Product Description

The PO1212 module is part of the Ponto Series and has 8 isolated analog inputs for measuring voltage, current, RTD, thermocouples, mV and resistance. When measuring temperature the module automatically compensates for cold joint temperature, conversion and linearization of the values. Furthermore, this module has a filter for 60 Hz rejection for applications under power systems interferences.

The module is designed to control or supervise machineries and processes.

The picture shows the product installed in an analog I/O spring-clamp terminal base.

The module main features are:

- Universal isolated module, with independently configurable inputs for any transducer and range
- Local and remote diagnostic
- Measurement of voltage and current
- Measurement of thermocouples type J, K, B, E, T, R, S, N with linearization
- Measurement of RTDs type Pt100 and Pt100 accordingly to American and European standards
- Cold joint compensation for thermocouples measurement
- Verification of open thermocouple
- Hot swap with no interference on panel cabling
- Remote parameterization via software
- Galvanic isolation between analog inputs and logic circuits
- Field cabling connected to the terminal base, thus eliminating intermediary terminal blocks for field signals
- Optional protection with fuses on I/Os power supply and on 4-20mA signal
- Filters parameters configurable by software
- Automatic addressing
- Automatic verification of module type based on the bus head
- Dedicated digital filter for 60 Hz and its harmonics rejection

ATTENTION:

The analog input PO1212 is totally compatible with the PO1112, adding a 60 Hz rejection filter, qualifying this module to be used at applications under systems interference. This module may substitute the PO1112 directly, with no changes on the application program.

Ordering Information

Included Items

The product packaging comes with:

- PO1212 Module
- Installation Guide

Product Code

Please use following product code when ordering the product:

Code	Description
PO1212	8 Isolated Universal AI

Related Products

Depending on your system requirements, the following products might be ordered along with the PO1212. Please check with your sales representative if you have any questions.

Code	Description
PO6004	Analog I/O Spring-clamp Terminal Base
PO6104	Analog I/O Spring-clamp Terminal Base with Fuse
PO6001	Analog I/O Spring-clamp Terminal Base
PO6101	Analog I/O Spring-clamp Terminal Base with Fuse
PO8520	16 Fuses 3 A 250 Vac
PO8521	16 Fuses 32 mA 250 Vac
PO8510	10 Sheets with 14 Labels of 16 Tags for Printer
PO8523	Spring Terminal Block Tool
AL3492	Current Analog I/O Suppressor
AL3493	Analog I/O Suppressor

Notes

PO6004, PO6104, PO6001 and PO6101: The section Electrical Installation describes how to select the best analog base for each application.

PO8520: The product PO8520 is a set of 16 spare 3 A fuses for terminal bases PO6101, PO6104 and PO6151 used to sensor's protection.

PO8521: The product PO8521 is a set of 16 spare 32 mA fuses for terminal bases PO6101, PO6104 and PO6151 used to protect the current signal inputs. It is recommended to use only original fuses provided by ALTUS due to its special features for the applications, on the contrary there is a risk of the module's permanent damage.

PO8510: The product PO8510 are A4 sheets with labels where the tags may be printed using the MasterTool ProPonto Software - MT6000.

PO8523: The product PO8523 is an isolated tool to connect the cables into the spring-clamp terminal bases PO6001, PO6004, PO6101 and PO6104.

AL3492: The product AL3492 is a suppressor module for analog points of current that adds a high level of protection against surges.

AL3493: The product AL3493 is a suppressor module for analog points that adds a high level of protection against surges.

Features

General Features

	PO1212
Module type	8 isolated analog inputs
Input type	Voltage, current, thermocouple, RTD, resistance
Data format	16 bits in 2 complement, justified to the left
Converter resolution	16 bits monotonicity guaranteed, no missing codes
Channel Terminal block configuration	1 terminal for power supply 24 Vdc for sensors (P) 1 terminal for voltage input (+) (V) 1 terminal for voltage input (-) (L) 1 terminal for current input (I) 1 terminal for each I/O return (0 Vdc), interconnected (N) 1 terminal for shield cable (G)
Diagnostic indication	Two multifunctional LEDs with indication of OK module, burned fuse, out of range signal and missing parameterization.
Configurable parameters	Signal type per input Measurement range per input Thermocouple and RTD per input Filters per input (except in case of 60 Hz filter) Temperature unit (^{o}F or ^{o}C) per module
Self test	A/D converter and all the control logic
Hot swap	Yes
Protections	3 A fuse in the sensor power cable and 32mA fuse in line with current signal when used with fused bases Polarity inversion for power supplies Surge voltage suppressors in all analog inputs Modules with revision AN or greater have a PTC thermistor in all current inputs to over current/ voltage protection
External power supply	19.2 to 30 Vdc including ripple Consumption 100 mA @ 24 Vdc.
Scanning time	25 ms, 100 ms or 580 ms
Initialization time	0,5 s
Isolation	
Inputs to logic circuits	1500 Vac up to 1 minute
Inputs to ground	1500 Vac up to 1 minute
Power supply to logic circuits	1500 Vac up to 1 minute
Among inputs	No isolation
Bus power consumption	66 mA
Power consumption	2.5 W
Maximum operating temperature	60 ^{o}C
Dimensions	99 x 52 x 80,8 mm
Norms	- IEC 61131-2:2003, clauses 8 and 11 Please see Series' general features
Compatible terminal bases	PO6001: Spring-clamp Analog I/O Terminal Base PO6004: Spring-clamp Analog I/O Terminal Base PO6051: Screw-clamp Analog I/O Terminal Base PO6101: Fuse and Spring-clamp Analog I/O Terminal Base PO6104: Fuse and Spring-clamp Analog I/O Terminal Base PO6151: Fuse and Screw-clamp Analog I/O Terminal Base

Notes

The scanning time: The scanning time is the time the module takes to provide a new channel value to the GBL bus. This time may be configured for 25 ms, 100 ms or 580 ms for the entire module. All the 8 channels are updated at the same time.

