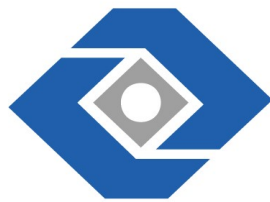


ML-VVF

VFD Pump Manual



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INTRODUCTION:

The Miller-Leaman Variable Frequency Drive (Model ML-VVF) booster pump system is designed to provide constant pressure even with fluctuating water volume demands. It provides this while running with a “soft” start and stop feature providing added life to the pump. The ML-VVF is available in 50gpm, 100gpm & 140gpm models in 230V and 460V 3 Phase and 230V 1 Phase. They are “Turnkey” skid mounted systems available with brass or stainless-steel inlet and outlet manifolds.

System Specifications

VFD Serial Number	
VFD Model Number	
Pump Serial Number	
Pump Model Number	
Drive Serial Number	
Drive PO Number	

Performance Test Results

PSI Setting	psi
Sleep Function	
Flow Switch	
Enclosure Fan	

SETUP AND INSTALLATION:

1. Place skid mounted system in desired location and level skid using adjustable feet.
2. Connect plumbing to check valve on inlet (front) of pump and to Ball Valve on outlet on pump.
3. Connect wiring to fuse block on inside of control box, make sure to check that voltage that is being installed matches voltage for VFD Drive.
4. Plug in Fan for control box to 120v outlet. NOTE: Fan is controlled by switch on cord only, it does not run off VFD controller. Fan is for extra ventilation and should be used at all times during warm months.
5. System comes programmed, you will not need to do any programming.

WARNING: DO NOT MODIFY SYSTEM IN ANY WAY. Modifying system will negate warranty.

START-UP:

Every VVF system from Velocity Water Works comes fully programmed and tested and is ready to go right out of the crate. Simply follow these steps before pushing start.

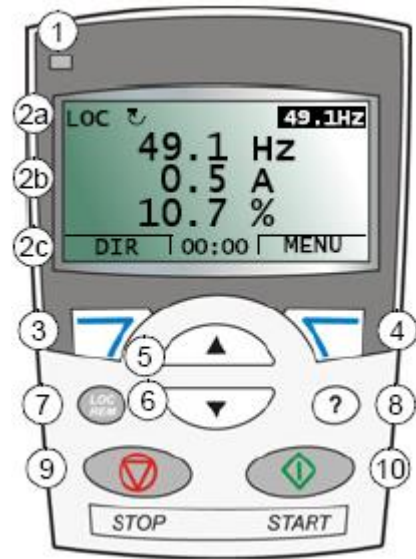
1. Flood suction side of pump with water from city water supply, well water supply or storage tank.
2. Turn power on to VVF system from disconnect near system or master breaker panel. System should read X psi, 0 Amps, 0 Hz.
3. Keep ball valve on outlet manifold shut during initial start-up. (You may need to open valve to flood pump)
4. Confirm keypad is in "REM" (displayed in top left corner of display screen). If keypad is in "LOC" change to "REM" using LOC/REM button on keypad.
5. Push Start on keypad
6. Confirm Pump is rotating in the correct direction.
7. System should ramp up to 60psi and Hz will start to decrease. System will go into ALARM 2018 – PID SLEEP "sleep" after 30 seconds of pump running with less than 57.5 Hz.
 - a. **NOTE: ALARM 2018 - PID SLEEP** is normal and means that the system has reached maximum pressure and has sustained that pressure for 30 seconds without any water demand.
8. After system goes into ALARM 2018 - PID SLEEP open ball valve on outlet manifold. System is now operational.

MANUAL OPERATION:

There may be times you need to run the VVF system slower or faster at a constant Hz for troubleshooting purposes. This can be accomplished by following these steps.

1. Using LOC/REM button on keypad change operation to “LOC”. This will appear in upper left corner of display.
2. Press Start.
3. Using arrow keys, you can increase and decrease the Hz thus speeding up or slowing down the pump speed.
4. After troubleshooting is finished press the LOC/REM button to change back to “REM”, push start to go back to normal operation.

