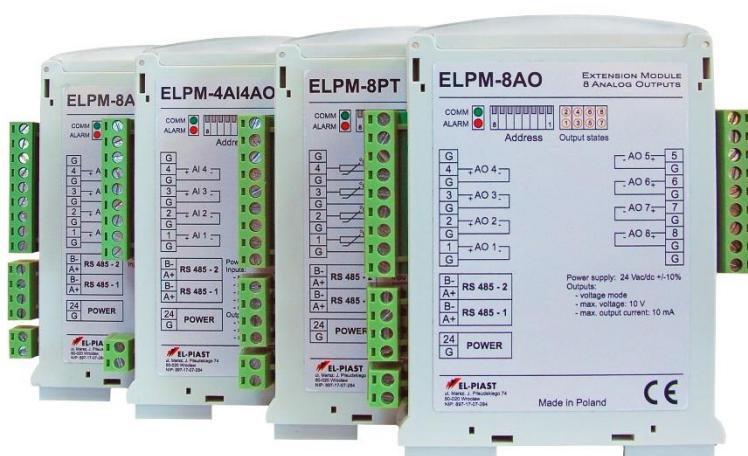


PLC Controllers – I/O expansion modules ELPM series

Application „AP1v1”



1. Description

ELPM series modules are freely programmable PLC controllers (without RTC). They can be used as a stand-alone controllers or as an expansion modules for the expansion of other PLCs with additional functionality. Their compact design, large quantity of inputs and outputs allows you to build large control systems with compact dimensions. Special features of the device include: unlimited possibilities of configuration, BACnet and Modbus protocol support, slave device management (frequency drives, other modules), all types of EL-Piast's HMI based on communication on the RS-485 support.

ELPM series modules have a factory preloaded application that allows to use the module as an I/O extension, regardless of the version of the module, list of variables in the version of the "AP1 v1" application is fixed. Pay attention to use the addresses assigned to specific I/O available in the module.

2. Technical details

	ELPM-16DO	ELPM-16DI	ELPM-8DI8DO	ELPM-8AI	ELPM-8AO	ELPM-4AI4AO	ELPM-8PT
Supply voltage	24 V AC/DC	24 V AC/DC	24 V AC/DC	24 V AC/DC	24 V AC/DC	24 V AC/DC	24 V AC/DC
Mounting	DIN rail	DIN rail	DIN rail	DIN rail	DIN rail	DIN rail	DIN rail
Communication ports:	2 x RS-485	2 x RS-485	2 x RS-485	2 x RS-485	2 x RS-485	2 x RS-485	2 x RS-485
Communication protocols:	Modbus RTU, BACnet	Modbus RTU, BACnet	Modbus RTU, BACnet	Modbus RTU, BACnet	Modbus RTU, BACnet	Modbus RTU, BACnet	Modbus RTU, BACnet
Output of operating state I/O on LEDs	✓	✓	✓	✓	✓	✓	✓
Alarm and communication on LEDs	✓	✓	✓	✓	✓	✓	✓
The work mode configuration on the switch	✓	✓	✓	✓	✓	✓	✓
Relays NO type	16 pcs. 5A	—	8 pcs. 5A	—	—	—	—
Digital Inputs	—	16 pcs. (nominal voltage 24 V AC/DC)	8 pcs. (nominal voltage 24 V AC/DC)	—	—	—	—
Analog Inputs (voltage/current)	—	—	—	(8 pcs. 0..10V or 2..10V/8 pcs. 0..20mA or 4..20mA)	—	(4 pcs. 0..10V or 2..10V/4 pcs. 0..20mA or 4..20mA)	—
Analog Outputs	—	—	—	—	(8 pcs. 0..10V or 2..10V)	(4 pcs. 0..10V or 2..10V)	—
Temperature Inputs	—	—	—	—	—	—	8 pcs. PT1000 (range -256...166°C)
Dimensions	22,5 x 109 x 124	22,5 x 109 x 124	22,5 x 109 x 124	22,5 x 109 x 124	22,5 x 109 x 124	22,5 x 109 x 124	22,5 x 109 x 124

3. Setting of the communication parameters

The PLC Controllers – modules ELPM series are an expansion modules dedicated for controllers with a communication port Modbus RTU or BACnet MS-TP in standard RS-485. The module address is set using DIP Switch in the range of 1-256.

Setting the communication speed, parity, stop bits and setting the communication protocol is carried out by a DIP Switch and do the following steps:

- turn the power module Off, all DIP Switches set to On and switch the power module On
- after turning the power module On, all DIP Switches set to Off (LEDs COM and ALR should start flashing alternately)
- set on the DIP Switches necessary parameters according to the description below:
 - a)** DIP Switches 1-4: communication speed (0 - 2k4, 1 - 4k8, 2 - 9k6, 3 - 14k4, 4 - 19k2, 5 - 28k8, 6 - 38k4, 7 - 57k6, 8 - 76k8, 9 - 115k2, 10 - 230k4, 11 - 250k, 12 - 500k, 13 - 500k, 14 - 500k, 15 - 500k)
 - b)** DIP Switches 5-6: parity: (0 - lack, 1 - even, 2 - odd, 3 - odd)
 - c)** DIP Switch 7 - stop bits (0 - 1bit, 1 - 2bits)
 - d)** DIP Switch 8 - mode (0 - Modbus / ELPBus, 1 - BACnet MS/TP)

Configuration example:

- communication speed 9k6
- lack of parity
- 2 stop bits
- Modbus/ELPBus

d)	c)	b)	a)				
8	7	6	5	4	3	2	1
	X					X	
X		X	X	X	X	X	X

On
Off

After setting, turn Off the module and using DIP Switch set the address in range 1-256.

