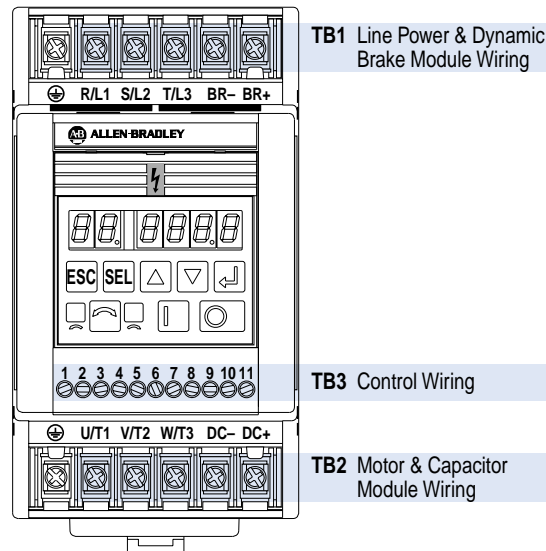
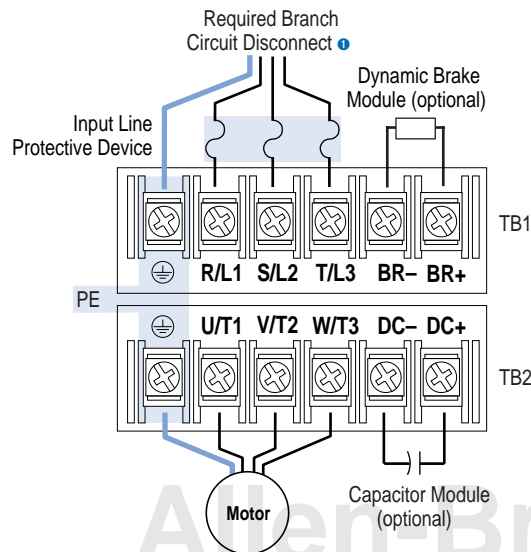


Power Wiring – TB1, TB2



Wire Size and Torque Ranges

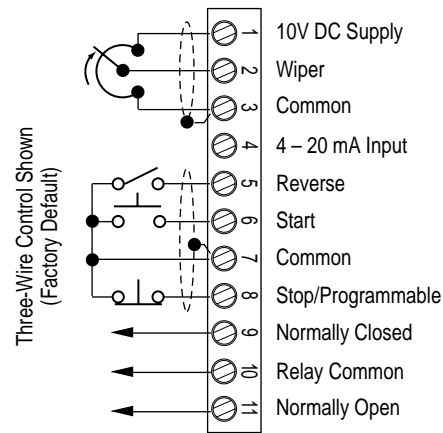
Model	Terminal	Min./Max. Wire Size mm ² (AWG)	Min./Max. Torque Nm (lb.-in.)
4.0 kW (5 HP)	TB1, TB2	5.26-3.31 (10-12)	1.35-0.90 (12-8)
	Three Phase TB3	2.50-0.50 (14-22)	0.80-0.40 (8-4)
1.5 kW (2 HP)	TB1, TB2	5.26-3.31 (10-12)	1.35-0.90 (12-8)
	Single Phase TB3	2.50-0.50 (14-22)	0.80-0.40 (8-4)
All Other Ratings	TB1, TB2	3.31-0.82 (12-18)	1.35-0.90 (12-8)
	TB3	2.50-0.50 (14-22)	0.80-0.40 (8-4)



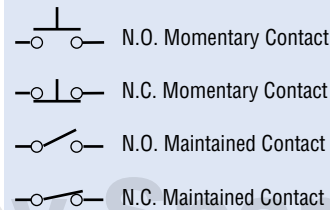
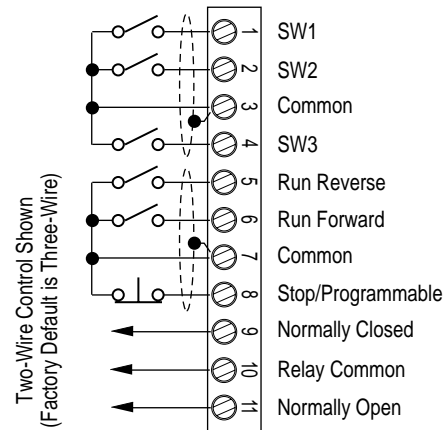
1 For single phase input applications, connect the AC input line to input terminals S (L2) and T (L3).

