

User Manual

MPNT003 model

Modbus RTU interface



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1 Introduction

To ensure a quick installation of the device please follow carefully the information given in this manual.

1.1 Staff qualification

Products described here are to be used exclusively by personnel with experience in programming PLCs, or technician specialized in the use of electrical device for automation. MECT S.r.l declines any responsibility for malfunctions or damages caused by improper use of MECT devices, due to the non-compliance with information in this manual. In MECT S.r.l there is an help desk service.

1.2 Symbols

**Danger**

Follow these advices to avoid people injury.

**Warning**

Follow these advices to protect the device.

**Caution**

Follow this advices to have a more effective performance.

**ESD (Electrostatic discharge)**

Danger: possibility of components damage due to electrostatic discharge.

**Note**

Steps to follow for a correct installation

**Additional information**

1.3 Security

**Attention**

Switch off devices before connecting them .

**Attention**

MPNT003 must be mounted inside cabinet or electrical switchboards whose access must be performed by qualified personnel.

**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 not internal fuse, but it powers on immediately after the correct supply voltage has been supplied (check the value of the supply voltage indicated on the instrument label under “Supply”). Provide a power supply line as direct as possible and separate from the line that supplies the power elements.

For safety regulations, it is necessary to provide a two-phase switch-disconnector with fuse located near the instrument and easily replaceable.

Avoid the presence of power elements (contactors, motors, drives, etc.), excessive humidity, heat sources and corrosive gases in the same panel.

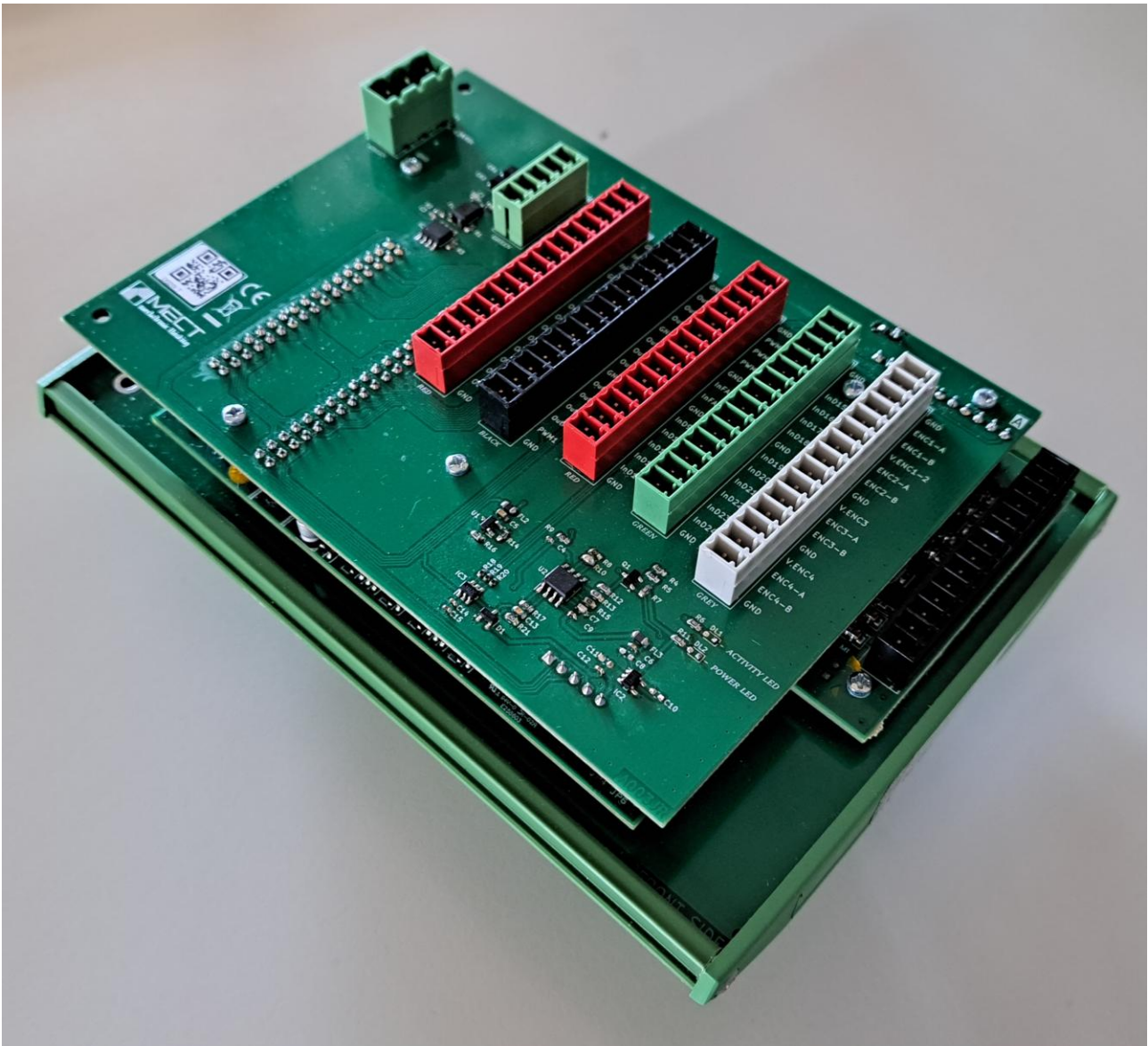
Instruments must be powered by safety transformers or by SELV-type power supplies.

