

Installation Instructions

Modbus CLX Specification¹

Valid Software Version(s): v0.1.18

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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 data bits 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 – 00XXX

1.1.4 Definitions

Address	Function	Default
00001	Access code enabled	False
00002	Not used	False
00003	4-20 mA enabled	False
00004	Service mode	False
00005	fDI (flag data in) Used in conjunction with address 10005. 0 Means waiting for command. Standby mode. 1 Means Start a cycle.	False
00006	Toggle flow measure	False
00007	Restore factory settings	False
00008	Power reset	False
00009	Initiate reagent priming	False

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 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 – 10XXX

1.2.4 Definitions

Address	Function
10001	Instrument error (levels 1, 2, 3, and 4)
10002	Instrument error with alarm (levels 1, 2, and 3)
10003	Alarm 1 active
10004	Alarm 2 active
10005	fDO (flag for data out), 0 means waiting for a command to Start, command must be summited in address 00005. 1 Means going thru a cycle to take a reading or busy.
10006	Cycle time has been exceeded

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

1.3.3 Valid Addresses

40001 – 40XXX

1.3.4 Definitions

Address	Type	Register	Min	Default	Max	Function
40001	Int	Decimal places	0	2	3	0 – XXXXX 1 – XXXX.X 2 – XXX.XX 3 – XX.XXX
40002	Int	Units (scaling)	0	0	1	0 – PPM 1 – MG/L
40003	Int	Readings Per Average	1	2	5	Number of readings used for averaging
40004	Int	LCD backlight	1	8	10	Higher is brighter
40005, 40006	Float	4-20 mA minimum value	0.0	0.00	15 or 10.0	Scaling value When extended range is enabled max is 15.0, otherwise it is 10.0
40007, 40008	Float	4-20 mA maximum value	0.0	6.00	15 or 10.0	Scaling value When extended range is enabled max is 15.0, otherwise it is 10.0
40009	Int	4-20 mA error alarm output	0	2	3	0 – Off 1 – 0 mA 2 – 2 mA 3 – 4 mA
40010	Int	RS-485 baud	1	3	4	1 – 2,400 2 – 4,800 3 – 9,600 4 – 19,200
40011	Int	In Terms Of Units	0	0	3	0 - Chlorine (Default) 1 - Chlorine Dioxide 2 - Permanganate 3 - Peracetic Acid
40012	Int	Not used	-	0	-	
40013	Int	Not used	-	0	-	
40014	Int	Instrument address	1	1	127	
40015	Int	Not used	-	0	-	
40016	Int	Not used	-	0	-	
40017, 40018	Float	Not used	-	0.0	-	
40019	Int	Not used	-	0	-	
40020, 40021	Float	Not used	-	0.0	-	
40022	Int	Not used	-	0	-	
40023	Int	Not used	-	0	-	
40024	Int	Measurement period	60	150	600	Seconds between measurements
40025	Int	Water Conservation	0	0	1	Water Conservation flag
40026	Int	Alarm 1 type	0	0	3	0 – Off 1 – On 2 – Error alarm 3 – Service alarm 4 - On above High Point, Off below Low Point (Hi Lo) 5 - On below Low Point, Off above High Point (Lo Hi)
40027, 40028	Float	Alarm 1 low set point	0.0	1.0	15.0 or 10.0	When extended range is enabled max is 15.0, otherwise it is 10.0
40029, 40030	Float	Alarm 1 high set point	0.0	1.0	15.0 or 10.0	When extended range is enabled max is 15.0, otherwise it is 10.0
40031	Int	Alarm 2 type	0	0	3	0 – Off 1 – On 2 – Error alarm 3 – Service alarm 4 - On above High Point, Off below Low Point (Hi Lo) 5 - On below Low Point, Off above High Point (Lo Hi)
40032, 40033	Float	Alarm 2 low set point	0.0	1.0	15.0 or 10.0	When extended range is enabled max is 15.0, otherwise it is 10.0
40034, 40035	Float	Alarm 2 high set point	0.0	1.0	15.0 or 10.0	When extended range is enabled max is 15.0, otherwise it is 10.0

1.4 Holding 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 – stored in two consecutive addresses, with the first address containing the least significant word (lower part of mantissa) and the second address containing the most significant word (sign, exponent, and upper part of mantissa).

