Free Chlorine Amperometric Sensors

Product Instructions

Section 1.0
Theory of Operation

1.0 Free Chlorine Defined

Free Chlorine or "freely active chlorine" is defined as the sum of molecular chlorine (Cl_2), hypochlorous acid (HOCl) and hypochlorite ions (OCl^-). Molecular chlorine occurs at pH values <pH4. Hypochlorus acid and hypochlorite ions are in pH dependent equilibrium with one another. Hypochlorous acid is a much stronger disinfecting agent (oxidizer) as compared to hypochlorite ions.

1.1 Sensor Operating Principle

Only hypochlorous acid (HOCl) diffuses through the membrane between the cathode and sample solution. At the applied potential, only hyphochlorous acid is electrochemically reduced. HOCl is reduced to chloride ion at the gold cathode. At the same time, the silver anode is oxidized to form silver chloride (AgCl). When the concentration of HOCl at the cathode is dramatically decreased by electrochemical reduction, hypochlorite ion will be transformed into hypochlorous acid, and to some extent, by proton transfer. The release of electrons at the cathode and acceptance at the anode creates a current flow, which under constant conditions, is proportional to the free chlorine concentration in the medium outside the sensor. The resulting low current output is then conditioned to 4-20mA current or Modbus 485 output by the sensor's onboard electronic circuitry.

Section 2.0
Factors Influencing the Sensor

2.0 pH

Free Chlorine (FCL) exists as hypochlorous acid and hypochlorite anion. The acid-base dissociation of FCL has a pKa of approximately 7.5. The FCL sensor responds to hypochlorous acid and hypochlorite anion with different sensitivity. In combination, an increase in pH reduces the mea-sured FCL and decrease in pH increases the measured FCL. For the most accurate free chlorine measurement, keep system pH at <6.5.

2.1 Chemical Interferences

The sensor should not be used in water containing surfactants. Monochloramine and ozone are interferences.

2.2 Flow

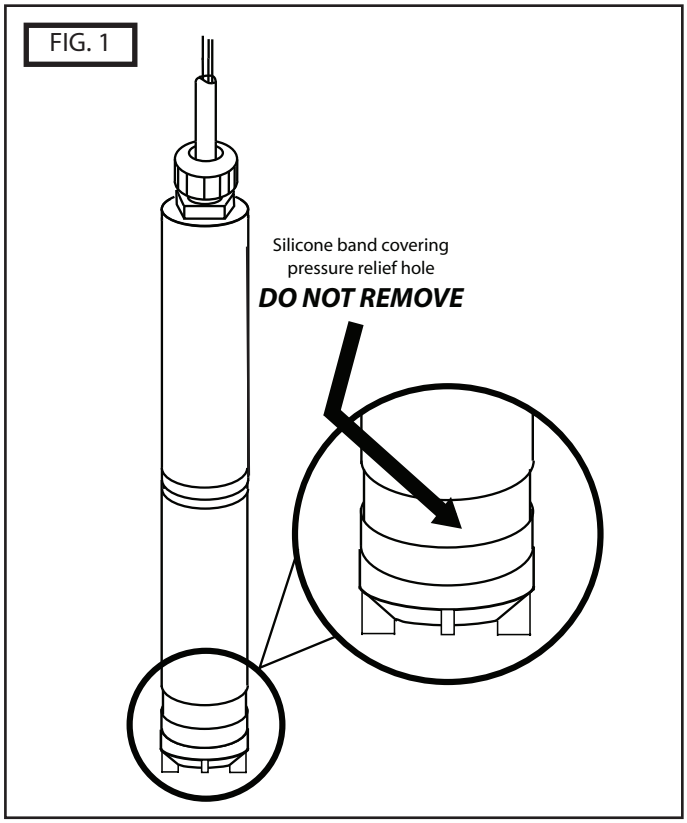
To acheive reproducible measurements, the (FCL) free chlorine require a specified constant flow rate. To avoid complications (such as bubbles), it is best to operate the sensors at a flow rate of 0.2 - 0.6 gpm if using flow cell FC72 or FC70 (old version). Use of a flowmeter is recommended (FM001- See Section 4.1)

2.3 Pressure

Pressure is relieved via a small vent hole covered with a silicone sleeve (FIG1). DO NOT REMOVE THE SLEEVE, even when refilling the sensor.

Parts covered by this product data sheet include:
FCL502, FCL505, FCL510, FC72, FCLA-5015, FCLA-5016, FCLA-5017, FCLA-5018

FIG. 1



pH Correction

If your system is >6.5 pH compensation should be applied to the measured output as follows:

$K(pH) = a_1 * pH^4 + a_2 * pH^3 + a_3 * pH^2 + a_4 * pH + a_5$

Where $a_1 = 0.006817$
$a_2 = -0.000764468$
$a_3 = -2.406291$
$a_4 = -23.75$
$a_5 = -63.0508$

