

Modbus Configuration

MODBUS PROTOCOL

Modbus is a Master-Slave protocol that is widely used as an industry standard. It is simple, efficient and reliable. It can be easily used to access and collect data or exchange information between digital systems over a serial line local bus (and with its TCP/IP extension through a LAN or World Wide Web).

Please refer to specific detailed documentation and implementations freely available at www.modbus.org

SM PRO is a Modbus RTU slave that implements the following standard access functions:

Function code	Description
0x03	READ HOLDING REGISTERS
0x04	READ INPUT REGISTERS
0x06	WRITE SINGLE REGISTER
0x10	WRITE MULTIPLE REGISTERS

Tab. 2

Please note that in the current implementation of SM PRO function codes 0x03 and 0x04 are equivalent and address the same data area.

Data is accessible through Modbus's functions by 16 bits units called "registers". In the current implementation of SM PRO these registers are available:

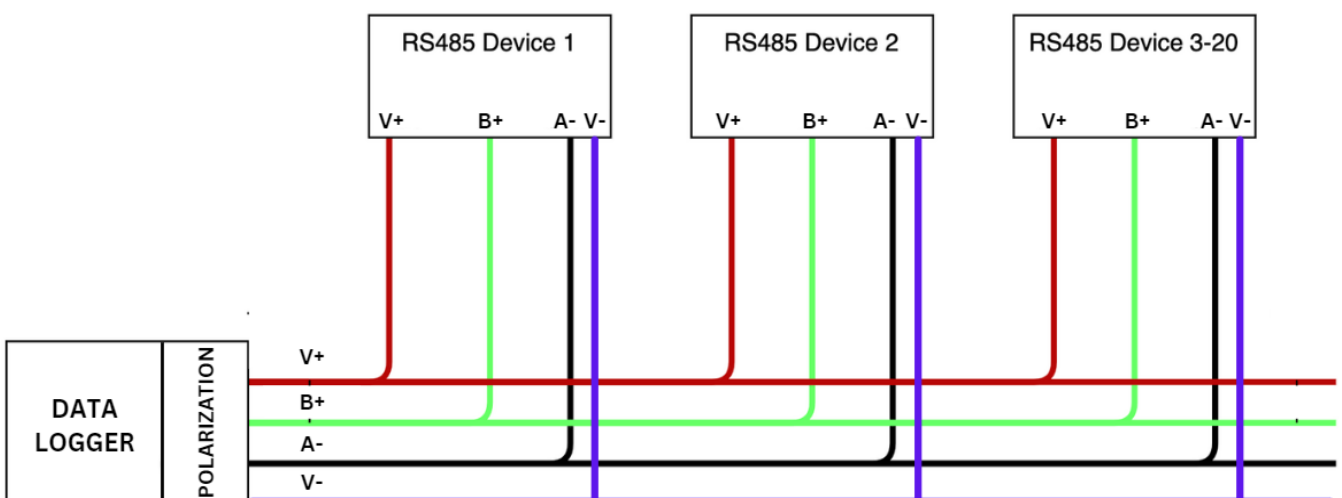
Register #	Description	Access	NV save																
0x0101 or 0x0201	Current irradiance level [W/m ²]	R																	
0x0102	Current PT100 temperature [°C], 2-complement value, fixed point 14.2 format (14 bits integer, 2 bits fractional)	R																	
0x0103	Status , bit coded <table border="1" data-bbox="287 1164 1228 1657"> <thead> <tr> <th>Bit</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Factory calibration/configuration 1 = OK; 0 = need recalibration</td> </tr> <tr> <td>1</td> <td>Not volatile parameters 1 = OK; 0 = default loaded, need to be changed/saved</td> </tr> <tr> <td>2</td> <td>Digital input monitor 1 = not active (open); 0 = active (shorted to GND)</td> </tr> <tr> <td>3</td> <td>PT100 RTD element 1 = OK; 0 = shorted or open circuit (not present/malfunctioning)</td> </tr> <tr> <td>4</td> <td>Analog output 1 = OK; 0 = output current can't flow at desired level due to wire break/high load impedance/output voltage approaching positive supply</td> </tr> <tr> <td>5</td> <td>Watchdog 1 = reset by watchdog timeout occurred; 0 = normal operation</td> </tr> <tr> <td colspan="2">All undefined bits read as 0</td> </tr> </tbody> </table>	Bit	Description	0	Factory calibration/configuration 1 = OK; 0 = need recalibration	1	Not volatile parameters 1 = OK; 0 = default loaded, need to be changed/saved	2	Digital input monitor 1 = not active (open); 0 = active (shorted to GND)	3	PT100 RTD element 1 = OK; 0 = shorted or open circuit (not present/malfunctioning)	4	Analog output 1 = OK; 0 = output current can't flow at desired level due to wire break/high load impedance/output voltage approaching positive supply	5	Watchdog 1 = reset by watchdog timeout occurred; 0 = normal operation	All undefined bits read as 0		R	
Bit	Description																		
0	Factory calibration/configuration 1 = OK; 0 = need recalibration																		
1	Not volatile parameters 1 = OK; 0 = default loaded, need to be changed/saved																		
2	Digital input monitor 1 = not active (open); 0 = active (shorted to GND)																		
3	PT100 RTD element 1 = OK; 0 = shorted or open circuit (not present/malfunctioning)																		
4	Analog output 1 = OK; 0 = output current can't flow at desired level due to wire break/high load impedance/output voltage approaching positive supply																		
5	Watchdog 1 = reset by watchdog timeout occurred; 0 = normal operation																		
All undefined bits read as 0																			
0x0104	WindSpeed , instant wind speed, unsigned fixed point 10.6	R																	
0x0202	Current PT100 temperature [°C], Module temperature multipl. By 10 (to get value in °C divide by 10)	R																	
0x0204	WindSpeed [m/s], current wind speed multipl. By 10 (to get value in m/s divide by 10)	R																	
0x8031	Constant for digital pulse, unsigned fixed point 5.11	W	Y																
0x8001	Serial number , least significant word	R																	
0x8002	Serial number , most significant word	R																	
0x8003	Firmware main version , hexadecimal	R																	
0x8004	Firmware minor version , hexadecimal	R																	
0x8005	Node address , range 1 ÷ 247, decimal, default 1	R/W	Y																

