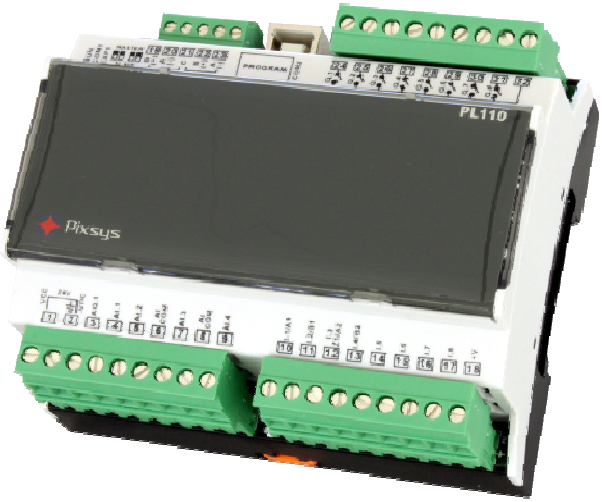
Pixsys
ELECTRONICS



PLC

PL110

Datasheet

Summary

1 Acquisition and actuation module PL110

1.1 Introduction

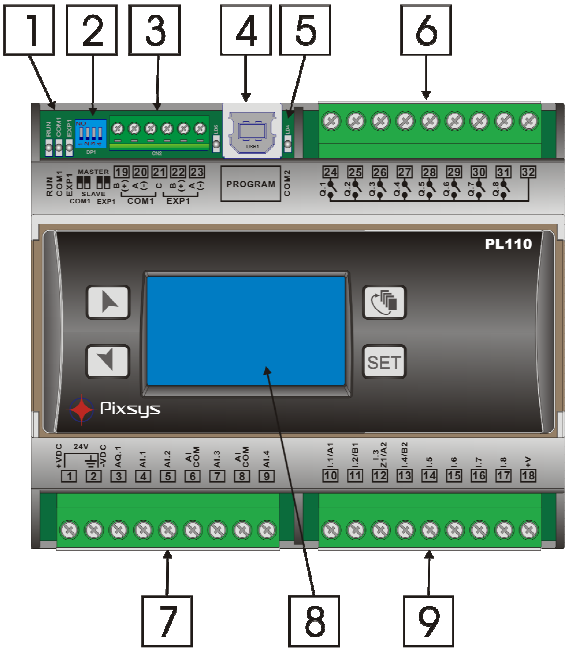
Thanks for choosing a Pixsys device. The PL110 is a compact PLC. Distinctive feature is the optional OLED display to visualize/write alphanumeric data. Page structure is pre-programmed but it is possible to choose visualized variables. Pixsys PLprog development tool in Ladder language allows to program via USB port both the operating logic and the visualization. Analogue inputs are available for NTC temperature sensors and V/mA signals. Relay outputs make the PL110 suitable for AC applications. A Real-time clock with back-up battery is available and allows timeframe programming. Connectivity is provided by 2 RS485 ports supporting Modbus-RTU protocol. Additional I/O can be managed with Pixsys expansion modules series MCM260.

Main features	
Operating conditions	Temperature 0-45 °C, Humidity 35..95 rU%
Box	6 DIN rail modules Self-extinguishing polycarbonate / V0
Sealing	Box IP30
Weight	Approx. 250 gr.
Dimensions	90 x 107,6 depth 63 mm

Ordering codes:

PL110 -	☐	☐	
Features	1		8 digital inputs 4 analogue inputs (10 bit resolution) 8 relay outputs 1 analogue 0..10V (8 bit)
	2		8 digital inputs 4 analogue inputs (10 bit resolution) 8 relay outputs 1 analogue 0..10V (8 bit) **OLED graphic display 128x64 pixel**
Power-supply		A	24V AC/DC

1.2 Front panel and main features



N°	Description
1	Green led **RUN**: • **ON** → PLC is in RUN mode and is executing the instructions programmed by ladder language. • **Slowly flashing** → (0,5 s on / 0,5 s off) boot program and firmware are loaded on PL110, but no ladder application loaded. • **Fast flashing** → (0,2 s on / 0,2 s off) only boot program is loaded on PL110 (no firmware and no ladder application). Yellow led **COM1** and **EXP1**: • **ON** → for 50mS during transmission of each frame on one of the available serial ports • **ON** → always during ladder programming or maintenance of PLC (updating main and ladder program)
2	Dip-switch for the selection of master/slave mode for COM1 and EXP1 serial ports.
3	Expansion terminal block for COM1 and EXP1 serial
4	COM2 port USB connector for the connection to the PC, for programming and communication.

N°	Description
5	Yellow led **COM2:** • **ON** → during output transmission on COM2 port.
6	Relay outputs terminal block
7	Power-supply terminal block, analogue inputs/output
8	Terminal with OLED display and keys (only on PL110-2A)
9	Digital inputs terminal block

1.3 Main hardware features

Hardware		
Power-supply	+VDC -VDC	24V AC/DC 6VA
Analogue inputs	AI.1	Current 0-20mA / 4-20mA (10 bit resolution)
	AI.2	Tension 0-10V (10 bit resolution)
	AI.3	Input NTC-10K = β3435 Potentiometer 10 KΩ (10 bit resolution)
	AI.4	Input NTC-10K = β3435 Potentiometer 10 KΩ (10 bit resolution)
Encoder inputs[1]	I.1/A1 I.2/B1 I.3/Z1	1st input for bidirectional encoder
	I.3/A2 I.4/B2	2nd input for bidirectional encoder
Digital inputs	I.1÷I.8	Inputs PNP V_{LH} = 15,0V (threshold "0" → "1") V_{HL} = 10,5V (threshold "1" → "0")

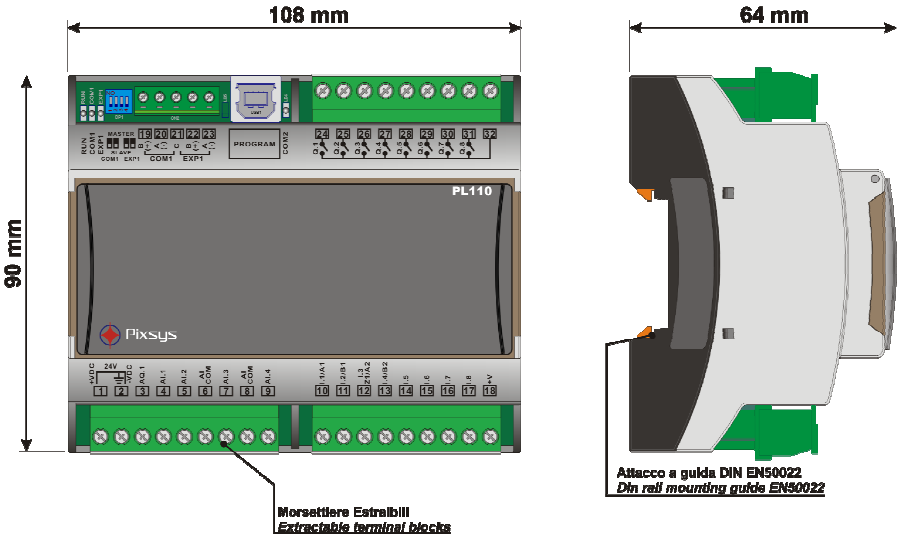
[1] First encoder input uses hardware inputs I1 and I2, eventually also I3 for the management of zero signal (in this case it is not possible to use the second encoder). Second encoder input uses hardware inputs I3 and I4. If encoder inputs are used, the relevant digital inputs are not available. Max. frequency for encoders is 25 KHz if not used contemporarily, 15 KHz if both inputs are used contemporarily. The PL110 notices positive and negative signals of the A signal, so it redouble the number of counts/turns.

