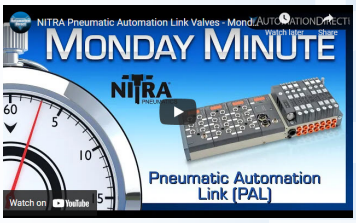
Pneumatic Automation Link (PAL)





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/nitrapal/nitrapal.html for online PAL system Documentaiton 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.*

PAL System - EtherNet/IP Modules

EtherNet/IP Bus Couplers and Conventional Electrical Modules

Control interface with the PAL system is via one of the units shown below. If I/O modules are to be used, the PAL-EIP bus coupler is required and EtherNet/IP communications is used. For pneumatic only systems, one of the electrical connection modules can be used.

PAL System - EtherNet/IP Modules						
Item	*Part No.*	*Price*	*Description*	*Electrical Cables*	*Weight (lbs)*	*Drawing Link*
	***PAL-EIP***	$535.00	NITRA bus coupler, 12-24 VDC, (2) Ethernet 10/100Base-T (M12) port(s), EtherNet/IP, 10/100 Mbps, (128) solenoid(s) per system, IP65. For use with PAL series. Requires 4-pin M8 power cable.	Power: 4-Pole Pico (M8) cable EtherNet: M12 4-Pole, D-Coded cable	1.05	PDF
	***PAL-EAD***	$264.00	NITRA local expansion coupler, 12-24 VDC, (1) 4-pin M8 quick-disconnect port(s), number of solenoid(s) inclusive of main system, IP65. For use with PAL series. Requires 4-pin M8 power cable.		1	PDF
PAL System - Conventional Electrical Modules						
	***PAL-E25***	$121.00	NITRA electrical connection module, 12-24 VDC, (21) solenoid(s), IP65. For use with PAL series. Requires PAL series 25-pin male D-sub control cable.	Listed below	0.5	PDF
	***PAL-E44***	$127.00	NITRA electrical connection module, 12-24 VDC, (38) solenoid(s), IP65. For use with PAL series. Requires PAL series 44-pin male D-sub control cable.		0.5	PDF

PAL System - EtherNet/IP Module Specifications	
Maximum Admissible Current (PAL-EIP, PAL-EAD)	4A continuous, 6A instantaneous for valve supply 4A continuous, 6A instantaneous for bus and signal supply
Maximum Admissible Current (PAL-E25, PAL-E44)	With multi-pole connection 6A continuous, 9A instantaneous With fieldbus connection 4A continuous, 6A instantaneous for valve supply; 4A continuous, 6A instantaneous for bus and signal supply
Protection	Overload and short-circuit protected solenoid pilot Output
Diagnostics	LED signal on valve, LED on electrical connection and software message regarding: short-circuited solenoid pilot; solenoid pilot with coil failure; voltage out of range (undervoltage and overvoltage); module communication control; on switching, configuration other than that stored
Maximum Number of Solenoid Pilots	128
Maximum number of simultaneously controllable solenoid pilots*	38
Maximum Number of I/O	128 digital inputs, 128 digital outputs, 16 analog inputs, 16 analog outputs
Maximum Number of Modules	40 Bases for valves + 16 digital inputs + 16 digital outputs + 4 analog inputs + 4 analog outputs
Maximum Number of Class 1 Input Only/Listen Only Connections	8
Maximum Number of Class 3 Connections	8
Maximum Number of Concurrent TCP Connections (thinking of resources for Unconnected Explicit Messaging)	30
****Note - To actuate a greater number of solenoid pilots at the same time, Intermediate module PAL-M12P with electrical connection must be added.***	

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 - EtherNet/IP Modules

The cables listed below were designed to fit the electrical connection modules and maintain IP65 protection.

