Analog I/O Specifications

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Analog I/O Modules Overview

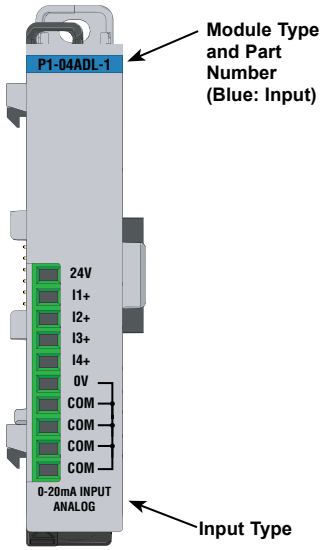
A variety of analog I/O modules are available for use with Productivity® 1000 system.

Each I/O module is identified as an "Input" or "Output"module on its front panel using the color coding scheme listed below. See Chapter 2 for discrete I/O module specifications and Chapter 6 for communications wiring and connectivity information. The following pages contain the analog I/O module specifications and associated wiring diagrams.

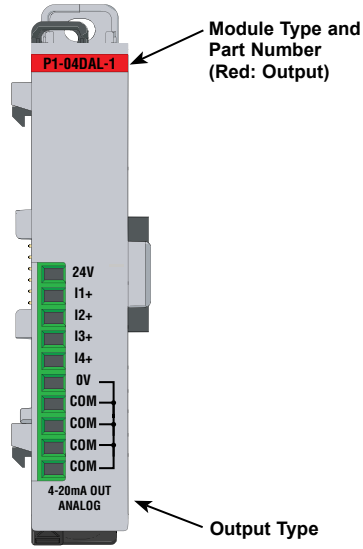
There are 16 analog I/O modules available; ten Input, four Output modules and two Input/Output combination modules. The specifications and wiring diagrams, along with configuration and signal scaling information, are in this chapter.

Use the hardware configuration tool in the Productivity Suite programming software to setup the I/O modules. See the Productivity Suite help file for in-depth configuration and programming concepts.

Analog Input Modules

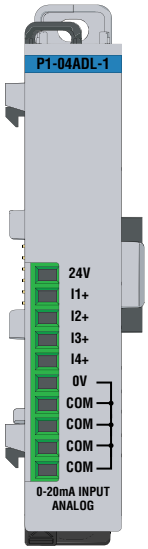


Analog Output Modules



Analog I/O Modules

Analog Input Modules



Productivity1000 Analog Input Modules			
Part Number	Number of Channels	Description	See Page
P1-04AD	4	Analog Input (Current/Voltage)	3–6
P1-04AD-1	4	Analog Input (Current)	3-10
P1-04AD-2	4	Analog Input (Voltage)	3-14
P1-04ADL-1	4	Analog Input (Current)	3–18
P1-04ADL-2	4	Analog Input (Voltage)	3–22
P1-08ADL-1	8	Analog Input (Current)	3–26
P1-08ADL-2	8	Analog Input (Voltage)	3–30
P1-04RTD	4	RTD Input	3-34
P1-04THM	4	Analog Thermocouple Input	3-39
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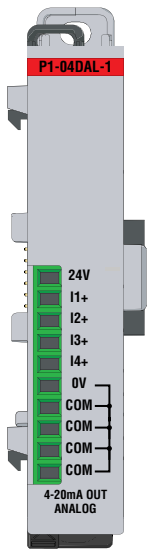
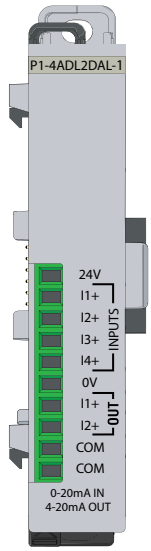
Analog Output Modules



Productivity1000 Analog Output Modules			
Part Number	Number of Channels	Description	See Page
P1-04DAL-1	4	Analog Output (Current)	3–48
P1-04DAL-2	4	Analog Output (Voltage)	3–52
P1-08DAL-1	8	Analog Output (Current)	3–56
P1-08DAL-2	8	Analog Output (Voltage)	3-60

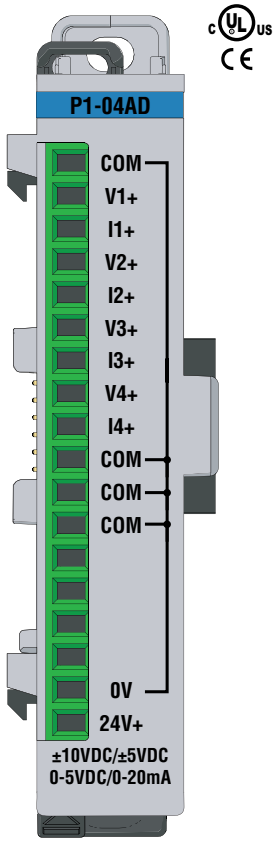
Analog Input/Output Modules



Productivity1000 Analog Input/Output Modules			
Part Number	Number of Channels	Description	See Page
P1-4ADL2DAL-1	4/2	Analog Input/Analog Output (Current)	3–64
P1-4ADL2DAL-2	4/2	Analog Input/Analog Output (Voltage)	3–69

P1-04AD Analog Input

The P1-04AD Voltage/Current Analog Input Module provides four channels for receiving ±5VDC, ±10VDC, 0–5 VDC, 0–10 VDC, and 0 to 20mA signals for use with the Productivity® 1000 system.



Terminal block sold separately.

Input Specifications

Inputs per Module	4
Module Signal Input Range	±5VDC, ±10VDC, 0–5 VDC, 0–10 VDC, 0–20 mA
Signal Resolution	16-bit
Resolution Value of LSB (least significant bit)	±5V=152µV, ±10V=0.305 µV 0–5 V=76µV, 0–10 V=152µV, 0–20 mA=0.305 µA per count (1LSB = 1 count)
Data Range	0-65535 counts unipolar -32768 to +32767 counts bipolar
Input Type	Single-ended (1 common)
Maximum Continuous Overload	±31mA, current input ±100V, voltage input
Input Impedance	1.1 M ±10% voltage input 250 ±0.1% 1/4W current input
Filter Characteristics	Low Pass 1st order, -3dB @ 48Hz
Sample Duration Time	3.5 ms per channel (Does not include ladder scan time)
All Channel Update Rate	15ms
Open Circuit Detection Time	Zero reading within 1s (current input only)
Conversion Method	Successive approximation
Accuracy vs Temperature	±10PPM / ºC maximum
Maximum Inaccuracy	0.1% of range voltage, 0.2% of range current (Including temperature drift)
Linearity Error (end to end)	±0.01% of range max., ±10V & ±5V ±0.015% of range max., 0–5 V & 0–20 mA; Monotonic with no missing codes
Input Stability and Repeatability	±0.035% of range (after 10 min. warm-up)
Full Scale Calibration Error	±0.2% of range maximum
Offset Calibration Error	±0.065% of range maximum
Max Crosstalk	-96dB, of range maximum
Recommended Fuse (external)	Edison S500-32-R, 0.032 A fuse (On current inputs only)
External Power Supply Required	24VDC (-20% / + 25%), 35mA

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5.
If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P2-RTB or P2-RTB-1

P1-04AD Analog Input (continued)

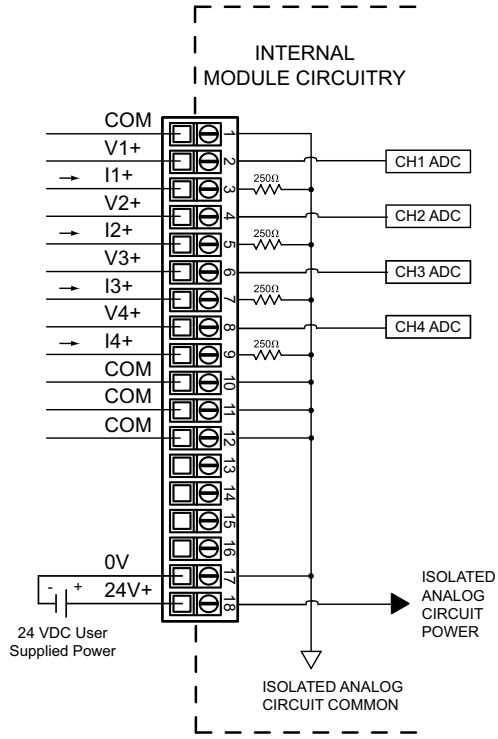
General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Altitude	2,000 meters, max.
Pollution Degree	2
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	>10MΩ @ 500VDC
Heat Dissipation	1400mW
Overvoltage Category	II
Enclosure Type	Open equipment
Field Wiring	Removable terminal block (sold separately). Use ***ZIP***Link wiring system optional. See "Wiring Options" in Chapter 5.
Terminal Type (sold separately)	18-position removable terminal block
Weight	71g (2.5 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

** Recommended screw driver P/N: TW-SD-MSL-1.*

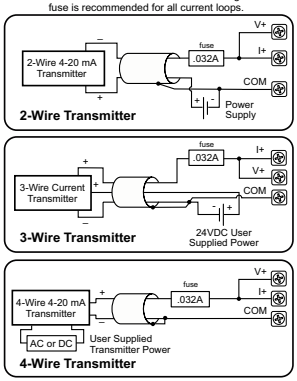
P1-04AD Analog Input (continued)

Wiring Diagrams



Current Sinking Input Circuits

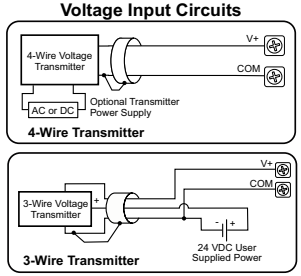
An Edison S500-32-R 0.032A fast-acting fuse is recommended for all current loops.



Notes:

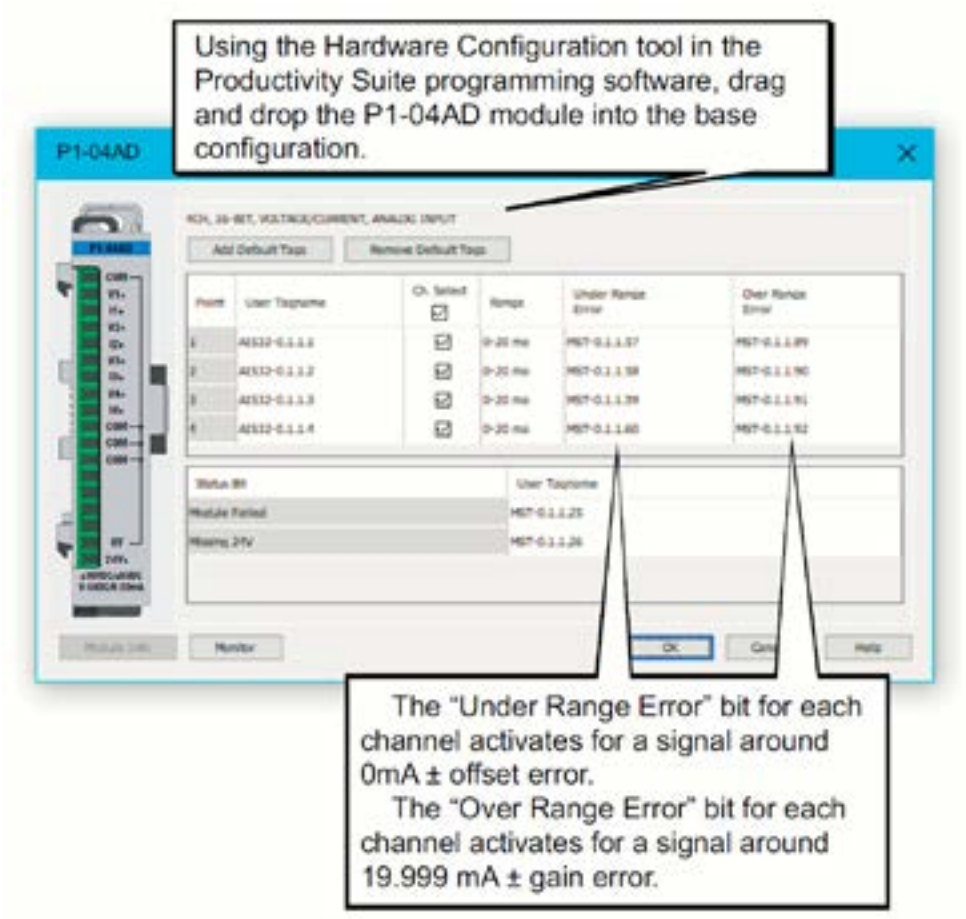
1. Shield connected to signal source common.
2. If current is chosen, I+ MUST be jumpered to V+. For example, when using 4–20 mA source for Input 3, I3+ must be connected to V3+.

Voltage Input Circuits



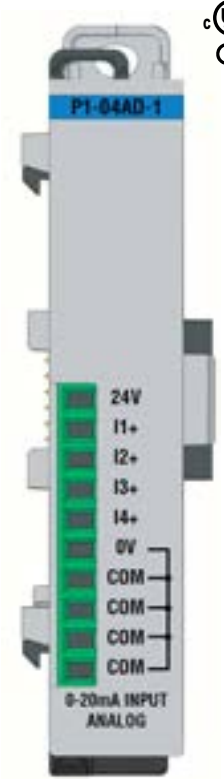
P1-04AD Analog Input (continued)

Module Configuration



P1-04AD-1 Analog Input

The P1-04AD-1 Current Analog Input Module provides four channels for receiving 0 to 20mA signals for use with the Productivity® 1000 system.



Input Specifications	
Inputs per Module	4
Module Signal Input Range	0–20 mA
Signal Resolution	16-bit
Resolution Value of LSB (least significant bit)	0–20 mA=0.305 µA per count (1LSB = 1 count)
Data Range	0-65535 counts
Input Type	Single-ended (1 common)
Maximum Continuous Overload	±31mA
Input Impedance	250 ±0.1% 1/4 W
Filter Characteristics	Low Pass, -3dB @ 100Hz
Sample Duration Time	9ms per channel (Does not include ladder scan time)
All Channel Update Rate	80ms
Open Circuit Detection Time	Zero reading within 1s
Conversion Method	Successive approximation
Accuracy vs Temperature	±25PPM / ºC maximum
Maximum Inaccuracy	0.1% of range (Including temperature drift)
Linearity Error (end to end)	±0.015% of range Monotonic with no missing codes
Input Stability and Repeatability	±0.015% of range (after 10 min. warm-up)
Full Scale Calibration Error	±0.015% of range maximum
Offset Calibration Error	±0.015% of range maximum
Max Crosstalk	-76dB, of range maximum
Recommended Fuse (external)	Edison S500-32-R, 0.032 A fuse
External Power Supply Required	24VDC (-20% / + 25%), 35mA

Terminal block sold separately.