Example of setting the address „1”

8	7	6	5	4	3	2	1
							X
X	X	X	X	X	X	X	X

On
Off

4. Modbus RTU communication

The PLC Controller – module ELPM series has implementation of Modbus RTU protocol. To make the coupling with network, connect the RS-485 bus port on the terminal RS-485-1 of the controller. The setting of communication parameters described in section 3 of this manual.

The default communication parameters:

- baud rate of 9600 bps (the ability to change from the level of inbuilt or external HMI)
- 8 bits frame
- 2 stop bits
- No parity

All variables are 32-bit values which are presented in Modbus protocol as an *Input*, *Coil*, *Holding Register* or *Input Register* in different address spaces.

Read and write data type *Input* and *Coil*:

Each variable is a 32-bit value. For example, a variable with the address in the table 0x0008 provides bits at binary addresses 8*32...9*32-1 for *Input* and *Coil* in Modbus standard.

Reading and writing data types *Holding Register* and *Input Register*:

The variables in this form for ease of integration with the BMS systems, are available in different address spaces.

- 0x0000 ... 0x1000 – traditional representation according information below
 - **Multistate** – listed integer variable values correspond to the states described
 - **Decimal** – 32-bit value of the variable is treated as an integer type with sign
 - **Fixed** – where the 8 least significant bits are used for fractional part, while the remaining 24 bits are part of a signed integer. It follows that the accuracy of Fixed value is 1/256. To scale the value represented in the Fixed form to the target (right), multiply it by 1/256 = 0,00390625.
- 0x1000 ... 0x2000 – variable in Fixed format presented as an integer values without a fraction
- 0x2000 ... 0x3000 – variable in Fixed format presented as a values with accuracy to one decimal place in decimal format. The value of 20.67 is shown as 206
- 0x3000 ... 0x4000 – variable in Fixed format presented as a values with accuracy to tow decimal places in decimal format. The value of 20.67 is shown as 2067
- 0x4000 ... 0x5000 – just like in the 0x0000 ... 0x1000 but the variables are treated as 16-bit values. This means that the older 16-bit are not included. Addresses must be divided by two. For example, a variable from table with the address 0x0124 is available in 16-bit format at Modbus address 0x4092
- 0x5000 ... 0x6000 – just like in the 0x1000 ... 0x2000 but the variables are treated as 16-bit values. This means that the older 16-bit are not included. Addresses must be divided by two. For example, a variable from table with the address 0x0124 is available in 16-bit format at Modbus address 0x4092
- 0x6000 ... 0x7000 – just like in the 0x2000 ... 0x3000 but the variables are treated as 16-bit values. This means that the older 16-bit are not included. Addresses must be divided by two. For example, a variable from table with the address 0x0124 is available in 16-bit format at Modbus address 0x4092

- $0x7000 \dots 0x8000$ – just like in the $0x2000 \dots 0x3000$ but the variables are treated as 16-bit values. This means that the older 16-bit are not included. Addresses must be divided by two. For example, a variable from table with the address $0x0124$ is available in 16-bit format at Modbus address $0x4092$

Variables in the representation of **Multistate** and **Decimal** do not use in the address spaces $0x1000 \dots 0x4000$ and $0x5000 \dots 0x8000$ because it loses the least significant 8 bits of each of the variables. Addresses in the table are converted to the Modbus protocol as follows:

Address space	Calculating an address
$0x0000 \dots 0x1000$	Modbus Address = Address.
$0x1000 \dots 0x2000$	Modbus Address = $0x1000 + \text{Address}$
$0x2000 \dots 0x3000$	Modbus Address = $0x2000 + \text{Address}$
$0x3000 \dots 0x4000$	Modbus Address = $0x3000 + \text{Address}$
$0x4000 \dots 0x5000$	Modbus Address = $0x4000 + (\text{Address} / 2)$
$0x5000 \dots 0x6000$	Modbus Address = $0x5000 + (\text{Address} / 2)$
$0x6000 \dots 0x7000$	Modbus Address = $0x6000 + (\text{Address} / 2)$
$0x7000 \dots 0x8000$	Modbus Address = $0x7000 + (\text{Address} / 2)$

NOTE: You can not make a record of a single 16-bit register at address spaces $0x1000 \dots 0x4000$. In this case, write the registers in pairs using command *Preset Multiple Registers* (0x10) which consists of a full value of the 32-bit variable. This means that the address of the start of the recording and the number of registers must be an even number.

5. BACnet MS-TP communication

BACnet variables should be searched after connecting the powered controller and entered the relevant settings of BACnet network (see section 3).

