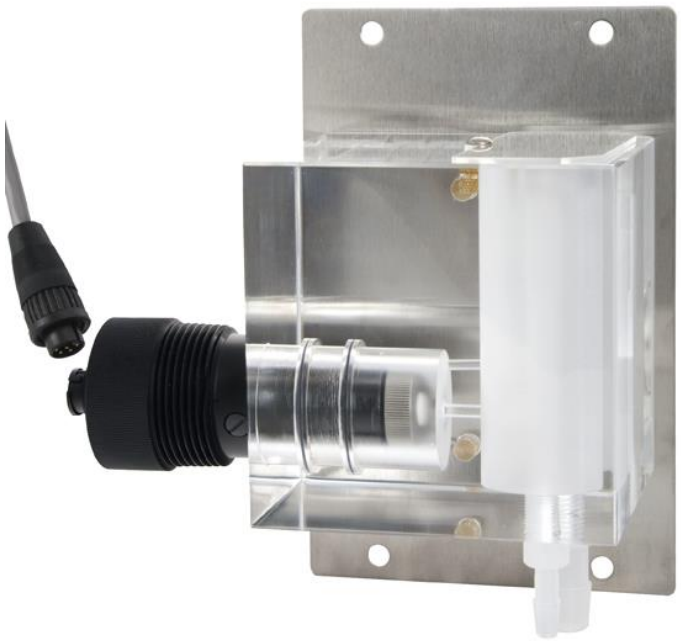
UNI EN ISO 9001
CERT. N. 9115 BCEL

INSTRUCTION MANUAL

CL 7901 Free Chlorine

CL 7902 Combined Chlorine

OZ 7901 Dissolved Ozone



Option _____

REP N° _____

Cod. 280067611 – Rev B

BC3531-A - Rev.01

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1 DESCRIPTION

The basic sensing element used in the free chlorine, combined chlorine and dissolved ozone monitors is a polarographic membraned sensor which measures chlorine or dissolved ozone directly. Water simply flows past the sensor and directly to drain, with the flow rate and pressure across the sensor controlled by a constant head flow cell assembly. The measurement does not alter the sample or add any chemicals to the sample stream, so the water flow can return to the system if desired. The concentration and temperature values are displayed on a backlit liquid crystal display on the front of the instrument CL 7585.010 or CL 7685.001.

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The model CL 7901 is suitable for free chlorine measuring in drinking water plants, cooling towers, reverse osmosis, de-chlorination. It requires – 200 mV polarization voltage.

The model CL 7902 is suitable for the combined chlorine measuring in swimming pools and water treatment with chloramines content. It requires – 400 mV polarization voltage.

The model OZ 7901 is suitable for d.ozone measuring in drinking water plants, cooling towers, disinfection plants and active carbon de-ozonization. It requires – 200 mV polarization voltage.

1.1 ACCESSORIES AND SPARES

The chapter 3.1 describes the accessories included in the package to be used for the installation and to be ordered as spare part or consumable.

2 TECHNICAL SPECIFICATIONS

2.1 SENSOR

Response time:	90% in 60 seconds.
Temperature sensor:	100 ohm platinum RTD integral to sensor
Temperature limits:	-5° to +55° C.
Connection:	Watertight 6 pin plug
Materials:	Noryl and titanium (nut)
Polarization:	- 200 mV for CL 7901 and OZ 7901 - 400 mV for CL 7902

2.2 FLOWCELL ASSEMBLY

Type:	Constant head overflow system
Materials:	Clear Cast Acrylic
Inlet Flow:	25/110 liter/hour (suggested 50 l/h)
Inlet Connection:	¼" Hose barb, 1/8" MNPT
Drain Connection:	½" Hose barb, 3/8" MNPT
Dimensions:	115 x 175 x 90 mm

3 OPERATING INSTRUCTION

3.1 PACKING LIST AND SPARES

CL 7901 contents:

- 0012.000066 free/combined chlorine sensor
- 0012.030029 cable l=7mt.
- 0012.000043 flow cell
- 0012.090011 120 cc electrolyte bottle
- 0012.050005 kit 10 membranes
- 0012.050004 kit screws and OR (installed in the cell)
- 278667611 instruction manual

CL 7902 contents:

- 0012.000066 free/combined chlorine sensor
- 0012.030029 cable l=7mt.
- 0012.000043 flow cell
- 0012.090010 120 cc electrolyte bottle
- 0012.050007 kit 10 membranes
- 0012.050004 kit screws and OR (installed in the cell)
- 278667611 instruction manual

