
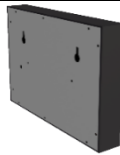



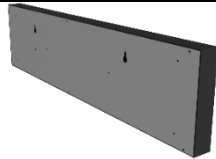

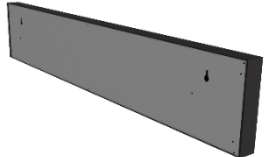


## E160 exterior LED display with 160 mm segments RED, GREEN, WHITE

	From the front	From the rear
<b>Name:</b> E160_2 <b>Dimensions:</b> 278 x 192 x 33 [mm] <b>Weight:</b> 1.2 kg <b>Power:</b> 12 - 26V DC / 12 W		
<b>Name:</b> E160_4 <b>Dimensions:</b> 530 x 192 x 33 [mm] <b>Weight:</b> 3.0 kg <b>Power:</b> 12 - 26V DC / 18 W		
<b>Name:</b> E160_6 <b>Dimensions:</b> 782 x 192 x 24 [mm] <b>Weight:</b> 4.5 kg <b>Power:</b> 12 - 26V DC / 26 W		
<b>Name:</b> E160_8 <b>Dimensions:</b> 1034 x 192 x 33 [mm] <b>Weight:</b> 6.0 kg <b>Power:</b> 12 - 26V DC / 34 W		

**Option: Optional cover color, Ethernet connection, control via binary inputs, control via Wifi, control via Radio 869Mhz, user program.**

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## 1. Design

Name	HWS version	Comment
E160_2	E160_2*	
E160_4	E160_4*	
E160_6	E160_6*	
E160_8	E160_8*	
E160_x	E160_x*	Reserve



## 2. Hardware

2.1 Hardware parameters	
Segment	LED, 160 mm height
Working temperature	-20°C +50°C
Working humidity	10 ÷ 90% Rh
Power	15 - 26V DC from 12 W (2 segment) to 34 W (8 segments)
Interface	Isolated RS485 – Modbus RTU
Comm. Speed	9600 or 115200 Bd
Design	Exterior, IP55
Setup	Via software Bootloader or via ModBus directly

2.2 Setup parameters, shown after Reset on the 0. and 1. segment		
Example for display with 4 segment		
	Displayed	Comment
1.		Address in hex. 70h = 112 dec
2.		Communication speed. 0 – 9600 1 – 115200
3.		Communication protocol. 4 – Modbus RTU

2.3 Sending parameters to RS485 after RESET		
	Parameters	Comment
1. row	112:RESET=4<cr><lf>	112 – address, 4 – Communication protocol

### 3. Wiring, standard cable length: 2m

Wire colour	Comment
Green	Ground
White	15 - 26V DC
Yellow	RS485 +
Brown	RS485 -

### 4. ModBus RTU communication protocol

4.1 Command 0x10 Write Multiple registers			
Register	Register name	Description	Notes
0	Luminosity and Dot	0000 LLLL 0000 DDDD	◆
1	0.1.	0. segment, 1. segment	ASCII
2	2.3.	2. segment, 3. segment	ASCII
3	4.5.	4. segment, 5. segment	ASCII
4	6.7.	5. segment, 7. segment	ASCII

◆LLLL	function	◆DDDD	place of DOT
0	Blank display	0	0.
1	Lowest Luminosity	1	1.
....		....	
7	Highest Luminosity	7	7.
8	Automatic Luminosity	other	DOT not displayed

4.2 Command 0x06 Write Registers			
Register	Register name	Description	Notes
100	Address	1 – 247	
101	Comm. speed	0 – 115200, 1 - 9600	Bd
107	Comm. Protocol	1 - INGSIMON 2 – HTML, 3 - MODBUS ASCII 4 – MODBUS RTU 5 – MODBUS TCP	

4.3 Command 0x03 Read Configuration Registers			
Register	Register name	Description	Units/Notes
100	Address	1 – 247	
101	Communication speed	0 – 115200, 1 - 9600	Bd
102	HWS version 0	Read Only	E1
103	HWS version 1	Read Only	60
104	HWS version 2	Read Only	4*
105	HWS version 3	Read Only	:1
106	HWS version 4	Read Only	.0
107	Comm. Protocol		4 – Modbus RTU

4.4 Default parameters		
Parameter	Value	Comment
Address	0x70h (112d)	
Communication speed	115200, N, 8,1	
Communication Protocol	0x04	MODBUS RTU