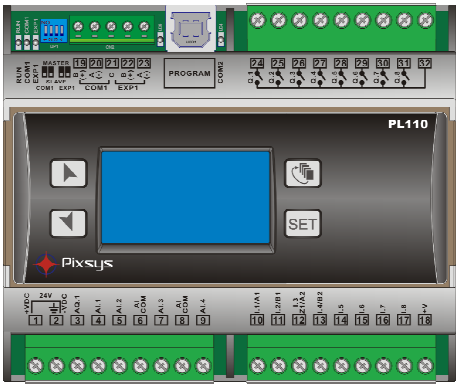
Hardware		
Relay outputs	Q.1÷Q.8	2A 250Vac/30Vdc resistive load (p.f.=1) 1A 250Vac/30Vdc inductive load (p.f.=0.40) 6A max. total current Q.1÷Q.8
Analogue output	AQ.1	0-10V (8 bit resolution)
Communication port [2]	COM1	RS485 available on terminal block
	EXP1	RS485 available on terminal block
	COM2	USB (VCP virtual comm port)

[2] Serial ports are isolated from power-supply, inputs and outputs. COM1 and EXP1 are not isolated between each other.

1.4 Size and installation

PL110-1A





PL110-2A

1.5 Electrical wirings

1.5.1 Connectors and terminal blocks

<table>
<tr><th>N°</th><th>Name</th><th colspan="3">Description</th></tr>
<tr><td>1</td><td>+VDC</td><td colspan="3" rowspan="2">Power-supply 24V AC/DC 6VA.
To improve noise immunity, the use of a dedicated supply or transformer is recommended.
N.B.: If more devices are connected in AC using the same transformer, it is necessary to comply with polarity of the power connection between the various devices.</td></tr>
<tr><td>2</td><td>-VDC ⏚</td></tr>
<tr><td>3</td><td>AQ.1</td><td colspan="3">Analogue output AQ.1 positive signal (0÷10 VDC)</td></tr>
<tr><td>4</td><td>AI.1</td><td colspan="3">Analogue input AI.1 positive signal</td></tr>
<tr><td>5</td><td>AI.2</td><td colspan="3">Analogue input AI.2 positive signal</td></tr>
<tr><td>6</td><td>AI-COM</td><td colspan="3">Common negative signal for analogue inputs AI.1 e AI.2</td></tr>
<tr><td>7</td><td>AI.3</td><td colspan="3">Analogue input AI.3 positive signal</td></tr>
<tr><td>8</td><td>AI-COM</td><td colspan="3">Common negative signal for analogue inputs AI.3 e AI.4</td></tr>
<tr><td>9</td><td>AI.4</td><td colspan="3">Analogue input AI.4 positive signal</td></tr>
<tr><td>10</td><td>I.1 / A1</td><td>Digital input</td><td>Input for bidirectional encoder no.1
Signal A.</td><td rowspan="8">Inputs PNP

V_{LH} = 15,0V threshold “0”→“1”

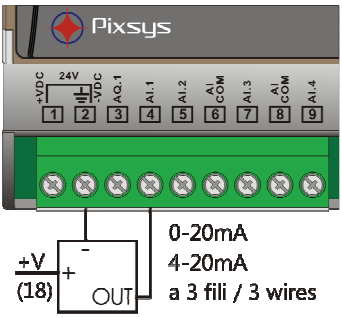
V_{HL} = 10,5V threshold “1”→”0”

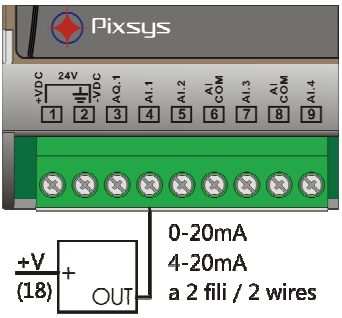
To activate digital inputs, switch the signal +V (pin 18) to the input pin.</td></tr>
<tr><td>11</td><td>I.2 / B1</td><td>Digital input</td><td>Input for bidirectional encoder no.1
Signal B.</td></tr>
<tr><td>12</td><td>I.3
Z1 / A2</td><td>Digital input</td><td>Input for bidirectional encoder no. 1 signal Zero, or input for bidirectional encoder no. 2
Signal A.</td></tr>
<tr><td>13</td><td>I.4 / B2</td><td>Digital input</td><td>Input for bidirectional encoder no. 2
Signal B.</td></tr>
<tr><td>14</td><td>I.5</td><td colspan="2">Digital input</td></tr>
<tr><td>15</td><td>I.6</td><td colspan="2">Digital input</td></tr>
<tr><td>16</td><td>I.7</td><td colspan="2">Digital input</td></tr>
<tr><td>17</td><td>I.8</td><td colspan="2">Digital input</td></tr>
</table>

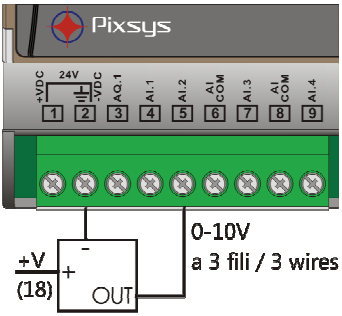
N°	Name	Description	
18	+V	Common positive signal for digital inputs. Connect this signal to one of the digital inputs I1÷I18, to activate inputs. Tension available on these pins can supply sensors to be connected to the analogue inputs (max 20mA). (N.B.: on these pins the available supply is Vcc, not stabilized!).	
19	B	Signal RS485+	COM1 serial
20	A	Signal RS485-	COM1 serial
21	C	Signal RS REF	COM1 and EXP1 interface
22	B	Signal RS485+	EXP1 interface
23	A	Signal RS485-	EXP1 interface
	PROGRAM	USB	COM2 VCP of programming
24	Q.1	Relay output	Contacts features: 2A 250Vac/30Vdc resistive load (p.f.=1) 1A 250Vac/30Vdc inductive load (p.f.=0.40)
25	Q.2	Relay output	
26	Q.3	Relay output	
27	Q.4	Relay output	
28	Q.5	Relay output	
29	Q.6	Relay output	
30	Q.7	Relay output	
31	Q.8	Relay output	
32		Common relay outputs	6A max. total current Q.1÷Q.8

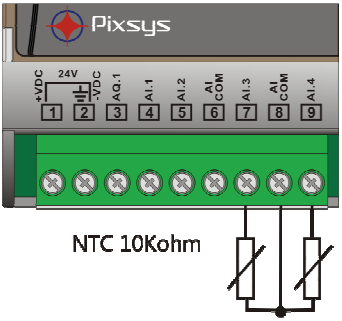
1.5.2 Connection of sensors to analogue inputs

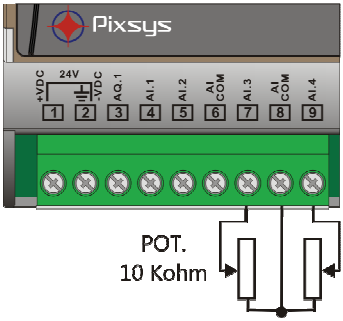
Below some examples of connection for common sensors to the analogue inputs of the PL110.





