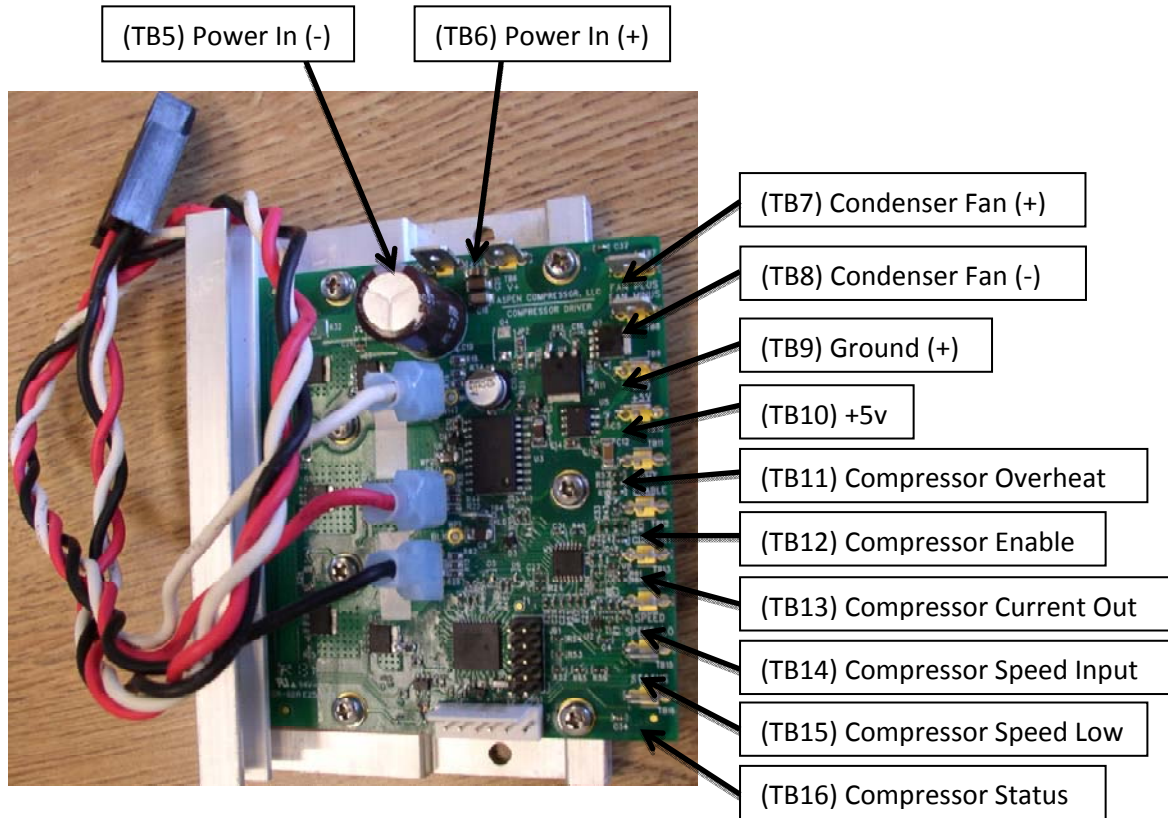


### Wiring & Operating Instructions



#### 1. Power Supply Input (TB5 & TB6)

Aspen's new High Capacity Drive is available in 3 voltages, 12,24 and 48 volts.

The connections to the drive board power input are two .250" faston tabs.

The use of adequate wire gage and an inline fuse for short circuit protection is highly recommended.

