or switches power loads greater than 2500 VA, it must be constructed from substantially noncombustible materials, such as materials designed to meet or exceed ANSI/UL94 ratings of 94 V-0 or 94 5V.

Adjacent Enclosures

1. Adjacent enclosures must be protected by one of the following means:
 - a) purged or pressurized in series with the protected enclosure;
 - b) purged or pressurized separately; or
 - c) protected by other means; e.g. explosion proof enclosures, hermetically sealed devices or intrinsic safe circuits.
2. Adjacent purged or pressurized enclosures must be designed to meet all construction requirements above.

Total Volume Calculation

1. The total volume of all pressurized enclosures, devices and wireways must be considered.
2. All enclosure, device and wireway volumes must be calculated without consideration of internally consumed space.

NOTE: NFPA 496 defines the enclosure volume for generators, motors and other rotating electric machinery to be the volume within the enclosure minus the volume of the internal components, e.g., rotors, stators and field coils.

Device Ventilation

1. Enclosed devices within the protected enclosure which do not exceed 1.22 cubic inches (20 cm³) of free volume do not require ventilation to the protected enclosure.
2. If the free volume of an internal device exceeds 1.22 cubic inches (20 cm³) it must be protected by one of the following means:
 - a) ventilated on the top and bottom sides with one (1) square inch (6.45 cm²) of opening for each four hundred (400) cubic inches (6555 cm³) of volume within the internal protected enclosure, at a minimum diameter of one (1) quarter inch (6.4 mm);
 - b) purged in series with the protected enclosure or be purged separately; or
 - c) protected by other means; e.g. explosion proof enclosures, hermetically sealed devices or intrinsic safe circuits.

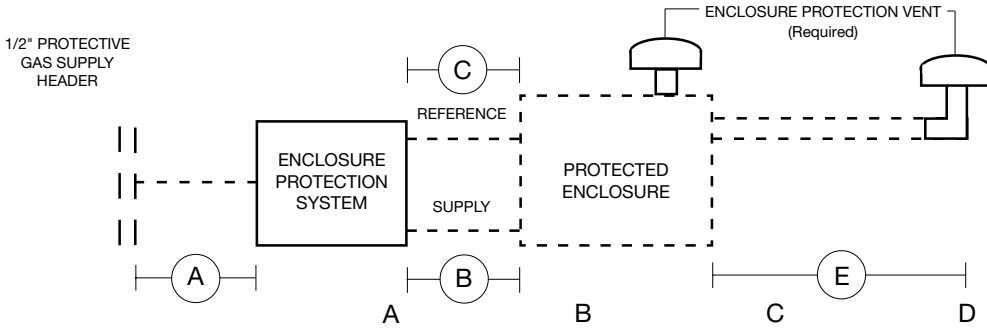
Temperature Limitations

1. The enclosure must have no surface area which exceeds 80 percent of the flammable or ignitable substance's auto-ignition temperature.
2. Internal devices which exceed this temperature must be protected by one of the following manners.
 - a) The device is enclosed in a chamber which is cUL or FM listed as a hermetically sealed device which prohibits the entrance of flammable or ignitable substance, and maintains a surface temperature below temperature limits.
 - b) It can be proven by testing that the devices will not ignite the substance involved.
 - c) The device is purged in a separate enclosure that bears an ETW (Enclosure Temperature Warning Nameplate). Devices may only be accessed after power has been removed and the device has been allowed to cool to safe temperature, or the area is positively known to be nonhazardous.

Getting Started

Establishing Connection Sizes, Lengths & Bends

TYPICAL SINGLE PROTECTED ENCLOSURE CONNECTIONS

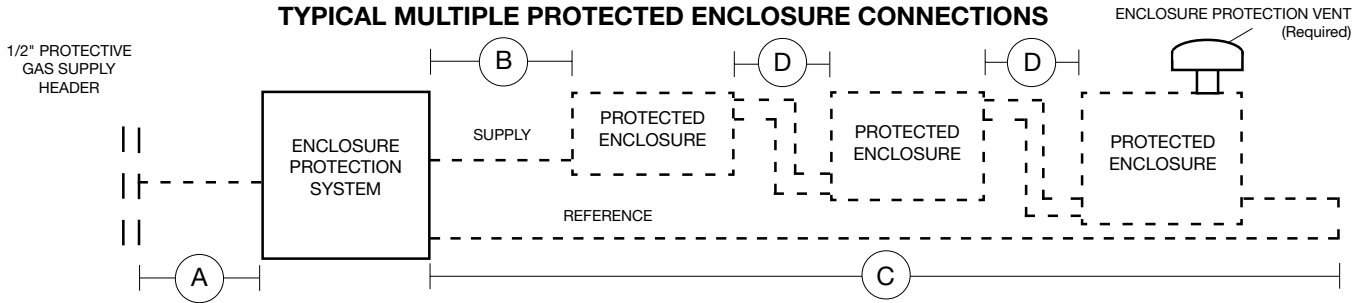


***NOTE: Tube and pipe sizes are trade sizes and are not equal in inside diameters. DO NOT substitute tube for pipe with same trade size.**

Model 4003 Systems	System Supply	Enclosure Supply	Enclosure Reference	Multi - Enclosure Connections	Optional Remote Venting
*Tubing or Pipe Diameter Tubing & Pipe Must Be Fully Reamed	3/8" O.D. Tubing or 1/4" I.D. Pipe	3/8" O.D. Tubing or 1/2" I.D. Pipe	1/4" O.D. Tubing Fully Reamed	1 1/4" I.D. Pipe Fully Reamed	1 1/4" I.D. Pipe Fully Reamed
Maximum Tubing / Pipe Length and Maximum Number of Bends / Elbows	20 Feet (6.1 m) 10 Bends	5 Feet (1.5 m) 5 Bends	20 Feet (6.1 m) 10 Bends	10 Feet (3.1 m) 5 Elbows	30 Feet (9.1 m) 5 Elbows

Model 4004 Systems	System Supply	Enclosure Supply	Enclosure Reference	Multi - Enclosure Connections	Optional Remote Venting
*Tubing or Pipe Diameter Tubing & Pipe Must Be Fully Reamed	1/2" O.D. Tubing or 1/2" I.D. Pipe	1/2" O.D. Tubing or 1/2" I.D. Pipe	1/4" O.D. Tubing Fully Reamed	1 1/2" I.D. Pipe Fully Reamed	1 1/2" I.D. Pipe Fully Reamed
Maximum Tubing / Pipe Length and Maximum Number of Bends / Elbows	20 Feet (6.1 m) 10 Bends	5 Feet (1.5 m) 5 Bends	20 Feet (6.1 m) 10 Bends	10 Feet (3.1 m) 5 Elbows	30 Feet (9.1m) 5 Elbows

TYPICAL MULTIPLE PROTECTED ENCLOSURE CONNECTIONS



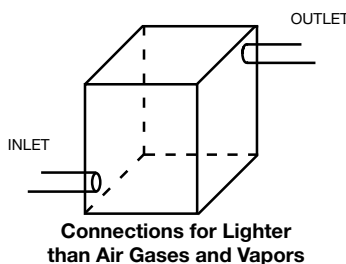
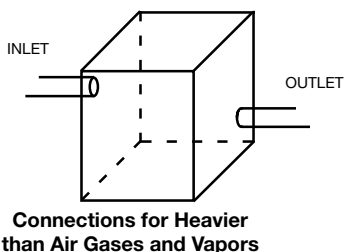
HELPFUL HINTS

To ensure adequate protective gas flow to the protected enclosure(s), all piping and tubing must be fully reamed.

Precautions must be taken to prevent crimping and other damage to protective gas piping and tubing.

When protecting multiple enclosures with a single enclosure protection system, the enclosures must be connected in series from the smallest to the largest to ensure adequate protective gas flow.

Determining Enclosure Inlet & Outlet Connection Locations



HELPFUL HINTS

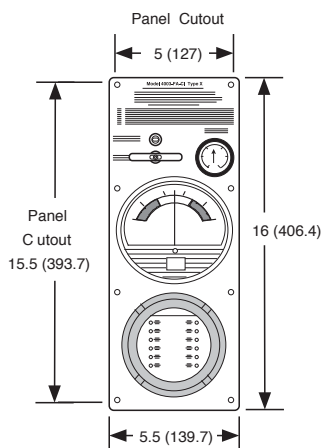
If flammable gases are lighter than air, the inlet connection to each enclosure must enter near a bottom corner. The outlet connection, for the required enclosure protection vent or piping to an adjacent protected enclosure, must exit near an extreme opposite top corner.

If flammable gases are heavier than air, inlet and outlet connections must be reversed.

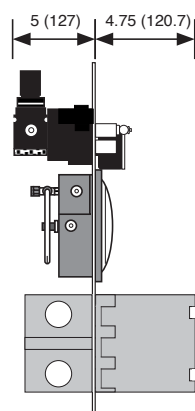
In all cases, the most prevalent gas must determine the location of inlet and outlet connections.

System Mounting Dimensions

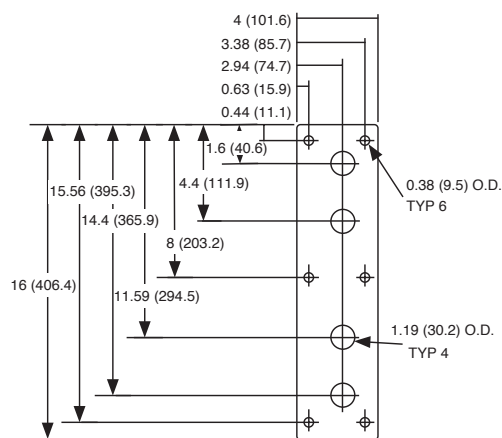
Series 4000 VM & HM Configuration Systems & Flange Dimensions



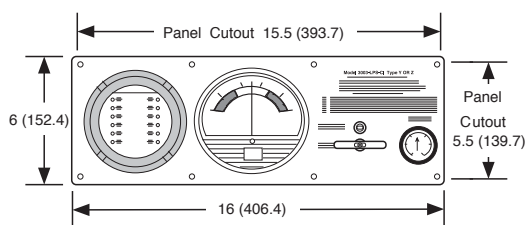
VM Configuration Front View



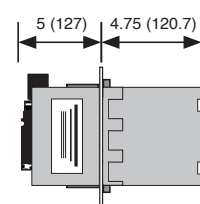
VM Configuration Side View



VM & HM Configuration Flange Surface Mounting Face View



HM Configuration Front View

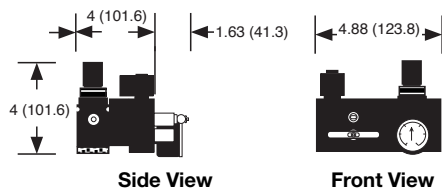


HM Configuration Side View

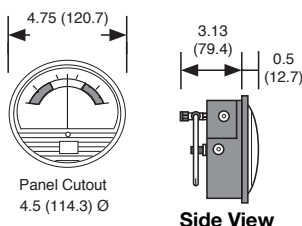
IMPORTANT NOTES

Panel cutout dimensions should not be utilized for mounting Systems directly through the surface of a protected enclosure.
Alternate metric dimensions available.

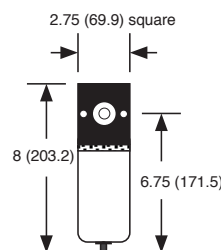
Series 4000 CK Configuration Component & Optional Remote Cube Filter Dimensions



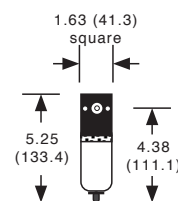
Model 4003 Pneumatic Manifold



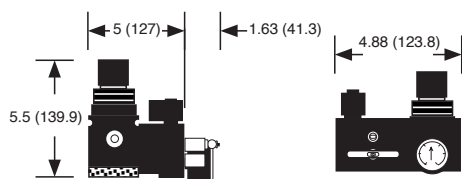
Enclosure Pressure Indicator



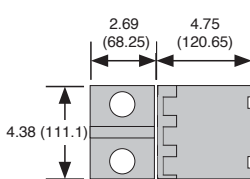
Model RCF-8



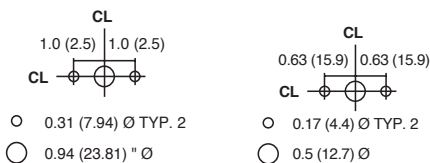
Model RCF-4



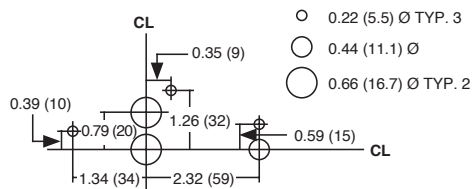
Model 4004 Pneumatic Manifold



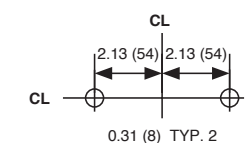
Series 4000 EPCU Enclosure



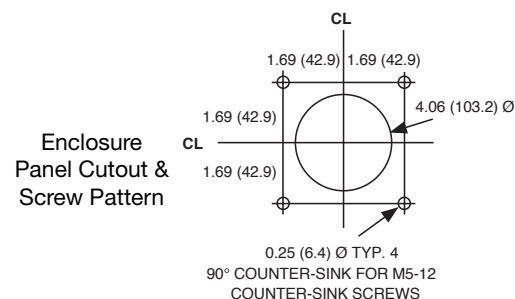
Filter Panel Cutout Patterns



Model 4003 & 4004 Pneumatic Manifold Panel Cutout Pattern



Enclosure Surface Mount Bolt Pattern



VM & HM Mounting

IMPORTANT NOTES

The system should be mounted at EYE LEVEL.

