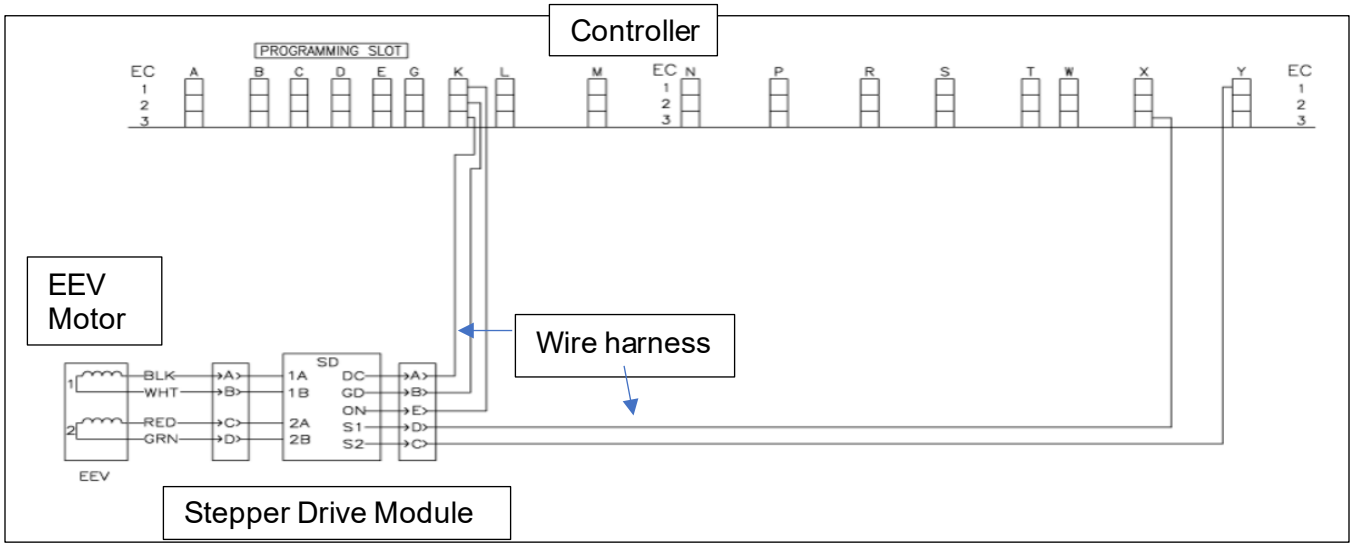
AN EXCHANGE OF TECHNICAL INFORMATION

Number: **TL010 - 2022**
Subject: **AL03 troubleshooting on NaturaLINE (69NT40-601)** **Released: August 23, 2022**

If experiencing an active AL03 - Loss of Superheat Control, then it is recommended that the first step to fault finding this alarm is to verify proper Electronic Expansion Valve (EEV) operation which includes:

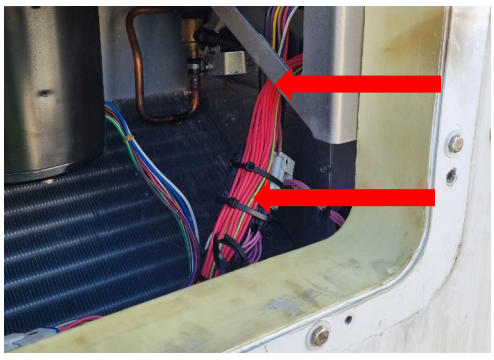
1. EEV (Electronic Expansion Valve)
2. Stepper Drive Module
3. Wire Harness
4. Controller

Following are the guidelines to be used in troubleshooting the circuit from the controller to the EEV:

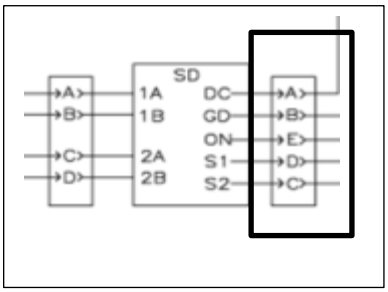


The EEV and Stepper Drive Pack are located behind the evaporator fan access panel located above the control box.

With power off, remove the access panel and locate the EEV and Stepper Drive Pack.



