

# Operation and Maintenance Manual

Doc No: OMMAN Rev. 3

**SWN- P+, EX-P-HT4  
SWN-HT2+ Sensor**

**HALOGEN**  
s y s t e m s i n c

## Critical Safety Information

### NOTICE

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

### Use of hazard information

	<b>DANGER</b>
Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury	
	<b>WARNING</b>
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.	
	<b>CAUTION</b>
Indicates a potentially hazardous situation that may result in minor or moderate injury.	

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## 1 SPECIFICATIONS

**Sensor housing:** Stainless Steel 316

**Chlorine Accuracy:**  $\pm 15\%$  or 0.07 ppm, whichever is greater

**Salinity Accuracy:**  $\pm 15\%$  in range of 500  $\mu\text{S}$  to 45,000  $\mu\text{S}$

**Chlorine range:** 0 to 5.5 ppm as  $\text{Cl}_2$ . (0 to 10 ppm)

**Response time to step change in chlorine concentration:** <150 sec to 95% of final reading

**Process connection:** To be fitted in a 2-in NPT FIP Pipe Fitting (Tee)

### **Wetted parts:**

Teflon, platinum, PEEK, PPS-GF, Buna N, glass, Stainless Steel 316

### **Weight/shipping weight:**

Model SWN-P: 1.5 kg

(Rounded to the nearest 0.5 kg)

### **Sample requirements:**

Pressure: 0 to 10 Bar

Temperature: 1 to 35° C

Minimum velocity: N/A

Maximum velocity: 5 m/s

Sample Salinity: 0 to 34 PSU at 0 to 35°C

pH: 6.5 to 8.5

## 2 START-UP AND OPERATION

The start-up screen will appear after the first cycle Figure 1. The display will take one minute to update. The system calibration should be checked at start and commissioning. If air is detected the sensor pump will cycle on and off three times to remove air from the sensor and may delay the first cycle completion by up to 20 seconds.

C H L	8 . 9 7	T M P	1 5 . 8 °C
		C O N D	3 4 5 5 0
O R P	8 7 6	P S U	5
A D D R	1 2 5		

Figure 1: Main Screen

## 3 MEANING OF INDICATORS

**CHL:** This is the level in ppm. The range is 0 to 15 ppm. The raw signal in in nanoamps of current and is proportional to the TRO level.

**ORP:** ORP is short for Oxidation Reduction Potential. This is another parameter that indicates the effectiveness of the TRO in killing organisms. Raw untreated seawater has an ORP of 180 to 280. This is used for diagnostics and can indicate the condition of the TRO electrode. It has a logarithmic relationship to TRO and is used for a qualitative comparison only. The reading is a voltage in millivolts.

**PSU (Salinity):**This is derived from the measurement of the electrical conductivity of the water.

**TEMP:** This indicates the temperature in degrees C or F. It will also display below zero values.

## 4 DISPLAY INTERFACE & KEY PAD OPERATION



Figure 2: Display & Buttons

Key	Function Description
MENU	Displays the Menu Tree
SELECT	Accepts the value
→	Move Cursor Right
←	Move Cursor down
↑	Increment a digit or move cursor up

↓	Decrement a digit or mover cursor down
>	Cursor used to select items in a list
_	Cursor for digits- indicates digit that will be edited.
BACK	Moves one level back in Menu

## 5 CONFIGURATION

Press the **MENU** button and from the *Menu Screen* (Figure 3) select “Configuration”. From the *Configuration Screen* (Figure 4) select “4 – 20 MA range.” Use this screen to assign a full-scale chlorine concentration to the **20 mA** output. Use the **ARROW** buttons to change the maximum chlorine to the desired value. Press **SELECT** to store the setting. Edit the other settings as necessary in a similar manner.

**Note:** Standard Display units (D01) have two 4-20 mA outputs. D01A has 4 outputs.

	F	A	S	T		C	h	I		C	a	I								
>	C	O	N	F	I	G	U	R	A	T	I	O	N							
	C	A	L	I	B	R	A	T	E											
	D	I	A	G	N	O	S	T	I	C	S									

Figure 3: Menu Screen

>	4	-	2	0		M	A		R	A	N	G	E							

Figure 4: Configuration Screen

Set 4-20 mA																																		
	4	-	2	0		M	A		C	H	L										1	0	.	0										
>	4	-	2	0		M	A		P	S	U														5	0	.	0						
	4	-	2	0		M	A		T	E	M	P																	5	0	.	0		
	4	-	2	0		M	A		P	H																					1	2	.	0

Figure 5: Set 4 - 20 mA

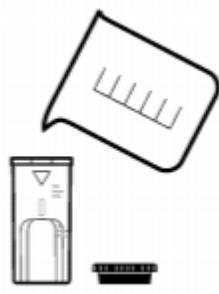
## 6 CALIBRATION

- (1) Check calibration every 60 days.
- (2) If the value deviates by more than 20% then sensor recalibrate.
- (3) Calibration can be checked using a Hach Pocket Colorimeter (or equivalent).

To check calibration follow the steps below:

## Prepare DPD blank

To calibrate chlorine sensor to known chlorine level: **Prepare the instrument with a zero (blank value).**

<p>1. Press the Power button</p> 	<p>2. Press the</p>  <p>button once</p>	<p>3. If the icon is not under HR</p>  <p>then press the</p>  <p>button to change.</p>	<p>4. If the icon is under HR then press the</p>  <p>again to escape.</p>
<p>5. Fill the plastic cuvette to the 5 mL mark.</p> 	<p>6. Clean the plastic cuvette</p> 	<p>6. Insert the cuvette into the colorimeter</p> 	<p>7. Place the cap over the cell and press the</p>  <p>Key.</p>  <p>This will “zero” the instrument</p>

## Start Calibration Cycle

If Chlorine levels are generally stable during ballasting, use the Fast Calibration Method. If levels are changing rapidly, use the time delay calibration in the CALIBRATE menu function. The sequence differs slightly and will be described below.