Control Wiring – TB3

Analog Signal Follower Model



Preset Speed Model

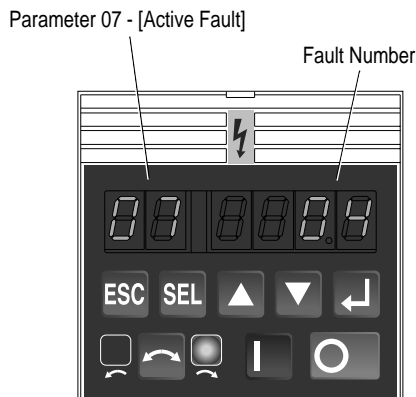


Wires must be shielded.

Troubleshooting

- **Motor Does Not Start** (*No output voltage to motor*)
 1. Check power circuit.
 - Check supply voltage.
 - Check all fuses and disconnects.
 2. Check the motor – Verify that it is connected properly.
 3. Check control input signals.
 - Verify that START signal is present.
 - Verify that the contact closure signal is present at **TB3-8**.
 - Verify that either the RUN FORWARD or RUN REVERSE signal is active, but NOT both.
 4. Check P46 - [Input Mode].
 - If P46 - [Input Mode] is set to 2, only the program keypad module Start button will start the motor.
 5. Cycle power or use P56 - [Reset Functions] if you changed P46 - [Input Mode].
- **Drive Started but Motor NOT Rotating** (*P01 - [Output Frequency] displays "0.0"*)
 1. Check the motor – Verify that it is connected properly.
 2. Check frequency source P06 - [Frequency Command].
 - Verify that a frequency signal is present at terminal block TB3. Either a -10 to +10V or 4-20 mA signal.
 - Verify that Preset Frequencies are set properly.
 3. Check control input signals.
 - Verify that SW1, SW2 and SW3 are correct. (Refer to the chart in the User Manual at the end of Chapter 5).
 4. Check parameter settings.
 - Verify that P59 - [Frequency Select] is showing the desired frequency source.
 - Verify that P58 - [Internal Frequency] is the desired value.
 5. Cycle power or use P56 - [Reset Functions] if you changed P46 - [Input Mode].
- **Motor Not Accelerating Properly**
 1. Check the motor – Verify that it is connected properly and that no mechanical problems exist.
 2. Check parameter settings.
 - Verify that P30 - [Accel Time 1] or P69 - [Accel Time 2] (whichever is current used) is set properly.
 - Verify that P43 - [Current Limit] is set properly.
 - Verify that P38 - [Boost Select] is set properly.
- **Can Not Operate in "RUN FWD/RUN REV" Mode**
 1. Verify that P46 - [Input Mode] is set to 1.
 2. Verify that the contact closure signal is present at **TB3-8**.
 3. Verify that P73 - [Reverse Disable] and P74 - [Analog Select] are not set to 1.
 4. Verify that power has been cycled for above change to take effect.
 5. Verify that both RUN FORWARD and RUN REVERSE switches are NOT closed simultaneously.
 6. Cycle power or use P56 - [Reset Functions] if you changed P46 - [Input Mode].

Fault Codes



Fault No.	Fault Indication and Corrective Action
03	Power Loss Fault Monitor incoming AC line for low voltage or line power interruption.
04	UnderVoltage Fault Monitor incoming AC line for low voltage or line power interruption.
05	OverVoltage Fault Bus overvoltage caused by motor regeneration. Monitor incoming AC line for excessive voltage. Extend the decel time or install dynamic brake module or external capacitor module.
06	Motor Stall Fault Longer acceleration time or a reduced load required.
07	Motor Overload Fault Reduce motor load until drive output current does not exceed the current set by P42 - [Motor Overload Current]. Reduce P38 - [Boost Select].
08	Over Temperature Fault Clear blocked or dirty heat sink fins. Check ambient temperature. Check for blocked or non-operating fan.
11	Operator Error Clear fault. Do not remove keypad under power.
12	Overcurrent Fault Check short circuit at the drive output or excessive load conditions at the motor.
13	Software Overcurrent Fault A longer acceleration time, reduced load, or removal of motor shaft blockage is required.

