USER'S MANUAL for
TPX1043 series
HMI with PLC

ME7101_01
05/23

INDICE

1.0   Introduction

To grant a fast setup of the device please follow carefully the information in this manual.

1.1.   Staff skill

Products described in this manual are devoted to PLC programmers or automation experts only. MECT S.r.l. declines any responsibility about malfunctioning or damage caused by incorrect use of MECT devices, due to noncompliance to this manual information. MECT S.r.l has an help desk.

1.2.   Simbols

Danger
Follow this advice to avoid people injury.

Warning
Follow this advice to protect the device

Caution
Follow this advice to have a more effective performance.

ESD (Electrostatic discharge)
Danger: possibly damage due to Electrostatic discharge.

Note
Step to follow for a correct installation.

Additional information

1.3   Terms

PLC:	TPX1043
Terminals:	MPNC006, MPNC020, MPNC030, MPNC035 MPNE series
System:	PLC (TPX1043) with terminals

1.4   Safety

Attention
Switch off devices before connecting them.

ESD (Electrostatic discharge)
Modules have electronic components that can be damaged by. electrostatic discharge. Be sure to be connected to ground when handle the devices.

The instrument has no power switch and no internal fuse, but it powers on immediately after connecting a correct power supply input (check the power supply value on the instrument label). Keep the power supply line as short as possible and keep it separate from other power lines.

For safety reasons it is necessary to have a 2 section power switch with a fuse near the instrument easily replaceable.

Avoid the presence of other power actuators in the same control panel, high humidity, excessive heat and corrosive gas.

Instruments must have a power supply from safety transformers or SELV transformers.

1.5   Reference manual

The **Quick Start** (downloadable from the web site) and **MectSuite Tutorial** are reference manuals for MectSuite to develop HMI and PLC applications.
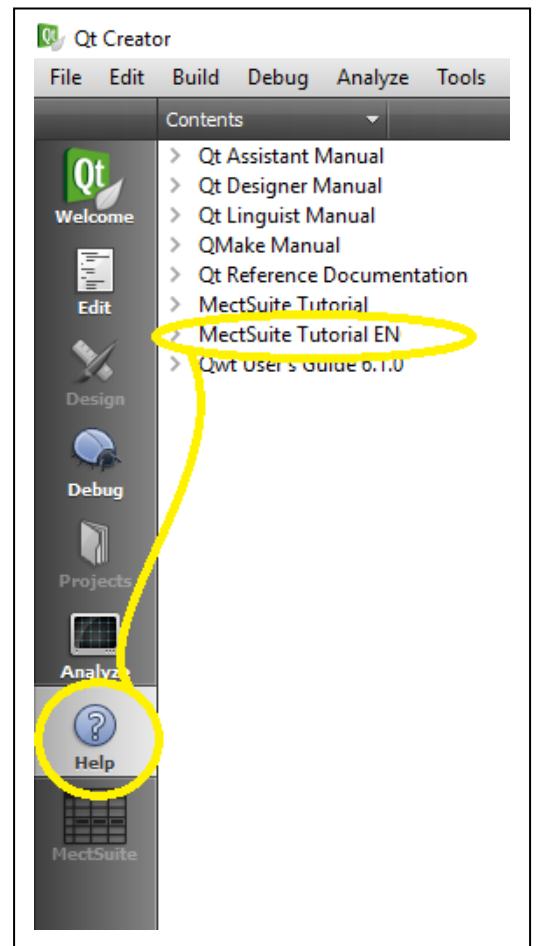
2.0   System description

TPX1043 is a device composed by a PLC and a HMI with touch-screen monitor 4.3" width and 480 x 272 pixel resolution with 262.000 colors.

TPX1043 allows the supervision of networked Modbus RTU and Modbus TCP devices. The networks are managed simultaneously by TPX1043 and data from a network can be sent to another in order to create a bridge between the two networks.

A Micro-USB host port allows, with a special adapter, the use of an USB-pen drive for software updates and data log. Through a GPRS/UMTS or Wi-Fi key (optionally sold by Mect) is possible to connect the operator panel to a Wi-Fi or Mobile network. Settings under MENU → OPTIONS → NETWORK_CFG → tab "Wi-Fi" or tab "Mobile"

On TPX1043 there are up to 1 Kbyte for retentive variables, stored on the internal flash memory.

The device is also able to manage an up to 64GB wide, micro SD card. The SD card is factory mounted on request.

A real-time clock maintains the date and time up to four months with the device turned off.

TPX1043 is equipped with a micro PLC with several digital I/O to make a small automation of the process.

The device can be used in horizontal or in vertical orientation with the option "V" (see following pictures).