The sensor should be calibrated in water with a chlorine level between 6 and 10 ppm. **Do not calibrate below 2.0 ppm as this may result in inaccurate results at higher levels.**

## Fast Calibration

This method can be used by most BWMS systems that inject oxidant during ballasting.

Determine the chlorine level in Section 0 below

Once you have obtained the reading, perform this sequence.

**MENU | ↓ Fast CHL Cal | SELECT | Edit digits**

<p>Press Select. This will store the sensor value for up to 5 minutes until the DPD level is obtained.</p>	<p>Menu</p> <table border="1"> <tr><td>&gt;</td><td>F</td><td>A</td><td>S</td><td>T</td><td>C</td><td>H</td><td>L</td><td>C</td><td>A</td><td>L</td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>C</td><td>A</td><td>L</td><td>I</td><td>B</td><td>R</td><td>A</td><td>T</td><td>E</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>C</td><td>O</td><td>N</td><td>F</td><td>I</td><td>G</td><td>U</td><td>R</td><td>A</td><td>T</td><td>I</td><td>O</td><td>N</td><td></td></tr> <tr><td></td><td>D</td><td>I</td><td>A</td><td>G</td><td>N</td><td>O</td><td>S</td><td>T</td><td>I</td><td>C</td><td>S</td><td></td><td></td><td></td></tr> </table>	>	F	A	S	T	C	H	L	C	A	L						C	A	L	I	B	R	A	T	E							C	O	N	F	I	G	U	R	A	T	I	O	N			D	I	A	G	N	O	S	T	I	C	S											
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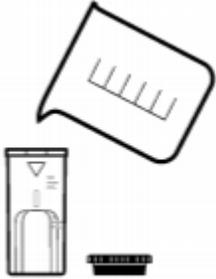
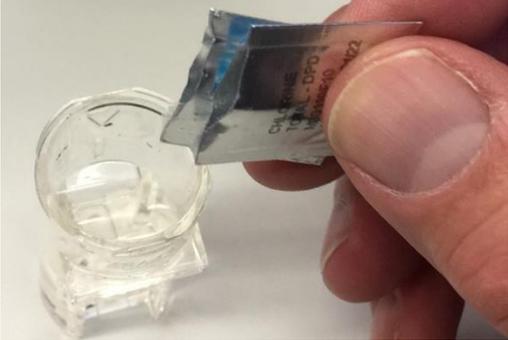
### CALIBRATION (4 Minute Time Delay)

This method will store the internal signal value for chlorine in the Display for up to 4 minutes. This will allow time after pulling the water sample for the DPD reaction time (3 minutes). The stored signal value will be used for the calibration of the sensor. This is useful for a system using an in tank BWMS method.

<p>Select CALIBRATE from the Menu</p>	<table border="1"> <tr><td></td><td>F</td><td>A</td><td>S</td><td>T</td><td>C</td><td>H</td><td>L</td><td>C</td><td>A</td><td>L</td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>C</td><td>O</td><td>N</td><td>F</td><td>I</td><td>G</td><td>U</td><td>R</td><td>A</td><td>T</td><td>I</td><td>O</td><td>N</td><td></td></tr> <tr><td>&gt;</td><td>C</td><td>A</td><td>L</td><td>I</td><td>B</td><td>R</td><td>A</td><td>T</td><td>E</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>D</td><td>I</td><td>A</td><td>G</td><td>N</td><td>O</td><td>S</td><td>T</td><td>I</td><td>C</td><td>S</td><td></td><td></td><td></td></tr> </table>		F	A	S	T	C	H	L	C	A	L						C	O	N	F	I	G	U	R	A	T	I	O	N		>	C	A	L	I	B	R	A	T	E							D	I	A	G	N	O	S	T	I	C	S											
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<p>Select KNOWN LEVEL</p>	<table border="1"> <tr><td>&gt;</td><td>K</td><td>N</td><td>O</td><td>W</td><td>N</td><td>L</td><td>E</td><td>V</td><td>E</td><td>L</td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>C</td><td>H</td><td>L</td><td>Z</td><td>E</td><td>R</td><td>O</td><td></td><td></td><td>D</td><td>O</td><td>N</td><td>E</td><td></td></tr> <tr><td></td><td>F</td><td>a</td><td>s</td><td>t</td><td>C</td><td>a</td><td>l</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>R</td><td>e</td><td>s</td><td>t</td><td>o</td><td>r</td><td>e</td><td>D</td><td>e</td><td>f</td><td>a</td><td>u</td><td>l</td><td>t</td><td>C</td><td>a</td><td>l</td></tr> </table>	>	K	N	O	W	N	L	E	V	E	L						C	H	L	Z	E	R	O			D	O	N	E			F	a	s	t	C	a	l									R	e	s	t	o	r	e	D	e	f	a	u	l	t	C	a	l					
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<p>When you have pulled the sample select TAKE SAMPLE. This will start the 4 minute timer and store the signal value.</p>	<table border="1"> <tr><td>&gt;</td><td>T</td><td>A</td><td>K</td><td>E</td><td>S</td><td>A</td><td>M</td><td>P</td><td>L</td><td>E</td><td>4</td><td>M</td><td>I</td><td>N</td><td></td><td></td></tr> <tr><td></td><td>D</td><td>P</td><td>D</td><td>L</td><td>E</td><td>V</td><td>E</td><td>L</td><td></td><td></td><td>0</td><td>8</td><td>.</td><td>9</td><td>7</td><td></td></tr> <tr><td></td><td>C</td><td>A</td><td>L</td><td>I</td><td>B</td><td>R</td><td>A</td><td>T</td><td>E</td><td>N</td><td>O</td><td>W</td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>S</td><td>I</td><td>p</td><td>3</td><td>4</td><td>5</td><td>1</td><td>8</td><td></td><td>Z</td><td>E</td><td>R</td><td>O</td><td>0</td><td></td><td></td></tr> </table>	>	T	A	K	E	S	A	M	P	L	E	4	M	I	N				D	P	D	L	E	V	E	L			0	8	.	9	7			C	A	L	I	B	R	A	T	E	N	O	W						S	I	p	3	4	5	1	8		Z	E	R	O	0		
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<p>Move the cursor to CALIBRATE NOW and press <b>SELECT</b>.</p>	<table border="1"> <tr><td></td><td>T</td><td>A</td><td>K</td><td>E</td><td>S</td><td>A</td><td>M</td><td>P</td><td>L</td><td>E</td><td>4</td><td>M</td><td>I</td><td>N</td><td></td><td></td></tr> <tr><td></td><td>D</td><td>P</td><td>D</td><td>L</td><td>E</td><td>V</td><td>E</td><td>L</td><td></td><td></td><td>0</td><td>8</td><td>.</td><td>9</td><td>7</td><td></td></tr> <tr><td>&gt;</td><td>C</td><td>A</td><td>L</td><td>I</td><td>B</td><td>R</td><td>A</td><td>T</td><td>E</td><td>N</td><td>O</td><td>W</td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>S</td><td>I</td><td>p</td><td>3</td><td>4</td><td>5</td><td>1</td><td>8</td><td></td><td>Z</td><td>E</td><td>R</td><td>O</td><td>0</td><td></td><td></td></tr> </table>		T	A	K	E	S	A	M	P	L	E	4	M	I	N				D	P	D	L	E	V	E	L			0	8	.	9	7		>	C	A	L	I	B	R	A	T	E	N	O	W						S	I	p	3	4	5	1	8		Z	E	R	O	0		
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## DPD Reading

