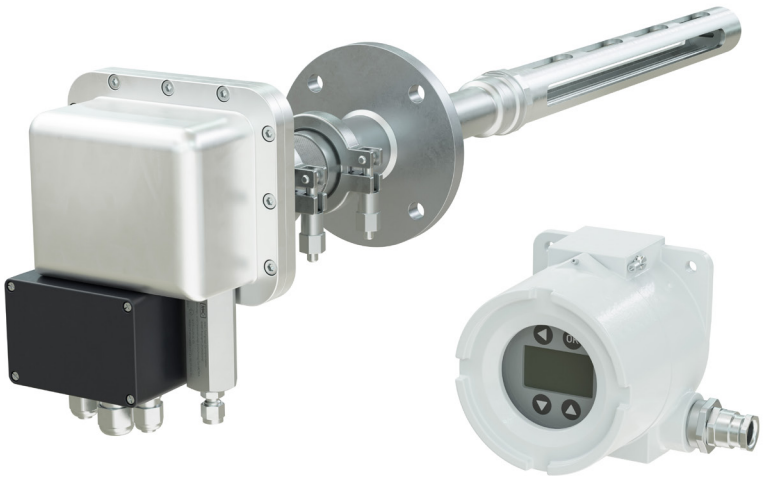
Embracing Challenge

In-situ Laser Analysator ILA1-X000-EX
Modbus Protocol Description

Software Description for In-situ Laser Analyzers ILA1-X000-EX

Version 1.00.00

Modbus Protocol Software Version 3.1.4



Embracing Challenge

Quick support

If you have any questions about this product regarding commissioning, handling or technical service - feel free to contact us. We will support you directly, quickly and of course free of charge with our experience and product knowledge.

Please contact our service center in Ratingen, Germany,

for US Service Ventura, California

Please help us by providing this information about the device, if possible:

- Product model
- Product serial number
- M&C order or invoice number

- Germany service center:
  +49 2102 935 - 888
  service@mc-techgroup.com
- US service:
  +1 805-654-6970
  info-usa@mc-techgroup.com

In addition, we are continuously working on providing further assistance for many of our products online on our webpage:

- www.mc-techgroup.com

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1 About this Document

This documentation only applies to in-situ laser analyzers starting with software version 1.00. The document is therefore also explicitly non-transferable.

If you have any questions about this document, please contact M&C or one of our official distributors.

Document:	Software description in EN for Modbus Protocol
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Software Version:	3.1.4
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	40885 Ratingen, Deutschland

This document does not claim to be complete and it may be subject to technical modifications. We appreciate any feedback you may have to this document .

The German software description is the original document.

With the release of this version all older versions will no longer be valid.

Registered trademarks

MODBUS	Modbus is a registered trademark of SCHNEIDER ELECTRIC USA, INC.

2 Important Safety Information

Please follow the general safety precautions when mounting, commissioning and operating M&C components.

The Modbus protocol description with applications is a software description for in-situ laser analyzers for implementing the Modbus protocol.

Implementation may only be carried out by personnel specially trained for this purpose. Missing or incorrect data may cause damage to the instrument or to the plant where the instrument has been used.

2.1 Signs and Definitions in this Document

Qualified personnel	"Qualified personnel" are experts who are familiar with the installation, mounting, commissioning and operation of these types of products.

Note	"Note" indicates important information relating to the product or highlights parts of the documentation for special attention.

3 Modbus-TCP

Communication with the in-situ laser analyzer is possible via Modbus using the TCP protocol. The in-situ laser analyzer is a TCP server. The TCP client must establish a connection to the device using its IP address and port.

IP address: By default, the analyzer is configured in DHCP mode, so the IP is supplied by the router. It is possible to configure it in fixed IP mode by using the web interface of the analyzer.

TCP Port: 502

3.1 Modbus Protocol Implementation

Qualified personnel Implementation should only be carried out by personnel specially trained for this purpose.

