

# **USER'S MANUAL for TPAC1008 03 series HMI PLC all in one**



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## 1. 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 provides an help desk service.

### 1.2. Symbols

**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:	TPAC1008 03
Terminals:	MPNC020, MPNC030, MPNC035
Systems:	PLC (TPAC1008 03) with terminals
PTO:	Train pulse output

### 1.4. Security



#### 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 not power switch and 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.

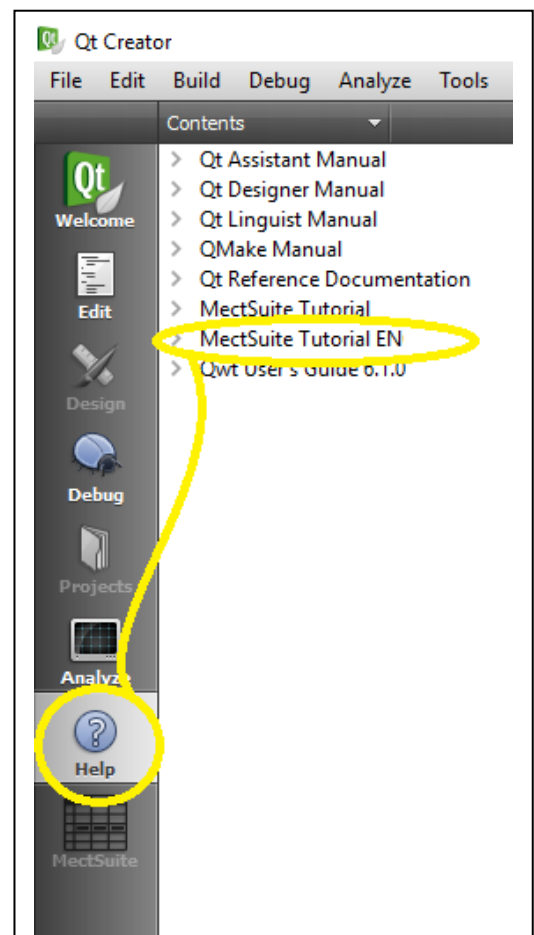
For security reasons it is necessary to have a 2 section power switch with a fuse near the instrument and easily approachable.

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 security transformers or SELV transformers.

### 1.5. Reference manual

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



2. System description

TPAC1008 03 is a device composed by a PLC and a HMI with touch-screen monitor 7” width and 800 x 480 pixel resolution with 262.000 colors. TPAC1008 03 has digital and analog inputs and outputs, CanOpen and Modbus fieldbus, and a 100Mbit/s Ethernet interface.

The networks are managed simultaneously by TPAC1008 03 and data from a network can be sent to another thus creating a bridge between the two networks.

On TPAC1008 03 there is an USB host port , that allows, with an 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 TPAC1008 03 there are up to 1 Kbyte of retentive variables stored on flash.

Instrument can be ordered with landscape or vertical (V option) orientation (see following pictures).



Figure 1: front view TPAC1008 03 (landscape version)

Figure 2: front view TPAC1008 03 (vertical version)

**2.1 Specifications**

Il TPAC1008 03 is based on a multiprocessor system. PLC and HMI are based on a 454MHz ARM9, I/O interface and acquisition is managed by a Cortex M3 processor. Two systems are on different boards and communicate via a CAN interface.

Table 1

<b>PLC Hardware characteristics</b>		
PLC Processor	ARM926JE 454MHz	
RAM	128MB	
FLASH	128MB	
Non volatile variables	On FLASH memory	
Real Time Clock	Yes with rechargeable battery	
Screen 7"	TFT 800 x 480 pixel 262k colors	
Touch screen	Resistive 4 wires	
Ethernet	10Mbit/s - 100Mbit/s self recognition	
USB	Host 2.0	
CANOpen	1 channel	
	Max Bit rate : 1Mbit/sec	
	Cycle time : 10msec	
Serial output	RS485 full duplex (hardware configuration)	
<b>Hardware I/O characteristics</b>		
Processor 1 and 2	Cortex-M3 72MHz	
<b>PLC software characteristics</b>		
OS	LINUX 2.35	
PLC	IEC61131-3	
Graphics	Based on QT library	
CAN Bus	Not available	
ModBus	Modbus RTU master	
Mass Storage	Possibility of history storage	
<b>TPAC1008_03_AD</b>		
Digital inputs PNP	24+4 fast	Input Range 0 - 24Vdc +/- 15% 2 of them can be for mono/bidirectional encoder or counter and 2 capture (ms) *
Digital outputs PNP	16+4 fast	Max output current: 200mAdc@24Vdc

Analog outputs	4	PT100, TCJ, TCK, TCT, TCS, TCB, TCR, 0÷10Vdc,
Cell inputs	3	2.5mV Max Sensibility
Encoder inputs	4 + 1*	Max Frequency 40kHz
PTO ( Pulse Train Output)	4	Max Frequency 65kHz
Configurable analogue outputs	2	0÷10Vdc, 0÷20mA
Not configurable analogue outputs	2	0÷10Vdc

<b>Power supply</b>	
12÷36VDC	
Absorbed Power	3.5W Digital output excluded

**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.



### 3. Hardware installation

In the following figures the mechanical dimensions of TPAC1008 03 are shown.

#### 3.1. Mechanical dimensions

Side view

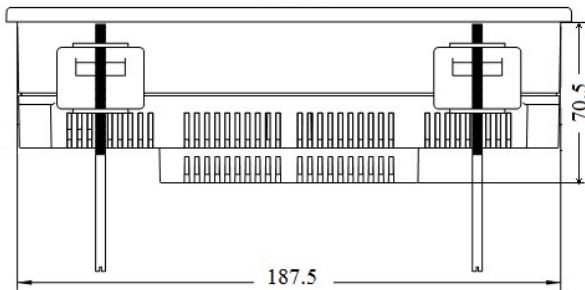


Figure 3

Rear view

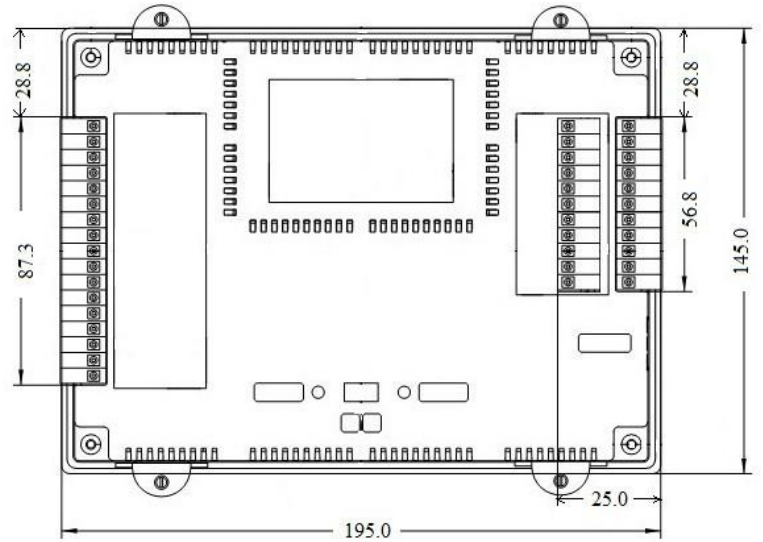


Figure 4

Side view

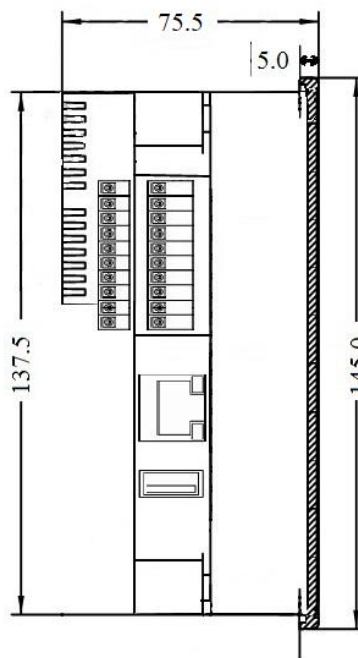


Figure 5

**Technical specifications**

Table 2

<b>MECHANICAL</b>	
Material	Polycarbonate, Polyamide 6.6
Dimensions W x L x H	195 mm x 145 mm x 75.5 mm
Mounting plate	138mm x 188mm
Installation	Panel installation
<b>Environmental conditions</b>	
Operating Temperature	0 °C ... 55 °C
Storage Temperature	-20 °C ... +85 °C
Relative Humidity	5 % a 95 % without condensation
<b>Electric isolation</b>	
Air clearance	According to IEC 60664-1
Pollution according to IEC 61131-2	2
<b>Protection</b>	
Rear protection	IP 20
Front protection	IP65

**Attention**

Install the devices in an electrical cabinets with no more than 55°C.

