



# PAL System - Valve Bases

## Valve Bases

The PAL Bases for valves can be provided with 3 or 4 positions. A version is available with an electrical connection for a single control of each position, suitable for 5/2 single solenoid valves or 3/2 high flow valves (physically impossible to install other valves). Another version comes with two electrical connections for each position and is suitable for all types of valves. The electronics in the base controls the signal coming from both the multi-pole connector and the fieldbus, so the base is the same, regardless of the control system of the island. The air delivery ports (ports 2 and 4) are made up of easy to replace cartridge-style push-in fittings.

| PAL System - Valve Bases                                                            |                           |          |                                                                                                                                                                             |              |                     |
|-------------------------------------------------------------------------------------|---------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------|
| Item                                                                                | Part No.                  | Price    | Description                                                                                                                                                                 | Weight (lbs) | Drawing Link        |
|    | <a href="#">PAL-B3314</a> | \$82.00  | NITRA pneumatic modular valve base, fiberglass-reinforced thermoplastic, (3) solenoid(s), (3) stations, (6) 1/4in push-to-connect outlet(s), IP65. For use with PAL series. | 0.6          | <a href="#">PDF</a> |
|   | <a href="#">PAL-B3614</a> | \$87.00  | NITRA pneumatic modular valve base, fiberglass-reinforced thermoplastic, (6) solenoid(s), (3) stations, (6) 1/4in push-to-connect outlet(s), IP65. For use with PAL series. | 0.6          | <a href="#">PDF</a> |
|  | <a href="#">PAL-B4414</a> | \$99.00  | NITRA pneumatic modular valve base, fiberglass-reinforced thermoplastic, (4) solenoid(s), (4) stations, (8) 1/4in push-to-connect outlet(s), IP65. For use with PAL series. | 0.75         | <a href="#">PDF</a> |
|  | <a href="#">PAL-B4814</a> | \$107.00 | NITRA pneumatic modular valve base, fiberglass-reinforced thermoplastic, (8) solenoid(s), (4) stations, (8) 1/4in push-to-connect outlet(s), IP65. For use with PAL series. | 0.75         | <a href="#">PDF</a> |

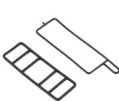
| Valve Flow Rate (scfm) @ 91.4 psi (6.3 bar) ΔP 14.5 psi (1 bar) |               |       |               |                  |             |
|-----------------------------------------------------------------|---------------|-------|---------------|------------------|-------------|
| Valve                                                           | Ø 4mm (5/32") | Ø 6mm | Ø 8mm (5/16") | Ø 1/4" (Default) | Ø 3/8"*     |
| 3-way/2-position                                                | 12.4          | 21.2  | 24.7          | 21.2             | 44.1        |
| 5-way/2-position                                                | 12.4          | 23.0  | 28.3          | 23.0             | 44.1 - 49.4 |
| 5-way/3-position                                                | 12.4          | 16.2  | 17.7          | 16.2             | 35.3 - 44.1 |
| PAL-V1-SR                                                       | -             | -     | -             | -                | 35.3        |
| * Using high-flow valves or connected valves with PAL-Y38       |               |       |               |                  |             |



Click the icon or scan the QR code to be taken to <https://www.automationdirect.com/selectors/pal> for our online PAL system Configuration Tool for further selection assistance.



# PAL System - Valve Bases

| PAL System - Valve Base Accessories                                               |                                  |         |                                                                                                                           |              |                            |
|-----------------------------------------------------------------------------------|----------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------|--------------|----------------------------|
| Item                                                                              | Part No.                         | Price   | Description                                                                                                               | Weight (lbs) | Drawing Link               |
|  | <a href="#"><u>PAL-PC04M</u></a> | \$22.00 | NITRA pneumatic push-to-connect cartridge, 5/32in (4mm) tubing. Package of 10. For use with PAL series valve bases.       | 0.25         | <a href="#"><u>PDF</u></a> |
|  | <a href="#"><u>PAL-PC06M</u></a> | \$22.00 | NITRA pneumatic push-to-connect cartridge, 6mm tubing. Package of 10. For use with PAL series valve bases.                | 0.2          | N/A                        |
|  | <a href="#"><u>PAL-PC08M</u></a> | \$22.00 | NITRA pneumatic push-to-connect cartridge, 5/16in (8mm) tubing. Package of 10. For use with PAL series valve bases.       | 0.15         | N/A                        |
|  | <a href="#"><u>PAL-PC14</u></a>  | \$22.00 | NITRA pneumatic push-to-connect cartridge, replacement, 1/4in tubing. Package of 10. For use with PAL series valve bases. | 0.2          | N/A                        |
|  | <a href="#"><u>PAL-ACC16</u></a> | \$11.50 | NITRA gasket, replacement. Package of 10. For use with PAL series base and valve.                                         | 0.05         | N/A                        |



