FLUID CONTROL DIVISION
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IOM HN01
(Rev 0812)

Installation, Operating & Maintenance Instructions

3-Way and 4-Way, Pilot Operated, Sealed Spool Solenoid Valves 1/4" NPT & 1/2" NPT Valve Types: U331N03, U331N04, U341N03, U341N04, U341N05, U342N03, U347N03

⚠ WARNING

☞ **GENERAL SAFETY INSTRUCTIONS BEFORE INSTALLATION**

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

Both the conduit coil and hazardous coil contain a green "grounding" wire that must be secured to a proper ground location. DO NOT cut off the green ground wire. Doing so could negate a proper ground path and leave the valve assembly unprotected or "hot".

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 your application, including consequences of any failure, and review the information concerning the product or system in the current product catalog. 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 products and systems and assuring that all performance, safety and warning requirements of the application are met. Usage of the device in a manner that is contrary to these Operating Instructions or the application conditions and specification provided in the Catalog is improper and will void your warranty.

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.

Carefully read installation, operation and maintenance procedures prior to installing or servicing valve.
Do not use valve as a safety shut-off valve when making repairs.
Do not install a valve or attempt to repair a valve before depressurizing system down to atmospheric pressure and removing electrical voltage.

Care must be taken to ensure the proper use of the valve and that the valve materials selected are suitable for the media being handled. Parker assumes no liability for damage caused by improper material selection in the case of corrosion from aggressive media.

Caution: *Do not, at any time, make any alteration or modifications to any valve without the express and written approval of Parker's Fluid Control Division.*

Description

These valves are pilot operated 2-position, 4 ported 3-way or 5 ported 4-way, and 3-position 5 ported 4-way, directional control, solenoid models. They are offered in anodized aluminum body construction. Valves may be ordered with either DIN or Conduit NEMA 2, 4, 4X integrated coils for ordinary locations or NEMA 7 and 9 for hazardous locations:

Applicable Standards

FM	**CSA**
Divisions I; Class I, Groups A, B, C, D	Divisions I; Class I, Groups A, B, C, D
Divisions II; Class I, Groups E, F, and G	Divisions II; Class I, Groups E, F, and G
Class 1, Zone 1, AEx m II T4	Class 1, Zone 1, Ex m II T4

The spool valves comprise a standard locking manual override providing operation without electrical supply.
The spool valves are offered with the following standard features:

- In line pilot for a low profile
- 22mm DIN pilot for direct mounting in non-explosive environments.
- Both Conduit and Hazardous pilots for NEMA rated and explosive environments. Mounting plate required for NEMA rated coils.
- High Nominal Flow
  - Cv 1.2 for 1/4" valves or 1250Nl/mn
  - Cv 3.0 for 1/2" valves or 3000Nl/mn
- Standard Fluid temperature 14°F (-10°C) to 122°F (50°C)
- Single Solenoid electrically operated, combined spring & pneumatic return (U331 & U341 series)
- Dual Solenoid (Bistable) electrically operated, with neutral position return closed (U342 series)
- Dual Solenoid (Bistable) electrically operated, air-solenoid return (U347 series)

Principles of Operation – Connection of the NAMUR spool valve

3-Way Valves

The valve is piped to a single acting spring return cylinder as follows: Supply air pressure is applied at the inlet port 1. When de-energized, the valve inlet port 1 is closed and valve cylinder port 2 is open to the valve exhaust port 3. The cylinder is in the retracted state.

When the coil is energized, pressure is applied from the valve inlet port 1 to the valve cylinder port 2 forcing the cylinder open and exhausting air behind the piston to the valve exhaust port 3. The cylinder is in the extended state.

4-Way Valves

The valve is piped to a double acting cylinder as follows: Supply air pressure is applied at the valve inlet port 1. Valve port 2 is open to one port of the cylinder while valve port 4 is open to the other port of the cylinder. The solenoid valve functions in such a way that pressure is applied to either side of the piston in the cylinder, and exhausted out of the opposite side of the pressurized cylinder.

When de-energized, the supply air pressure port 1 is open to the valve port 2, valve port 4 is open to valve exhaust port 5, and valve exhaust port 3 is isolated by seals on the spool. The pilot valve orifice is sealed by the insert in the plunger. The pilot valve exhaust port is open to the valve piston assembly and atmosphere.

When energized, the valve inlet port 1 is open to port 4, as well as between valve port 2 and valve exhaust port 3. The spool and seals seal valve exhaust port 5. This allows pressure to be applied to other side of the piston in the cylinder, causing the piston to move, and exhaust the fluid on the other side of the piston of the cylinder into port 2, through the valve and out of valve exhaust port 3.

