



Pneumatic Division
Richland, Michigan 49083

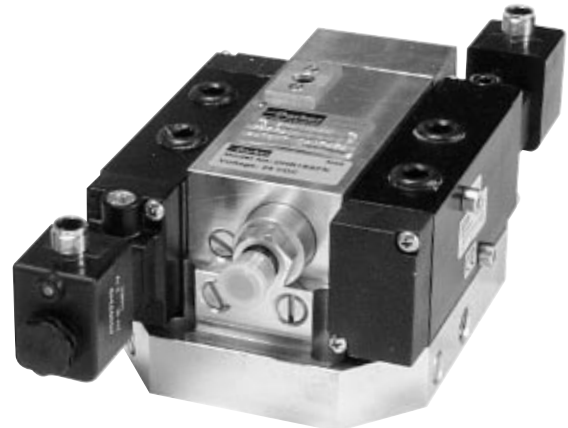
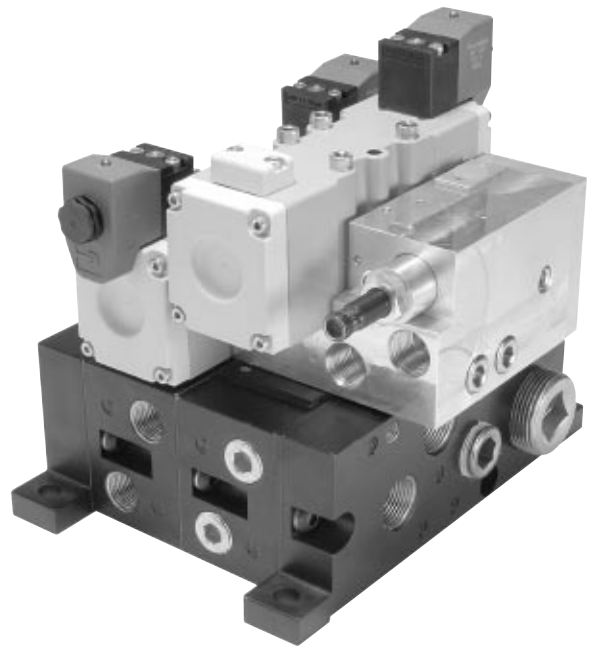
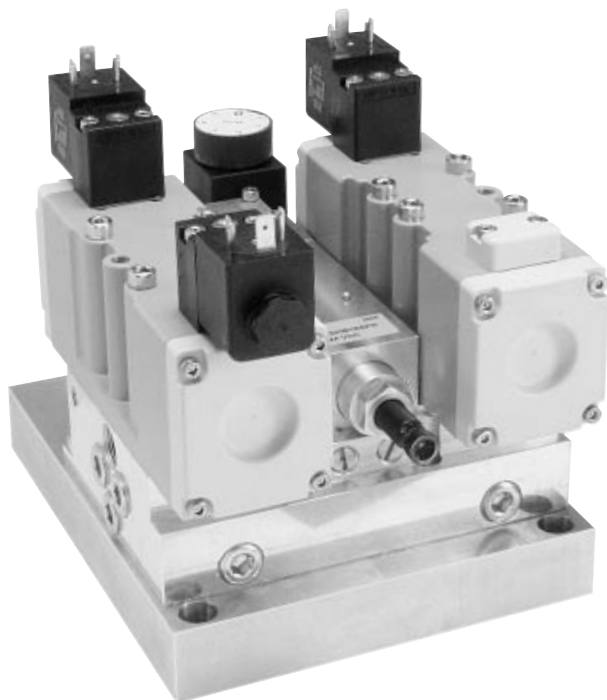
WCS-SIF-01

Training & Maintenance Manual

ISSUED: November, 2006

Supersedes: June, 2006

Pneumatic Spotwelding Control Systems Training & Maintenance Manual



Description & Operation

General Description of Spotwelding Units

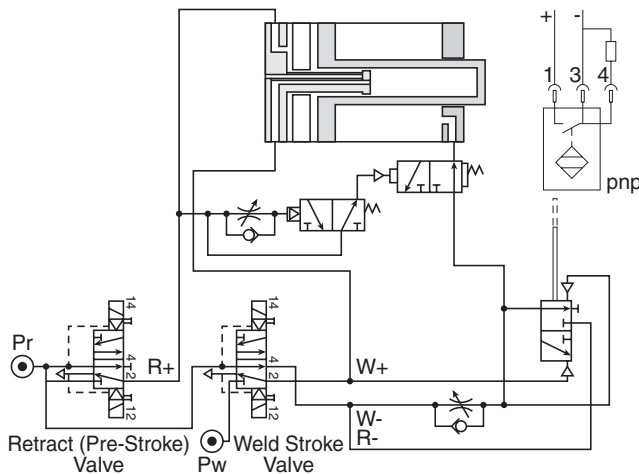
The spotwelding system is an integrated pneumatic controlled circuit that is specifically designed to increase production throughput, while improving weld quality and reducing decibel noise level.

Each unit consists of 2 independent, 2 position, directional control valves for retract (pre-stroke) and weld stroke. Each valve is dual pressure, with single solenoid / spring assist return or double solenoid available. Also included with each unit is a proportional / quick dump valve, a feedback sensor for initiating the welding process, and a flow control for metering the impact speed of the weld tips.

ANSI (3 Ported Cylinder Option)

Inductive Sensor / Connection: Turck Connection Diagram Inductive Sensor

- | | | |
|---|-------|----------------------|
| 1 | Brown | +24 VDC Power Supply |
| 3 | Blue | 0 V Power Supply |
| 4 | Black | Switch Wire |

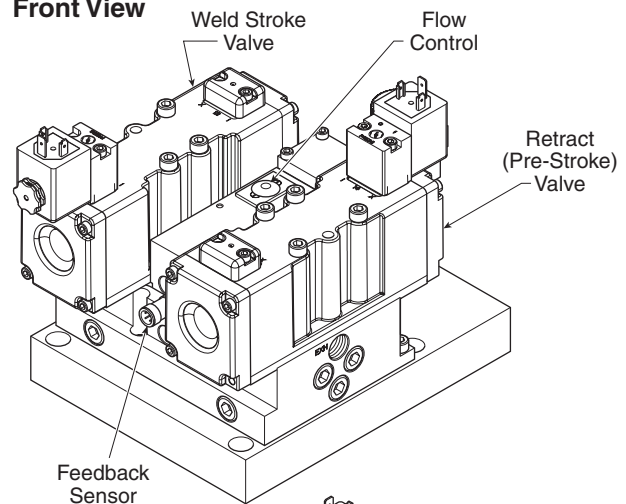


General Operation of Spotwelding Units – 3 ported guns

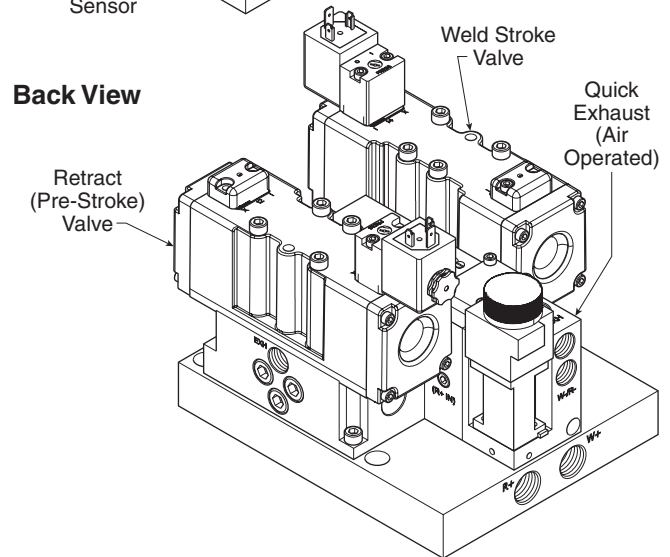
Spotwelding systems control both retract (pre-stroke) and weld stroke motions. When a 3 ported cylinder is used, the control block functions as follows:

1. The pre-stroke (retract) valve is energized, allowing the weld cylinder to extend under full line pressure by actuating the quick exhaust valve and moving to its predetermined position prior to welding.
2. The quick exhaust valve time is adjusted by the knob on top of the unit. To start, the white line on the dial is set at top dead center. Turn knob clockwise to set quick exhaust valve open time. Continuing to turn knob clockwise will lengthen time until it reaches a full 360° rotation, which covers the complete timing range.
3. The weld stroke valve is then energized using a selected weld schedule pressure. The closure speed of the weld tips is controlled by the use of an adjustable flow control, thus creating "low impact".
4. Immediately following weld tip contact with the sheet metal, two actions take place.

Front View



Back View



- a. The proportional / quick dump valve that senses pressure allows the front end of the cylinder to exhaust (by-passing the flow control), providing weld schedule pressure instantly.
- b. The proportional / quick dump valve also actuates a feedback sensor to start the weld cycle.
5. Once the weld cycle is complete, the weld stroke valve is de-energized, allowing the weld tips to open under full pressure.
6. The retract (pre-stroke) valve is then de-energized, allowing the weld cylinder to open completely under full line pressure.

Note: Dual pressure is provided to the control block. Line (high) pressure is used for both retract stroke and weld stroke open. Weld schedule pressure is used for weld stroke close. Dual pressure provides for weld tips to be closed for tip dressing using any pressures available, from as low as 5 PSIG to maximum line pressure.

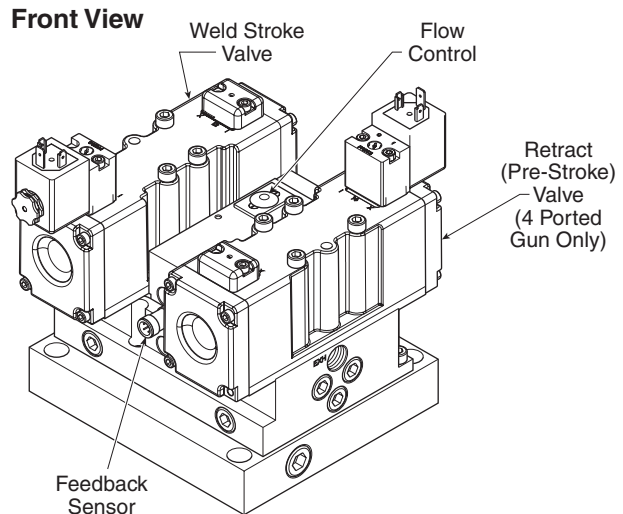
Description & Operation

General Operation of Spotwelding Units – 2 and 4 ported guns

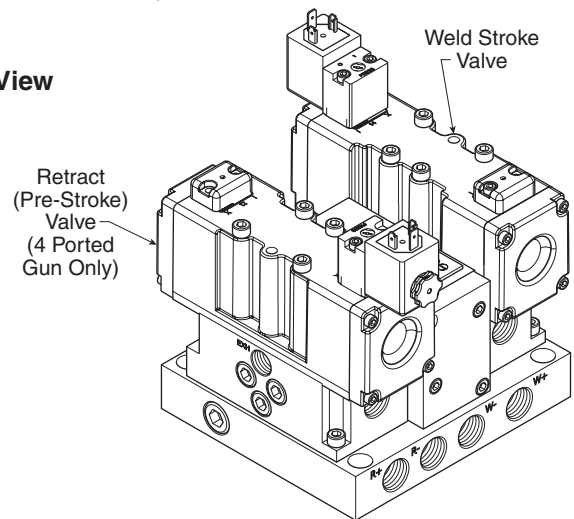
Spotwelding systems control both retract (pre-stroke) and weld stroke motions. When a 4 ported cylinder is used, the control block functions as follows:

1. The retract (pre-stroke) valve is energized, allowing the weld cylinder to extend under full line pressure and moving to its predetermined position prior to welding.
2. The weld stroke valve is then energized using a selected weld schedule pressure. The closure speed of the weld tips is controlled by the use of an adjustable flow control, thus creating "low impact".
3. Immediately following weld tip contact with the sheet metal, two actions take place.
 - a. The proportional / quick dump valve that senses pressure allows the front end of the cylinder to exhaust (by-passing the flow control), providing weld schedule pressure instantly.
 - b. The proportional / quick dump valve also actuates a feedback sensor to start the weld cycle.
4. Once the weld cycle is complete, the weld stroke valve is de-energized, allowing the weld tips to open under full pressure.
5. The retract (pre-stroke) valve is then de-energized, allowing the weld cylinder to open completely under full line pressure.

