

Model # \_\_\_\_\_

# The Over Voltage Protector 2 (OVP2)



## Operating and Installation Instructions

### INTRODUCTION

The Over Voltage Protector 2 (OVP2) is a solid-state DC and AC isolation device designed for use in conjunction with cathodically protected equipment located in Class I, Division 2 hazardous (classified) locations or ordinary (non-hazardous) locations. The OVP2 is suitable for: (1) over-voltage protection of insulated joints and similar structures and equipment, (2) tank isolation from ground, and (3) decoupling dissimilar metals that must otherwise be bonded for safety.

The OVP2 can be used in a variety of different applications, each of which requires specific installation guidelines. These installation instructions cover the following common applications and arrangements.

- Dimensioned outlined drawing: See Figure 1
- General use mounting by banding: See Figure 2
- General use mounting by using pin brazed studs: See Figure 3
- Over-Voltage protection for insulated joints: See Figures 4-6
- General use mounting in a pedestal. See Figure 7

If your application is not covered by these installation instructions, contact DEI. "Application Notes" for most applications are also available on the DEI website.

### CERTIFICATIONS

#### United States:

The OVP2 is Underwriters Laboratories (UL) listed for use in hazardous loca-

tions in accordance with NFPA 70, (U.S. National Electric Code) Articles 500-505 for Class I, Div. 2 for Groups A, B, C, and D. Over-voltage protection due to lightning complies with the pertinent requirements of ANSI C62.11. The OVP2 is also UL listed as meeting the requirements of an effective grounding path as defined in NFPA 70 Article 250.2, 250.4(A)(5) and as suitable for the isolation of objectionable DC current from cathodically protected systems to ground as defined in Article 250.6(E).

#### Canada:

The OVP2 has been C-UL listed to Canadian Standards Association (CSA) as meeting the criteria for "an effective grounding path" as defined in CSA Code Section 10-500, 10-806, and CSA C22.2 No. 0.4-M1982. Further, it is C-UL listed for Division 2 locations per Canadian code C22.2 No. 213-M1987.

#### Europe:

The devices have been examined by a Notified Body (UL/Demko) for compliance with ATEX directive 94/9/EC using EN50021. The device is marked II 3 G EEx nA II T5 for Zone 2 use and should be installed using wiring methods appropriate for the above classification.

The listings are valid for ambient temperatures from -45°C to +65°C.

### ENCLOSURE

The standard enclosure is rated IP68 to 2m depth (comparable to NEMA 6P). This enclosure is suitable for submersible applications.

### RATINGS

The system on which this OVP2 is installed should be compatible with the ratings on the nameplate of the product ordered. The ratings available and the ratings of this OVP2 are listed as follows, at 50/60 Hz.

#### AC Fault Current Ratings (Amps AC-RMS-Symmetrical)

50/60 Hz Cycles	OVP2 5KA	OVP2 3.7KA	OVP2 2KA	OVP2 1.2KA
1	8,800	6,500	5,300	2,100
3	6,800	5,000	4,500	1,600
10	5,700	4,200	3,700	1,400
30	5,000	3,700	2,000	1,200

This unit:

- 5.0KA (50/60 Hz)
- 3.7KA (50/60 Hz)
- 2.0KA (50/60 Hz)
- 1.2KA (50/60 Hz)

#### Lightning Current Rating

- This unit: 75kA (4x10 waveform)
- 100kA (4x10 waveform)

#### DC Blocking Voltage

This unit:

- 2.0 V / +2.0 V (Standard)
- 3.0 V / +1.0 V (Optional)
- \_\_\_ V / + \_\_\_ V (Custom)

### OVP2 MOUNTING OPTIONS

Mounting options must be ordered separately. See Figures 2 through 7 for options. Select the most appro-

priate option or contact DEI if a different mounting method is required.

**General Use Mounting Bracket**

For general use mounting, order part number MTG-OVP2, shown in Figure 1.

MTG-OVP2

**Attachment Leads**

When the OVP2 is mounted using the mounting bracket illustrated in Figure 1, connection to the OVP2 terminals will normally be with #6 AWG insulated leads with compression terminals that can be ordered separately from DEI. Each lead will have a factory installed compression terminal on one end with the other lead end left unfinished for cutting to the shortest feasible length during installation. (The required 5/16" bolts, nuts and washers to attach the leads to the OVP2 are furnished with each OVP2.) Standard lengths are 12 inches (300mm) and 36 inches (900mm). Specify part number MTL-6-12 or MTL-6-36 for a set of two conductors with 12" or 36" lengths, respectively. For custom lengths, specify MTL-6-"X" and specify the units for "X." If a terminal is required for the unfinished end of the lead, contact DEI.

MTL-6-12

MTL-6-36

MTL-6-\_\_\_

**Note: Whenever the OVP2 is connected with leads, it is recommended that two of the above leads be connected to each OVP2 terminal.**

For any OVP2 model with an AC fault current rating equal to or greater than 2.0kA, two leads per terminal are required. Therefore, take care to order the correct number of leads for the mounting option selected.

**Banding OVP2 to Test Station or Pipe Wall**

The OVP2 is suitable for banding to a

test station or steel pipe using stainless steel bands (customer furnished) over the general use mounting bracket (part number MTG-OVP2, ordered separately), as illustrated in Figure 2. Order the necessary leads as described in the previous section.

**Pin Brazed Stud Connection to a Pipe Wall**

Note: To choose this option, a user must have the required pin brazing equipment and consumable items. Also requires general use mounting bracket, part number MTG-OVP2.