The MODBUS protocol was implemented in line with the following specifications:

MODBUS Protocol Specification, December 28, 2006

(Modbus_application_Protocol_V1_1b.pdf)

MODBUS Messaging in TCP/IP Implementation Guide, October 24, 2006

(Modbus_Messaging_Implementation_Guide_V1_0b.pdf)

The specifications are available at:

http://www.modbus.org

http://www.modbus.org/specs.php

3.2 User Data Format

The data transmission is carried out in the Big Endian format (High Byte/Low Byte, High Word/Low Word).

Floating point data are transmitted in the IEEE 754 format.

Term	Number Bits	Description	
S	1	Sign	
E	8	Exponent	
M	23	Mantissa	
SEEEEEEE	EMMMMMMM	MMMMMMMM	MMMMMMMM

3.3 Modbus Frame

Example Request: Read Holding Register

Byte	Description	Value	Description
	MBAP Header		
0	Transaction identifier (high)	0x00	0x0005: Consecutive number of request
1	Transaction identifier (low)	0x05	
2	Protocol identifier (high)	0x00	0x0000 = Modbus protocol
3	Protocol identifier (low)	0x00	
4	Length (high)	0x00	0x0006 bytes follow this byte. The value includes the last byte of the MBAP header
5	Length (low)	0x06	
6	Unit identifier	0xFF	Can be any value.
	General Modbus Frame		
7	Function code	0x03	0x03 = read holding register
8	Start adress (high)	0x9C	0x9C41: start address 40001
9	Start adress (low)	0x41	
10	Number of 16 bit register (high)	0x00	Number of 16 bit register = 0x0004
11	Number of 16 bit register (low)	0x04	

Example Response: Read Holding Register

Byte	Description	Value	Description
	MBAP Header		
0	Transaction identifier (high)	0x00	0x0005: Same identifier as in the request for clear assignment.
1	Transaction identifier (low)	0x05	
2	Protocol identifier (high)	0x00	0x0000 = Modbus protocol
3	Protocol identifier (low)	0x00	
4	Length (high)	0x00	11 bytes follow this byte. The value includes the last byte of the MBAP header
5	Length (low)	0x06	
6	Unit identifier	0xFF	Same identifier as in the request
	General Modbus Frame		
7	Function code	0x03	0x03 = read holding register
8	Byte count	0x08	0x08 bytes follow
9	Byte 1	0x41	0x411E3282 IEEE = 9.887331
10	Byte 2	0x1E	
11	Byte 3	0x32	
12	Byte 4	0x82	

Byte	Description	Value	Description
13	Byte 5	0x80	Status bits
14	Byte 6	0x00	
15	Byte 7	0x00	
16	Byte 8	0x0F	

3.4 Modbus Functions Implemented

Function Code	Function
0x01	**Read Coils**
0x02	Read Discrete Inputs
0x03	**Read Holding Registers**
0x04	Read Input Registers
0x05	Write Single Coil
0x06	Write Single Register
0x0F	Write Multiple Coils
0x10	Write Multiple Registers
0x14	Read File Record
0x15	Write File Record

Note Modbus protocol version 3.1.4 only includes: **0x01** and **0x03**

3.5 Holding Registers

Note All Holding Registers and Coils are Read-Only.

Holding Register			
Address	**Format**	**Unit**	**Description**
30001	Float		Gas concentration 1 - Value VDI 4201 Format
30003	Uint32		Gas concentration 1 - Status VDI 4201 Format
30005	Float		Gas concentration 2 - Value VDI 4201 Format
30007	Uint32		Gas concentration 2 - Status VDI 4201 Format
30009	Float		Gas concentration 3 - Value VDI 4201 Format
30011	Uint32		Gas concentration 3 - Status VDI 4201 Format
30013	Float		Gas concentration 4 - Value VDI 4201 Format
30015	Uint32		Gas concentration 4 - Status VDI 4201 Format
30017	Float		Gas concentration 5 - Value VDI 4201 Format