6. Addresses of variables - Modbus RTU and BacNet MS-TP

Variables to read the state of Inputs/Outputs

Address (DEC)		Variable	Description	States	Type		Read [R] /Write [W]
BACnet	Modbus				BACnet	Modbus	
0	0	Din1	Reading the state of the digital input DI1	0 - disabled, 1 - enabled	BV	Coil 0	R
1	2	Din2	Reading the state of the digital input DI2	0 - disabled, 1 - enabled	BV	Coil 32	R
2	4	Din3	Reading the state of the digital input DI3	0 - disabled, 1 - enabled	BV	Coil 64	R
3	6	Din4	Reading the state of the digital input DI4	0 - disabled, 1 - enabled	BV	Coil 96	R
4	8	Din5	Reading the state of the digital input DI5	0 - disabled, 1 - enabled	BV	Coil 128	R
5	10	Din6	Reading the state of the digital input DI6	0 - disabled, 1 - enabled	BV	Coil 160	R
6	12	Din7	Reading the state of the digital input DI7	0 - disabled, 1 - enabled	BV	Coil 192	R
7	14	Din8	Reading the state of the digital input DI8	0 - disabled, 1 - enabled	BV	Coil 224	R
8	16	Din9	Reading the state of the digital input DI9	0 - disabled, 1 - enabled	BV	Coil 256	R
9	18	Din10	Reading the state of the digital input DI10	0 - disabled, 1 - enabled	BV	Coil 288	R
10	20	Din11	Reading the state of the digital input DI11	0 - disabled, 1 - enabled	BV	Coil 320	R
11	22	Din12	Reading the state of the digital input DI12	0 - disabled, 1 - enabled	BV	Coil 352	R
12	24	Din13	Reading the state of the digital input DI13	0 - disabled, 1 - enabled	BV	Coil 384	R
13	26	Din14	Reading the state of the digital input DI14	0 - disabled, 1 - enabled	BV	Coil 416	R
14	28	Din15	Reading the state of the digital input DI15	0 - disabled, 1 - enabled	BV	Coil 448	R
15	30	Din16	Reading the state of the digital input DI16	0 - disabled, 1 - enabled	BV	Coil 480	R
16	32	Din1_16	Reading the state of digital inputs DI1...DI16 (variable 16 BIT)	0 - disabled, 1 - enabled	BSV	Coil 512...528	R
17	34	FreqDin1	The frequency measured by digital input Din1	1Hz = 256 (22Hz = 22*256 = 5632 = 0x1600)	AV	Register	R
18	36	FreqDin2	The frequency measured by digital input Din2	1Hz = 256 (22Hz = 22*256 = 5632 = 0x1600)	AV	Register	R
19	38	FreqDin3	The frequency measured by digital input Din3	1Hz = 256 (22Hz = 22*256 = 5632 = 0x1600)	AV	Register	R
20	40	FreqDin4	The frequency measured by digital input Din4	1Hz = 256 (22Hz = 22*256 = 5632 = 0x1600)	AV	Register	R
21	42	FreqDin5	The frequency measured by digital input Din5	1Hz = 256 (22Hz = 22*256 = 5632 = 0x1600)	AV	Register	R
22	44	FreqDin6	The frequency measured by digital input Din6	1Hz = 256 (22Hz = 22*256 = 5632 = 0x1600)	AV	Register	R

23	46	FreqDin7	The frequency measured by digital input Din7	$1\text{Hz} = 256 (22\text{Hz} = 22*256 = 5632 = 0x1600)$	AV	Register	R
24	48	FreqDin8	The frequency measured by digital input Din8	$1\text{Hz} = 256 (22\text{Hz} = 22*256 = 5632 = 0x1600)$	AV	Register	R
25	50	FreqDin9	The frequency measured by digital input Din9	$1\text{Hz} = 256 (22\text{Hz} = 22*256 = 5632 = 0x1600)$	AV	Register	R
26	52	FreqDin10	The frequency measured by digital input Din10	$1\text{Hz} = 256 (22\text{Hz} = 22*256 = 5632 = 0x1600)$	AV	Register	R
27	54	FreqDin11	The frequency measured by digital input Din11	$1\text{Hz} = 256 (22\text{Hz} = 22*256 = 5632 = 0x1600)$	AV	Register	R
28	56	FreqDin12	The frequency measured by digital input Din12	$1\text{Hz} = 256 (22\text{Hz} = 22*256 = 5632 = 0x1600)$	AV	Register	R
29	58	FreqDin13	The frequency measured by digital input Din13	$1\text{Hz} = 256 (22\text{Hz} = 22*256 = 5632 = 0x1600)$	AV	Register	R
30	60	FreqDin14	The frequency measured by digital input Din14	$1\text{Hz} = 256 (22\text{Hz} = 22*256 = 5632 = 0x1600)$	AV	Register	R
31	62	FreqDin15	The frequency measured by digital input Din15	$1\text{Hz} = 256 (22\text{Hz} = 22*256 = 5632 = 0x1600)$	AV	Register	R
32	64	FreqDin16	The frequency measured by digital input Din16	$1\text{Hz} = 256 (22\text{Hz} = 22*256 = 5632 = 0x1600)$	AV	Register	R
33	66	CountDin1	Starts counter of digital input Din1	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
34	68	CountDin2	Starts counter of digital input Din2	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
35	70	CountDin3	Starts counter of digital input Din3	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
36	72	CountDin4	Starts counter of digital input Din4	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
37	74	CountDin5	Starts counter of digital input Din5	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
38	76	CountDin6	Starts counter of digital input Din6	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
39	78	CountDin7	Starts counter of digital input Din7	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
40	80	CountDin8	Starts counter of digital input Din8	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
41	82	CountDin9	Starts counter of digital input Din9	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
42	84	CountDin10	Starts counter of digital input Din10	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
43	86	CountDin11	Starts counter of digital input Din11	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
44	88	CountDin12	Starts counter of digital input Din12	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
45	90	CountDin13	Starts counter of digital input Din13	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
46	92	CountDin14	Starts counter of digital input Din14	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
47	94	CountDin15	Starts counter of digital input Din15	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
48	96	CountDin16	Starts counter of digital input Din16	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R
49	98	Ain1	Reading the value of analog input AI1	$1 = 256 (22 = 22*256 = 5632 = 0x1600)$	AV	Register	R