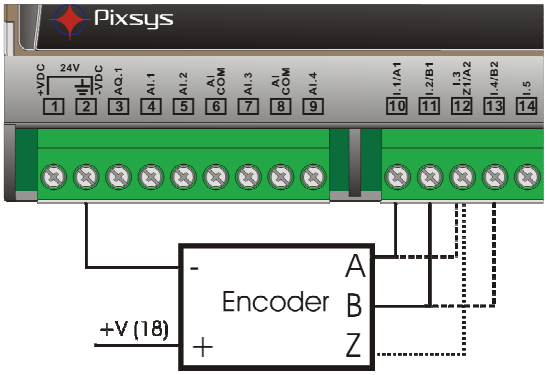






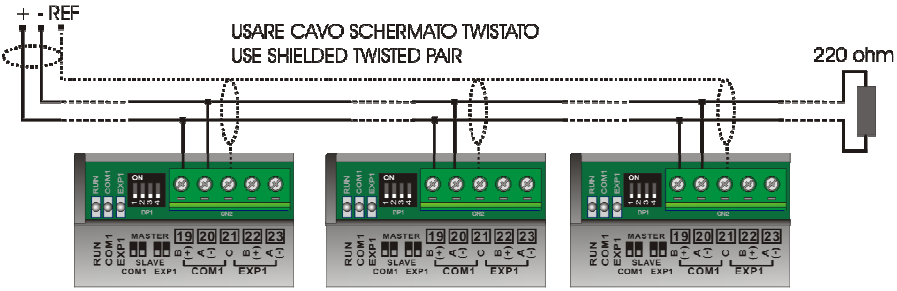
1.5.3 Connection of a bidirectional encoder

Below an example of connection for a typical bidirectional encoder (phase A,B and Z optional) which can be connected to the PL110 inputs. The device allows to connect up to two encoders. The Z signal management is available if only one encoder is used.



1.5.4 Connect PL110 to RS485

Below an example of connection for more modules PL110 to RS485 line for the communication with a master device through COM1 in slave mode.



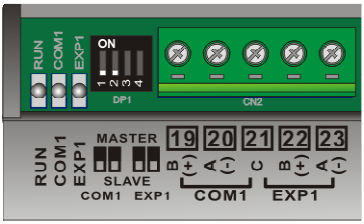
1.6 Setting dip-switch and rotary-switch

The PL110 is provided with some dip-switches and a rotary-switch which allow the user to configure COM1 and EXP1 serials as master or slave, and to select the device address.
N.B. All hardware configuration procedures must be done with PL110 switched off.

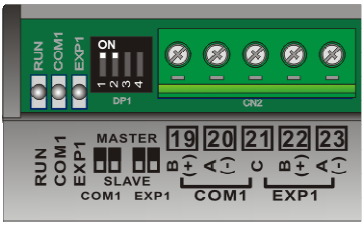
1.6.1 Setting dip-switches to select COM1 interface

The dip-switches 1 and 2 select the serial interface COM1 for the use in master or slave mode. If master mode is selected, through the dip-switches, it is possible to connect the polarizers (470 ohm) and the line termination resistors (330 ohm) to RS485. If slave mode is selected, RS485 is devoid of any polarization or termination resistance.

- COM1 serial in slave mode (dip 1 and 2 OFF)



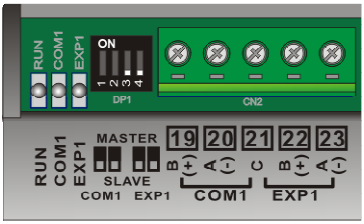
- COM1 serial in master mode (dip 1 and 2 ON)



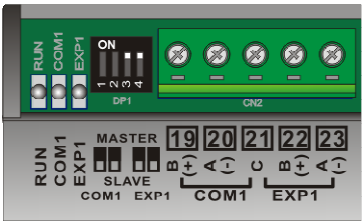
1.6.2 Setting dip-switches to select master / slave EXP1

The dip-switches 3 and 4 select the serial interface EXP1 for the use in master or slave mode. If master mode is selected, through the dip-switches, it is possible to connect the polarizers (470 ohm) and the line termination resistors (330 ohm) to RS485. If slave mode is selected, the line RS485 is devoid of any polarization or termination resistance.

- EXP1 serial in slave mode (dip 3 and 4 OFF)



- EXP1 serial in master mode (dip 3 and 4 ON)



1.6.3 Setting PL110-1A protocol address

The PL110-1A is provided with an internal rotary-switch (accessible by lifting the box cover) to select the address for serial communication with a master device. The rotary-switch allows 16 combinations, to connect more than 16 devices on the same line it is necessary to modify the parameter which indicates the offset address. This module address is given by:

MODULE ADDRESS = ADDRESS OFFSET (SMW4) + ROTARY-SWITCH VALUE

The address offset, value kept on the PL110 memory (default "0"), can be modified writing on the word SMW4.

The correspondence between the position of the rotary switch and the module address is summarized in the following table:

ROTARY POSITION	ROTARY VALUE	MODULE ADDRESS
0	0	SMW4 + 0
1	1	SMW4 + 1
2	2	SMW4 + 2
3	3	SMW4 + 3
4	4	SMW4 + 4
5	5	SMW4 + 5
6	6	SMW4 + 6
7	7	SMW4 + 7
8	8	SMW4 + 8
9	9	SMW4 + 9
A	10	SMW4 + 10
B	11	SMW4 + 11
C	12	SMW4 + 12
D	13	SMW4 + 13
E	14	SMW4 + 14
F	15	SMW4 + 15

1.6.4 Setting PL110-2A protocol address

The setting of the PL110-2A address for serial communication with a master device is done through the special marker SMW4. This module address is given by:

MODULE ADDRESS = ADDRESS OFFSET (SMW4)

The address offset, value kept on the PL110 memory (default "1"), can be modified writing on word SMW4.
This value can be changed through the specific system page entering the password "1357".

2 PL110 memory

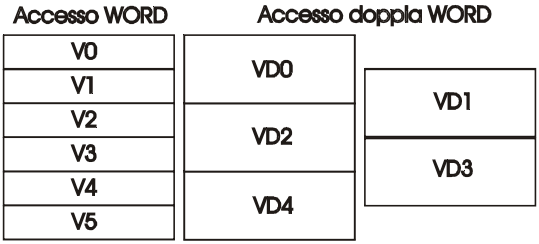
2.1 PL110 memory areas

The PL110 module provides the user with memory areas where it is possible to read or write program data. Memory areas can be entered by instruction with access by single bit (B), by word (W) or double word (D).

CODE	AREA	ACCESS
V	Variables V area	B, W, D
SM	Special Marker area	B, W, D
I	Digital inputs area	B, W
AI	Analogue inputs area	B, W
Q	Digital outputs area	B, W
M	Marker area	B, W
AQ	Analogue outputs area	B, W
T	Timer area	B, W
PT	Preset Timer area	B, W
C	Counters area	B, W
PV	Preset counters area	B, W
EEP	EEPROM area	W
MMC	EEPROM_MEMORY area	W
COM1_TX	COM1_TX area	W
COM1_RX	COM1_RX area	W
EXP1_TX	EXP1_TX area	W
EXP1_RX	EXP1_RX area	W
COM2_TX	COM2_TX area	W
COM2_RX	COM2_RX area	W
DISPLAY	Display digits area	W

2.1.1 Variables V memory area

The memory area “Variables V” is the memory which is used by the program to store data of operations. It is composed by 350 locations, type word (175 double words). This area may be edited by operations on bit, word or double word. The number of double word still refers to the words structure, therefore a single double word uses 2 single word addresses.



The values are stored also in case of power failure thanks to a rechargeable back-up battery. After charging, the battery stores data for approx. 6 months

2.1.2 Memory area “special marker SM”

This area is the memory which contains all data used by the ladder program to interact with the hardware resources of PL110. Some of this data is initialized when starting the PLC with the default values described in the table below. This area contains all data related to analogue inputs/ouputs, counts and set values of encoders, and also some bits controlled by the PLC for the ladder application as well as the settings for the communication serial ports.
The table below includes the content of each single location of the area “Special markers”, giving the address for Modbus protocol and the type of operation allowed for each location (R=reading, W=writing, R/W=reading/writing).