# PAL System - Accessories and Mounting Options

| PAL System - Accessories |                           |         |                                                                                           |              |                     |
|--------------------------|---------------------------|---------|-------------------------------------------------------------------------------------------|--------------|---------------------|
| Item                     | Part No.                  | Price   | Description                                                                               | Weight (lbs) | Drawing Link        |
|                          | <a href="#">PAL-ACC01</a> | \$11.50 | NITRA base mount, panel. Package of 2. For use with PAL series. Mounting screws included. | 0.1          | <a href="#">PDF</a> |
|                          | <a href="#">PAL-ACC02</a> | \$2.00  | NITRA M8 protective cap, for use with PAL series.                                         | 0.05         | N/A                 |
|                          | <a href="#">PAL-ACC03</a> | \$1.00  | NITRA M12 protective cap, for use with PAL series.                                        | 0.05         | N/A                 |

## Mounting Options

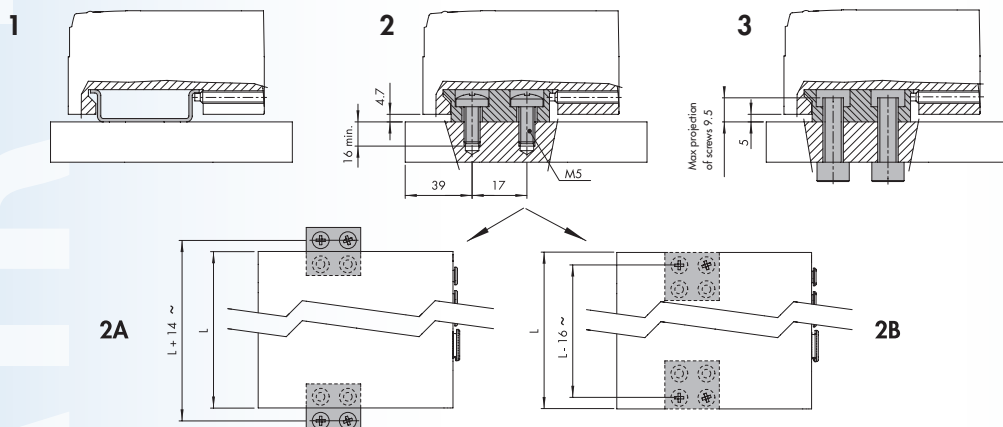
Using the [PAL-ACC01](#)

1. Mounting to DIN rail: tighten the set screws into modules E (electrical connection) and C (closed end plate).
2. Mounting on a flat surface: use the pair of brackets part number [PAL-ACC01](#) and the M5x20 screws supplied.

You can choose where to position the brackets in relation to the base:

- 2a. Protruding brackets: Can be used to install the base + brackets unit from above. First secure the brackets to the modules E and C using the set screws, then secure everything with M5x20 screws.
  - 2b. Concealed brackets: the overall dimensions of the base are reduced. First secure the brackets to the flat top with M5x20 screws, then place the base onto the brackets and lock the two set screws provided in the modules E and C.
3. Mounting through a wall: use the brackets part number [PAL-ACC01](#). The brackets come with M6 threaded holes and can be fixed with M6 screws (not included in the supply) passing through the wall. The brackets can fixed either protruded or concealed.

Note: Planar surfaces are required to ensure correct mounting. Avoid twisting or bending the valve units.