Collect the water sample. Be sure to open the sample port long enough to obtain a representative sample. This may require many seconds depending on flowrate. Rinse both the container used to capture the sample and colorimeter cell with the sample water several times.

 <p>1. Fill the cuvette to the 5 mL mark with the water sample</p>	 <p>2. Add the contents of <u>two powder packets</u> to the sample</p>	 <p>3. Place the cap on the sample cuvette and shake for 20 seconds</p>
<p>4. Clean the plastic cuvette</p> 	<p>5. Wait 3: minutes</p> 	 <p>6. Place the cuvette in the colorimeter and place in instrument cap over the cuvette</p>
<p>Press the  Key to check the DPD reading</p>		

**Note:** After calibration, new value will display on the next cycle, ~1 minute.

## 7 CALIBRATE CHLORINE ZERO (USUALLY UNNECESSARY)

MENU | Calibrate | Chl | Chl Zero

Press SELECT for each Menu Option

The cursor will move to “Done” and the chlorine zero has been set.

*Be certain that there is no chlorine residual before performing this operation*

## 8 TROUBLESHOOTING

*Display “ADDR None Searching”*

This indicates that the display is not communicating with the sensor module.

- Check the connection and wiring to the Sensor Module for loose or swapped connections.
- After correcting the problem, power the display off and back on.
- Check the sensor to see if the motor is working.
  - If not, power and ground lines may be wired backwards. Check and correct.
- There could be short in the wiring to the sensor.
- Check all four wires resistance to ground (sensor housing) with an Ohm Meter.
  - There could be a short from the wires internally to the sensor when they added the valve adapter. Resistance should be open (infinite resistance).
  - If the motor is working, the com lines may be reversed. Check and correct.
- If the sensor still does not communicate, then replace it with a new sensor.

C	H	L		--	--	--	--		T	M	P		--	--	--	--	°C
									C	O	N	D		--	--	--	--
O	R	P		--	--	--	--		P	S	U						0
A	D	D	R		N	o	n	e	S	e	a	r	c	h	i	n	g

Figure 6: Screen indicates no communication with sensor

## 9 LEVEL ONE PROBLEM CODES AND ALARMS

If an error occurs with the sensor it will be displayed in the lower right corner of the *Main Screen* (Figure 7).

C	H	L		5	.	6	0		T	M	P		2	5	.	0	°C	
									C	N	D		3	4	5	5	0	
O	R	P		8	7	6			P	S	U		2	3				
A	D	D	R		1	2	5						E	r	r	.	1	5

Figure 7: Error displayed on Main Screen

When critical error is present

- a. the Display will flash the backlight on the display to indicate sensor error has compromised data.
- b. The Display will set the 4-20ma outputs under 4mA (negative value) to indicate error present

## 10 ALARM CONDITIONS

If the measurement is outside of the normal operating ranges an alarm condition will be displayed

<b>Chlorine Alarm Conditions</b>		
If these conditions are met, generate an alarm condition- the chlorine level may not be accurate		
<b>Parameter</b>	<b>Error Limit</b>	<b>Error Code</b>
Chlorine >	28 ppm	36
pH <	6	37
pH >	9.5	38
Cond >	65,000 $\mu$ S	39
Temp>	42 °C	40

