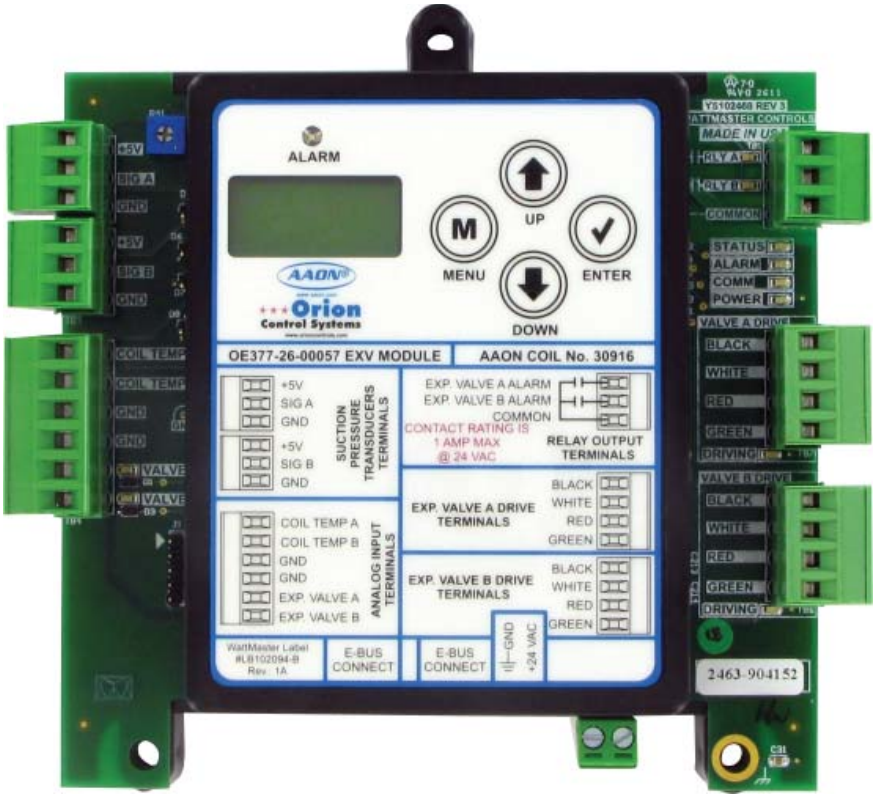
Factory Packaged Controls

Coil Products

OE377-26-00057 (AAON Part #30916) Dual Electronic Expansion Valve Module Technical Guide



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Overview

The OE377-26-00057 Dual Electronic Expansion Valve (EXV) Module (AAON Part #30916) provides control of two electronic expansion valves to maintain the superheat in the cooling circuits of the HVAC unit. The module is designed only for R410-A refrigerant.

The EXV Module is used in stand-alone applications only.

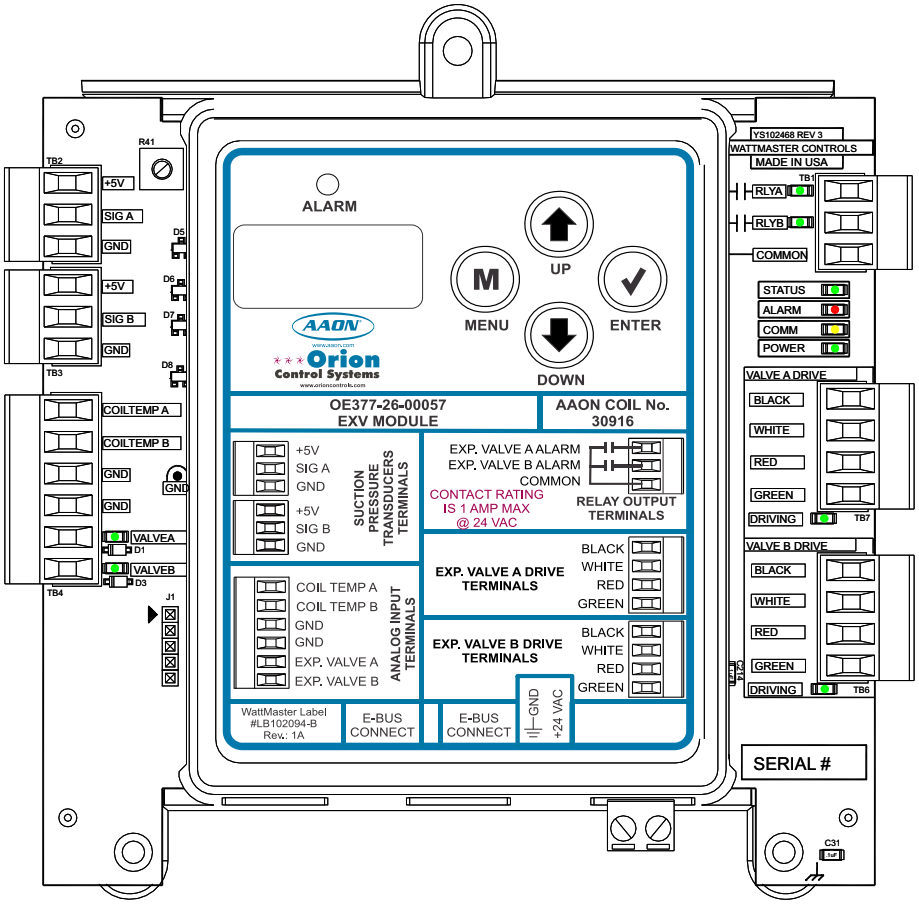


Figure 1: OE377-26-00057 Dual Electronic Expansion Valve Module

Features and Applications

Features

The Dual Electronic Expansion Valve Module provides the following:

- Contains a 2x8 LCD character display and 4 buttons that allow for status display, setpoint changes, and configuration changes.
- Can control two electronic expansion valves independently.
- Monitors suction pressure and coil temperature and modulates electronic expansion valves to maintain superheat.
- Provides active relays to monitor valve alarms.

NOTE: The Dual Electronic Expansion Valve Module contains no user-serviceable parts. Contact qualified technical personnel if your Dual Electronic Expansion Valve Module is not operating correctly.

Adjustable Setpoints

The following describes some of the setpoints available for adjustment using the LCD display on the Dual Electronic Expansion Valve Module:

- **Superheat Setpoint** - One setpoint is used for both valves.
- **Modulation Rate -** This setpoint (in seconds) will adjust how often the modulation routine will make a valve adjustment.
- **Proportional Window** - This setpoint (in degrees) will adjust how much of an adjustment will be made according to how far away it is from setpoint.