Figure 1: Front view TPX1043 (horizontal version)

Figure 2: front view TPX1043 (vertical version)

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2.1   Specification

TPX1043 is based on a processor system. PLC and HMI are based on a 454MHz ARM9

Table 1

PLC Hardware characteristics	
PLC Processor	ARM926JE 454MHz
RAM	128MB
FLASH	128MB
Non volatile variables	On FLASH memory
Real Time Clock	Yes with rechargeable battery
Screen	TFT 480 x 272 pixel 262k colors
Touch screen	Resistive 4 wires
Ethernet	10Mbit/s - 100Mbit/s self recognition
Micro-USB	Host 2.0
Micro SD	64 GB
PLC software characteristics	
OS	LINUX 2.35
PLC	IEC61131-3
Graphics	Based on QT library
ModBus	Modbus RTU master
Storage memory	Possibility of history storage
Field bus main features	
Modbus RTU	Master/ Client 2 wires
Modbus TCP	Master/ Client

Power supply	
12÷28VDC	
Power	3.5W digital output off

Tightening torque	
0,07-0,08 Nm	

Electromagnetic compatibility

The electromagnetic compatibility tests have been carried out at accredited laboratories, according to EN 61326-1, EN 61131-2 and EN 61000-6-2standards.

2.2   *Description of connections*
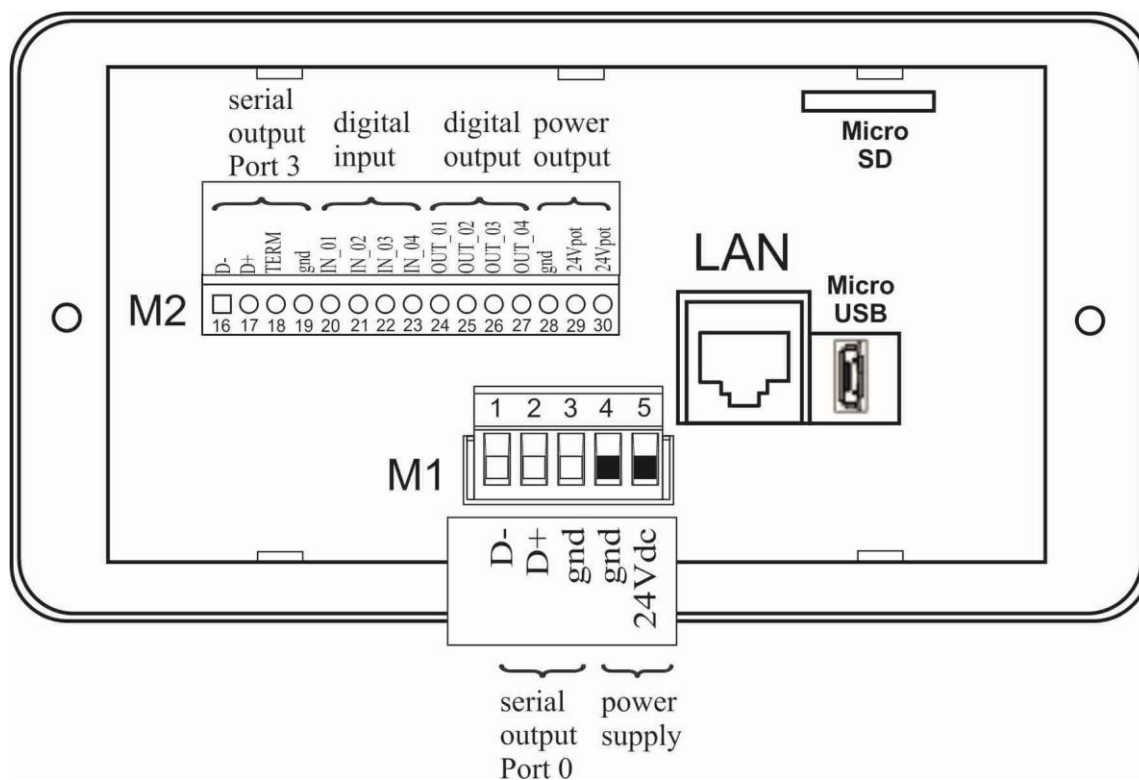
For "serial output Port 0" connections see: ModBus serial PORT 0 chapter.

