ec-H20 NanoClean Troubleshooting Guide

Rev 1.1. 2015.11.04

Introduction

The ec-H2O NanoClean Troubleshooting Guide serves is an aid to solving technical issues that arise with the new second generation ec-H2O module. While the module has been designed to operate in more conditions with better performance, it had to become smarter and slightly more complex.

The module is designed to operate in two different modes depending on the machine harness wiring. CAN Mode operation is for the latest floor machines utilizing CANbus communication between control boards. This communication allows the machine to get better detailed information such as fault codes from the ec-H2O NanoClean module. Machines that do not support CANbus are referred to as Legacy machines. The module uses the Legacy Detect Pin on the connector to operation in the correct mode.

The document is divided into three sections: Legacy Mode flowcharts, CAN Mode flowcharts and finally a Fault Code Table. When troubleshooting a Legacy machine, refer to the Legacy Mode flowchart. This will require more effort to troubleshoot the specific fault reported by the module. Start at the beginning of the flowchart and work through it based on the issues observed. To troubleshoot the correct fault code, latter branches figure earlier ones are functioning correctly.

Troubleshooting a CAN machine brings advantages of more quickly identifying the fault condition. The CAN Mode flowchart is much smaller. Some CAN machines may report the specific fault code on the display while others may require the Tennant Service Diagnostic application to get the specific code. For unexpected operating conditions that do not produce a fault, the CAN Mode flowchart helps identify those.

Once the fault condition is identified, the final section of this document provides possible solutions to fix the issue. This fault table applies to both Legacy and CANbus based machines. The flowcharts that identify a specific fault code can then be looked up in the Fault Table. Faults are clearly identified by a yellow box containing a 4 digit hex code like the following.

0x0702

The fault table also includes a quick reference guide to the connector pin-out on the new ec-H2O NanoClean module. Since the module is used in many different machine models, reference the machine schematic as needed for troubleshooting.

Terminology

Panel LED – This refers to the specific machine user panel LED for the status of the ec-H2O system. On legacy machines, this is a bi-color green/red and on CAN machines this is a blue/red LED.

Module LED – The ec-H2O module contains a new small membrane with 4 LED's that makes it distinguishable from a previous generation module. A single blue status LED and three green flow rate LED's make up the 4.

ec-H2O NC Plumbing Kit – This is the water half of the module box that contains the cell electrodes.

ec-H2O NC Controller Kit – This is the electronics half of the module box that contains the control board.

WCM – Water Conditioning Module. This is the housing that holds the cartridge. A WCM pump refers specifically to the micro pump that runs infrequently to dose the ec-H2O system.

Pre-Check Conditions

There are a few conditions that should be verified prior to starting the troubleshooting process. They are listed below.

- Very important to verify the machine is an ec-H2O NanoClean. Check the label on the side of the machine and/ or verify the ec-H2O module contains a small membrane panel.