Note: Dual pressure is provided to the control block. Line (high) pressure is used for both retract stroke and weld stroke open. Weld schedule pressure is used for weld stroke close. Dual pressure provides for weld tips to be closed for tip dressing using any pressures available, from as low as 5 PSIG to maximum line pressure. 2 ported guns perform the same steps as above, except that the retract (pre-stroke) portion of the cylinder does not exist. Steps 2–4 only apply.



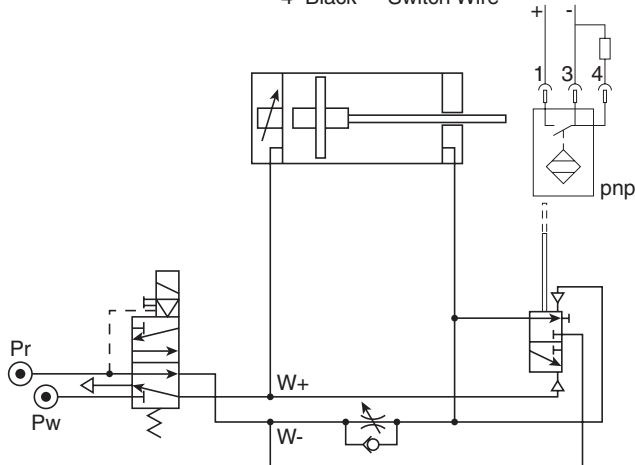
Back View



ANSI (2 Ported Cylinder Option)

Inductive Sensor / Connection: Turck Connection Diagram Inductive Sensor

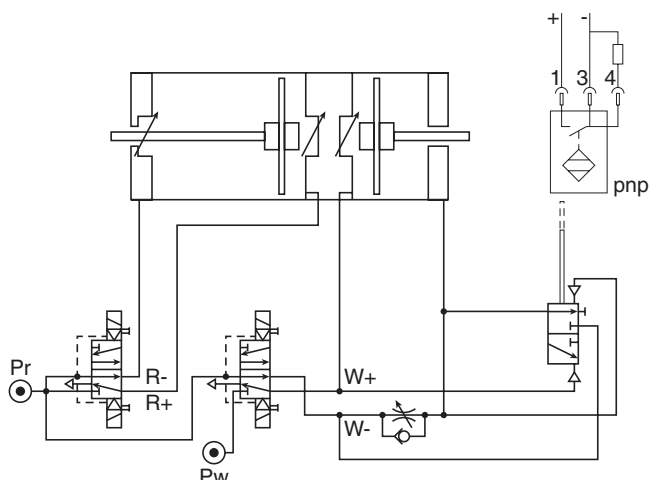
- 1 Brown +24 VDC Power Supply
- 3 Blue 0 V Power Supply
- 4 Black Switch Wire



ANSI (4 Ported Cylinder Option)

Inductive Sensor / Connection: Turck Connection Diagram Inductive Sensor

- 1 Brown +24 VDC Power Supply
- 3 Blue 0 V Power Supply
- 4 Black Switch Wire



Installation – Air and Electrical

A. Installing Weld Block with Existing Equipment

1. Shut off air supply to weld gun and turn power off to cell.
2. Disconnect air hoses from existing weld block ports. This will vary depending on weld gun type, and whether the existing weld block is single or dual pressure.

Note: If the current weld block is mounted directly to the cylinder, then only the inlet port hoses will be disconnected.
3. Disconnect solenoid connectors from valves. Be sure to note which connectors are being used for pre-stroke (retract) valves and weld stroke valves.
4. Remove current weld block from gun.

B. Installing Weld Block on New Equipment

5. Mount weld block spotwelding system to robot using (4) M8 screws and torque to 130 to 145 in. lbs (14.7 to 16.4 Nm).
6. Connect all air hoses to weld block (see schematic on pages 2 or 3).

Note: An additional air hose may be necessary for the inlet, since this unit is dual pressure. If so, connect the already existing hose to the Pw port (pressure weld). This hose should be supplying scheduled pressures from a proportional regulator. Connect the additional hose before the proportional regulator using a T-fitting so that full line pressure is being used. This hose should be connected to the Pr port (pressure retract).
7. Connect the solenoid cables to the proper valves. Connect an M12 sensor cable to the feedback sensor on the unit. The other end of this cable should be wired to the PLC controller.

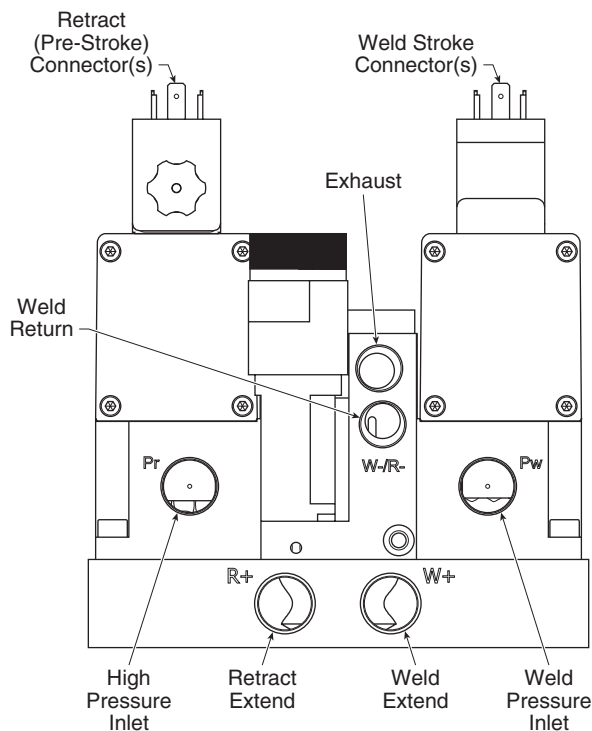
8. Turn air supply and power on.
9. Check for air leaks. The weld cylinder should be in the home position (completely open). If not, check that all air hoses are connected to the correct ports. Verify that all solenoids are de-energized, and valve overrides are unactuated. Once this is done, verify the function of the weld block, by actuating the weld block valves using the manual overrides. Press and hold the retract (pre-stroke) valve manual override. The weld cylinder should move to the weld stroke position. Press and hold the weld stroke valve manual override [still holding the retract (pre-stroke) override]. The weld cylinder should now close. Release the weld stroke override and the retract (pre-stroke) override. The weld cylinder will return to home position.

Note: The weld stroke portion of the cylinder will move slower than the pre-stroke. This is due to the regulated pressure being used, as well as the flow control. Adjusting the speed of the cylinder will be covered in the Setup Instructions. Repeat this process, now energizing the solenoids. The cylinder should perform the same. If not, verify that the solenoid connectors are located on the proper valves. Once the unit has been properly installed, the following setup procedure can be used to ensure that the Parker weld system is used to its fullest potential.

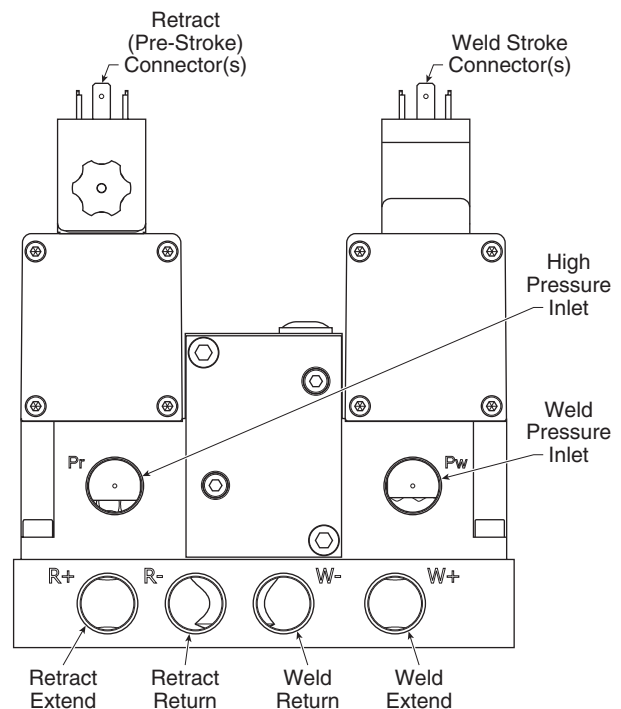
Wiring

Refer to valve Instruction Sheet for proper wiring connections. Available at: www.parker.com/pneumatic (see B6 and ISO size 2 valves Installation and Service Instructions).

3 Ported Installation



4 Ported Installation



Installation & Setup Instructions

Setup

Below are the step by step setup procedures for properly setting the flow control and feedback sensor.

How to Set the Flow Control Properly

Begin by turning the flow control clockwise until it stops. If this is done properly, then the weld stroke should move extremely slow or not at all.

Note: As stated in the Installation procedure, the pre-stroke valve must be actuated prior to the weld stroke valve in order for the weld cylinder to move correctly.

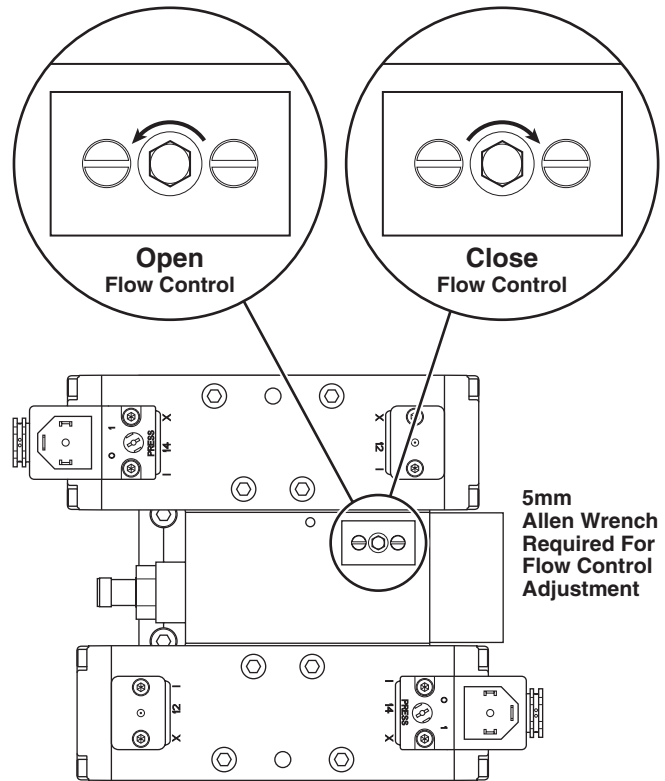
Slowly (1/4 to 1/2 turn at a time) begin to open the flow control by turning counterclockwise. The weld tips should now close upon actuation of the valves. At this point, you should begin to hear a second exhaust coming from the weld unit once the weld tips have made contact. This second exhaust is the air from the front side of the cylinder bypassing the flow control. As you continue to speed up the weld stroke by turning the flow control, the delay between the tips closing and the second exhaust will get shorter. Also, check the feedback sensor while this is occurring. The indicator light from the sensor should illuminate when you hear the second exhaust. This is the key to determining the proper setting of the flow control. The optimum setting for each weld block will be different for each gun, based on the bore size and weld stroke used. Continue to open the flow control, allowing the weld tips to close faster until:

1. You have reached an impact speed you are happy with.
2. You have reached an acceptable decibel noise level.
3. You see that the second exhaust and feedback sensor illumination occur “just” as the weld tips contact.

