

## Product Description

The PO2022 module is part of the Ponto Series and has 16 digital outputs dry contacts. It is designed for actuation of loads with continuous or alternate current and also for logic circuit interlocking.

The module typical applications are control and supervision of machineries and processes.

The picture shows the product installed in a base with spring terminal blocks.

The module main features are:

- High density of IOs
- Utilization of relays for dry or wet contact configurable by the base
- Hot swap with no interference on the panel cabling
- Field cabling connected to the base, thus eliminating intermediary terminal blocks for field signals
- Optional protection with fuse in line with field signals
- Remote and local diagnosis
- Automatic addressing.
- Automatic verification of module type by the bus head.



## Ordering Information

### Product Packaging

The product package contains:

- PO2022 module
- Installation Guide

## Product Code

Please use following product code when ordering the product:

Code	Description
PO2022	16 DO Relay NO Dry Contact

## Related Products

Depending on your system requirements, the following products might be ordered along with the PO1112. Please check with your sales representative if you have any questions.

Code	Descriptions
PO6000	IO Base: Digital Spring
PO6002	IO Base: Digital Spring Common Line
PO6050	IO Base: Digital Screw
PO6052	IO Base: Digital Screw Common Line
PO6100	IO Base: Digital Spring with Fuse
PO6102	IO Base: Digital Spring with Fuse and Common Line
PO6150	IO Base: Digital Screw with Fuse
PO6152	IO Base: Digital Screw with Fuse and Common Line
PO8510	10 Sheets with 14 labels of 16 tags for printer
PO8520	16 fuses 3 A 250 VAC
PO8522	Lock for assembly in TS35 rail
PO8523	Spring Terminal Block Tool

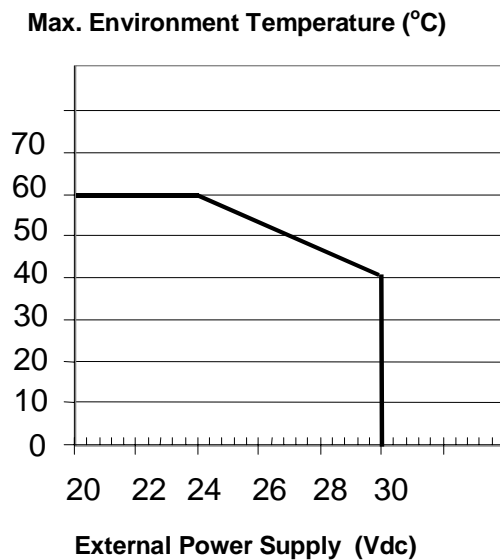
## Features

	PO2022
<b>Module Type</b>	16 isolated digital outputs with dry relays contacts
<b>Resistive switching capacity</b>	1.5 A @ 5 to 30 VDC 0.5 A @ 48 VDC 0.150 A @ 125 VDC 1.5 A @ 125 VAC 1.5 A @ 240 VAC
<b>Maximum current module capacity</b>	16 A
<b>Output type</b>	Relay normally open, individually isolated.
<b>Contact resistance</b>	Maximum 100 mΩ on PO6100 base.
<b>Minimum load for switching</b>	10 mA @ 12 V
<b>Expected life time</b>	10. 10 <sup>6</sup> cycles with nominal load.
<b>Terminal block configuration</b>	2 terminal blocks per relay or 1 terminal block for load, 1 terminal block for return and 1 for power supply
<b>Switching time</b>	7.5 ms for closing 8.5 ms for opening
<b>Maximum switching frequency with load</b>	0.5 Hz
<b>Status indication</b>	One LED per output
<b>Diagnosis indication</b>	One multifunctional LED with indication for Ok, non accessed module and no external power supply.
<b>Configurable parameters</b>	None
<b>Hot swap</b>	Yes
<b>Protections</b>	Fuse for each contact 3 A , 250 VAC, when using fused bases
<b>External power supply</b>	19 to 30 VDC including ripple consumption of 5 mA with all outputs off. Consumptions of 160 mA will all outputs on
<b>Isolation</b>	
<b>Contacts to logic</b>	1500 VAC per 1 minute, 250 VAC continuous
<b>Contacts to ground</b>	1500 VAC per 1 minute, 250 VAC continuous
<b>Among outputs</b>	1500 VAC per 1 minute, 250 VAC continuous
<b>Among contacts within a relay</b>	1000 VAC per 1 minute, 250 VAC continuous
<b>Bus current consumption</b>	83 mA
<b>Power consumption</b>	4.30 W with all outputs on 0.6 W with all outputs off
<b>Maximum operating temperature</b>	60 °C , please see notes and graph 1
<b>Dimensions</b>	99 x 49 x 81 mm
<b>Norms</b>	IEC 61131 CE Please see generic characteristics of Series on CT109000
<b>Compatible base</b>	The compatible bases are listed on the Related Products item