OZ 7901 contents:

- 0012.000042 dissolved ozone sensor
- 0012.030029 cable l=7mt.
- 0012.000043 flow cell
- 0012.090008 120 cc electrolyte bottle
- 0012.050002 kit 10 membranes
- 0012.050004 kit screws and OR (installed in the cell)
- 278667611 instruction manual

3.2 INSTALLATION

The sensors are best used in a constant head overflow chamber because variations in sample flow rate and pressure can cause unstable readings.
When monitoring low concentrations (below 0.5 PPM), this method should always be used.

Mechanical installation of the flowcell requires that it be mounted to a wall or other convenient flat surface. Alternatively, the mounting holes on the plate will accommodate a 2" U-bolt for mounting the plate to a 2" pipe.
Be sure to allow enough clearance on the left side of the flowcell for insertion and removal of the sensor. About 30 cm clearance is recommended.

3.3 SENSOR ASSEMBLING PROCEDURE

The sensors are shipped dry.
The sensor will not operate until it is prepared by adding electrolyte and a membrane.
Preparation of the sensor for operation must be done carefully.
The procedure should be done by a qualified technician, and it should only be done when the system is ready for operation.
Until then, it is best to leave the sensor in the condition in which it is received.

Follow the procedure below to prepare the chlorine sensor for operation:

1. Unscrew the electrolyte chamber from the assembled sensor and also remove the fill screw from the side of the sensor body.

2. Remove the front nut from the bottom of the chamber and discard the protective membrane.
   O-rings are contained in grooves on both the bottom and top of the chamber.
   Be sure that these o-rings remain in place.

3. From the package of membranes supplied with the sensor, place a new membrane into the front nut.
   The membrane is white in color and is separated from other membranes by a light blue paper spacer. Screw the front nut on to the chamber until you feel the o-ring compress.
   Hand tight compression is all that is needed. Do not use tools to tighten.
   The membrane should be flat across the bottom of the chamber without wrinkles.

5. Fill the chamber with electrolyte until the level reaches the bottom of the internal threads.

6. Slowly screw the chamber onto the sensor body.
   A small amount of electrolyte will run out of the hole from which the fill screw was removed.
   Place a paper towel around the sensor to absorb the electrolyte overflow.
   The electrolyte is harmless and will not irritate skin.
   Tighten the chamber until the o-ring at the top of the chamber is compressed.
   Once again, do not use tools to tighten.

7. Shake excess electrolyte from the fill hole on the side of the sensor and replace the fill screw.

The sensor is now ready for operation.
The membrane should be stretched tightly across the tip of the sensor.
When handling the assembled sensor, do not set the sensor on its tip or damage to the membrane will result.
Severe impacts on the tip of the sensor from dropping or other misuse may cause permanent damage to the sensor.

3.4 CONNECTION TO THE CL 7685.010 CONTROLLER

The connection must be done by using the cable included in the package.

Connect the 7 pins connector to the cell..

Connect the white wire to the terminal 17.
Connect the brown (or orange) wire to the terminal 18.
In some models/applications it is necessary to install the jumper between terminals 17-19.

Connect the red wire to the terminal 23.
Connect the black wire to the terminal 24.
Connect the green wire to the terminal 25.

3.5 CONNECTION TO THE CL 7685.001 CONTROLLER

Refer to the specific instruction manual of the controller.

3.6 CONNECTION TO THE CL 3630 TRANSMITTER

Refer to the specific instruction manual of the transmitter.

4 OPERATION

The monitor should be calibrated while operating on a chlorinated/ozonated sample stream. Place the system into operation as follows:

1. Place the previously zeroed sensor into the sensor chamber of the flowcell assembly.
   The sensor is inserted into the side of the flowcell and is sealed in place with a double o-ring.
   The o-rings are lubricated at the factory to allow the sensor to slide smoothly into place.
   If insertion becomes difficult, use a small amount of silicon grease to lubricate the o-rings.

2. Turn on the inlet water flow to the flowcell and adjust the inlet flowrate so that water is overflowing from the inlet chamber.
   The best performance will be obtained when some water is always overflowing.
   This maintains constant flow and pressure on the sensor at all times.

3. Allow the system to operate undisturbed for 30-60 minutes.
   Assuming the water contains chlorine/d.ozone, the display will be reading positive values.
   If the system is stable, the value on the display will increase to some PPM value and remain at that level.
   At that point, calibration may be completed.