Manual Overrides

Manual override - The unit is shipped with a latching manual override. For a latching override, apply force to the slotted screw component, turn clockwise to lock. To unlock, turn counterclockwise.

Fluid Codes

Listed below are the common fluid codes The codes for the approved fluids for use with each valve are printed on the outside of the individual packaging.

CODE		FLUID
A	-	Air or non-toxic, nonflammable gases

For the maximum fluid temperatures, as well as valve ambient temperature limitations, check the valve part number on the nameplate and refer to the catalog.

Installation Instructions

⚠ Prior to installing the solenoid valve, depressurize the pipes and clean them internally to avoid particles entering the system.(tape sealant, thread compound). The valves may be mounted in any position.

Mounting position and pressure limits:

Valve with DIN Coil:
Mount the valve directly on the actuator with the (2) M5 thread screws provided for the 1/4" valve and with the (2) M6 thread screws for the 1/2" valve. Torque to 35 to 45 in-lbs (4 to 5 Nm). Make sure the O-rings and locating pin are assembled to the bottom of the valve prior to mounting the valve for correct positioning on the actuator. ***Do not use the sleeve or enclosure as a lever when applying torque.***

Valve with Conduit or Hazardous Coil: (see next paragraph for valve model U341N05 only)
The conduit and hazardous coils require the use of a mounting plate kit due to the increased coil width. The mounting plate kit consists of the aluminum mounting/spacer plate, 2 O-rings and 2 longer screws. The valve model number U341N05 containing the 3/2, 5/2 conversion plate does not require a separate mounting kit (see next paragraph). Make sure the O-rings are assembled to the bottom of the valve before positioning the valve over the mounting/spacer plate. Make sure that the O-rings and the locating pin are assembled to the bottom of the mounting/spacer plate prior to mounting the valve onto the actuator. Use the 2 longer screws to mount the valve to the actuator. Torque to 35 to 45 in-lbs (4 to 5 Nm). ***Do not use the sleeve or enclosure as a lever when applying torque.***

Valve model U341N05 with conversion plate:
With the U341N05 valve, the 3/2, 5/2 conversion plate also functions as the mounting/spacer plate for the conduit and hazardous coils. Make sure that the gasket surface with the function indicator tab is assembled toward the bottom of the valve body. The indicator tab will point toward the schematic on the top of the valve body indicating the valve function. To change the valve function, rotate the conversion plate 180 degrees keeping the gasket face toward the vale body. The O-rings and the locating pin are assembled to the bottom of the conversion plate prior to mounting the valve onto the actuator. Use the 2 of the included screws to mount the valve to the actuator. Torque to 35 to 45 in-lbs (4 to 5 Nm). ***Do not use the sleeve or enclosure as a lever when applying torque.***

The valves are multi-poised and will perform properly when mounted in any position. However, for optimum life and performance, the valves should be mounted with the spool in the vertical position to minimize wear and reduce the possibility of foreign matter accumulating inside the sleeve and spool area.

Line pressure must conform to nameplate rating.

Valve Piping: Correctly support and align pipes to prevent mechanical strain on the valve. Connect line pressure to the inlet port. Use of tape sealant, thread compound or sealants is permissible, but should be applied sparingly to male pipe threads only. To avoid damage to the equipment, DO NOT OVERTIGHTEN pipe connections.

Media filtration: Normally, filtration is not required, but dirt or foreign material in the media may cause excessive leakage, wear, or in exceptional cases, malfunction. The valves do include a 40 micron internal pilot filter to help prevent clogging of the pilot orifice. If additional filtration is used, install the filter on the inlet side as close to the valve as possible. Clean periodically depending on service conditions.

Lubrication: Lubrication is not required.

ELECTRICAL CONNECTIONS

⚠ **General Recommendations and Safety Precautions**

- **Electrical connection must be made by qualified personnel using standard electrical practices in compliance with local authorities and the National Electrical Code.**
- **Depending on the voltage, electrical components must be grounded according to local standards and regulations**
- **Most valves are designed for continuous duty. To prevent the risk of personal injury, do not touch the solenoid operator which can become hot under normal operating conditions.**

- **The solenoid coil must be assembled to the valve sleeve operator for proper valve operation. Failure to assemble the coil to the valve before applying system voltage will permanently damage the coil within a short period of time.**
- **Electrical supply must conform to nameplate rating.**

Hazardous Location Coil WARNING: Valves to be installed in Hazardous Locations, must be outfitted with Hazardous Location coils only. Verify nameplate data and coil part number before installing the valve.
A surge protector corresponding to the coil's rated current or a motor safety switch with instantenous short circuit or thermal cutout (set at rated current) has to be pre-connected for each solenoid coil as a short circuit cutout. The surge protector may be positioned in the respective power supply unit or it must be pre-connected separately.