Electrical Module Power Cables						
Item	**Part No.**	**Price**	**Description**	**Length**	**Weight (lbs)**	**Drawing Link**
	**PAL-ACC04**	$44.00	NITRA control cable, 25-pin D-sub right-angle female to pigtail, IP65, 3.2ft [1m] cable length. For use with PAL-E25 electrical connection module.	3.2 ft (1m)	0.40	PDF
	PAL-ACC05	$60.00	NITRA control cable, 25-pin D-sub right-angle female to pigtail, IP65, 8.2ft [2.5m] cable length. For use with PAL-E25 electrical connection module.	8.2 ft (2.5 m)	0.85	PDF
	PAL-ACC06	$78.00	NITRA control cable, 25-pin D-sub right-angle female to pigtail, IP65, 16.4ft [5m] cable length. For use with PAL-E25 electrical connection module.	16.4 ft (5m)	1.60	PDF
	**PAL-ACC07**	$58.00	NITRA control cable, 44-pin D-sub right-angle female to pigtail, IP65, 3.2ft [1m] cable length. For use with PAL-E44 electrical connection module.	3.2 ft (1m)	0.65	PDF
	PAL-ACC08	$81.00	NITRA control cable, 44-pin D-sub right-angle female to pigtail, IP65, 8.2ft [2.5m] cable length. For use with PAL-E44 electrical connection module.	8.2 ft (2.5 m)	1.40	PDF
	PAL-ACC09	$105.00	NITRA control cable, 44-pin D-sub right-angle female to pigtail, IP65, 16.4ft [5m] cable length. For use with PAL-E44 electrical connection module.	16.4 ft (5m)	2.65	PDF

EtherNet/IP Wiring

Connection to the network

IN or P1 (M12 female connector, D encoding)

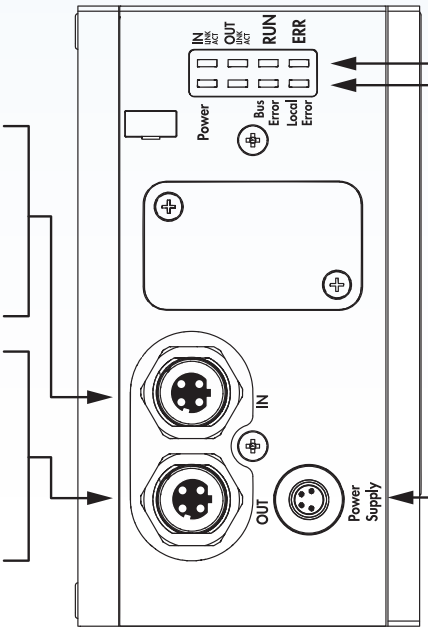


1 = TD+
2 = RD+
3 = TD-
4 = RD-
Metal ring nut = Shield

OUT or P2 (M12 female connector, D encoding)



1 = TD+
2 = RD+
3 = TD-
4 = RD-
Metal ring nut = Shield



Diagnostic signaling LED

Net diagnostic signaling LED

Power Supply (M8 male connector)

Connection for node power supply and auxiliary valve power supply



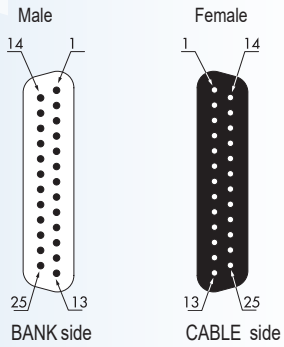
1 = +24V bus (Brown)
2 = +24V valve (White)
3 = GND (Blue)
4 = GND (Black)

AIR - PLC - I/O

PAL System - EtherNet/IP Modules

Wiring

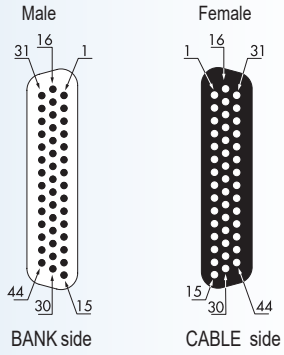
D-SUB 25-PIN CONNECTOR



PIN	Color of the corresponding wire (DIN 47100)	Function
1	White	1
2	Brown	2
3	Green	3
4	Yellow	4
5	Grey	5
6	Pink	6
7	Blue	7
8	Red	8
9	Black	9
10	Violet	10
11	Grey + Pink ring	11
12	Red + Blue ring	12
13	White + Green ring	13