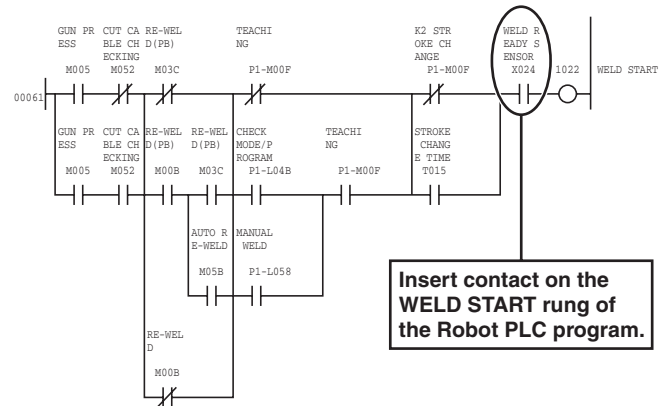
Note: This is a judgement call. If the flow control is set too far open, then the weld block could result in welding misfire causing the gun to fire before the weld tips close fully. The reason this would occur is because the flow control has been opened so much that all the air on the front side of the cylinder has exhausted before the tips fully close, thus negating the “low impact” benefit of the system. To guarantee proper performance, find the setting where the exhaust / illumination occurs “just” as the tips close, and then adjust the flow control 1/2 turn clockwise.

How to Set the Feedback Sensor Properly

The purpose of the feedback sensor is to provide an input signal at the exact moment that full weld pressure has been obtained at the weld tips. Traditionally this is achieved using squeeze time. An experienced weld / electrical engineer is needed to place the feedback sensor input into the PLC program. The location of this input will vary depending on the PLC manufacturer. Consult the robot manufacturer for the proper input location.



Electrical Changes (Sample):

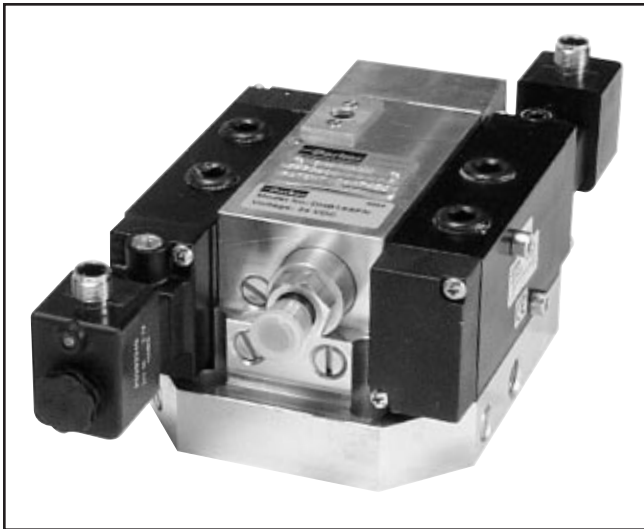


Above is a sample PLC program where the feedback sensor was placed during a typical install. The location of the input should be right before the weld start command. Once the input has been placed into the program, disconnect the sensor cable from the feedback sensor. This will allow you to determine whether or not the input was placed in the correct spot.

Perform a trial run. If on the first weld, the weld tips close and the robot stops, then the sensor input has been located correctly in the program. If the robot continues to run, despite the cable being disconnected, then the sensor input is not correct. Review the location and then try the trial run again.

Note: The weld block should perform the same whether the robot is in manual or automatic mode.

Pneumatic System with Low Impact and Rapid Approach Control



Description

Pneumatic valve block for use with pneumatic weld gun cylinders. The block has an integrated low impact system and is provided with two solenoid operated "Namur" or ISO size 2 valves. One valve for the retract (pre-stroke) and one for the weld stroke. The valves can be of the single solenoid type or the double solenoid type. The block is available for different constructions of cylinders:

- DH / WH = 3 Ported Cylinders
- DP / WP = 2 and 4 Ported Cylinders

Ordering Code: See pages 7 – 13.

Dimensions: See pages 15 – 18.

Applications

The Spotwelding System can be used with any Pneumatic Spot Weld Cylinder.

Mounting

The weld block can either be mounted on the side of the robot or directly to the cylinder. See pages 10 – 12 for bolt hole patterns for robot mount. Consult Parker for cylinder mount application.

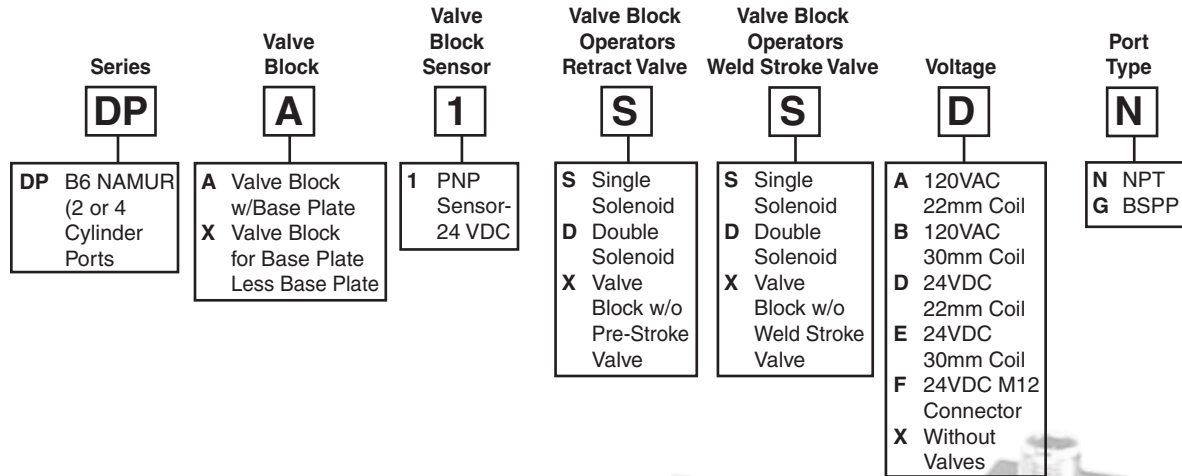
Technical Data

- Medium..... Compressed air, filtered to 40µ and dried to a dewpoint of 37°F (3°C), lubricated or non-lubricated. Once lubricated air is applied, this must be maintained.
- Working Pressure37 to 145 PSIG (2.5 to 10 bar)
 - WH Series Air Operated
 - Quick Exhaust40 to 115 PSIG (2.7 to 7.9 bar)
- Ambient Temperature 41°F to 120°F (5°C to 49°C)
- Weight –
 - DP 12.0 lbs (5.4 kgs)
 - DH 7.0 lbs (3.2 kgs)
 - WP (with Baseplate) 14.0 lbs (6.4 kgs)
 - WH (with Baseplate) 18.0 lbs (8.2 kgs)
- Pneumatic Valve
 - 24 VDC
 - Operating Voltage Solenoids 24 VDC +10/-15%
 - Power Consumption.....4.8W
 - Class of Protection..... IP65 (with plug mounted)
 - Connector M12, 22mm, 30mm, Auto (ISO 2 only)
 - 120 VAC
 - Operating Voltage Solenoids ... 120 VAC +10/-15%
 - Frequency.....50 / 60 Hz
 - Power Consumption..... 7.8 VA / 6.3 VA
 - Class of Protection..... IP65 (with plug mounted)
 - Connector M12, 22mm, 30mm, Auto (WP / WH only)
- Proximity Sensor
 - 24 VDC
 - Supply Voltage10 to 30 VDC
 - Rated Operational Current.....200mA
 - Degree of Protection.....IP67
 - Ambient Temperature Range -13°F to 158°F (-25°C to 70°C)
 - Switching Indication By LED (Yellow)
 - Output..... PNP or NPN
 - 120 VDC (Consult factory for availability)
 - Supply Voltage 20 to 140 VAC
 - Frequency..... 50 or 60 Hz
 - Supply Voltage Indication..... By LED (Green)
 - Rated Operational Current.....400 mA
 - Degree of Protection.....IP67
 - Ambient Temperature Range -13°F to 158°F (-25°C - +70°C)
 - Switching Indication By LED (Orange)

Service Kits: See page 9.

Ordering Information

Model Number Index – B6 Namur Valves (2 and 4 Ported Guns)

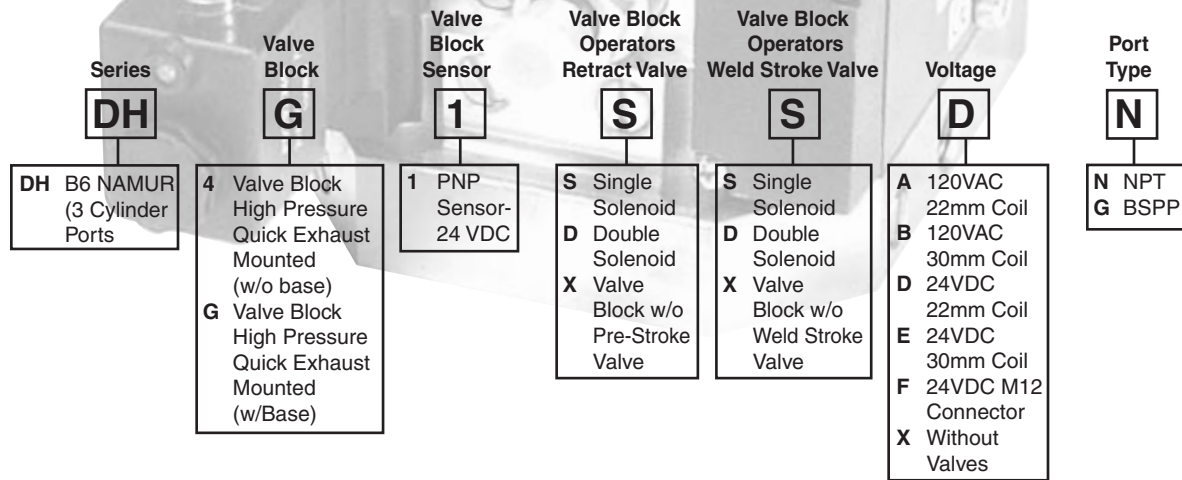


Note: NAMUR valves mounted on valve block have BSPP porting.