WARNING: *Turn off electrical power before connecting the valve to the power source.*

If the coil assembly is located in an inconvenient orientation, it may be reoriented to facilitate installation. Loosen coil assembly nut, rotate coil assembly in 45° increments to desired position, and then retighten the nut with an input torque of 4.0 to 5.0 in-lbs. [0,5 Nm].

DIN Coil (ND1x) and various cable option terminations: Electrical connection is made with detachable DIN 43650 B plug connector for cable dia. 6-8mm (Pg9), rotatable by 180° increments (3 pins: 2 + earth ground pin). Loosen cable screw and remove plastic housing from DIN coil. Do not remove the gasket from the DIN spades on the coil. Separate the plastic block from the housing with a small screwdriver to expose the elecctrical terminations. Feed the lead wires through the conduit hub and attach them to the appropriate screw terminal. For electrical connection within the terminal box, use field wire that is rated for 90^{o} C or greater. Snap the plastic block back into place inside the metal enclosure. Replace the cover and hand-tighten the cover screws. Place the gasket over the DIN spades on the coil and press the terminal box and coil together. Secure the terminal box to the coil using the mounting screw provided.

Slide one o-ring over and down the sleeve assembly until the o-ring rests on the valve body., Slide the DIN coil over the valve sleeve. Affix nut to sleeve and tighten between 4.0 to 5.0 in-lbs. [0,5 Nm] torque.

Conduit Coil (NC1x) with 1/2" NPT connection: Conduit coils meeting NEMA 2, 4, 4X integrated coils for ordinary locations. Use suitable electrical cabling and conduit materials and components meeting applicable NEMA recommendations.

Hazardous Coil (NH1x) with 1/2" NPT connection: Hazardous coils meeting NEMA 7, and 9: Divisions I and II; Class I, Groups A, B, C, and D; Class II, Groups E, F, and G. Use suitable electrical cabling and conduit materials and components meeting applicable NEMA recommendations.

Coil/enclosure temperature: Standard valves are supplied with coils designed for continuous duty service. Normal free space must be provided for proper ventilation. When the coil is energized continuously for long periods of time, the coil assembly will become hot. The coil is designed to operate permanently under these conditions. Any excessive heating will be indicated by smoking and/or odor of burning coil insulation.

For the maximum valve ambient conditions, as well as the fluid temperatures, check the valve part number on the nameplate and refer to the catalog to determine the maximum temperatures.

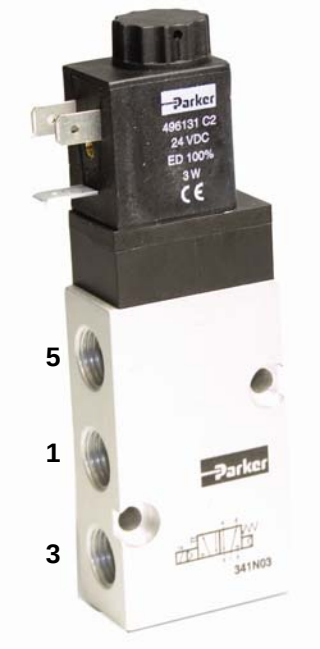
MAINTENANCE

⚠ Prior any maintenance work, switch off power supply, depressurise and vent the valve to prevent the risk of personal injury or damage equipment.

- **Preventive maintenance**
  Valve should be exercised (cycled from de-energized to energized position several times) if stored in inventory or if inactive for a lengthy period of time (more than a month).
  Avoid obstruction of exhaust port when it is not connected or protect it with a cap.
- **Cleaning**
  Maintenance of the valve depends on the operating conditions. They must be cleaned at regular intervals. Cleaning must be done when a slowing down of the cycle, a leakage or an abnormal noise is noticed. The components must be checked for excessive wear.

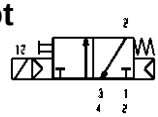
Note: Depending on service conditions, filtration, and lubrication, it may be required to periodically clean and/or replace worn components.