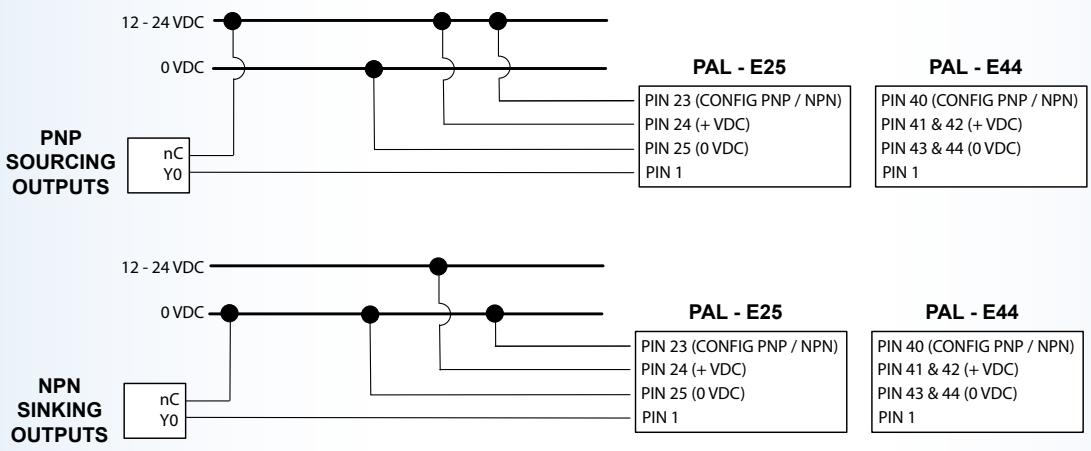
PIN	Color of the corresponding wire (DIN 47100)	Function
14	Brown + Green ring	14
15	White + Yellow ring	15
16	Yellow + Brown ring	16
17	White + Grey ring	17
18	Grey + Brown ring	18
19	White + Pink ring	19
20	Pink + Brown ring	20
21	White + Blue ring	21
22	Brown + Blue ring	Fault reporting
23	White + Red ring	* Config. PNP/NPN
24	Brown + Red ring	+VDC
25	White + Black ring	0VDC

D-SUB 44-PIN CONNECTOR



PIN	Color of the corresponding wire (DIN 47100)	Function
1	White	1
2	Brown	2
3	Green	3
4	Yellow	4
5	Grey	5
6	Pink	6
7	Blue	7
8	Red	8
9	Black	9
10	Violet	10
11	Grey + Pink ring	11
12	Red + Blue ring	12
13	White + Green ring	13
14	Brown + Green ring	14
15	White + Yellow ring	15
16	Yellow + Brown ring	16
17	White + Grey ring	17
18	Grey + Brown ring	18
19	White + Pink ring	19
20	Pink + Brown ring	20
21	White + Blue ring	21
22	Brown + Blue ring	22

PIN	Color of the corresponding wire (DIN 47100)	Function
23	White + Red ring	23
24	Brown + Red ring	24
25	White + Black ring	25
26	Brown + Black ring	26
27	Grey + Green ring	27
28	Yellow + Grey ring	28
29	Pink + Green ring	29
30	Yellow + Pink ring	30
31	Green + Blue ring	31
32	Yellow + Blue ring	32
33	Green + Red ring	33
34	Yellow + Red ring	34
35	Green + Black ring	35
36	Yellow + Black ring	36
37	Grey + Blue ring	37
38	Pink + Blue ring	38
39	Grey + Red ring	Fault reporting
40	Pink + Red ring	* Config. PNP/NPN
41	Grey + Black ring	+VDC
42	Pink + Black ring	+VDC
43	Blue + Black ring	0VDC
44	Red + Black ring	0VDC



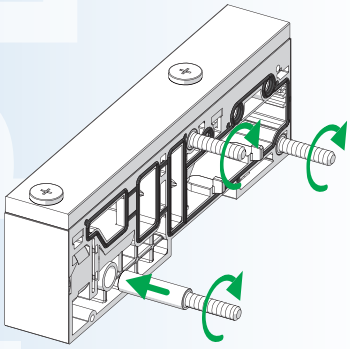
PAL System - Closed End Spacer

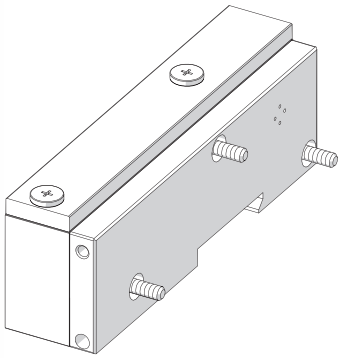
Closed End Spacer Module

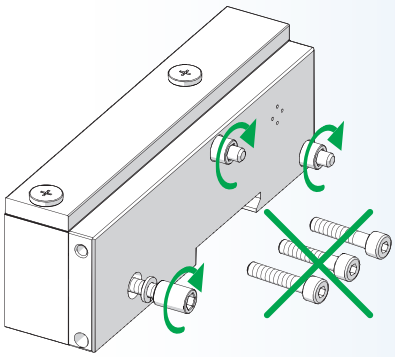
To use the PAL system bank without pneumatics the closed end spacer module is needed. Only one module per bank required.