$i_{corrected} = [i_{measured} - 4.2mA/k(pH)$, $FCL(ppm) = i_{corrected}/slope$

SECTION 3.0
Sensor Preparation

3.0 Free Chlorine Sensor Assembly

Your Free Chlorine Sensor is shipped with a protective tube covering the cathode. Remove the tube per FIG. 1A, page 1. It is also shipped with 2 mebrane cap assemblies, 2 replacement pressure relief band, 3 sheets of polishing paper and 2 bottles of electrolyte. First, fill the sensor with electrolyte using the provided needle and syringe (FIG. 8). Next place a few drops of electrolyte into the cap (FIG 1b) and then screw on the membrane cap assembly (FIG. 1C). Next install sensor into flow cell per SECTION 5. 0. **NOTE:** ***If sensor will be stored out of flow cell, the internal fill solution should be removed. Take the membrane cap and immerse in a cup of tap water until ready to reuse. See Section 10. Replace cap and electrolyte before installing into flow cell (See section 10 for cap and electrolyte change and see section 5 for sensor installation into flow cell).***

SECTION 4.0
Flow Cell/Flow Meter Installation

4.0 Flow Cell

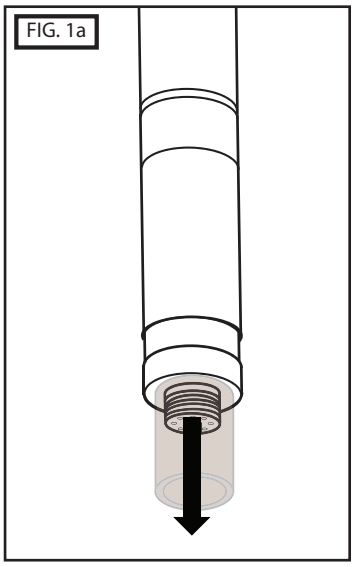
To obtain accurate Free Chlorine readings, the Sensor must be installed into the Flow Cell to prevent air bubbles formation on the membrane while maintaining proper spacing between the sensor and the installation wall, and laminar flow across the membrane. *Make sure sensor and flow cell are oriented vertically or no more than 45 degrees below vertical* (SEE FIG 2B).

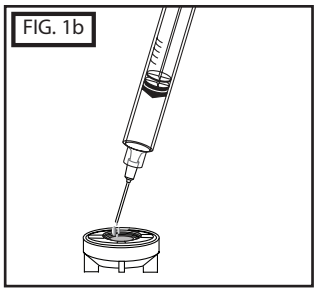
4.0a Using two 1/4" NPT Tube fittings, connect the FC72 Flow Cell into your system, noting the inlet (bottom) and outlet (side) orientation (SEE FIG 2).
4.0b Install clamp with rubber backing as shown in FIG 2A.
4.0c Drill 3/8" diameter hole on the panel.
4.0d Insert bolt as shown in FIG 2A.
4.0e On back of panel attach lock washer and nut to secure clamp and flow cell to panel.

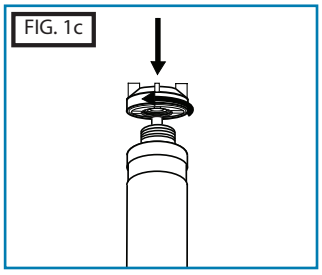
Ensure flow cell is mounted at 45 deg or higher above horizontal as shown in FIG 2B.

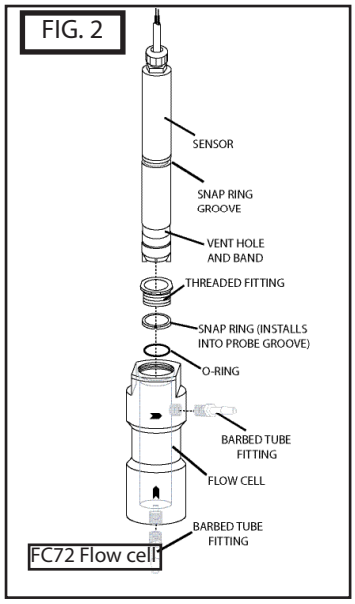
4.1 Flow Meter

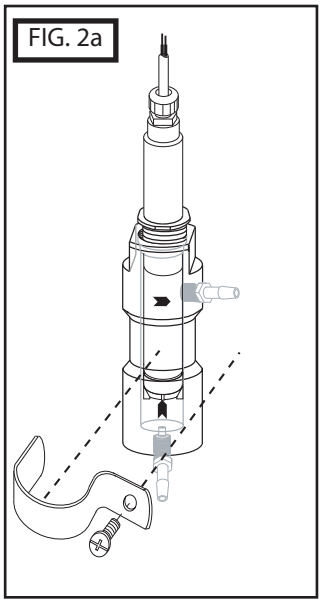
To control flow to the flow cell, a flow meter is recommended. Sensorex supplies model FM001 for this purpose. The FM001 provides flow control from 0.1 to 1.0 GPM (0.5 to 4.0 LPM) with 94% accuracy.

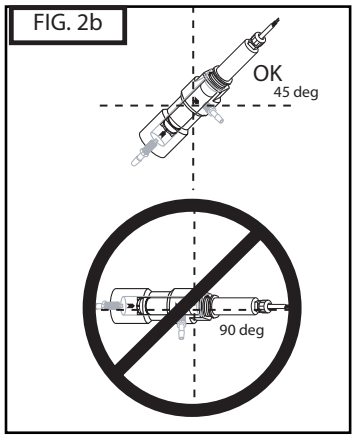












4.1.1 Install the flow meter and flow cell as shown in FIG 2C. Follow the diagram so that the incoming water is attached to the bottom of the flow meter (where flow adjustment knob is located).