50	100	Ain2	Reading the value of analog input AI2	$1 = 256 \text{ (} 22 = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
51	102	Ain3	Reading the value of analog input AI3	$1 = 256 \text{ (} 22 = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
52	104	Ain4	Reading the value of analog input AI4	$1 = 256 \text{ (} 22 = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
53	106	Ain5	Reading the value of analog input AI5	$1 = 256 \text{ (} 22 = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
54	108	Ain6	Reading the value of analog input AI6	$1 = 256 \text{ (} 22 = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
55	110	Ain7	Reading the value of analog input AI7	$1 = 256 \text{ (} 22 = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
56	112	Ain8	Reading the value of analog input AI8	$1 = 256 \text{ (} 22 = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
57	114	Pt1	Reading the value of PT1000 sensor, input PT1	$1^{\circ}\text{C} = 256 \text{ (} 22^{\circ}\text{C} = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
58	116	Pt2	Reading the value of PT1000 sensor, input PT2	$1^{\circ}\text{C} = 256 \text{ (} 22^{\circ}\text{C} = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
59	118	Pt3	Reading the value of PT1000 sensor, input PT3	$1^{\circ}\text{C} = 256 \text{ (} 22^{\circ}\text{C} = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
60	120	Pt4	Reading the value of PT1000 sensor, input PT4	$1^{\circ}\text{C} = 256 \text{ (} 22^{\circ}\text{C} = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
61	122	Pt5	Reading the value of PT1000 sensor, input PT5	$1^{\circ}\text{C} = 256 \text{ (} 22^{\circ}\text{C} = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
62	124	Pt6	Reading the value of PT1000 sensor, input PT6	$1^{\circ}\text{C} = 256 \text{ (} 22^{\circ}\text{C} = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
63	126	Pt7	Reading the value of PT1000 sensor, input PT7	$1^{\circ}\text{C} = 256 \text{ (} 22^{\circ}\text{C} = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
64	128	Pt8	Reading the value of PT1000 sensor, input PT8	$1^{\circ}\text{C} = 256 \text{ (} 22^{\circ}\text{C} = 22*256 = 5632 = 0x1600\text{)}$	AV	Register	R
65	130	Dout1	Reading the state of the digital output DO1	0 - disabled, 1 - enabled	BV	Coil 2080	R
66	132	Dout2	Reading the state of the digital output DO2	0 - disabled, 1 - enabled	BV	Coil 2112	R
67	134	Dout3	Reading the state of the digital output DO3	0 - disabled, 1 - enabled	BV	Coil 2144	R
68	136	Dout4	Reading the state of the digital output DO4	0 - disabled, 1 - enabled	BV	Coil 2176	R
69	138	Dout5	Reading the state of the digital output DO5	0 - disabled, 1 - enabled	BV	Coil 2208	R
70	140	Dout6	Reading the state of the digital output DO6	0 - disabled, 1 - enabled	BV	Coil 2240	R
71	142	Dout7	Reading the state of the digital output DO7	0 - disabled, 1 - enabled	BV	Coil 2272	R
72	144	Dout8	Reading the state of the digital output DO8	0 - disabled, 1 - enabled	BV	Coil 2304	R
73	146	Dout9	Reading the state of the digital output DO9	0 - disabled, 1 - enabled	BV	Coil 2336	R
74	148	Dout10	Reading the state of the digital output DO10	0 - disabled, 1 - enabled	BV	Coil 2368	R
75	150	Dout11	Reading the state of the digital output DO11	0 - disabled, 1 - enabled	BV	Coil 2400	R
76	152	Dout12	Reading the state of the digital output DO12	0 - disabled, 1 - enabled	BV	Coil 2432	R
77	154	Dout13	Reading the state of the digital output DO13	0 - disabled, 1 - enabled	BV	Coil 2464	R

78	156	Dout14	Reading the state of the digital output DO14	0 - disabled, 1 - enabled	BV	Coil 2496	R
79	158	Dout15	Reading the state of the digital output DO15	0 - disabled, 1 - enabled	BV	Coil 2528	R
80	160	Dout16	Reading the state of the digital output DO16	0 - disabled, 1 - enabled	BV	Coil 2560	R
81	162	Dout1_16	Reading the state of digital outputs DO1...DO16 (variable 16 BIT)	0 - disabled, 1 - enabled	BSV	Coil 2592...2608	R
82	164	Aout1	Reading analog output value Aout1	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R
83	166	Aout2	Reading analog output value Aout2	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R
84	168	Aout3	Reading analog output value Aout3	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R
85	170	Aout4	Reading analog output value Aout4	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R
86	172	Aout5	Reading analog output value Aout5	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R
87	174	Aout6	Reading analog output value Aout6	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R
88	176	Aout7	Reading analog output value Aout7	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R
89	178	Aout8	Reading analog output value Aout8	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R

The variables controlling the states of outputs (without limit switches, without the memory state before the power supply reset). **According to factory settings variables marked in bold are changing state of the outputs.**

Address (DEC)	BACnet	Modbus	Variable	Description	States	Type		Read [R] /Write [W]
						BACnet	Modbus	
90	180		SetDout1	Setting of output state DO1	0 - disabled, 1 - enabled	BV	Coil 2880	R / W
91	182		SetDout2	Setting of output state DO2	0 - disabled, 1 - enabled	BV	Coil 2912	R / W
92	184		SetDout3	Setting of output state DO3	0 - disabled, 1 - enabled	BV	Coil 2944	R / W
93	186		SetDout4	Setting of output state DO4	0 - disabled, 1 - enabled	BV	Coil 2976	R / W
94	188		SetDout5	Setting of output state DO5	0 - disabled, 1 - enabled	BV	Coil 3008	R / W
95	190		SetDout6	Setting of output state DO6	0 - disabled, 1 - enabled	BV	Coil 3040	R / W
96	192		SetDout7	Setting of output state DO7	0 - disabled, 1 - enabled	BV	Coil 3072	R / W
97	194		SetDout8	Setting of output state DO8	0 - disabled, 1 - enabled	BV	Coil 3104	R / W
98	196		SetDout9	Setting of output state DO9	0 - disabled, 1 - enabled	BV	Coil 3136	R / W
99	198		SetDout10	Setting of output state DO10	0 - disabled, 1 - enabled	BV	Coil 3168	R / W
100	200		SetDout11	Setting of output state DO11	0 - disabled, 1 - enabled	BV	Coil 3200	R / W

