

Installation Instructions

Modbus MTOL+ Specification¹

Software Version: 1510

1. Commands Implemented

1.1 Coils

These single-bit values are readable and changeable from the master. The data will be returned with the lowest addressed coil in the LSB of the data. Unused bits in the data will be set to 0. True is a 1 and False is a 0.

1.1.1 Valid Command(s)

Call customer support if you need assistance with technical details.

Code	Name	Broadcast?
0x01	Read Coil Status	No
0x05	Force Single Coil	Yes

1.1.2 Format

16-bit word format

MSB															LSB
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

1.1.3 Valid Addresses

00001 – 00004, 00200

1.1.4 Definitions

Address	Function	Default
00001	Offset added	False
00002	Flow alarm selected	False
00003	Access code enabled	False
00004	Auto-cleaning enabled	False

1.2 Input Status

These single-bit values are readable from the master. The data will be returned with the lowest addressed input status in the LSB of the data. Unused bits in the data will be set to 0.

1.2.1 Valid Command(s)

Code	Name	Broadcast?
0x02	Read Input Status	No

1.2.2 Format

16-bit word format

MSB															LSB
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

1.2.3 Valid Addresses

10001 – 10005, 10200 - 10204

¹ From *Modicon Modbus Protocol Reference Guide*, PI-MBUS-300 Rev. J

WARNING



Read this Manual **BEFORE** using the equipment.
Do not use unless you know the safe and proper operation of this equipment. Keep this manual available for easy access by all users. Replacement manuals are available at HFscientific.com.



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1.2.4 Definitions

Address	Function
10001	Instrument error
10002	Alarm 1 active
10003	Alarm 2 active
10004	Calibration error
10005	Desiccant error
10006	Dew Point error

1.3 Holding Registers

These 16-bit values are readable and changeable from the master. The data is stored and transmitted with the MSB first and then the LSB.

1.3.1 Valid Command(s)

Code	Name	Broadcast?
0x03	Read Holding Registers	No
0x06	Preset Single Register	Yes
0x16	Preset Multiple Registers	Yes

1.3.2 Format

Float – based on IEEE-754 stored in two consecutive addresses, with the first address containing the most significant word (sign, exponent, and upper part of mantissa) and the second address containing the least significant word (lower upper part of mantissa).

1.3.3 Valid Addresses

40001 – 40055, 40200 - 40219

1.3.4 Definitions

Address	Type	Register	Value	Default	Function
40001, 40002	Float	Offset value	-	0.0	0.0 – 2.0
40003	Int	Decimal places	0 1 2 3 4	2 1	XXXX. XXXX.X XXX.XX XX.XXX X.XXXX
40004	Int	Response time	-	1	1-60 seconds
40005	Int	Units (scaling)	1	1	NTU FNU
40006	Int	LCD backlight	-	8	1 – 10 (brightest)
40007	Int	4-20 mA Error level	0 - 3	0	0 – Off 1 – 0mA 2 – 2mA 3 – 4mA
40008	Int	4-20 Output option	0 1 2 3	0	0 - None 1 – 4-20mA
40009, 40010	Float	4mA minimum value	0.001 – 10.000 0.01 – 100.00 0.1 – 1000.0	0.001 0.01 0.1	Turbidity (NTU) level at which 4-20 mA will be 4mA.
40011, 40012	Float	20mA maximum value	0.001 – 10.000 0.01 – 100.00 0.1 – 1000.0	10.000 100.00 1000.0	Turbidity (NTU) level at which 4-20 mA will be 20mA.
40013	Int	RS-485 baud rate	0	3	1,200 2,400 4,800 9,600 19,200
40014	Int	RS-485 data bits	0	1	7 bits 8 bits
40015	Int	RS-485 parity	0	0	None Even Odd
40016	Int	RS-485 stop bits	0	0	1 stop bit 2 stop bits
40017	Int	Instrument address	-	1	1 – 255