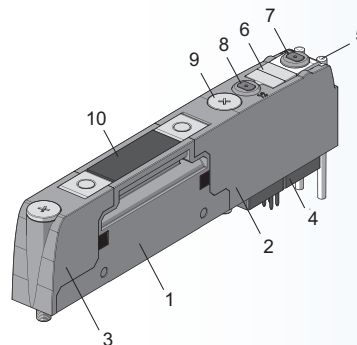


# PAL System - Solenoid Valves

## Solenoid Valves

The valves in the PAL system are designed to ensure high flow using only one small size valve (14 mm wide), without the need of installing a larger size one, to the benefit of component standardization. Models are available with all the main air supply diagrams - from 3/2 to 5/3. The valves are secured to the base with two sturdy M4 captive screws. They come with all the accessories that facilitate their use: manual control, LED light, plate with air supply diagram and technical data and white ID tags. The range also includes:

- High-flow valves which have an innovative system that reaches flow rates that are uncommon for this size of valve.
- Bypass element that makes it possible to boost supply and reliefs or create special pneumatic circuits.
- Circuit shut-off valve PAL-V1-SR to connect/disconnect all station valves.
- Blanking plate to plug blank base positions.



1. BODY: technopolymer
2. CONTROL: technopolymer
3. BASE: technopolymer
4. SOLENOID PILOT
5. DISPLAY: LED light and optical tester in technopolymer
6. TAG: removable
7. MANUAL CONTROL 14, for port 4: locking, brass
8. MANUAL CONTROL 12, for port 2: locking, brass
9. SCREW FOR MOUNTING TO THE BASE: M4 with PH 1 Phillips-head, galvanized steel. Max. torque: 1.2 Nm
10. TAG: technopolymer with laser-etched wording

| PAL System - Solenoid Valves                                                        |                                      |         |                                                                                                                                                                                         |              |                            |
|-------------------------------------------------------------------------------------|--------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------------------------|
| Item                                                                                | Part No.                             | Price   | Description                                                                                                                                                                             | Weight (lbs) | Drawing Link               |
|  | <a href="#"><u>PAL-V2-32C</u></a>    | \$45.00 | NITRA solenoid valve, modular, 3-way, 2-position, (2) N.C., single solenoid spring return, reinforced technopolymer body, IP65, locking manual override, Cv=0.64, 12-24 VDC.            | 0.2          | <a href="#"><u>PDF</u></a> |
|  | <a href="#"><u>PAL-V2-32A</u></a>    | \$50.00 | NITRA solenoid valve, modular, 3-way, 2-position, (2) N.O., single solenoid spring return, reinforced technopolymer body, IP65, locking manual override, Cv=0.64, 12-24 VDC.            | 0.2          | <a href="#"><u>PDF</u></a> |
|  | <a href="#"><u>PAL-V2-32C32A</u></a> | \$50.00 | NITRA solenoid valve, modular, 3-way, 2-position, (1) N.C. / (1) N.O., single solenoid spring return, reinforced technopolymer body, IP65, locking manual override, Cv=0.64, 12-24 VDC. | 0.2          | <a href="#"><u>PDF</u></a> |
|  | <a href="#"><u>PAL-V1-52</u></a>     | \$33.50 | NITRA solenoid valve, 5-way, 2-position, single solenoid spring return, reinforced technopolymer body, IP65, locking manual override, Cv=0.7, 12-24 VDC.                                | 0.15         | <a href="#"><u>PDF</u></a> |
|  | <a href="#"><u>PAL-V2-52</u></a>     | \$47.00 | NITRA solenoid valve, 5-way, 2-position, double solenoid, reinforced technopolymer body, IP65, locking manual override, Cv=0.7, 12-24 VDC.                                              | 0.2          | <a href="#"><u>PDF</u></a> |
|  | <a href="#"><u>PAL-V2-53C</u></a>    | \$50.00 | NITRA solenoid valve, 5-way, 3-position, center closed, double solenoid, reinforced technopolymer body, IP65, locking manual override, Cv=0.49, 12-24 VDC.                              | 0.2          | <a href="#"><u>PDF</u></a> |



Click the icon or scan the QR code to be taken to <https://www.automationdirect.com/selectors/pal> for our online PAL system Configuration Tool for further selection assistance.



