



Purge and Pressurization Systems for Hazardous Locations



Model AP-01 Installation & Operations Manual

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IOM-AP/1

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AP-01 – Purpose and Function

The AB-CO PURGE AP-01 Purge and Pressurization Systems are Z-Type systems designed for electrical enclosures with relatively small volumes. There are two versions of the AP-01:

1. The AP-01Z-02 for electrical enclosures with volumes up to 2 cubic feet (0.06 cubic meters). This unit is suitable for hazardous locations classified as Class I, Division 2, Groups A, B, C, or D. (UL Certification requires a DP-1B or DP-1C, or DP-1D pressure switch. See pages 19-20)
2. The AP-01Z-10 for electrical enclosures with volumes up to 10 cubic feet (0.28 cubic meters). This unit is suitable for hazardous locations classified as Class II, Division 2, Groups F and G. (UL Certification requires a DP-1B or DP-1C, or DP-1D pressure switch. See pages 19-20)

Each AP-01 unit supplies the enclosure with the proper amount of inert gas or clean instrument air to remove concentrations of combustible material from the enclosure and prevent the accumulation of this material within the enclosure. When properly installed and operated, the system provides a sustained positive pressure, relative to the ambient pressure outside the enclosure, of 0.15 inches of water to 0.35 inches of water. These limits are inside those prescribed by NFPA 496 which requires the protected enclosure be constantly maintained at a positive pressure of at least 25 Pa (0.1 inches of water) above the surrounding atmosphere during operation of the protected equipment. In accordance with this standard, the protected equipment can be energized once an enclosure pressure of at least 25 Pa exists, and the atmosphere within the enclosure is known to be below the ignitable concentration of the combustible material.

The AP-01 has an analog enclosure pressure gauge that provides a visual indication of the differential pressure within the enclosure versus the ambient pressure outside the enclosure. The flow of protective gas into the electrical enclosure can also reduce problems such as heat, moisture, dust, and corrosion within the enclosure. Effective operation of the AP-01 purge and pressurization system requires an exchange of four (4) enclosure volumes of inert gas or clean instrument air **at a flow rate of 1.14 cubic feet/minute** before the protected enclosure is allowed to be energized. For motors, generators, and other rotating electrical machinery, the system requires an exchange of ten (10) enclosure volumes of inert gas or clean instrument air **also at a flow rate of 1.14 cubic feet/minute**. The times are so indicated on the front of the system's control panel. These systems are also provided with a vent which acts as a relief valve to ensure the enclosure is not over pressurized.

If required, an explosion proof pressure switch is available which can provide additional visual and/or audio indication of a loss of purge pressure within the enclosure.

As a Z-Type purge and pressurization system, the AP-01 systems reduce the classification within the electrical enclosure used in a Class I or Class II hazardous environment from Division 2 to unclassified.

The AP-01 is certified for Class II atmospheres where the particle density is less than 130 lb/ft³ (2083 kg/m³) or specific gravity less than 2.083. In accordance with Table 6.2.4 of NFPA 497:2017, dust particles with densities greater or equal to 130 lb/ft³ (2083 kg/m³) or specific gravity greater less than 2.083 require a higher enclosure pressure which is outside the scope of this certification.

BODILY INJURY OR DEATH WARNINGS



Read and understand this manual before attempting to install, operate, or service this purge and pressurization system. Failure to do so can cause bodily injury or death.

The purchaser is solely responsible for ensuring that their system, including the electrical enclosure, is in conformance with applicable codes. This manual only covers the general applicability of the AB-CO PURGE AP-01 Type-Z purge and pressurization systems and relief valves. Specific installation must be approved by the governing code body or bodies.

This purge and pressurization system is only one component of a “Purged and Pressurized Electrical Equipment” installation. The complete system installation shall be in accordance with the current issue of the National Electrical Code NFPA-70 and in accordance with the current issue of the National Fire Protection Agency NFPA-496.

ADDITIONAL SAFETY WARNINGS



Note the following warnings located on warning labels must be applied to the exterior of the electrical enclosure in a easy to see location:



“WARNING – PRESSURIZED ENCLOSURE – This enclosure must not be opened unless the area atmosphere is known to be below the ignitable concentration of combustible materials or unless all devices within have been de-energized.”



If protective gas other than air is used, the following warning will be located on the electrical enclosure:

“WARNING – Protective Gas Release Poses Potential for Asphyxiation”



For enclosures used in Class II hazardous environments, the following warning label is provided and must be applied to the electrical enclosure:

“WARNING – Power must not be restored after the enclosure has been opened until combustible dusts have been removed and the enclosure repressurized.”

ADDITIONAL SAFETY WARNINGS ...continued



Install this warning label to the enclosure in a readily visible location.
(Refer to page 22 for how to calculate minimum purge times)



Note:
For UL certified units, with applications in Canada, a French Language Warning Label will be included in the installation kit. See page 37D in the appendix.

Figure F-1
Warning Label
to be installed on the enclosure
in a readily visible location
(Label included in the AP-01 installation kit)

See page 22 for examples on how to calculate purge times
User to permanently inscribe number of minutes in this space

ADDITIONAL SAFETY WARNINGS ...continued



Example of Installation of the warning label to the enclosure in a readily visible location.

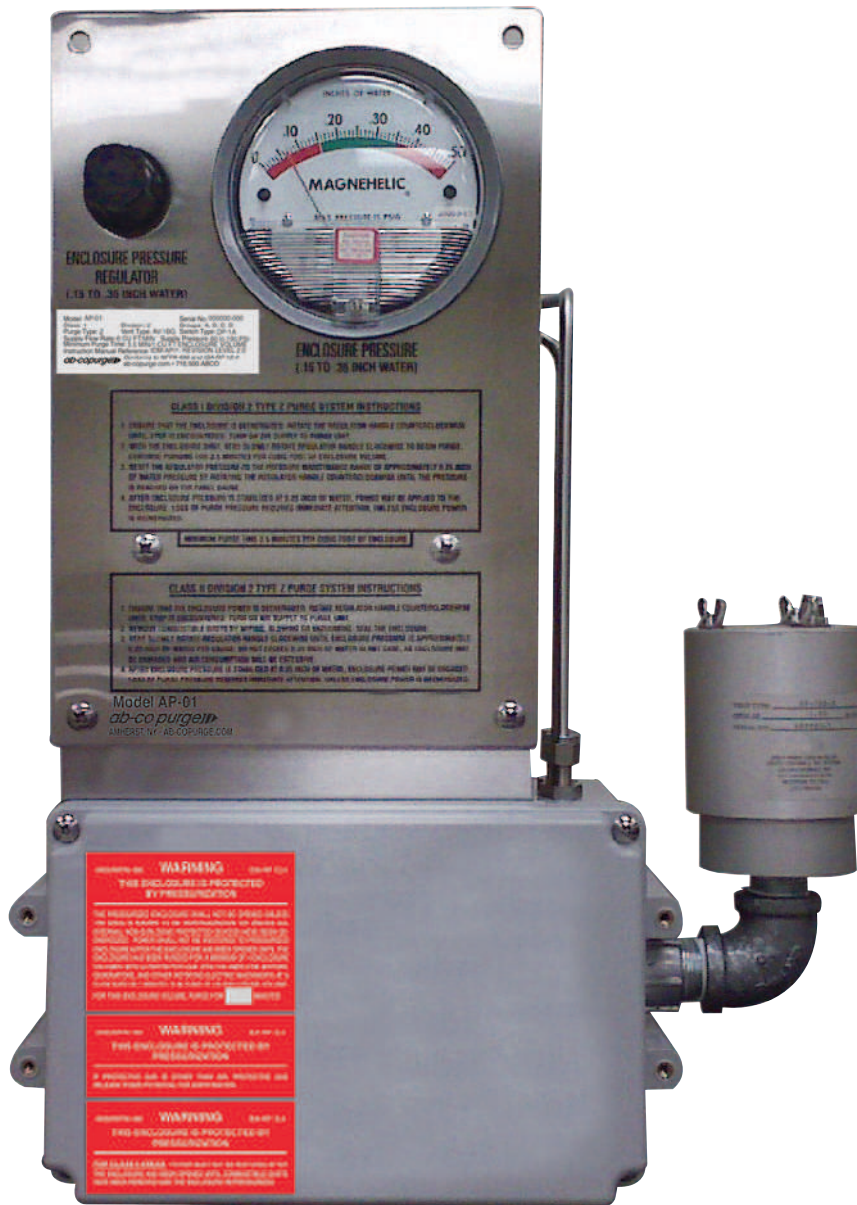


Figure F-2
Warning Label
to be installed on the enclosure
in a readily visible location
(Label included in the AP-01 installation kit)

SPECIAL CONSIDERATIONS

READ AND UNDERSTAND THIS MANUAL BEFORE ATTEMPTING TO INSTALL, OPERATE, OR SERVICE THIS AP-01 PURGE/PRESSURIZATION SYSTEM

The AP-01 unit must be placed in a readily accessible and visible location.

Non-explosive, non-corrosive purge (protective) gas must be supplied to the AP-01 unit. The protective gas shall be essentially free of contaminants or foreign matter and shall contain no more than trace amounts of flammable vapor or gas within the pressure range of 60 psig to 195 psig and at an appropriate rate consistent with the specifications for the AP-01.

As a purge and pressurization system the AP-01 requires the purged enclosure be provided with a minimum of one (1) relief valve (vent) appropriate for the configuration of the enclosure. (See Figure F-6 on page 17 for vent configurations) The purged enclosure must be capable of withstanding a minimum of 0.4 psi (11.1 inch of water) differential pressure.

Use backup wrenches when tightening the inlet and outlet fitting for the enclosure. These fittings (Figure F-3 below) are supplied by AB-CO PURGE in the installation kit.



Figure F-3
1/4 " Inlet and Outlet Fittings
for Electrical Enclosure
(Included with AP-01 Installation Kit)

Routine operational checks of the AP-01 system and its components are required. It is recommended that these operational performance checks be done at least monthly. More frequent checks are best determined by the user who is aware of the operational use and environment. Any adjustments should only be made in accordance with procedures outlined in this manual.

The AP-01 is certified for Class II atmospheres where the particle density is less than 130 lb/ft³ (2083 kg/m³) or specific gravity less than 2.083. In accordance with Table 6.2.4 of NFPA 497:2017, dust particles with densities greater or equal to 130 lb/ft³ (2083 kg/m³) or specific gravity greater less than 2.083 require a higher enclosure pressure which is outside the scope of this certification.

INDUSTRY SPECIFICATIONS



NFPA 496:2017

“Purged and Pressurized Enclosures for Electrical Equipment” 1 – 2017 Edition.

UL508, 17th Edition

“Standard for Industrial Control Equipment”

CSA C22 2, No. 14-13, 12th Edition

“Canadian Standards Association Standard for Industrial Control Equipment”



AP-01 Basic Specifications



AP-01Z-02 Configuration:

Suitable for up to two (2) cubic foot (0.06 cubic meters) volumes for Class I, Division 2, Groups A, B, C, & D. (See pages 19 and 20 when pressure switch is used)

AP-01Z-10 Configuration:

Suitable for up to ten (10) cubic foot (0.28 cubic meters) volumes for Class I and II, Division 2, Groups F & G. (See pages 19 and 20 when pressure switch is used)

Outlet to enclosure 1/4-inch tube fitting.