Configuration Settings

- **Board Address** – Can be addressed from 1 to 4. Used as stand-alone, the default address is 1.
- **Valve B Enable** – When using the module for only one valve, valve B can be disabled so false information is not displayed such as alarms and sensor readings.
- **Valve Steps** – Configurable for what valve is being used (1596, 2500, 3193, 6386)
- **Max Valve Position** – The maximum position each valve will modulate (%).
- **Min Valve Position** – The minimum position each valve will modulate (%).
- **Suction Pressure A Calibration Offset** – Adjustable between -10 and 10 PSI.
- **Suction Pressure B Calibration Offset** – Adjustable between -10 and 10 PSI.

AAON® Unit Start-Up Procedures

NOTE: The following instructions were provided by AAON to set up the unit. If you have any questions about this start-up procedure, please contact AAON Technical Support.

Refrigeration Charging Sequence:

1. Determine valve size utilized on equipment part number from the physical valve. There are currently 4 models used:
   - SER-C (5-Ton Maximum Nominal Capacity)
   - SER-D (13-Ton Maximum Nominal Capacity)
   - SER-G (26-Ton Maximum Nominal Capacity)
   - SER-J (48-Ton Maximum Nominal Capacity)
2. Determine circuit capacity and divide by valve Maximum Nominal Capacity to determine average full refrigerant mass flow

   Example: CC-B-045 Condensing unit; (2) 22.5 Ton Circuits, Evaporator contains (2) SER-G EEV (Electronic Expansion Valve)

   22.5/26 = 0.865 = 86.5%, Rounded to 87%

NOTE: Consult with System Specification and Unit Rating, as lower or higher evaporator temperatures and other factors play a role in the actual capacity the compressors may deliver.

3. Ensure system is charged to a reasonable point to enable compressor start and ensure that all other procedures dictated for installation and startup have been followed from the unit IOM.
4. Set the EEV Module's Valve to manual override position of 87%.
5. Ensure the space is fully loaded at design conditions to allow for maximum capacity operation and lock the compressor to fully-loaded capacity.
6. Energize the compressor and ensure a solid column of liquid to the EEV via verification at the sight glass.
7. From the point of a full sight glass, follow standard charging procedures to maximize efficiency via sub cooling, and delta T at the evaporator.
8. Disable the manual override position on the EEV Module and allow automatic operation at the desired set point.
9. Verify superheat operation and consistent solid column of liquid at the sight glass. This may take up to 15 minutes.
10. Repeat instruction for Valve 2 starting with Step 3.

Fine-Tuning the EEV Module's Setpoints for Best Reaction Time and Efficiency:

1. Ballpark the modulation rate based on line set length using the following table as a guide:

Line Set Length	Modulation Rate
15	15
30	20
45	30
60	35
75	40
90	45
120	50

Table 1: Modulation Rate Table

2. Ensure the outside air temperature, return air temperature, and control setpoints do not change during calibration and fine-tuning procedures.
3. Power off the EEV Module completely to ensure the smart-start routine does not skew the initial position of future tests.
4. Power on the EEV Module and initialize the unit to enable compressor operation.
5. Monitor superheat on the EEV Module and mark the time system started until superheat is maintained at a steady state within an acceptable dead band for more than 60 seconds.
6. Note the time from startup to stable superheat as well as the current modulation rate set point (this process should not take longer than 20 minutes. If it does, then check unit charge or unstable operating conditions).
7. Adjust the modulation rate set point by 2-3 seconds in either direction and repeat test from Step 4.
8. Compare and adjust change until the best modulation rate is obtained for the final setting.

Dimensions and Mounting

Environmental Requirements

The Dual Electronic Expansion Valve Module needs to be installed in an environment that can maintain a temperature range between -30°F and 150°F and not exceed 90% RH levels (non-condensing).

Mounting

The Dual Electronic Expansion Valve Module is housed in a plastic enclosure. It is designed to be mounted by using the 3 mounting holes in the enclosure base. It is important to mount the module in a location that is free from extreme high or low temperatures, moisture, dust, and dirt. Be careful not to damage the electronic components when mounting the module.

See Figure 2 for Module dimensions (in inches).

It is important to keep the module in a location that is free from extreme high or low temperatures, moisture, dust, and dirt. Be careful not to damage the electronic components.

Power Supply

The Dual Electronic Expansion Valve Module requires a 24 VAC power connection with a minimum power rating of 1 VA.

WARNING:	Observe polarity! All boards must be wired GND-to-GND and 24 VAC-to-VAC. Failure to observe polarity could result in damage to the boards.