Pixsys®
ELECTRONICS

PL500-PL600-PL700

Modular PLC - PLC modulare - SPS-Modul

User manual - Manuale installatore - Installationsanleitung

Table of contents

Indice degli argomenti

Inhalt

Introduction

The PLC Pixsys PL500-PL600-PL700 / PLE500 range features a modular and flexible structure.
The PL500 CPU is a control unit and connectivity node, complete with serial RS485 and RS232 (Modbus RTU), Ethernet (Modbus TCP/IP) and CanOpen and is based on an ARM CORTEX A8 -1 GHz microprocessor.
The various combinations of analogue-digital I/O instead reside on the PLE500 modules, which communicate via real-time internal Bus on DIN-rail.
The LogicLab development environment is available in order to program the logic and can be downloaded from the dedicated area at www.pixsys.net.

1 Safety guidelines

Read carefully the safety guidelines and programming instructions contained in this manual before connecting/using the device.
Disconnect power supply before proceeding to hardware settings or electrical wirings to avoid risk of electric shock, fire, malfunction.
Do not install/operate the device in environments with flammable/explosive gases.
This device has been designed and conceived for industrial environments and applications that rely on proper safety conditions in accordance with national and international regulations on labour and personal safety. Any application that might lead to serious physical dama ge/ life risk or involve medical life support devices should be avoided.
Device is not conceived for applications related to nuclear power plants, weapon systems, flight control, mass transportation systems.
Only qualified personnel should be allowed to use device and/or service it and only in accordance to technical data listed in this manual.
Do not dismantle/modify/repair any internal component.
Device must be installed and can operate only within the allowed environmental conditions. Overheating may lead to risk of fire and can shorten the lifecycle of electronic components.

1.1 Organization of safety notices

Safety notices in this manual are organized as follows:

Safety notice	Description
Danger!	Disregarding these safety guidelines and notices can be life-threatening.
Warning!	Disregarding these safety guidelines and notices can result in severe injury or substantial damage to property.
Information!	This information is important for preventing errors.

1.2 Safety Precautions

Danger!	CAUTION - Risk of Fire and Electric Shock This product is UL listed as Open Type Process Control Equipment. It must be mounted in an enclosure that does not allow fire to escape externally.
Danger!	If the output relays are used past their life expectancy, contact fusing or burning may occasionally occur. Always consider the application conditions and use the output relays within their rated load and electrical life expectancy. The life expectancy of output relays varies considerably with the output load and switching conditions.
Warning!	Devices shall be supplied with limited energy according to UL 61010-1 3rd Ed, section 9.4 or LPS in conformance with UL 60950-1 or SELV in conformance with UL 60950-1 or Class 2 in compliance with UL 1310 or UL 1585.
Warning!	Loose screws may occasionally result in fire. For screw terminals, tighten screws to tightening torque of 0.5 Nm
Warning!	A malfunction in the Digital Controller may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage. To maintain safety in the event of malfunction of the Digital Controller, take appropriate safety measures, such as installing a monitoring device on a separate line.

1.3 Precautions for safe use

Be sure to observe the following precautions to prevent operation failure, malfunction, or adverse affects on the performance and functions of the product. Not doing so may occasionally result in unexpected events. Do not handle the Digital Controller in ways that exceed the ratings.

- The product is designed for indoor use only. Do not use or store the product outdoors or in any of the following places.
  - Places directly subject to heat radiated from heating equipment.
  - Places subject to splashing liquid or oil atmosphere.
  - Places subject to direct sunlight.
  - Places subject to dust or corrosive gas (in particular, sulfide gas and ammonia gas).
  - Places subject to intense temperature change.
  - Places subject to icing and condensation.
  - Places subject to vibration and large shocks.
- Installing two or more controllers in close proximity might lead to increased internal temperature and this might shorten the life cycle of electronic components. It is strongly recommended to install cooling fans or other air-conditioning devices inside the control cabinet.
- Always check the terminal names and polarity and be sure to wire properly. Do not wire the terminals that are not used.
- To avoid inductive noise, keep the controller wiring away from power cables that carry high voltages or large currents. Also, do not wire power lines together with or parallel to Digital Controller wiring. Using shielded cables and using separate conduits or ducts is recommended. Attach a surge suppressor or noise filter to peripheral devices that generate noise (in particular motors, transformers, solenoids, magnetic coils or other equipment that have an inductance component). When a noise filter is used at the power supply, first check the voltage or current, and attach the noise filter as close as possible to the Digital Controller. Allow as much space as possible between the Digital Controller and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.
- A switch or circuit breaker must be provided close to device. The switch or circuit breaker must be within easy reach of the operator, and must be marked as a disconnecting means for the controller.
- The device must be protected by a fuse 5A (cl. 9.6.2).
- Wipe off any dirt from the Digital Controller with a soft dry cloth. Never

use thinners, benzine, alcohol, or any cleaners that contain these or other organic solvents. Deformation or discoloration may occur.

- The number of non-volatile memory write operations is limited. Therefore, use EEprom write mode when frequently overwriting data, e.g.: through communications.

1.4 Environmental policy / WEEE

Do not dispose electric tools together with household waste material.
According to European Directive 2012/19/EU on waste electrical and electronic equipment and its implementation in accordance with national law, electric tools that have reached the end of their life must be collected separately and returned to an environmentally compatible recycling facility.

2 Model identification

PL500-335-1AD	PLC DIN Rail 1 Ethernet, 1 RS485, 1 RS232, 1 CANopen
PL500-335-1AD-WEB	PLC DIN Rail 1 Ethernet, 1 RS485, 1 RS232, 1 CANopen Movicon Webserver
PL600-335-1AD	PLC DIN Rail 1 Ethernet, 1 RS485, 1 RS232, 1 CANopen
PL700-335-1AD	PLC DIN Rail 1 Ethernet, 1 RS485, 1 RS232, 1 CANopen

3 Technical data

3.1 General characteristics

Supply voltage	12...24 VDC ± 10%
Consumption (max. use with 1 USB device)	5 W
Operating conditions	Temperature: 0-45°C; humidity 35...95 RH% without condensation
Container	DIN43880, 54 x 90 x 64 mm
Materials	Container: PC UL94V0 self-extinguishing Front panel: PC UL94V0 self-extinguishing
Protection	IP20 (container and terminals)
Weight	Approx. 130 g.