## Notes

**Maximum operating temperature:** the PO2022 module supports maximum temperature of 60 °C, as long as the power supply voltage is 24 VDC regulated. Higher voltages up to 30 VDC will reduce the maximum temperature accordingly to the following graph. We recommend the power supplies should always be regulated in order to improve automation systems performance.

Please note that the maximum operating temperature is 40 °C when the power supply is at 30VDC.



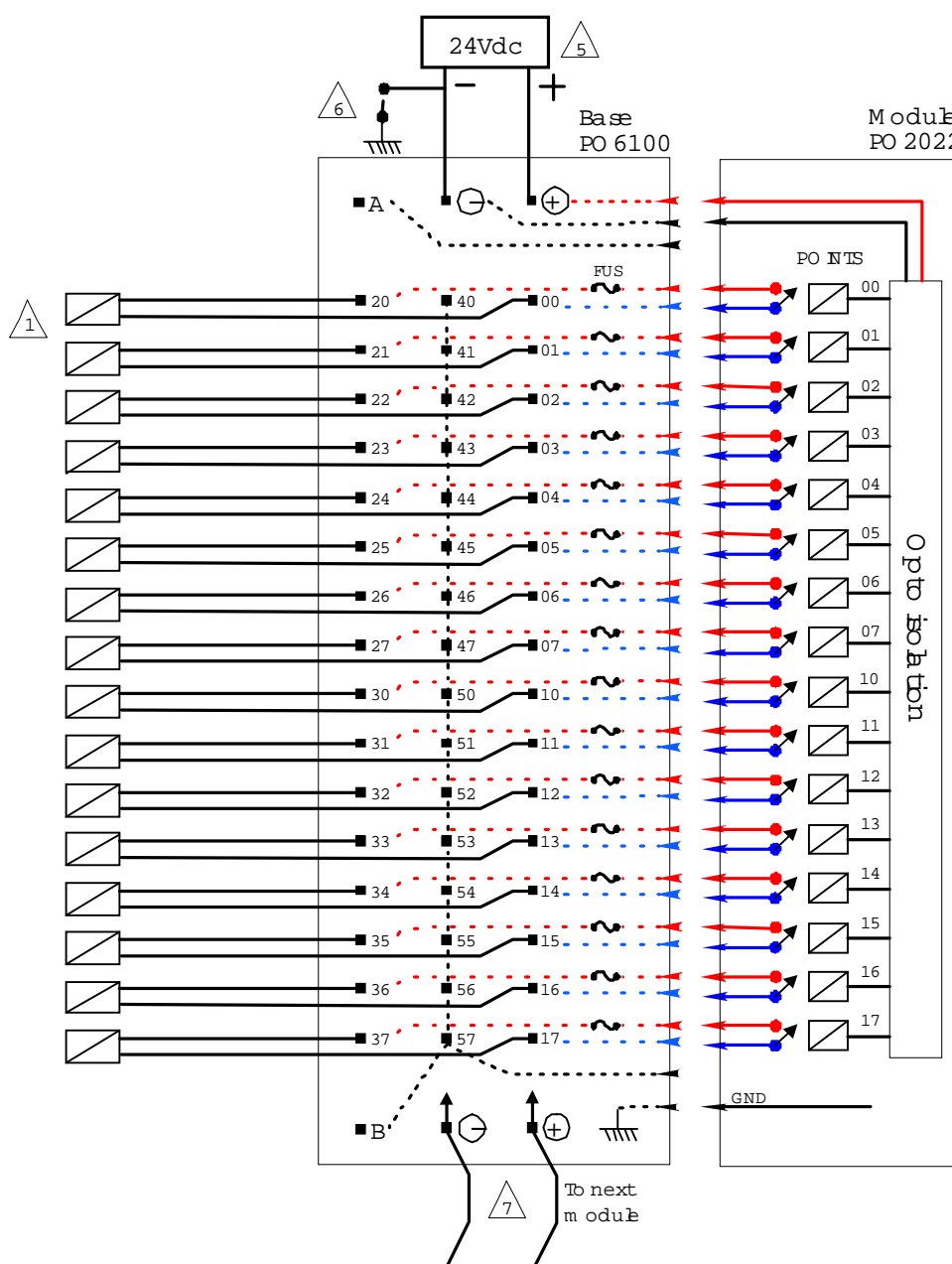
Graph 1

## Installation

The installation of the PO2022 module may take place in different ways as shown here. The considerations taken for the spring terminal blocks also apply to the screw ones.

### Electrical Installation with Dry Contact

The following diagram shows the cabling for self powered loads, with the PO2022 installed in a PO6100 fused base. The internal circuit is shown in dotted lines in order to make the signals distribution clearer.



**Notes:**

- 1 – The devices to control must have all the accessories and components needed in order to have a reliable actuation through relays, such as: diodes for inductive loads in DC actuation, spark suppressor for inductive loads with AC actuation.
- 5 – The electrical installation is done through powering the base with 24VDC in the extremities of the terminal block (blocks marked with + and -). This connection is mandatory.
- 6 – The common point for the modules power supply (0V) may be connected to the electrical panel ground. This connection is not mandatory but it is recommended in order to reduce electrical noise in automation systems.
- 7 – The next module may be fed through bridges from points ( + ) and ( - ) from this base. The maximum number of bases that may be interconnected in such way is 10. No other device should be interconnected to such terminal blocks.

**Module power supply:**

The PO2022 module utilizes a 24 VDC regulated power supply for energizing the relays coils (terminal blocks + and -). This power supply may be used also to feed the field sensors. We recommend to use separate power supplies for larger systems.

**Field cabling:**

The field elements should be connected to the base as shown on diagram. The fuse in line protects the relays contacts in cases of short circuit or a overload. For non fused bases the interconnections are the same.

The terminal blocks identification have direct correlation with the module IOs and LEDs as follow:

Module IO	00	01	02	03	04	05	06	07	10	11	12	13	14	15	16	17
Output Terminal Block	00	01	02	03	04	05	06	07	10	11	12	13	14	15	16	17
Output Terminal Block	20	21	22	23	24	25	26	27	30	31	32	33	34	35	36	37