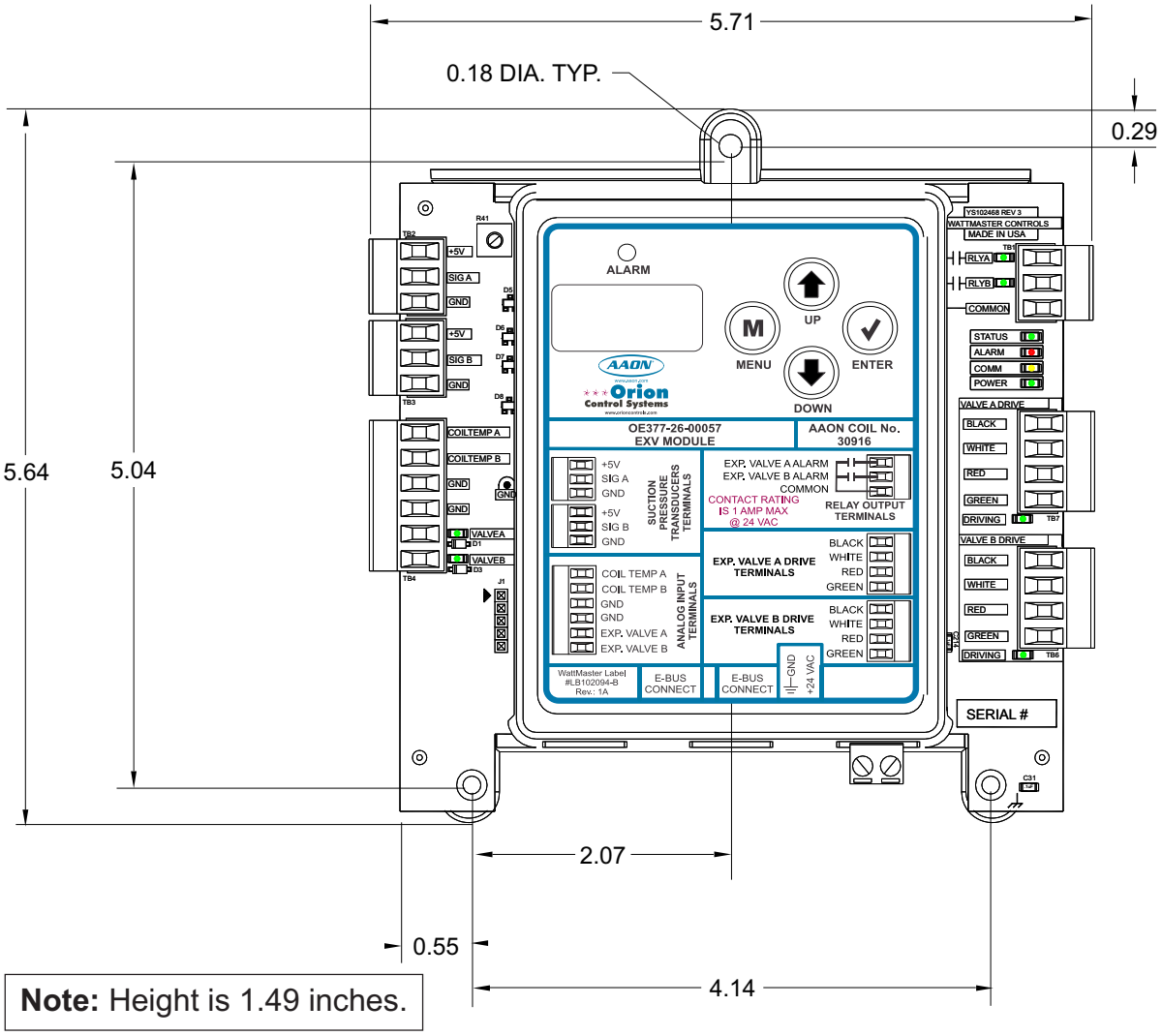


Figure 2: OE377-26-00057 Dual Electronic Expansion Valve Module Dimensions

Important Wiring Considerations

Please read carefully and apply the following information when wiring the Dual Electronic Expansion Valve Module Controller:

1. The Dual Electronic Expansion Valve Module requires a 24 VAC power connection with an appropriate VA rating.

2. Each Pressure Transducer must have its own 18-gauge shielded twisted pair cable. The Drain Wire must be the "Gnd" signal for the transducer.

3. All 24 VAC wiring must be connected so that all ground wires remain common. Failure to follow this procedure can result in damage to the module and connected devices.

4. All wiring is to be in accordance with local and national electrical codes and specifications.

5. Check all wiring leads at the terminal block for tightness. Be sure that wire strands do not stick out and touch adjacent terminals. Confirm that all transducers required for your system are mounted in the appropriate location and wired into the correct terminals.

WARNING: Observe polarity! All boards must be wired GND-to-GND and 24 VAC-to-VAC. Failure to observe polarity could result in damage to the boards.

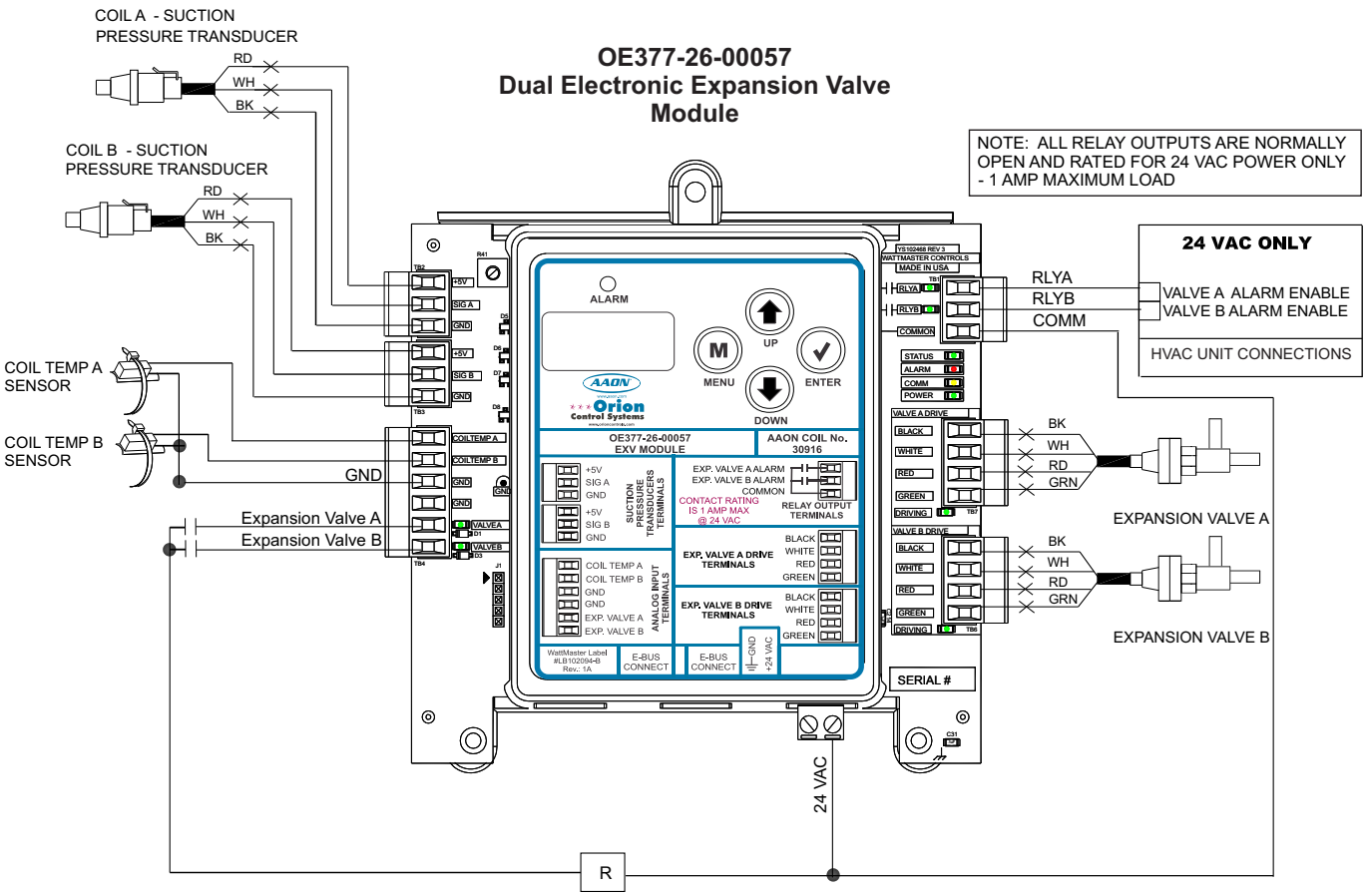


Figure 3: OE377-26-00057 Dual Electrical Expansion Valve Module Wiring Diagram

I/O Map

The following inputs and outputs are available on the Dual Electronic Expansion Valve Module. See **Table 2** below to reference the Input/ Output Map.

