



Liquid Stop Valve

**Three-way Fuel Oil Stop Valve
with Electric Trip**

Installation and Operation Manual



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 **26311**, *Revision Status & Distribution Restrictions of Woodward Technical Publications*, on the *publications page* of the Woodward website:

www.woodward.com/publications

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 **26311**, *Revision Status & Distribution Restrictions of Woodward Technical Publications*, 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 Out-of-date translations are marked with .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—Changes in this publication since the last revision are indicated by a black line alongside the text.

Woodward reserves the right to update any portion of this publication at any time. Information provided by Woodward is believed to be correct and reliable. However, no responsibility is assumed by Woodward unless otherwise expressly undertaken.

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Warnings and Notices

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

Automotive Applications

On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.

NOTICE**Battery Charging
Device**

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

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.

Regulatory Compliance

European Compliance for CE Marking:

These listings are limited only to those units bearing the CE Marking:

Pressure Equipment Directive: Directive 2014/68/EU on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment.
PED Category II
PED Module H – Full Quality Assurance,
CE-0041-PED-H-WDI 001-16-USA, Bureau Veritas UK Ltd (0041)

ATEX – Potentially Explosive Atmospheres Directive: Directive 2014/34/EU on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.
Zone 2, Category 3, Group II G, Ex nA IIC T4X Gc IP54

Other European and International Compliance:

Compliance with the following European Directives or standards does not qualify this product for application of the CE Marking:

Machinery Directive: Compliant as partly completed machinery with Directive 2006/42/EC of the European parliament and the Council of 17 May 2006 on machinery.

EMC Directive: Not applicable to this product. Electromagnetically passive devices are excluded from the scope of the 2014/30/EU Directive.

ATEX: Exempt from the non-electrical portion of the ATEX Directive 2014/34/EU due to no potential ignition sources per EN 13463-1.

EAC Customs Union

These listings are limited only to those units with labels, marking, and manuals in Russian language to comply with their certificates and declaration.

EAC Customs Union (Marked): Certified to Technical Regulation CU 012/2011 for use in potentially explosive atmospheres per Certificate RU C-US.MW06.B.00084 as 2Ex nA IIC T4 Gc for electrical and II Gb c T3...T5 for non-electrical portions of the valve.

EAC Customs Union: Declared to Technical Regulation CU 032/2013 On the safety of equipment operating under excessive pressure. Declaration of Conformity Registration No: RU Д-US. MIO62.B.01513

EAC Customs Union: Declared to Technical Regulation CU 010/2011 On the safety of machinery and equipment. Declaration of Conformity Registration No: RU Д-US.MW06.B.00011

North American Compliance:

Suitability for use in North American Hazardous Locations is the result of compliance of the individual components:

Proximity Switch: CSA Certified for Class I, Groups A, B, C, & D. For use in Canada and the United States. Per CSA 1372905.

Solenoid: CSA Certified for Class I, Division 2, Groups A, B, C, D. For use in Canada and the United States. Per CSA 1260548

Special Conditions for Safe Use

Wiring must be in accordance with North American Class I, Division 2 or European Zone 2, Category 3 wiring methods as applicable, and in accordance with the authority having jurisdiction.

Field Wiring must be suitable for at least 82 °C.

Compliance with the Machinery Directive 2006/42EC noise measurement and mitigation requirements is the responsibility of the manufacturer of the machinery into which this product is incorporated.

The risk of electrostatic discharge is reduced by permanent installation of the valve, proper connection to the protective earth (PE) terminals, and care when cleaning. The valve should not be cleaned unless the area is known to be non-hazardous.



EXPLOSION HAZARD—Do not connect or disconnect while circuit is live unless area is known to be non-hazardous.

Substitution of components may impair suitability for Class I, Division 2 or Zone 2 applications.



RISQUE D'EXPLOSION—Ne pas raccorder ni débrancher tant que l'installation est sous tension, sauf en cas l'ambiance est décidément non dangereuse.

La substitution de composants peut rendre ce matériel inacceptable pour les applications de Classe I, Division 2 ou Zone 2.

Chapter 1. General Information

Three-way Fuel Oil Stop Valve

The Three-way Fuel Oil Stop Valve is a two-position valve used to shut off the flow of liquid fuel to the turbine and divert it to the fuel pump suction. The valve position is controlled by an electric solenoid acting on the pilot-operated trip circuit integrated into the valve. The valve uses a failsafe spring to ensure the shutoff of fuel from the turbine on loss of hydraulic control pressure or hydraulic actuation pressure. The valve utilizes a fully integrated valve and actuator design. This design is equivalent to a single-acting hydraulic actuator and a three-way shutoff valve.

The fluid inlet is to the center portion of a double-piston arrangement. Fuel shutoff control is accomplished by shuttling the actuation/metering piston in the metering bushing. The piston is actuated via the hydraulic pressure acting on one side of the piston and the failsafe spring acting on the other. When the piston moves to the left, the valve opens and sends the fuel to the turbine port. When the piston moves to the right, the valve closes and sends the fuel to the bypass port.