When a OVP2 is used to decouple an above ground section of steel pipe from a gradient control mat (or other grounding system), an ideal method is to pin braze M8 studs to the steel pipe as illustrated in Figure 3 as this minimizes the voltage drop in the lead connections and thereby minimizes touch potential. One terminal of the OVP2 is connected directly to the lower stud using a Hex Coupling Nut with bolt/washer ordered separately from DEI, #HCN-M8. The opposite terminal connects to a grounding system, or other structure with leads, as illustrated in Figure 3.

HCN-M8

**Flange Mount Using Tapped Holes or Pin Brazed Studs**

Mounting the OVP2 to a flange can be accomplished via drilling and tapping the edge of the flange for a 5/16-18x1" or M8-1.25x20mm fully-threaded stud with jam nuts, or by pin brazing an M8x16 stud to each flange, as shown in Figures 4 and 5. Verify that the dimensions of either of these mounting arrangements are suitable for the flange before ordering. For mounting using tapped holes and studs, specify DEI part number MTT-516 for the 5/16" threaded studs, or MTT-M8 for the M8 threaded studs.

MTT-516

MTT-M8

To mount using pin brazed M8 stud kit,

specify DEI part number MTS-M8 for the mounting kit required and order the M8 pin brazed stud kit and ceramic sleeve required from the manufacturer/distributor of the pin brazing equipment being used.

MTS-M8

**Flange Mount Using Existing Flange Bolts**

The OVP2 can be mounted across an insulated flange using an existing flange bolt, usually at the top center position on the flange (as shown in Figure 6A, 6B, 6C). The flange must have a machined outer face in order to mate to the bus bars. To order a complete kit to flange mount using flange bolts, specify MTF-A-B-C where dimensions A, B, and C are provided (in inches or mm) per Figure 6. Also, provide the pipe diameter and the ANSI LB class.

MTF-\_\_\_\_-\_\_\_\_-\_\_\_\_

**Pedestal Mounting**

The OVP2 can be installed in a fiberglass pedestal for enclosing the OVP2 and all cable connections, model MTP-42. When the OVP2 is used in applications where both cable lead connections come from below ground level or where it is desired to provide a second level of protection around the standard OVP2 enclosure, the pedestal can be ordered as a separate item. The pedestal has nominal 3/16" thick fiberglass with 14 mil UV stabilized gelcoat. The internal mounting channel and mounting hardware are all stainless steel. See Figure 7. Also requires general use mounting bracket, part number MTG-OVP2.

MTP-42

**GENERAL INSTALLATION INSTRUCTIONS**

These general instructions apply to all applications. For specific installation instructions, refer to the figure numbers that apply to the application as noted on the first page.

## **MOUNTING**

Mount the OVP2 so that the total length of lead to the connection points will be as short as possible if the OVP2 is going to be used to provide over-voltage protection from lightning. All leads have inductance which will cause a significant voltage per unit of lead length when subject to lightning surge current. To minimize the voltage developed between the connection points, install the OVP2 as close as practical to the required connection points and cut the lead to the shortest possible length during installation. For most insulated joint applications the OVP2 can, and should, be installed with less than 8" (200 mm) of lead. Leads can develop 1-3 kV/ft. (approx. 3-10 kV/meter) of length due to lightning; hence, for this reason, leads should be kept as short as possible in lightning applications. Lead length is not critical for limiting voltage due to 50 Hz or 60 Hz current.

## **POLARITY**

If the OVP2 purchased has asymmetrical blocking characteristics and it is being connected between a cathodically protected structure and ground, connect the negative terminal of the OVP2 to the cathodically protected structure and the positive terminal to ground. If being connected between two different cathodically protected systems, attach the negative terminal to the more negative structure and the positive terminal to the less negative structure. A label on the OVP2 housing shows the polarity of each terminal. If a symmetrical version of the OVP2 was furnished, the polarity marks are not shown since the unit has identical voltage blocking with either polarity.

## **FIELD TESTING**

Before installation, the following measurements are suggested to confirm that the steady-state conditions imposed on the OVP2 will be within its ratings.

1. Measure the open-circuit DC voltage between the OVP2 connection points with a multimeter. The open-circuit DC voltage measured should be with-

in the DC blocking voltage rating of the model selected (i.e., normally -3.0 V/+1.0 V or +/-2.0 V, unless a custom version has been ordered).