Binary Inputs	
1	Valve A Enable
2	Valve B Enable
Binary Outputs	
1	Valve A Alarm Relay
2	Valve B Alarm Relay
Analog Inputs	
1	Coil A Temperature
2	Coil A Suction Pressure
3	Coil B Temperature
4	Coil B Suction Pressure
Stepper Motor Outputs	
1	Expansion Valve A
2	Expansion Valve B

Table 2: Dual Electronic Expansion Valve Module Inputs & Outputs

Stand-Alone Input Commands

Valve A Enable On/Off

A 24 volt signal to Binary Input #1 initiates the Valve A Enable function. Once Valve A is enabled, it tries to maintain the desired Superheat Setpoint. Valve A maintains the Superheat Setpoint until it loses the enable signal which then puts Valve A in Off mode.

Valve B Enable On/Off

A 24 volt signal to Binary Input #2 initiates the Valve B Enable function. Once Valve B is enabled, it tries to maintain the desired Superheat Setpoint. Valve B maintains the Superheat Setpoint until it loses the enable signal which then puts Valve B in Off mode.

Initialization

At power up, the Dual Electronic Expansion Valve Module will send both expansion valves 110% of total steps in the closed position. This is done to make sure that the valves always start from a valid 0% position. For example, if the module is configured for a 6386 expansion valve, the controller will step 7025 steps.

Normal Operation

The Dual Electronic Expansion Valve Module will continuously calculate the superheat for the different cooling circuits. The superheat will be calculated by subtracting the saturated suction pressure from the measured coil temperature at the suction line. The module is designed for R410-A refrigerant.

The expansion valve signals will be maintained at the Smart Start position until the enable signal is activated. Anytime power is cycled, the Smart Start will be 50%. After that, the Smart Start is based on the history of the valve position.

The module will then modulate the expansion valve signals to maintain the desired superheat.

The Superheat Setpoint and Time Constant are user-adjustable.

Modulation Routine

The electronic expansion valve is designed with a modulation routine that is used to try to maintain superheat as quickly and efficiently as possible. Currently, there are user adjustable setpoints that can be set to adjust the modulation sequence to function better on a particular unit.

1. **Modulation Rate** (in seconds) – This setpoint will adjust how often the modulation routine will make a valve adjustment. Some systems are slower reacting than others, so setting this setpoint to a higher value will slow down the response.

2. **Proportional Window** (in degrees) – This setpoint will adjust how much of an adjustment will be made according to how far away it is from setpoint. A smaller value will make larger changes while a larger value will make smaller changes.

Force Mode

The electronic expansion valve is designed with the ability to manually adjust the valve position by turning the Force Mode on for each valve. The valve will reinitialize to zero when the Force Mode is turned back off or after 1 hour. Each valve works independently.

- **Force Mode Valve A** – Ability to enable Valve A Force Mode. Force Mode for Valve A will timeout after 1 hour if not manually turned off.
- **Force Valve A %** - If Force Valve A mode is enabled, you can manually adjust the valve position.
- **Force Mode Valve B** – Ability to enable Valve B Force Mode. Force Mode for Valve B will timeout after 1 hour if not manually turned off.
- **Force Valve B %** - If Force Valve B mode is enabled, you can manually adjust the valve position.

Alarms

The controller may have the following alarms for each refrigerant circuit:

- **Low Suction Pressure**
  This alarm will be activated when the suction pressure drops below 70 PSIG for longer than 10 seconds.Valve will modulate by 10% one time when alarm occurs to try to get suction pressure back up. This alarm will cease when Suction Pressure is above 70 PSIG.

- **High Superheat**
  This alarm will be activated when the Superheat reaches 25 degrees for longer than 60 seconds. This alarm will not affect valve operation. This alarm will cease when the Superheat drops below 25 degrees.

- **Low Superheat**
  This alarm will be activated when the Superheat is 0 degrees for longer than 60 seconds. This alarm will not affect valve operation. This alarm will cease when the Superheat rises above 0 degrees.

Alarm LED's will blink and the specific alarm can be accessed on the LCD display. Also, the Relay will activate for the specific valve that has the alarm.

LED Descriptions

The Dual Electronic Expansion Valve Module is equipped with LEDs that can be used to verify operation and perform troubleshooting. There are LEDs for communication, operation modes, and diagnostic codes. The module has 11 LEDs—1 used for E-BUS communications, 8 used for operation & status, and 2 used for alarms.

See **Figure 4** for the LED locations. The LEDs associated with these inputs and outputs allow you to see what is active without using a voltmeter. The LEDs and their uses are as follows:

Operation LEDs

POWER - This green LED will light up to indicate that 24 VAC power has been applied to the module.

STATUS - This green LED will light up and blink the board address at startup.

Diagnostic LEDs

ALARM - This red LED will light up to indicate an alarm. The type of alarm will display on the LCD display. The ALARM LED also blinks when the expansion valve is initializing at startup.

Communication LEDs

COMM - This yellow LED will light up and blink when E-BUS communications are detected.

Expansion Valve LEDs

DRIVING VALVE A - This green LED will light up when Expansion Valve A is being driven open or closed.

DRIVING VALVE B - This green LED will light up when Expansion Valve B is being driven open or closed.

Relay LEDs

RLYA - This green LED will light up when Valve A has an alarm and will stay lit as long as Valve A relay is active.

RLYB - This green LED will light up when Valve B has an alarm and will stay lit as long as Valve B relay is active.

Binary Input LEDs

VALVE A - This green LED will light up when Valve A is enabled.

VALVE B - This green LED will light up when Valve B is enabled.