SECTION 5.0
Sensor Installation

5.0 Sensor Installation into Flow Cell

a) First install threaded fitting onto sensor body (remove fitting if pre-installed in flow cell) FIG 2d
b) Install snap-ring into groove on sensor body
c) Next, slide o-ring onto body of sensor until it reaches bottom of threaded fitting.
d) Thread sensor assembly into top of flow cell as shown in FIG 2c.
e) Turn on flow and verify the flow through the Flow Cell is at least 0.2 gpm (45 liters/hour and no more than 0.6gpm (135 liters/hour).

SECTION 6.0
Electrical Installation

6.0 Electrical Installation

The sensor is supplied in 2 output types, 4-20mA or Modbus 485. Output of 4 mA in air and 20 mA at the top range of free chlorine output (0-2ppm, 0-5ppm and 0-10ppm) or Modbus 485.

NOTE: The supply voltage to the Sensor must be 12-24 V DC with minimum of 250 mA. Maximum load is 1 Watt. The sensor has 2 wires, red (+), black (-). Attach the red wire to the power supply positive ter-minal (+) and the black wire to the PLC or DVM positive (+) terminal. Connect a wire (customer supplied) from the power suppy negative (-) and the PLC or DVM (-). **See FIG 3. See FIG3A for Modbus connections.**

SECTION 7.0
Sensor Conditioning

7.0 Sensor Conditioning

The sensor requires conditioning prior to generating stable values.

a) For new Sensors, connect the sensor to power and allow to run overnight (at least 12 hours) before calibration.
b) If the Sensor will be un-powered for two hours or more, run for two hours prior to use.
c) If the Sensor's flow will be off for one hour or less, run the sensor for at least one hour prior to recalibration.
d) After membrane/electrolyte replacement, allow the Sensor to run powered overnight (at least 12 hours) before calibration.

FIG. 2c

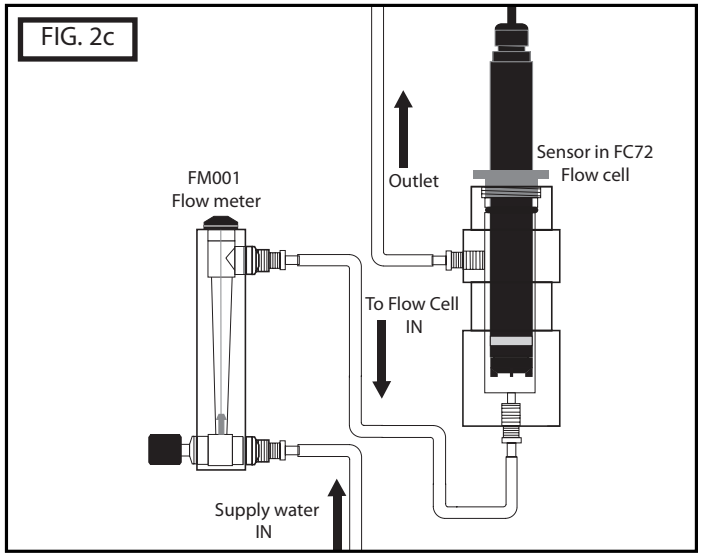


FIG. 2d

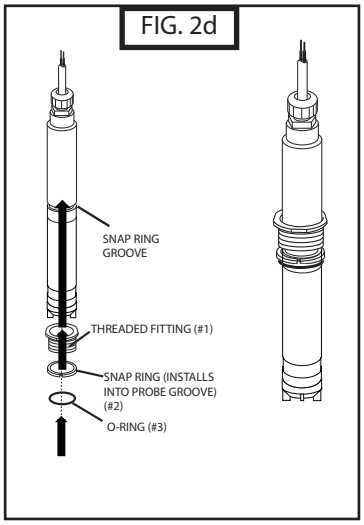


FIG. 2e

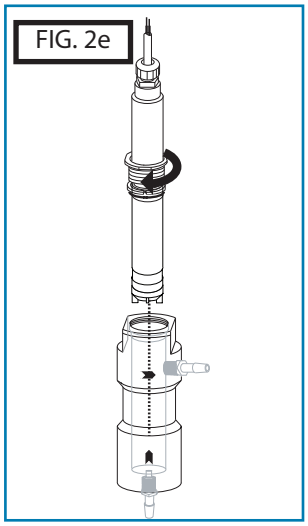
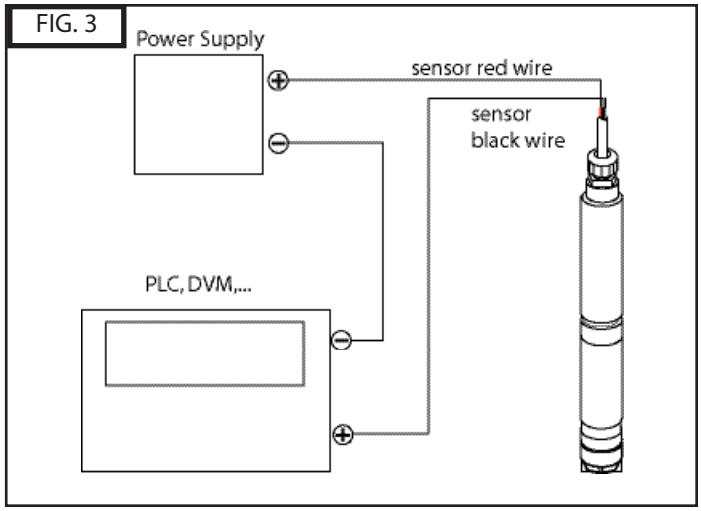


FIG. 3



Section 8.0
Calibration

NOTE: Sensors are supplied factory calibrated with a 4-20mA or Modbus 485 signal output corresponding to their specific range (0-2, 0-5 or 0-10ppm). Any span/range calibration can be done at your PLC or other 4-20mA input device. The zero-point calibration is not necessary since the zero setting is very stable. Check calibration at least once per week. There is no need to calibrate if it has not changed much. If calibration is required it should also be done at the PLC or other 4-20mA input device for the 4-20mA models. Calibration of Modbus 485 sensors can be done via Sensorex software on your computer or at PLC.