The scanning time is a function of the conversion time and the filter algorithm, where the cutting frequency is programmable by the user. The scanning time may be set to 25 or 100 ms when measuring voltage and current. When measuring temperature via thermistors, thermocouples and resistance the scanning time must is set to 100 ms or 580 ms.

> ATTENTION:
>
> If the scanning time is set to 25 ms it is not possible to configure measurement for thermocouples, RTDs and resistance; also filtering times of 100 ms, 1 s and 10 s are not available.
>
> If scanning time is set to 25 ms and the modes and filtering times set to values described above, then the module will get into operation and will indicate a channel configuration error status.

Initialization time: The initialization time is the time needed to the module starts internally, during this time the data is not available for the CUP. After this time the channel scanning and data update start. This initialization time occurs also after any system reconfiguration.

Power supply interruptions: Interruptions in power port that are supported if not longer than 10 ms and if the module is powered with its nominal 24 Vdc voltage or greater. Longer interruptions or in voltages lower than the nominal may cause modules reset.

Voltage Mode Features

	PO1212 – Voltage Mode		
Precision	± 0.1% full range@ 25 °C ± 0.005% / °C full range		
Resolution	16 bits Monotonicity guaranteed with no missing codes		
Input impedance	1.1 MΩ		
Maximum voltage without damage	± 15 Vdc		
Filtering	Time constant configurable: 0.2 ms, 1.3 ms, 100 ms, 1 s or 10 s Enable / disable 60 Hz filter (120 dB @ 60 Hz)		
Crosstalk DC to 100 Hz	- 30 dB mim		
Scanning time	25 ms, 100 ms or 580 ms		
Ranges	Range	Counting	Resolution
	-100 to +100 mVdc	-30,000 to 30,000	3,33 μVdc
	0 to 1 Vdc	0 to 30,000	33,3 μVdc
	0 to 5 Vdc	0 to 30,000	166,6 μVdc
	0 to 10 Vdc	0 to 30,000	333 μVdc
	-1 to +1 Vdc	-30,000 to 30,000	33,3 μVdc
	-5 to +5 Vdc	-30,000 to 30,000	166,6 μVdc
	-10 to +10 Vdc	-30,000 to 30,000	333 μVdc
Range slack	± 5%		
Over-range indication	When 5% over or under measurement range		

Current Mode Features

	PO1212 – Current Mode		
Precision	± 0.1% full range @ 25 °C ± 0.005% / °C full range		
Resolution	16 bits Monotonicity guaranteed with no missing codes		
Input impedance	Less than 75 Ω - no fuse (PO6001, PO6004 or PO6051 base) Less than 365 Ω - with fuse 32 mA (PO6101, PO6104 or PO6151 base)		
Maximum continuous current without damaging	40 mA		
Maximum continuous voltage without damaging	± 30 Vdc		
Filtering	Time constant configurable: 0.2 ms, 1.3 ms, 100 ms, 1 s or 10 s Enable / disable 60 Hz filter (120 dB @ 60 Hz)		
Crosstalk @ 100hz	- 30 dB mim		
Scanning time	25 ms, 100 ms or 580 ms		
Ranges	Range	Counting	Resolution
	-1 to +1 mA	-30,000 to 30,000	0.033 μA
	0 to 20 mA	0 to 30,000	0.666 μA
	4 to 20 mA	0 to 30,000	0.533 μA
	-20 to +20 mA	-30,000 to 30,000	0.667 μA
Range slack	± 5%		
Over-range indication	When 5% over or under measurement range		
Cable rupture detection	Indicates when the circuit is opened (only for the 4 to 20 mA range)		

Notes

Ranges - Counting: When an analog input is configured to 4-20 mA current mode and there is no input current, the PO1212 module will read the value -7500.