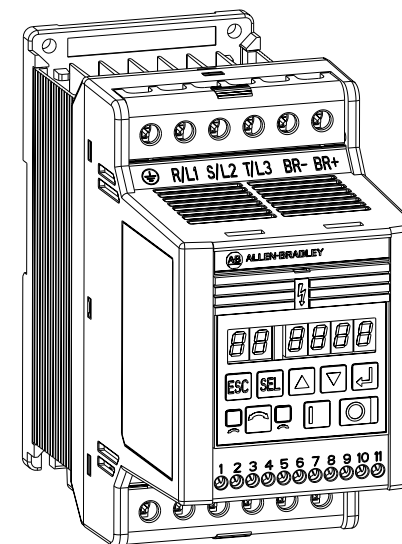
- 20 **Drive Overload Fault**
Clear blocked or dirty heat sink fins. Check ambient temperature. Check for blocked or non-operating fan. Reduce motor load current.
- 32 **EEPROM Fault**
Reset EEPROM using P56 - [Reset Functions]. Set to 1. Cycle Power
- 33 **Max Retries Fault**
Repair system fault.
- 36 **Incompatible Fault**
Check the wiring between the drive and the motor. Check the motor for a grounded phase.
- 38 **Phase U Fault**
Check the wiring between the drive and motor. Check motor for grounded phase.
- 39 **Phase V Fault**
Check the wiring between the drive and motor. Check motor for grounded phase.
- 40 **Phase W Fault**
Check the wiring between the drive and motor. Check motor for grounded phase.
- 41 **UV Short Fault**
Check the motor and external wiring to the drive output terminals for a shorted condition.
- 42 **UW Short Fault**
Check the motor and external wiring to the drive output terminals for a shorted condition.
- 43 **VW Short Fault**
Check the motor and external wiring to the drive output terminals for a shorted condition.
- 46 **Intermittent Power Output Fault**
Check the wiring between the drive and motor. Check the motor for more than one shorted output.
- 48 **Reprogram Fault**
Clear fault.

These faults have an auto reset feature. This feature automatically clears overvoltage, undervoltage and overtemperature faults 1 second after the fault condition is removed. Refer to P51 - [Restart Time].



160 SSC™ Variable Speed Drive

Quick Reference
Series C, FRN 7.xx



IMPORTANT: This publication is designed as a reference tool. The 160 SSC User Manual (publication 0160-5.15) must be consulted for more detailed information about parameters, faults and hazards of personal injury.

Keypad Module Description

Parameter Number Display

These two digits display the active parameter number for both Display and Program Group parameters.

Program Mode Indicator

When the Program Mode Indicator flashes, you can edit the parameter value. When the Display Mode is active, the indicator will not be lit.



Escape

The ESCape key allows you to toggle between the Display and Program modes. When the Program mode is active, this key will disable the editing of a parameter value.



Select

The SELect key enables editing of a parameter value when the Program mode is active. When you press this key the Program Mode Indicator flashes.



Up/Down Arrow Keys

Use the Up/Down Arrow keys to scroll through a list of parameters, or increase and decrease parameter values. Press and hold either key to increase scrolling speed.

Real time frequency adjustment can be achieved when using P58 - [Internal Frequency]. Refer to the User Manual for further information.



Enter

Pressing this key causes the current value displayed to be entered into memory (only while in the Program mode). When you press this key the Program Mode Indicator remains on, but stops flashing.