2 Hardware features

2.1 System description

The MPNT003 is a RTU Modbus bus coupler device. The RS485 ModBus / RTU slave interface allows the MPNT003 to communicate with an operator panel or a PLC. The inputs/outputs are:

- 16 digital inputs
- 16 digital outputs
- 3 load cells inputs 2.5mV/V max sensibility
- 1 analogue inputs 0-1V (not calibrated)
- 4 bidirectional encoders
- 4 PTO (Pulse Train Output) max freq 65kHz



2.2 Features

Mechanics	
Power supply	24Vdc +/-15% 3W
Base dimensions W x H x L	160 x 60 x 118 (8 DIN modules)
Installation	DIN 35
Climatic conditions	
Operative temperature	0 °C ÷ 55 °C
Storage temperature	-20 °C ÷ +85 °C
Relative humidity	From 5 % to 95 % no condensation
Electric isolation	
Air clearance	According to IEC 60664-1
Pollution according to IEC 61131-2	2
Digital inputs	0V - 24Vdc +/- 15%
Max current for each digital output	200mAdc@24 Vdc
Analogue inputs	3 Load cells 1 0-10V (not calibrated)
Dissipated power without loads	0.5 W

2.2.1 Caratteristiche elettriche ingressi/uscite

	n	Line type	Update	Note
Digital inputs	16	PNP	Modbus cycle time	
Digital outputs	16	PNP	Modbus cycle time	
Analog input	3	Cella di carico		2.5mV/V sensibilità massima
	1			0-10V
Bidirectional encoder inputs	4	PNP	max frequency 40kHz	
PTO	4	PNP		Pulse train output (max frequency 65kHz)