101	202	SetDout12	Setting of output state DO12	0 - disabled, 1 - enabled	BV	Coil 3232	R / W
102	204	SetDout13	Setting of output state DO13	0 - disabled, 1 - enabled	BV	Coil 3264	R / W
103	206	SetDout14	Setting of output state DO14	0 - disabled, 1 - enabled	BV	Coil 3296	R / W
104	208	SetDout15	Setting of output state DO15	0 - disabled, 1 - enabled	BV	Coil 3328	R / W
105	210	SetDout16	Setting of output state DO16	0 - disabled, 1 - enabled	BV	Coil 3360	R / W
106	212	SetDout1_16	Setting of output state DO1...DO16 (variable 16 BIT)	0 - disabled, 1 - enabled	BSV	Coil 3392...3408	R / W
107	214	SetAout1	Setting of the analog output Aout1	1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
108	216	SetAout2	Setting of the analog output Aout2	1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
109	218	SetAout3	Setting of the analog output Aout3	1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
110	220	SetAout4	Setting of the analog output Aout4	1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
111	222	SetAout5	Setting of the analog output Aout5	1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
112	224	SetAout6	Setting of the analog output Aout6	1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
113	226	SetAout7	Setting of the analog output Aout7	1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
114	228	SetAout8	Setting of the analog output Aout8	1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W

The variables controlling the states of outputs (with limit switches at 100 000, with the memory state before the power supply reset)

Address (DEC)		Variable	Description	States	Type		Read [R] /Write [W]
BACnet	Modbus				BACnet	Modbus	
115	230	SetPermDout1	Setting of output state DO1	0 - disabled, 1 - enabled	BV	Coil 3680	R / W
116	232	SetPermDout2	Setting of output state DO2	0 - disabled, 1 - enabled	BV	Coil 3712	R / W
117	234	SetPermDout3	Setting of output state DO3	0 - disabled, 1 - enabled	BV	Coil 3744	R / W
118	236	SetPermDout4	Setting of output state DO4	0 - disabled, 1 - enabled	BV	Coil 3776	R / W
119	238	SetPermDout5	Setting of output state DO5	0 - disabled, 1 - enabled	BV	Coil 3808	R / W
120	240	SetPermDout6	Setting of output state DO6	0 - disabled, 1 - enabled	BV	Coil 3840	R / W
121	242	SetPermDout7	Setting of output state DO7	0 - disabled, 1 - enabled	BV	Coil 3872	R / W
122	244	SetPermDout8	Setting of output state DO8	0 - disabled, 1 - enabled	BV	Coil 3904	R / W
123	246	SetPermDout9	Setting of output state DO9	0 - disabled, 1 - enabled	BV	Coil 3936	R / W

124	248	SetPermDout10	Setting of output state DO10	0 - disabled, 1 - enabled	BV	Coil 3968	R / W
125	250	SetPermDout11	Setting of output state DO11	0 - disabled, 1 - enabled	BV	Coil 4000	R / W
126	252	SetPermDout12	Setting of output state DO12	0 - disabled, 1 - enabled	BV	Coil 4032	R / W
127	254	SetPermDout13	Setting of output state DO13	0 - disabled, 1 - enabled	BV	Coil 4064	R / W
128	256	SetPermDout14	Setting of output state DO14	0 - disabled, 1 - enabled	BV	Coil 4096	R / W
129	258	SetPermDout15	Setting of output state DO15	0 - disabled, 1 - enabled	BV	Coil 4128	R / W
130	260	SetPermDout16	Setting of output state DO16	0 - disabled, 1 - enabled	BV	Coil 4160	R / W
131	262	SetPermDout1_16	Setting of the outputs state DO1...DO16	0 - disabled, 1 - enabled	BSV	Coil 4192...4208	R / W
132	264	SetPermAout1	Setting of the analog output Aout1	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R / W
133	266	SetPermAout2	Setting of the analog output Aout2	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R / W
134	268	SetPermAout3	Setting of the analog output Aout3	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R / W
135	270	SetPermAout4	Setting of the analog output Aout4	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R / W
136	272	SetPermAout5	Setting of the analog output Aout5	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R / W
137	274	SetPermAout6	Setting of the analog output Aout6	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R / W
138	276	SetPermAout7	Setting of the analog output Aout7	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R / W
139	278	SetPermAout8	Setting of the analog output Aout8	$1V = 256 (10V = 10*256 = 2560 = 0xA00)$	AV	Register	R / W

Variables for reading and editing - menu settings

Address (DEC)	BACnet	Modbus	Variable	Description	States	Type	Read [R] /Write [W]
						BACnet	
140	280		OfsPt1	Measurement offset of PT1000 sensor, input PT1	$1^{\circ}C = 256 (22^{\circ}C = 22*256 = 5632 = 0x1600)$	AV	Register
141	282		OfsPt2	Measurement offset of PT1000 sensor, input PT2	$1^{\circ}C = 256 (22^{\circ}C = 22*256 = 5632 = 0x1600)$	AV	Register
142	284		OfsPt3	Measurement offset of PT1000 sensor, input PT3	$1^{\circ}C = 256 (22^{\circ}C = 22*256 = 5632 = 0x1600)$	AV	Register
143	286		OfsPt4	Measurement offset of PT1000 sensor, input PT4	$1^{\circ}C = 256 (22^{\circ}C = 22*256 = 5632 = 0x1600)$	AV	Register
144	288		OfsPt5	Measurement offset of PT1000 sensor, input PT5	$1^{\circ}C = 256 (22^{\circ}C = 22*256 = 5632 = 0x1600)$	AV	Register
145	290		OfsPt6	Measurement offset of PT1000 sensor, input PT6	$1^{\circ}C = 256 (22^{\circ}C = 22*256 = 5632 = 0x1600)$	AV	Register