The return spring forces the piston to move to the bypass position upon loss of solenoid voltage or hydraulic supply pressure. The actuator control interface is accomplished through the hydraulic trip circuit. When voltage is removed from the trip solenoid, the three-way pilot-operated valve shuttles to dump the oil from the actuation side of the piston to drain. This removes the force opposing the spring and allows the spring to force the valve to full bypass position. An integrated orifice allows the valve to have a controlled rate of opening and a faster controlled rate of closing.



Figure 1-1. Three-way Fuel Oil Stop Valve

The fuel oil inlet is through the bottom of the valve, and the bypass and control are out the side of the valve. All inlet and outlet ports are 3 inch (75 mm) SAE flanges per SAE J518 Code 61. All seals between the fuel oil and hydraulic oil are of a dual-seal design with a vent port between the two seals. This arrangement prevents any fuel oil from leaking into the hydraulic oil as well as prevents any hydraulic oil from leaking into the fuel oil. All external seals are static elastomeric seals so there is no danger of fluid leakage to the ambient environment.

The internal metering cage and sliding metering piston are made from hardened stainless steel materials and electroless nickel plated and hardened materials respectively for wear and corrosion resistance.

Fuel Oil Stop Valve Technical Specifications

Functional Requirement	Fuel Oil Stop Valve (3") (9904-1352, 9904-1353 & similar)
Valve Type	Three Way—Two Position Metering Plug
Trim Configuration	On/Off
Type of Operation	Trip—Plug Right—Inlet to Bypass Run—Plug Left—Inlet to Turbine
Number of Control Valves	1 per Engine
Fluid Ports	3 inch (75 mm) Ports per SAE J518 Code 61
Flowing Media	Light Distillate Fuel SG= 0.82 to 0.85 Viscosity = 32 to 58 SSU (1.8 to 10 cST)
Maximum Fluid Supply Pressure	1200 psig (8274 kPa)
Proof Test Fluid Pressure Level	1800 psig (12 411 kPa) minimum for 2 minutes per ANSI B16.34
Minimum Burst Fluid Pressure	6000 psig (41 370 kPa) minimum for 1 minute
Fuel Filtration Standard	25 µm at Beta 200
Fuel Temperature	0 to +200 °F (–18 to +93 °C)
Ambient Temperature	–20 to +180 °F (–29 to +82 °C)
Storage Temperature	–40 to +180 °F (–40 to +82 °C)
Dry Weight	approx. 300 lb (136 kg)
Maximum Fluid Flow Rate	400 US gal/min (1514 L/min) (7 psid/48 kPa) (inlet to either outlet port)
Flow Characteristic (9904-1352)	Cv of 85 minimum (inlet to either outlet port)
Flow Characteristic (9904-1353)	Cv of 140 minimum (inlet to either outlet port)
Failure Mode	To Bypass
Shut-off Classification	Class IV per ANSI B16.104 between turbine & inlet port and bypass to inlet port in both flow directions.
Hydraulic Filtration	10 to 15 µm at Beta 75
Hydraulic Pressure	1200 to 1900 psig (8274 to 13 100 kPa)
Proof	2850 psig (19 650 kPa)
Burst	4750 psig (32 750 kPa)
Hydraulic Fluid Temperature	+50 to +180 °F (+10 to +82 °C)
Slew Time	1.5 to 2.0 seconds—Opening (at 1625 psig hydraulic pressure) 0.25 to 0.5 seconds—Closing
Solenoid Voltage	125 Vdc
Hydraulic Pressure to Actuate	100 psig (690 kPa)
Switch Rating	2 A @ 240 Vac, 0.5 A @ 24 Vdc
Design Availability Objective	Better than 99.5%