2.3 Electromagnetic compatibility

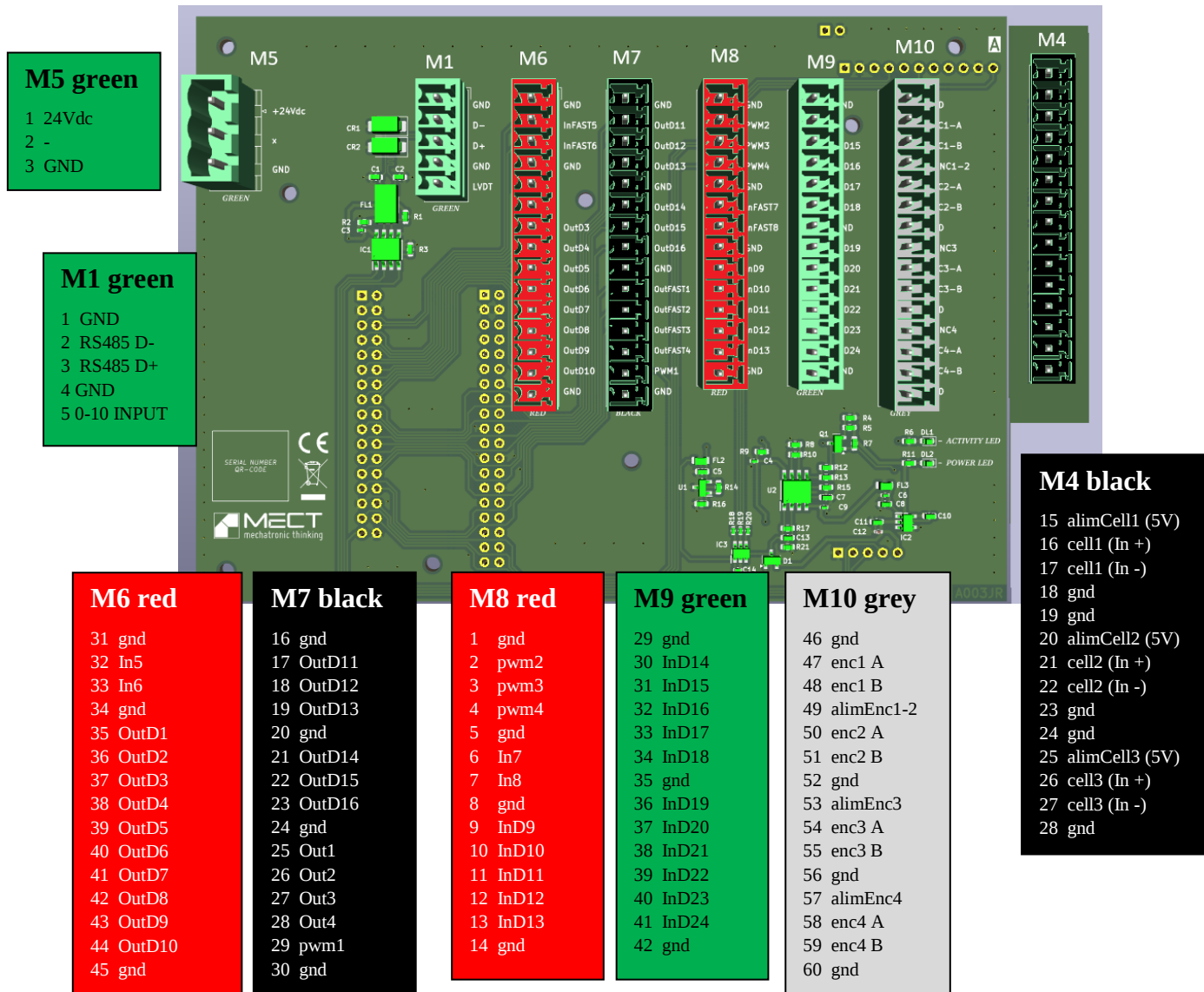
The electromagnetic compatibility tests have been carried out at accredited laboratories, according to EN 61326-1, EN 61131-2 and EN 61000-6-2 standards .

**Attention**

Install the devices in electrical switchboards where temperature doesn't exceed 55 °C.

3 Product architecture

MPNT003 is a device consisting of a base with some digital inputs and outputs and RTU modbus interface towards a master.



3.1 Distances

The system must be installed in a way that there is enough space for heat dissipation and cabling. Avoid cables superimposition to prevent EMC problems.

3.2 MPNT003 Wiring

3.2.1 Isolation

On MPNT003 there is not galvanic isolation between the main power supply and the internal communication bus.

3.2.2 System power supply

Il MPNT003 requires a 24VDC (+/-15%) power supply as shown in the figure. The system is protected from the power supply polarity inversion.

Before turning on the device configure the Modbus setting, see chapter: [Modbus parameters configurations](#).



Attention

Wrong value for the power supply can cause a irreversible damage to the device.

3.2.3 Fuses

The system has no fuses internally; however, for the protection of the input of the MPNT003 power supply, it is recommended to insert a 1A fuse, while for the power it is necessary to put a 4A.

3.2.4 Grounding

The DIN rail on which are mounted the MPNT003 and the terminals must be carefully grounded in order to increase the rejection of electromagnetic disturbances.