8.0 Span/Slope Calibration

a) Determine the free chlorine content using a diethyl-p-phenylenediamine (DPD) colorimeter test kit (SEE FIG 4) not included with the sensor and flow cell.
b) Measure free chlorine content with sensor. Make sure that calibration flow rate matches flow rate when measuring sample since probe output is flow rate dependent. Make sure pH is within 5.5-8.5 range.
c) Adjust span/slope at PLC/4-20mA device for 4-20mA models only.
d) Repeat this slope calibration one day after sensor is initially installed.
e) Repeat the slope calibration weekly.

Section 9.0
Sensor Storage

9.0 Storage

Store sensor at 5^{O} C - 50^{O} C *only* and maximum humidity of 95% non-condensing.

a) *Short Term Storage* (one week or less): Store in Flow cell with water to prevent the probe from drying out.
b) *Intermediate Term* (one week to one month): Store with cap on sensor in a beaker with water to keep membrane wet.
c) *Long Term* (one month or longer): Remove Membrane Cap and store cap completely immersed in tap water. Remove fill solution and pour down drain.

Note: Electrolyte shelf life is one year from date of mfg (see bottle).

Section 10.0
Sensor Maintenance

10.0 Membrane Cap Replacement

If membrane replacement is required, a new cap with preinstalled membrane must be used. Two caps and 2 bottles of refill solution are shipped with each sensor. Additional caps are ordered as FCLA-5016, and refill solution as FCLA-5015.

To change membrane cap:

a) Turn sensor upside down with cap facing upward.
b) Rotate cap counter-clockwise to remove (SEE FIG 5).
c) Place needle tip on syringe as shown in FIG 6
d) Remove solution from bottle with needle and syringe (FIG 7)
e) Fill sensor body with electrolyte using needle and bottle of refill solution until it flows out of the holes near the cathode(SEE FIG 8).
f) Add a few drops of electrolyte to the membrane cap (FIG 9)
g) Install new membrane cap by threading cap onto sensor rotating cap clockwise (Opposite of FIG 5).

DO NOT TOUCH THE CATHODE DURING THIS PROCESS SINCE IT CAN BE DAMAGED.

FIG. 3A

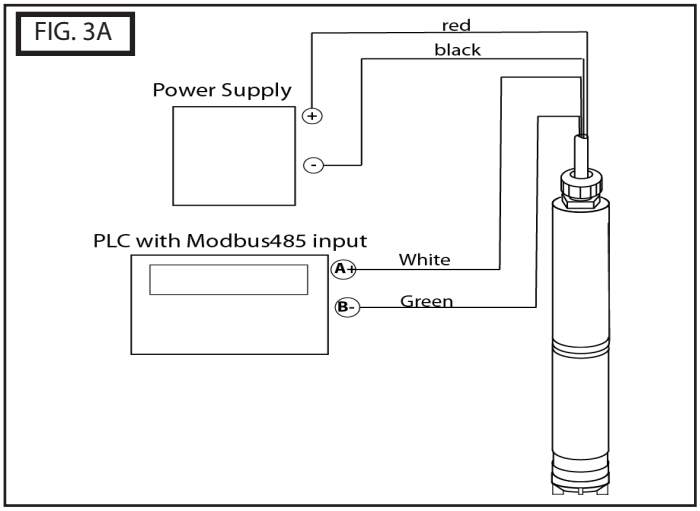


FIG. 4

FIG. 5

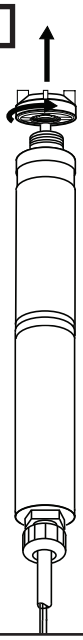
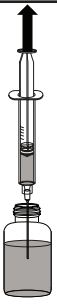


FIG. 6

FIG. 7



SECTION 11
Sensor Reconditioning

11.0 Electrolyte Solution Replacement

Drain old refill solution and pour down drain. Refill the sensor approximately every two months.

11.1 Membrane Replacement

If membrane replacement is required **(change at least every 6 months**), a new cap with preinstalled membrane must be used. 2 caps and 2 bottles of fill solution are shipped with each sensor. Additional caps are ordered as FCLA-5016, and refill solution as FCLA-5015. To change membrane cap :

a) Turn sensor upside down with cap facing upward.
b) Rotate cap counter-clockwise to remove (SEE FIG 5).
c) Attached supplied needle to syringe and remove fill solution as shown in FIG 6 & FIG 7. ***Electrolyte is safe and can be poured down the drain.***
d) Fill sensor body with electrolyte using needle and syringe of refill solution (SEE FIG 8).
e) Add a few drops of electrolyte to the membrane cap (FIG 9)
f) DO NOT TOUCH THE CATHODE DURING THIS PROCESS SINCE IT CAN BE DAMAGED.
g) Install a new membrane cap by threading cap onto sensor rotating cap clockwise (FIG 1B).

