



USER MANUAL



3S-CLR Online color sensor



Electrical equipment marked with this symbol can not be disposed of through home or public waste disposal systems after 12 August 2005. In accordance with local and national European regulations (EU Directive 2002/96 / EC), users must return the equipment which is unsuccessful or can no longer be used to the manufacturer, which have to provide free of charge disposal.

Note: To return devices at the end of their useful life, accessories supplied by the manufacturer and all auxiliary items for recycling, contact the manufacturer or the vendor of the device to arrange proper disposal.

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1 - SAFETY INFORMATION

1.1 Warnings and safety information

Before installing and operating the analyzer, read this manual thoroughly. Please pay particular attention to all the labels applied to the analyzer and to all the hazard information indicators in this manual.



This symbol indicates that you must refer to this manual for proper use of the equipment. Only qualified operators, properly trained on the use and maintenance of the analyzer can carry out service activities on the equipment.



The instrument operates with low power UV radiation. Do not look directly at the light source and do not disassemble the light source enclosure.

Parts involved:
- UV source

The manufacturer shall not be held responsible under any circumstances for improper use of the equipment.

The head of department and the machine operator must comply with the following rules and with the provisions of current legislation on the safety and health of workers.

The use, maintenance, and repair of the instrument are permitted only to persons authorised for such operations. These operators must be physically and mentally capable to perform such activities, which can not be performed under the influence of alcohol and drugs.

When the instrument is not being used it must be protected from voluntary or involuntary activation, after disconnecting the power supply.

Failure to follow the instructions given and/or failure to pay attention to the hazard indicators may cause serious risks of physical damage to operators and breaks or malfunctioning of the analyzer.

All the components of the instrument are placed within a panel closed by a door with a special key, supplied only to maintenance operators.

The instrument must then be used under operating conditions with the door closed.

2 - GENERAL INFORMATION

2.1 Technical specifications

Measured parameters	Color intensity
Measuring principle	Absorption photometry.
Measuring range	0 - 500 Hazen
Analysis Frequency	Continuous (aquisition time < 1 s)
Sample	Pressure-free vessel (up to 3 bar) Temperature: 0 - 50 °C (32 - 122 °F)
Dimensions	∅ 46 mm, L 189.6 mm
Weight	Approx. 1 kg (2.2 lbs)
Body Material	Titanium
Power Supply	Voltage: 12 - 24 VDC Power consumption: max. 0.5 VA
Output	Modbus via RS485
Operating temperature	0 - 50 °C (32 - 122 °F)
Installation	Flow cell, immersion pipe or brackets (optional accessories)
Protection Grade	IP68

2.2 Instrument description

The 3S-CLR is a sensor for water monitoring. The probe needs minimum maintenance and can be installed right out of the box, without initial configuration. The design is compact and robust, the titanium body offers great protection up to a depth of 60 m.

Data is transmitted using the widespread industrial Modbus protocol.

2.3 Applications

The sensor works with the principle of UV absorption and can be used to measure the color intensity in water samples. Common applications include civil and industrial wastewaters, surface waters and treatment and distribution of potable water.

2.4 Method description

The method is based on the photometric determination of the color intensity. The light radiation that passes through the sample water is absorbed and the absorption is proportional to the color intensity. The measurement is expressed in Hazen scale (platinum-cobalt scale).

The maximum range of the probe is 500 Hazen.

3 - INSTALLATION

3.1 Opening the package

For safety reasons, when removing the packaging of the equipment, please check for any visible defects and, if necessary, inform the supplier.

