

# I/O MODULES




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**OVERVIEW**

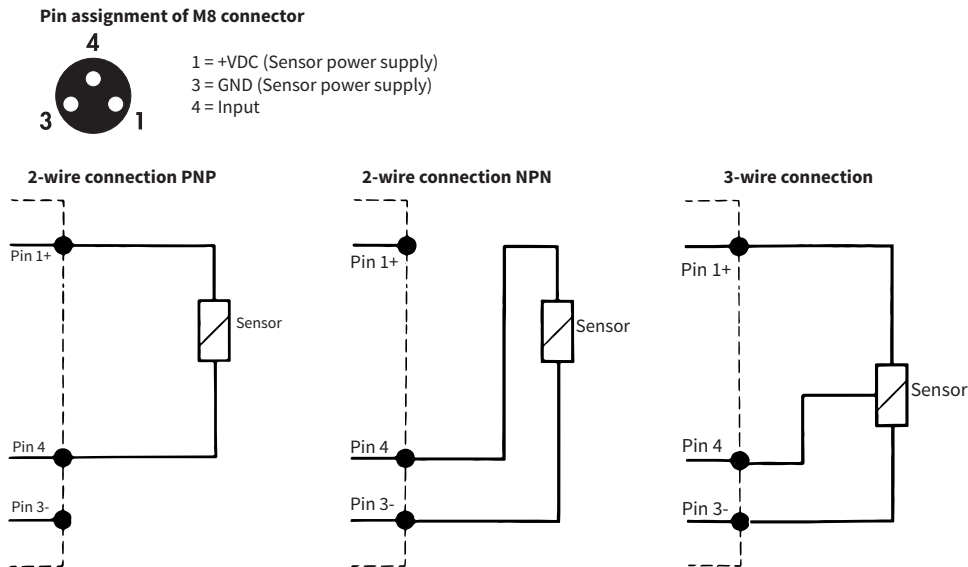
The PAL system has eight input and output modules that are highly configurable by the user during setup. A single PAL system using EtherNet/IP can have up to 128 digital inputs, 128 digital outputs, 16 analog inputs and 16 analog outputs. Each input / output module is protected internally from short-circuit. This chapter will cover each I/O module in detail.

**PAL-S01 8-POINT DISCRETE INPUT**

PAL System - Discrete Input Module		
Item	Part No.	Description
	<b>PAL-S01</b>	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.

The PAL-S01 has eight 3-pole M8 connectors for discrete inputs. Each input point is separately configured for polarity, operating state, signal persistence and input filter time. Any unused points should be capped with PAL-ACC02 M8 caps available separately.

**WIRING DIAGRAM**



**PARAMETER CONFIGURATION**


Use the information in the table below to configure the parameters for the PAL-S01 8-point digital input module.

Setting	Options	How It Works	Setting Description
<b>Polarity</b>	PNP (+VDC) (default)	Determines whether the Input becomes true with +VDC or 0VDC.	Input is ON when signal pin has +VDC present.
	NPN (0VDC)		Input is ON when signal pin has 0VDC present.
<b>Operating State</b>	Normally Open (default)	Determines whether the digital value of the Input is true when the signal is present or true when the signal is not present.	Input is ON when point is enabled.
	Normally Closed		Input is ON when point is not enabled.
<b>Signal Persistence</b>	Filter Off (default)	Ensures that the EtherNet/IP scanner sees the digital value by keeping the digital value on for the specified amount of time regardless of whether or not the actual signal is still present.	Ensures the EtherNet/IP Scanner will see the Input data indicate true if the signal becomes true by leaving the Input data ON for the time period specified. Filter Off means that Input data only indicates true while signal is true.
	15 ms		Input data indicates true for at least 15 ms when signal becomes true.
	50 ms		Input data indicates true for at least 50 ms when signal becomes true.
	100 ms		Input data indicates true for at least 100 ms when signal becomes true.
<b>Input Filter</b>	Filter Off	This option will only indicate the digital value as true if the signal is on for the specified amount of time to eliminate spurious or noisy signals.	Filters out spurious Input signals. Filter Off means that Input data only indicates true while signal is true.
	3 ms (default)		Input data indicates true if signal is on for at least 3 ms.
	10 ms		Input data indicates true if signal is on for at least 10 ms.
	20 ms		Input data indicates true if signal is on for at least 20 ms.