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5.
If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P1-10RTB or P1-10RTB-1

P1-04AD-1 Analog Input (continued)

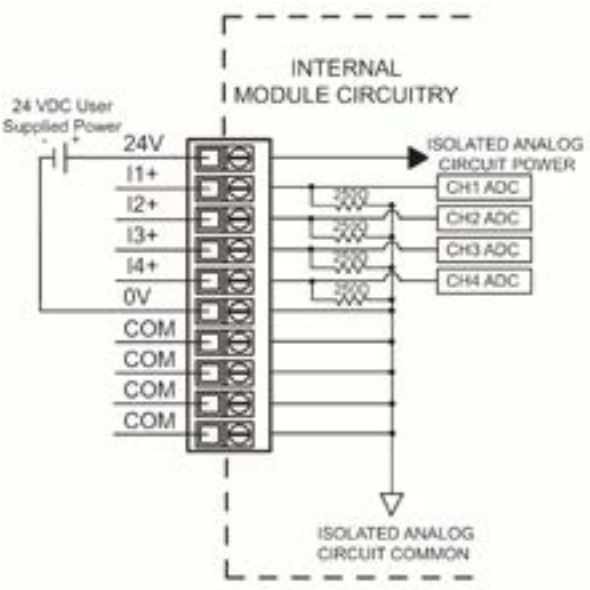
General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Altitude	2,000 meters, max.
Pollution Degree	2
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	>10MΩ @ 500VDC
Heat Dissipation	1400mW
Overvoltage Category	II
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity1000 system
Field Wiring	Removable terminal block (sold separately). Use ***ZIP***Link wiring system optional. See "Wiring Options" in Chapter 5.
Terminal Type (sold separately)	10-position removable terminal block
Weight	58g (2.0 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid / stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid / stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

** Recommended screw driver P/N: TW-SD-MSL-1.*

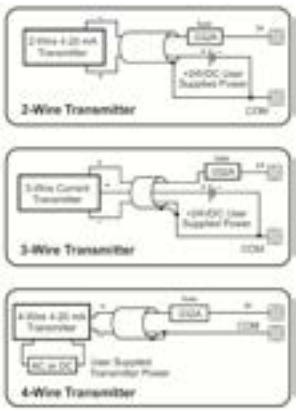
P1-04AD-1 Analog Input (continued)

Wiring Diagrams



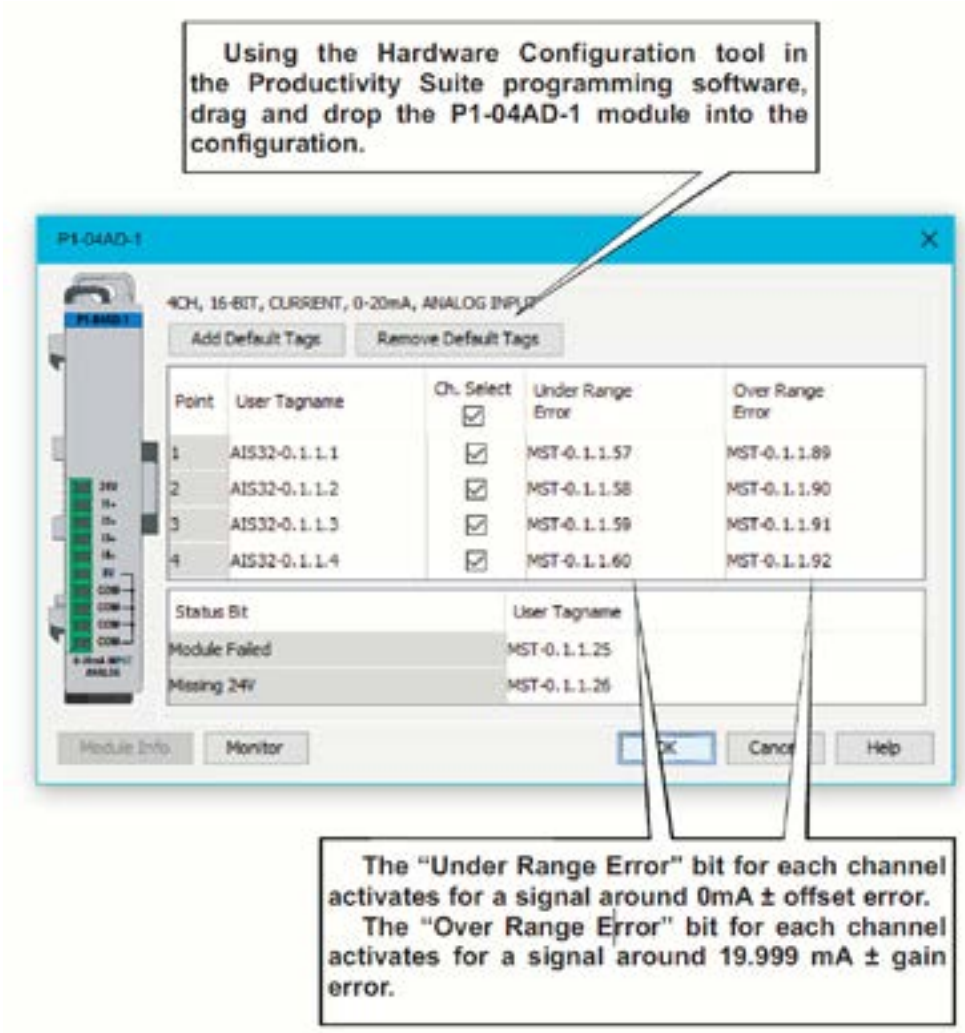
Current Input Circuits

An Edison S500-32-R 0.032 A fast-acting fuse is recommended for current loops.



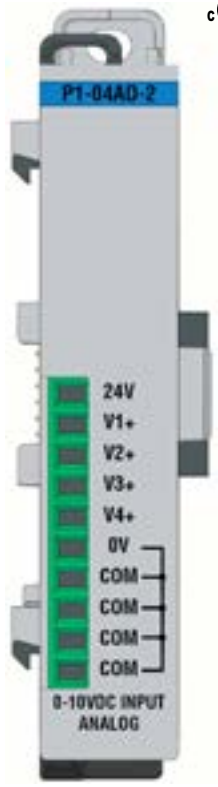
P1-04AD-1 Analog Input (continued)

Module Configuration



P1-04AD-2 Analog Input

The P1-04AD-2 Voltage Analog Input Module provides four channels for receiving 0–10 VDC signals for use with the Productivity® 1000 system.



Input Specifications	
Inputs per Module	4
Module Signal Input Range	0–10 VDC
Signal Resolution	16-bit
Resolution Value of LSB (least significant bit)	0–10 VDC=152µV, (1LSB = 1 count)
Data Range	0-65535 counts unipolar
Input Type	Single-ended (1 common)
Maximum Continuous Overload	±100V
Input Impedance	250kΩ (typical)
Filter Characteristics	Low Pass, -3dB @ 60Hz
Sample Duration Time	7ms per channel (Does not include ladder scan time)
All Channel Update Rate	50ms
Open Circuit Detection Time	Zero reading within 1s
Conversion Method	Successive approximation
Accuracy vs Temperature	±25PPM / ºC maximum
Maximum Inaccuracy	0.1% of range (Including temperature drift)
Linearity Error (end to end)	±0.015% of range Monotonic with no missing codes
Input Stability and Repeatability	±0.015% of range (after 10 min. warm-up)
Full Scale Calibration Error	±0.015% of range maximum
Offset Calibration Error	±0.015% of range maximum
Max Crosstalk	-76dB, of range maximum
External Power Supply Required	24VDC (-20% / + 25%), 35mA

Terminal block sold separately.

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5. If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P1-10RTB or P1-10RTB-1

P1-04AD-2 Analog Input (continued)

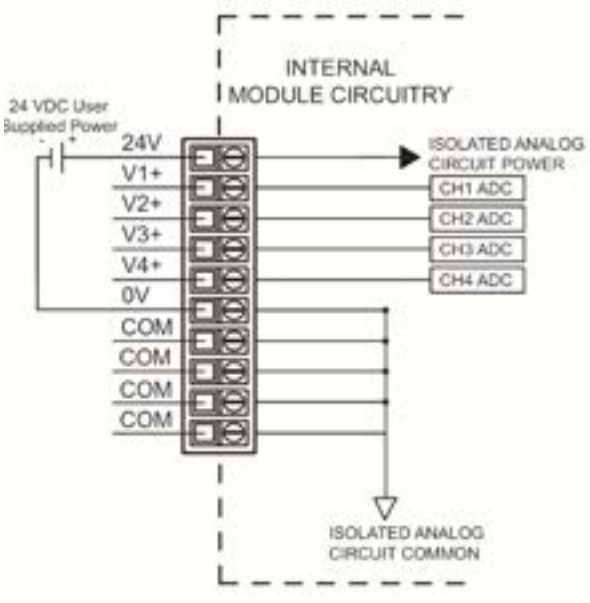
General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Altitude	2,000 meters, max.
Pollution Degree	2
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	>10MΩ @ 500VDC
Heat Dissipation	1400mW
Overvoltage Category	II
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity1000 System
Field Wiring	Removable terminal block (sold separately). Use ***ZIP***Link wiring system optional. See "Wiring Options" in Chapter 5.
Terminal Type (sold separately)	10-position removable terminal block
Weight	58g (2.0 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

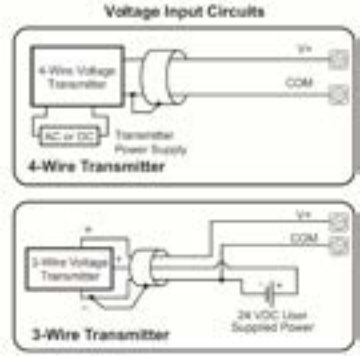
Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

** Recommended screw driver P/N: TW-SD-MSL-1.*

P1-04AD-2 Analog Input (continued)

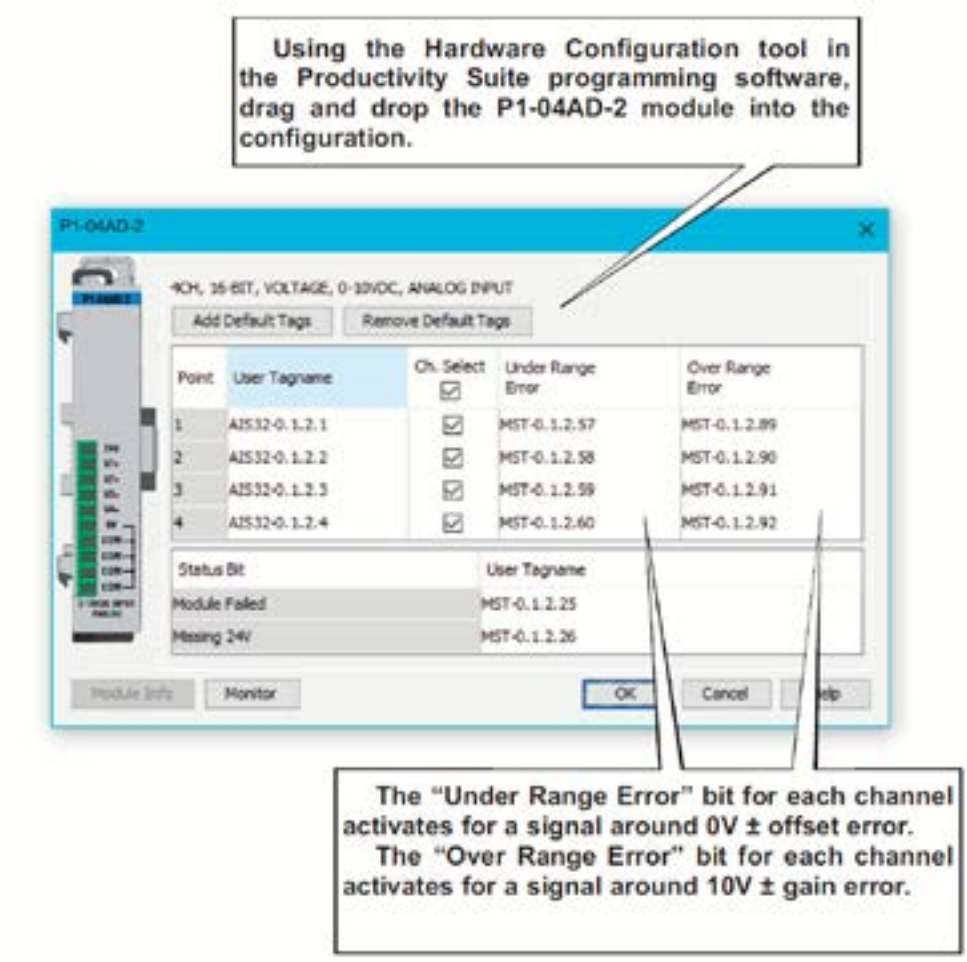
Wiring Diagrams





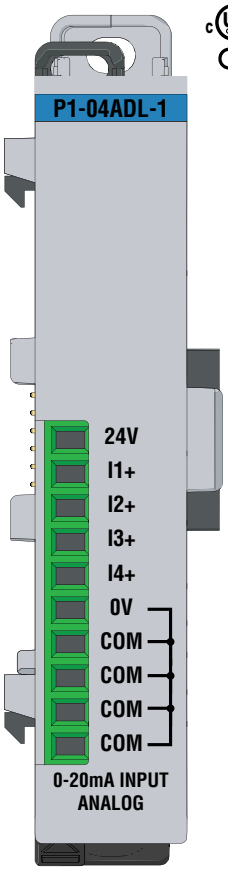
P1-04AD-2 Analog Input (continued)

Module Configuration



P1-04ADL-1 Analog Input

The P1-04ADL-1 Low Resolution Analog Input Module provides four current sinking channels for converting 0–20 mA analog signals to a digital value of 0–8191 (13-bit) for use with the Productivity® 1000 system.



Terminal block sold separately.

Input Specifications	
Input Channels	4
Input Range	0–20 mA
Signal Resolution	13-bit
Resolution Value of LSB (least significant bit)	0–20 mA = 2.44 µA per count (1LSB = 1 count)
Data Range	0–8191 counts
Input Type	Sinking, Single-ended (1 common)
Maximum Continuous Overload	±31mA
Input Impedance	243Ω, ±0.5%, 1/4W Current Input
Filter Characteristics	Low Pass, -3dB @ 120Hz
Sample Duration Time	2.5 ms per channel (Does not include ladder scan time)
All Channel Update Rate	10ms
Open Circuit Detection Time	Zero reading within 100ms
Conversion Method	Successive approximation
Accuracy vs Temperature	±75PPM / ºC maximum
Maximum Inaccuracy	0.5% of range (Including temperature drift)
Linearity Error (end to end)	±0.037% of range Monotonic with no missing codes
Input Stability and Repeatability	±0.024% of range
Maximum Full Scale Calibration Error	±0.098% of range
Offset Calibration Error	±0.098% of range
Max Crosstalk at DC, 50Hz and 60Hz	±0.049% of range
Recommended Fuse (external)	Edison S500-32-R, 0.032 A fuse
External DC Power Required	24VDC (-20% / + 25%), 30mA

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5. If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P1-10RTB or P1-10RTB-1

P1-04ADL-1 Analog Input (continued)

General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Altitude	2,000 meters, max.
Pollution Degree	2
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	>10MΩ @ 500VDC
Heat Dissipation	1200mW
Overvoltage Category	II
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity®1000 system
Field Wiring	Use ***ZIP***Link wiring system or removable terminal block (not included). See "Wiring Options" in Chapter 5.
Terminal Type (sold separately)	10-position removable terminal block
Weight	71g (2.5 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

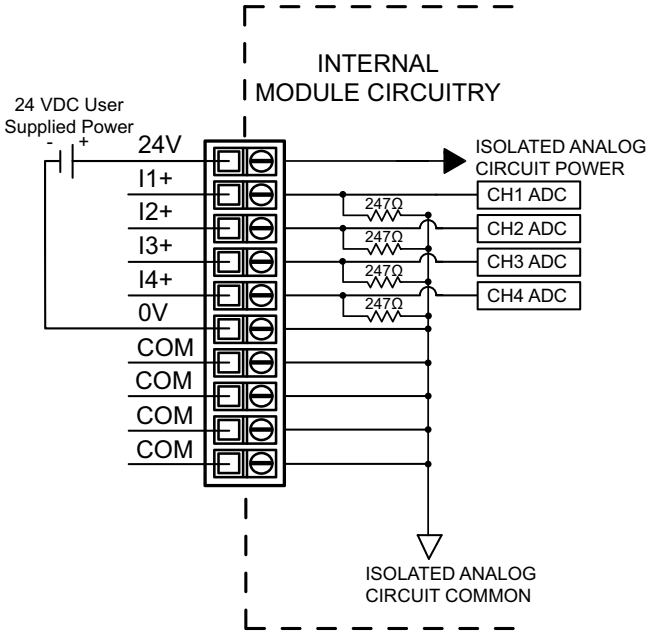
** See CE Declaration of Conformance for details.*

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

** Recommended screw driver P/N: TW-SD-MSL-1.*

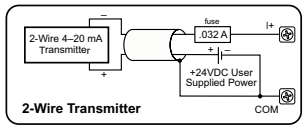
P1-04ADL-1 Analog Input (continued)

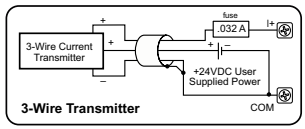
Wiring Diagrams

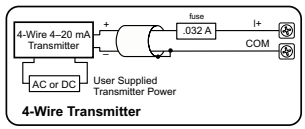


Current Input Circuits

An Edison S500-32-R 0.032 A fast-acting fuse is recommended for current loops.



