



# Service Testing

Rev. 8.0 - March 04, 2011

# Service Testing



### Prior to performing any tests the following conditions must be met.

- Machine batteries are fully charged.
- Sufficient tap water is in the solution tank and the filter is clean.
- All other machine operating systems including water supply components are functioning properly.
- Conventional / ec-H2O mode switch. (See Figure 1)
- · Confirm the operator fully understands the operation of the

(0 = ec-H2O Systems Off - I = ec-H2O Systems On)

### **Operational LED Indicator Link**

### **Testing Step Links**

| Step 1: Configuration                | Step 8: e-cell Amp Draw                       |
|--------------------------------------|---|
| Step 2: Mode Selector                | Step 9: Oxygenizer (Sparger) Amp Draw         |
| Step 3: Supply Voltage - A           | Step 10: Pump Voltage Supply                  |
| Step 4: Supply Voltage - B           | Step 11: Pump Operation                       |
| Step 5: Negative Board Switching     | Step 12 Pressure Switch Testing               |
| Step 6: Board functioning            | Step 13 ec-H2O Module Flush Procedure Example |
| Step 7: ec-H2O System Total Amp Draw | Step 14: ec-H2O Module Activation Test        |

Figure 1





# ec-H2O Systems Operational

Indicator Light



TENNANT

#### Green Light

The ec-H2O systems (ec-H2O Module, pressure switch, indicator LED) are functioning properly.

### Red Solid Light

Over current condition: (Open or shorted component)

•Solenoid •Pump

- ec-H2O Control BoardSparger (Oxygenizer)
- •E-Cell

•No water conductivity

or

•ec-H2O system ran with antifreeze: Perform Flush Procedure (See Step 13)

# Red Flashing Light

System blocked: Perform Flush Procedure (See Step 13)
Pressure switch wired incorrectly
Bad pressure switch
Wires to switch faulty
Bad solenoid
Bad wires to solenoid
Kinked hose
Plumbed incorrectly

Low water Conductivity

- •Approximate Amp Draw by Component
  - •Solution Flow Solenoid = 0.3 Amps
  - •Solution Pump = 0.2 Amps (Higher at higher flow rate settings)
  - ec-H2O Module Control Board = 0.2 Amps
  - •Sparger (Oxygenizer) = 0.3 Amps
  - •e-cell = 0.9 Amps
  - •Overall ec-H2O system = 2.0 Amps + 0.5 / 0.1 Amps (Dependant on machine model and water flow setting)

Note: In most situations, low current can be remedied by performing one or two flush procedures unless the water has low conductivity. If the light is still flashing red after two flushes, the water may have low conductivity. To confirm this is the cause, add ½ tablespoon of salt to every 10 gallons (37.85L) of water and perform the flush procedure again.

Note: If the Red LED starts to flash within 1 - 10 seconds after starting to scrub, it is likely an over pressure fault. If the Red LED starts to flash after 1 minute of scrubbing, it is likely due to low water conductivity.



#### **Step 2: Mode Selector**











#### Step 7: ec-H2O System Total Amp Draw



#### Step 8: e-cell Amp Draw



# ec-H2O Module Amperage Testing

Figure 6

## Testing e-cell Amp Draws

The ec-H2O module control board controls the amp draw of the e-cell.

The e-cell amp draw setting is 0.9 Amps.

Test points are provided for confirming these amp draws.