**SPECIFICATIONS**

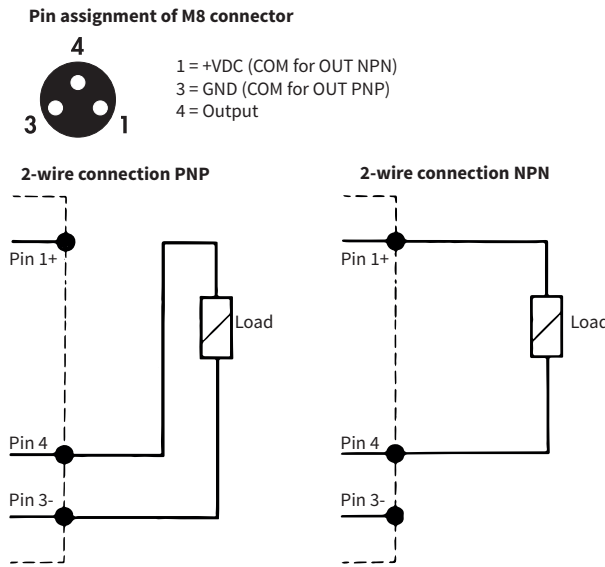
PAL System - Discrete Input Module Specifications	
<b>Sensors Supply Voltage</b>	Corresponding to the supply voltage
<b>Current for Each Connector</b>	200mA max
<b>Current for Each Module</b>	500mA max
<b>Input Impedance</b>	3.9 kΩ
<b>Type of Input</b>	Software-configurable PNP/NPN
<b>Protection</b>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

### PAL-S02 8-POINT DISCRETE OUTPUT

PAL System - Discrete Output Module		
Item	Part No.	Description
	<b>PAL-S02</b>	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.

The PAL-S02 has eight 3-pole M8 connectors for discrete outputs. Each output point is separately configured for polarity, operating state and fail safe operation. Any unused points should be capped with PAL-ACC02 M8 caps available separately.

#### WIRING DIAGRAM




#### PARAMETER CONFIGURATION

Use the information in the table below to configure the parameters for the PAL-S02 8-point digital output module.

Setting	Options	How It Works	Setting Description
<b>Polarity</b>	PNP (+VDC) (default)	Determines whether the point outputs + VDC or 0VDC.	Output signal presents +VDC when Output data point is true.
	NPN (0VDC)		Output signal presents 0VDC when Output data point is true.
<b>Operating State</b>	Normally Open (default)	Determines whether the Output signal is present when the digital value is true or if the Output signal is present when the digital value is false.	Output signal is present when Output data point is true.
	Normally Closed		Output signal is present when Output data point is false.
<b>Fail Safe</b>	Hold Last State	Specifies the behavior of the Outputs when the connection to the EtherNet/IP scanner is lost. Note that the "Fail Safe" byte of the PAL Controller options must be set to 'Fault Mode' for this option to work.	Output signal will remain at last state when EtherNet/IP connection is lost.
	Reset Output (default)		Output signal will disable when EtherNet/IP connection is lost.
	Set Output		Output signal will enable when EtherNet/IP connection is lost.

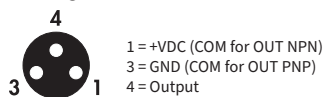
**PAL-S03 6-POINT DISCRETE OUTPUT + ADDITIONAL POWER CONNECTION**

PAL System - Discrete Output Module		
Item	Part No.	Description
	<b>PAL-S03</b>	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.

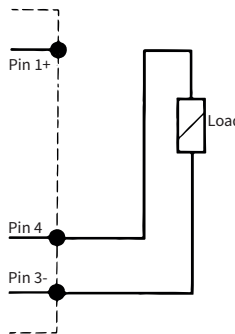
The PAL-S03 has six 3-pole M8 connectors for discrete outputs and one 4-pole power connection to add additional capacity to the electrical bus. This makes it possible to increase the current supplied by the module and system. A PAL-S03 digital output with additional power connection should be used when the current required for the I/O modules will exceed the rated 4A continuous / 6A instantaneous available at the PAL-EIP or PAL-EAD coupler. Each output point is separately configured for polarity, operating state and fail safe operation. The current supplied is the sum of all currents supplied by the PAL-S03 module plus that supplied by all the output modules connected to the left hand side up to another PAL-S03 module with power supply. Any unused points should be capped with PAL-ACC02 M8 caps available separately.

**WIRING DIAGRAM**

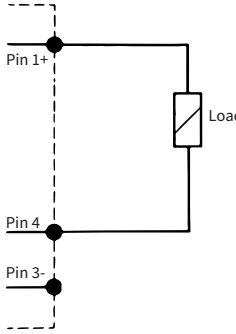
Pin assignment of M8 connector



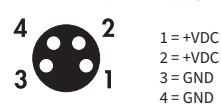
2-wire connection PNP



2-wire connection NPN



Pin assignment of M8 connector for electrical power supply



**PARAMETER CONFIGURATION**

Use the information in the table below to configure the parameters for the PAL-S03 6-point digital output module.


