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WOODWARD

Application Note 51436
(Revision B, 7/2019)
Original Instructions

DLE Metering Skid
GSOV25 Valve Replacement Guide

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26455*, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, on the *publications page* of the Woodward website:

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The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual *26455*, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, to verify whether this translation is up to date. Out-of-date translations are marked with ⚠. Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

Revisions— A bold, black line alongside the text identifies changes in this publication since the last revision.

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Important Definitions

This is the safety alert symbol used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER** - Indicates a hazardous situation, which if not avoided, will result in death or serious injury.
- **WARNING** - Indicates a hazardous situation, which if not avoided, could result in death or serious injury.
- **CAUTION** - Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury.
- **NOTICE** - Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT** - Designates an operating tip or maintenance suggestion.

⚠WARNING

Overspeed / Overtemperature / Overpressure

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

Start-up

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

⚠WARNING

***GSOV25 Conduit Replacement**

All GSOV25HT kits and procedures require replacement of the valve. Kit 8923-2785 does not include a valve and so the replacement valve must be supplied by the customer. This ensures proper function and electrical installation for the flying-leads of the solenoid and proximity switch.

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Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

IMPORTANT

External wiring connections for reverse-acting controls are identical to those for direct-acting controls.

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Chapter 1.
General Information

Woodward GSOV25 Gas Stop Valves installed on Woodward DLE Fuel Skids may be replaced in the field. Special care must be taken to ensure that the valve or skid is not damaged during the valve replacement. This guide serves to help an operator through the process of replacing the GSOV25 valve.

This guide is not intended to replace any site-specific instructions or safety procedures

⚠WARNING

EXPLOSION HAZARD—Do not remove covers or connect/disconnect electrical connections unless power has been switched off and the area is known to be non-hazardous.

⚠WARNING

All work should be carried out under safe conditions. Be sure gas is not present and the environment is safe to work on electrical components. Ensure all power is removed from the fuel skid and surrounding equipment.

Refer to Woodward GSOV25 Gas Shutoff manual 26190 prior to performing work.

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Chapter 2.
GSOV25 Gas Valve Removal

Example DLE Skid

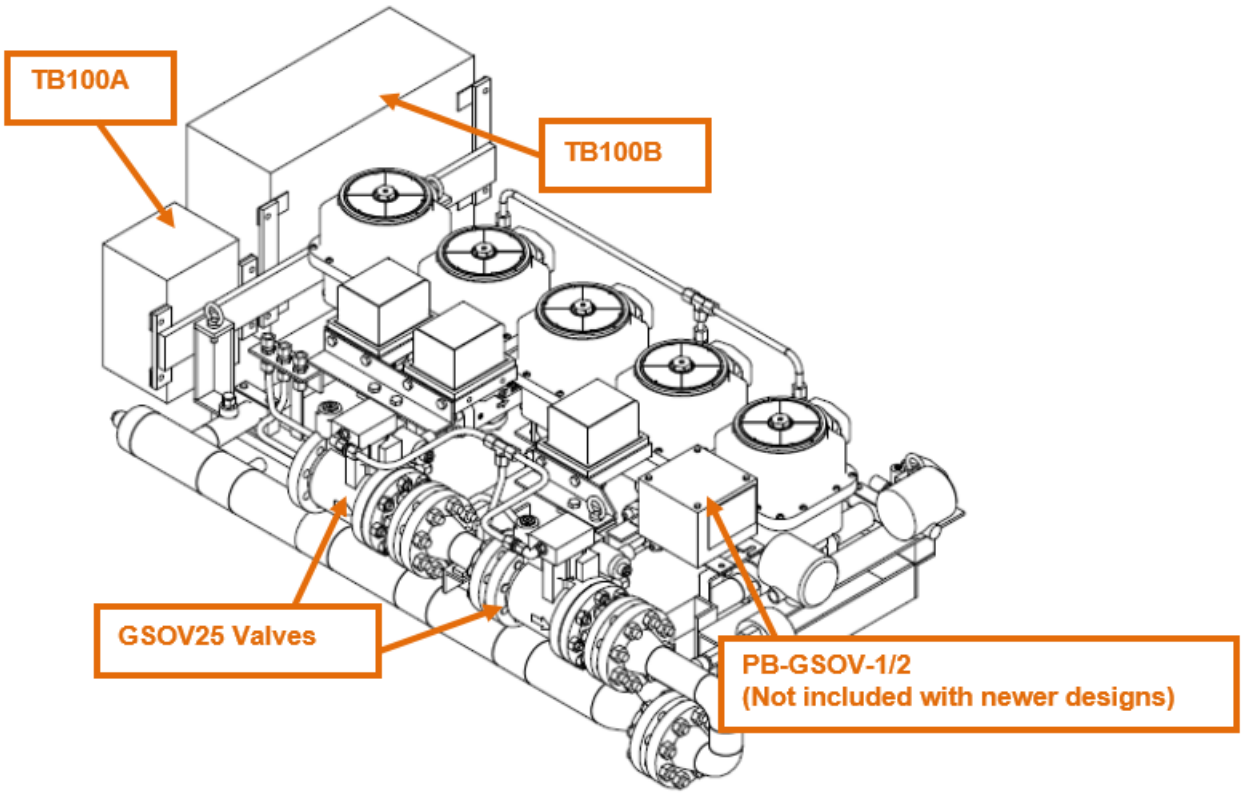

Figure 2-1. GE Oil & Gas PGT25+G4 DLE Skid

The GSOV25 Gas Stop Valve location in the skid is shown in Figure 2-1. Actual skid configuration may vary.

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Table 2-1. Tools and Parts List

Required Tools:		
Channel Locks		
Wire Cutters		
Needle Nose Pliers		
Philips and Flat Head Screwdrivers		
Wrenches	2x 1-1/16 Box End Combo Wrench or 1-1/16 Stubby Ratcheting Combo Wrench Torque Wrench (capable of 122 N·m / 90 lb-ft) Adjustable Wrench	
1-1/16 Crows Foot Socket		
Lifting Straps		
Kit Components:		
COMPONENT		QTY
GSOV25 HT - 24 Vdc (Kit 8923-1955)		1 ea
GSOV25 HT – 125 Vdc (Kit 8923-2090)		1 ea
All kits include the following components (Kit 8923-2785*)		
600# Spiral Wound Gasket per B16.20, Type CGI		2 ea
Conduit Seal fitting & compound		2 ea
90° ½” Liquidtite conduit fitting with ground		4 ea
45° ½” Liquidtite conduit fitting with ground		4 ea
TITAN Type HC High Temp ½” Flex Conduit		24 ft
Tefzel Grounding Wire		24 ft
Tefzel Cable Ties - 14 inch		5 ea
Tefzel Cable Ties - 7 inch		15 ea
1/2" Straight Pipe Nipple		1 ea
1/2" Female to Female Coupling		1 ea
White Flex Tubing		1 ft
Wire Label		7 ea
Stahl series 8166/11 conduit hub, solid zinc		2 ea
GSOV25HT Valve Replacement Guide		1 ea

⚠WARNING

***GSOV25 Conduit Replacement**

All GSOV25HT kits and procedures require replacement of the valve. Kit 8923-2785 does not include a valve and so the replacement valve must be supplied by the customer. This ensures proper function and electrical installation for the flying-leads of the solenoid and proximity switch.

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Component Reference

Intermediate junction box PB-GSOV-1/2 is optional and only required for older designs with shorter flying-leads on the GSOV25 solenoid.

