WALCHEM

IWAKI America Inc.

Disinfection Sensors

# Non-Membrane Disinfection Sensors
# Instruction Manual

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# Notice


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Printed in USA

## Proprietary Material



## Statement of Limited Warranty

WALCHEM warrants equipment of its manufacture, and bearing its identification to be free from defects in workmanship and material for a period of 24 months for electronics and 12 months for mechanical parts and electrodes from date of delivery from the factory or authorized distributor under normal use and service and otherwise when such equipment is used in accordance with instructions furnished by WALCHEM and for the purposes disclosed in writing at the time of purchase, if any. WALCHEM’s liability under this warranty shall be limited to replacement or repair, F.O.B. Holliston, MA U.S.A. of any defective equipment or part which, having been returned to WALCHEM, transportation charges prepaid, has been inspected and determined by WALCHEM to be defective. Replacement elastomeric parts and glass components are expendable and are not covered by any warranty.

THIS WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, EITHER EXPRESS OR IMPLIED, AS TO DESCRIPTION, QUALITY, MERCHANTABILITY, and FITNESS FOR ANY PARTICULAR PURPOSE OR USE, OR ANY OTHER MATTER.

**P/N 180560.I**
**February 2023**

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# 1.0 Introduction

The Walchem non-membrane chlorine and chlorine dioxide sensors require use of an amperometric sensor assembly, cable, and a flow cell (each sold separately). Also available are optional flow switch and cleaning kit (recommended for all chlorine applications). Assembly of these parts is required, so please read these instructions carefully.

The sensor can measure the disinfectant in drinking water or drinking water quality water. It is not suitable for use in seawater.

## Sensor

The sensor assembly includes the sensor body, a 50-ml bottle of electrolyte fill solution, and special abrasive emery paper. Make sure that all parts are included.

The sensors are open (not-membrane covered) amperometric 3-electrode types. The measuring and counter electrode are in direct contact with the measuring water. The reference electrode is separated from the measuring water by a housing which contains an electrolyte. Together with the electrolyte, an electrical signal is generated at the measuring electrode, which is proportional to the concentration of the disinfectant, and amplified by the electronics of the sensor. The measuring signal is temperature compensated.

## Flow Cell

The flow cell consists of a translucent flow cell body, mounting nut, slide rings, tubing connectors, and o-rings. Make sure that all parts are included.

The flow cell is required for non-membrane sensors to read accurately. A steady flow rate of at least 15 liters per hour (4 gal/hr.) is required for sensors without a cleaning kit, with an optimal flow rate of 50 l/hr. A steady flow rate of 45 l/hr. (12 gal/hr.) is required for sensors with a cleaning kit, with an optimal flow rate of 80 l/hr. The maximum recommended is 90 liters per hour. The maximum pressure is 8 bar (116 psi).

An optional flow switch is available to provide a dry contact signal when the flow rate is less than 45 l/hr.

# 2.0 Installation

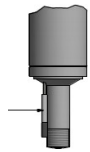
## Assembling the Sensor

**CAUTION:** Wear gloves and safety glasses during assembly of the sensor since the electrolyte is a dilute acid. It is recommended to perform this operation over a sink with running water available. Please heed the warnings on the electrolyte bottle. Do not swallow the electrolyte. Avoid contact of the electrolyte with skin and eyes. Otherwise wash with a lot of water. In case of eye inflammation, contact a doctor.

After using, re-cap any remaining electrolyte and store the bottle upside-down until the next use.

Never shake the electrolyte bottle, as this will introduce air bubbles that will negatively impact performance!

Do not touch or otherwise contaminate the electrodes!

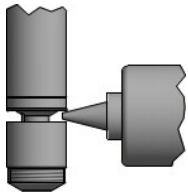


For PEEK sensors, never remove the reservoir cartridge attached to the reference electrode!

### Sensor Preparation

1. Holding the sensor at the housing as shown, unscrew the dark grey protective cap. The cap contains liquid. Save the protective cap in case the electrode will need to be stored for more than a month of downtime.

2. Unscrew the housing until there is a gap, then fill it to the top with the electrolyte until it overflows. **Never shake the electrolyte bottle, it must stay free of bubbles!**



3. SLOWLY screw on the housing until it is hand tight. **Be prepared for some electrolyte solution to squeeze out.**

4. Rinse your hands, the sensor, and all surfaces contaminated with electrolyte solution with running water. Check the sensor for leaks.

5. Push the cable onto the end of the sensor, aligning the pins with the holes. Turn the connector until hand tight to seal the cable connection.

## Flow Cell Placement

Requirements for mounting the sensor into the process can vary greatly with the circumstances that are encountered in each application. Here are some general guidelines for best results. Reference the typical installation drawings.

The flow cell should be placed on the discharge side of a circulation pump or downhill from a gravity feed. Flow into the cell must come through the tubing fitting on the bottom of the flow cell. The sensor must be installed vertically with the measuring surface pointing down, at least 5 degrees above horizontal.

System pressure must be maintained at or below 8 bar (116 psi) and still achieve the required flow. If flow cannot be achieved, plumbing the discharge to open atmosphere will allow best results. The flow cell has a flow regulator knob.

If the flow through the line cannot be stopped to allow for cleaning and calibration of the sensor, then the flow cell should be placed in a by-pass line with isolation valves to allow for sensor removal.

The sensor should be installed in an area where there is good solution

movement and where it will respond rapidly to chemical additions. The placement of the sensor relative to the placement of chemical replenishment, along with the quality of the mixing, and the replenishment chemical flow rate are critical to accurate process control.