Care must be taken to ensure the system and all protruding components are clear of all enclosure accesses (doors and covers) and conduit, pipe, tubing or cable entries.

Flange mounted systems are intended for mounting adjacent to the protected enclosure and are also suitable for 2" schedule 40 pipe mounting.

Dimensional mounting configuration diagrams are located on page 7.

Remove and save the clear plastic envelope containing the enclosure warning nameplate.

Although all systems are factory tested and calibrated, we strongly suggest a bench test of basic functions prior to installation.

Flange Mounted Systems

First, determine the system mounting flange to system face plate orientation for your installation (top or bottom for HM configurations, left or right for VM configurations).

Surface Mounted Systems

1. Transfer hole pattern of system mounting flange to intended enclosure or adjacent mounting surface.
2. Check for obstructions hindering bolt fastening, electrical conduit and pneumatic tubing installation. Drill and ream the six (6) 3/8" mounting and two (2) 3/4" conduit entry* holes before mounting the flange.

* CAUTION: This is a universal flange, only drill the two conduit holes which align with the two conduit entries of the system's EPCU when mounted to the flange and ONLY when utilizing WH-IS-4 and WH-HW-4 sealed wiring harnesses. See page 14.

3. Secure the system mounting flange to the enclosure, or other mounting surface, using one (1) SMK-3 or equivalent - six (6) 3/8" x 3/4" stainless steel bolts, nuts and lock washers.
4. Install WH-IS-4 and WH-HW-4 sealed wiring harnesses or alternate conduit and fittings onto the EPCU before mounting the system face plate to the mounting flange. See electrical conduit installation instructions for surface mounted systems located on page 14.
5. Secure the system face plate to system mounting flange utilizing the four (4) 5mm x 8 screws and nuts provided.

Pipe Mounted Systems

NOTE: Pipe Mounted systems prohibit the use of Pepperl+Fuchs' through flange wiring harnesses designed for electrical and intrinsic safe signal connections to the EPCU. See page 14 for more information.

1. Locate 2" schedule 40 pipe within five (5) feet of protected enclosure.
2. Check for obstructions hindering bolt fastening, electrical conduit and pneumatic tubing installation before mounting the flange.
3. Ensure flange is mounted in a true vertical position, secure the flange to pipe, using one (1) PMK-3 or equivalent - three (3) 3/8" x 2" pipe stainless steel "U" bolts, nuts and lock washers.
4. Proceed to electrical conduit installation instructions for pipe mounted systems located on page 14.
5. Secure the system face plate to system mounting flange utilizing the hardware provided.

WARNING

ALL unused conduit entries MUST be sealed with approved plugs or fittings rated for the hazardous location. All wiring MUST be installed in accordance with all relevant national, plant and local codes.

Face Plate Mounted Systems

HELPFUL HINTS

Face Plate or Frame Mount (FM) installations are designed to mount through a cutout one half (1/2) inch smaller than the overall height and width of the system face plate, using clips and fasteners provided with SMK-8m. This design eliminates the need for the universal mounting flange or the need to drill the faceplate mounting bolt holes in the mounting surface.

FM installations are intended for operation adjacent to the protected enclosure. For installations which are intended for mounting through a cutout directly in the protected enclosure surface, Pepperl+Fuchs strongly recommends the use of our CK (Component Kit) configuration. See "Helpful Hints" on page 9 for more information.

1. Transfer panel cutout pattern to the intended surface.
2. Check for obstructions which could prohibit bolt fastening, electrical conduit or system pneumatic connections.
3. Cut panel cutout pattern on the intended surface.
4. Deburr all cutout surfaces.
5. Secure system to surface using SMK-8m, or equivalent - eight (8) 5mm x 12mm stainless steel nuts, bolts, mounting clips and lock washers.
6. Go to page 13 for RCF-4 installation (if provided).
7. Proceed to electrical conduit installation instructions for surface mounted systems located on page 14.

CK & RCF Mounting

HELPFUL HINTS

The Series 4000 purging system is supplied in several configurations to meet your installation needs. When ordered as a CK configuration, the system components mount directly through panel cutouts (provided by others) adjacent or external to the pressurized enclosure. In addition, the CK configuration is best suited for mounting directly through the surface of a pressurized enclosure when modified with a GCK Gauge Conversion Kit (see "Panel Mount Conversion Procedure" below).

Care must be taken to ensure the system and all protruding components are clear of all enclosure accesses, conduit, pipe, tubing or cable entries.

Component dimensions are located on page 7.

Save the clear plastic envelope containing the enclosure warning nameplate.

Although all systems are factory tested and calibrated, we strongly suggest a bench test of basic functions prior to installation.

CK Configuration Mounting Procedure

1. Transfer hole pattern of System Panel Cutout to intended surface (see page 7 for dimensions).
2. Check for obstructions hindering component installation or operation. Drill and ream all holes.
3. Remove adhesive backing from System Instruction Nameplate and place on enclosure surface, taking care to align all holes of nameplate with corresponding manifold mounting holes on enclosure.
4. Ensure manifold mounting gasket and manifold valve stem O-rings are installed onto manifold. Install manifold through panel cutouts.
5. Secure manifold to intended surface utilizing hardware supplied with system. Do not overtighten.
6. Install Rapid Exchange® Injection Pressure Indicator into appropriate threaded port in manifold. Tighten and align.
7. Install Enclosure Pressure gauge, with gasket in place, secure gauge with mounting hardware provided.
8. Carefully remove EPCU screw cover. Install EPCU base, with gasket in place, through panel cutouts. Secure base with mounting hardware provided. Ensure EPCU screw cover tightens flush with EPCU base without obstruction from mounting hardware.

Perform the following procedure to convert Enclosure Pressure Gauge for Panel Mount (PM) installations.

1. Secure one Model GCK Gauge Conversion Kit. Kit includes one (1) PRB-4 & SC-2 Fitting and one (1) Enclosure Pressure Gauge gasket.
2. Ensure Enclosure Pressure Gauge is supplied with gasket. If not, install gauge gasket supplied with GCK between gauge and mounting surface.
3. Remove venturi orifice and run tee from high port located on rear of Enclosure Pressure Gauge, discard.
4. Remove sintered vent from low port located on rear* of Enclosure Pressure Gauge.
5. Reinstall sintered vent into high port located on rear* of the Enclosure Pressure Gauge.
6. Install Model SC-2 fitting into low port located on rear* of Enclosure Pressure Gauge.
7. Install Model PRB-4 vent through enclosure surface (vent end out) and connect tubing (furnished by others) between SC-2 & PRB-4 fittings.

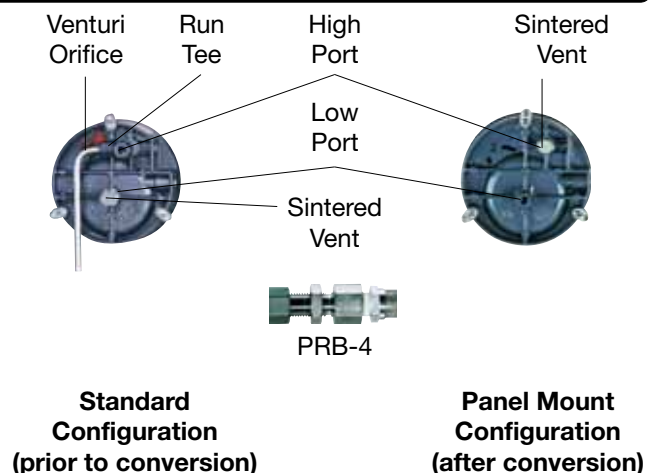
* As an alternative, the high and low ports located on the side of the Enclosure Pressure Indicator can be utilized by removing the stainless steel plugs and reinstalling them into the high and low ports located on the rear of the Enclosure Pressure Indicator.

RCF Enclosure Mounting Procedure

The following instructions detail mounting an optional Bebcu Model RCF (Remote Cube Filter) directly to the protected enclosure of a PM system installation. Alternately, the RCF can be installed "in-line" on the Protective Gas Supply.

1. Determine mounting location of RCF and transfer hole pattern (located on page 7) to intended surface.
2. Check for obstructions hindering bolt fastening or tubing connections. Drill and ream mounting holes.
4. Ensure the O-ring gasket supplied with the filter is placed around the outlet port of the mounting cube mounted directly to the enclosure surface. This O-ring will seal the filter to the enclosure to prevent air leakage.
5. Secure filter to intended mounting surface with mounting hardware provided, confirm O-ring seal is properly positioned. Tighten mounting hardware.
6. Follow tubing instructions located on pages 10 & 11.

Typical Panel Mount Conversion



Pneumatic Tubing Requirements

Protective Gas Supply Requirements

The protective gas supply to the protection system must be a clean, instrument quality compressed air or inert gas filtered to 40 microns minimum and must contain no more than trace amounts of flammable gas, vapor or dust.

The protective gas supply compressor intake must originate in a nonhazardous location. Suction duct passing through a hazardous location and the protection system tubing and piping must be fabricated from noncombustible materials suitable for prevailing hazards and environmental conditions.

The protective gas supply must originate from a dedicated instrument quality compressed air header (1/2" pipe or larger), no farther than twenty (20) feet (6.1 m) from the protection system. Local compressors and gas cylinders should not be used before consulting with Bebcos.

The protective gas supply to the protection system must be regulated from 120 psi (8.27 bar) maximum to 80 psi (5.5 bar) minimum.



Model 4003: SC-6-4 & SC-6-8 Model 4003: NC-6-4 & NC-6-8
Model 4004: SC-8 Model 4004: NC-8

SYSTEM SUPPLY INLET & ENCLOSURE SUPPLY OUTLET FITTINGS



Model 4003: EFC-4 & EFC-6 Model 4003: EBC-4 & EBC-6
Model 4004: EFC-4 & EFC-8 Model 4004: EBC-4 & EBC-8

ENCLOSURE SUPPLY, ENCLOSURE REFERENCE & SYSTEM SUPPLY BULKHEAD FITTINGS



Model 4003: EPC-13
Model 4004: EPC-14

MULTIPLE ENCLOSURE CONNECTION FITTING

Pneumatic Connection Requirements

ALL FITTINGS MAY BE CUSTOMER OR FACTORY FURNISHED

1. For system supply, one (1) SC-6-4 (4003) or SC-8 (4004) Male Straight Connector or one (1) NC-6-4 (4003) or NC-8 (4004) Male Elbow Connector or equivalent fitting.

Note: Systems supplied with optional RCF or ILF filter accessories require two (2) additional SC or NC connectors.

One (1) similar fitting which will connect the protective gas supply tubing to the protective gas supply header connection point and one (1) lot of 3/8" (4003) or 1/2" (4004) O.D., .035" wall thickness, welded or seamless stainless steel tubing.

NOTE: 1/4" (4003) or 1/2" (4004) 150# rated pipe, couplings & unions, fully reamed, can be utilized in place of the fittings and tubing listed above.

2. For enclosure supply from the system, one (1) SC-6-8 (4003) or SC-8 (4004) Male Straight Connector or one (1) NC-6-8 (4003) or NC-8 (4004) Male Elbow Connector or equivalent fitting.
3. For enclosure supply into the protected enclosure, one (1) EFC-6 (4003) or EFC-8 (4004) Flush Connector, or one (1) EBC-6 (4003) or EBC-8 (4004) Feed-Through Connector or equivalent fitting.
4. For enclosure reference (4003 & 4004), one (1) EFC-4 1/4" Flush Connector, or one (1) EBC-4 1/4" Feed-Through Connector or equivalent fitting.
5. One (1) lot of 1/4" & 3/8" or 1/2" O.D., .035" wall thickness, welded or seamless stainless steel tubing.
6. For multiple enclosure connections, two (2) EPC-13 (4003) or EPC-14 (4004) Pipe Mounting Hubs or equivalent and 1-1/4" (4003) or 1-1/2" (4004) 150# rated pipe couplings & unions per interconnection.

One (1) lot 150# rating 1-1/4" (4003) or 1-1/2" (4004) galvanized or aluminum pipe and fittings, fully reamed.

PM Pneumatic Connection Requirements

In addition to item numbers 1, 5 and 6 above, the following fittings are required for all PM systems.