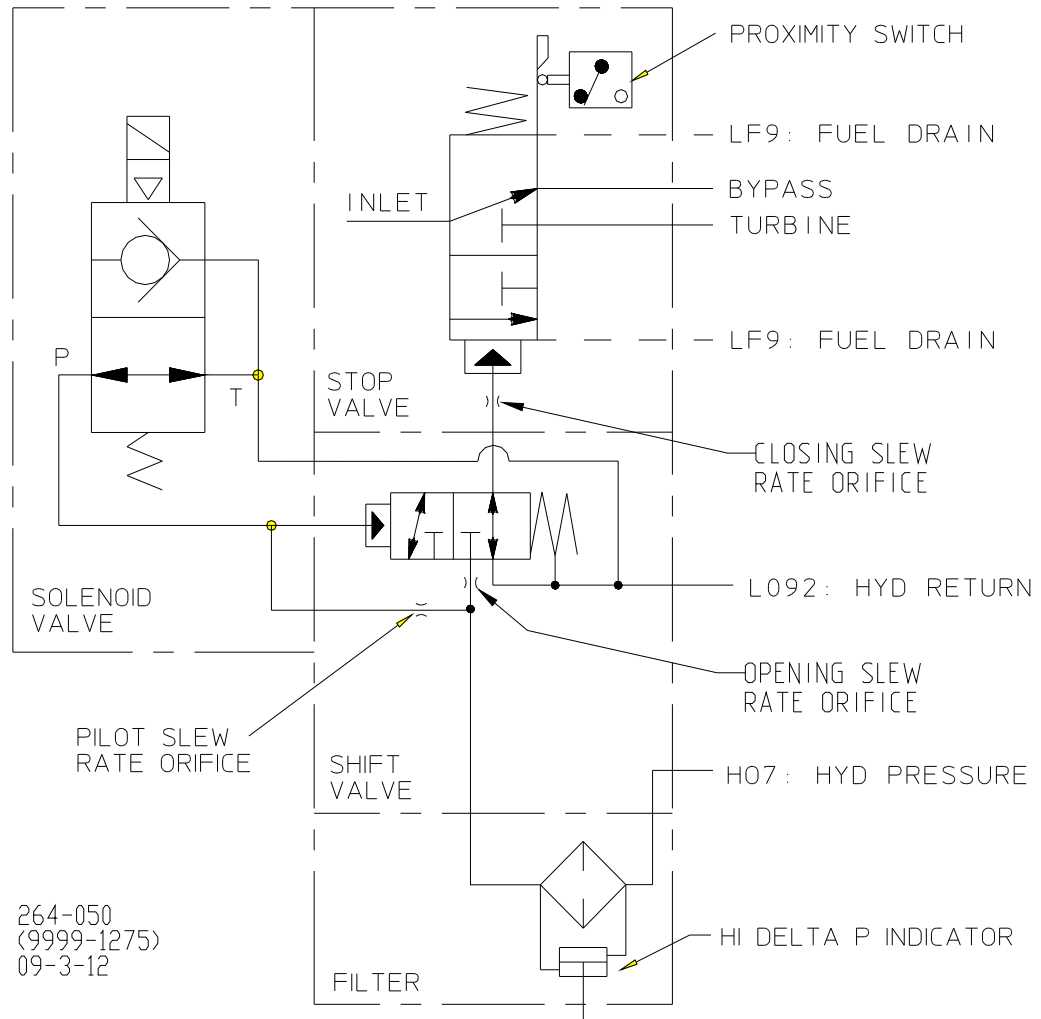


Figure 1-2. Hydraulic Schematic Circuit—Stop Valve

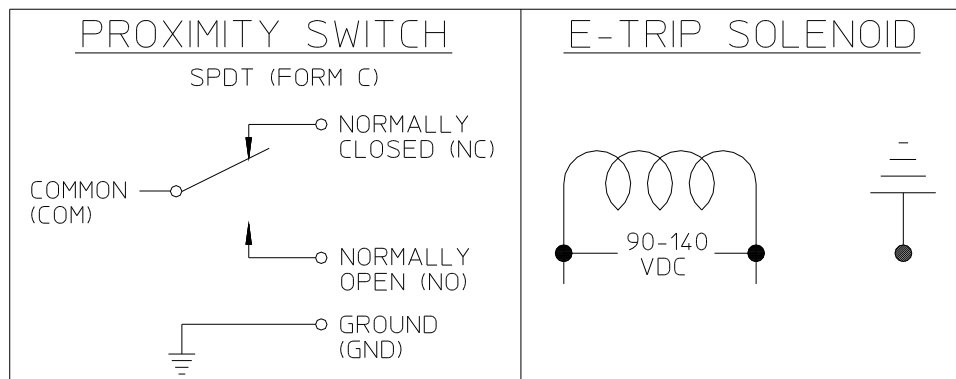