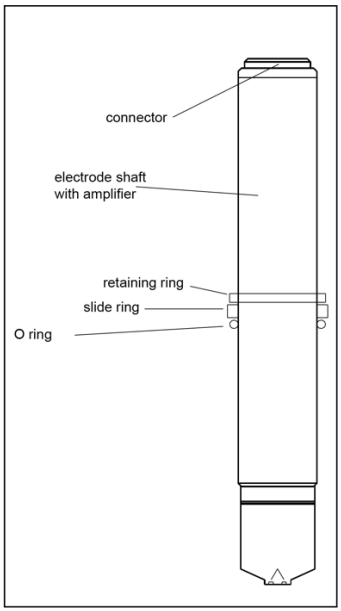
To avoid biological growth on the electrodes, which can block measurement, never leave the sensor in water without oxidant for longer than 24 hours, unless using the recommended cleaning kit.

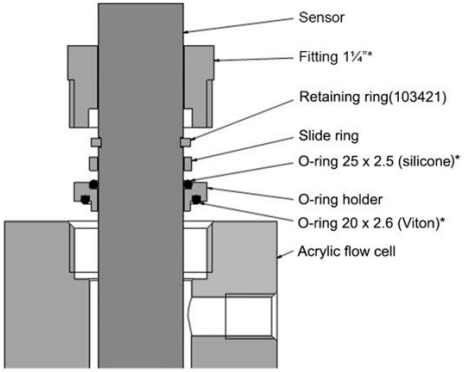
When installing the molded polysulfone flow cell, protect it from direct sunlight to prevent discoloration.

## Installing Sensor into Acrylic Flow Cells

1. Unscrew the 1 ¼" fitting from the acrylic flow cell. Insert the sensor through the o-ring holder as shown below. For sensors with the cleaning kit installed, the fit will be tight. Insert the sensor through the o-ring holder and into the flow cell by continuously turning it clockwise until the o-ring holder is tight between the slide ring and the flow cell. CAUTION turning CCW can loosen the electrolyte housing and/or cleaning kit.
2. Make sure that the large black o-ring is located between the o-ring holder and the flow cell, as shown below.
3. Push the 1 ¼" fitting over the sensor and fasten it tightly. Make sure that the sensor is tightly fastened in place, otherwise leakage may occur, or it may be pushed out of the flow cell when it is under pressure.
4. To supply a sample, open the water outlet valve first. Then slowly open the water supply valve to the sensor. The minimum flow rate is 45 liters/hour (12 gal/hr.) when using the cleaning kit, 15 liters/hour (4 gal/hr.) without. The acrylic flow cell has a flow regulator knob that should be used to adjust the flow to the desired rate.
5. Avoid installations that allow air bubbles to enter the water supplied to the flow cell. Bubbles in the water will cause incorrect sensor readings.

