



BY JOHNSON CONTROLS

Service Information

File In/With: N/A
(supercedes SI0187 [711])

SI0187

Equipment Affected: YK, YD, YT, YR Chillers

Refrigerant Level Sensor

The **Innovation Solutions 4-button Refrigerant Level Sensor** outputs a voltage proportional to refrigerant level. Four values define the operation of the device. These values are:

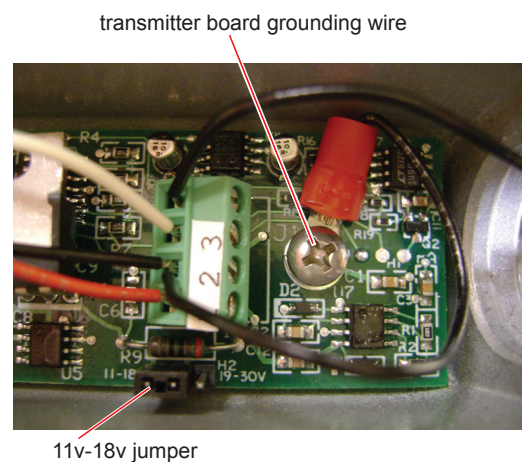
1. Bottom of span output voltage
2. Top of span output voltage
3. Bottom of span refrigerant level
4. Top of span refrigerant level

When the refrigerant level is at the bottom of the span, the device will output the voltage set for the bottom of the span. When the refrigerant level is at the top of the span, the device will output the voltage set for the top of the span. Output is proportional to level change between top and bottom of span. All four of these parameters can be changed.



Before deciding the sensor needs any adjustments, check the following:

1. Determine issues with the level sensor separately from issues with the variable orifice valve control itself. If level is actually fluctuating because of control issues and the sensor is reporting that fluctuation, the problem is not with the sensor.
2. Ensure that the housing has a good ground path through the threaded connection to the probe by ensuring no sealant is present and the probe is tight.
3. Ensure all wiring is landed tightly and the voltage jumper on the board in the housing is set for 11-18V position not the 19-30V position.
4. Ensure that terminal 2 of the transmitter board is grounded to the housing. Probes sent from the factory since early 2007 have a ground wire from terminal 2 (parallel with cable wire) to the screw that holds the board in place. Sensors without this should have a wire added for this purpose. **Be careful not to short to the circuitry when landing under the board mount screw.** Ensure the jumper lug has good contact with the printed circuit ring around the board-mount screw. Also, make sure that any star washers have internal teeth. External teeth may miss the contact area.
5. If the sensor has demonstrated a definite calibration drift from a known good calibration, a problem may exist with that sensor's electronics. Obtain a replacement electronic head with updated oscillator according to the part number in the Replacement Parts sections of this letter. The replacement head is factory calibrated.
6. If Optiview reads <0% when the condenser is empty, verify the input voltage for the Refrigerant Level channel on the Diagnostics-Analog Inputs screen. A value at minimum coverage of 0.0 to 0.4 is not an operational concern. It represents a small deadband below the Optiview scaled range.



Generally with an adequate ground, the probe factory calibration is good and no calibration adjustments are required.

The device has four states of operation:

State 1- No pushbuttons depressed - Normal operation responding to refrigerant level

State 2- MIN pushbutton depressed and held - Sensor outputs the voltage preset for the bottom of the working span. In this mode the output of the device has nothing to do with existing refrigerant level. In this mode, the bottom span voltage value is seen and can be adjusted.

