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Cummins Part Number : 6566526
Valve Part Number : 13589-P09

2-Way Direct Acting Valve
Hydrogen Gas Purge Valve
IOMHF002
REV20250203

Installation, Operation, and Maintenance Instructions

This document is intended for use as a complementary resource to the User Safety Responsibility Statements located in product literature and posted to www.parker.com/safety.

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCT AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS ("Products") COULD CAUSE DEATH, PERSONAL INJURY, AND PROPERTY DAMAGE.

Possible consequences of failure or improper selection, or improper use of these Products include, but are not limited to the following :

- Unintended or mistimed cycling or motion of machine members or failure to cycle.
- Work piece or component parts being thrown off at high speeds.
- Failure of a device to function properly, for example, failure to clamp or unclamp an associated item or device.
- Explosion.
- Sudden moving or falling objects.
- Release of toxic or otherwise injurious liquids or gases.
- Electrical shorts or burn out of equipment.

Before selecting or using any of these Products, it is important that you read and follow the subsequent instructions. This document and other information from Parker Hannifin Corporation, its subsidiaries, and authorized distributors, provide Product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the Product in the current Product literature and in any other materials provided from Parker or its subsidiaries or authorized distributors. Due to the variety of operating conditions and applications for these Products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety, and warning requirements of the application are met.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

The Products described herein, including without limitation, Product features, specifications, designs, availability, and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice. Do not, at any time, make alterations or modifications to any Product without the express and written approval of Parker Fluid Control Division.

Product Overview ..... Section 1 :

This valve is a 2-Way Normally Closed, direct acting valve with an integrated Parker A-Lok® fitting at the inlet and a Triple-Lok® 2 fitting at the outlet. The valve is equipped with low temperature elastomers compatible with hydrogen gas and it is operated using a 24VDC TYCO HDSCS solenoid coil. Repair kits are available to service the component.

Reference Documentation ..... Section 2 :

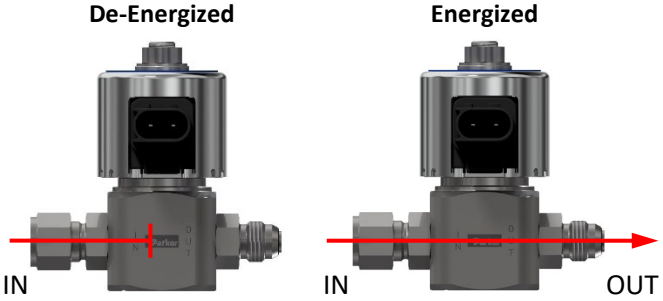
Parker Instrumentation Products Division (IPD) Document "4190-1 A-LOK® Assembly Wall Chart 09/16."
Parker Tube Fittings Division (TFD) Catalog 4300 "Industrial Tube Fittings, Adapters and Equipment."

Principles of Operation ..... Section 3 :

2-Way Normally Closed:

De-Energized : Pressure is connected to the port labeled "IN" and flow is blocked by the plunger seal pressing on the body orifice.

Energized : The plunger lifts off the orifice allowing flow through valve from port "IN" to port "OUT".



Installation .....Section 4 :

Carefully read all installation, operation, and maintenance procedures prior to installing or servicing valves. Do not use valves as shut-off valves during installation or maintenance.

WARNING

Return system to atmospheric pressure before installation. Turn off electrical power before connecting the valve to a power source. Verify nameplate data and solenoid coil part number before installation. Failure to comply could result in injury or death.

Mounting Position and Piping.....Section 4.1 :
For optimum longevity and performance, the valve should be mounted vertically upright to minimize wear and reduce the possibility of foreign matter accumulating inside the valve sleeve. Valves may be mounted directly on piping or by using the two (2) M6x1 - 6H threaded holes on the bottom of the valve. Allow adequate clearance above the valve for removal of the Solenoid Coil during maintenance.

CAUTION

Do not use Sleeve or Solenoid Coil as a lever when applying torque.

Remove protective covers from the fitting connections. Connect line pressure to the fitting attached to the "IN" port. Do not allow foreign particles to enter the purge valve.

Parker A-Lok® Fitting Assembly :
The valve is equipped with a Parker IPD A-Lok® fitting at the valve inlet. To install the fitting's ferrule onto the mating tube, the following applies :

1. Insert tube into the fitting until it is fully bottomed.
2. Rotate the fitting nut until it is finger tight.
3. With a permanent pen, mark the nut in the six (6) o'clock position.
4. While holding the tube fully bottomed, tighten the nut with a wrench an additional 1-1/4 turns to the nine (9) o'clock position; see Figure 2.

(*This sub-section has been compiled utilizing Parker IPD documentation*)

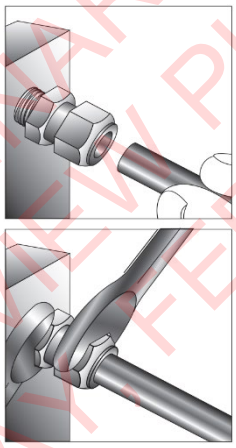


Figure 1 : Ferrule to tube assembly.

