

SIGNUX CLA01

Water quality — RS485



SX-CLA01



DESCRIPTION

Integrated residual chlorine transmitter for treated water, with a three-electrode cell and RS485 Modbus RTU output. Three ranges up to 20 mg/L, with standard or gold electrode.

The SX-CLA01 measures residual chlorine concentration in water. Cell and electronics share one body: the integrated design outputs the RS485 signal directly, which is the reason it is free of signal interference.

It is a non-membrane, constant-voltage type with a three-electrode system. There is no membrane and no reagent to replace: the three-electrode system gives high measurement accuracy, long working life and no need for frequent calibration. It resolves 0.01 mg/L, to within $\pm 5\%$ of full scale, with ± 0.05 mg/L of repeatability, and responds in under 30 seconds.

Measuring ranges are fixed when ordering — 0 to 2, 0 to 10 or 0 to 20 mg/L — with a standard or a gold electrode. The electrode has a service life of about one year depending on the water and usage conditions. Keep the platinum wire clean and bright, because dirt and mineral deposits on it reduce sensitivity and may stop it measuring properly.

FEATURES

- Three electrodes: They let it measure down to 0.01 mg/L and settle in under 30 seconds.
- Three ranges: 2, 10 or 20 mg/L, each with a standard or a gold electrode. Chosen when ordering.
- Installation: NPT 3/4 in at both ends, IP68, 6 bar, and the same four wires.

AT A GLANCE

Measures	Chlorine residual concentration
Output	RS485
Protection	IP68
Operating	0 to +50 °C

CONTENTS

01	Introduction	3
02	Wiring	4
03	Dimensions, model and what is in the box	5
04	Safety, care and installation	6
4.1	Installation	6
4.2	Care and maintenance	7
4.2.1	Cleaning the platinum wire	8
05	Adjusting the reading	9
06	Modbus RS485 protocol	10
6.1	Communication parameters	10
6.2	Frame format	10
6.3	Modbus registers	11
6.4	Communication examples	12
6.4.1	Example 1: read the free chlorine	12
6.4.2	Example 2: correct the reading with the deviation	12

1 Introduction

The SX-CLA01 measures free residual chlorine in treated water. Cell and electronics share one body, so the probe connects directly to an RS485 bus with Modbus RTU protocol.

The cell is amperometric with three electrodes and a constant working voltage, and needs neither a membrane nor reagents. It is meant for circulating-water dosing control, swimming pool chlorination, drinking water treatment and distribution, and hospital effluent.

- Free chlorine from 0 to 2, 0 to 10 or 0 to 20 mg/L, resolution 0.01 mg/L
- Three-electrode constant-voltage cell: no membrane and no reagents to replace
- Integrated design: the RS485 signal leaves the probe itself
- 3/4 in thread at top and bottom, easy to install
- IP68 protection rating
- RS485 interface with Modbus RTU protocol
- Modbus address and baud rate configurable
- Wide supply range, 7 to 30 V DC

Power supply	7-30 V DC
Power consumption	.19 W
Communication interface	RS485, Modbus RTU 4800 baud by default
Measuring range	0-2, 0-10 or 0-20 mg/L, resolution 0.01 mg/L
Accuracy	±5 % FS
Repeatability	±0.05 mg/L
Response time	Under 30 s
Water temperature	0 to +50 °C
Water pH	4 to 9
Flow rate	30 to 60 L/h in a flow-through cell
Pressure resistance	.6 MPa
Protection rating	IP68
Cable length	5 m by default (10, 15 and 20 m on request)
Electrode life	About one year

2 Wiring

The probe is supplied with a four-core cable with bare ends.

FUNCTION	WIRE COLOUR	DESCRIPTION
Power supply	Brown	Power supply positive (7-30 V DC)
Power supply	Black	Power supply negative (GND)
Communication	Yellow	RS485 A
Communication	Blue	RS485 B

Do not take the colours for granted from memory: not every water probe follows the same convention.

3 Dimensions, model and what is in the box

The model code states the range and the electrode. Both are fixed when ordering and cannot be changed afterwards.

CODE	MEANING
SX-CLA01	Residual chlorine transmitter with RS485 Modbus RTU output
2 · 10 · 20	The range: 0-2, 0-10 or 0-20 mg/L
A	Gold electrode. Without the A, standard electrode

- One integrated residual chlorine transmitter
- 5 m cable (or the length ordered)

4 Safety, care and installation

4.1 Installation

- Submerged installation: run the cable through a rigid waterproof bracket and screw the bracket onto the 3/4 in thread on top of the probe, sealing the thread with PTFE tape.
- Pipe installation: screw the probe into the pipe through the 3/4 in thread at its lower end.

Two conditions have to be met for the reading to mean anything. The water must be moving past the cell, between 30 and 60 litres an hour in a flow-through fitting: in still water the probe reads its own boundary layer and drifts. And the water must sit between pH 4 and 9, because the share of free chlorine present as hypochlorous acid — the part that disinfects — depends on it. Out of the water the probe reads 0.00 mg/L and stays there; that is normal, not a fault.