4.1 ZERO CALIBRATION

Chlorine sensors have extremely low offset currents at zero.
For this reason, it is normally sufficient to simply leave the zero at the factory default of 0.0 nA.
As an alternative, an electronic zero can be set by following the zero calibration instruction of the controller.

1. Connect the sensor to the electronics by plugging the cable plug into the receptacle on the top of the sensor.
2. Place about an inch of water in a small beaker or other convenient container and immerse the tip of the sensor.
   The water used need not be distilled, but it must not contain residual chlorine or d.ozone.
   Allow the sensor to sit undisturbed for at least 8 hours.

Follow the zero procedure related to the controller.

Note
If the zero current of the sensor is too large, the microprocessor will not accept the offset value and will flash the message "NO UPDATE". Should this occur, carefully inspect the sensor for a tear in the membrane. It will probably be necessary to rebuild the sensor as described in this manual. Should the offset remain high, contact the service dept. at B&C for assistance.

4.2 SENSITIVITY CALIBRATION

Calibration of the sensitivity must be done against a laboratory measurement on the same sample that the sensor is measuring.

A sample should be collected from the inlet line feeding the flow cell and quickly analyzed for chlorine or d.ozone contents.

When calibrating, it is best to have a reasonably high concentration of chlorine/d.ozone in the system.

The higher the value, the smaller will be the calibration errors caused by errors in the laboratory analytical procedure.

It is generally preferable to calibrate at values above 0.5 PPM to reduce calibration errors. If possible, the amperometric titration procedure for free chlorine should be used as the reference method.

Alternately, the specific colorimetric method may be used (DPD1, DPD3, Indigo).
The DPD procedure will indicate high values for free chlorine if a large amount of mono chloramines is present in the sample.

5 MAINTENANCE

5.1 SENSOR MAINTENANCE

Virtually all of the maintenance required for operation of the Chlorine Monitor is sensor related.
The electronics are generally trouble free. They are burned in at the factory and will likely have a problem only if random component failure occurs.

Sensor maintenance is required for accurate measurements.
The primary requirement is simply to keep the sensor membrane clean.
The membrane is a microporous polymer that is resistant to anything that will be encountered in water streams.
However, deposits can form on the surface or in the pores of the membrane, and these deposits will reduce the sensitivity.
Certain constituents in water, mainly iron and manganese, will for precipitates when the water is chlorinated.
These precipitates can sometimes form a coating on the membrane.

Because membranes are microporous, they can be relatively difficult to clean effectively.
Immersing the tip of the sensor in 1N nitric acid solution will sometimes remove deposits that cause low sensitivity, but this is not always the case.
The recommended practice is to simply replace the membrane when it becomes fouled.
To change a membrane, follow the sensor assembly procedure of this manual.
Do not reuse the electrolyte from the sensor when changing a membrane.
Always refill with fresh electrolyte. The electrolyte is stable and does not have a limited shelf life.

In normal operation, the output of the sensor will fall slowly as the membrane becomes fouled.
Normal calibration will require the sensitivity adjustment of the monitor.
It is good practice to replace the membrane if the sensitivity number of the monitor falls to 30-40%.
The value will not go below 20%.

Even if no build up is apparent on the membrane, it should be changed on a regular schedule.
The recommended membrane change interval is every 3 months.
For high purity water applications, this can probably be extended if desired, but a more frequent changing interval is a small price to pay for avoiding membrane failure at the wrong time.

While the sensor is disassembled for membrane changing, examine the condition of the o-rings on both ends of the electrolyte chamber.
If the o-rings show any signs of damage, replace them with new ones from the spare parts kit.
It is good practice to change these o-rings once a year, regardless of their condition.