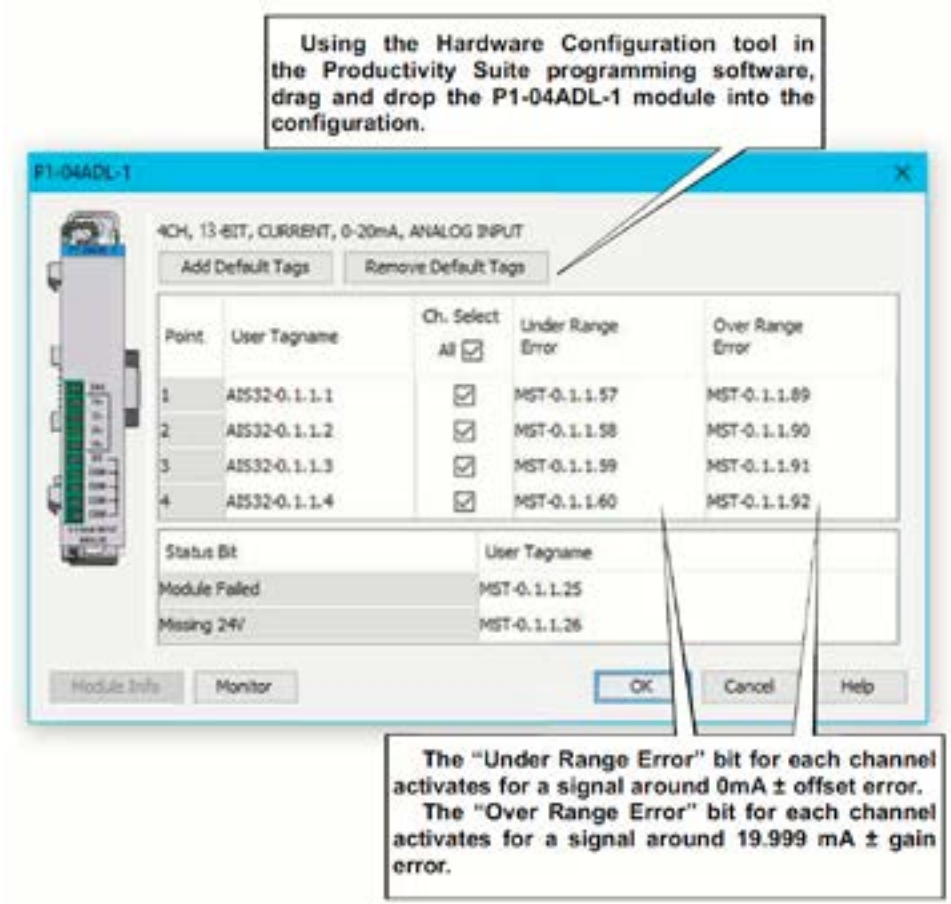




Note: Do not connect both ends of shield.

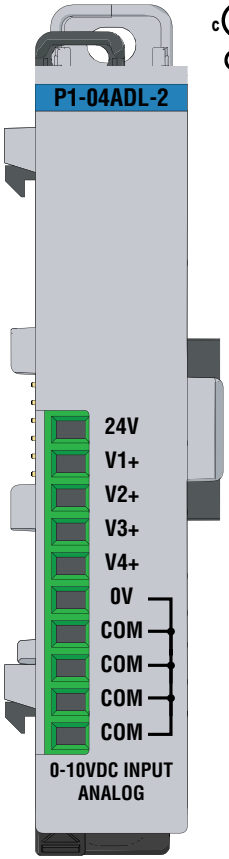
P1-04ADL-1 Analog Input (continued)

Module Configuration



P1-04ADL-2 Analog Input

The P1-04ADL-2 Low Resolution Voltage Analog Input Module provides four channels for converting 0–10 VDC analog signals to digital values of 0–8191 (13-bit) for use with the Productivity® 1000 system.



Terminal block sold separately.

Input Specifications	
Input Channels	4
Input Range	0–10 VDC
Signal Resolution	13-bit
Resolution Value of LSB	0–10 VDC = 1.22 mV per count (1 LSB = 1 count)
Data Range	0–8191 counts
Input Type	Single-ended (1 common)
Maximum Continuous Overload	±100VDC
Input Impedance	>150kΩ
Hardware Filter Characteristics	Low Pass, -3dB @ 300Hz
Sample Duration Time	2.5 ms per channel (does not include ladder scan time)
All Channel Update Rate	10ms
Conversion Method	Successive approximation
Accuracy vs Temperature	±75PPM / °C maximum
Maximum Inaccuracy	0.5% of range (including temperature drift)
Linearity Error (end to end)	±0.036% of range Monotonic with no missing codes
Input Stability and Repeatability	±0.024% of range
Full Scale Calibration Error (including offset)	±0.097% of range
Offset Calibration Error	±0.097% of range
Max Crosstalk at DC, 50Hz and 60Hz	±0.049% of range
External 24VDC Power Required	24VDC (-20% / +25%), 30mA

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5. If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P1-10RTB or P1-10RTB-1

Diagnosis/Status	
Under Range Error	1 bit per channel
Over Range Error	1 bit per channel
Module Failed	1 bit per module
Missing 24V	1 bit per module

P1-04ADL-2 Analog Input (continued)

General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Altitude	2000 meters max.
Pollution Degree	2
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	>10MΩ @ 500VDC
Heat Dissipation	1200mW
Overvoltage Category	II
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity®1000 system
Field Wiring	Use ***ZIP***Link wiring system or removable terminal block (not included). See "Wiring Options" in Chapter 5.
Terminal Type (sold separately)	10-position removable terminal block
Weight	62g (2.2 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

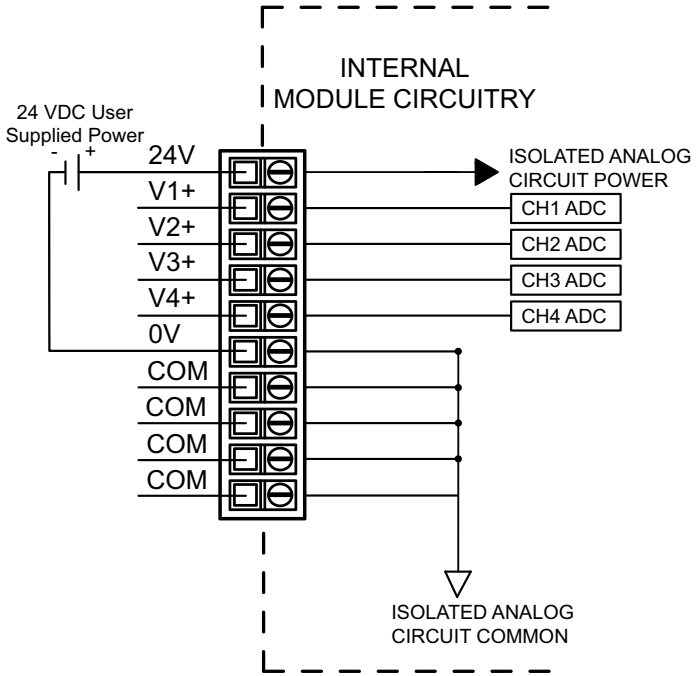
** See CE Declaration of Conformance for details.*

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

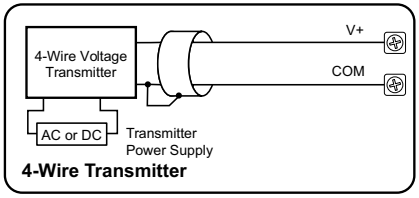
** Recommended screw driver P/N: TW-SD-SL-1 or TW-SD-MSL-1*

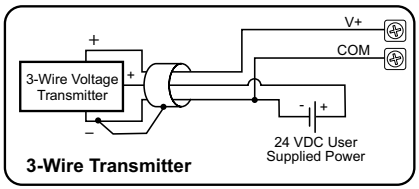
P1-04ADL-2 Analog Input (continued)

Wiring Diagrams

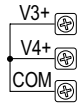


Voltage Input Circuits





Notes for maximum accuracy:
1. Jumper unused inputs to common.

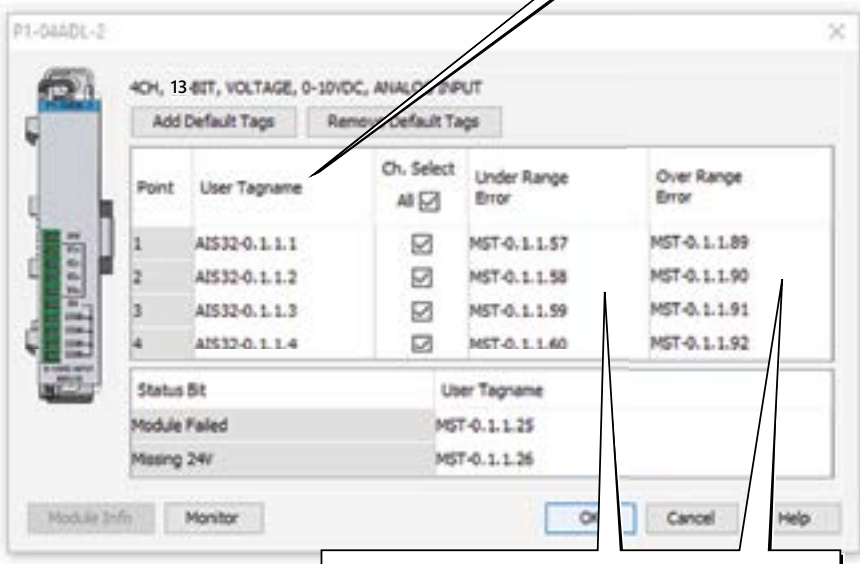


P1-04ADL-2 Analog Input (continued)

Module Configuration

Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P1-04ADL-2 module into the configuration.

If desired, assign a *User Tagname* to each input point (channel) selected and to each *Status Bit Item*.

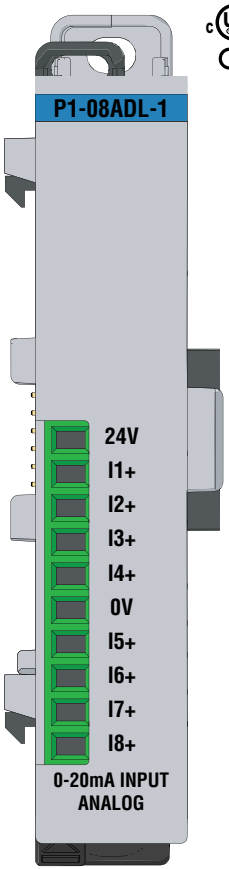


The "Under Range Error" bit for each channel activates for a signal around 0V, ± offset error.

The "Over Range Error" bit for each channel activates for a signal around 10V, ± gain error.

P1-08ADL-1 Analog Input

The P1-08ADL-1 Low Resolution Analog Input Module provides eight current sinking channels for converting 0–20 mA analog signals to a digital value of 0–8191 (13-bit) for use with the Productivity® 1000 system.



Terminal block sold separately.

Input Specifications	
Input Channels	8
Input Range	0–20 mA
Signal Resolution	13-bit
Resolution Value of LSB (least significant bit)	0–20 mA = 2.44 µA per count (1LSB = 1 count)
Data Range	0–8191 counts
Input Type	Sinking, Single-ended (1 common)
Maximum Continuous Overload	±31mA
Input Impedance	243Ω, ±1%, 1/8W Current Input
Filter Characteristics	Low Pass, -3dB @ 120Hz
Sample Duration Time	2ms per channel (Does not include ladder scan time)
All Channel Update Rate	20ms
Open Circuit Detection Time	Zero reading within 100ms
Conversion Method	Successive approximation
Accuracy vs Temperature	±75PPM / ºC maximum
Maximum Inaccuracy	0.5% of range (Including temperature drift)
Linearity Error (end to end)	±0.037% of range Monotonic with no missing codes
Input Stability and Repeatability	±0.024% of range
Maximum Full Scale Calibration Error	±0.098% of range
Offset Calibration Error	±0.098% of range
Max Crosstalk at DC, 50Hz and 60Hz	±0.049% of range
Recommended External Fuse	Edison S500-32-R, 0.032 A fuse
External DC Power Required	24VDC (-20% / + 25%), 30mA

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5. If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P1-10RTB or P1-10RTB-1

P1-08ADL-1 Analog Input (continued)

General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	>10MΩ @ 500VDC
Heat Dissipation	1200mW
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity®1000 system
Field Wiring	Use ZIPLink wiring system or removable terminal block (not included). See “Wiring Options” in Chapter 5.
Terminal Type (sold separately)	10-position removable terminal block
Weight	71g (2.5 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

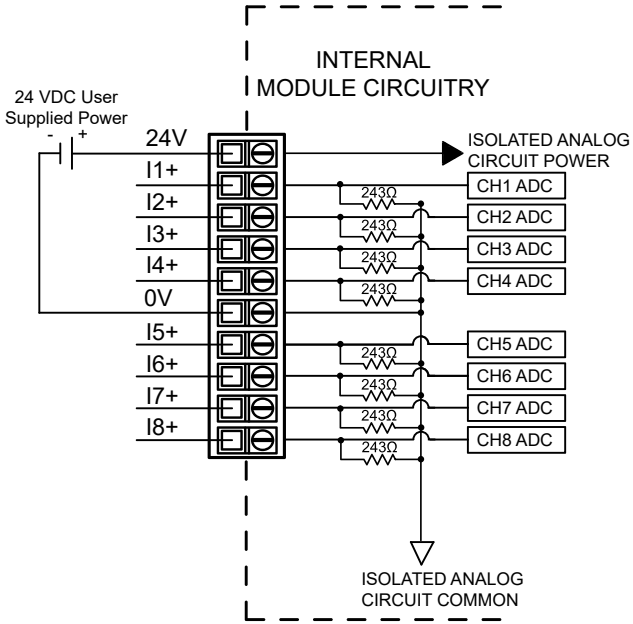
** See CE Declaration of Conformance for details.*

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

** Recommended screw driver P/N: TW-SD-MSL-1.*

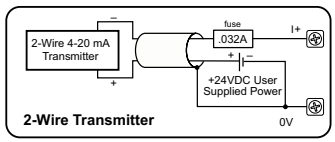
P1-08ADL-1 Analog Input (continued)

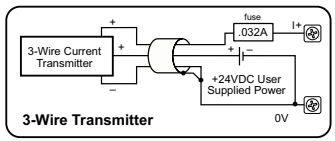
Wiring Diagrams

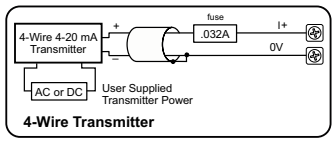


Current Input Circuits

An Edison S500-32-R 0.032A fast-acting fuse is recommended for current loops.