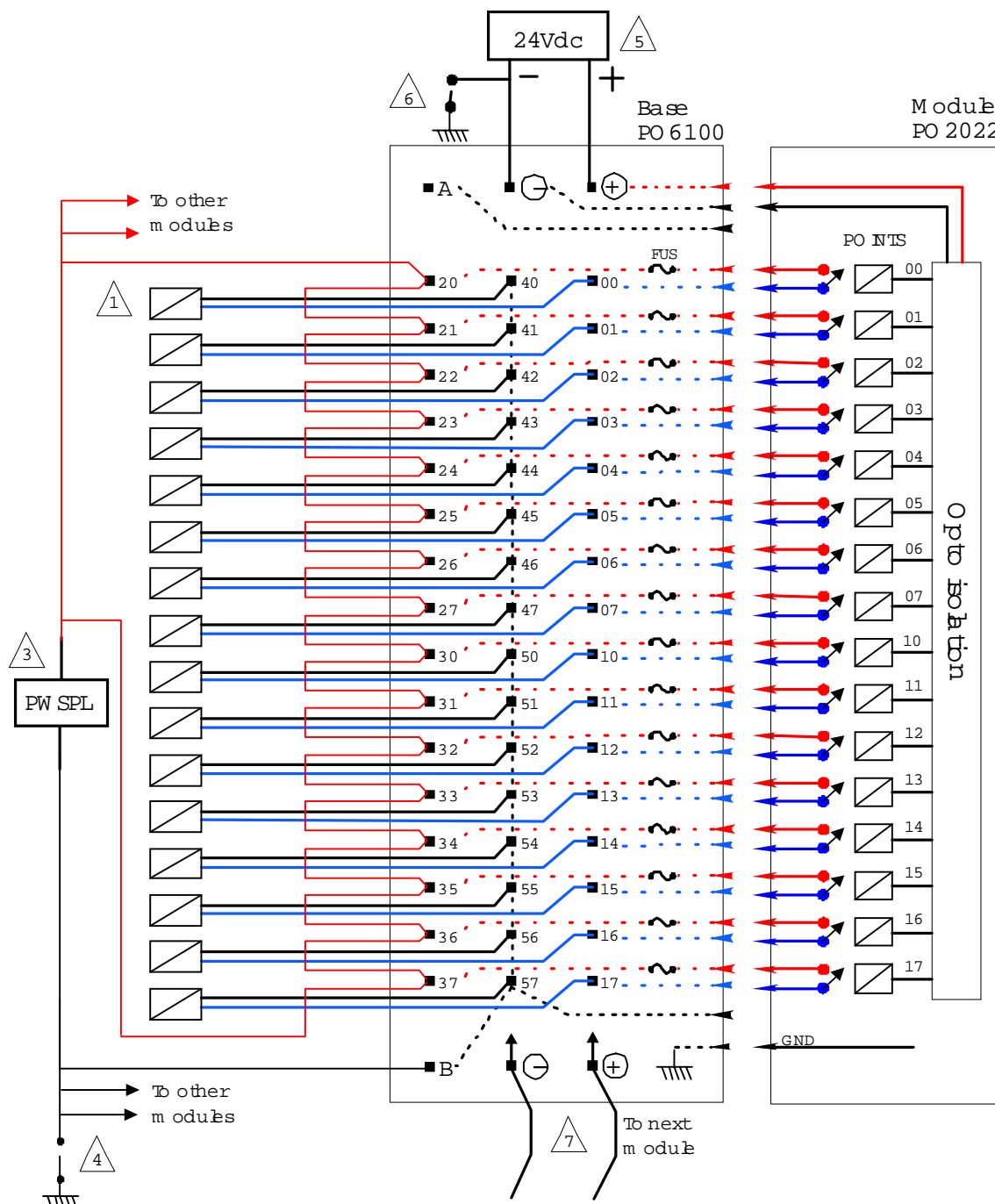
As a general rule for automation projects, we recommend using noise suppressors on the controlled devices, such as solenoid valves and contactors. Please see incoming item Protection Circuits.

## Electrical Installation with Wet Contact on PO6100 Base

The PO2022 module may be used for wet contacts utilizing the base PO6100 as shown below. Then there is no need to use additional terminal blocks to distribute the power to the field.

The internal circuit is plotted in dotted lines with the purpose to clarify the signals distribution.

The bridges between the terminal blocks 20 to 37 may be done through terminals with 2 wires. Through this base it is possible to use some dry contacts and others fed by the field power supply.



**Notes:**

- 1 – The devices to control must have all the accessories and components needed in order to have a reliable actuation through relays, such as: diodes for inductive loads in DC actuation, spark suppressor for inductive loads with AC actuation.
- 3 – The power supply for the field devices must be connected to the A and B point in each base as shown on the diagram. The voltage must fall within the module commutation limits as described in the technical characteristics.
- 4 – The common point for the modules power supply (0V) may be connected to the electrical panel ground. This connection is not mandatory but it is recommended in order to reduce electrical noise in automation systems.
- 5 – The electrical installation is done through powering the base with 24VDC in the extremities of the terminal block (blocks marked with + and -). This connection is mandatory.
- 6 – The common point for the modules power supply (0V) may be connected to the electrical panel ground. This connection is not mandatory but it is recommended in order to reduce electrical noise in automation systems.
- 7 – The next module may be fed through bridges from points ( + ) and ( - ) from this base. The maximum number of bases that may be interconnected in such way is 10. No other device should be interconnected to such terminal blocks.

**Module power supply:**

The PO2022 module utilizes a 24 VDC regulated power supply for energizing the relays coils (terminal blocks + and -). This power supply may be used also to feed the field sensors and actuators (terminal blocks A and B). We recommend to use separate power supplies for larger systems.

The user must be sure the power supply is well regulated and the protection system is adequate for short circuits or overloads in the field. Such precautions will avoid interferences in the system operation.

**Field cabling:**

This electrical installation option allows the PO2022 module to operate with wet contacts. This is done through the interconnection of common contacts by one cable in the terminal block rows 20 to 37.

This connection is done using double terminals, connecting both cables in one common point.

The field elements should be connected to the base as shown on diagram. The fuse in line protects the relays contacts in cases of short circuit or a overload. For non fused bases the interconnections are the same.