The table below shows the recommended wire gage and fuse size for each of the Aspen drives

Drive Board	Operating Voltage Range	Recommend Wire AWG	Recommended Fuse
12 Volt	11-16 Volts	12	10A or 15A (Littlefuse 0312010 / 0312015)
24 Volt	20-30 Volts	12	10A or 15A (Littlefuse 0312010 / 0312015)
48 Volt	43-60 Volts	16	8A (Littlefuse 0312008)

### **2. Condenser Fan Output (TB7 & TB8)**

An output has been provided for running condenser fan(s) from the Aspen drive. The voltage of this output will be equivalent to the DC input voltage provided to the board. The power to the condenser fan is enabled 10 seconds after the drive starts the compressor. Therefore, when the compressor is off, the power to the condenser fan(s) is off. When the compressor is signaled to run, the power to the condenser fan(s) will be enabled 10 seconds after the compressor has started running. This 10 second delay is intentional and is meant to reduce the total amount of inrush current when the compressor starts. The connections to the condenser fan outputs are two .250" faston tabs. The condenser fan output should be limited to a maximum of 5 amps on 12/24 volts boards and 3 amps on 48 volt boards.

### **3. Ground (TB9)**

The ground tab is for connecting both the compressor enable and compressor over temp connections to. Both the compressor enable and the compressor overheat connections must be connected to ground in order for the compressor to operate. The connection to the ground is a .187" faston tab.

### **4. +5V (TB10)**

The +5v tab is provided to give the user the ability to provide a low voltage speed signal input without the use of an additional power supply. The 5 volts can be wired directly to the speed input tab, which will cause the compressor to operate at full speed, or can be wired to a 20k potentiometer to allow the user to vary the voltage to the speed input tab and vary the speed of the compressor. The connection to the +5v is a .187" faston tab.

### **5. Compressor Overheat (TB11)**

In order for the compressor to operate, the overheat tab connection must either be connected directly to ground, or connected to an optional thermal safety switch, which is then connected to ground. When used in conjunction with the thermal switch, the drive will shut the compressor off when the thermal switch indicates that the compressor has overheated. Once this has occurred, the board will flash the red LED a sequence of 16 flashes to indicate that the compressor has overheated. To restart the compressor, the thermal switch must reset and the user must either cycle the main power on the drive board or momentarily disconnect the enable wire from ground. The connection to the compressor overheat is a .187" faston tab.

### **6. Compressor Enable (TB12)**

In order for the compressor to operate, the compressor enable tab connection must be connected to ground. This connection can also be wired through a thermostat and then to ground to cycle the compressor on and off via a thermostat. The connection to the compressor enable is a .187" faston tab.

### **7. Compressor Current Out (TB13)**

The drive is equipped with a current out connection to allow the user to monitor the current consumption of the compressor. The current out connection puts out a voltage that correlates to the current being used by the compressor only and not the condenser fans if they are so attached. The correlation is .1 volts per amp, so if the compressor is using 5 amps of power, the voltage measure on the current out tab will be .5 volts. The connection to the compressor current out is a .187" faston tab.

### **8. Compressor Speed Input (TB14)**

A voltage must be applied to the compressor speed input tab in order for the compressor to operate. The compressor speed input accepts a 0-5 vdc analog voltage signal and will regulate the speed of the compressor automatically with respect to this input voltage.

The compressor will turn on once the input voltage has reached ~.8 volts and off once the input voltage has dropped below .6 volts. There will be a linear increase in speed from the turn on voltage of .8 volts (~2200 rpm) through the max speed voltage of 4.5 volts (~6500 rpm). There is no additional increase in speed between 4.5-5 volts. The connection to the compressor speed input is a .187" faston tab.

### **9. Compressor Speed Low (TB15)**

This tab should be used when a secondary power supply is being used to supply power for speed control and the user wants the secondary supply to be isolated from the power supply being used to power the drive. In this case the factory installed jumper should be removed. This will decouple the board ground reference and allow the secondary power supply source for speed control to be completely isolated. The secondary power supply for speed control can then be wired between the speed input and speed low connections to vary compressor speed. The connection to the compressor speed low is a .187" faston tab. See the jumper configuration table at the end of this section for details.

### **10. Compressor Status (TB16)**

This tab is available to the end user so that they can monitor the normal operation of the compressor. When speed signal is being sent to the drive and the compressor is operating normally, there will be no voltage on this connection. However, if a speed signal is present and the compressor enable is satisfied but the compressor is not running, 5 volts will be present on this tab. This 5v signal can be monitored to alert the end user that there is a problem with the system and that the compressor is not running.