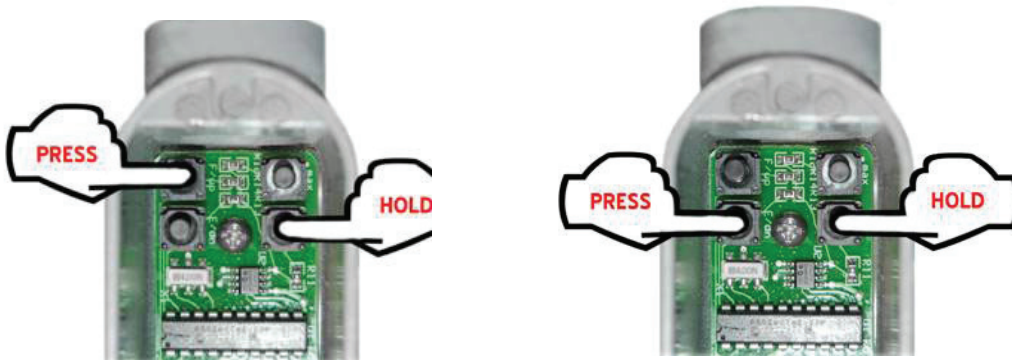
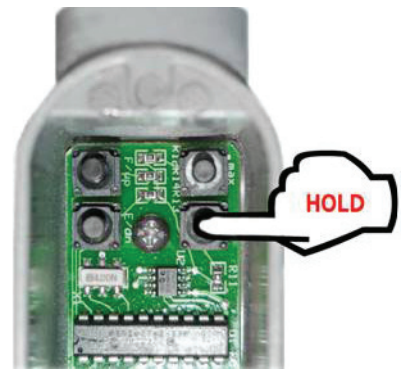
State 3- MAX pushbutton depressed and held - Sensor outputs the voltage preset for the top of the working span. In this mode the output of the device has nothing to do with existing refrigerant level. In this mode, this top span voltage value is seen and can be adjusted.

State 4- MIN and MAX pushbuttons depressed simultaneously - Probe level calibration mode. In this mode the device is reading existing refrigerant level awaiting the user to assign this level as top or bottom of span.

Verify or set the four span parameters as follows:

1. To verify the bottom of span output voltage, press and hold the MIN pushbutton. This output should be indicated between zero and 2% level on the Optiview, not < 0.

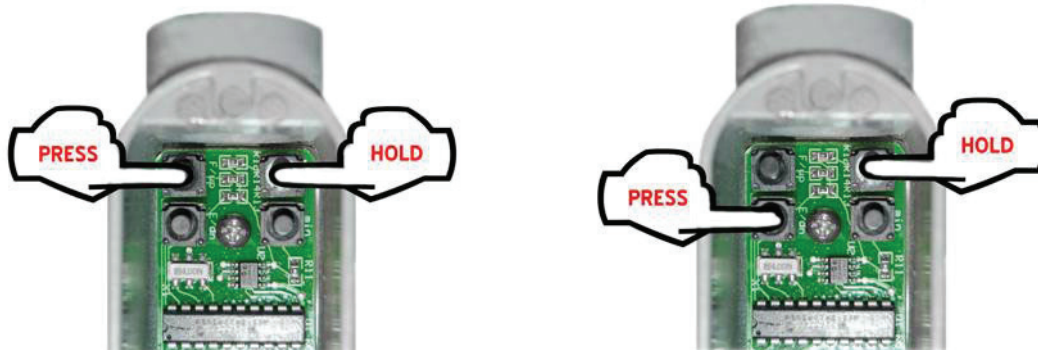
To adjust this output value, hold the MIN button and incrementally press either the F/UP or E/DOWN buttons several times as needed to achieve the desired Optiview value. F/up will increase the output voltage in increments. E/dn will decrease the output in increments.



2. To verify the top of span output voltage, press and hold the MAX pushbutton. This output should be indicated between 98% and 100% level on the Optiview, not >100.



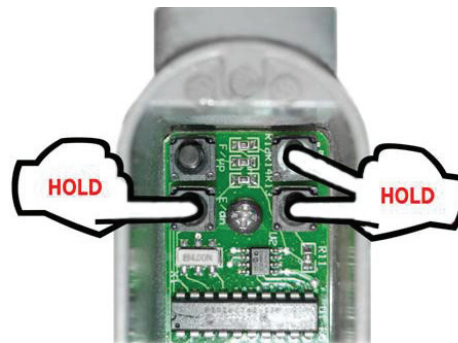
To adjust this output value, hold the MAX button and incrementally press either the F/UP or E/DOWN buttons several times as needed to achieve the desired Optiview value. F/UP will increase the output voltage in increments. E/DOWN will decrease the output in increments.



If the Optiview does not change level indication during adjustment steps 1 or 2, verify whether the probe is the issue using a DC voltmeter to check output response between 0 to 5 VDC across sensor terminals 2 and 3. If the voltage does not change with button changes, and 11VDC is available across terminals 1 and 2, the sensor board may have failed. If the voltage changes but Optiview does not, check the wiring to the microboard.

3. To verify the bottom of span refrigerant level setpoint, that level must be achieved on the chiller. Normally this is preset correctly from the vendor. If adjustment is necessary, this is done by performing the following routine WHILE THE PROBE IS CURRENTLY SEEING THE MIN LEVEL OF REFRIGERANT. If this pushbutton procedure is done at any other refrigerant level, the transmitter will accept the bogus position as the end of span and performance will be unsatisfactory.