Use 1/4-inch OD x 0.035-inch stainless steel Tubing

Required input flow capability: Ten (10) SCFM (Standard Cubic Feet per Minute)

Protective Gas Minimum Flow Rate (after enclosure is closed and prior to being energized):

1.14 SCFM (Standard Cubic Feet per Minute)

Inlet Flow Capability: 10 SCFM (Standard Cubic Feet per Minute)

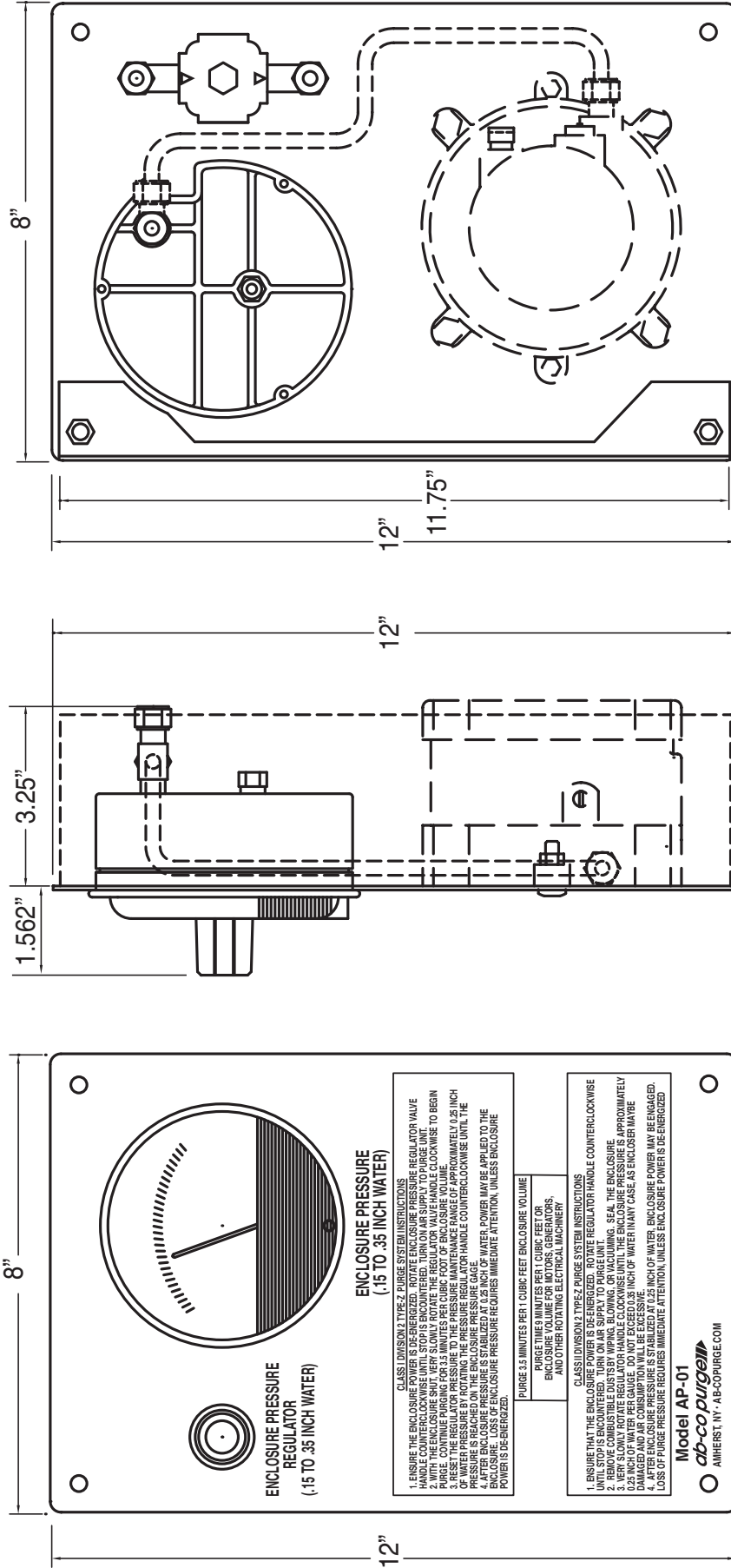
Purge time: 1 minute/0.28 cubic feet of enclosure volume (1 minute/0.12 cubic feet for motors, generators, and other rotating electric machinery.
(NOTE: For AP-01, the purge time is to be filled in by the user on the warning label, Fig. F-1, provided with the installation kit).

Continuous flow rate: 0.5 to 15 SCFH (Standard Cubic Feet per Hour)

Connections: Supply fitting into the enclosure for the AP-01 is a 1/4" FNPT
The outlet fitting from enclosure to the AP-01 is 1/4" tube fitting
Reference lines are 1/4" stainless steel tubing with 0.035" wall.

Purge Gas Supply: The protective gas used as purge air should have a pressure that does not exceed 195 psig and it is recommended the pressure be about 100 psig. The supply of protective gas shall be essentially free of contaminants of foreign matter and shall contain no more than trace amounts of flammable vapor or gas.

AP-01 Dimensional Drawings



AP-01 Components - Front View

The following pages of the manual will refer to each of these components by the name and number as designated on this figure (Figure F-4).

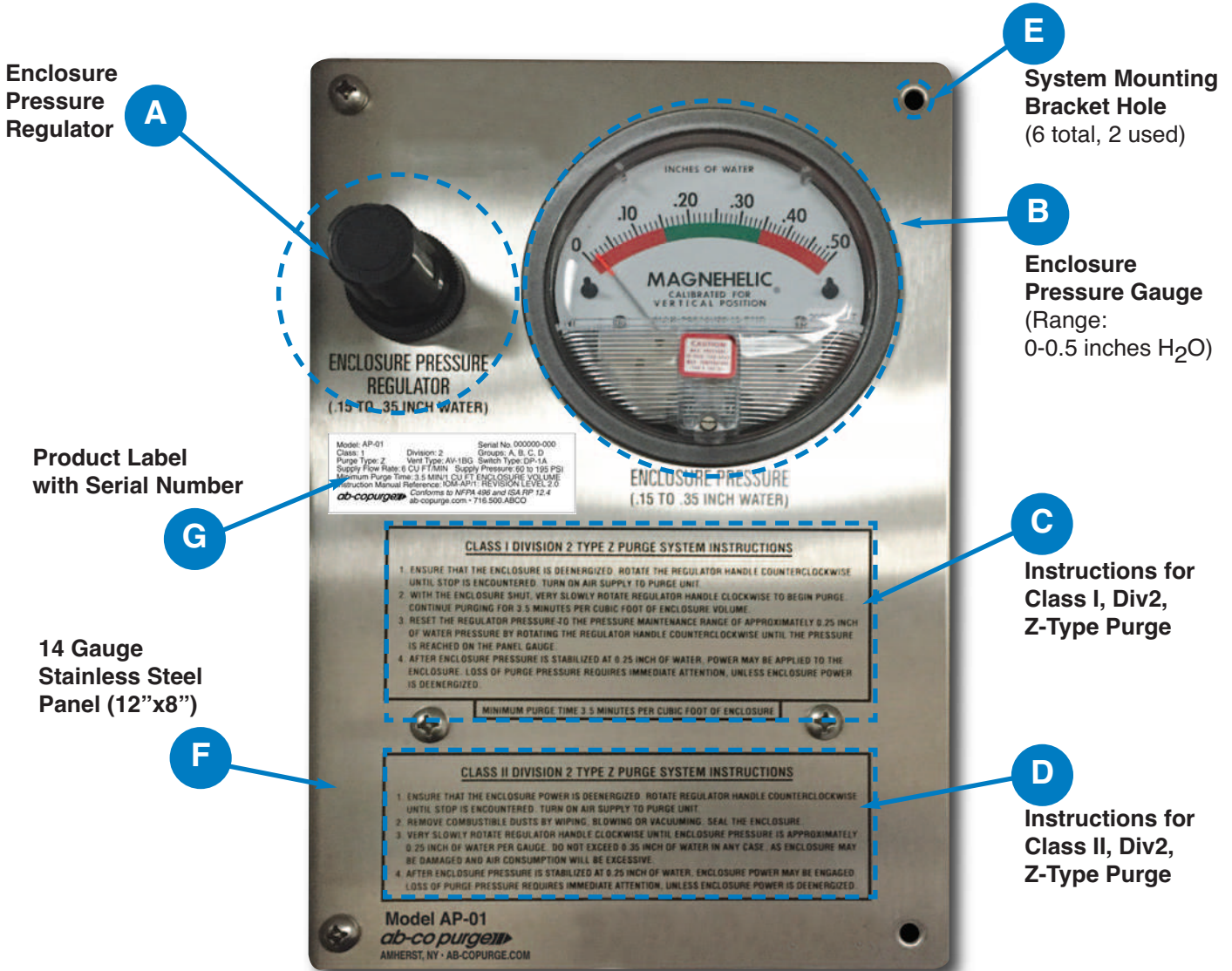


Figure F-4
(AP-01 Front Panel)

AP-01 Components - Rear View

The following pages of the manual will refer to each of these components by the name and number as designated on this figure (Figure R-1).