PAL System - Closed End Spacer Module					
Item	***Part No.***	***Price***	***Description***	***Weight (lbs)***	***Drawing Link***
	***PAL-SPC***	$35.50	NITRA closed end spacer, IP65. For use with PAL series assemblies without pneumatics.	0.4	PDF







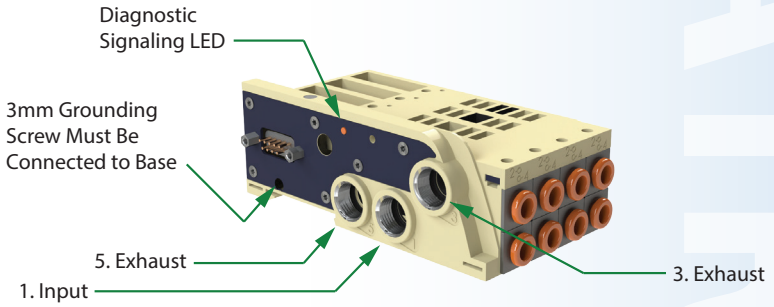
Note: Version used to make up a PAL Base without pneumatic valves, but only with "S" signal modules and fieldbus or additional electrical connection "E". Pneumatic bases and valves cannot be added.

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 - Stand-Alone Valve Bases

Conventional Stand-Alone Valve Bases

The PAL stand-alone base is a 4-position electro-pneumatic manifold base for PAL valves, available in 2 configurations, with 4 or 8 controls for solenoid pilots. Up to 4 valves with one solenoid pilot can be installed on the manifold base with 4 controls, and up to 4 valves with one or two solenoid pilots can be installed on the manifold base with 8 controls.

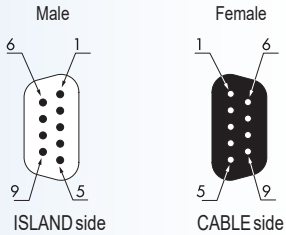


PAL System - Stand-Alone Valve Bases

Item	Part No.	Price	Description	Weight (lbs)	Drawing Link
	PAL-CB4414	$135.00	NITRA pneumatic stand-alone valve base, fiberglass-reinforced thermoplastic, (4) solenoid(s), (4) stations, (1) 1/4in female NPT inlet(s), (8) 1/4in push-to-connect outlet(s), (2) 1/4in female NPT exhaust(s), IP65. For use with PAL series.	0.85	PDF
	PAL-CB4814	$154.00	NITRA pneumatic stand-alone valve base, fiberglass-reinforced thermoplastic, (8) solenoid(s), (4) stations, (1) 1/4in female NPT inlet(s), (8) 1/4in push-to-connect outlet(s), (2) 1/4in female NPT exhaust(s), IP65. For use with PAL series.	0.85	PDF
	PAL-ACC19	$24.00	NITRA control cable, 9-pin D-sub axial female to pigtail, IP65, 3.2ft [1m] cable length. For use with PAL series stand-alone valve base.	0.15	PDF
	PAL-ACC20	$25.50	NITRA control cable, 9-pin D-sub axial female to pigtail, IP65, 8.2ft [2.5m] cable length. For use with PAL series stand-alone valve base.	0.35	PDF
	PAL-ACC21	$29.00	NITRA control cable, 9-pin D-sub axial female to pigtail, IP65, 16.4ft [5m] cable length. For use with PAL series stand-alone valve base.	0.60	PDF