Thermocouple Mode Features

	PO1212 – Thermocouple Mode			
Precision	± 0.1% full range @ 25 °C ± 0.001% /°C full range			
Resolution	16 bits Monotonicity guaranteed with no missing codes			
Measurement unit	Configurable: °C or °F			
Input impedance	10 MΩ			
Maximum continuous voltage without damage	± 15 Vdc			
Filtering	Time constant configurable: 100 ms, 1 s or 10 s Enable / disable 60 Hz filter (120dB @ 60Hz)			
Maximum common mode voltage	± 1500 mVdc			
Common mode rejection	120 dB @ 60 Hz			
Crosstalk among channels @ 100hz	- 30 dB mim			
Open thermocouple detection	Indicated at the diagnostic			
Cold joint compensation	Usage of two temperature sensors integrated into the terminal base Compensation range from 0 to 80 °C Precision ± 1 °C from 0 to 80 °C			
Scanning time	100 ms or 580 ms			
Thermocouple Mode °C **Curve ITS-90**	Model	Temperature	Counting	Resolution
	J	0 to 1140 °C	0 to 11400	0.1°C
	K	-200 to 1250 °C	-2000 to 12500	0.1°C
	B	485 to 1700 °C	4850 to 17000	0.1°C
	E	-200 to 900 °C	-2000 to 9000	0.1°C
	T	-200 to 350 °C	-2000 to 3500	0.1°C
	R	0 to 1450 °C	0 to 14500	0.1°C
	S	0 to 1450 °C	0 to 14500	0.1°C
	N	-200 to 1235 °C	-2000 to 12350	0.1°C
Thermocouple Mode °F **Curve ITS-90**	Model	Temperature	Counting	Resolution
	J	32 to 2084 °F	320 to 20840	0.2 °F
	K	-328 to 2282 °F	-3280 to 22820	0.2 °F
	B	905 to 3092 °F	9050 to 30920	0.2 °F
	E	-328 to 1652 °F	-3280 to 16520	0.2 °F
	T	-328 to 662 °F	-3280 to 6620	0.2 °F
	R	32 to 2642 °F	320 to 26420	0.2 °F
	S	-32 to 2642 °F	-320 to 26420	0.2 °F
	N	-328 to 2372 °F	-3280 to 23720	0.2 °F
Range slack	± 5%			
Over-range indication	When 5% over or under measurement range			

Notes

Precision: The determination of the maximum scales thermocouple should be done by adding the error of the cold junction. The error of the cold junction is computed in milivolts from the table of the thermocouple used.

RTD Mode Features

	PO1212 –RTD Mode			
Precision	± 0.1% full range @ 25 °C ± 0.006% / °C full range			
Resolution	16 bits Monotonicity guaranteed with no missing codes			
Measurement unit	Configurable: °C or °F			
Input impedance	1.1 MΩ			
Excitation current	452 μA			
Measurement technique	3 wires			
Maximum continuous voltage with no damage	± 15 Vdc			
Filtering	Time constant configurable: 100 ms, 1 s or 10 s Enable / disable 60 Hz filter (120dB @ 60Hz)			
Crosstalk among channels @ 100hz	- 30 dB mim			
Detection of open RTD	Indication at the diagnoses if the measured temperature is 8% above the measurement range.			
Scanning time	100 ms or 580 ms			
RTD Mode Measurement °C	Model	Temperature	Counting	Resolution
European Curve (DIN 43760)	Pt100	-160 to +810 °C	-1600 to 8100	0.1 °C
α= 0,00385	Pt1000	-160 to +810 °C	-1600 to 8100	0.1 °C
RTD Mode Measurement °C	Model	Temperature	Counting	Resolution
American Curve	Pt100	-78 to +435 °C	-780 to 4350	0.1 °C
α=0,00392	Pt1000	-78 to +435 °C	-780 to 4350	0.1 °C
RTD Mode Measurement °F	Model	Temperature	Counting	Resolution
European Curve (DIN 43760)	Pt100	-256 to 1490 °F	-2560 to 14900	0.2 °F
α= 0,00385	Pt1000	-256 to 1490 °F	-2560 to 14900	0.2 °F
RTD Mode Measurement °F	Model	Temperature	Counting	Resolution
American Curve	Pt100	-108,4 to 815 °F	-1084 to 8150	0.2 °F
α=0,00392	Pt1000	-108,4 to 815 °F	-1084 to 8150	0.2 °F
Range slack	± 5%			
Sensor cable	3-wires, maximum resistance per wire = 20 Ω			
Over-range indication	When 5% over or under measurement range			

Notes

European curve and American curve: For a correct measurement of temperature the module must to be configured with the same curve of the RTD sensors.

Resistance Mode Features

	PO1212 – Resistance Mode		
Precision	± 0.1% full range @ 25 °C ± 0.006% / °C full range		
Resolution	16 bits Monotonicity guaranteed with no missing codes		
Input impedance	1.1 MΩ		
Excitation current	452 μA		
Measurement technique	2 or 3 wires		
Filtering	Time constant configurable: 100 ms, 1 s or 10 s Enable / disable 60 Hz filter (120dB @ 60Hz)		
Crosstalk among channels @ 100hz	- 30 dB mim		
Detection of open resistance	Indicated at the diagnoses if the measured resistance is 8% above the measurement range.		
Ranges	Range	Counting	Resolution
	0 to 400 Ω	0 to 30,000	13,3 mΩ
	0 to 4000 Ω	0 to 30,000	133 mΩ
Scanning time	100 ms or 580 ms		
Range slack	± 5%		
Sensor cable	3-wires, maximum resistance per wire = 20 Ω		
Over-range indication	When 5% over or under measurement range		

Compatibility with Others Products

	Compatible version
MasterTool Programmer - MT4100	Version 3.90 or above
MasterTool ProPonto – MT6000	Version 1.51 or above
PO5063 PROFIBUS Head's GSD file	Version 1.24 or above

Installation

ATTENTION:
ESD (Electro Static Discharge) sensitive device. Always touch a grounded metallic object before handling the device.