### Additional Board Functions

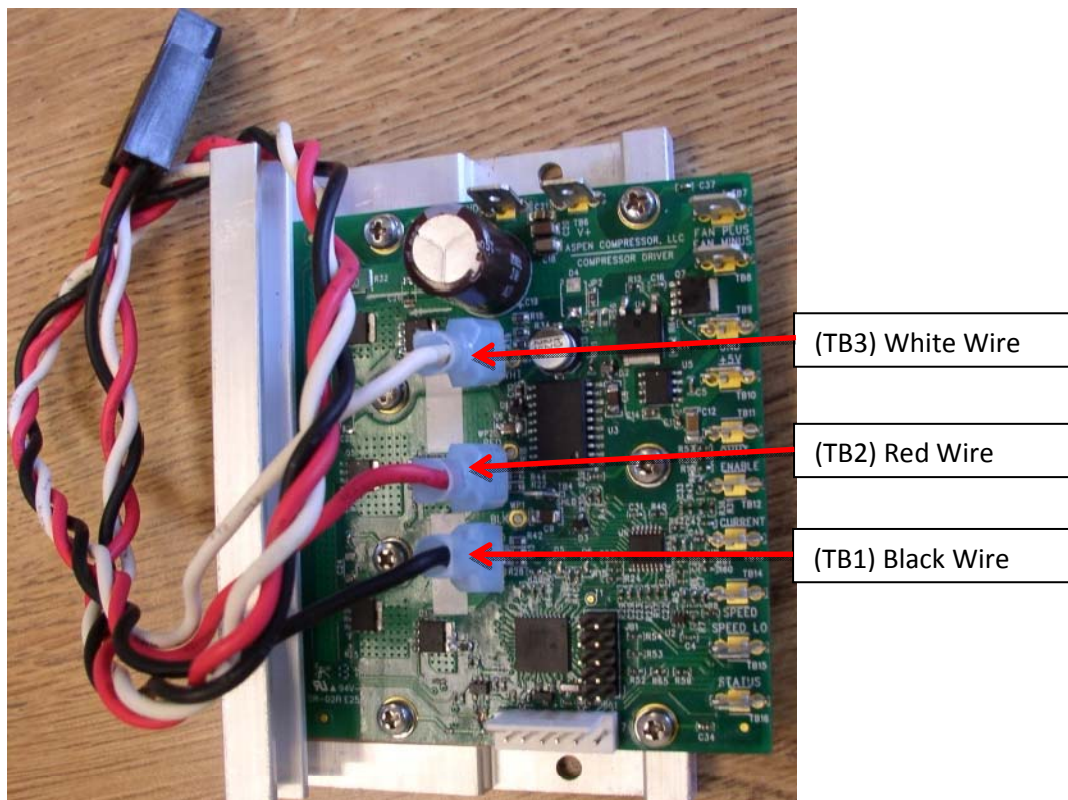
1. **Compressor Start Delay** – The Aspen high capacity drive has the ability to delay the compressor start in situations where starting may be difficult due to an unbalanced system. The logic behind the delay is based on a minimum off time for the compressor and can be enabled by installing jumpers per the table at the end of this section. When activated the controller keeps track of how long the compressor has been turned off before trying to restart. If the compressor has been off for the minimum amount of time set by the jumpers when there is a call to restart, it will start immediately. If the minimum amount of time has not passed, the compressor will wait until the minimum time has been reached before attempting to start.
2. **Board Overheat** – The Aspen high capacity drive has an onboard thermistor that enables the drive to prevent itself from overheating. When the board detects that it has overheated, the drive will stop the compressor and emit a series of 8 flashes on the red LED.
3. **Automatic Current Limiting** – The Aspen high capacity drive has the ability to regulate the amount of current being used by the compressor. While the 48V drive has an 8 amp limit, the 12/24 drive has two limits for the current control. One is 15 amps and the other one is 10 amps and can be set by the jumpers in the table at the end of this section. The drive will automatically monitor the current consumption of the compressor. If the compressor begins to draw more than the maximum set current, the drive will automatically decrease the speed of the compressor in an effort to reduce the current being used. Once the speed of the compressor has been reduced below the minimum compressor speed, the drive will stop the compressor and flash the red LED continuously to allow the user to know that the compressor has stalled from excessive current draw or a lock rotor condition. It should be noted that the automatic current limit only reduces the current used by the compressor and does not account for any current that may be drawn by the use of the condenser fan output.
4. **Lock Rotor Protection** - The Aspen high capacity drive has the ability to detect if the compressor is not running due to a lock rotor condition. After the drive has made several unsuccessful attempts to start the compressor, the drive will stop attempting to start the compressor and flash the red LED continuously to allow the user to know that the compressor has stalled from excessive current draw or a lock rotor condition.
5. **Error Clearing** – The drive can go in to error mode for several reasons in which case the compressor will stop running. To clear the error and restart the compressor, the enable wire must be disconnected and then reconnected to ground. For a list of error conditions, see the error code table at the end of this section.