146	292	OfsPt7	Measurement offset of PT1000 sensor, input PT7	$1^{\circ}\text{C} = 256 \text{ (22 }^{\circ}\text{C} = 22*256 = 5632 = 0x1600)$	AV	Register	R / W
147	294	OfsPt8	Measurement offset of PT1000 sensor, input PT8	$1^{\circ}\text{C} = 256 \text{ (22 }^{\circ}\text{C} = 22*256 = 5632 = 0x1600)$	AV	Register	R / W
148	296	TypeDin1	Selecting the type of digital inputs (input set as fast can measure the frequency up to 1kHz while controller's power supply is 24VDC)	0 - Slow AC/DC 1 - Fast DC	BV	Coil 4736	R / W
149	298	TypeDin2			BV	Coil 4768	R / W
150	300	TypeDin3			BV	Coil 4800	R / W
151	302	TypeDin4			BV	Coil 4832	R / W
152	304	TypeDin5			BV	Coil 4864	R / W
153	306	TypeDin6			BV	Coil 4896	R / W
154	308	TypeDin7			BV	Coil 4928	R / W
155	310	TypeDin8			BV	Coil 4960	R / W
156	312	TypeDin9			BV	Coil 4992	R / W
157	314	TypeDin10			BV	Coil 5024	R / W
158	316	TypeDin11			BV	Coil 5056	R / W
159	318	TypeDin12			BV	Coil 5088	R / W
160	320	TypeDin13			BV	Coil 5120	R / W
161	322	TypeDin14			BV	Coil 5152	R / W
162	324	TypeDin15			BV	Coil 5184	R / W
163	326	TypeDin16			BV	Coil 5216	R / W
164	328	ResDin1	Counter restet of starts of digital inputs	0 - inactive, 1 - active	BV	Coil 5248	R / W
165	330	ResDin2			BV	Coil 5280	R / W
166	332	ResDin3			BV	Coil 5312	R / W
167	334	ResDin4			BV	Coil 5344	R / W
168	336	ResDin5			BV	Coil 5376	R / W
169	338	ResDin6			BV	Coil 5408	R / W
170	340	ResDin7			BV	Coil 5440	R / W
171	342	ResDin8			BV	Coil 5472	R / W
172	344	ResDin9			BV	Coil 5504	R / W
173	346	ResDin10			BV	Coil 5536	R / W
174	348	ResDin11			BV	Coil 5568	R / W
175	350	ResDin12			BV	Coil 5600	R / W
176	352	ResDin13			BV	Coil 5632	R / W
177	354	ResDin14			BV	Coil 5664	R / W
178	356	ResDin15			BV	Coil 5696	R / W
179	358	ResDin16			BV	Coil 5728	R / W
180	360	TypeAin1	Input type selection Ain 1...8	0 - "0-10VDC", 1 - "0-20mA"	BV	Coil 5760	R / W
181	362	TypeAin2			BV	Coil 5792	R / W
182	364	TypeAin3			BV	Coil 5824	R / W
183	366	TypeAin4			BV	Coil 5856	R / W
184	368	TypeAin5			BV	Coil 5888	R / W
185	370	TypeAin6			BV	Coil 5920	R / W
186	372	TypeAin7			BV	Coil 5952	R / W
187	374	TypeAin8			BV	Coil 5984	R / W
188	376	TypeSetDout	Selecting the type of control variables of the digital outputs states Dout 1...16	0 – SetDoutX 1 – SetPermDoutX 2 – SetDout1_16 4 – SetPermDout1_16	MSV	Register	R / W

189	378	TypeSetAout	Selecting the type of control variables of the analog outputs states Aout1...8	0 – SetAoutX 1 – SetPermAoutX 2 - SetAout1_16 4 - SetPermAout1_16	MSV	Register	R / W
190	380	ModComDetAct	Activation of the module communication test with a master Modbus device (internal communication test)	0 - inactive, 1 - active	BV	Coil 6080	R / W
191	382	ModComDetTime	Measuring time of lost communication	1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
192	384	ModComDetOK	Module's communication status with Modbus master device	0 - lack, 1 - correct	BV	Coil 6144	R
193	386	VarComDetAct	Activation of the test connection with a master device (cyclic change in the value of the variable "VarComDet")	0 - inactive, 1 - active	BV	Coil 6176	R / W
194	388	VarComDetTime	The cycle time of changes in the value required for communication recognized as correct	1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
195	390	VarComDetOK	Module's communication status with master device	0 - lack, 1 - correct	BV	Coil 6240	R
196	392	VarComDet	Test communication variable through cyclical changes in the value of 0/1	0 / 1	BV	Coil 6272	R / W
197	394	LostComDout1	Setting the state of outputs Dout1...16 in case of lack of communication with the master device (when set to 1 or 3 takes precedence over the settings SetDout, SetPermDout)	0 – do not change, 1 – set Off , 3 – set On	MSV	Register	R / W
198	396	LostComDout2			MSV	Register	R / W
199	398	LostComDout3			MSV	Register	R / W
200	400	LostComDout4			MSV	Register	R / W
201	402	LostComDout5			MSV	Register	R / W
202	404	LostComDout6			MSV	Register	R / W
203	406	LostComDout7			MSV	Register	R / W
204	408	LostComDout8			MSV	Register	R / W
205	410	LostComDout9			MSV	Register	R / W
206	412	LostComDout10			MSV	Register	R / W
207	414	LostComDout11			MSV	Register	R / W
208	416	LostComDout12			MSV	Register	R / W
209	418	LostComDout13			MSV	Register	R / W
210	420	LostComDout14			MSV	Register	R / W
211	422	LostComDout15			MSV	Register	R / W
212	424	LostComDout16			MSV	Register	R / W
213	426	LostComAout1	Response to the loss of communication output Aout1	0 - do not change, 1 - "SetLostComAout1"	MSV	Coil 6816	R / W
214	428	SetLostComAout1	Setting of the value during the loss of communication for output Aout1	1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
215	430	LostComAout2	Response to the loss of communication output Aout2	0 - do not change, 1 - "SetLostComAout2"	MSV	Coil 6880	R / W
216	432	SetLostComAout2	Setting of the value during the loss of communication for output Aout2	1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
217	434	LostComAout3	Response to the loss of communication output Aout3	0 - do not change, 1 - "SetLostComAout3"	MSV	Coil 6944	R / W