Step 1: Verify Controller and Wire Harness to Stepper Drive Pack

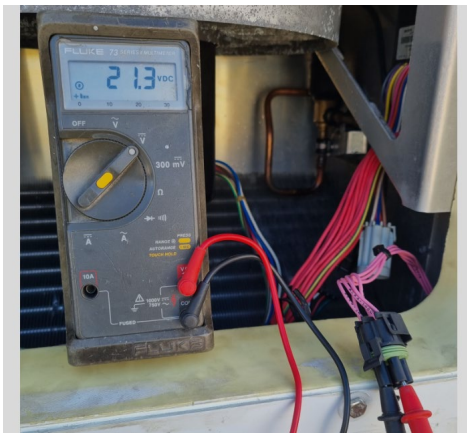


a) With the unit off, disconnect the five-pin connector to the stepper drive from the controller.

b) With the voltmeter set to read 50 volts DC, attach the positive lead to outlet pin “A” (wire SDDC) of the five-pin connector, and the negative lead to pin “B” (wire SDGD).

c) Turn ON the unit for 40 seconds and watch the volt-meter. There should be approximately 24 to 32 VDC.

d) Repeat test for pins “E” (wire SDON) to “B” (wire SDGD). There should be approximately 24 to 32 VDC.

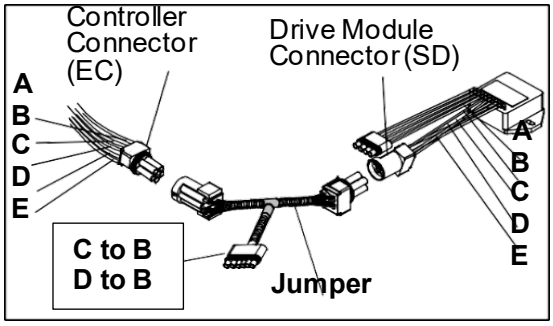


e) Pins “C” (wire SDS1) and “D” (wire SDS2) will have zero to 5 volts transistor logic (TTL) signals present; however, this can only be checked with the connector assembled as this is an open collector type circuit.

By checking the outputs on “A,” “B,” and “E” it can be verified that the controller is supplying power to the drive module. To be thorough, the signals on pins “C” and “D” can be checked as follows:

1. Install a jumper assembly (Carrier part number 07-00408-00) to connect the drive module and controller connectors as shown.
2. Connect the positive lead of the voltmeter to test connector socket “C” and negative lead to socket “B” and run as before by resetting the unit.
3. Repeat for sockets “D” to “B.”

   There should be approximately five 5-8 volts DC on sockets “C” and “D” (S1 and S2) when measured as above. If not, the connections or controller is faulty.



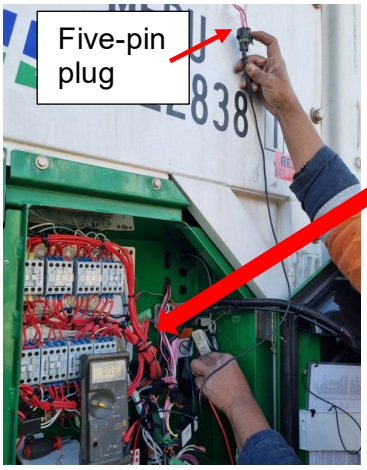
If the above voltage readings are correct at the jumper, proceed to step 3.

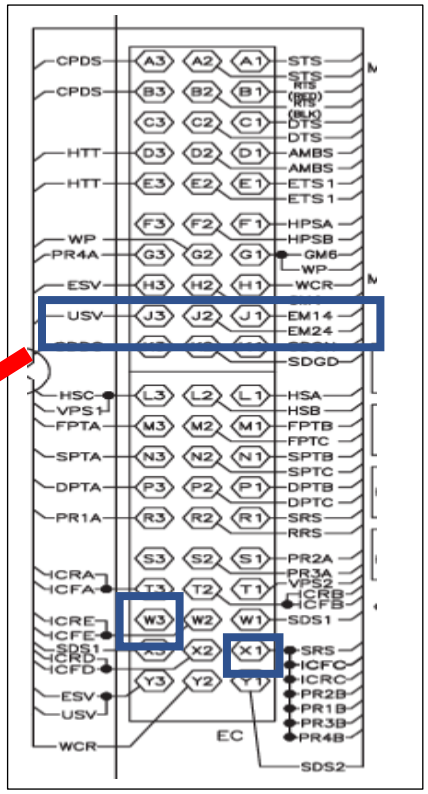
If the above readings are not correct, identify which wire has the wrong reading and ohm out the wire to verify if it has continuity.