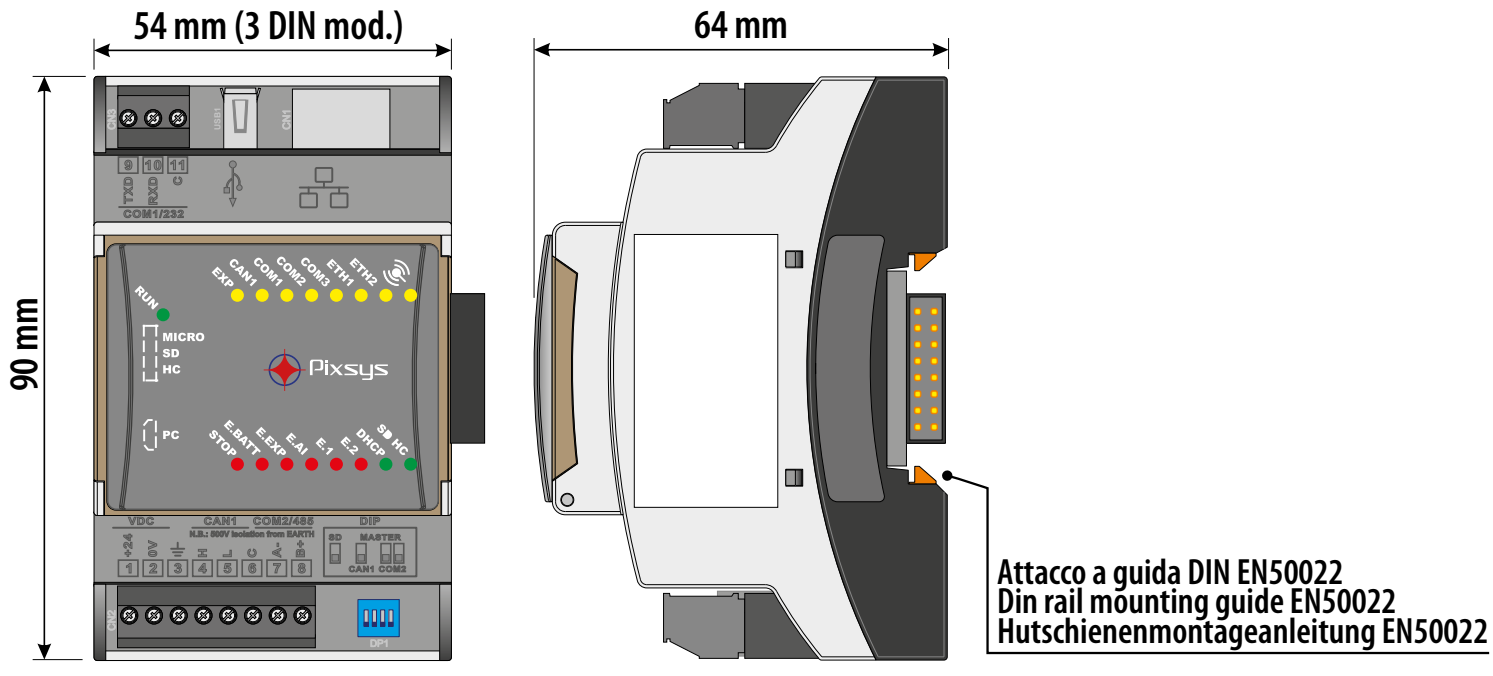
3.2 Hardware characteristics

CPU	ARM® CORTEX™ - A8 @1.0GHz
RAM	512 MB DDR3
eMMC (pSLC)	1,8 GB for PLC code and retentive memories

3.3 Software characteristics

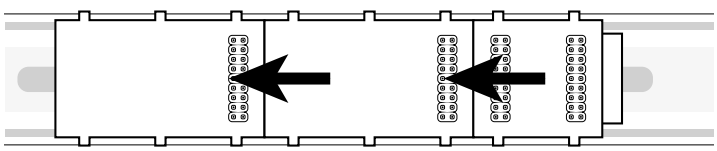
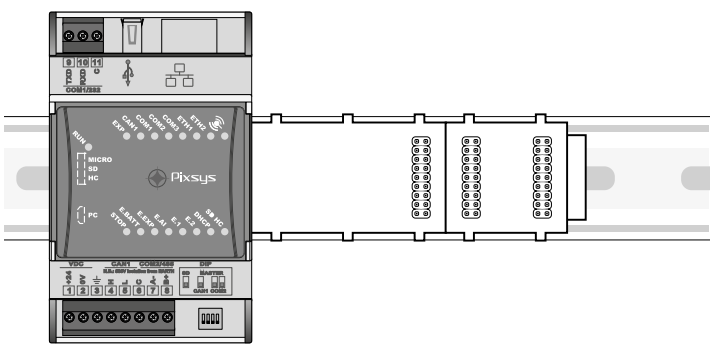
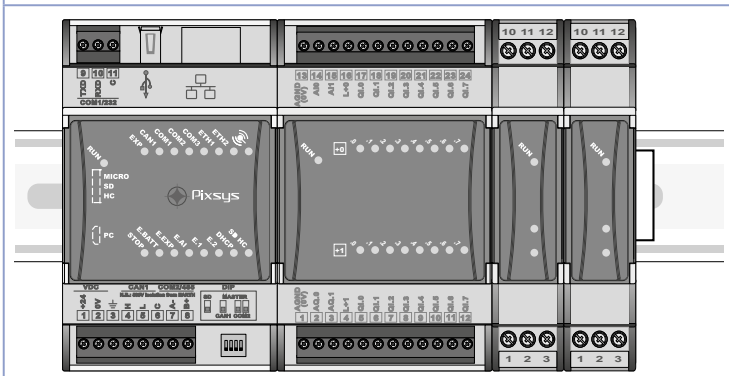
	PL500	PL500 -WEB	PL600	PL700
Operating system	WEC7	WEC7	Linux Debian with Kernel RealTime	
SoftPLC architecture	LogicLab	LogicLab	LogicLab	CodeSys
Minimum cycle time	5mS	10mS	2mS	2mS
No. of non retentive words	10.000 words			Unlimited
No. of retentive words	10.000 words			Unlimited
Timer, meter, PID functions	Unlimited			
PLC code size	Unlimited			

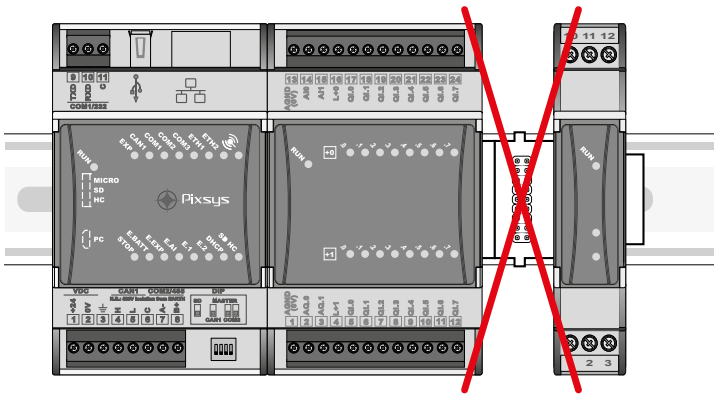
4 Dimensions and installation



4.1 Mounting sequence of the PLC and of the PLE500 expansion modules

The PLC with the relevant I/O modules requires mounting and connection via the specific bus lodged in the hollow of the DIN rail. The I/O modules (series PLE500-xAD) will be automatically numbered at each power-on, assigning the number 1 to the first I/O module connected to the right of the PLC, the number 2 to the following one and so on, always moving towards the right side. The position of the various modules shall thus reflect the sequence set in the LogicLab project in the definition of the PLCEXP network. For the numbering procedure to work correctly, it is not permitted to remove devices from the network by releasing them from their own bus and leaving some empty modules (bus slots) between one module and another. All connection/disconnection operations must be carried out with power off.

	Couple all the buses by pushing them towards the DIN rail, making sure that the male connection faces left and the female one faces right.
	Couple the buses together by sliding them along the DIN rail.
	Insert the various modules in the slots of the buses starting from the PLC and continuing to the right with the I/O modules.
	Proceed with mounting all the modules according to the requested order until the plc is completely formed.

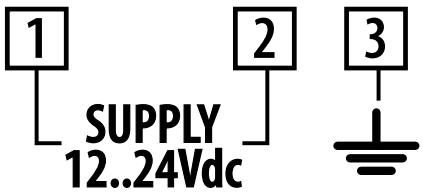
	It is not possible to leave free slots in the bus between one module and another.

