

PPS - 10

Description of Communication Protocol ML V 3.0

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EXCETUTIVE SUMMARY

The document contains a detailed description of the communication protocol adapter using the serial RS232/485 interface and Ethernet



EDFelectronics

Woryny 11A, 44-200 Rybnik, Poland

http: www.edfelectronics.com , e-mail: info@edfelectronics.eu tel.: +48 604 343 504

1. Description Of The Protocol

The protocol works with following serial transmission parameters:

- transmission speed 2400, 4800, 9600, 19200, 38400, 57600, 115 200 b/s

NOTE: the same speed has to be set in device

- 8 data bits
- 1 stop bit
- no parity control

Frame Protocol takes a length of 10 bytes and has the following form:

Byte:	0	1	2	3	4	5... 8 (LSB...MSB)	9
Length:	1Byte	1Byte	1Byte	1Byte	1Byte	4Bytes (B5...B8)	1Byte
Command:	Header (0xAA)	Device Type	Device address	r/w	Function Code	Data	CRC

Field first (Byte 0) - header - is always the same - **0xAA** and it takes the value of one byte.

The second field (Byte 1) specifies the type of device:

0x01h – MPS500 Power Supply

0x02h – PPS10 Power Supply

0x03h – PPS20 Power Supply

0x04h – HPS300 Power Supply

0x05h – SW10 Sweeper Controller

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and takes the value of one byte.

The third field (Byte 2) defines the address of the device. The address is set in the device itself (see user manual of the device for details)

0x00h ... 0xFFh

and takes the value of one byte.

The fourth field (Byte 3) specifies the type of instruction - reading or writing:

0x10h – read

0x20h – write

and takes the value of one byte.

Field fifth (Byte 4) determines the type of functions including the division type of statement - the field (Byte 4). Takes the value of one byte.

Field sixth (Byte 5... 8) takes the length of four bytes always and is determined for each feature separately - see description of the protocol of the device.

The seventh field (Byte 9) determines the control of sent frame.

"modulo 256" method has been use for CRC calculation of the entire frame, except for field 1.

Takes the value of one byte.

2. Description of data commands

Pos.	Command:	Description	Data Byte:
"read" commands – sent to the device in order to receive the status			
1	10h	Read Errors	<p>B5:</p> <ul style="list-style-type: none"> b'00000000' – no errors, b'xxxxxxxx1' – interlock lost during Operation (when HV on) b'xxxxxxxx1x' – no interlock, b'xxxxxxxx1xx' – over temperature, b'xxxxx1xxx' – sensor brake (see corresponding device manuals for details), b'xxxx1xxxx' – sensor brake (see corresponding device manuals for details), b'xxx1xxxxx' – arcs detected (see corresponding device manuals for details), <p>B6: 0x00h B7: 0x00h B8: 0x00h</p>
2	20h	Read Timer	<p>xx:yy ; xx - minutes; yy - seconds; B6 (xx): 0x00h ... 0x63h (0...99 min) B5 (yy): 0x00h ... 0x3Bh (0 .. 59 sec) B7 – 0x00h B8 – 0x00h</p>
3	25h	Read Operating Mode	<p>B5: 0x10h - Timer mode or B5: 0x20h – No Timer Mode B6: 0x00h B7: 0x00h B8: 0x00h</p>
4	30h	Read Device Status	<p>B5:</p> <ul style="list-style-type: none"> b'xxxxxxxx1' – HV on b'xxxxxxxx1x' – '1' - timer operating mode; '0' – continue operating mode b'xxxxx1xx' – „Hardware Remote” operating mode b'xxxx1xxx' – BEEPER on b'xxx1xxxx' – operate mode – HV on b'xx1xxxxx' – HV output active ('1' HV1 active) b'x1xxxxxx' – HV output active ('1' HV2 active) b'1xxxxxxx' – interlock OK <p>B6:</p> <ul style="list-style-type: none"> b'xxxxxxxx1' – ARCs detected b'xxxxxxxx1x' – INTERNAL + EXTERNAL interlock type