1. For system supply on PM installations, one (1) additional EBC-6 (4003) or EBC-8 (4004) or equivalent Through Bulkhead Fitting is required.
2. For atmospheric reference, one (1) PRB-4 or equivalent 1/4" female bulkhead fitting and stainless steel sintered element is required.



PRB-4
PRESSURE REFERENCE BULKHEAD FITTING

Tubing Installation

HELPFUL HINTS

All work must be performed by technicians qualified in pneumatic tubing and electrical conduit installation. Pepperl+Fuchs recommends the use of .035" wall thickness, welded or seamless stainless steel tubing. If flexible tubing is used, it must be installed in a manner which will protect it from damage and corrosion.

Surface, Pipe or Frame Mounted Installations

System Supply Connections

1. Select or install a protective gas supply header tap, fitted with the proper tube size fitting and located within twenty (20) feet (6.1 m) of the enclosure protection system.
2. If a service valve is placed between the protective gas supply header and the enclosure protection system, it must be installed in close proximity of the protected enclosure and be labeled in accordance with NFPA 496, 2003 edition.
3. Select the appropriate fittings required to connect the protective gas supply to the System Supply Inlet as determined on page 10, "Pneumatic Connection Requirements". Install fittings.
4. Determine appropriate tubing route from the protective gas supply header to the System Supply Inlet.
5. Bend tubing using industrial grade benders, check tubing fit to ensure proper seating between the tubing and fittings. Fully ream all tubing ends.
6. Install tubing and tighten all fittings to fitting manufacturer's specifications. Secure tubing to appropriate structural supports as required.

Enclosure Supply & Reference Connections

1. Choose location for the enclosure supply connection(s) based on the requirements on page 6, "Getting Started".
2. Place the enclosure reference connection fitting directly behind the enclosure protection system and at least one foot away from the enclosure supply and enclosure protection vent connections, whenever possible. For systems protecting multiple enclosures in series, the enclosure reference connection fitting must be placed on the last enclosure in the series. (see page 6, "Getting Started")
3. Drill and deburr enclosure supply and reference fitting holes on the protected enclosure. Mount the fittings.
4. Determine appropriate route for the enclosure supply and reference tubing.
5. Bend tubing using industrial grade benders, check tubing fit to ensure proper seating between the tubing and fittings. Fully ream all tubing ends.
6. Install tubing and tighten all fittings to fitting manufacturer's specifications. Secure tubing to appropriate structural supports as required.

Panel Mounted Installations

IMPORTANT NOTE

The System's enclosure pressure gauge must be modified for panel mount installation prior to performing the following instructions. Refer to page 9 "Panel Mount Conversion Process" for additional information.

Enclosure Bulkhead Fittings

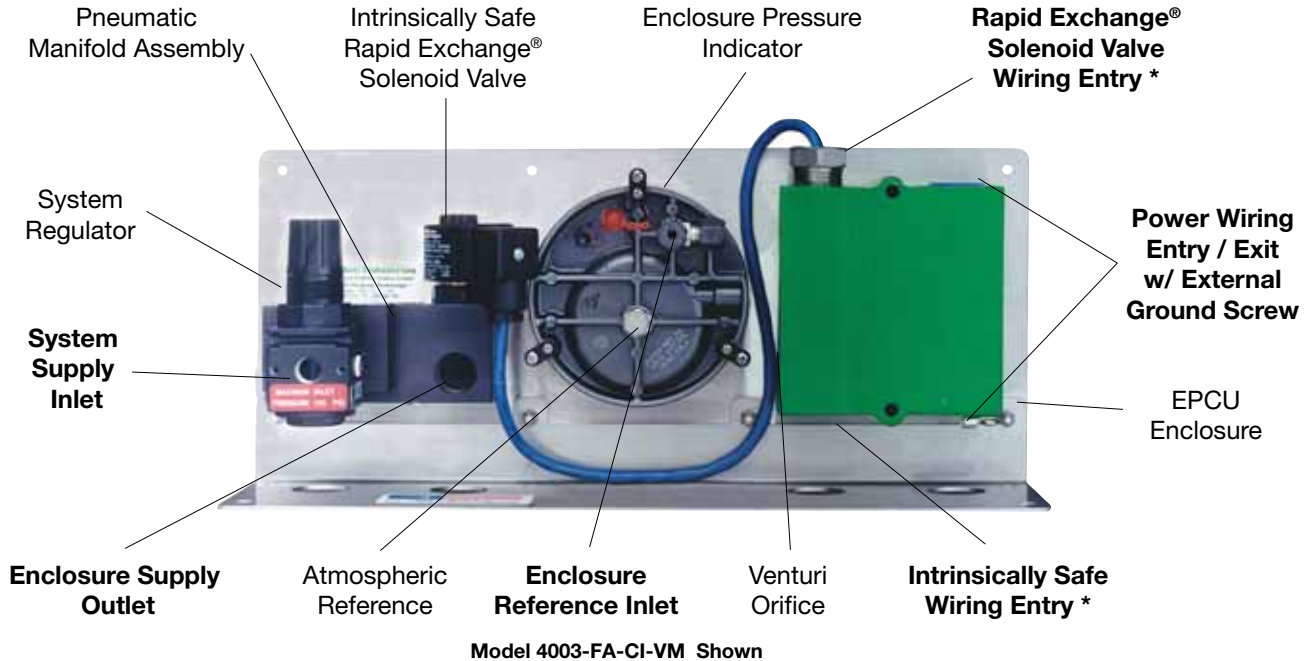
1. Select the fittings required to install the System Supply, System Supply Bulkhead Fitting and Atmospheric Reference Bulkhead Fitting, (see page 10, "Pneumatic Tubing Requirements").
2. Choose location for the system supply bulkhead fitting. This fitting allows the protective gas supply to pass through the wall of a protected enclosure to the protection system's regulator supply inlet connection.
3. Choose location for the atmospheric reference bulkhead fitting. This fitting allows the enclosure pressure indicator to reference atmospheric pressure.
4. Drill and deburr system supply and reference bulkhead fitting holes in the protected enclosure. Install fittings.

System Supply & Reference Connections

1. Select or install a protective gas supply header tap, fitted with the proper tube size fitting and located within twenty (20) feet (6.1 m) of the enclosure protection system.
2. If a service valve is placed between the protective gas supply header and the protection system, it must be in close proximity of the protected enclosure and labeled in accordance with NFPA 496.
3. Determine appropriate tubing route from the protective gas supply header to the system supply bulkhead fitting.
4. Determine appropriate tubing route from the system supply bulkhead fitting to the System Supply Inlet.
5. Determine appropriate tubing route from the atmospheric reference bulkhead fitting to the enclosure pressure gauge's reference inlet side connection.
6. Bend tubing using industrial grade benders, check tubing fit to ensure proper seating between the tubing and fittings. Fully ream all tubing ends.
7. Install tubing and tighten all fittings to fitting manufacturer's specifications. Secure tubing as required.

System Connection Diagrams

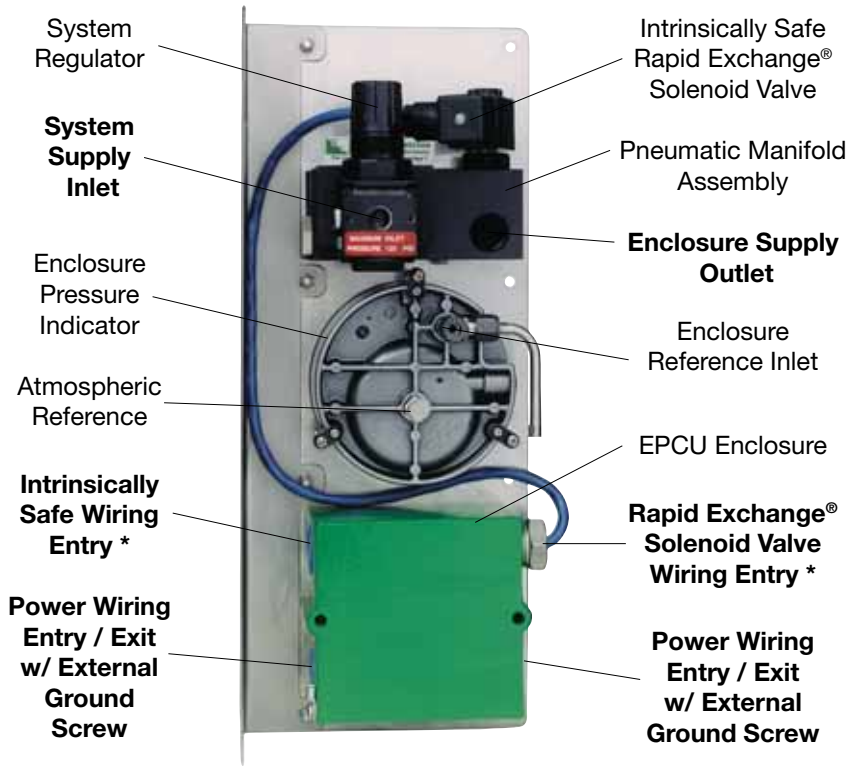
Surface, Pipe & Frame Mounted Connection Points



HELPFUL HINT

This information is intended for systems mounted external or adjacent to the protected enclosure. VM & CK configuration connection points and pneumatic diagrams are identical to the HM configuration shown.

Panel Mount Connection Points



* Intrinsic Safe Wiring & Rapid Exchange Solenoid Valve Wiring Entries are interchangeable but are factory installed as shown unless specified in opposite ports upon order.

HELPFUL HINT

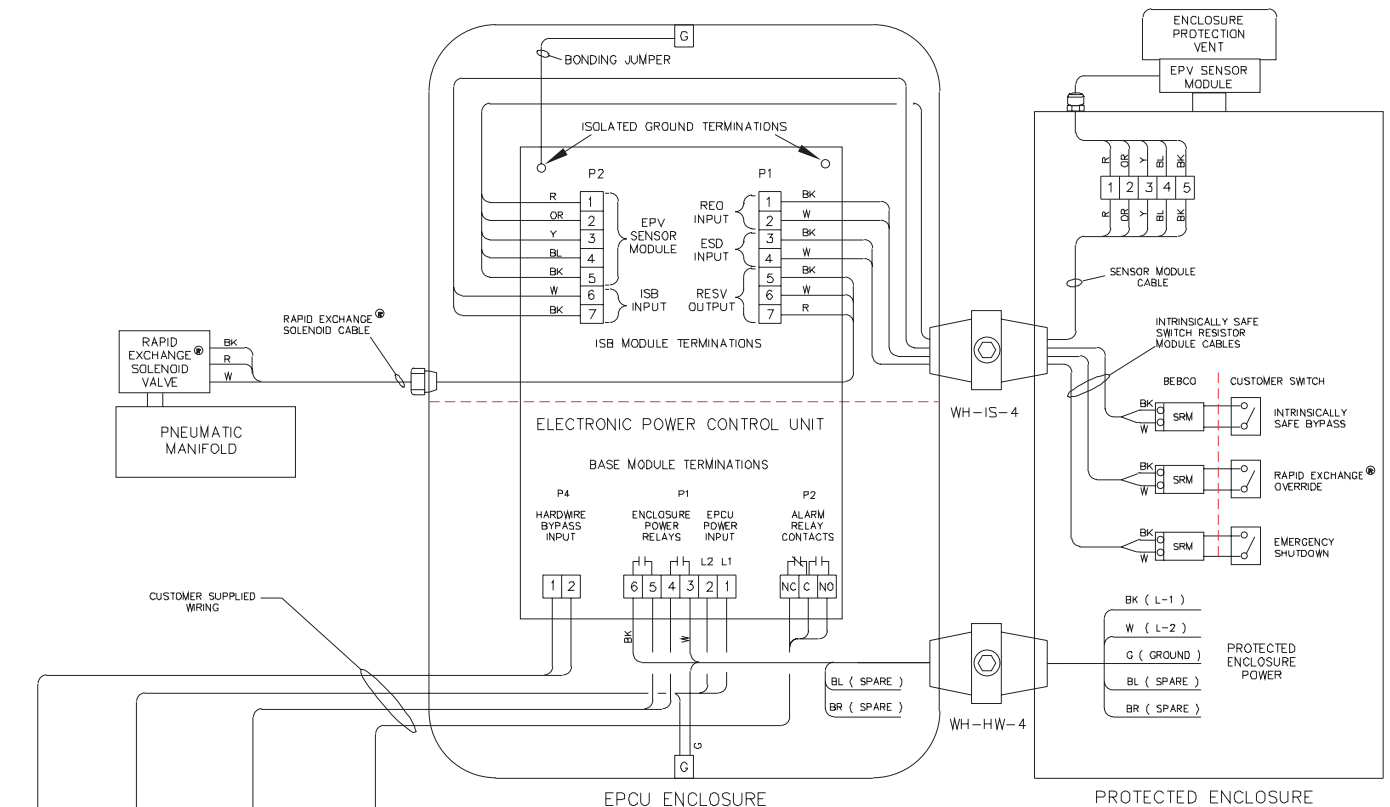
This information is intended for systems mounted internal to or through the surface of the protected enclosure. HM & CK configuration connection points and pneumatic diagrams are identical to the VM configuration shown.