5 Electric connections

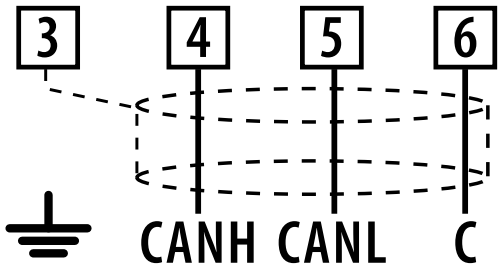
This regulator was designed and built in compliance with the Low Voltage Directives 2006/95/CE, 2014/35/EU (LVD) and the Electromagnetic compatibility Directives 2004/108/EC and 2014/30/EU (EMC). For installation in industrial environments it is a good rule to follow the precautions below:

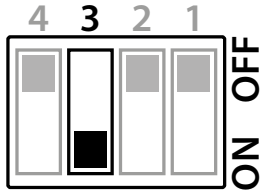
- Distinguish the power supply line from the power lines.
- Avoid proximity with contactor units, electromagnetic contactors, high power motors and use filters in any event.
- Avoid proximity with power units, particularly if with phase control.
- The use of network filters is recommended on the power supply of the machine in which the instrument will be installed, particular in case of 230Vac power supply.
  The regulator is devised to be assembled with other machines. Therefore, the EC marking of the regulator does not exempt the manufacturer of the system from the safety and conformity obligations imposed for the machine as a whole.

5.a Power supply

	12..24 VDC ± 10%

5.b CAN1 serial

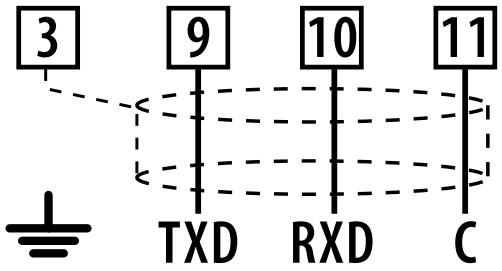




CAN MASTER:
120Ω terminator

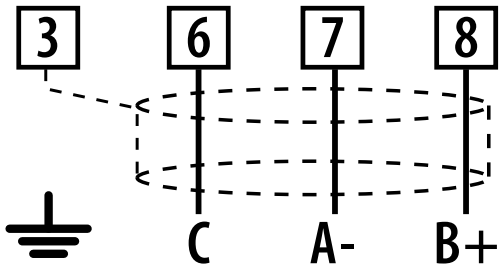
Connect any shield of the cable to terminal 3.

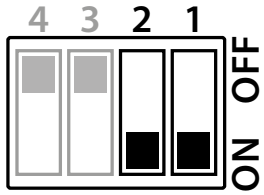
5.c RS232 / COM1 serial



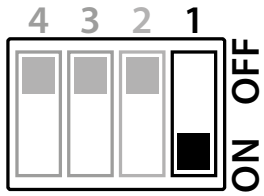
Connect any shield of the cable to terminal 3.

5.d RS485 / COM2 serial

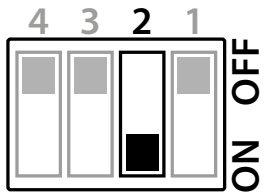




RS485 MASTER:
120Ω terminator
470Ω polarizer

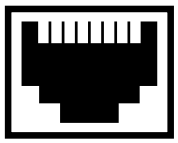


RS485 MASTER:
Only 470Ω Polarizer



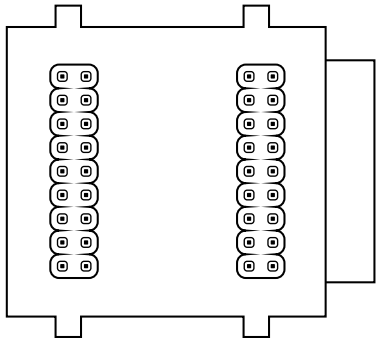
RS485 SLAVE:
Only 120Ω Terminator

5.e Ethernet



10/100 Mbit Ethernet port to program the development software and network connectivity.

5.f PLE / DIN bus

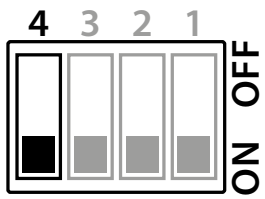


Bus connector to be lodged in the hollow of the DIN rail to connect any I/O module to the PL500. For the mounting sequence see paragraph *2.2*.

5.g USB

USB 2.0 port for Backup / Restore of the mass archiving functionalities and applications (the memory must be formatted in FAT/FAT32).
By using the converter USB-Ethernet cod. 2400.70.005 it is possible to get a second Ethernet port (ETH1). In this way, the first one (ETH0) is open to communication protocols which need a total control of the port (EtherCAT).

5.h Micro SD slot (internal)



MicroSD slot for Backup / Restore of the mass archiving functionalities and applications (the memory must be formatted in FAT/FAT32). The Boot function from MicroSD is possible by positioning the DIP 4 of the external Dip switch on ON.

5.i S1 button for system Backup / Restore (internal)

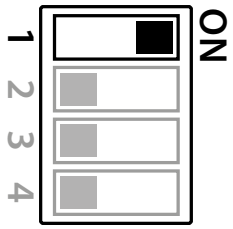
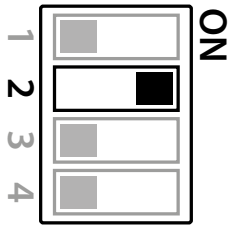
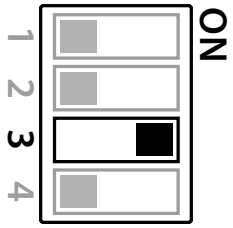
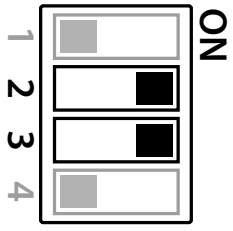
Backup:

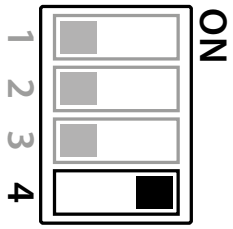
1 Insert a MicroSD (internal) or USB (external) memory.
2 Position the *"Stop"* DIP to **ON** and turn the PLC on by pressing the button (the internal green LED turns on).
3 Wait for the completion of the Backup procedure (the internal green LED turns off).
4 Turn the PLC off, remove the MicroSD or USB memory and turn the device on again.

	**Restore:** 1 Insert a MicroSD or USB memory containing Backup. 2 Position the *"Stop"* DIP to **OFF** and turn the PLC on by pressing the button (the internal green LED turns on). 3 Wait for the completion of the Backup procedure (the internal green LED turns off). 4 Turn the PLC off, remove the MicroSD or USB memory and turn the device on again.

6 DIP switch settings (internal)

6.a IP address

	STOP To interrupt the running of the PLC program.
	192.168.0.ID • If set to ON, force the first part of the IP address of the PLC to "192.168.0.", then allowing the last part of the address to be assigned through two internal rotary-switches IDX10 and IDX1. • If set to OFF (**default** position) the IP address is 192.168.0.99 (or the last one manually assigned using the TdControlPanel for the version PL500-335-1AD-WEB) or the Pixsys *"DeviceFinder"* utility for the other models.
	DHCP If set to ON, force the assignment of the IP address of the PLC through the DHCP function; as a result, this service must be enabled in the network where the device resides.
	Condition not available yet.

	BATT If set to ON, it inserts the battery in the circuit of the internal clock. This DIP must remain on ON to maintain the system clock active also without power.

6.b Battery (internal)

	The battery allows the system clock of the PLC to be kept active also without power. When flat, the original battery can be replaced with a standard CR2032 type battery.