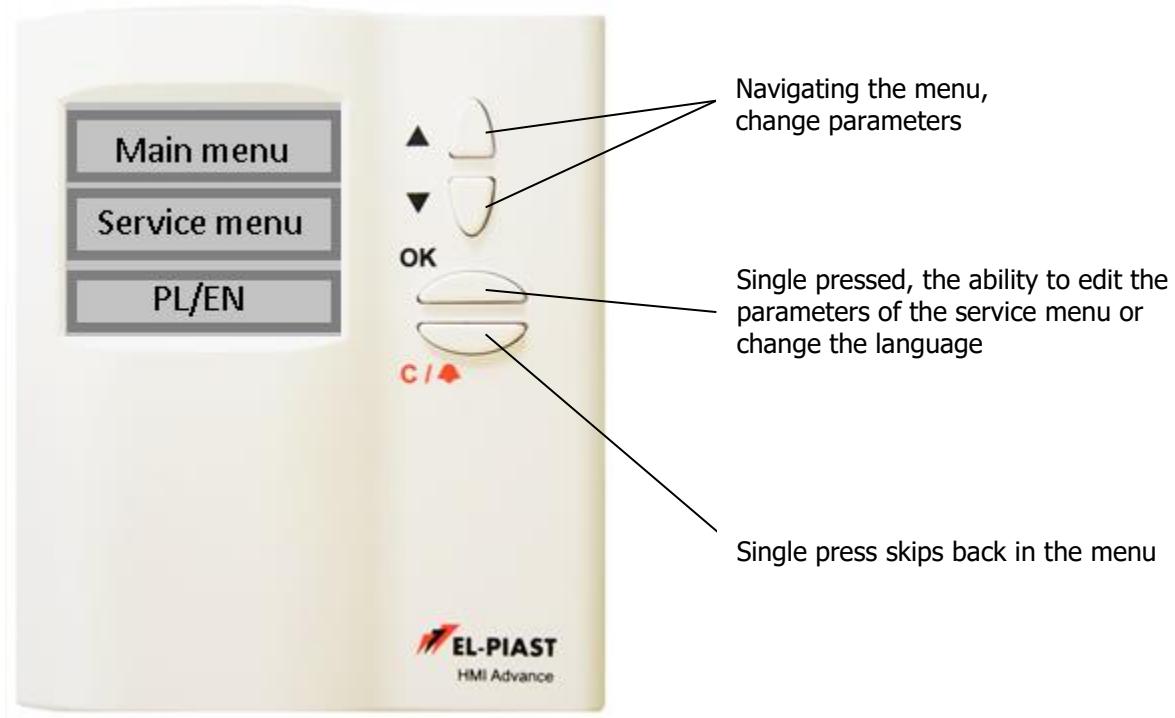
218	436	SetLostComAout3	Setting of the value during the loss of communication for output Aout3	1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
219	438	LostComAout4	Response to the loss of communication output Aout4	0 - do not change, 1 - "SetLostComAout4"	MSV	Coil 7008	R / W
220	440	SetLostComAout4	Setting of the value during the loss of communication for output Aout4	1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
221	442	LostComAout5	Response to the loss of communication output Aout5	0 - do not change, 1 - "SetLostComAout5"	MSV	Coil 7072	R / W
222	444	SetLostComAout5	Setting of the value during the loss of communication for output Aout5	1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
223	446	LostComAout6	Response to the loss of communication output Aout6	0 - do not change, 1 - "SetLostComAout6"	MSV	Coil 7136	R / W
224	448	SetLostComAout6	Setting of the value during the loss of communication for output Aout6	1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
225	450	LostComAout7	Response to the loss of communication output Aout7	0 - do not change, 1 - "SetLostComAout7"	MSV	Coil 7200	R / W
226	452	SetLostComAout7	Setting of the value during the loss of communication for output Aout7	1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
227	454	LostComAout8	Response to the loss of communication output Aout8	0 - do not change, 1 - "SetLostComAout8"	MSV	Coil 7264	R / W
228	456	SetLostComAout8	Setting of the value during the loss of communication for output Aout8	1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
229	458	E_Din1	Emulation of digital inputs Din1...Din16 (when set to 1 or 3 takes precedence over the physical state of the input)	0 – no emulation, 1 – set open, 3 – set close	MSV	Register	R / W
230	460	E_Din2			MSV	Register	R / W
231	462	E_Din3			MSV	Register	R / W
232	464	E_Din4			MSV	Register	R / W
233	466	E_Din5			MSV	Register	R / W
234	468	E_Din6			MSV	Register	R / W
235	470	E_Din7			MSV	Register	R / W
236	472	E_Din8			MSV	Register	R / W
237	474	E_Din9			MSV	Register	R / W
238	476	E_Din10			MSV	Register	R / W
239	478	E_Din11			MSV	Register	R / W
240	480	E_Din12			MSV	Register	R / W
241	482	E_Din13			MSV	Register	R / W
242	484	E_Din14			MSV	Register	R / W
243	486	E_Din15			MSV	Register	R / W
244	488	E_Din16			MSV	Register	R / W
245	490	Em_Ain1	Emulation of analog inputs Ain1...Ain3 (when set to 1 takes precedence over the physical state of the input)	0 - inactive, 1 - active 1 = 256 (22 = 22*256 = 5632 = 0x1600)	MSV	Coil 7840	R / W
246	492	E_Ain1			AV	Register	R / W
247	494	Em_Ain2			MSV	Coil 7904	R / W
248	496	E_Ain2			AV	Register	R / W
249	498	Em_Ain3			MSV	Coil 7968	R / W
250	500	E_Ain3			AV	Register	R / W