1.4.3 Valid Addresses

30001 – 30XXX

1.4.4 Definitions

Address	Type	Register	Function
30001, 30002	Float	Sensor reading	The meter reading
30003, 30004	Float	Sensor reading	Duplicate meter reading
30005	Int	Version major	Software version major number
30006	Int	Version minor	Software version minor number
30007	Int	Version revision	Software version revision number
30008	Int	Model number	Product number
30009	Int	Model suffix number	Options – model dependent
30010	Int	Reading status	0 - unknown 1 - normal 2 - over range 3 - under range 4 - service mode 5 - need sample 6 - reading problem (Err)
30011	Int	PCB Revision	0 - Revision 0 1 - Revision 1 2 - Revision 2
30012	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
30013, 30014	Long	Level 4 Errors (bitmapped), least severe	0x00000 - Normal 0x00001 - Alarm 1 active (ALM1) 0x00002 - Alarm 2 active (ALM2) 0x00004 - Data over-range (OVER) 0x00008 - Reading error (Err) Above error was changed to display last reading twice then 0.00 is displayed. 0x00010 - Cycle Time Exceeded (CYCL)
30015, 30016	Long	Level 3 Errors (bitmapped)	0x00000 - Normal 0x00001 - Break in the 4-20 mA current loop (MA) 0x00002 - Zero calibration error (ZCAL) 0x00004 - No intake water (WATR) 0x00008 - Intake water fill fast (FAST) 0x00010 - Intake water fill slow (SLOW) 0x00020 - Purge is slow (PURG) 0x00040 - Purge clogged (NPRG) 0x00800 - Sample chamber glass too dark (GLAS) 0x01000 - Water calibration invalid (WCAL) 0x02000 - Reagent is old and needs to be replaced (REPL) 0x04000 - Adjust calibration error (ACAL)
30017, 30018	Long	Level 2 Errors (bitmapped)	0x00000 - Normal 0x00001 - POST error (POST) 0x00002 - Visible lamp blown (GRN0) 0x00004 - Visible lamp stuck on (GRN1) 0x00008 - Visible lamp optimization problem (GRN2) 0x00010 - IR lamp blown (WTR0) 0x00020 - IR lamp stuck on (WTR1) 0x00040 - IR lamp optimization problem (WTR2) 0x00080 - Solenoid power supply (SOL0) 0x00100 - Intake solenoid (SOL1) 0x00200 - Purge solenoid (SOL2) 0x00400 - Reagent solenoid (SOL3) 0x00800 - Hardware fault in alarm 1 (ALM1) 0x01000 - Hardware fault in alarm 2 (ALM2)
30019, 30020	Long	Level 1 Errors (bitmapped), most severe	0x00000 - Normal 0x00001 - MCU oscillator 0x00002 - MCU A/D 0x00004 - External flash data read 0x00008 - External flash data write 0x00010 -A/D problem 0x00040 - S/W stack overflow
30021	Int	Days since last prime	Time since last reagent priming in days.
30022	Int	Total flow measure counts	Number of counts in a flow measure test.

Continued

Address	Type	Register	Function
30023	Int	Measurement step (Normal state)	0 – Overflow 1 – Wait for next sample 2 – Pre-wash 3 – Prepare zero sample 4 – Optimize green LED 5 – Take zero sample 6 – Drain cuvette after zero sample 7 – Fill water prior reagent 8 – Add reagent 9 – Fill water post reagent 10 – Wait reaction time 11 – Take sample 12 – Drain cuvette after sample 13 – Open water intake 14 – Post wash
30024, 30025	Float	Temperature	Internal temperature sensor in °C.
30026, 30027	Float	Humidity	Relative humidity percentage (%RH)

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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