Wiring

CONNECTOR D-Sub 9 PIN PRE-WIRED

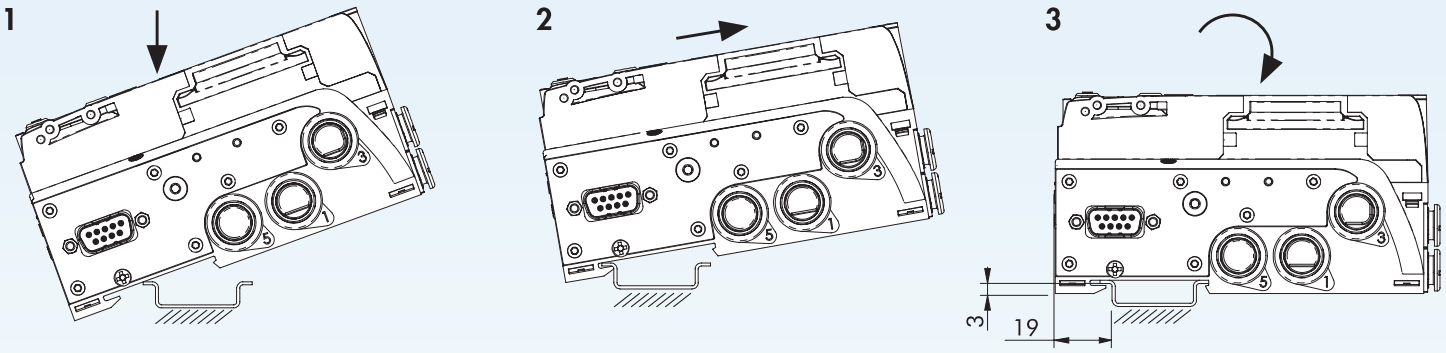


Electric contact position	Color conductor cable	Function	4-position base	8-position base
1	White	1 + VDC	Solenoid pilot 14 valve 1	Solenoid pilot 14 valve 1
2	Brown	2 + VDC	Solenoid pilot 14 valve 2	Solenoid pilot 12 valve 1
3	Green	3 + VDC	Solenoid pilot 14 valve 3	Solenoid pilot 14 valve 2
4	Yellow	4 + VDC	Solenoid pilot 14 valve 4	Solenoid pilot 12 valve 2
5	Grey	5 + VDC	/	Solenoid pilot 14 valve 3
6	Pink	6 + VDC	/	Solenoid pilot 12 valve 3
7	Blue	7 + VDC	/	Solenoid pilot 14 valve 4
8	Red	8 + VDC	/	Solenoid pilot 12 valve 4
9	Black	COM 0VDC	Common	Common

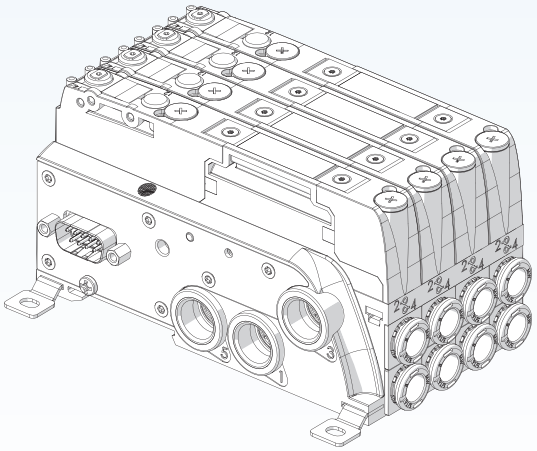
PAL System - Stand-Alone Valve Bases

Mounting Options

Mounting to DIN rail is done per the sequence shown below:



Mounting with brackets: The 3 brackets are included with each PAL stand-alone valve base. Push them firmly into the appropriate seats on the bases until they "click".



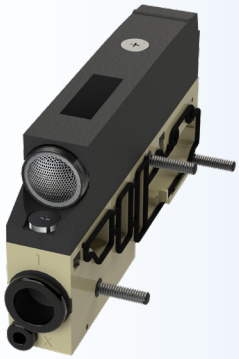
Click the icon or scan the QR code to be taken to https://www.automationdirect.com/selectors/pal for our online PAL system Configuration Tool for further selection assistance.

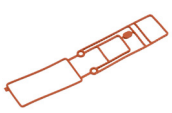
AIR - PLC - I/O

PAL System - Compressed Air Connection Modules

Compressed Air Connection Modules

The PAL-P12 compressed air connection module is the primary interface for the compressed air supply and PAL system solenoid valves. It features a 1/2" push-to-connect main supply and 5/32"(4mm) pilot supply. Used in the default configuration, pilot pressure of 3 to 8 bar (43 to 116 psi) is supplied to port X, allowing the main supply to be in the range of vacuum to 10 bar (145 psi). If the total system is operated in the range of 3.5 to 8 bar (51 to 116 psi), the PAL-P12 can be easily converted to require only the single main supply connection for complete operation.