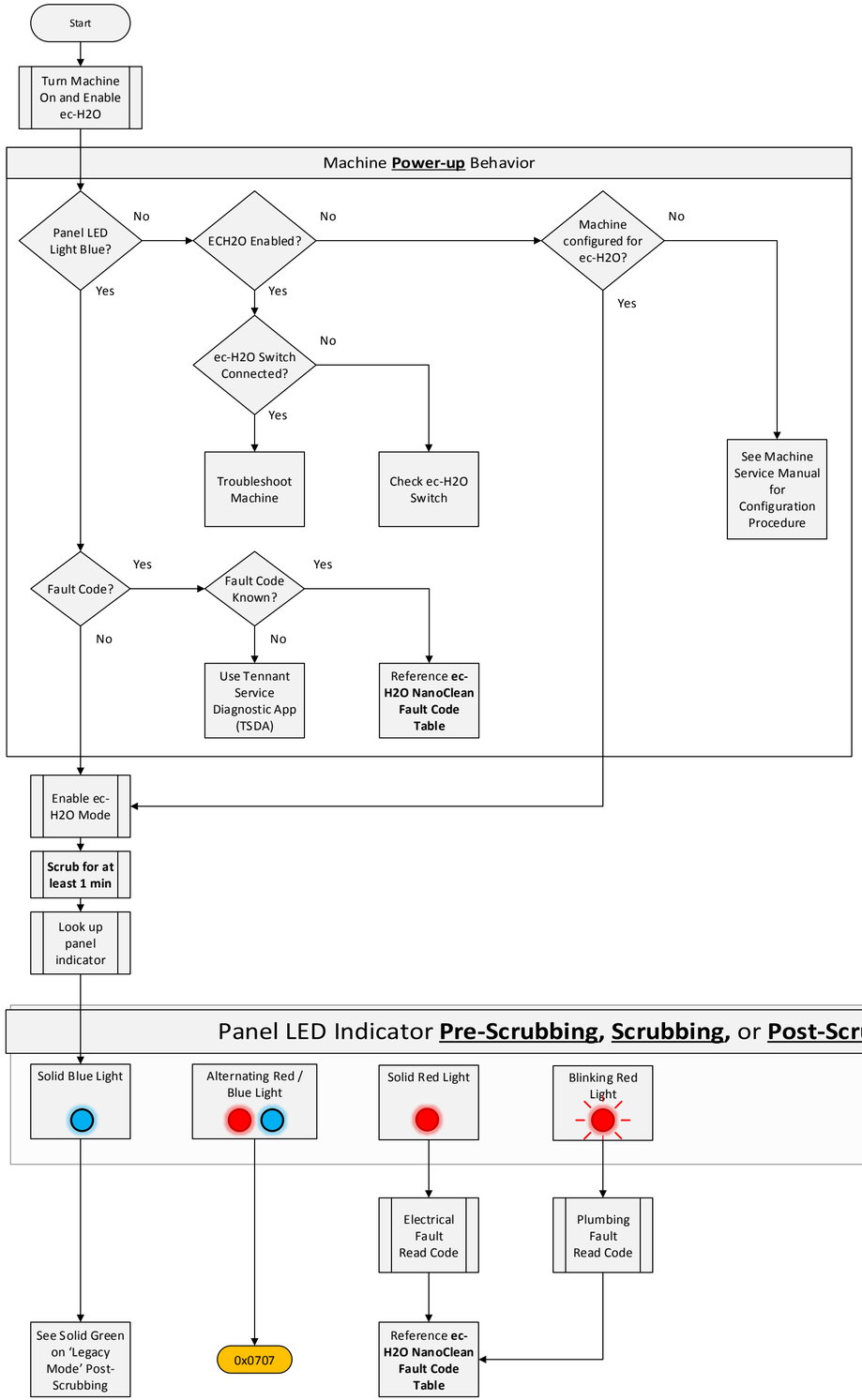
- Machine battery voltage is at a correct level.
- Machine is able to operate properly in conventional mode (ec-H2O system turned off).
- Sufficient water level in the solution tank. Half tank or more is sufficient.
- Water filter is clean.
- ec-H2O mode is enabled.

ec-H20 NanoClean General Troubleshooting

Behavior	Causes	Actions
Flow rate button doesn't change flow rate indicator.	• Solution flow has been locked out by a supervisor.	• If module is in CAN mode, see the machine user manual for flow rate lockout settings. • If module is in Legacy mode, check that the module is not configured with supervisor lockout.
	• Membrane tail has become disconnected on the PCB connector.	• Check the ecH2O NanoClean controller half for membrane tail may be coming out slightly.
	• Membrane is bad or damaged.	• Replace ec-H2O NC Controller Kit which includes a new membrane and tail.
The flow low and high flow rate LED's are flashing back and forth.	• Pump is running.	• Press service switch to exit.
No flow rate LED's are lighting.	• A CAN mode only function allows the EC water module flow rate to be disabled (Off) for specific machines functions.	• See the machine user manual for flow rate configuration and settings.
	• Membrane may not be working.	• In CAN mode, verify NC membrane slights come on when key turned on. If not, check membrane connection to PCB and replace if damaged. • In Legacy mode, see Troubleshooting Guide for Legacy mode to verify operation and corrective action.

ec-H20 NanoClean Troubleshooting Decision Tree

CAN Mode



ec-H20 NanoClean Troubleshooting Decision Tree

Legacy Mode

Start

Turn Machine On

Machine **Power-up** Behavior

Does Panel LED flash red then green? — No → Does Panel LED flash green then red? — No → No panel LED? — No → Red or Green Missing? — No → Cycle Key → All Module LED's all flash on? — No → Module LED's ripple in pattern? — No → Any LED's not lighting? — No → No LED's?