# PAL System - Solenoid Valves

| PAL System - Solenoid Valves                                                        |                             |         |                                                                                                                                                                                         |              |                     |
|-------------------------------------------------------------------------------------|-----------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------|
| Item                                                                                | Part No.                    | Price   | Description                                                                                                                                                                             | Weight (lbs) | Drawing Link        |
|    | <a href="#">PAL-V1-32C</a>  | \$37.50 | NITRA solenoid valve, modular, 3-way, 2-position, (1) high-flow N.C., single solenoid spring return, reinforced technopolymer body, IP65, locking manual override, Cv=1.28, 12-24 VDC.  | 0.15         | <a href="#">PDF</a> |
|    | <a href="#">PAL-V1-32A</a>  | \$37.50 | NITRA solenoid valve, modular, 3-way, 2-position, (1) high-flow N.O., single solenoid spring return, reinforced technopolymer body, IP65, locking manual override, Cv=1.28, 12-24 VDC.  | 0.15         | <a href="#">PDF</a> |
|    | <a href="#">PAL-V1-SR</a>   | \$57.00 | NITRA solenoid bank shut-off pressure relief valve, 5-way, 2-position, single solenoid spring return, reinforced technopolymer body, IP65, locking manual override, Cv=1.07, 12-24 VDC. | 0.2          | <a href="#">PDF</a> |
|    | <a href="#">PAL-V0-PLUG</a> | \$6.75  | NITRA blanking plug, fiberglass reinforced plastic. For use with PAL series valve bases.                                                                                                | 0.1          | N/A                 |
|  | <a href="#">PAL-Y38</a>     | \$4.25  | NITRA pneumatic push-to-connect fitting, Y, reinforced technopolymer body, (2) 5/16in (8mm) plug-in to 3/8in push-to-connect.                                                           | 0.05         | <a href="#">PDF</a> |
|  | <a href="#">PAL-ACC17</a>   | \$5.25  | NITRA base screw, replacement. Package of 10. For use with PAL series.                                                                                                                  | 0.05         | N/A                 |

| PAL System - General Specifications                                         |                                 |                 |                                    |                              |
|-----------------------------------------------------------------------------|---------------------------------|-----------------|------------------------------------|------------------------------|
| Nominal Supply Voltage                                                      | 12 or 24 VDC                    |                 |                                    |                              |
| Minimum Operating Voltage                                                   | 10.8 V *                        |                 |                                    |                              |
| Maximum Operating Voltage                                                   | 31.2 V                          |                 |                                    |                              |
| Maximum Admissible Voltage                                                  | 32V **                          |                 |                                    |                              |
| Power for Each Controlled Pilot                                             | 3W for 15ms, then holding 0.3 W |                 |                                    |                              |
| Drive (for multi-pole)                                                      | PNP or NPN                      |                 |                                    |                              |
| Solenoid Rating                                                             | 100% ED                         |                 |                                    |                              |
| Operating Pressure                                                          |                                 |                 | 5/2 and 5/3                        | 3/2                          |
|                                                                             | Common supply                   | Port 1          | 3 to 8 bar (43 to 116 psi)         | 3.5 to 8 bar (51 to 116 psi) |
|                                                                             | Separate pilot supply           | Assisted valves | Vacuum to 10bar (Vacuum to 145psi) |                              |
|                                                                             |                                 | Pilot pressure  | 3 to 8 bar (43 to 116 psi)         |                              |
| * Minimum voltage 10.8V required at solenoid pilots.                        |                                 |                 |                                    |                              |
| ** IMPORTANT! Voltage greater than 32VDC can permanently damage the system. |                                 |                 |                                    |                              |



# PAL System - Solenoid Valves

## HOW TO GET HIGH-FLOW RATE FOR EACH PNEUMATIC FUNCTION

Note: The two cartridges on the base (2 and 4) must fit the Ø 8mm pipe.

Outputs 2 and 4 must be connected one to the other. To do this, you can use the special PAL-Y38 fitting.