Step 2: Wire Harness Continuity Check

To check the continuity of the wiring, remove the ML3 controller exposing both environmental connectors (EC plugs) at the back of the controller and ohm between the gray plug and EC connector as follows:

- ECK1–SDON, ECK2–SDGD. ECK3–SDDC,
- ECY1–SDS2, ECX3–SDS1



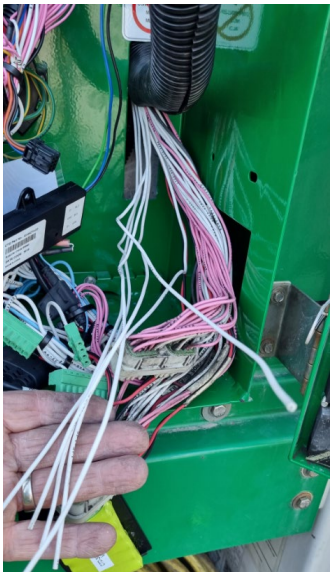


If all five wires have continuity, the controller is suspect.

If an open circuit is noted, the wire needs to be replaced as follows:

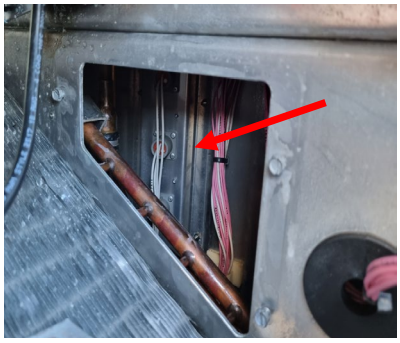
Control Box End

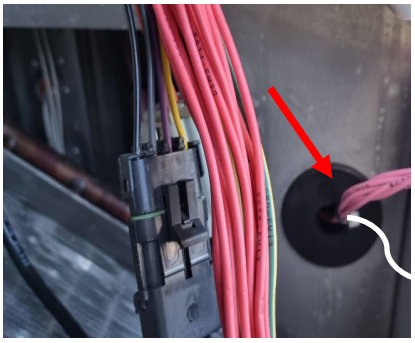
There are 6 spare wires (SP1 - SP6) in the loom behind the control box going up into the evaporator section. To locate the spare wires, pull the wiring loom into the control box through the EC plug slot and remove the flexible conduit sheathing, identify SP1 and retie the remaining wires back into the loom and refit the flexible conduit sheath.



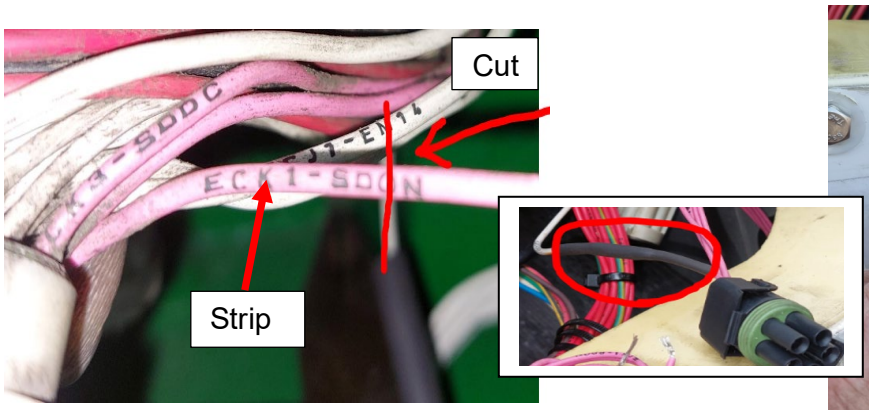
Evaporator End

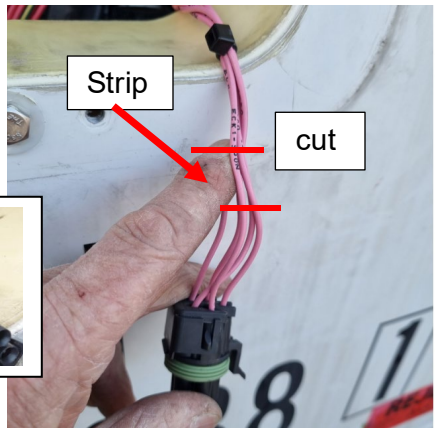
Remove the evaporator fan motor, cut the cable ties and locate SP1. Remove the triangular cover and pull SP1 back into the duct, feed SP1 through the grommet with the pink wires feeding the EEV plug. Retie the spare wires and refit the evaporator fan motor.