<b>Level One Fault Codes (Firmware 3.31 and higher)</b>			
These problems will still allow operation of the measurement module and will be cleared when the condition is removed or corrected			
<b>Error Code</b>	<b>Meaning</b>	<b>Cause</b>	<b>Corrective Action</b>
1	Air in Sensor	Possible air in sensor, open wire connection or bad sensor.	Power on and off to prime sensor. Check installation to ensure outlet port is vertical Check orientation: should be mounted 90° to 270° If problem persists for five resets, replace sensor with exchange unit.
2	ORP Error	ORP is 9999. Air in sensor.	Power on and off to prime sensor.
31	Air in Sensor	Air in sensor. The sensor will enter a priming function and try to remove the air. It will retry 5 times before it shuts down.	Power on and off several times. Make sure sensor is immersed in water. Check Sensor orientation
32	Motor RPM High	Electronics problem	Replace sensor with exchange unit.
33	Motor Locked	Impeller corrosion or locked up (check motor speed)	Replace impeller. If impeller cannot be removed, replace sensor with exchange unit.
34	Motor Stalled	Debris in sensor cover	Check for debris in sensor cover. See Section 21 for sensor disassembly.
35	Motor RPM very Low	Debris in sensor or corroded impeller or worn bearings (error code only present in firmware versions earlier than 396.	Check for debris in sensor cover. See Section 21 for sensor disassembly. Replace impeller and bearings if worn or corroded.
89	Chlorine signal too low to calibrate	Increase chlorine level and recalibrate	If error persists, replace sensor with exchange unit.
15	pH displayed is ~650	pH turned on when no pH sensor is present	Replace pH sensor Turn off pH in Measure Options (Section Figure 10) if pH electrode not present.
87	Bad temp Cal	Temperature Cal out of range too low to calibrate	Replace sensor with exchange unit.

14	Chlorine slope error	Chlorine slope out of range	Recalibrate chlorine at a level >2 ppm or Restore default chlorine calibration. Figure 11
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## 11 LEVEL THREE OUTSIDE MEASUREMENT RANGE PROBLEM CODES

These errors will cause the Display to flash the backlight and the 4-20 mA output to go negative (<4 mA output). These conditions are outside of the Sensors operating parameters indicating the displayed results may not be accurate.

<b>Outside Measurement Range Alarms (Firmware 490 and higher Display 199)</b>			
These problems will still allow operation of the Sensor and will be cleared when the condition is removed or corrected			
<b>Error Code</b>	<b>Meaning</b>	<b>Cause</b>	<b>Corrective Action</b>
36	Chlorine level exceeds measuring range >24 ppm	Process chlorine level to high- may be inaccurate	Check process. Replace sensor if TRO level is not accurate.
37	pH low <5	Verify pH with handheld meter	If sensor is not accurate, replace the pH sensor
38	pH high >10	Verify pH with handheld meter	If sensor is not accurate, replace the pH sensor
39	Conductivity high >65,000 $\mu$ S	Check sensor operation	Verify conductivity level and replace sensor with exchange unit if necessary.
40	Temperature high >42°C	Check accuracy of measurement	If temperature is accurate, reduce process temperature.

## 12 PH RELATED ERROR CODES (IF PH IS PRESENT SWN-PH-HT2)

15	pH reading out of range	pH sensor bad System set with pH option but no pH installed	Replace pH sensor Turn off pH measurement option
16	Bad offset	pH Zero not in manufacturer specified range	Replace pH sensor.
17	Bad pH slope	pH slope not in manufacturer specified range	Replace pH sensor
18	pH Sensor damaged	pH Sensor broken bulb	Replace pH sensor

## 13 LEVEL TWO PROBLEM CODES

These types of faults detected by the system, stop the cycle pending removal or correction of the condition.

These errors will generate an alarm condition that will cause the Display to flash the backlight and the 4-20 mA output to go negative (<4 mA output).

<b>Level Two Error Codes</b>
These problem codes will stop cycling of the measurement module until corrected

Error Code	Message	Cause	Corrective Action
10	Sensor communication problem	Sensor not responding or missing, no communications with the temperature sensor board.	Check sensor connections; Replace sensor with exchange unit
12	Sensor calibration out of range	Sensor calibration out of range	Clear faults; Reset calibrations to defaults and recalibrate
13	Zero calibration out of range	Zero calibration out of range	Reset zero calibration to zero

## 14 DIAGNOSTICS

### To Check Sensor Readings

To check the sensor measurement readings follow the key press sequence below to see the measurement values of a reading.

MENU | Diagnostics | Monitor | Meas Readings

1	6	2	4	N	a	A	U	X	1	1	5	7	m	V
I	2	V	2	5	0	M	T	R	2	0	9	3		
A	D	1	0	2	7	0	F	L	T	0	0	0	0	0
V	e	r	M	3	0	1	V	e	r	D	1	7	7	

Figure 8: Measure Readings Screen

MXXX = Sensor Firmware Version (3.31 )

DXXX = Display Firmware Version (1.72)

## 15 CHANGE MEASUREMENT OPTIONS

MENU | Configuration | Meas Options

>	M	e	a	u	r	e	m	e	n	t	O	p	t	i	o	n	s
	4	-	2	0	M	A	R	a	n	g	e						
	M	o	d	b	u	s											

Figure 9: Measurement Options

>	p	H							X	O	n						
	O	R	P								O	f	f				
	D	i	s	p	l	a	y	p	H			O	f	f			

Figure 10: Select item to enable or disable

## 16 RESTORE DEFAULT CALIBRATIONS

If the sensor settings and calibrations have been changed and the sensor is not measuring correctly or has persistent error codes that cannot be resolved then restoring the default calibrations may resolve the issue.