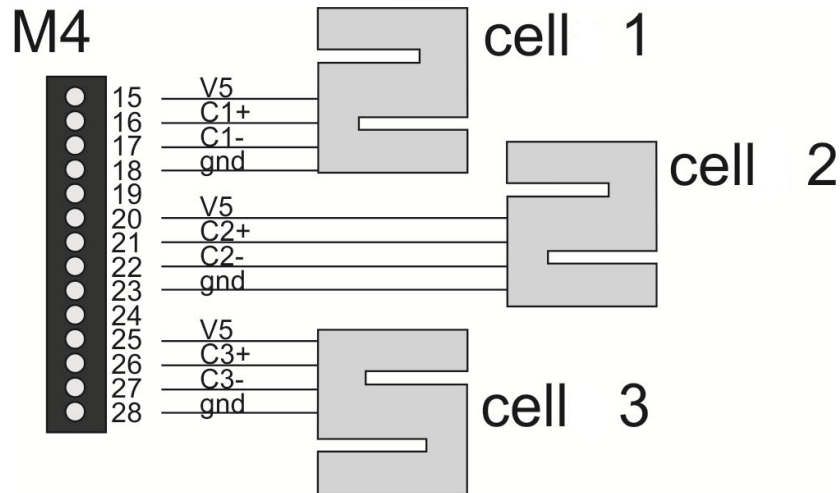
3.2.5 Cable screen

To make the system less sensible to disturbances , the connection cable between the operator panel and the MPNT003 should be screened and connected to both devices GND.

4 I/O Connection

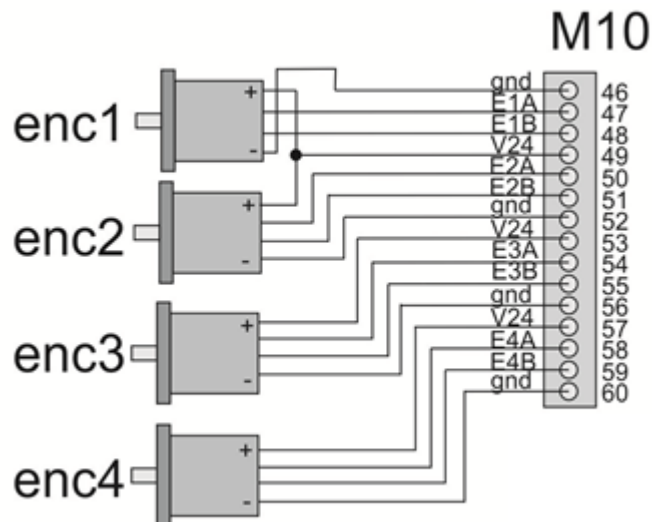
4.1 Load cell inputs

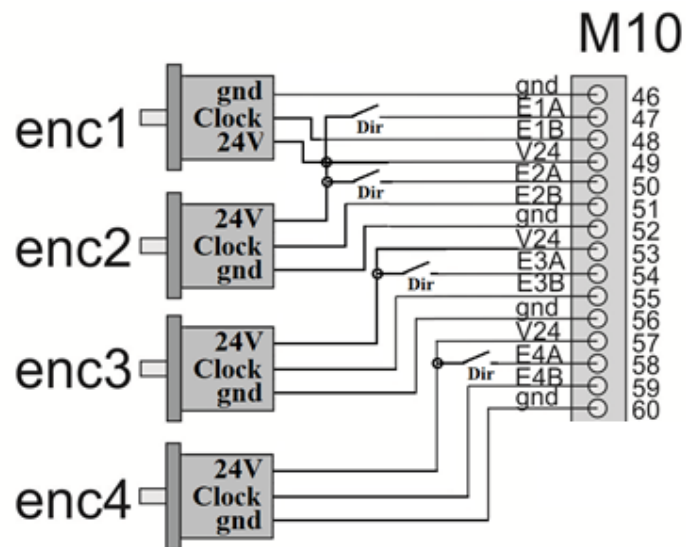
On the 3 inputs for load cells can be connected as follow:



4.2 Base connection - encoder

Bidirectional encoder



Mono directional encoder

The EB lines count (Clock) while in the EA inputs are direction:

- EA = 0 counter UP
- EA = 1 (24V) counter DOWN

4.3 Digital inputs connection

If configured as inputs, the digital lines are PNP type.

