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Purpose

The Bebco 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 NEMA (National Electrical Manufacturers Association) 4 or 12 enclosures in the place of explosion proof NEMA 7 enclosures. Other purposes include heat, moisture and dust contamination prevention.

Description

Model 11 is an enclosure pressurization or purging system that operates on a supply of compressed instrument air or inert gas. It regulates and monitors pressure within sealed (protected) enclosures, to prevent combustible dust accumulation or remove and prevent flammable gas or vapor accumulations. In Class II areas, the system maintains a "safe" (1.0") pressure. In Class I areas, the system accomplishes four air exchanges and maintains a "safe" (0.25") pressure. These processes reduce the hazardous (classified) area rating within the enclosure(s), in accordance with the NEC - NFPA 70, Article 500, NFPA 496 and ISA ds12.4

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 Bebco Industries, Inc. requirements. Bebco 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 Bebco 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.

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Identifying Your System

This Enclosure Protection System is offered in various styles. For proper installation and operation, examine the System Model Number Nameplate to identify the System Style, Area Classification, and Type, as noted below.

SYSTEM STYLE

Systems are available in three styles, with or without an explosion proof differential pressure switch, used to detect loss of "safe" enclosure pressure

LPS - **L**ess **P**ressure **S**witch

WPS - **W**ith **P**ressure **S**witch Groups C & D

WPSA - **W**ith **P**ressure **S**witch Groups A - D

SYSTEM CLASS RATING

Defines Class rating for Protection System's method of use

CI - Class I Purging system

CII - Class II Pressurization system

SERIES MODEL NUMBER

MAXIMUM TOTAL ENCLOSURE VOLUME

Defines total protected enclosure(s) volume capacity for this particular system. Total enclosure(s) volume must be calculated without regard for consumed volume

Model 11-LPS-CI Type Y or Z

2 CUBIC FEET MAXIMUM ENCLOSURE VOLUME

REDUCES INTERNAL AREA CLASSIFICATION AS FOLLOWS:
TYPE Y: CL. I, DIV. 1, GR. A-D / ZONE 1, GR. IIC TO DIV 2/ ZONE 2
TYPE Z: CL. I, DIV. 2, GR. A-D / ZONE 1, GR. IIC TO NONHAZARDOUS

CLASSIFIED UL FM APPROVED

PURGE CONTROL FOR USE IN HAZARDOUS LOCATIONS. IN ACCORDANCE WITH THE NATIONAL FIRE PROTECTION ASSOCIATION STANDARD FOR PURGED AND PRESSURIZED ENCLOSURES FOR ELECTRICAL EQUIPMENT NFPA 496- 1998 7L93

APPROVED BY FACTORY MUTUAL AS ASSOCIATED TYPE Y & Z PRESSURIZATION CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS. REDUCES THE INTERNAL AREA OF A CONNECTED ENCLOSURE IN ACCORDANCE WITH DRAWING NUMBER 11-IOM.

SYSTEM TYPE

Type Z

Reduces the internal enclosure area Division rating from Division 2 to nonhazardous

Type Y

Reduces the internal enclosure area Division rating from Division 1 to Division 2

AREA CLASSIFICATION

Defines the area classification for which the system is suitable for operation

APPROVAL MARKINGS & DEFINITIONS

Identifies the current third party approvals for this system

To assist you through the installation and operation of your pressurization / purge system, Bebco Industries, 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.

HELPFUL HINT

IMPORTANT NOTE

WARNING

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General Information

System Specifications

System Dimensions:	See Pages 10 & 11
Shipping Weight (lbs.):	LPS - 5, WPS & WPSA - 10
Operating Temp. Range:	40° F - 120° F
Supply Pressure Range:	* 5 -120 PSI max.
Supply Requirements:	Clean Air or Inert Gas
Safe Press. (CI/CII):	0.25" / 1.0"
Safe Pressure Flowrate:	** 0.1-3.5 SCFH/Cubic Ft.
System Supply Fitting:	1/4" Tube Fitting
Enclosure Supply Fitting:	1/4" Tube Fitting
Enclosure Reference Fitting:	1/4" Tube Fitting
Switch Setting (WPS & WPSA Only):	0.15" ± 0.02"
WPS & WPSA Pressure Switch Wiring:	1/2" FPT
Switch Contact Ratings:	
WPS Style:	120 VAC, 15 Amps
WPSA Style:	*** 120/240 VAC, 10 Amps, 28 - 125 VDC