Setting	Options	How It Works	Setting Description
<b>Polarity</b>	PNP (+VDC) (default)	Determines whether the point outputs + VDC or 0VDC.	Output signal presents +VDC when Output data point is true.
	NPN (0VDC)		Output signal presents 0VDC when Output data point is true.
<b>Operating State</b>	Normally Open (default)	Determines whether the Output signal is present when the digital value is true or if the Output signal is present when the digital value is false.	Output signal is present when Output data point is true.
	Normally Closed		Output signal is present when Output data point is false.
<b>Fail Safe</b>	Hold Last State	Specifies the behavior of the Outputs when the connection to the EtherNet/IP scanner is lost. Note that the "Fail Safe" byte of the PAL Controller options must be set to 'Fault Mode' for this option to work.	Output signal will remain at last state when EtherNet/IP connection is lost.
	Reset Output (default)		Output signal will disable when EtherNet/IP connection is lost.
	Set Output		Output signal will enable when EtherNet/IP connection is lost.

**SPECIFICATIONS**

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

\* Minimum voltage 10.8V required at solenoid pilots.  
 \*\* **IMPORTANT!** Voltage greater than 32VDC will damage the system irreparably.

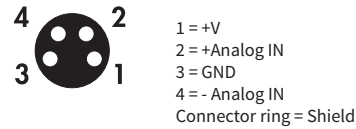
**PAL-S04 4-POINT ANALOG INPUT**

PAL System - Analog Input Module		
Item	Part No.	Description
	<b>PAL-S04</b>	NITRA analog input module, 4-channel, current/voltage, 15-bit, input current signal range(s) of 0-20 mA, 4-20 mA, input voltage signal range(s) of 0-5 VDC, 0-10 VDC, +/- 5 VDC, +/- 10 VDC, IP65.

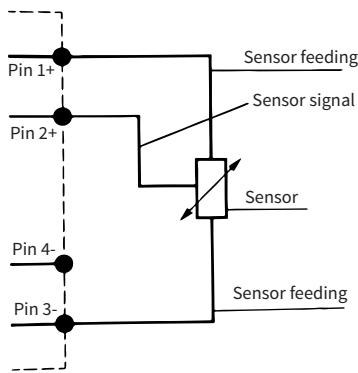
The PAL-S04 has four 4-pole M8 connectors for analog inputs. Each input point is separately configured for signal range and filtering. Any unused points should be capped with PAL-ACC02 M8 caps available separately.

**WIRING DIAGRAM**

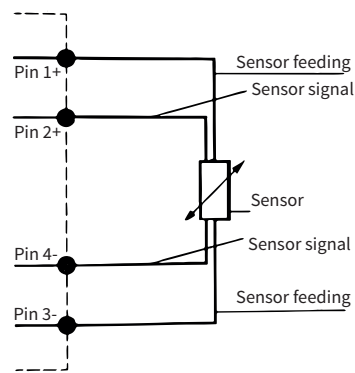
Pin assignment of M8 connector



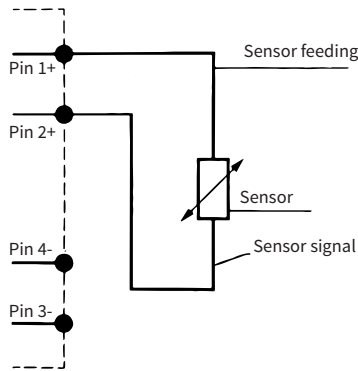
**3-wire voltage sensors**



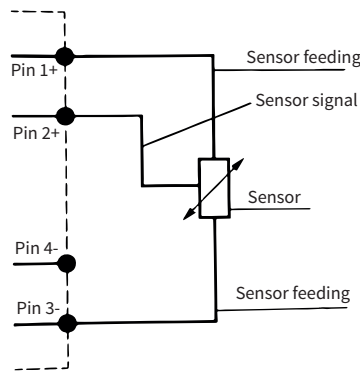
**4-wire voltage sensors (differential)**



**2-wire current sensors**



**3-wire current sensors**



**PARAMETER CONFIGURATION**


Use the information in the table below to configure the parameters for the PAL-S04 4-Channel Analog Input module.

Setting	Options	How It Works	Setting Description
<b>Signal Type</b>	Off (default)	Determines the type of signal being provided to the Analog input channel. A value of 0 disables the channel and is recommended for unused channels to save processing time.	Determines the signal read by the Analog Input channel (configurable for each individual channel). Any channel not being used should be set to Off to save on processing time for the module.
	0 to 10V		
	-10 to 10V		
	0 to 5V		
	-5 to 5V		
	1 to 5V		
	0 to 20mA		
	4 to 20mA		
-20 to 20mA			
<b>Filter</b>	No filter	Averages the values specified to give a 'steadier' digital value. The higher the value, the steadier the result but the slower the update.	Input filter. The channel value is averaged by the number of readings specified. Configuring this option to No filter will deliver a faster update but with less stability.
	2 values		
	4 values		
	8 values (default)		
	16 values		
	32 values		
	64 values		