6.1 Meaning of the status lights (LED)

●	RUN	Fixed on indicates the normal operation of the PLC. Flashing in flash mode every 1 s indicates that the device is still in the initialization phase and the PLC has not started yet (STOP LED on).
●	EXP	The LED indicates that the PLC program requires the use of the PLCEXP expansion bus
●	CAN1	The LED indicates that the PLC program requires the use of the CAN1 bus
●	COM1	The LED indicates that the PLC program requires the use of the COM1 serial line
●	COM2	The LED indicates that the PLC program requires the use of the COM2 serial line
●	COM3	The LED indicates that the PLC program requires the use of the COM3 serial line
●	ETH1	The LED indicates the presence of activity on the ETH1 network
●	ETH2	The LED indicates the presence of activity on the ETH2 network
●	WIFI	The LED indicates the presence of activity on the wi-fi network
●	STOP	The LED on indicates that the PLC is in the STOP status

●	E.BATT	The LED on indicates that the battery of the clock is flat and must be replaced
●	E.EXP	The LED on indicates an anomaly on the PLCEXP expansion bus (missing/faulty modules or modules that do not match the program being run)
●	E.AI	The LED on indicates that one or more analogue inputs of the PLCEXP bus modules is out of range
●	E.1	The LED on indicates a software/hardware error in the PLCEXP bus expansion modules
●	E.2	The LED on indicates that the PLC is in software/hardware error
●	DHCP	The LED on indicates that the IP address of PLC is assigned automatically by the DHC
●	SD HC	The LED indicates that the PLC is set to BOOT from SD memory (dip SD on ON)

7 Graphic interface – Webserver function

The PLC PL500, in the PL500-335-1AD-WEB variation, provides both a graphical interface and the chance to develop synoptics thanks to the integrated runtime Movicon 11 CE.
It is possible to access the graphic interface through any *"VNC client"* or through the Webserver HTML5 function integrated in Movicon. This last one allows you to access the synoptics from any Internet browser or with a specific App, available for Android and iOS.

The PLC PL600 provides both a graphical interface and the possibility to develop synoptics thanks to the integrated runtime PageLab. It is possible to access the graphic interface through any *"VNC client"* or through the Webserver HTML5 function. This last one allows you to access the synoptics from any Internet browser.

The PLC PL700 provides both a graphical interface and the chance to develop synoptics thanks to the integrated runtime Codesys. It is possible to access the graphic interface through the Webserver HTML5 function which allows you to access the synoptics from any Internet browser.

MCM260X

Modbus RTU - CANopen expansion module

User manual - Manuale d'uso

Table of contents

Indice dei contenuti

Introduction

Thank you for choosing a Pixsys instrument.
The MCM260X modules are a series of digital/analog expansions for PLC that implement the Modbus RTU protocol with RS485 interface or the CANopen protocol.
There are 6 versions of the expansion module, in continuous voltage for the models MCM260X-1AD, MCM260X-2AD, MCM260X-3AD, MCM260X-9AD, while for the models with relay outputs or analog inputs/outputs MCM260X-4AD, MCM260X-5AD operation is required in low continuous and alternating voltage.

1 Safety guidelines

Read carefully the safety guidelines and programming instructions contained in this manual before connecting/using the device.
Disconnect power supply before proceeding to hardware settings or electrical wirings to avoid risk of electric shock, fire, malfunction.
Do not install/operate the device in environments with flammable/explosive gases.
This device has been designed and conceived for industrial environments and applications that rely on proper safety conditions in accordance with national and international regulations on labour and personal safety. Any application that might lead to serious physical dama ge/ life risk or involve medical life support devices should be avoided.
Device is not conceived for applications related to nuclear power plants, weapon systems, flight control, mass transportation systems.
Only qualified personnel should be allowed to use device and/or service it and only in accordance to technical data listed in this manual.
Do not dismantle/modify/repair any internal component.
Device must be installed and can operate only within the allowed environmental conditions. Overheating may lead to risk of fire and can shorten the lifecycle of electronic components.

1.1 Organization of safety notices

Safety notices in this manual are organized as follows:

Safety notice	Description
Danger!	Disregarding these safety guidelines and notices can be life-threatening.
Warning!	Disregarding these safety guidelines and notices can result in severe injury or substantial damage to property.
Information!	This information is important for preventing errors.

1.2 Safety Precautions

Danger!	CAUTION - Risk of Fire and Electric Shock This product is UL listed as DIN-rail mounting process control equipment. It must be mounted in an enclosure that does not allow fire to escape externally.
Danger!	If the output relays are used past their life expectancy, contact fusing or burning may occasionally occur. Always consider the application conditions and use the output relays within their rated load and electrical life expectancy. The life expectancy of output relays varies considerably with the output load and switching conditions.
Warning!	Devices shall be supplied with limited energy according to UL 61010-1 3rd Ed, section 9.4 or LPS in conformance with UL 60950-1 or SELV in conformance with UL 60950-1 or Class 2 in compliance with UL 1310 or UL 1585.
Warning!	Loose screws may occasionally result in fire. For screw terminals, tighten screws to tightening torque is 0.5 Nm for 5 mm Pitch terminal blocks or 0.25 Nm for 3.81 mm Pitch terminal blocks.

Warning!	A malfunction in the Digital Controller may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage. To maintain safety in the event of malfunction of the Digital Controller, take appropriate safety measures, such as installing a monitoring device on a separate line.

1.3 Precautions for safe use

Be sure to observe the following precautions to prevent operation failure, malfunction, or adverse affects on the performance and functions of the product. Not doing so may occasionally result in unexpected events. Do not handle the Digital Controller in ways that exceed the ratings.

- The product is designed for indoor use only. Do not use or store the product outdoors or in any of the following places.
  - Places directly subject to heat radiated from heating equipment.
  - Places subject to splashing liquid or oil atmosphere.
  - Places subject to direct sunlight.
  - Places subject to dust or corrosive gas (in particular, sulfide gas and ammonia gas).
  - Places subject to intense temperature change.
  - Places subject to icing and condensation.
  - Places subject to vibration and large shocks.
- Installing two or more controllers in close proximity might lead to increased internal temperature and this might shorten the life cycle of electronic components. It is strongly recommended to install cooling fans or other air-conditioning devices inside the control cabinet.
- Always check the terminal names and polarity and be sure to wire properly. Do not wire the terminals that are not used.
- To avoid inductive noise, keep the controller wiring away from power cables that carry high voltages or large currents. Also, do not wire power lines together with or parallel to Digital Controller wiring. Using shielded cables and using separate conduits or ducts is recommended. Attach a surge suppressor or noise filter to peripheral devices that generate noise (in particular motors, transformers, solenoids, magnetic coils or other equipment that have an inductance component). When a noise filter is used at the power supply, first check the voltage or current, and attach the noise filter as close as possible to the Digital Controller. Allow as much space as possible between the Digital Controller and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.
- A switch or circuit breaker must be provided close to device. The switch or circuit breaker must be within easy reach of the operator, and must be marked as a disconnecting means for the controller.
- Wipe off any dirt from the Digital Controller with a soft dry cloth. Never use thinners, benzine, alcohol, or any cleaners that contain these or other organic solvents. Deformation or discoloration may occur.
- The number of non-volatile memory write operations is limited. Therefore, use EEprom write mode when frequently overwriting data, e.g.: through communications.
- The device must be protected by:

MCM260X-1AD:	4A Fast Fuse (F)	MCM260X-4AD:	1A Fast Fuse (F)
MCM260X-2AD:	1A Fast Fuse (F)	MCM260X-5AD:	1A Fast Fuse (F)
MCM260X-3AD:	4A Fast Fuse (F)	MCM260X-9AD:	5A Fast Fuse (F)

- The MCM260X series does not require ventilation.

1.4 Environmental policy / WEEE

Do not dispose electric tools together with household waste material.
According to European Directive 2012/19/EU on waste electrical and electronic equipment and its implementation in accordance with national law, electric tools that have reached the end of their life must be collected separately and returned to an environmentally compatible recycling facility.