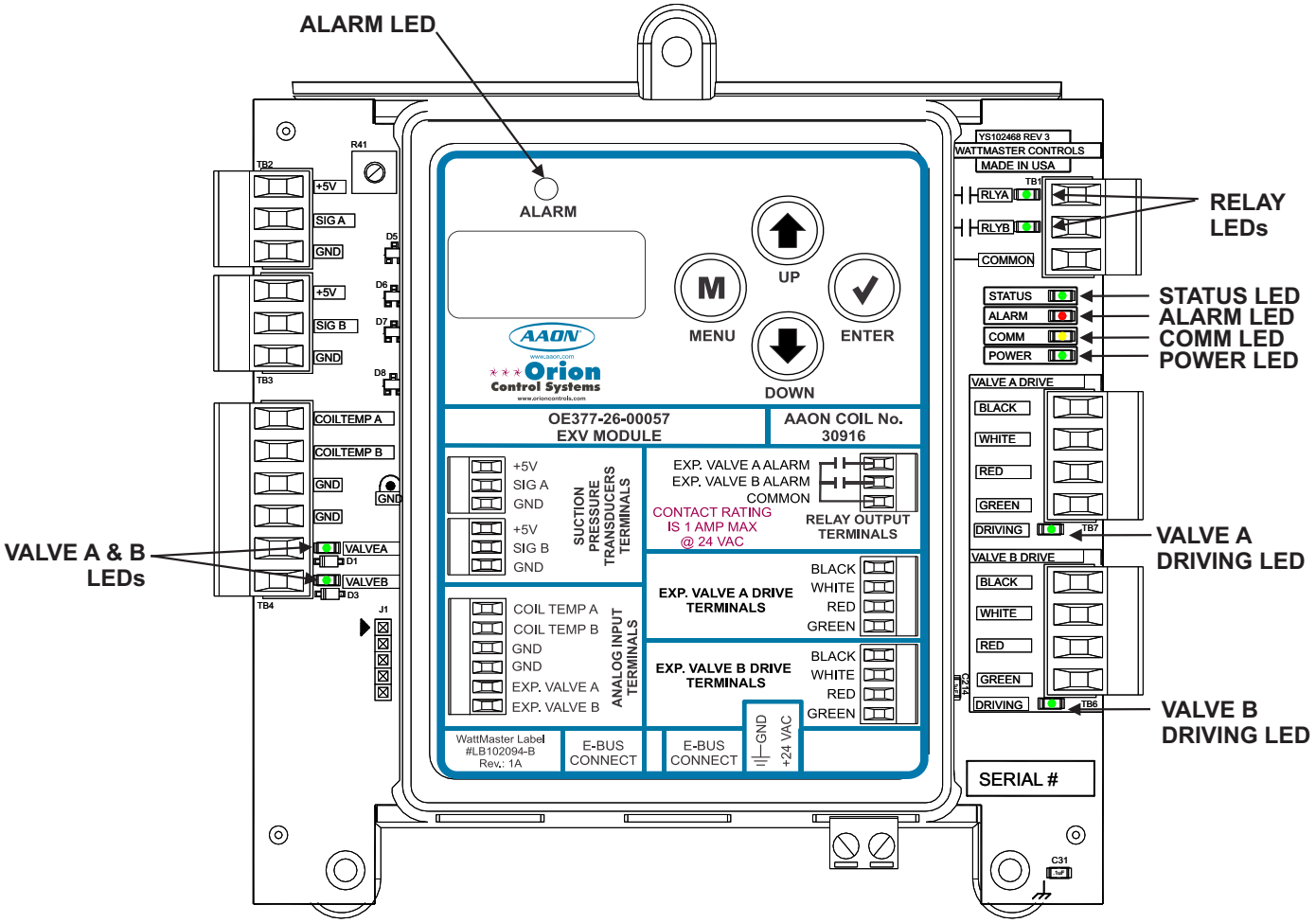


Figure 4: Dual Electrical Expansion Valve Module LED Locations and Descriptions

Navigation Keys and Main Screens Map

LCD Display Screen & Navigation Keys

The Dual Electronic Expansion Valve Module allows you to make configuration changes, view status, change setpoints, create force modes, and perform diagnostics using the keypad next to the LCD display. See **Figure 5** and refer to **Table 3** for descriptions.

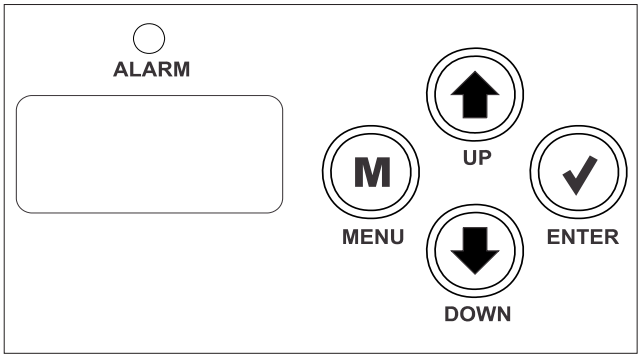


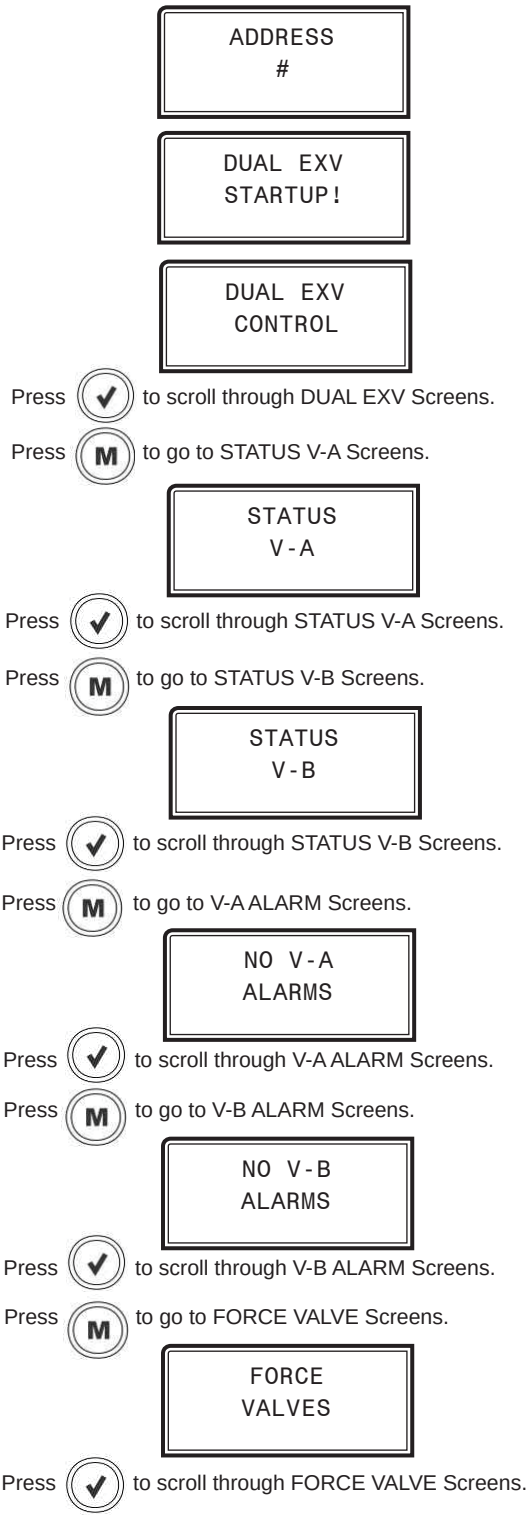
Figure 5: LCD Display and Navigation Keys