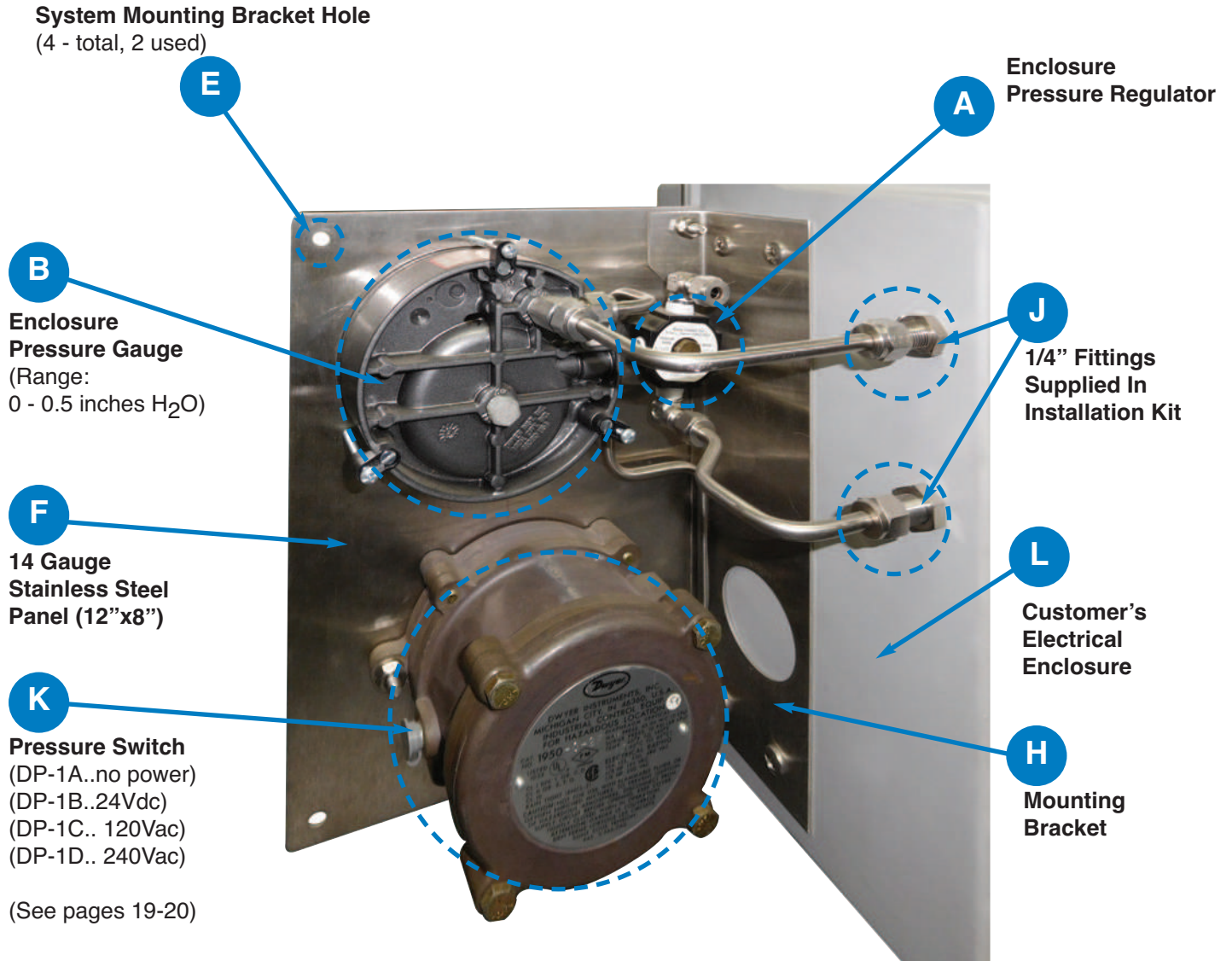


Figure R-1

AP-01 Components

Stainless Steel Tubing/Fitting - Layout

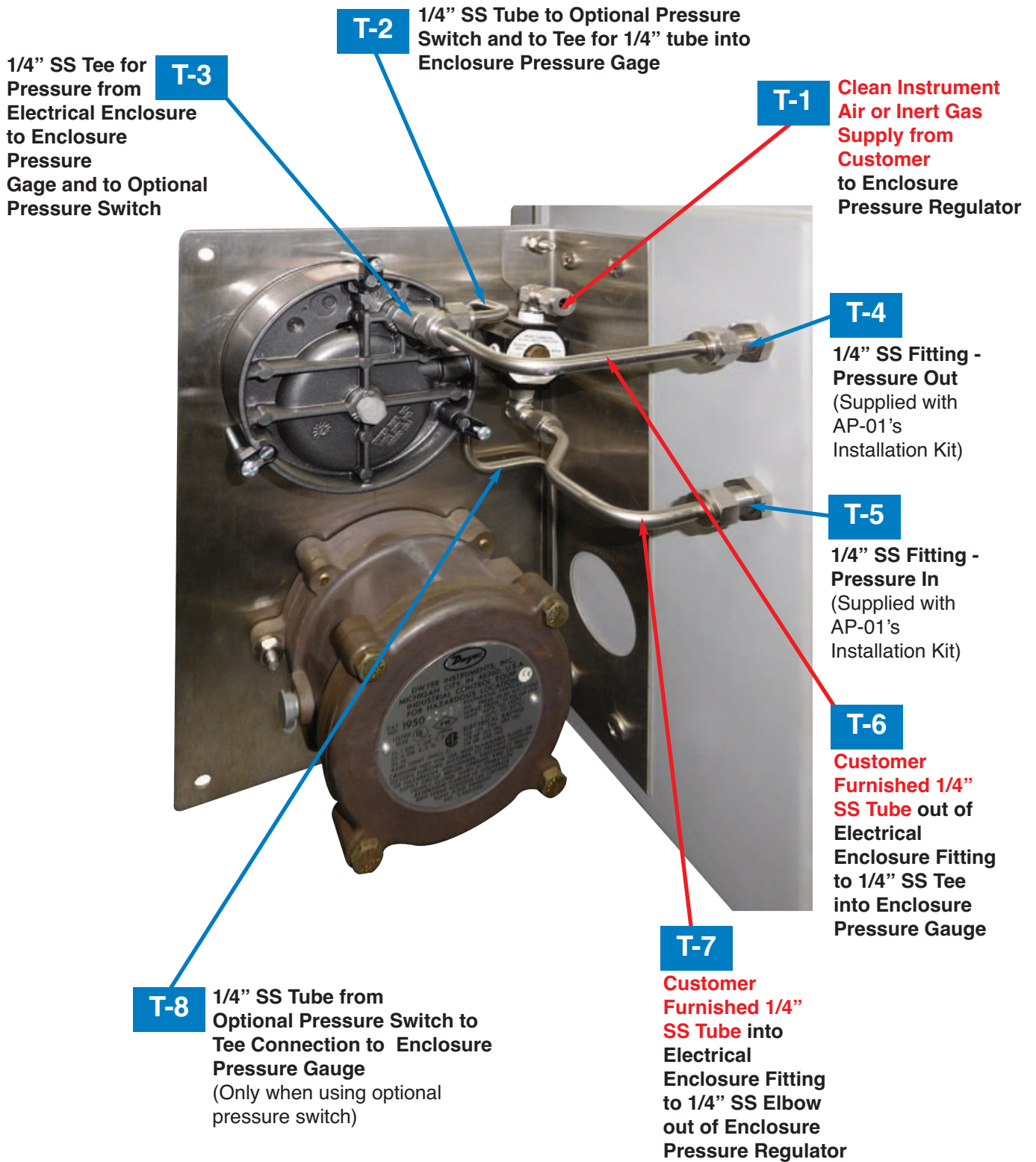


Figure R-2

INSTALLATION



The purchaser is solely responsible for ensuring that their system, including the electrical enclosure, is in conformance with applicable codes. These instructions only cover the general applicability of the AB-CO PURGE Type-Y or Type-Z purge and pressurization systems and relief valves. Specific installation must be approved by the governing code body or bodies.

Enclosure

Before an enclosure can be considered satisfactorily purged, it must meet certain criteria:

1. The enclosure meets either NEMA 4 or NEMA 12 specifications
2. The enclosure must be able to withstand a minimum internal pressure of 0.4 psig (11.1 inches of water) without distortion or other damage to itself or other components. With the fast purging function, it is very important that the enclosure withstand this internal pressure because the vent (relief valve) has a combined flow restriction slightly less than 0.4 psig.

NOTE: The AP-01 must be placed in a readily accessible and visible location.

This is essential in order to allow the operator to visually confirm the functionality of the purge system. If the visual indicator (enclosure pressure gauge -- “E” in Figure F-4) is not readily visible during normal operating conditions, the optional pressure switch (“K” in Figure R-1) is required to provide remote annunciation.

Step I-1



The installer must ensure the electrical enclosure is de-energized – there must be no power into the enclosure. AB-CO PURGE suggests that the customer has an effective “Lock-Out/Tag-Out” system in place in order to ensure all safety precautions are addressed.

Step I-2

A. Prepare the electrical enclosure for installing the stainless steel tube fittings and attaching the AP-01. The installation kit provided with the AP-01 includes one 1/4” stainless steel fittings for the instrument air/gas into the enclosure and and one 1/4” stainless steel fitting for air/gas out of the enclosure. (See Figure F-5 below.)



Figure F-5
1/4” Stainless Tube Fittings
Supplied with AP-01
Installation Kit

INSTALLATION

The 4 mounting holes in the universal mounting bracket are 10¼” x 1½” apart
All mounting holes are 9/32” diameter. (Figure F-6 below.)

Note: The universal mounting bracket is provided with the AP-01 and interfaces with the front panel

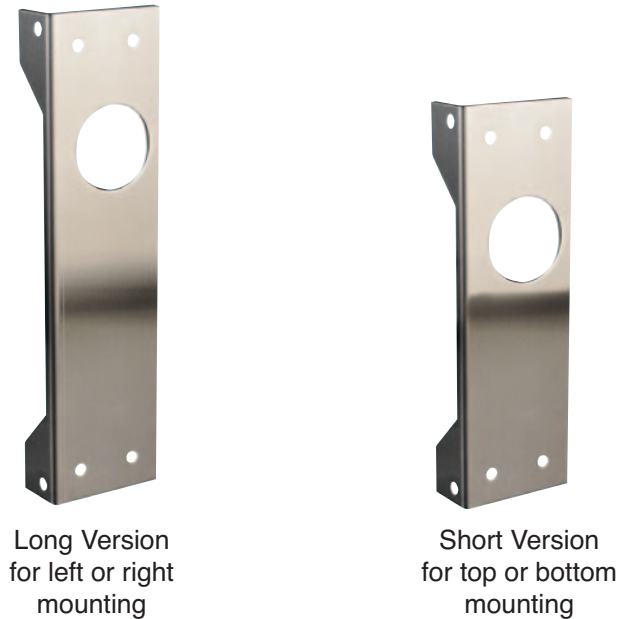


Figure F-6
Universal Mounting Bracket
showing location of 4 of
9/32” OD mounting holes

B. We suggest mounting the AP-01 to the electrical enclosure first. This will help determine the optimum location for drilling the holes for the ¼” tube fittings (Figure F-5; Supplied with the installation kit) required for air/gas into and out of the enclosure. This helps ensure there are no interferences on the inside wall of the enclosure. Since the customer can best determine what type of mounting hardware to use, ***the customer supplies the fasteners for attaching the AP-01 mounting bracket to the electrical enclosure.***

C. The AP-01 should be installed as close to the enclosure as practical in order to avoid excessive pressure drops. The air/gas supply line into the fast purge pressure regulator (“A”) should be of adequate capacity for the AP-01. Customer furnished tubing is to be ¼” stainless tubing (0.035” wall) and associated fittings of the same size as the recommended outlet size.

Note: AB-CO PURGE can provide additional sections of straight stainless tubing if this is convenient for the customer.

INSTALLATION

Step I-3

A. Drill the required holes for ¼" stainless steel fittings to be used for enclosure's input and output tubing. These fittings are included with the AP-01's installation kit (Figure F-5).

If the hazardous environment consists of concentrations of combustible gas which are lighter than air, then the input fitting should be located toward the bottom and near one corner of the enclosure. If the hazardous environment consists of concentrations of combustible gas which are heavier than air, the inlet fitting should be located toward the top and near one corner of the enclosure.

Note: Ensure the locations for both the inlet fitting and outlet fitting do not interfere with the four (4) mounting bracket holes.

B. With inlet and outlet fitting installed in the enclosure, mount the AP-01 system to the enclosure using the mounting hardware supplied with the system's installation kit. Even though the mounting bracket is already fastened to the 12"x 8" stainless steel panel ("F" in Figure F-4 and Figure R-1), the mounting bracket can be installed on either side of the panel or the top or bottom of the panel. (See Figure R-4 below.)

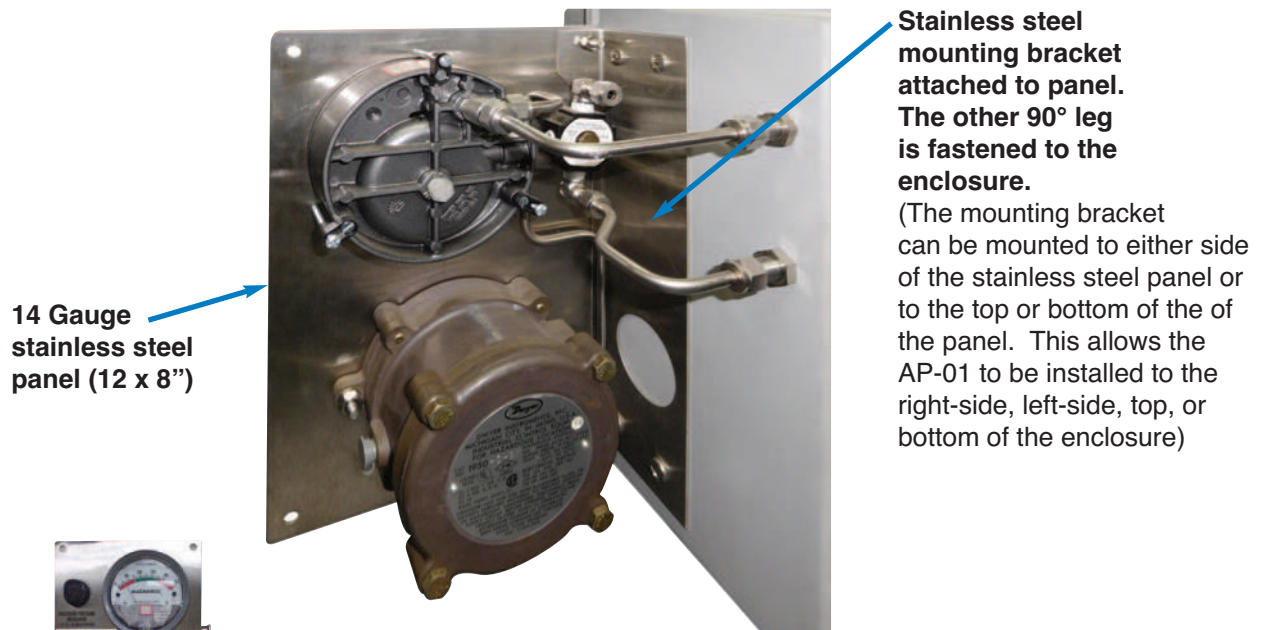


Figure R-4



(Front view of AP-01 attached to top of an enclosure and with side vent)

INSTALLATION of OPTIONAL VENT

Step I-4

A. A vent (pressure control valve) installed in the electrical enclosure is optional for AP-01 system installations. During proper application, the vent ensures that the enclosure is not over-pressurized. There are two versions of the vent used with the AP-01 (see Figure F-7 below and dimensional drawings on the following page.)