The terminal blocks identification have direct correlation with the module IOs and LEDs as follow:

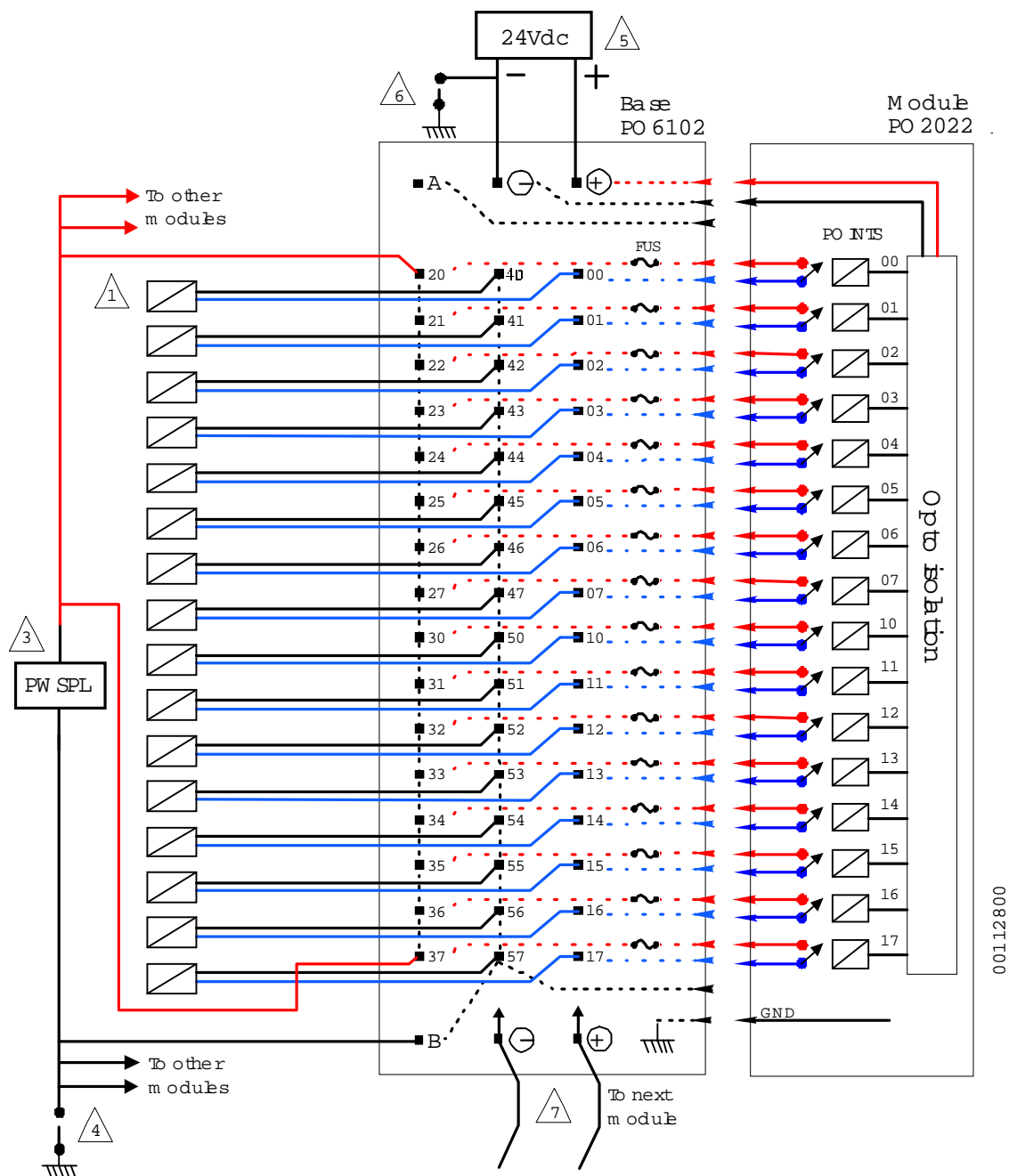
Module IO	00	01	02	03	04	05	06	07	10	11	12	13	14	15	16	17
Output Terminal Block	00	01	02	03	04	05	06	07	10	11	12	13	14	15	16	17
Load Common Terminal Block	40	41	42	43	44	45	46	47	50	51	52	53	54	55	56	57

As a general rule for automation projects, we recommend using noise suppressors on the controlled devices, such as solenoid valves and contactors. Please see incoming item Protection Circuits.