### 3.2. Panel mounting

#### 3.2.1 Distance

The system must be installed with enough space for heat dissipation and cabling. Avoid cables superimposing to prevent EMC problems.

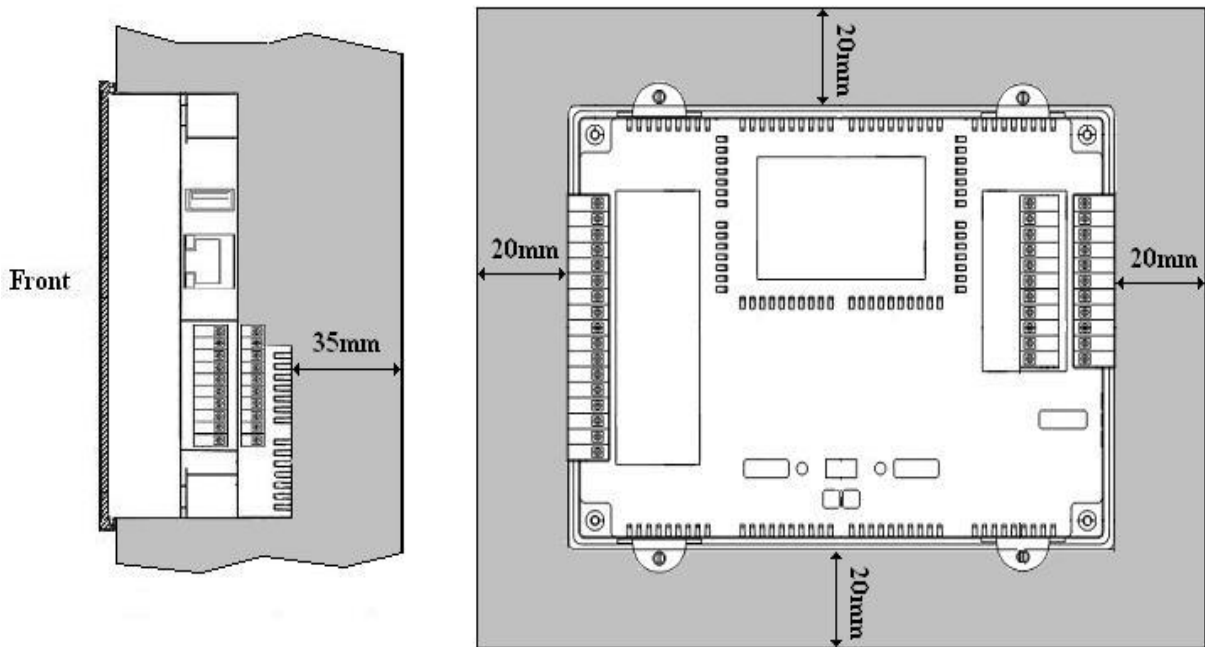


Figure 6A – Horizontal mounting

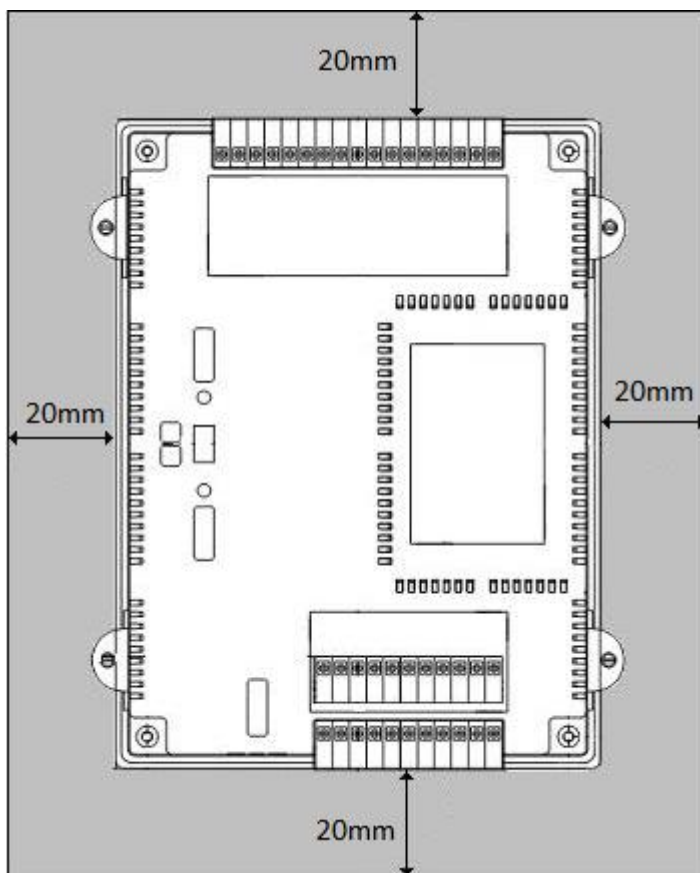


Figure 6B – Vertical mounting

4. TPAC1008 03 wiring

4.1. Connections

In the following figure the wiring diagram with the available I/O is shown.