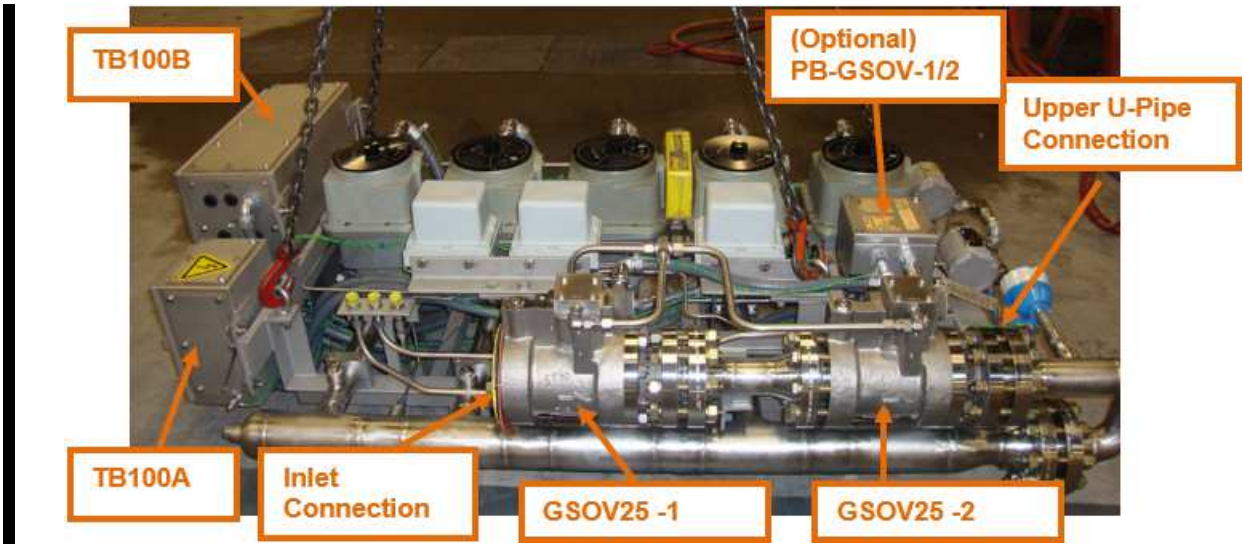

Figure 2-2. Example Inlet Piping-1

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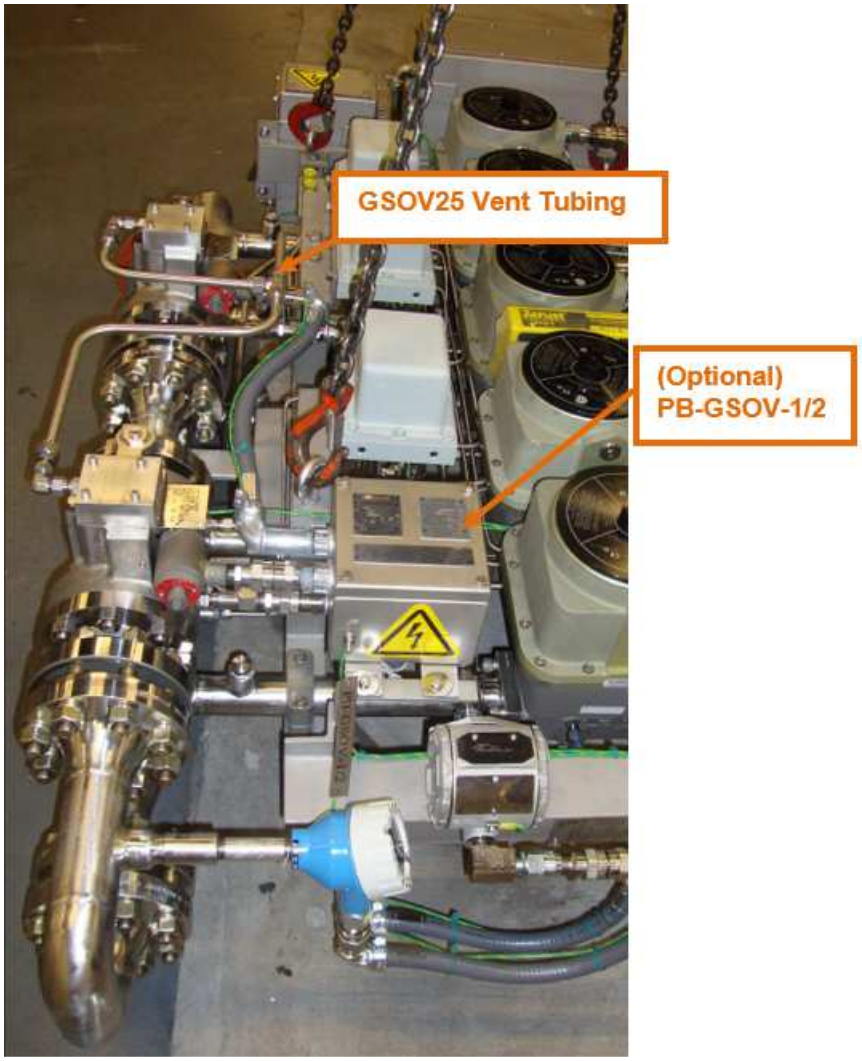

Figure 2-3. Example Inlet Piping-2

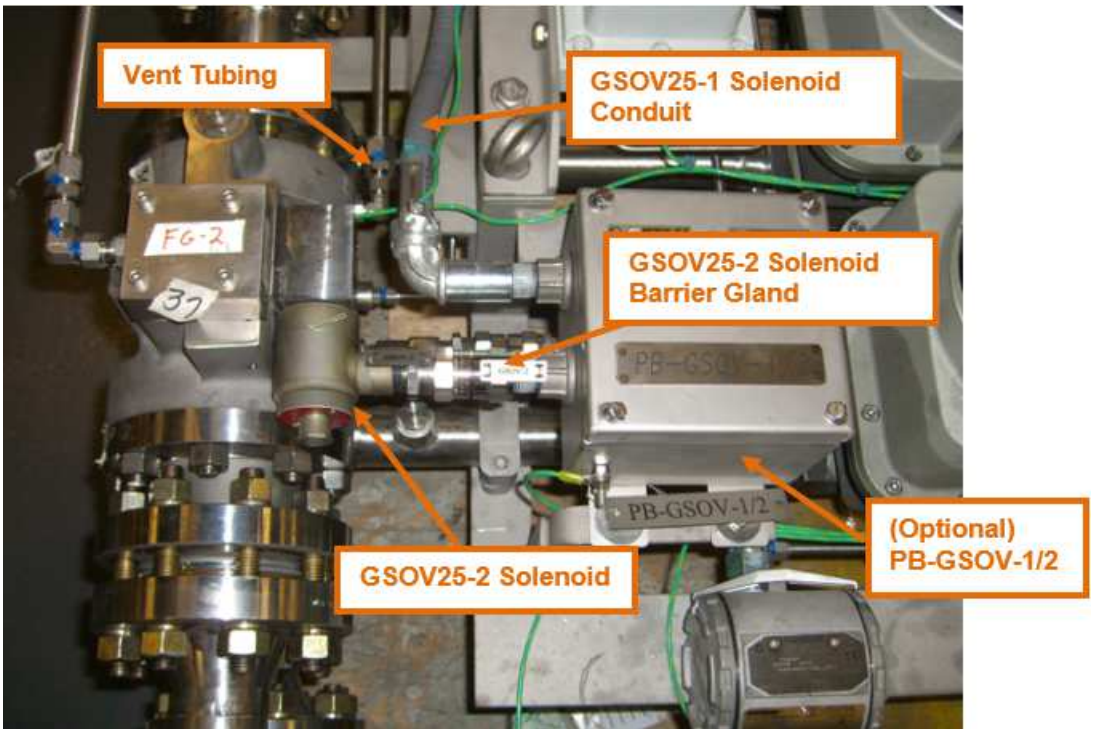

Figure 2-4. Example Inlet Piping-3

Figure 2-5. Example Junction Box

⚠WARNING **The GSOV25 Gas Shutoff weighs 33 kg (72 lb). To prevent possible injury, take special care to ensure the upper section of the manifold piping is removed appropriately.**

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GSOV25-1/2 Wiring Removal

Figure 2-6. PB-GSOV25-1/2 Junction Box

1. Ensure that all electrical circuits are de-activated.
2. Disconnect the solenoid valve terminal block connections
   a. If PB-GSOV-1/2 is present, disconnect the terminal block connections inside the PB-GSOV-1/2 junction box. These connections are from the GSOV25 solenoids. Only the connections coming from the GSOV25 solenoids need to be disconnected. The connections leading to TB100B from the PB-GSOV-1/2 junction box can stay connected to the terminal block.
   b. If PB-GSOV-1/2 is not present, disconnect the terminal block connections inside the TB100 B junction box.
3. Disconnect the proximity switch terminal block connections inside TB100B under label TB-SOV-SW.
4. Remove any tie wraps retaining the proximity switch wires inside TB-100B.
5. Remove the conduit fitting nut from the TB100B junction box hub.
6. Remove the ground wires from the GSOV25 valves.

GSOV25-1 Conduit Removal

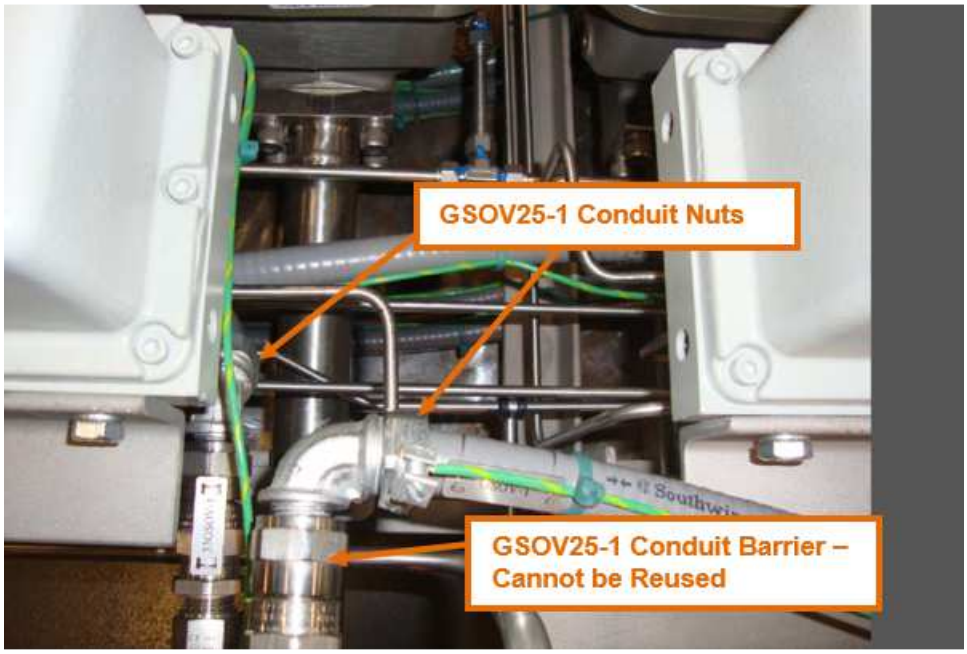

Figure 2-7. GSOV25-1 Conduit Removal

1. For the GSOV25-1, remove the solenoid conduit by removing the conduit nut at the 90° elbow.
2. Repeat the process for the GSOV25-1 proximity switch conduit.
3. The GSOV25-1 solenoid and proximity switch wiring can now be removed from the junction boxes by pulling on the wire where the conduit nut was removed. The conduit and fittings can either be kept in place or replaced with the new conduit and fittings in the replacement kit.

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GSOV25-2 Conduit Removal

Figure 2-8. GSOV25-2 Solenoid Conduit Removal

1. For the GSOV25-2, remove the solenoid conduit
   a. If PB-GSOV-1/2 is present, remove the solenoid conduit by removing the PB-GSOV-1/2 hub nut inside the junction box.
   b. If PB-GSOV-1/2 is not present, remove the solenoid conduit by removing the TB100 B hub nut inside the junction box.