**\*\*Note:** If you restore calibration to defaults, you will need to re-calibrate the sensor for chlorine.

*For chlorine*

MENU | Calibrate | CHL | Restore Default Cal

	K	N	O	W	N		L	E	V	E	L								
	C	H	L		Z	E	R	O											
	F	a	s	t		C	a	l											
>	R	e	s	t	o	r	e		D	e	f	a	u	l	t		C	a	l

Figure 11: Restore chlorine default calibration

*For pH*

MENU | Calibrate | pH | Restore Default Cal

	K	n	o	w	n		V	a	l	u	e					8	.	1	0
	U	s	e		B	u	f	f	e	r	s								
>	N	e	w		p	H		R	e	s	e	t	D	e	f	a	u	l	t
	S	l	o	p	e		5	9	7		O	f	f	s	e	t	-	1	4

Figure 12: Restore pH default calibration

## 17 CHANGING MODBUS OPTIONS

MENU | Configuration | Modbus

These options can be used to reset the Modbus address of the sensor or identify which sensor the Display is connected. At power up, the Display will search for all sensors on the bus.

	M	e	a	u	r	e	m	e	n	t		O	p	t	i	o	n	s	
	4	-	2	0	M	A		R	a	n	g	e							
>	M	o	d	b	u	s													

Figure 13: Select the Modbus item

	S	l	a	v	e		A	d	d	r	e	s	s				1	2	5
	C	h	a	n	g	e		A	d	d	r						1	2	5
>	B	u	s		S	e	a	r	c	h						1	2	5	

Figure 14: Bus search will find all available sensors on the bus

## 18 MANDATORY MAINTENANCE BY USER FOR SWN-P-HT2



## DANGER

le hazards. Only qualified personnel must conduct the tasks described in this section of the document. Close ballast pipe valves to isolate sensor.

### 19 MAINTENANCE COMPONENTS FOR THE SWN-P-HT2

Table 1: Part Numbers for replacement

Quantity	PN	Description
1	RP-HT2	Replacement Wear Kit (includes the below items)
1		Sensor cover
1		Impeller
15		Cleaning balls

Maintenance SWN-P-HT2	Frequency
Calibration Chlorine	Check every 2 months and recalibrate if level differs more than 20% from DPD reading
Replace Wear Parts	Every 24 months
Sensor Exchange- Replace motor assembly	Every 60 months

=-

## 20 BI ANNUAL MAINTENANCE (SWN-P+/SWN-P-HT2+)

1. Disconnect power from the sensor.
2. Make sure the ballast water system is shut down.
3. Isolate the sensor by closing all valves adjacent to the sensor.
4. Drain water from the ballast pipe section with the sensor.
5. Loosen the threaded retainer nut (Figure 15).
6. Remove sensor slowly to limit of lanyard assembly **\*DANGER\*\*** If sensor is removed without closing the valve, flooding can result.
7. Close the Hot Tap Valve.
8. Disconnect lanyard hooks from valve brackets
9. Remove the sensor assembly from the valve.

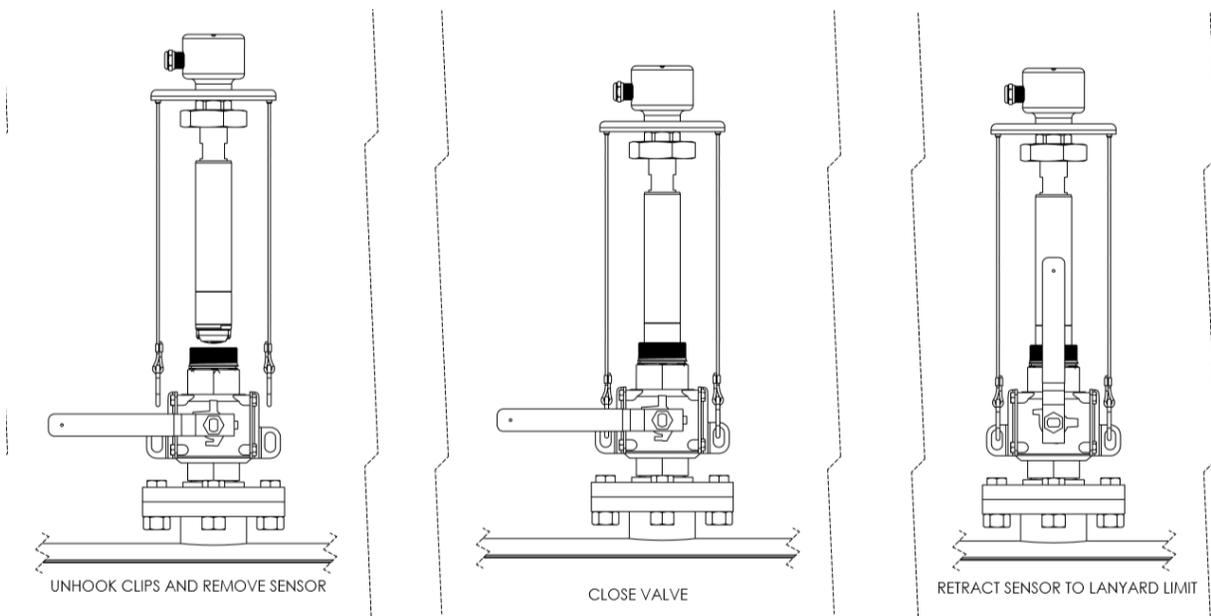
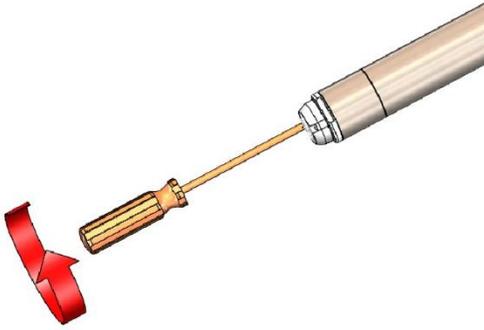


Figure 15: Remove sensor from Hot Tap Valve (Sequence Right to Left for removal)

	<b>CAUTION</b>
Close all isolation valves before sensor removal	
	<b>CAUTION</b>
Drain water from ballast pipe before sensor removal.	

