CS-APC-2

Bulletin No.: CS-APC-2-S001

Subject: ERROR 35 Cause and Repair

Background

Error 35 occurs. The opto board has either failed or could have been contaminated with oil. The black plastic unit is a “Slotted optical switch” and contains a light source (LED) on one side (S) and a detector on the other. If contaminated with oil, the oil will prevent the light from reaching the detector.

Optical Detector PCB

Issue

Fluid contaminants pooling at the base of the syringe housing will eventually lead to the contamination of the opto-detector PCB and cause a syringe drive error. The error will be reported either as error “25 – Syringe Pump Stall” or error “35 – Missing Syringe Pump Encoder” and typically requires the replacement of the opto-detector PCB to restore drive functionality. If the opto-detector board has only been contaminated with oil it is often possible to clean the surface of the black slotted opto-switch on the PCB and restore the required level of optical sensitivity. To clean the opto-switch it should be sprayed with heptane and wiped with a tissue and must never be submerged in the solvent.

To remove the optical Detector PCB

1. Remove the power and communication cables from the back of the unit.
2. Remove the power cable from the back of the solenoid valve mounted on the top of the dilutor.
3. Remove the delivery tube from the inlet port of the laser sensor.
4. Remove the delivery tubes from the three ports of the solenoid valve.
5. Remove the laser sensor from the mounting on the 402 dilutor and put it to one side.
6. Remove the swing arm from the column of the laser mounting.
7. Remove the mounting screws from the valve heads and undo the thumb screw that secures the syringe to the drive.
8. Remove the syringe and valves from the front panel of the dilutor.
9. Lay the Dilutor on its side and remove the four screws that secure the cover to the dilutor frame.
10. With the dilutor in its upright position pull the cover outwards and upwards from its base to remove it.
11. Remove the two screws from the top of the panel of the faulty drive to release it from the dilutor’s frame
12. Unplug the flat ribbon cable (pink and white one) from the two sockets on the control board. This step can be delayed until later if it is difficult to access the cable on both sides of the drive board.
13. Pull the drive slightly forward from the top so that is pivots about it base and then slightly upwards to release the base,
14. When the base is free pivot the base out until the PC board at the back of the drive clears the housing then lower the drive again to provide clearance for the valve drive components and remove the drive completely from its housing. It may be necessary to push some of the cabling inwards if it does not clear the sides of the housing when the drive is being removed.
15. If the flat ribbon cable (pink and white one) was not removed earlier it will need to be removed now to completely free the drive. The ribbon cable has multiple connections to provides power and data lines to both the valve and syringe motors of both drives in the pump.
16. Un secure the control board by removing the top and bottom screws that secure it to the drives frame.
17. Without removing any more cables push from the drive board move it to one side to gain access to the optical sensor board.
18. Remove the top screw and nut from the top of the opto-detector board that holds the dust cover and then remove the standoff from the bottom of the board to free it from its mounting.
19. Unplug the ribbon cable and plug it into the new replacement board.
20. Reverse steps 19 to 1 to reinstall everything and then test the pump.

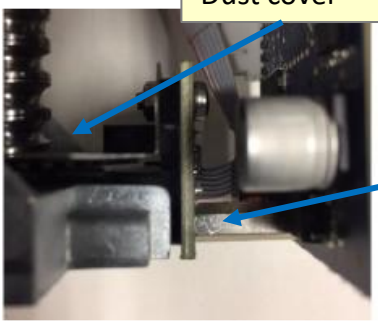
To remove the optical Detector PCB

The optical detector PCB is located on the drive as shown. The PCB is mounted to the drive frame with the stand-off that provides the mounting for the motor drive board. It is also mounted to the metal dust cover plate that protects the encoder wheel.

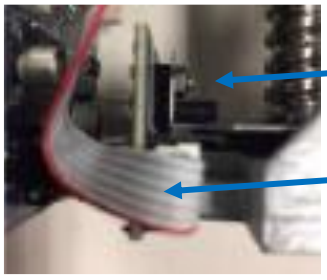
Mounting Screws For the Motor Control PCB

1. Remove the two mounting screws for the Motor control board.
2. The motor control board can be moved sideways with all the cables still plugged in to gain access to the optical detector circuit board, or the cables can be unplugged from the control board so it can be removed completely out of the way. (Note where the cable plug in if the board is completely removed so they can be put back in the correct sockets).
3. Unplug the grey ribbon cable from the optical sensor PCB.
4. Remove the screw and nut that holds the metal dust plate to the optical detector board.
5. Remove the standoff to completely free the board from the drive
6. Spray heptane on both the source and detector surfaces of the inside of the slotted optical switch and then plow with clean air to dry.
7. Re-install the PCB and test the drive.
8. If cleaning fails then replace the PCB.

Dust cover



Stand-off



Screw & nut

Cable