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## **START-UP PROCEDURE**

## **FOR THE VM7 INVERTER**

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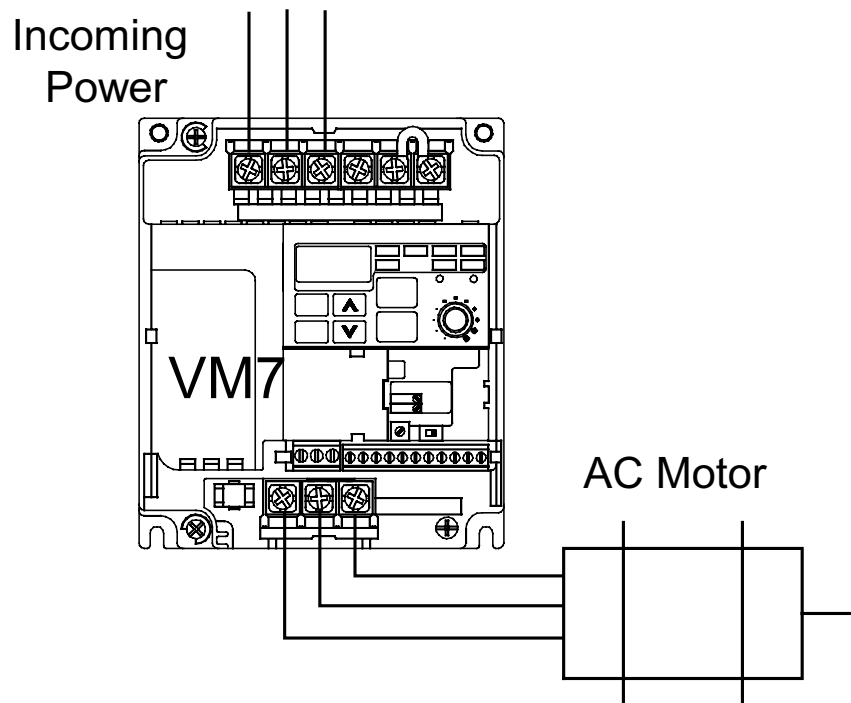
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## Start-Up Procedure for the VM7 Inverter

The following procedure is to assist in the start-up of the VM7 inverter by providing a step by step guide to installing, programming and using the VM7 inverter. The procedure is based on several common configurations used in the industry. For more detailed configurations and applications refer to the VM7 Instruction Manual (P/N 027-2060) available at [www.saftronics.com](http://www.saftronics.com).

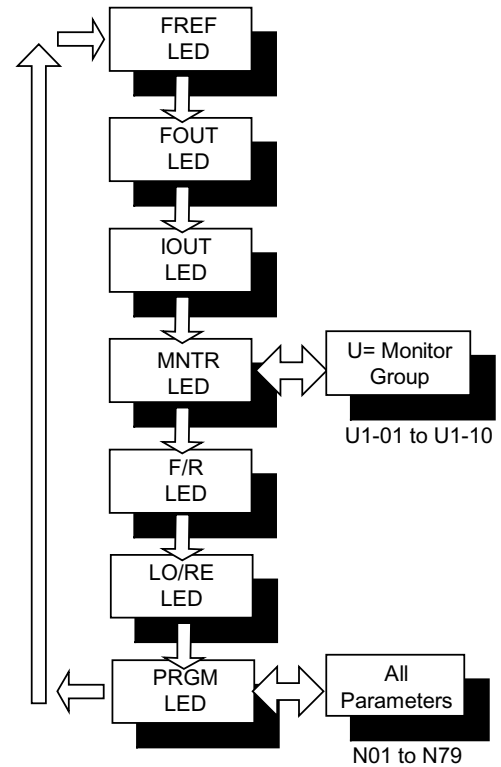
### Installation

1. Verify that the input voltage of the supply, motor and the drive model number are all marked with the same voltage. Caution: If improper voltage is applied to the inverter, severe damage will result.
2. Mount the inverter on a vertical surface with adequate space for proper air circulation (minimum 1.18 inches on each side and 4 inches above and below; Instruction Manual Pg.1-3).
3. Remove the front cover by removing the screw in the lower left corner, then connect power and ground wires as shown. Caution: Connect correct input voltage to terminal L1, L2, and L3 or severe damage will result.