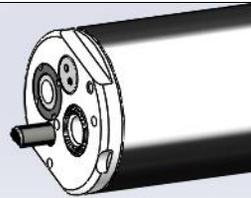
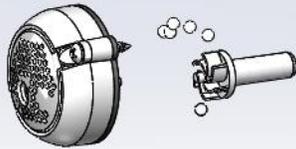




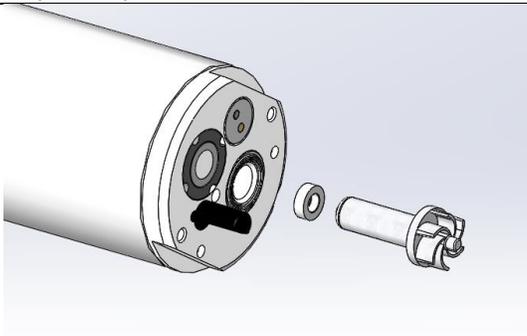
Step 1: Remove the screws holding the Sensor Cover and strainer on to the sensor end



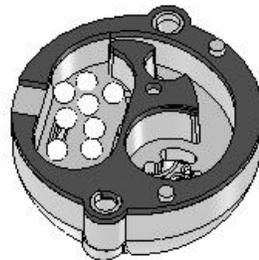
Step 2: Before separating the Sensor Cover from the sensor end, position the sensor vertically, with the wet side facing down, to prevent the balls from escaping. Pull down without twisting.



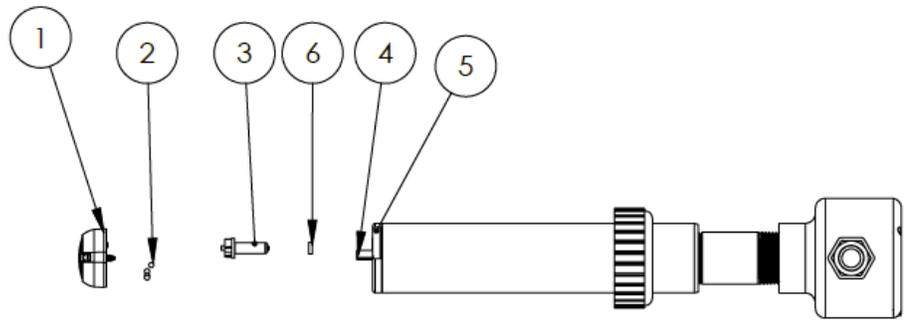
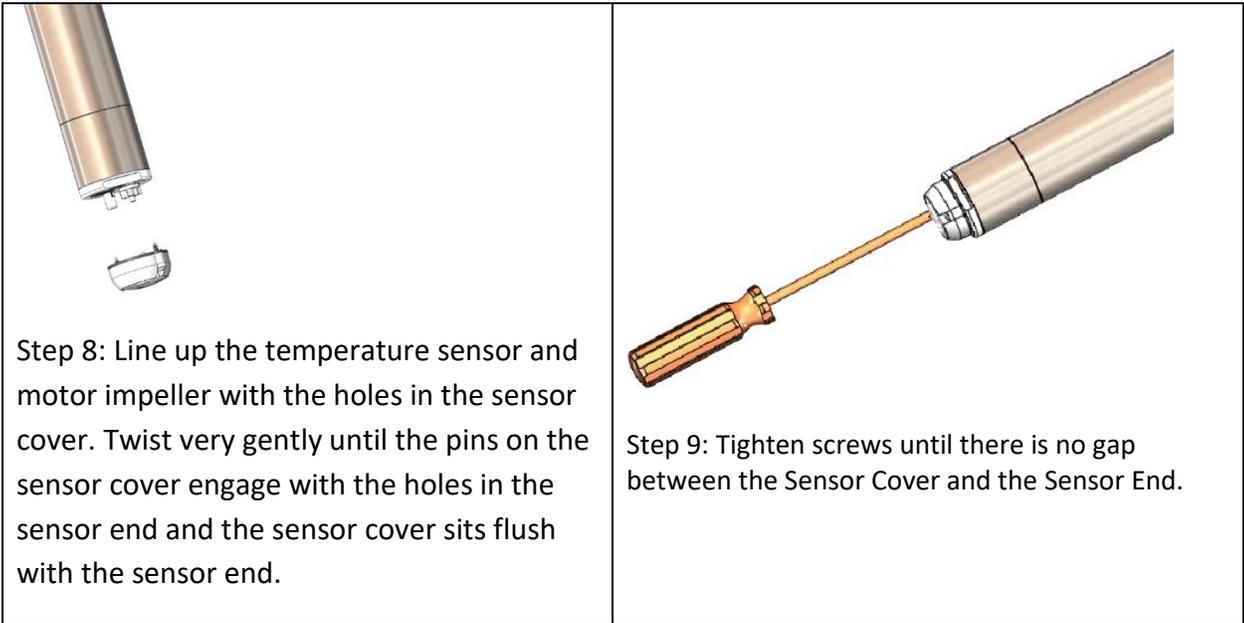
Step 3: Remove the sensor cover assembly, impeller and cleaning beads. Note which impeller was installed (Large Pin or Small Pin). Then discard those parts. If the impeller has a small pin, then proceed to Step 4. For large pin impeller, skip ahead to Step 6 since the large pin bearing does not require replacement.