# ASPEN COMPRESSOR

## High Capacity Drive



**Compressor Wiring** – The Aspen high capacity drive is supplied with a cable to attach the drive to the compressor. All other wiring is to be supplied by the end user. It is important to wire the compressor to the drive with the colors coded in the order per the picture below. If the order of the wires is not correct, the compressor will not operate properly.



# ASPEN COMPRESSOR

## High Capacity Drive



**Jumper Configuration** – There 5 jumpers (4 user selectable) that can be adjusted to change the configuration of the drive. The tables below provide detailed information on how to configure the jumpers.

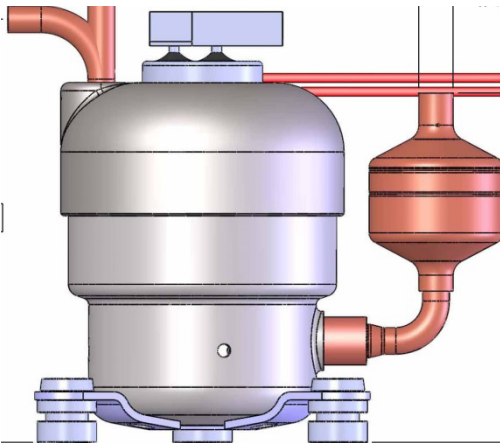


Jumper Position	Function	Installed	Not Installed
5	Speed Low Isolation	Not Isolated <b>(Factory Default)</b>	Isolated
4	Current Limit	10 Amps	15 Amps <b>(Factory Default)</b> See Application Note Below
3	Start Delay	See table	See table
2	Start Delay	See table	See table
1	Voltage Setting	Consult Factory	Consult Factory

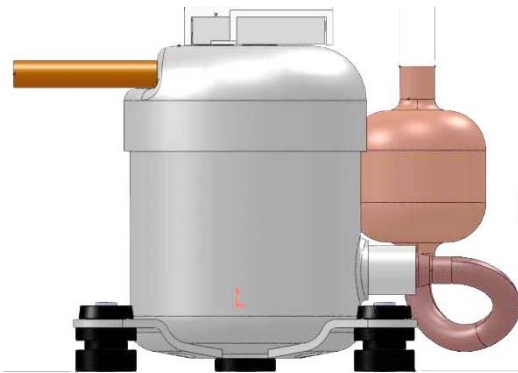
Start Delay	Jumpers To Install
Off	None
30 sec	Location 2
60 sec	Location 3
120 sec	Location 2 & 3

**\*\* Application Note \*\***

When operating a new Q-Series type compressor, either the 10 amp or 15 amp setting may be used. When operating a standard compressor, only the 10 amp setting should be used or the compressor may not operate properly at high current levels.



**Q Series Compressor**  
Jumper 4 can be configured to 10 amps or 15 amps current limiting  
Factory default setting is 15 amps.