NOTE: When measuring e-cell Amp Draw, Volts DC = Amps DC



#### Step 9: Oxygenizer (Sparger) Amp Draw



#### Step 10: Pump Voltage Supply (See Figure 10) To test the voltage output from the ec-H2O controller to the water pump, back probe the electrical pump connector TENNAN and set your meter to read VDC. With the ec-H2O and the scrubbing systems activated, read the output voltage to the water pump. Depending on the machine model and the flow setting, the voltage reading should be between 6 VDC and 36 VDC. Are the readings correct for the model number and flow setting? ecH2O Pump Voltage Chart - March - 2011 ec H2O ¥ No Yes Pump Flow DIP Switch Settings Dip Sw. Rate Machine description Default Setting Volts) Flow Disk Default Low 11.2 4 5680/5700 36" disk Med 15.0 • \* This confirms that the High 17.4 \* . Replace the ec-H2O module. Cyl. Default Low 15.0 ٠ ۲ control board is capable of 5680/5700 (36") Cylindrical \* + High 17.4 sending the correct output Disk Default Low 8.5 ▲ ▲ voltage to the water pump. 5680/5700/T5/SS (28" & 32") disk Med 11.8 4 High 15.0 ۲ Figure 10 Proceed to Step 11 Cyl. Default Low 11.8 4 5680/5700/T5/SS (28" & 32") Cylindrical 15.0 High ۲ Disk Default Low 6.5 Dip Switches 1 - 2 T5/SS (24"-26") disk Med 8.5 • used to configure +/- 5% High 10.6 \* NOTE: The EXTECH ec-H2O flow rate Cyl. Default Med 8.5 • T5/SS (24"-26") Cylindrical High 10.6 \* Instruments Model DV30 Disk Default Low 6.0\* • T3/SS3 12V-600V AC Med 7.5\* • \* Low and Medium Flows are set to high for the first 30 seconds of scrubbing after the keyswitch is turned on. High 9.0 \* • Non-Contact Adjustable **Disk Default** 6.5 **A A** Low T3 Plus/Speed Scrub XC Med 7.8 . ♦ Voltage Detector (24" Dual Disk Scrub Head) High 9.0 \* + Disk Default Low 11.2 • . can also be used to An ORBIO<sup>®</sup> Technoloc T7/SSR disk Med 14.5 + indicate Pulse Width High 17.4 ۲ Cyl. Default Med 14.5 4 Modulated voltage by **T7/SSR Cylindrical** Hiah 17.4 \* **Disk Default** 11.2 Low + placing the detector near T15/7100 disk & Cylindrical Med 14.5 • the Pump Motor. High 17.4 \* Disk Default Low + . 11.6 T16 Cyl. Default Med 16.5 . \* When in Full Flow, Dip Switches are ByPassed High 25.5 ۲ . (BP = ByPassed) Full 36.0 BP BP Low 11.6 ▲ ▲ 7300/8300 7300/8300 (Full Flow is Operator Controlled) Med 16.5 ♠ \* Disk/Cyl Default When in Full Flow, 25.5 Dip Switches 1 & 2 are ByPassed. High ★ ▲ (BP = Bypassed) Full 36.0 BP BP Low 7.0 NU NU T20/M20/M30

(Flow Rates Operator Controlled)

(Flow Control Dip Switches are Not Used = NU)

