Installation Instructions

MCX Modbus Specification

Valid Software Version(s): 3.01 and Up

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 (PLC Addresses not supported)	Default
00001	Prime Water	False
00002	Prime Air	False
00003	Prime Buffer	False
00004	Prime Indicator	False
00005	Prime Chlorinating Solution	False
00006	Service Mode	False
00009	End Of Cyle	False

1.2 Input Status

These single-bit values are readable by 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. True is a 1 and False is a 0.

1.2.1 Valid Command(s)

Code	Name	Broadcast?
0x02	Read Input Status	No
0x05	Force Single Coil	Yes

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

⚠ WARNING

Read this Manual BEFORE using the equipment.

Do not use unless you know the safe an 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	Default
10002	Instrument error	False

1.3 Input Registers

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

1.3.1 Valid Command(s)

Code	Name	Broadcast?
0x04	Read Input Registers	No

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

30001 – 30XXX

1.3.4 Definitions

Address	Type	Register	Function
30001-30002	Float	NH2CL-CL2 Sensor reading	The NH2CL-CL2 meter reading displayed
30003-30004	Float	NH2CL-CL2 Sensor reading raw	NH2CL-CL2 Sensor reading to six significant places
30005-30006	Float	NH2CL-CL2 Sensor reading without cuvette correction	
30007-30008	Float	Total NH3-N Sensor reading	The Total NH3-N meter reading displayed
30009-30010	Float	Total NH3-N Sensor reading raw	Total NH3-N Sensor reading to six significant places
30011-30012	Float	Total NH3-N Sensor reading without cuvette correction	
30013-30014	Float	Free NH3-N Sensor reading	The Free NH3-N meter reading displayed
30015-30016	Float	Free NH3-N Sensor reading raw	Free NH3-N Sensor reading to six significant places
30017-30018	Float	Free NH3-N Sensor reading without cuvette correction	
30019-30020	Float	Firmware version MMB	Main Measurement Board Firmware Version
30021-30022	Float	Firmware version UIB	User Interface Board Firmware Version
30023-30024	Float	Firmware version DB	Display Board Firmware Version
30025	Int	Error Code	Shows the active error code, see Appendix for Error Code
30026	Int	Warning Code	Shows the active warning code, see Appendix for Warning Code

1.4 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.

1.4.1 Valid Command(s)

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

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 Format

40001 – 40XXX

1.4.4 Definitions

Address	Type	Register	Min	Default	Max	Function
40001	Int	Decimal places	0	2	4	0 – XXXXX 1 – XXXX.X 2 – XXX.XX 3 – XX.XXX 4 – X.XXXX
40002	Int	Units (scaling)	0	0	1	0 – PPM 1 – Mg/L
40014	Int	Instrument address	1	1	255	
40015	Int	Time between measurements	0	60	1440	Wait time between readings in minutes

2. Exception Responses Implemented

Code	Name	Meaning
00	--	No error
01	ILLEGAL FUNCTION	The function code is not allowed on 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

3. Appendix

3.1 Errors and Warning Codes

Error (Address 30025)	Code
Communication Error	26
Water Intake Error	27
Backlight LED Off Error	32
Backlight LED On Error	33
Water Detect LED Off Error	34
Water Detect LED On Error	35
Measurement LED Off Error	38
Measurement LED On Error	39
Optical Board Error	40
Motor Stop Error	52
Drain Valve Open Error	56
Drain Valve Close Error	57
Chlorine Pump On Error	64
Chlorine Pump Off Error	65
Air Pump On Error	66
Air Pump Off Error	67
Stepper Motor Move Error	68
Heater On Error	69
Heater Of Error	70
Indicator Pump On Error	71
Indicator Pump Off Error	72
Buffer Pump On Error	73
Buffer Pump Off Error	80
Photodiode ADC Error	83
Thermocouple ADC Error	84
Heater ADC Error	85
Stepper Motor Error – Overcurrent Detection	87
Stepper Motor Error -Thermal Shutdown	88
Stepper Motor Error – Thermal Warning	89
Stepper Motor Error - Undervoltage Lockout	96
Stepper Motor Error - Motor Stalled	97
Stepper Motor Error - Motor Stalled	98
MMB CPU Thermal Error	103
MMB CPU Thermal Warning	104

Warning (Address 30026)	Code
Water Intake Warning	36
LED Optimization Error	49
Bad Absorbance Values	55
Timer 9 Failure	81
Timer 2 Failure	82
Stepper Motor Error – Invalid Command Received	99
NH2Cl Over Range	128
Total NH3 Over Range	131
Free NH3 Over Range	134
Cell Temperature Low	137
Heater Timed Out	155

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