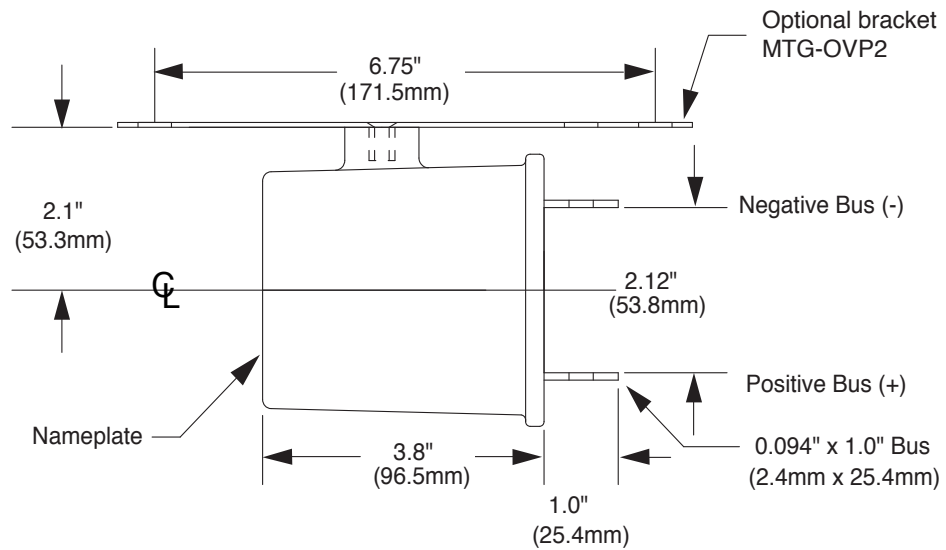
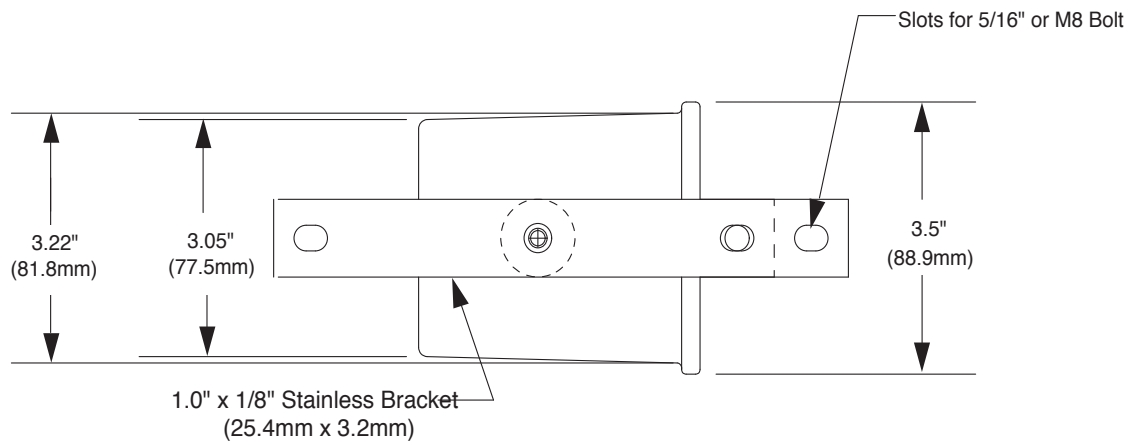
2. Measure the open circuit peak AC voltage ( $V_{ac-rms} \times 1.414$ ) between the OVP2 connection points with a multimeter. Verify that the DC plus peak AC voltage is less than the threshold voltage. If this is not the case, the OVP2 will be conducting current, which may adversely affect cathodic protection. In this case, the model SSD should be used instead.

3. After installation, the DC voltage across the OVP2 terminals can be measured to confirm that the expected value of cathodic protection voltage exists, assuming the cathodic protection system is ON. (The voltage measured between the OVP2 connection points will be different than the cathodic protection voltage measured with respect to a reference cell.) Correct application of the OVP2 should result in no change of the CP system before and after installation of the OVP2.

4. If the cathodic protection system is ON, one can check the leakage current through the OVP2 as follows, if desired. Connect a Hall Effect DC current measurement device over one of the OVP2 leads to read the leakage current. The value of current measured at normal cathodic protection voltages should be negligible.

If any measurements do not produce the expected results, contact DEI.