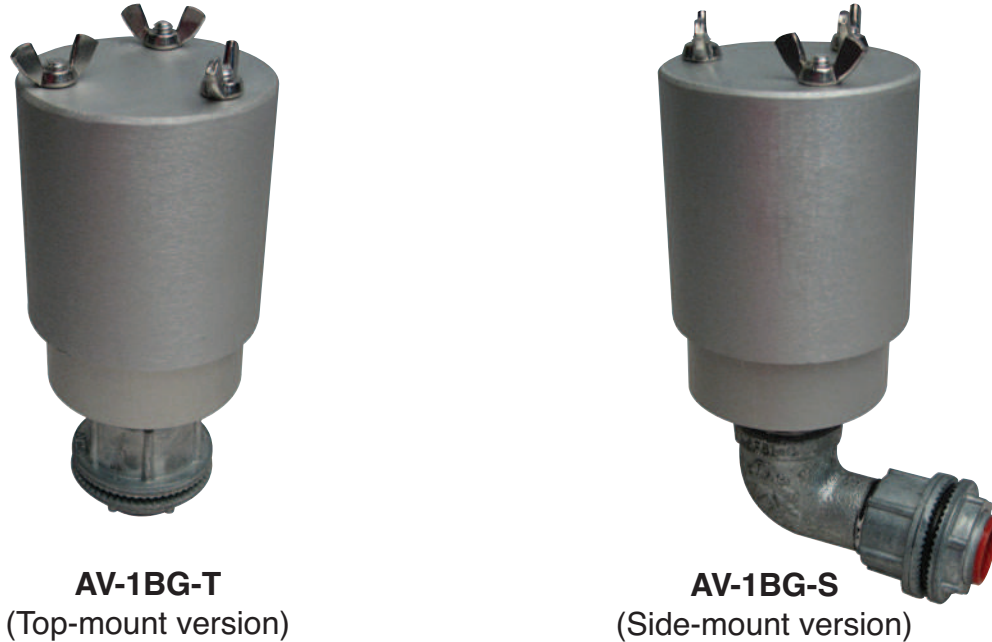
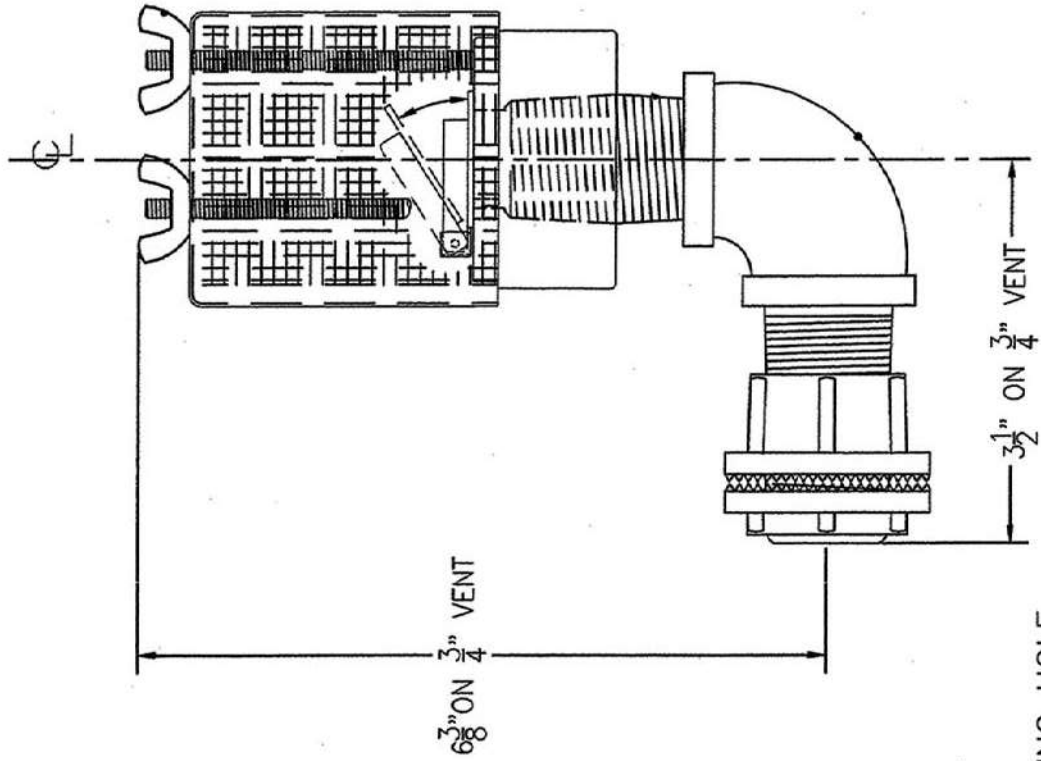


Figure F-7

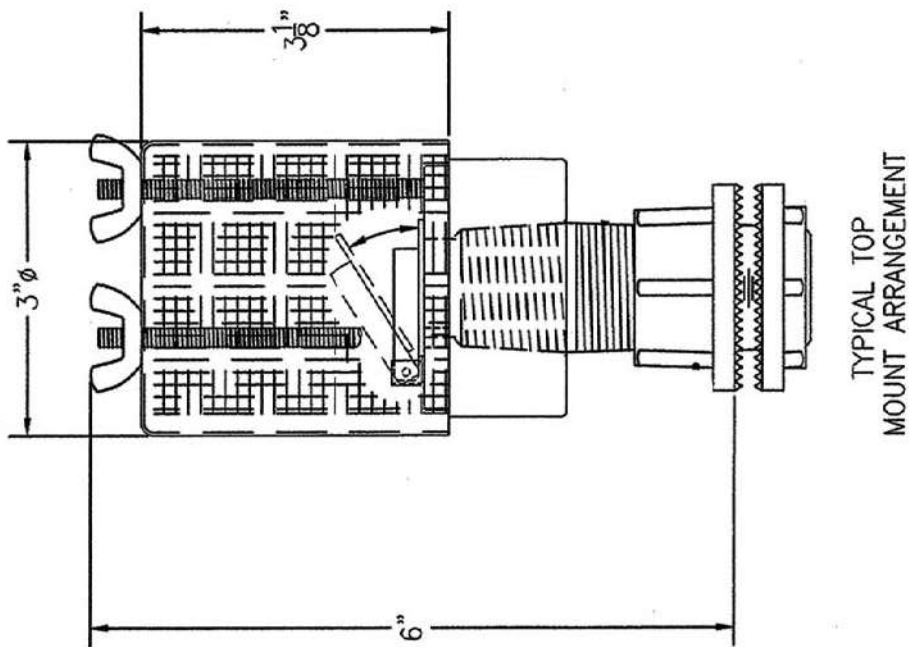
B. The vent is mounted with the hub-type connector provided with the vent assembly. Make a 1-1/16" diameter vent mounting hole in the enclosure. The vent must be mounted with its axis vertical in order to ensure proper functioning.

Note: It is best to locate the vent mounting hole diagonally opposite the 1/4" SS inlet fitting ("T-5" on Figure R-2) installed for the AP-01 panel.

AP-01 Dimensional Drawings



TYPICAL SIDE MOUNT ARRANGEMENT



NOTES: — 3/4" VENT REQUIRES A 1 1/16" ϕ MOUNTING HOLE

INSTALLATION for Pressure Switch

Step I-5

Note: For installations requiring UL certification, one of the following pressure switches is required: DP-1B, DP-1C, DP-1D.

(For all other certifications, a pressure switch is an option)

A. The pressure switch provides for alarm capability allowing an electrical output that can be used to provide a visual or audible signal that is intended to attract attention.

B. The pressure switch is a differential pressure device which compares the protected enclosure pressure with ambient hazardous environment pressure and is designed to activate an additional alarm (visual or audible) indication when positive pressure inside the enclosure has dropped below 0.15 inches of water (or customer safety set-point).

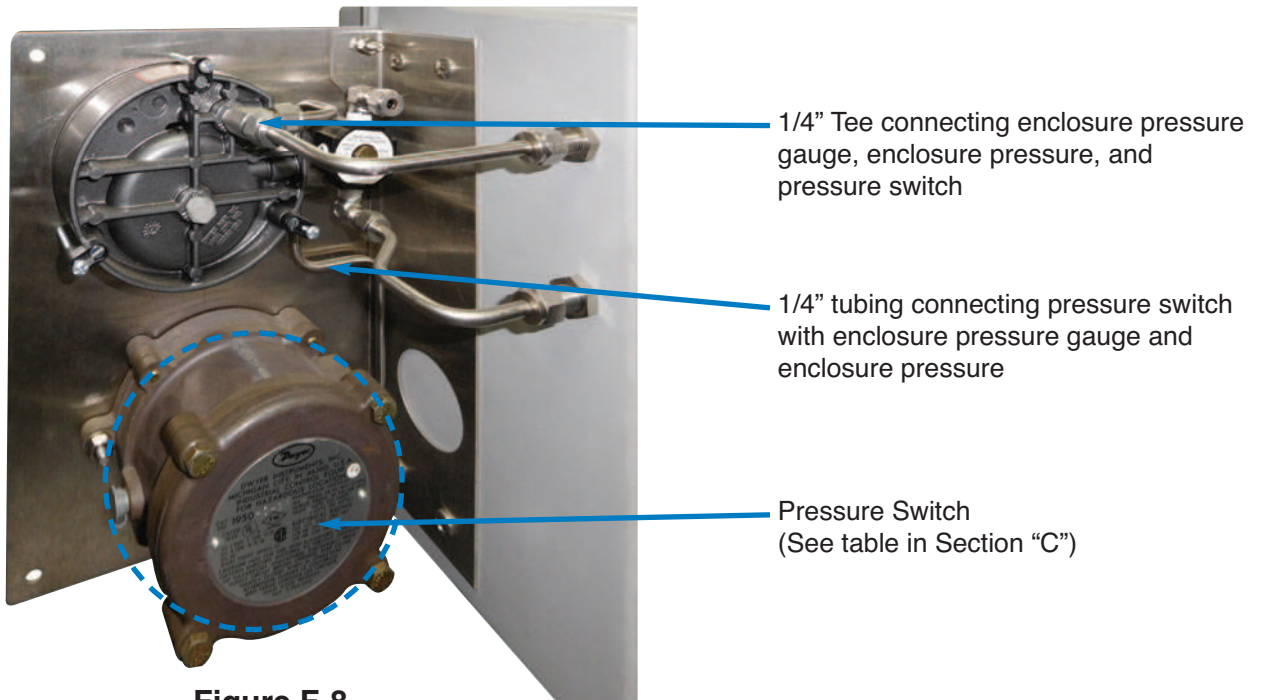


Figure F-8

View of Pressure Switch

C. There are four different versions of the pressure switch, depending on switch type, power requirements to the switch, signal out connections, and Group ratings for both Class I and Class II hazardous environments.

