




PAL System - I/O Modules

Signal Modules

The PAL systems can be configured with a variety of input or output signal modules, which can be mounted on systems with a fieldbus electrical connection. The signal modules can be added at any time. You only need to unscrew the aluminum plate to the left side of the electrical connection module and install the signal modules (mounting tie rods included) and retighten the end plate to the left.

| PAL System - Discrete Input Module | | | | | |
|---|--------------------------------|----------|--|--------------|---------------------|
| Item | Part No. | Price | Description | Weight (lbs) | Drawing Link |
|  | PAL-S01 | \$276.00 | NITRA discrete input module, 8-point, 12-24 VDC, PNP/NPN, 1 common(s), 8 point(s) per common, IP65. For use with PAL series. Mounting hardware included. Requires PAL-EIP bus coupler. | 0.6 | PDF |



| PAL System - Discrete Input Module Specifications | |
|---|---|
| Sensors Supply Voltage | Corresponding to the supply voltage |
| Current for Each Connector | 200mA max |
| Current for Each Module | 500mA max |
| Input Impedance | 3.9 kΩ |
| Type of Input | Software-configurable PNP/NPN |
| Protection | Overload and short-circuit protected inputs |
| Connections | 8 M8 3-pole female connectors |
| Input Active Signals | One LED for each input |



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 - I/O Modules

| PAL System - Discrete Output Modules | | | | | |
|---|-------------------------|----------|--|--------------|---------------------|
| Item | Part No. | Price | Description | Weight (lbs) | Drawing Link |
|  | PAL-S02 | \$279.00 | NITRA discrete output module, 8-point, 12-24 VDC, PNP/NPN, 1 common(s), 8 point(s) per common, 1A/point, 4A/common, short circuit and overload protection, IP65. Mounting hardware included. Requires PAL-EIP bus coupler. | 0.6 | PDF |
|  | PAL-S03 | \$287.00 | NITRA discrete output module, 6-point, 12-24 VDC, PNP/NPN, 1 common(s), 6 point(s) per common, 1A/point, 4A/common, short circuit and overload protection, IP65. Mounting hardware included. Requires PAL-EIP bus coupler and power cable. | 0.6 | PDF |



| PAL System - Discrete Output Module Specifications | | |
|---|---|--|
| | PAL-S02 | PAL-S03 |
| Supply Voltage Range | N/A | 12V -10% 24V +30% |
| Minimum Operating Voltage | N/A | 10.8 V* |
| Maximum Operating Voltage | N/A | 31.2 V |
| Maximum Admissible Voltage | N/A | 32V ** |
| Output Voltage | Corresponding to the supply voltage | |
| Current for Each Connector | 500mA max | 1000mA max |
| Current for Each Module | 3000mA max | 4000mA max |
| Type of Output | Software-configurable PNP/NPN | |
| Protection | Overload and short-circuit protected inputs | |
| Connections | 8 M8 3-pole female connectors | 6 M8 3-pole female connectors for Signals 1 M8 4-pole male connector for Supply |
| Status Indicator | One LED for each output | |
| * Minimum voltage 10.8V required at solenoid pilots. | | |
| ** IMPORTANT! Voltage greater than 32VDC can permanently damage the system. | | |



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PAL System - I/O Modules

| PAL System - Analog Modules | | | | | |
|---|-------------------------|----------|---|--------------|---------------------|
| Item | Part No. | Price | Description | Weight (lbs) | Drawing Link |
|  | PAL-S04 | \$313.00 | NITRA pneumatic automation link (PAL) analog input module, 4-channel, current/voltage, 15-bit, IP65. Requires PAL-EIP bus coupler. | 0.55 | PDF |
|  | PAL-S05 | \$404.00 | NITRA pneumatic automation link (PAL) analog output module, 4-channel, current/voltage, 15-bit, IP65. Requires PAL-EIP bus coupler. | 0.55 | PDF |



| PAL System - Analog Module Specifications | | |
|---|---|---|
| | PAL-S04 | PAL-S05 |
| Supply Voltage Range | Corresponding to the supply voltage | |
| Current for Each Connector | 200mA max | |
| Current for Each Module | 650mA max | |
| Type of Input | Software configurable: 0/10 V; 0/5 V; +/-10 V; +/-5 V; 4/20 mA; 0/20 mA | N/A |
| Type of Output | N/A | Software configurable: 0/10 V; 0/5 V; +/-10 V; +/-5 V; 4/20 mA; 0/20 mA |
| Protection | Overload and short-circuit protected inputs | |
| Connections | 4 M8 4-pin female connectors | |
| Signal Indicator | One LED for each input or output | |
| Digital Convert Resolution | 15 bit + prefix | |