14.0

14.0

Med

High

DIP SWITCH NUMBERS

NU NU

NU NU

1

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| Step 11: Pump Operation                                | (See Figure 11) Confirm the<br>operating by activating th<br>scrubbing systems and w<br>flow to the brushes.<br>Is there water flow to the | e pump is<br>e ec-H2O<br>/atch for w<br>brushes? | and<br>ater   |               |         |                 |        | TENNA              | Ň  |
|--|--|--|---|---------------|---------|-----------------|--------|--------------------|----|
|  | Yes  | <b>→</b>   | No  |               |         |                 |        | <br>l              |    |
| Confirm the flow rate is                               | Dip Switch Settings Cha  | rt - March                                       | - 2011  | Fi            | gure 11 | 1. Che          | ck th  | e pump             |    |
| flow rate setting. Is the                              | Machine description  | Default Setting                                  | wol3<br>(mdl)   | Flow<br>(gpm) |         | wiring.         | ai pi  | uy anu             |    |
| flow rate correct?                                     | 5680/5700  | Disk Default<br>Cyl. Default                     | Low 0.83<br>Med 1.25  | 0.22<br>0.33  |         | 2. Che          | ck pi  | Imp relief         |    |
|  |  | Disk Default                                     | High 1.66<br>Low 1.14   | 0.44<br>0.30  |         | valve           | oran   | у рюскаде          | e. |
| Yes – Proceed to step 12                               | 5680/5700 (36")  | Cyl. Default                                     | Med 1.66<br>High 2.01   | 0.44<br>0.53  |         | If all go       | ood, r | eplace the         | э  |
| Check the water supply filter for cleanliness.         | T5/SS (24"-26")  | Disk Default<br>Cyl. Default                     | Low 0.57<br>Med 0.83  | 0.15          |         | pump.           |        | 1                  |    |
| Check for pinched hoses.<br>Clean or repair as needed. | T5/SS (28"-32")  | Disk Default<br>Cyl. Default                     | High         1.14           Low         0.83           Med         1.25           High         1.66 | 0.30          | 1/ 100/ |                 | Proc   | eed to             |    |
| Proceed to   | T3/SS3   | Disk Default                                     | Low         0.50           Med         0.72           High         0.95                             | 0.12          | +/- 10% |                 |        |                    |    |
| Conversions: Step 14<br>Gallons/Min = Ounces/Min       | T3 Plus/Speed Scrub XC<br>(24" Dual Disk Scrub Head)   | Disk Default                                     | High         0.95           Low         0.57           Med         0.76                             | 0.25          | Gal     | Con<br>Ions/Min | vers   | 3IONS:<br>Liters/M | in |
| 0.12 = 15<br>0.15 = 19                                 | T7/SSR   | Disk Default                                     | High 0.95<br>Low 1.14<br>Med 1.51   | 0.25<br>0.30  |         | 0.12            | =      | 0.45               |    |
| 0.19 = 24  |  | Disk Default                                     | High         1.89           Low         1.14  | 0.50<br>0.30  |         | 0.19            | =      | 0.72               |    |
| 0.22 = 20<br>0.25 = 32                                 | T15/7100   | Cyl. Default                                     | Med 1.51<br>High 1.89   | 0.40<br>0.50  |         | 0.22            | =      | 0.95               |    |
| 0.30 = 38<br>0.33 = 42                                 | T16<br>When in Full Flow   | Disk Default<br>Cyl. Default                     | Low 1.51<br>Med 2.27  | 0.40<br>0.60  |         | 0.30            | =      | 1.14<br>1.25       |    |
| 0.40 = 51<br>0.44 = 56                                 | Dip Switches are ByPassed<br>(BP = ByPassed)   | Main Brush                                       | High         3.03           Full         3.03   | 0.80<br>0.80  |         | 0.40<br>0.44    | =      | 1.51<br>1.66       |    |
| 0.50 = 64  | 7300/8300  | Side Brush                                       | Full         0.76           Low         1.66  | 0.20<br>0.44  |         | 0.50            | =      | 1.89               |    |
| 0.53 = 68<br>0.55 = 70                                 | (Full Flow is Operator Controlled)<br>When in Full Flow,<br>Dip Switches 1 & 2 are ByPassed.   | 7300/8300<br>Disk/Cyl Default                    | Med 2.35  | 0.62          |         | 0.55            | =      | 2.01               |    |
| 0.62 = 79  | (BP = Bypassed)  |  | Full 3.79   | 1.00<br>0.70  |         | 0.62            | =      | 2.35<br>3.18       |    |
| 1.00 = 128   | ا ک۵/۱۳۵۷/۲۵۵<br>(Flow Rates Operator Controlled)<br>(Flow Control Dip Switches are Not Used = NU)   |  | Med         5.30           High         5.30  | 1.40          |         | 1.00            | =      | 3.79               | 14 |



#### Step 13: ec-H2O Module Flush Procedure Example





Refer to the Machine Maintenance Manual for Specific Directions

*ec-H2o* **MODULE FLUSH PROCEDURE** (See Figure 13) this procedure is only required when the *ec-H2O* system indicator light begins to blink red:

1. Drain the solution tank and recovery tank of all water.

2. Pour maintenance manual recommended amount of white vinegar into the solution tank at full strength. Do not dilute.

3. Remove the brush(es) from the scrub head and position the machine over a floor drain. If no floor drain is available, remove the front cover from the machine, disconnect the quick connect fitting at the scrub head, and place the hose into a bucket.

4. Turn the key to the on ( I ) position.

5. Lift the recovery tank to access the *echo* system module. Press and release the module flush switch to start the flush cycle (See Figure 14).

**NOTE:** The module will automatically shut off when the flush cycle is complete (after 7 minutes). The module must run the full 7 minute cycle in order to reset the system indicator light and alarm.

6. If the ec-H2O system indicator light continues to flash, repeat the flush procedure.

If the problem persists, check for pinched hoses. 7: Turn the key off and then back on to operate the machine.





Figure 13

Figure 14

NOTE: If a bucket is not available, you can place the water delivery hose in the vacuum hose for the rear squeegee and lower the squeegee to turn on the vacuum and contain the water.

#### Step 14: ec-H2O Module Activation Test