# Sensor Part Identification with Acrylic Flow Cells

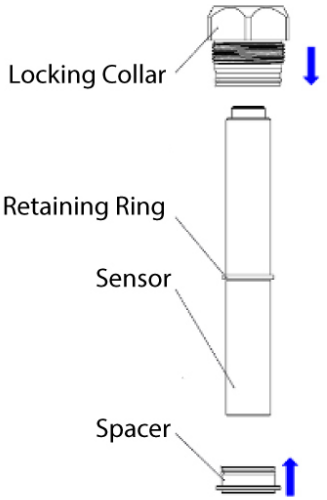


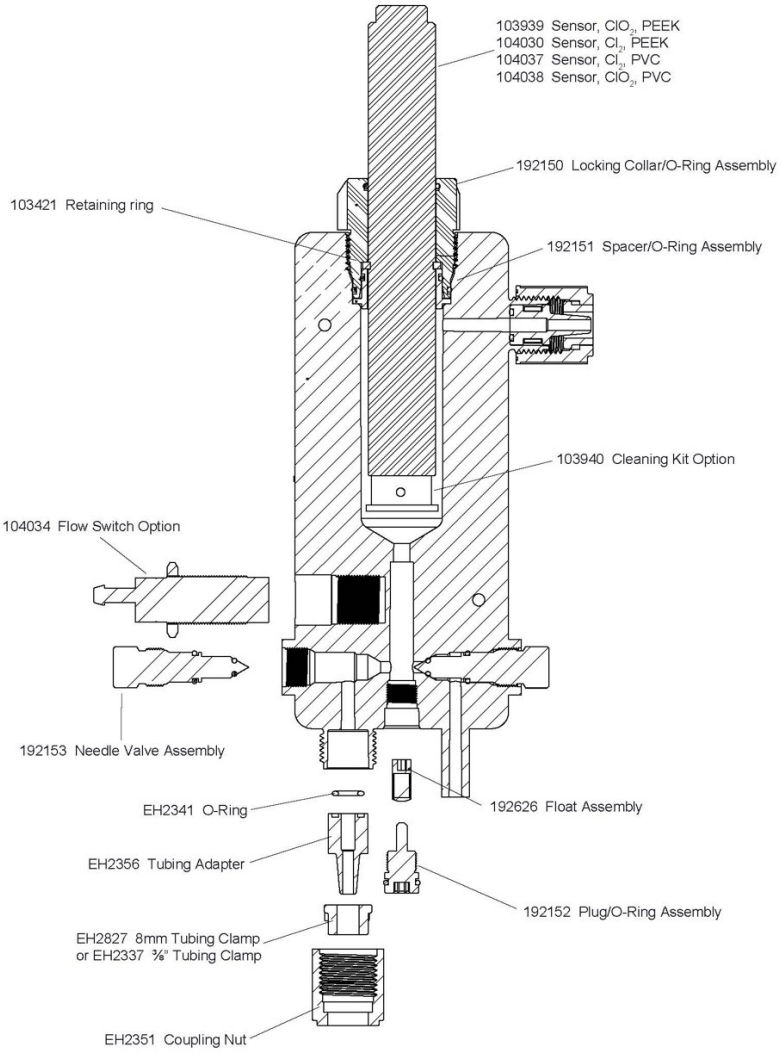

* Parts included in P/N 104173 Repair Kit

## Installing Sensor into Molded Polysulfone Flow Cell

1. Remove the o-ring and the slide ring from the sensor, leaving only the retaining ring.
2. Unscrew the 1 ¼" locking collar from the flow cell. Push the 1 ¼" locking collar over the sensor from the cable end. Push the spacer assembly up from the measurement end and insert the sensor into the flow cell as shown below.
3. For sensors with the cleaning attachment, Insert the sensor with mounted cleaning attachment into the flow cell by turning it CLOCKWISE until the sensor is snug (turning CCW can loosen the electrolyte housing and/or cleaning attachment).
4. Tighten the locking collar. Make sure that the sensor is tightly fastened in place, otherwise it may be pushed out of the flow cell when it is under pressure, or leaks can occur.
5. To supply a sample, first open the water outlet valve. Then open slowly the measuring water supply valve. The minimum flow rate is 45 liters/hour when using the cleaning attachment, 20 liters/hour without. The acrylic flow cell has a flow regulator knob on the lower left-hand side. Avoid installations that allow air bubbles to enter the measuring water.



# Parts Identification with Molded Polysulfone Flow Cell

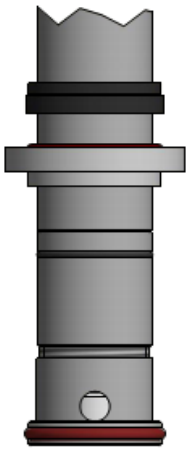


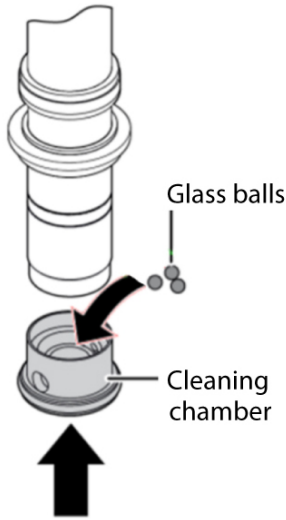
**Sensors with cleaning kit**
**(Recommended for all chlorine and most other installations)**

The cleaning kit consists of a cleaning chamber and two bags of glass balls. When using the cleaning kit, the minimum sample flow rate is 45 l/hour**.** The cleaning kit is only effective in removing thin deposits.

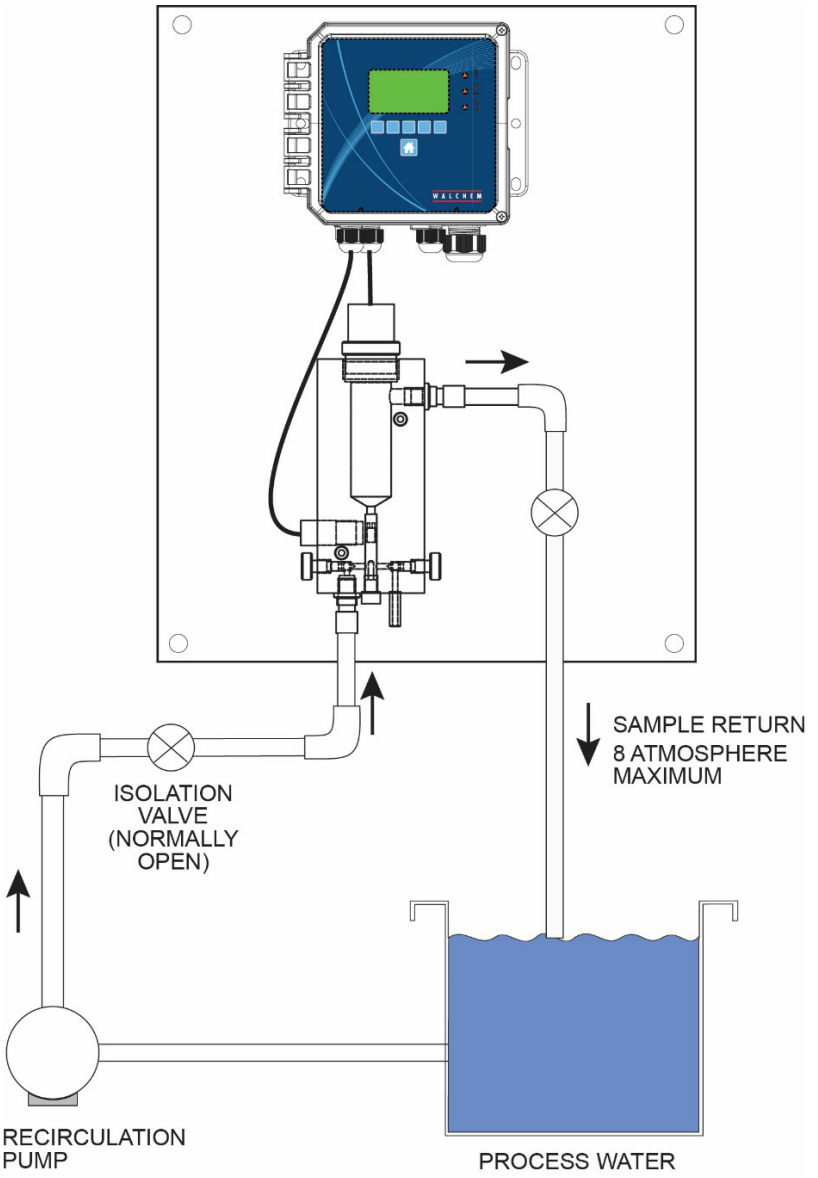
1. Remove the sensor from the flow cell.