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2. Remove the conduit barrier union. Take special care to ensure the proper connection is taken apart. See the figure below for information. The barrier uses a fine thread, so it will take some time to unscrew completely.

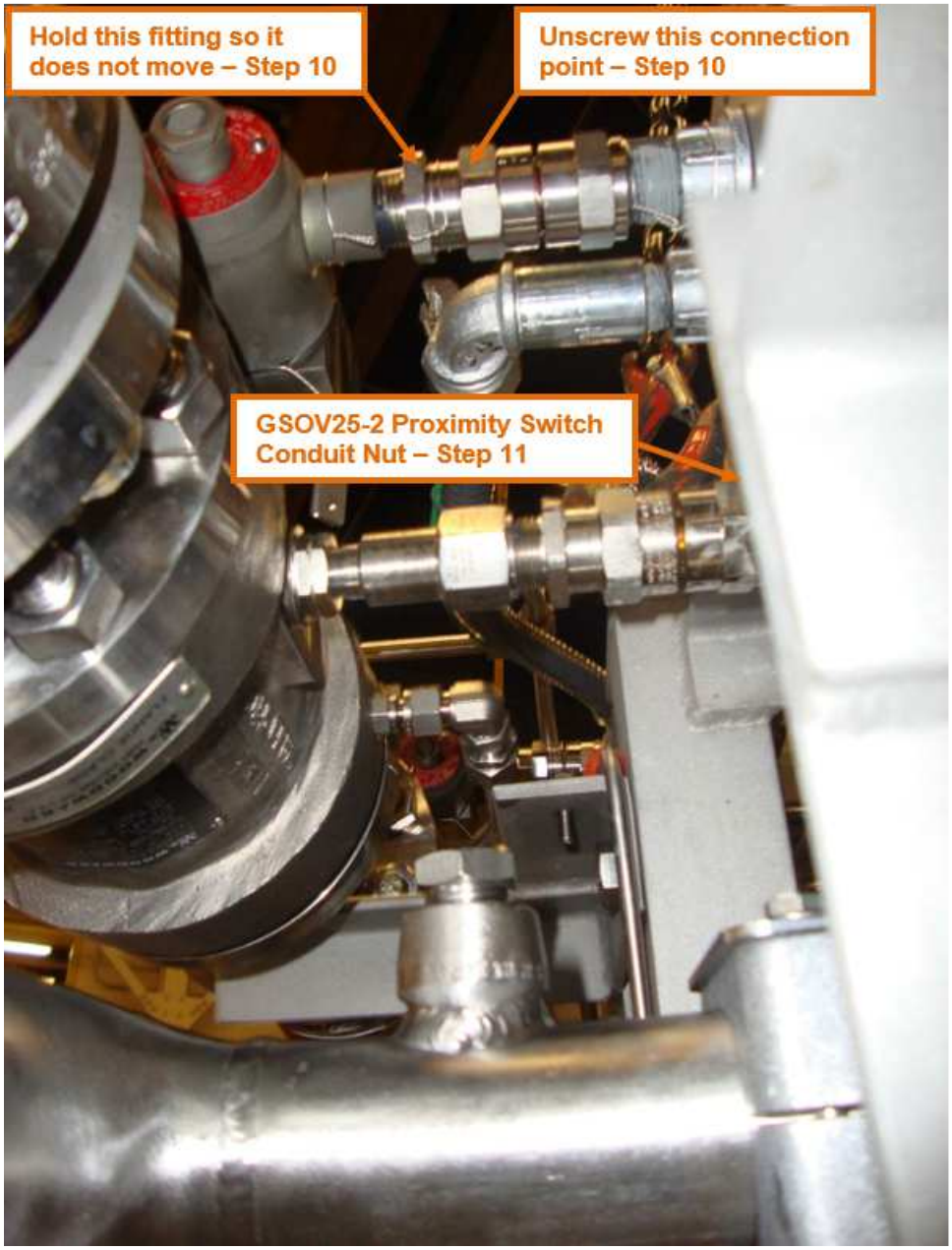

Figure 2-9. GSOV25-2 Proximity Switch Conduit Removal

3. Remove the proximity switch conduit by removing the conduit nut at the 90° elbow.
4. The GSOV25-2 proximity switch wiring can now be removed from the junction boxes by pulling on the wire where the conduit nut was removed. The conduit and fittings can either be kept in place or replaced with the new conduit and fittings in the replacement kit.

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GSOV25-1/2 Vent Tubing Removal

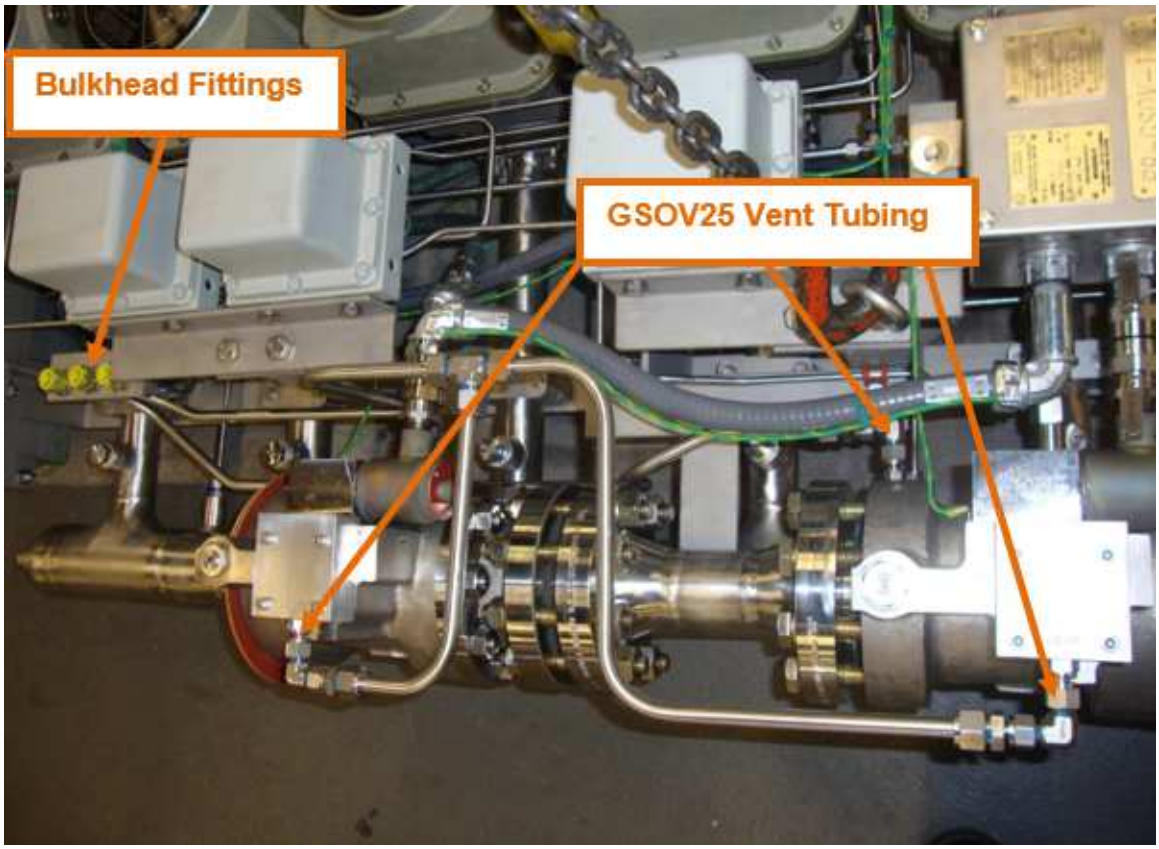

Figure 2-10. GSOV25-1/2 Vent Tube Removal

1. Disconnect GSOV25 vent tubing at locations shown in Figure 2-10. The bulkhead fittings must first be loosened before the vent line tubing can be removed.
2. Remove the vent lines connecting the GSOV25 valves. Tape or seal open vent connections.
3. Properly support GSOV25 valves using wood chocks or lift straps supported by a hoist.

GSOV25 Removal

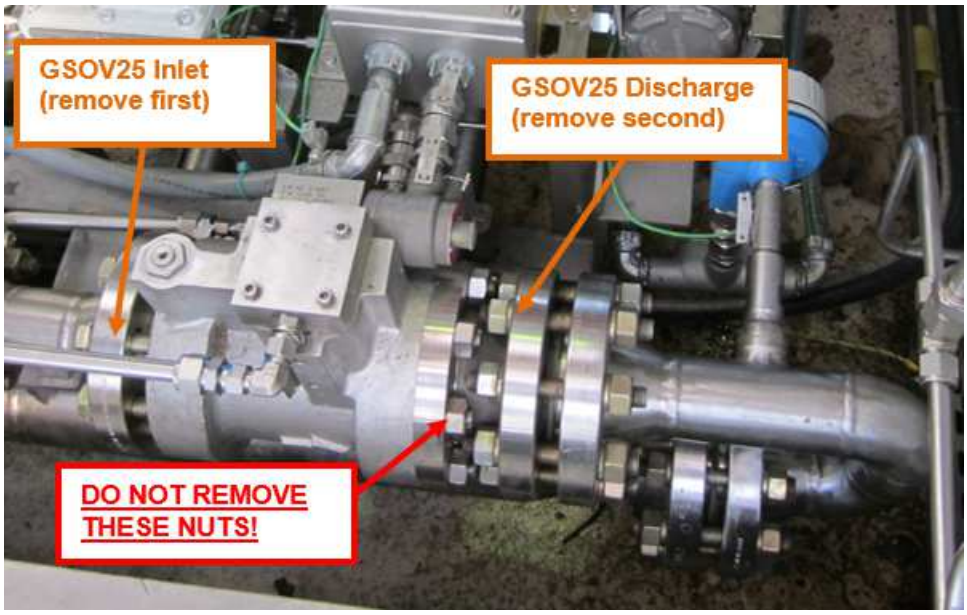

Figure 2-11. GSOV25 Valve

Figure 2-12. Wrenches
[Box-open combo wrench (left); stubby ratcheting combo wrench (right)]

⚠WARNING **The GSOV25 Gas Shutoff weighs 33 kg (72 lb). In order to prevent injury, use a lifting strap when handling the GSOV25 valve. Do not lift or handle the GSOV25 valve by any conduit, cable, or component.**

⚠WARNING **Do not remove the inner retaining flange nuts and studs on the GSOV25 discharge flange. These nuts are critical to the sealing component of the GSOV25 and the warranty will be voided if they are removed.**

1. Properly support the GSOV25 and upper manifold assembly using lifting straps supported by a hoist.

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2. Remove the 8, 5/8-11 bolts on the inlet side of the GSOV25 using a 1-1/16" box-open combo wrench or a stubby ratcheting combo wrench. Due to space constraints inside the package, the box-open combo wrench may need to be cut in half.