- Does Panel LED flash red then green? — Yes → Cycle key
- Does Panel LED flash green then red? — Yes → Fix harness wiring
- Red or Green Missing? — Yes → Repair harness and/or LED
- All Module LED's all flash on? — Yes (Legacy mode) → 
- Module LED's ripple in pattern? — Yes → CAN Mode Active; Repair Harness
- Any LED's not lighting? — Yes → Check membrane connection or replace
- No panel LED? — Yes → Module LED's All on 1 sec? — No → Any LED's not lighting? — Yes → Check membrane connection or replace
- Module LED's All on 1 sec? — Yes → Wait 10 seconds
- No panel LED? — Yes → Does module have power? — No → Does harness have power? — No → Fix or Repair Harness
- Does module have power? — Yes → Replace LED and/or harness
- Does harness have power? — Yes → Replace ec-H2O NC Controller Kit
- No LED's? — Yes → Wait 10 seconds

Wait 10 seconds

Look up Panel LED Indicator

Panel LED Indicator **Pre-Scrubbing** Behavior

- No Light → Pump Running? — Yes → Repair Harness; No → B
- Alternating Red / Green Light → 0x0707
- Solid Red Light → Is ec-H2O pump running? — No → Is WCM pump connected? — No → 0x0741; Yes → 10+/-3 ohms? — No → 0x0741; Yes → 0x0727
- Is ec-H2O pump running? — Yes → 0x0717
- Blinking Red Light → Is Pressure Switch Connected? — Yes → Does pressure switch have continuity? — Yes → Replace ec-H2O NC Controller Kit; No → 0x0702
- Is Pressure Switch Connected? — No → 0x0702
- Solid Green Light → Is 'Mode Input Signal' B+ at Module? — No → Is 'Enable Input Signal' B+ at Module? — No → Troubleshoot Machine Specific Failure; Yes → Replace ec-H2O NC Controller Kit
- Is 'Mode Input Signal' B+ at Module? — Yes → Is Module Running? — No → Disconnect ECH2O Module from Harness → Is Voltage on LED Present? — Yes → Repair Harness; No → Replace ec-H2O NC Controller Kit
- Is Module Running? — Yes → Replace ec-H2O NC Controller Kit

B

Troubleshooting from this point assumes previous page steps have been completed.

Enable ECH2O Mode

Scrub for at least 1 min

Look up panel indicator

Panel LED Indicator **Scrubbing or Post-Scrubbing** Behavior

Solid Green Light

Water flow to floor?

- No → Verify machine plumbing
- Yes → Keep scrubbing

Solid Red Light

Does H2O pump run?

- No → 0x0746
- Yes → Is B+ on H2O Pump Output wire?
  - Yes → Key cycle, retest and measure time to solid red
    - Errors in < 5 seconds?
      - Yes → 0x0716
      - No → 0x0713
  - No → 0x0711

Blinking Red Light

Is the Blue Status Light blinking?

- No → 0x0702
- Yes → Is blue light Fast or Slow?
  - Fast → Water conductivity >2000 us/cm?
    - No → 0x0726
    - Yes → 0x0708
  - Slow → Water flow through cell?
    - No → Verify Machine Plumbing
    - Yes → Fault in less than 1 min?
      - Yes → 0x0721
      - No → 0x072A

No Light

Is 'Mode Input Signal' B+ at Module?