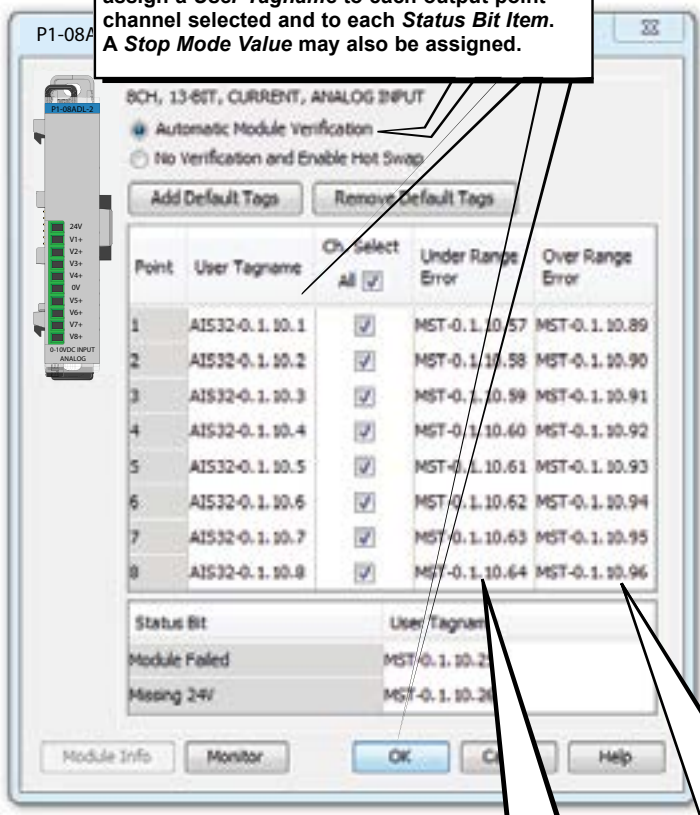
Note: Do not connect both ends of shield.

P1-08ADL-1 Analog Input (continued)

Module Configuration

Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P1-08ADL-1 module into the base configuration.

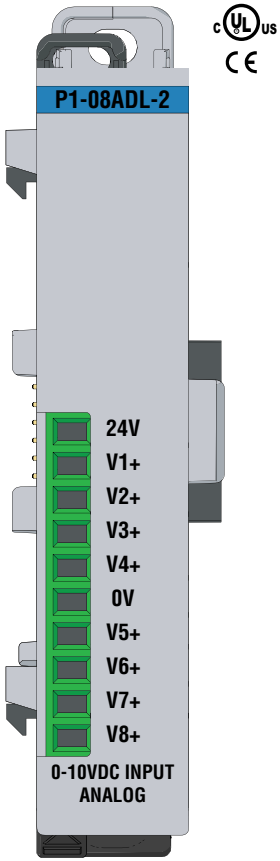
Select *Automatic Module Verification* or No *Verification and Enable Hot Swap*. If desired, assign a *User Tagname* to each output point channel selected and to each *Status Bit Item*. A *Stop Mode Value* may also be assigned.



The 'Under Range Error' bit for each channel activates below 0mA.
The 'Over Range Error' bit for each channel activates at a count of 8190 and above (above 19.999 mA).

P1-08ADL-2 Analog Input

The P1-08ADL-2 Low Resolution Voltage Analog Input Module provides eight channels for converting 0–10 VDC analog signals to digital values of 0–8191 (13-bit) for use with the Productivity® 1000 system.



Terminal block sold separately.

Input Specifications

Input Channels	8
Input Range	0–10 VDC
Signal Resolution	13-bit
Resolution Value of LSB	0–10 VDC = 1.22 mV per count (1 LSB = 1 count)
Data Range	0–8191 counts
Input Type	Single-ended (1 common)
Maximum Continuous Overload	±100VDC
Input Impedance	>150kΩ
Hardware Filter Characteristics	Low Pass, -3dB @ 500Hz
Sample Duration Time	2.5 ms per channel (Does not include ladder scan time)
All Channel Update Rate	25ms
Conversion Method	Successive approximation
Accuracy vs Temperature	±75PPM / °C maximum
Maximum Inaccuracy	0.5% of range (Including temperature drift)
Linearity Error	±0.036% of range Monotonic with no missing codes
Input Stability and Repeatability	±0.024% of range
Full Scale Calibration Error (including offset)	±0.097% of range
Offset Calibration Error	±0.097% of range
Max Crosstalk at DC, 50Hz and 60Hz	±0.049% of range
External 24VDC Power Required	24VDC (-20% / +25%), 30mA

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5. If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P1-10RTB or P1-10RTB-1

Diagnosis/Status

Under Range Error	1 bit per channel
Over Range Error	1 bit per channel
Module Failed	1 bit per module
Missing 24V	1 bit per module

P1-08ADL-2 Analog Input (continued)

General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Altitude	2000 meters max.
Pollution Degree	2
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	>10MΩ @ 500VDC
Heat Dissipation	1200mW
Overvoltage Category	II
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity®1000 system
Field Wiring	Use ZIPLink wiring system or removable terminal block (not included). See “Wiring Options” in Chapter 5..
Terminal Type (sold separately)	10-position removable terminal block
Weight	71g (2.5 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

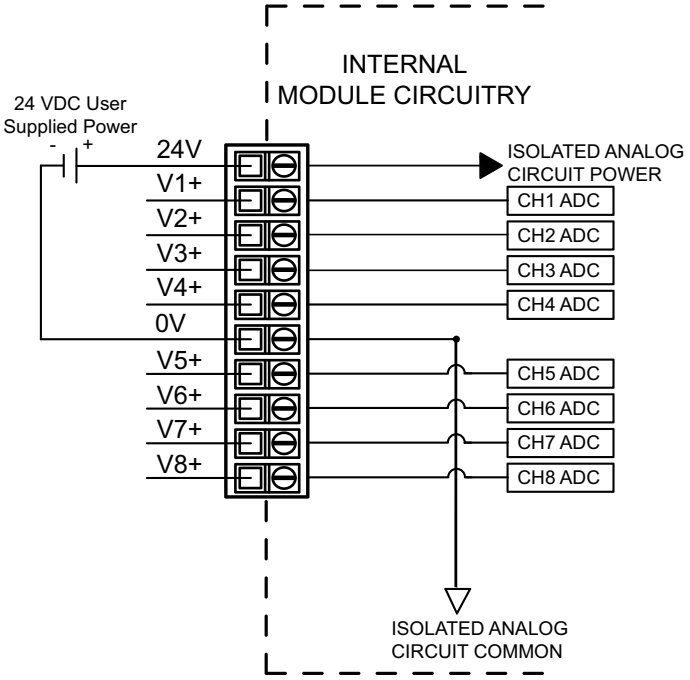
** See CE Declaration of Conformance for details.*

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

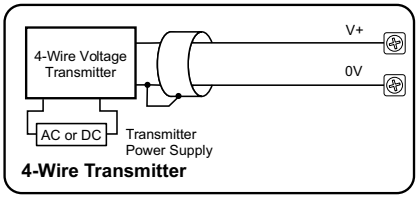
** Recommended screw driver P/N: TW-SD-MSL-1.*

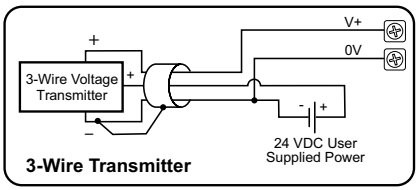
P1-08ADL-2 Analog Input (continued)

Wiring Diagrams



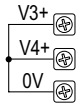
Voltage Input Circuits





Note: Do not connect both ends of shield.

Notes for maximum accuracy:
1. Jumper unused inputs to common.

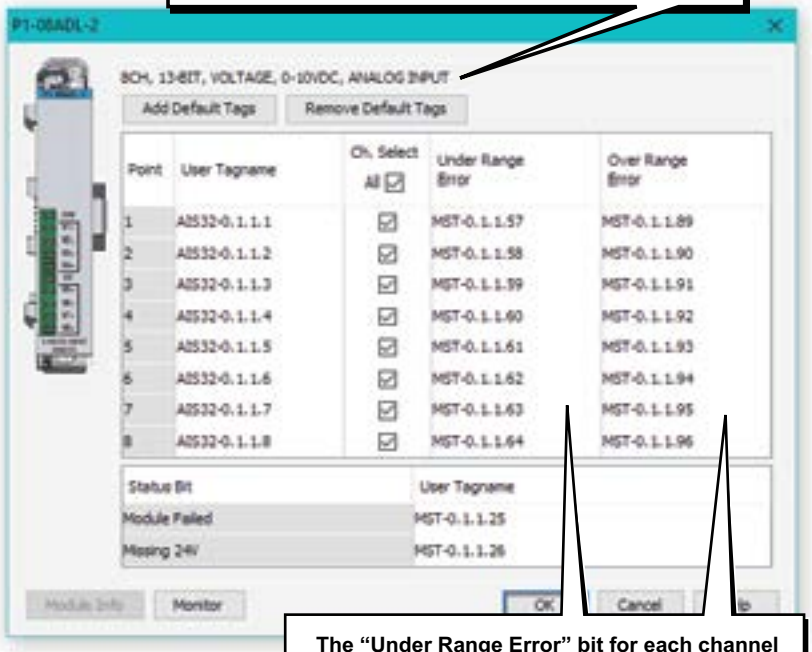


P1-08ADL-2 Analog Input (continued)

Module Configuration

Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P1-08ADL-2 module into the base configuration.

If desired, assign a *User Tagname* to each input point (channel) selected and to each *Status Bit Item*. A *Stop Mode Value* may be assigned.

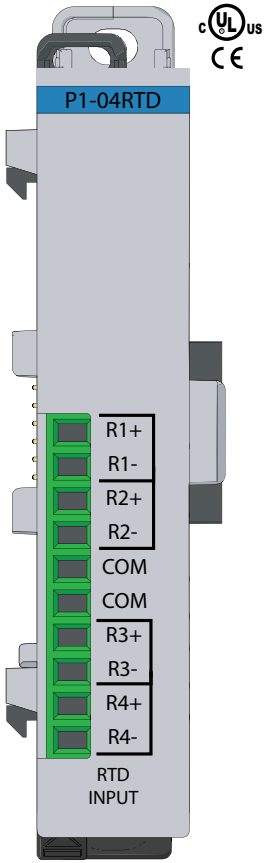


The "Under Range Error" bit for each channel activates for a signal around 0V, ± offset error.

The "Over Range Error" bit for each channel activates for a signal around 10V, ± gain error.

P1-04RTD Analog Input

The P1-04RTD Input Module provides four differential channels for receiving RTD and resistance input signals for use with the Productivity® 1000 system.



Terminal Block Included.
Not Compatible with *ZIP*Link.

Warranty: Thirty-day money-back guarantee. Two-year limited replacement. (See www.productivity1000.com for details).

RTD Input Specifications		
Input Channels	4 Differential	
Data Format	Floating Point	
Max. Common Mode Voltage	5VDC	
Common Mode Rejection	-100dB min. @ DC, -100dB min. @ 50/60 Hz*	
Absolute Maximum Ratings	Fault protected input, ±50V	
Internal Resolution	16-bit, ±0.1°C or °F	
Input Ranges (RTD Types)	Pt100 Pt1000 JPt100 10Ω Cu. 25Ω Cu. 120Ω Ni.	-200°C–850°C (-328°F–1562°F) -200°C–595°C (-328°F–1103°F) -100°C–450°C (-148°F–842°F) -200°C–260°C (-328°F–500°F) -200°C–260°C (-328°F–500°F) -80°C–260°C (-112°F–500°F)
RTD Linearization	Automatic	
Excitation Current (all ranges)	210µA	
Accuracy vs. Temperature	±10ppm per °C (maximum)	
Warm-up Time	2 minutes for ±0.2% repeatability	
Maximum Inaccuracy*	±1°C maximum @ 16.7 Hz, ±3°C maximum @470Hz ±5°C maximum on Cu10 & Cu25	
Sample Duration (Single channel update rate)	Dependent on digital filter settings – 200ms @ 16.7 Hz, 90ms @ 470Hz	
Filter Characteristics	Digital filter cutoff frequencies: 16.7 Hz, 470Hz	
All Channel Update Rate	Single channel update rate times the number of enabled channels	
Open Circuit Detection Time	Burnout detect within 2s	
Conversion Method	Sigma-Delta	
External DC Power Required	None	

** Note: Excluding RTD error, including temperature drift.*

P1-04RTD Analog Input (continued)

General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Heat Dissipation	100mW
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity®1000 system
Field Wiring	Removable terminal block (included). The P1-04RTD module is not compatible with the ZIPLink wiring system.
Connector Type (included)	10-position removable terminal block
Weight	60g (2.1 oz)
Agency Approvals	UL61010-2-201 File E139594, Canada & USA CE (EN61131-2 EMC and EN61010-2-201 Safety)*

** See the Declaration of Conformance for details.*

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

** Recommended screw driver P/N: TW-SD-MSL-1.*

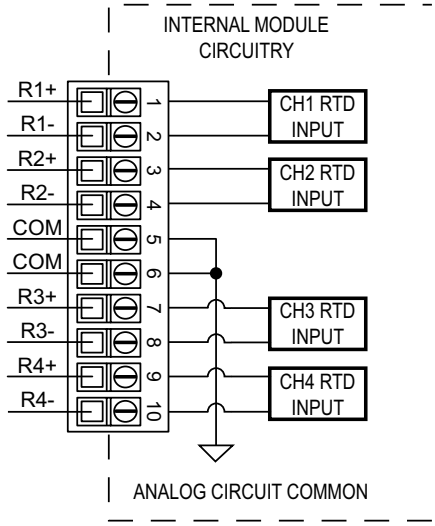
P1-04RTD Analog Input (continued)

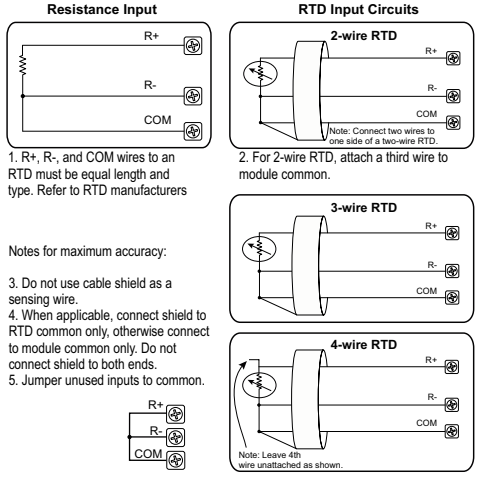
Resistance Input Specifications	
Internal Resolution	16 bit, 0.0015% of full scale range in ohms
Resistance Input Ranges and CPU Resolution	0–10,000 V, Resolution 1V 0–6,250 V, Resolution 0.1 V 0–3,125 V, Resolution 0.1 V 0–1,562.5 V, Resolution 0.1 V 0–781.25 V, Resolution 0.1 V 0–390.625 V, Resolution 0.01 V 0–195.3125 V, Resolution 0.01 V
Accuracy vs. Temperature	±25ppm per °C (maximum)
Linearity Error (end to end)	± 0.03% @16.7 Hz, ±0.06% 470Hz of full scale range maximum at 25°C, Monotonic with no missing codes
Maximum Inaccuracy	± 0.10% of full scale range

Diagnostics	
Module Diagnostics Failure	1 bit per module
Module Not Ready	1 bit per module
Channel Burn-out (RTD only)	1 bit per channel
Under-range (RTD only)	1 bit per channel
Over-range	1 bit per channel

P1-04RTD Analog Input (continued)

Wiring Diagrams





1. R+, R-, and COM wires to an RTD must be equal length and type. Refer to RTD manufacturers

2. For 2-wire RTD, attach a third wire to module common.

Notes for maximum accuracy:

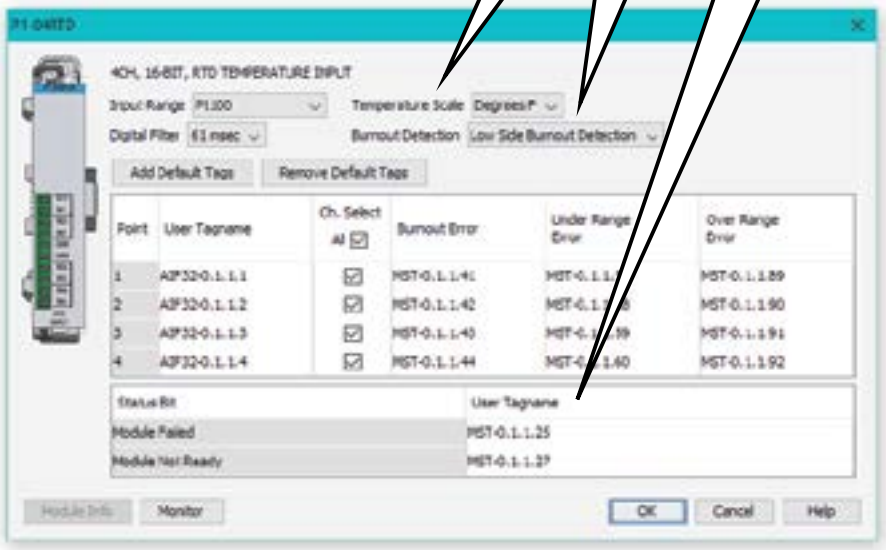
3. Do not use cable shield as a sensing wire.
4. When applicable, connect shield to RTD common only, otherwise connect to module common only. Do not connect shield to both ends.
5. Jumper unused inputs to common.