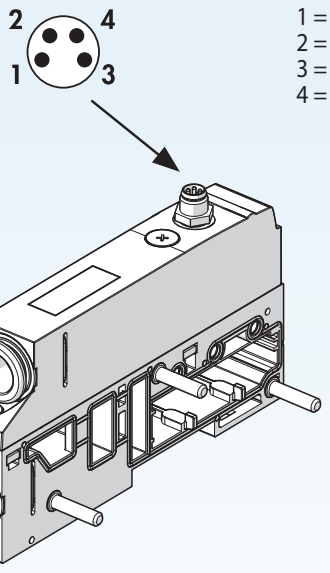


PAL System - Compressed Air Connection Module					
Item	*Part No.*	*Price*	*Description*	*Weight (lbs)*	*Drawing Link*
	***PAL-P12***	$35.50	NITRA pneumatic compressed air module, left supply/exhaust, Cv=3.76, 1/2in push-to-connect inlet(s), silenced exhaust(s), 5/32in (4mm) push-to-connect pilot(s), IP65. For use with PAL series.	0.45	PDF
PAL System - Intermediate Air Connection Modules					
	***PAL-M12***	$77.00	NITRA pneumatic air module, intermediate through, Cv=3.76, 1/2in push-to-connect inlet(s), 5/32in (4mm) push-to-connect pilot(s), IP65. For use with PAL series. Without additional power connection.	0.4	PDF
	***PAL-M12P***	$132.00	NITRA pneumatic air module, intermediate through, Cv=3.76, 1/2in push-to-connect inlet(s), 5/32in (4mm) push-to-connect pilot(s), IP65. For use with PAL series. Requires power cable. With additional power connection.	0.45	PDF
	***PAL-PC12***	$7.75	NITRA pneumatic push-to-connect cartridge, replacement, 1/2in tubing. Package of 2. For use with PAL-P12 compressed air supply module.	0.05	PDF
	***PAL-ACC13***	$5.25	NITRA pneumatic exhaust silencer, replacement. For use with PAL-P12 compressed air supply module.	0.05	N/A
	***PAL-ACC14***	$9.50	NITRA gasket, replacement. Package of 10. For use with PAL series base interface between valve bases.	0.05	N/A
	***PAL-ACC15***	$11.00	NITRA gasket, replacement. Package of 10. For use with PAL-P12 or PAL-SPC lower/upper body.	0.05	N/A

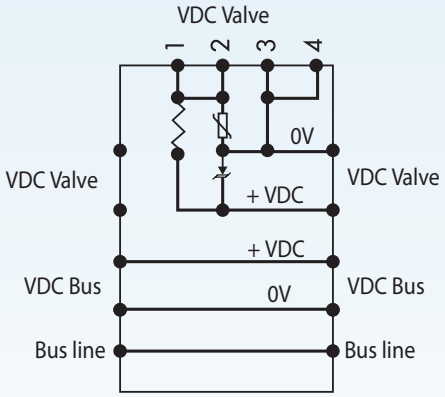
PAL System - Compressed Air Connection Modules

Intermediate Wiring

M8 male connector



1 = + VDC
2 = + VDC
3 = GND
4 = GND



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

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
	PAL-B3314	$96.00	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	PDF
	PAL-B3614	$101.00	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	PDF
	PAL-B4414	$115.00	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	PDF
	PAL-B4814	$125.00	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	PDF

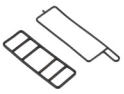
Valve Flow Rate (scfm) @ 91.4 psi (6.3 bar) ΔP 14.5 psi (1 bar)

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*

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PAL System - Valve Bases

PAL System - Valve Base Accessories					
Item	*Part No.*	*Price*	*Description*	*Weight (lbs)*	*Drawing Link*
	***PAL-PC04M***	$25.50	NITRA pneumatic push-to-connect cartridge, 5/32in (4mm) tubing. Package of 10. For use with PAL series valve bases.	0.25	PDF
	***PAL-PC06M***	$25.50	NITRA pneumatic push-to-connect cartridge, 6mm tubing. Package of 10. For use with PAL series valve bases.	0.2	N/A
	***PAL-PC08M***	$25.50	NITRA pneumatic push-to-connect cartridge, 5/16in (8mm) tubing. Package of 10. For use with PAL series valve bases.	0.15	N/A
	***PAL-PC14***	$25.50	NITRA pneumatic push-to-connect cartridge, replacement, 1/4in tubing. Package of 10. For use with PAL series valve bases.	0.2	N/A
	***PAL-ACC16***	$13.50	NITRA gasket, replacement. Package of 10. For use with PAL series base and valve.	0.05	N/A