4. Replace the cover and apply input voltage. The keypad will display "0.0", the *FREF* LED will be illuminated, and Run LED will be Flashing. Press the DSPL key until the LO/RE LED (Local/Remote) is illuminated, use the ▲ arrow to change the value to LO (Local Mode), then press ENTER. Press the DSPL key until *FREF* LED is illuminated, now turn the pot. until 10 Hz is displayed. Press the RUN key and check for rotation and direction of the motor. If rotation is not correct then remove power from the inverter and wait for the *Charge* LED to extinguish, then swap two motor leads at the output of the inverter (T1, T2, T3). Then reapply power and run the inverter and motor.

5. Keypad  
The DSPL key scrolls through all of the LED's. To access a parameter, press the DSPL key until the PRGM LED is illuminated. Use the ▲ and ▼ keys until the desired parameter number is displayed, then press ENTER. Use the ▲ and ▼ keys to adjust the value, press ENTER, then DSPL. Before the drive will accept a Run command, one of the following LED's must be illuminated: FREF, FOUT, IOUT, MNTR, or F/R. For more detailed information refer to the VM7 Instruction Manual P/N 027-2060, Chapter 2.
6. Choose a configuration from the table below. Each example listed contains control wiring diagram, operation explanation, and all necessary programming. The VM7 can be configured in several more modes than are described in the following examples. The examples are the most common configurations that are used in the field.



**Table A: Common Drive Configuration Examples**

Sequence (Run Stop Signal)	Reference (Motor Speed)	Description
Keypad	Pot. on Keypad	This method requires no external wiring connections to the inverter. Commonly used to perform initial start-up, (check rotation) out of the box configuration.
2-Wire	4 to 20mA	With this method, the drive can be started and stopped from a remote source, and the reference is supplied via a 4 to 20mA source such as a PLC .
3-Wire	Speed Potentionmeter (0 to 10V)	With this method, remote pushbuttons start and stop the inverter and the reference is supplied by a speed potentiometer or a external supply (0 to 10Vdc) such as an process controller.

7. Control Terminal Wiring- Remove power and wait for all LED's to extinguish before connecting any control wiring to the inverter. The control wires should be between 16 to 20 AWG wire. The analog signal on the control wiring needs to be shielded cable with the shield wire connected to the ground terminal, located on the left hand side of the heat sink.

### **Example 1: Start/Stop and Speed changes via the Pot. on Keypad**

When the inverter is set up with the start/stop and the speed changes via the pot. on the keypad, that is considered local mode. Local mode is most often used during initial start-up to check the motor operation and rotation of the shaft. The inverter is capable of running in local mode by pressing the DSPL key until LO/RE LED(Local/Remote) is illuminated, use the **▲** key to change the value to LO (Local Mode) then press ENTER. When power is removed and then reapplied the unit will default back to remote mode. The inverter is capable of staying in local mode after power is lost. Refer to Table 1 for the programming.

### **Operation**

The speed changes via the speed pot located on the keypad.