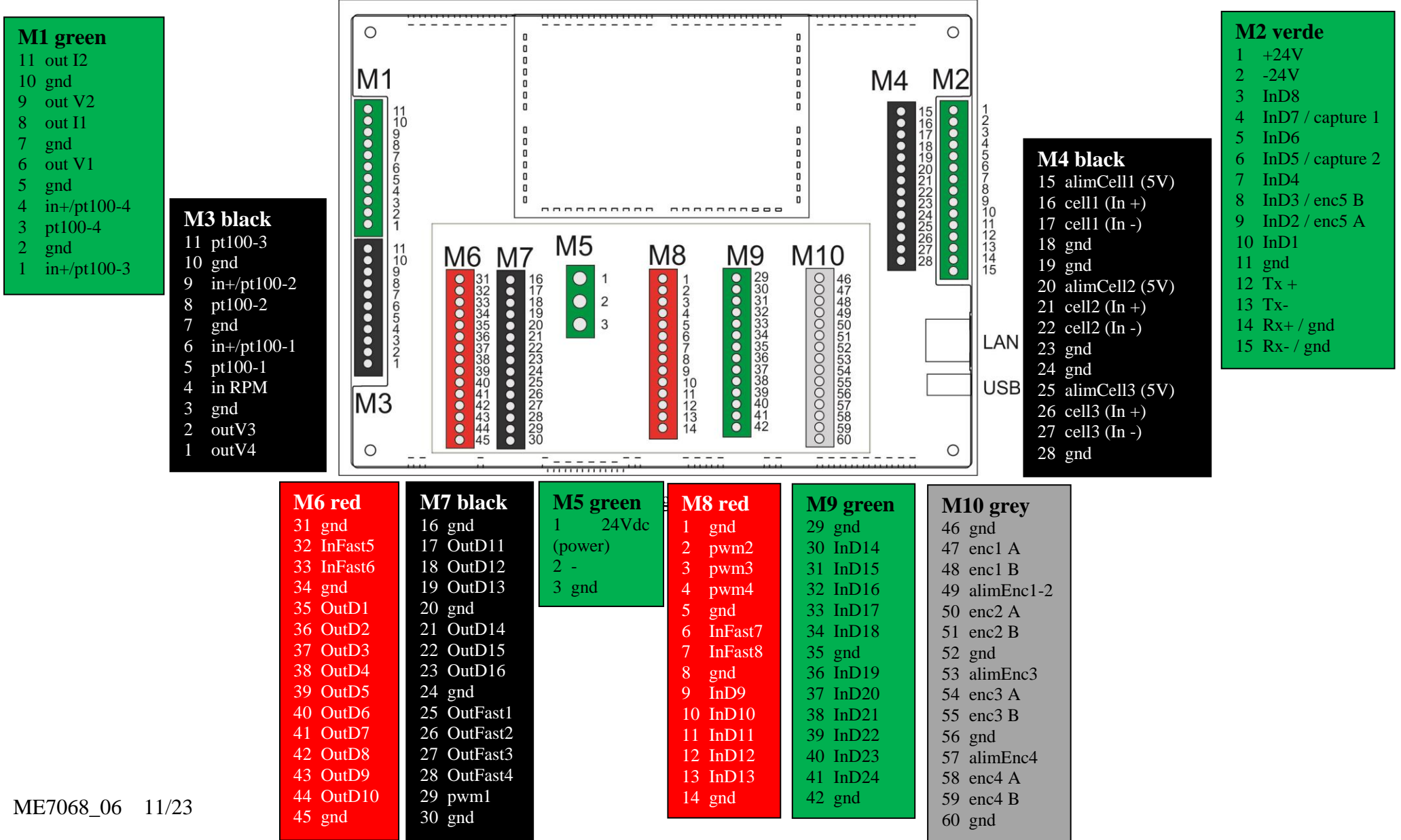


Table 3

TPAC1008 03 AD					
Analog inputs	N° 4	<b>Input type</b>	<b>Resolution</b>	<b>BIT</b>	<b>Note</b>
		0÷20 mA	0.01mA	12	Input impedance 8Ω
		0÷10V	0.005V	12	Input impedance 500KΩ
		Thermocouples: J(0°C ÷ 600°C), T(0°C ÷ 400°C), K(0°C ÷ 1200°C), S(0°C ÷ 1710°C), B(100°C ÷ 1800°C) R(0°C ÷ 1500°C)	1°C	12	Cold junction compensation
		PT100 narrow range -40.0°C ÷ 200.0°C	0.1°C	12	
		PT100 wide range -40°C÷800°C	1°C	12	
Configurable analog outputs	N° 2	<b>Output type</b>	<b>Resolution</b>	<b>BIT</b>	<b>Note</b>
		0÷20 mA	0.005mA	12	Max impedance: 400 Ω
		0÷10V	0.003V	12	Min impedance: 1KΩ
Not configurable analog outputs	N° 2	<b>Type</b>	<b>Resolution</b>	<b>BIT</b>	<b>Note</b>
		0÷10V	0.003V	12	Min impedance: 1KΩ
Input (rpm)	N° 1	<b>Type</b>	<b>Resolution</b>	<b>BIT</b>	<b>Note</b>
		rpm	Max Frequency 1kHz (60000 rpm)		
Standard digital inputs	N°24	<b>Input type</b>	<b>Resolution</b>	<b>BIT</b>	<b>Note</b>
		PNP	Max Frequency 100Hz		<b>M3</b> inputs <b>In 2</b> and <b>In 3</b> can be used as incremental encoder inputs Fmax 40kHz In2: A In3: B  Counter: IN 2: direction (0: count up, 1: count down) IN 3: clock  IN7 capture time 1(μs) IN5 capture time 2(μs)
Standard digital outputs	N°16	<b>Output type</b>	<b>Resolution</b>	<b>BIT</b>	<b>Note</b>
		PNP	Max Frequency 100Hz		Max 200mA for each output. 2 A max total

		Type	Resolution	BIT	Note
Fast Inputs	N°4	PNP	Max Frequency 1000Hz		
Fast Outputs	N°4	PNP	Max Frequency 1000Hz		Max 200mA for each output. 2 A max total
Encoder inputs	N°5	PNP	Max Frequency 40kHz		
PTO (Pulse Train Outputs)	N°4	PNP	Max Frequency 65kHz		Max 100mA for each output. Duty cycle 50%
Load cell inputs	N°3	Type	Resolution	BIT	Note
				24	Cell power supply 5V

## 4.2 Power supply

### 4.2.1. Isolation

The device has not galvanic isolation between inputs, outputs and power supply.

### 4.2.2 System power supply

The TPAC1008 03 has a 24Vdc (12-36Vdc) supply according to the scheme in the figure. The system is protected against reverse power supply.

As shown in the figure, the digital outputs must have a separate power supply respect the main power supply of the instrument.

### 4.2.3 Digital output power supply

Digital outputs must have a separate power supply respect the main power supply of the TPAC1008 03 to avoid consequences on control system due to I/O problems.

### 4.2.4. Fuse

The system has not internal fuses, thus the use of an external 1A fuse is recommended for the panel power supply and an external 3A delayed fuse for the I/O power supply.

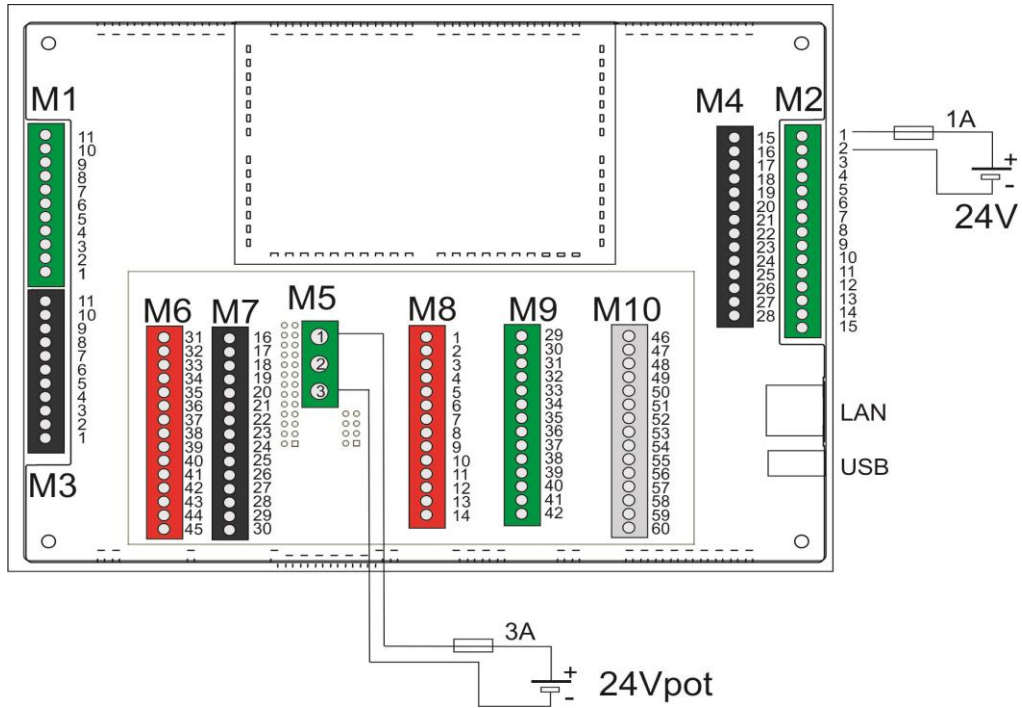


Figure 8



**Attention**

A wrong value for the power supply can cause a damage to the device.

**4.3 Digital input/output wiring**

The digital I/Os are PNP type, the wiring must follow the scheme below.

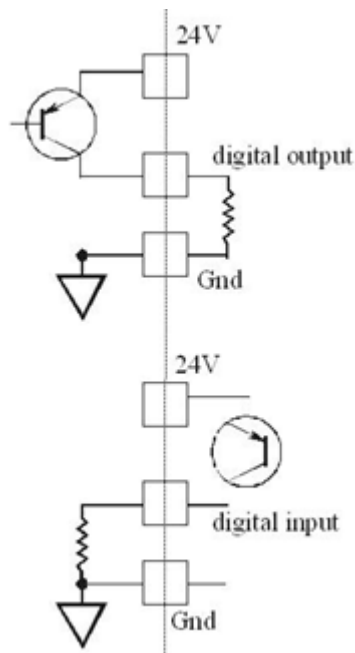


Figure 9

Each digital output can provide a 200mA max, and the total sum of the output currents can not be more than 2A.

**4.4. Analogue input wiring**

By means of the PLC program the TPAC1008 03 can be configured to connect several analog input type. Configuration is done by the setup of a system variable in the PLC program. Configuration can be set up and modified in any moment.