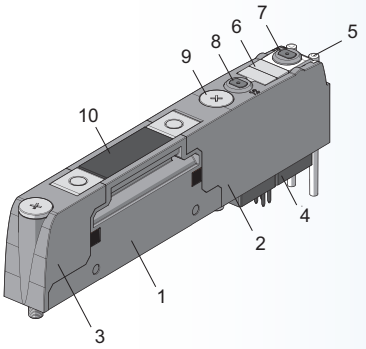
AIR - PLC - I/O

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
	PAL-V2-32C	$52.00	NITRA pneumatic 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	PDF
	PAL-V2-32A	$58.00	NITRA pneumatic 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	PDF
	PAL-V2-32C32A	$58.00	NITRA pneumatic 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	PDF
	PAL-V1-52	$39.00	NITRA pneumatic solenoid valve, modular, 5-way, 2-position, single solenoid spring return, reinforced technopolymer body, IP65, locking manual override, Cv=0.7, 12-24 VDC.	0.15	PDF
	PAL-V2-52	$55.00	NITRA pneumatic solenoid valve, modular, 5-way, 2-position, double solenoid, reinforced technopolymer body, IP65, locking manual override, Cv=0.7, 12-24 VDC.	0.2	PDF
	PAL-V2-53C	$58.00	NITRA pneumatic solenoid valve, modular, 5-way, 3-position, center closed, double solenoid, reinforced technopolymer body, IP65, locking manual override, Cv=0.49, 12-24 VDC.	0.2	PDF

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PAL System - Solenoid Valves

PAL System - Solenoid Valves					
Item	*Part No.*	*Price*	*Description*	*Weight (lbs)*	*Drawing Link*
	***PAL-V1-32C***	$43.50	NITRA pneumatic 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	PDF
	***PAL-V1-32A***	$43.50	NITRA pneumatic 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	PDF
	***PAL-V1-SR***	$67.00	NITRA pneumatic solenoid bank shut-off pressure relief valve, modular, 5-way, 2-position, single solenoid spring return, reinforced technopolymer body, IP65, locking manual override, Cv=1.07, 12-24 VDC.	0.2	PDF
	***PAL-V0-PLUG***	$7.75	NITRA blanking plug, fiberglass reinforced plastic. For use with PAL series valve bases.	0.1	N/A
	***PAL-Y38***	$5.00	NITRA pneumatic push-to-connect fitting, Y, reinforced technopolymer body, (2) 5/16in (8mm) plug-in to 3/8in push-to-connect.	0.05	PDF
	***PAL-ACC17***	$6.00	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	3/2 NO	5/2	5/2 *	5/3 OC	5/3 PC	5/3 CC *
			Momentary	Maintained	(Open Center)	(Pressure Center)	(Closed Center)
Part No.	PAL-V1-32C	PAL-V1-32A	PAL-V1-32C PAL-V1-32A	PAL-V2-52 PAL-V2-52	PAL-V1-32C PAL-V1-32C	PAL-V1-32A PAL-V1-32A	PAL-V2-53C 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.

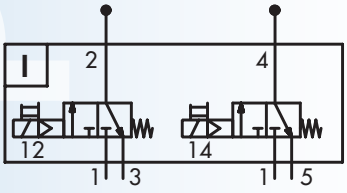


Diagram PAL-V2-32A
(2) 3-way, 2-pos, Single Solenoid, N.O.

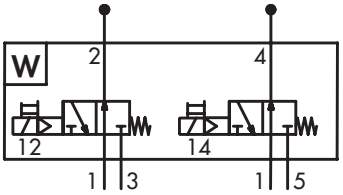


Diagram PAL-V2-32C32A
(2) 3-way, 2-pos, Single Solenoid, N.C./N.O.