Figure 1-3. Wiring Diagram—Stop Valve Proximity Switch

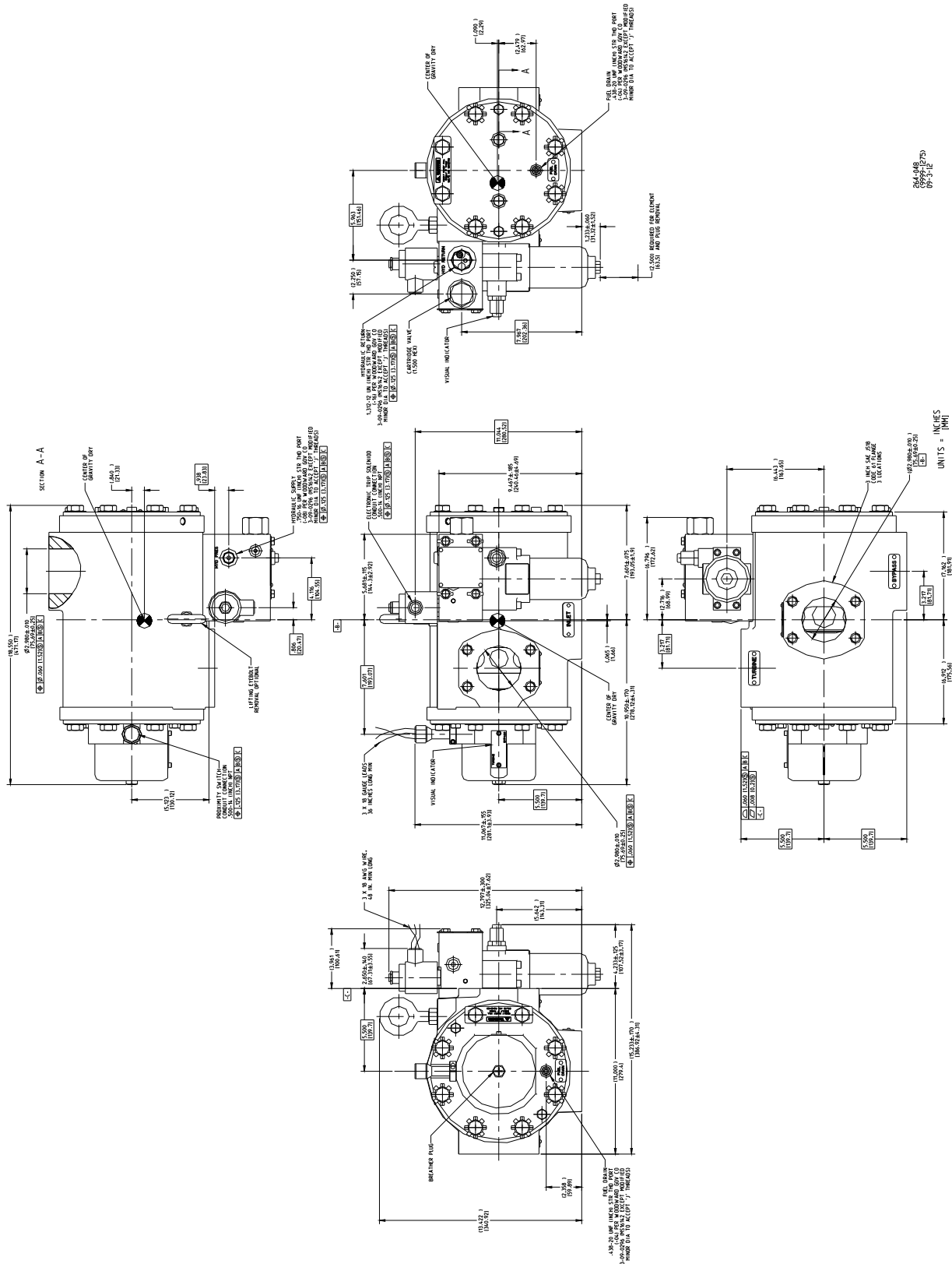
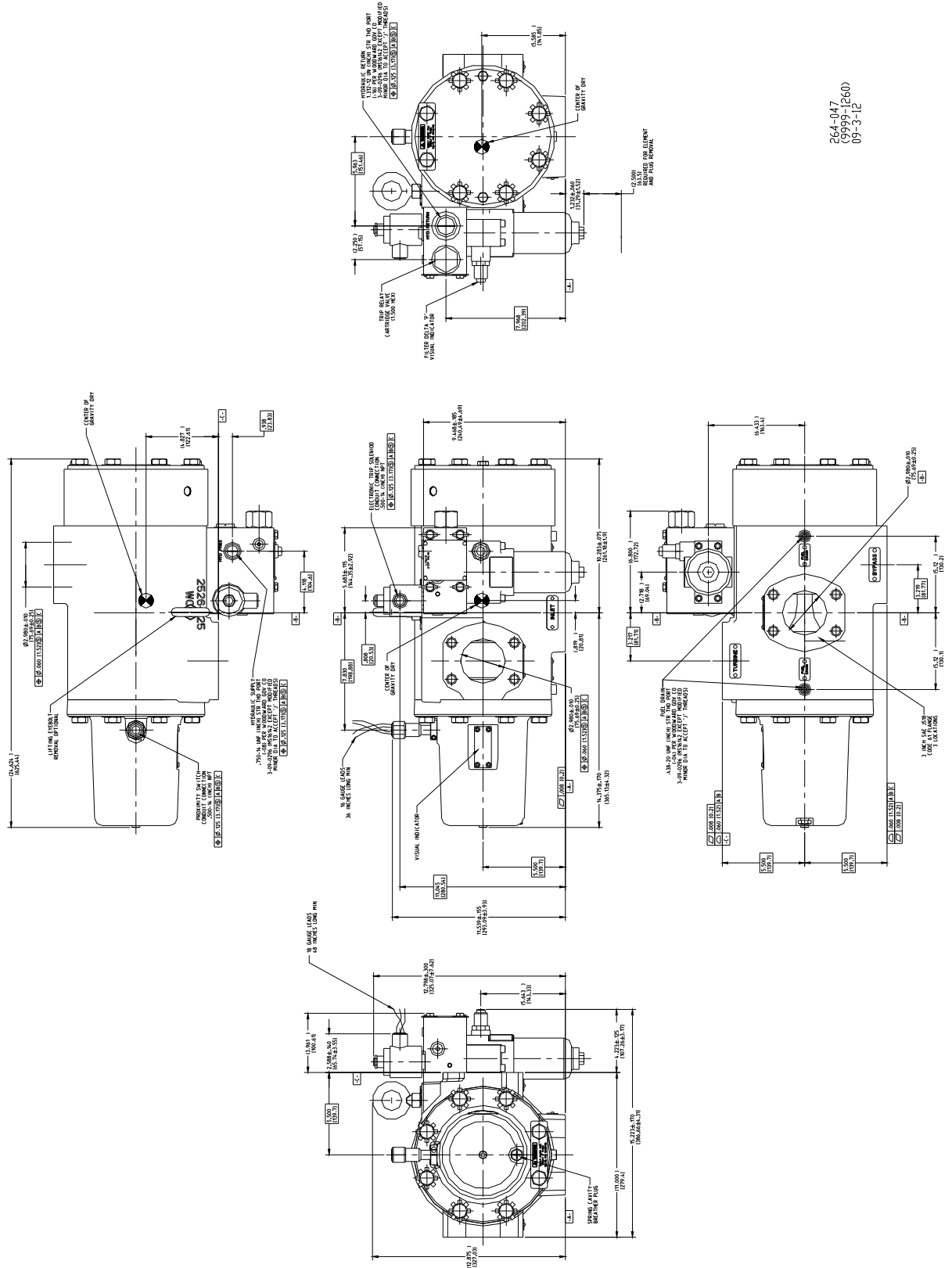