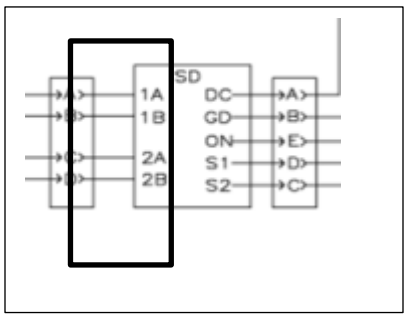


Cut the wire at both ends at the last letter in the string prior to it going into the EC connector and at the gray plug as marked. Strip the wire back to the first alpha marked. Slide heat shrink over the wire and splice the SP1 wire in its place. Using a heat gun, heat shrink over the splice.





Once the wire has been replaced, retest the continuity of all 5 wires and reinstate all wiring looms back to OEM standard using wire tie wraps.



Step 3: Verify Stepper Drive Pack Module Output

a) Turn the unit OFF.

b) Disconnect the four-pin connector to the SMV.

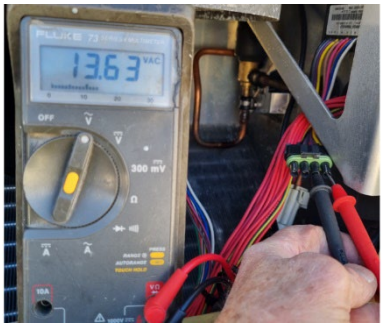
c) With voltmeter set to read 24 volts AC, attach the positive lead to the drive module outlet pin “A” (wire 1A) of the four-pin connector and the negative lead to the “B” pin (wire 1B).

d) Turn the unit ON and watch the voltmeter. After a short delay, the reading should rise to approximately 12 volts.

e) Repeat for pins “C” to “D” (wires 2 A and 2 B).

f) Voltage is required on both outputs. If no voltage is found, check connections and retest. ***Both readings should be the same.***

g) If the retest reads out the same, the drive module is faulty.



h) To replace the drive module, disconnect all connectors, unscrew from mounting, and replace with a NEW drive module in reverse order.

Step 4: Verify EEV Coil

Checking with ohmmeter

a) Disconnect the four-pin connector to the stepper EEV.

b) With a reliable digital ohmmeter, check the winding resistance. In normal ambient, the valve should be 100 ohms +/-10% measured on the red/green (a-b terminals) and on the white/black (c-d terminals) leads.

Both readings should be the same

c) If the readings are not similar or if an infinite or zero reading occurs, replace the EEV motor.

Step 5: Verify EEV operation

Checking with a Stepper Tool to see if the EEV manually opens and closes

The SMA-12 portable stepper drive tester (Carrier Transicold P/N 07-00375-00) is a battery operated stepper drive which will open and close the EEV. For this test, install manifold gauges on the suction port of the unit.

To check operation:

1. Stop the unit, disconnect the four-pin connector at the stepper drive module and attach the SMA-12 stepper drive to the connector going to the valve.
2. Set the SMA-12 pulse per second (PPS) to one PPS and either open or close valve. Each LED should light sequentially until all four are lit. Any LED failing to light indicates an open on that leg which indicates a poor connection or an open coil. Repair or replace as required to achieve proper operation.
3. Restart the unit, set the step rate to 200 PPS on SMA-12 for the valve, and close the EEV while watching the suction gauge. Within 30 seconds the suction pressure will drop. This is an indication that the valve is moving.
4. If no change in suction pressure is detected, then the valve may be jammed and will require replacement.
5. Follow procedures with the unit service manual for replacement of the valve.

Note: This procedure described in this document can be completed on either a loaded or empty unit.