11.2 Membrane Cap/Sensor Cleaning

Rinse cap with water only. If cap does not clean, replace with new one.

11.3 Cathode Polishing

If the sensor cannot calibrate, then the gold cathode could be coated. Follow instruction in cathode polishing addendum on page 7 of this instruction manual. Then fill the sensor and replace membrane cap assembly. Allow 4 hours before repowering sensor for measurement.

SECTION 12
Sensor Troubleshooting

12.0 Calibration Problems

A. Sensor output *higher* than DPD test
1. Run in time too short
2. Membrane cap damaged
3. Interference from water contaminants (see Specifications, "Cross Sensitivity")
4. Cable short circuit or damage
5. pH value less than pH 5.5

B. Sensor output *lower* than DPD test
1. Run in time too short
2. Deposits on Membrane cap
3. Flow rate too low
4. Air bubbles on membrane
5. Surfactants in water
6. pH value more than pH 8.5
7. No electrolyte in sensor chamber
8. Cathode coated

C. Sensor ouput is 4mA (zero ppm for Modbus 485 version)
1. Run in time too short
2. Only bound chlorine present
3. Chlorine content below detection limit
4. Sensor not wired correctly (See SECTION 6.0 of this manual)
5. Defective sensor

D. Sensor output *unstable*
1. Air bubbles on membrane
2. Membrane damage
3. Pressure fluctuation in sample line

FIG. 8

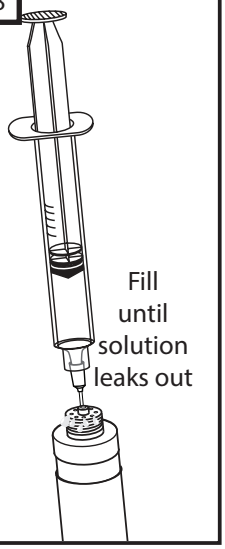
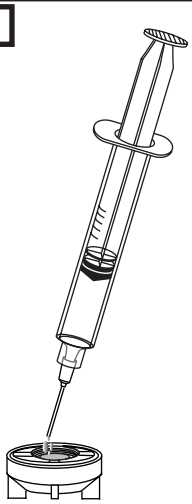


FIG. 9



TROUBLESHOOTING CHART

Symptom	Possible Cause	Solution/Remedy
The sensor cannot be calibrated- ouput is HIGHER than	1) Run in time too short 2) Membrane cap damaged 3) Interference from contaminants 4) DPD chemicals bad 5)Temperatue increased since cal	1) See Sec 7.0 -CONDITIONING 2) Replace cap - See Sec 11.0 3) See SPECIFICATIONS 4) Use new DPD kit 5) Match calibration temp.
The sensor cannot be calibrated- output is LOWER than DPD Test	1) Run in time too short 2) Deposits on membrane cap 3) Flow rate too low 4) Air bubbles on membrane 5) Surfactants in water 6) No electrolyte in cap 8) Temperature decreased since cal 9) Cathode coated	1) See Sec 7.0 -CONDITIONING 2) Remove deposits or replace cap if cleaning ineffective. 3) increase flow - See SPECIFICATIONS 4) Remove and re-install sensor to remove bubbles. 5) Remove surfactants and replace cap. See SEC 11.0 6) Add new electrolyte, run in sensor and re-calibrate 8) Increase temp to match cal 9) Polish cathode per Sensorex instructions. This should only be done if electrolyte refill and membrane cap change have not improved sensor performance.
Sensor output is 4mA or (0ppm with Modbus 485 version)	1) NO Free chlorine present 2) Run in time too short 3) Free chlorine concentration low 4) No electrolyte in cap 5) Sensor electrical connection wrong/Modbus comm error	1) Check system. 2) See Sec 7.0 -CONDITIONING 3) Add free chlorine and repeat calibration 4) Refill electrolyte 5) See SECTION 6.0
Unstable output from sensor	1) Air bubbles on sensor membrane 2) Membrane damaged 3) Non-sensor problem	1) Tap to remove bubbles 2) Replace membrane, run in sensor and recalibrate. 3) check PLC or I/O device

SECTION 13
Sensor Specification

13.0 Operating Specifications

Follow all operating specifications, especially for pH and flow rate as noted in the specification tables below.

TECHNICAL SPECIFICATIONS

SENSOR	
Dimensions:	8.2"L x 1" dia
Body Material:	Black PVC
Membrane Material:	proprietary
O-ring material:	Viton®
Cathode:	Gold
Anode:	Silver chloride (AgCl)
Cable:	2 -conductor shielded, 10ft (3mtr) tinned wire leads
FLOW CELL	
Dimensions:	5.60"H x 2.25"DIA
Material:	Acrylic
Connections:	1/4" NPT inlet and outlet

OPERATING SPECIFICATIONS

Operating Temperature Range:	0-45 degC
Maximum Operating Pressure:	1 bar/14.7 psi/1atm
Flow Rate Minimum:	0.2 gpm (0.75Lpm)
Flow Rate Maximum:	0.6 ppm (2.25Lpm)
pH Range:	5.5-8.5
Output Signal:	4.0+/- 0.4mA in air (zero) 21mA +/- 0.5mA at high range (2, 5 or 10ppm) or Modbus 485
Power Requirement:	12-24 VDC, *250* mA minimum
Cross-Sensitivity:	ClO2, ozone, bromine, iodine
Chemical Compatibility:	up to 50% ethanol/water or up to 50% glycerol/water