**4.4.1. Thermocouples inputs**

Configuring inputs as thermocouples it is possible to connect up to 4 of the following type:

- J(0°C ÷ 600°C),
- T(0°C ÷ 400°C),
- K(0°C ÷ 1200°C)
- S(0°C ÷ 1710°C)
- B(100°C ÷ 1800°C)
- R(0°C ÷ 1500°C)

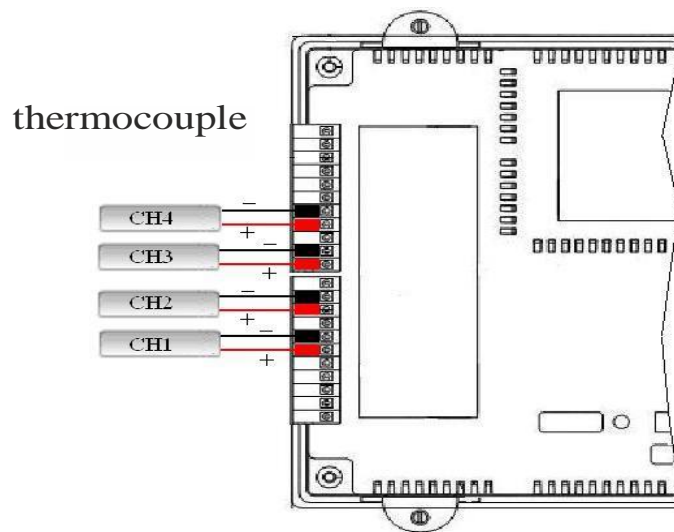


Figure 10



**4.4.2. PT100 inputs**

Il TPAC1008 03 can be connected to PT100. 2 different scales are possible:

From  $-40.0\text{ }^{\circ}\text{C}$  to  $200.0\text{ }^{\circ}\text{C}$

From  $-40\text{ }^{\circ}\text{C}$  to  $800\text{ }^{\circ}\text{C}$

The scale from  $-40.0\text{ }^{\circ}\text{C}$  a  $200.0\text{ }^{\circ}\text{C}$  has a resolution of  $0.1\text{ }^{\circ}\text{C}$ .

The scale from  $-40\text{ }^{\circ}\text{C}$  a  $800\text{ }^{\circ}\text{C}$  has a resolution of  $1\text{ }^{\circ}\text{C}$  instead.

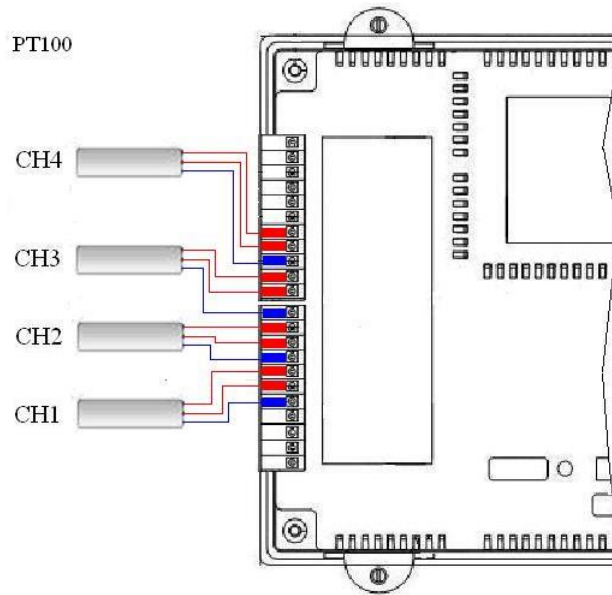


Figure 11

**4.4.3. Voltage/Current inputs**

Configuring input as  $0\div 10\text{V}$  or  $4\div 20\text{mA}$  is possible to connect up to 4:

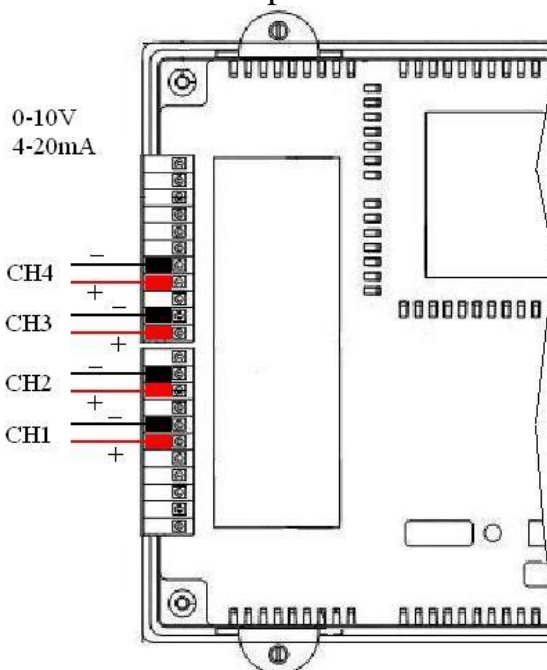
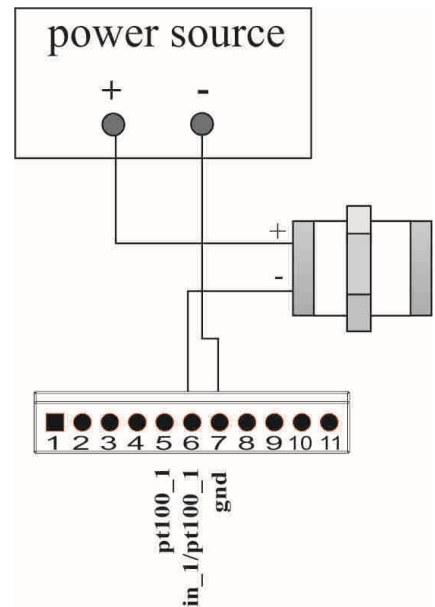


Figure 12

mA/V Input. Analogue inputs 4÷20mA and 0÷10V are connected to input and GND terminals. See figure to connect a 2 wire transducer with external power supply.