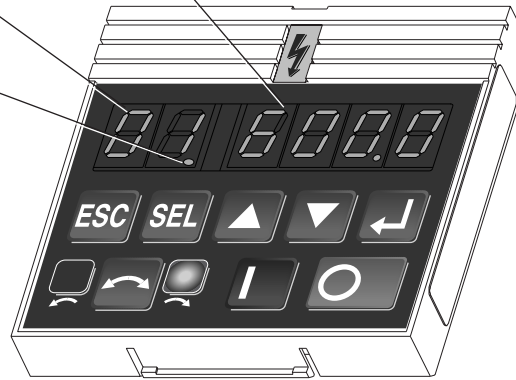
Direction LEDs (Indicators)

The appropriate LED will illuminate continuously to indicate the commanded direction of rotation. If the second LED is flashing, the drive has been commanded to change direction, but is still decelerating.

Important: Actual motor rotation could be different if motor leads are not connected properly. See Chapter 4 of the User Manual for details on verifying correct rotation.

Parameter Value/Fault Number

These four digits display the parameter value or fault code number.



Reverse (Change Direction)

This function is only active when P46 - [Input Mode] is set to 2. When active, pressing this key causes the motor to ramp down to 0 Hz and then ramp up to its set speed in the opposite direction. When the motor is running, pressing this key causes the (currently illuminated) LED to flash, indicating motor rotation while decelerating to zero. The other LED will illuminate indicating the commanded direction.



Start

This function is only active when P46 - [Input Mode] is set to 2. When active, pressing this key initiates a start command.



Stop

Pressing the Stop key will cause the motor to stop, using the selected stop mode. Refer to the P34 - [Stop Mode] parameter.

If the drive has stopped due to a fault, pressing this key will clear the fault.

Programming Steps

Action



Description



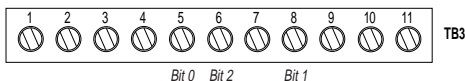
1. To program the value of a Program Group parameter, enter the Program Group by pressing the ESCape key. The Program Mode Indicator will illuminate.
2. Press the Up/Down Arrow keys until the desired parameter number is displayed.
3. Press the SELect key. The Program Mode Indicator flashes, indicating that you can use the Up/Down Arrow keys to change the parameter value.
4. Press the arrow keys until the desired value is shown.
Important: Continuously holding the Up or Down key will cause the value to increase or decrease as long as the key is pressed.
5. When the desired value is displayed, press the Enter key. This writes the new value to memory. The Program Mode Indicator will stop flashing and the display will flash once indicating that the new value has been accepted.

Important: If at any time (while in the Program mode) you wish to abort the editing process, press the ESCape key. The original value of the parameter will remain unchanged and you will be exited from the Program mode.

Display Group Parameter List

Display Group Parameters

No.	Parameter Name	Min/Max Range	Units/Settings
01	[Output Frequency]	0-240 Hz	0.1 Hz
02	[Output Voltage]	0-Max Voltage	1 Volt
03	[Output Current]	0-2 x Rtd. Out. Curr.	0.01Amps
04	[Output Power]	0-2 x Rtd. Out. Power	0.01 kW
05	[Bus Voltage]	0-400 (230V) 0-800 (460V)	1 Volt
06	[Frequency Command]	0-240	0.1 Hz
07	[Active Fault]	0-48	Numeric Value
08	[Heatsink Temperature]	69-150	1 Degree C
09	[Controller Status]	0000 to 1011	Bit 3 Bit 2 Bit 1 Bit 0 Decel Accel Forward Running
10	[Controller Type]	Numeric Value	Numeric Value
11	[Control Version]	Fixed Value	Numeric Value
12	[Input Status]	0000 to 1111	See Below