Model Selection Examples

Valve Block Only.....DPX1SSDN
 Valve Block with Base..... DPA1SSDN

Model Number Index – B6 Namur Valves (3 Ported Guns)



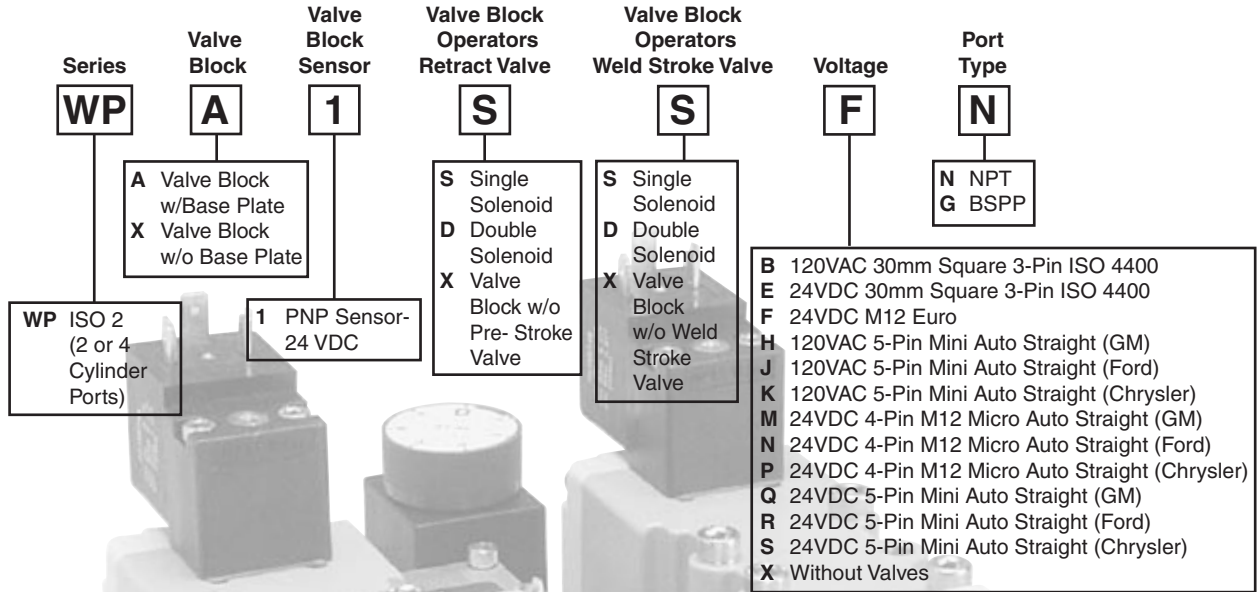
Note: NAMUR valves mounted on valve block have BSPP porting.

Model Selection Examples

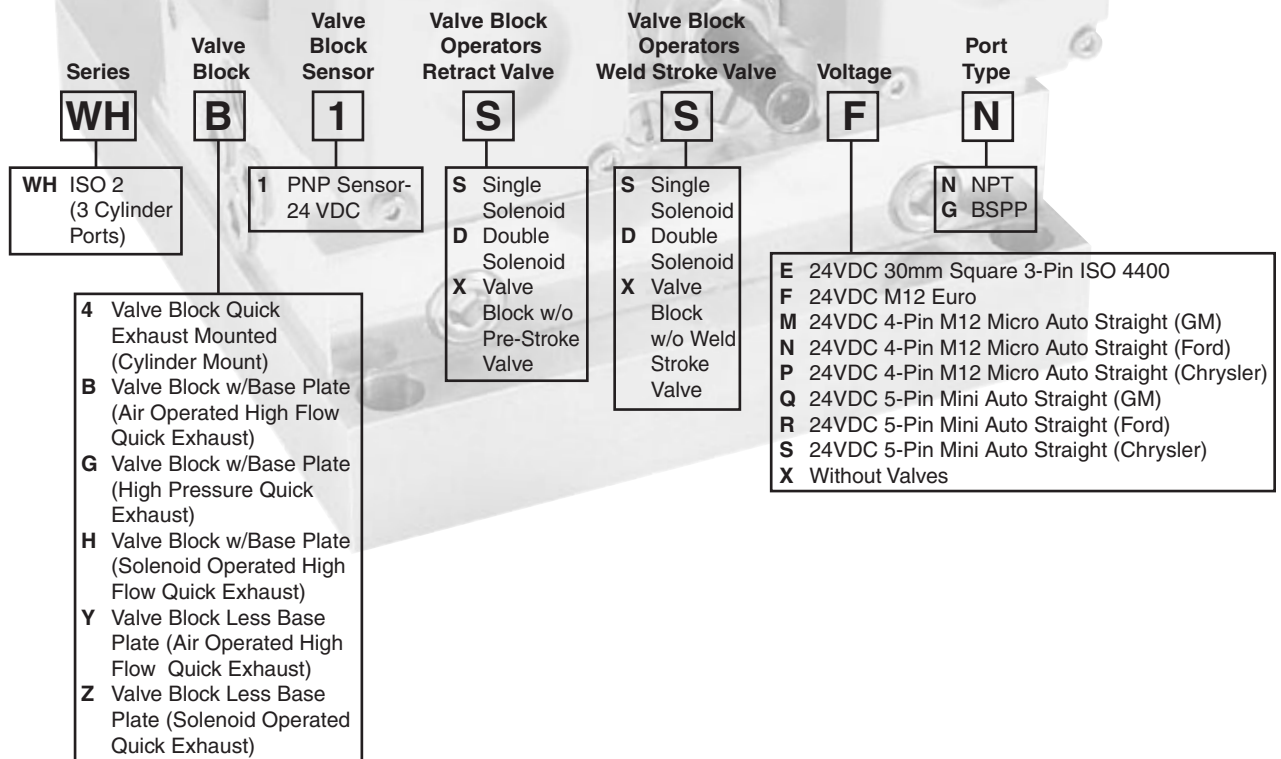
Valve Block with Quick Exhaust (w/o Base) DH41SSDN
 Valve Block with Quick Exhaust (w/ Base) DHG1SSDN

Ordering Information

Model Number Index – ISO Size 2 Cylinder & Base Plate Mountable (2 and 4 Ported Guns)

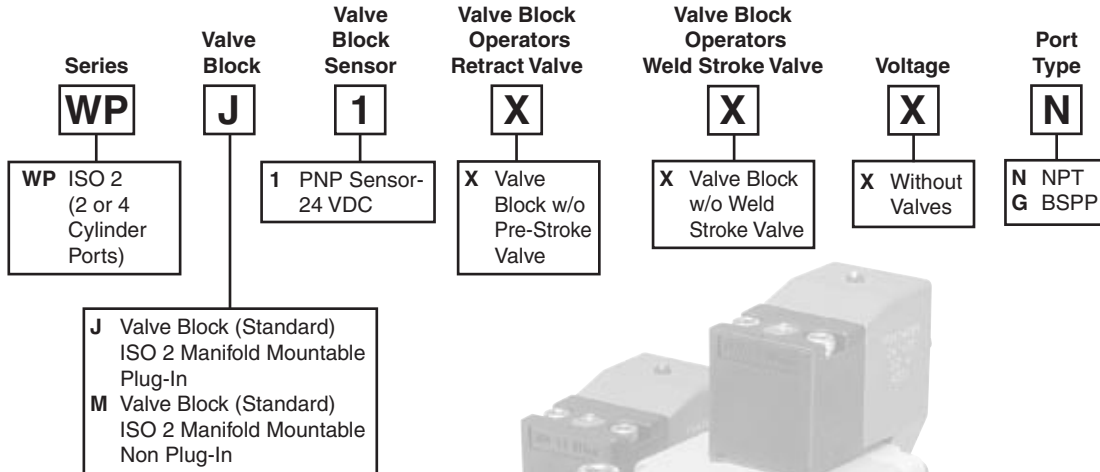


Model Number Index – ISO Size 2 Cylinder & Base Plate Mountable (3 Ported Guns)

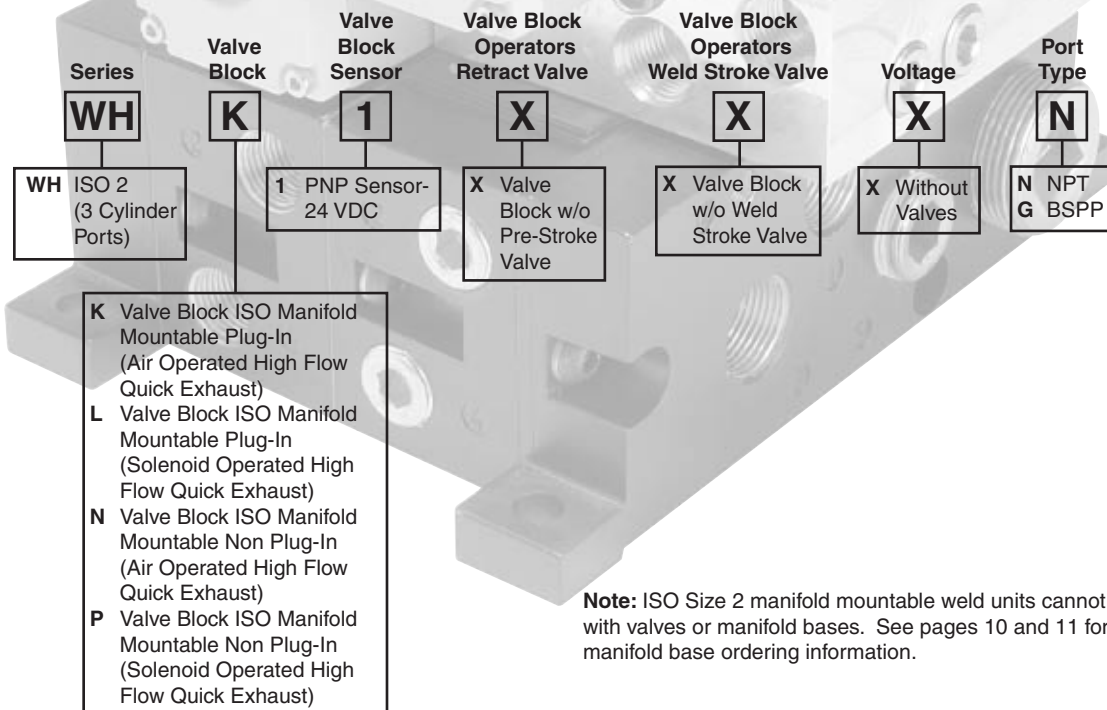


Ordering Information

Model Number Index – ISO Size 2 Manifold Mountable (2 and 4 Ported Guns)

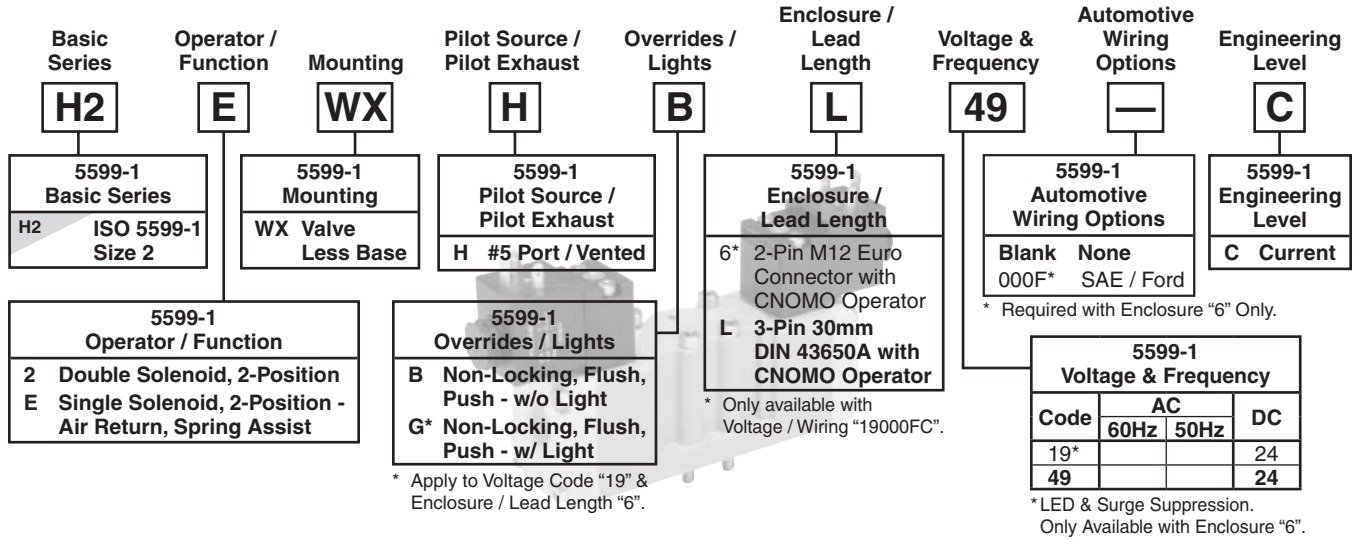


Model Number Index – ISO Size 2 Manifold Mountable (3 Ported Guns)