For "serial output Port 3" connections see: ModBus serial PORT 3 chapter.
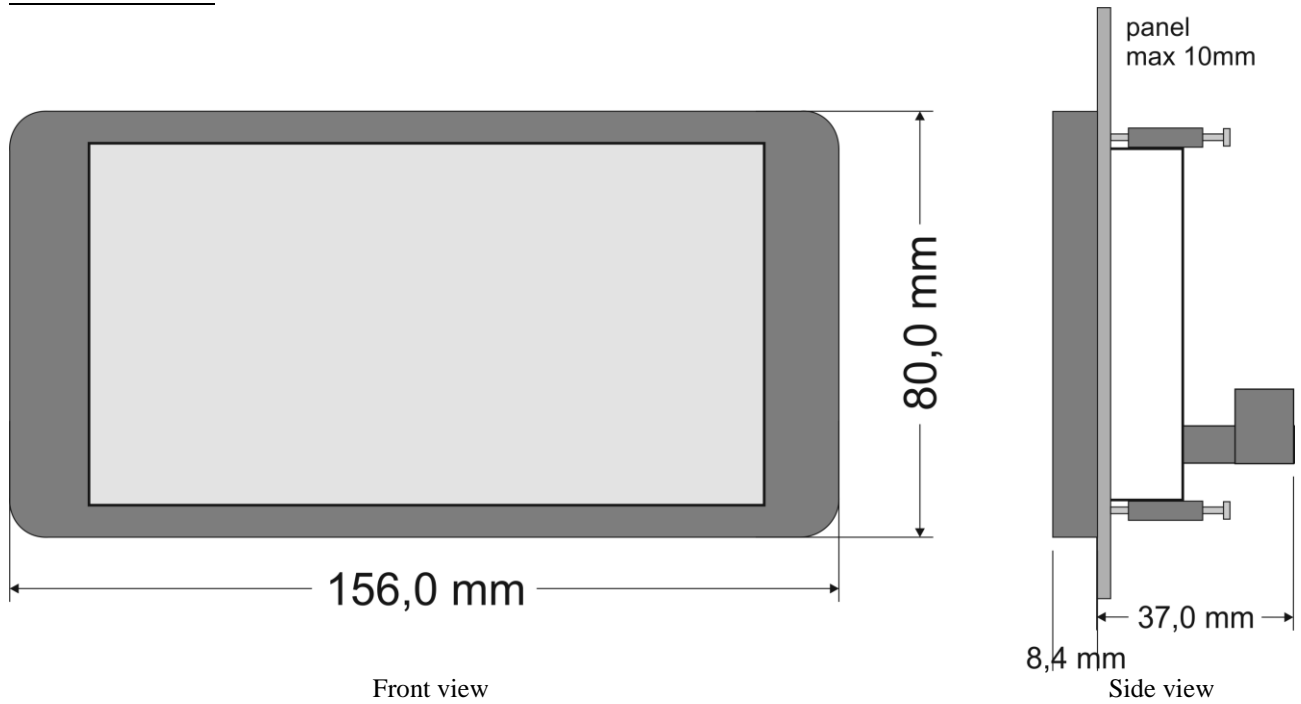
Follow table and connections for TPX1043 model:

Table 2

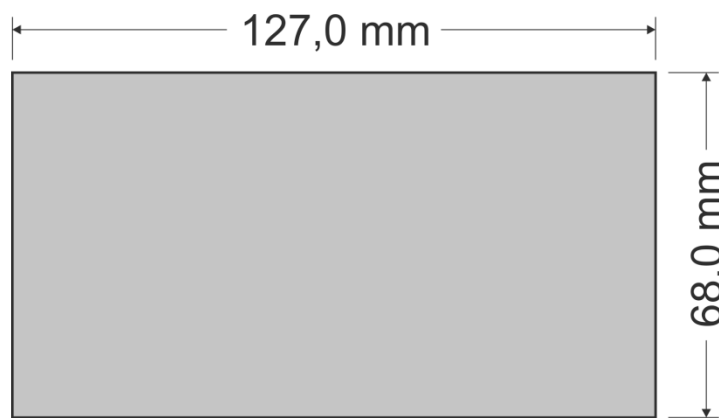| TPX1043 Expansion features		
Digital Inputs	Input PNP 24Vdc	Input impedence: 20Kohm
Digital outputs	Output PNP 24Vdc	200mA max for each output.

2.3   Mechanical dimensions

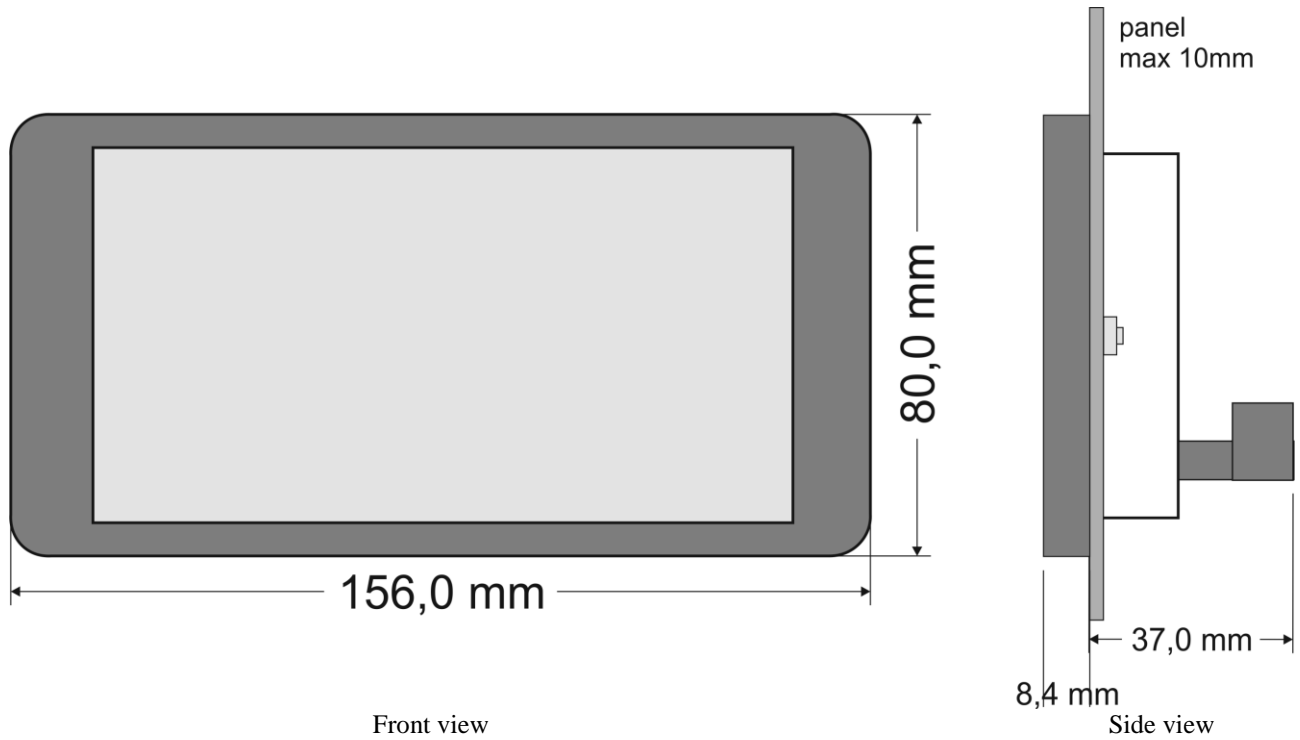In the following figures see the TPX1043 dimensions.