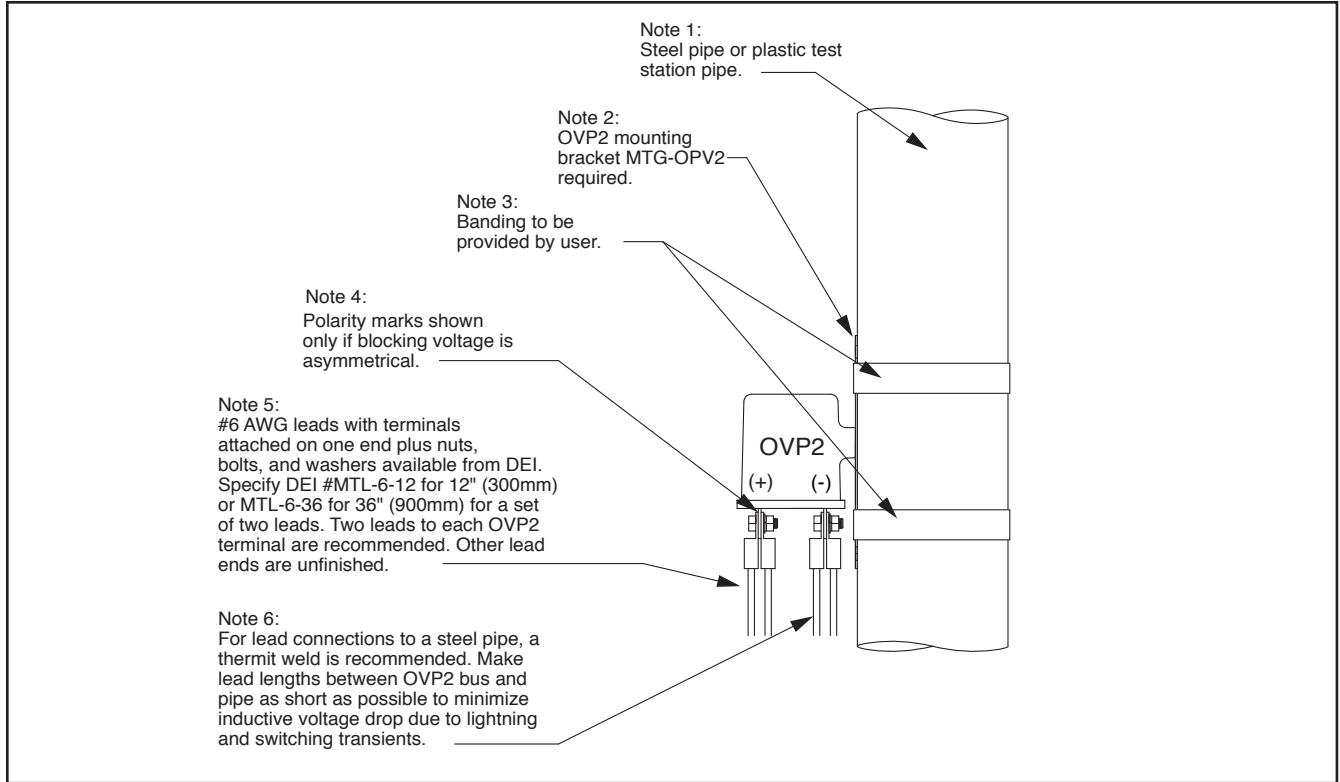
**FIGURE 1** OVP2 Outline Drawing



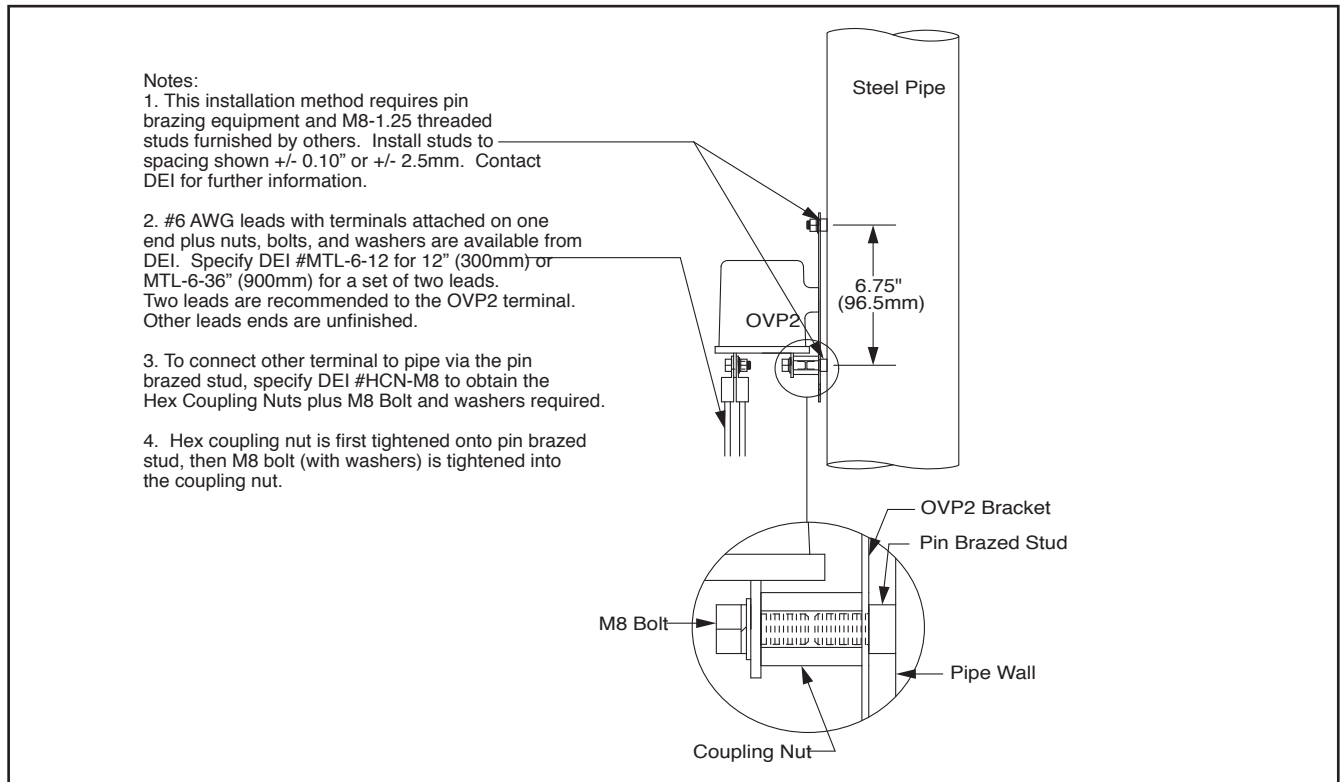
**Notes:**

1. Only models with an asymmetrical blocking voltage will have polarity marks shown.
2. General use mounting bracket, part number MTG-OVP2, must be ordered separately, if needed.