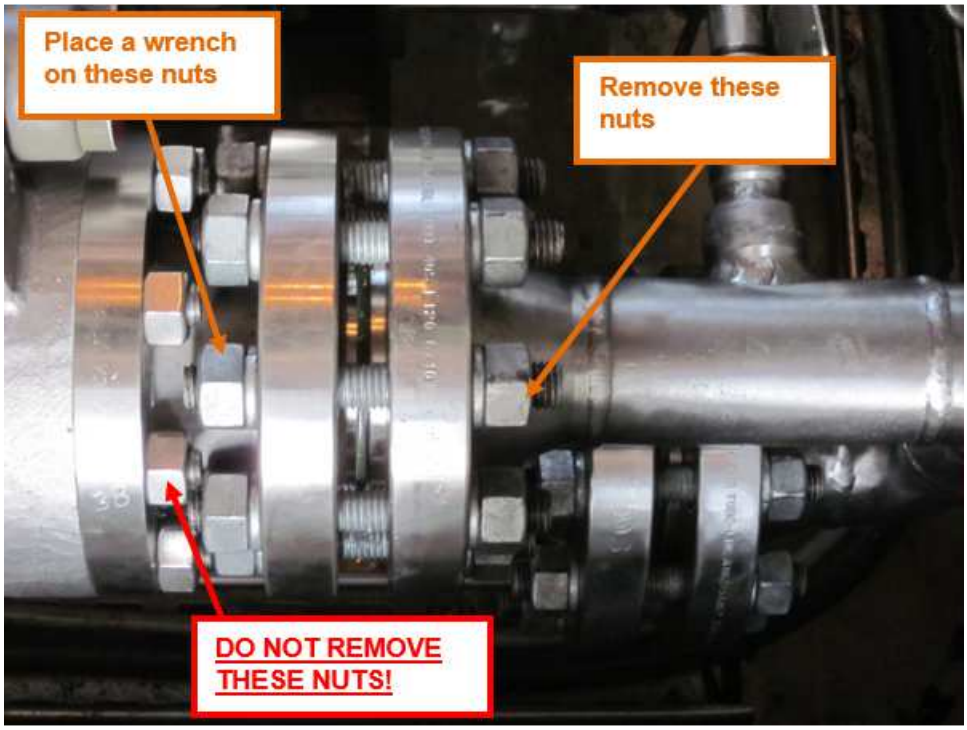

Figure 2-13. GSOV25 Discharge Flange

3. Disconnect the GSOV25 upper manifold at the discharge flange.
   a. Using a 1-1/16 box-open end combination wrench or a stubby ratcheting combo wrench, hold the nut closest to the valve as shown above.
   b. Using a second wrench, loosen and remove the nut on the opposite side as shown above. The nut on the valve side and stud will now be loose and the stud can be removed from the nut.
   c. Remove the stud and nut from the flange.
   d. Repeat for all other nuts and studs on the flange connection.
4. Carefully remove the GSOV25 from the fuel skid. Insure that shipping flanges or proper protection is used to retain the cleanliness of the valve.
5. This process can be used on either individual GSOV25 valve.
6. Tape or seal any open connections.

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Chapter 3.
GSOV25 Re-installation Procedure

Valve Installation

Figure 3-1. Crows Foot Socket

1. Piping re-installation follows the removal procedure in the reverse order.
2. ANSI flange gaskets (type CGI) must be replaced for all connections that were disconnected.
   a. Gasket inner ring and winding material must match the pipe material.
3. Torque the ANSI flange bolts to 108 to 122 N•m (80 to 90 lb-ft) in a star pattern in order to properly seat the gasket.
   a. Due to the location of the nuts on the discharge flange of the GSOV25, a 1-1/16” crows foot socket must be used with a torque wrench in order to properly torque the nuts.
4. Install all removed vent lines.

Titan Flex Conduit

NOTICE

Since it is easier to cut the conduit based on the exact need of the terminations, the flex conduit and cables have been supplied un-cut. It may be necessary for field installers to change the lengths of the cable slightly in order to adapt to the current site conditions. The lengths and route of the re-installed conduit/cable is at the discretion of the field installer in order to complete this task in the best way possible to meet the intention of this reinstallation.

NOTICE

It is strongly recommended that only a competent person, well versed in the installation of electrical systems, shall install any of the required electrical devices or wiring runs. All conduit and wiring shall be installed per the Woodward Control Wiring Diagram.

1. The Woodward GSOV25HT replacement kit provides all components needed to replace the GSOV25HT conduit, fittings, and barrier glands if desired. The original conduit can also be re-used if it was not damaged during removal of the stop valve.

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2. Determine the length of flex conduit:
   a. Measure required distances and routes needed to run flex conduit from the GSOV25HT to the conduit connection at the gland plate of the TB100 B Junction Box. Be sure when measuring length of flex conduit that there is enough slack to not put tension on the run, but the conduit does not lie on the ground or interfere with other applications. If desired, the new conduit can be cut to the same length as the original conduit.
      i. Older designs with shorter flying-leads on the GSOV25 solenoid valve require the intermediate junction box PB-GSOV-1/2. In these cases, an additional short conduit run from the solenoid to the PB-GSOV-1/2 junction box will also be required. The GSOV25 proximity switch requires a third conduit run directly to the TB100 B junction box.
      i. New designs with longer flying-leads on the GSOV25 are wired directly to the TB100 B junction box and only two conduit runs are needed.
   b. Cut the flex conduit supplied with this kit at specific length.
3. Install Liquid Tight conduit fittings (see Figure 3-2).

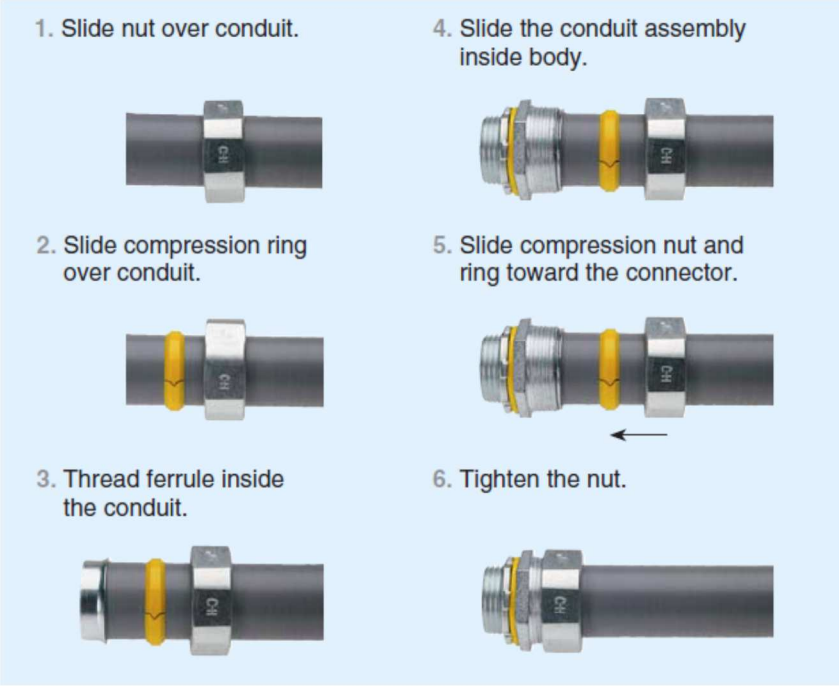

Figure 3-2. Liquid Tight Fitting Installation

4. After installation of the fittings, remove the stainless steel conduit tags from the previously installed conduit runs and replace them on the new conduit.

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5. Install green/yellow ground wire:
   a. Measure a length of green/yellow Tefzel grounding wire supplied with this kit, to the same length as the required flex conduit.
   b. Run the wire along the flex conduit and fasten with supplied Tefzel cable ties (see figures below).

Figure 3-3. Tefzel Grounding Wiring Installation

Figure 3-4. Tefzel Grounding Lug

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GSOV25 Solenoid Rotation

1. The solenoid can be rotated as needed to direct the conduit port to the desired direction.
2. Loosen the hex nut at the top of the solenoid stem highlighted in RED.
3. If not moveable by hand force, use a pair of channel locks. Gently rotate the large circular coil retaining nut (BLUE) until the solenoid coil is free to move.
4. When coil is in desired position, retighten BLUE circular retaining nut firmly hand tight.
5. To avoid damage to threads, carefully re-install hex jam nut back onto solenoid shaft. Tighten with wrench to 16 to 20 N•m (12 to 15 lb-ft).