Step 6: Install new impeller and bearing for small pin impeller. For large pin impeller, replace only the impeller.



Step 7: Place the cleaning balls in the larger cavity of the new Sensor Cover as shown above. Make sure no balls are in the other (impeller cavity)



Item No.	Description
1	Sensor Cover Assm
2	Cleaning Beads
3	Impeller
4	Lower Bearing
5	Temperature Sensor
6	Sensor End

Figure 16: Wear Part Exploded Diagram

## 23 BI ANNUAL PH SENSOR REPLACEMENT SWN-P-HT2+ AND SWN-P+

1. Use Halogen Repair Tool (included in kit) and insert prongs into recess in pH sensor Figure 17 and Figure 18.
2. Rotate sensor counterclockwise (CCW) to unthread it Figure 19.
3. Remove the old pH sensor and replace it with the new one Figure 20
4. Upon Start Up, reset the pH default value.

K	n	o	w	n	V	a	l	u	e					8	.	1	0
U	s	e	B	u	f	f	e	r	s								
N	e	w	p	H	R	e	s	e	t	D	e	f	a	u	l	t	
S	l	o	p	e	5	9	7	O	f	f	s	e	t	-	1	4	

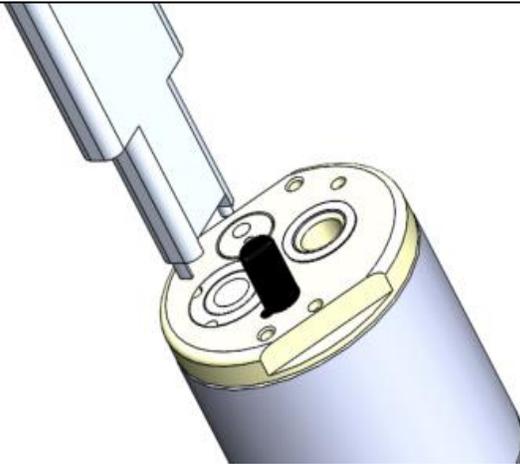


Figure 17: Use Halogen tool and insert prongs into the recess on the pH sensor.

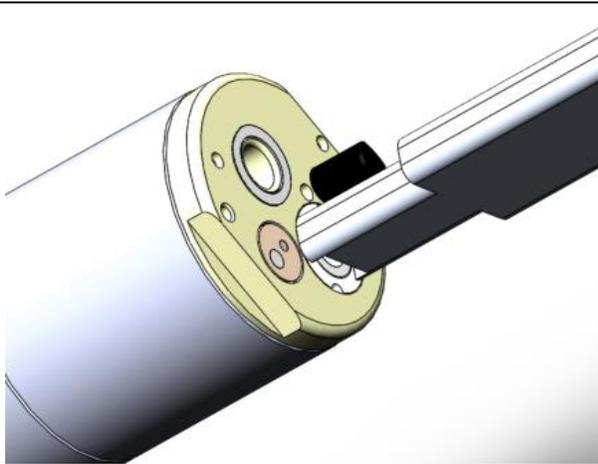


Figure 18: Insert prongs flush with pH Sensor.



Figure 19: Unthread the sensor by twisting counterclockwise (CCW).

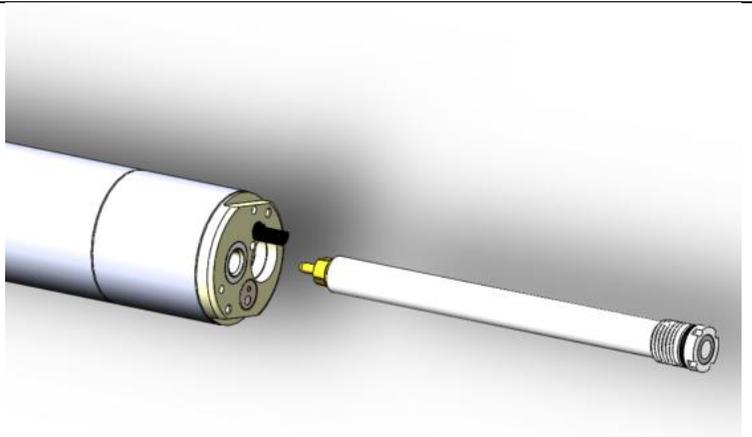


Figure 20: Remove the pH Sensor and discard. Replace with a new one. Make hole is wiped clean. Replacement sensor has silicone grease and an o-ring applied.



4. Remove the sensor and return it for service.
5. Connect exchange sensor to junction box and replace sensor assembly.

## 26 LIMITED WARRANTY

Halogen Systems warrants its products against material workmanship defects for a period of one year from the date of shipment.

In the event that a defect is discovered during the warranty period, Halogen Systems agrees, at its option, to repair or replace the defective product. Any product repaired or replaced under this warranty will be warranted only for the remainder of the original product warranty period.

Products may not be returned without authorization from Halogen Systems. To obtain authorization, please call Halogen Systems for a return material authorization number.