HELPFUL HINT

Pneumatic & Electrical Connections are **bolded**.

Electrical & Pneumatic Diagrams

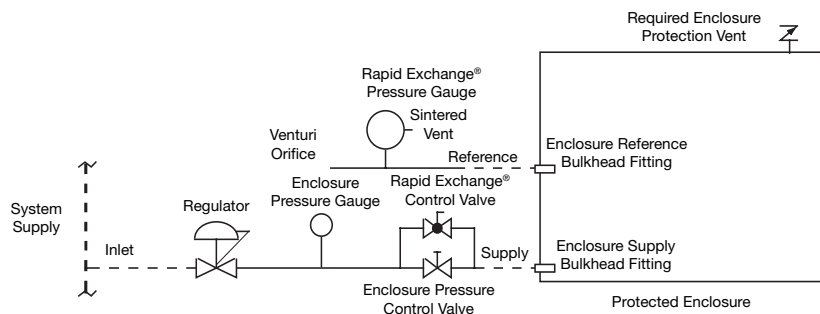
EPCU Electrical Schematic Diagram



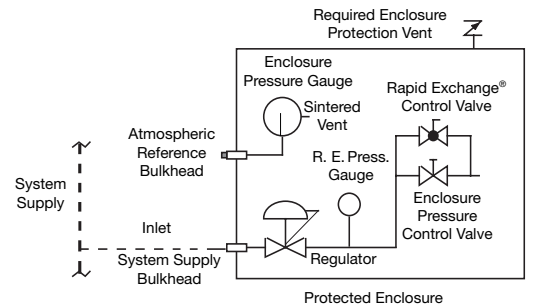
NOTES:

1. EPCU POWER REQUIREMENTS: 85-250 VAC 50-60 Hz SINGLE PHASE.
2. WIRING DIAGRAM ABOVE SHOWN WITH STANDARD BEBCO MODEL WH-HW-4 & CUSTOM MODEL WH-IS-4 WIRING HARNESSSES. STANDARD WH-IS-4 HARNESS ONLY FEATURES VENT SENSOR MODULE CABLE. UNIT MAY BE PROVIDED WITH A STANDARD OR CUSTOM MODEL WH-HW-4 OR WH-IS-4 (LOOSE OR INSTALLED) TO PROVIDE ALL OR PART OF THE WIRING SHOWN ABOVE, OR CUSTOMER MAY ELECT TO FURNISH ALL WIRING SEPERATELY. SEE WIRING INSTALLATION INSTRUCTIONS, PAGE 14.
3. WH-HW-4 SHOWN WIRED FOR 120/240 VAC AMERICAN POWER SOURCE. CUSTOMER MAY ELECT TO UTILIZE BLUE & BROWN WIRES FOR 240 VAC EUROPEAN POWER SOURCE.
4. INTRINSICALLY SAFE SWITCHES SHOWN REQUIRE INSTALLATION OF A MODEL SRM-4000 SWITCH RESISTOR MODULE, FURNISHED SEPERATELY & THE INSTALLATION OF ACTIVATION JUMPERS ON THE EPCU LOGIC MODULE.

Surface, Pipe & Frame Mounted Pneumatic Diagram



Panel Mount Pneumatic Diagram



EPCU Conduit Installation

General Information

All VM and HM flange mounted configurations previously described (except pipe mount installations, see caution note below) are designed for Through Flange electrical and intrinsic safe signal connections utilizing WH-IS-4 and WH-HW-4 sealed wiring harnesses. As an alternate, standard 3/4" conduit and fittings rated for the area can be utilized for electrical and intrinsic safe signal connections. Any wiring method utilized must comply with all electrical supply requirements listed on page 20 of this manual.

CK and FM configurations can also utilize the WH-IS-4 and WH-HW-4 sealed wiring harnesses for electrical and intrinsic safe signal connections to the EPCU.

The EPCU's Module Assembly **MUST** be removed, exactly as described below, prior to conduit, wire or wiring harness installation, regardless of the wiring method utilized. See pages 16 through 19 for detailed EPCU component and feature descriptions.

CAUTION

The through flange design of the WH-IS-4 and WH-HW-4 sealed wiring harnesses are not intended for pipe mount installations. See example on this page for pipe mount installations.

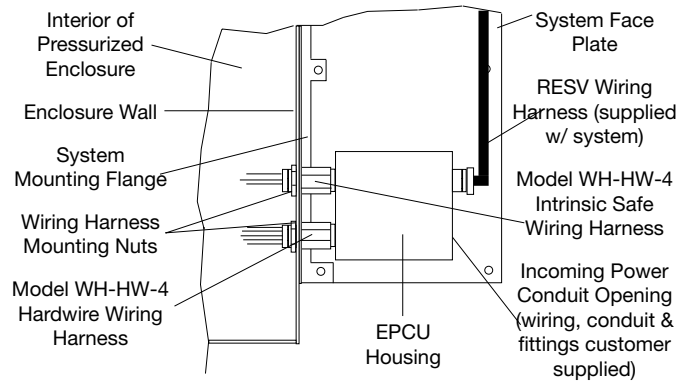
Module Assembly Removal Procedure

WARNING

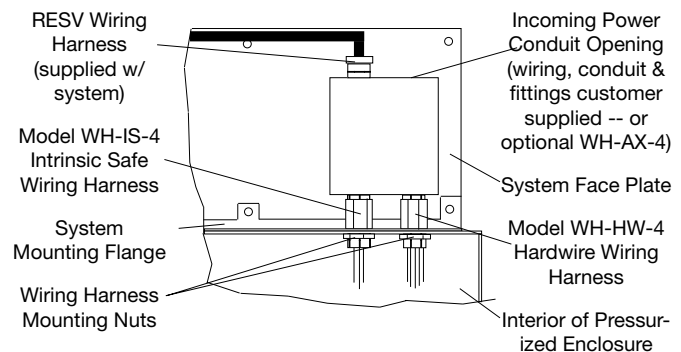
The EPCU Module Assembly is a microprocessor based electronic device. Technicians **MUST be properly grounded to prevent module damage.**

- Carefully remove EPCU screw cover from EPCU base.
- Remove two (2) Display Interface Module mounting screws.
- Remove the Display Interface Module by grasping the card with one hand and gently pull outward while slightly rocking the card up and down.
- If the Encapsulated Intrinsic Safety Module's (EISM) connection headers are not wired, go to step 5. If the EISM's connection headers are wired, remove connection headers from module, continue to step 5.
- Utilizing a small flat blade screwdriver, remove the two (2) EISM's bonding screws.
- Remove the EPCU's Control Module Assembly by grasping with one hand and gently pull outward while slightly rocking the card side to side.
- If replacing an existing EPCU Module Assembly, go to step 8. If wiring or installing a new EPCU, remove the Main Power wiring header - P1, Hardwire Bypass wiring header - P4 (if utilized) and the Alarm wiring header - P2 (if utilized). **DO NOT** remove the EPCU Base Module unless specifically requested by the factory.
- To install the EPCU Module Assembly, reverse steps 6 through 1 above.

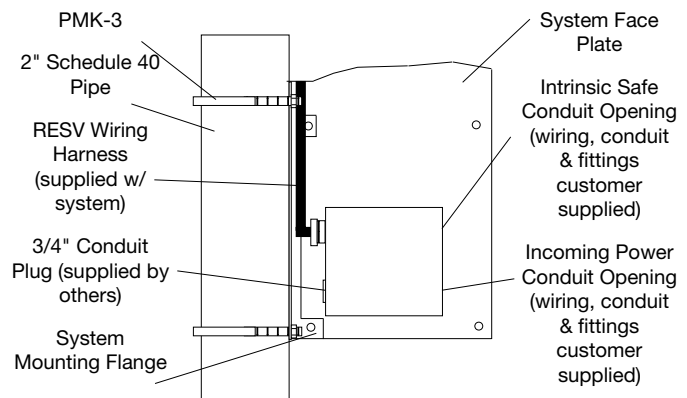
Typical EPCU Conduit Installation Details



Vertical Mount Configuration Surface Mounted with WH Wiring Harnesses installed



Horizontal Mount Configuration Surface Mounted with WH Wiring Harnesses installed



Vertical Mount Configuration Pipe Mounted requires customer supplied wiring, conduit & fittings

Required Hardware Mounting

Required Enclosure Protection Vent

All configurations must be mounted in a true vertical position.

The vent must be located to provide access for routine testing of the vent's flapper assembly. A minimum 8" (203 mm) clearance is required below the vent opening.

1. Determine the vent's mounting configuration, i.e.; -00 vertical mount or -90 side mount, (see photos below).
2. Determine vent location and layout vent mounting hole on the protected enclosure, (as determined on page 6, "Getting Started").
3. Determine location for VSM (Vent Sensor Module) signal wiring entry into the protected enclosure, utilizing the cable gland fitting provided, and layout entry fitting hole on the protected enclosure. NOTE: It is not essential for the VSM signal wiring to be installed through the protected enclosure as described above, however, Pepperl+Fuchs strongly recommends this method for the followings reasons:
 - a) Most practical way to protect signal wiring and connections from environmental conditions.
 - b) Required method when utilizing the WH-IS-4 (series 4000 Intrinsic Safe Wiring Harness).
4. Using a 1.6875" hole saw or 1 1/4" conduit punch, Model EPV-3 Vents or a 2.0" hole saw or 1 1/2" conduit punch, Model EPV-4 Vents for the enclosure protection vent mounting hole and a 0.875" hole saw for the VSM cable gland fitting described in step 3 above (if utilized). Drill and deburr mounting hole(s).
5. Remove the enclosure protection vent hub mounting nut from the vent hub and place the hub, with O-ring intact, through the enclosure protection vent mounting hole. The O-ring must be on the outside of the protected enclosure.
6. Reinstall the hub mounting nut to the mounting hub from inside the protected enclosure and tighten.
7. Remove VSM cable gland fitting mounting nut and install fitting and cable through the protected enclosure, reinstall the mounting nut and tighten.



EPV - 3 - SA - 00
Vertical Mount
(shown)

EPV - 3 - SA - 90
Side Mount
(also available)

Required Warning Nameplates

An EWN (Enclosure Warning Nameplate) must be located in a prominent position on or near **all** enclosure accesses (doors and covers).

One (1) EWN is provided with each system, located in the plastic envelope taped to the mounting flange of the system. Additional EWN's are available from Pepperl+Fuchs.

All EWNs provide labeled spaces allowing the customer to mark the protected enclosure with: 1) a T Code (temperature identification number), 2) Class, Group and Division of surrounding area, and 3) NFPA pressurization Type X, Y or Z, as may be required by plant and local codes and is required by NFPA 496.

An ETW (Enclosure Temperature Warning nameplate) must be located in a prominent position on or near all enclosure accesses (doors and covers) when the temperature of an internal component exceeds 80 percent of the ignition temperature of the flammable vapor, gas or dust involved.

An ETW warns the operator to deenergize all equipment for a specified length of time, allowing the protected equipment to cool before opening the protected enclosure. The length of time required must be determined by the customer and can be factory or field engraved.

All EWNs and ETWs are furnished with an adhesive back, but should be permanently attached with rivets or screws.



Enclosure Warning Nameplate - Class I



Enclosure Warning Nameplate - Class II



Enclosure Temperature Warning Nameplate

Electronic Power Control Unit

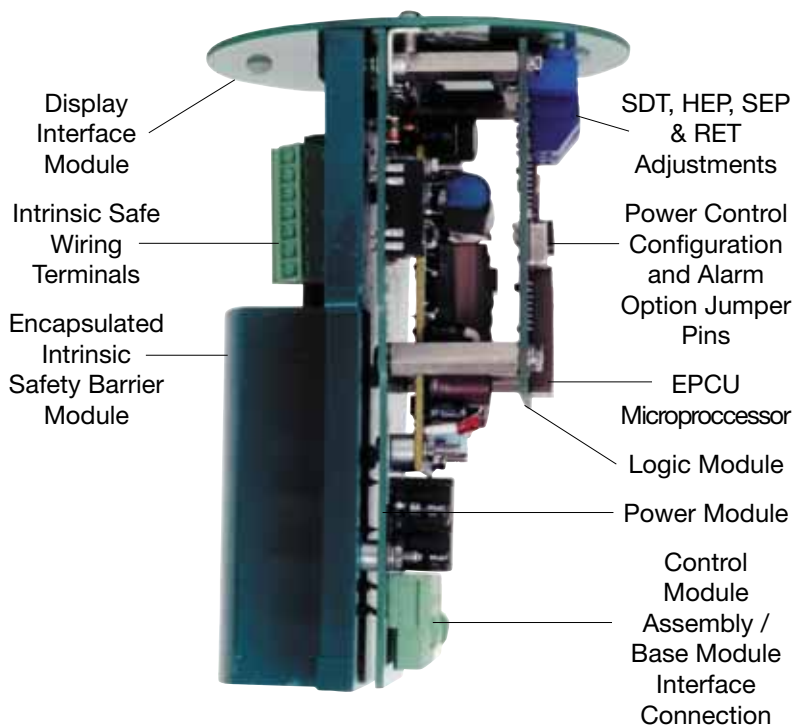
EPCU Description

The series 4000 Electronic Power Control Unit (EPCU) is a factory programmed, field adjustable, microprocessor controlled unit featuring full status indication, redundant “watchdog” timers, gate array logic and electromechanical power relays. The EPCU is constructed from five major items - 1) a Base Module, 2) a Logic Module, 3) a Power Module, 4) an encapsulated Intrinsic Safety Barrier Module and 5) a Display/Interface Module. Modules 2) through 5) are formed into a single part, known as the Control Module Assembly, in a manner which allows the Base Module and all wiring terminations to remain intact, while the Control Module Assembly can be easily removed as one compact part for easy field service or replacement. The Module Assembly fits snugly into a compact transmitter style explosion proof enclosure, third party approved for US Class I, Groups B, C & D and European Zone 1, Groups IIA and IIB+ H₂ hazardous areas. The EPCU is supplied with four (4) 3/4” conduit connections and a Type 4 rated screw cover dome with viewing window. The window allows easy viewing of the twelve LED status indicators.