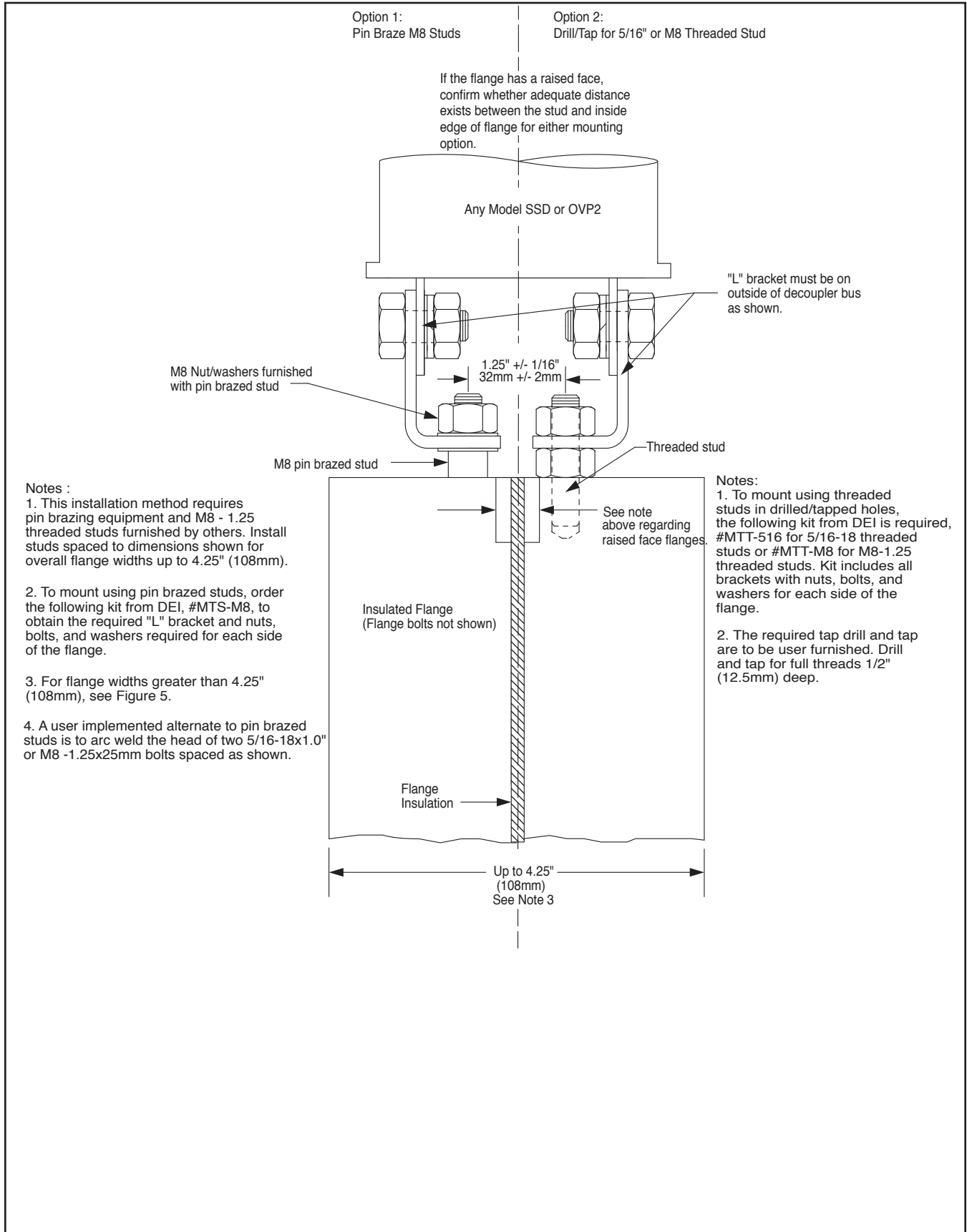
**FIGURE 2 Banding the OVP2 to a Test Station or Pipe Wall**



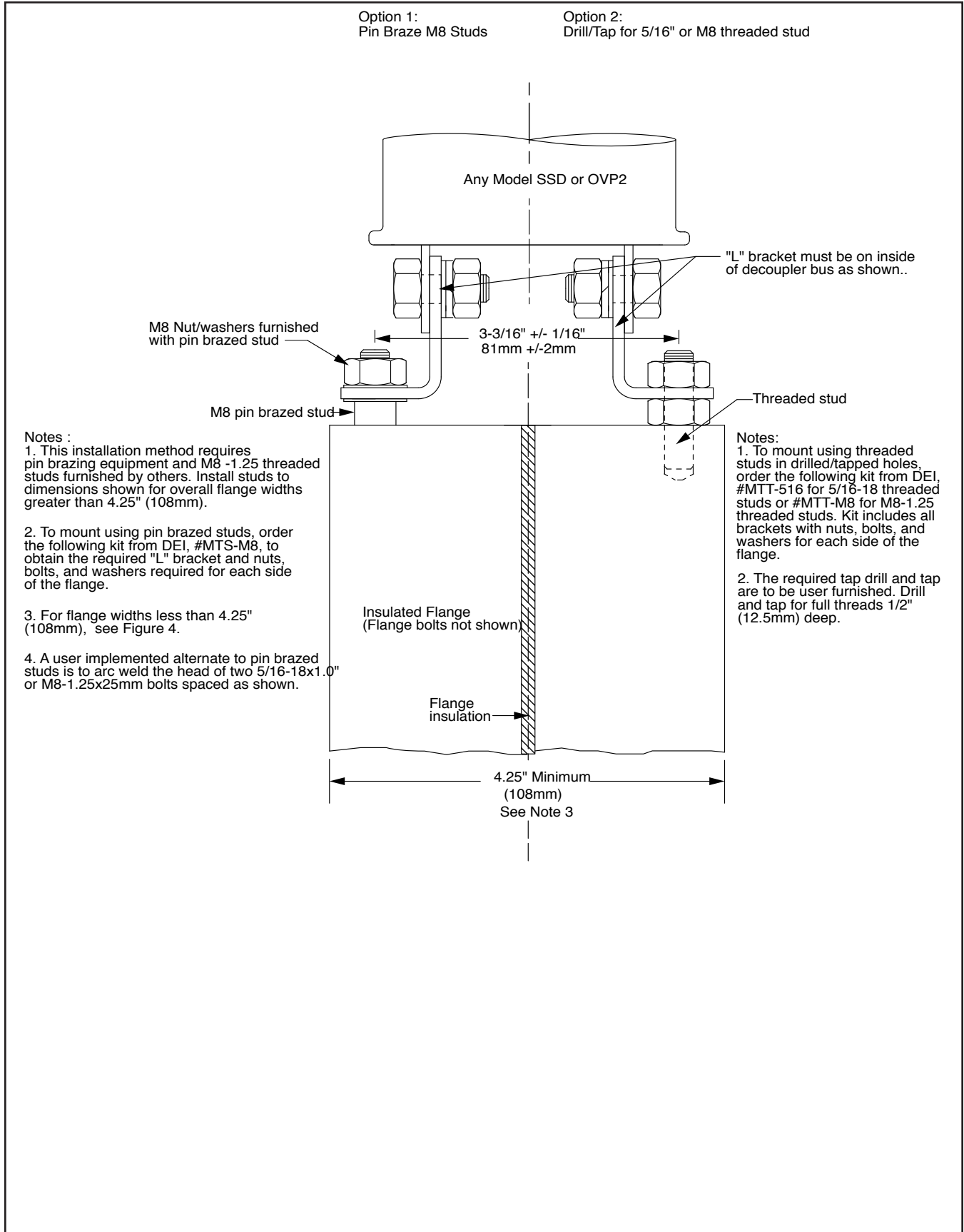
**FIGURE 3 Pin Brazed Stud Connection to a Pipe Wall**