P1-04RTD Analog Input (continued)

Module Configuration

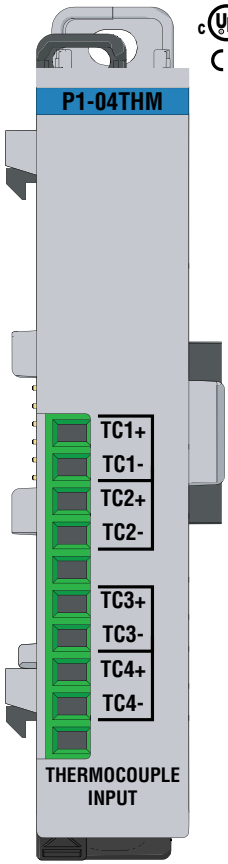
Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P1-04RTD module into the base configuration.

Specify *Temperature Scale* and *Burnout Detection*, and use the drop down menu to select module range and resolution. If desired, assign a *User Tagname* to each output point channel selected and to each *Status Bit*.



P1-04THM Analog Input

The P1-04THM Thermocouple Input Module provides four differential channels for receiving thermocouple and voltage input signals for use with the Productivity® 1000 system.



Terminal Block Included.
Not Compatible with *ZIP*Link.

Warranty: Thirty-day money-back guarantee. Two-year limited replacement. (See www.productivity1000.com for details).

Thermocouple Input Specifications

Input Channels	4 Differential
Data Format	Floating Point
Common Mode Range	±0.5 V
Common Mode Rejection	100dB @ DC
Input Impedance	>5MΩ
Maximum Ratings	Fault protected inputs to ±50V
Resolution	16-bit, ±0.1°C or °F
Thermocouple Input Ranges	Type J - 190° to 760°C (-310° to 1400°F); Type E - 210° to 1000°C (-346° to 1832°F); Type K - 150° to 1372°C (-238° to 2502°F); Type R - 65° to 1768°C (149° to 3214°F); Type S - 65° to 1768°C (149° to 3214°F); Type T - 230° to 400°C (-382° to 752°F); Type B - 529° to 1820°C (984° to 3308°F); Type N - 70° to 1300°C (-94° to 2372°F); Type C - 65° to 2320°C (149° to 4208°F);
Thermocouple Linearization	Automatic
Cold Junction Compensation	Automatic
Sample Duration Time	270ms
All Channel Update Rate	1.08 s
Open Circuit Detection Time	Within 5s
Conversion Method	Sigma-Delta
Accuracy vs. Temperature	±50ppm per °C (maximum)
Maximum Inaccuracy	±3°C maximum (excluding thermocouple error).
Linearity Error	±1°C maximum (±0.5°C typical) Monotonic with no missing codes.
Warm-up Time	30 minutes for ±1% repeatability 2 minutes to reach voltage specifications
External Power Supply Required	None

Voltage Input Specifications

Linear mV Device Input Ranges	0–39.0625 mVDC, ±39.0625 mVDC, ±78.125 mVDC, 0–156.25 mVDC, ±156.25 mVDC, 0–1250 mVDC
Max Voltage Input Offset Error	0.05% @ 0°– 60°C, typical 0.04% @ 25°C
Max Voltage Input Gain Error	0.06% @ 25°C
Max Voltage Input Linearity Error	0.05% @ 0°– 60°C, typical 0.03% @ 25°C
Max Voltage Input Impedance	0.2% @ 0°– 60°C, typical 0.06% @ 25°C

P1-04THM Analog Input (continued)

General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Altitude	2000 meters max.
Pollution Degree	2
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Overvoltage Category	II
Field to Logic Side Isolation	1800VAC applied for 1s
Heat Dissipation	100mW
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity®1000 system
Field Wiring	Removable terminal block (included). The P1-04THM module is not compatible with the *ZIP*Link wiring system.
Connector Type (Included)	10-position removable terminal block
Weight	58g (2.0 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

** See CE Declaration of Conformance for details.*

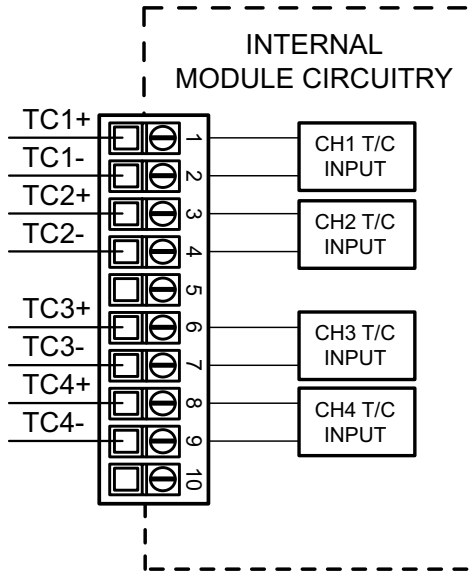
Configuration/Diagnostics	
Burn-out Detection: High Side/Disable	1 bit per module
°C/°F (T/C Only)	1 bit per module
Module Diagnostics Failure	1 bit per module
Burn-out (on if T/C input is open – no connection between TCn+ and TCn-)	1 bit per channel
Channel Under-range (T/C only)	1 bit per channel
Channel Over-range (T/C only)	1 bit per channel

P1-04THM Analog Input (continued)

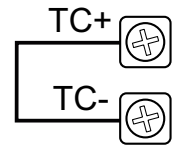
Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

** Recommended screw driver P/N: TW-SD-MSL-1.*

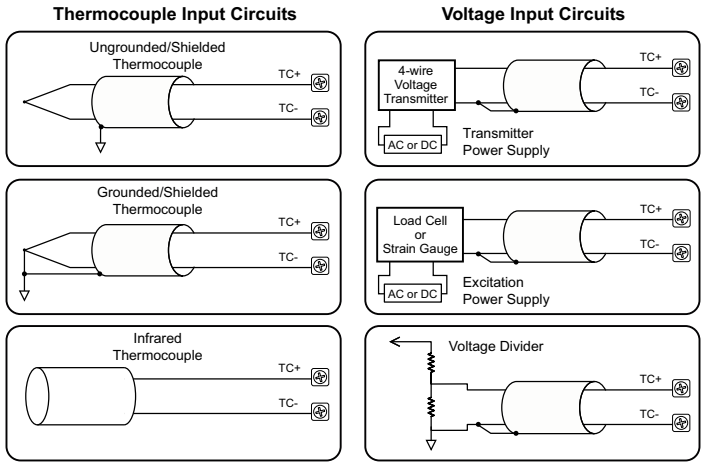
Wiring Diagrams

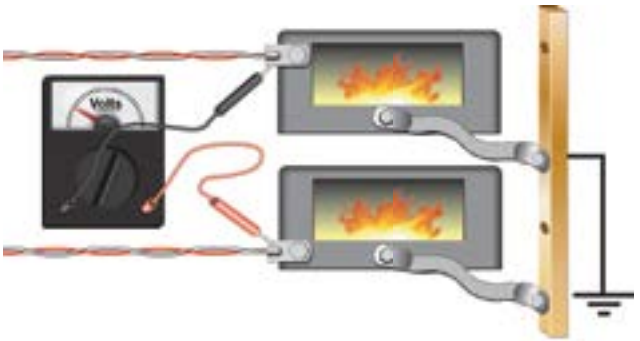


NOTE: *Install jumper wire on each unused input; TC+ to TC-.*



P1-04THM Analog Input (continued)





NOTES:

1. Connect shield to thermocouple signal/ground only. Do not connect to both ends.
2. Install jumper wire on each unused input, TC+ to TC-.

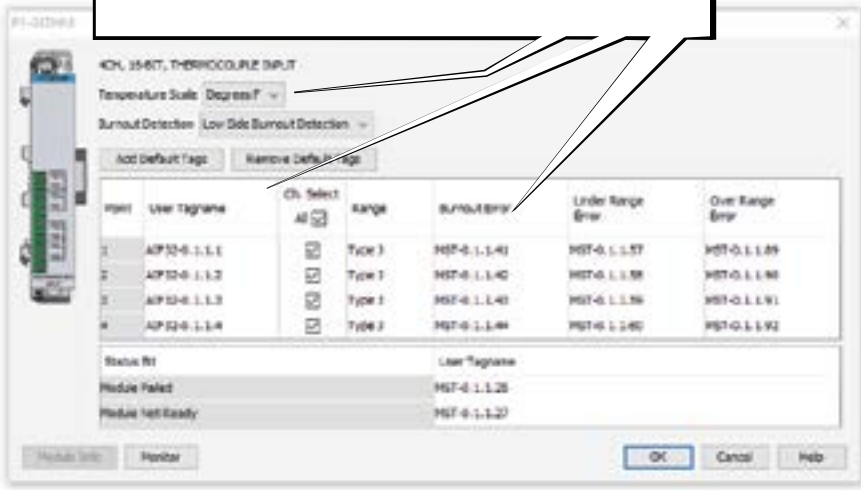
3. With grounded thermocouples, take precautions to prevent having a voltage potential between thermocouple tips. A voltage of 0.5V or greater between tips will skew measurements.
4. Use shielded, twisted thermocouple extension wire that matches the thermocouple type. Use thermocouple-compatible junction blocks.

P1-04THM Analog Input (continued)

Module Configuration

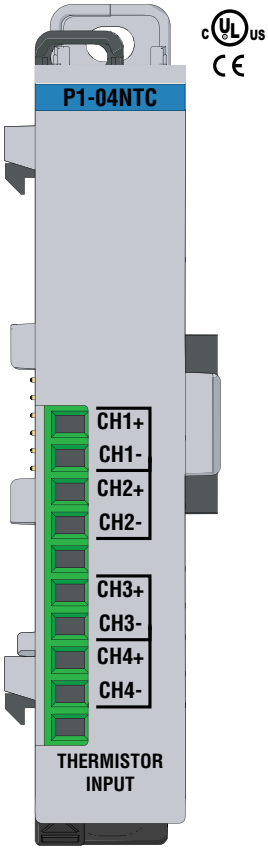
Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P1-04THM module into the base configuration.

Select *Automatic Module Verification* or No *Verification*. Specify *Temperature Scale* **and** *Burnout Detection*, **and use the drop down menu to select module range and resolution. If desired, assign a *User Tagname* to each output point channel selected and to each *Status Bit Item*.**



P1-04NTC Thermistor

The P1-04NTC module provides four Thermistor input channels for use with the Productivity®1000 system.



Terminal Block Included.
Not Compatible with *ZIP*Link.

Warranty: Thirty-day money-back guarantee. Two-year limited replacement. (See www.productivity1000.com for details).

NTC Input Specifications

Input Channels	4 Single Ended (Temperature only)	
Data Format	Floating Point	
Common Mode Rejection	100dB @ DC	
Input Impedance	>5MΩ	
Maximum Ratings	Fault protected inputs to ±50V	
Resolution	16-bit, ±0.1°C or °F	
Thermistor Input Ranges	2252 10K-AN Type 3 10K-CP Type 2 5K 3K 1.8 K	-40° to 150°C (-40° to 300°F)
Thermistor Linearization	Automatic	
Sample Duration	Dependent on digital filter settings - 61ms @ 33Hz; 4ms @ 470Hz	
Sample Duration Time	Per channel: 61ms @ 33Hz, 4ms @ 470Hz	
All Channel Update Rate	1.2 s @ 33Hz; 300ms @ 470Hz	
Open Circuit Detection Time	Within 5s @ 33Hz	
Conversion Method	Sigma-Delta	
Accuracy vs. Temperature	±35PPM per °C (maximum)	
Maximum Inaccuracy	±1°C maximum (33Hz) ±2.5°C maximum (470Hz) (Excluding thermistor error; including temperature drift)	
Linearity Error	±0.5°C maximum (±0.35°C typical) Monotonic with no missing codes	
Filter Characteristics	Digital filter cutoff frequencies: 33Hz, 470Hz.	
External Power Supply Required	None	

P1-04NTC Thermistor (continued)

General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Heat Dissipation	100mW
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity®1000 system
Field Wiring	Removable terminal block (included). The P1-04NTC module is not compatible with the ZIPLink wiring system.
Connector Type (included)	10-position removable terminal block
Weight	60g (2.1 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

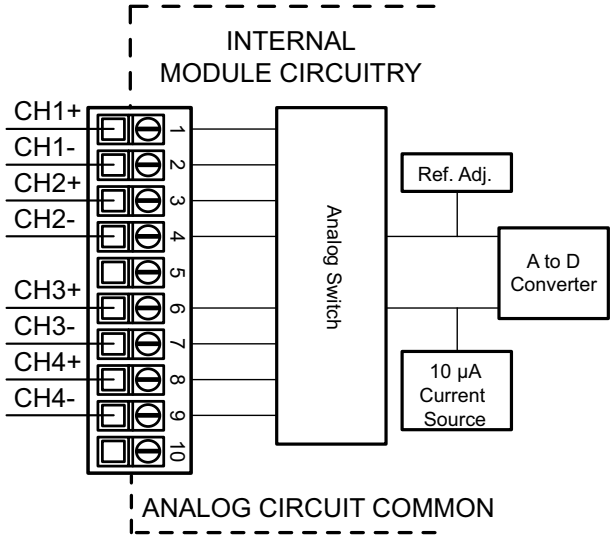
** See CE Declaration of Conformance for details.*

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

** Recommended screw driver P/N: TW-SD-MSL-1.*

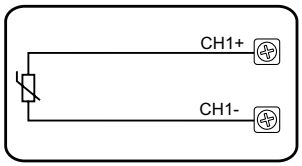
P1-04NTC Thermistor (continued)

Wiring Diagrams

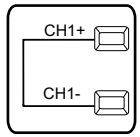


NOTE: *Install jumper wire on each unused input; CH+ to CH-.*

Thermistor Input



Jumpers

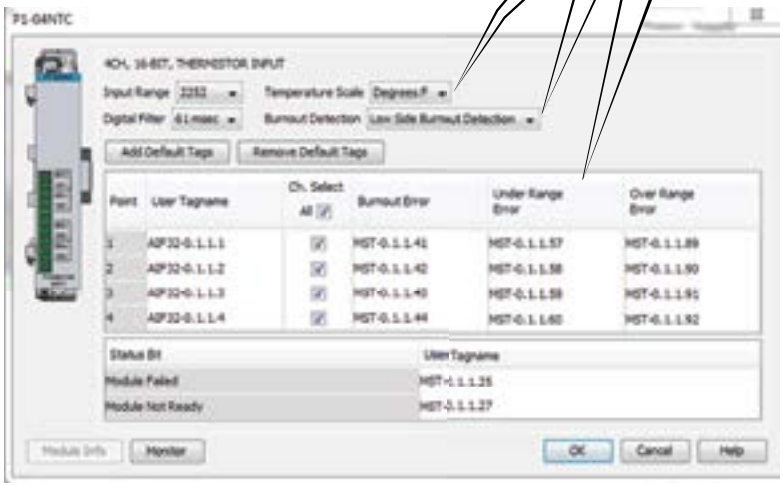


P1-04NTC Thermistor (continued)

Module Configuration

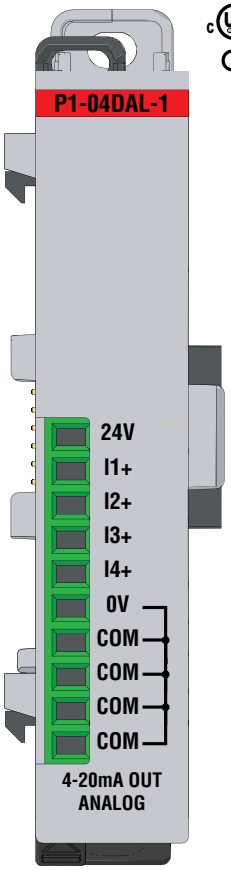
Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P1-04NTC module into the base configuration.