251	502	Em_Ain4		0 - inactive, 1 - active	MSV	Coil 8032	R / W
252	504	E_Ain4		1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
253	506	Em_Ain5		0 - inactive, 1 - active	MSV	Coil 8096	R / W
254	508	E_Ain5		1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
255	510	Em_Ain6	Emulation of analog inputs Ain4...Ain8 (when set to 1 takes precedence over the physical state of the input)	0 - inactive, 1 - active	MSV	Coil 8160	R / W
256	512	E_Ain6		1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
257	514	Em_Ain7		0 - inactive, 1 - active	MSV	Coil 8224	R / W
258	516	E_Ain7		1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
259	518	Em_Ain8		0 - inactive, 1 - active	MSV	Coil 8288	R / W
260	520	E_Ain8		1 = 256 (22 = 22*256 = 5632 = 0x1600)	AV	Register	R / W
261	522	Em_Pt1	Emulation of PT1000 sensors inputs Pt1...Pt8 (when set to 1 takes precedence over the physical state of the input)	0 - inactive, 1 - active	MSV	Coil 8352	R / W
262	524	E_Pt1		1°C = 256 (22 °C = 22*256 = 5632 = 0x1600)	AV	Register	R / W
263	526	Em_Pt2		0 - inactive, 1 - active	MSV	Coil 8416	R / W
264	528	E_Pt2		1°C = 256 (22 °C = 22*256 = 5632 = 0x1600)	AV	Register	R / W
265	530	Em_Pt3		0 - inactive, 1 - active	MSV	Coil 8480	R / W
266	532	E_Pt3		1°C = 256 (22 °C = 22*256 = 5632 = 0x1600)	AV	Register	R / W
267	534	Em_Pt4		0 - inactive, 1 - active	MSV	Coil 8544	R / W
268	536	E_Pt4		1°C = 256 (22 °C = 22*256 = 5632 = 0x1600)	AV	Register	R / W
269	538	Em_Pt5		0 - inactive, 1 - active	MSV	Coil 8608	R / W
270	540	E_Pt5		1°C = 256 (22 °C = 22*256 = 5632 = 0x1600)	AV	Register	R / W
271	542	Em_Pt6		0 - inactive, 1 - active	MSV	Coil 8672	R / W
272	544	E_Pt6		1°C = 256 (22 °C = 22*256 = 5632 = 0x1600)	AV	Register	R / W
273	546	Em_Pt7		0 - inactive, 1 - active	MSV	Coil 8736	R / W
274	548	E_Pt7		1°C = 256 (22 °C = 22*256 = 5632 = 0x1600)	AV	Register	R / W
275	550	Em_Pt8		0 - inactive, 1 - active	MSV	Coil 8800	R / W
276	552	E_Pt8		1°C = 256 (22 °C = 22*256 = 5632 = 0x1600)	AV	Register	R / W
277	554	F_Dout1	Forcing of digital outputs Dout1...Dout3 (when set to 1 or 3 takes precedence over the settings SetDout, SetPermDout)	0 - no forcing, 1 - forcing Off, 3 - forcing On.	MSV	Register	R / W
278	556	F_Dout2			MSV	Register	R / W
279	558	F_Dout3			MSV	Register	R / W

280	560	F_Dout4	Forcing of digital outputs Dout4...Dout16 (when set to 1 or 3 takes precedence over the settings SetDout, SetPermDout)	0 – no forcing, 1 – forcing Off, 3 – forsing On.	MSV	Register	R / W	
281	562	F_Dout5			MSV	Register	R / W	
282	564	F_Dout6			MSV	Register	R / W	
283	566	F_Dout7			MSV	Register	R / W	
284	568	F_Dout8			MSV	Register	R / W	
285	570	F_Dout9			MSV	Register	R / W	
286	572	F_Dout10			MSV	Register	R / W	
287	574	F_Dout11			MSV	Register	R / W	
288	576	F_Dout12			MSV	Register	R / W	
289	578	F_Dout13			MSV	Register	R / W	
290	580	F_Dout14			MSV	Register	R / W	
291	582	F_Dout15			MSV	Register	R / W	
292	584	F_Dout16			MSV	Register	R / W	
293	586	Fo_Aout1			0 - inactive, 1 - active	MSV	Coil 9376	R / W
294	588	F_Aout1			1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
295	590	Fo_Aout2			0 - inactive, 1 - active	MSV	Coil 9440	R / W
296	592	F_Aout2			1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
297	594	Fo_Aout3			0 - inactive, 1 - active	MSV	Coil 9504	R / W
298	596	F_Aout3			1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
299	598	Fo_Aout4			0 - inactive, 1 - active	MSV	Coil 9568	R / W
300	600	F_Aout4			1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
301	602	Fo_Aout5			0 - inactive, 1 - active	MSV	Coil 9632	R / W
302	604	F_Aout5			1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
303	606	Fo_Aout6			0 - inactive, 1 - active	MSV	Coil 9696	R / W
304	608	F_Aout6			1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
305	610	Fo_Aout7			0 - inactive, 1 - active	MSV	Coil 9760	R / W
306	612	F_Aout7			1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
307	614	Fo_Aout8			0 - inactive, 1 - active	MSV	Coil 9824	R / W
308	616	F_Aout8			1V = 256 (10V = 10*256 = 2560 = 0xA00)	AV	Register	R / W
309	618	A_InEmul	Alarm of module inputs emulation ELPM...	0 – no alarm, 1 - alarm occurs	BV	Register	R	
310	620	A_OutForce	Alarm of module inputs forsing ELPM...	0 – no alarm, 1 - alarm occurs	BV	Register	R	

7. Setting and operation using HMI room unit

AP1v1 application of the ELPM modules has been equipped with the ability to configure by connecting the room unit HMI Advance to link RS485-1 and setting appropriate parameters menu (the order of menu items in accordance with the order and descriptions of the list of variables).



7.1 Main menu

Name	Default value	Description
Main menu	-	Reading the current status of the inputs/outputs and the ability to make output settings
Settings	-	It allows you to configure additional functions.
PL/EN	PL	Selecting the menu language (Polish/English).
v1.4 01-03-17 ELPM-...	-	The current version of the software and the module name