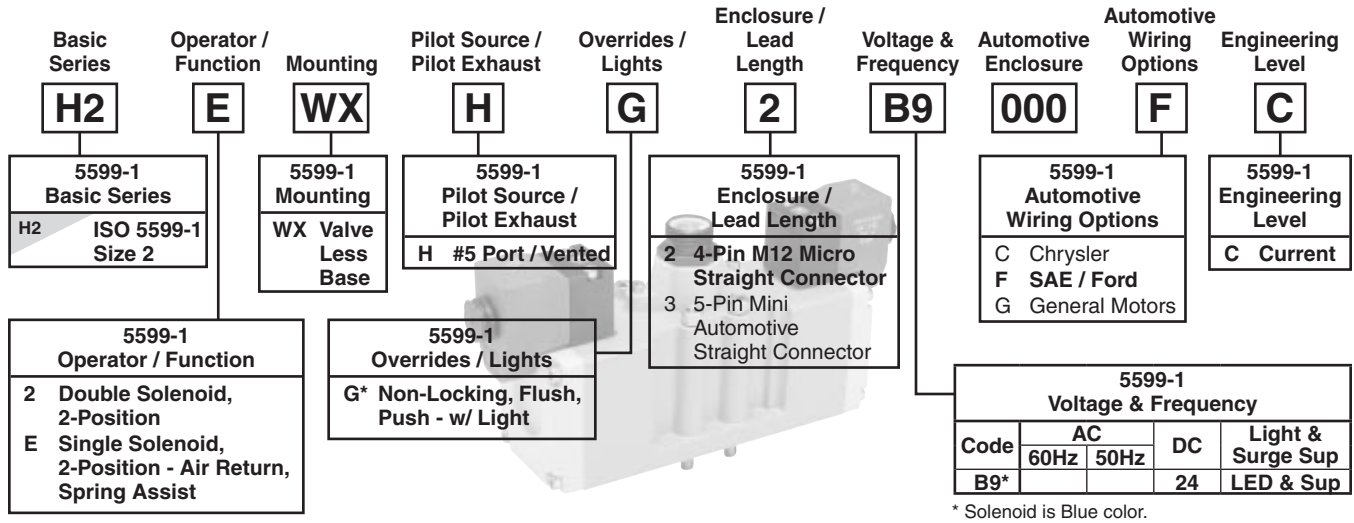


Ordering Information

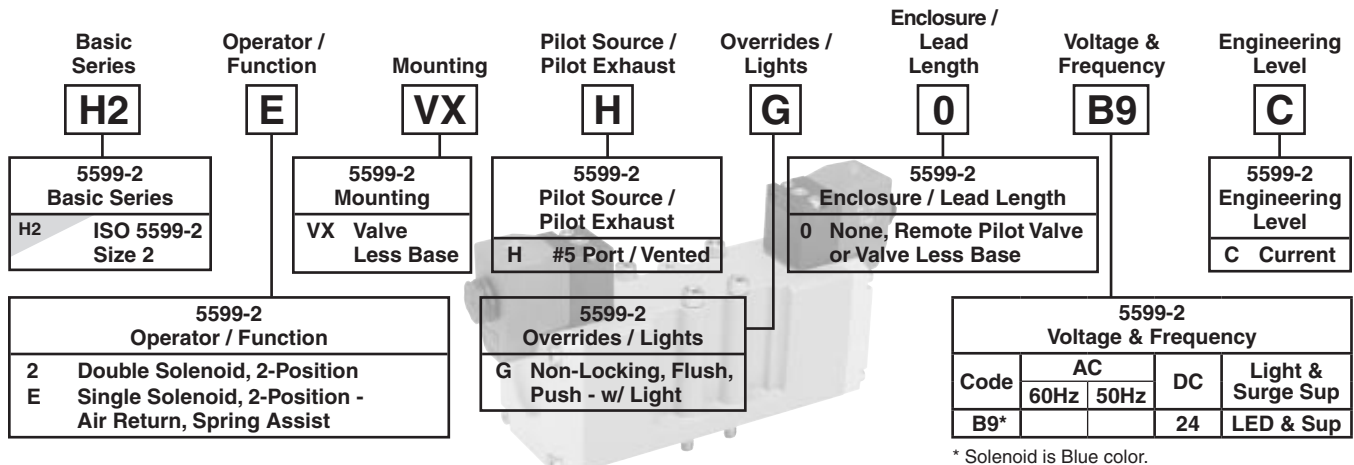
Model Number Index – 5599-1 CNOMO - Size 2