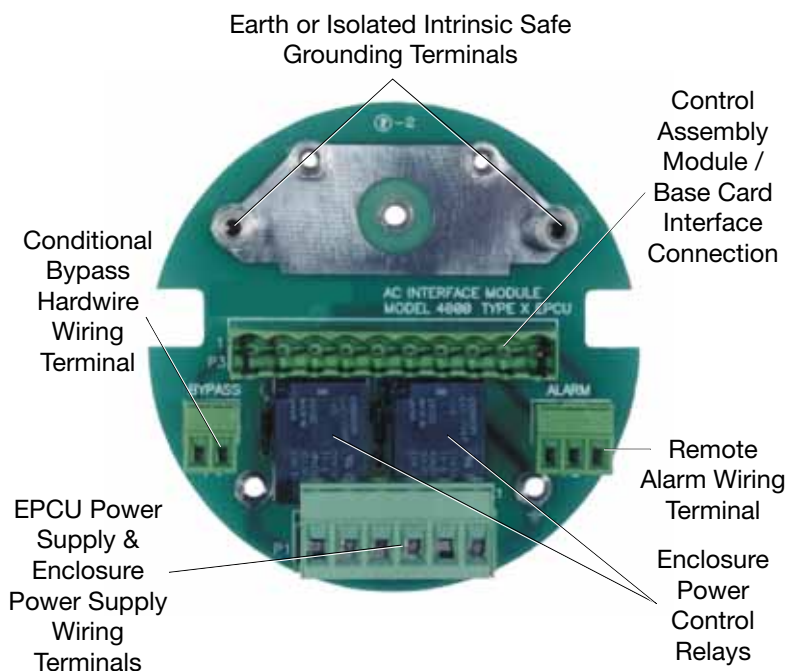
Base Module Description

1) The Base Module includes a heat sink/grounding plate with pem nut studs, and a circuit card with three sets of socket plug wiring terminations. The first set, for Hardwire Power Control Bypass, has two terminals. The second set, for power input and enclosure power control has six terminals. The third set, for a remote alarm system, has three terminals. Each terminal set is located along the bottom half of the Base Module, to create isolation between power wiring and the intrinsically safe wiring for the Intrinsic Safety Barrier Module on the top half of the Module Assembly. The Base Module also contains two relays which switch power loads up to ten (10) amps on two circuits ranging from 85 to 240 V AC. Finally, the Base Module includes two rails which guide the Control Module Assembly to an interface terminal at the center of the Base Module, and two ground terminals on the top which permit connection to either an earth ground or isolated ground plane.

EPCU Control Module Assembly



EPCU Base Module



Electronic Power Control Unit

EPCU Module Descriptions

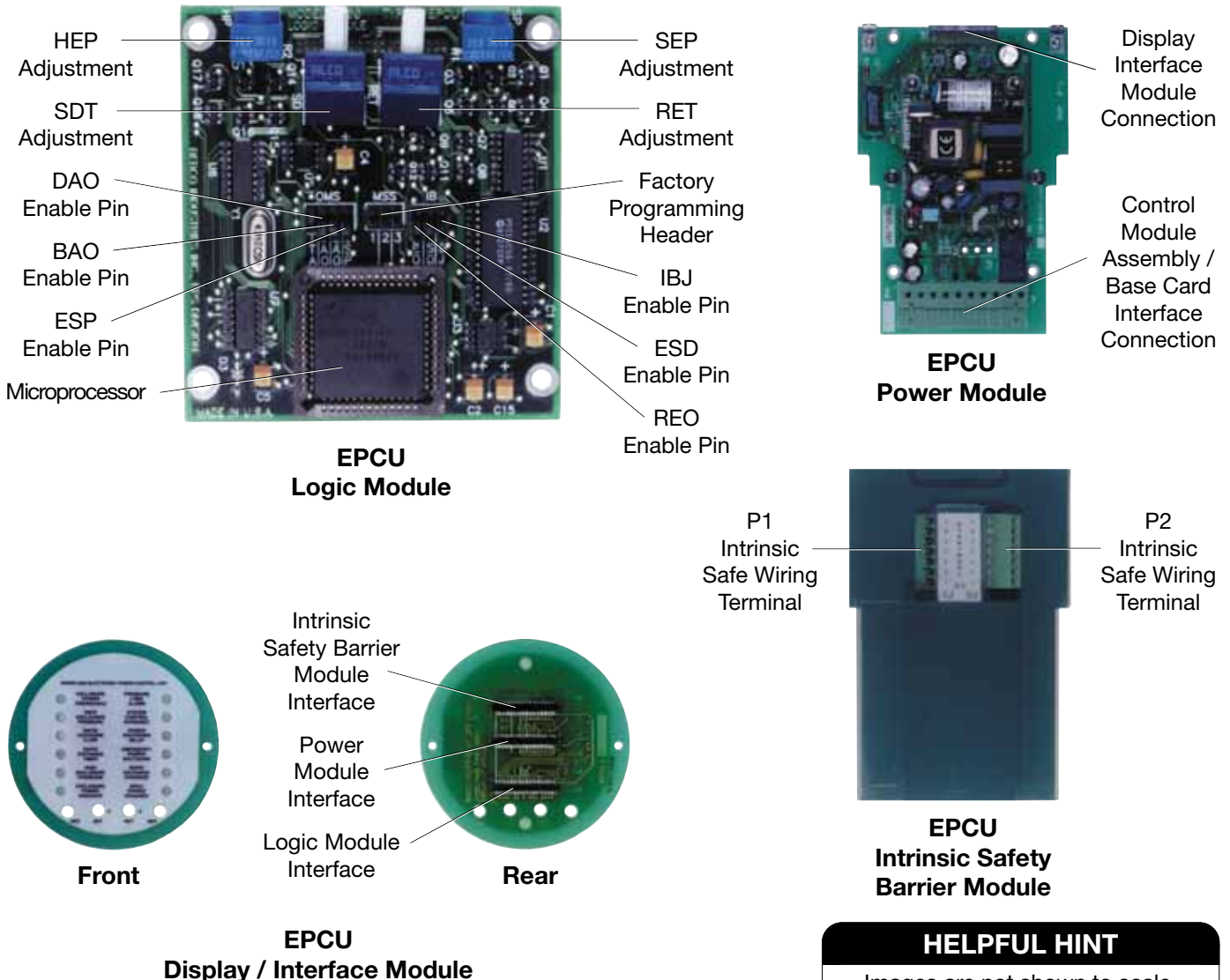
2) **The Logic Module** contains the microprocessor, the watchdog timers and gate array logic. In addition, adjustments for Safe Enclosure Pressure (SEP), High Enclosure Pressure (HEP), Rapid Exchange® Timer (RET) and the Shutdown Delay Timer (SDT) are featured and accessed through screwdriver slots through the Display/Interface Module. Along the bottom edge of the Logic Module, programming pins are featured for adding various power control, alarm control and shutdown priority functions to the unit.

3) **The Power Module** features a multi-pin modular plug which interfaces with the Base Module to transfer all power, alarm and bypass signals to the Control Module Assembly. The module contains a power switching supply and a 5 amp rated 120 VAC form "C" contact alarm relay and a multi-pin modular plug along the top edge which interfaces with the Display/Interface Module.

4) **The Encapsulated Intrinsic Safety Module** features two modular plug in terminals and an array of intrinsic safety barriers which provide intrinsically safe signals to the Rapid Exchange® Solenoid Valve, the Sensor Module and the optional Emergency Shutdown, Power Shutdown Bypass and Rapid Exchange® Override switches which may be installed as the user desires. The Module features two independent grounding screws which extend through the body of the module to fasten to pem nuts in the Base Module. In addition, a multi-pin modular plug along the top edge interfaces the Display/Interface Module.

5) **The Display/Interface Module** consists of three multi-pin modular plugs which interface with the Logic, Power and Intrinsic Safety Barrier Modules completing interface circuitry. The module features twelve LED status indicators and four (4) labeled through-holes which allow access to timer and pressure setpoint adjustments on the logic module.

EPCU Module Descriptions



HELPFUL HINT
 Images are not shown to scale.
 Provided for reference purposes only.

EPCU Features & Setpoints

EPCU LED Display

All LEDs Illuminate Upon EPCU Initialization

Enclosure Power Disengaged

On - Power Relays Deenergized

Safe Enclosure Pressure

On - Enclosure Pressure $\geq 0.25"$ (6.4 mm) w.c.

Rapid Exchange® Flow

On - Enclosure Pressure $\geq 1.0"$ (25.4 mm) w.c. & Rapid Exchange® Flow \geq setpoint
 4003: Flow ≥ 10 cfm (283 l/min)
 4004: Flow ≥ 30 cfm (849 l/min)
 Blinking - Warmup Cycle Activated

Rapid Exchange® Timer

On - Rapid Exchange® Solenoid Energized & Delay Timer Active

High Enclosure Pressure

On - Enclosure Pressure $\geq 8.5"$ (216 mm) w.c.

Enclosure Power Engaged

On - Enclosure Power Relays Energized

High Enclosure Pressure - HEP

Factory set at 8.5" (216 mm) w.c., adjustable from 7" to 10" (178-254 mm) w.c. When activated, the Rapid Exchange® Solenoid Valve is disabled and the alarm system is activated.

Shutdown Delay Timer - SDT

Adjustable from 0 to 5 minutes. When initiated by loss of safe pressure, the power relays are latched and the Power Shutdown Delay LED illuminates. Upon time-out, the power relays deenergize unless a safe pressure is restored or PSB input is activated (*Passive Access™*)

Pressure Loss Alarm

On - Alarm Relay Deenergized

System Control Bypassed

On - Active, Off - Passive
 Blinking - Faulted Wiring

Power Shutdown Delay

On - Shutdown Delay Timer Active

Emergency Shutdown

On - Active, Off - Passive
 Blinking - Faulted Wiring

Rapid Exchange® Override

On - Active, Off - Passive
 Blinking - Faulted Wiring

EPCU Power Engaged

On - EPCU Power Energized
 Off - Warmup Cycle Activated

Safe Enclosure Pressure - SEP

Factory set at 0.50" (12.7 mm) w.c., adjustable from 0.1" to 0.9" (0.25 - 22.9 mm) w.c. When activated, normal operation is enabled. Upon deactivation, enclosure power relays are deenergized or delayed by SDT function and the alarm system is activated.

Rapid Exchange® Timer - RET

Provides delay after Rapid Exchange® pressure and flow are detected, to accomplish multiple volume exchanges before the enclosure power relays are energized.

EPCU Field Adjustable Functions

SDT (Shutdown Delay Timer) field adjustable from 0 to 5 minutes, when activated by loss of safe pressure, the unit activates the Power Shutdown Delay LED while the unit PSD timer times out. Upon time out, the unit deactivates the Power Shutdown Delay LED and the unit removes enclosure power instantaneously.

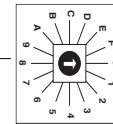
RET (Rapid Exchange Timer) provides a time delay after Rapid Exchange® pressure is detected, to allow the required volume exchanges prior to energizing the enclosure power relays. If safe pressure, Rapid Exchange® Pressure or Rapid Exchange® Flow is lost or interrupted during time delay cycle, the EPCU will reset.

SEP (Safe Enclosure Pressure) factory set at 0.5" (12.7 mm) w.c. and field adjustable from 0.10" w.c. to 0.90" (2.5 - 22.9 mm) w.c., when SEP pressure is lost, EPCU activates the Power Shutdown Delay function and the system alarm is activated.