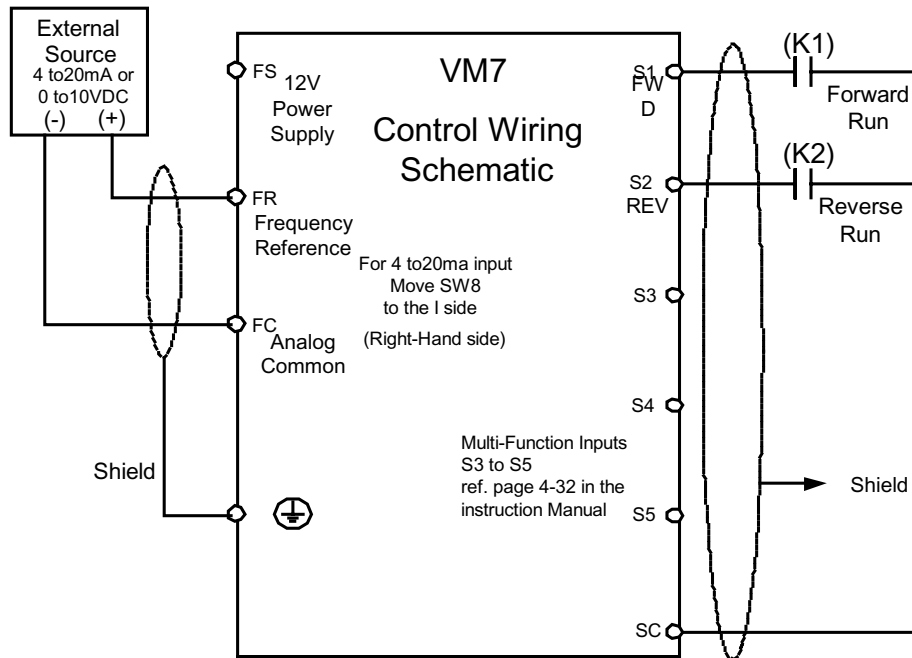
The inverter can be started by pressing the RUN button and stopped by pressing the STOP button on the keypad.

The direction of the motor can be changed regardless of the motor speed, by going to the F/R LED and, using the **▲** arrow to change direction, then press ENTER.

**Table 1: Programming needed to Operate via the Keypad**

Parameter	Display (Readout)	Description
N02	0	This parameter sets the Run/Stop to Local control (keypad)
N03	0	This parameter sets the speed changes (shaft RPM) to control via the potentiometer on the keypad
N16/N17	XX seconds	Acceleration time and Deceleration times/ The time from stop to full speed.
N32	Motor Full Load Amps (FLA)	Enter the motor's FLA from the nameplate of the motor.
Quick Start LED	F/R	Motor direction can be changed regardless of the motor speed using the quick LED.

### Example 2: Remote Start/Stop (2-wire) & Speed Changes via External Source



The above configuration is commonly used when the start/stop and the speed changes are supplied by a remote supply such as a PLC and relays. It can be used with a maintained switch when it is desirable to have the drive restart on restoration of power. It should not be used where safety of attending personnel might be threatened by a restart. A speed pot. may be used in this configuration by connecting the highside to FS, the wiper to FR and the low end to FC (5K $\Omega$  1/4 watt)

#### Operation

Close K1 to run Forward.

Close K2 to run Reverse.

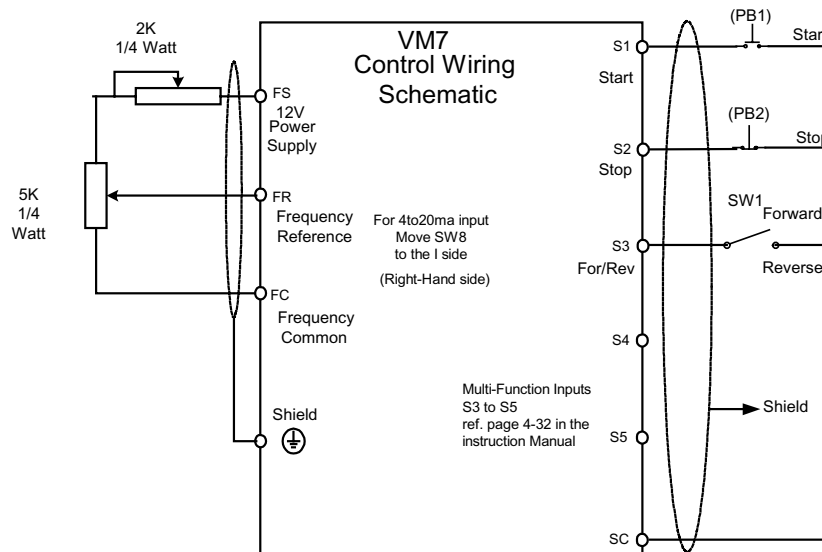
The speed changes are proportional to the signal level at Terminal FR: 4mA=0Hz., 12mA=30Hz., and 20mA= 60Hz.

