



# VFD Marksman Troubleshooting Guide

Refer to the manual for full error messages & troubleshooting.



**DANGER**

Marksman operates with high voltage which can cause injury or death.

## “Marksman stops and shows No Flow Error or VFD error code”

1. Follow high rate troubleshooting steps below.
2. Check to see if the drive is currently faulted or receives a fault while trying to run. Faults can be reset by cycling power or by hitting STOP/RESET button on the drive. The following are common faults and causes:
  - A. E04 - Overcurrent - The load on the drive is too high. Make sure the pump is free to turn and operating pressure is in operating range. This can be done by removing the 4 bolts from the pump, and threading them into the threaded holes in the pump casting to separate the pump and motor. Tighten the bolts in a star pattern so the motor shaft is not bent.
  - B. E05 - Overload - The load is causing a thermal trip. High load for long periods of time can cause this.
  - C. E07\* - Overvoltage - The incoming voltage is too high (>520 VAC) or the drive saw a spike in voltage.
  - D. E09\* - Undervoltage - The incoming voltage is too low (<440 VAC) or the drive saw a dip in voltage.

\*Use a voltmeter and extreme caution to check the voltage at the panel and across the VFD to ensure there is not a problem with the incoming voltage. Contact SureFire Ag Support for E07 error using a Roto-Phase.

## “Marksman won’t build pressure”

1. Typically the pump not building pressure can be attributed to two things. The pump is not primed, or there is an issue internal to the pump with a check valve or diaphragm. Follow the high rate troubleshooting steps below to help diagnose the problem.

## “Marksman won’t achieve high rate” (High Rate Troubleshooting)

1. Make sure the VFD is showing 60-65 Hz, commanding the motor to run full speed. Feel the pump and motor to see if you can feel vibration indicating the pump is running.
2. Check for obstructions in the injection device, plugged strainers, closed valves. Tighten all hose clamps on inlet side of the pump! If the hose clamp is stripped, replace with new. Commonly high rate can induce an air leak causing high end rate fluctuation.
3. The inlet and outlet hose conditions can cause pressure loss in the system at high rates or with high viscosity products. Higher system pressure can lead to reduced upper end flow, or cause the system to go into pressure relief. Remove the outlet hose from the injection point and check open flow, is the pressure less than 5-10 psi? If not, shorten or increase the size of the outlet hose to reduce pressure loss.
4. If the Chem Pressure is at or near 100psi, the system may be relieving excess pressure. Squeeze the hose between the PRV valve and inlet hose. The proper setpoint of the PRV is one full turn out from closed in order to set the relief at approximately 125psi with water.
5. Open the oil cap and examine the oil. Is the oil cloudy, indicating a diaphragm tear?
6. Make sure the fluid end and oil side of the pump are fully primed. You can check prime by using manual mode and running the pump through the full range of flow (10-100% in 10% intervals) into a 5 gallon bucket and check for bubbles (entrained air). Tighten hose clamps and/or run until you no longer see bubbles in the bucket.

## “Marksman won’t achieve low rate, rate is fluctuating” (Low Rate Troubleshooting)

Any application under 20 GPH is considered low rate and may require some fine tuning at startup.

1. Rarely are low rate issues plumbing related, but there are a few things to check first. A smaller ID tube is recommended for low rates as hose can expand and act as a spring, making the system difficult to control.
2. Run the pump in manual mode to ensure the unit is capable of a steady flow, such as air in the system, flow restrictions, etc.
3. Prior to adjusting PID settings, read the portion in the manual regarding PID settings in entirety. Check to see if the pump/motor is completely stopping. If so, the MIN PWM setting may need to be adjusted up. The motor could be slowing down too much and stalling out. This causes the flow to stop completely and the control loop to ramp up quickly, overshooting. This will cause a see-saw effect on rate. If this isn’t the case, jump to step 5.
4. If the MIN PWM cannot be adjusted low enough to hit the rate and keep the pump from stalling, the drive may need to be put into a “Sensorless Vector” mode, [contact support for this](#).
5. If the motor isn’t stalling but rate is fluctuating, adjust the INTERVAL to 0.4-1.0 and DEADBAND to 15-25%.

## “Marksman pumped more/less than my tank shows”

The SureFire flowmeter should measure with less than 1% error (as low as 0.5%) with proper calibration done by a careful catch test.

### Catch Test

1. Use accurate measuring containers with significant enough volume to reduce % error. Calibration using larger volumetric containers will result in more accurate field results.
2. Time the test closely. The longer the test runs, the better the accuracy will be.
3. Compare the actual amount caught with the volume indicated by the display. The total volume can be reset before starting on the “Totalizers” page
4. Adjust the flow calibration number as needed.

**Increase** the flow calibration number if **not enough** product is actually being applied.

**Decrease** the flow calibration number if **too much** product is actually being applied.

### Flow Calibration Adjustment Formula

Formula: (Controller Gallons X Controller Flow Cal)/Actual Gallons Caught = New Flow Meter Cal

Example: (1 Gal Batch X 22710 Flow Cal)/.93 Gal Caught = 24419 New Flow Cal