CAUTION: *Do not expose plastic or elastomeric materials to any type of commercial cleaning fluid. Parts should be cleaned with a mild soap and water solution.*

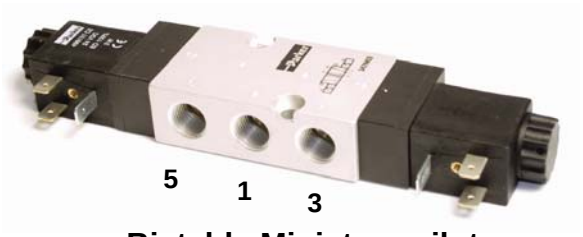


Monostable in line
Miniature pilot

U331N03, U331N04

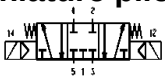


U341N03, U341N04

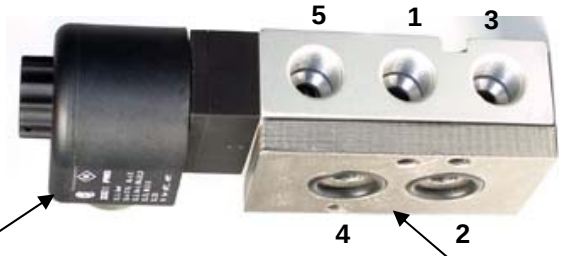


Bistable Miniature pilot

U342N03

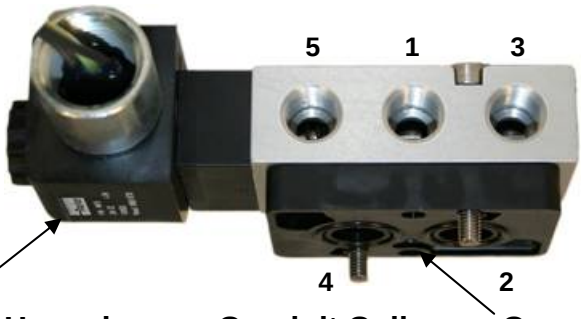


U347N03



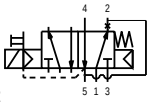
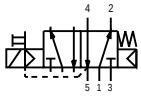
Hazardous or Conduit Coil **Mounting Plate Kit**

Valve with Mounting Plate for use with Hazardous & Conduit Coils

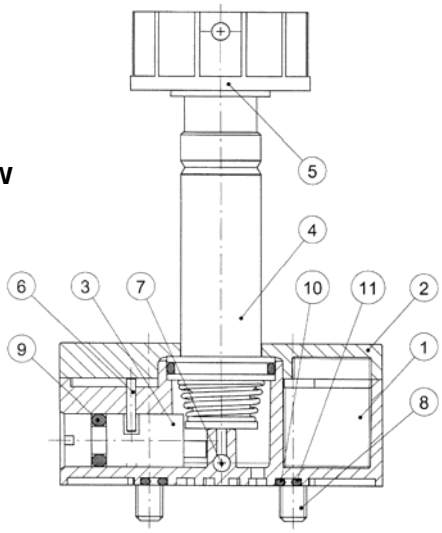


Hazardous or Conduit Coil **Conversion Plate**

U341N05 Valve with 3/2, 5/2 Conversion Plate shown for use with Hazardous & Conduit Coils

U341N05  3/2 **or**  5/2

Pilot Valve
Cross Section View



Item	Description
1	Pilot Body
2	Pilot Top Plate
3	Manual Override
4	Operator Sleeve
5	“Bug” cap
6	Pin
7	Under Seat Flow Path
8	Screws
9	O-ring
10	O-ring
11	O-ring

Trouble Shooting

Symptom	Procedure
1. Valve fails to operate or is sluggish.	1. Check electrical supply with voltmeter. Voltage must agree with coil rating. 2. Check coil with ohmmeter for shorted or open coil. 3. Make sure that pressure complies with pressure rating marked on valve. Pressure must not be less than minimum operating pressure. 4. Inspect for contamination in ports. Remove debris if found. Check filter in main body, clean or replace if necessary. 5. Verify that the sleeve assembly and plunger spring are not damaged. * Remove the 4 screws and gently lift off the pilot section of the valve. Take care not to lose the o-rings and internal components. * Remove the top plate. Lift out and inspect the sleeve, plunger, rubber disk and spring for debris or damage. Replace sleeve assembly, top plate and 4 screws. * Make sure the manual override stem is located on the ported side of the valve body.
2. External leakage at sleeve flange to body joint or pilot section to main body joint.	1. Check the 4 screws are tight but do not apply excessive force to damage the plastic plate. 2. If leakage persists, remove sleeve and check flange and o-ring seals for damage. Refer to step 5 above for disassembly.