

Pegasor PPS-G2 sensor, ASCII protocol

1.9.2025

Messages from sensor and commands to the sensor uses same ASCII-packet frame.

Bitrate is 115200 bps, 8 data bits, no parity, 1 stop bit.

Packet frame

Start	length	DATA	Chksum	End of frame
1 char	2 chars	0-255 chars	4 chars	1 char
STX (0x02)	28	0107F02200000EC903F2011D023201F712345678	08B7	ETX (0x03)

length = num of characters in data-field, 2 character hex number, uppercase letters

data = printable characters, 0 to 255 characters

chksum = 16bit sum of ascii values of <data> and <length> -fields, 4 character hex number (uppercase)

List of messages (from device) / commands (to device)

Type	Code	Desc.
Msg	0x01	Measurement Data
Msg	0x02	Diagnostic Data
Msg	0x03	Additional Meas Data
Cmd	0x04	Query Serial number
Cmd	0x05	Query Data
Cmd	0x06	Query User Calibration N
Cmd	0x07	Write User Calibration N
Msg	0x08	User Calibration N
Cmd	0x09	Query Maintenance timer
Msg	0x0A	Maintenance Timer
Cmd	0x0B	Reset Maintenance timer
Cmd	0x0C	Write Maintenance Timer limit
Cmd	0x0D	Enable High Voltage
Cmd	0x0E	Disable High Voltage
Cmd	0x0F	Query User Calibration M
Cmd	0x10	Write User Calibration M
Msg	0x11	User Calibration M
Cmd	0x12	Query User Calibration LDSA
Cmd	0x13	Write User Calibration LDSA
Msg	0x14	User Calibration LDSA
Cmd	0x20	Start Zero Check

Msg	0x21	Zeroing status
Cmd	0x22	Query Diagnostic data
Cmd	0x23	Query Factory Calibration (particle number)
Cmd	0x24	Write Factory Calibration (particle number)
Msg	0x25	Factory Calibration (particle number)
Cmd	0x26	Set Heater
Cmd	0x27	Query Heater State
Msg	0x28	Heater Status
Msg	0x81	Serial number

Messages from device

Measurement Data 0x01

```

.----- uint8_t 0x01, Msg id
| .----- uint8_t 0x07, Status 1
| | .----- uint8_t 0xf0, Status 2
| | | .----- uint8_t 34, relative humidity [%]
| | | | .----- int32_t 3785, measurement [# /cm³]
| | | | | .----- int16_t 101.0, pressure [0.1 kPa]
| | | | | .----- int16_t 28.5, Air Temp [0.1 °C]
| | | | | .----- int16_t 56.2, Board Temp [0.1 °C]
| | | | | .----- int16_t 503, CMD [1 nm]
| | | | | .- uint32_t, running index (100Hz)
0107F02200000EC903F2011D023201F712345678 (example data)

```

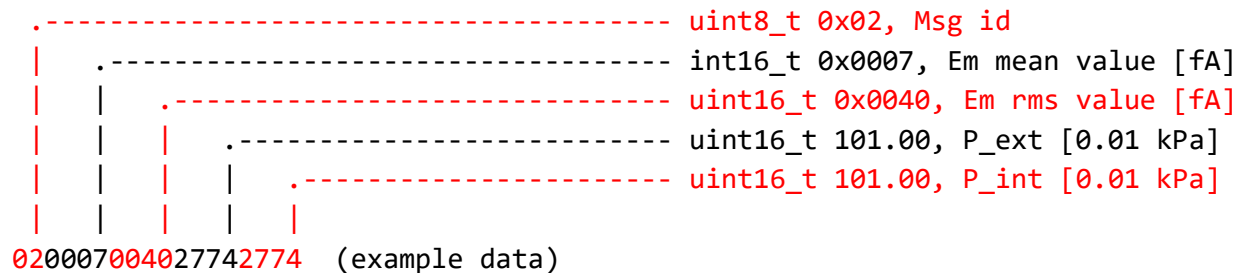
Status1 bit0 1 = Corona current low
 bit1 1 = trap voltage error (too low or high)
 bit2 1 = pressure low
 bit3 1 = humidity high
 bit4 1 = impedance low
 bit5 1 = flow out of range
 bit6 1 = service needed
 bit7 reserved

Status2 bit0 1 = measurement not valid
 bit1 1 = startup sequence running
 bit2 1 = impedance test running
 bit3 1 = zeroing running
 bit4 1 = High voltage disabled (by command)
 bit5-7 reserved

The particle measurement value [# /cm³] is averaged over period between data messages. So the polling (mode 0) or streaming (modes 01, 02) also defines the averaging period.