Figure 1-4a. Outline Drawing—Electric Trip Stop Valve (9904-1352)



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(9999-1260)
09-3-12

Chapter 2.

Standard Component Details

Trip Relay Valve Assembly

The Liquid Stop Valve uses a solenoid-operated trip relay circuit to operate a high-capacity, three-way, two-position, hydraulically operated valve. This trip relay circuit consists of four functional elements: the trip relay solenoid valve, the trip relay supply orifice, the hydraulically operated trip valve, and the trip relay volume.

In the normal run mode, the trip relay solenoid valve is closed, which prevents the trip relay volume from bleeding to the hydraulic return. As a result, high-pressure oil is fed into the trip relay circuit through the supply orifice, which quickly pressurizes the trip circuit to supply pressure. When the trip circuit pressure increases above 1100 kPa (160 psig), the three-way relay valve shifts position so that the common port connects to the lower piston cavity of the actuator, opening the Liquid Stop Valve.

The solenoid valve opens when it is de-energized. Opening the solenoid valve causes the trip circuit to be connected to drain. This in turn causes the three-way relay valve to shift position so that the common port is connected to the hydraulic drain circuit, and isolated from the hydraulic supply. As the pressure falls within the lower piston cavity, the return spring rapidly returns the valve plug to the downward position, closing the stop valve and shutting off fuel to the engine.

Position Indicator Switch Assembly

The Fuel Oil Stop Valve requires a position indication at the full bypass position. The limit switch is magnetically actuated when the ferrous target on the piston comes within the switch's sensing range.

Hydraulic Filter Assembly

The valves are supplied with an integrated, high-capacity filter. The broad-range filter protects the internal hydraulic control components from large oil-borne contaminants that might cause the hydraulic components to stick or operate erratically. The filter is supplied with a visual indicator which indicates when the recommended pressure differential has been exceeded indicating that replacement of the element is necessary.

Chapter 3. Installation

Introduction

See the outline drawings (Figure 1-4) for overall dimensions, installation hole locations, hydraulic fitting sizes, and electrical connections.

Installation attitude does not affect valve performance. A vertical position of the hydraulic filter is recommended for ease of making electrical, fuel, and hydraulic connections, and changing the hydraulic filter element. Additionally, a vertical position will prevent retention of fuel in the overboard drains.

These valves are designed for support by the piping flanges alone; additional supports are neither needed nor recommended.



External fire protection is not provided in the scope of this product. It is the responsibility of the user to satisfy any applicable requirements for their system.



Due to typical noise levels in turbine environments, hearing protection should be worn when working on or around these valves.



To prevent possible personal injury, always lift or move the valve using the lifting eye and a proper lifting device.



The surface of this product can become hot enough or cold enough to be a hazard. Use protective gear for product handling in these circumstances. Temperature ratings are included in the specification section of this manual.

NOTICE

To prevent possible equipment failure, the valve must not be subjected to impact or shock loads.

NOTICE

There are two fuel drain ports on each of the Bypass and Stop valves (one port on each end) that must be vented to a safe location. During normal operation, these vents should have less than 2 cm³/min leakage.

Hydraulic Fluid

Make provisions for proper filtration of the hydraulic fluid that supplies the valves. A 10 μm (nominal) metal filter is recommended and must be installed in the supply line to the valves. The filter included with the valves is not meant to provide adequate filtration over the life of the valves. The absolute rating of the filter should not exceed 30 μm .

Make all hydraulic connections as shown in the outline drawing (Hydraulic Supply and Hydraulic Drain). The hydraulic supply pressure should be 1200 to 1900 psig (8274 to 11 032 kPa). The drain pressure should not exceed 25 psig (172 kPa).

Electrical Connection

Make all electrical connections that are required based on the wiring diagrams (Figure 1-3).



Due to the hazardous location listings associated with this product, proper wire type and wiring practices are critical to operation.