2. Place three of the glass balls into the cleaning chamber and screw it onto the electrolyte housing.





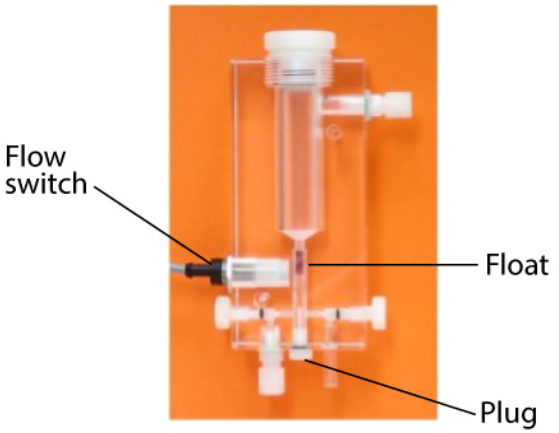
## Typical Installation



## Optional Flow Switch Installation

Unscrew the plug at the bottom of the flow cell and insert the float, notched end up. Replace the plug. Then screw the flow switch into the threaded cavity on the side of the flow cell.

## Wiring Instructions



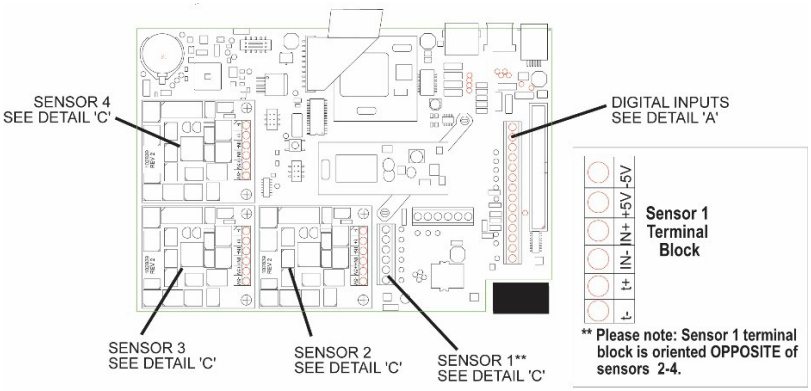

The sensor is provided with a 2-twisted pair, shielded, 24 AWG, 35 pF/foot capacitance cable. The wiring to the controller is as follows:

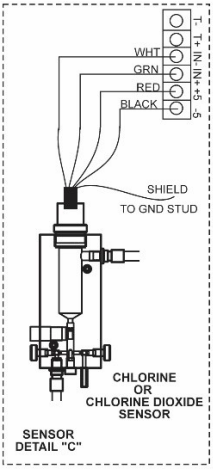
| SENSOR | CONTROLLER |
|---|---|
| Shield Drain: | Earth Ground |
| GRN: | IN+ |
| WHT: | IN- |
| RED: | +5 V |
| BLK: | - 5 V |

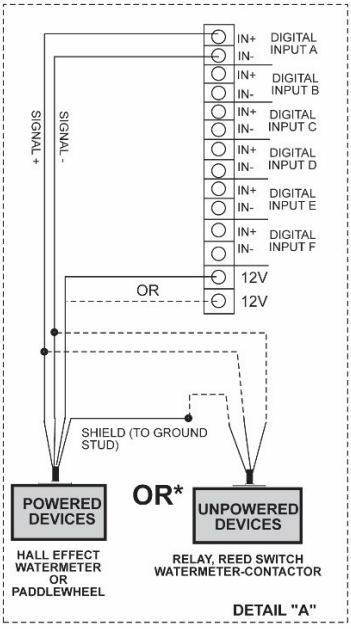
If the required cable length exceeds the 6 meters (20 feet) that is supplied, wire the housing to a part number 190851 junction box, then use a part number 100084 cable to reach the instrument. The maximum cable length is 30 meters (100 feet).

The optional flow switch is a powered device and is wired to one of the digital inputs as follows:

| | |
|---|---|
| BLK: | IN+ |
| BLU: | IN- |
| BRN: | 9-40 VDC |

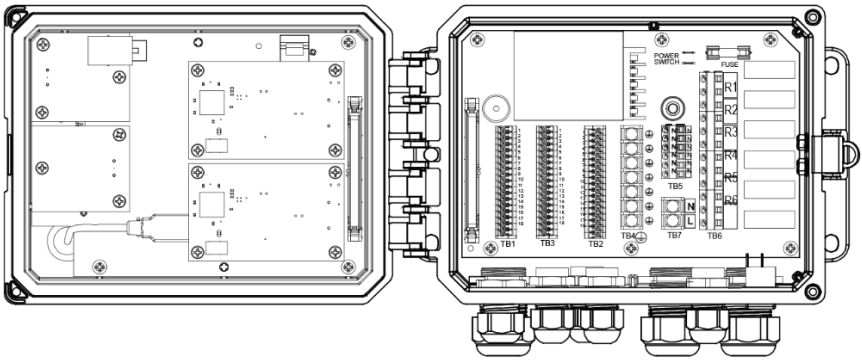


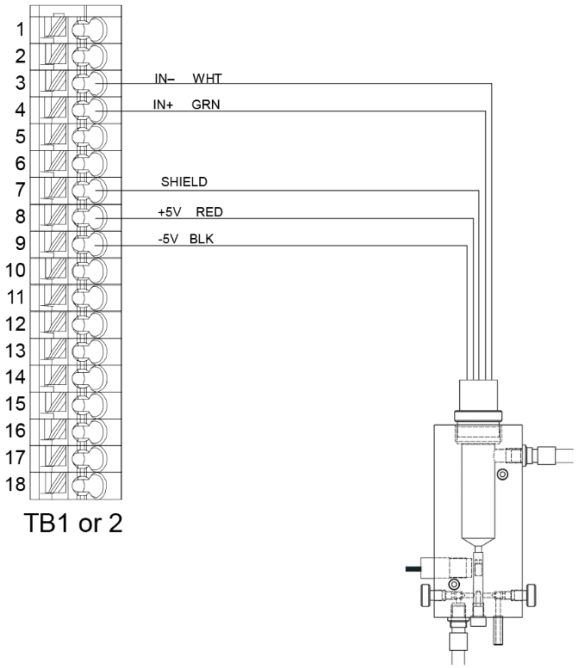

* Either an unpowered or a powered device may be connected to each digital input, one device per input.

# 600/Intuition-6



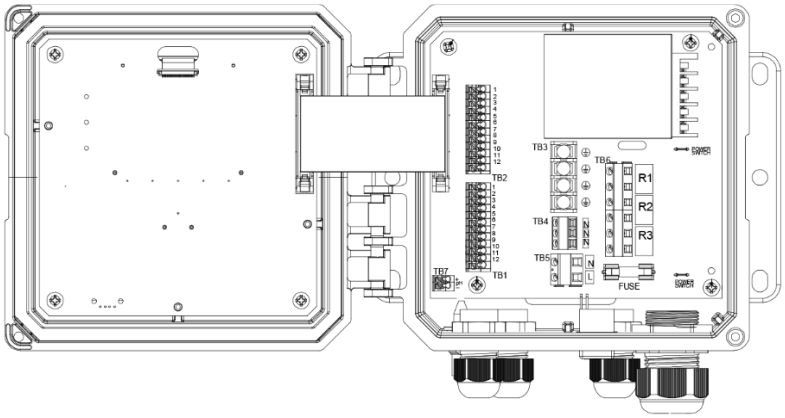

| | ECOND | CCOND | pH/ORP DIS |
|---|---|---|---|
| 1 | TEMP– | TEMP– | TEMP– |
| 2 | TEMP+ | TEMP+ | TEMP+ |
| 3 | R-SHLD | | IN– |
| 4 | | RCV | IN+ |
| 5 | RCV– | | |
| 6 | RCV+ | | |
| 7 | X-SHLD | SHIELD | SHIELD |
| 8 | | | +5V |
| 9 | | | –5V |
| 10 | XMT+ | XMT | |
| 11 | XMT– | | |
| 12 | ⏚ | | |