Navigation Key	Key Function
MENU 	Use the MENU key to navigate through the Main Menu Screens
UP 	Use this key to adjust setpoints and change configurations. This key is also used to turn Valve Force Mode on.
DOWN 	Use this key to adjust setpoints and change configurations. This key is also used to turn Valve Force Mode off.
ENTER 	Use the Enter key to move through screens within Main Menu categories. Also, use this key to save setpoints and configuration changes.

Table 3: Navigation Key Functions

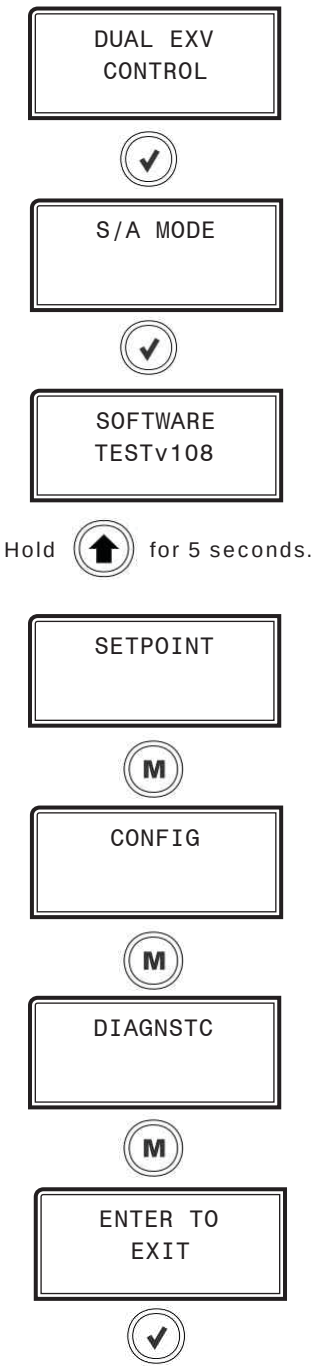
Main Screens Map

Refer to the following map when navigating through the LCD Main Screens. The first two screens are initialization screens. To scroll through the rest of the screens, press the <MENU> button.



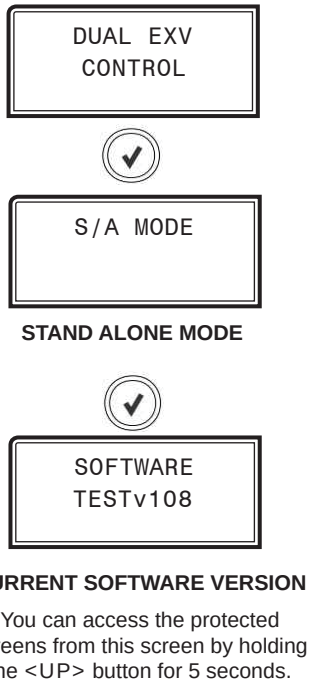
Protected Screens Map

Refer to the following map when navigating through the LCD Protected Screens. From the DUAL EXV CONTROL Screen, press <ENTER> twice to get to the Software Screen. Then hold the <UP> button for 5 seconds. To scroll through the rest of the screens, press the <MENU> button.



Main (Dual EXV Control) Screens

Refer to the following map when navigating through the Main Screens. From the DUAL EXV CONTROL Screen, press <ENTER> to scroll through the screens.



STAND ALONE MODE

CURRENT SOFTWARE VERSION

You can access the protected screens from this screen by holding the <UP> button for 5 seconds.

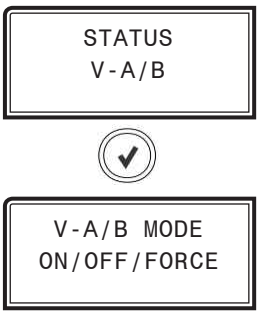
CURRENT BOARD ADDRESS

CURRENT VALVE CONFIGURATION (STEP SIZE)

Status V-A/B and V-A/B Alarm Screens

Status V-A & V-B Screens

Refer to the following map when navigating through the Status Valve A Screens. From the STATUS V-A or STATUS V-B Screen, press <ENTER> to scroll through the screens.

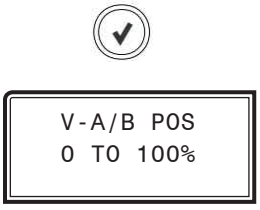


VALVE A/B MODES: ON ,OFF, FORCE

ON: Valve is modulating to maintain Superheat.

OFF: System is off.

FORCE: Valve is set to a forced position.



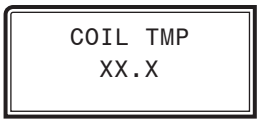
VALVE POSITION

0 to 100 percent

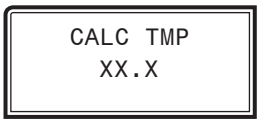
CURRENT SUPERHEAT CALCULATION

SUPERHEAT SETPOINT SETTING

0 to 25



COIL TEMPERATURE READING FROM TEMPERATURE SENSOR INPUT

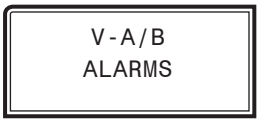


CALCULATED COIL TEMPERATURE FROM SUCTION PRESSURE INPUT

SUCTION PRESSURE READING FROM INPUT

V-A & V-B Alarm Screens

Refer to the following map when viewing Valve A and Valve B Alarm Screens. These screens will display automatically when alarms are present.