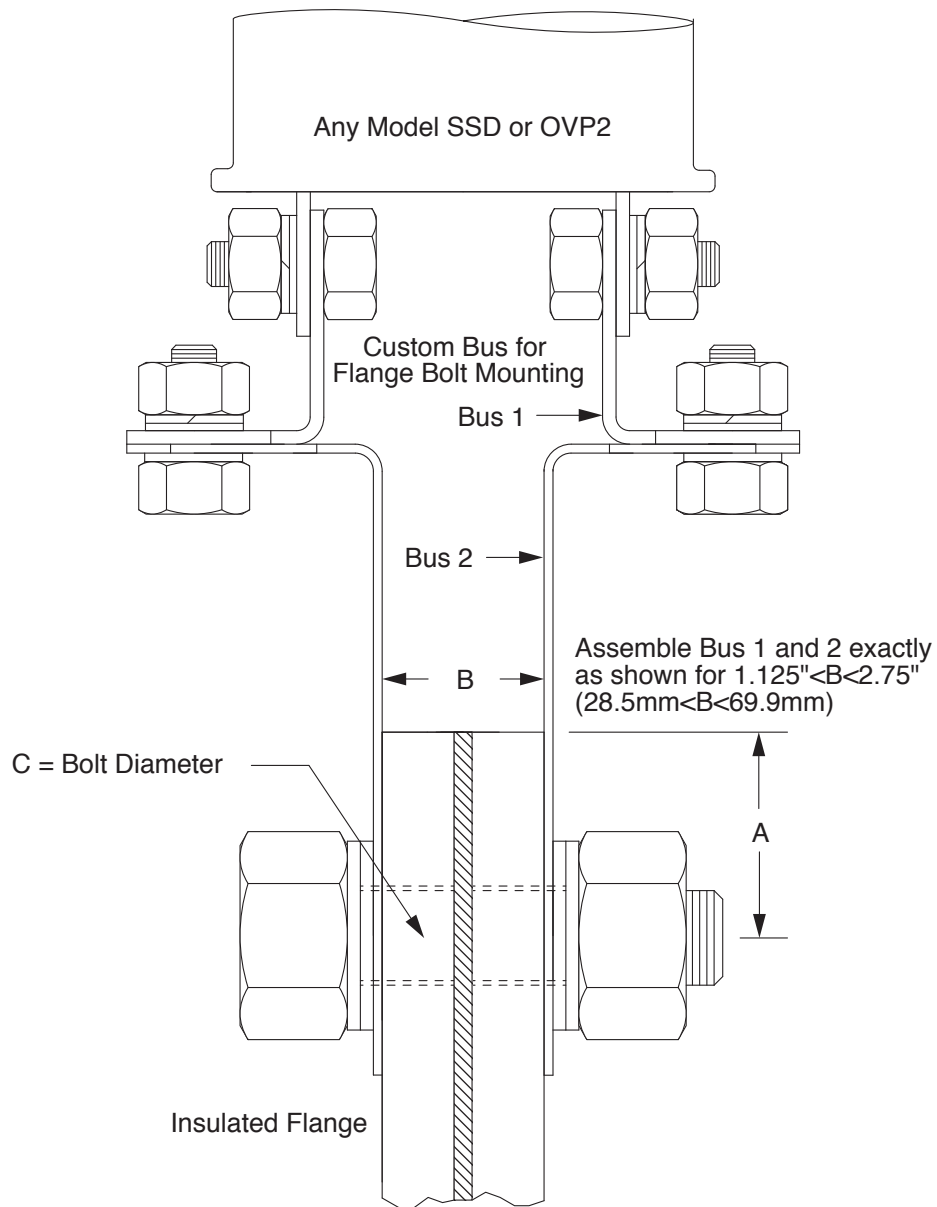
**FIGURE 4 Flange Mount Using Tapped Holes or Pin Brazed Studs**