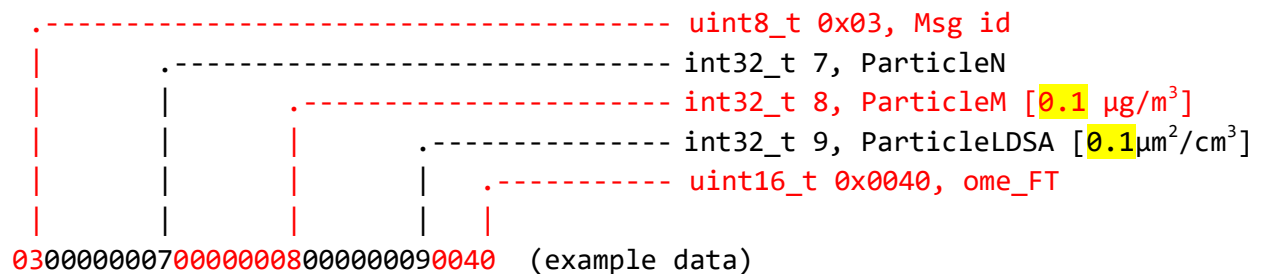
Poll mode 03 uses fixed 1 second averaging - regardless of the polling rate.

Diagnostic Data 0x02

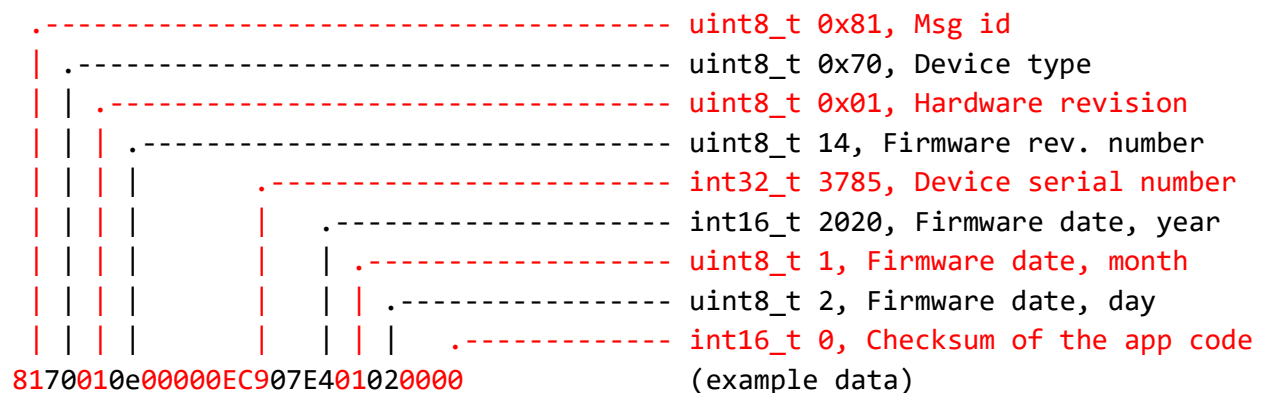


Electrometer mean and rms values are calculated over 1 second period.

Additional Measurement Data 0x03



Serial number message 0x81



User N Calibration message 0x08

```
.----- uint8_t 0x08, Msg id
|          .----- uint32_t calibration value U
0801000000
```

Measured particle number (in 0x01 message) is calculated as $N = \text{meas} * U / 0x1000000$

Maintenance Timer message 0x0A

```
.----- uint8_t 0x0A, Msg id
|          .----- uint32_t counter fAh
|          |          .----- uint32_t limit fAh
|          |          |          .----- uint32_t time, seconds
0A00000000C000044E7000F4240
```

User M Calibration message 0x11

```
.----- uint8_t 0x11, Msg id
|          .----- uint32_t calibration value U
1101000000
```

Measured particle number (in 0x01 message) is calculated as $M = \text{meas} * U / 0x1000000$

User LDSA Calibration message 0x14

```
.----- uint8_t 0x14, Msg id
|          .----- uint32_t calibration value U
1401000000
```

Measured particle number (in 0x01 message) is calculated as $LDSA = \text{meas} * U / 0x1000000$

Zeroing status message 0x21

```

.----- uint8_t 0x21, Msg id
| .----- uint16_t 0x0, errors
| | .----- int16_t 0x01, Zero Level [fA]
| | | .----- uint16_t 0x1389, Impedance [MΩ]
21000000011389 (example data)
```

Error Bits 0 – no signal (sets flow error on data message status1)
 1 – no flow (sets flow error on data message status1)
 2 - Offset (zero level) high (>10000)
 3 – Impedance low (< 500 MΩ)

This message is sent when zeroing cycle is finished.