No.	Use
1	Status LED – Green for normal operation. If LED is flashing or RED check faults.
2	LCD display – Divided into three main areas: 2a: Status line – Shows Remote or Local Mode, rotation of pump, MAX % setting 2b: Center line – shows parameter values, line 1 psi, line 2 Amps, line 3 Hz 2c: Bottom Line – shows current function of the two soft keys and if enabled, the clock display
3	Soft key 1 – Function depends on the context. The text in the lower left corner of the LCD display indicates the function
4	Soft key 2 – Function depends on the context. The text in the lower right corner of the LCD display indicates the function
5	Up – <ul style="list-style-type: none"> • Scrolls up through a menu or list displayed in the center of the LCD display. • Increments a value up if a parameter is selected. • Increments the reference value up if the upper right corner is highlighted. Holding the key down changes the value faster.
6	Down – <ul style="list-style-type: none"> • Scrolls down through a menu or list displayed in the center of the LCD display. • Increments a value down if a parameter is selected. • Increments the reference value down if the upper right corner is highlighted. Holding the key down changes the value faster.
7	LOC/REM – Changes between Local and Remote control of the drive
8	Help – Displays context sensitive information when the key is pressed.
9	STOP – Stops the drive in Local or Remote mode.
10	START – Starts the drive in Local or Remote mode.



ALARM CODES:

ALARM 2001 – Overcurrent

- Drive detected an overcurrent situation
 - Check Motor load
 - Check acceleration time
 - Check motor and motor cable (including phasing)

ALARM 2002 – Overvoltage

- Drive detected an overvoltage situation
 - Check input power line for static or transient overvoltage

ALARM 2003 – Undervoltage

- Drive detected an undervoltage situation
 - Check input power supply

ALARM 2006 – AI1 Loss

- Analog input AI1 signal (Pressure transducer) has fallen below limit defined by parameter
 - Check pressure transducer connections
 - Check pressure transducer output reading vs inline pressure gauge

ALARM 2008 – Panel Loss

- Control panel has ceased communicating
 - Check Panel connection
 - Check control panel connector (ethernet cable)
 - Check group 10 START/STOP/DIR Settings

ALARM 2010 – Motor Temp

- Motor temp is too high (or appears to be too high) due to excessive load, insufficient motor power or inadequate cooling.
 - Check motor ratings, load and cooling

ALARM 2018 – PID SLEEP

- Sleep function has entered sleeping mode
 - ***ALARM 2018 - PID SLEEP is normal and means that the system has reached maximum pressure and has sustained that pressure for 30 seconds without any water demand.***

FAULT CODES:

FAULT 0001 – Overcurrent

- Output current has exceeded trip level
 - Check motor load
 - Check motor and motor cable (including phasing)

FAULT 0002 – DC Overvolt

- Excessive intermediate circuit DC voltage. DC overvoltage trip limit is 420v for 200v drives and 840v for 400v drives.
 - Check input power line for static or transient overvoltage.

FAULT 0006 – DC Undervolt

- Intermediate circuit DC voltage is not sufficient.
 - Check input power voltage.
 - Check for missing input power phase.
 - Check fuses.

FAULT 0007 – AI1 Loss

- Analog input AI1 signal (Pressure transducer) has fallen below limit defined by parameter.
 - Check pressure transducer connections.
 - Check pressure transducer output reading vs inline pressure gauge.

FAULT 0009 – Motor Overtemp

- VFD Motor temp is too high (or appears to be too high) due to excessive load, insufficient motor power or inadequate cooling.
 - Check motor ratings, load and cooling

FAULT 0010 – Panel Loss

- Control panel has ceased communicating
 - Check Panel connection
 - Check control panel connector (ethernet cable)
 - Check group 10 START/STOP/DIR Settings

FAULT 0014 – EXT FAULT 1

- Safety flow switch has triggered ext fault 1. The flow switch is an optional safety feature available on the VVF systems, it sends the drive into a fault when the pump continues to run with no water flow for 90 seconds. This is to prevent the pump from overheating.
 - Check flow switch micro switch for damage.
 - Check pump inlet check valve for obstruction (if water can flow back to storage tank pump will not hold pressure and continue to run with no flow on outlet side)
- ****NOTE: The Safety Flow Switch has a built-in auto-restart and will try to reset itself 3 times before going into a "Hard Fault" and shutting down the system.***

FAULT 0016 – Earth Fault

- Drive has Detected earth (ground) fault in motor or motor cable.
 - Check motor.
 - Check Motor cable.
 - Check ground.



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