**FIGURE 5** Flange Mount Using Tapped Holes or Pin Brazed Studs



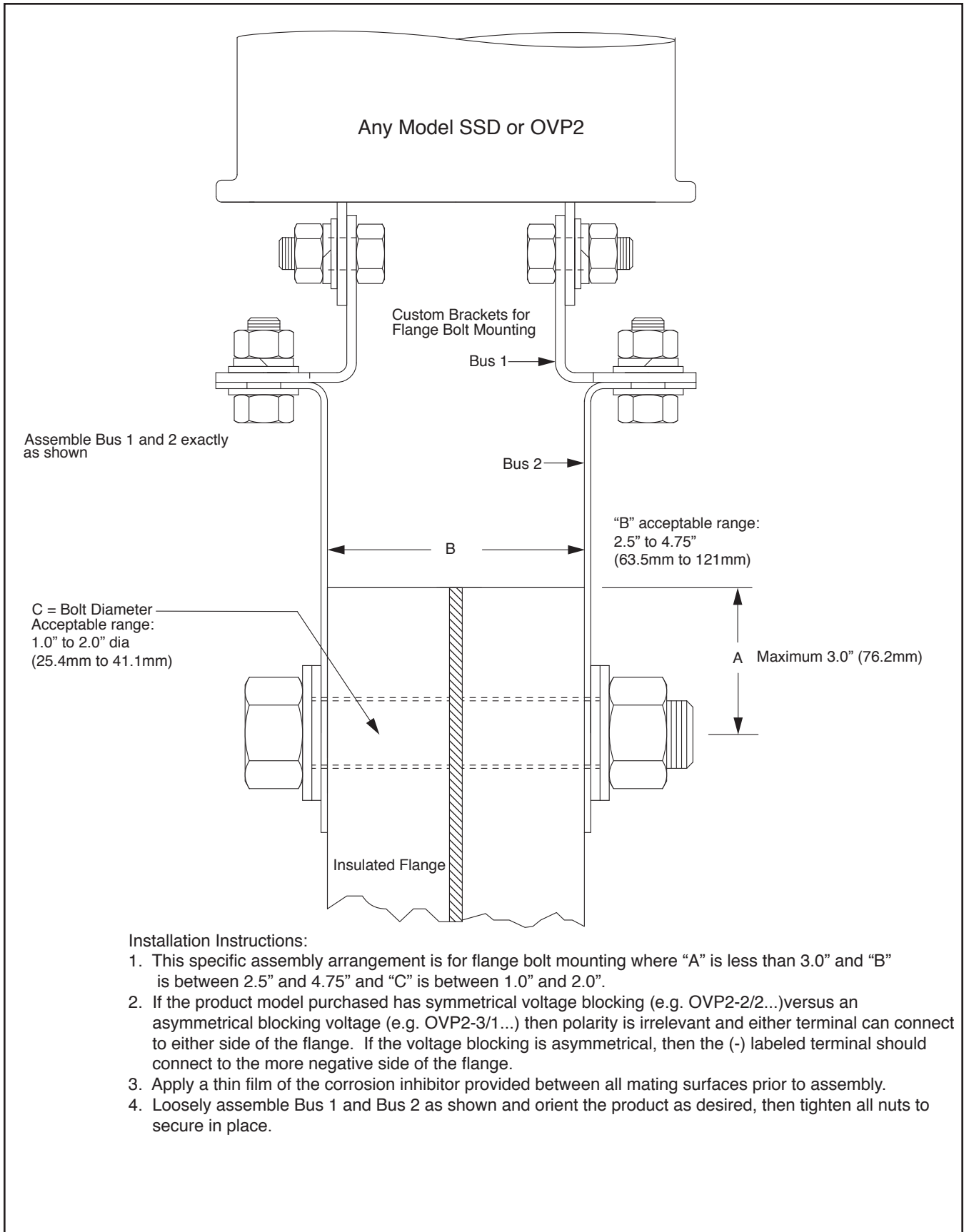
**FIGURE 6A** Flange Mount Using Existing Flange Bolts