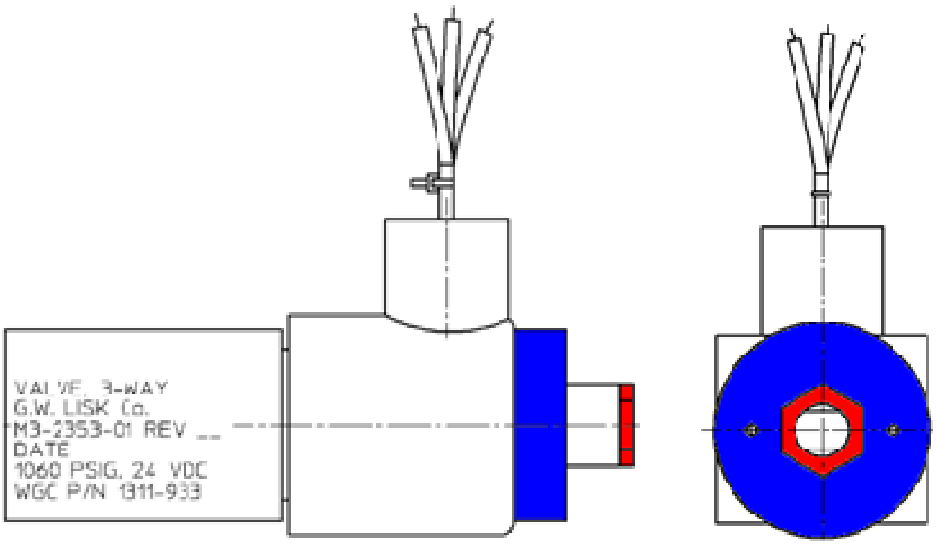

Figure 3-5. GSOV25 Solenoid

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Proximity Switch Installation Notice

1. During conduit installation, it can be very easy to move or disturb the limit switch. This is a calibrated device and should not be moved. Follow the figure below to avoid disturbing the limit switch.
2. In the event that the proximity switch is rotated, refer to the GSOV25 manual for instructions for repositioning the device.

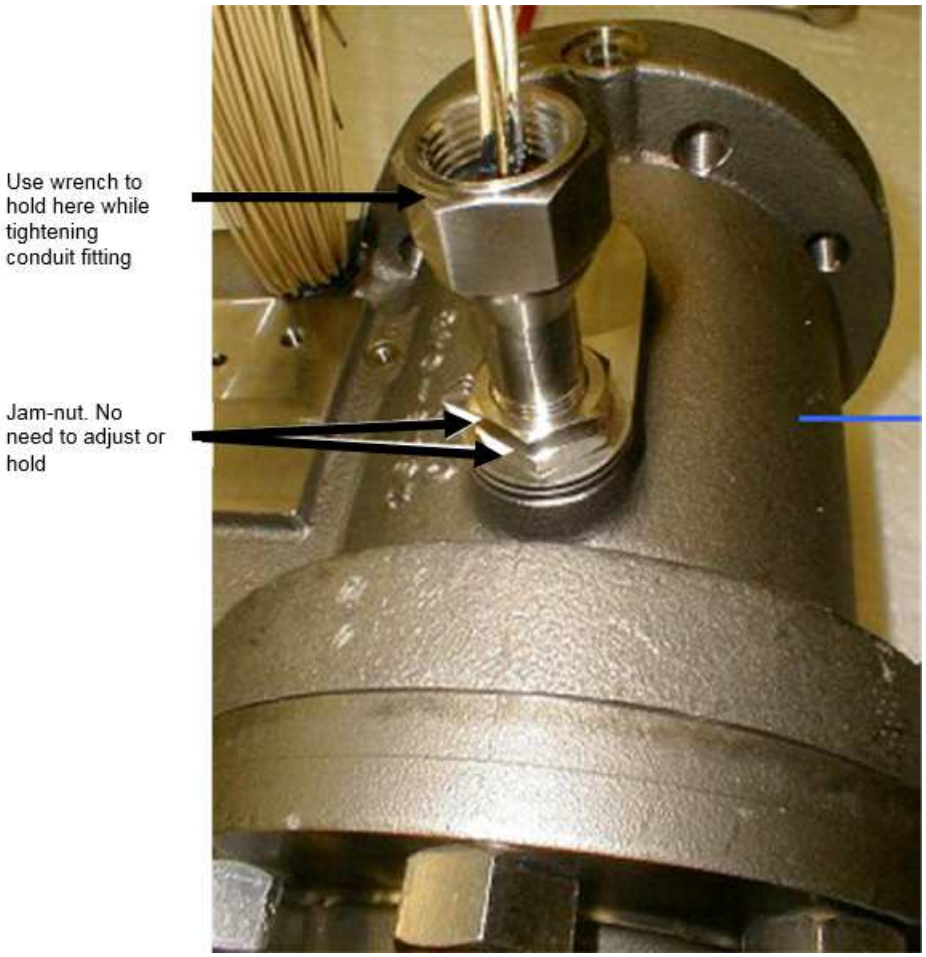

Figure 3-6. GSOV25 Proximity Switch

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Conduit Barrier Installation & Final Assembly

1. Please refer to the manufacturer's installation instructions in the appendix. After the sealing compound has cured, do not remove the conduit barriers or attempt to decouple the conduit barrier union.

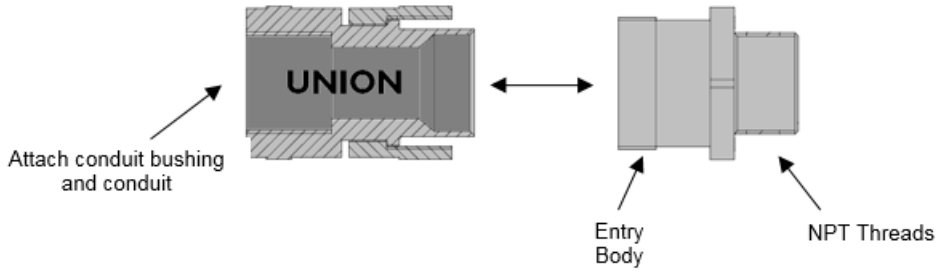
WARNING

Do not attempt to decouple conduit barrier union. Damage to the compound or wires can result in a compromise of the protective flame path that the compound provides.

NOTICE

Do not attempt to rotate the sealing device. Damage to the wires can result in loss of component functionality.

2. With the conduit barrier, separate the union and entry body halves.
3. Pre-install the 3/4 inch bushing and 1/2 inch conduit to the 3/4 inch NPT female side of the union.



4. Install the male NPT threaded entry body.
   a. Route wires through the entry body.
   b. Thread entry body into conduit port until hand tight.
   c. Tighten with wrench until firmly snug approximately ½ turn. Do not over-tighten.
5. Bundle wires together with electrical tape about 30 cm (12 inches) from the entry body to keep them close together for easier workability when applying the compound.

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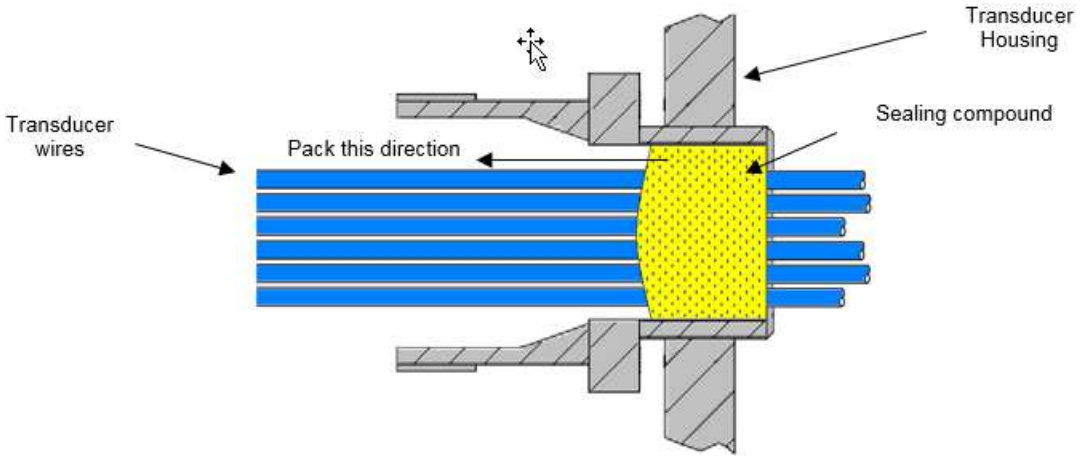
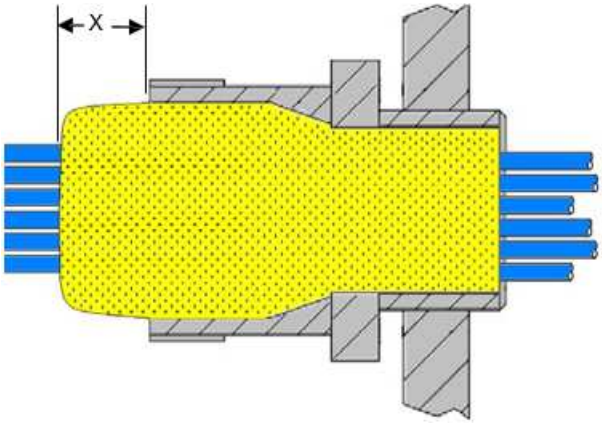
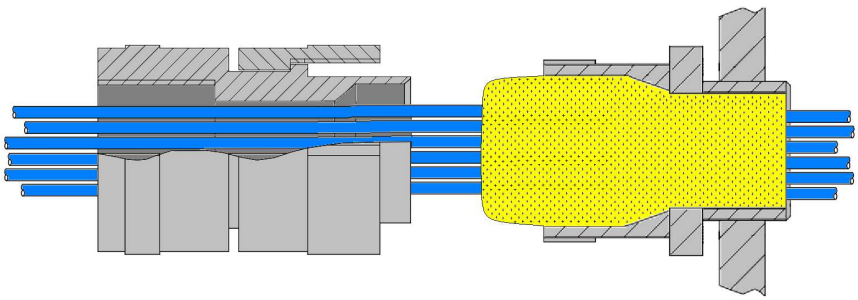
6. With entry body mated to the transducer, pack the sealing compound into the entry body. Be sure to wear gloves when mixing or handling the compound.
   a. With the supplied compound stick, trim off any hardened pieces.
   b. Mix the compound by rolling, folding, and breaking. Ease mixing by cutting large sticks in half. Fully mixed compound has a uniform yellow color with no streaks.
   c. Starting in the middle of the wires toward the transducer housing, pack small amounts of rolled out compound between the cores. A small non-sharp object may be necessary to maneuver the compound toward the back and around the cores.
   d. Work outwards until the gaps are filled.



   e. Continue packing the compound outward as shown. The compound should be packed beyond the entry body by a distance (X) of about 40 mm (1.5 inches).