**ANALOG INPUT DATA FORMAT**

Input Type	Analog Value	Digital Value	State
<b>-10 V to +10 V</b>	+11.7 V	32767	Overflow
	+10 V	28095	Nominal Range
	-10 V	-28095	
	-11.7 V	-32768	Underflow
<b>-5 V to +5 V</b>	+5.8 V	32767	Overflow
	+5 V	28095	Nominal Range
	-5 V	-28095	
	-5.8 V	-32768	Underflow
<b>+1 V to +5 V</b>	+5.8 V	32767	Overflow
	+5 V	28095	Nominal Range
	0 V	0	Underflow
<b>-20 mA to +20 mA</b>	+23 mA	32767	Overflow
	+20 mA	28095	Nominal Range
	-20 mA	-28095	
	-23 mA	-32768	Underflow
<b>+4 mA to +20 mA</b>	+23 mA	32767	Overflow
	+20 mA	28095	Nominal Range
	4 mA	5513	
	0 mA	0	Underflow

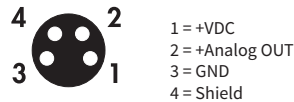
**PAL-S05 4-POINT ANALOG OUTPUT**

PAL System - Analog Output Module		
Item	Part No.	Description
	<b>PAL-S05</b>	NITRA analog output module, 4-channel, current/voltage, 15-bit, output current signal range(s) of 0-20 mA and 4-20 mA, output voltage signal range(s) of 0-5 VDC, +/- 5 VDC, 0-10 VDC and +/- 10 VDC, IP65.

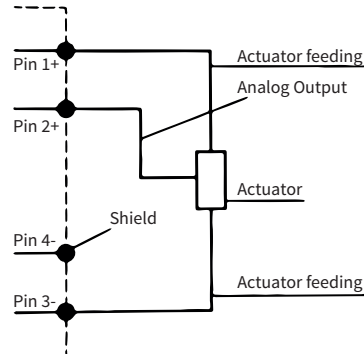
The PAL-S05 has four 4-pole M8 connectors for analog outputs. Each output point is separately configured for signal range, min/max monitoring, fail safe operation and fault mode. Any unused points should be capped with PAL-ACC02 M8 caps available separately.

**WIRING DIAGRAM**

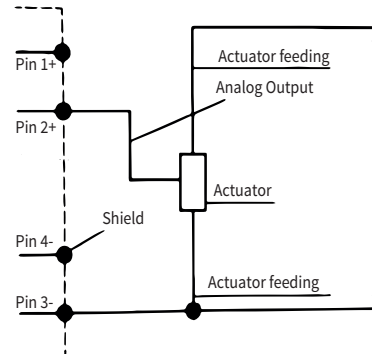
Pin assignment of M8 connector



**Analog actuator with internal power supply**



**Analog actuator with external power supply**





**PARAMETER CONFIGURATION**

Use the information in the table below to configure the parameters for the PAL-S05 4-Channel Analog Output module.

Setting	Options	How It Works	Setting Description
<b>Signal Monitor / Fail Safe</b>	<b>Signal:</b>	Determines what kind of signal the analog module channels will output.	This option configures the signal for each output. Any channel not being used should be set to Off to save on processing.
	Off (default)		
	0 to 10V		
	-10V to 10V		
	0 to 5V		
	-5V to 5V		
	0 to 20mA		
	4 to 20mA		
	<b>Max Monitor:</b>	These 2 options (Max Monitor and Min Monitor) enable Maximum value and minimum value output limiting. Enabling these bits requires specifying the minimum and maximum values in the fields described below.	This option enables the Maximum and Minimum Output option value feature. Each channel can be enabled independently. When enabled, the module will limit the analog output values to the values specified for each channel in the Minimum and Maximum Value Monitor configuration settings.
	Disable (default)		
Enable			
<b>Min Monitor:</b>			
Disable (default)			
Enable			
<b>Fail Safe:</b>	This option allows a value to be specified for the analog module to output in case the connection is lost between the controllers and the EtherNet/IP scanner module.	When this setting is enabled, the module will output the value specified in Fault Mode Value settings in case of EtherNet/IP communication loss.	
Hold last value (default)			
Fault Mode value			
<b>Minimum Value Monitor</b>	Valid range for each channel: -32768 to 32767 Default: 384	If the Minimum value monitor is enabled, this is the lower limit value that the module will output.	If this feature is enabled, the firmware will limit the output value to the minimum specified in this field.
<b>Maximum Value Monitor</b>	Valid range for each channel: -32768 to 32767 Default: 32767	If the Maximum value monitor is enabled, this is the upper limit value that the module will output.	If this feature is enabled, the firmware will limit the output value to the maximum specified in this field.
<b>Fault Mode Value</b>	Valid range for each channel: -32768 to 32767 Default: 0	If the Fail Safe option is enabled, this is the value that the module will output if the connection is lost to the EtherNet/IP scanner. Note that the Fail Safe byte of the PAL Controller options must be set to Fault Mode for this option to work.	If this feature is enabled, the firmware will output this value upon loss of EtherNet/IP connectivity with the client.