Electrical Installation

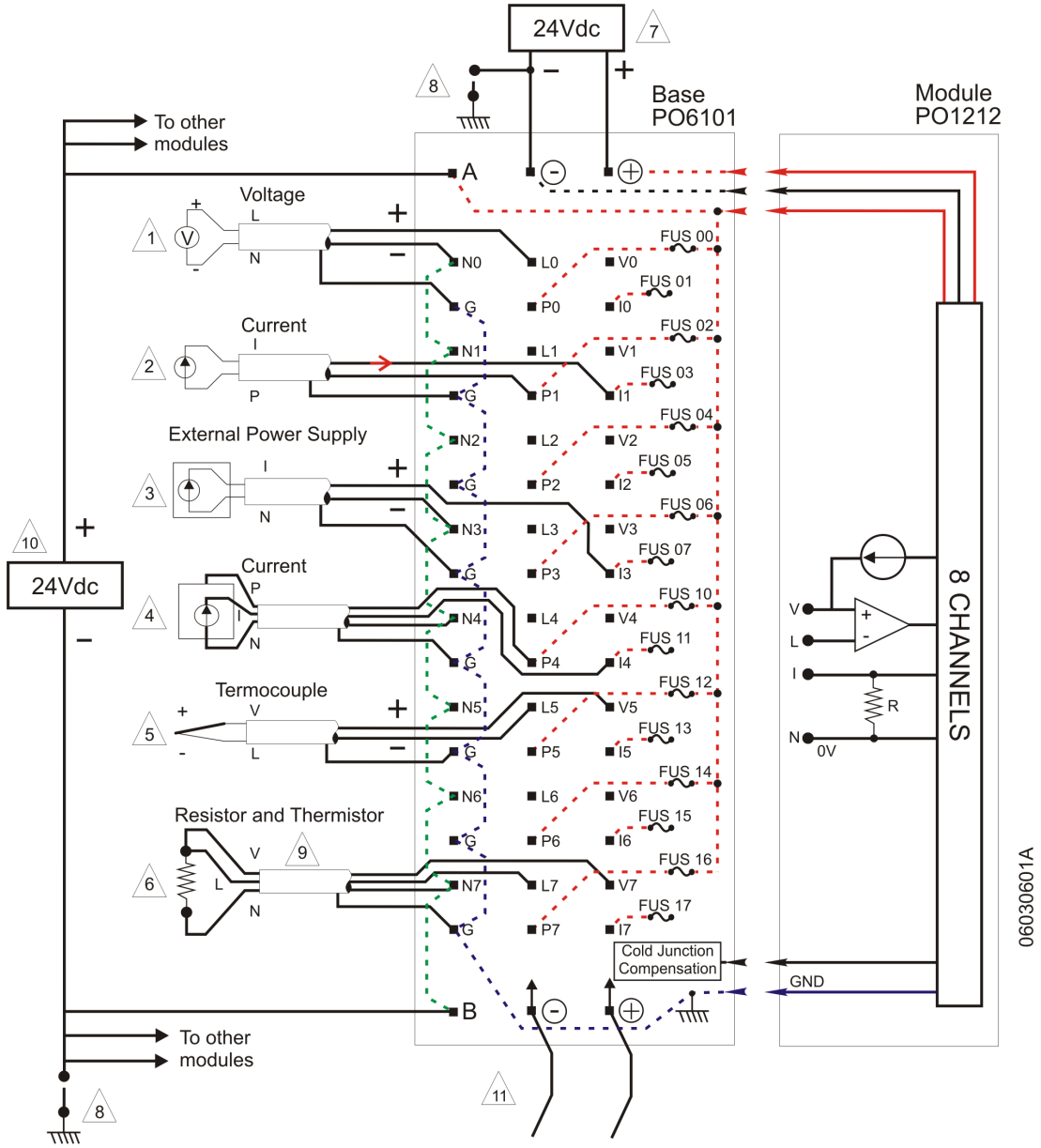
The module PO1212 should be used together with one of the following Ponto Series analog bases: P6001, P6004, PO6051, PO6101, PO6104 and PO6151. The table below can be used to help the choice of the best analog base to be used on a given application.

	Signals Px and Ix with fuse	Without fuse
Only current measurements or any others analog measurements	PO6101/PO6151	PO6001/PO6051
Current measurement and other analog measurement on the same module	PO6104	PO6004

The analog bases PO6xx1 and PO6x04 are different according the following characteristics:

- The bases PO6xx1 (PO6001, PO6051, PO6101 and PO6151) are ideal for applications where it's used the signals Px to supply field sensors because they allow a more simplified electrical installation for these cases.
- The bases PO6x04 (P6004 and PO6104) allow the usage of current measurement together with any other analog measurement on the same module. The usage of PO6xx1 bases in this case may result in analog signals measurement variation.
- The bases PO6001 and PO6051 only differ in the way of how the field sensor wiring is fixed.
- The bases PO6101 and PO6151 only differ in the way of how the field sensor wiring is fixed.

The diagram below shows the PO1212 electrical connection with the analog bases PO6101, PO6151, PO6001 or PO6051. For the bases PO6001 and PO6051 the fuses, indicated in the diagram as FUS 0x, must be ignored.



The diagram below shows the PO1212 electrical connection with the analog bases PO6104 or PO6004. For the base PO6005 the fuses, indicated in the diagram as FUS 0x, must be ignored.