5.2 FLOWCELL MAINTENANCE

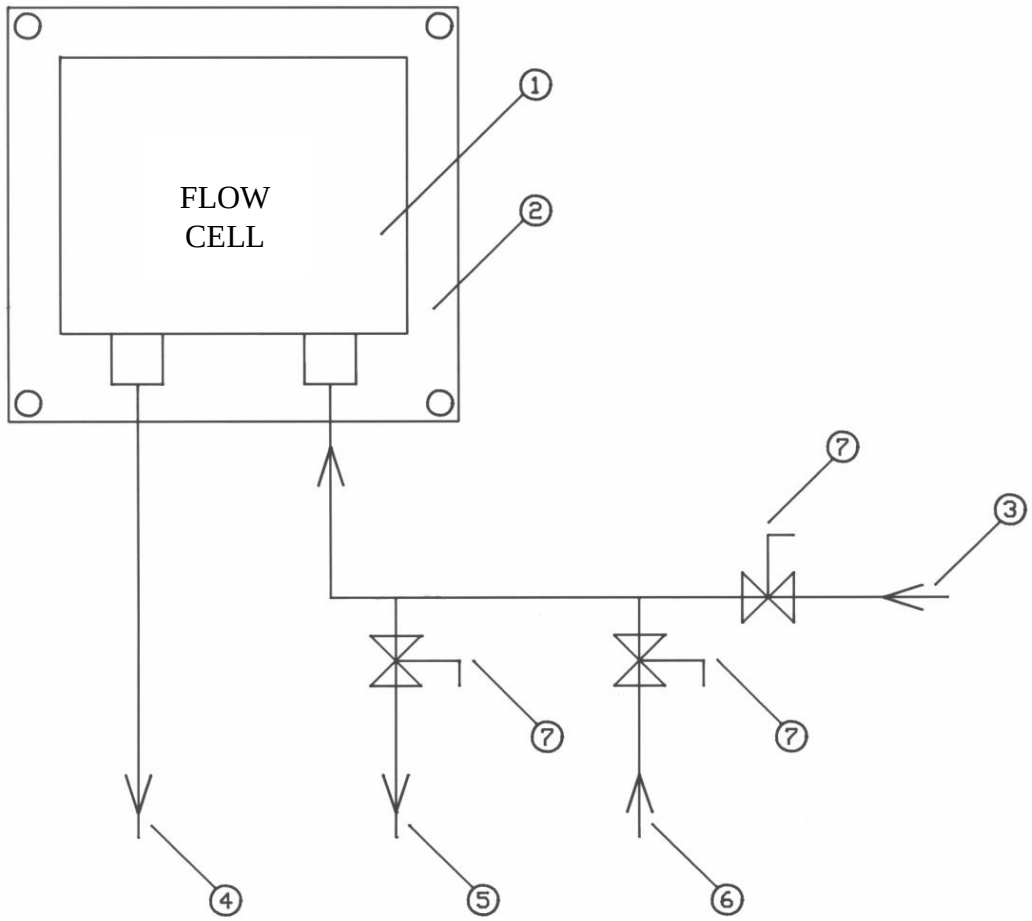
The maintenance on the flowcell is simply to keep it clean.

The flowcell is clear to assist operators in examining the condition of the sensor without interfering with operations.
Deposits on the flowcell with make this more difficult.
The flowcell may be cleaned by wiping or by washing with detergents or dilute acids.
Do not try to clean with solvents as the acrylic may craze or crack.

Change the o-ring in the flowcell yearly or if any damage is observed.
If insertion of the sensor into the flowcell becomes difficult, use silicon grease to lubricate the o-rings that hold the sensor in place.

Use only enough grease to provide surface lubrication.
Excess grease could foul the sensor membrane.