P46 Input Mode	Description	Bit 3	TB3-6 Bit 2	TB3-8 Bit 1	TB3-5 Bit 0
0	3-Wire	0 = Positive	Start	Stop	Reverse
1	2-Wire	Analog Input	Run Forward	Stop	Run Reverse
2	Keypad	N/A	Stop	Stop	N/A
3	Mom. Run Fwd/Rev	1 = Negative	Run Forward	Stop	Run Reverse
4	Accel/Decel	Analog Input	Run Forward	0=Accel 2/Decel 2 1=Accel1/Decel 1	Run Reverse
5	Coast to Rest		Run Forward	Coast to Rest Stop	Run Reverse
6	TB3Keypad or Comm.		Run Forward	0=TB3 Control 1=Keypad or Comm.	Run Reverse
7	Frequency Select		Run Forward	0=Analog Freq. Select 1=Internal Freq. Select	Run Reverse
8	SF1 Preset Speed		Run Forward	0=Open 1=Closed	Run Reverse
9	2-Wire PI Control		Run Forward	0=PI 1=Internal Freq. Select	Run Reverse
13	[Power Factor Angle]	0.0-180.0	0.1 Degrees		
14	[Memory Probe Display]	Numeric Value	Numeric Value		
15	[Preset Status]	0000 to 0111	Bit 3 Bit 2 Bit 1 Bit 0 Not Used SW3 SW2 SW1		
16	[Analog Input]	-150 to +150	0.1%		
17	[Fault Buffer 0]	0-48	Numeric Value		
18	[Fault Buffer 1]	0-48	Numeric Value		
19	[Fault Buffer 2]	0-48	Numeric Value		

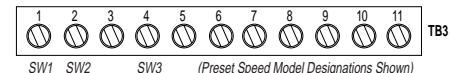
Program Group Parameter List

Program Group Parameters

No.	Parameter Name	Min/Max Range	Units/Settings	Default
30	[Accel Time 1]	0.0-600	0.1 Sec	10.0
31	[Decel Time 1]	0.1-600	0.1 Sec	10.0
32	[Min. Freq.]	0-240	1 Hz	0
33	[Max. Freq.]	0-240	1 Hz	60
34	[Stop Mode Select]	0-3	0 = Ramp 1 = Coast 2 = DC Brake 3 = DC Brake Auto-Off	0
35	[Base Freq.]	10-240	1 Hz	60
36	[Base Voltage]	20-230/460	1 Volt	230/460
37	[Max. Voltage]	20-255/510	1 Volt	230/460
38	[Boost Select]	0-12	Start Volts (%) Midpoint (%) 0 = 0 9 = 45.0 1 = 2.5 10 = 40.0 2 = 5.0 11 = 35.0 3 = 7.5 12 = 30.0 4 = 10.0 5 = 12.5 6 = 15.0 7 = 17.5 8 = 20.0	2
39	[Skip Freq.]	0-240	1 Hz	240
40	[Skip Freq. Band]	0-30	1 Hz	0
41	[Motor Overload Select]	0-2	0 = No Derating 1 = Min. Derating 2 = Max. Derating	0
42	[Motor Overload Current]	0.1-200% of Drive Rating	0.01 Amps	115% of Rating
43	[Current Limit]	1-180% of Drive rating	1%	150%
44	[DC Hold Time]	0-25	0.1 Sec	0
45	[DC Hold Voltage]	0-115	1 Volt	0
46	[Input Mode]	0-9	0 = 3-wire control 1 = 2-wire control 2 = Keypad control 3 = Momentary FWD/REV control 4 = 2-wire "Accel/Decel" control 5 = 2-wire Coast to Rest control 6 = 2-wire TB3/Keypad-Comm control 7 = 2-wire P59-[Frequency Select] control 8 = 2-wire Preset Speed control 9 = 2-wire PI control	0
47	[Output Configure]	0-10	0 = Drive Ready/Faulted 1 = At Frequency 2 = Motor Running 3 = Reverse 4 = Motor Overload 5 = Ramp Regulated 6 = Above Frequency 7 = Above Current 8 = Above DC Bus Voltage 9 = Retries Exhausted 10 = Above Power Factor Angle	0
48	[Output Threshold]	0-815	P47 - 6 = 0-240 Hz Range P47 - 7 = 0-180% Range P47 - 8 = 0-815 V Range P47 - 10 = 0-180°	0
49	[PWM Freq.]	2.0-8.0	0.1 kHz	4.0
50	[Restart Tries]	0-9	Numeric Value	0
51	[Restart Time]	0.5-300	0.1 Sec	10.0
52	[DB Enable]	0-100	0 = Disable, > 0 = % of dB	0
53	[S-Curve]	0-10	0, 1...10 @ 10% Increments	0
54	[Clear Fault]	0-1	1 = Reset fault	0
55	[Memory Probe Address]	Numeric Value	Numeric Value	Numeric
56	[Reset Functions]	0-2	0 = Idle State 1 = Reset Defaults 2 = Update Input Mode	0