ALARMS

The alarms are as follows:

NO V-A/B ALARMS: This will be shown if there are no current alarms.

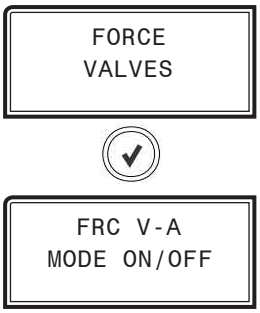
LO SPRESS: This indicates a Low Suction Pressure Alarm condition which is activated when the Suction Pressure drops below 70 PSIG for longer than 10 seconds. The valve will modulate by 10% one time when alarm occurs to try to increase the suction pressure. This alarm will disable when Suction Pressure is above 70 PSIG.

HI SHEAT: This alarm will be activated when the Superheat reaches 25 degrees for longer than 60 seconds. This alarm will not affect valve operation. This alarm will disable when the Superheat drops below 25 degrees.

LO SHEAT: This alarm will be activated when the Superheat is 0 degrees for longer than 60 seconds. This alarm will not affect valve operation. This alarm will disable when the Superheat rises above 0 degrees

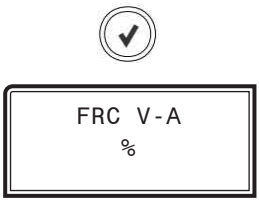
Force Valves Screens

Refer to the following map when navigating through the Force Valves Screens. From the FORCE VALVE Screen, press <ENTER>. At the FORCE MODE ON/OFF screens, press the <UP> arrow key to turn the valve on and press the <DOWN> arrow key to turn the valve off. Use the <UP> and <DOWN> arrow keys to increase and decrease the percentage.



Press the <UP> button to turn the valve on.
Press the <DOWN> button to turn the valve off

Force Valve will timeout after 1 hour
if not manually turned off.

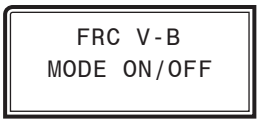


FORCE VALVE PERCENTAGE

If Force Valve A is enabled, you can manually adjust the valve position.

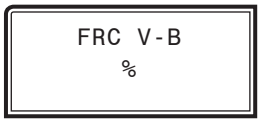
Press the <UP> button to increase the percentage. Press the <DOWN> button to decrease the percentage.

NOTE: When you turn the Force Valve back off or after 1 hour has elapsed, the valve will reinitialize to zero.



Press the <UP> button to turn the valve on. Press the <DOWN> button to turn the valve off.

Force Valve will timeout after 1 hour if not manually turned off.



FORCE VALVE PERCENTAGE

If Force Valve B is enabled, you can manually adjust the valve position.

Press the <UP> button to increase the percentage. Press the <DOWN> button to decrease the percentage.

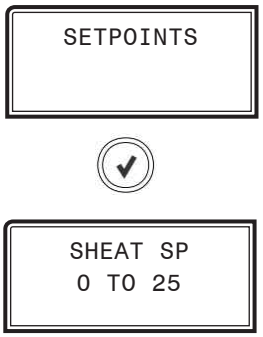
NOTE: When you turn the Force Valve back off or after 1 hour has elapsed, the valve will reinitialize to zero.

FORCE MODE TIME OUT

This screen will appear when the Force Mode times out after 1 hour.

Setpoints Screens

Refer to the following map when navigating through the Setpoints Screens. From the SETPOINTS Screen, press <ENTER> to scroll through the screens and change setpoints. Use the <UP> and <DOWN> arrow keys to change your selections. Then press <ENTER> to save the new setpoint.



SUPERHEAT SETPOINT

One setpoint is used for both valves
Default = 9

MODULATION RATE (in seconds)

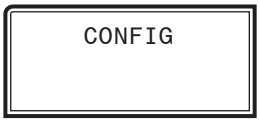
This setpoint will adjust how often the modulation routine will make a valve adjustment. Some systems are slower reacting than others, so setting this setpoint to a higher value will slow down the response.
Default = 30

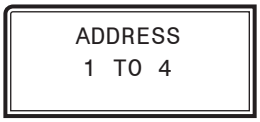
PROPORTIONAL WINDOW (in degrees)

This setpoint will adjust how much of an adjustment will be made according to how far away it is from setpoint. A smaller value will make larger changes while a larger value will make smaller changes.
Default = 30

Configuration Screens

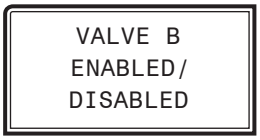
Refer to the following map when navigating through the Configuration Screens. From the CONFIG Screen, press <ENTER> to scroll through the screens and change setpoints. Use the <UP> and <DOWN> arrow keys to change your selections. Press <ENTER> to save any changes.





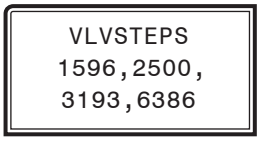
CURRENT ADDRESS OF THE BOARD

The address configuration is not used in Stand Alone Mode. Stand Alone Mode Default is 1.



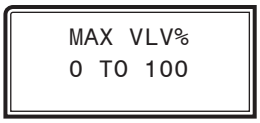
VALVE B ENABLED/DISABLED

When using the module for only one valve, valve B can be disabled so false information is not displayed such as alarms and sensor readings.



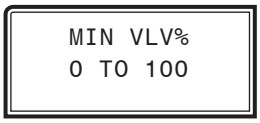
VALVE STEPS

Configurable for what valve is being used
(1596, 2500, 3193, 6386)
Default = 2500



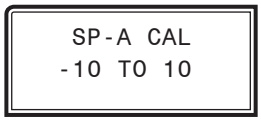
MAXIMUM VALVE POSITION

The maximum position each valve will modulate (%).
Default =100



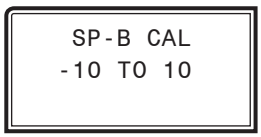
MINIMUM VALVE POSITION

The maximum position each valve will modulate (%).
Default = 0



SUCTION PRESSURE VALVE A CALIBRATION OFFSET

If the Suction Pressure Sensor is reading incorrectly, you can use this offset to adjust its reading.
Default = 0



SUCTION PRESSURE VALVE B CALIBRATION OFFSET

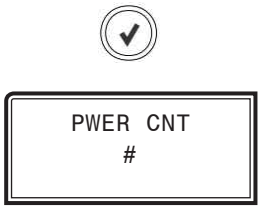
If the Suction Pressure Sensor is reading incorrectly, you can use this offset to adjust its reading.
Default = 0

Diagnostic Screens

Refer to the following map when navigating through the Diagnostic Screens. From the DIAGNSTC Screen, press <ENTER> to scroll through the screens.