*\*NOTE: The Nitra PAL has fail-safe behavior options of the physical outputs when a Class 1 Implicit connection or Class 3 Explicit connection is established with the PAL-EIP unit. The fail-safe behavior is dependent upon the CIP connection. Since Unconnected Explicit Messaging does not establish or maintain a CIP connection, the fail-safe features are not applicable when using an Unconnected Explicit Message.*

**SPECIFICATIONS**

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

**PAL-S06 16-POINT DISCRETE INPUT**

PAL System - Wired Discrete Input Module		
Item	Part No.	Description
	<b>PAL-S06</b>	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.

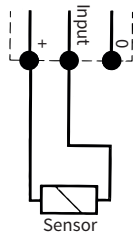
The PAL-S06 has 16 3-pole spring terminals for discrete inputs. Each input point is separately configured for polarity, operating state, signal persistence and input filter time.

**WIRING DIAGRAM**

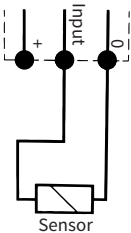
Pin assignment of terminal board connectors

Input X1 - X5 - X9 - X13			Input X2 - X6 - X10 - X14			Input X3 - X7 - X11 - X15			Input X4 - X8 - X12 - X16		
+	Input	0	+	Input	0	+	Input	0	+	Input	0

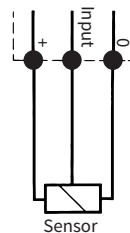
2-wire connection PNP



2-wire connection NPN



3-wire connection




**PARAMETER CONFIGURATION**

Use the information in the table below to configure the parameters for the PAL-S06 16-point input module.

Setting	Options	How It Works	Setting Description
<b>Polarity</b>	PNP (+VDC) (default)	Determines whether the Input becomes true with +VDC or 0VDC.	Input is ON when signal pin has +VDC present.
	NPN (0VDC)		Input is ON when signal pin has 0VDC present.
<b>Operating State</b>	Normally Open (default)	Determines whether the digital value of the Input is true when the signal is present or true when the signal is not present.	Input is ON when point is enabled.
	Normally Closed		Input is ON when point is not enabled.
<b>Signal Persistence</b>	Filter Off (default)	Ensures that the EtherNet/IP scanner sees the digital value by keeping the digital value on for the specified amount of time regardless of whether the actual signal is still present or not.	Ensures the EtherNet/IP Scanner will see the Input data indicate true if the signal becomes true by leaving the Input data ON for the time period specified. The (Filter Off) setting disables this feature (Input data only indicates true while signal is true). The other values will ensure that the Input data is indicated for the value specified.
	15 ms		
	50 ms		
	100 ms		
<b>Input Filter</b>	Filter Off	Only indicates the digital value as true if the signal is on for the specified amount of time to eliminate spurious or noisy signals.	Filters out spurious Input signals. The (Filter Off) setting disables filter (Input Data only indicates true while signal is true). The other values will filter out input signals shorter than the value specified.
	3 ms (default)		
	10 ms		
	20 ms		

### PAL-S07 16-POINT DISCRETE OUTPUT

PAL System - Wired Discrete Output Module		
Item	Part No.	Description
	<b>PAL-S07</b>	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.

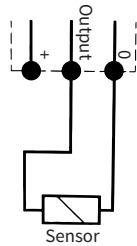
The PAL-S07 has 16 3-pole spring terminals for discrete outputs. Each output point is separately configured for polarity, operating state and fail safe operation.

#### WIRING DIAGRAM

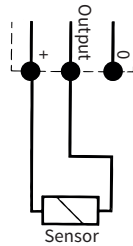
Pin assignment of terminal board connectors

Input X1 - X5 - X9 - X13		Input X2 - X6 - X10 - X14		Input X3 - X7 - X11 - X15		Input X4 - X8 - X12 - X16	
+	Output 0	+	Output 0	+	Input 0	+	Output 0

2-wire connection PNP



2-wire connection NPN



#### PARAMETER CONFIGURATION


Use the information in the table below to configure the parameters for the PAL-S07 16-point digital output module.

Setting	Options	How It Works	Setting Description
<b>Polarity</b>	PNP (+VDC) (default)	Determines whether the point outputs +VDC or 0VDC.	Output signal presents +VDC when Output data point is true.
	NPN (0VDC)		Output signal presents 0VDC when Output data point is true.
<b>Operating State</b>	Normally Open (default)	Determines whether the Output signal is present when the digital value is true or if the Output signal is present when the digital value is false.	Output signal is present when Output data point is true.
	Normally Closed		Output signal is present when Output data point is false.
<b>Fail Safe</b>	Hold last state	Specifies the behavior of the Outputs when the connection to the EtherNet/IP scanner is lost. Note that the Fail Safe byte of the PAL Controller options must be set to Fault Mode for this option to work.	Output signal will remain at last state when EtherNet/IP connection is lost.
	Reset Output (default)		Output signal will disable when EtherNet/IP connection is lost.
	Set Output		Output signal will enable when EtherNet/IP connection is lost.