Limitations:

This warranty does not cover:

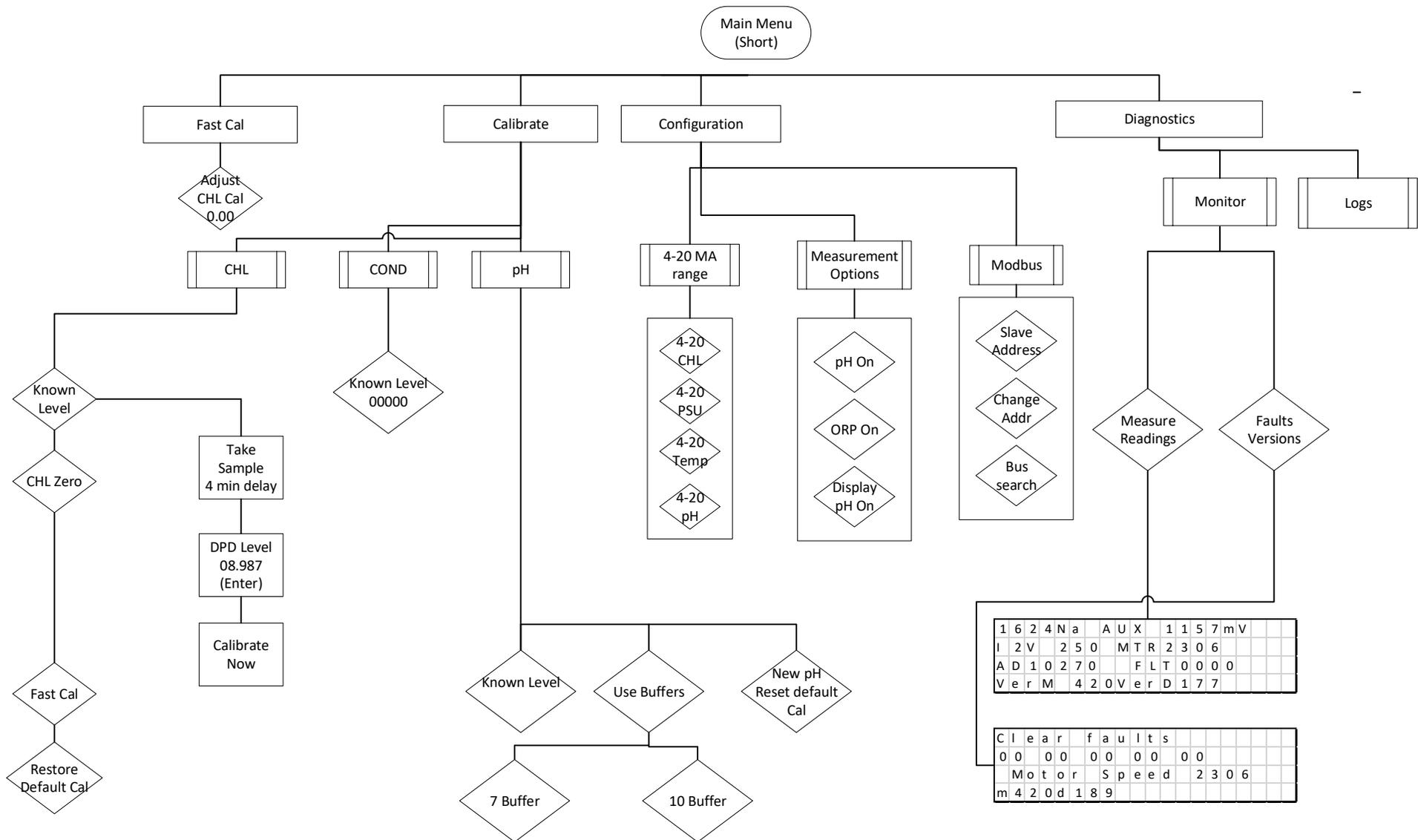
- 1) Damage caused by misuse, neglect (lack of appropriate maintenance), alteration, accident, or improper application or installation.
- 2) Damage caused by any repair or attempted repair not authorized by Halogen Systems.
- 3) Any product not used in accordance with the instructions furnished by Halogen Systems.
- 4) Damage caused by acts of God, natural disaster, acts of war (declared or undeclared), acts of terrorism, work actions, or acts of any governmental jurisdiction.
- 5) Freight charges to return merchandise to Halogen Systems.
- 6) Travel fees associated with on-site warranty repair.

This warranty is the sole expressed warranty made by Halogen Systems in connection with its product. All other warranties, whether expresses or implied, including without limitation, the warranties of merchantability and fitness for a particular purpose, are expressly disclaimed.

The liability of Halogen Systems shall be limited to the cost of the item giving rise to the claim. In no event shall Halogen Systems be liable for incidental or consequential damages.

This warranty is the sole and complete warranty for Halogen Systems. No person is authorized to make any warranties or representations on behalf of Halogen Systems.

Halogen Systems reserves the right to change or modify this warranty at any time.



1	6	2	4	N	a	A	U	X	1	1	5	7	m	V
I	2	V	2	5	0	M	T	R	2	3	0	6		
A	D	1	0	2	7	0		F	L	T	0	0	0	0
V	e	r	M	4	2	0	V	e	r	D	1	7	7	

C	l	e	a	r	f	a	u	l	t	s				
0	0	0	0	0	0	0	0	0	0	0				
M	o	t	o	r	S	p	e	e	d	2	3	0	6	
m	4	2	0	d	1	8	9							

To enable the Long Menu: Press the → and SELECT Key for at least 2 Seconds. You will see a notice that the Long Menu is Now Active. This will remain until the Display is powered off and on.