Specify *Temperature Scale* **and** *Burnout Detection*, **and use the drop down menu to select module range and resolution. If desired, assign a *User Tagname* to each output point channel selected and to each *Status Bit Item*.**



P1-04DAL-1 Analog Output

The P1-04DAL-1 Low Resolution Analog Output Module provides four current sourcing channels for converting a digital value of 0–4095 (12-bit) to 4–20 mA analog signals for use with the Productivity® 1000 system.



Terminal block sold separately.

Output Specifications

Output Channels	4
Output Range	4–20 mA
Signal Resolution	12-bit
Resolution Value of LSB (least significant bit)	4–20 mA = 3.9 µA / count 1 LSB = 1 count
Data Range	0 to 4095 counts
Output Type (sourcing)	Current sourcing at 20mA max
Output Value in Fault Mode	Less than 4mA
Load Impedance	0–570Ω (19.2 VDC), 0–690Ω (21.6 VDC), 0–810Ω (24VDC), 0–930Ω (26.4 VDC), 0–1100Ω (30.0 VDC), Minimum Load: 0Ω @ 0–45°C 125Ω @ 45–60°C ambient temperature
Maximum Inductive Load	1mH
Allowed Load Type	Grounded
Maximum Inaccuracy	1% of range
Maximum Full Scale Calibration Error (Including Offset)	±0.2% of range minimum
Maximum Offset Calibration Error	±0.2% of range maximum
Accuracy vs. Temperature	±75PPM / °C maximum full-scale calibration change (±0.005% of range / °C)
Max Crosstalk at DC, 50/60Hz	-72dB, 1 LSB
Linearity Error (End to End)	±4 counts max., (±0.1% of full scale)
Output Stability and Repeatability	±2 count after 10 min. warm up (typical)
Output Ripple	±0.2% of full scale
Output Settling Time	0.3 ms max., 5µs min. (full scale range)
All Channel Update Rate	2ms (max)
Maximum Continuous Overload	Outputs open circuit protected
Type of Output Protection	Electronically current limited to 20mA or less
Output Signal at Power Up and Power Down	4mA
External Power Supply Required	24VDC (-20% / +25%),140mA (Loop power included)

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5.
If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P1-10RTB or P1-10RTB-1

P1-04DAL-1 Analog Output (continued)

General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	>10MΩ @ 500VDC
Heat Dissipation	3000mW Maximum
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity®1000 system
Field Wiring	Use ZIPLink wiring system or removable terminal block (not included). See “Wiring Options” in Chapter 5.
Terminal Type (sold separately)	10-position removable terminal block
Weight	85.1 g (3.0 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

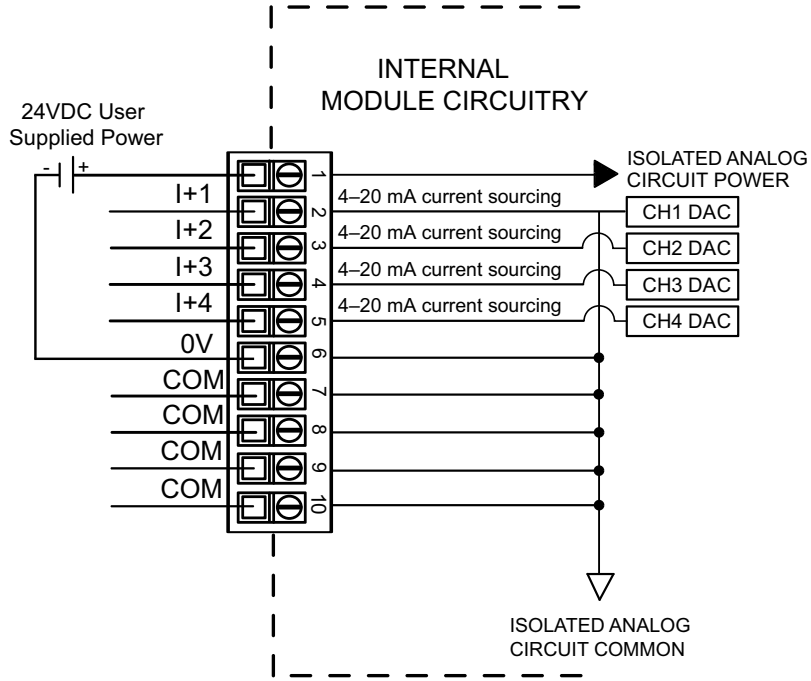
** See CE Declaration of Conformance for details.*

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

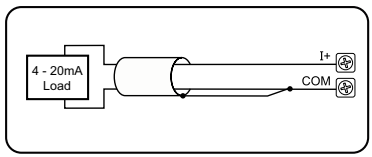
** Recommended screw driver P/N: TW-SD-MSL-1.*

P1-04DAL-1 Analog Output (continued)

Wiring Diagrams



Current Source Output Circuit



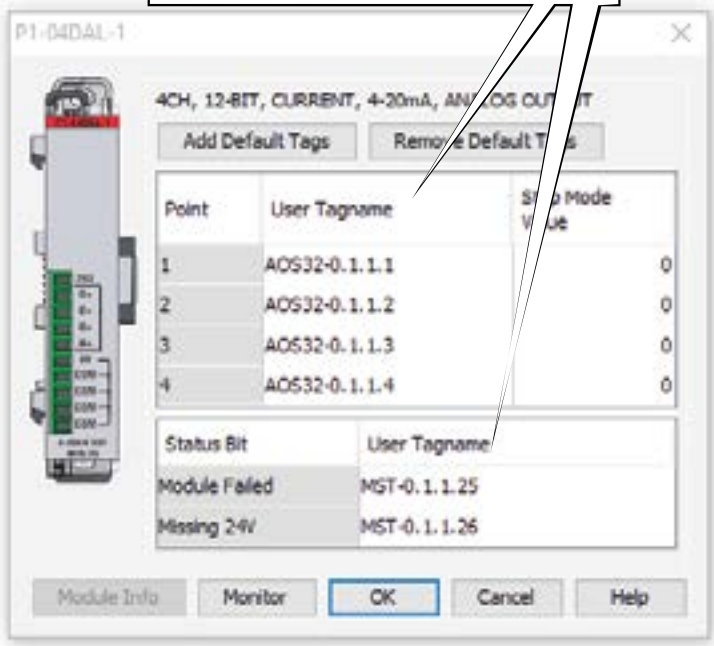
Note: Shield is connected to common at the source device.

P1-04DAL-1 Analog Output (continued)

Module Configuration

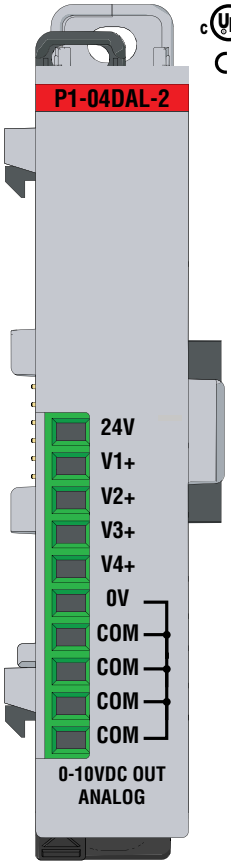
Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P1-04DAL-1 module into the base configuration.

If desired, assign a *User Tagname* to each output point channel selected and to each *Status Bit Item*. A *Stop Mode Value* may also be assigned.



P1-04DAL-2 Analog Output

The P1-04DAL-2 Low Resolution Voltage Analog Output Module provides four outputs for converting digital values from 0–4095 (12-bit) to 0–10 VDC analog signals for use with the Productivity® 1000 system.



Terminal block sold separately.

Output Specifications	
Output Channels	4
Module Signal Input Range	0–10 V
Output Signal Resolution	12-bit
Resolution Value of LSB (least significant bit)	0–10 V = 2.44 mV per count 1 LSB = 1 count
Data Range	0 to 4095 counts
Output Type	Voltage sourcing at 10mA
Output Value in Fault Mode	0V
Load Impedance	≥1000Ω
Maximum Capacitive Load	0.01 µF
Allowed Load Type	Grounded
Maximum Inaccuracy	0.5% of range
Maximum Full Scale Calibration Error (Not Including Offset)	±0.2% of range
Maximum Offset Calibration Error	±0.2% of range
Accuracy vs. Temperature	±75PPM / °C maximum full-scale calibration change (±0.0025% of range / °C)
Max Crosstalk	-72dB, 1 LSB
Linearity Error (End to End)	±4 LSB maximum, (±0.1% of full scale) Monotonic with no missing codes
Output Stability and Repeatability	±2% LSB after 10 min. warm up (typical)
Output Ripple	±0.2% of full scale
Output Settling Time	0.3 ms max., 5µs min. (full scale range)
All Channel Update Rate (typical)	2ms
Maximum Continuous Overload	Outputs current limited to 40mA typical Continuous overloads on multiple outputs can damage the module.
Type of Output Protection	0.1 µF Transient Suppressor
Output Signal at Power Up and Power Down	0V
External Power Supply Required	24VDC (-20% / +25%), 100mA

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5. If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P1-10RTB or P1-10RTB-1

P1-04DAL-2 Analog Output (continued)

General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	>10MΩ @ 500VDC
Heat Dissipation	2000mW
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity®1000 system
Field Wiring	Use ZIPLink wiring system or removable terminal block (not included). See “Wiring Options” in Chapter 5.
Connector Type (Not included)	10-position removable terminal block
Weight	62g (2.2 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

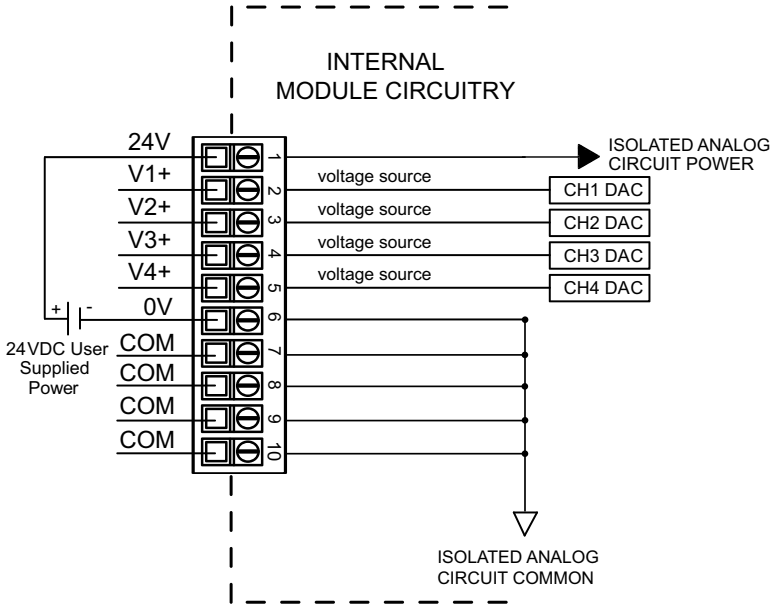
** See CE Declaration of Conformance for details.*

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

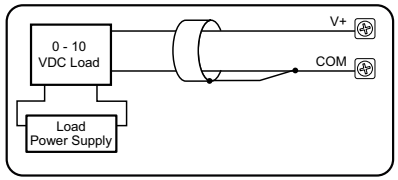
** Recommended screw driver P/N: TW-SD-MSL-1.*

P1-04DAL-2 Analog Output (continued)

Wiring Diagrams



Voltage Output Circuits

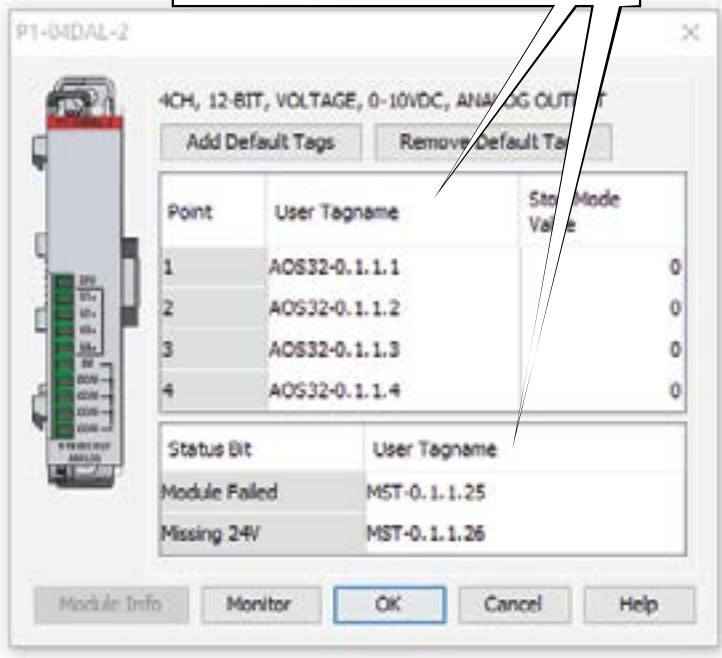


P1-04DAL-2 Analog Output (continued)

Module Configuration

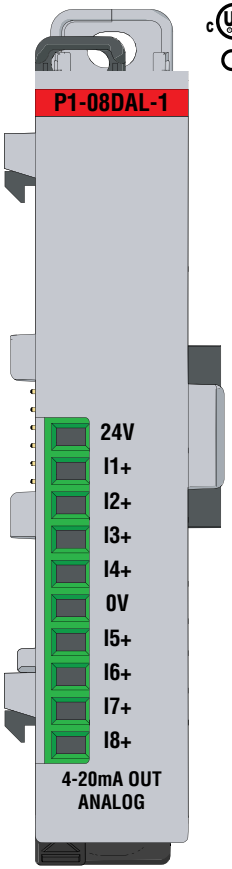
Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P1-04DAL-2 module into the base configuration.