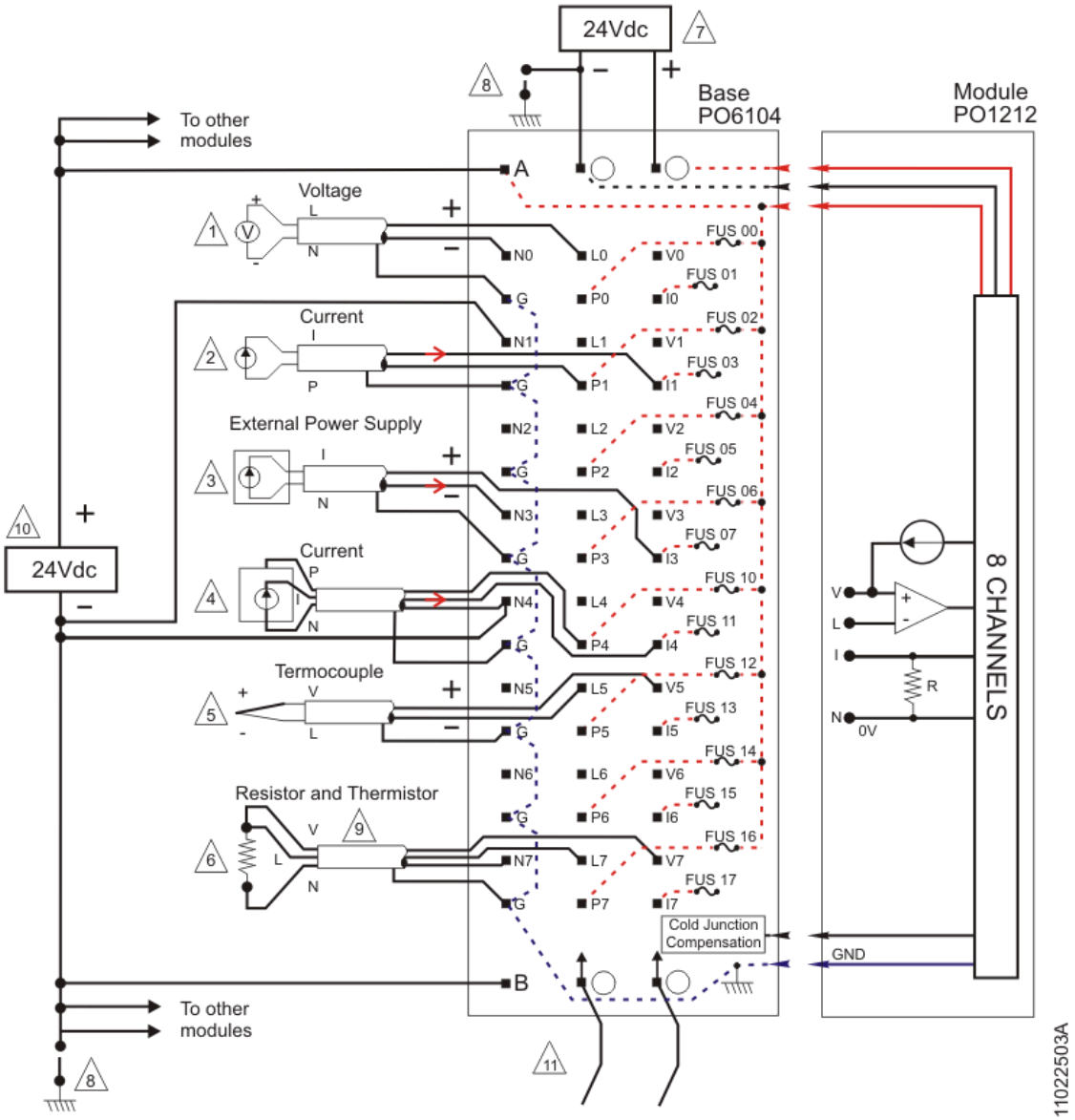


Diagram notes:

1. Please connect the +24 Vdc to the terminal L and the common to the terminal N when measuring voltage.
2. This is the required connection for 2 wires current sensors – the sensor is powered by the current signal. The 24 Vdc power supply is gotten from the terminal P and the input signal is connected to the terminal I. For this kind of application we recommend the use of terminal bases with fuses (PO6101, PO6104 or PO6151). Using this terminal bases the current input is protected by a 32 mA fuse per channel, identified by the odd numbering in the fuse case.
3. When using current sensors that require external power, type four wire sensors, the input signal is connected to the terminal I and returns to sensor through the terminal N.
4. Sensors that need 24 Vdc power supply can use the terminals P. These terminals are internally connected to the Power Supplier (10) and they are protected by a 3 A fuse with even numbering in the terminal base.
5. The thermocouples measurement should be made by the positive terminal connected to terminal V and the negative to the terminal L. The environment temperature compensation (cold joint) is automatically done through integrated sensors in the terminal base – under the terminal strips.
6. For measuring resistors or thermistors you should use shielded cable with 3 wires of the same size and the shield should be connected to terminal G. The terminals V, L and N should be connected directly on the component to be measured, without intermediary connectors.