## Electrical Installation with Wet Contact on PO6102 Base

The PO2022 module may be used for wet contacts utilizing the base PO6102 that already has the terminal blocks 20 to 37 interconnected – such arrangement allows the distributions of the power supply common. Then there is no need to use additional terminal blocks to distribute the power to the field.

The internal circuit is plotted in dotted lines with the purpose to clarify the signals distribution.



### Notes:

- 1 – The devices to control must have all the accessories and components needed in order to have a reliable actuation through relays, such as: diodes for inductive loads in DC actuation, spark suppressor for inductive loads with AC actuation.
- 3 – The power supply for the field devices must be connected to the A and B point in each base as shown on the diagram. The voltage must fall within the module commutation limits as described in the technical characteristics.



4 – The common point for the modules power supply (0V) may be connected to the electrical panel ground. This connection is not mandatory but it is recommended in order to reduce electrical noise in automation systems.

5 – The electrical installation is done through powering the base with 24VDC in the extremities of the terminal block (blocks marked with + and -). This connection is mandatory.

6 – The common point for the modules power supply (0V) may be connected to the electrical panel ground. This connection is not mandatory but it is recommended in order to reduce electrical noise in automation systems.

7 – The next module may be fed through bridges from points ( + ) and ( - ) from this base. The maximum number of bases that may be interconnected in such way is 10. No other device should be interconnected to such terminal blocks.

## Module power supply:

The PO2022 module utilizes a 24 VDC regulated power supply for energizing the relays coils (terminal blocks + and -). This power supply may be used also to feed the field sensors and actuators (terminal blocks A and B). We recommend to use separate power supplies for larger systems.

The user must be sure the power supply is well regulated and the protection system is adequate for short circuits or overloads in the field. Such precautions will avoid interferences in the system operation.

## Field cabling:

This electrical installation option allows the PO2022 module to operate with wet contacts. This is done through the PO6102 base that has the terminal blocks 20 to 37 interconnected.

The field elements should be connected to the base as shown on diagram. The fuse in line protects the relays contacts in cases of short circuit or a overload. For non fused bases the interconnections are the same.

The terminal blocks identification have direct correlation with the module IOs and LEDs as follow:

IO Module	00	01	02	03	04	05	06	07	10	11	12	13	14	15	16	17
Output Terminal Block	00	01	02	03	04	05	06	07	10	11	12	13	14	15	16	17
Load Common Terminal Block	40	41	42	43	44	45	46	47	50	51	52	53	54	55	56	57

As a general rule for automation projects, we recommend using noise suppressors on the controlled devices, such as solenoid valves and contactors. Please see incoming item Protection Circuits.

## Protection Circuits

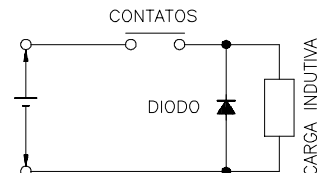
The protection circuits will extend the relays life time, specially when they are working with inductive loads. Such protections also will suppress noises as well as avoid the carbonization of the contacts superficies when the relay is open.

As a general rule, the protection circuits must be assembled by the load (within 0.5 meters cabling distance). The most used protection circuits for contacts are shown below.

### Diode Circuit

This is the most efficient way to eliminate the sparks created when the contact opens. On the other hand it takes longer to stop the load in cases like contactors or solenoids.

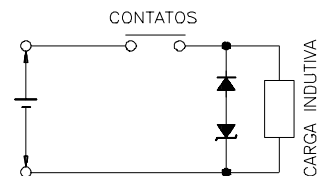
This circuit applies only to DC and its reverse voltage must be higher than the power supply voltage and the minimum current should be higher than the load current.



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### Zener and Diode Circuit

The zener and diode circuit applies when the shut down time for the diode circuit is too long. The same way as the diode circuit it should be used just with DC. The zener voltage must be higher than the power supply peak voltage and the minimum current should be higher than the load current.

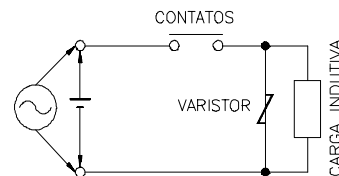


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### Varistor Circuit

The varistor circuit limits the inductive circuit voltage in a similar way to the zener circuit. Its conduction voltage in general is higher than the zener and it is bi-directional, allowing its use in DC and AC circuits (more used in AC).