Parker Triple-Lok® 2 Fitting :

The valve is equipped with a Parker TFD Triple-Lok® 2 | 37° Flare Tube fitting at the outlet. For tube preparation instructions, refer to Parker TFD catalog number 4300. If lubrication is required, only utilize lubricants compatible with hydrogen gas.

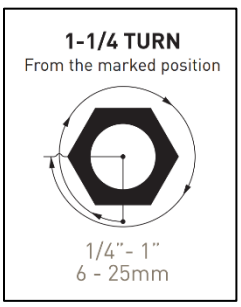


Figure 2 : Additional turn(s) past initial six (6) o'clock position.

Pressure and Temperature Limits.....Section 4.4 :
The application pressure and temperature parameters must conform to valve nameplate ratings. Adequate free space around purge valve must be provided for proper solenoid ventilation. When a solenoid coil is energized continuously for long periods of time, the solenoid coil assembly will become hot. The coil is designed to operate permanently under these conditions. Any excessive heating above rated operating temperature will be indicated by smoking and/or odor of burning coil insulation.

Electrical Connection and Voltage Limits .....Section 4.5 :
Electrical supply must conform to nameplate rating. Connect solenoid coil terminals to the electrical circuit using standard electrical practices in compliance with local authorities.

General Maintenance .....Section 5

Equipment Needed.....Section 5.1 :
The following items are needed to service the purge valve.

- Personal Protective Equipment ..... PPE
- Torque Wrench ..... 360 ± 60 in·lbf [40.7 ± 6.8 N·m]
- Torque Wrench ..... 140 ± 10 in·lbf [15.8 ± 1.2 N·m]
- Torque Wrench ..... 48 ± 5 in·lbf [5.4 ± 0.6 N·m]
- Socket ..... 9/16" [14 mm]
- Allen key ..... 5/32"[4 mm]
- Lubricant .....Krytox GPL 203 or similar

NOTICE

Personal Protective Equipment (PPE) appropriate for the task must be worn during servicing of the purge valve. Follow your organization's safety procedures to ensure operator safety.

Depending on service conditions, valve media, filtration, periodic cleaning, and/or worn component replacement may be required. While in service, valves should be operated at least once per month to ensure proper operation. Periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts if dirtied. If any valve component is worn or damaged, install the corresponding service kit for the valve.

WARNING

When servicing the purge valve, do not utilize lubricants containing hydrocarbons, as they are not suitable for hydrogen use. Only use lubricants that are compatible with hydrogen gas.

NOTICE

Krytox GPL 203 may be used, sparingly, to lubricate O-Rings and component threads during service.

Valve Service Kits .....Section 5.2 :
The following kits are available for valve service; see Fig. 3 :

- Valve Repair Kit.....HFK002
- Solenoid Coil Kit HFK003
- Fitting Kit.....HFK004

Cleaning.....Section 5.3 :
All solenoid valves should be cleaned periodically. Frequency will vary depending on service conditions. In general, if voltage to the coil is correct, sluggish valve operation or leakage indicates that cleaning is required. In extreme cases, faulty valve operation will occur, and the valve may fail to open or close. Clean any strainers / filters when cleaning valves. Do not expose the valve's internal components to any type of commercial cleaning fluid.

Solenoid Coil Replacement .....Section 6 :

WARNING 	Prior to servicing component, depressurize the valve, turn off electrical power supply, and disconnect the coil from its power supply. Verify nameplate data and coil part number before installing replacement coil. Do not energize coils which are not installed to a proper pressure vessel. Failure to comply could result in personal injury or death.
CAUTION	If possible, remove the valve from process connections. Component parts must be replaced in the proper order and orientation. Valve contains loose parts.

1. Unscrew nut and remove nut, washer(s), and nameplate. Place them in a secure area.
2. Slide solenoid coil assembly off sleeve.
3. Using the new solenoid coil, install all component parts in reverse order of disassembly, re-install nameplate.
4. Torque Nut utilizing 48 ± 5 in·lbf [5.4 ± 0.6 N·m]

Pressure Vessel Maintenance ....Section 7 :

WARNING 	Prior to servicing the component, depressurize the valve, turn off electrical power supply, and disconnect the coil from its power supply. Do not energize coils which are not installed to a pressure vessel. Failure to comply could result in injury or death.
CAUTION	If possible, remove the valve from process connections. Component parts must be replaced in the proper order and orientation. Valve contains loose parts.

Leakage | Internal and External.....Section 7.1 :
Valve leakage, both internal and external, shall be verified while applying pressure to the inlet port of the valve, labeled "IN". A suitable verification method must be utilized to ensure valve leakage does not exceed the allowable rate. Internal leakage is to be checked at the outlet port of the valve. External leakage is to be checked at (1) the interface between the valve Sleeve and the valve Body and (2) the weld in the valve Sleeve.