Panel with frame mounting and hooks fastening:

Encumbrance

Front view   Side view

Mounting plate

Panel with frame mounting and screws fastening:
<u>Encumbrance</u>

panel
max 10mm

80,0 mm

156,0 mm

37,0 mm

8,4 mm

Front view   Side view

<u>Mounting plate</u>
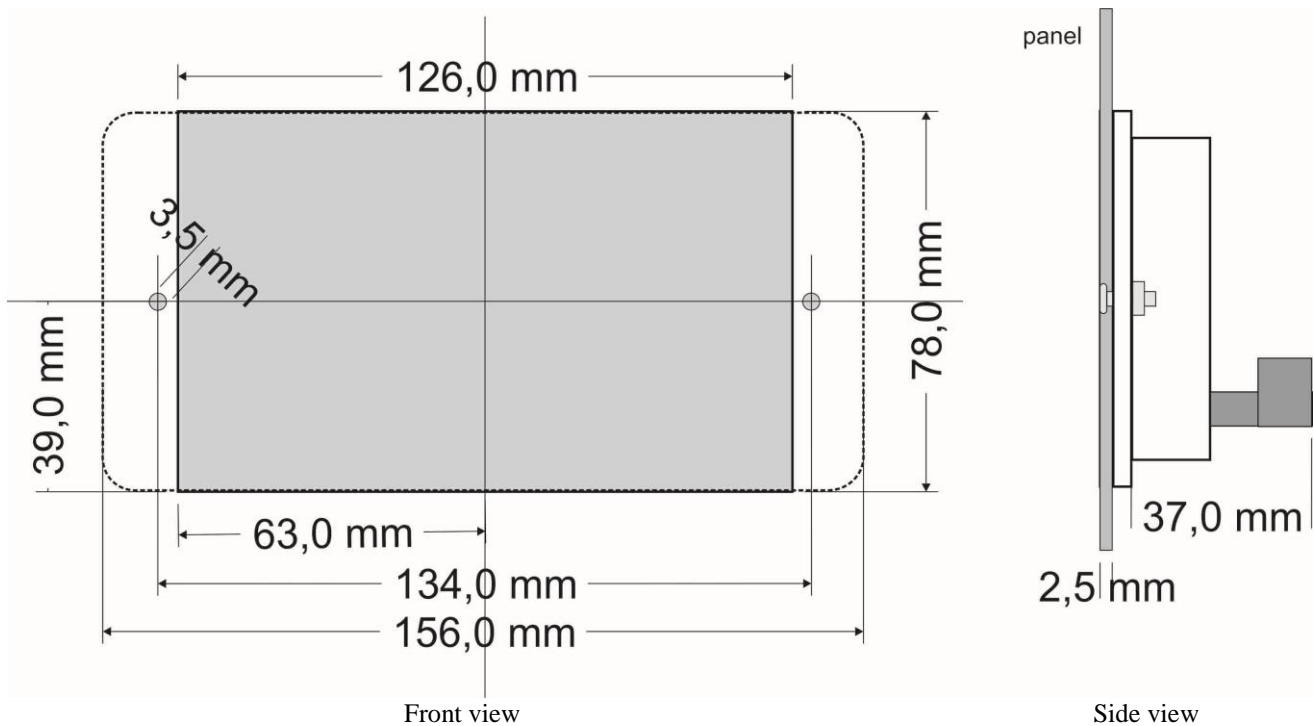

127,0 mm

3,5 mm

68,0 mm

34,0 mm

67,0 mm

134,0 mm
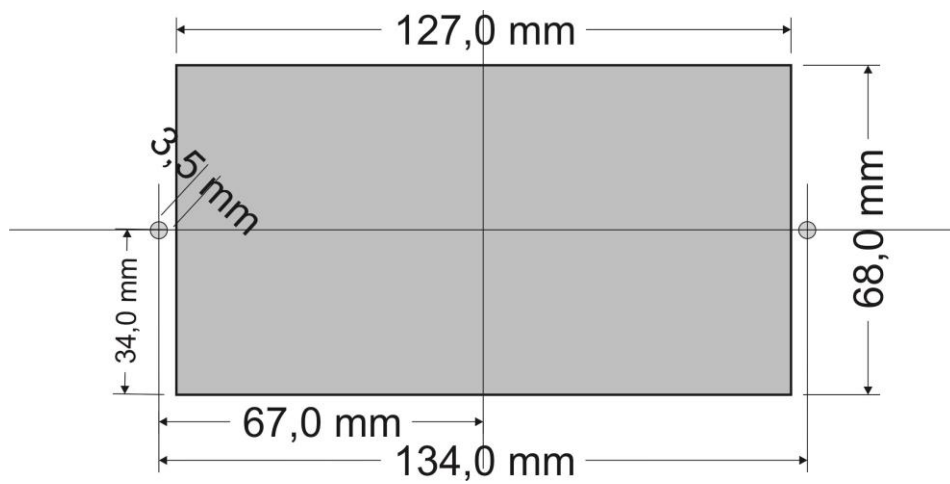
Panel without frame mounting:

In this case, the display has to be exactly at the same height of the panel, so for metal panels below 2,5mm it needs to insert a spacer to reach the exact height.

Front view   Side view

Technical specification

Table 3

MECHANICAL	
Material	ABS, Polycarbonate
Installation	Panel installation
Environmental conditions	
Operative temperature	0 °C ... 55 °C
Storage Temperature	-20 °C ... +85 °C
Relative Humidity	5 % a 95 % no condensation
Electric isolation	
Air clearance	According to IEC 60664-1
Pollution According to IEC 61131-2	2
Protection	
Rear protection	IP 20
Front protection	IP65

⚠️ **Attention**

Install the device in a panel with no more than 55 °C.

2.4   Panel mounting

2.4.1 Distance

The device must be installed with some space between other devices to allow the right heat dissipation and cabling. In order to avoid EMC issues, you should not overlap cables.
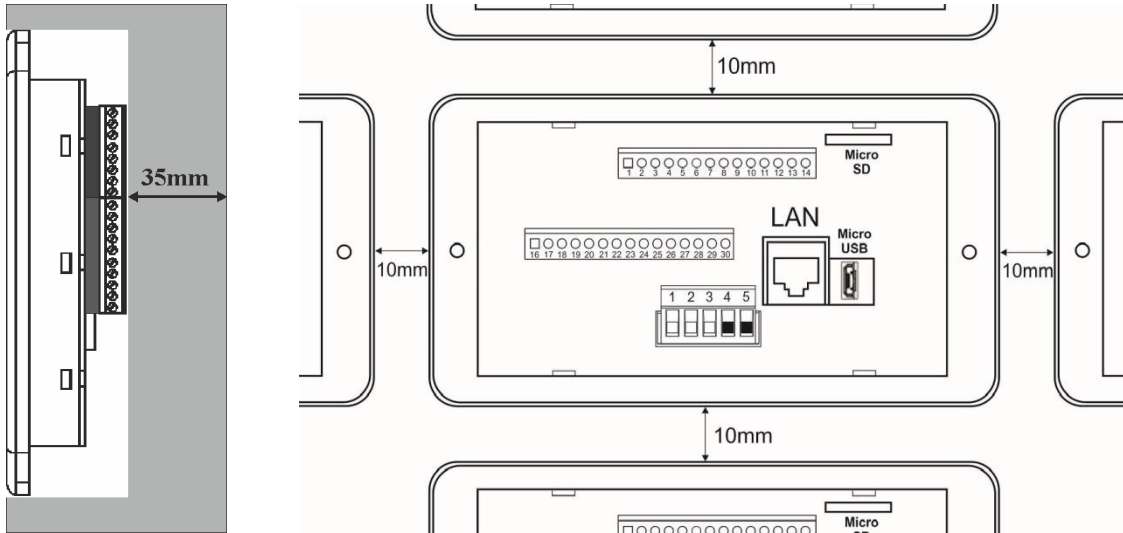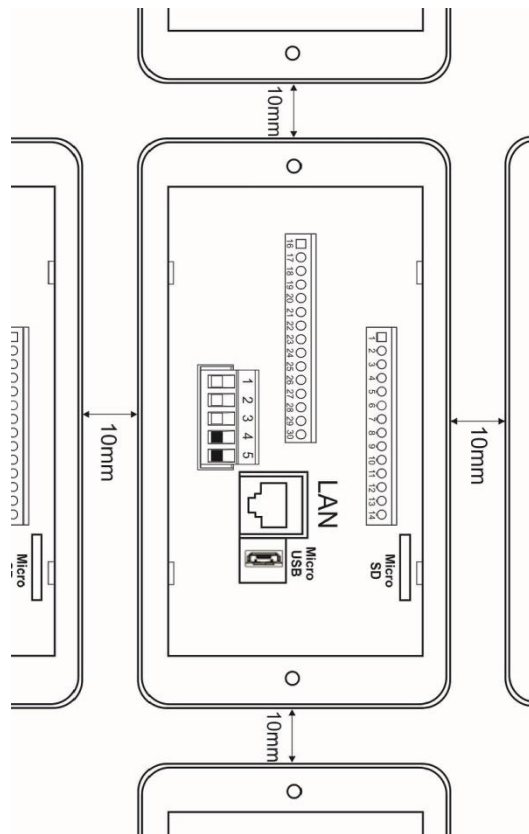