The varistor should be specified taking into consideration the maximum power supply voltage, load stored energy and desired life time.



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### RC Circuit

The RC ( R in line with C) circuit may be assembled in parallel to the load. The assembly in parallel to the contacts is recommended for DC circuits. The assembly in parallel to the load is recommended for either DC or AC circuits. The RC circuits are more efficient when used for voltages over 100V.

It is recommended the resistor to have from 0.5 to 1 ohm for each 1V of voltage, and the capacitor to have 0.5 to 1μF for each 1A of current. For example, if the load is 220V / 1<sup>A</sup>, then the resistor should be 220 ohms and the capacitor 1μF (the capacitor should be adequate to accommodate the type of load and voltage).

## Mechanical Assembly

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

Please adjust the mechanical code on the assembly base to 22 (2 on switch A and 2 on switch B).

## Parameterization

The PO2022 module has no parameters.

## Diagnosis

### Diagnosis Bytes

The PO2022 module has one byte for its diagnosis.  
Following the bits are described:

Byte	Diagnosis
0	Module generics

Byte 0 - Module generics								Description
7	6	5	4	3	2	1	0	
0		0	0	0	0	0	0	Always zeros
	0							Normal external voltage
	1							External voltage under 19 VDC

### Diagnosis LED

The diagnosis LED indicates the following situations:

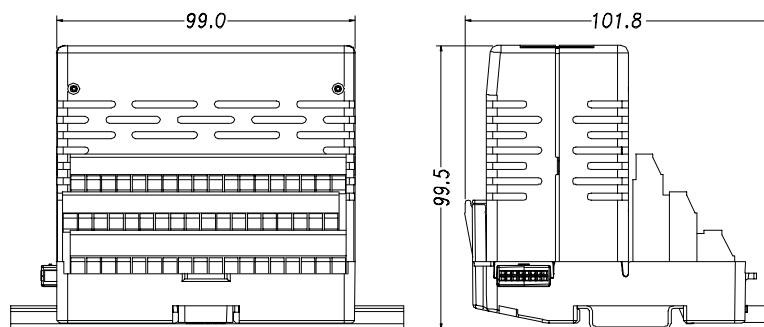
LED DG	Meaning	Causes
On	Normal operation	
Blinking 1X	Module non accessed by the head or failure on module logic	<ul style="list-style-type: none"> <li>- Wrong module type for position</li> <li>- Non declared module</li> <li>- Damaged module</li> </ul>
Blinking 3X	Low external voltage	<ul style="list-style-type: none"> <li>- The external power supply is under 19 VDC</li> </ul>

## Physical Dimensions

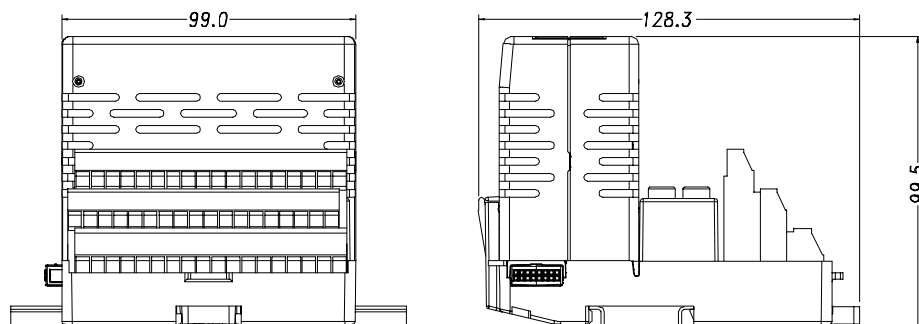
Dimensions in mm.

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

Here is a PO2022 module assembled on a base PO6000, PO6002, PO6050 or PO6052 and on a DIN TS35 rail.



Here is a PO2022 module assembled on a base PO6100, PO6102, PO6150 or PO6152 and on a DIN TS35 rail.



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## Maintenance

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

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## Manuals

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

Document Code	Description
CT109000	Characteristics and Configuration of Ponto Series - IP20
MU209000	Ponto Series Utilization Manual
MU209100	Utilization Manual PO3045 - CPU
MU209503	Utilization Manual PO5063 – PROFIBUS Head
MU209010	Configuration Manual PROFIBUS Remote

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