7. The electric installation is done by feeding the terminal base with a 24 Vdc power supply on the terminal strip extremities – terminals marked by (+) and (-). This connection is mandatory because is the only way the module receive power.
8. The common point for the power supply (7) and the sensor (10) may be connected to the panel ground. This connection is not mandatory but it is recommended in order to reduce electric noise in automation systems.
9. All the signals must be connected using shielded cables with the shield grounded at the terminal G or at the sensor. It should not be grounded at both shield ends. Also, it is a good practice to ground all the analog signal shielded cables at the panel entrance. Doing that the induced electrical disturbance will not reach the measurement module.
10. Points A and B need only to be connected to a external power supply (24 Vdc) when some of the points P (P0 to P7) are used to supply a field sensor that requires external power. In addition, when using the points A and B in the analog base PO6101, fuses peers of 3 A must be in good condition so that the module does not indicate a diagnosis of burned fuse. It is recommended the use of a separate power supply of indicated on the item (7), as in the case of a short circuit failure in the field, the system does not lose the integrity and still be able to help maintenance services through the diagnostics.
11. The next module may be fed through the points (+) and (-) on this terminal base. The maximum number of terminal bases that may be connected in this way is 10. No other device can be connected to these terminal strips.

Module power supply:
The PO1212 module utilizes a 24 Vdc regulated power supply (terminals + and -). This power supply may be used also to feed the field sensors. We recommend using separate power supplies for larger systems.

Field cabling:
When installing the module please follow procedures described below in order to avoid electromagnetic interference:

- Avoid sharing the same conduit for high voltage or current cables (for instance, motors power supply) and sensor cables.
- Identify and eliminate other noise sources, such as faulty or unprotected contactors and sparks produced by wear down motors' brushes.
- Utilize shielded cables for carrying input signals and having one of the shield ends grounded.

> ATTENTION: Should be use the recommendations from standard IEEE 518-1977 Guide for the Installation of Electrical Equipment to Minimize Electrical Noise Input to Controllers from External Sources.

Fuses:
The PO6101, PO6104 and PO6151 terminal bases have protection fuses for the sensors power supply or against current surges on the current inputs.
The fuses identification follows direct relation to the I/Os as shows below:

Module I/O	00	01	02	03	04	05	06	07
3 A Power Supply Fuse	F00	F02	F04	F06	F10	F12	F14	F16
32 mA Current Input Fuse	F01	F03	F05	F07	F11	F13	F15	F17

The fuse casing is of the bayonet type. When replacing the fuse, please shut down the power supply and use a plastic screwdriver with 5mm width. Please consult the Ponto Series Utilization Manual for complete fuse replacement procedures.

> ATTENTION: The characteristics of 32 mA fuses, supplied with PO6101, PO6104 or PO6151 terminal bases, were specified in order to protect the current signal input circuit. In case of replacement, we recommend using original spare part PO8521. On the contrary there is a risk of the module's permanent damage.

Measurement of Environment Temperature:
In order to measure the environment temperature please short circuit the terminals V and L for any analog input available. Then such input should be configured for any thermocouple that includes the environment temperature range (any thermocouple except type B). The temperature value measured by such point will be the environment temperature.

> ATTENTION:
>
> Atmospheric discharges (lightning) may cause damages to the modules although its protections.
>
> Additional protections should be used if module's power comes from a power supply located outside the cabinet where the module is installed, because it could be vulnerable to this kind of discharges.
>
> If the field wiring of the input points is susceptible to this kind of discharge, surge suppressors should be used.

ATTENTION:

This is an analog module and its installation near radio-frequency emitter devices may interfere in the precision of the inputs. Avoid installing it near radio equipment, antennas and similar devices.

Field wiring should be shielded because radio-frequency coupling may happen in field signals.

Module has been tested with electromagnetic fields of intensities up to 10 V/m. In those conditions, observed precision was at least 0.5%. This field intensity corresponds to the maximum values considered by international standards to industrial environment. Stronger fields can cause greater performance depreciation.

Tests with portable radio transmitters (walkie-talkies) near the module (1 meter) caused no alteration in nominal precision.

Mechanical Assembly

The mechanical assembly is described in the Ponto Series Utilization Manual.

Please adjust the mechanical code on the assembly terminal base to 12 (1 on switch A and 2 on switch B).

Parameterization

The CPU or field network head defines via software the PO1212 module parameterization. The parameterization sets the measurement modes as well as the filtering. The MasterTool may set such parameterization when using Altus CPUs or by the software that configures the field bus master. For further information please consult Ponto Series Utilization Manual, MasterTool Utilization Manual and Manuals for the Interfaces and Field Network Heads. The parameterization is set through user-friendly menus. For reference purposes, following are the binary codes.

Parameters Bytes

The module parameterization is defined by ten bytes. The first two bytes set the generic module aspects and the remaining eight set the parameterization of each analog input.

The bytes should be defined as follow.

Byte	Parameters
0	Module generics
1	Module generics
2	Channel 0
3	Channel 1
4	Channel 2
5	Channel 3
6	Channel 4
7	Channel 5
8	Channel 6
9	Channel 7

Bits

Description of the parameterization bits for each byte:

Byte 0 - Module generics								Description
7	6	5	4	3	2	1	0	
				1	**0**	**1**	**0**	Number of parameters
0	**0**	**0**	**0**					Not used

The byte 0 carries always the OAH value, with no options.