**SPECIFICATIONS**

PAL System - Wired Discrete Module Specifications		
	PAL-S06	PAL-S07
<b>Supply Voltage Range</b>	Corresponding to the supply voltage	N/A
<b>Output Voltage</b>	N/A	Corresponding to the supply voltage
<b>Current for Each Connector</b>	200mA max	500mA max
<b>Current for Each Module</b>	500mA max	3000mA max*
<b>Input Impedance</b>	3.9 kΩ	N/A
<b>Type of Input</b>	Software-configurable PNP/NPN	N/A
<b>Type of Output</b>	N/A	Software-configurable PNP/NPN
<b>Protection</b>	Overload and short-circuit protected inputs	
<b>Connections</b>	4 12-pin connectors with spring clamping	
<b>Maximum Wire Size</b>	20 AWG (0.5 mm <sup>2</sup> )	
<b>Status Indicator</b>	One LED for each input or output	
<b>Degree of Protection</b>	IP40	
* <b>IMPORTANT:</b> the module is powered via the fieldbus. Check that the total current of connected outputs is not greater than 3.5 A.		

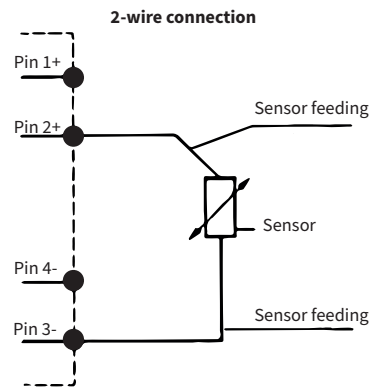
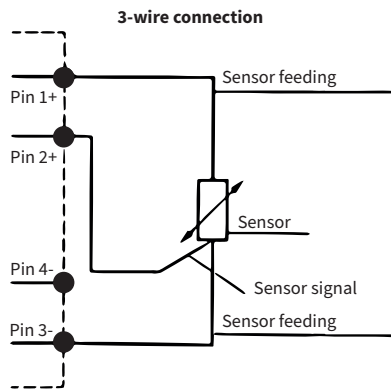
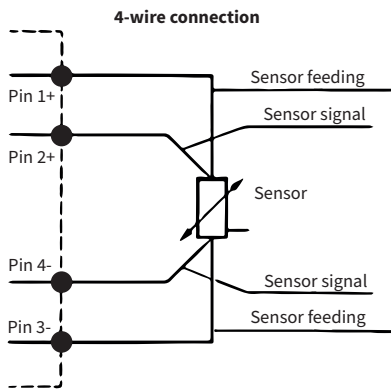
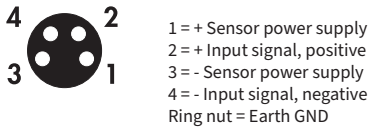
## PAL-S08 4-POINT ANALOG TEMPERATURE INPUT

PAL System - Temperature Input Module		
Item	Part No.	Description
	<b>PAL-S08</b>	NITRA temperature input module, RTD/ thermocouple, 4-channel, 15-bit resolution, IP65. Mounting hardware included. Requires PAL-EIP bus coupler.

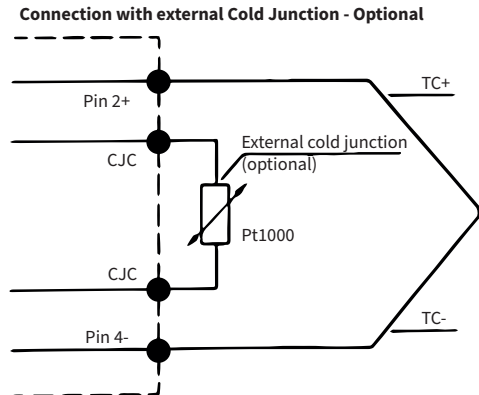
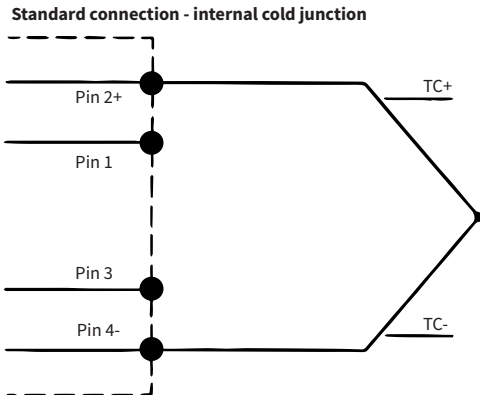
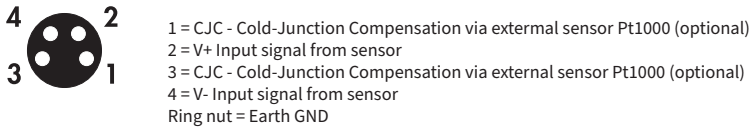
The PAL-S08 has four 3-pole M8 connectors for analog temperature inputs. Each input point is separately configured for the type of RTD or thermocouple, number of wires, resolution, filtering, min/max monitoring and short or open circuit handling. Any unused points should be capped with PAL-ACC02 M8 caps available separately.