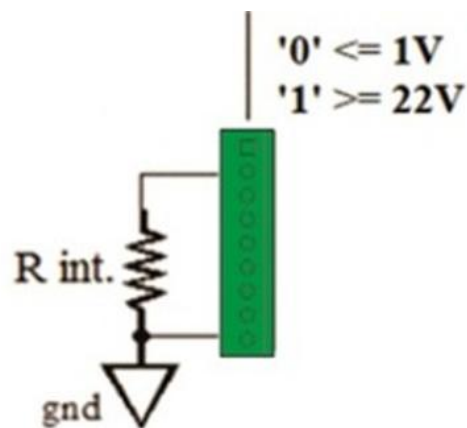


Fig.: Digital inputs

4.4 Digital outputs connection

If configured as outputs, the digital lines are PNP type.

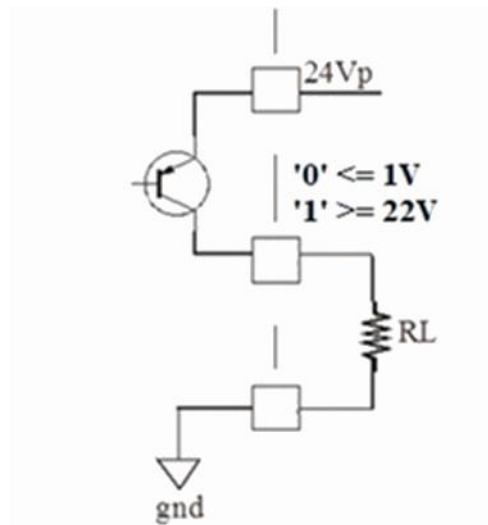


Fig.: Digital outputs

ATTENTION: each expansion should be supplied with 24V_{DC}.

4.5 Modbus parameters configurations

Baud rate: 115200

Node ID: 1

Both parameters are preset and cannot be modified by the user.

5 Memory map ModBus RTU registers

The MPNT003 is a RTU ModBus node. The following table shows the memory map.

Var name	Type	Decimals	Modbus Address	Access	Description	Note
PLC_cella_1	DINT	0	0	[RO]	Load cell 1 input	Value on 24bit
PLC_cella_2	DINT	0	2	[RO]	Load cell 2 input	Value on 24bit
PLC_cella_3	DINT	0	4	[RO]	Load cell 3 input	Value on 24bit
PLC_VCC	INT	3	6	[RO]	Cell polarity voltage	Raw value in mV
PLC_encoder_1	DINT	0	7	[RO]	Encoder 1	Counter 1 32 bit
PLC_encoder_2	DINT	0	9	[RO]	Encoder 2	Counter 2 32 bit
PLC_encoder_3	DINT	0	11	[RO]	Encoder 3	Counter 3 32 bit
PLC_encoder_4	DINT	0	13	[RO]	Encoder 4	Counter 4 32 bit
PLC_DigIn_9	WORD_BIT	1	15	[RO]	Digital input 9	
PLC_DigIn_10	WORD_BIT	2	15	[RO]	Digital input 10	
PLC_DigIn_11	WORD_BIT	3	15	[RO]	Digital input 11	
PLC_DigIn_12	WORD_BIT	4	15	[RO]	Digital input 12	
PLC_DigIn_13	WORD_BIT	5	15	[RO]	Digital input 13	
PLC_DigIn_14	WORD_BIT	6	15	[RO]	Digital input 14	
PLC_DigIn_15	WORD_BIT	7	15	[RO]	Digital input 15	
PLC_DigIn_16	WORD_BIT	8	15	[RO]	Digital input 16	
PLC_DigIn_17	WORD_BIT	9	15	[RO]	Digital input 17	
PLC_DigIn_18	WORD_BIT	10	15	[RO]	Digital input 18	
PLC_DigIn_19	WORD_BIT	11	15	[RO]	Digital input 19	
PLC_DigIn_20	WORD_BIT	12	15	[RO]	Digital input 20	
PLC_DigIn_21	WORD_BIT	13	15	[RO]	Digital input 21	
PLC_DigIn_22	WORD_BIT	14	15	[RO]	Digital input 22	
PLC_DigIn_23	WORD_BIT	15	15	[RO]	Digital input 23	
PLC_DigIn_24	WORD_BIT	16	15	[RO]	Digital input 24	
PLC_Expansion_HB	UINT	0	16	[RO]	Heart beat	
PLC_Expansion_FW	UINT	0	17	[RO]	FW version	
PLC_Expansion_HW	UINT	0	18	[RO]	HW version	
PLC_PtoWork_1	WORD_BIT	1	19	[RO]	Status PTO 1. Indicates PTO 1 is busy	PTO 1 status register
PLC_PtoWork_2	WORD_BIT	2	19	[RO]	Status PTO 2. Indicates PTO 2 is busy	PTO 2 status register
PLC_PtoWork_3	WORD_BIT	3	19	[RO]	Status PTO 3. Indicates PTO 3 is busy	PTO 3 status register