Parts inside the package apart from the user manual:

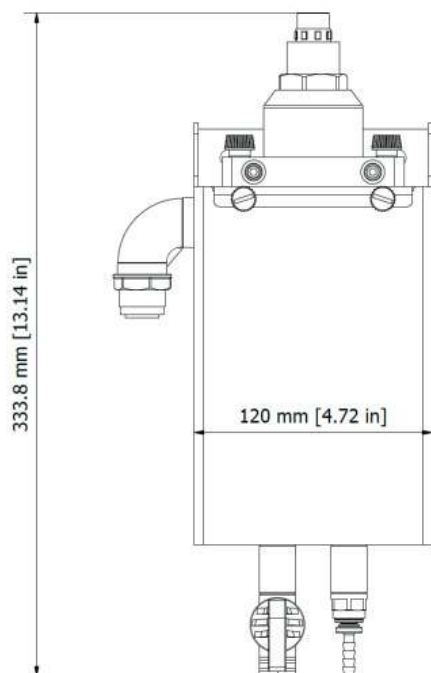
A	3S-CLR color sensor
B	Probe cable (10 m)

3.2 Product code

The product code is an alphanumeric code that identify your 3S Analyzers product and its configuration. For the 3S fluorescence sensor the code is the following:

3S-CLR

3.3 Wall mounting dimensions



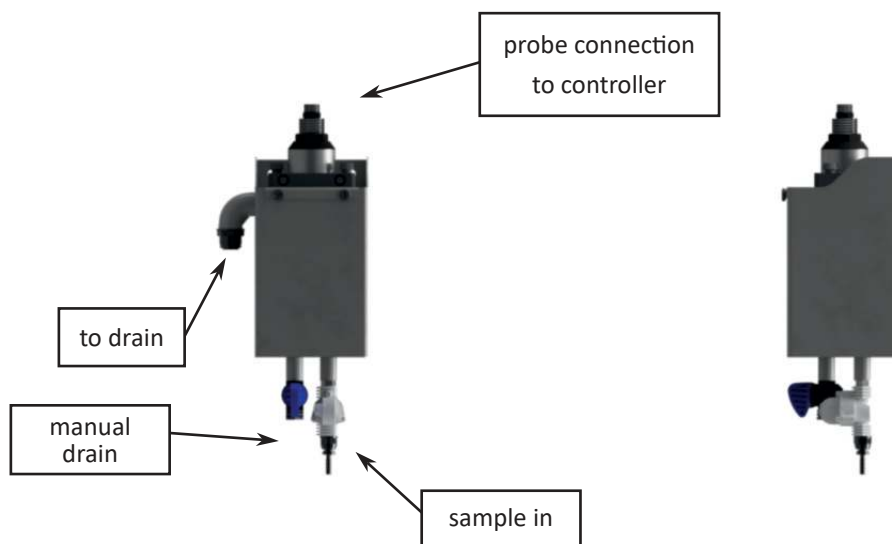
Recirculating sample reservoir cod. A46U10035 is included in the scheme as a reference but should be purchased separately.

3.4 Mounting the instrument (example with 3S-PC1000)

The 3S-PC1000 controller and the sample reservoir must be mounted vertically on a wall or support suitable for their weight and not subject to vibrations. Use suitable screws (not included in the supply) and fasten them only on the side brackets (ear clips) of the instrument and in the holes of the tank metal plate. Mount them so as to get the display at eye height (160 cm, 63 in).

Since the probe connections and flow sensor connectors are on the right side of the analyzer, install sample reservoir underneath the analyzer, in a way that is reachable from the right side. Please, also consider that the surrounding space must allow easy opening of the analyzer door and easy access to the sample reservoir for cleaning or maintenance.

A minimum distance of 10 cm is required between the sides of the instrument and any other obstacle.



The sample reservoir (cod. A46U10035) should be mounted preferably under the controller. The sample line must be connected to the inlet below the container, optionally a flow sensor can be installed on the same line to detect the presence of the sample.

The reservoir has a side arm to drain the excess liquid and to maintain a constant sample flow. The side arm must be connected to the drain.

When the container is installed in a proper position the probe can be inserted into its slot and secured with the clamp.

Finally, attach the probe connector to the analyzer.

4 - CALIBRATION

4.1 About the method

The probe is calibrated using standard solutions which are analyzed in the same way as the sample.

In order to ensure correct measurement performance, the probe should be calibrated periodically, best results are obtained if it has been recently cleaned and serviced.

Due to the nature of some analytical methods the concentration/signal plot is not linear in the whole range of our interest. Therefore the analyzer uses a multi-point calibration curve. The first point is the blank (zero), which is usually done by analyzing demineralized water. A part from the blank, other points are needed for the calibration curve, covering the whole range of interest.