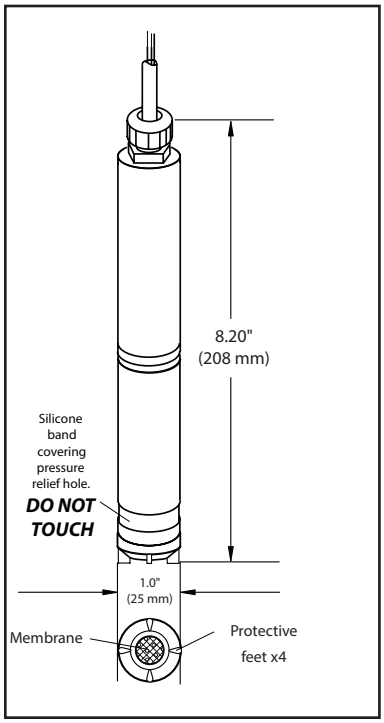
MAINTENANCE/REPLACEMENT PARTS

FCLA-5015	Free Chlorine sensor fill solution, 30mL, 2 each
FCLA-5016	Free Chlorine Replacement premembraned cap, 1 each + pressure relief band, 1 each
FCLA-5017	Polishing squares for gold cathode, 3 each
FCLA-5018	Complete maintenance kit, FCL5 Series includes: 2 each 30mL bottles of electrolyte, 1 membrane cap assembly, 1 pressure relief band, 3 polishing squares for gold cathode

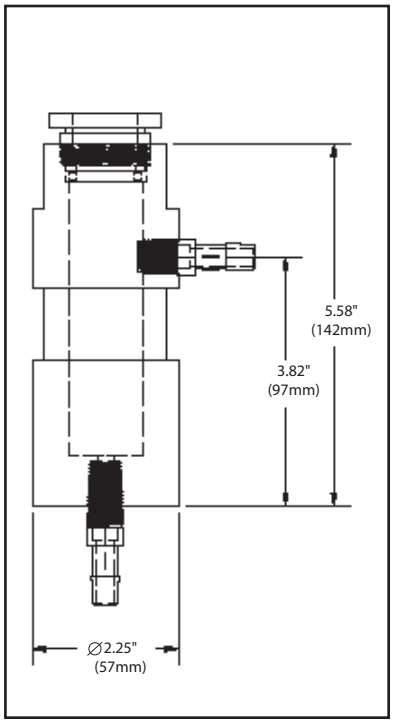
ACCESSORIES

FM001	Flow Meter, 0.1 to 1.0 gpm (0.5 to 4.0 Lpm)1/2 inch MNPT & 1/4 inch FNPT inlet and outlet, includes: 2 each 1/4" barbed tube fittings(3/8" tube)
FC72C	Flow Cell, 1/4 inch FNPT inlet and outlet, includes: 2 each 1/4" barbed tube (3/8" tube) fittings, clamp, threaded flow cell installation fitting
FCLA-7000	Free Chlorine /Chlorine Dioxide Colorimeter-eXact 7+, requires CLDA-7001 strips