When connecting one or more valves using the PAL-Y38 fitting, the pneumatic system functions must be configured according to the following diagram.

| Pneumatic function               | 3/2 NC<br>Part No.<br>PAL-V1-32C | 3/2 NO<br>Part No.<br>PAL-V1-32A | 5/2 Momentary<br>Part No.<br>PAL-V1-32C<br>PAL-V1-32A | 5/2 * Maintained<br>Part No.<br>PAL-V2-52<br>PAL-V2-52 | 5/3 OC (Open Center)<br>Part No.<br>PAL-V1-32C<br>PAL-V1-32C | 5/3 PC (Pressure Center)<br>Part No.<br>PAL-V1-32A<br>PAL-V1-32A | 5/3 CC* (Closed Center)<br>Part No.<br>PAL-V2-53C<br>PAL-V2-53C |
|----------------------------------|----------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------|
| Valves to be used                |                                  |                                  |                                                       |                                                        |                                                              |                                                                  |                                                                 |
| Y-fitting layout                 |                                  |                                  |                                                       |                                                        |                                                              |                                                                  |                                                                 |
| Flow rate at 6.3 ΔP 1 bar [SCFM] | 44.1                             | 44.1                             | 44.1                                                  | 49.4                                                   | 44.1                                                         | 44.1                                                             | 35.3                                                            |

In order to get 5/2 momentary, 5/2 maintained and 5/3 CC high flow, use two parallel valves, by energizing the solenoids simultaneously.

\* The PAL-Y38 fittings of this valve must be installed longitudinally with one PAL-Y38 fitting connecting the two outputs (2) and the other the two outputs (4). The solenoid pilots must be operated simultaneously.

## Solenoid Valve Diagrams

Diagram PAL-V2-32C

(2) 3-way, 2-pos, Single Solenoid, N.C.

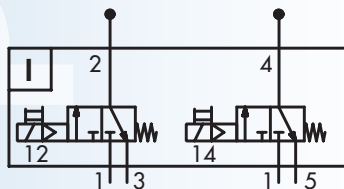


Diagram PAL-V2-32A

(2) 3-way, 2-pos, Single Solenoid, N.O.

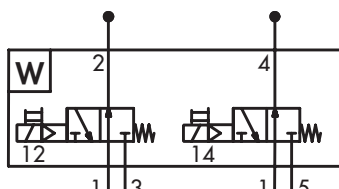


Diagram PAL-V2-32C32A

(2) 3-way, 2-pos, Single Solenoid, N.C./N.O.

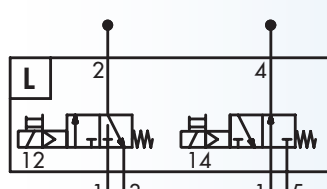


Diagram PAL-V1-52

5-way, 2-pos, Single Solenoid, non-locking

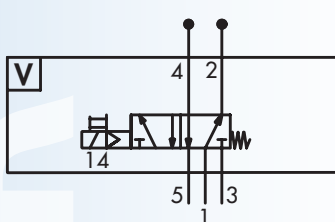


Diagram PAL-V2-52

5-way, 2-pos, Single Solenoid, locking

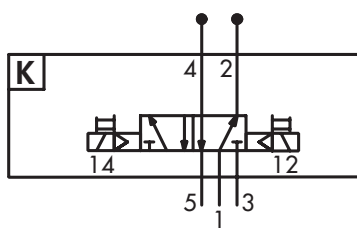


Diagram PAL-V2-53C

5-way, 3-pos, Double Solenoids, Center Closed

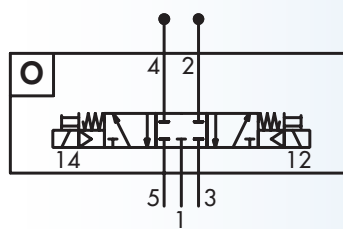


Diagram PAL-V1-32C

3-way, 2-pos, Single Solenoid, N.C., high flow

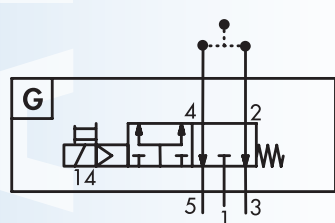


Diagram PAL-V1-32A

3-way, 2-pos, Single Solenoid, N.O., high flow

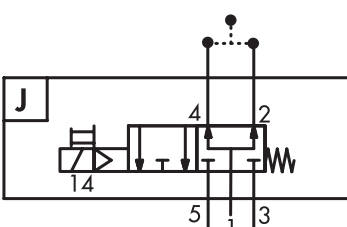
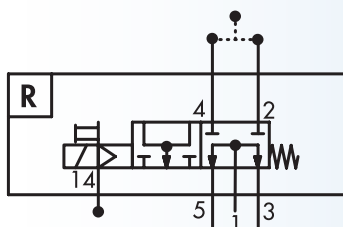


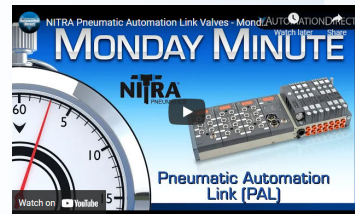
Diagram PAL-V1-SR

Shut-off Valve





# Pneumatic Automation Link (PAL)



Click on the thumbnail or go to  
<https://www.automationdirect.com/VID-PN-0055> for a  
 short video on the Nitra PAL system.