Model Number Index – 5599-1 AUTO - Size 2

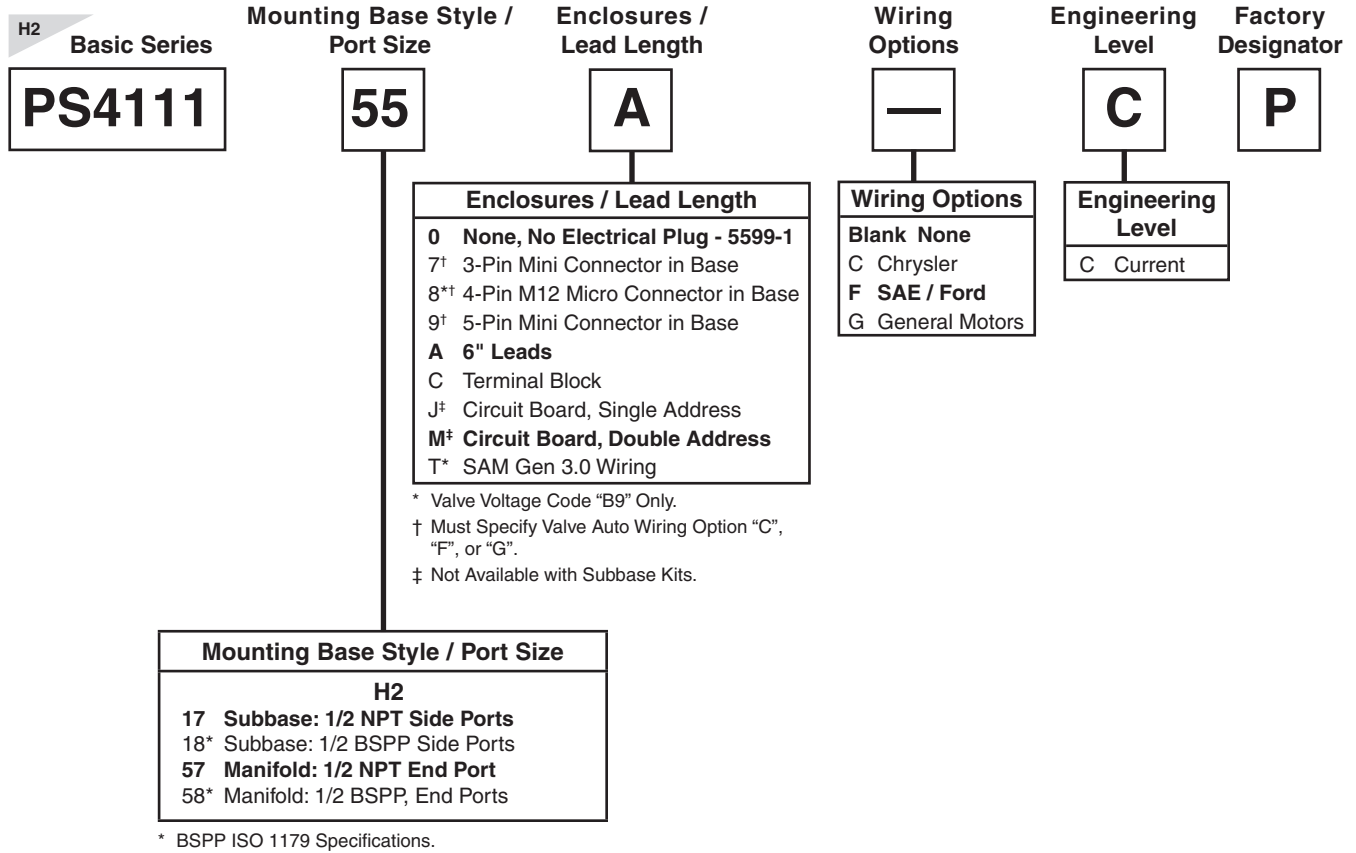


Model Number Index – 5599-2 Size 2

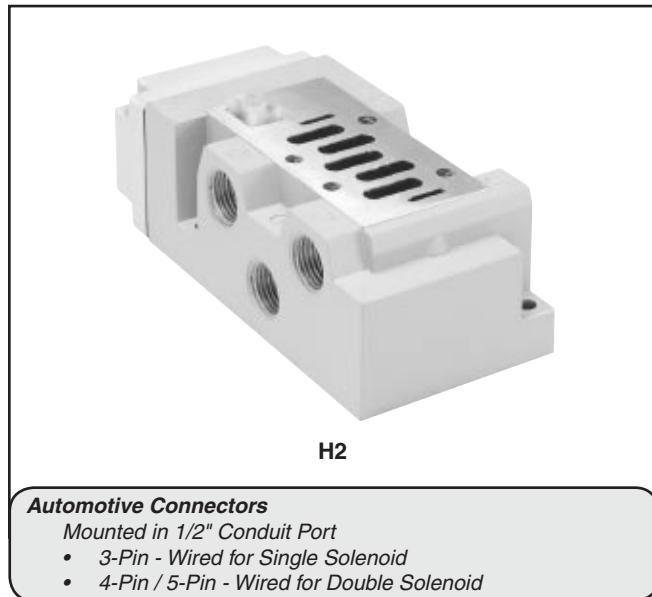


BOLD OPTIONS ARE MOST POPULAR

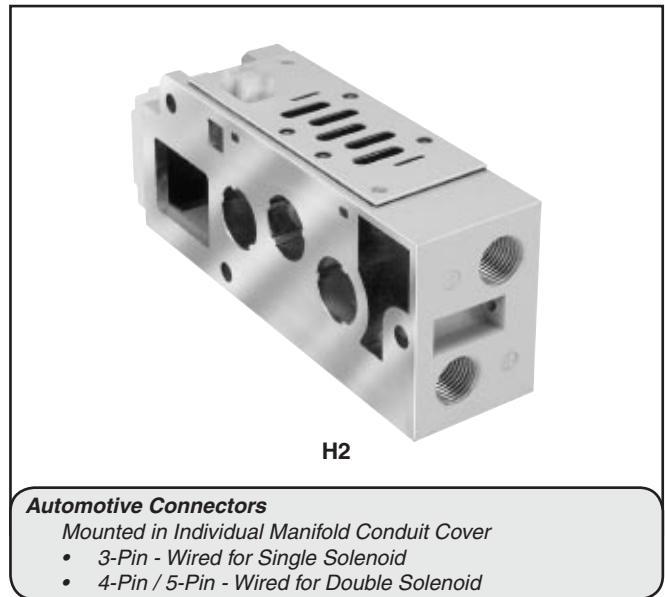
Manifold and Subbase Kit Ordering Code



Subbase Kits

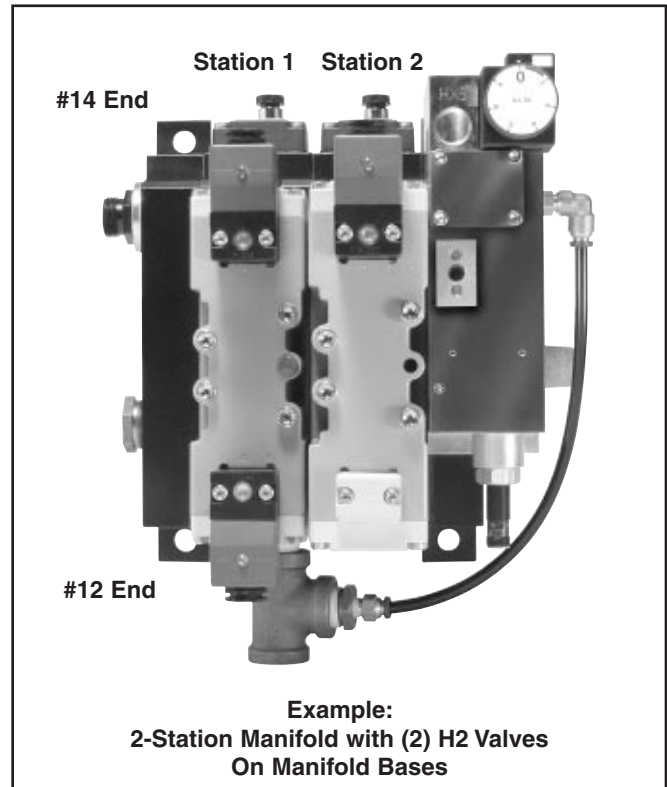


Manifold Kits

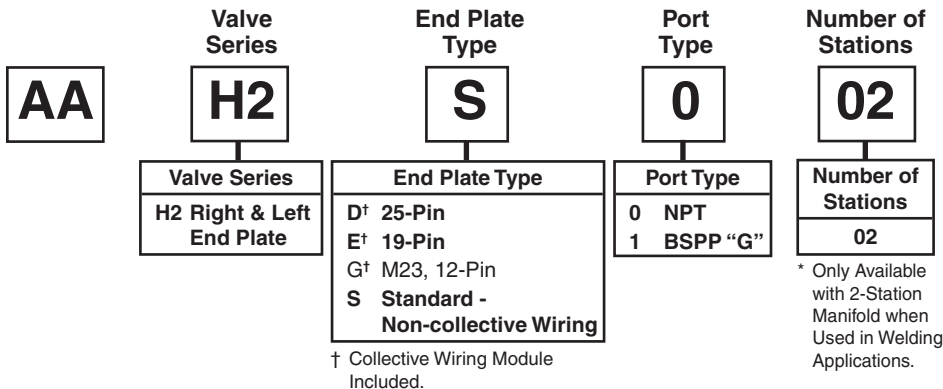


How To Order Add-A-Fold Assemblies

1. List Add-A-Fold Assembly call out. This automatically includes the end plate kit assembly.
2. List complete Valve and Base model number. List left to right, LOOKING AT THE CYLINDER PORTS on the #12 end of the manifold. The left most station is station 1.



Add-A-Fold Assembly Model Number



Example

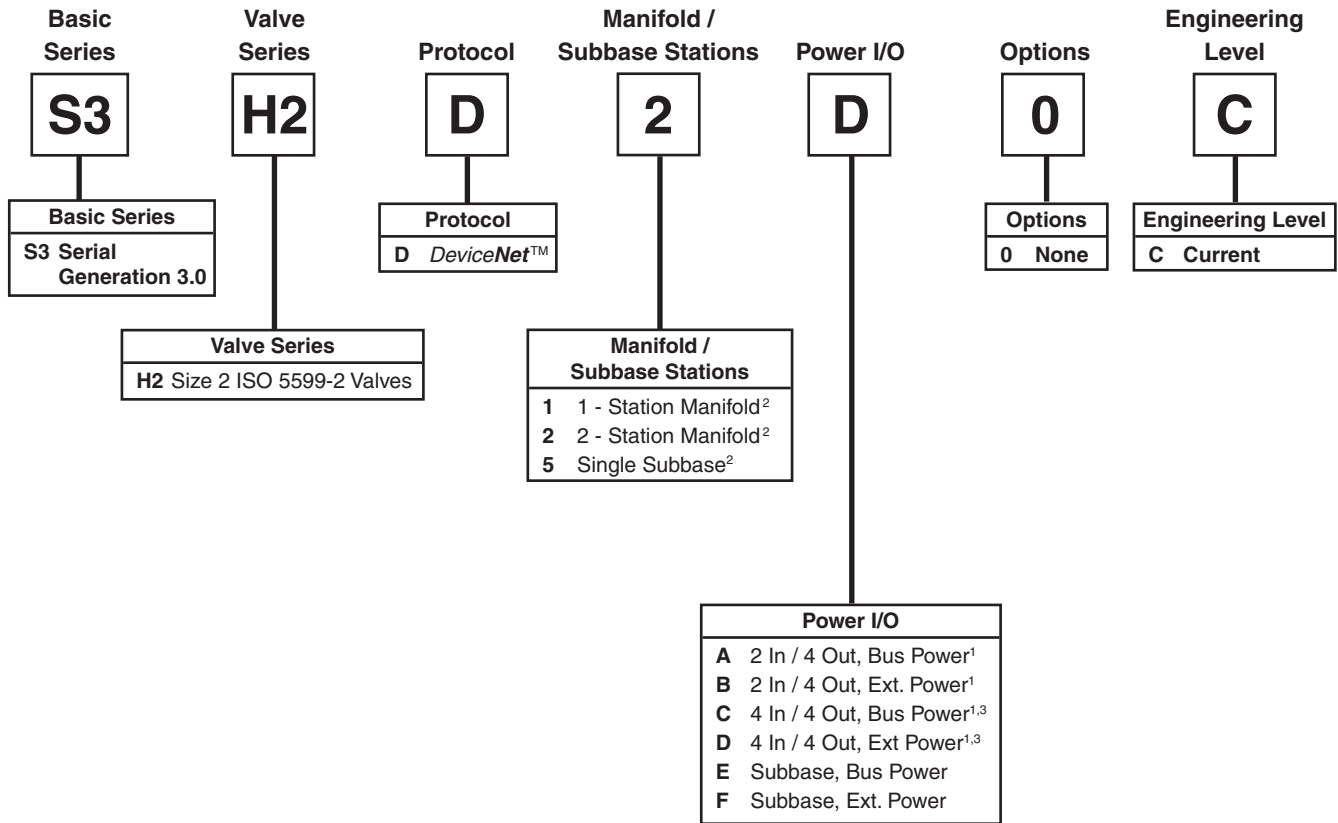
Application requires a 2-Station manifold with weld block and valves, and requires isolation between station 1 and 2 for port #3 galley only.

NOTE: Construct manifold assemblies from left to right while looking at the cylinder ports.

| Item | Qty. | Part No. |
|------|------|--|
| 01 | 1 | AAH2E002 |
| 02 | 1 | H22VXHG0B9C Station 1 & 2 |
| 03 | 2 | PS411157MCP Station 1 & 2 |
| 04 | 1 | WPJ1XXXN Station 2 |
| 05 | 1 | H2EVXHG0B9C Station 2 |
| 06 | 1 | PS3632P Galley 3 Isolation Between Station 1 & 2 |

Ordering Information

Model Number Index – Generation 3.0



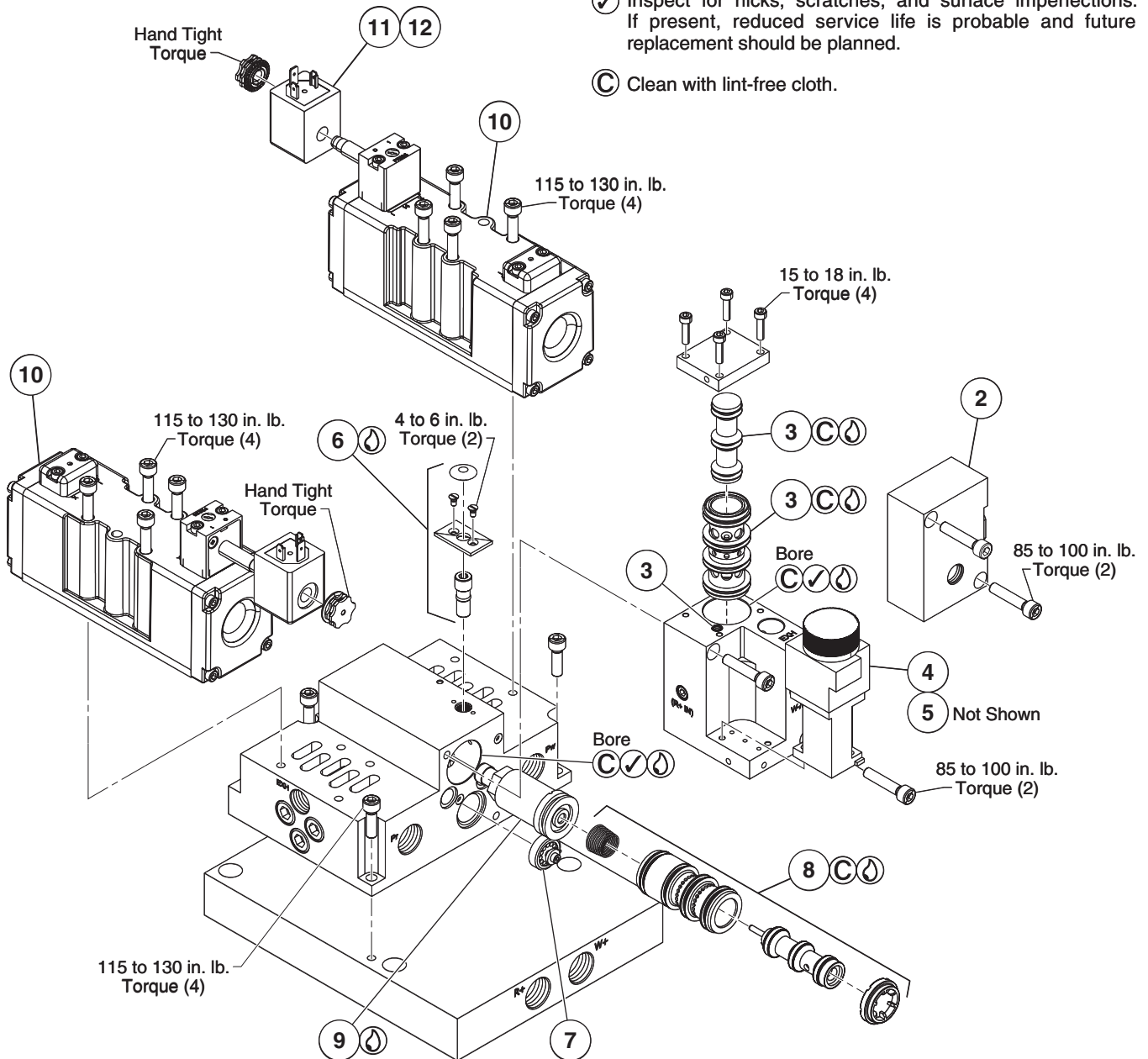
Notes:

1. Not available with single subbase option.
2. 2 inputs come standard with subbase or manifold options.
3. 2 additional auxiliary inputs can be ordered by selecting this option.