2 Composition of acronym

The MCM260X series includes the following models:

MCM260X-	
MCM260X-1AD	Power supply 12..24 Vdc 16 Static Outputs 12..24Vdc
MCM260X-2AD	Power supply 12..24 Vdc 16 Digital inputs PNP 12..24Vdc 2 Analog inputs 0...10V 3 Encoders/Counters
MCM260X-3AD	Power supply 12..24 Vdc 8 Digital inputs PNP 12..24Vdc 8 Static Outputs 12..24Vdc 3 Encoders/Counters
MCM260X-4AD	Power supply 12..24 Vdc/Vac 8 Digital inputs PNP 12..24Vdc 8 Relay outputs 2 Analog inputs 0...10V 3 Encoders/Counters
MCM260X-5AD	Power supply 12..24 Vdc/Vac 4 Universal analog inputs 2 Analog outputs 0..10V / 4..20mA
MCM260X-9AD	Power supply 12..24 Vdc 4 Universal analog inputs 2 Analog outputs 0..10V / 4..20mA 16 Static outputs 12..24Vdc / Digital inputs PNP 12..24Vdc 4 Encoders/Counters

3 Technical data

3.1 General characteristics

Displays	4 0.52 inch displays RUN, COM LEDs and I/O status LEDs
Operating conditions	Temperature: 0-50 °C -Humidity 35..95 Rh% Max. altitude: 2000m
Protection	IP30 container
Materials	Container: Self-extinguishing polycarbonate Front: Self-extinguishing polyamide
Weight	Approximately 250 g

3.2 Hardware characteristics

3.2.a MCM260X-1AD

Power supply	12..24 Vdc ± 15%	Consumption 100VA max
Digital outputs	16 static outputs 12-24Vdc	Max 700mA per output Max 3A in total for all the outputs
Communication port	2 modes to select: - RS485 with Modbus RTU protocol - CAN with CANopen protocol	Galvanically isolated Up to 115200 baud Up to 1Mbit

3.2.b MCM260X-2AD

Power supply	12..24 Vdc ± 15%	Consumption 10VA max
Digital inputs	16 inputs PNP 12-24Vdc	V_{IL} = 4.3V V_{IL} = 8.0V
Encoder/Counter inputs	3 encoders/counters superimposed on the PNP digital inputs	32 bit resolution Maximum frequency 80KHz
Analog inputs	2 inputs 0..10V superimposed on the digital inputs	45000 points resolution
Communication port	2 modes to select: - RS485 with Modbus RTU protocol - CAN with CANopen protocol	Galvanically isolated Up to 115200 baud Up to 1Mbit

3.2.c MCM260X-3AD

Power supply	12..24 Vdc ± 15%	Consumption 50VA max
Digital inputs	8 inputs PNP 12-24Vdc	V_{IL} = 4.3V V_{IL} = 8.0V
Encoder/Counter inputs	3 encoders/counters superimposed on the PNP digital inputs	32 bit resolution Maximum frequency 80KHz
Digital outputs	8 static outputs 12-24Vdc	Max 700mA per output Max 3A in total for all the outputs
Communication port	2 modes to select: - RS485 with Modbus RTU protocol - CAN with CANopen protocol	Galvanically isolated Up to 115200 baud Up to 1Mbit

3.2.d MCM260X-4AD

Power supply	12..24 Vdc/Vac ± 15%	Consumption 20VA max
Digital inputs	8 inputs PNP 12-24Vdc	V_{IL} = 4.3V V_{IL} = 8.0V
Encoder/Counter inputs	3 encoders/counters superimposed on the PNP digital inputs	32 bit resolution Maximum frequency 80KHz
Analog inputs	2 inputs 0..10V superimposed on the digital inputs	45000 points resolution
Relay outputs	8 relay outputs with single in common	Contact data: 5A at 250Vac, 30Vdc resistive load 2A at 250Vac, 30Vdc inductive load Max exchange power 1250 VA, 150W resistive load 500 VA, 60W inductive load Max 10A in total
Communication port	2 modes to select: - RS485 with Modbus RTU protocol - CAN with CANopen protocol	Galvanically isolated Up to 115200 baud Up to 1Mbit

3.2.e MCM260X-5AD

Power supply	12..24 Vdc/Vac ± 15%	Consumption 20VA max
Analog inputs	4 inputs that can be configured via software **Thermocouples**: type K, S, R, J, T, E, N, B; automatic compensation of cold junction at 0..50°C. **Resistance thermometers**: PT100, PT500, PT1000, Ni100, PTC1K, NTC10K (ß 3435K) **V/I input**: 0-10V, 0-20 or 4-20mA, 0-60mV, 0-1V, 0-5V. **Potentiometer**: 1..150KΩ	Galvanically insulated from power supply and communication port 16 bit resolution Tolerance (25 °C) +/-0.2% ±1 digit (on F.s.)
Analog outputs	2 outputs that can be configured via software: 0-10V or 4-20mA	16 bit resolution
Sensor power supply output	Output to power supply 0-10V or 4-20mA normalized sensors to be connected to analog inputs	Galvanically insulated from power supply and communication port 24 Vdc, 100mA max
Communication port	2 modes to select: - RS485 with Modbus RTU protocol - CAN with CANopen protocol	Galvanically isolated Up to 115200 baud Up to 1Mbit

3.2.f MCM260X-9AD

Power supply	12..24 Vdc ± 15%	Consumption 100VA max
Digital inputs	16 inputs PNP 12-24Vdc (Superimposed on the digital outputs)	V_{IL} = 4.3V V_{IL} = 8.0V
Encoder/Counter inputs	4 encoders/counters superimposed on the PNP digital inputs	32 bit resolution Maximum frequency 80KHz
Analog inputs	4 inputs that can be configured via software **Thermocouples**: type K, S, R, J, T, E, N, B; automatic compensation of cold junction at 0..50°C. **Resistance thermometers**: PT100, PT500, PT1000, Ni100, PTC1K, NTC10K (ß 3435K) **V/I input**: 0-10V, 0-20 or 4-20mA, 0-60mV, 0-1V, 0-5V. **Potentiometer**: 1..150KΩ	Galvanically insulated from power supply and communication port 16 bit resolution Tolerance (25 °C) +/-0.2% ±1 digit (on F.s.)
Digital outputs	16 static outputs 12-24Vdc (superimposed on the digital inputs)	Max 700mA per output Max 2A in total for each group of 8 outputs (Q.1-Q.8 and Q.9-Q.16)
Analog outputs	2 outputs that can be configured via software: 0-10V or 4-20mA	16 bit resolution
Sensor power supply output	Output to power supply 0-10V or 4-20mA normalized sensors to be connected to analog inputs	Galvanically insulated from power supply and communication port 24 Vdc, 100mA max
Communication port	2 modes to select: - RS485 with Modbus RTU protocol - CAN with CANopen protocol	Galvanically isolated Up to 115200 baud Up to 1Mbit

3.3 Software features

Manual configuration via terminal	It is possible to manually configure the parameters related to the communication of each device using the terminal with display and buttons present on the inside of the top cover of the instrument, accessible through the opening towards the bottom of the cover itself
Configuration via app MyPixsys via NFC	It is possible to configure the parameters relating to the communication of each device using the MyPixsys app and transferring the data via NFC. Simply move your smartphone close to the antenna present on the cover of the instrument, in the point marked by the symbol ⦿. Configuration via the MyPixsys app is possible with the instrument both on and off. When activated by a reader/interrogator supporting NFC-V protocol, the controller is to be considered a VICC (Vicinity Inductively Coupled Card) according to ISO/IEC 15693 and it operates at a frequency of 13.56 MHz. The device does not intentionally emit radio waves.
Termination resistance	You can automatically activate a termination resistance of the communication line by setting a specific parameter
Communication protocol	The device can operate in two communication modes. The mode is selected in the configuration phase, via terminal or using the MyPixsys app. Only the selected mode will be active

4 Dimension and installation