HEP (High Enclosure Pressure) factory set at 8.5" (216 mm) w.c. and field adjustable from 7.0" w.c. to 10.0" (178 - 254 mm) w.c., when HEP pressure is detected, EPCU disengages Rapid Exchange® Solenoid Valve (RESV) regardless of system status.

SDT & RET Timer Settings

Rotary Switch Body



SDT Timer

RET Timer

POSITION	TIME IN SECONDS	POSITION	TIME IN MINUTES
0	0	0	5
1	5	1	10
2	10	2	15
3	15	3	20
4	20	4	25
5	25	5	30
6	30	6	35
7	60	7	40
8	90	8	45
9	120	9	50
A	150	A	55
B	180	B	60
C	210	C	65
D	240	D	70
E	270	E	75
F	300	F	80

EPCU Control Options

Power Control Options

POWER SHUTDOWN BYPASS (PSB)

This function allows the user to prevent the removal of protected enclosure power upon loss of safe pressure within the protected enclosure(s) or upon time-out of the SDT. It is often used to allow access to devices within the enclosure(s) for calibration, adjustment or maintenance (*Passive Access™*). The user has two options for activating this function, 1) a hard-wire termination requiring conduit, or 2) an intrinsically safe termination requiring only cable, an SRM-4000, (see below) and installation of the IBJ jumper pin. Both require a two wire conductor and switch (supplied by others) for field activation of this feature.

SHUTDOWN DELAY TIMER (SDT)

This function allows the user to set a time delay for protected enclosure power shutdown upon the loss of safe enclosure pressure or deactivation of the PSB Input. The function is activated by a control switch accessible through a hole in the display module. At the first step of the multi-position switch, the shutdown delay timer setting is “zero” and immediate shutdown of protected enclosure power occurs. Each step forward provides a longer delay before removing power upon loss of safe pressure in the protected enclosure(s) or deactivation of the PSB Input. When this function is activated the Power Shutdown Delay LED illuminates while the delay timer operates. The EPCU removes enclosure power instantaneously upon time-out, unless safe pressure is restored or the PSB Input is activated.

EMERGENCY SHUTDOWN (ESD)

This intrinsically safe user input is enabled by the installation of a jumper (supplied by Pepperl+Fuchs) across the “ESD” programming pins on the logic module and is activated by a remote switch and wiring (customer supplied) and an SRM-4000 (furnished separately). This feature allows the use of cable wiring and is commonly used to shutdown power to the protected enclosure(s), regardless of System status or Shutdown Delay Timer operation.

RAPID EXCHANGE® OVERRIDE (REO)

This intrinsically safe user input is enabled by the installation of a jumper (supplied by Pepperl+Fuchs) across the “REO” programming pins on the logic module and is activated by a remote switch and wiring (customer supplied) and an SRM-4000 (furnished separately). This feature allows the use of cable wiring and is commonly used to engage the Rapid Exchange® Solenoid Valve (on SA & FA Models) to increase the flow of protective gas through the protected enclosure(s). This function will be disengaged immediately if High Enclosure Pressure is detected.

MODEL SRM-4000 DESCRIPTION

An SRM-4000 Switch Resistor Module must be installed immediately adjacent to the remote switches used to activate REO, PSB & ESD inputs. This Module provides active or passive state and shorted or broken wire detection. Each function's display LED then indicates its current status by staying on for an active (closed) state, staying off for an inactive (open) state, or by blinking to indicate faulty wiring.

Alarm Control Options

The Series 4000 EPCU features two distinct alarming responses to power shutdown delay and power shutdown bypass functions, activated by the absence or presence of programming jumpers located on the logic module.

POWER SHUTDOWN DELAY ALARM OPTION (DAO)

- With Jumper removed, alarm is activated upon loss of safe pressure in the protected enclosure(s).
- With Jumper installed, alarm is activated upon time out of the Power Shutdown Delay cycle.

POWER SHUTDOWN BYPASS ALARM OPTION (BAO)

- With Jumper removed, alarm is activated upon loss of safe pressure in the protected enclosure(s).
- With Jumper installed, alarm is activated upon Bypass Switch activation, regardless of protected enclosure pressure status.

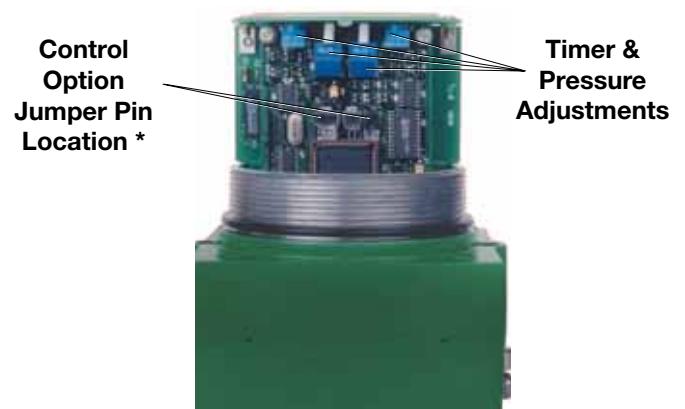
EMERGENCY SHUTDOWN PRIORITY (ESP)

Following a successful start-up cycle which applies power to the protected enclosure(s), the Power Shutdown Bypass and Emergency Shutdown Power Control Options may both be active, but are contradictory in nature and purpose. Therefore, the Series 4000 EPCU features a priority programming function that is activated by the absence or presence of a programming jumper on the logic module.

Assuming that both functions are operational, by the addition of programming jumpers and remote switches, programming dictates that if Emergency Shutdown is activated prior to Bypass, the unit will remove power from the protected enclosure(s). However, assuming that Bypass is activated first, and that Emergency Shutdown is activated thereafter, the unit will respond as follows:

- With Jumper removed, Emergency Shutdown shall take priority over Bypass, and the unit will remove power from the protected enclosure(s).
- With Jumper installed, Bypass shall take priority over Emergency Shutdown, and power will not be removed from the protected enclosure(s).

Control Options General Layout



EPCU w/ Cover Removed

* For Detailed Jumper Pin Layout See page 17

Electrical Supply Requirements

General Wiring Requirements

WARNING

THIS DEVICE CONTAINS ELECTRICAL PARTS WHICH CAN CAUSE SHOCK OR INJURY

All electrical connections, conduit and fittings on the protected enclosure must be suitable for the hazardous location in which they are installed. In addition, all conduit and wire must be installed in accordance with all relevant international, national, plant and local codes.

Conduit seals must be utilized on all electrical conduit connections and poured with an approved compound prior to operation of the protection system in a hazardous location.

Exception: Do not use seals on conduit used as a protected "wireway" to supply protective gas to adjacent protected enclosures. The same conduit can be utilized for both electrical and pneumatic service to an adjacent protected enclosure(s), provided the conduit is oversized to allow a minimum free clearance equal to or larger than the pipe size required between multiple enclosures as stated on page 6, "Getting Started".

Enclosure Power Requirements

The protected enclosure(s) electrical power source must originate from a circuit breaker or fused disconnect suitable for the hazardous location in which it is installed. The switch must be located within fifty (50) feet (15.2 m) of the protected enclosure(s) and the protection system and be properly marked. Voltage: 85-240 VAC / 47-63 Hz / single phase.

System Grounding Options

The 4000 EPCU accepts an earth or isolated ground plane by providing an isolated field looped grounding circuit. The EPCU and sensor module are mechanically and electrically connected to terminate the ground plane of the entire assembly at two (2) isolated grounding screw terminals on the EPCU Base Module capable of accepting two (2) 12 gauge (2.5 mm²) ring-lugs.

The System is normally supplied for earth ground plane installation. For earth grounding schemes, the System is factory supplied with one (1) internal wire grounding boss in the lower (hardware) chamber of the EPCU enclosure to accept a field installed earth ground wire for NEC compliance and one external cable grounding boss for CENELEC compliance.

One (1) earth ground bonding jumper is factory installed to terminate one of the EPCU isolated grounding screw terminals to a wire grounding boss within the upper (intrinsically safe) chamber of the EPCU enclosure.

To isolate the ground plane, remove the earth ground bonding jumper. Terminate two (2) 12 gauge (2.5 mm²) wires from an isolated ground plane directly to the EPCU isolated grounding screw terminals, use the 12 gauge (2.5 mm²) ring lugs supplied by Pepperl+Fuchs. This procedure will totally isolate the system ground plane.

Typical Enclosure Wiring Methods

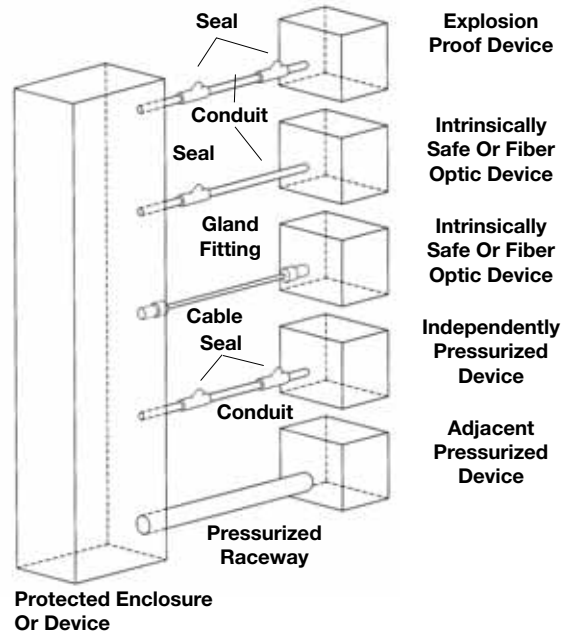
In a general sense, protected enclosures should be wired similar to explosion proof enclosures, in accordance with Article 500 of the National Electric Code - NFPA 70.

Single conductor wiring should be placed in rigid metal conduit, seal-flex conduit or other mediums approved for use in the hazardous location surrounding the protected enclosure. Additionally, NFPA 496 requires the use of approved seals on all pressurized enclosure conduit wiring entries, in accordance with NFPA 70. Furthermore, the use of an approved seal is simply the most practical way to prevent excessive leakage through conduit connections.

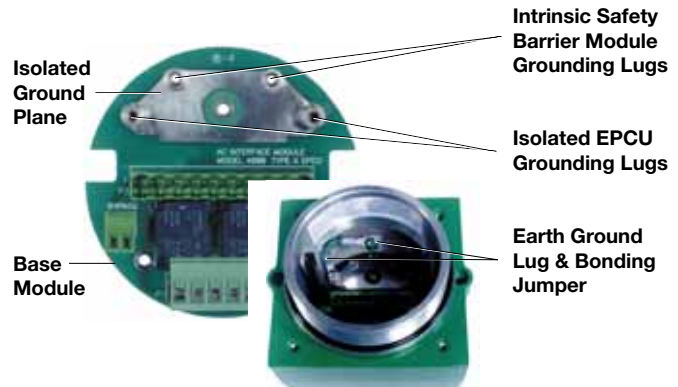
However, while explosion proof enclosures require conduit seals on all cable entries, in accordance with NFPA 70. Other methods of sealed cable entries that are suitable for hazardous locations can be used, such as compression glands.

In conclusion, there are two primary goals. First, the installer should ensure that all associated wiring and cable is protected by pressurization or other means, such as explosion proof conduit or intrinsic safety barriers. Secondly, the installer should ensure that all associated conduit and wireways are sealed to conserve protective gas, unless they are used to supply protective gas to other enclosures or devices.

Typical Enclosure Wiring Connections



System Grounding Connection Points



EPCU Wiring Methods

Power Source Wiring

1. With EPCU Module Assembly removed, (see page 14 for removal instructions) carefully remove the three (3) modular plug in terminals, located on EPCU Base Module.
2. Carefully feed all wiring from the EPCU Power Source and Enclosure Power Source, and all wiring to the Protected Enclosure Power Terminals, Hardwire Power Control Bypass Switch and Alarm System (as utilized), through the 3/4" Power wiring entries of EPCU Housing. **See notes below.**
3. Pull all wires up through the screw cover opening of the EPCU housing. Trim wires approximately one (1") to one and a half (1-1/2") inches beyond the housing threads.
4. Terminate all wiring to the appropriate point of the modular plug in terminals. **Do not utilize jumpers within the EPCU Housing nor attempt to terminate two wires to any one point on the modular plug in terminals.**
5. Reinstall the modular plug in terminals to their corresponding sockets on the EPCU Base Module, by folding the wires over gently and pushing the fold of wire down and away from the base module, into the bottom wiring cavity located between the conduit entries.
6. Double check to ensure that all excess wiring remains in position to provide necessary clearance for the installation of the EPCU Module Assembly.
7. Attempt insertion of the EPCU Module Assembly to ensure adequate clearance between wiring and EPCU Module Assembly. **See notes below.**

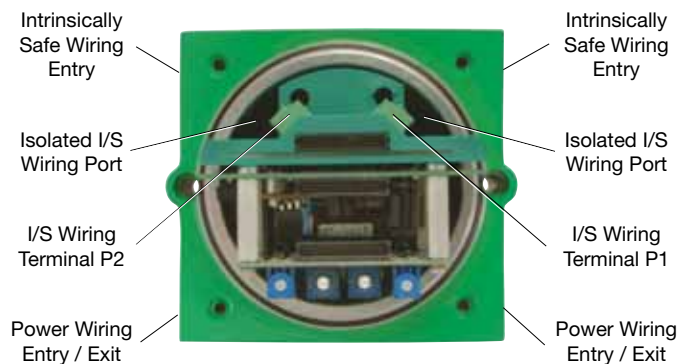
IMPORTANT NOTES

Unit may feature a WH-HW-4 Wiring Harness, Rapid Exchange® Solenoid Valve Harness and/or a WH-IS-4 Wiring Harness, installed or as a loose accessories. Harnesses may feature all or part of wiring described above.