7. Run cores through the union half with conduit attached and mate with the entry body. Ensure that as much as possible of the protruding compound is pushed into the entry body on engagement.



8. Engage union nut and screw onto the entry body, turning 7 full turns.

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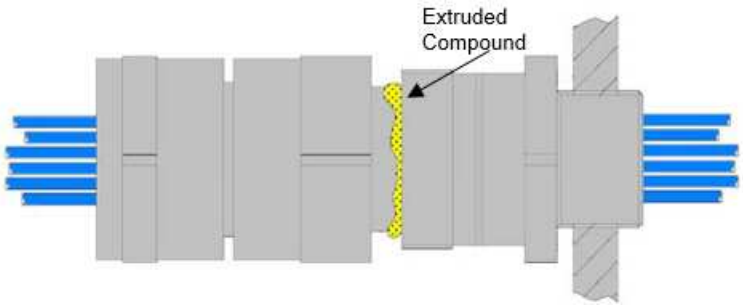
9. Remove excess and squeezed out compound from the joint.



10. Leave to cure for at least 4 hours when working at 21 °C (70 °F).

WARNING

Do not attempt to decouple union. Damage to the compound or wires can result in a compromise of the protective flamepath that the compound provides.

NOTICE

Do not attempt to rotate the sealing device. Damage to the wires can result in loss of transducer functionality.

11. Route the component wires through the conduit to either the PB-GSOV-1/2 junction box for the solenoids, or to the TB100B junction box for the proximity switches. Newer designs with longer flying-leads do not require PB-GSOV-1/2 and the solenoids are also wired directly to TB100 B.
12. Reconnect the elbows and conduit to each other.
13. Connect all electrical connections to the PB-GSOV-1/2 (when included) and TB100B junction boxes per the electrical schematic.

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Chapter 4.
Product Support and Service Options

Product Support Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact the manufacturer or packager of your system.
- Contact the Woodward Full Service Distributor serving your area.
- Contact Woodward technical assistance (see “How to Contact Woodward” later in this chapter) and discuss your problem. In many cases, your problem can be resolved over the phone. If not, you can select which course of action to pursue based on the available services listed in this chapter.

OEM or Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A **Full Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.
- An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.
- A **Recognized Turbine Retrofitter (RTR)** is an independent company that does both steam and gas turbine control retrofits and upgrades globally, and can provide the full line of Woodward systems and components for the retrofits and overhauls, long term service contracts, emergency repairs, etc.

A current list of Woodward Business Partners is available at **www.woodward.com/directory**.

Product Service Options

The following factory options for servicing Woodward products are available through your local Full-Service Distributor or the OEM or Packager of the equipment system, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is originally shipped from Woodward or a service is performed:

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

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Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime. This is a flat-rate program and includes the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Charges for the Replacement/Exchange service are based on a flat rate plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned within 60 days, a credit for the core charge will be issued.

Flat Rate Repair: Flat Rate Repair is available for the majority of standard products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option with the exception that the unit will be returned to you in “like-new” condition and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205). This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:

- Return authorization number
- Name and location where the control is installed
- Name and phone number of contact person
- Complete Woodward part number(s) and serial number(s)
- Description of the problem
- Instructions describing the desired type of repair

Packing a Control

Use the following materials when returning a complete control:

- Protective caps on any connectors
- Antistatic protective bags on all electronic modules
- Packing materials that will not damage the surface of the unit
- At least 100 mm (4 inches) of tightly packed, industry-approved packing material
- A packing carton with double walls
- A strong tape around the outside of the carton for increased strength

NOTICE

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Replacement Parts

When ordering replacement parts for controls, include the following information:

- The part number(s) (XXXX-XXXX) that is on the enclosure nameplate
- The unit serial number, which is also on the nameplate

Engineering Services

Woodward offers various Engineering Services for our products. For these services, you can contact us by telephone, by email, or through the Woodward website.

- Technical Support
- Product Training
- Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact. Emergency assistance is also available during non-business hours by phoning Woodward and stating the urgency of your problem.

Product Training is available as standard classes at many of our worldwide locations. We also offer customized classes, which can be tailored to your needs and can be held at one of our locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from many of our worldwide locations or from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact us via telephone, email us, or use our website: **www.woodward.com**.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory at **www.woodward.com/directory**, which also contains the most current product support and contact information.

You can also contact the Woodward Customer Service Department at one of the following Woodward facilities to obtain the address and phone number of the nearest facility at which you can obtain information and service.

Products Used in Electrical Power Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany:	
Kempen	+49 (0) 21 52 14 51
Stuttgart	+49 (711) 78954-510
India	+91 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

Products Used in Engine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany	+49 (711) 78954-510
India	+91 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
United States	+1 (970) 482-5811

Products Used in Industrial Turbomachinery Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
India	+91 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

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Technical Assistance

If you need to contact technical assistance, you will need to provide the following information. Please write it down here before contacting the Engine OEM, the Packager, a Woodward Business Partner, or the Woodward factory:

General

Your Name _____

Site Location _____

Phone Number _____

Fax Number

Prime Mover Information

Manufacturer _____

Turbine Model Number _____

Type of Fuel (gas, steam, etc.) _____

Power Output Rating _____

Application (power generation, marine, etc.) _____

Control/Governor Information

Control/Governor #1

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Control/Governor #2

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Control/Governor #3

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Symptoms

Description _____

_____

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

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Appendix A.
Conduit Stopper Box Assembly Instructions

Peppers Cable Glands Ltd. Stanhope Road Camberley GU15 3BT UK.

CR-S*F / CR-S*M Conduit Stopper Box – ASSEMBLY INSTRUCTIONS

Brief Description

The Peppers CR-S*F and CR-S*M type Conduit Stopper Box is for outdoor use in the appropriate Hazardous Areas with conductors carried in conduit, providing a flameproof barrier entry into enclosures and as a line bushing for terminating flying leads or for the direct inter-connection of associated enclosures. It gives environmental protection to IP66, IP68 (100 metres for 7 days) and Deluge.

Warning

Please read these instructions carefully. These products should not be used in applications except as detailed here or in our datasheets, unless confirmed in writing by Peppers. Peppers take no responsibility for any damage, injury or other consequential loss caused where products are not installed or used according to these instructions. This leaflet is not intended to advise on the selection of product. Further guidance can be found in the standards listed overleaf or the prevailing code of practice.

STEP-BY-STEP FITTING INSTRUCTIONS (youtube video)

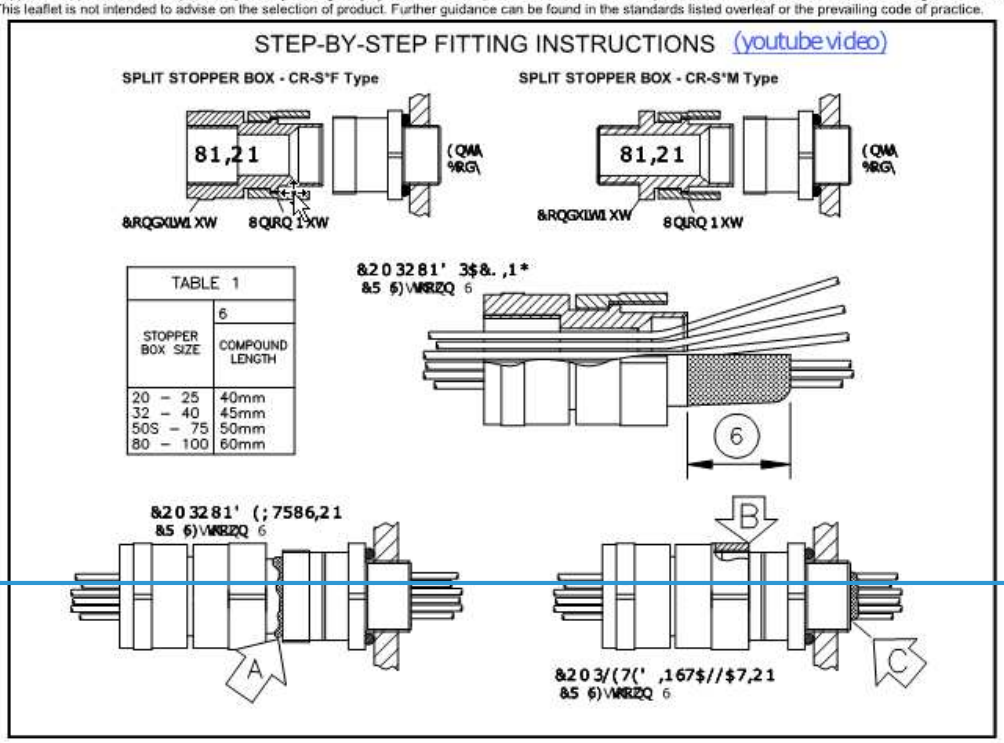

TABLE 1	
STOPPER BOX SIZE	6 COMPOUND LENGTH
20 – 25	40mm
32 – 40	45mm
50S – 75	50mm
80 – 100	60mm

STEP-BY-STEP FITTING INSTRUCTIONS

1 Split Stopper Box as shown. Warning. The entry body of this cable gland is coated with a releasing agent to ensure the compound form can be inspected after curing. The entry body should not be treated with any lubricant or be exposed to any solvents. The internal bore of the entry body must not be damaged. Any handling during the course of normal installation will not effect the operation of the releasing agent.