### WIRING DIAGRAM

#### Pin assignment of Temperature Sensors (PT and NI Series)



#### Pin assignment of Temperature Sensors (Thermocouples)



**PARAMETER CONFIGURATION**

Use the information in the table below to configure the parameters for the PAL-S08 temperature input module.

Setting	Options	How It Works	Setting Description
<b>Unit of Measurement</b>	Celsius (default)	Select between Celsius and Fahrenheit as the temperature format for the module.	Module setting for temperature format.
	Fahrenheit		
<b>Noise Suppression</b>	50Hz (default)	This is a module setting to choose between better filtering or faster update.	Suppresses noise generated by main electrical supply. 50/60Hz slow delivers a high level of filtering, but updates the channels more slowly. 50/60Hz fast delivers less filtering, but updates the channels faster.
	60Hz		
	50/60Hz slow		
	50/60Hz fast		
<b>Sensor Type</b>	No sensor (default)	Choose between the different available RTD and Thermocouple types. Choose 0 to disable the channel. It is recommended to disable unused channels to save on processing time.	Types of sensors and thermocouples the module supports. Set all unused channels to No sensor to save on processing time.
	Pt100 (TK=0.00385)		
	Pt200 (TK=0.00385)		
	Pt500 (TK=0.00385)		
	Pt1000 (TK=0.00385)		
	Pt100 (TK=0.00391)		
	Pt200 (TK=0.00391)		
	Pt500 (TK=0.00391)		
	Pt1000 (TK=0.00391)		
	Ni100 (TK=0.00617)		
	Ni200 (TK=0.00617)		
	Ni500 (TK=0.00617)		
	Ni1000 (TK=0.00617)		
	TC Type E		
	TC Type J		
	TC Type T		
TC Type K			
TC Type N			
TC Type S			
TC Type B			
TC Type R			
<b>Resolution Parameters</b>	<b>CJC Compensation:</b>	There is an internal CJC provided with the module, but in some applications with some sensor types an external CJC (such as with the Pt1000) may work better.	There is an internal Cold Junction Compensation but it may be better to use an external CJC (such as a Pt1000) for cases where sudden temperature changes occur.
	External (default)		
	Internal		
	<b>Resolution:</b>	Determines the resolution of the temperature reading and only applies to RTD sensors with temperature reading range of +/- 327 C.	Choose the resolution of temperature display. This only applies to RTD sensors with temperature reading range of +/- 327 C.
	0.1 (default)		
	0.01		
<b>Filter:</b>	This digital filter setting works in conjunction with the module Noise Suppression filter. Sync4 provides greater filtering than Sync3, but has slower updates.	The digital filter setting that works in conjunction with the Noise Suppression filter. Sync4 provides greater filtering but slower updates than Sync3.	
Sync 3 (default)			
Sync 4			

(table continued on next page)


Setting	Options	How It Works	Setting Description
<b>Filter Diagnostic Parameters</b>	Filter setting:	This option determines the number of samples that are averaged. The greater the value, the steadier the value but the slower the update.	Filter Setting determines the number of samples that are acquired before updating the digital value. The higher the samples, the greater the filtering but slower updates.
	No Filter (default)		
	1 sample		
	2 samples		
	4 samples		
	8 samples		
	16 samples		
	32 samples		
	64 samples		
	<b>Max Value Monitor:</b>	An alarm option to inform the user when the temperature has exceeded a specified value. Enabling this option requires specifying the Maximum temperature value in the field below. If the temperature exceeds the value specified, it will be indicated in Input Byte 0 (status byte). The error data will be between 0xD4 – 0xD7.	Max Value Monitor enables the Max Temperature monitor and will generate an alarm if the value is exceeded. Use the Max Temperature value setting if enabling this option.
	Disabled (default)		
	Enabled		
<b>Min Value Monitor:</b>	An alarm option to inform the user when the temperature has dropped below a specified value. Enabling this option requires specifying the Minimum temperature value in the field below. If the temperature is below the value specified, it will be indicated in Input Byte 0 (status byte). The error data will be between 0xD4 – 0xD7.	Min Value Monitor enables the Min Temperature monitor and will generate an alarm if the value is exceeded. Use the Min Temperature value setting if enabling this option.	
Disabled (default)			
Enabled			
<b>Short Circuit detect:</b>	An alarm option to inform the user that a channel has short circuited. If a short circuit is detected, it will be indicated in Input Byte 0 (status byte). The error data will be between 0xD4 – 0xD7.	This option enables Short circuit detection for the channel. An alarm is generated if a short circuit is detected.	
			Disabled (default)
			Enabled
<b>Filter Diagnostic Parameters (cont'd)</b>	<b>Open Circuit detect:</b>	An alarm option to inform the user that a channel has an open circuit. If an open circuit is detected, it will be indicated in Input Byte 0 (status byte). The error data will be between 0xD4 – 0xD7.	This bit enables Open circuit detection for the channel. An alarm is generated if an open circuit is detected.
	Disabled (default)		
	Enabled		
<b>Minimum Temperature</b>	Valid range for each channel: -32768 to 32767 Default: 1	This value is used in conjunction with the Min Value Monitor to signal an alarm when the temperature has dropped below the value specified in this field. Valid range is -32768 to 32767.	Minimum Temperature value used for the Minimum Temperature detection function.
<b>Maximum Temperature</b>	Valid range for each channel: -32768 to 32767 Default: 127	This value is used in conjunction with the Max Value Monitor to signal an alarm when the temperature has risen above the value specified in this field. Valid range is -32768 to 32767.	Maximum Temperature value used for the Maximum Temperature detection function.