Program Group Parameters (continued)

No.	Parameter Name	Min/Max Range	Units/Settings	Default
57	[Program Lock]	0-1	0 = Unlock 1 = Lock	0
58	[Internal Freq.]	0-240	0.1 Hz	60
59	[Freq. Select]	0-1	0 = TB3 1 = Internal Freq.	0
60	[Zero Offset]	-50.0 to +50.0	0.1%	0
61-68	[Preset Freq. 0 - 7]	0-240	0.1 Hz	See Below



No.	Name	Default	Preset Speed Model			Signal Follower Model		Accel	Decel
			TB3-4 (SW3)	TB3-2 (SW2)	TB3-1 (SW1)	TB3-8 (SW2)	TB3-2 (SW1)		
61	[Preset 0]	3 Hz	0	0	0	0	0	Parameter 30, Parameter 31,	
62	[Preset 1]	20 Hz	0	0	1	0	1	[Accel Time 1] [Decel Time 1]	
63	[Preset 2]	30 Hz	0	1	0	N/A	N/A		
64	[Preset 3]	40 Hz	0	1	1	N/A	N/A		
65	[Preset 4]	45 Hz	1	0	0	1	0	Parameter 69, Parameter 70,	
66	[Preset 5]	50 Hz	1	0	1	1	1	[Accel Time 2] [Decel Time 2]	
67	[Preset 6]	55 Hz	1	1	0	N/A	N/A		
68	[Preset 7]	60 Hz	1	1	1	N/A	N/A		
69	[Accel Time 2]	0.0-600	0.1 Sec.			0.1 Sec.		20.0	
70	[Decel Time 2]	0.1-600	0.1 Sec.			0.1 Sec.		20.0	
71	[IR Compensation]	0-150	1%			1%		50%	
72	[Slip Compensation]	0.0-5.0	0.1 Hz			0.1 Hz		2.0 Hz	
73	[Reverse Disable]	0-1	0 = Enable 1 = Disable			0 = Enable 1 = Disable		0	
74	[Analog Select]	0-1	0 = Unipolar 1 = Bipolar			0 = Unipolar 1 = Bipolar		0	
75	[Analog Input Min.]	0.0-150.0	0.1%			0.1%		0.0%	
76	[Analog Input Max.]	0.0-150.0	0.1%			0.1%		100%	
78	[Compensation]	0-2	Numeric Value			Numeric Value		0	
79	[Software Current Trip]	0-50%	1%			1%		0	
80	[Stall Fault Time]	0-5	0 = Normal (Appx. 60 sec) 1 = 2 x Normal 2 = 4 x Normal 3 = 6 x Normal 4 = 8 x Normal 5 = Disable			0 = Normal (Appx. 60 sec) 1 = 2 x Normal 2 = 4 x Normal 3 = 6 x Normal 4 = 8 x Normal 5 = Disable		0	
81	[PI Proportional Gain]	0-10.00	Numeric Value			Numeric Value		0.01	
82	[PI Integral Gain]	0-10.00	Numeric Value			Numeric Value		0.01	
83	[PI Process Reference]	0-100.0%	0.1%			0.1%		0.0%	
84	[PI Dead Band]	0-10.0%	0.1%			0.1%		0.0%	

- 1 Status of Bit 3 for P46 - [Input Mode] setting 8 (TB3-2) is 0 = Open, 1 = Closed.
- 2 Parameters 63, 64, 67 & 68 apply to the Preset Speed model only.
- 3 This parameter setting applies to the Analog Signal Follower model only.
- 4 When using P46 - [Input Mode] setting 4, the Accel and Decel times are selected by providing an input to TB3-8.
- 5 In firmware 7.05, there are minimum decel settings based on horsepower. 1 HP and less remain 0.1 seconds, 2 HP is 0.2 seconds, 3 HP is 0.6 seconds, and 5 HP is 0.7 seconds.
- 6 In firmware 7.06, all Input Modes of parameter 46 allow PI control except Input Mode 8.