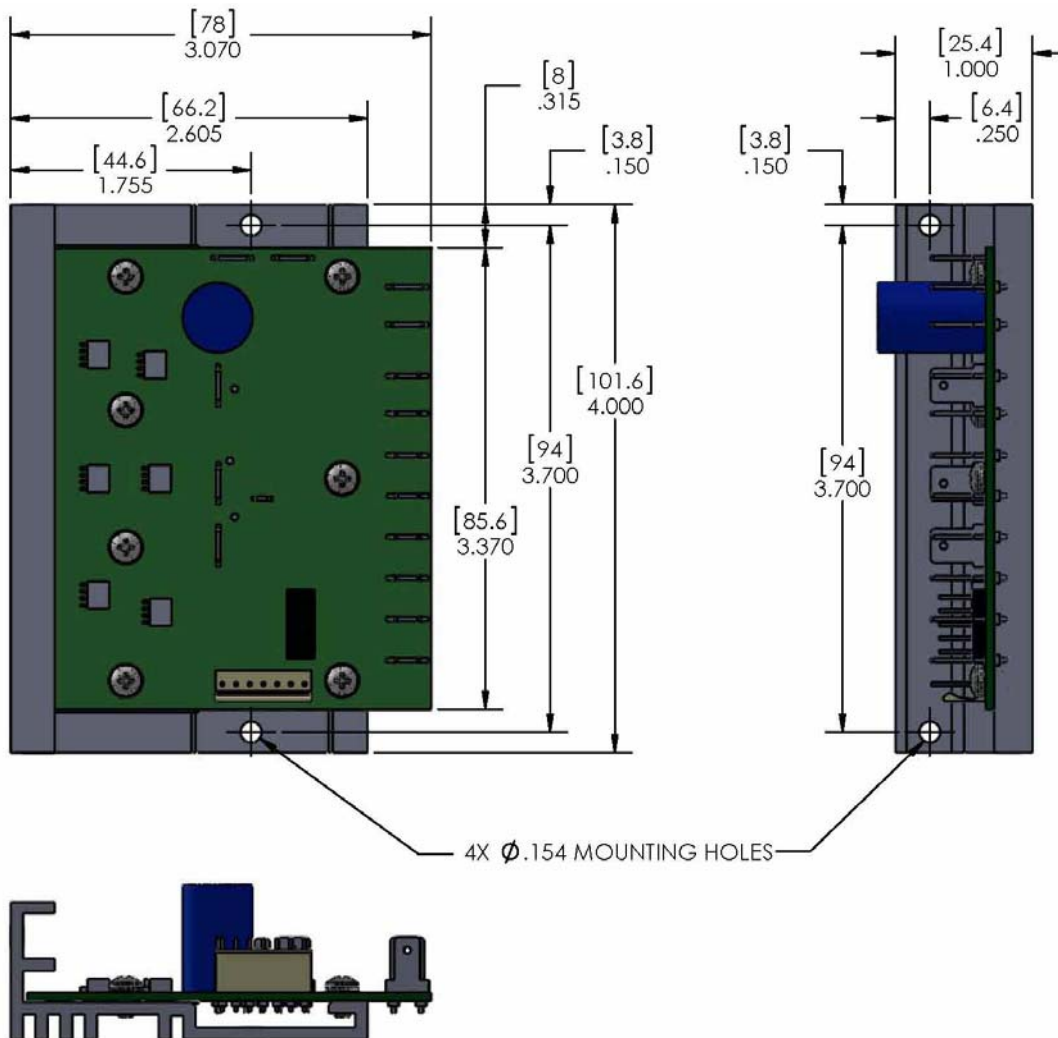


**Standard Compressor**  
Jumper #4 factory default setting is 15 amps and must be changed to 10 amps for operating this style compressor. Install jumper in position 4 whenever operating this type of compressor.