Model	Type of Switch	Supply Power	Signal Out	Class/Group Rating
DP-1A	Mechanical (Diaphragm)	N/A	Yes	Class I/ C & D Class II/ F & G
DP-1B	Electronic (Hall-Effect Sensor)	24 Vdc	Yes	Class I/ A, B, C, & D Class II/ F & G
DP-1C	Electronic (Hall-Effect Sensor)	120 Vac	Yes	Class I/ A, B, C, & D Class II/ F & G
DP-1D	Electronic (Hall-Effect Sensor)	240 Vac	Yes	Class I/ A, B, C, & D Class II/ F & G

INSTALLATION for Pressure Switch

- D. If there is power to the pressure switch, the installer/operator determines if both supply power (DC or AC) and signal will be connected from within the enclosure or from outside the enclosure.
- E. To make electrical connections, remove the three hex head screws from the pressure switch cover and after loosening the fourth captive screw, swing the cover aside. Electrical connections to the standard single pole, double throw relay
- F. **For DP-1A Pressure Switch** (Mechanical diaphragm type):
Certified for Class I, Groups C & D, and Class II, Groups F and G
No input power is required. The output signal wires are connected to the pressure switch internal terminal strip (See Figure R-5 below). This differential pressure switch has an internal diaphragm that activates a relay when pressure set-point show loss of enclosure pressure below a safe level.
- G. **For DP-1B Pressure Switch** (Electronic Hall-Effect sensor):
Certified for Class I, Groups A, B, C, & D and Class II, Groups F and G
Supply power is 24 VDC. Electrical connection to the standard single pole, double throw relay and DC supply voltage connections to the switch are provided by means of terminals marked "COM", "NO", "NC", "+", and "-" (See Figure R-6 below.)
The normally open contacts close and the normally closed contacts open when pressure exceeds the setpoint.
- H. **For DP-1C and DP-1D Pressure Switches** (Electronic Hall-Effect sensor):
Certified for Class I, Groups A, B, C, & D and Class II, Groups F and G
Supply power is 120 VAC for the DP-1C and 240 VAC for the DP-1D. Electrical connections to the standard single pole, double throw relay and AC supply voltage connections to the switch are provided by means of terminals marked "COM", "NO", "NC", "~", and "~". (See Figure R-7 below)



Figure R-5
DP-1A
Terminal Block

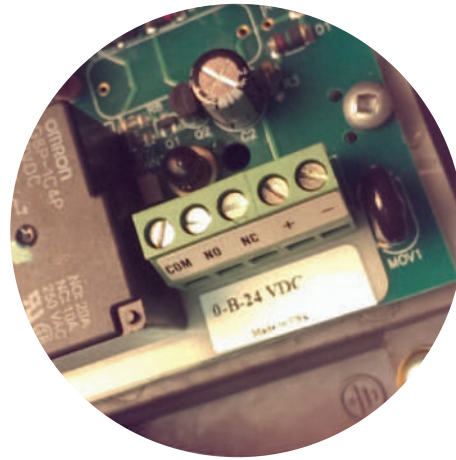


Figure R-6
DP-1B
Terminal Block

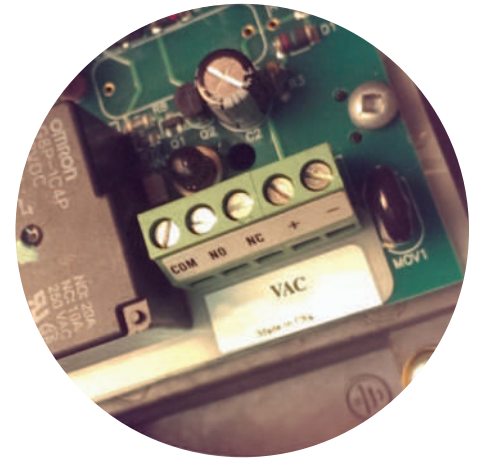


Figure R-7
DP-1C and DP-1D
Terminal Block

INSTALLATION for Pressure Switch

I. Adjusting the set-point on the pressure switch:

Remove the plastic cap and turn the slotted adjustment screw (Figure R-8) clockwise to raise the set-point pressure and counter-clockwise to lower the set-point pressure.

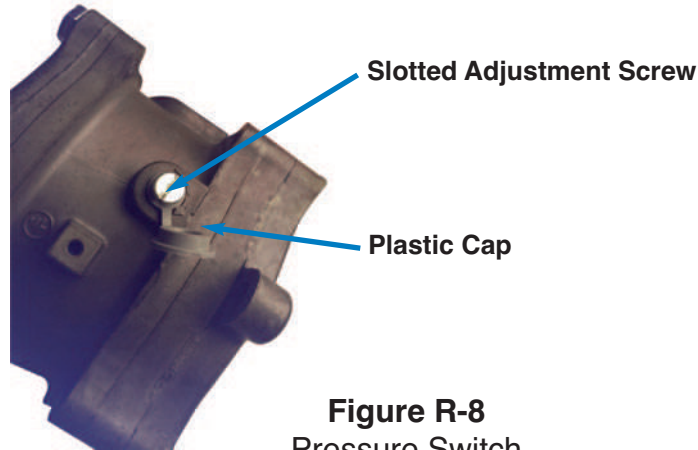


Figure R-8
Pressure Switch
Slotted Adjustment Screw

J. Connect electrical conduit to pressure switch:

The pressure switch has a 1/2" NPTF electrical conduit connection. The customer is responsible for the cable entry device. Cable entry device shall be of certified flameproof type, suitable for the conditions of use and be correctly installed. (See Figure R-9 for location of conduit entry.)

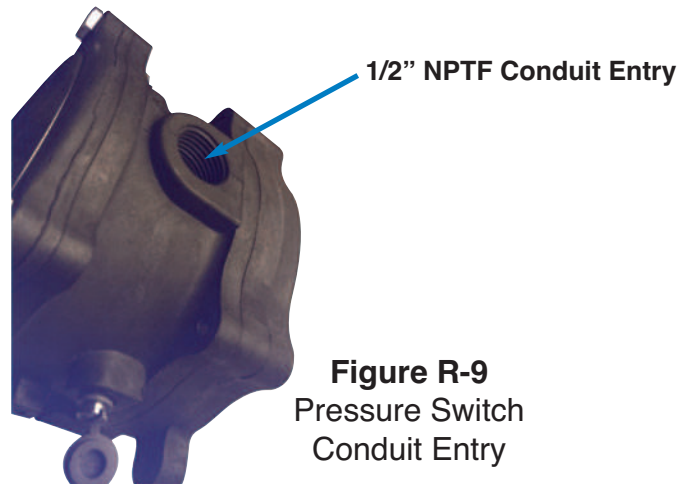


Figure R-9
Pressure Switch
Conduit Entry

K. Checking calibration of pressure switch set-point:

The recommended procedure for calibrating or checking calibration is to use a "T" assembly with three rubber tubing leads – all as short as possible and the entire assembly providing minimum flow restriction. Run one lead to the pressure switch, another to a manometer of known accuracy and appropriate range, and then apply pressure through the third tube. Turn the slotted set-point adjustment screw very slowly as the set-point is approached.

INSTALLATION

Step I-6

A. Calculate the minimum purge time for the AP-01/Enclosure combination:

Use the recommended purge cycle times for the specific volume of the electrical enclosure (see following table).

NOTE: This information is also on the warning label shown below

AP-01	Minimum Purge Cycle Times
	1 minute per 0.28 cubic feet of enclosure volume
	(For motors, generators, and other rotating electric machinery): 1 minute per 0.12 cubic feet of enclosure volume

Example No. 1: If the electrical enclosure is 24 inches x 18 inches x 10 inches, the volume is 4,320 cubic inches or 2.5 cubic ft. ($4320 \text{ in}^3 / 1728 \text{ in}^3/\text{ft}^3 = 2.5 \text{ ft}^3$). Therefore the total purge time is 8 minutes and 20 seconds. ($2.5 \text{ ft}^3 / 0.3 \text{ ft}^3/\text{minute} = 8.33 \text{ minutes}$ or 8 minutes and 20 seconds.)

Example No. 2 (For enclosures with motors, generators, or other rotating electric machinery): If the electrical enclosure is 36 inches x 24 inches x 12 inches, the volume is 10,368 cubic inches or 6 cubic ft. ($10,368 \text{ in}^3 / 1728 \text{ in}^3/\text{ft}^3 = 6 \text{ ft}^3$). Therefore the total purge time is 50. ($6 \text{ ft}^3 / 0.12 \text{ ft}^3/\text{minute} = 50 \text{ minutes}$.)

Note: If using Nitrogen to purge, the purge time is increased by 3%. As in example No. 2, the purge time will be 51.5 minutes.

B. Permanently inscribe the time on the warning label shown below.



Note:
For UL certified units, with applications in Canada, a French Language Warning Label will be included in the installation kit. See page 37D in the appendix.

User to permanently inscribe number of purge minutes in this space

INSTALLATION

Step I-7

A. Attach the following warning labels to the electrical enclosure. Location of the warning labels must be in a very visible location.



Note:
For UL certified units, with applications in Canada, a French Language Warning Label will be included in the installation kit. See page 37D in the appendix.

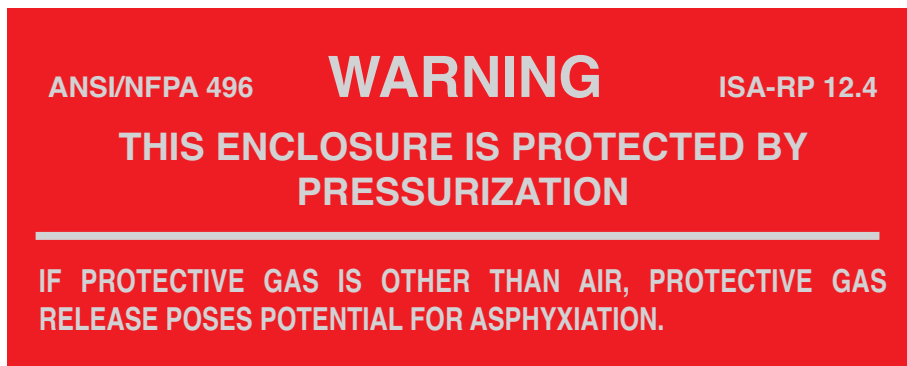


Figure F-9
Warning Labels
to be installed on the enclosure
in a readily visible location
(Labels included in the AP-01 installation kit)