NOTICE

Do not connect any cable grounds to “instrument ground”, “control ground”, or any non-earth ground system. Make all required electrical connections based on the wiring diagrams (Figure 1-4).

The use of cable with individually-shielded twisted pairs is recommended. All signal lines should be shielded to prevent picking up stray signals from nearby equipment. Installations with severe electromagnetic interference (EMI) may require shielded cable run in conduit, double-shielded wire, or other precautions. Connect the shields at the control system side or as indicated by the control system wiring practices, but never at both ends of the shield such that a ground loop is created. Wires exposed beyond the shield must be less than 2 inches (51 mm). The wiring should provide signal attenuation to greater than 60 dB.

Long Term Storage

In order to protect the valve from damage caused by rust or corrosion, certain storage procedures must be followed when the valves must be stored for long periods.

Use rust- and oxidation-inhibiting oil such as Texaco Regal R & O oil, or other oil that meets US MIL-H-17672 (hydraulic fluid, petroleum inhibited) specifications, to coat all internal surfaces of the device. If the valve is operated with oil other than rust- and oxidation-inhibiting oil, flush the unit with rust- and oxidation-inhibiting oil during operation before storage.

Plug all external openings to prevent contamination by solvents, cleaning agents, moisture, or other elements.

Wrap the valve in a cushioning material to prevent projections, sharp corners, and sharp edges from damaging the barrier bag.

Enclose the valve in a barrier bag just large enough to fully enclose it. Enclose the valve in a second heat-sealed barrier bag of the same material as the inner bag with the calculated amount of desiccant.

Calculate the amount of desiccant required by using the following formula:

$$U = AC + DX$$

where:

U = The number of units of desiccant required

A = Area (square inches) of barrier material to be used

C = 0.011

D = The number of pounds of packing material, other than metal, used within the barrier

X = 8 for cellulosic material, including wood, use as packing material. See US MIL-P-116 for other materials.

Use desiccants which meet the requirements of US MIL-D-3464 Type I or Type II. One producer of such desiccants is the Eagle Chemical Company, Inc.

Position the desiccant in bags of standard unit size and in appropriate locations in order to expose all voids in the valve to the dehydrating action of the desiccant.

Use a heat-sealable barrier bag that meets the requirements of Type I material per US MIL-B-22191 (latest revision).

Visually inspect the barrier material to see if the heat seal is complete and that no tears or damages are present. Pad the storage or shipping crate sufficiently to prevent tearing the barrier material.

Chapter 4. Maintenance

Introduction



WARNING

Any cleaning by hand or with water spray must be performed while the area is known to be non-hazardous to prevent an electrostatic discharge in an explosive atmosphere.

The Stop valve requires no maintenance or adjustment for operation. However, if excessive leakage is detected from either of the fuel drain ports, consider valve replacement or overhaul by an authorized Woodward repair facility.

Woodward recommends routine checks of the DP gauge on the filter assembly to verify that the filter is not partially clogged. If the DP indicator shows red, the filter element needs to be replaced.

If any of the standard components (see Section 2) of the valve become inoperative, field replacement is possible. See the detailed replacement instructions that follow.

Replacement of Standard Components



WARNING

To prevent possible personal injury, do NOT remove the spring cover (which is spring-loaded to 1000 lb/4448 N).



WARNING

To prevent possible serious injury, be sure all electric power, hydraulic pressure, and fuel pressure has been removed from the valve before maintenance or repairs are to begin.

See the outline drawing (Figure 1-4) for the location of items.

Hydraulic Filter Assembly/Cartridge

The hydraulic filter on both valves is located on the bottom of the hydraulic manifold (Figure 1-4).

Replacement of Filter Assembly:

1. Remove the four 0.312-18 socket head cap screws.
2. Remove the filter assembly from the manifold block. The filter will contain a large amount of hydraulic fluid—be cautious when handling.
3. Verify that two O-rings are present in the interface between the filter and the manifold.
4. Obtain a new filter assembly.
5. Verify that two new O-rings are present in the new filter assembly.
6. Install the filter onto the manifold assembly. Be sure to place the filter in the correct orientation (Figure 1-4).
7. Install four 0.312-18 cap screws through the filter and torque them into the manifold to 106–146 lb-in (12.0–16.5 N·m).

Replacement of Filter Cartridge:

1. Using a 1-5/16 wrench (approx. 33+ mm), loosen the bowl from the filter assembly.
2. The filter bowl will contain a large amount of hydraulic fluid—be cautious when handling.
3. Remove the filter element by pulling straight down from the rest of the assembly.
4. Obtain a new filter element.
5. Lubricate the O-ring on the ID of the cartridge with hydraulic fluid.
6. Install the cartridge into the assembly by sliding the open end of the cartridge onto the nipple.
7. Install the filter bowl onto the assembly. Tighten only by hand. Do not torque the bowl.

Trip Relay Valve Cartridge

The trip relay valve cartridge of the stop valve is located in the hydraulic manifold block (Figure 1-4).