2 Fit Entry Body. Hand-tighten, then suitably secure with a wrench.

3 For CR-S*F glands apply suitable seal / sealant to conduit threads to maintain ingress protection. Screw Union onto conduit. For both CR-S*F and CR-S*M glands - prepare the conductors to suit the installation and pass through the union assembly.

HEALTH AND SAFETY WARNING The resin used in the compound can cause eye and skin irritation. For your personal protection, wear the gloves supplied whilst in contact with the compound. **A COMPREHENSIVE MATERIAL SAFETY DATA SHEET IS AVAILABLE FOR DOWNLOAD FROM OUR WEBSITE.**

4 Check compound has not passed its "Use By" date. Installation at temperatures below 10°C should be avoided.

5 Trim any hardened pieces from ends of stick. Mix the compound by rolling, folding and breaking. Ease mixing by cutting large sticks in half. Fully mixed compound has a uniform yellow colour with no streaks See Figure 1 for correctly mixed compound.

6 Support the conduit/union assembly. Starting at the middle, pack small amounts of rolled-out compound between the cores. Work outwards until all gaps are filled. Bundle the cores with cord or tape (see figure 2) so they are not disturbed. Wrap compound around the outside of the core bundle, then locate the compound & cores into the Union cup. Ensure that the cup is completely filled. Build up compound around the outside of the cores, with a slight taper and to approximate compound length shown in diagram and Table 1 column 6.

7 Pass cores through & push compound into Entry Body until Union cup engages. Remove squeezed out compound at arrow A. Screw Union Nut 7 full turns onto Entry Body (arrow B).

8 Clean off excess compound from Entry Body to allow withdrawal when cured (arrow C). Cores may be disturbed after 1 hour. Leave to cure for at least 4 hours when working at 21° C.

9 To release and pull back the joint for inspection, unscrew Union Nut. Using a wrench on the Conduit Nut, rotate the Conduit Nut no more than 1/16 of a turn. This will release the compound from the entry body. Do not over rotate as this may damage cable conductors. Pull the Conduit Nut and compound out for inspection. The compound should appear as in Figure 3 with no gaps, holes or cracks.

10 To re-make the joint on a CR-S*F gland installation hold Conduit Nut and hand-tighten Union Nut. Then refer to table below and tighten using wrench to the given amount. To re-make the joint on a CR-S*M gland installation screw the Union Nut into 2nd enclosure/equipment. Hand-tighten, then suitably secure with a wrench. Hold Conduit Nut and hand-tighten Union Nut. Then refer to table below and tighten using wrench to the given amount.

11 The equipment should not be energised until the compound has been left to cure for at least 4 hours when working at 21° C. See chart 'Energising Time vs. Temperature' for further guidance.

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CR-S*F / CR-S*M Conduit Stopper Box – ASSEMBLY INSTRUCTIONS

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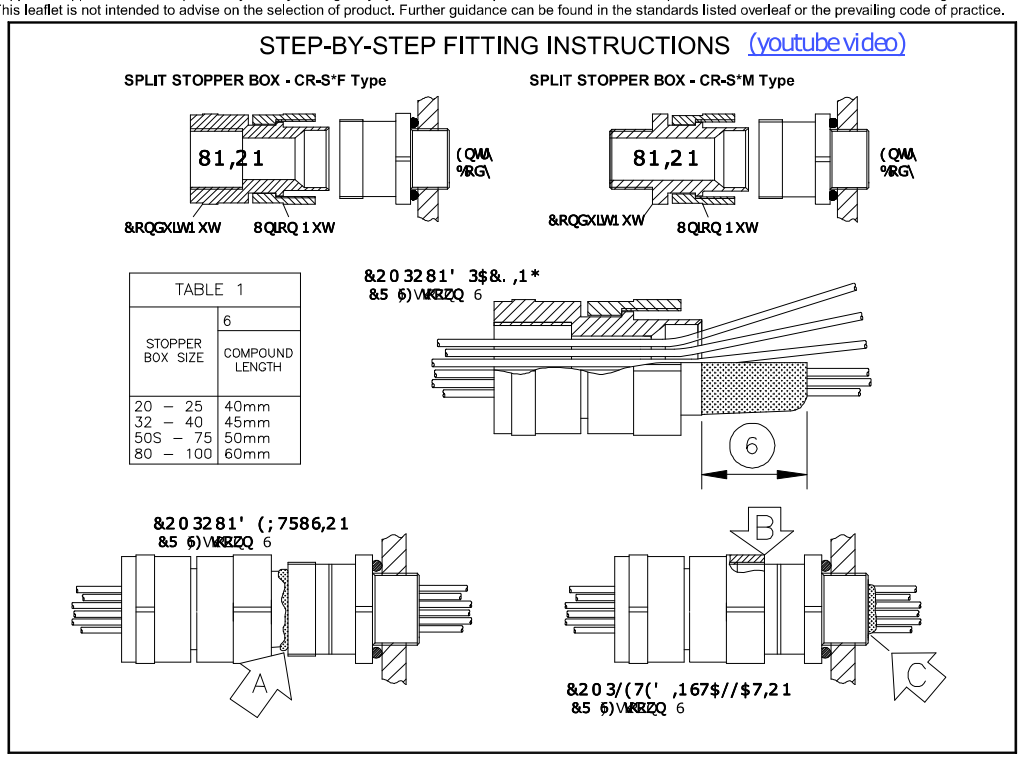
The Peppers CR-S*F and CR-S*M type Conduit Stopper Box is for outdoor use in the appropriate Hazardous Areas with conductors carried in conduit, providing a flameproof barrier entry into enclosures and as a line bushing for terminating flying leads or for the direct inter-connection of associated enclosures. It gives environmental protection to IP66, IP68 (100 metres for 7 days) and Deluge.

Warning

Please read these instructions carefully. These products should not be used in applications except as detailed here or in our datasheets, unless confirmed in writing by Peppers. Peppers take no responsibility for any damage, injury or other consequential loss caused where products are not installed or used according to these instructions. This leaflet is not intended to advise on the selection of product. Further guidance can be found in the standards listed overleaf or the prevailing code of practice.



STEP-BY-STEP FITTING INSTRUCTIONS

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2 Fit Entry Body. Hand-tighten, then suitably secure with a wrench.

3 For CR-S*F glands apply suitable seal / sealant to conduit threads to maintain ingress protection. Screw Union onto conduit. For both CR-S*F and CR-S*M glands - prepare the conductors to suit the installation and pass through the union assembly.

HEALTH AND SAFETY WARNING The resin used in the compound can cause eye and skin irritation. For your personal protection, wear the gloves supplied whilst in contact with the compound. **A COMPREHENSIVE MATERIAL SAFETY DATA SHEET IS AVAILABLE FOR DOWNLOAD FROM OUR WEBSITE.**

4 Check compound has not passed its "Use By" date. Installation at temperatures below 10ϒC should be avoided.

5 Trim any hardened pieces from ends of stick. Mix the compound by rolling, folding and breaking. Ease mixing by cutting large sticks in half. Fully mixed compound has a uniform yellow colour with no streaks See Figure 1 for correctly mixed compound.

6 Support the conduit/union assembly. Starting at the middle, pack small amounts of rolled-out compound between the cores. Work outwards until all gaps are filled. Bundle the cores with cord or tape (see figure 2) so they are not disturbed. Wrap compound around the outside of the core bundle, then locate the compound & cores into the Union cup. Ensure that the cup is completely filled. Build up compound around the outside of the cores, with a slight taper and to approximate compound length shown in diagram and Table 1 column 6.

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8 Clean off excess compound from Entry Body to allow withdrawal when cured (arrow C). Cores may be disturbed after 1 hour. Leave to cure for at least 4 hours when working at 21° C.

9 To release and pull back the joint for inspection, unscrew Union Nut. Using a wrench on the Conduit Nut, rotate the Conduit Nut no more than 1/16 of a turn. This will release the compound from the entry body. Do not over rotate as this may damage cable conductors. Pull the Conduit Nut and compound out for inspection. The compound should appear as in Figure 3 with no gaps, holes or cracks.

10 To re-make the joint on a CR-S*F gland installation hold Conduit Nut and hand-tighten Union Nut. Then refer to table below and tighten using wrench to the given amount. To re-make the joint on a CR-S*M gland installation screw the Union Nut into 2nd enclosure/equipment. Hand-tighten, then suitably secure with a wrench. Hold Conduit Nut and hand-tighten Union Nut. Then refer to table below and tighten using wrench to the given amount.

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Peppers Cable Glands Ltd. Stanhope Road Camberley GU15 3BT UK.