0x8006	Bitrate , coded, range 0 ÷ 4, decimal, default 1 0 – 9600 bps 1 – 19200 bps 2 – 38400 bps 3 – 57600 bps 4 – 115200 bps	R/W	Y
0x8007	Serial configuration , coded, range 0 ÷ 3, decimal, default 0 0 – 8N1 (8 bit / no parity / 1 stop bit) 1 – 8E1 (8 bit / even parity / 1 stop bit) 2 – 8O1 (8 bit / odd parity / 1 stop bit) 3 – 8N2 (8 bit / no parity / 2 stop bit)	R/W	Y
0x8008	Serial reply delay [ms] , range 0 ÷ 100, decimal, default 1	R/W	Y
0x800B	PT100 RTD reading enable , coded, range 0 ÷ 1, decimal, default 1 0 – disabled 1 – enabled	R/W	Y
0x8101	Not volatile params save command , write 1 to execute (then wait 1 s before to send next message)	W	
0x8102	Software reset command , write 1 to execute (then wait 6 s before to send next message)	W	

Please note that, conventionally, Modbus register's numbering starts from 1 but register's addressing start from 0 so, to obtain the register's address you had simply to subtract 1 from its number. That's meaningful depending on, as a master, you are using a high level Modbus utility/program (that normally refers to the registers' number) or a low level driver (that normally directly works with addresses).

MODBUS – MORE INFORMATION

- For troubleshooting and information about MODBUS protocol kindly visit <https://modbus.org/> even for recommendations on polarization. Kindly check the general schema of the MODBUS RS485 protocol given below.



- In case if you have a bad communication and in order to have a right polarization, follow

this formula for calculating the voltages B+ and A- for finding out if the connections satisfy the condition

$$V_{B+} - V_{A-} \geq 0.2 \text{ V}$$

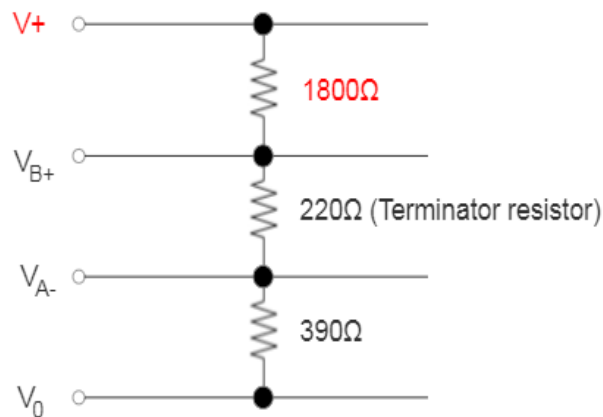
Voltage in B+ is equal to $\frac{(R_2 + R_3)}{(R_1 + R_2 + R_3)} * (V+)$

Voltage in A- is equal to $\frac{(R_3)}{(R_1 + R_2 + R_3)} * (V+)$

Where R_1 , R_2 and R_3 are the three resistors.

$V+$ is the supply voltage

Example for 12V



Example for 24V