The EPCU Module Assembly and Housing Cover provide minimal clearance for the plug in terminals and associated wiring. If EPCU Module Assembly is difficult to insert, or the Housing Cover makes contact with the wiring, or the Power Module interface connection will not easily engage, check wiring for insufficient clearance and ensure wire is trimmed, routed and tapered as instructed above.

Intrinsically Safe Wiring

1. Prior to EPCU Module Assembly removal, observe location and size of the two isolated I/S wiring "ports" between the EPCU Housing and Intrinsic Safety Barrier Module. **All intrinsically safe wiring must pass through these ports for termination. See photo below.**
2. Remove the EPCU Module Assembly and carefully feed all intrinsically safe wiring to the Vent Sensor Module, Intrinsically Safe Remote Input Switches, Isolated Grounds and Rapid Exchange® Solenoid Valve (as utilized) through the 3/4" Intrinsically Safe wiring entries of the EPCU Housing. **See notes below.**
3. Pull all wires through the opening of the EPCU housing and segregate wiring for Terminal P1 from Terminal P2.
4. Route all wiring within the top wiring cavity of the EPCU Housing, so the two segregated bundles can be braided to rise straight up from the top wiring cavity and through the wiring ports, to the modular plug in terminals on the Barrier Module. **All wires which "crossover" from one side to the other must be routed within the EPCU Housing's top cavity, between the conduit entries, to permit installation of the EPCU Module Assembly.**
5. Remove the modular plug in terminals on the Intrinsic Safety Barrier Module. Taper and terminate all wiring to the appropriate point on the modular plug in terminals in a manner which will ensure that the two wire bundles will fit within the wiring ports. If necessary, check the wire length and final position of the modular plug in terminals by reinserting the EPCU Module Assembly. **Tapering is required to eliminate any excessive wire mass at the point of termination on the modular plug in terminals from making contact with the EPCU Housing Cover.**
6. Attempt insertion of the EPCU Module Assembly and Housing Cover, to ensure adequate clearance between the two wire bundles, the EPCU Module Assembly and the EPCU Housing Cover. **See notes below.**
7. Upon successful insertion, place the modular plug in terminals into their respective sockets to complete wiring.



EPCU w/ Cover Removed

Set-up Procedure

HELPFUL HINTS

“Safe” pressure, for purposes of this manual, is defined as a minimum 0.50” (12.7 mm) of water column.

Regulator may be in the locked position upon arrival. To adjust regulator, pull handle to outward position.

Carefully insert T-Bar Valve Key to align valve stem tip of both valves. Practice locking and unlocking key in the RECV valve stem. Practice and familiarization of this process should ease operation of the system.

To test the vent’s operation, gently prod the vent flapper open with a soft pointed object, (example: eraser end of a pencil) ensuring that the vent valve works freely. On vertically configured vents, this can be accomplished from within the protected enclosure. Side mounted -90 configured vents can be tested by removing the conduit plug at the bottom of the mounting tee. Multiple operations require only one test per day if enclosure is not opened or left unattended.

IMPORTANT NOTES

The Rapid Exchange® Control Valve and the Enclosure Pressure Control Valve are both operated by utilizing the removable T-Bar Valve Key supplied with the system. The Bebco system is shipped with the T-Bar Valve Key locked in the Rapid Exchange® Control Valve stem. To remove the T-Bar Valve Key, wrap your index and middle finger around the T-Bar and place your thumb firmly against the system face plate. Pull the T-Bar Valve Key straight out firmly. This will unlock and free the T-Bar Valve Key for use in the Enclosure Pressure Control Valve stem. When Set-Up or Operating procedures are complete, replace the T-Bar Valve Key in the Rapid Exchange® Control Valve stem and push in firmly to lock in position. **THE T-BAR VALVE KEY LOCKS IN THE RAPID EXCHANGE® CONTROL VALVE STEM ONLY.**

Rapid Exchange Purging Systems are designed to provide a pre-calibrated and certified volume exchange rate. With the Rapid Exchange® pressure gauge set at 60 psi (4.14 bar) minimum, and the RET timer set as required (see “System Specifications” on page 4), the System will accomplish the required volume exchanges.

Multiply the required four (4) enclosure volume exchange time by 2.5 for applications requiring a ten (10) volume exchange for motors.

Regardless of enclosure volume or system flow rate, the Series 4000 will withhold power to the enclosure while inducing the required enclosure volume exchange, for a minimum of five (5) minutes. Normal exchange times should be doubled if large obstructions block protective gas flow.

Series 4000 Type X Set-up

READ IMPORTANT NOTES BEFORE PROCEEDING WITH SET-UP

1. Ensure that EPCU power is de-energized.
2. Utilizing the T-Bar Valve Key supplied with system (see important notes), close Rapid Exchange® and Enclosure Pressure Control Valves by turning clockwise (CW).
3. Engage the protective gas supply to the System Supply Inlet and insure the Rapid Exchange® Injection Pressure Gauge is set to 60 psi (4.14 bar) or greater.
4. Temporarily connect a 0-10 inch (0-254 mm) water column pressure indicator or manometer to the protected enclosure.
5. Check operation of Enclosure Protection Vent as detailed above. (see "Helpful Hints")
6. Seal enclosure(s) and adjust Enclosure Pressure Control Valve, utilizing the T-Bar Valve Key, by opening slowly counterclockwise (CCW) to set a “Safe” pressure on the Enclosure Pressure Gauge.

NOTE: If pressure setting is difficult to stabilize or set, see page 25, “Trouble-Shooting Procedures”.
7. Carefully remove T-Bar Valve Key from Enclosure Pressure Control Valve stem. Ensure Enclosure Pressure Gauge "Safe" pressure setting is stable.

8. Utilizing the T-Bar Valve Key supplied with system, lock T-Bar Valve Key into Rapid Exchange® Control Valve stem. Open valve fully by turning 90° CCW SLOWLY and quickly ensure the Enclosure Protection Vent opens. Note: The Enclosure Pressure Gauge should move quickly off scale to the right, this is normal for all Rapid Exchange® purging systems.

9. Confirm the Rapid Exchange® Pressure Gauge is reading 60 psi (4.14 bar) or greater while inducing Rapid Exchange® and the test gauge reads approximately 3 to 7 inches (76-178 mm) of pressure and does not fluctuate, (insufficient enclosure pressure will cause the Enclosure Protection Vent to "shuttle"). DO NOT exceed 10 inches (254 mm) of pressure within the protected enclosure.

Note: If Rapid Exchange® Pressure is less than 60 psi (4.14 bar) or the test gauge reads less than 3 to 7 inches (76-178 mm) of pressure or the Enclosure Protection Vent is "Shuttling", fully disengage the Rapid Exchange® Control and Enclosure Pressure Control Valves. Unlock and adjust the system regulator (located on the back of the Rapid Exchange® Pneumatic Manifold) to increase the pressure reading on the Rapid Exchange® Pressure Gauge by approximately 10 psi, (0.69 bar) lock regulator. Repeat steps 6 through 9.

Set Up procedure continued on page 23 of this manual.

Set-up Procedure (continued)

Series 4000 Type X Set-up (continued)

10. Close Rapid Exchange® Control Valve fully and ensure T-Bar Valve Key is firmly locked in Rapid Exchange® Control Valve stem.
11. Set RET timer (see page 18 for timer location and settings) for required exchange time (see “System Specifications” on page 4), five (5) minute minimum.
12. Install and tighten cover of EPCU. Ensure the conduit is sealed with approved compounds.
13. Energize EPCU power via local disconnect switch. Each LED should illuminate fully for two seconds (self test), then all LED's should turn off except Rapid Exchange Flow (flashing blue). The Rapid Exchange Flow LED will flash for approximately one minute while the Rapid Exchange Flow switch warms up. The EPCU will initiate this warm up cycle each time power is energized.
14. Upon warm up cycle completion, the Rapid Exchange Flow LED will turn off, the Enclosure Power Disengaged LED will turn on (solid red), the Pressure Loss Alarm LED will turn on (solid red) and EPCU Power Engaged LED will turn on (solid green).
15. Adjust Enclosure Pressure Control Valve, utilizing the T-Bar Valve Key, by opening slowly counterclockwise (CCW) to set a “Safe” pressure on the Enclosure Pressure Gauge. The Safe Enclosure Pressure LED should be on, the Pressure Loss Alarm LED should turn off. Check for a 0.25-0.30 inch (6.4-7.6 mm) trip point by slowly stroking the indicator from 0.20-0.30 inch (5.1-7.6 mm) readings. The Safe Enclosure Pressure LED should turn on and the Pressure Loss Alarm LED should turn off when the indicator reads between 0.25 and 0.30 inches (6.4-7.6 mm).
16. **FA Style** - Rapid Exchange® Solenoid Valve will engage automatically approximately five (5) seconds after Safe Enclosure Pressure LED illuminates, when this occurs, quickly ensure the Enclosure Protection Vent opens. The Rapid Exchange® Flow LED will illuminate when unit detects Rapid Exchange® Flow and Pressure. The Rapid Exchange® Timer LED will illuminate five (5) seconds after unit detects Rapid Exchange® Flow and Pressure. Allow System to run through a complete RET timer cycle and wait for solenoid to disengage. When the Rapid Exchange® Solenoid Valve disengages, the system should resume the Safe Pressure setting. See step 17.

SA Style - Utilizing the T-Bar Valve Key locked into the Rapid Exchange® Control Valve stem, open valve fully by turning 90° CCW until Rapid Exchange® Solenoid Valve engages. Quickly ensure the Enclosure Protection Vent opens. Close Rapid Exchange® Control Valve fully. The Rapid Exchange® Flow LED will illuminate when unit detects Rapid Exchange® Flow and Pressure. The Rapid Exchange® Timer LED will illuminate five (5) seconds after unit detects Rapid Exchange® Flow and Pressure. Allow System to run through a complete RET timer cycle and wait for solenoid to disengage. When the Rapid Exchange® Solenoid Valve disengages, the system should resume the Safe Pressure setting. See step 17.

Series 4000 Type X Set-up (continued)

STD Style - Utilizing the T-Bar Valve Key locked into the Rapid Exchange® Control Valve stem, open valve fully by turning 90° CCW. Quickly ensure the Enclosure Protection Vent opens. The Rapid Exchange® Flow and Rapid Exchange® Timer LEDs should be on. The Rapid Exchange® Flow and Timer LEDs should not turn on until valve is more than half open. Check for trip point by turning Rapid Exchange® Control Valve on and off. The Rapid Exchange® and Timer Running LEDs should turn on and off as exchange is engaged and disengaged, without disturbing the status of the Safe Enclosure LED. Allow System to run through a complete RET timer cycle and watch for Rapid Exchange® LED to turn off. Close Rapid Exchange® Control Valve fully.

17. Having ensured that the Safe Enclosure Pressure, Rapid Exchange® Flow and Rapid Exchange® Timer LEDs are functioning properly, optional EPCU Control Features (if utilized) can now be checked for proper setup and operation. If no optional control functions are utilized, proceed to Operating Sequence located on page 24.

Optional EPCU Control Functions Set-up

Detailed descriptions of all optional EPCU control functions listed below, their intended use and set up are located on page 19 of this manual.

POWER CONTROL OPTIONS

Intrinsically safe Power Shutdown Bypass, Emergency Shutdown and Rapid Exchange® Override functions are enabled by the installation of a jumper pin (supplied with system) located on the top side of the EPCU Logic Module. In addition, these functions require an SRM-4000 Switch Resistor Module installed between the EPCU wiring terminals and the dry contact switch utilized with each particular function.

ALARM CONTROL OPTIONS

DELAY ALARM OPTION (DAO)

- a) With Jumper removed, alarm is activated upon loss of safe pressure in the protected enclosure(s).
- b) With Jumper installed, alarm is activated upon time out of the Power Shutdown Delay cycle.

BYPASS ALARM OPTION (BAO)

- a) With Jumper removed, alarm is activated upon loss of safe pressure in the protected enclosure(s).
- b) With Jumper installed, alarm is activated upon Bypass Switch activation, regardless of protected enclosure pressure status.