C. Example of warning labels applied to electrical enclosure:

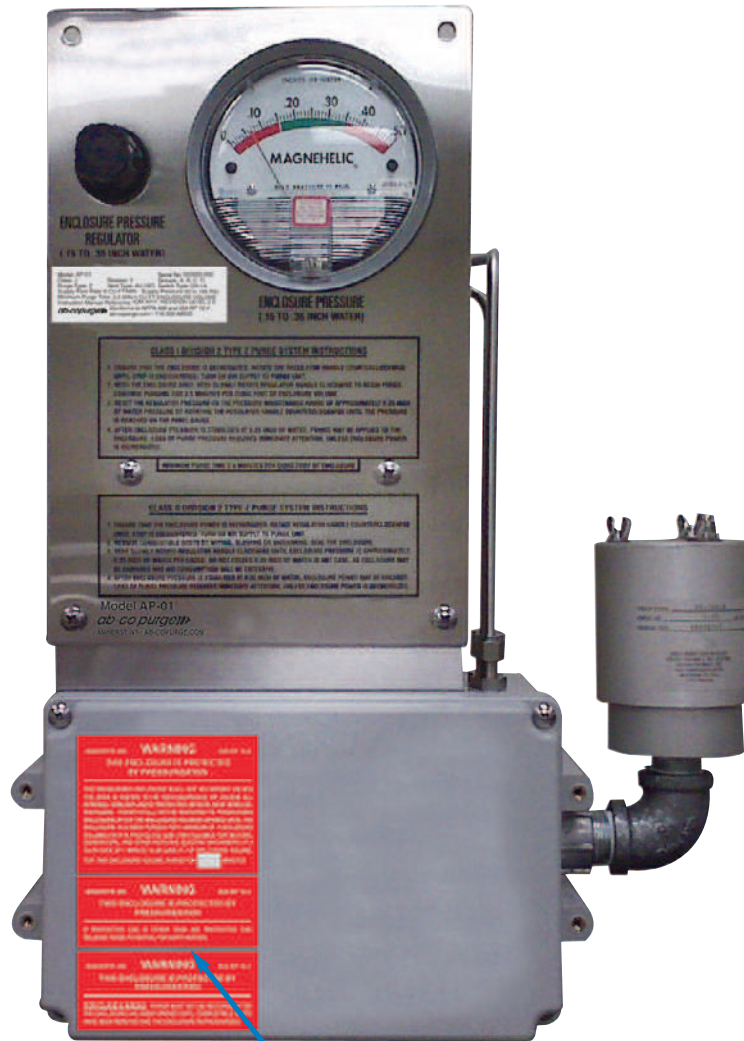


Figure F-10
Warning Labels
installed on the enclosure
in a readily visible location
(Labels included in the AP-01 installation kit)

OPERATION



The purchaser is solely responsible for ensuring that their system, including the electrical enclosure, is in conformance with applicable codes. These instructions only covers the general applicability of the AB-CO PURGE Type-Z purge and pressurization systems and relief valves. Specific installation must be approved by the governing code body or bodies.

NOTE:

1. The primary adjustment for the AP-01 is the enclosure pressure regulator located on the front panel of the AP-01 (“A” in Figure F-3).
2. The AP-01’s enclosure pressure regulator is manually adjusted. The enclosure pressure gauge is pneumatic and provides a visual indication of low-normal-high enclosure pressure.

Step O-1



During operational set-up, it is extremely important that the electrical enclosure is de-energized – there must be no power into the enclosure. As stated in Installation “Step I-1”, AB-CO PURGE suggests the customer have an effective “Lock-Out/Tag-Out” system in place in order to ensure all safety precautions are addressed.

Step O-2

Verify the supply line pressure of instrument air or inert gas does exceed 195 psi.

Concurrently, the size and flow capacity of the supply line must be sufficient so that, under service conditions, the AP-01 system is not “starved” of protective gas.

Step O-3

Note: THIS STEP IS FOR CLASS II AREAS ONLY

Remove combustible dusts from inside the protected enclosure by wiping, blowing, or vacuuming.

OPERATION

Step O-4

Shut the protected enclosure.

Step O-5

Ensure the vent (pressure relief valve) is functioning. As purge pressurized air is flowing into the electrical enclosure, air should be escaping through the vent. This is because the volume of air during the purging operation is much greater than the amount of air flowing during the continuous pressurization process. Figure F-11 below shows the two configurations of vents.

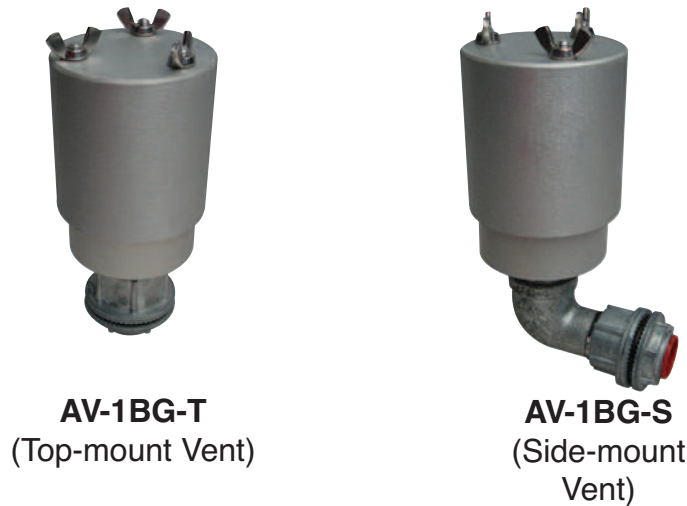


Figure F-11
Vent Configurations

Note: The AP-01 is leakage compensated by providing high protective gas volumes to quickly purge concentrations of combustible gas from the electrical enclosure and then providing lower volumes sufficient to maintain a pressure inside the enclosure that is greater than the surrounding hazardous environment – thus compensating for any leakage from the enclosure.

OPERATION

Step O-6

Shut the protected enclosure

Step O-7

With the protected enclosure shut and de-energized, **rotate the enclosure pressure regulator handle counterclockwise** (See Figure F-12 below) **until stop is encountered.**



Figure F-12
Enclosure Pressure
Regulator –
Turn Counter Clockwise



AP-01 Front Panel

Step O-8

Turn on the protective gas supply to the AP-01. Ensure the pressure into the AP-01 does not exceed 195 psi.

OPERATION

Step O-9

Very slowly rotate the enclosure regulator handle clockwise to begin the purge process. Continue purging for 3.5 minutes per cubic foot of enclosure volume.

(Refer to page 22 of this manual to see examples of how to compute the purge time for an AP-01 application.)



Figure F-13
Enclosure Pressure
Regulator –
Turn Clockwise



AP-01 Front Panel

OPERATION

Step O-10

After purging the enclosure for the required purge time, reset the enclosure pressure regulator to the pressure maintenance range of approximately 0.25 inches of water pressure by rotating the pressure regulator knob counterclockwise until 0.25 inches of water is reached on the enclosure pressure gauge (the Magnehelic analog gauge). (See Figures F-14 and F-15 below).

Correct adjustment places the needle of the Enclosure Pressure Gauge within the required (green area of the Magnehelic analog gauge) safe setting. **The AP-01's purge pressure setting is 0.25 inches of water.** The safe range as scaled on the Enclosure Pressure Gauge is 0.15 inches of water to 0.35 inches of water.

As stated above, a purge pressure of 0.25 inches of water represents a reasonable pressure which gives a safety margin above the required minimum to allow for supply air pressure and enclosure leakage variations. . These limits are inside those prescribed by NFPA 496 which requires the protected enclosure be constantly maintained at a positive pressure of at least 25 Pa (0.10 inches of water) above the surrounding atmosphere during operation of the protected equipment.

Higher pressures should be avoided to minimize air use and keep enclosure distortion possibilities at a minimum.



Figure F-14
Enclosure Pressure Regulator – Turn Clockwise



AP-01 Front Panel

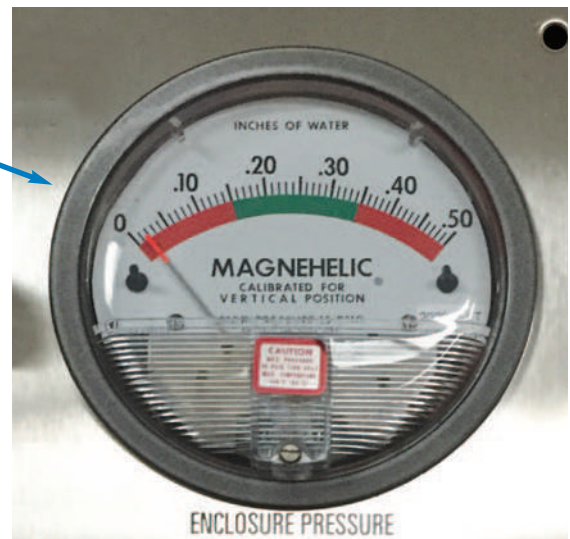


Figure F-15
Enclosure Pressure Gauge
(Visual Indicator-Safe Range of 0.15 inches of water to 0.35 inches of water indicated in green)

OPERATION

Step O-11

Stabilize the enclosure pressure reading on the enclosure pressure gauge at 0.25 inches of water (See Figure F-16 below).

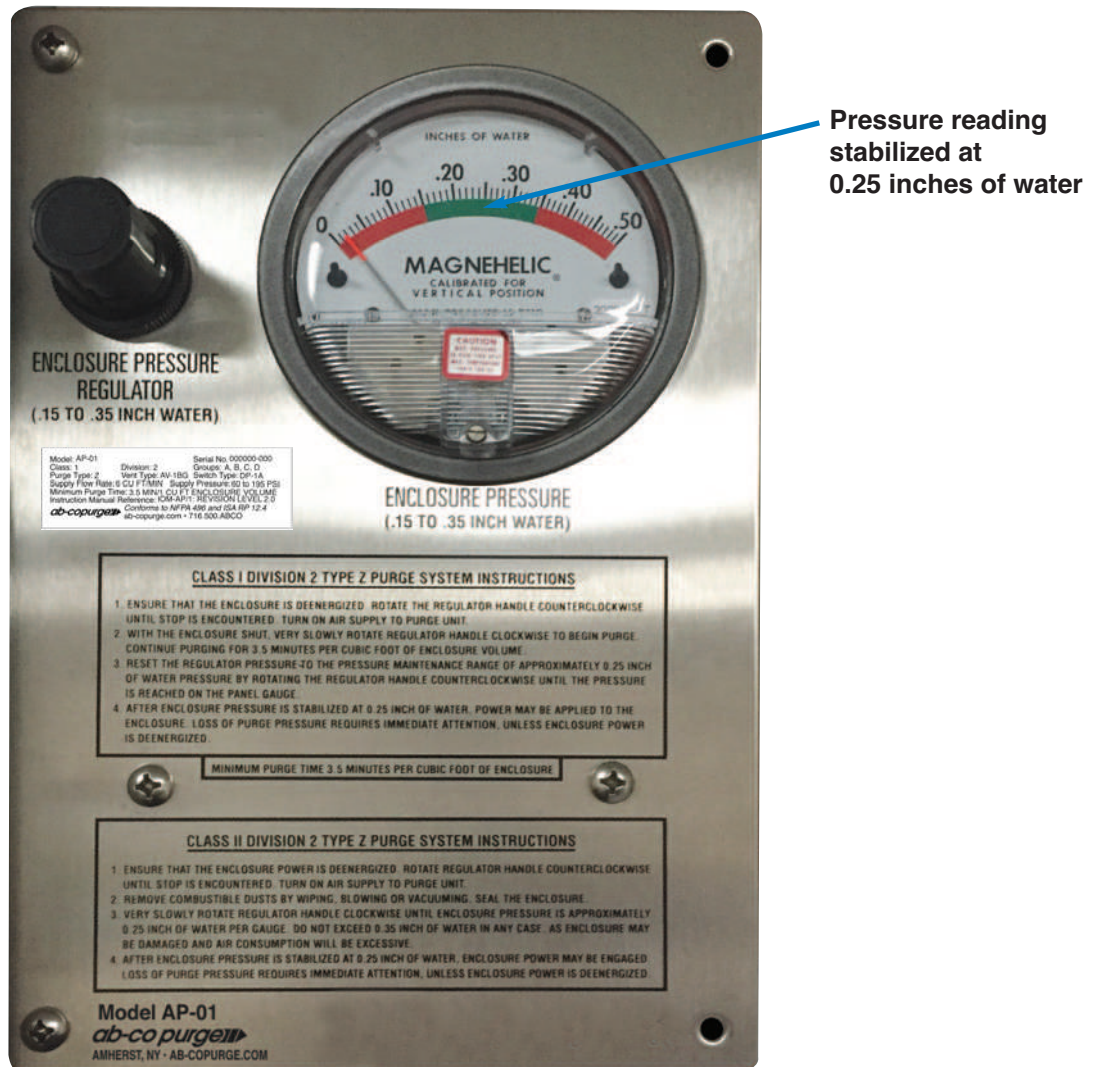


Figure F-16
AP-01 Front Panel
(With Magnehelic Analog Gauge's Reading Stabilized at 0.25 inches of water)

OPERATION

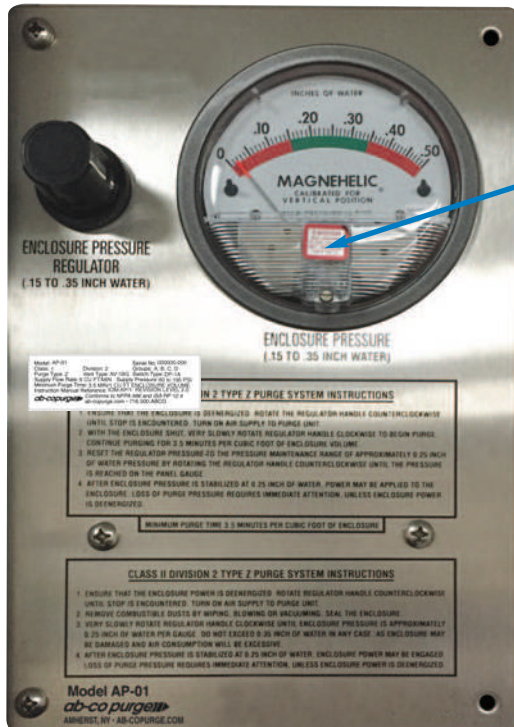
Step O-12

Turn Power on to the Protected Enclosure – Ensure Lock-out/Tag-out has been properly checked prior to energizing the enclosure.