The 3S-PC1000 controller is able to manage two probes with independent calibration curves, up to five points each.

Please refer to the 3S-PC1000 user manual for detailed instructions to perform a multi-point calibration with the 3S-CLR probe.

4.2 Calibration

The probe can be calibrated in Hazen units using a platinum-cobalt standard solution.

Chemicals

- Pt-Co Standard Solution
- Demineralized water

Stock solution

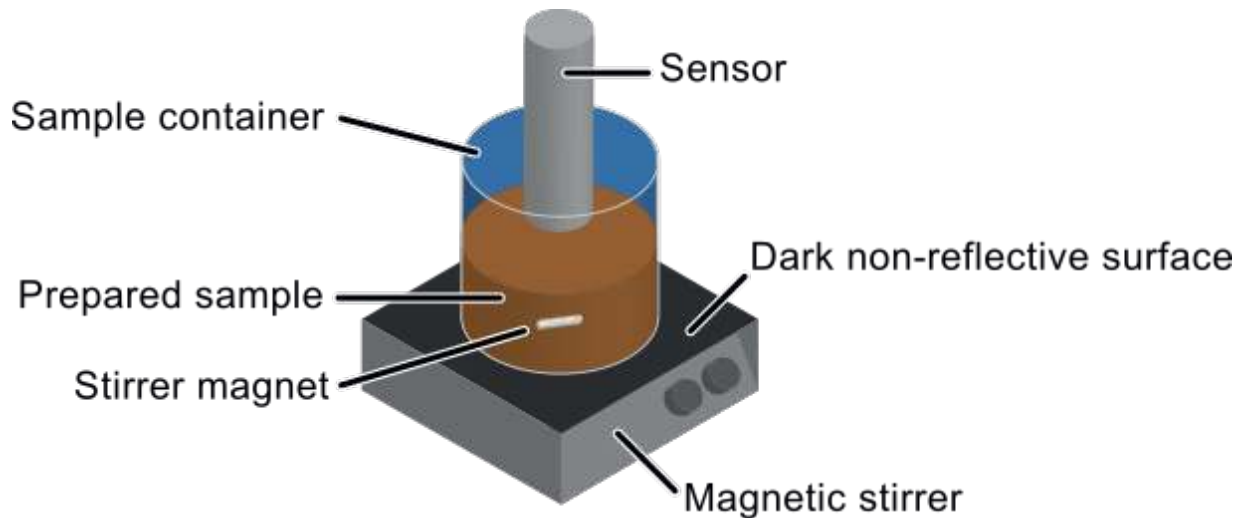
Hazen stock solution can be prepared or purchased by chemical suppliers.

Blank

The blank is measured using demineralized water.

Standard

Standard solutions of lower values can be prepared by appropriately diluting the stock solution. The maximum range of the probe is 500 Hazen.



Procedure

Prepare an appropriate beaker tall enough to contain the probe, and fill it with demineralized water.

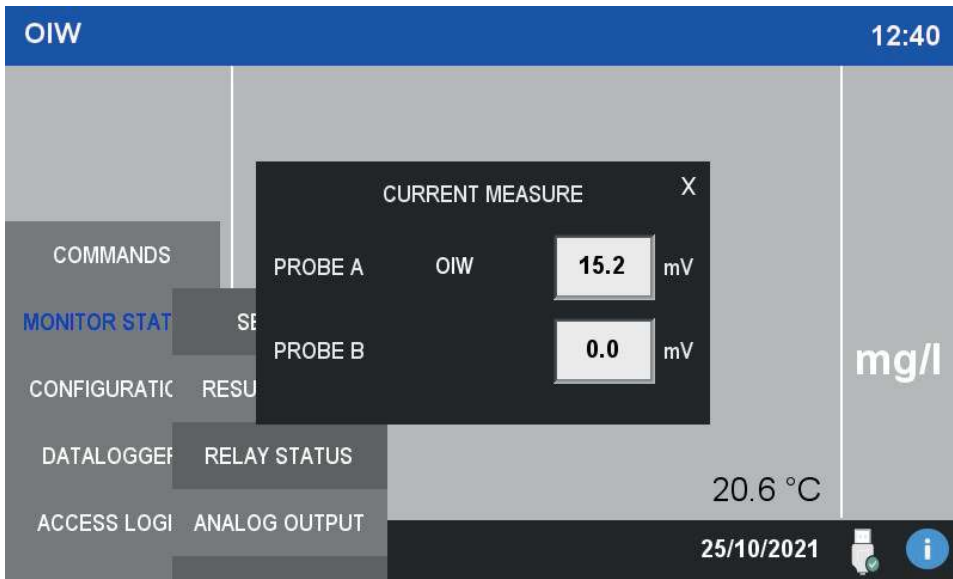
Clean the probe with a clean cloth and a drop of isopropanol. Place the probe into an appropriate beaker, the sensor part of the probe must be at least 3 - 4 cm below the solution level and at least 5 cm from the container walls. You can use a stand to help the probe stay in position. Make sure no air bubbles are trapped below the sensor. Be also sure to place a dark, non reflective sheet under the beaker.