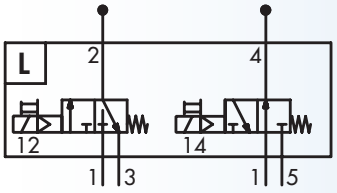


Diagram PAL-V1-52
5-way, 2-pos, Single Solenoid, non-locking

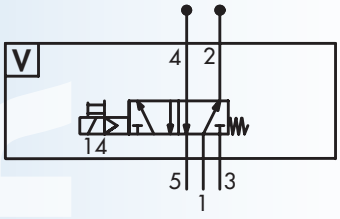


Diagram PAL-V2-52
5-way, 2-pos, Single Solenoid, locking

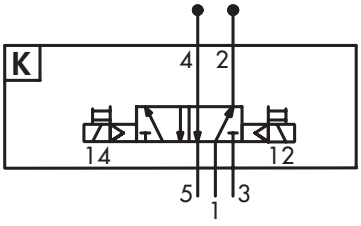


Diagram PAL-V2-53C
5-way, 3-pos, Double Solenoids, Center Closed

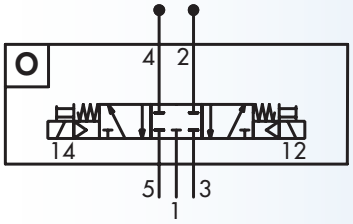


Diagram PAL-V1-32C
3-way, 2-pos, Single Solenoid, N.C., high flow

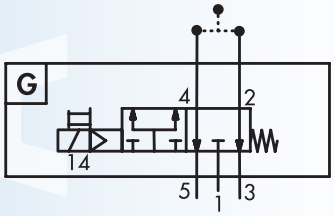


Diagram PAL-V1-32A
3-way, 2-pos, Single Solenoid, N.O., high flow

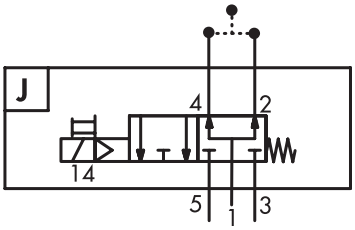
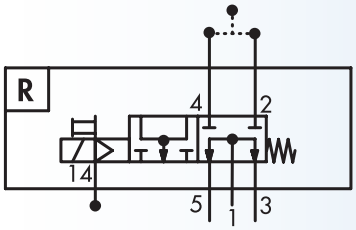


Diagram PAL-V1-SR
Shut-off Valve



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	$321.00	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

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AIR - PLC - I/O

PAL System - I/O Modules

PAL System - Discrete Output Modules					
Item	*Part No.*	*Price*	*Description*	*Weight (lbs)*	*Drawing Link*
	***PAL-S02***	$324.00	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***	$334.00	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***	$365.00	NITRA analog input module, 4-channel, current/voltage, 15-bit, IP65. Requires PAL-EIP bus coupler.	0.55	PDF
	***PAL-S05***	$470.00	NITRA 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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AIR - PLC - I/O

PAL System - I/O Modules

PAL System - Wired Discrete Modules					
Item	***Part No.***	***Price***	***Description***	***Weight (lbs)***	***Drawing Link***
	***PAL-S06***	$365.00	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***	$494.00	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*
	*PAL-S08*	$604.00	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 - End Plates

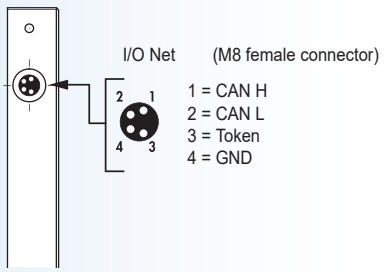
End Plates

The closed end plate is the last element on the right hand end of each PAL system. PAL-C4 is used for direct wired systems. For fieldbus systems, PAL-C2 can be used for a single PAL system or PAL-C3 is used to allow daisy-chaining separate PAL subsystems that share a common IP address. The end plate houses the system for mechanically mounting the base to external supports i.e. DIN rail.

PAL System - End Plates

Item	Part No.	Price	Description	Weight (lbs)	Drawing Link
	***PAL-C2***	$75.00	NITRA closed end plate, IP65. For use with PAL series single fieldbus assemblies.	0.4	PDF
	***PAL-C3***	$105.00	NITRA closed end plate, IP65. For use with PAL series fieldbus assemblies and expansion. Requires PAL series expansion cable or PAL-ACC18 M8 terminator. Used for local expansion.	0.4	PDF
	***PAL-C4***	$39.00	NITRA closed end plate, IP65. For use with PAL series wired assemblies.	0.25	PDF
	***PAL-ACC10***	$27.00	NITRA expansion cable, 4-pin M8 axial male to 4-pin M8 axial male, IP65, 3.2ft [1m] cable length. For use with PAL series bus expansion coupler.	0.10	PDF
	***PAL-ACC11***	$40.00	NITRA expansion cable, 4-pin M8 axial male to 4-pin M8 axial male, IP65, 16.4ft [5m] cable length. For use with PAL series bus expansion coupler.	0.45	PDF
	***PAL-ACC12***	$58.00	NITRA expansion cable, 4-pin M8 axial male to 4-pin M8 axial male, IP65, 32.8ft [10m] cable length. For use with PAL series bus expansion coupler.	0.90	PDF
	***PAL-ACC18***	$21.00	NITRA M8 terminator, for use with PAL-C3 end plate.	0.05	PDF

PAL-C3 Wiring



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PAL System - Accessories and Mounting Options

PAL System - Accessories					
Item	*Part No.*	*Price*	*Description*	*Weight (lbs)*	*Drawing Link*
	***PAL-ACC01***	$13.50	NITRA base mount, panel. Package of 2. For use with PAL series. Mounting screws included.	0.1	PDF
	***PAL-ACC02***	$2.25	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.