SENSOR LABEL



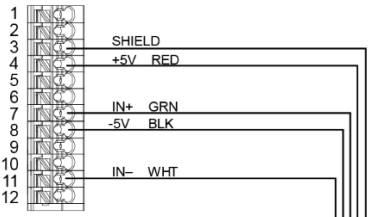

TB1 or 2

# WDSW100

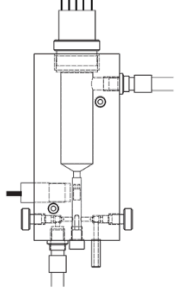


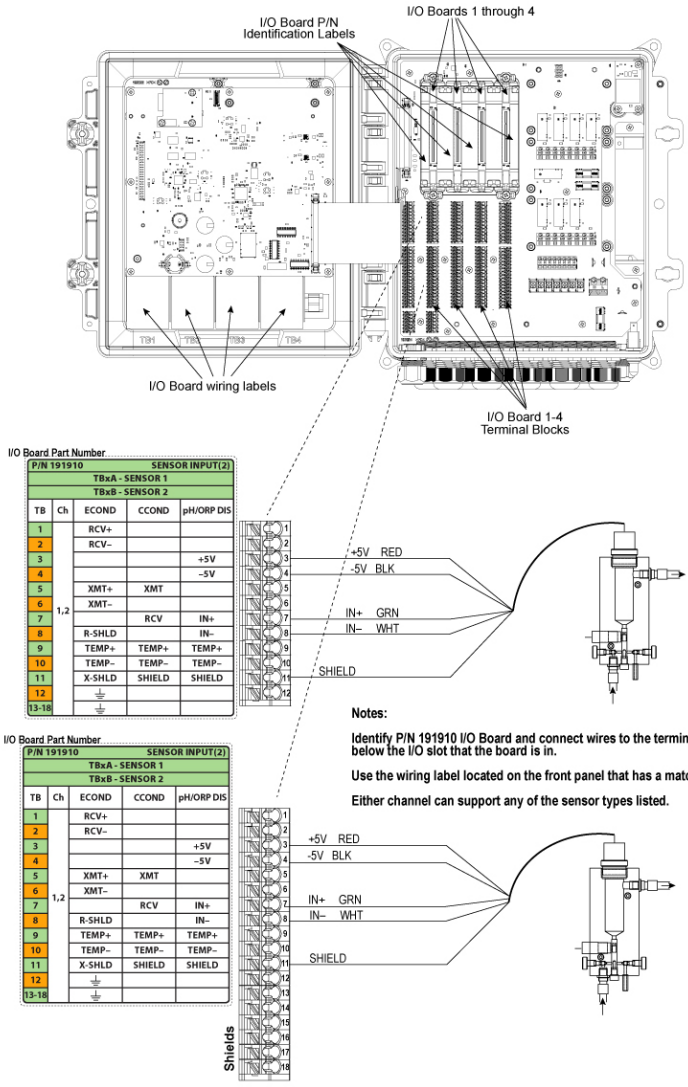

| TB1 | ECOND | CCOND | pH/ORP w/BNC | pH/ORP DIS | TB2 | FUNCTION |
|---|---|---|---|---|---|---|
| 1 | XMT+ | XMT | | | 1 | 4-20 OUT– |
| 2 | XMT– | | | | 2 | 4-20 OUT+ |
| 3 | X-SHLD | SHIELD | SHIELD | SHIELD | 3 | SHIELD |
| 4 | | | USE BNC FOR INPUT SIGNAL | +5V | 4 | DIG IN 2– |
| 5 | RCV– | | | | 5 | DIG IN 2+ |
| 6 | RCV+ | | | | 6 | +9 VDC |
| 7 | | RCV | | IN+ | 7 | SHIELD |
| 8 | | | | –5V | 8 | DIG IN 1– |
| 9 | TEMP– | TEMP– | TEMP– | TEMP– | 9 | DIG IN 1+ |
| 10 | TEMP+ | TEMP+ | TEMP+ | TEMP+ | 10 | +9 VDC |
| 11 | R-SHLD | | | IN– | 11 | SHIELD |
| 12 | ⏚ | | | | 12 | |

SAFETY COVER LABEL




TB1






Part Number 191910 Dual Sensor Board Wiring - Disinfection

# 3.0 Operation

This section describes how to prepare the sensor for use.

## Conditioning

The sensor requires conditioning to acclimate the electrodes prior to generating stable readings. Conditioning consists of installing the sensor in the flow cell, ensuring that the sensor remains wet at all times with water containing the disinfectant to be measured, and supplying power to the sensor.

The following conditioning times are recommended:

| | |
|---|---|
| New Sensor | 1 – 48 hours, depending upon water quality |
| New electrolyte | 1 – 3 hours |

## Calibration

The frequency of calibration is a function of many factors. These factors include:

1. The accuracy required by the application.
2. The tolerance for inaccurate readings versus the cost of calibration.
3. The coating or abrasive nature of the application.
4. The stability of the sensor and controller as a system.

The frequency of calibration is really determined by experience. At a new installation, calibration might initially be checked every day by comparing the controller reading to a DPD test or other manual analysis and logging the results. If the reading drifts off significantly in one direction you should consider calibrating. Resist the temptation to calibrate to correct for small errors that may be a result of normal variations in the test methods.

A calibration MUST be performed on initial installation, after cleaning the electrodes, or after replacing the electrolyte. A sensor installed in clean water can hold its calibration for several months.

DO NOT attempt to perform a calibration until the following conditions have been met:

1. The sensor has been conditioned as described above.
2. The sensor has equilibrated to the temperature of the water (for the zero calibration) or the sample (for the 1-point process calibration).

## Zero Calibration

1. Remove the sensor from the flow cell and place it in a beaker of clean, oxidizer-free water.
2. Allow the sensor 1 hour to equilibrate.
3. Go to the Zero Calibration menu of the controller. Refer to the controller instructions.
4. Stir the water with the sensor until the mV reading is stable for at least 5 minutes.
5. When the reading is stable, continue to the final steps of the calibration as described in the controller instructions.
6. Return the sensor to the flow cell and check for leaks.

## One Point Process Calibration

1. Ensure that the sensor is conditioned and equilibrated to the temperature of the sample.
2. Ensure that the sample flow rate is at the correct flow rate, adjusting the flow regulation valve if necessary.
3. Ensure that the pH is at its normal value and in range (chlorine).
4. Perform a DPD test or other manual analysis on the sample water.
5. Go to the One Point Process Calibration menu of the controller. Refer to the controller instructions.
6. When the reading is stable, continue to the final steps of the calibration as described in the controller instructions.

NOTE: Disinfectant concentration can change rapidly in the sample! Minimize the time between performing the DPD test or manual analysis and finishing the calibration.

# 4.0 Troubleshooting

### The disinfectant reading is much lower than the manual analysis

| Possible Causes | Corrective Actions |
|---|---|
| Insufficient conditioning | Wait for the appropriate amount of time before attempting a calibration |
| Insufficient sample flow | Increase flow rate |
| High pH (chlorine sensors) | Reduce the pH of the water |
| Air bubbles in sample | Dislodge bubbles<br>Adjust flow rate higher if necessary<br>Allow sample to outgas |
| Loose electrolyte housing | Tighten electrolyte housing |
| Protection cap not removed | Remove protection cap |
| Dirty electrodes | Clean electrodes with emery paper<br>Replace balls in cleaning attachment |
| No electrolyte fill solution in electrolyte housing | Fill electrolyte housing with electrolyte |
| Air bubbles in electrolyte | Empty electrolyte housing and refill it |
| Faulty cable | Replace cable |
| Faulty sensor | Replace sensor |
| Faulty analysis equipment or reagents | Consult test equipment instructions |

### The disinfectant reading is much higher than the manual analysis

| Possible Causes | Corrective Actions |
|---|---|
| Insufficient conditioning | Wait for the appropriate amount of time before attempting a calibration |
| Faulty sensor | Replace sensor |
| Faulty analysis equipment or reagents | Consult test equipment instructions |
| Sample contaminated with interfering molecule (refer to Sensitivity specification in Section 6) | Remove source of contamination |