The sensor signal can be read from the MONITOR STATUS > SENSOR page, this can be useful for the verification of the value before calibrating.

In the COMMANDS > MANUAL BLANK page press and hold MANUAL BLANK.

Now, replace the demineralized water in the beaker with the standard solution, after waiting at least 90 seconds then take note of the sensor response.

In the COMMANDS > MANUAL CAL page press and hold MANUAL CAL.

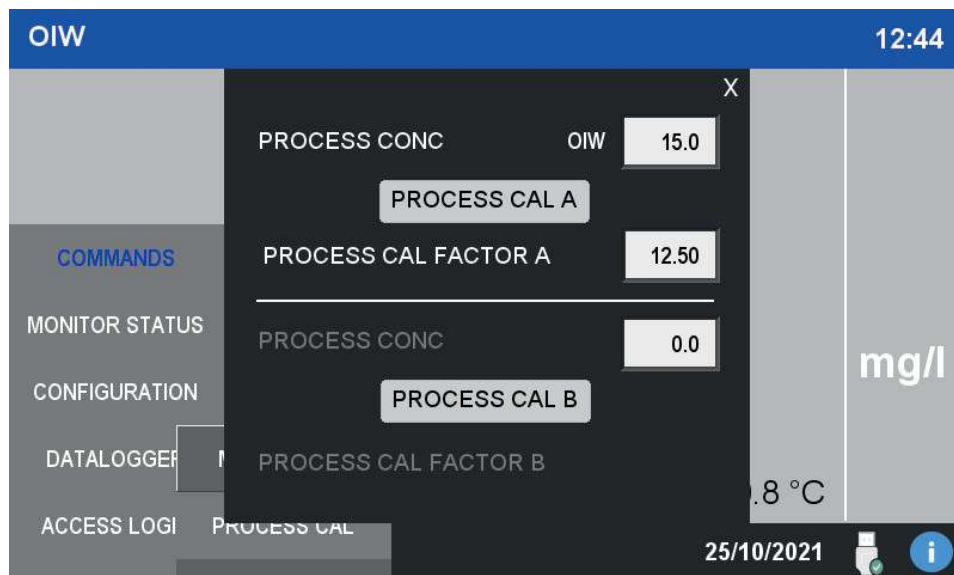


4.3 Process calibration

Alternatively, the probe can be calibrated using a real sample whose concentration is known. To do this, the same setup described in the previous section can be prepared. The calibration can also be done directly on the installed sample line, if real time results are available.

The process calibration can be performed through the following steps:

1. Take a sample representative of the water stream to be analyzed, at least 1 liter. Follow good sampling techniques to have reliable results.
2. Determine the concentration of the analyte of interest using a reference instrument or a laboratory analysis of the sample .
3. Immerse the probe in the sample and wait for a stable result.
4. Go to COMMANDS > PROCESS CAL



5. Press and hold PROCESS CAL A (or B depending on the probe you want to calibrate if more than one are present).
6. The process calibration is now completed, the new measurements will be corrected with the factor calculated in the procedure.

Note: is it possible to calculate the factor analyte/standard and put it directly in the process factor field on the same page.