**4.4.4. Load cell inputs**

On the TPAC1008 03 there are 3 inputs for load cells

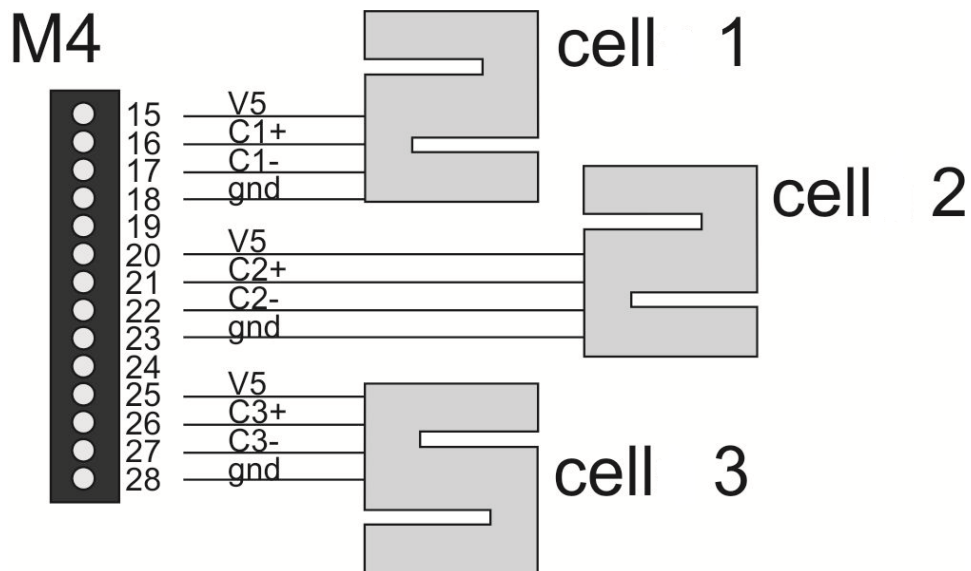


Figure 13

4.4.5. Encoder inputs

On TPAC1008 03 there are 5 encoder inputs

Bidirectional encoder

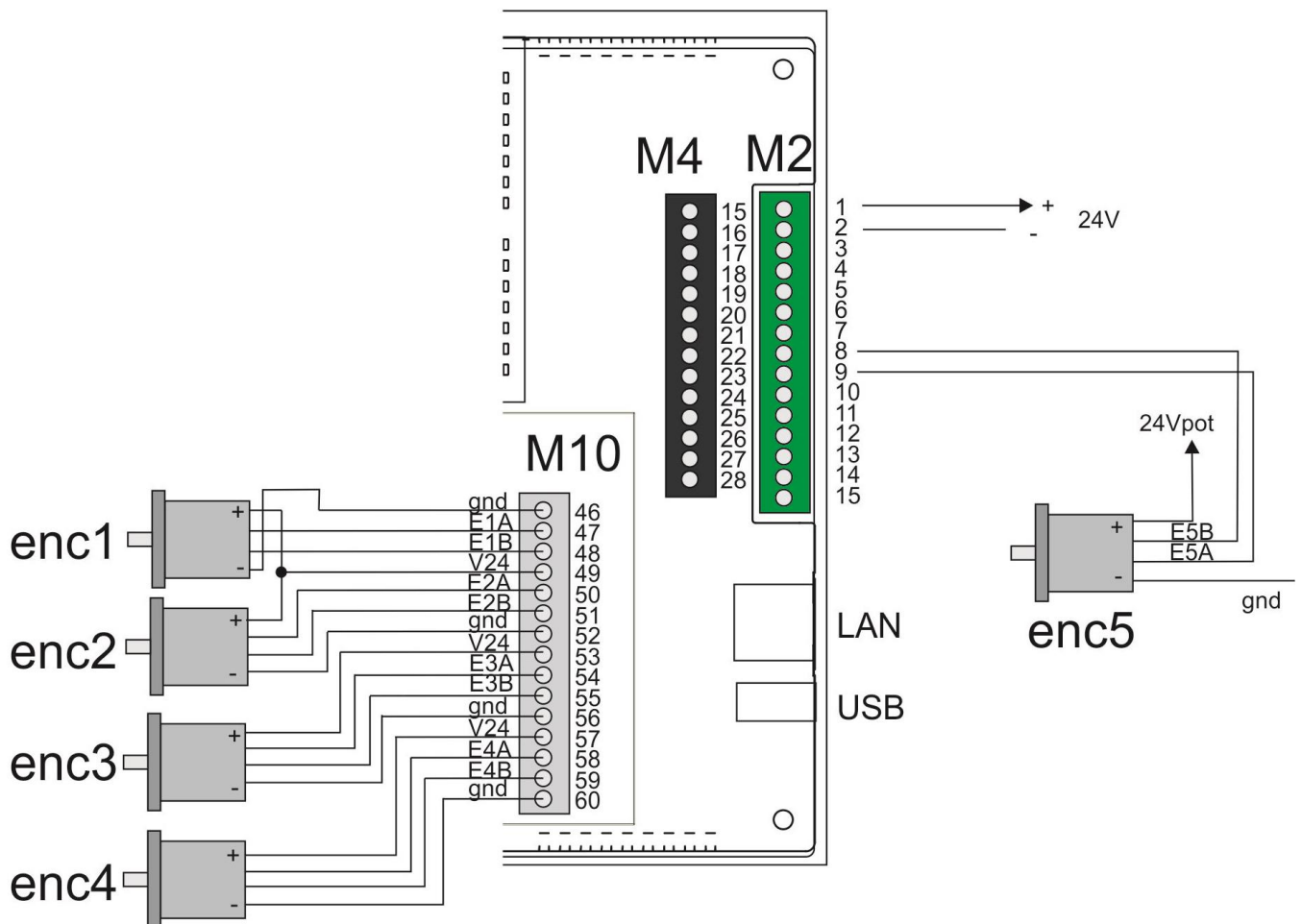


Figure 14

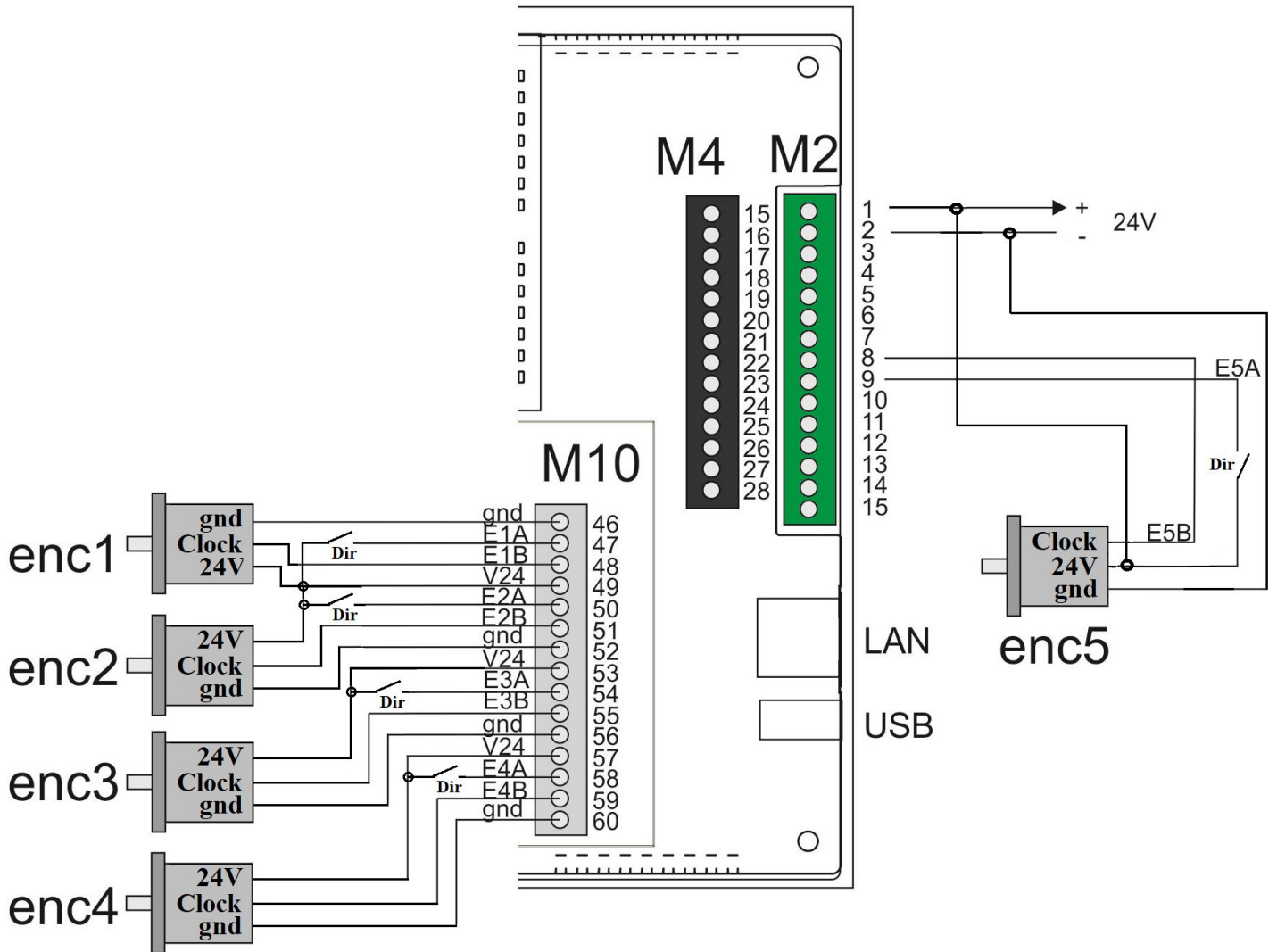


Figure 15

**4.5. Analog outputs wiring**

2 analog output channels are available.

See in the figure 15 the analog current output wiring.

**4.5.1. Output current**

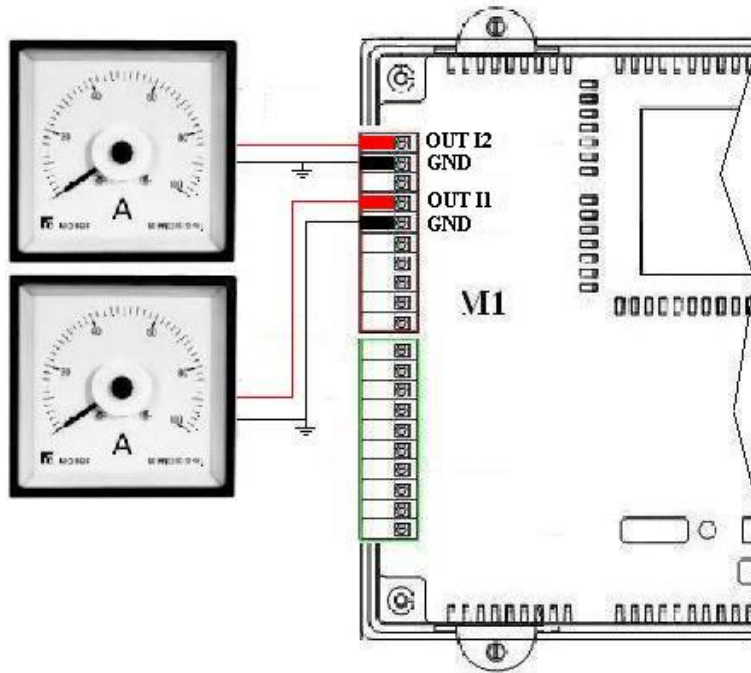


Figure 16

**4.5.2. Voltage output**

See in the figure 16 the analog voltage output wiring.