<b>Troubleshooting Guide</b>		
<b>Symptom</b>	<b>Possible Cause</b>	<b>Remedy</b>
Compressor will not run when speed input voltage is applied.	<ol style="list-style-type: none"> <li>1. Enable connection and or compressor overheat connection is not connected to ground.</li> <li>2. Speed input voltage is less than (.7) volts.</li> <li>3. Loose wire or connection</li> <li>4. Power supply too small, voltage dropping at compressor startup.</li> <li>5. Compressor is in lock rotor condition</li> </ol>	<ol style="list-style-type: none"> <li>1. Verify enable and overheat connections.</li> <li>2. Verify speed input voltage to be greater than (.7) volts.</li> <li>3. When speed input voltage is applied, verify yellow light changes from slow flashing (1x/sec) to fast flashing (5x/sec)</li> <li>4. Verify all connections between compressor and drive are in place and in the proper order.</li> <li>5. Measure input voltage to drive board and verify voltage is not dropping below minimum supply voltage when compressor is trying to start.</li> <li>6. Check drive for flashing red light. If red light is flashing, check error code table for appropriate code.</li> </ol>
Compressor turns off intermittently.	<ol style="list-style-type: none"> <li>1. Compressor overheating</li> <li>2. Drive board overheating</li> <li>3. Loose wire or connection</li> <li>4. Inadequate power supply</li> </ol>	<ol style="list-style-type: none"> <li>1. Check drive for flashing red light. If red light is flashing, check error code table for appropriate code.</li> <li>2. Verify all wiring connections</li> <li>3. Verify compressor is not drawing more power than power supply can deliver.</li> </ol>
Compressor speed ramps up and down automatically	<ol style="list-style-type: none"> <li>1. Drive board in current limiting mode</li> <li>2. Drive board close to overheating</li> </ol>	<ol style="list-style-type: none"> <li>1. Check drive for flashing red light. If red/yellow light is flashing, check error code table for appropriate code.</li> </ol>
Compressor Overheating	<ol style="list-style-type: none"> <li>1. Ambient temperature too high</li> <li>2. Inadequate airflow over compressor</li> <li>3. Return gas temperature too high</li> </ol>	<ol style="list-style-type: none"> <li>1. Increase airflow over compressor</li> <li>2. Verify superheat to be between recommended 8-12 deg. F.</li> </ol>
Compressor Current Limiting	<ol style="list-style-type: none"> <li>1. Condensing pressure too high.</li> <li>2. Liquid refrigerant being returned to the compressor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce condensing temperature / pressure.</li> <li>2. Verify superheat to be between recommended 8-12 deg. F.</li> </ol>

Drive LED / Error Code Table	Red LED	Yellow LED
Normal Operation (Compressor not running)		Slow Flash ~ 1x/sec
Normal Operation (Compressor Running)		Fast Flash ~ 5x/sec
Compressor stall / lock rotor	1 Flash Repeating	
Supply voltage too low	4 Flashes Repeating	
Board overheated	8 Flashes Repeating	
Compressor overheated	16 Flashes Repeating	