Step O-13



Loss of enclosure pressure to a level below 0.15 inches of water requires immediate attention including de-energizing enclosure power (unless power has already been de-energized).



Enclosure pressure gauge with visual indication that enclosure pressure is below 0.15 inches of water – **ACTION REQUIRED – De-energize the enclosure.**

Figure F-17

Enclosure Pressure Gauge Indication



Note: Do not let the enclosure pressure exceed 0.35 inches of water in any case, as protected enclosure may be damaged and air Consumption will be excessive. (Visual indication of over pressure is shown as the red section on the enclosure pressure gauge in the range of 0.35 inches of water to 0.50 inches of water.)



Warning.....Your electrical enclosure is protected by pressurization. The pressurized enclosure shall not be opened unless the area atmosphere is known to be below the ignitable concentration of combustible material or unless all internal non-explosive protected devices have been de-energized.

Power shall not be restored to pressurized enclosures after the enclosure has been opened until the enclosure has been purged for a minimum of 4 enclosure volumes with a protected gas (ten volumes for motors, generators, and other rotating electrical machinery) at a flow rate of **1.14 cubic feet per minute**. Refer to the red warning label on the enclosure to determine how long the enclosure needs to be purged. (See page 22 .)

MAINTENANCE

A. The AP-01 requires minimal maintenance. It is recommended that the functionality of the unit be tested weekly. **Always confirm the functionality of any vents (Figure F-8) in the system prior to testing.**

B. Dirty or wet air is a major inhibitor to correct functioning of the system. Installing a 30 micron filter upstream of the AP-01 is advisable. Regular checking and servicing of such filters is vital to ensure dirt or wet air does not enter the AP-01. The frequency of filter service is dependent on supply air quality and is to be determined by the user in the field.

C. The AP-01 should be wiped off and/or wash on a regular basis – dependent on the environment in which it is located.

D. For service questions concerning any AP-01 Purge and Pressurization System, please refer to the product label on the front panel of the unit. This information will help expedite any questions you may have concerning your system

Model: AP-01 X-XX-X-XX-X Purge Type: X
Serial Number: 000000-000
Class: X Division: X Groups: X, X, X, X
Class: X Division: X Groups: X, X, X, X
Min. Supply Flow Rate: 1.4 CU FT/MIN • Supply Pressure: 60 to 195 PSI
Min. Purge Required: 4 ENCLOSURE VOLUMES
ab-copurge Conforms to NFPA 496 and ISA RP 12.4

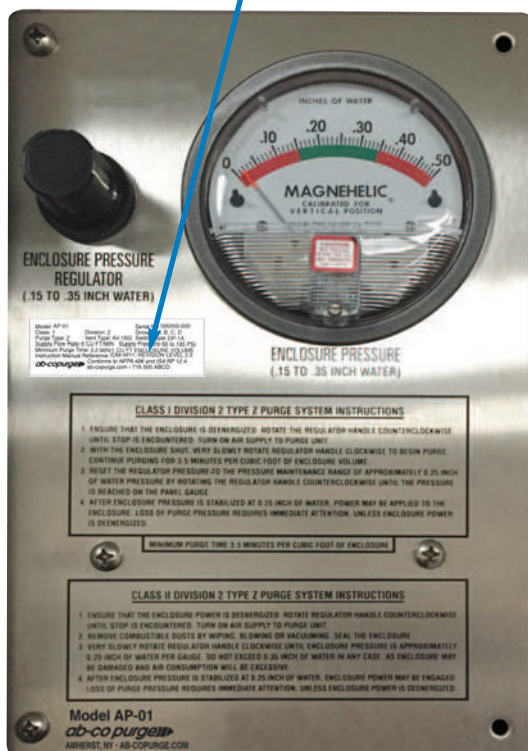


Figure F-18
Front Panel
Label Location

PRODUCT DATA SHEETS

Detailed product data sheets for AP-01 Type-Z Purge and Pressurization Systems are available on the AB-CO PURGE web site at www.AB-COPURGE.com



Figure F-19

Example: AP-01 Mounted to the top of a small electrical enclosure with side-mounted vent and required warning labels (in red).

Instructions on AP-01 Control Panel

CLASS I DIVISION 2 TYPE-Z PURGE SYSTEM INSTRUCTIONS

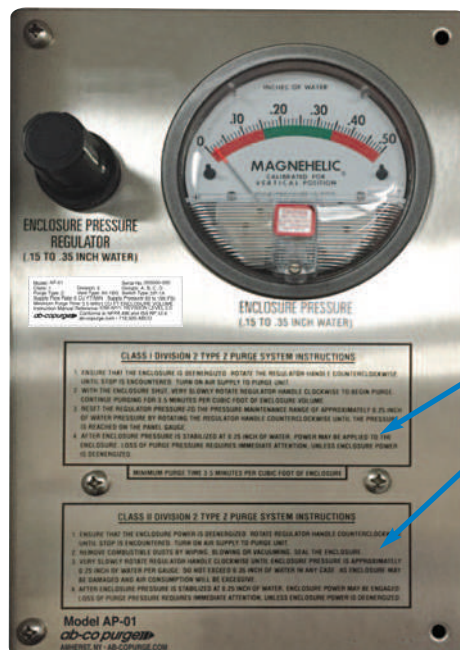
1. ENSURE THE ENCLOSURE POWER IS DE-ENERGIZED. ROTATE ENCLOSURE PRESSURE REGULATOR VALVE HANDLE COUNTERCLOCKWISE UNTIL STOP IS ENCOUNTERED. TURN ON AIR SUPPLY TO PURGE UNIT.
2. WITH THE ENCLOSURE SHUT, VERY SLOWLY ROTATE THE REGULATOR VALVE HANDLE CLOCKWISE TO BEGIN PURGE. CONTINUE PURGING FOR 3.5 MINUTES PER CUBIC FOOT OF ENCLOSURE VOLUME.
3. RESET THE REGULATOR PRESSURE TO THE PRESSURE MAINTENANCE RANGE OF APPROXIMATELY 0.25 INCH OF WATER PRESSURE BY ROTATING THE PRESSURE REGULATOR HANDLE COUNTERCLOCKWISE UNTIL THE PRESSURE IS REACHED ON THE ENCLOSURE PRESSURE GAGE.
4. AFTER ENCLOSURE PRESSURE IS STABILIZED AT 0.25 INCH OF WATER, POWER MAY BE APPLIED TO THE ENCLOSURE. LOSS OF ENCLOSURE PRESSURE REQUIRES IMMEDIATE ATTENTION, UNLESS ENCLOSURE POWER IS DE-ENERGIZED.

PURGE 3.5 MINUTES PER 1 CUBIC FEET ENCLOSURE VOLUME

PURGE TIME 9 MINUTES PER 1 CUBIC FEET OR ENCLOSURE VOLUME FOR MOTORS, GENERATORS, AND OTHER ROTATING ELECTRICAL MACHINERY

CLASS II DIVISION 2 TYPE-Z PURGE SYSTEM INSTRUCTIONS

1. ENSURE THAT THE ENCLOSURE POWER IS DE-ENERGIZED. ROTATE REGULATOR HANDLE COUNTERCLOCKWISE UNTIL STOP IS ENCOUNTERED. TURN ON AIR SUPPLY TO PURGE UNIT.
2. REMOVE COMBUSTIBLE DUSTS BY WIPING, BLOWING, OR VACUUMING. SEAL THE ENCLOSURE.
3. VERY SLOWLY ROTATE REGULATOR HANDLE CLOCKWISE UNTIL THE ENCLOSURE PRESSURE IS APPROXIMATELY 0.25 INCH OF WATER PER GAUGE. DO NOT EXCEED 0.35 INCH OF WATER IN ANY CASE, AS ENCLOSURE MAYBE DAMAGED AND AIR COMSUMPTION WILL BE EXCESSIVE.
4. AFTER ENCLOSURE PRESSURE IS STABILIZED AT 0.25 INCH OF WATER, ENCLOSURE POWER MAY BE ENGAGED. LOSS OF PURGE PRESSURE REQUIRES IMMEDIATE ATTENTION, UNLESS ENCLOSURE POWER IS DE-ENERGIZED