Var name	Type	Decimals	Modbus Address	Access	Description	Note
PLC_PtoWork_4	WORD_BIT	4	19	[RO]	Status PTO 4. Indicates PTO 4 is busy	PTO 4 status register
PLC_PtoDone_1	WORD_BIT	5	19	[RO]	Status PTO 1. Indicates PTO 1 has finished	PTO 1 status register
PLC_PtoDone_2	WORD_BIT	6	19	[RO]	Status PTO 2. Indicates PTO 2 has finished	PTO 2 status register
PLC_PtoDone_3	WORD_BIT	7	19	[RO]	Status PTO 3. Indicates PTO 3 has finished	PTO 3 status register
PLC_PtoDone_4	WORD_BIT	8	19	[RO]	Status PTO 4. Indicates PTO 4 has finished	PTO 4 status register
PLC_EncMatch_1	WORD_BIT	9	19	[RO]	N/A	
PLC_EncMatch_2	WORD_BIT	10	19	[RO]	N/A	
PLC_EncMatch_3	WORD_BIT	11	19	[RO]	N/A	
PLC_EncMatch_4	WORD_BIT	12	19	[RO]	N/A	
PLC_Exp_ST_13	WORD_BIT	13	19	[RO]	N/A	
PLC_Exp_ST_14	WORD_BIT	14	19	[RO]	N/A	
PLC_Exp_ST_15	WORD_BIT	15	19	[RO]	N/A	
PLC_Exp_ST_16	WORD_BIT	16	19	[RO]	N/A	
PLC_AnIn_1	INT	0	20	[RO]	Input 0-10V	
PLC_Conf_enc_1	UINT	0	22	[RW]	Encoder 1 configuration 0: not configured and count is 0. 1: set monodirectional counter. To reset: 16#11 2: set bidirectional encoder. To reset: 16#12	Input A (M10-47) counter direction: 0: CUp, 1: CDown Input B (M10-48) clock
PLC_Conf_enc_2	UINT	0	23	[RW]	Encoder 2 configuration Same as conf. encoder 1	Same as conf. encoder 1
PLC_Conf_enc_3	UINT	0	24	[RW]	Encoder 3 configuration Same as conf. encoder 1	Same as conf. encoder 1
PLC_Conf_enc_4	UINT	0	25	[RW]	Encoder 4 configuration Same as conf. encoder 1	Same as conf. encoder 1