1. Using a 1-1/2 inch wrench (approx. 38+ mm), loosen the trip relay valve from the hydraulic manifold.
2. Slowly remove the cartridge from the manifold. There could be a substantial amount of hydraulic fluid upon removal—be cautious when handling.
3. Obtain a new trip relay valve cartridge and verify the part number and revision with the existing unit.
4. Verify that all O-rings and backup rings are present on new cartridge (kit available, including all cartridge O-rings and backup rings, if required).
5. Lubricate the O-rings with hydraulic fluid or petroleum jelly.
6. Install the cartridge into the manifold housing.
7. Torque to 80–90 lb-ft (108–122 N·m).

Trip Solenoid Valve

The trip solenoid valve is located in the hydraulic manifold block (Figure 1-5).

IMPORTANT

Hydraulic fluid may spill during cartridge removal.

1. Loosen the 3/4 inch jam nut on top of the solenoid coil (see Figure 3-1).



Figure 3-1. Trip Solenoid Assembly

2. Loosen the coil retention nut (see Figure 3-1).
3. Using 1-inch wrench, loosen and remove the solenoid from the actuator.
4. Obtain a replacement solenoid from Woodward and verify part number and revision with the existing unit.
5. Verify that the O-rings on the replacement solenoid are undamaged and present as compared to the old solenoid.
6. Lubricate the O-rings with a light oil or petroleum jelly.
7. Install replacement solenoid into actuator and tighten to 75 lb-in (8.5 N·m).
8. Install the coil retention nut tighten to 2–10 lb-in (0.23–1.13 N·m).
9. Install the jam nut and tighten to 10–12 lb-ft (13.6–16.3 N·m).

Position Indicator Switch

The position indicator switch of the stop valve is located on the spring end of the valve (Figure 1-4).

1. Disconnect the switch wires from the closest field connection point.
2. Holding the switch hex with a 1 inch wrench (approx. 25+ mm) loosen the conduit from the switch.
3. Carefully remove the conduit from the switch and pull the wiring out of the conduit.
4. Loosen the #10-32 UNF socket head cap screw clamping the locking collar and save for reuse with the new switch.
5. Using a 1 inch wrench (approx. 25+ mm), remove the switch.
6. Remove the locking collar from the switch and save for reuse on the replacement switch.
7. Obtain replacement switch and verify part number and revision with existing unit.
8. Remove two 0.625-18 jam nuts from the switch, and discard.
9. Reinstall the locking collar onto the new switch to the top of the threads by hand tightening only. The locking collar must be as high as possible on the switch to ensure that the switch can be installed to the correct depth.
10. Look into the switch port (using a flashlight or other illuminating source) and ensure that the piston step covers at least half of the port diameter. If the port diameter is not at least half covered, the stop valve is not fully closed and should be returned for factory service and repair.
11. Apply Loctite 242 to the switch threads where the threads will enter the switch port.
12. Install the replacement switch all the way into the switch port by hand tightening only until it contacts the piston step.
13. Back the switch out 3/4 turn to correctly set the sensing distance.
14. Hold the switch with a 1 inch wrench to ensure that it does not rotate during the following steps.
15. Screw the locking collar down until it contacts the housing.
16. Insert the Allen wrench into the locking collar #10-32 UNF socket head cap screw and by using the Allen wrench as a lever tighten the locking collar against the housing.
17. Torque the locking collar #10-32 UNF socket head cap screw to 32–35 lb-in (3.6–4.0 N·m).

18. Using a 1 inch wrench (approx. 25+ mm), torque the switch to 25–30 lb-ft (34–41 N·m). Ensure that the switch does not move more than one quarter turn while torquing. The switch's final position must be between one half and three quarters of a turn away from the piston step to ensure proper switch functioning and proper valve operation.



WARNING If the switch is less than one half turn away from the piston step, the valve could fail to close when commanded, possibly resulting in personal injury or damage to equipment.

19. Install wiring through the conduit to the field connection point.
20. Hold the switch with a 1 inch wrench (approx. 25+ mm) to ensure that it does not rotate. Connect the conduit to the switch and torque to 150 lb-ft (203 N·m) max. Ensure that the switch does not move while torquing. The switch's final position must be between one half and one turn away from the piston step to ensure proper switch functioning and proper valve operation.



WARNING If the switch is less than one half turn away from the piston step, the valve could fail to close when commanded, possibly resulting in personal injury or damage to equipment.

21. Reconnect the switch wires to the closest field connection point.

Chapter 5. Service Options

Product Service 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 and 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 Engine Retrofitter (RER)** is an independent company that does retrofits and upgrades on reciprocating gas engines and dual-fuel conversions, and can provide the full line of Woodward systems and components for the retrofits and overhauls, emission compliance upgrades, long term service contracts, emergency repairs, etc.
- 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.

You can locate your nearest Woodward distributor, AISF, RER, or RTR on our website at:

www.woodward.com/directory

Woodward Factory Servicing 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

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.

How to Contact Woodward

For assistance, call one of the following Woodward facilities to obtain the address and phone number of the facility nearest your location where you will be able to get information and service.