## Sensor Error

This error message appears if the signal from the sensor is outside the range of –1400 to 1400 mVDC (WebMaster) or –2000 to 2000 (WDIS) or -2560 to 60 mV (W100/W600/900/Intuition)

| Possible Causes | Corrective Actions |
|---|---|
| Faulty wiring | Check wiring |
| Faulty sensor | Replace sensor |
| Faulty controller sensor input | WebMaster, WDIS4<br>Go to the Sensor Input menu and perform a self-test. If this passes, then the problem is with the sensor or its wiring. If it fails, then disconnect the sensor from the circuit board and try the self-test again. If it still fails, replace the circuit board. |

## Disinfectant Reading is Unstable

| Possible Causes | Corrective Actions |
|---|---|
| Air bubbles on electrodes | Dislodge bubbles<br>Adjust flow rate higher if necessary<br>Allow sample to outgas |
| Air bubbles in electrolyte | Refill electrolyte housing |
| Pressure fluctuations in sample | Check installation |
| Faulty wiring | Check wiring |
| Faulty sensor | Replace sensor |

## Calibration Failure

***For WebMaster:***

The controller will display a calibration failure if the offset calculated in the Zero Calibration is outside of the range –20 to 40 mV or the slope (mV/ppm) calculated in the One Point Process Calibration is outside of the range of the nominal mV per 0.1 to 2.0 ppm.

***For WDIS400:***

The acceptable range for the slope (mV/ppm) is the nominal mV per 0.5 to 2.0 ppm. The range of mV for a Zero Calibration is –100 mV to 100 mV.

***For W100 or W600 or 900 or Intuition:***

The acceptable range for the slope (mV/ppm) is the nominal mV per 0.2 to 10.0 ppm. The range of mV for a Zero Calibration is –100 mV to 100 mV.

To calculate the nominal slope for your sensor, divide the high end of the nominal range by -2000. For example, for a 0-20 ppm sensor, the nominal slope is -2000/20 = -100 mV/ppm.

| Possible Causes | Corrective Actions |
|---|---|
| Insufficient conditioning | Wait for between 1 hour and 48 hours before attempting a calibration. |
| Insufficient sample flow | Increase flow rate |
| Air bubbles in sample | Dislodge bubbles<br>Adjust flow rate higher if necessary<br>Allow sample to outgas |
| Loose electrolyte housing | Tighten electrolyte housing |
| Protection cap not removed | Remove protection cap |
| Dirty electrodes | Clean electrodes with Emory paper<br>Replace balls in cleaning attachment |
| No electrolyte fill solution in electrolyte housing | Fill electrolyte housing with electrolyte |
| Air bubbles in electrolyte | Empty electrolyte housing and refill it |
| Faulty sensor | Replace sensor |
| Faulty analysis equipment or reagents | Consult test equipment instructions |
| Sample contaminated with interfering molecule (refer to Sensitivity specification in section 6.0) | Remove source of contamination |
| Faulty wiring | Check wiring |
| Faulty controller sensor input | WebMaster, WDIS4<br>Go to the Sensor Input menu and perform a self-test. If this passes, then the problem is with the sensor or its wiring. If it fails, disconnect the sensor from the circuit board and try the self-test again. If it still fails, replace the circuit board. |

# 5.0 Maintenance

The sections below describe normal maintenance.

See section 4.0 Troubleshooting for assistance in determining when maintenance may be required.

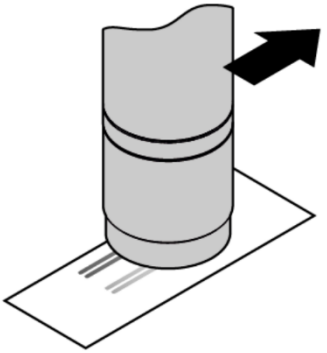
## Cleaning the Electrodes

It is recommended to clean the electrodes every 4 – 12 weeks or sooner if calibration is impossible due to unstable or low values are displayed, if not using the cleaning kit. The cleaning kit should be used for all chlorine applications.

Before removing the sensor from the flow cell close the water supply valve first, then the water discharge valve. Open the sample valve to relieve any pressure in the flow cell. Unscrew the 1 ¼" fitting/locking collar from the flow cell, holding the sensor to prevent it from twisting counterclockwise.

Pull the sensor out while turning it in a clockwise direction to prevent the housing with electrolyte and optional cleaning kit from disconnecting.

Dry the outside of the sensor with a clean paper towel or cloth. If installed, remove the optional cleaning kit. Hold the electrolyte housing tight to unscrew the cleaning kit, taking care not to lose the cleaning balls.



Use the emery paper supplied to clean the electrodes. Place the emery paper on a paper towel on a flat surface and while holding the sensor upright, pull the sensor across the paper twice. Use a clean part of the emery paper for each pass. Do not wipe from one electrode to the other. Keep them parallel and apart as shown.

Put the sensor back into operation. If the sensor still displays unstable or low values, the electrolyte must be changed as described in Section 2. It is recommended to change the electrolyte every 3 – 6 months.

If the electrodes are dirty and the optional cleaning kit is being used, it is possible that the cleaning balls need to be replaced (recommended annually).

## Replacing the Electrolyte

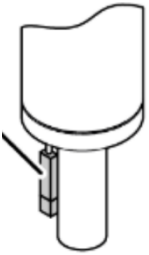
It is recommended to replace the electrolyte every 3-6 months.