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PAL System - I/O Modules

| PAL System - Wired Discrete Modules | | | | | |
|---|-------------------------|----------|--|--------------|---------------------|
| Item | Part No. | Price | Description | Weight (lbs) | Drawing Link |
|  | PAL-S06 | \$313.00 | NITRA discrete input module, 16-point, 12-24 VDC, PNP/NPN, 1 common(s), 16 point(s) per common, IP40. For use with PAL series. Mounting hardware included. Requires PAL-EIP bus coupler. | 0.5 | PDF |
|  | PAL-S07 | \$424.00 | NITRA discrete output module, 16-point, 12-24 VDC, PNP/NPN, 1 common(s), 16 point(s) per common, 0.5A/point, 3A/common, short circuit and overload protection, IP40. Mounting hardware included. Requires PAL-EIP bus coupler. | 0.5 | PDF |

| PAL System - Wired Discrete Module Specifications | | |
|---|---|-------------------------------------|
| | PAL-S06 | PAL-S07 |
| Supply Voltage Range | Corresponding to the supply voltage | N/A |
| Output Voltage | N/A | Corresponding to the supply voltage |
| Current for Each Connector | 200mA max | 500mA max |
| Current for Each Module | 500mA max | 3000mA max* |
| Input Impedance | 3.9 kΩ | N/A |
| Type of Input | Software-configurable PNP/NPN | N/A |
| Type of Output | N/A | Software-configurable PNP/NPN |
| Protection | Overload and short-circuit protected inputs | |
| Connections | 4 12-pin connectors with spring clamping | |
| Maximum Wire Size | 20 AWG (0.5 mm²) | |
| Status Indicator | One LED for each input or output | |
| Degree of Protection | IP40 | |
| * IMPORTANT: the module is powered via the fieldbus. Check that the total current of connected outputs is not greater than 3.5 A. | | |




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PAL System - I/O Modules

PAL System - Temperature Input Module

| Item | Part No. | Price | Description | Weight (lbs) | Drawing Link |
|---|-----------------------|----------|---|--------------|---------------------|
|  | <u>PAL-S08</u> | \$519.00 | NITRA temperature input module, RTD/thermocouple, 4-channel, 15-bit resolution, IP65. Mounting hardware included. Requires PAL-EIP bus coupler. | 0.55 | PDF |

PAL System - Temperature Input Module Specifications

| | |
|--|--|
| Sensors Supply Voltage | Corresponding to the supply voltage |
| Maximum Input Voltage | 30VDC |
| Sensor Type (RTD) | Platinum (-200 to +850°C): Pt100, Pt200, Pt500, Pt1000 (TK = 0.00385 and TK = 0.00391) Nickel (-60 to +180°C): Ni100, Ni120, Ni500, Ni1000 (TK = 0.00618) |
| Connections Type (RTD) | 2, 3 or 4-wire |
| Type of Thermocouple (TC) | J, E, T, K, N, S, B, R |
| Cold Junction Compensation for Thermocouples | Internal: With internal electronic sensor included External (recommended in case of sudden changes in the ambient temperature): PT1000 sensor for connection with the M8 thermocouple connector |
| Temperature Range | -200 to + 800 °C (-328 to + 1472 °F) |
| Digital Convert Resolution | 15 bit + prefix |
| Max Error Compared to Ambient Temperature | ±0.5% (TC) ±0.06% (RTD) |
| Max. Basic Error (Ambient T 25°C) | ±0.6 °C (with 4-wire RTD with 0.1 resolution) ±0.2 °C (with 4-wire RTD with 0.01 resolution) |
| Repeatability (Ambient T 25°C) | ±0.03% |
| Address Employment | 2 bytes for each input - 8 bytes per module |
| Cycle time (Module) | 240ms |
| Software Linearization | For RTD: Piecewise linear approximation For TC: NIST (National Institute of Standards and Technology) Linearization based on ITS-90 scale (International Temperature Scale of 1990) for the thermocouple linearization |
| Maximum Length of Shielded Cable for the Connection | < 30m |
| Status Indicator | One LED for each input and reporting to the Master |



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PAL System - Accessories and Mounting Options

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

Mounting Options

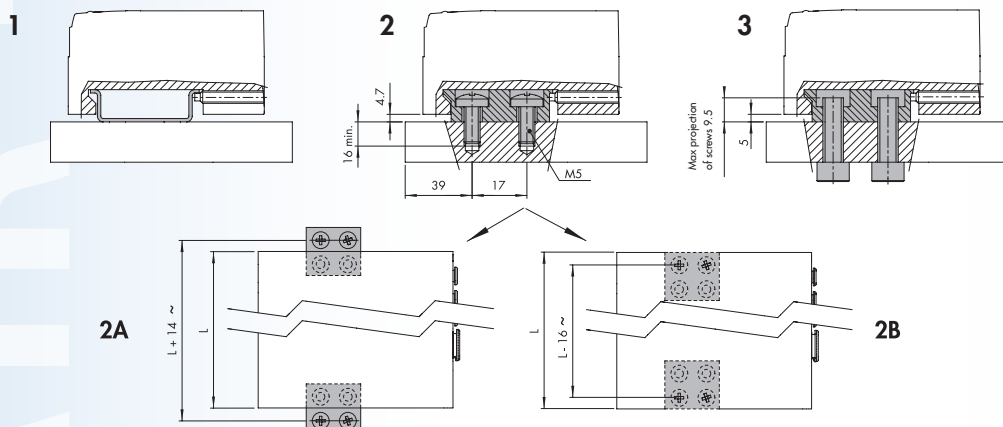
Using the [PAL-ACC01](#)

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:

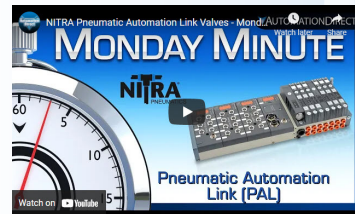
- 2a. Protruding brackets: Can be used to install the base + brackets unit from above. First secure the brackets to the modules E and C using the set screws, then secure everything with M5x20 screws.
 - 2b. Concealed brackets: the overall dimensions of the base are reduced. First secure the brackets 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.





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 | 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) | |
| 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. | | | | |