The switch SW8 should be placed in the I position (right-hand side). The switch is located above the control terminal strip underneath a plastic cover.

**Table 2: Programming required for 3-wire Start/Stop and Speed Changes via external Source.**

Parameter	Display (Readout)	Description
N01	10	Resets all parameters to factory setting for a 2-wire configuration (Caution: all previous settings will be lost) Once 10 is entered, the setting will return to its factory setting of 1.
N03	2/3	2=Parameter sets terminal FR to accept a 0 to10VDC signal. 3=Parameter sets terminal FR to accept a 4 to 20mA signal.
N16/N17	xx seconds	Acceleration time and Deceleration times from stop to full speed.
N32	Motor Full Load Amps (FLA)	Enter the motor's FLA from the nameplate of the motor.

### Example 3: 3 wire Start/Stop with an External Source



This configuration is common when an inverter has replaced a contactor in an existing application and an operator will vary the speed via the external speed potentiometer. It is recommended that the pot. be between 2KW $\Omega$  and 10KW $\Omega$  and a minimum wattage of 1/4 watt. The trim potentiometer is optional; it is used to eliminate any dead span on the external speed potentiometer. Analog speed setting is also possible by connecting the analog signal between FR and FC. The external analog signal may be a 0-10 Vdc or 4-20 mA signal (ensure proper SW8 position).

### Operation

Close push-button (PB1) momentarily while push-button (PB2) is closed and the drive will start.

Push-button (PB1) does not need to be maintained.

Open push-button (PB2) at any time and the drive will stop.

If switch SW1 is open, the drive will run in the forward direction, and when switch SW1 is closed, the unit will then change direction.

The speed changes are proportional to the input signal at terminal FR.

If the inverter is put into local mode using the *LO/RE* LED, the inverter will behave the same as Example 1.

**Table 3: Programming needed for 3-wire Start/Stop and External Source**

Parameter	Display (readout)	Description
N01	11	Reset all parameters to factory setting for a 3-wire configuration (Caution all previous settings will be lost ) Once 11 is entered the setting will return to its factory setting of 1.
N03	2/3	2= Parameter sets Terminal FR to accept 0 to 10Vdc signal. 3= Parameter sets Terminal FR to accept 4 to 20ma signal.
N16/N17	xx.x Seconds	Acceleration Time and Deceleration Time/ The time from stop to full speed.
N32	Motor Full Load Amps(FLA)	Enter the motor's FLA from the nameplate of the motor.

### Adjusting the Trim Pot.

After the programming is complete, the trim pot should be calibrated. Press DSPL key until *Fref* LED is lit. Turn the external speed pot. (R1) all the way up. Adjust the trim potentiometer (R2) so that the FREF display is just flickering between 59.9 and 60Hz. This completes the adjustment of the trim potentiometer.

### **Terms**

**Two-Wire** – utilizes a maintained switch or relay contact, maintaining either a forward run or a reverse run command controls direction.

**Three-Wire** – utilizes a momentary button or switch. This control scheme emulates the traditional 3-wire motor starter control. A momentary closure of a normally open Run button latches the inverter in the Run mode. A momentary opening of the normally closed Stop button unlatches Run mode, bringing the inverter to a stop.

**Notes:**        Underlined words indicate a key on the keypad.  
*Italic words indicate an LED on the keypad.*

### **WARNING!**

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