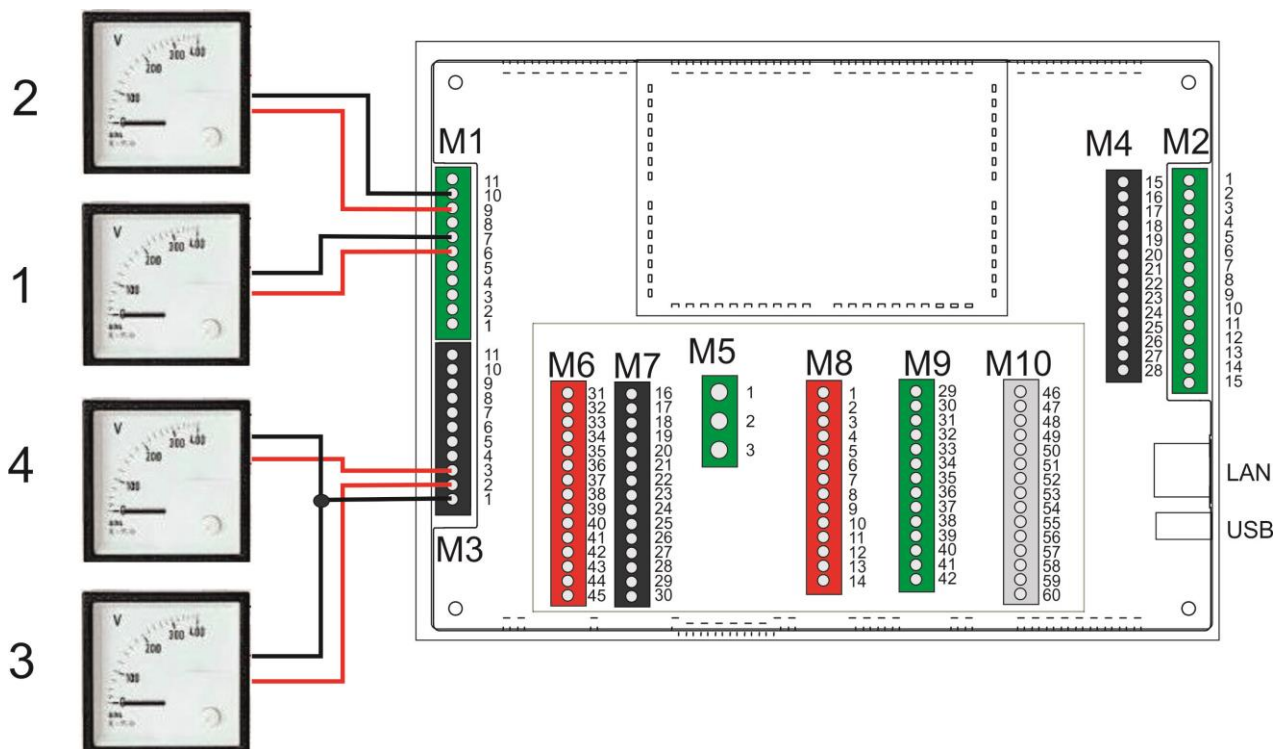


Figure 17

4.6. ModBus wiring (available in all models)

The ModBus interface on the TPAC1008 03 is a 4 wires RS485 serial one, on M2 terminal on the pins shown in the following table.

Table 9

Pin	Segnale	Descrizione
11	GND	
12	TX +	Line + Trasmission
13	TX -	Line - Trasmission
14	RX +	Line + Reception
15	RX -	Line - Reception

Here is a wiring example of a system composed by:

- MPNC006
- MPNC020
- MPNC030
- TPAC1008 03

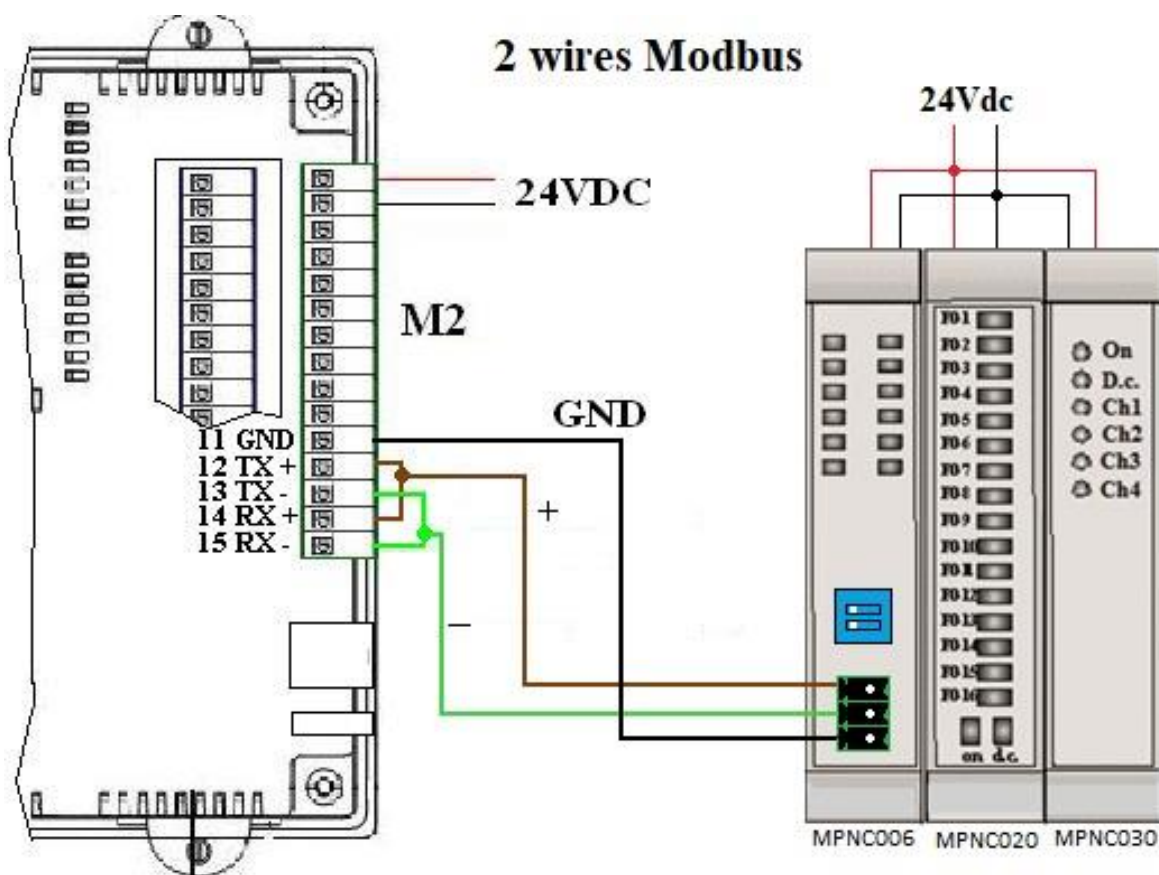


Figure18

**5. Peripherals**

**5.1. USB**

On TPAC1008 03 there is USB 2.0 host, that can be used for:

- software updating.
- data storage: data logger.
- connecting USB peripherals as printers, mouse, etc.
- connecting a Wi-Fi or Mobile key (optionally supplied by Mect) to connect to a different network from LAN.

**Specific connection of external peripherals are implemented on request.**

**5.2. Ethernet**

TPAC1008 03 has a 10/100Mbit/s Ethernet port with auto configuration, with direct or inverse connection cable.

If TPAC1008 03, by Ethernet, can be controlled by a personal computer, it is possible to control the I/O of TPAC1008 03 by a PC program.

**6. PLC and HMI**

To program TPAC1008 03 it is necessary to develop 2 software.

A PLC program written with the IDE software PLC program.