4.5 Range of address	
Addresses [dec]	Comment
1 – 247	For sensors
248 – 254	Reserve
255	Universal address – used only to read registers, Writing to registers does not work with this address

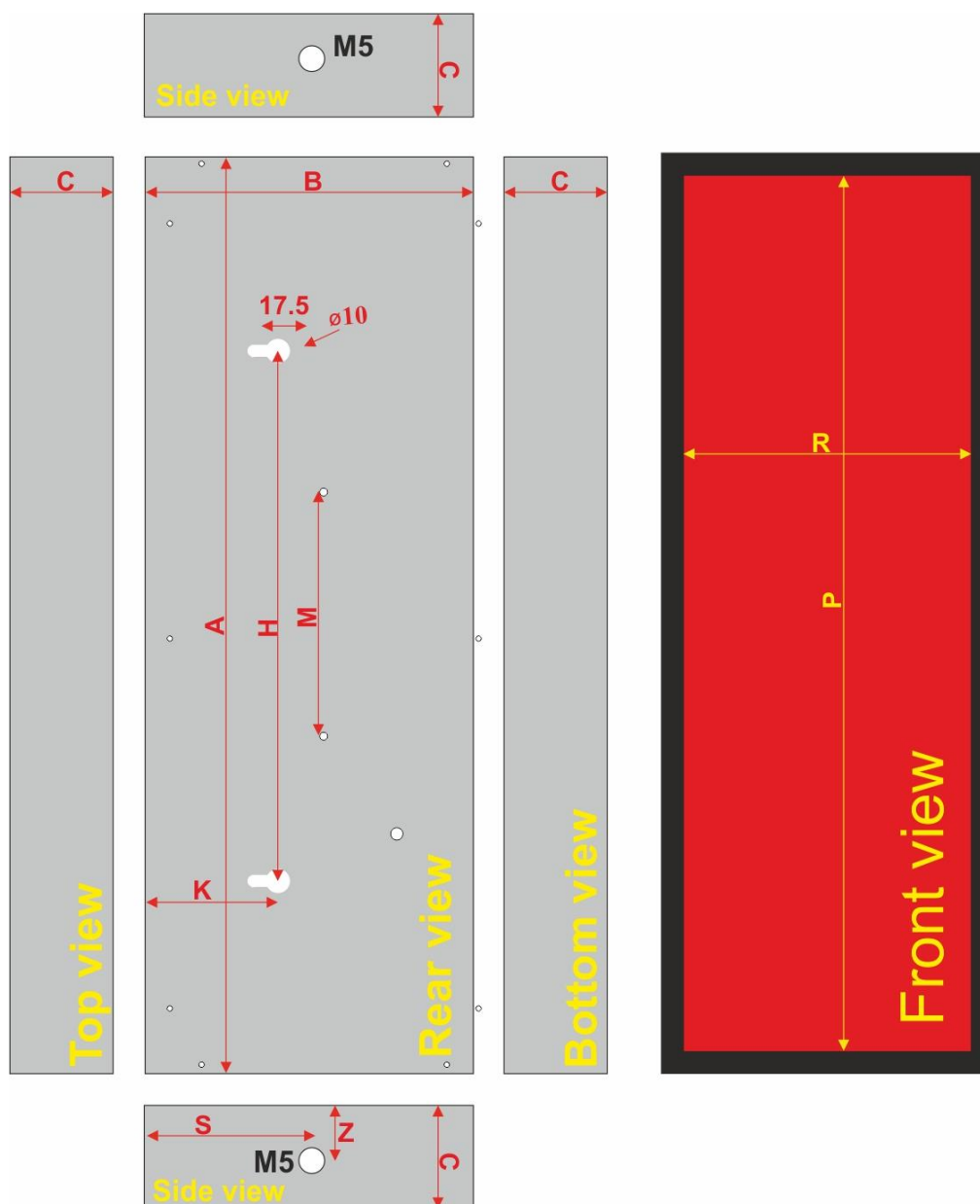
## 5. Examples for Modbus RTU

Example 5.1		
Set the communication speed from 115200 Bd to 9600 Bd for Address 0x70 (112 dec)		
Poll	70 06 00 65 00 01 52 F4	Response with 115200 Bd. In next communication will use 9600 Bd
Response	70 06 00 65 00 01 52 F4	
Example 5.2		
Set the communication speed from 9600 Bd to 115200 Bd for Address 0x70 (112 dec)		
Poll	70 06 00 65 00 00 93 34	Response with 9600 Bd. In next communication will use 115200 Bd
Response	70 06 00 65 00 00 93 34	
Example 5.3		
Read 8 registers from 100 from Address 0x70 (112 dec)		
Poll	70 03 00 64 00 08 0F 32	
Response	70 03 10 00 70 00 00 45 31 36 30 34 2A 3A 31 2E 30 00 04 48 3B	
<b>Meaning:</b>		
Byte [hex]	Description	Comment
70	Address	
03	function code	Read holding register
10	count of bytes (16 dec)	
00 70	Address	
00 00	communication speed	115200 Bd
45 31	E1	E1
36 30	60	60
34 2A	4*	4* - reserve
3A 31	:1	
2E 30	.0	
00 04	communication protocol	4 - MODBUS RTU
48 3B	Checksum	
Example 5.4		
Getting the current address using the universal address 0xFF		
<b>Be aware, that only 1 equipment can be connected to the Modbus network.</b>		
Poll	FF 03 00 64 00 01 D0 0B	Read register 100
Response	FF 03 02 00 70 90 74	70 – equipment's address
Example 5.5		
How to set the address. We want to change the address from 70h to 1h.		
<b>Be aware, that only 1 equipment can be connected to the Modbus network.</b>		
Poll	70 06 00 64 00 01 03 34	Write to register 100 value 1
Response	70 06 00 64 00 01 03 34	01 – equipment's new address
The next communication with the equipment will be at address 1		
Example 5.6		
Changing the address from 1h to 2h.		
<b>Be aware, that only 1 equipment can be connected to the Modbus network.</b>		