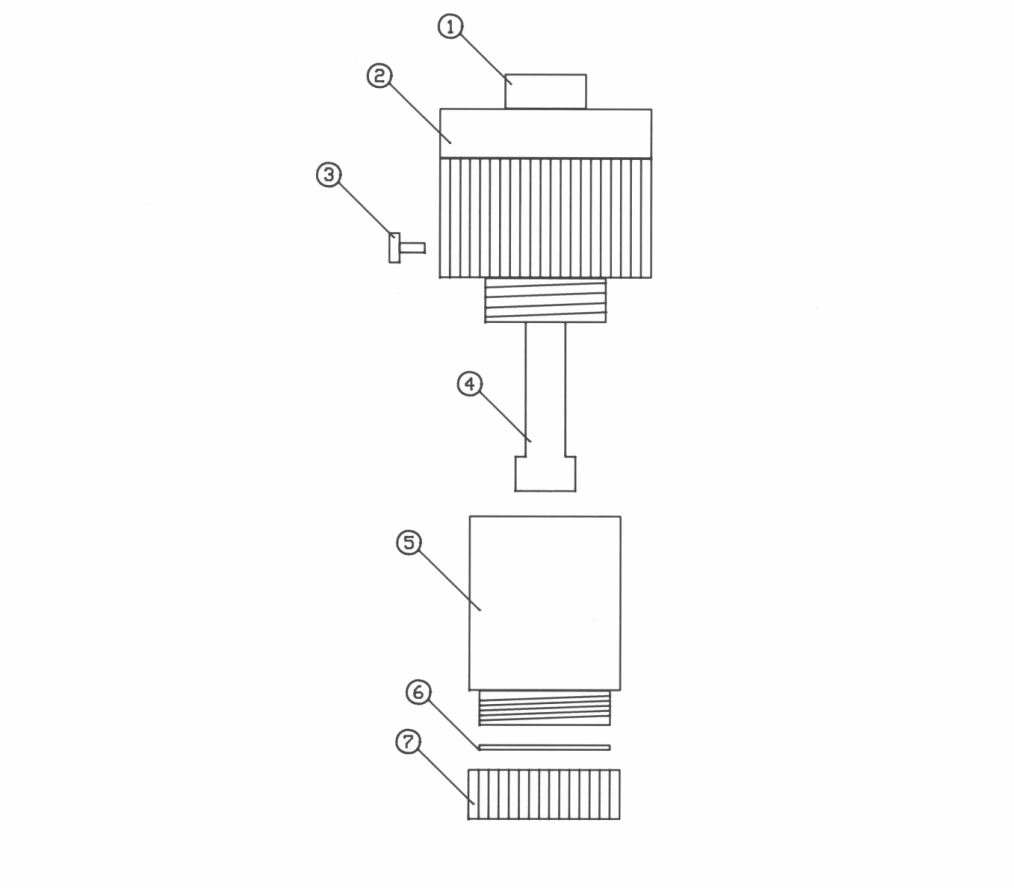
Typical installation



1. Flowcell and sensor
2. Fixing plate
3. Sample inlet
4. Sample discharge
5. Grab sample
6. Zeroing water
7. Manual tap

Fig. 1

Sensor



1. Connector
2. Body
3. Full screw
4. Sensing element
5. Electrolyte chamber
6. Membrane
7. Front nut

Fig. 2

WARRANTY CERTIFICATE

1) Your product is covered by B&C Electronics Warranty for 5 years from the date of shipment. In order for this Warranty to be valid, the Manufacturer must determine that the instrument failed due to defective materials or workmanship.

2) The Warranty is void if the product has been subject to misuse and abuse, or if the damage is caused by a faulty installation or maintenance.

3) The Warranty includes the repair of the instrument at no charge. All repairs will be completed at the Manufacturer's facilities in Carnate, Italy.

4) B&C Electronics assumes no liability for consequential damages of any kind, and the buyer by accepting this equipment will assume all liability for the consequences of its use by the Customer, his employees, or others.

REPAIRS

1) In order to efficiently solve your problem, we suggest You to ship the instrument along with the Technical Support's Data Sheet (following page) and a Repair Order.

2) The estimate, if requested by the Customer, is free of charge when it is followed by the Customer confirmation for repair. As opposite, if the Customer shall not decide to have the instrument repaired, he will be charged to cover labor and other expenses needed.

3) All instruments that need to be repaired must be shipped pre-paid to B&C Electronics. All other expenses that have not been previously discussed will be charged to Customer.

4) Our Sales Dept. will contact You to inform You about the estimate or to offer you an alternative, in particular when:
   - the repairing cost is too high compared to the cost of a new instrument,
   - the repairing results being technically impossible or unreliable

5) In order to quickly return the repaired instrument, unless differently required by the Customer, the shipment will be freight collect and through the Customer's usual forwarder.

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TECHNICAL SUPPORT

Data sheet

In case of damage, we suggest You to contact our Technical Support by email or phone. If it is necessary for the instrument to be repaired, we recommend to photocopy and fill out this data sheet to be sent along with the instrument, so to help us identifying the problem and therefore accelerate the repairing process.

□ *ESTIMATE* □ *REPAIR*

COMPANY NAME

ADDRESS ZIP CITY

REFER TO MR./MISS. PHONE

MODEL S/N DATE

Please check the operator's manual to better identify the area where the problem seems to be and please provide a brief description of the damage:

□ SENSOR
□ POWER SUPPLY
□ CALIBRATION
□ DISPLAY
□ ANALOG OUTPUT
□ SET POINT
□ RELAY CONTACTS
□ PERIODICAL

MALFUNCTIONING

➢ *DESCRIPTION*

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