



VT-0036

003

5/15

EWK

LNG Vehicle Fuel Switch Low Temperature Protection Circuit

Overview

Chart Inc. has developed a low temperature switch kit (Chart 14636472). The switch can be integrated into a low temperature (LT) protection circuit. The LT circuit is required by law in certain cryogenic fuel delivery systems. In a properly designed system it can protect the system and engine components downstream of the heat exchanger from cryogenic temperatures.

Most engine sensors and components in the gas phase portion of the fuel system are not designed for -260°F (-162°C) cryogenic fuel. The switch will activate a ground circuit if temperatures below -4°F (-20°C) are encountered at the sensor lead.

The switch can be used to operate a warning lamp / buzzer in the driver's compartment or it can be wired into an on-vehicle control module to turn on a warning lamp or the ECM for engine protection.

It is very important that the driver understand he must safely pull the truck to the side of the road and shut it down to prevent severe engine. A trained technician should evaluate the fuel system to determine the cause of the alarm.

Parts

The Chart part numbers for the components are:

- temperature switch – 11732240
- light/buzzer – 20768642
- sticker/label – low fuel temp - 20837109
- male Weather Pack – 10692101
- attaching screw – 14636464

Depending on the installation and wiring arrangement other items (wiring, connectors, etc.) may need to be purchased separately.

Identification

The switch is comprised of a gray sealed box which houses the electronic circuit board, a sensor lead and a wire harness (see photo 1). The box and leads are not serviceable.

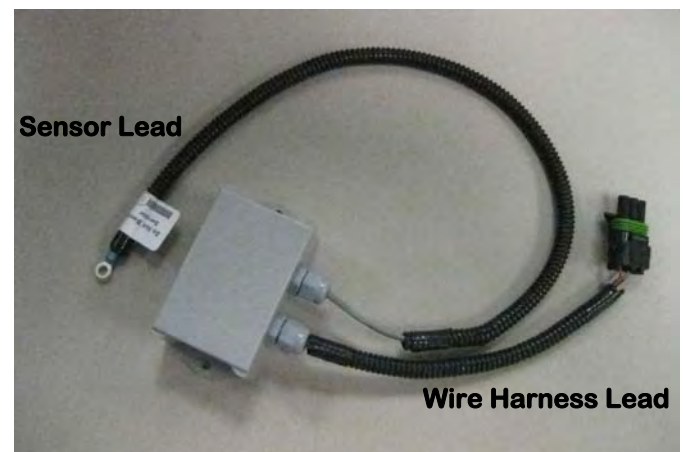


Photo 1

Operation

The sensor lead will continuously monitor the temperature present at its ring terminal (see photo 2).

This procedure is for use by trained technicians with experience on systems using LNG. Review all applicable safety documents before beginning this procedure.



VT-0036

003

5/15

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Photo 2

Having the ring terminal mounted on the shut off solenoid valve will ensure it can sense the temperature of the gas or liquid flowing through the solenoid valve. The wire harness lead contains three wires with a three pin Weather Pack (WP) connector (see photo 3).



Photo 3

The red wire (WP "A" terminal) is for a 10-30 VDC supply voltage.

The black wire (WP "C" terminal) is wired to chassis ground.

The green wire (WP "B" terminal) is a signal wire.

It is normally open and will complete a path to ground when a low temperature occurrence is detected at the sensor. The low temperature set point is -20°C (-4°F) at which time the switch will close the loop to ground on the green wire the switch has a built in cold temperature start feature which will delay the closing of the ground loop during cold ambient temperatures. This will allow the engine to warm up prior to signaling a false cold fuel condition during cold ambient temperatures

Installation

An electric fuel shut off solenoid and valve (SOV) assembly should always be mounted at the outlet of the heat exchanger (HE). The shut off solenoid has bolts which hold the body together. The sensor lead ring terminal will need to be connected to one of the housing bolts on the shut off valve (SOV). This will allow it to monitor the temperature of the gas or liquid flowing thru the SOV.

The switch circuitry is enclosed in a sealed box and the box will be mounted in close proximity to the gas (outlet) end of the HE and SOV. Do not allow the box or leads to be subjected to extreme heat (above 150°F) or cold (below -20°F) temperatures. If heat sources (exhaust, coolant or hydraulic lines, etc.) are present within the immediate area, the box must be shielded from the heat source.

The harness lead contains three wires. A ("A") 10 – 30 VDC supply voltage should be connected to the red wire. This wire must be

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003

5/15

EWK

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connected to an ignition switched source and contain an ATC fuse holder with a 1 amp ATC fuse. The fuse holder and fuse assembly will be located in a weather protected compartment such as the cab of the truck. A sealed type terminal must be used (see photo 4).



Photo 4

The black wire ("C") will connect to a common chassis ground source.

A warning lamp must be installed in a visible location in the driver's compartment. Chart will supply the light (photo 5) which has an integral buzzer (Chart 20768642). It will flash/sound on an intermittent basis when activated. The light should be bright enough so that it can be easily recognized during sunny daylight conditions. The buzzer will also draw driver attention to the alarm.

A sticker/label (Chart 20837109) is also include to be placed by the light on the dash.



The light must also have an identification decal which will advise the driver to shut down the vehicle if the alarm is sounding (photo 6).



The light/buzzer should be wired into the same 10-30 VDC source as the box (terminal "A") and will also be ignition switched and fuse protected. The green wire ("B") will be run into the driver's compartment and will be connected to the ground side of the light/buzzer. The light will

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VT-0036

003

5/15

EWK

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have voltage supplied to it when the ignition switch is ON and will illuminate only when it receives the ground signal from the gray box (green wire).

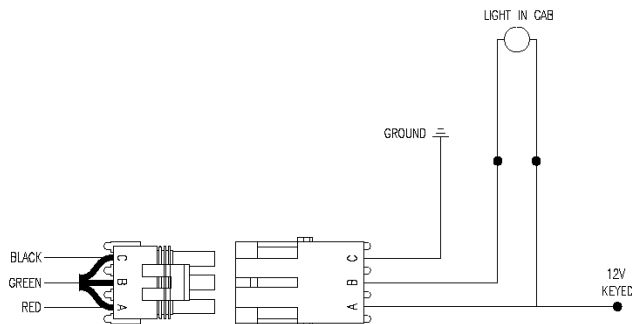


Photo 7

All three wires (red, green and black) should run together into the cab and be insulated by wire loom and secured via zip ties or run through existing wire harness security clamps.

System Testing

When the system is completely installed it can be tested for accuracy and operation. The system must be tested with LNG in the vehicle's tank and the tank system pressure at the economizer set point.

It is also best to perform the test with the engine coolant and heat exchanger at around ambient temperature.

- Ensure the vehicle's parking brakes are set and wheels are chocked.
- With the key on and the engine not running open the bleed valve at the engine fuel filter. This will allow fuel to

flow from the tank and thru the heat exchanger.

- While fuel will be flowing thru the heat exchanger, engine coolant will not be flowing. The heat exchanger outlet and shut off solenoid will get colder and start to frost up the longer flow occurs.
- Use an infrared temperature gun to monitor the temperature of the solenoid body at the sensor lead terminal while an assistant (if necessary) monitors the light operation.
- The light/buzzer should come activate when the solenoid body has reached a temperature of -20°C (-4°F).
- If the test is successful, close the bleed screw, allow the solenoid valve to defrost before turning off the ignition.
- The vehicle can then be returned to normal operation.

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