Figure 6A – Horizontal mounting

Figure 6B – Vertical mounting

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3.0   Connections TPX1043
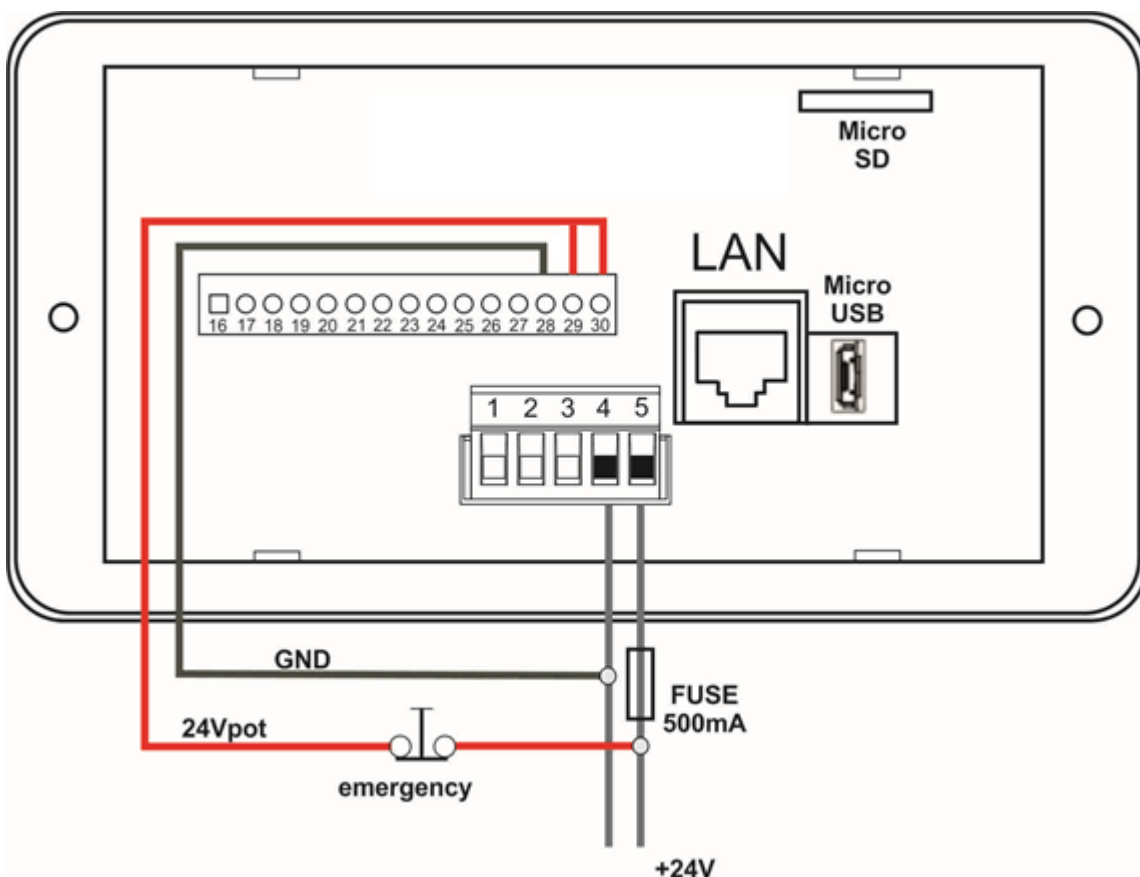
Power supply

3.1   Isolation

Device has no a galvanic isolation.

3.2   System power supply

TPX1043 has a 12Vdc to 28Vdc power supply for the main board and the expansion board as well, according to the schematic in the figure below. Both input power can be connected to the same power supply.

Digital outputs circuitry is powered by the 28 (-) and the 30 (+) terminals. This part of the circuit can be separated by an external power switch.

The device is protected against revers polarity power supply.

⚠️ **Attention**
A wrong power supply voltage can damage the device.

3.2.1   Fuse

The device has no internal fuse protection, so it is suggested the use of an external 500mA fuse for the panel power supply.

3.3 Connections IO

Connections description.

TPX1043
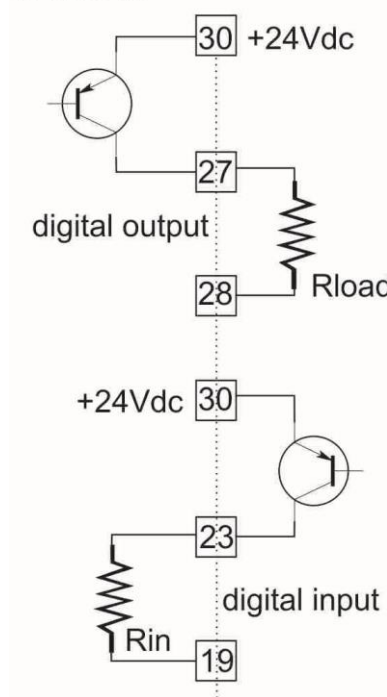
Digital output. Terminals 24 ÷ 27 are dedicated to digital outputs. An example of connection of terminal 27 is shown in the figure.

Terminals "20 ÷ 23" are high speed inputs. An example of connection of terminal 23 is shown in the figure.