Continued

Address	Type	Register	Value	Default	Function
40018	Int	Modbus serial mode	0	0	RTU (read only)
40019	Int	4mA Fine Tuning	-200 –200	0	Fine tuning adjustment of 4mA output level.
40020	Int	Alarm 1 type	0 1 2 3	0	0 - Off 1 - Low Alarm 2 - High Alarm 3 - Error Alarm
40021, 40022	Float	Alarm 1 set point	0.001 – 10.000 0.01 – 100.00 0.1 – 1000.0	0.001 0.01 0.1	Level at which alarm 1 triggers
40023	Int	Alarm 1 delay on	-	5	0 – 30 seconds
40024	Int	Alarm 1 delay off	-	5	0 – 30 seconds
40025	Int	20mA Fine Tuning	-1000 – 1000	0	Fine tuning adjustment of 20mA output level.
40026	Int	Alarm 2 type	0 1 2 3	0	0 - Off 1 - Low Alarm 2 - High Alarm 3 - Error Alarm
40027, 40028	Float	Alarm 2 set point	0.001 – 10.000 0.01 – 100.00 0.1 – 1000.0	0.001 0.01 0.1	Level at which alarm 2 triggers
40029	Int	Alarm 2 delay on	-	5	0 – 30 seconds
40030	Int	Alarm 2 delay off	-	5	0 – 30 seconds
40031, 40032 ²	Float	Sensor reading	-	-	The meter reading, after applying RESP and OFFSET settings.
40033, 40034 ²	Float	Sensor reading raw	-	-	Sensor reading before applying RESP or OFFSET settings.
40035 ²		Not Used	-	-	
40036 ²		Not Used	-	-	
40037 ²	Int	Version revision	-	-	Software version revision number
40038 ²	Int	Model number	-	-	Product number
40039 ²		Not Used	-	-	
40040 ²		Not Used	-	-	
40041 ²	Int	Instrument error summary (bit-mapped)	0x0000 0x0001 0x0002 0x0004 0x0008	- - - - -	Normal Error (see error register for further details) Alarm 1 is active Alarm 2 is active Calibration error
40042 ²	Int	Errors (bit-mapped)	0x0000 0x0001 0x0002 0x0004 0x0008 0x0010 0x0020 0x0100	- - - - - - - -	Normal CONF error. Settings were not read correctly at power-up and should be verified. Replace dessicant Break in 4-20mA circuit. Lamp problem Flow switch alarm Auto-cleaning problem (if applicable) Calibration error
40043 ²	Int	PCB Revision	0 1 2	- - -	Revision 1 Revision 2 Revision 3
40044	Int	Hours	0 - 23	0	Hour of the day
40045	Int	Minute	0 – 59	0	Minute of the hour
40046	Int	Date	1 -31	1	Day of the month
40047	Int	Month	0 – 11	0	Month of the year
40048	Int	Year	2017 – 2100	2017	Current year
40049	Int	DST Enabled	0 - 1	1	Daylight Saving Time Enabled 0 – DST is ignored 1 – Spring forward/Fall back rules apply according to North American DST intervals.
40053	Int	Log Interval	1 – 60	1	Number of minutes between log entries.
40054	Int	Instrument Log ID	0000 – 9999	0001	4-digit instrument identifier used in the names of log files.
40055	Int	Flow Acknowledge	0 - 1	1	If a flow alarm is active, writing 0 to this will silence the alarm. Normally this is forced to 1 by software, i.e. if no flow alarm condition is present.

² Duplicate of 30XXX addresses (input registers). These registers are not writable.

1.4 Input Registers

These 16-bit values are readable by the master. The data is stored with the MSB first and then the LSB.

1.4.1 Valid Command(s)

Code	Name	Broadcast?
0x04	Read Input Registers	No

1.4.2 Format

Float – based on IEEE-754 stored in two consecutive addresses, with the first address containing the most significant word (sign, exponent, and upper part of mantissa) and the second address containing the least significant word (lower upper part of mantissa).

1.4.3 Valid Addresses

30001 – 30013, 30200 – 30242, 30300 - 30331

1.4.4 Definitions

Address	Type	Register	Function
30001, 30002	Float	Sensor reading	The meter reading
30003, 30004	Float	Sensor reading raw	Sensor reading to six significant places
30007	Int	Version revision	Software version revision number
30008	Int	Model number	Product number
30011	Int	Instrument error summary (bit-mapped)	0x0000 – normal 0x0001 – Error (see error register for further details) 0x0002 – Alarm 1 is active 0x0004 – Alarm 2 is active 0x0008 – Calibration error
30012	Int	Errors (bit-mapped)	0x0000 – normal 0x0001 – CONF error. Verify CONFIG settings. 0x0002 – Replace desiccant 0x0004 – Break in the 4-20mA current loop 0x0008 – Lamp problem 0x0010 – Flow switch alarm 0x0020 – Auto-cleaning problem (if applicable) 0x0100 – Calibration error
30013	Int	PCB Revision	0 – Revision 1 1 – Revision 2 2 – Revision 3

Counters are set to zero on power-up and cannot be reset without powering down instrument.

2. Exception Responses Implemented

Code	Name	Meaning
00	-	No error
01	ILLEGAL FUNCTION	The function code is not allowed in the device.
02	ILLEGAL DATA ADDRESS	The data address is not allowed in the device
03	ILLEGAL DATA VALUE	A value contained in the query field is wrong for the device



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