Factory Calibration message 0x25

```

.----- uint8_t 0x25, Msg id
| .----- uint32_t calibration value U
2500000000
```

Heater Status message 0x28

```

.----- uint8_t 0x28, Msg id
| .----- uint8_t bit0: 0=heater off, 1=on
| | bit1: 1=heating on
| | .----- int16_t Limit [0.1°C]
| | | .----- int16_t Board Temp [0.1°C]
2800015E011D (example data)
```

Commands to the device

Query Serial number 0x04

```
.----- uint8_t 0x04, Msg id  
04
```

Device responds with 0x81 message.

Query Data 0x05

```
.----- uint8_t 0x05, Msg id  
| .----- uint8_t 0x02, data query mode  
0502
```

Query modes:

- 0 – respond with data message 0x01
- 1 – 1Hz auto send data message 0x01 (default operation)
- 2 – 10Hz auto send data message 0x01
- 3 – single response (0x01) with fixed 1 second averaging period
- 4 – respond with data message 0x01 & 0x03
- 5 – 1Hz auto send data message 0x01 & 0x03
- 6 – 10Hz auto send data message 0x01 & 0x03
- 7 – single response (0x01 & 0x03) with fixed 1 second averaging period

Query User N Calibration 0x06

```
.----- uint8_t 0x06, Msg id  
06
```

Device responds with User Calibration message 0x08

Write User N Calibration 0x07

```
.----- uint8_t 0x07, Msg id
|          .----- uint32_t calibration value U
0701000000
```

Measured particle number is calculated as $N = \text{meas} * U / 0x1000000$

Example: $U = 0x00fe1020 \Rightarrow \text{effective coefficient} = 0x00fe1020 / 0x1000000 = 0.9924335$

Device responds with User Calibration message 0x08. Value is stored to non-volatile memory.

Query Maintenance timer 0x09

```
.----- uint8_t 0x09, Msg id
09
```

Device responds with Maintenance timer message 0x0a

Reset Maintenance timer 0x0b

```
.----- uint8_t 0x0b, Msg id
0B
```

Device resets the maintenance timer's counter and time and responds with Maintenance timer message 0x0a

Write Maintenance Timer limit 0x0c

```
.----- uint8_t 0x0c, Msg id
|          .----- uint32_t limit value [fAh]
0C010F4240
```

Devices set new limit value and responds with Maintenance timer message 0x0a.

Enable High Voltage 0x0d

```
.----- uint8_t 0x0D, Msg id
0D
```

High voltage supply is enabled, Status2 bit4 is cleared

Disable High Voltage 0x0e

```
.----- uint8_t 0x0E, Msg id
0E
```

High voltage supply is disabled, Status2 bit4 is set

Query User M Calibration 0x0F

```
.----- uint8_t 0x0F, Msg id
0F
```

Device responds with User Calibration M message 0x11

Write User M Calibration 0x10

```
.----- uint8_t 0x10, Msg id
| .----- uint32_t calibration value U
1001000000
```

Measured particle number is calculated as $M = \text{meas} * U / 0x1000000$

Example: $U = 0x00fe1020 \Rightarrow \text{effective coefficient} = 0x00fe1020 / 0x1000000 = 0.9924335$

Query User LDSA Calibration 0x12

```
.----- uint8_t 0x12, Msg id
12
```

Device responds with User Calibration message 0x14

Write User LDSA Calibration 0x13

```
.----- uint8_t 0x13, Msg id
| .----- uint32_t calibration value U
1301000000
```

Measured particle number is calculated as $LDSA = \text{meas} * U / 0x1000000$

Example: $U = 0x00fe1020 \Rightarrow \text{effective coefficient} = 0x00fe1020 / 0x1000000 = 0.9924335$

Start Zero Check 0x20

.----- uint8_t 0x20, Msg id
20

Device starts averaging its measurement value. Bit 3 in Status2 byte (measurement data message 0x01) is set to 1. When averaging period is done, new zero level is applied to outputted measurement value and the status bit is cleared in data message.

0x21 (Zeroing Status Msg) message is sent after zeroing cycle.

Query Diagnostic Data 0x22

.----- uint8_t 0x22, Msg id
22

Device responds with latest diagnostic data 0x22

Query Factory Calibration 0x23

.----- uint8_t 0x23, Msg id
23

Device responds with Factory Calibration message 0x25

Write Factory Calibration 0x24

.----- uint8_t 0x24, Msg id
| .----- uint32_t calibration value U
2400000000

Set Heater 0x26

.----- uint8_t 0x26, Msg id
| .----- uint8_t 0=heater off, 1=on
| | .----- int16_t Limit [0.1°C]
| | |
2600015E

Query Heater Status 0x27

.----- uint8_t 0x27, Msg id
27

Device responds with Heater Status message 0x28

History

- 1.9.2025 - Heater status message updated
- 17.10.2024 - 0x03-msg, M & LDSA units changed to 0.1
- 2.10.2023 - Additional meas data 0x03 updated (M & LDSA added)
- Added new user calib commands for M & LDSA (0x0f ... 0x14)