A human machine interface program (HMI) written with Qt Creator.

A PLC program can be written using one of the following standard IEC 61131-3 languages:

Table 10

FBD	Functional Block Diagram	Graphic	Contact scheme
LD	Ladder	Graphic	Ladder scheme
SFC	Sequential Function Chart	Graphic	State Diagram
ST	Structured Text	Text	Pascal-like language
IL (AWL)	Instruction List	Text	Assembler-like language

The 2 programming environment (PLC and HMI) are for Windows OS.

6.1. System variables

Here some system variables available for PLC program.

Table 11

Nome Variabile	Description	R/W	Note
PLC_Hwconf	HW configuration	RO	0x32 TPAC1008 03 AD
PLC_Revisione	Firmware revision	RO	
PLC_StatusReg	State register	RO	bit 0: on bit 1: run bit 2: _ bit 3: overflow analog in 1 bit 4: overflow analog in 2 bit 5: overflow analog in 3 bit 6: overflow analog in 4 bit 7: bit 8: overflow analog out 1 bit 9: overflow analog out 2 bit 10:overflow analog out 3 bit 11: overflow analog out 4
PLC_Heartbeat	Heart beat	RO	A variable indicating that device is in run state
PLC_DigIn_1.. PLC_DigIn_24	Digital input	RO	
PLC_DigOut_1.. PLC_DigOut_16	Digital output	RW	
PLC_AnInConf_1	Analog input 1 configuration	RW	Bit 0..3 input 1 configuration Analog input configuration 4 bit for each channel: <ul style="list-style-type: none"> <li>• 0 not configured</li> <li>• 1 current</li> <li>• 2 voltage</li> <li>• 3 TCJ (J type thermocouple)</li> <li>• 4 TCK (K type thermocouple)</li> <li>• 5 TCT (T type thermocouple)</li> <li>• 6 PT100E (1 digit Resolution) range: -40 +800°C</li> <li>• 7 PT100R (0.1 digit Resolution) range: -40 +200°C</li> <li>• 8 TCS (S type thermocouple)</li> <li>• 9 TCB ( B type thermocouple)</li> <li>• 10 TCR ( R type thermocouple)</li> </ul>
PLC_AnInConf_2	Analog input 2 configuration	RW	Bit 0..3 input 2 configuration Analogue input configuration 4 bit for each channel: <ul style="list-style-type: none"> <li>• 0 not configured</li> <li>• 1 current</li> <li>• 2 voltage</li> <li>• 3 TCJ (J type thermocouple)</li> <li>• 4 TCK (K type thermocouple)</li> <li>• 5 TCT (T type thermocouple)</li> </ul>



			<ul style="list-style-type: none"> <li>• 6 PT100E (1 digit Resolution) range: -40 +800°C</li> <li>• 7 PT100R (0.1 digit Resolution) range: -40 +200°C</li> <li>• 8 TCS (S type thermocouple)</li> <li>• 9 TCB ( B type thermocouple)</li> <li>• 10 TCR ( R type thermocouple)</li> </ul>	
PLC_AnInConf_3	Analog input 3 configuration	RW	<p>Bit 0..3 input 3 configuration Analog input configuration 4 bit for each channel:</p> <ul style="list-style-type: none"> <li>• 0 not configured</li> <li>• 1 current</li> <li>• 2 voltage</li> <li>• 3 TCJ (J type thermocouple)</li> <li>• 4 TCK (K type thermocouple)</li> <li>• 5 TCT (T type thermocouple)</li> <li>• 6 PT100E (1 digit Resolution) range: -40 +800°C</li> <li>• 7 PT100R (0.1 digit Resolution) range: -40 +200°C</li> <li>• 8 TCS (S type thermocouple)</li> <li>• 9 TCB ( B type thermocouple)</li> <li>• 10 TCR ( R type thermocouple)</li> </ul>	
PLC_AnInConf_4	Analog input 4 configuration	RW	<p>Bit 0..3 input 4 configuration Analog input configuration 4 bit for each channel:</p> <ul style="list-style-type: none"> <li>• 0 not configured</li> <li>• 1 current</li> <li>• 2 voltage</li> <li>• 3 TCJ (J type thermocouple)</li> <li>• 4 TCK (K type thermocouple)</li> <li>• 5 TCT (T type thermocouple)</li> <li>• 6 PT100E (1 digit Resolution) range: -40 +800°C</li> <li>• 7 PT100R (0.1 digit Resolution) range: -40 +200°C</li> <li>• 8 TCS (S type thermocouple)</li> <li>• 9 TCB ( B type thermocouple)</li> <li>• 10 TCR ( R type thermocouple)</li> </ul>	
PLC_AnIn_1	Analog input 1 value	RO	Conf 1: 0 ÷ 20000 5 digit resolution	values: 0.0 ÷ 20.000mA
			Conf 2: 0 ÷ 10000 3 digit resolution	values: 0.0 ÷ 10.000V
			Conf 3: 0 ÷ 600 1 digit resolution	values: 0 ÷ 600°C
			Conf 4: 0 ÷ 1200 1 digit resolution	values: 0 ÷ 1200°C
			Conf 5: 0 ÷ 400 1 digit resolution	values: 0 ÷ 400°C
			Conf 6: -40 ÷ 800 1 digit resolution	values: -40 ÷ 800°C

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			Conf 7: -400 ÷ 2000 1 digit resolution	values: -40.0 ÷ 200.0°C
			Conf 8: 0 ÷ 1710 1 digit resolution	values: 0 ÷ 1710°C
			Conf 9: 100 ÷ 1800 1 digit resolution	values: 100 ÷ 1800°C
			Conf 10: 0 ÷ 1500 1 digit resolution	values : 0 ÷ 1500°C
PLC_AnIn_2	Analog input 2 value	RO	Conf 1: 0 ÷ 20000 5 digit resolution	values: 0.0 ÷ 20.000mA
			Conf 2: 0 ÷ 10000 3 digit resolution	values: 0.0 ÷ 10.000V
			Conf 3: 0 ÷ 600 1 digit resolution	values: 0 ÷ 600°C
			Conf 4: 0 ÷ 1200 1 digit resolution	values: 0 ÷ 1200°C
			Conf 5: 0 ÷ 400 1 digit resolution	values: 0 ÷ 400°C
			Conf 6: -40 ÷ 800 1 digit resolution	values: -40 ÷ 800°C
			Conf 7: -400 ÷ 2000 1 digit resolution	values: -40.0 ÷ 200.0°C
			Conf 8: 0 ÷ 1710 1 digit resolution	values: 0 ÷ 1710°C
			Conf 9: 100 ÷ 1800 1 digit resolution	values: 100 ÷ 1800°C
			Conf 10: 0 ÷ 1500 1 digit resolution	values: 0 ÷ 1500°C
PLC_AnIn_3	Analog input 3 value	RO	Conf 1: 0 ÷ 20000 5 digit resolution	values: 0.0 ÷ 20.000mA
			Conf 2: 0 ÷ 10000 3 digit resolution	values: 0.0 ÷ 10.000V
			Conf 3: 0 ÷ 600 1 digit resolution	values: 0 ÷ 600°C
			Conf 4: 0 ÷ 1200 1 digit resolution	values: 0 ÷ 1200°C
			Conf 5: 0 ÷ 400 1 digit resolution	values: 0 ÷ 400°C
			Conf 6: -40 ÷ 800 1 digit resolution	values: -40 ÷ 800°C
			Conf 7: -400 ÷ 2000 1 digit resolution	values: -40.0 ÷ 200.0°C
			Conf 8: 0 ÷ 1710 1 digit resolution	values : 0 ÷ 1710°C
			Conf 9: 100 ÷ 1800 1 digit resolution	values: 100 ÷ 1800°C