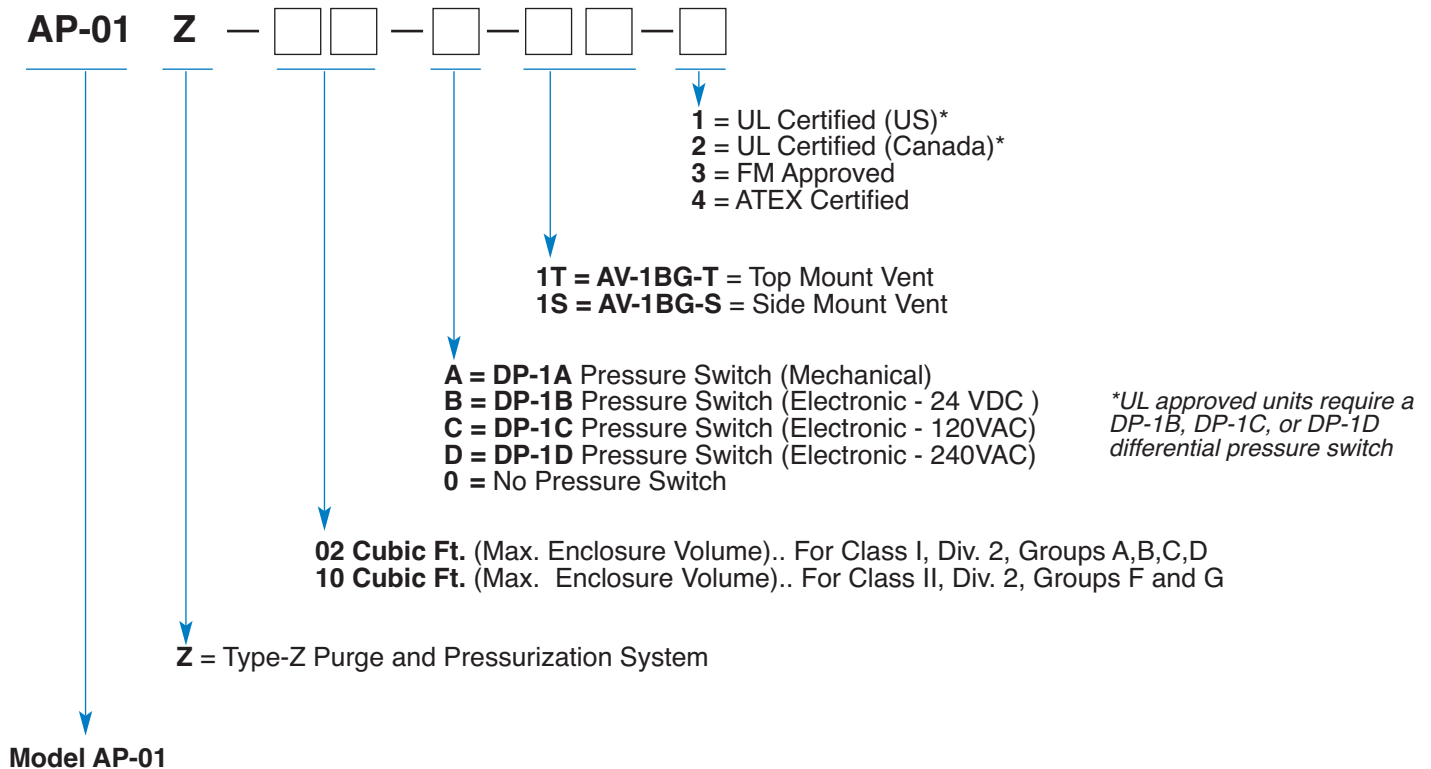


AP-01 Instructions
(shown above)
Located on Front Panel

Figure F-20
AP-01 Front Panel
with Instructions

AP-01 Product Configuration Code

All AP-01 Type-Z Purge and Pressurization Systems adhere to a “Configuration Code” that is used by both the customers and AB-CO PURGE sales/service when ordering or servicing these respective systems. In all cases, these order codes start with the “AP-01” designations and every product with this designation in the order code adheres to the installation and operations instructions contained within this manual.



Example:

A configuration code of **AP-01Z-02-B-1T-1** designates a Model AP-01, Z-Type purge and pressurizations system which is designed for a maximum enclosure volume of 2 cubic feet. The front panel is standard with a short-side (top or bottom mounting) mounting bracket. This system has the DP-1B pressure switch with a top-mount vent and UL certification for US applications.

ab-copurge SYSTEM – Selection Checklist

The following checklist can be used as an aid to determine applicability of your current system or for specifying a future system. Completing this checklist can assist AB-CO PURGE’s technical sales staff to assist you in the selection of your next purge and pressurization system.

- I.** The area classification in which the purged enclosure(s) will be installed
- NEC Class/Division System:** _____ **NEC & IEC Zone System:** _____
- Class: _____ Zone: _____
- Division: _____ Group(s): _____
- Group(s): _____

- II.** Volume (Length X Width X Height) of each enclosure to be purged and pressurized
- L x W x H = _____ (in cubic dimensional units; i.e. cubic inches, cubic feet, cubic centimeters, etc.)
- List additional enclosure volumes as required:
- _____
- _____

- III.** Type of enclosure to be purged and pressurized:
- _____
- _____

- Does the electrical enclosure have a NEMA rating?
 Yes No
 If “Yes”, please give the rating (i.e., NEMA 4, NEMA 12, etc.):
- _____

Give the material the enclosure is constructed of:

- III.** The lowest rated piece of equipment going into the enclosure(s):
- _____
- (For example: Unclassified; Class I, Division 1 : Class I, Division 2; Class II, Division 1; Class II, Division 2; Zone 1, Group A; etc.)*

- Type of purge and pressurization system needed
- Y Purge
- Z Purge
- X Purge *(Type X Systems are not currently available from AB-CO PURGE)*

- VI.** Will you use a single purge and pressurization system for one or multiple enclosures?
- NO... A separate system required for each enclosure
- YES... A single system will be used for multiple enclosures
- OTHER... A combination of systems with multiple enclosures

- VII.** Mounting of the purge and pressurization system:
- Left side Right side Top Bottom

- VIII.** Location of vent (relief valve):
- Top Mounted Side Mounted

- IX.** If the optional pressure switch is used, depending on the type of switch, signal from and power to is required. Is there signal/power accessible within or outside the enclosure?
- Yes...within the electrical enclosure
- Yes...outside the electrical enclosure (In this case, ensure conduit connections meet required standards for hazardous environments).

- DP-1A pressure switch has signal out (not power to the switch)
- DP-1B pressure switch has signal out and requires 24 VDC supply
- DP-1C pressure switch has signal out and requires 120 VDC supply
- DP-1D pressure switch has signal out and requires 240 VDC supply

(Note: The optional pressure switch provides capability for remote visual (and/or audio) indication of enclosure pressure.

- X.** What is the maximum supply pressure of the instrument air or inert gas?
- _____ psig
- (Note: Maximum allowed pressure is 250 psig.)*

- XI.** Is there a “Lock-Out/Tag-Out” system in location of enclosure?
- Yes No

- XII.** Certification(s) Required
- UL (US) FM (US)
- UL (Canada) FM (Canada) IECex

Appendix

CERTIFICATE OF COMPLIANCE

Certificate Number 20170802-E490810
Report Reference E490810-20170728
Issue Date 2017-AUGUST-02

Issued to: AB-CO PURGE
320 Creekside Drive
Amherst NY 14228

This is to certify that representative samples of PURGING AND PRESSURIZING CONTROLS AND ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS
See addendum page

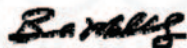
Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: NFPA 496 - Standard for Purged and Pressurized Enclosures for Electrical Equipment

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Look for the UL Certification Mark on the product.



Bruce Mahrenholz, Director North American Certification Program
UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at <http://ul.com/about/locations/>



Appendix

RFPW7.E490810 - PURGING AND PRESSURIZING CONTROLS AND ACCESSORIES FOR USE IN HAZARDOUS LOCATIONS CERTIFIED FOR CANADA

Purging and Pressurizing Controls and Accessories for Use in Hazardous Locations Certified for Canada

See General Information for Purging and Pressurizing Controls and Accessories for Use in Hazardous Locations Certified for Canada

AB-CO PURGE

E490810

320 CREEKSIDE DRIVE
AMHERST, NY 14228 USA

Purging and pressurizing controls, Type Y, Models *AFP-01*, *AFP-02*, and *AFP-03* for use in Class I, Division 1, Groups A, B, C, and D; Class II, Groups F and G Hazardous Locations when assembled with Cat. No. 1950G pressure switch.

Type Y, Models *AFP-01*, *AFP-02*, and *AFP-03* for use in Class I, Division 1, Groups C and D; Class II, Groups F and G Hazardous Locations when assembled with Cat. No. 1950 pressure switch.

Type Z, Models *AP-01*, *AFP-01*, *AFP-02*, and *AFP-03* for use in Class I, Division 2, Groups A, B, C, and D; Class II, Groups F and G Hazardous Locations when assembled with Cat. No. 1950G pressure switch.

Type Y, Models *AP-01*, *AFP-01*, *AFP-02*, and *AFP-03* for use in Class I, Division 2, Groups C and D; Class II, Groups F and G Hazardous Locations when assembled with Cat. No. 1950 pressure switch.

Last Updated on 2017-08-04

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Appendix

NOT to be distributed outside the FACTORY MUTUAL SYSTEM, except by CLIENT.


APPROVAL REPORT

**MODELS AP-01a, AFP-01a, AFP-02a AND AFP-03a
TYPE Z & Y PRESSURIZING SYSTEMS
FOR HAZARDOUS (CLASSIFIED) LOCATIONS**

Prepared For:

**AB-CO Controls Inc.
804 Park Two Drive
Sugarland, Texas 77478**

**J.I. 3002170
(3620)
April 7, 1999**

FACTORY MUTUAL | 
1151 Boston-Providence Turnpike
P.O. Box 9102
Norwood, Massachusetts 02062

Full Documentation can be viewed on our website: ab-copurge.com

Appendix

ANSI/NFPA 496

WARNING

ISA-RP 12.4

**THIS ENCLOSURE IS PROTECTED
BY PRESSURIZATION**

THE PRESSURIZED ENCLOSURE SHALL NOT BE OPENED UNLESS THE AREA IS KNOWN TO BE NON-HAZARDOUS OR UNLESS ALL INTERNAL NON-EXPLOSIVE PROTECTED DEVICES HAVE BEEN DE-ENERGIZED. POWER SHALL NOT BE RESTORED TO PRESSURIZED ENCLOSURE AFTER THE ENCLOSURE HAS BEEN OPENED UNTIL THE ENCLOSURE HAS BEEN PURGED FOR A MINIMUM OF 4 ENCLOSURE VOLUMES WITH A PROTECTED GAS (TEN VOLUMES FOR MOTORS, GENERATORS, AND OTHER ROTATING ELECTRIC MACHINERY) AT A FLOW RATE OF 1 MINUTE / 0.28 CUBIC FT. OF ENCLOSURE VOLUME. FOR THIS ENCLOSURE VOLUME, PURGE FOR MINUTES

ANSI/NFPA 496

WARNING

ISA-RP 12.4

**THIS ENCLOSURE IS PROTECTED BY
PRESSURIZATION**

IF PROTECTIVE GAS IS OTHER THAN AIR, PROTECTIVE GAS RELEASE POSES POTENTIAL FOR ASPHYXIATION.

ANSI/NFPA 496

WARNING

ISA-RP 12.4

**THIS ENCLOSURE IS PROTECTED BY
PRESSURIZATION**

FOR CLASS II AREAS: POWER MUST NOT BE RESTORED AFTER THE ENCLOSURE HAS BEEN OPENED UNTIL COMBUSTIBLE DUSTS HAVE BEEN REMOVED AND THE ENCLOSURE REPRESSURIZED.

Warranty Statement

- a. Company warrants its Goods to be free from material defects in material and workmanship except:
- i. when Goods have been modified following delivery and/or subject to improper handling, storage, installation, operation, or maintenance.
 - ii. when an item is purchased by Company as a component part of the Goods, except to the extent to which such item or items are covered by the warranty, if any, of the original manufacturer.
 - iii. when an item which is a component part of the product has been furnished by Buyer.
 - iv. no warranty of a component part shall extend beyond the warranty period of the device in which such component part is incorporated.

b. There is no implied warranty of merchantability or of fitness for particular purpose and there are no warranties of any nature except as set forth in paragraph 3 herein. Any claim by Buyer made pursuant to Company's warranty must be made in writing. Company shall have the right to inspect the Goods claimed to be defective and shall have the right to determine the cause of such alleged defect. All Goods replaced or repaired by Company under its warranty shall be replaced or repaired F.O.B. Company's plant. Buyer must notify Company, in writing, within fifteen (15) days from receipt of Goods of any obvious defect in the product or shortages, or Company shall have no obligation to correct such defect. Company shall have the option of re-inspection at Buyer's plant or its own before allowing or disallowing Buyer's claim. Defects that do not impair service shall not be a cause for rejection or recovery under any warranty. Buyer assumes full responsibility for the use and application of the product. Buyer accepts Company's design and material selection and specifications in placing this order unless other specifications are agreed to in writing by both parties prior to the manufacture of Goods by Company.

PLEASE OBTAIN A RETURNS GOODS AUTHORIZATION NUMBER (RMA) BEFORE SHIPPING ANY WARRANTY ITEM TO AB-CO PURGE. OUR PHONE NUMBER IS 716-500-ABCO. ALL SHIPMENTS WILL BE AT THE CUSTOMERS EXPENSE. SHIPMENTS WILL BE SENT TO THE FOLLOWING ADDRESS.

AB-CO PURGE • 320 Creekside Drive • Amherst, NY 14228, USA