Replacement Components

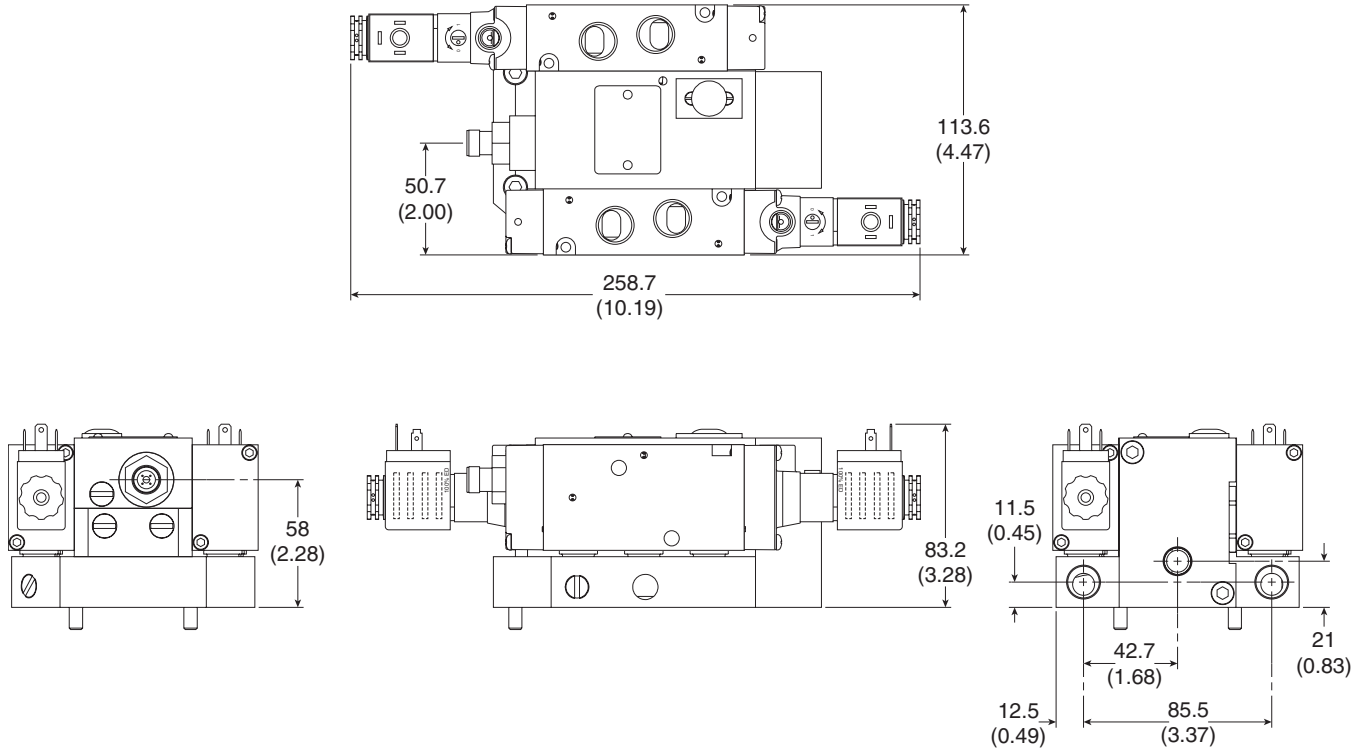
| Item | Kit Number | Description | Item | Kit Number | Description |
|------|------------|---|------|----------------|---|
| 1 | 6505953 | DP/DH Weld Block Sleeve Kit (1 pc.) (Not Shown) | 8 | 3087900 | Sensor Valve Kit |
| 2 | 3534400 | Quick Exhaust Kit - High Pressure | 9 | 3087800 | PNP 24 VDC Sensor Kit |
| 3 | 3538600 | High Flow Quick Exhaust Kit | 10 | See page 10 | ISO 2 Replacement Valve for WP/WH Weld Blocks |
| 4 | PRTF10 | Air Operated Timer for High Flow Quick Exh. | 11 | PS2828A49P | 24 VAC 30mm Coil Kit |
| 5 | WHQE49 | Sol. Oper. Kit for High Flow Quick Exh. 24VDC | 12 | PS2828619P | 24 VDC M12 Euro Coil Kit |
| 6 | 3059500 | Flow Control Kit | 13 | Contact Parker | B6 Replacement Valve for DP/DH Weld Blocks |
| 7 | 3059900 | Check Valve Kit | — | — | — |

- Ⓐ Lightly grease with provided lubricant.
- ✓ Inspect for nicks, scratches, and surface imperfections. If present, reduced service life is probable and future replacement should be planned.
- Ⓒ Clean with lint-free cloth.

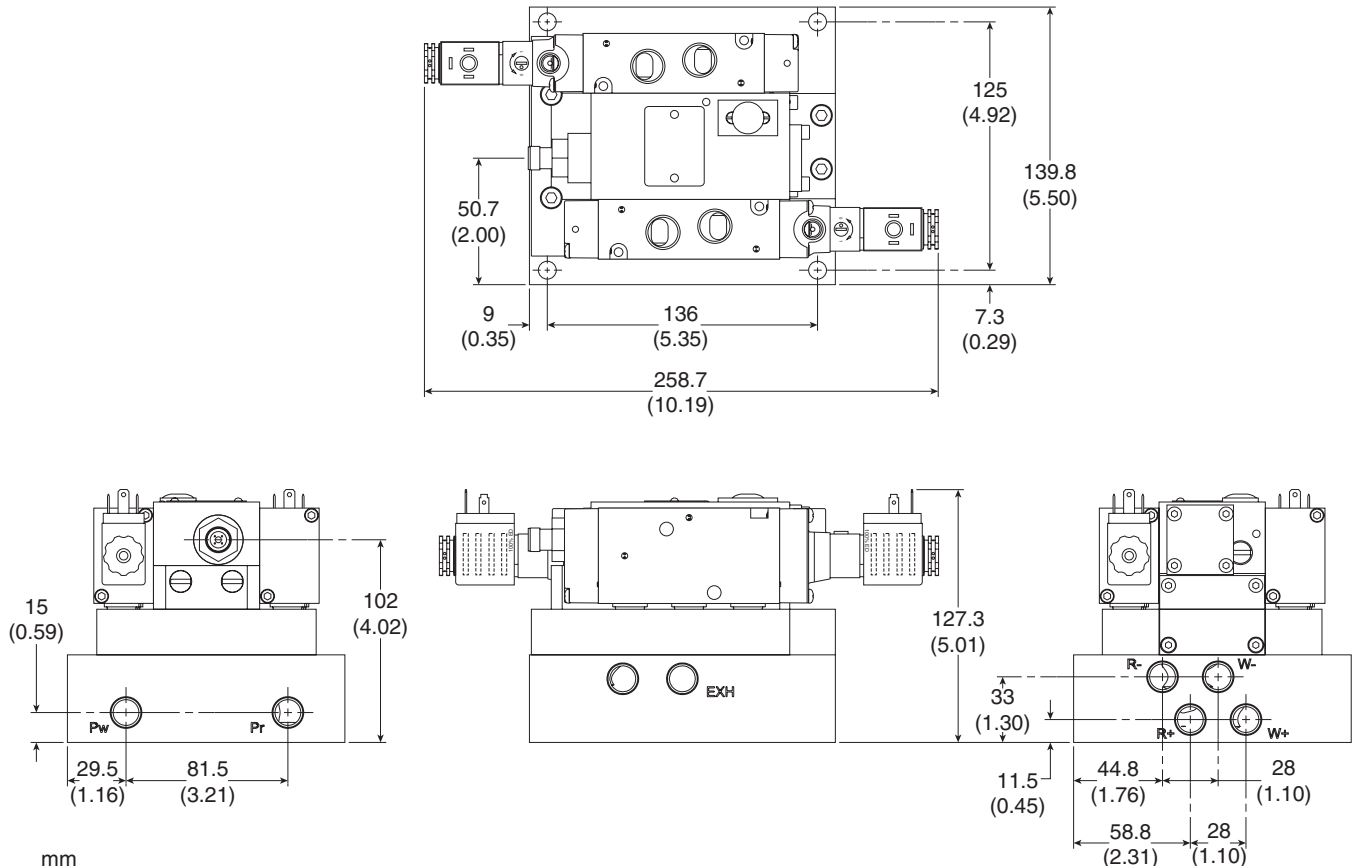


ISO 2 Weld Block - Exploded View

DH Series – 3 Ported Guns Dimensions



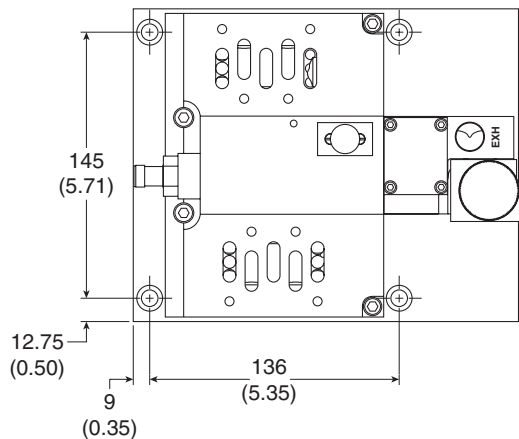
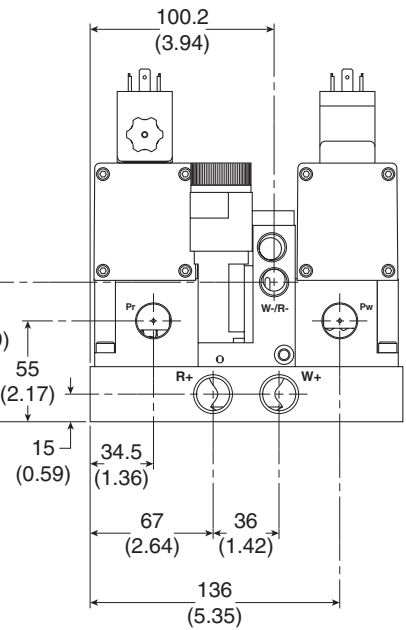
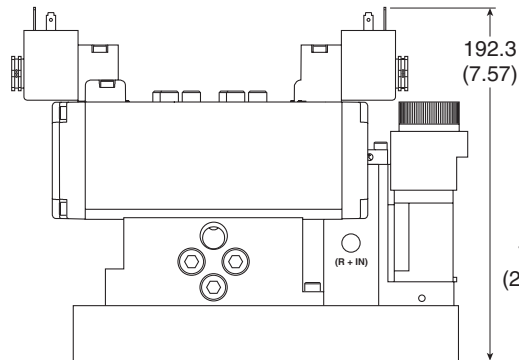
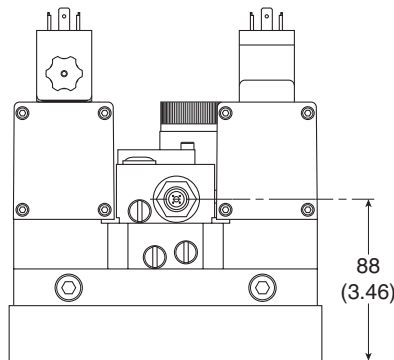
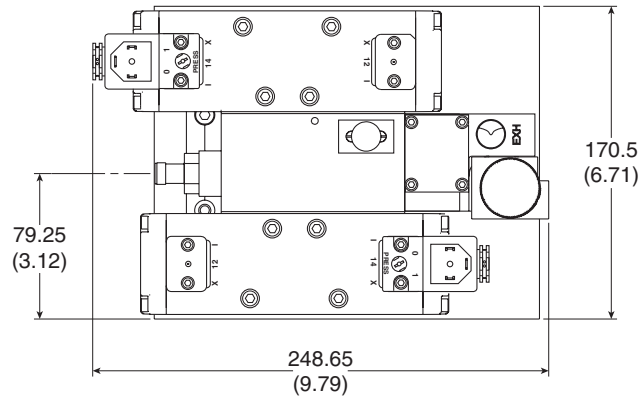
DP Series – 2 and 4 Ported Guns Dimensions



mm
(inches)