			<p>b'xxxxx1xx' – ARCs detection ON b'xxxx1xxx' – PID regulation mode: '1' deltaT; '0' deltaT/T b'xxx1xxxx' – not implemented b'xx1xxxxx' – not implemented b'x1xxxxxx' – not implemented b'1xxxxxxx' – not implemented</p> <p>B7: 0x00h B8: 0x00h</p>
5	31h	Read Actual Temperature	<p>B5:0x00h..0x55h B6: 0x00h B7: 0x00h B8: 0x00h</p>
6	32h	Read "ARC of Time" parameter	<p>B5:0x00h..0xFFh B6: 0x00h..0xFFh B7: 0x00h..0x9Fh B8: 0x00h</p> <p>Value: 0 ... 65535,5 us</p>
7	33h	Read "ARC detect Delay" parameter	<p>B5:0x00h..0xFFh B6: 0x00h..0xFFh B7: 0x00h..0x04h B8: 0x00h</p> <p>Value: 0 ... 32767,5 us</p>
8	34h	Read "Arc Rate"	<p>B5:0x00h..0xFFh B6: 0x00h..0xFFh B7: 0x00h B8: 0x00h</p>
9	35h	Read Display Contrast	<p>B5:0x14h..0x64h B6: 0x00h B7: 0x00h B8: 0x00h</p> <p>Value: 20 ... 100%</p>
10	36h	Read Display Brightness	<p>B5:0x14h..0x64h B6: 0x00h B7: 0x00h B8: 0x00h</p> <p>Value: 20 ... 100%</p>
11	37h	Read VacuuGauge2 Type	<p>B5: 0x00 .. 0xFFh</p> <p>0x00h - CTR 90/91 0x01h - ANALOG</p>

			0x02h - TTR 211/216 0x03h - PTR 225/237 0x04h - PTR 90 0x05h - ITR 90 0x06h - ITR 100 0x07h - MKS 870B 0x08h - TTR - 091 0x09h - MKS-937A B6: 0x00h B7: 0x00h B8: 0x00h
12	40h	Read Actual HV Power	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x01h B7: 0x00h B8: 0x00h - power 0...500 W
13	41h	Read HV Power Preset Value	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x01h B7: 0x00h B8: 0x00h - power 0...500 W
14	42h	Read Actual HV Voltage	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x03h B7: 0x00h B8: 0x00h - voltage 0..1000V
15	43h	Read HV Voltage Preset Value	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x03h B7: 0x00h B8: 0x00h - voltage 0..1000V
16	44h	Read Actual HV Current	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x01h B7: 0x00h B8: 0x00h - current 0..500mA
17	45h	Read HV Current Preset Value	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x01h B7: 0x00h B8: 0x00h - current 0..500mA
18	46h	Read HV Power Limit	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x01h B7: 0x00h

			B8: 0x00h - power 0...500 W
19	47h	Read HV Voltage Limit	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x03h B7: 0x00h B8: 0x00h – voltage 0..1000V
20	48h	Read HV Current Limit	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x01h B7: 0x00h B8: 0x00h – current 0..500mA
21	49h	Read Software Version	Format: X.Y.Z B5: 0x00 .. 0xFFh (X) B6: 0x00 .. 0xFFh (Y) B7: 0x00 .. 0xFFh (Z) B8: 0x00h
22	4Ah	Read Vacuum Gauge 1 Value	B5: 0x00h...0x0C – exp B6: 0x00h or 0x01h – exponent sign (1 -> “-“) B7: 0x00h ... 0xFFh – LSB of mantissa B8: 0x00h ... 0x03h – MSB of mantissa (1.00 .. 9.99)
23	4Bh	Read Vacuum Gauge1 setpoint low LO	B5: 0x00h...0x0C – exp B6: 0x00h or 0x01h – exponent sign (1 -> “-“) B7: 0x00h ... 0xFFh – LSB of mantissa B8: 0x00h ... 0x03h – MSB of mantissa (1.00 .. 9.99)
24	4Ch	Read Vacuum Gauge1 setpoint High HI	B5: 0x00h...0x0C – exp B6: 0x00h or 0x01h – exponent sign (1 -> “-“) B7: 0x00h ... 0xFFh – LSB of mantissa B8: 0x00h ... 0x03h – MSB of mantissa (1.00 .. 9.99)
25	4Dh	Read Vacuum Gauge2 Value	B5: 0x00h...0x0C – exp B6: 0x00h or 0x01h – exponent sign (1 -> “-“) B7: 0x00h ... 0xFFh – LSB of mantissa B8: 0x00h ... 0x03h – MSB of mantissa (1.00 .. 9.99)
26	4Eh	Read Vacuum Gauge2 setpoint low LO	B5: 0x00h...0x0C – exp B6: 0x00h or 0x01h – exponent sign (1 -> “-“) B7: 0x00h ... 0xFFh – LSB of mantissa B8: 0x00h ... 0x03h – MSB of mantissa (1.00 .. 9.99)
27	4Fh	Read Vacuum Gauge2 setpoint High HI	B5: 0x00h...0x0C – exp B6: 0x00h or 0x01h – exponent sign (1 -> “-“) B7: 0x00h ... 0xFFh – LSB of mantissa B8: 0x00h ... 0x03h – MSB of mantissa (1.00 .. 9.99)
28	50h	Read Power Ramp	Format: B5,B6 – value; B7 - unit B5: 0x00 .. 0xFFh LSB B6: 0x00 .. 0x01h MSB B7: 0x00h – W/s unit