If desired, assign a *User Tagname* to each output point channel selected and to each *Status Bit Item*. A *Stop Mode Value* may also be assigned.



P1-08DAL-1 Analog Output

The P1-08DAL-1 Current Analog Output Module provides eight (12-bit) to 4–20 mA analog signals for use with the Productivity® 1000 system.



Terminal block sold separately.

Output Specifications

Output Channels	8
Output Type (sourcing)	Current sourcing at 20mA max
Output Range	4–20 mA
Signal Resolution	12-bit
Resolution Value of LSB (least significant bit)	4–20 mA = 3.9 µA / count 1 LSB = 1 count
Data Range	0 to 4095 counts
Output Value in Fault Mode	Less than 4mA
Load Impedance	0–570Ω (19.2 VDC), 0–690Ω (21.6 VDC), 0–810Ω (24VDC), 0–930Ω (26.4 VDC), 0–1100Ω (30.0 VDC), Minimum Load: 0Ω @ 0–45°C 125Ω @ 45–60°C ambient temperature
Maximum Inductive Load	1mH
Allowed Load Type	Grounded
Maximum Inaccuracy	1% of range
Maximum Full Scale Calibration Error (Including Offset)	±0.2% of range minimum
Maximum Offset Calibration Error	±0.2% of range maximum
Accuracy vs. Temperature	±75PPM / °C maximum full-scale calibration change (±0.005% of range / °C)
Max Crosstalk at DC, 50/60Hz	-72dB, 1 LSB
Linearity Error (End to End)	±4 LSB max., (±0.1% of full scale)
Output Stability and Repeatability	±2% LSB after 10 min. warm up (typical)
Output Ripple	±0.1% of full scale
Output Settling Time	0.3 ms max., 5µs min. (full scale range)
All Channel Update Rate	10ms (max)
Maximum Continuous Overload	Outputs open circuit protected
Type of Output Protection	Electronically current limited to 20mA or less
Output Signal at Power Up and Power Down	4mA
External Power Supply Required	24VDC @ 160mA

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5.
If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P1-10RTB or P1-10RTB-1

P1-08DAL-1 Analog Output (continued)

General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	>10MΩ @ 500VDC
Heat Dissipation	6000mW
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity®1000 system
Field Wiring	Use ZIPLink wiring system or removable terminal block (not included). See “Wiring Options” in Chapter 5.
Terminal Type (sold separately)	10-position removable terminal block
Weight	70g (2.3 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

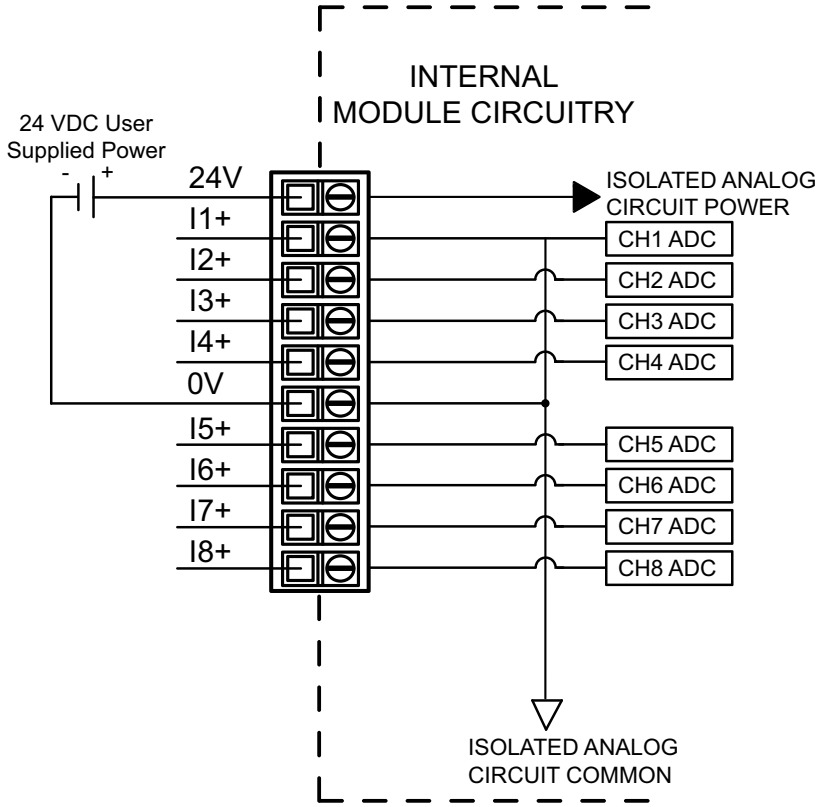
** See CE Declaration of Conformance for details.*

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

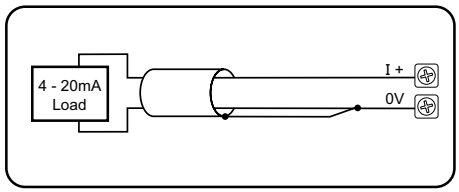
** Recommended screw driver P/N: TW-SD-MSL-1.*

P1-08DAL-1 Analog Output (continued)

Wiring Diagrams



Current Source Output Circuit



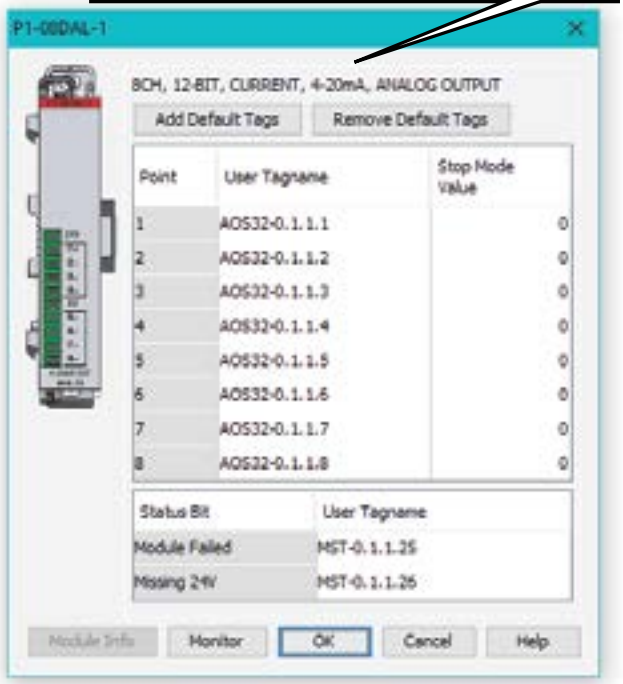
Note: Shield is connected to common at the source device.

P1-08DAL-1 Analog Output (continued)

Module Configuration

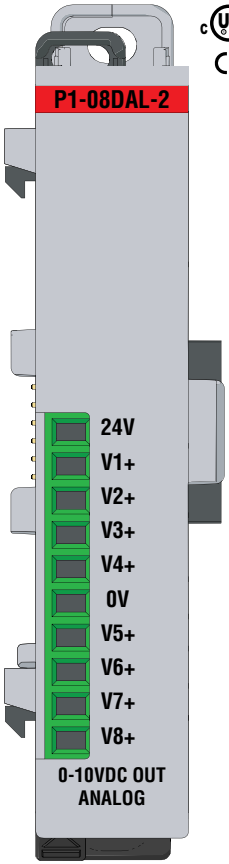
Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P1-08DAL-1 module into the base configuration.

If desired, assign a *User Tagname* to each input point (channel) selected and to each *Status Bit Item*. A *Stop Mode Value* may be assigned.



P1-08DAL-2 Analog Output

The P1-08DAL-2 Current Analog Output Module provides eight 12-bit channels of 0–10 VDC analog signals for use with the Productivity® 1000 system.



Terminal block sold separately.

Output Specifications	
Output Channels	8
Output Type	Sinking/sourcing, 10mA max.
Module Signal Input Range	0–10 V
Output Signal Resolution	12-bit
Resolution Value of LSB (least significant bit)	0–10 V = 2.44 mV per count 1 LSB = 1 count
Data Range	0 to 4095 counts
Output Value in Fault Mode	0V
Load Impedance	≥1000Ω
Maximum Capacitive Load	0.01 µF
Allowed Load Type	Grounded
Maximum Inaccuracy	0.5% of range (Including temperature drift)
Maximum Full Scale Calibration Error (Including Offset)	±0.2% of range minimum
Maximum Offset Calibration Error	±0.2% of range maximum
Accuracy vs. Temperature	±75PPM / °C maximum full-scale calibration change (±0.0025% of range / °C)
Max Crosstalk	-72dB, 1 LSB
Linearity Error (End to End)	±4 LSB maximum, (±0.1% of full scale) Monotonic with no missing codes
Output Stability and Repeatability	±2% LSB after 10 min. warm up (typical)
Output Ripple	±0.1% of full scale
Output Settling Time	300µs max., 5µs min. (full scale range)
All Channel Update Rate (typical)	1ms
Maximum Continuous Overload	Outputs current limited to 40mA typical Continuous overloads on multiple outputs can damage the module.
Type of Output Protection	0.1 µF Transient Suppressor
Output Signal at Power Up and Power Down	0V
External Power Supply Required	24VDC (-20% / +25%), 100mA

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5. If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P1-10RTB or P1-10RTB-1

P1-08DAL-2 Analog Output (continued)

General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	>10MΩ @ 500VDC
Heat Dissipation	3250mW
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity®1000 system
Field Wiring	Use ZIPLink wiring system or removable terminal block (not included). See “Wiring Options” in Chapter 5.
Connector Type (Not included)	10-position removable terminal block
Weight	72g (2.5 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

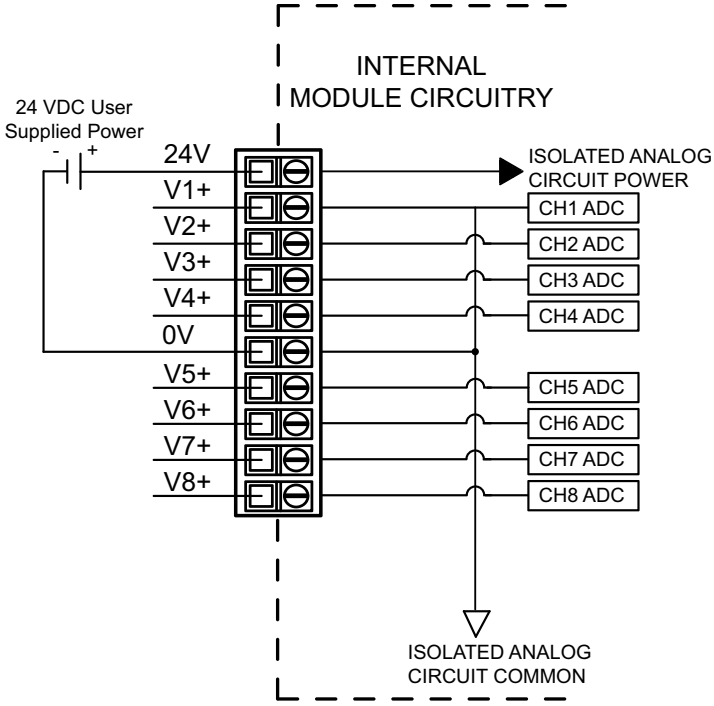
** See CE Declaration of Conformance for details.*

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

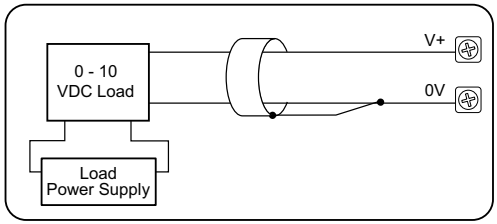
** Recommended screw driver P/N: TW-SD-MSL-1.*

P1-08DAL-2 Analog Output (continued)

Wiring Diagrams



Voltage Output Circuits

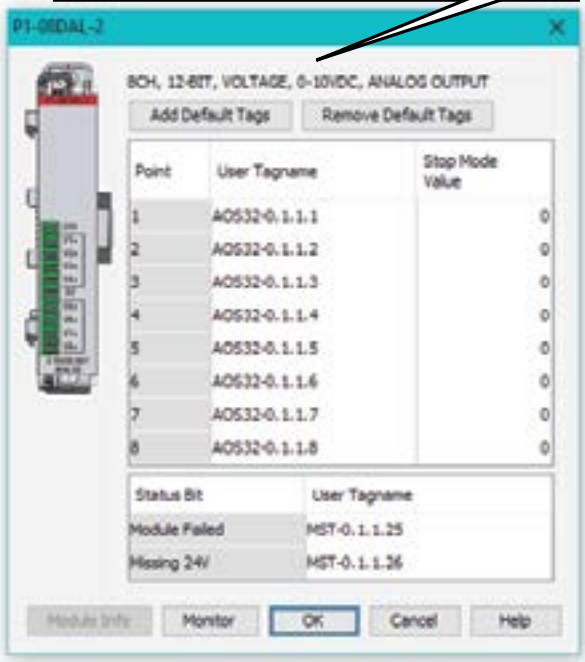


P1-08DAL-2 Analog Output (continued)

Module Configuration

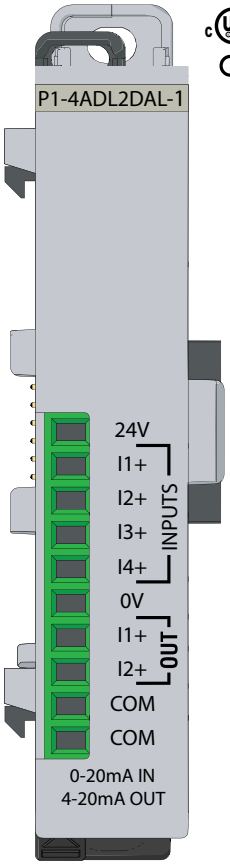
Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P1-08DAL-2 module into the base configuration.

If desired, assign a *User Tagname* to each input point (channel) selected and to each *Status Bit Item*. A *Stop Mode Value* may be assigned.



P1-4ADL2DAL-1 Current Analog Input/Output

The P1-4ADL2DAL-1 Current Analog Input/Output Module provides four 13-bit input channels of 0–20 mA inputs and two 12-bit output channels at 4–20 mA for use with the Productivity® 1000 system.



Input Specifications	
Inputs per Module	4
Module Signal Input Range	0–20 mA
Signal Resolution	13-bit
Resolution Value of LSB (least significant bit)	0–20 mA = 2.44 µA per count (1 LSB = 1 count)
Data Range	0–8191 counts
Input Type	Sinking, single ended (1 common)
Maximum Continuous Overload	±31mA
Input Impedance	247Ω ±0.5%, 1/4 W current input
Filter Characteristics	Low pass, -3dB @ 120Hz
Sample Duration Time	4ms per channel (does not include ladder scan time)
All Channel Update Rate	20ms
Open Circuit Detection Time	Zero reading within 100ms
Conversion Method	Successive approximation
Accuracy vs. Temperature	±75PPM/°C maximum
Maximum Inaccuracy	0.5% of range (including temperature drift)
Linearity Error (end to end)	0.037% of range Monotonic with no missing codes
Input Stability and Repeatability	±0.024% of range (after 10 minute warm-up)
Maximum Full Scale Calibration Error	±0.098% of range
Offset Calibration Error	±0.098% of range
Maximum Crosstalk at DC, 50Hz and 60Hz	0.049% of range
Recommended Fuse (external)	Edison S500-32-R, 0.032 A fuse
External Power Supply Required	24VDC (-20% / +25%), 140mA (Loop power included)

Terminal block sold separately.