* With Enclosure Protection Vent - 120 PSI maximum
Without Enclosure Protection Vent - 5 PSI maximum

*** WPSA style switch requires 120/240 VAC supply voltage

In order to comply with the NFPA 496 standard requiring protection against over pressurization of the protected enclosure, the installer must install one of the following items in addition to the enclosure protection system.

a) Install a Bebco Model EPV-1 Enclosure Protection Vent on the protected enclosure.
b) Install a tamper-proof regulator upstream of the enclosure protection system's system supply inlet to pre-regulate protective gas supply to 5 PSI max.

In addition, for small, tightly sealed enclosures, or to compensate for a fluctuating protective gas supply, it may be necessary to pre-regulate the protective gas supply to a constant 5 PSI regardless of whether an EPV-1 is installed. This will reduce the amount of "drifting" that can normally occur when maintaining a "Safe" pressure inside a protected enclosure. The pre-regulation can be accomplished by installing Bebco Models TR-10 or TR-10G Tamper-Proof Regulator accessories or equivalent.

Applications requiring a steady "Safe" pressure setting or for protective gas supplies which may have dramatic pressure fluctuations, it may be necessary to utilize the Bebco Models PR-10 or PR-10G self relieving Precision Regulators or equivalent to pre-regulate the protective gas supply to a constant 5 PSI (please consult factory for more information).

** Enclosure integrity determines actual flow rate

Material Specifications

Regulator Body:	Zinc w/ Enamel Finish, Brass
Regulator Handle:	Polycarbonate
Enclosure Pressure Gauge:	ABS Plastic
Tube Fittings:	316 SS Forged Body
Tubing:	316 SS 1/4" .035 Welded
System Nameplates:	Silkscreened Lexan® & SS
Fastener Hardware:	Zink Plated & Stainless Steel
Mounting Plate:	316 14 Ga #3 Brush SS
EXP Pressure Switch Body:	Anodized Cast Alum.
Enclosure Warning Nameplate:	Silkscreened SS

Lexan® is a registered trademark of the General Electric Corporation

Recommended Spare Parts

Qty	Description	Part Number
1	Enclosure Pressure Indicator-CI	001050
1	Enclosure Pressure Indicator-CII	001052
1	Enclosure Pressure Control Regulator	002000
1	Installation & Operation Manual	IOM 11
1	Group C - D Pressure Switch-CI	001080
1	Group A - D Pressure Switch-CI	001085
1	Group E - G Pressure Switch-CII	001082
1	Enclosure Warning Nameplate-CI	EWN-1
1	Enclosure Warning Nameplate-CII	EWN-2

Please call and reference Bebco 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
1/2" conduit knockout punch or 0.875" hole saw
Complete set of tubing, conduit bending, instrument fitting and electrical craftsman hand tools
0 - 250 scfh flowmeter (connected upstream of the Protection System to determine air consumption and flow during set-up procedure)

Model 11 System Accessories

Optional Enclosure Protection Vents

EPV-1-SA-00	Straight w/ Spark Arrestor
EPV-1-SA-90	Rt Angle w/ Spark Arrestor

Additional Items

SMK-1, -4 or -6	System Mounting Kit
EPSK-1	Class I, Group C - D Pressure Switch Kit
EPSK-1A	Class I, Group A - D Pressure Switch Kit
EPSK-2	Class II, Group E - G Pressure Switch Kit
GPSK-1	Class I, General Purpose Switch Kit
GPSK-2	Class II, General Purpose Switch Kit
RAH	Div. 1 Remote Alarm Horn
RAB-1	Div. 1 Remote Alarm Beacon
RAB-2	Div. 2 Remote Alarm Beacon
LCK	L Fitting Conduit Kit
TCK	T Fitting Conduit Kit
PIAD	Purgeable Instrument Access Door
TR-10	Tamper-Proof Regulator
TR-10G	Tamper-Proof Regulator w/ Gauge
PR-10	Precision Regulator
PR-10G	Precision Regulator w/ Gauge

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Enclosure & Device Design

Enclosure Design Requirements

1. All windows must be shatterproof and sized as small as possible.
2. All NFPA 496 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 non-static polycarbonate to meet or exceed NEMA 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.