**SPECIFICATIONS**

<b>PAL System - Temperature Input Module Specifications</b>	
<b>Sensors Supply Voltage</b>	Corresponding to the supply voltage
<b>Maximum Input Voltage</b>	30VDC
<b>Sensor Type (RTD)</b>	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)
<b>Connections Type (RTD)</b>	2, 3 or 4-wire
<b>Type of Thermocouple (TC)</b>	J, E, T, K, N, S, B, R
<b>Cold Junction Compensation for Thermocouples</b>	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
<b>Temperature Range</b>	-200 to + 800 °C (-328 to + 1472 °F)
<b>Digital Convert Resolution</b>	15 bit + prefix
<b>Max Error Compared to Ambient Temperature</b>	±0.5% (TC) ±0.06% (RTD)
<b>Max. Basic Error (Ambient T 25°C)</b>	±0.6 °C (with 4-wire RTD with 0.1 resolution) ±0.2 °C (with 4-wire RTD with 0.01 resolution)
<b>Repeatability (Ambient T 25°C)</b>	±0.03%
<b>Address Employment</b>	2 bytes for each input - 8 bytes per module
<b>Cycle time (Module)</b>	240ms
<b>Software Linearization</b>	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
<b>Maximum Length of Shielded Cable for the Connection</b>	< 30m
<b>Status Indicator</b>	One LED for each input and reporting to the Master

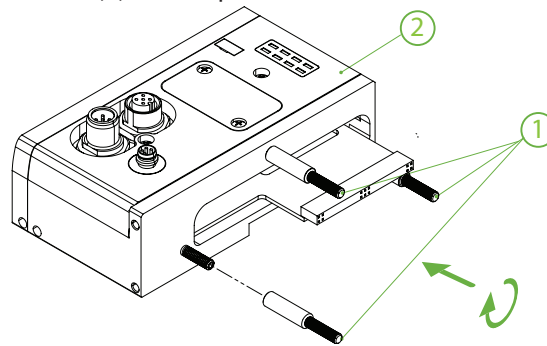
**CLOSED END SPACER MODULE**

PAL System - Closed End Spacer Module		
Item	Part No.	Description
	<b>PAL-SPC</b>	NITRA closed end spacer, IP65. For use with PAL series assemblies without pneumatics.

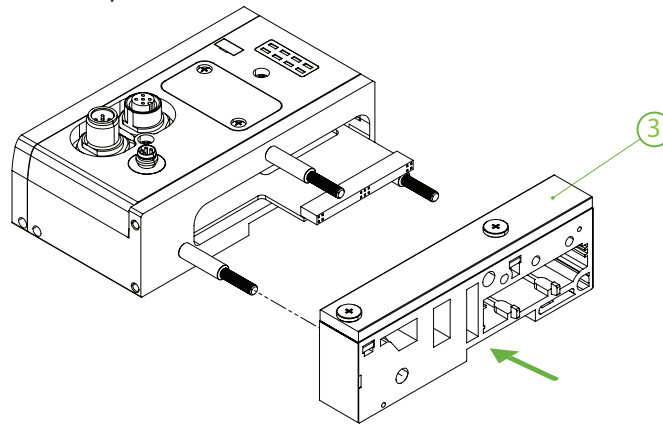
To use the PAL system bank without pneumatics the closed end spacer module is needed. Only one module per bank required.

**INSTALLATION**

Hand tighten the three tie rods (1) of the spacer module for connection to the bus coupler (2).



While aligning the tie rods, carefully mate the spacer module (3) onto the electrical module. Make sure the board fits into the slots provided. **DO NOT FORCE!**



Place the assembly on a flat surface, insert the closed end plate (4), three lock washers (5) and tighten the three nuts (6) using a 4mm hex wrench at a torque of 2Nm [18 lb-in]. Make sure the electronic boards are properly aligned. **DO NOT FORCE!**