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5. If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P1-10RTB or P1-10RTB-1

P1-4ADL2DAL-1 Current Analog Input/Output (cont'd)

Output Specifications	
Output Channels	2
Module Signal Output Range	4–20 mA
Output Signal Resolution	12-bit
Resolution Value of LSB (least significant bit)	4–20 mA = 3.9 µA / count; 1 LSB = 1 count
Data Range	0–4095 counts
Output Type	Current sourcing at 20mA max
Output Value in Fault Mode	Less than 4mA
Load Impedance (Minimum External Power Supply)	0–570 Ω (19.2 VDC) 0–690 Ω (21.6 VDC) 0–810 Ω (24.0 VDC) 0–930 Ω (26.4 VDC) 0–1100 Ω (30VDC); Minimum load: 0Ω @ 0-45ºC, 125Ω@45–60ºC ambient temperature
Maximum Inductive Load	1mH
Allowed Load Type	Grounded
Maximum Inaccuracy	1% of range
Full Scale Calibration Error	±0.2% of range minimum
Offset Calibration Error	±0.2% of range minimum
Accuracy vs. Temperature	±75 PPM/°C max full scale calibration change (±0.005% of range/°C)
Max Crosstalk	-72dB, 1 LSB
Linearity Error (End to End)	±4 counts max. (±0.1% of full scale)
Output Stability and Repeatability	±2% counts max. after 10 minute warm-up (typical)
Output Ripple	0.2% of full scale
Output Settling Time	0.3 ms max., 5µs min. (full scale range)
All Channel Update Rate	4ms (max)
Maximum Continuous Overload	Outputs open circuit protected
Type of Output Protection	Electronically current limited to 20mA or less
Output Signal (power-up, -down)	4mA

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

** Recommended screw driver P/N: TW-SD-MSL-1.*

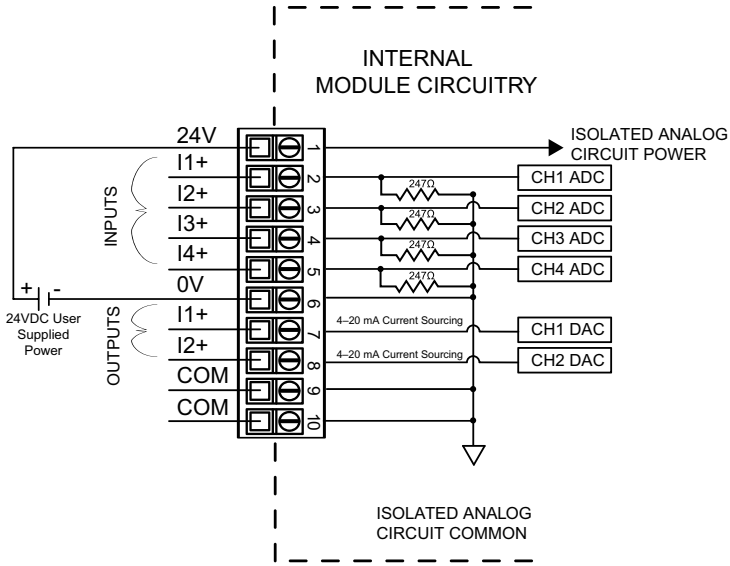
P1-4ADL2DAL-1 Current Analog Input/Output (cont'd)

General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Altitude	2,000 meters, max.
Pollution Degree	2
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	> 10MΩ @ 500VDC
Heat Dissipation	2470mW
Overvoltage Category	II
Enclosure Type	Open equipment
Module Location	Any I/O position in a Productivity®1000 system
Field Wiring	Removable terminal block (sold separately). Use ZIPLink wiring system, optional See "Wiring Options" in Chapter 5.
Terminal Type (sold separately)	10-position removable terminal block
Weight	60g (2.1 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

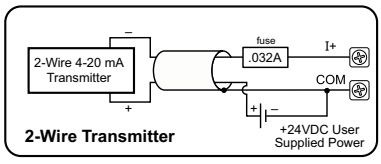
** See CE Declaration of Conformance for details.*

P1-4ADL2DAL-1 Current Analog Input/Output (cont'd)

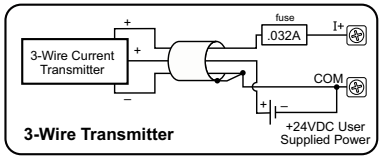
Wiring Diagrams



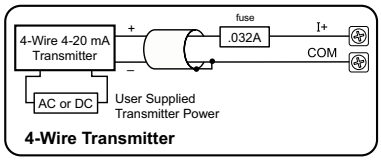
Current Input Circuits



2-Wire Transmitter



3-Wire Transmitter

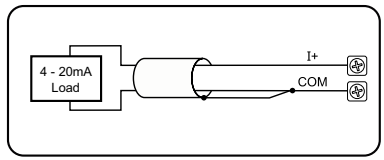


4-Wire Transmitter

Note: Do not connect both ends of shield.

An Edison S500-32-R 0.032A fast-acting fuse is recommended for all 4-20 mA current loops.

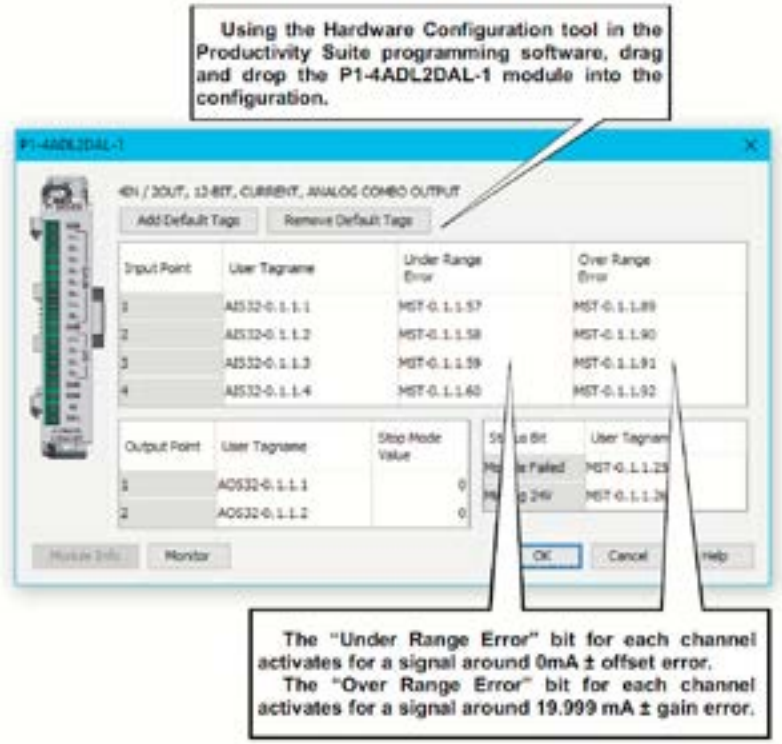
Current Output Circuits



Note: Shield is connected to common at the source device.

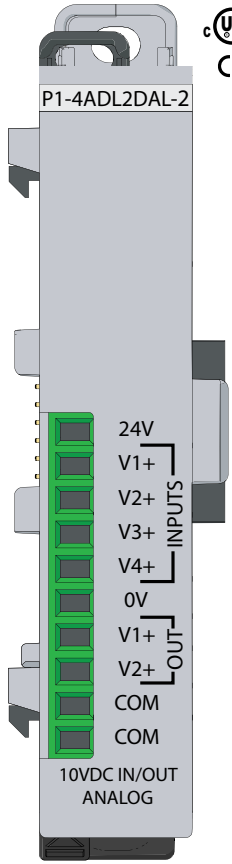
P1-4ADL2DAL-1 Current Analog Input/Output (cont'd)

Module Configuration



P1-4ADL2DAL-2 Voltage Analog Input/Output

The P1-4ADL2DAL-2 Voltage Analog Input/Output Module provides four 13-bit input channels at 0–10 VDC and two 12-bit output channels at 0–10 VDC for use with Productivity® 1000 system.



Input Specifications

Input Channels	4
Module Signal Input Range	0–10 VDC
Signal Resolution	13-bit
Resolution Value of LSB (least significant bit)	0–10 VDC = 1.22 mV per count (1 LSB = 1 count)
Data Range	0–8191 counts
Input Type	Single Ended (1 common)
Maximum Continuous Overload	±100VDC
Input Impedance	200kΩ
Filter Characteristics	Low pass, -3dB @ 100Hz
Signal Duration Time	4ms per channel (does not include ladder scan time)
All Channel Update Rate	20ms
Conversion Method	Successive approximation
Accuracy vs. Temperature	±75PPM/°C maximum
Maximum Inaccuracy	0.5% of range (including temperature drift)
Linearity Error	±0.036% of range Monotonic with no missing codes
Input Stability and Repeatability	±0.03% of range
Full Scale Calibration Error (not including offset)	±0.097% of range
Offset Calibration Error	±0.097% of range
Maximum Crosstalk at DC, 50Hz and 60Hz	±0.049% of range
External Power Supply Required	24VDC (-20% / +25%), 100mA

Terminal blocks sold separately.

We recommend using pre-wired ZIPLink cables and connection modules. See Chapter 5. If you wish to hand-wire your module, removable terminal blocks are sold separately. Order part number P1-10RTB or P1-10RTB-1

Diagnosis/Status

Under Range Error	1 bit per channel
Over Range Error	1 bit per channel
Module Failed	1 bit per module
Missing 24V	1 bit per module

P1-4ADL2DAL-2 Voltage Analog Input/Output (cont'd)

Output Specifications	
Output Channels	2
Module Signal Output Range	0–10 VDC
Output Signal Resolution	12-bit
Resolution Value of LSB (least significant bit)	0–10 VDC = 2.44 mV / count; 1 LSB= 1 count
Data Range	0–4095 counts
Output Type	Voltage @10mA
Output Value in Fault Mode	0V
Load Impedance	≥1000Ω
Maximum Inductive Load	0.01 µF
Allowed Load Type	Grounded
Maximum Inaccuracy	0.5% of range
Full Scale Calibration Error	±0.2% of range
Offset Calibration Error	±0.2% of range
Accuracy vs. Temperature	±75PPM/°C max full-scale calibration change (±0.0025% of range/°C)
Max Crosstalk	-72dB, 1 LSB
Linearity Error (End to End)	±4 LSB max. (±0.1% of full scale) Monotonic with not missing codes
Output Stability and Repeatability	±2% LSB after 10 minute warm-up (typical)
Output Ripple	±0.2% of full scale
Output Settling Time	0.3 ms max., 5µs min. (full scale range)
All Channel Update Rate	4ms
Maximum Continuous Overload	Outputs open circuit limited to 40mA typical Continuous overloads on multiple outputs can damage the module
Type of Output Protection	0.1 µs Transient Suppressor
Output Signal at Power-up and Power-down	0V

Removable Terminal Block Specifications		
Part Number	P1-10RTB	P1-10RTB-1
Number of positions	10 screw terminals	10 spring clamp terminals
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid/stranded conductor 3/64 in. (1.2 mm) insulation max. 1/4 in (6– 7 mm) strip length	28–16 AWG (0.081–1.31 mm²) Solid/stranded conductor 3/64 in (1.2 mm) insulation max. 19/64 in (7–8 mm) strip length
Conductors	USE COPPER CONDUCTORS, 75ºC or equivalent.	
Screw Driver	0.1 in (2.5 mm) maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

** Recommended screw driver P/N: TW-SD-MSL-1.*

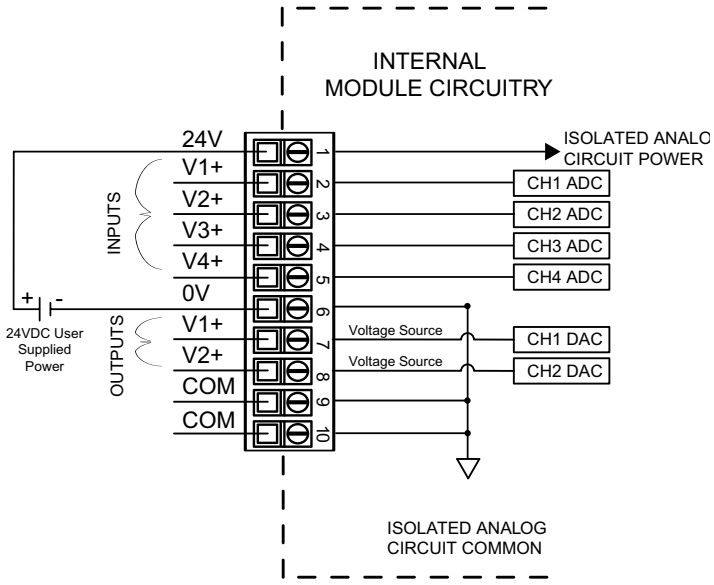
P1-4ADL2DAL-2 Voltage Analog Input/Output (cont'd)

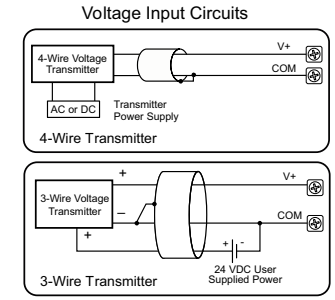
General Specifications	
Operating Temperature	0°C– 60°C (32°F–140°F)
Storage Temperature	-20ºC–70ºC (-4ºF–158ºF)
Humidity	5 to 95% (non-condensing)
Altitude	2000 meter max.
Pollution Degree	2
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800VAC applied for 1s
Insulation Resistance	> 10MΩ @ 500VDC
Heat Dissipation	1950mW
Overvoltage Category	II
Enclosure Type	Open equipment
Module Location	Any I/O slot in a Productivity®1000 system
Field Wiring	Use ZIPLink wiring system or removable terminal block (not included). See "Wiring Options" in Chapter 5.
Connector Type (Not included)	10-position removable terminal block
Weight	60g (2.1 oz)
Agency Approvals	UL61010-2-201 File E139594, Canada & USA CE (EN61131-2 EMC and EN61010-2-201 Safety)*

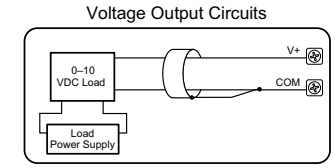
** See CE Declaration of Conformance for details.*

P1-4ADL2DAL-2 Voltage Analog Input/Output (cont'd)

Wiring Diagrams







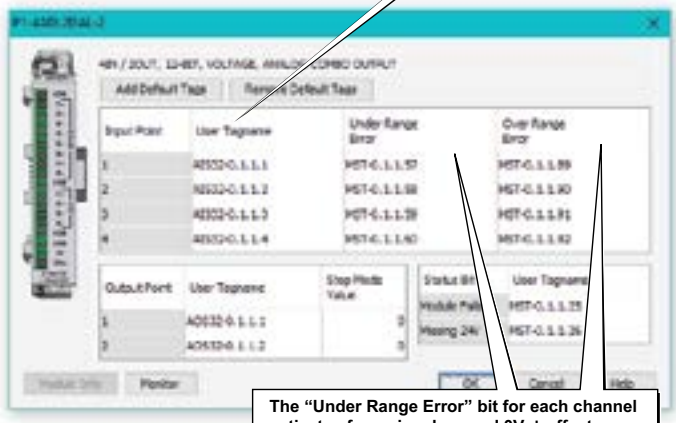
Notes for maximum accuracy:
1. Jumper unused inputs to common.

P1-4ADL2DAL-2 Voltage Analog Input/Output (cont'd)

Module Configuration

Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P1-4ADL2DAL-2 module into the configuration.

If desired, assign a *User Tagname* to each input point (channel) selected and to each *Status Bit Item*.



The "Under Range Error" bit for each channel activates for a signal around 0V, ± offset error.

THe "Over Raqnge Error" bit for each channel activates for a signal aroungd 10V, ± gain error.