Device Ventilation

1. Enclosed devices within the protected enclosure which do not exceed 1.22 cubic inches 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 it must be protected by one of the following means:
   a) ventilated on the top and bottom sides with one (1) square inch of opening for each four hundred (400) cubic inches of volume within the internal protected enclosure, at a minimum diameter of one (1) quarter inch;
   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

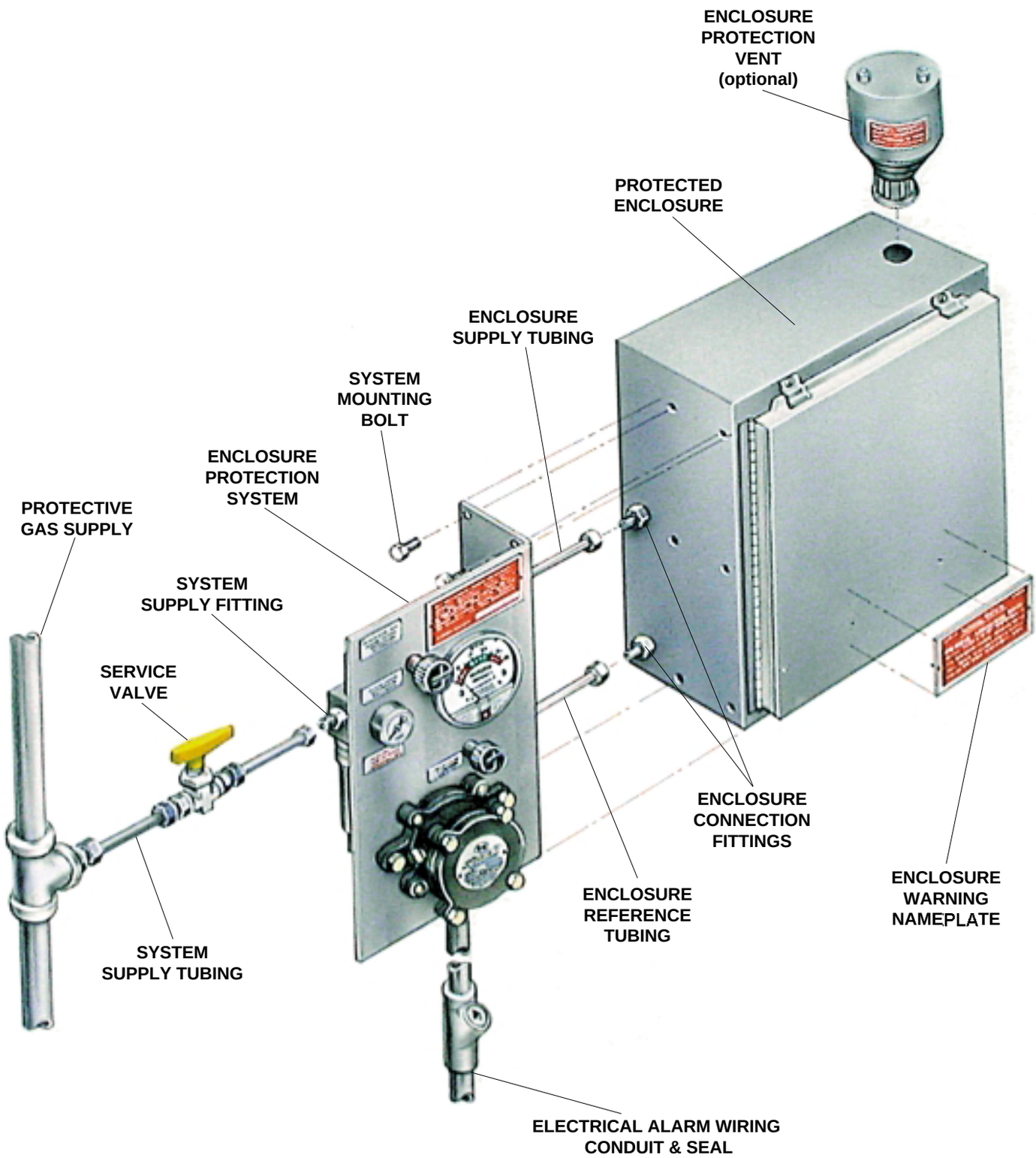
1. The enclosure must have no surface area which exceeds 80 percent of the flammable or ignitable substance's auto-ignition temperature.
2. Internal devices which exceed this temperature must be protected by one of the following manners.
   a) The device is enclosed in a chamber which is UL, FM or CSA 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 a Bebco model 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.