Byte 1 - Module generics								Description
7	6	5	4	3	2	1	0	
							0	Temperature unit in ^{o}C
							1	Temperature unit in ^{o}F
						0		Not used (always zero)
					0			RTD Curve American standard
					1			RTD Curve European standard
			0	**0**				122 Hz filter (update time = 100 ms)
			0	**1**				780 Hz filter (update time = 25 ms)
			1	**0**				60 Hz filter (update time = 580 ms)
0	**0**	**0**						Not used (always zeros)

Scanning time: if scanning time is set to 25 ms then it is not possible to use any channel for measurement of thermocouples, RTDs and resistance because it will get into a parameterization error.

The bytes 2 to 9 define individually each analog input. The 3 most significant bits define the filter and the 5 least significant ones define the type of the analog variable.

Bytes 2 to 9								Description
7	6	5	4	3	2	1	0	
	0	**0**						Filtering according to the bits 3 and 4 defined on the Byte 1 – Module generics.
	0	**1**						100 ms filter – cut frequency at 1.6 Hz
	1	**0**						1 s filter – cut frequency at 0.16 Hz
	1	**1**						10 s filter – cut frequency at 0.016 Hz
			0	**0**	**0**	**0**	**0**	Deactivated channel
			0	**0**	**0**	**0**	**1**	Voltage -100 to 100 mVdc
			0	**0**	**0**	**1**	**0**	Voltage 0 to 1 Vdc
			0	**0**	**0**	**1**	**1**	Voltage 0 to 5 Vdc
			0	**0**	**1**	**0**	**0**	Voltage 0 to 10 Vdc
			0	**0**	**1**	**0**	**1**	Voltage -1 to +1 Vdc
			0	**0**	**1**	**1**	**0**	Voltage -5 to + 5 Vdc
			0	**0**	**1**	**1**	**1**	Voltage -10 to +10 Vdc
			0	**1**	**0**	**0**	**0**	Current -1 to +1 mA
			0	**1**	**0**	**0**	**1**	Current: 0 to 20 mA
			0	**1**	**0**	**1**	**0**	Current 4 to 20 mA
			0	**1**	**0**	**1**	**1**	Current -20 to +20 mA
			1	**0**	**0**	**0**	**0**	Thermocouple type J
			1	**0**	**0**	**0**	**1**	Thermocouple type K
			1	**0**	**0**	**1**	**0**	Thermocouple type B
			1	**0**	**0**	**1**	**1**	Thermocouple type E
			1	**0**	**1**	**0**	**0**	Thermocouple type T
			1	**0**	**1**	**0**	**1**	Thermocouple type R
			1	**0**	**1**	**1**	**0**	Thermocouple type S
			1	**0**	**1**	**1**	**1**	Thermocouple type N
			1	**1**	**0**	**0**	**0**	RTD PT100
			1	**1**	**0**	**0**	**1**	RTD PT1000
			1	**1**	**0**	**1**	**1**	Resistance of 0 to 400 Ω
			1	**1**	**1**	**0**	**0**	Resistance of 0 to 4000 Ω
0								Not used (always zero)

Deactivated channel: module will always provide zero for such input.

Filters:

1. The 100 ms, 1 s and 10 s are available just for scanning time set to 100 ms in the Byte 1.
2. In order to get a good efficiency from the filters the noise amplitude must respect the channels configured electrical limits. If these limits are exceeded the channels under the noise may lose precision.

Example

Byte	Parameters	7	6	5	4	3	2	1	0	Hex Value	Description
0	Module generics	0	0	0	0	1	0	1	0	0A	Fixed value
1	Module generics	0	0	0	0	0	1	0	1	05	^{o}F /European Curve/ scanning in 100 ms
2	Channel 0	0	1	0	1	0	0	0	0	50	Filter 1 s / Thermocouple type J
3	Channel 1	0	0	1	0	0	1	1	1	27	Filter 100 ms / Voltage –10 to 10 Vdc
4	Channel 2	0	0	0	0	1	0	1	0	0A	Filter 25 ms / Current 4 to 20 mA
5	Channel 3	0	1	1	1	1	0	0	0	78	Filter 10 s / RTD PT100
6	Channel 4	0	0	1	1	1	0	1	1	3B	Filter 100 ms / Resistance 0 to 400 Ω
7	Channel 5	0	1	1	1	1	0	1	1	7B	Filter 10 s / Resistance 0 to 400 Ω
8	Channel 6	0	1	0	0	0	0	1	0	42	Filter 1 s / Voltage 0 to 1 Vdc
9	Channel 7	0	0	0	0	0	0	0	0	00	Deactivated channel

Diagnosis

The PO1212 module provides ten bytes for operating diagnosis including information about the connected sensors. The first two bytes indicate the generic aspects related to the module operation.

Byte	Diagnosis
0	Module generics
1	Module generics
2	Channel 0
3	Channel 1
4	Channel 2
5	Channel 3
6	Channel 4
7	Channel 5
8	Channel 6
9	Channel 7

When the module is used on a local bus the PO1212's diagnose is sent to the CPU according to the following tables.

When the module is a PROFIBUS remote component, the diagnose information are available to the CPU, that contain the PROFIBUS Master Interface, only for fault cases. In this case, the respective codes are sent in the decimal form.

Byte 0 - Module generics								PROFIBUS Message Code	Description
7	6	5	4	3	2	1	0		
					0	**0**	**0**	-	Always zero
				0				-	Normal operation
				1				31	Module without parameters
			0					-	Normal temperature
			1					05	Out of range temperature (1)
		0						-	Normal operation
		1						01	I/O Error
	0							-	Always zero
0								-	Normal fuses
1								30	One or more burned 3 A fuses

(1) The module uses the cold joint temperature sensor in order to monitor the environment temperature. This indication will occur when the temperature is out of the operating range of module, beyond the limits 0 to 65ºC.