			Conf 10: 0 ÷ 1500 1 digit resolution	values: 0 ÷ 1500°C
PLC_AnIn_4	Analog input 4 value	RO	Conf 1: 0 ÷ 20000 5 digit resolution	values: 0.0 ÷ 20.000mA
			Conf 2: 0 ÷ 10000 3 digit resolution	values: 0.0 ÷ 10.000V
			Conf 3: 0 ÷ 600 1 digit resolution	values: 0 ÷ 600°C
			Conf 4: 0 ÷ 1200 1 digit resolution	values: 0 ÷ 1200°C
			Conf 5: 0 ÷ 400 1 digit resolution	values: 0 ÷ 400°C
			Conf 6: -40 ÷ 800 1 digit resolution	values: -40 ÷ 800°C
			Conf 7: -400 ÷ 2000 1 digit resolution	values: -40.0 ÷ 200.0°C
			Conf 8: 0 ÷ 1710 1 digit resolution	values: 0 ÷ 1710°C
			Conf 9: 100 ÷ 1800 1 digit resolution	values: 100 ÷ 1800°C
			Conf 10: 0 ÷ 1500 1 digit resolution	values: 0 ÷ 1500°C
PLC_FiltAnIn_1	Filter	RW	Analog input 1 moving average	
PLC_FiltAnIn_2	Filter	RW	Analog input 2 moving average	
PLC_FiltAnIn_3	Filter	RW	Analog input 3 moving average	
PLC_FiltAnIn_4	Filter	RW	Analog input 4 moving average	
PLC_AnOutConf_1	Analog output 1 configuration	RW	<ul style="list-style-type: none"> <li>• 0 not configured</li> <li>• 1 current</li> <li>• 2 voltage</li> </ul>	
PLC_AnOutConf_2	Analog output 2 configuration	RW	<ul style="list-style-type: none"> <li>• 0 not configured</li> <li>• 1 current</li> <li>• 2 voltage</li> </ul>	
PLC_AnOutConf_3	Analog output 3 configuration	RW	Not used	
PLC_AnOutConf_4	Analog output 4 configuration	RW	Not used	
PLC_AnOut_1	Analog output 1	RW	Conf 1 (mA)	0 ÷ 2000
			Conf 2 (V)	0 ÷ 1000
PLC_AnOut_2	Analog output 2	RW	Conf 1(mA)	0 ÷ 2000
			Conf 2 (V)	0 ÷ 1000
PLC_AnOut_3	Analog output 3	RW	Conf 2 (V)	0 ÷ 1000
PLC_AnOut_4	Analog output 4	RW	Conf 2 (V)	0 ÷ 1000
PLC_Tamb	Cold junction compensation	RO	0 ÷ 1000 1 digit Resolution	Values: 0.0 ÷ 100.0
PLC_EnableEnc	Enable encoder 5	RW	1: sets bidirectional encoder 2: sets counter input A (M2-9) (In2) counter direction 0 = CUp, 1= CDown input B (M2-8) (In3) clock	
PLC_ResetCount	Reset Encoder 5	RW	1: encoder/counter reset	

PLC_EncoderCo_Lo	Reading Encoder5 low value	RO	
PLC_EncoderCo_Hi	Reading Encoder5 high value	RO	
PLC_CaptureT1_Lo	Capture	RO	time (µs) between 2 edges of digital input IN7 low register
PLC_CaptureT1_Hi	Capture	RO	time (µs) between 2 edges of digital input IN7 high register
PLC_CaptureT2_Lo	Capture	RO	time (µs) between 2 edges of digital input IN5 low register
PLC_CaptureT2_Hi	Capture	RO	time (µs) between 2 edges of digital input IN5 high register
PLC_RPM	Input Frequency	RO	Reading in Hertz
PLC_Heartbeat	Heartbeat	RO	I/O board Heartbeat
PLC_cella_1.. PLC_cella_3	Load cell input	RO	Value on 24bit
PLC_VCC	Cell polarity voltage	RO	Raw value in mV
PLC_Expansion_FW	FW expansion revision	RO	
PLC_Expansion_HW	HW expansion revision	RO	Bit 0..7 microcontroller revision Bit 8..15 FPGA revision
PLC_Expansion_ER	Internal communication error register	RO	0: No error 1: start frame error 2: CRC error 3: failed to receive packages 4: invalid frame
PLC_Conf_enc_1	Encoder1 Configuration	RW	<b>0: not configured</b> and count is 0. <b>1: set monodirectional counter.</b> To reset: 16#11 Input A (M10-47) counter direction: 0 = CUp, 1= CDown Input B (M10-48) clock <b>2: set bidirectional encoder.</b> To reset: 16#12
PLC_Conf_enc_2	Encoder 2 Configuration	RW	<b>0: not configured</b> and count is 0. <b>1: set monodirectional counter.</b> To reset: 16#11 Input A (M10-50) counter direction :0 = CUp, 1= CDown Input B (M10-51) clock <b>2: set bidirectional encoder.</b> To reset: 16#12
PLC_Conf_enc_3	Encoder 3 Configuration	RW	<b>0: not configured</b> and count is 0. <b>1: set monodirectional counter.</b> To reset: 16#11 Input A (M10-54) counter direction :0 = CUp, 1= CDown Input B (M10-55) clock <b>2: set bidirectional encoder.</b> To reset: 16#12

PLC_Conf_enc_4	Encoder 4 Configuration	RW	<b>0: not configured</b> and count is 0. <b>1: set monodirectional counter.</b> To reset: 16#11 Input A (M10-58) counter direction: 0 = CUp, 1= CDown Input B (M10-59) clock <b>2: set bidirectional encoder.</b> To reset: 16#12
PLC_encoder_1.. PLC_encoder_4	Encoder value 1..4	RO	Count value 32 bit
PLC_PtoEnable_1.. PLC_PtoEnable_4	PTO enabling	RW	if 1, PTO enables the output. Duty cycle 50%
PLC_PtoWork_1.. PLC_PtoWork_4	PTO state	RO	Indicates PTO is busy
PLC_PtoDone_1.. PLC_PtoDone_4	PTO state	RO	Indicates PTO has finished
PLC_Pwm_Freq_1.. PLC_Pwm_Freq_4	PTO frequency settings	RW	1Hz Resolution, max value 65535 Hz
PLC_Pwm_Steps_1.. PLC_Pwm_Steps_4	Setting the number of steps PTO must make	RW	Value on 32 bit, if 0, PTO is counting indefinitely
PLC_FastIO_Ena	Fast I/O enabling	RW	Hexadecimal configuration to enable 8 Fast I/O: PLC_FastIO_Ena := 16#FF;
PLC_FastIO_Dir	Direction setting (Inputs/Output)	RW	Hexadecimal configuration. For exemple to have 4 input and 4 output: PLC_FastIO_Dir := 16#0F;
PLC_FastIO_1... PLC_FastIO_8	Fast I/O value	RW	PLC_FastIO_1...4 -> OUTPUT PLC_FastIO_5...8 -> INPUT
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 version	RW	
PLC_HMI_Version	HMI 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_WATCHDOGEN	Watchdog	RW	enable Watchdog
PLC_WATCHDOG_ms	Watchdog	RW	reset Watchdog timer
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))
CH0_NETRUN	active channel	RO	
CH0_NETGOOD	channel configuration	RO	
CH0_NETERR	bus status	RO	
CH0_NETRST	bus reset	RW	
CH0_NETDIS	disable the bus	RW	
CH0_01_NODERUN	In Out board - active channel	RO	
CH0_01_NODEGOOD	In Out board - channel configuration	RO	
CH0_01_NODEERR	In Out board - bus status	RO	
CH0_01_NODERST	In Out board - bus reset	RW	
CH0_01_NODEDIS	In Out board - disable the bus	RW	

After that the variables are available in read / write mode as described in the program tutorial. The system can use 5472 interchange variables between HMI and automation (at maximum) which include:  
 internal variables, interchange variables on Modbus network, retentive variables.  
 The variables are defined by a software “Mect Suite”.

**7. How to order**



**TPAC1008 03 A** - Existing interfaces

- 1 Rs485 4 wires
- 1 Ethernet 10/100 Base-T
- 1 USB 2.0 host port
- 24 Digital inputs (PNP 0-24Vdc)
- 4 Fast inputs (PNP 0-24Vdc)
- 4 Analog inputs (0÷10V, 0÷20mA, Pt100, J, K, T, S, B, R) 12bit resolution
- 5 Encoder inputs
- 3 Load cells inputs, 24bit resolution
- 16 Digital outputs (PNP 0-24Vdc)
- 4 Fast outputs (PNP 0-24Vdc)
- 2 Analog outputs (0÷10V or 0÷20mA or PWM @250Hz) 12bit resolution
- 4 PTO (train pulse outputs)

**A** - Interface

D = 2 analog outputs 0÷10V or PWM @250Hz

**B** - Orientation

Blank = Horizontal  
 V = Vertical

**C** - Options

Upon customer's request