WH Series – For 3 Ported Gun Dimensions

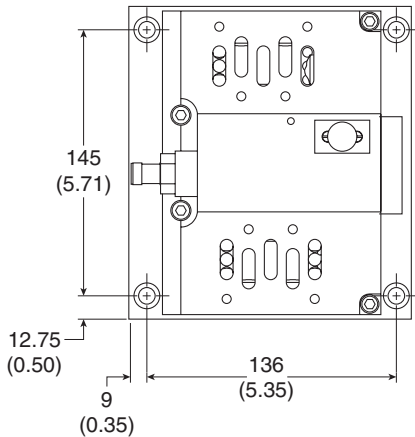
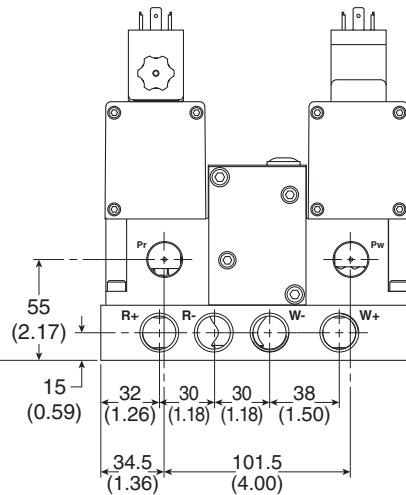
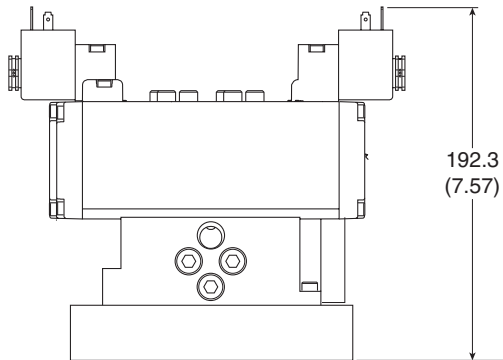
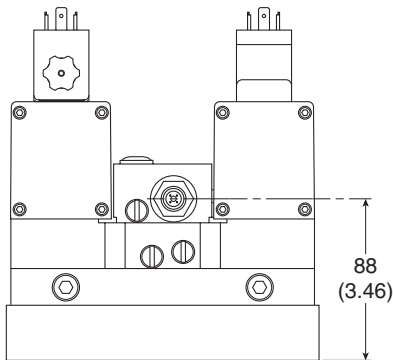
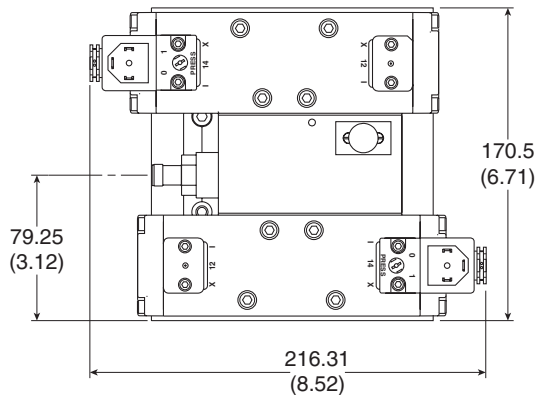
WH ISO Size 2 Cylinder & Base Plate Mountable



mm
(inches)

WH Series – For 3 Ported Gun Dimensions

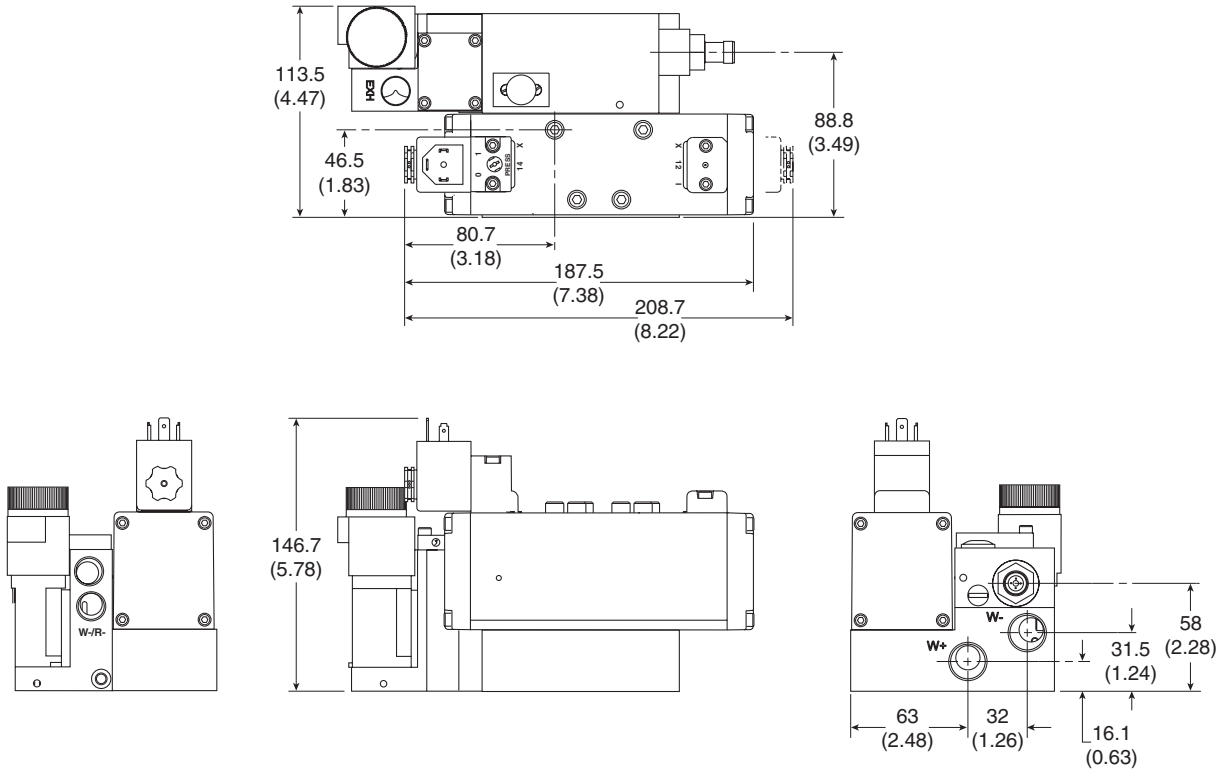
WP ISO Size 2 Cylinder & Base Plate Mountable



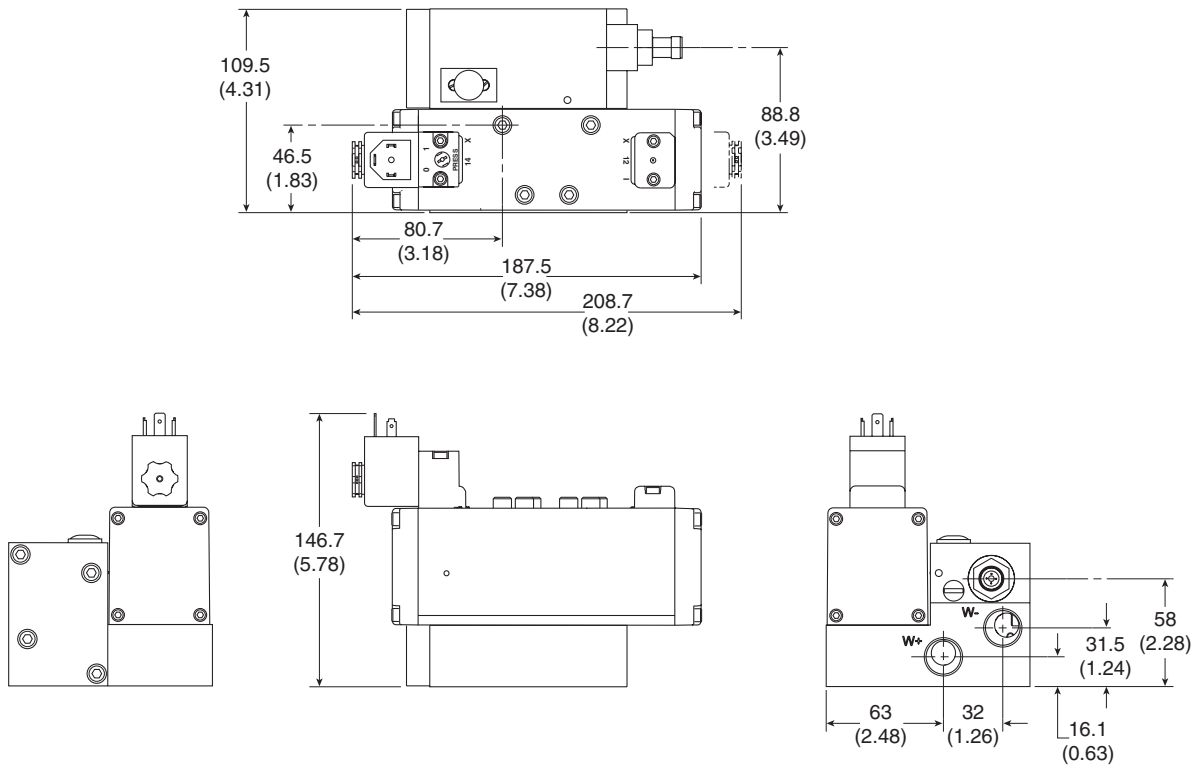
mm (inches)

WP Series – For 2 & 4 Ported Gun Dimensions

WH ISO Size 2 Manifold Mountable



WP ISO Size 2 Manifold Mountable



mm
(inches)

Scheduled Maintenance

Silencer – Periodic maintenance of the exhaust mufflers may be required. The frequency of maintenance depends on the environment and condition of the air supply.

Cautions

- Filtrate the inlet air to protect the weld block against contaminating matter typically found in compressed air systems (i.e. rust, water, compressor oil, or other foreign particles). A standard 40 micron filter is recommended.

If liquid aerosols, both water and oil, and submicron particulate matter need to be removed from your air system, then a coalescing filter is required.

- The inlet compressed air must be filtered, regulated, and periodically maintained to ensure maximum operating performance and warranty.

Weld Block Troubleshooting

Always verify that air and electrical are connected properly per Installation Instructions on page 4. At startup, cylinder should be open fully with no electrical signal to solenoids. All air lines, filters, regulators, tubing, hoses, fittings and electrical cables should be in good working condition as specified in automotive plant maintenance schedule.

1. Cylinder does not extend / retract.

- Does the cylinder move using manual overrides?
 - If yes, then check electrical conditions. Check the following:
 - Solenoid connections
 - Coils – replace if necessary
 - PLC program

- If no, does the cylinder move freely with air turned off?
 - If no, then cylinder should be repaired / replaced.
 - If yes, is the flow control open?
 - If no, open flow control. See Setup Instructions on page 5.
 - If yes, verify with gauges that there is pressure on back side of cylinder when valve shifts. There is a possibility that the metering of exhaust air on the front side of the cylinder, due to the flow control, is creating a “Joe Block” effect occurring between the piston face and cylinder. Contact Parker Representative for assistance.
 - If yes, replace valves on System

2. Cylinder tips close too fast / slow.

- Adjust flow control. See Setup Instructions on page 5.
- Quick Exhaust only – Adjust air timer on quick exhaust.
- Check muffler for proper operation. If covered with weld slag, then replace muffler.

3. Weld gun does not fire weld.

- Is cable connected to sensor?
 - If no, connect to sensor
 - If yes, is cable connected to PLC?
 - If no, wire to controller
 - If yes, check PLC program on location of weld signal to start weld. Also verify feedback sensor is operating properly.

4. Weld gun fires before tips are closed

- Adjust flow control so that weld tips close slower. See Setup Instructions on page 5.
- Is sensor input in the PLC correct? See Setup Instructions on page 5.

Warnings

WARNING

To avoid unpredictable system behavior that can cause personal injury and property damage:

- Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
- Disconnect air supply and depressurize all air lines connected to this product before installation, servicing, or conversion.
- Operate within the manufacturer’s specified pressure, temperature, and other conditions listed in these instructions.
- Medium must be moisture-free if ambient temperature is below freezing.
- Service according to procedures listed in these instructions.
- Installation, service, and conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversion, air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or the product does not operate properly, do not put into use.
- Warnings and specifications on the product should not be covered by paint, etc. If masking is not possible, contact your local representative for replacement labels.

WARNING

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.

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to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

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11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

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