### Mounting Diagram

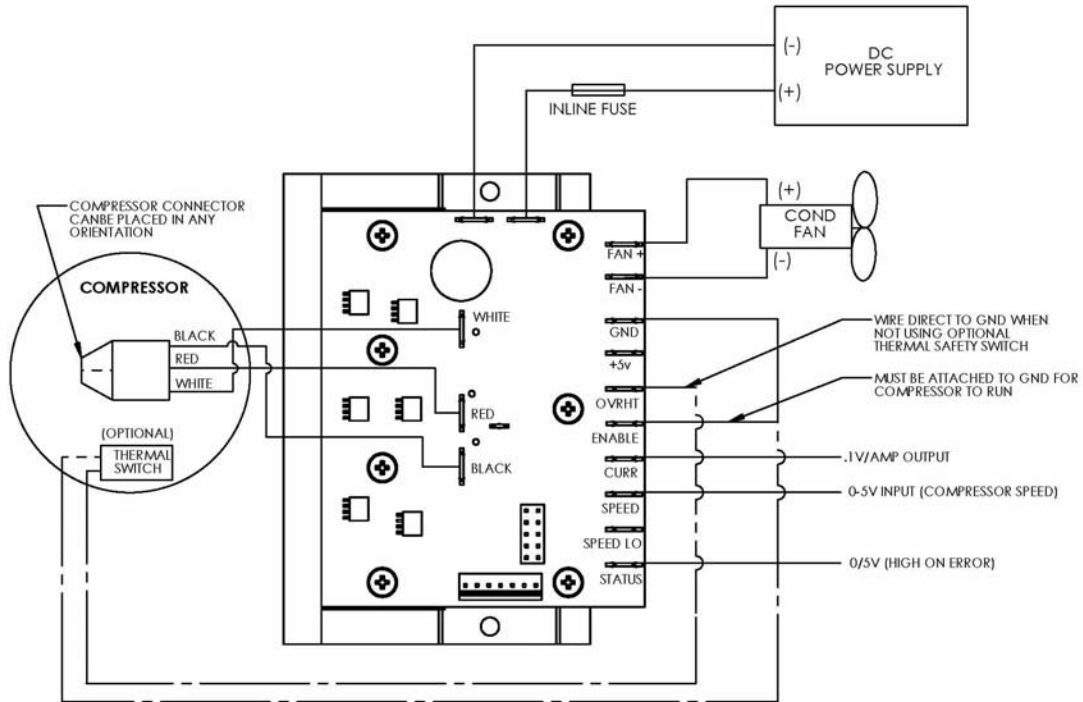


### Typical Wiring Diagram

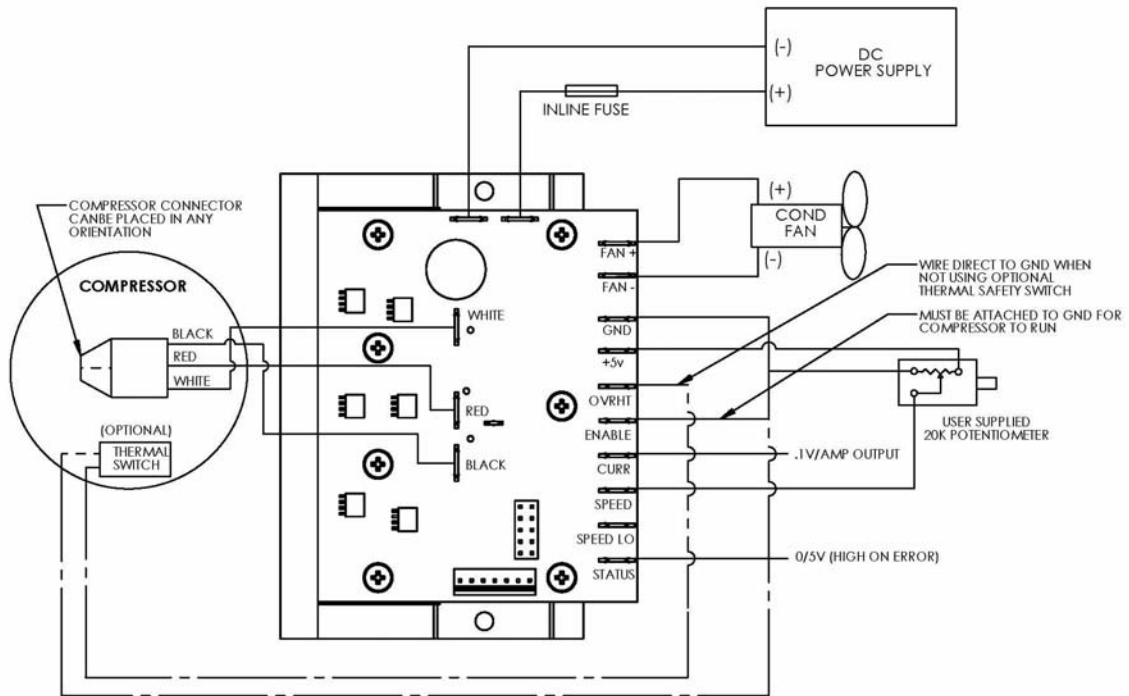


# ASPEN COMPRESSOR

## High Capacity Drive



Wiring with user supplied speed input voltage



Wiring with user supplied 20k potentiometer