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Installation Overview

Typical Left Hand Configuration Installation Diagram

1002-WPS-LH Shown

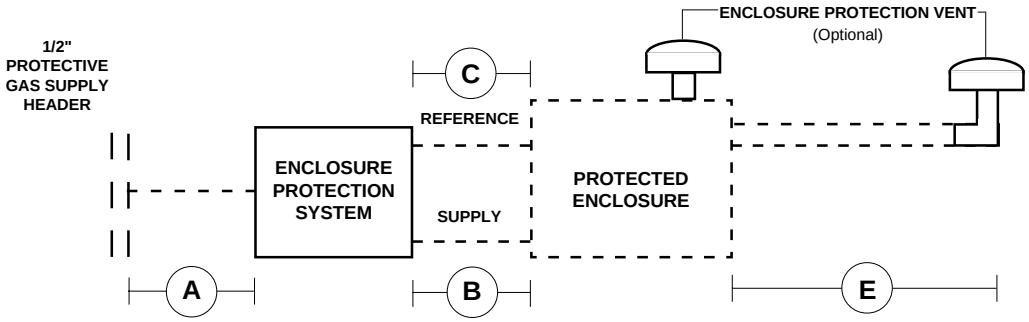


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Getting Started

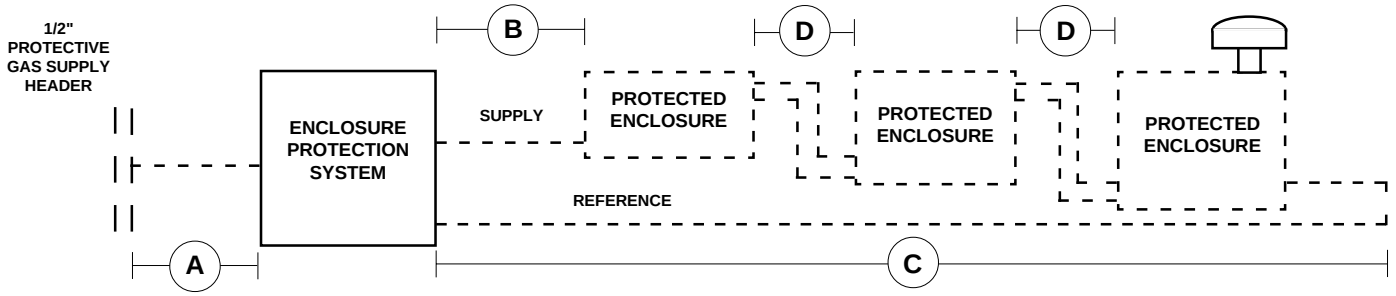
Establishing Connection Sizes, Lengths & Bends

TYPICAL SINGLE PROTECTED ENCLOSURE CONNECTIONS



	A	B	C	D	E
Description	**System Supply Tubing**	**Enclosure Supply**	**Enclosure Reference**	**Multi - Enclosure Connections**	**Optional Remote Venting**
Tubing or Pipe Diameter	1/4" O.D. Tubing Fully Reamed	1/4" O.D. Tubing Fully Reamed	1/4" O.D. Tubing Fully Reamed	1/2" I.D. Pipe Fully Reamed	1/2" I.D. Pipe Fully Reamed
Maximum Tubing / Pipe Length and Maximum Number of Bends / Elbows	20 Feet 10 Bends	5 Feet 5 Bends	20 Feet 10 Bends	10 Feet 5 Elbows	30 Feet 5 Elbows