WATCH DOG TIMER

Displays the number of times the board has been reset due to watchdog timer overflow.



POWER LOSS COUNT

Displays the number of times the board has been reset due to power loss.

Dual Electronic Expansion Valve Module Troubleshooting

Valve Enable Outputs Not Working

Make sure 24 VAC is applied and the LEDs are lit.

Electronic Expansion Valve Outputs Not Working

- Make sure the valves are wired correctly according to the colored wires shown on the module.
- Make sure the correct valve size is configured.
- Monitor the LEDs to see if the valve is modulating.
- Valve may not modulate if Superheat is at the Superheat Setpoint.

OE275-01 Suction Pressure Transducer Testing for R410A Refrigerant

The Evaporator Coil Temperature is calculated by converting the Suction Pressure to Temperature. The Suction Pressure is obtained by using the OE275-01 Suction Pressure Transducer, which is connected into the Suction Line of the Compressor.

The Suction Pressure and Calculated Temperature is displayed in the Module's Status Screens. A voltage measurement can also be taken on input for verification.

The Suction Pressure Transducer must have a 5 volt supply voltage to work properly. A measurement can be taken on the +5V terminal for verification.

Use the voltage column to check the Suction Pressure Transducer while connected to the Dual Electronic Expansion Valve Module. Read voltage with a meter set on DC volts. If the temperature/voltage or pressure/voltage readings do not align closely with the chart, your Suction Pressure Transducer is probably defective and will need to be replaced.

See the OE275-01 Suction Pressure Transducer, Pressure, Temperature, and Voltage Chart for R410A Refrigerant testing (**Table 4)**. The chart shows a temperature range from 20°F to 80°F. For troubleshooting purposes, the DC Voltage readings are also listed with their corresponding temperatures and pressures.

OE275-01 Suction Pressure Transducer Coil Pressure – Temperature – Voltage Chart for R410A Refrigerant

Temperature °F	Pressure PSI	Signal DC Volts	Temperature °F	Pressure PSI	Signal DC Volts
21.19	80.94	1.8	59.03	168.10	3.2
24.49	87.16	1.9	61.17	174.32	3.3
27.80	93.39	2.0	63.19	180.55	3.4
30.99	99.62	2.1	65.21	186.78	3.5
33.89	105.84	2.2	67.23	193.00	3.6
36.80	112.07	2.3	69.24	199.23	3.7
39.71	118.29	2.4	71.15	205.46	3.8
42.30	124.52	2.5	72.95	211.68	3.9
44.85	130.75	2.6	74.76	217.91	4.0
47.39	136.97	2.7	76.57	224.14	4.1
49.94	143.2	2.8	78.37	230.36	4.2
52.23	149.42	2.9	80.18	236.59	4.3
54.50	155.65	3.0			
56.76	161.88	3.1			

Table 4: Coil Pressure/Voltage/Temp for OE275-01 Suction Pressure Transducers - R410A Refrigerant

Coil Temperature Sensor Testing

The following sensor voltage and resistance table is provided to aid in checking a coil temperature sensor that appears to be operating incorrectly. Many system operating problems can be traced to incorrect sensor wiring. Be sure the sensor is wired per the wiring diagrams in this manual.

The Suction Pressure and Calculated Temperature is displayed in the Module's Status Screens. A voltage measurement can also be taken on input for verification.

If the sensors still do not appear to be operating or reading correctly, check voltage and/or resistance to confirm that the sensor is operating correctly per the tables. Please follow the notes and instructions that appear after the chart when checking sensors.

Temperature – Resistance – Voltage for Type III 10 K Ohm Thermistor Sensors			
Temp (ºF)	Temp (ºC)	Resistance (Ohms)	Voltage @ Input (VDC)
-10	-23.33	93333	4.51
-5	-20.55	80531	4.45
0	-17.77	69822	4.37
5	-15	60552	4.29
10	-12.22	52500	4.2
15	-9.44	45902	4.1
20	-6.66	40147	4.002
25	-3.88	35165	3.891
30	-1.11	30805	3.773
35	1.66	27140	3.651
40	4.44	23874	3.522
45	7.22	21094	3.39
50	10	18655	3.252
52	11.11	17799	3.199
54	12.22	16956	3.143
56	13.33	16164	3.087
58	14.44	15385	3.029
60	15.55	14681	2.972
62	16.66	14014	2.916
64	17.77	13382	2.861
66	18.88	12758	2.802
68	20	12191	2.746
69	20.55	11906	2.717
70	21.11	11652	2.691
71	21.66	11379	2.661

Table 5: Temperature/Resistance for Type III 10K Ohm Thermistor Sensors

Temperature – Resistance – Voltage for Type III 10 K Ohm Thermistor Sensors			
Temp (ºF)	Temp (ºC)	Resistance (Ohms)	Voltage @ Input (VDC)
72	22.22	11136	2.635
73	22.77	10878	2.605
74	23.33	10625	2.576
75	23.88	10398	2.549
76	24.44	10158	2.52
77	25	10000	2.5
78	25.55	9711	2.464
80	26.66	9302	2.41
82	27.77	8893	2.354
84	28.88	8514	2.3
86	30	8153	2.246
88	31.11	7805	2.192
90	32.22	7472	2.139
95	35	6716	2.009
100	37.77	6047	1.884
105	40.55	5453	1.765
110	43.33	4923	1.65
115	46.11	4449	1.54
120	48.88	4030	1.436
125	51.66	3656	1.339
130	54.44	3317	1.246
135	57.22	3015	1.159
140	60	2743	1.077
145	62.77	2502	1.001
150	65.55	2288	0.931

Table 5, cont.: Temperature/Resistance for Type III 10K Ohm Thermistor Sensors

Thermistor Sensor Testing Instructions

Use the resistance column to check the thermistor sensor while disconnected from the controllers (not powered).

Use the voltage column to check sensors while connected to powered controllers. Read voltage with meter set on DC volts. Place the "-" (minus) lead on GND terminal and the "+" (plus) lead on the sensor input terminal being investigated.

If the voltage is above 4.88 VDC, then the sensor or wiring is "open." If the voltage is less than 0.05 VDC, then the sensor or wiring is shorted.

Notes

Notes

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