CR-S*F / CR-S*M Conduit Stopper Box – ASSEMBLY INSTRUCTIONS

Figure 1

Figure 2

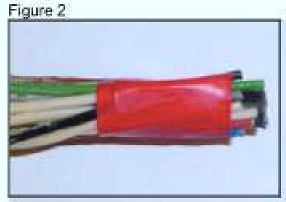
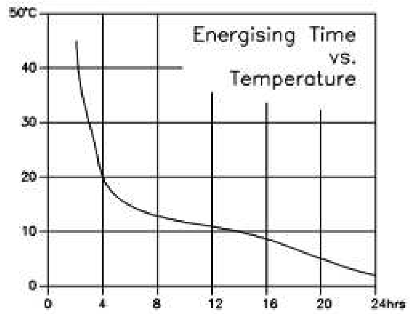


Figure 3

Tightening information (Instruction 10), and permitted cores

Stopper Box Size	Tighten Union Nut using wrench up to	Max Diameter over Cores	Max No of Cores
20	½-turn	12.5	40
25	½-turn	17.8	60
32	½-turn	23.5	80
40	½-turn	28.8	130
50	½-turn	39.4	400
63	½-turn	50.0	425
75	½-turn	60.8	425
80	¾-turn	64.4	425
85	¾-turn	69.8	425
90	¾-turn	75.1	425
100	¾-turn	80.5	425



Installation Guidance

Point	Advice			
1	EN/IEC 60079-10	EN/IEC 60079-14	National Electrical Code (NEC 500 – 505)	Canadian Electrical Code (CSA C22.1)
2	Installation should only be carried out by a competent electrician, skilled in cable gland installation.			
3	NO INSTALLATION SHOULD BE CARRIED OUT UNDER LIVE CONDITIONS.			
4	Threaded entries: the product can be installed directly into threaded entries. Threaded entries should comply with clause 5.3 of IEC/EN 60079-1 and have a lead-in chamfer to allow for full engagement of the threads. For Ex d applications a minimum of 5 fully engaged parallel threads is required. Metric threads are supplied with an o-ring and will maintain IP66 and IP68. Parallel entry threads will maintain an IP rating of IP64. A sealing washer should be used to maintain all IP ratings greater than IP64. Any thread sealant used should be non-hardening.			
5	To maintain the Ingress Protection rating of the product, the entry hole must be perpendicular to the surface of the enclosure. The surface should be sufficiently flat and rigid to make the IP joint. The surface must be clean and dry. It is the users/installers responsibility to ensure that the interface between the enclosure and cable gland is suitably sealed for the required application.			
6	Whilst Peppers products with tapered threads, when installed into a threaded entry, have been tested to maintain IP66 without any additional sealant, due to the differing gauging tolerances associated with the use of tapered threads it is recommended to use a non-hardening thread sealant if an IP rating higher than IP64 is required.			
7	Once installed do not dismantle except for routine inspection. An inspection should be conducted as per IEC/EN 60079-17. After inspection the gland should be re-assembled as instructed, ensuring the mid cap and back nut are correctly tightened to ensure the cable is secure.			

Approvals and Certification

Approval	Certificate Number	Protection Concept / Type
ATEX	Sira 03ATEX1479X	Ex II 1D 2G Ex d I Mb / Ex d IIC Gb / Ex e I Mb / Ex e IIC Gb / Ex ta IIIC Da
	Sira 09ATEX4124X	Ex II 3G Ex nR IIC Gc
IECEx	IECEx SIR 07.0098X	Ex d I Mb / Ex d IIC Gb / Ex e I Mb / Ex e IIC Gb / Ex ta IIIC Da / Ex nR IIC Gc
CSA - Canada	1356011	Ex d IIC / Ex e II / CL I Div 2 Gr ABCD / CL II Gr EFG / CL III Type 4X
GOST-R	ЦJ qq GB.ŁØ06.ȼ01316	Ex dIU / Ex dIICU / Ex eIU / Ex eIIU / Ex nRIIU
EAC	RU C-GB. ŁØ06.ȼ.00098	Ex dIU / Ex dIICU / Ex eIU / Ex eIIU / Ex nRIIU
UKRAINE	UA.TR.047.C.0408-13	Ex d IIC X / Ex e II X
INMETRO	NCC 13.2188 X	Ex d I Mb / Ex d IIC Gb / Ex e I Mb / Ex e IIC Gb / Ex ta IIIC Da / Ex nR IIC Gc
NEPSI	GYJ111309X	Ex d IIC / Ex e II

Interpretation of Markings. Markings on the outside of this gland carry the following meanings:

Cable Gland Type & Size CR-S-a-b-ccc-ddd-eee-nn; where: -

a =	Main component material B = brass S = stainless steel	ddd =	Entry thread type and size
b =	Back End Configuration F = female M = male	eee =	Back End Connection Thread type and size
ccc =	Gland size	nn =	Year of manufacture

Special Conditions for Safe Use

1. The cable glands shall not be used in enclosures where the temperature, at the point of entry/mounting, is outside the range of -60°C to +135°C.
2. The entry component threads will be suitably sealed using a method that is applicable to the associated equipment to which the gland will be attached. This will be in accordance with the relevant installation code of practice and will ensure that any ingress protection and restricted breathing sealing requirements are maintained.

   Where glands without sealing rings are installed in protection by enclosure (Ex t) equipment for use in explosive dust atmospheres, they shall only be fitted into enclosures offering a minimum of 5 full threads, in accordance with EN 60079-31:2009 clause 5.1.1.

0518 No. 2807

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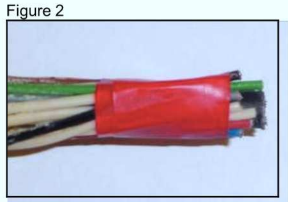
Peppers Cable Glands Ltd. Stanhope Road Camberley GU15 3BT UK.

CR-S*F / CR-S*M Conduit Stopper Box – ASSEMBLY INSTRUCTIONS

Figure 1

Figure 2



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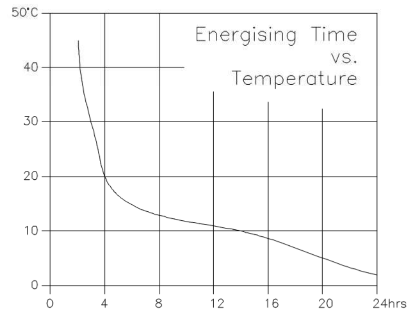

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5	To maintain the Ingress Protection rating of the product, the entry hole must be perpendicular to the surface of the enclosure. The surface should be sufficiently flat and rigid to make the IP joint. The surface must be clean and dry. It is the users/installers responsibility to ensure that the interface between the enclosure and cable gland is suitably sealed for the required application.
6	Whilst Peppers products with tapered threads, when installed into a threaded entry, have been tested to maintain IP66 without any additional sealant, due to the differing gauging tolerances associated with the use of tapered threads it is recommended to use a non-hardening thread sealant if an IP rating higher than IP64 is required.
7	Once installed do not dismantle except for routine inspection. An inspection should be conducted as per IEC/EN 60079-17. After inspection the gland should be re-assembled as instructed, ensuring the mid cap and back nut are correctly tightened to ensure the cable is secure.

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CSA - Canada	1356011	Ex d IIC / Ex e II / CL I Div 2 Gr ABCD / CL II Gr EFG / CL III Type 4X
GOST-R	ꝖɈ q q GB.ŁØ06.₵01316	Ex dIU / Ex dIICU / Ex eIU / Ex eIIU / Ex nRIIU
EAC	RU C-GB. ŁØ06.₵.00098	Ex dIU / Ex dIICU / Ex eIU / Ex eIIU / Ex nRIIU
UKRAINE	UA.TR.047.C.0408-13	Ex d IIC X / Ex e II X
INMETRO	NCC 13.2188 X	Ex d I Mb / Ex d IIC Gb / Ex e I Mb / Ex e IIC Gb / Ex ta IIIC Da / Ex nR IIC Gc
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ccc =	Gland size	nn =	Year of manufacture

Special Conditions for Safe Use

1. The cable glands shall not be used in enclosures where the temperature, at the point of entry/mounting, is outside the range of -60°C to +135°C.
2. The entry component threads will be suitably sealed using a method that is applicable to the associated equipment to which the gland will be attached. This will be in accordance with the relevant installation code of practice and will ensure that any ingress protection and restricted breathing sealing requirements are maintained.
   Where glands without sealing rings are installed in protection by enclosure (Ex t) equipment for use in explosive dust atmospheres, they shall only be fitted into enclosures offering a minimum of 5 full threads, in accordance with EN 60079-31:2009 clause 5.1.1.

0518 ГБ06 No. 2937 TYPE APPROVED PRODUCT

Revision History

Changes in Revision B—

- Added GSOV25 Conduit Replacement Warning to the Warnings section
- Added new content to Table 2-1
- Added GSOV25 Conduit Replacement Warning to Chapter 2 below Table 2-1
- Added content in the Component Reference section
- Added new verbiage to Figures 2-2, 2-3, 2-4, 2-6, 2-8
- Added new content to step 2 of GSOV25-1/2 Wiring Removal
- Added new content to step 10 GSOV25-1/2 Wiring Removal
- Added new content to step 2 of Titan Flex Conduit
- Added new content to steps 1, 2, and 4 of Conduit Barrier Installation & Final Assembly
- Added nine new steps, new images and a new Warning box and Notice box to Conduit Barrier Installation & Final Assembly Section of Chapter 3
- Added Appendix A

Released

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 51436.

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PO Box 1519, Fort Collins CO 80522-1519, USA
1041 Woodward Way, Fort Collins CO 80524, USA
Phone +1 (970) 482-5811

Email and Website—www.woodward.com

Woodward has company-owned plants, subsidiaries, and branches, as well as authorized distributors and other authorized service and sales facilities throughout the world.

Complete address / phone / fax / email information for all locations is available on our website.