3.4   System variables

Table 4

| Variable name	Description	R/W	Description
PLC_FastIO_1 PLC_FastIO_2 PLC_FastIO_3 PLC_FastIO_4	Digital Input	RO	digital input value
PLC_FastIO_5 PLC_FastIO_6 PLC_FastIO_7 PLC_FastIO_8	Digital Output	RW	digital output control
PLC_time	Time	RO	time elapsed [s]
PLC_timeMin	Time min	RO	start window 10 seconds
PLC_timeMax	Time max	RO	end window 10 seconds
PLC_timeWin	Time window	RW	graph window
PLC_Version	PLC	RO	PLC version
PLC_EngineStatus	Status	RO	PLC status
PLC_ResetValues	Reset	RW	diagnostic variables reset
PLC_buzzerOn	Buzzer	RW	buzzer sound (enable = 1 / disable = 0)
PLC_PLC_Version	PLC application version	RW	
PLC_HMI_Version	HMI application version	RW	
PLC_Year	Currently year	RO	
PLC_Month	Currently month	RO	
PLC_Day	Currently day	RO	
PLC_Hours	Currently hour	RO	
PLC_Minutes	Currently minutes	RO	
PLC_Seconds	Currently seconds	RO	
PLC_UPTIME_s	Time Up	RO	counter in seconds
PLC_UPTIME_cs	Time Up	RO	counter in c. seconds
PLC_WATCHDOGEN	Watchdog	RW	watchdog enable
PLC_WATCHDOG_ms	Watchdog	RW	watchdog time reset
PLC_PRODUCT_ID	Product ID	RO	
PLC_SERIAL_NUMBER	Serial number device	RO	
PLC_HMI_PAGE	Change page via code	RW	
PLC_BEEP_VOLUME	Beep volume (when buzzerOn)	RW	
PLC_TOUCH_VOLUME	Touch volume	RW	
PLC_ALARM_VOLUME	Alarm volume (when alarm)	RW	
PLC_BUZZER	Buzzer	RW	enable dynamic buzzer sound (0x44332211 up=0x11(%) on=0x22(cs) off=0x33(cs) rep=0x44(times))

3.5 *ModBus serial PORT 0*

ModBus on TPX1043 is a 2 wires RS485 serial line, at the following pins of the terminal board:

Table 5

Pin	Signal	Description
3	GND	
2	D +	Line +
1	D -	Line -

Example of wiring for a system composed by:
- TPX1043
- MPNC006
- MPNC020
- MPNC030

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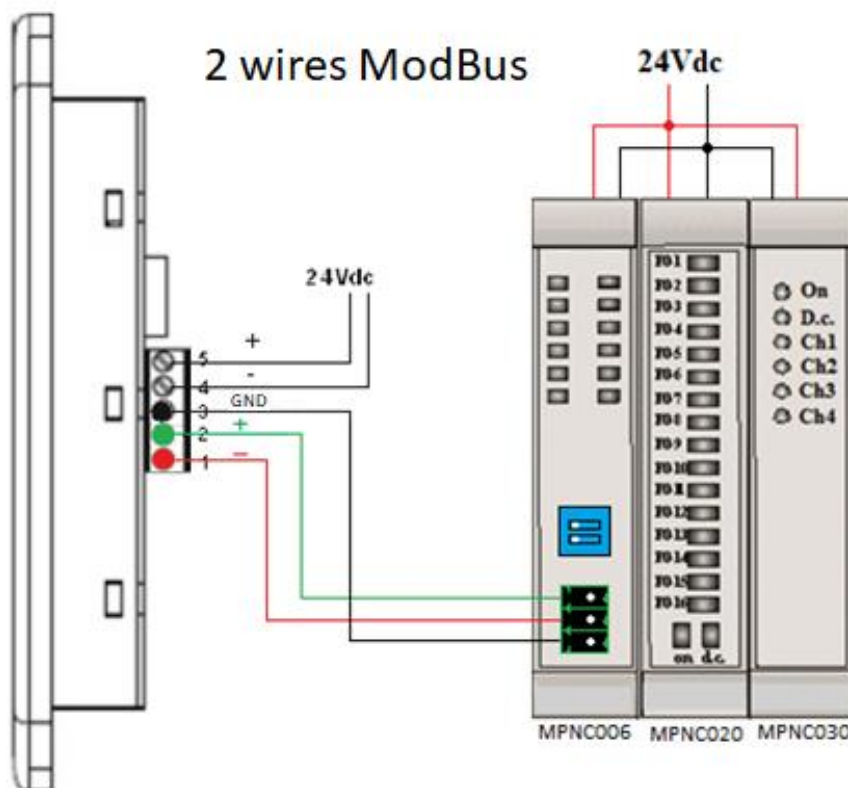
3.6 ModBus serial PORT 3

Modbus interface is a 2-wire RS485 serial, located on M2 terminal block pins.

Table 6

Pin	Segnal	Description
19	GND	
17	D +	Line +
16	D -	Line -
18	TERM	**If connected to terminal 17**, it inserts the termination resistor. Do this only if it is the last device in the chain.

4.0 Peripherals

4.1 USB

TPX1043 has a Micro-USB 2.0 host used for:
- software update
- data storage: data logger
- USB peripherals as printers, mouse, etc.
- Wi-Fi or Mobile key interface (optionally supplied by Mect) to connect to a different network from LAN.