NOTICE	Leak rate ≤ 10 Ncm^3/h of H_2

Valve Disassembly (Refer to "Figure 3") .....Section 7.2 :
1. Refer to step 1-2 in Section 6, Solenoid *Coil Replacement*.
2. Ensure the pressure vessel has been depressurized.
3. These valves employ an internal hex on top of sleeve. A 5/32" [4 mm] Allen key may be applied to the hex to loosen the sleeve. Loosen the sleeve until finger tight.
3. Hold the valve upside down. Fully loosen and remove the sleeve and the internal parts. Sleeve contains loose parts.
4. Inspect componentry for wear. Take care not to damage the valve's seals and orifice.
5. If parts are worn or damaged, install a Valve Repair Kit and refer to instructions in Section 7.3, *Valve Assembly*.

Valve Assembly (Refer to "Figure 3").....Section 7.3 :
1. If possible, and to avoid component damage, hold the valve upside down. Carefully hand-tighten the sleeve, ensuring all internal parts are installed in the reverse order of disassembly.
2. With the valve positioned vertically and upright, tighten sleeve in the body with a 5/32" [4 mm] Allen key using an input torque of 140 ± 10 in·lbf [15.8 ± 1.2 N·m].
3. Check for external and internal leakage; see Section 7.
4. Re-install Solenoid Coil assembly as described in steps 3 through 5 in Section 6, *Solenoid Coil Replacement*.
5. Refer to Section 4, *Installation*, for complete installation guidance.

Valve Fittings (Refer to "Figure 3") .....Section 7.4 :
1. Place valve assembly in a fixture to firmly hold in place.
2. Lightly lubricate fitting threads and O-Ring.
3. Install fitting into body until hand-tight and then torque.

CAUTION	Do not use sleeve or enclosure as a lever when applying torque. Tightening torque must fall within the following values : #6 SAE J1926 : 360 ± 30 in·lbf

4. Check for external leakage.

Troubleshooting.....Section 8 :

WARNING 	Prior to servicing the component, depressurize the valve, turn off electrical power supply, and disconnect the coil from its power supply. Do not energize coils which are not installed to a proper pressure vessel. Failure to comply could result in injury or death
NOTE	If possible, remove the valve from process connections.

Valve Fails to Operate .....Section 8.1 :

1. Check electrical supply with voltmeter. Voltage must comply with nameplate rating.
2. If supply voltage is low, locate and correct cause of low voltage. Voltage must exceed 66% of rated voltage.
3. Check solenoid resistance with ohmmeter for shorted or open coil. Resistance must fall within 31.7 Ω and 37.3 Ω. If non-conforming, see Section 8.2, *Valve Coil Burn-Out*.
4. Ensure application pressure complies with nameplate rating. If conforming, refer to Section 8.3, *Valve is Sluggish or Inoperative*.

Valve Coil Burn-Out .....Section 8.2 :

1. Continuous voltage greater than 33% of rated voltage could result in solenoid coil failure. Check voltage and correct if necessary.
2. If the valve has been exposed to excessive ambient temperature, excessive media temperature, or excessive moisture, ventilate area or isolate valve from high temperatures areas. May require valve relocation.
3. Order Coil Kit to replace Solenoid Coil as described in Section 6, *Solenoid Coil Replacement*.

Valve is Sluggish or Inoperative ..... Section 8.3

1. Disassemble valve as described in Section 7, *Pressure Vessel Maintenance*. Clean out extraneous matter. The plunger and spring must move freely without binding.
2. The plunger spring must not be damaged. If damaged, service valve with a Valve Repair Kit.

External Leakage .....Section 8.4 :

1. Check for leakage at Sleeve weld interface. Leakage at this interface requires valve replacement.
2. Ensure the Sleeve is torqued as described in Section 7.3, *Valve Assembly*.
3. If leakage persists, remove the Sleeve as described in Section 7.2, *Valve Disassembly* and inspect Flange Seal. If Flange Seal is damaged or worn, service the valve with a Valve Repair Kit.

Internal Leakage (Leakage through valve) .....Section 8.5 :

1. Disassemble the valve as described in Section 7.2, *Valve Disassembly*. Clean out extraneous matter. Clean components as described in Section 5.3, *Cleaning*.
2. Examine Plunger, Plunger Seal, and Spring for damage. If damaged, service valve with a Valve Repair Kit.
3. Verify the Plunger moves freely and without binding inside the Sleeve. If binding is observed, replace Plunger with a Valve Repair Kit. If issue persists, valve may need replacement.
4. Inspect orifice in the Valve Body for damage or wear. A damaged orifice may require valve replacement.
5. Under normal operation, and with coil de-energized, check power at coil wires. Power should be off. If power is present, correct faulty contacts or wiring.

Figure 3 – Exploded View

Available Hydrogen Purge Valve service kits shown below.

Service Kit Key

- ● Valve Repair Kit **HFK002**
  - Flange Seal .....(1)
  - Return Spring .....(1)
  - Plunger.....(1)
- ○ Solenoid Coil Kit **HFK003**
  - Solenoid Coil | 24VDC.....(1)
- ♦ Fitting Kit (Fitting O-Ring(s) installed)..... **HFK004**
  - Inlet | A-Lok® to #6 SAE J1926.....(1)
  - Outlet | Triple-Lok® 2 to #6 SAE J1926.....(1)

Figure 3 : Exploded view of Hydrogen Purge Valve.