- No → Repair Machine Harness or Mode Switch
- Yes → Is 'Enable Input Signal' B+ at Module?
  - No → Repair Machine (harness or control board)
  - Yes → Replace ec-H2O NC Controller Kit

Alternating Red / Green Light

0x0707

Keep scrubbing

Module Membrane Blue LED **Scrubbing** Behavior

Solid Blue

ec-H2O System is Running → Cell is operating

No Blue

Replace ec-H2O NC Controller Kit

Fast Blink Blue

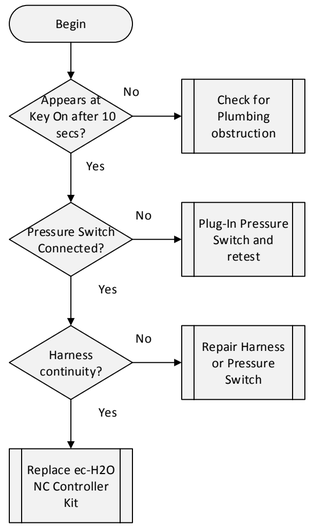
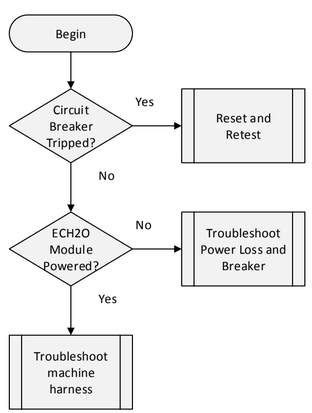
0x0728

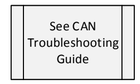
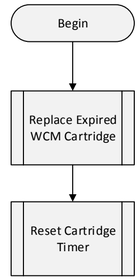
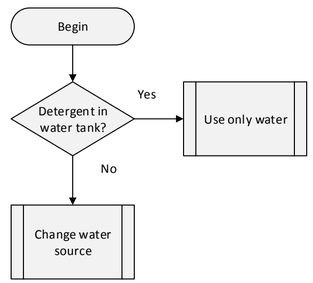
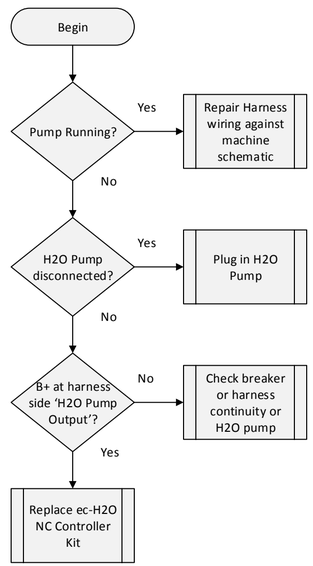
Slow Blink Blue

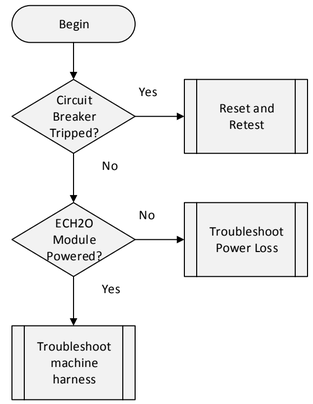
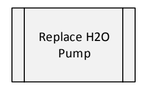
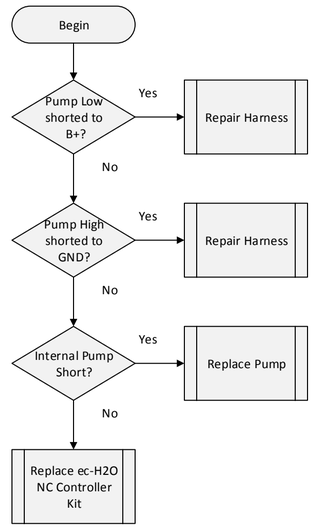
0x0729