Specific connection of external peripherals are implemented on request.

4.2 Ethernet

TPX1043 has a 10/100Mbit/s Ethernet port with auto-configuration, the connection cable between TPX1043 and a personal computer can be either straight or cross.

4.3 Micro SD-Card

On TPX1043 is it possible to insert a micro SD card up to 64 GB used by applications and/or data logging. The memory will be handled automatically by the device itself.

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4.4 Configuration DIP switches

In the rear of the panel, there is a DIP switch, used for the boot configuration.
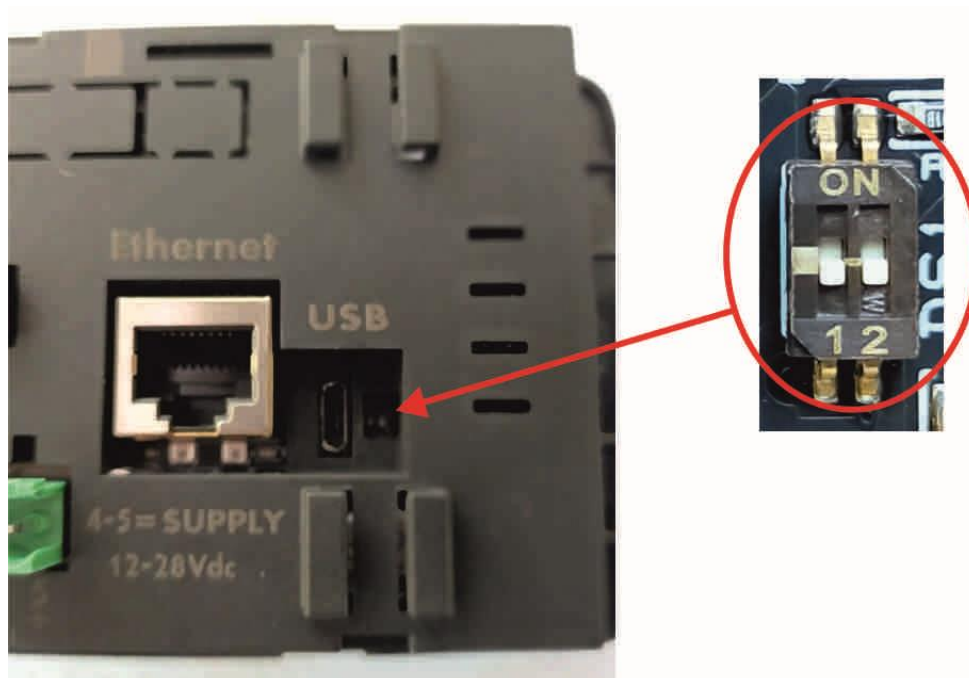
Three boot options are allowed:
- Internal FLASH
- SD card
- USB

Set accordingly the switches before the power up, to select the wanted boot mode.

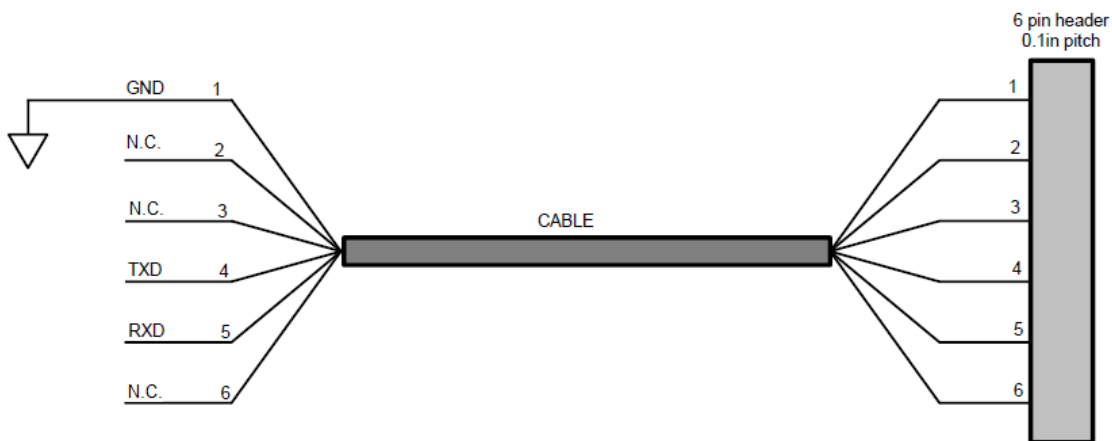Switches configuration is shown in the following table:
Table 7

SW1	SW2	Boot mode	Note
OFF	OFF	Internal Flash (default)	Default configuration
OFF	ON	USB	Factory firmware upgrade do not use
ON	ON	SD card	
ON	OFF	SD card	

4.5   UART debug

In the bottom side of the rear panel there is a six pole header used for debug purpose. The port is a TTL UART with the following pinout:

A commercial adapter is available from FTDI: TTL-232R.

This interface is only available for debugging, it cannot be absolutely used for any functional purposes at all.
The use of this port is recommended for advanced users only.

5.0   HMI / PLC

The device is programmed by a development suite (Mect Suite - QT based), tailored to MECT products.
A tutorial specifically made for the device is available.
The Mect suite software run on Windows operative system.