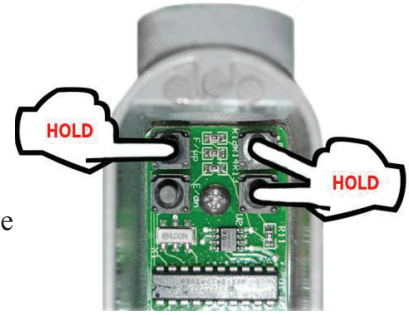
For YORK chillers, the full range of the probe must be effective, so this needs to be done while the probe is completely uncovered with refrigerant. With the chiller off and variable orifice open, the condenser level should be below the probe. If not, it may be necessary to flow warm condenser water to drive residual refrigerant to the evaporator by pressure. In this condition, press and hold the MAX and MIN buttons together and while holding them, press the E/DOWN button and hold for about 5 seconds to register this position of level to the probe as the bottom of the range (E for Empty tank setpoint).



4. To verify the top of span refrigerant level setpoint, that level must be achieved on the chiller. Normally this is preset correctly from the vendor. The top of the probe is generally covered when the sightglass is fully covered. If the Optiview reads the value set in step 2 above when the condenser sightglass is completely full and begins to decrease as level decreases into the top ¼ inch of the glass, it is recommended that the existing adjustment is satisfactory and no reset needed. If adjustment is necessary, set the top of range by performing the following routine WHILE THE PROBE IS CURRENTLY SEEING THE MAX LEVEL OF REFRIGERANT. If this pushbutton procedure is done at any other refrigerant level, the transmitter will accept the bogus position as the end of span and performance will be unsatisfactory.

For YORK chillers, the full range of the probe must be effective, so this needs to be done while the probe

is completely covered with refrigerant. With the chiller running, achieve a load where it is not likely to trip the unit on low evaporator pressure or cause surging and manually throttle the variable orifice to raise the condenser level above the top of the probe. In this condition, press and hold the MAX and MIN buttons together and while holding them, press the F/UP button and hold for about 5 seconds to register this position of level to the probe as the top of the range. (F for Full tank setpoint). An alternate time to set this is with chiller off and all charge pumped in the condenser when condenser isolation valves exist.



The Optiview level indication should repeat at the level end positions and change smoothly between those levels.

Replacement Parts

It is recommended that unless charge is already out of the chiller for other maintenance, that only the electronics head be replaced and the probe portion remain so the repair can be made without the need to remove charge from the chiller.

Complete Level Sensor Assembly (probe body along with transmitter head and DIN connector)

6-1/2" 025-43950-006
 8-1/2" 025-43950-008
 9-1/2" 025-43950-009

All YK chillers with condenser shell code X or larger use the 8-1/2" level probe. All other YK chillers use the 6-1/2" long probe.

YD Mod A or Mod B chillers with J1 or J2 compressors use 8-1/2" probes. YD Mod C chillers with K1 or K2 compressors or K3 compressors when used on E size condenser shells, use the 8-1/2" long probes. All other YD chillers use the 9-1/2" long probe part number.

Replacement Transmitter Head with DIN Connector

6-1/2" 325-42383-001
 8-1/2" & 9-1/2" 325-42383-002

Hanson 2 Potentiometer Style Sensors

Some chillers are using a Hanson-brand level sensor. Hanson sensors are identified by only having 2 potentiometers instead of the 4 push button type. If replacing complete assembly on earlier style 2 potentiometer version, order appropriate length probe using complete level sensor assembly part numbers listed above. If only replacing the transmitter head on this vintage sensor, the electronic head for these sensors are field replaceable. The part number for the Hanson 2 potentiometer transmitter head is part number 025-34146-000. Do not interchange different transmitter heads with different vendor sourced probes.

It is not recommended to replace the head of one style with the other style on alternate probe.

The replacement head needs to be screwed on snugly to the probe end for electrical ground. If this will cause the housing cover to be oriented where access is not possible, remove the head and install a 3/4" electrical conduit fitting locknut (star nut) first so it can be used as a jam nut to orient the head where needed and still maintain a tight fitup.

Important: After replacing transmitter heads on any level sensor the calibration of the new head must be verified and adjusted as needed using steps listed in this material.