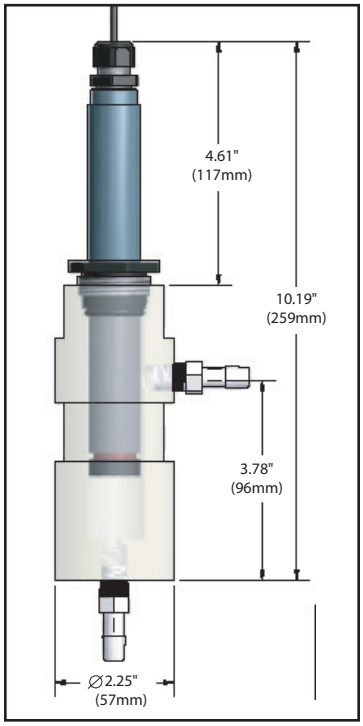
SENSOR DIMENSIONS



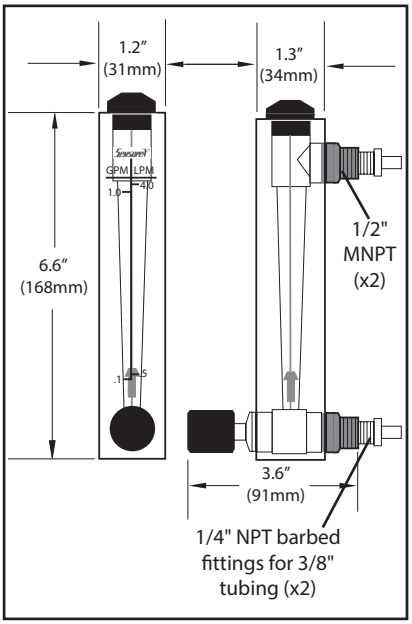
FC72 FLOW CELL DIMENSIONS



SENSOR AND FLOW CELL INSTALLATION DIMENSIONS



FM001 - FLOW METER DIMENSIONS



How to remove oxidation from the gold Catode of Sensorex FCL and CLD Sensors

1) f it is not possible to perform correct calibration after replacing the bottom cap and electrolyte, then the cause may be oxidation of the gold electrode. This oxidation will notably reduce the performance of the sensor and must be removed.
2) ake sure to wear rubber gloves and protective eye wear when servicing the sensor because the electrolyte is a strong acid **(FIG. 1)**.
3) Hold or clamp the sensor ertically so that the bottom cap is pointing up **(FIG. 2)**.
4) Uns ew the bottom cap **(FIG. 2)**and dry the internal electrode using a clean dry cloth **(FIG. 3)**. Be careful not to rub the gold surface because it is easily scratched.
5) sing the supplied abrasive paper (shinny side up) place it on the gold cathode and lightly rub it with your index finger using a circular motion **(FIG. 4)**.
6) ove the abrasive paper slightly as you rub the cathode to continuously expose new abrasive material. It does not take a lot of force, but continue to rub in a circular pattern for about a count of 60. Note the surface is domed and needs to stay this way – do not put a flat on the cathode.
7) Check t t the oxidation has been removed. The oxide layer is not easy to see, but the gold cathode should look brighter and shinier than before **(FIG. 5)**. If necessary, repeat the operation using the abrasive paper.
8) oak a Q-tip with fresh electrolyte and lightly wipe the electrode surface to clean off debris. Use only light pressure as the gold surface can be easily damaged. **(FIG. 6)**.
9) Top off the electrolyte with the syringe and needle so as to flush out any contaminants that may have dropped into the holes and the adjacent surface. If the cap is new and in good shape, add a few drops of electrolyte to the inside of the membrane pocket **(FIG. 7)**, then screw it slowly back on to the sensor. ***Catch any electrolyte that runs from under the cap with a towel.***
10. nstall sensor back into flow cell and start flow. Apply power to sensor for at least 4 hours before calibrating.

ONLY USE THE ABRASIVE PAPER SUPPLIED. OTHER TYPE OF ABRASIVE PAPER COULD CAUSE SERIOUS DAMAGE TO THE GOLD ELECTRODE.

FIG. 1

FIG. 2

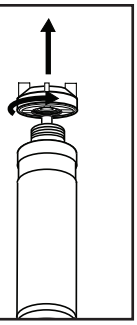


FIG. 3

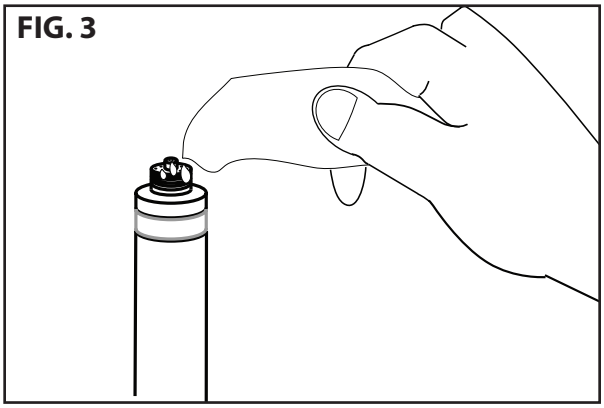


FIG. 4

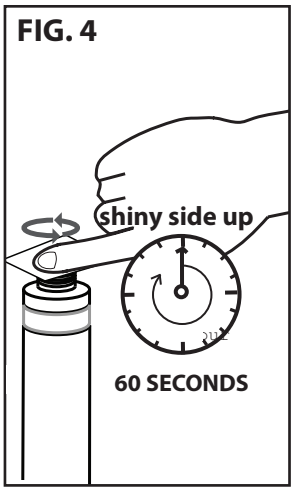


FIG.5

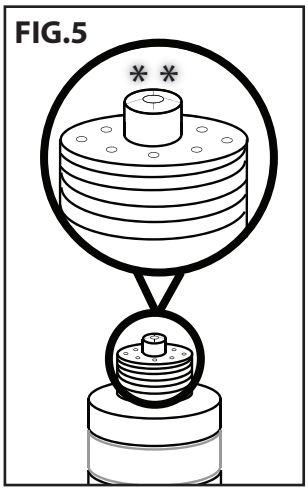


FIG. 6

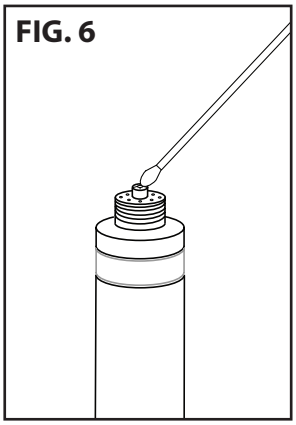
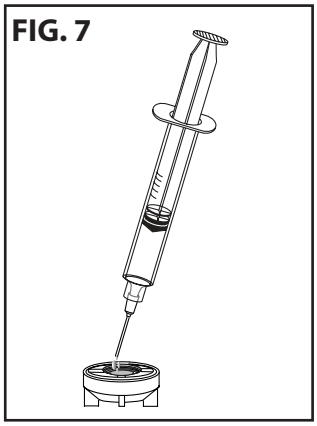


