

# Application Note: Magnetic Retrieval Tools and ETC Sensors

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## Background

Magnetic retrieval tools are used to retrieve broken plunger pieces from a plunger lift well during site maintenance. These tools can have a negative effect on the operation of ETC plunger arrival sensors. This app note describes these issues and some solutions.

## Lubricator Magnetization

Steel can be magnetized by being near or in contact with a strong magnet. When using a magnetic retrieval tool, the tool can cause a steel lubricator to become magnetized. If the magnetic field is strong enough, this can negatively affect ETC plunger arrival sensors (Cyclops, Sasquatch and Hawkeye).

A common symptom of this issue is the plunger arrival sensor will 'close' the switch (indicating a plunger arrival) and then never 'open' the switch to indicate the plunger departure. This behavior can occur immediately after the sensor is powered and regardless of if the plunger is at surface or not.

## Solution 1 – Update Firmware:

The recommended solution is to update the product firmware. The following table lists the recommended version for each product:

Product	Minimum Firmware Version
Cyclops	5.0.0
Sasquatch	TBD

Instructions for updating the firmware on these products are in this YouTube video: [ETC Cyclops Programming Tutorial](#)

## Solution 2 – Demagnetize Lubricator:

The lubricator can be demagnetized by rubbing a magnet on the outside of the lubricator. This solution is temporary and will likely have to be repeated each time a magnetic retrieval tool is used with that lubricator.

A magnet of sufficient strength needs to be used to demagnetize the lubricator. In general, the strength of the magnet needs to be close to the strength of the retrieval tool that magnetized the lubricator. If

the magnetic retrieval tool is available, that can be used as the magnet.

To demagnetize the lubricator the magnet should be rubbed in a horizontal direction across the outside of the lubricator. This assumes that the magnetic field is vertically oriented due to the magnetic retrieval tool travelling up and down in the lubricator.

In order to determine if the lubricator has been demagnetized here are some options:

**Option 1 – Monitor the SIG pin**

Using the connected PLC or a multimeter, monitor the state of the SIG pin. If the SIG pin of the sensor is 'closed' due to the magnetization, you can use the transition to 'open' to decide if the lubricator has been demagnetized. After demagnetizing, the sensor should be checked to ensure the SIG pin transitions correctly when the plunger or a piece of steel passes close to the sensor.

**Option 2 – Use a steel screw or filing**

If a small steel screw initially sticks to the lubricator due to the magnetization, rub the magnet against the lubricator until the screw no longer sticks. As the magnetization level of the lubricator may be quite low, only small screws or metal filings may stick initially.

**Option 3 – Use Vision connected to a plunger arrival sensor to visualize the magnetic field.**

The plunger arrival sensor should be configured in **Full Debug** mode. This method will display the sensor readings so one can visualize the effects of the lubricator demagnetization. Once the lubricator has been demagnetized the sensor should be configured for **Normal** mode of operation.