Poll	01 06 00 64 00 02 49 D4	Write to the register 100 value 2

<b>Response</b>	<b>01 06 00 64 00 02 49 D4</b>	<b>02 – equipment’s new address</b>
<b>The next communication with the equipment will be at address 2</b>		
<b>Example 5.7</b>		
<b>How to show 12.34 on the display E16004.</b>		
<b>Address: 0x70. Luminosity:3, Place of decimal point: 1</b>		
<b>Poll</b>	70 10 00 00 00 03 06 03 01 31 32 33 34 dc d6	
<b>Response</b>	70 10 00 00 00 03 8a e9	
<b>Example 5.8</b>		
<b>How to show 12.34 on the display E1604. CRC (dc d6) is replaced with universal CRC (XX) for test. It is possible to test from the serial terminal.</b>		
<b>Address: 0x70. Luminosity:3, Place of decimal point: 1</b>		
<b>Poll</b>	70 10 00 00 00 03 06 03 01 31 32 33 34 58 58	
<b>Response</b>	70 10 00 00 00 03 8a e9	
<b>Example 5.9</b>		
<b>How to show 123.45678 on the display E1608.</b>		
<b>Address: 0x70. Luminosity:4, Place of decimal point: 2</b>		
<b>Poll</b>	70 10 00 00 00 05 0a 04 02 31 32 33 34 35 36 37 38 b0 3a	
<b>Response</b>	70 10 00 00 00 05 0a eb	

## 6. Dimensions

Segment	A	B	C	D	E	F	H	K	M	S	Z	R	P
2	278	192	33				150	30		84	15	168	254
4	530	192	33				350	30		84	15	168	506
6	782	192	33				550	30		84	15	168	758
8	1034	192	33				750	30		84	15	168	1010



Real installtion



## 7. Displayed characters

0 – H				I - Z				Special			
	Dec	Hex	Disp.		Dec	Hex	Disp.		Dec	Hex	Disp.
0	48	30		I	73	49		SPACE	32	20	
1	49	31		J	74	4A		-	45	2D	
2	50	32		K	75	4B		TOPC	128	80	
3	51	33		L	76	4C		BOTC	129	81	
4	52	34		M	77	4D		D0	130	82	
5	53	35		N	78	4E		D1	131	83	
6	54	36		O	79	4F		D2	132	84	
7	55	37		P	80	50		D3	133	85	
8	56	38		Q	81	51		D4	134	86	
9	57	39		R	82	52		D5	135	87	
A	65	41		S	83	53		D6	136	88	
B	66	42		T	84	54		D7	137	89	
C	67	43		U	85	55					
D	68	44		V	86	56					
E	69	45		W	87	57					
F	70	46		X	88	58					
G	71	47		Y	89	59					
H	72	48		Z	90	5A					