Holding Register			
Address	**Format**	**Unit**	**Description**
30019	Uint32		Gas concentration 5 - Status VDI 4201 Format
30101	Float		Gas concentration extended 1 - Value VDI 4201 Format
30103	Uint32		Gas concentration extended 1 - Status VDI 4201 Format
30105	Float		Gas concentration extended 2 - Value VDI 4201 Format
30107	Uint32		Gas concentration extended 2 - Status VDI 4201 Format
30109	Float		Gas concentration extended 3 - Value VDI 4201 Format
30111	Uint32		Gas concentration extended 3 - Status VDI 4201 Format
30113	Float		Gas concentration extended 4 - Value VDI 4201 Format
30115	Uint32		Gas concentration extended 4 - Status VDI 4201 Format
30117	Float		Gas concentration extended 5 - Value VDI 4201 Format
30119	Uint32		Gas concentration extended 5 - Status VDI 4201 Format
30151	Float		Gas concentration 1 - Value Raw Format
30153	Float		Gas concentration 2- Value Raw Format
30155	Float		Gas concentration 3 - Value Raw Format
30157	Float		Gas concentration 4 - Value Raw Format
30159	Float		Gas concentration 5 - Value Raw Format
30161	Float		Gas concentration extended 1 - Value Raw Format
30163	Float		Gas concentration extended 2- Value Raw Format
30165	Float		Gas concentration extended 3 - Value Raw Format
30167	Float		Gas concentration extended 4 - Value Raw Format
30169	Float		Gas concentration extended 5 - Value Raw Format
30201	ASCII string (20 bytes)		Gas name 1
30211	Float		Gas range start 1
30213	Float		Gas range end 1
30215	Float		Gas range start 1 extended
30217	Float		Gas range end 1 extended
30219	ASCII string (4 bytes)		Gas unit 1

Holding Register			
Address	**Format**	**Unit**	**Description**
30221	ASCII string (20 bytes)		Gas name 2
30231	Float		Gas range start 2
30233	Float		Gas range end 2
30235	Float		Gas range start 2 extended
30237	Float		Gas range end 2 extended
30239	ASCII string (4 bytes)		Gas unit 2
30241	ASCII string (20 bytes)		Gas name 3
30251	Float		Gas range start 3
30253	Float		Gas range end 3
30255	Float		Gas range start 3 extended
30257	Float		Gas range end 3 extended
30259	ASCII string (4 bytes)		Gas unit 3
30261	ASCII string (20 bytes)		Gas name 4
30271	Float		Gas range start 4
30273	Float		Gas range end 4
30275	Float		Gas range start 4 extended
30277	Float		Gas range end 4 extended
30279	ASCII string (4 bytes)		Gas unit 4
30281	ASCII string (20 bytes)		Gas name 5
30291	Float		Gas range start 5
30293	Float		Gas range end 5
30295	Float		Gas range start 5 extended
30297	Float		Gas range end 5 extended
30299	ASCII string (4 bytes)		Gas unit 5
30301	Float		Confidence index gas
30303	Float	%	Transmission
30305	Float	°C	Diode temperature setpoint
30307	Float	°C	Diode temperature
30309	Float	V	Diode temperature output
30311	Float	°C	Gas temperature
30313	Float	Bar abs.	Gas pressure, bar abs.
30315	Float	%	Gas humidity
30317	Float	°C	Analyzer temperature
30319	Float	°C	Processor temperature
30321	Float	°C	PCB temperature
30323	Float	Bar abs.	Analyzer pressure, bar abs.
30325	uint16		Analyzer state
30326	uint16		Analyzer error code

Holding Register			
Address	**Format**	**Unit**	**Description**
30327	uint16		Number of gases
30341	ASCII string (20 bytes)		FPGA version
30351	ASCII string (20 bytes)		Firmware version
30361	ASCII string (20 bytes)		Serial number
30401	ASCII string (50 bytes)		Manufacturer
30451	ASCII string (50 bytes)		Device name

3.6 Coils

Note All Registers and Coils are Read-Only.

Coils	
Address	**Description**
10001	Error
10009	Relay_in
10017	Relay_out
10025	Heater_1
10033	Heater_2
10041	GPIO_0
10049	GPIO_1
10057	GPIO_2
10065	G0
10073	G1
10081	Laser_ON
10089	PID_regulation_ON
10097	Diode_temperature_stabilization

3.7 Input Registers

The input registers are currently not in use.

3.8 File Records

The file records are currently not in use.

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Get in contact with us.