

## **SECTION III**

### **START UP**

The controller has been factory tested and adjusted with a motor under simulated operating conditions. However, the following startup procedure should be performed for proper operation, system compatibility, and safety.

#### **PREPOWER CHECKOUT**

1. Be sure the AC supply voltage is turned-off to the controller.
2. Be sure all wiring is correct and all wiring terminations are tightened securely.
3. Be sure the motor is not smaller than 20% of the HP rating of the controller. An underrated motor may cause speed instability or loss of speed control.
4. Visually check the controller for damaged components. All damaged components must be replaced before power is applied to the controller.
5. Inspect the controller for dirt, dust, and debris. If necessary, clean the controller with a vacuum cleaner. Never use compressed air in the controller. Dirt blown beneath and into components can cause short circuits and grounds which can damage the controller.
6. Be familiar with all options associated with the controller. Factory installed options are noted on the controller identification label. Refer to Section VIII for option descriptions.
7. Check the primary connections of all power and control transformers, and be sure they are connected correctly for the applicable AC supply voltage.
8. Check the VOLTAGE SELECT SWITCHES on the control board in the 3120M Module and be sure they are in the appropriate position. Both switches must be in UP position for a 208 - 230 VAC line and in DOWN position for a 380 - 460 VAC line. See Figure 10-11 (page 10-13) for the location of the switches.
9. For operation from a 60 Hertz line, be sure the FREQ SELECT module is plugged into the control board. For 50 Hertz operation, remove (unplug) the FREQ SELECT module. See Figure 10-11 (page 10-13) for the location of the module.
10. Be sure the black wire (shunt feedback) is connected to the correct terminal on the Shunt (SH1) as shown in Table 3-1 on page 3-2. For the location of the shunt, see Figure 10-11 (page 10-13) for 3121M and 3122M Modules, Figure 10-12 (page 10-14) for 3123M Modules, Figure 10-13 (page 10-15) for 3124M Modules, or Figure 10-14 (page 10-16) for 3125M, 3126M, and 3127M Modules. On 3121M, 3122M and 3123M Modules, the black wire connects directly to the shunt. On

3124M, 3125M, 3126M, and 3127M Modules, the black wire connects to a Terminal Board (TB1) on a printed wire board attached to the shunt.

**Table 3-6: SHUNT CONNECTIONS**

LINE VOLTAGE (VAC)	MOTOR HP	ARMATURE CURRENT (AMPS)	BLACK WIRE SHUNT TERMINAL 3121M - 3123M MODULES	BLACK WIRE TB1 TERMINAL 3124M - 3127M MODULES
208 - 230	5	18	18	
	7.5	28	26	
	10	36	35	
	15	55	52	
	20	70	68	
	25	90	86	
	30	105	101	
	40	140	132	
	50	175	169	
	60	210	210	
	75	258	250	
	100	342		1
	125	426		2
380 - 460	5	9	9	
	7.5	14	14	
	10	18	18	
	15	25	26	
	20	35	35	
	25	43	43	
	30	51	52	
	40	66	68	
	50	83	86	
	60	98	101	
	75	123	123	
	100	163	169	
	125	205	210	
	150	245	250	
	200	325		3
	250	400		4
	300	480		2
	400	635		1
	500	790		2
	600	960		1
700	1120		3	
800	1280		2	
900	1440		3	
1000	1600		1	

## **POWER-ON CHECKOUT**

If all the prepower checks have been completed satisfactorily, turn-on all AC power to the controller. Be sure the AC line supply is turned-on before or at the same time as the 115 VAC supply to the relay/interface board in the 3120M Module. If the 115 VAC supply is turned-on first, the phase loss circuit in the 3120M Module will prevent the controller from operating.

### **WARNING**

#### **THE CONTROLLER CONTAINS HIGH VOLTAGE WHICH CAN CAUSE ELECTRIC SHOCK RESULTING IN PERSONAL INJURY OR LOSS OF LIFE.**

1. Measure the three-phase AC line voltage. The line voltage must be within  $\pm 10\%$  of the controller rating, and line voltage unbalance between phases must not be greater than  $\pm 10\%$ .
2. Be sure the input speed reference signal is zero. If a speed control potentiometer is used, turn it fully counterclockwise.
3. Energize the controller by turning-on the input line circuit breaker (or disconnect switch, if used).
4. Turn the selector switch on the test meter in the 3120M Module to Positions  $\emptyset 1$ ,  $\emptyset 2$ , and then to  $\emptyset 3$ , while observing the PERCENT meter beside the switch. At each position, the meter should read in the green shaded area, indicating the correct AC line voltage. If the meter does not read in the green zone, check that the VOLTAGE SELECT SWITCHES are in the correct position on the control board. See step 8 on page 3-1.

Note: The 115 VAC supply to the 3120M Module must be turned-on to activate the test meter.

5. Check the output of the DC power supplies by observing the PERCENT meter while turning the test meter switch to Positions +24V and -24V. The meter should read between 90 and 130% at each position. Then turn the switch to Positions +12V and -12V. The meter should read in the green zone at each position.

An incorrect reading indicates a faulty power supply on the control board or a short circuit connected to the control board.

6. Turn the test meter switch to FIELD position. This position monitors the motor shunt field voltage. Since the shunt field voltage should be at field economy potential, the PERCENT meter should read between 60% and 75% with the standard field supply and about 50% with an optional field supply. If the meter reads incorrectly, turn-off the input line circuit breaker and check the wiring to the shunt field and check the fuses to the field supply. The standard field supply has three Fuses (F1, F2, F3) on the field supply board. See Figure 10-11 (page 10-13) for the location of the standard field supply fuses.

7. With the input speed reference signal at zero, initiate a Run command (if used, push the RUN or START button). The PERCENT meter, when selected to FIELD position, should now read in the green zone.
8. Turn the test meter switch to ERROR position.
9. Slowly increase the speed reference signal (turn the speed control potentiometer clockwise, if used) until the motor rotates.

If motor rotation is opposite to that desired, stop the motor, turn-off the input line circuit breaker, and interchange motor Armature Leads A1 and A2 at the motor connection box. Do not change the motor shunt or series field leads. Unlike polarity between motor Leads S1 and F1 can cause speed instability.

10. After initiating a Start command, check that motor speed responds in proportion to the magnitude of the input speed reference signal (speed control potentiometer setting, if used).

The test meter, when selected to ERROR position, should read directly proportional to the speed reference signal. An incorrect reading indicates a faulty control board.

11. If necessary, adjust the rates of acceleration and/or deceleration as desired. The standard linear accel/decel board provides an ACCEL (R11) potentiometer and a DECEL (R10) potentiometer which independently adjust the rates of acceleration and deceleration, respectively, from 1 to 30 seconds.

Full clockwise rotation produces minimum time and full counterclockwise rotation produces maximum time.

- Notes:
1. When adjusting acceleration, be sure the motor is not overloaded. While this will not damage the controller, a high start-stop duty cycle could overload and overheat the motor. A longer acceleration time will minimize system shock and help prolong motor life.
  2. When adjusting deceleration, be sure the motor and load coasting time is not longer than the desired deceleration time. Too rapid deceleration may cause mechanical shock problems.

12. Since the controller has been factory tested and adjusted, additional adjustments are not normally necessary. If adjustments are required, refer to "Adjustment Instructions" in Section VI.