**CAUTION:** Wear gloves and safety glasses during disassembly of the sensor since the electrolyte is a dilute acid. It is recommended to perform this operation over a sink with running water available. Please heed the warnings on the electrolyte bottle. Do not swallow the electrolyte. Avoid contact of the electrolyte with skin and eyes. Otherwise wash with a lot of water. In case of eye inflammation, contact a doctor.

Before removing the sensor from the flow cell close the water supply valve first, then the water discharge valve. Open the sample valve to relieve any pressure in the flow cell. Unscrew the 1 ¼" fitting/locking collar from the flow cell, holding the sensor to prevent it from twisting counterclockwise.

Pull the sensor out while turning it in a clockwise direction to prevent the housing with electrolyte and optional cleaning kit from disconnecting.

Dry the outside of the sensor with a clean paper towel or cloth. If installed, remove the optional cleaning kit. Hold the electrolyte housing tight to unscrew the cleaning kit, taking care not to lose the cleaning balls.



Unscrew the housing, remove any old electrolyte, and rinse it with water. For PEEK sensors, make sure that the reference cartridge (shown here) remains in place.

Replace the housing, refill with electrolyte, and prepare the sensor for use as described in Section 2.0.

## Sensor Storage

The sensor may be stored for up to one month in the flow cell assuming that the tip is always kept submerged in water.

An unused sensor, still in the box with protective cap, may be stored up to 1 year if the ambient temperature is above freezing.
A used sensor may be stored up to a year following this procedure:

Perform the electrolyte replacement procedure.
Fill the protective cap that was on the sensor when it was first shipped with electrolyte.
Screw the filled cap onto the sensor housing, rinse and dry.

For long term dry storage of PVC sensors only, up to 3 years, follow this procedure:

Unscrew the electrolyte housing.
Rinse the electrolyte housing and the electrode finger in clean water and dry in a dust-free location.
Replace the protective cap onto the electrolyte housing.
Loosely screw the electrolyte housing with protective cap onto the electrode shaft to protect the electrodes.

When putting the sensor back into operation after storage, the electrodes must be cleaned with the emery paper.

# 6.0 Specifications

| | **Free Cl2/Br2 PVC** | **Free Cl2/Br2 PEEK** | **Chlorine Dioxide PVC** | **Chlorine Dioxide PEEK** |
|---|---|---|---|---|
| Range (W100, W600, W900) | 0.03-20 mg/l (reduce the range by a factor of 3 if using the optional cleaning attachment) | | | |
| Range (WebMaster) | 0.03-8 mg/l (reduce the range by a factor of 3 if using the optional cleaning attachment) | | | |
| Resolution | 0.01 mg/l | | | |
| Sensitivity | NaOCl, $Ca(OCl)_2$, $Cl_2$, HOCl NaOBr, HOBr and BCDMH. Not for stabilized bromine<br><br>O3 (900%), $ClO_2$ (400%), Chlorite detected | | $ClO_2$<br><br>$Cl_2$, Chlorite < 2% detection | |
| Flow Rate of Sample | 15 – 90 liter/hour (constant, 80 l/hr. optimum if using the optional cleaning kit, 50 l/hr. without) | | | |
| pH range of sample | pH 5.00 – 9.00 (pH must be stable within ±0.10) | | pH 1.00 – 12.00 | |
| Conductivity range of sample | 10 – 5,000 µS/cm | | | |
| Response time | 30 seconds | | | |
| Conditioning time | 1 hour – 2 days depending on water quality | | | |
| Operating Pressure | 0-8 bar (0-116 psi) – 104033, 192059, 192060 flow cells, 0-4 bar (0-58 psi) – 192011 flow cell | | | |
| Operating Temperature | 0 - 50°C (32-122°F) | 0 - 70°C (32-158°F) | 0 - 50°C (32-122°F) | 0 - 70°C (32-158°F) |
| Storage | Frost-protected, dry and without electrolyte – no limit | | | |
| Flow cell connectors | 8 mm OD tubing fittings (104033, 192011, 192060 flow cells), 3/8" OD tubing fittings (192059 flow cell) | | | |
| Electrolyte | P/N 104039, 50 ml | | | |
| Power | ±5 VDC, 5 mA | | | |
| Signal | 0 to -2000 mV DC | | | |
| Maximum cable length | 30 meters (100 feet) | | | |
| Extension cable | 4 conductor 24 AWG shielded (Walchem 100084) | | | |
| **Materials of construction** | | | | |
| Sensor | PVC-U | PEEK | PVC-U | PEEK |
| Flow cell | PMMA and Natural PVDF (104033), PMMA and PVC (192011), PSU and GFRPP (192059, 192060) | | | |
| Mounting rings | PETP, FKM, Silicone and Natural PVDF (104033) or PVC (192011) | | | |
| Optional cleaning cap | PVDF, Acrylic (PMMA), Silicone, Ceramic balls (Highly recommended for chlorine sensors) | | | |
| Optional flow switch | Switch: Stainless steel, Polyester (not wetted)<br>Float: PEEK, epoxy | | | |

# 7.0 Sensor Part Numbers

| | Sensor | Electrolyte |
|---|---|---|
| SENSOR, Cl2, PVC, NON-MEMBRANE, 20 PPM | 104037 | 104039 |
| SENSOR, Cl2, PEEK, NON-MEMBRANE, 20 PPM | 104030 | |
| SENSOR, ClO2, PVC, NON-MEMBRANE, 20 PPM | 104038 | |
| SENSOR, ClO2, PEEK, NON-MEMBRANE, 20 PPM | 103939 | |

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