Electrical Power Systems

Facility	Phone Number
Brazil-----	+55 (19) 3708 4800
China -----	+86 (512) 6762 6727
Germany-----	+49 (0) 21 52 14 51
India-----	+91 (129) 4097100
Japan-----	+81 (43) 213-2191
Korea -----	+82 (51) 636-7080
Poland-----	+48 12 295 13 00
United States ---	+1 (970) 482-5811

Engine Systems

Facility	Phone Number
Brazil-----	+55 (19) 3708 4800
China -----	+86 (512) 6762 6727
Germany-----	+49 (711) 78954-510
India-----	+91 (129) 4097100
Japan-----	+81 (43) 213-2191
Korea -----	+82 (51) 636-7080
The Netherlands -	+31 (23) 5661111
United States ---	+1 (970) 482-5811

Turbine Systems

Facility	Phone Number
Brazil-----	+55 (19) 3708 4800
China -----	+86 (512) 6762 6727
India-----	+91 (129) 4097100
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

You can also locate your nearest Woodward distributor or service facility on our website at:

www.woodward.com/directory

Technical Assistance

If you need to telephone for technical assistance, you will need to provide the following information. Please write it down here before phoning:

Your Name	_____
Site Location	_____
Phone Number	_____
Fax Number	_____
Engine/Turbine Model Number	_____
Manufacturer	_____
Number of Cylinders (if applicable)	_____
Type of Fuel (gas, gaseous, steam, etc)	_____
Rating	_____
Application	_____
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	_____

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.

Revision History

Changes in Revision E—

- Multiple updates in the Compliance section
- Updated Declarations

Changes in Revision D—


- Update ATEX listing (page iv)
- Updated Declaration

Changes in Revision C—

- Update Compliance information and added warnings required by ATEX changes (pages iv, v, 10)
- Updated Declarations

Declarations

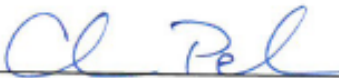
EU DECLARATION OF CONFORMITY

EU DoC No.: 00155-04-CE-02-02
Manufacturer's Name: WOODWARD INC.
Manufacturer's Contact Address: 1041 Woodward Way
 Fort Collins, CO 80524 USA
Model Name(s)/Number(s): Three Way Fuel Oil Stop Valves
 9904-268, 9904-518, 9904-1345, 9904-1353, 9904-1605, 9904-1569,
 9904-1938
The object of the declaration described above is in conformity with the following relevant Union harmonization legislation: Directive 2014/34/EU on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres
 Directive 2014/68/EU on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment
 PED Category II
Markings in addition to CE marking:  Category II 3G, Ex nA IIC T4X Gc IP54
Applicable Standards: ASME B31.3 Process Piping (2008)
 ASME Boiler and Pressure Vessel Code VIII (2010)
 EN 60079-0 :2012, Electrical apparatus for explosive atmospheres - Part 0: General Requirements
 EN 60079-15:2010, Electrical apparatus for explosive gas atmospheres - Part 15: Type of protection 'n'
 EN 13463-1:2009 Non-Electrical equipment for use in potentially explosive atmospheres
Conformity Assessment: PED Module H – Full Quality Assurance,
 CE-0041-PED-H-WDI 001-16-USA, Bureau Veritas UK Ltd (0041)
 Parklands, 825a Wilmslow Road, Didsbury, M20 2RE Manchester

This declaration of conformity is issued under the sole responsibility of the manufacturer
 We, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s).

MANUFACTURER

Signature



Christopher Perkins

Full Name

Engineering Manager

Position

Woodward, Fort Collins, CO, USA

Place

22 - APR - 2016

Date

5-09-1183 Rev 26

**DECLARATION OF INCORPORATION
Of Partly Completed Machinery
2006/42/EC**

File name: 00155-04-CE-02-01

Manufacturer's Name: WOODWARD INC.

Contact Address: 1041 Woodward Way
Fort Collins, CO 80524 USA

Model Names: Three Way Fuel Oil Stop Valve
9904-268, 9904-518, 9904-1345, 9904-1353, 9904-1605,
9904-1569, 9904-1938

**This product complies, where
applicable, with the following
Essential Requirements of Annex I:** 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7

The relevant technical documentation is compiled in accordance with part B of Annex VII. Woodward shall transmit relevant information if required by a reasoned request by the national authorities. The method of transmittal shall be agreed upon by the applicable parties.

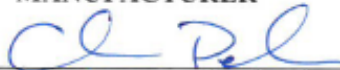
The person authorized to compile the technical documentation:

Name: Dominik Kania, Managing Director
Address: Woodward Poland Sp. z o.o., ul. Skarbowa 32, 32-005 Niepolomice, Poland

This product must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of this Directive, where appropriate.

The undersigned hereby declares, on behalf of Woodward, Inc. of Loveland and Fort Collins, Colorado that the above referenced product is in conformity with Directive 2006/42/EC as partly completed machinery:

MANUFACTURER



Signature

Full Name Christopher Perkins

Position Engineering Manager

Place Woodward Inc., Fort Collins, CO, USA

Date 12 - APR - 2016

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication **26463**.



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1014 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.