CS-APC-2

Bulletin No.: CS-APC-2-ERROR-45

Subject: ERROR 45 Trouble-shooting Flow Chart

Background

Error 45 occurs. This error can occur on the onboard syringe of the 215 liquid handler or the right-hand syringe of the 402 syringe pump but the trouble shooting process is the same for both units as the hardware is the same. There is however a difference in the commands that are required to drive the syringes, and this is important if the Gilson Utilities program is used to send commands to the pump. A syringe overload condition can have a variety of causes and only some of them actually cause the syringe drive to be overloaded.

Resolution

A number of issues can cause a syringe overload. Use the Syringe Overload Trouble-shooting Flow Chart on the next page to track down the source of the issue. Additionally, the trouble-shooting chart includes issue resolution instructions.

Possible causes are as follows:

1. A flow restriction in the solvent delivery system -This causes a genuine overload condition.
2. A tight syringe plunger –Some solvents cause the syringe plunger seal to swell, and it becomes much more difficult to move the syringe plunger up and down –This also causes a genuine overload condition.
3. One or more slots of the slotted encoder wheel at the base of the ball screw of the drive have become contaminated with debris that is blocking the light from the optical sensor from passing through the slot –this causes an overload message to be generated but it is not actually a genuine overload condition.
4. The optical sensor has become contaminated to the extent that the transmitted light beam in the sensor is either blocked completely or two weak to detect the slots in the encoder wheel when it turns –this causes an overload message to be generated but it is not actually an overload condition.
5. Either the transmitter or receiver of the optical sensor has failed, and the optical sensor no longer transmits voltage pulses in response to a moving encoder wheel -this causes an overload message to be generated but is not actually an overload condition.
6. The Motor drive board has failed –this will result in a syringe overload message and most often the drive board fails as a result of a genuine overload condition that has remained unresolved while several attempt have been made to initialize the syringe. In a genuine overload condition maximum power is applied to the motor for a short time until the fault is detected. This caused a high current to pass through the power transistors of the control board, and they get hot. If repeated attempts are made to initialize the syringe drive when it is genuinely overloaded, then the transistors on the drive get too hot and one or more of them fail. they fail.

Syringe Over-load Trouble-shooting Chart

Error 45 – Syringe Overload

Re-initialize the syringe

Did the syringe initialize without repeating the error

Yes

1. Check for flow restrictions in the fluid path and rectify any problems that are found.
2. Check the resistance of the syringe plunger to movement in both directions. Replace the syringe if the resistance movement is abnormally high.
3. Resume normal operation after problems have been resolved.

No

Remove the syringe and valve assembly from the pump and re-initialize the pump

Did the syringe initialize without repeating the error

Yes

Reinstall the syringe and valve assembly

No

There could be dirt or fluff on the encoder wheel and or optical sensor that is preventing the generation of encoder pulses.

1. Power down the pump.
2. Carefully remove the drive from its housing.
3. Blow compressed air or nitrogen over the encoder wheel and toward the optical sensor from just underneath the dust cover. (The compressed gas should blow any dirt or fluff from the encoder wheel and sensor).
4. Replace the drive in its housing.
5. Power up the pump and re-initialize the syringe.

Did the syringe initialize without repeating the error

Yes

1. Reinstall the syringe and valve assembly
2. Resume normal operation of the system.

No

The motor control board driving the syringe has possibly failed and will need to be replaced.

1. Carefully remove the drive from its housing.
2. Note the position of all cables that connect to the drive board and then remove them.
3. Remove the two screws that hold the control board to the drive frame.
4. Remove the dual control board and note the orientation of the board and the DIP switch settings of each circuit (upper and lower).
5. Set the DIP switch settings on the new board to match the settings on the board that is being replaced.
6. Install the board with the same orientation as the one that is being replaced.
7. Re-install all cables into the sockets in the same position from which they were originally removed.
8. Re-install the drive into its housing.
9. Power up the pump and re-initialize the syringe.

Did the syringe initialize without repeating the error

No

Replace the optical Sensor

Yes