FIG. 7



Sensor Type	Address	Register Name	Format	Register count	Bytes	ACCESS	Value
Common	0	modbus_address	uint8	1	2	read/write	
Common	1	baud_rate	uint8	1	2	read/write	9=9600, 19 = 19200, 38 =38400
Common	2	serial_format	uint8	1	2	read/write	0= 8n1, 1= 8e1, 2=8o1,3=8n2
Common	3	probe_value	float	2	4	read only	pH(pH), ORP, FCL, Condu, DO
Common	5	probe_temp_c	float	2	4	read only	deg C
Common	7	probe_alternate_value	float	2	4	read only	
Common	9	loop_current_ma	float	2	4	read only	mA current if mA mode
Common	11	probe_value_min	float	2	4	read only	
Common	13	probe_value_max	float	2	4	read only	
FCL, DO, TO(old)	15	probe_range	uint16	1	4	read only	
Common	16	model_number	char12	6	12	read only	
Common	22	serial_number	char12	6	12	read only	12-chacter string
Common	28	user_label	char12	6	12	read/write	
Common	34	firmware_version	char12	6	12	read only	16 bit - high order 8 bits = major version , low order 8 bits = minor version
Common	40	manufacture_date	char12	6	12	Read only	YYYYmmddHHMM
Cond/TO	46	temperature_coefficient	float	2	4	read only	default = 0.02(2%)
DO	48	pressure_torr	uint16	2	4	Read/write	default =760
DO	50	salinity_ppm	uint16	1	4	Read/write	default =0
Common	51	reed_switch_active	uint16	1	2	Read/write	
Common	52	operating_mode	uint8	1	2	Read/write	0=default =Modbus, 1=Modbus, 2=mA
Common	53	override_mode	uint16	1	2	Read	
Common	54	override_value	float	2	4	Read	
Common	56	probe_duty_cycle_c2	float	2	4	Read	
Common	58	probe_duty_cycle_c1	float	2	4	Read	
Common	60	probe_duty_cycle_c0	float	2	4	Read	
Common	62	probe_temp_c2	float	2	4	Read	
Common	64	probe_temp_c1	float	2	4	Read	
Common	66	probe_temp_c0	float	2	4	Read	
Common	68	probe_value_c2	float	2	4	Read	
Common	70	probe_value_c1	float	2	4	Read	
Common	72	probe_value_c0	float	2	4	Read	
Common	74	calib_mode_c2	float	2	4	Read	
Common	76	calib_mode_c1	float	2	4	Read	
Common	78	calib_mode_c0	float	2	4	Read	
Common	80	duty_cycle	float	2	4	Read	
Common	82	probe_value_raw	float	2	4	Read	
Common	84	probe_temp_raw	float	2	4	Read	
Common	86	instrument_temp_raw	float	2	4	Read	
Common	88	instrument_temp_c	float	2	4	Read	
Common	90	Cal_point_A	float	2	4	Read/write	
Common	92	Meas_point_A	float	2	4	Read/write	
Common	94	Cal_point_B	float	2	4	Read/write	
Common	96	Meas_point_B	float	2	4	Read/write	
Common	98	Cal_Time	char12	6	4	Read/write	
Common	104	Cal_point_A1	float	2	12	Read	
Common	106	Meas_point_A1	float	2	4	Read	
Common	108	Cal_point_B1	float	2	4	Read	
Common	110	Meas_point_B1	float	2	4	Read	
Common	112	Cal_Time1	char12	6	4	Read	
Common	118	Cal_point_A2	float	2	12	Read	
Common	120	Meas_point_A2	float	2	4	Read	
Common	122	Cal_point_B2	float	2	4	Read	
Common	124	Meas_point_B2	float	2	4	Read	
Common	126	Cal_Time2	char12	6	4	Read	
Common	132	Cal_number	uint16	2	12	Read	
FCL	134	Cal_ppm0	float	2	4	Read/write	
FCL	136	Meas_nA0	float	2	4	Read/write	
FCL	138	Cal_ppm1	float	2	4	Read/write	
FCL	140	Meas_nA1	float	2	4	Read/write	
FCL	142	Cal_Temp	float	2	4	Read/write	
FCL	144	Cal_pH	float	2	4	Read/write	
FCL	146	FCL_Cal_Time	char12	6	12	Read/write	
Common	152	FactorA1	float	2	4	Read	
Common	154	FactorA2	float	2	4	Read	
Common	156	FactorA3	float	2	4	Read	
Common	158	FactorA4	float	2	4	Read	
Common	160	FactorB1	float	2	4	Read	
Common	162	FactorB2	float	2	4	Read	
Common	164	FactorB3	float	2	4	Read	
Common	166	FactorB4	float	2	4	Read	
Common	168	FactorC1	float	2	4	Read	
Common	170	FactorC2	float	2	4	Read	
Common	172	FactorC3	float	2	4	Read	
Common	174	FactorC4	float	2	4	Read	
TOROIDAL	176	Cell_Const1	float	2	4	Read	
TOROIDAL	178	MiddlePoint	float	2	4	Read	
TOROIDAL	180	Zero_Cutoff	float	2	4	Read	
Common	182	Parameter0	float	2	4	Read	
Common	184	Parameter1	float	2	4	Read	
Common	186	Parameter2	float	2	4	Read	
Common	188	Parameter3	float	2	4	Read	
Common	190	Parameter4	float	2	4	Read	
Common	192	Parameter5	float	2	4	Read	
Common	194	Parameter6	float	2	4	Read	
Common	196	Pwm_Counts_4mA	uint16	1	2	Read/write	PWM value for 4mA
Common	197	Pwm_Counts_20mA	uint16	1	2	Read/write	Pwm Value for 20mA
Common	198	Pwm_Counts	uint16	1	2	Read	