TYPICAL MULTIPLE PROTECTED ENCLOSURE CONNECTIONS



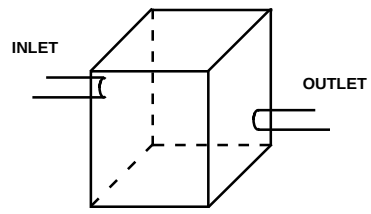
HELPFUL HINTS

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

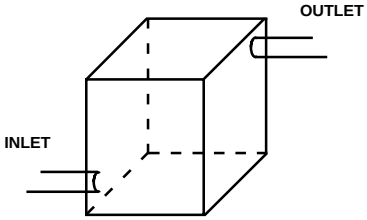
Precautions must be taken to prevent crimping and other damage to protective gas piping and tubing.

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



Connections for Heavier than Air Gases and Vapors



Connections for Lighter than Air Gases and Vapors

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 an optional 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.

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System 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.

LH, RH, TM, BM and WM configurations are intended for mounting adjacent to the protected enclosure.

LH, RH, TM & BM configurations are also suitable for 2" schedule 40 pipe mounting. In addition, these configurations can be accessorized with a Bebco Model ECK (Enclosure Connection Kit). (See page 9)

Systems furnished with a Model ECK are not compatible for pipe mounting or multiple enclosure applications.

Determine the mounting configuration of your system using the diagrams on pages 10 & 11.

Remove and save the manila envelope (containing the enclosure warning nameplate) which may be taped to the outer surface of the mounting flange.

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

Mounting LH, RH, TM, BM & WM Configurations

Surface mounting Systems with ECK accessory

1. Verify dimensions of the System's mounting holes and connection fittings in reference to the applicable drawing on pages 10 and 11.
2. Upon confirmation of dimensions, transfer mounting hole pattern from drawing to the intended surface.
3. Check for internal obstructions which could hinder bolt fastening and protective gas flow, drill and ream the mounting holes before mounting the system.
4. Remove locknuts on enclosure connection fittings.
5. Secure the system to the protected enclosure using one (1) Bebco Model SMK-1 or equivalent - four (4) 1/4" x 3/4" stainless steel bolts, nuts and lock washers.
6. Install the locknuts on the enclosure connection fittings from inside of the protected enclosure, ensuring that fittings seat directly against enclosure through the system mounting plate flange.

Surface mounting Systems without ECK accessory

1. Transfer hole pattern of System mounting plate to intended surface.
2. Check for obstructions hindering bolt fastening, drill and ream the mounting holes before mounting the system.
3. Secure the system to the enclosure, or other mounting surface, using one (1) Bebco Model SMK-1 or equivalent - four (4) 1/4" x 3/4" stainless steel bolts, nuts and lock washers.

Pipe mounting Systems without ECK accessory

1. Locate 2" schedule 40 pipe, (vertical for LH & RH, horizontal for TM & BM) within five (5) feet of protected enclosure.
2. Ensure system is mounted in a true vertical position, secure the system to pipe, using one (1) Bebco Model PMK-1 or equivalent - two (2) 1/4" x 2" stainless steel "U" bolts, nuts and lock washers.

Mounting FM & PM Configurations

HELPFUL HINTS

FM and PM configurations are designed to mount through a panel cutout one (1) inch smaller than the overall height and width of the system mounting plate, using clips and fasteners provided with Bebco Model SMK -4 or SMK-6. This design feature eliminates the need to drill the system mounting bolt holes in the protected enclosure.

FM configurations are intended for mounting adjacent to the protected enclosure.

PM configurations are intended for mounting through a cutout in the protected enclosure surface.

1. Transfer panel cutout pattern to the intended surface.
2. Check for obstructions which could prohibit bolt fastening or system pneumatic connections.
3. Cut panel cutout pattern on the intended surface.
4. Deburr all cutout surfaces.
5. Secure system to enclosure using Bebco Model SMK-4 or SMK-6, or equivalent 1/4" x 3/4" stainless steel nuts, bolts, mounting clips and lock washers.

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