			0x01h – W/min 0x02h – W/hour B8: 0x00h - power 0...500 W
29	51h	Read Voltage Ramp	Format: B5,B6 – value; B7 - unit B5: 0x00 .. 0xFFh LSB B6: 0x00 .. 0x03h MSB B7: 0x00h – V/s unit 0x01h – V/min 0x02h – V/hour B8: 0x00h - Voltage 0...1000 V
30	52h	Read Current Ramp	Format: B5,B6 – value; B7 - unit B5: 0x00 .. 0xFFh LSB B6: 0x00 .. 0x01h MSB B7: 0x00h – W/s unit 0x01h – W/min 0x02h – W/hour B8: 0x00h - current 0...500 mA
31	53h	Read P parameter of PID controller	B5: 0x00 .. 0xFFh B6: 0x00 .. 0xFFh B7: 0x00h B8: 0x00h – value 0..65535
32	54h	Read I parameter of PID controller	B5: 0x00 .. 0xFFh B6: 0x00 .. 0xFFh B7: 0x00h B8: 0x00h – value 0..65535
33	55h	Read Set PID regulation mode	B5: 0x00h – deltaT mode 0x01h – deltaT/T B6: 0x00h B7: 0x00h B8: 0x00h
34	56h	Read HV Stabilisation Mode	B5: 0x01 – Power Stabilisation Mode or B5: 0x02 – Voltage Stabilisation Mode or B5: 0x03 – Current Stabilisation Mode B6: 0x00h - ignore B7: 0x00h - ignore B8: 0x00h - ignore
35	58h	Read Software Remote mode	B5: 0x00h – Software Remote not possible – read only or 0x01h – Device set to “Software Remote” B6: 0x00h B7: 0x00h

			B8: 0x00h
36	60h	Read HV1 or HV2 output active	B5: 0x01h - HV1 active; 0x02h – HV2 active; 0x03h - HV1 + HV2 active; B6: 0x00h B7: 0x00h B8: 0x00h
37	61h	Read Device Master or Slave	B5: 0x00h – Slave 0x01h – Master B6: 0x00h B7: 0x00h B8: 0x00h
"write" commands – sent to the device to control			
1	10h	Device reset	
2	20h	Set Timer	xx:yy ; xx - minutes; yy - seconds; B6 (xx): 0x00h ... 0x63h (0...99 min) B5 (yy): 0x00h ... 0x3Bh (0 .. 59 sec) B7 – 0x00h B8 – 0x00h
3	25h	Set Operating Mode	B5: 0x10h - Timer mode or B5: 0x20h – No Timer Mode (Manual Operating) B6: 0x00h B7: 0x00h B8: 0x00h
4	32h	Set “ARC of Time” parameter	B5: 0x00h..0xFFh B6: 0x00h..0xFFh B7: 0x00h..0x9Fh B8: 0x00h Value: 0 ... 65535,5 us
5	33h	Set “ARC detect Delay” parameter	B5: 0x00h..0xFFh B6: 0x00h..0xFFh B7: 0x00h..0x04h B8: 0x00h Value: 0 ... 32767,5 us
6	34h	Set Display Contrast	B5: 0x14h..0x64h B6: 0x00h B7: 0x00h B8: 0x00h Value: 20 ... 100%
7	35h	Set Display Brightness	B5: 0x14h..0x64h B6: 0x00h B7: 0x00h B8: 0x00h

			Value: 20 ... 100%
8	4Bh	Set Vacuum Gauge1 setpoint low LO	B5: 0x00h...0x0C – exp B6: 0x00h or 0x01h – exponent sign (1 -> “-“) B7: 0x00h ... 0xFFh – LSB of mantissa B8: 0x00h ... 0x03h – MSB of mantissa (1.00 .. 9.99)
9	4Ch	Set Vacuum Gauge1 setpoint High HI	B5: 0x00h...0x0C – exp B6: 0x00h or 0x01h – exponent sign (1 -> “-“) B7: 0x00h ... 0xFFh – LSB of mantissa B8: 0x00h ... 0x03h – MSB of mantissa (1.00 .. 9.99)
10	4Eh	Set Vacuum Gauge2 setpoint low LO	B5: 0x00h...0x0C – exp B6: 0x00h or 0x01h – exponent sign (1 -> “-“) B7: 0x00h ... 0xFFh – LSB of mantissa B8: 0x00h ... 0x03h – MSB of mantissa (1.00 .. 9.99)
11	4Fh	Set Vacuum Gauge2 setpoint High HI	B5: 0x00h...0x0C – exp B6: 0x00h or 0x01h – exponent sign (1 -> “-“) B7: 0x00h ... 0xFFh – LSB of mantissa B8: 0x00h ... 0x03h – MSB of mantissa (1.00 .. 9.99)
12	41h	Set HV Power	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x01h B7: 0x00h B8: 0x00h - power 0...500 W
13	43h	Set HV Voltage	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x03h B7: 0x00h B8: 0x00h - voltage 0..1000V
14	45h	Set HV Current	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x01h B7: 0x00h B8: 0x00h - current 0..500mA
15	46h	Set HV Power Limit	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x01h B7: 0x00h B8: 0x00h - power 0...500 W
16	47h	Set HV Voltage Limit	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x03h B7: 0x00h B8: 0x00h - voltage 0..1000V
17	48h	Set HV Current Limit	B5: 0x00 .. 0xFFh B6: 0x00 .. 0x01h B7: 0x00h