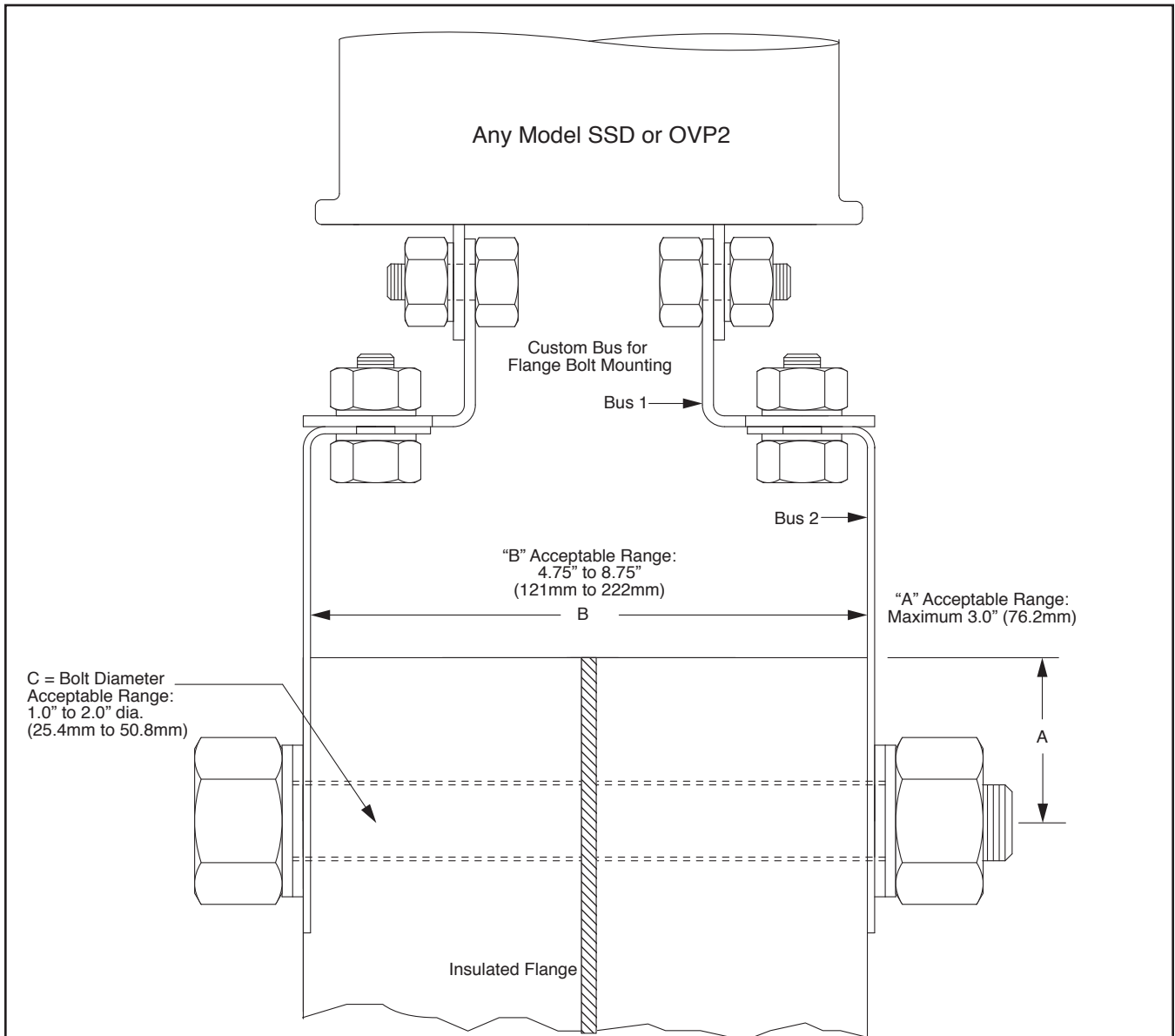
**Installation Instructions:**

1. This specific assembly arrangement is for flange bolt mounting where “A” is less than 2.0” and “B” is between 1.125” and 2.75” and “C” is between .05” and 1.0”
2. If the product model purchased has symmetrical voltage blocking (e.g. OVP2-2/2----) versus an asymmetrical blocking voltage (e.g. OVP2-3/1----) then polarity is irrelevant and either terminal can go to either side of the flange. If the voltage blocking is asymmetrical, then the (-) labeled terminal should go to the more negative side of the flange.
3. Apply a thin film of the corrosion inhibitor provided between all mating surfaces prior to assembly.
4. Loosely assemble Bus 1 and 2 as shown and orient product as desired, then tighten all nuts to secure in place.

**FIGURE 6B** Flange Mount Using Existing Flange Bolts



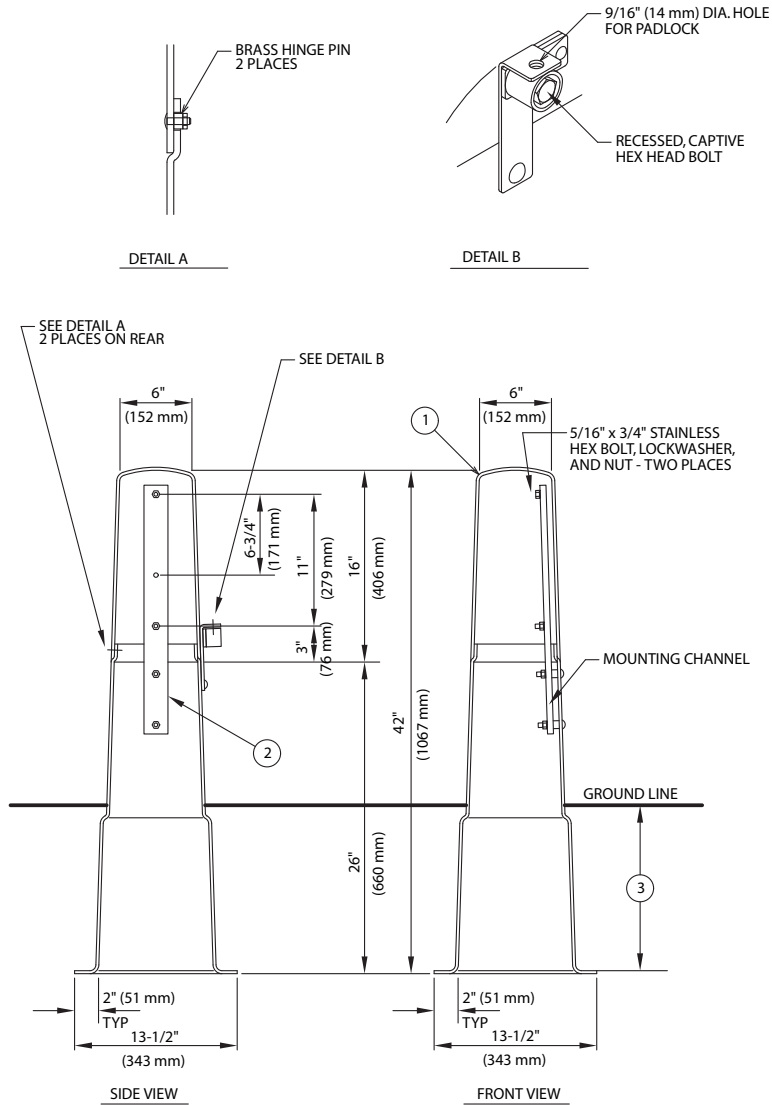
**FIGURE 6C** Flange Mount Using Existing Flange Bolts



**Installation Instructions:**

1. This specific assembly arrangement is for flange bolt mounting where "A" is less than 3.0" and "B" is between 4.75" and 8.75" and "C" is between 1.0 and 2.0".
2. If the product model purchased has symmetrical voltage blocking (e.g. OVP2-2/2...) versus an asymmetrical blocking voltage (e.g. OVP2-3/1...) then polarity is irrelevant and either terminal can connect to either side of the flange. If the voltage blocking is asymmetrical, then the (-) labeled terminal should connect to the more negative side of the flange.
3. Apply a thin film of the corrosion inhibitor provided between all mating surfaces prior to assembly.
4. Loosely assemble Bus 1 and Bus 2 as shown and orient the product as desired, then tighten all nuts to secure in place.

**FIGURE 7 Pedestal Mounted OVP2**



Model: MTP-42

1. Fiberglass pedestal, light green.
2. Stainless steel mounting channel.
3. Typical burial depth: 12" to 20" (300 mm to 500 mm)

Notes:

- Nominal fiberglass thickness, 3/16" (4.8 mm).
- Exterior UV stabilized gelcoat, 14 mil (0.36 mm) thick.
- Fire retardant: Does not support combustion.
- Stainless steel hardware.
- For mounting SSD (Solid-State Decoupler) or OVP2 (Over-Voltage Protector 2).