The Pneumatic Automation Link (PAL) system is defined as an electro-pneumatic system as it can contain both electrical I/O as well as a solenoid valve bank. In effect, a single assembly can combine solenoid valves of various types, digital or analog I/O and common power sources for all of the above.

Using a limited variety of basic components many different configurations can be built. Valves supported are compact yet have high flow ratings (Cv) and high performance. The system can be controlled by direct wiring if only pneumatic valves are used or via Ethernet/IP if a combination of electrical I/O and valves are part of your application. To simplify wiring and system design, DC power is connected through a central module using M8 connections. All PAL components come with an efficient diagnostic system.



Click or scan the QR code to be taken to <https://cdn.automationdirect.com/static/manuals/nitra-pal/nitrapal.html> for online PAL system Documentation including Manual and Module Options Insert.

## PAL System - General Specifications

|                                                                             |                                                            |                 |                                    |
|-----------------------------------------------------------------------------|------------------------------------------------------------|-----------------|------------------------------------|
| Nominal Supply Voltage                                                      | 12 or 24 VDC                                               |                 |                                    |
| Minimum Operating Voltage                                                   | 10.8 V *                                                   |                 |                                    |
| Maximum Operating Voltage                                                   | 31.2 V                                                     |                 |                                    |
| Maximum Admissible Voltage                                                  | 32V **                                                     |                 |                                    |
| Power for Each Controlled Pilot                                             | 3W for 15ms, then holding 0.3 W                            |                 |                                    |
| Drive (for multi-pole)                                                      | PNP or NPN                                                 |                 |                                    |
| Solenoid Rating                                                             | 100% ED                                                    |                 |                                    |
| Protection                                                                  | Overload and short-circuit protected solenoid pilot Output |                 |                                    |
| Maximum Number of Solenoid Pilots                                           | 21 or 38 multi-pole connection; field bus 128              |                 |                                    |
| Ambient Temperature                                                         | -10°C to + 50°C (at 8 bar) 14°F to 122°F (at 8 bar)        |                 |                                    |
| Operating Pressure                                                          |                                                            |                 | 5/2 and 5/3                        |
|                                                                             | Common supply                                              | Port 1          | 3 to 8 bar (43 to 116 psi)         |
|                                                                             | Separate pilot supply                                      | Assisted valves | Vacuum to 10bar (Vacuum to 145psi) |
|                                                                             |                                                            | Pilot pressure  | 3 to 8 bar (43 to 116 psi)         |
| Actuation Response Time (TRA) / Reset Response Time (TRR) at 6 bar          | TRA/TRR valve 2/2 and 3/2                                  |                 | 14 / 28 ms                         |
|                                                                             | TRA/TRR valves 5/2 monostable and shut-off valve           |                 | 12 / 45 ms                         |
|                                                                             | TRA/TRR valve 5/2 bistable                                 |                 | 12 / 14 ms                         |
|                                                                             | TRA/TRR valve 5/3                                          |                 | 15 / 45 ms                         |
|                                                                             | TRA/TRR valve 3/2 high flow                                |                 | 13 / 36 ms                         |
| Fluid                                                                       | Unlubricated air                                           |                 |                                    |
| Air Quality Required                                                        | ISO 8573-1 class 4-7-3                                     |                 |                                    |
| Degree of Protection                                                        | IP65 (with connectors connected or plugged if not used)    |                 |                                    |
| Agency Approvals                                                            | CE, cURus                                                  |                 |                                    |
| * Minimum voltage 10.8V required at solenoid pilots.                        |                                                            |                 |                                    |
| ** IMPORTANT! Voltage greater than 32VDC can permanently damage the system. |                                                            |                 |                                    |