Var name	Type	Decimals	Modbus Address	Access	Description	Note
PLC_Enc_Match_1	DINT	0	26	[RW]	Encoder 1 match register	
PLC_Enc_Match_2	DINT	0	28	[RW]	Encoder 2 match register	
PLC_Enc_Match_3	DINT	0	30	[RW]	Encoder 3 match register	
PLC_Enc_Match_4	DINT	0	32	[RW]	Encoder 4 match register	
PLC_Pto_Freq_1	UINT	0	34	[RW]	Set PTO 1 frequency	Resolution 1Hz, max value 65535 Hz
PLC_Pto_Freq_2	UINT	0	35	[RW]	Set PTO 2 frequency	Resolution 1Hz, max value 65535 Hz
PLC_Pto_Freq_3	UINT	0	36	[RW]	Set PTO 3 frequency	Resolution 1Hz, max value 65535 Hz
PLC_Pto_Freq_4	UINT	0	37	[RW]	Set PTO 4 frequency	Resolution 1Hz, max value 65535 Hz
PLC_Delay_Reg_1	UINT	0	38	[RW]	N/A	
PLC_Delay_Reg_2	UINT	0	39	[RW]	N/A	
PLC_Delay_Reg_3	UINT	0	40	[RW]	N/A	
PLC_Delay_Reg_4	UINT	0	41	[RW]	N/A	
PLC_Pto_Steps_1	DINT	0	42	[RW]	Set PTO 1 steps	32 bit value, if 0 PTO 1 doesn't stop
PLC_Pto_Steps_2	DINT	0	44	[RW]	Set PTO 2 steps	32 bit value, if 0 PTO 2 doesn't stop
PLC_Pto_Steps_3	DINT	0	46	[RW]	Set PTO 3 steps	32 bit value, if 0 PTO 3 doesn't stop
PLC_Pto_Steps_4	DINT	0	48	[RW]	Set PTO 4 steps	32 bit value, if 0 PTO 4 doesn't stop
PLC_DigOut_1	WORD_BIT	1	50	[RW]	Digital outputs 1	
PLC_DigOut_2	WORD_BIT	2	50	[RW]	Digital outputs 2	
PLC_DigOut_3	WORD_BIT	3	50	[RW]	Digital outputs 3	
PLC_DigOut_4	WORD_BIT	4	50	[RW]	Digital outputs 4	
PLC_DigOut_5	WORD_BIT	5	50	[RW]	Digital outputs 5	
PLC_DigOut_6	WORD_BIT	6	50	[RW]	Digital outputs 6	
PLC_DigOut_7	WORD_BIT	7	50	[RW]	Digital outputs 7	
PLC_DigOut_8	WORD_BIT	8	50	[RW]	Digital outputs 8	
PLC_DigOut_9	WORD_BIT	9	50	[RW]	Digital outputs 9	
PLC_DigOut_10	WORD_BIT	10	50	[RW]	Digital outputs 10	

Var name	Type	Decimals	Modbus Address	Access	Description	Note
PLC_DigOut_11	WORD_BIT	11	50	[RW]	Digital outputs 11	
PLC_DigOut_12	WORD_BIT	12	50	[RW]	Digital outputs 12	
PLC_DigOut_13	WORD_BIT	13	50	[RW]	Digital outputs 13	
PLC_DigOut_14	WORD_BIT	14	50	[RW]	Digital outputs 14	
PLC_DigOut_15	WORD_BIT	15	50	[RW]	Digital outputs 15	
PLC_DigOut_16	WORD_BIT	16	50	[RW]	Digital outputs 16	
PLC_PtoEnable_1	WORD_BIT	1	51	[RW]	PTO 1 enabling	
PLC_PtoEnable_2	WORD_BIT	2	51	[RW]	PTO 2 enabling	
PLC_PtoEnable_3	WORD_BIT	3	51	[RW]	PTO 3 enabling	
PLC_PtoEnable_4	WORD_BIT	4	51	[RW]	PTO 4 enabling	
PLC_Exp_CM_5	WORD_BIT	5	51	[RW]	N/A	
PLC_Exp_CM_6	WORD_BIT	6	51	[RW]	N/A	
PLC_Exp_CM_7	WORD_BIT	7	51	[RW]	N/A	
PLC_Exp_CM_8	WORD_BIT	8	51	[RW]	N/A	
PLC_Exp_CM_9	WORD_BIT	9	51	[RW]	N/A	
PLC_Exp_CM_10	WORD_BIT	10	51	[RW]	N/A	
PLC_Exp_CM_11	WORD_BIT	11	51	[RW]	N/A	
PLC_Exp_CM_12	WORD_BIT	12	51	[RW]	N/A	
PLC_Exp_CM_13	WORD_BIT	13	51	[RW]	N/A	
PLC_Exp_CM_14	WORD_BIT	14	51	[RW]	N/A	
PLC_Exp_CM_15	WORD_BIT	15	51	[RW]	N/A	
PLC_Exp_CM_16	WORD_BIT	16	51	[RW]	N/A	