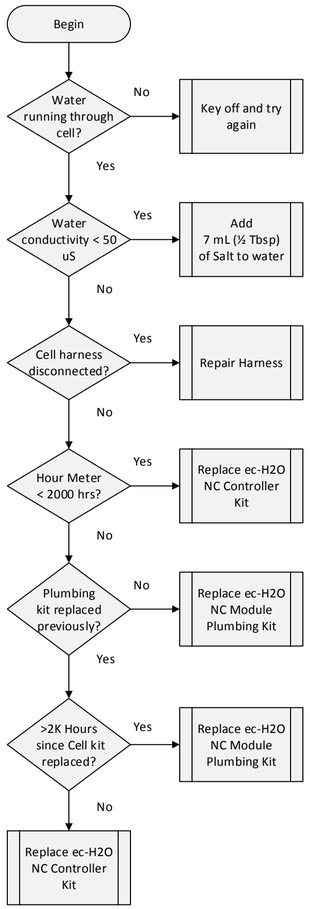
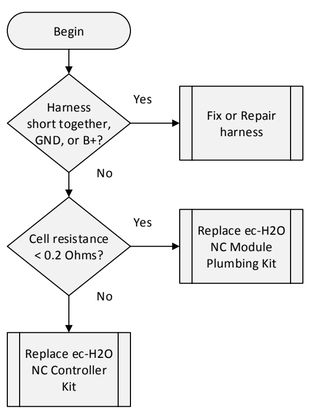
Blue LED

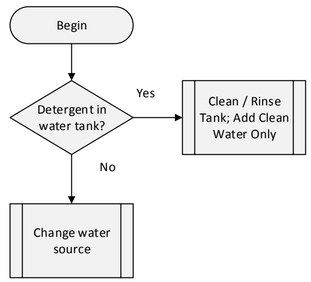
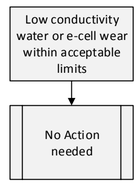
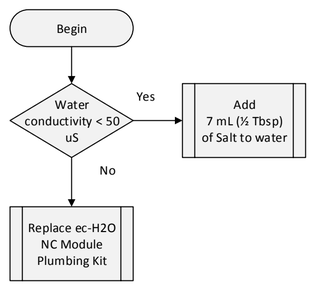
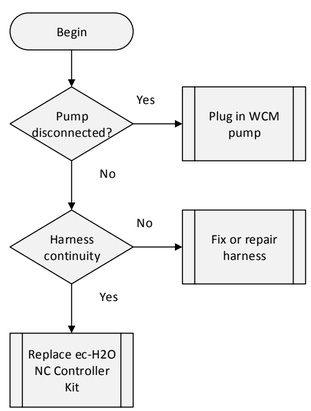
ec-H20 NanoClean Fault Code Troubleshooting Table

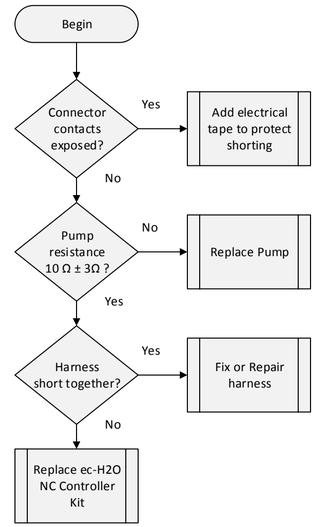
Code	Code Description	Actions
0x0702	EC H2O Pressure Switch Active	
0x0703	EC-H2O **Module** Breaker	

Code	Code Description	Actions
0x0704	ECH2O Module Offline	
0x0707	Water Condition Module (WCM) Cartridge Expired	
0x0708	ECH2O **System** Over Regulation Fault	
0x0711	ECH2O Pump Open Warning	

Code	Code Description	Actions
0x0712	ECH2O **Pump** Circuit Breaker Tripped	
0x0713	ECH2O **Pump** Over Current Detected	
0x0716	ECH2O **Pump** Short Fault	
0x0717	ECH2O **Pump** FET Short Fault	

Code	Code Description	Actions
0x0721	ECH2O Cell Open Warning	
0x0726	ECH2O **Cell** Short Fault	

Code	Code Description	Actions
0x0727	ECH2O **Cell** FET Short Fault	
0x0728	ECH2O **Cell** Over Regulation Warning	
0x0729	ECH2O **Cell** Under Regulation Warning	
0x072A	ECH2O Cell Electrode Warning	
0x0741	Water Conditioning Module (WCM) Pump Open Fault	

Code	Code Description	Actions
0x0746	Water Conditioning Module (WCM) Pump Short Fault	

ec-H2O NanoClean [B2] Module Connector Pin-out