			B8: 0x00h – current 0..500mA
18	50h	Set Power Ramp and unit	Format: B5,B6 – value; B7 - unit B5: 0x00 .. 0xFFh LSB B6: 0x00 .. 0x01h MSB B7: 0x00h – W/s unit 0x01h – W/min unit 0x02h – W/hour unit B8: 0x00h - power 0...500 W
19	51h	Set Voltage Ramp	Format: B5,B6 – value; B7 - unit B5: 0x00 .. 0xFFh LSB B6: 0x00 .. 0x03h MSB B7: 0x00h – V/s unit 0x01h – V/min 0x02h – V/hour B8: 0x00h - Voltage 0...1000 V
20	52h	Set Current Ramp	Format: B5,B6 – value; B7 - unit B5: 0x00 .. 0xFFh LSB B6: 0x00 .. 0x01h MSB B7: 0x00h – W/s unit 0x01h – W/min 0x02h – W/hour B8: 0x00h - current 0...500 mA
21	53h	Set P parameter of PID controller	B5: 0x00 .. 0xFFh B6: 0x00 .. 0xFFh B7: 0x00h B8: 0x00h – value 0..65535
22	54h	Set I parameter of PID controller	B5: 0x00 .. 0xFFh B6: 0x00 .. 0xFFh B7: 0x00h B8: 0x00h – value 0..65535
23	55h	Set PID regulation mode	B5: 0x00h – deltaT mode 0x01h – deltaT/T B6: 0x00h B7: 0x00h B8: 0x00h
24	56h	Set HV Stabilisation Mode	B5: 0x01 – Power Stabilisation Mode or 0x02 – Voltage Stabilisation Mode or 0x03 – Current Stabilisation Mode B6: 0x00h B7: 0x00h

			B8: 0x00h
25	59h	HV ON/OFF - operate	B5: 0x10h - HV ON or B5: 0x20h – HV OFF B6: 0x00h B7: 0x00h B8: 0x00h
26	60h	Set HV1 or HV2 output active	B5: 0x01h - HV1 active; 0x02h – HV2 active; 0x03h - HV1 + HV2 active; B6: 0x00h B7: 0x00h B8: 0x00h
27	61h	Set Device to Master or Slave	B5: 0x00h – Slave ; 0x01h – Master B6: 0x00h B7: 0x00h B8: 0x00h

2.1 Examples of protocol for PPS10 power supply

Power supply PPS10 address 05h – address must be set in the device via user interface:

1. Temperature reading (eg. **27** deg):

AAh 01h 05h 10h **31h** 47h

Example In response:

AAh 01h 05h 10h 31h **1Bh** 00h 00h 00h 62h

2. Timer reading:

AAh 01h 05h 10h **20h** 36h

3. Status reading:

AAh 01h 05h 10h **30h** 46h

4. Errors reading:

AAh 01h 05h 10h **10h** 26h

5. HV Power reading:

AAh 01h 05h 10h **40h** 56h

6. Firmware version reading:

AAh 01h 05h 10h **52h** 68h

7. Reset the device:

AAh 01h 05h 20h **10h** 36h

8. Set HV power to 25W

AAh	01h	05h	20h	41h	19h	00h	00h	00h	80h
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9. Set Timer to: 10mm 00 ss

AAh	01h	05h	20h	20h	0Ah	00h	00h	00h	50h
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10. Set operating mode – No Timer mode:

AAh	01h	05h	20h	25h	20h	00h	00h	00h	6Bh
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11. Turn the High Voltage ON: HV ON

AAh	01h	05h	20h	59h	10h	00h	00h	00h	8F
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12. Turn the High Voltage OFF: HV OFF

AAh	01h	05h	20h	59h	20h	00h	00h	00h	9F
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