ATENTION:
Some PROFIBUS programmers use the code message 01 - “I/O Error” as “short circuit”. When this message appears, de fail may be a short circuit or an error in the input circuit.

Byte 1 - Module generics								PROFIBUS Message Code	Description
7	6	5	4	3	2	1	0		
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**		Always zero

Byte 2 to 10 – Channel Diagnose								PROFIBUS Message Code	Description
7	6	5	4	3	2	1	0		
							0	-	Normal operation
							1	16	Wrong parameters in channel
						0		-	Normal RTD sensor
						1		17	Sensor RTD short circuit
					0			-	Normal sensor (thermocouples, RTDs) or cable (current)
					1			18	Open sensor (thermocouples, RTDs) or cable rupture (current) (1)
				0				-	Measurement within range
				1				19	Over-range
0	**0**	**0**	**0**					-	Always zero

(2) When the “Open sensor (thermocouple, RTD)” or “Cable rupture (current)” diagnose is indicated, the “Sensor RTD short circuit” and “Over-range on the measurement range” diagnose must be unconsidered.

The diagnosis LED indicates the following situations:

LED DG	Meaning	Causes
On	Normal operation	
Blinking 1X	Head is not accessing module or logic fault at module	- Wrong module type for the position - Non declared module - Damaged module
Blinking 2X	Burned fuse	- one or more 3 A fuses are burnt
Blinking 4X (the fault identification is done through CPU diagnosis word)	Missing continuity for signal of thermocouple, RTD and resistance	- Field cable open
	Missing continuity for signal current 4 – 20 mA	- Field cable open

LED 17	Meaning	Cause
On	Normal operation	
Blinking 1X	Parameterization error	Parameterization is not valid.
Off	Non parameterization	Parameterization missing

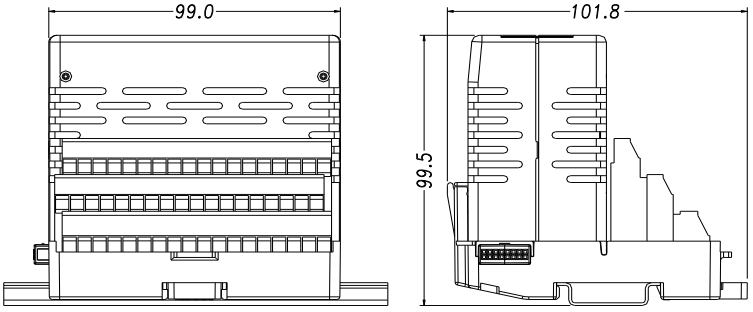
If you get any signalization different from described above please ship module to Altus Support.

Physical Dimensions

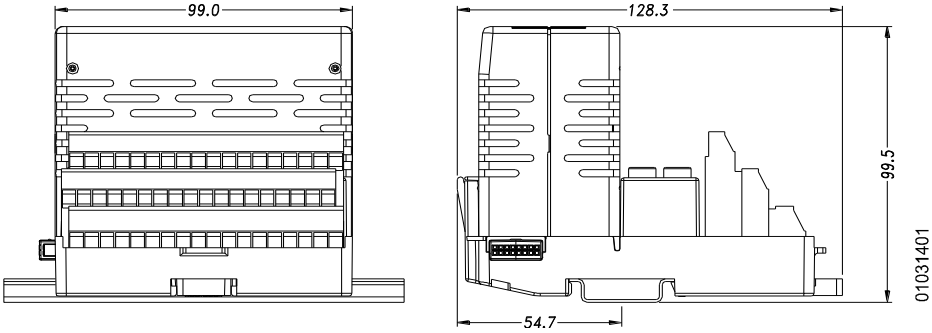
Dimensions in mm.

The electrical panel dimensions should take into consideration the module terminal base sizes. Please consult the Ponto Series Utilization Manual IP20 - MU209000.

Here is the PO1212 module assembled in a PO6001, PO6004 or PO6051 terminal base in DIN TS35 rails.



Here is the PO1212 module assembled in a PO6101, PO6104 or PO6151 fused terminal base in DIN TS35 rails.



Maintenance

The hot swap procedure is described in the Ponto Series Utilization Manual.

When calibrating the module please use instrumentation like Beta Calibrator or similar for voltage, current and thermocouples; and use precision resistors for RTDs and resistance.

All the module adjusts are set through software by Altus.

Manuals

For further technical details, configuration, installation and programming of Ponto Series products please consult following documents:

Document Code	Description
CT109000	Ponto Series General Characteristics
CT102660	Analog I/O Suppressor Characteristics
MU209000	Ponto Series Utilization Manual - IP20
MU203600	Utilization Manual MT6000 – MasterTool ProPonto
MU209100	Utilization Manual PO3045 – CPU
MU209104	Utilization Manual PO3042 – CPU
MU209503	Utilization Manual PO5063 and PO5063V4 – PROFIBUS Head
MAN/MT4100	Utilization Manual MT4100 – MasterTool

Also please consult the utilization manuals for the field network heads and compatible CPUs.