EMERGENCY SHUTDOWN PRIORITY (ESP)

- a) With Jumper removed, Emergency Shutdown shall take priority over Bypass, and the unit will remove power from the protected enclosure(s).
- b) With Jumper installed, Bypass shall take priority over Emergency Shutdown, and power will not be removed from the protected enclosure(s).

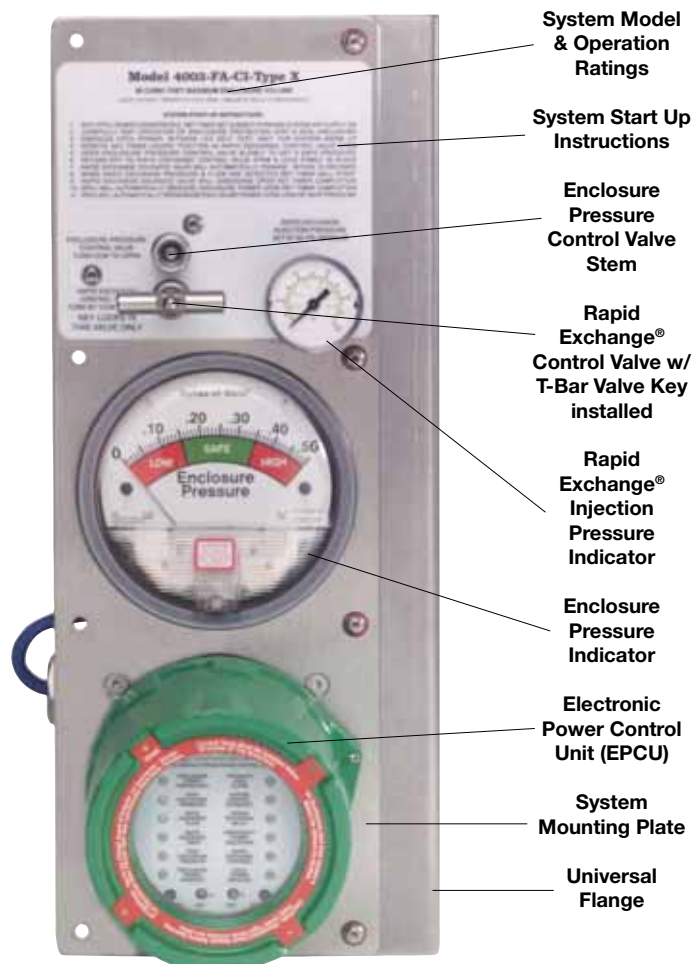
Operating Instructions

WARNING

Do not exceed a "Safe" pressure with the Enclosure Pressure Control Valve. Operators must follow step-by-step sequence of the Start-Up Instructions Nameplate provided with Protection System. **Do not use the Bypass Mode without first securing a "Hot Work" permit.** **Never leave the system unattended in Bypass Mode.**

Rapid Exchange® Purging System Operation

- With protective gas supply on, RET Timer set properly, EPCU power and alarm system denergized (if utilized)...
1. Carefully read Start-Up Instruction Nameplate on system.
 2. Check operation of the Enclosure Protection Vent, opening it manually several times (see page 22, "Helpful Hints").
 3. Seal protected enclosure(s).
 4. Energize EPCU power via local disconnect switch. Each LED should illuminate fully for two seconds (self test), then all LEDs should turn off except Rapid Exchange Flow (flashing blue). The Rapid Exchange Flow LED will flash for approximately one minute while the Rapid Exchange Flow switch warms up. The EPCU will initiate this warm up cycle each time power is energized.
 5. Upon warm up cycle completion, adjust Enclosure Pressure Control Valve, utilizing the T-Bar Valve Key, by opening slowly counterclockwise (CCW) to set a "Safe" pressure on the Enclosure Pressure Gauge. The Safe Enclosure Pressure LED should be on, the Pressure Loss Alarm LED should turn off.
 6. **FA Style** - Rapid Exchange® Solenoid Valve will engage automatically approximately five (5) seconds after Safe Enclosure Pressure LED illuminates. Quickly ensure the Enclosure Protection Vent opens. The Rapid Exchange® Flow and Rapid Exchange® Timer LEDs should be on.
SA Style - Utilizing the T-Bar Valve Key locked into the Rapid Exchange® Control Valve stem, open valve fully by turning 90° CCW until Rapid Exchange® Solenoid Valve engages. Quickly ensure the Enclosure Protection Vent opens. Close Rapid Exchange® Control Valve fully. The Rapid Exchange® Flow and Rapid Exchange® Timer LEDs should be on.
STD Style - Utilizing the T-Bar Valve Key locked into the Rapid Exchange® Control Valve stem, open valve fully by turning 90° CCW. Quickly ensure the Enclosure Protection Vent opens. The Rapid Exchange® Flow and Rapid Exchange® Timer LEDs should be on.
 7. Standby until the EPCU RET Timer completes the timing cycle and energizes enclosure power. The Rapid Exchange® Solenoid Valve should deenergize (FA & SA Styles) or MANUALLY CLOSE Rapid Exchange® Control Valve (STD Style). Safe Enclosure Pressure LED should stay on, Rapid Exchange® Timer and Rapid Exchange® Flow LED should turn off and Enclosure Power Engaged LED should turn on.
 8. Ensure the Protection System Enclosure Pressure Indicator maintains a "Safe" enclosure pressure for one (1) minute. Readjust Enclosure Pressure Control Valve if required.
 9. If "Safe" Enclosure pressure is lost, the EPCU will deenergize enclosure power and activate alarm system (if utilized).



Model 4003-FA-CI-VM
Front View

Trouble - Shooting Procedures

Problem or Fault		Corrective Action
Enclosure pressure control valve will not hold a "Safe" 0.5 inch (12.7 mm) pressure.	Leakage around gasketing, covers, seams, piping and tubing connections, conduit connections and electrical conduit seals of the enclosure.	Tighten enclosure latches: Where tightening is not feasible, and gasketing materials are not practical, holes or gaps can be closed with silicone sealant applied from inside the protected enclosure.
Enclosure pressure gauge reading is difficult to stabilize.	Insufficient enclosure leakage or opening of the venturi orifice is crimped too small.	Remove the orifice, cut off the crimped end and ream the tube, then recrimp and reinstall the tube to note effect. As tube is shortened, reamed, and recrimped, sensitivity decreases, allowing easier adjustment of setpoint on the enclosure pressure gauge.
EPCU indicator or indicators are "Blinking". Solenoid Valve does not engage. Peripheral functions are non-operative.	Loose wiring or connection. EPCU Logic failure. Shorted or broken wire.	Isolate particular LED or LEDs that are "Blinking". Individual LEDs indicate a problem with a particular function. Check all peripheral and internal wiring connections. All LEDs indicate EPCU logic problem.
Rapid Exchange® Flow and / or Rapid Exchange® Timer LEDs do not illuminate.	Insufficient Rapid Exchange® injection pressure. Air leakage from protected enclosure. Shorted or broken wire.	Increase Rapid Exchange® injection pressure, 60 psi (4.14 bar) minimum. Check enclosure's seals. Ensure all conduit & wiring connection are sealed. See corrective actions listed above.
Problems persists, or if the system does not appear to be operating properly.	Persisting problems.	Contact Pepperl+Fuchs Applications/Customer Service Department at (330) 486-0002 for more information.

This section covers the most common problems documented with these systems. Any problems not covered in this section should be addressed directly to our factory. Please address all service needs to Pepperl+Fuchs, Inc. - Customer Service Department at (330) 486-0002.

Warranty Terms and Conditions

PEPPERL+FUCHS STANDARD 24-MONTH WARRANTY

- Limited Warranty.** Pepperl + Fuchs, Inc. ("P+F") warrants Purge Units and components for Purge Units manufactured by P+F ("Product" or "Products") to be free from defects in material and workmanship under Normal Use for a period of twenty-four (24) months from the date of shipment of such Products from P+F's warehouse or place of manufacture (or from P+F's authorized representative or distributor). Only the original purchaser of such Products (the "Customer") shall be entitled to the benefit of the foregoing Limited Warranty. No representative, agent or salesman of P+F is authorized to give or provide any warranty or make any representation contrary to or in addition to the foregoing Limited Warranty.
- Inspection and Claims.** Customer must inspect and test all Products upon receipt. All claims under the Limited Warranty provided herein must be made within thirty (30) days of the discovery of the defect. Customer must obtain shipping instructions from P+F prior to returning any Product, which Product must be returned at Customer's expense in accordance with P+F's instructions.
- Limitations and Exclusions.** "Normal Use" shall mean use and operation within rated capacities, at the correct voltage, and with any required maintenance as provided in the applicable P+F Operating Manuals. The Limited Warranty provided herein does not apply to (i) any Products which have been altered or modified in any way or disassembled by the Customer or anyone else, (ii) any Products which have been subject to misuse, negligence or accident, or improperly installed, changed, substituted or replaced, (iii) any part or component not manufactured by P+F, or (iv) any part or component that is subject to wear or consumption. For parts or components not manufactured by P+F, the Customer or any other user or owner shall have only the warranty provided by the manufacturer of such part or component. The Limited Warranty set forth herein is also subject to the following:
 - (1) The Limited Warranty is limited to electronic and mechanical performance only, as expressly detailed in the product specifications, and does not apply to cosmetic appearance;
 - (2) The Limited Warranty shall not apply to any cables attached to, or integrated with, any Products.
 - (3) The Limited Warranty shall not apply to any Products which are stored, or utilized, in harsh environmental or electrical conditions outside P+F's written specifications.

THE LIMITED WARRANTY SET FORTH HEREIN IS THE ONLY WARRANTY MADE BY P+F WITH RESPECT TO THE PRODUCTS. IT IS EXPRESSLY AGREED AND UNDERSTOOD THAT P+F MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. EXCEPT FOR THE LIMITED WARRANTY SET FORTH HEREIN, THERE IS NO OTHER WARRANTY, EXPRESS, IMPLIED OR STATUTORY; AND THERE IS NO AFFIRMATION OF FACT OR PROMISE BY P+F WITH REFERENCE TO THE PRODUCTS. IN NO EVENT SHALL P+F BE LIABLE FOR ACTUAL OR ANTICIPATED LOST PROFITS OR FOR INCIDENTAL OR CONSEQUENTIAL OR PUNITIVE DAMAGES OR FOR DAMAGES RESULTING FROM BUSINESS INTERRUPTION, OR INJURY OR DEATH OF PERSONS, OR INJURY TO PROPERTY. P+F'S LIABILITY ON ANY CLAIM OF ANY KIND ARISING OUT OF, CONNECTED WITH OR RESULTING FROM THE DESIGN, MANUFACTURE, SALE, REPAIR OR OPERATION OF A PRODUCT, SHALL NOT EXCEED THE PRICE ALLOCABLE TO THAT PRODUCT OR THE PART THEREOF WHICH GIVES RISE TO THE CLAIM. THE REMEDY SET FORTH IN THIS LIMITED WARRANTY CONSTITUTES THE SOLE AND EXCLUSIVE REMEDY OF THE CUSTOMER. P+F SHALL NOT BE LIABLE FOR PENALTIES OF ANY DESCRIPTION.

- Limitation of Remedies.** In the event of P+F's liability, whether on this Limited Warranty or based on contract, tort (including, but not limited to, negligence and strict liability) or otherwise, Customer's sole and exclusive remedy will be limited to, at P+F's option, the repair or replacement (f/o/b P+F's place of manufacture) by P+F of any non-conforming items for which claim is made by Customer in accordance with paragraph 2, or the repayment of the portion of the purchase price paid by Customer attributable to the non-conforming item.
- Responsibility of Customer: Safety and Protection Precautions.** P+F takes great care to design and build reliable and dependable Products; however, some Products can fail eventually. Customer must take precautions to design its equipment to prevent property damage and personal injury in the unlikely event of a failure. AS A MATTER OF POLICY, P+F DOES NOT RECOMMEND THE INSTALLATION OF PRODUCTS AS THE SOLE DEVICE FOR THE PROTECTION OF PERSONNEL OR PROPERTY AND, THEREFORE, THE CUSTOMER SHOULD BUILD IN REDUNDANCY OR DUAL CONTROL USING APPROVED SAFETY DEVICES FOR THESE APPLICATIONS.
- Conflicts.** In the event there is any conflict between the provisions of this Limited Warranty and any provisions contained in any orders, offers, acceptances or other writings or statements provided or made by Customer to P+F, the provisions of this Limited Warranty shall prevail, and the contract between P+F and the Customer shall be deemed formed only upon the provisions set forth in this Limited Warranty, and any additional or conflicting provision inserted by Customer shall be of no force or effect.

SYSTEM IDENTIFICATION & APPLICATION INFORMATION

Date of Installation _____

System Serial # _____

Item _____

Customer P.O.# _____

Customer Project# _____

Service _____

Type _____

Features _____

Application _____

NOTES: _____

Local Sales Representative