4.2 Care and maintenance

- The equipment needs no routine maintenance. If it fails, do not open it: contact SIGNUX.
- After use, rinse the head with clean water and fit the protective cover.
- The platinum wire must stay clean and bright. Dirt or mineral deposits on it lower the sensitivity, and the probe may stop measuring properly.
- Before measuring, make sure the cell is wet and free of bubbles.
- The electrode lasts about a year. It is a consumable: replace it when it ages.

4.2.1 Cleaning the platinum wire

If the platinum wire becomes rough or is covered by deposits, clean it according to what has fouled it.

CONTAMINATIONHOW TO CLEAN IT	
Inorganic deposits	Soak the head in 0.1 mol/L dilute hydrochloric acid for 15 minutes, wipe the platinum wire gently with a cotton swab and rinse with tap water
Organic matter or oil	Soak the head in tap water with a little detergent, wipe the sensing surface and the platinum wire gently with a cotton swab, and rinse with tap water
Oxide film on the wire	Polish the sensing surface lightly with toothpaste or 1000 grit paper, then rinse with tap water

Take care when polishing: the platinum ring is bonded to the glass, and forcing it breaks the cell.

5 Adjusting the reading

The probe carries two adjustment values: a coefficient A, which multiplies the reading, and a deviation B, which is added to it. From the factory A is 1.0 and B is 0.0.

Both are 32-bit floating-point values, each held in a pair of registers — A in 0x1010 and 0x1011, B in 0x1012 and 0x1013 — and written with function code 16. To move a reading of 7.90 mg/L up to 8.00, the difference of 0.10 is encoded as a float (0x3DCCCCCD) and written to the B pair.

The SIGNUX configuration tool cannot write these two values yet: it does not handle floating-point registers. Until it does, the adjustment has to be made with a Modbus master that can write a float across two registers.

6 Modbus RS485 protocol

6.1 Communication parameters

Encoding	8-bit binary
Data bits	8
Parity	None
Stop bits	1
Error check	CRC (cyclic redundancy check)
Baud rate	4800 bit/s by default (1200 to 115200 configurable)
Device address	1 (0x01) by default

6.2 Frame format

Silence before the frame	≥ 4 byte times
Address code	1 byte: the address of the transmitter, unique on the bus (factory default 0x01)
Function code	1 byte: the operation requested by the master
Data area	N bytes: register addresses, counts and values
Error check	2 bytes: CRC
Silence after the frame	≥ 4 byte times

All 16-bit values are sent high byte first. The two floating-point pairs are big-endian: high word in the lower address.

6.3 Modbus registers

REGISTER ADDRESS	FUNCTION CODES (DEC)	DESCRIPTION
0x0000	3 / 4	Free chlorine concentration. UINT16, 100 times the value
0x1010 / 0x1011	3 / 4 / 16	Coefficient A, the gain applied to the reading. 32-bit float, 1.0 from the factory
0x1012 / 0x1013	3 / 4 / 16	Deviation B, added to the reading. 32-bit float, 0.0 from the factory
0x07D0	3 / 4 / 6 / 16	Device address: 1-254 (UINT16, factory default 1)
0x07D1	3 / 4 / 6 / 16	Baud rate: 0 = 2400, 1 = 4800, 2 = 9600, 3 = 19200, 4 = 38400, 5 = 57600, 6 = 115200, 7 = 1200 (factory default 1 = 4800)

- UINT16: 16-bit unsigned integer
- Float: 32-bit IEEE 754, high word first

6.4 Communication examples

6.4.1 Example 1: read the free chlorine

Slave address	1 byte	0x01
Function code	1 byte	0x03
Start register	2 bytes	0x0000
Number of registers	2 bytes	0x0001
CRC	2 bytes	0x84 0x0A

Slave address	1 byte	0x01
Function code	1 byte	0x03
Number of data bytes	1 byte	0x02
Concentration	2 bytes	0x0316
CRC	2 bytes	0x39 0x7A

0x0316 is 790 in decimal, so the concentration is $790 / 100 = 7.90$ mg/L.

6.4.2 Example 2: correct the reading with the deviation

The probe reads 7.90 mg/L and the reading should be 8.00. The difference is 0.10, which as a 32-bit float is 0x3DCCCCD. It is written to the B pair, 0x1012 and 0x1013, with function code 16 and two registers in one frame: the high word 0x3DCC first, the low word 0xCCCD second.

Slave address	1 byte	0x01
Function code	1 byte	0x10
Start register	2 bytes	0x1012
Number of registers	2 bytes	0x0002
Number of bytes	1 byte	0x04
0x1012 · high word	2 bytes	0x3DCC
0x1013 · low word	2 bytes	0xCCCD
CRC	2 bytes	0xE7 0xBC

Slave address	1 byte	0x01
Function code	1 byte	0x10
Start register	2 bytes	0x1012
Number of registers	2 bytes	0x0002
CRC	2 bytes	0xE5 0x0D