Installation guidelines

Introduction

The FTi FT-009399 High DP Shut Down system has been designed to allow simple and fast installation on to vehicles incorporating PLC and non-PLC differential pressure monitoring and dead man control systems. It is fully pneumatic in operation and, therefore, requires no electrical interface with the existing vehicle. Also, the FT-009399 system does not require the existing vehicle mounted differential pressure gauge (Gammon, Schulz or other) to provide a signal output for high differential pressure but instead derives this signal from a stand-alone differential pressure switch.

The system comprises of two basic circuits. These are:

1. Fuel sensed differential pressure switching system
2. Pneumatic control / deadman interface system

The system can be supplied with main components only or with a full installation kit (FT-009576).

Installation instructions

Please ensure that all local guidelines with regard to PPE and hot working are adhered to prior to the commencement of any installation work.

Fuel sensed differential pressure switching system

(Please refer to system schematic diagram FT-009399 with lines shown in yellow)

Parts required

1. FT-009381  Differential pressure switch  1-off (item 1)
2. MTL6L-ST.ST  Tee compression fitting St.St  2-off (item 5)
3. FT-00009539  Connection hoses 6mm x 1m  2-off (item 8)
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4. MMC6/4-ST.ST Stud coupling fitting 6mm x ¼"BSPPM 2-off (item 6)
5. KBD-04 Seal bonded ¼"BSPP 1-off (item 7)
6. FT-009656 Seal bonded ½"BSPP (modified) 1-off (item 7a)

Securely mount the fuel sensed differential pressure switch in a convenient and preferably sheltered position adjacent to or close by the vehicle’s existing differential pressure gauge using the mounting bracket supplied with the pressure switch. The distance from the gauge to the switch should be close enough to ensure that the two 6mm flexible hoses can be correctly routed and connected.

Incorporate the two 6mm equal tee pieces into the existing differential pressure gauge supply pipe work. The tee pieces should, where possible, be mounted on the DP gauge side of any gauge isolating valves as this will negate any requirement to drain the fuel out from part of the vehicle. Approximately 24mm of pipe will need to be removed from each gauge line to accommodate the new tee piece.

Install a 6mm x 1.4"BSPPM male stud coupling and bonded seal into each of the high and low pressure ports on the circular body of the differential pressure switch body and tighten as required. The modified bonded seal (FT-009656 – item 7a) is to be installed on the low pressure tapping of the differential pressure switch.

Install the two 6mm 1mtr long braided stainless steel supply hoses between the differential pressure switch and the two tee fittings installed in the differential pressure gauge supply pipe work. Ensure that the hose from the high pressure (HP) side of the differential pressure gauge is connected to the high pressure port on the differential pressure switch body and likewise the low pressure (LP) hose to the differential pressure switch body. The high and low pressure ports on the differential switch body are clearly identified (high / low). Tighten all compression joints. Open the gauge line isolating valves if fitted and/or re-prime the fuelling system and check for leaks.
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Pneumatic control / deadman interface system

(Please refer to system schematic diagram FT-009399 with lines shown in purple).

Parts required

6. FT-009402 Control Box Module 1-off (item 2)
7. 338-035 Pilot valve 3/2 x 1/8"BSPP 1-off (item 3)
8. AR2000-02 Regulator ¼" BSPP 1-off (item 15)
9. G50-10B Pressure gauge 1-off (item 16)
10. A-6510-06-1/4 Air fitting 6mm x ¼" 2-off (item 11)
11. A-6510-06-1/8 Air fitting 6mm x 1/8" 5-off (item 10)
12. A-2901-1/8 Diffuser 1/8" 2-off (item 13)
13. A-6560-06 Y piece connector 1-off (item 12)
14. MNF6-4BL Nylon tube black 6mm 6 metres (item 14)

Securely mount the control box module in a convenient location at the vehicle control station (bespoke mounting brackets can be manufactured to suit customer supplied dimensions).

Install two A-6510-06-1/8" air fittings into the differential pressure switch (FT-009381) at ports 1 and 2. Install a single A-2901-1/8" diffuser fitting into the remaining port (port 3).
Install three A-6510-06-1/8" air fittings into the pilot valve (338-035) at ports one, two and pilot. Install a single A-2901-1/8 diffuser fitting into the remaining port (port 3).

Install two A-6510-06-1/4 air fittings into the AR2000-02 air regulator. Install G50-10B pressure gauge into same.
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Identify a suitable protected air supply on the vehicle and pipe to the inlet side of the air regulator (the flow direction for the air through the regulator is clearly marked on the regulator body). From the air regulator, pipe to the air inlet connection (max 8 bar – air supply in) on the control box module. From the same supply line using the A-6560-06 Y piece connector, pipe an air supply to the differential pressure switch at port one. From port two on the differential pressure switch, pipe to the "switched supply" on the base of the control box module.

Identify a suitable point within the vehicle's existing dead man pneumatic system and install the pilot valve. This point should ideally be located immediately upstream of the dead man system as shown on the schematic diagram. Install the pilot valve as indicated with the dead man supply entering at port one and on to the existing system via port two. Pipe the air signal pilot supply from the pilot valve into the "air supply out" connection of the control box module.

This completes the installation of the system.
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Commissioning the system

Fuel system
Pressurise the fuelling system and check for any sign of leaks at the new connections made with the existing fuelling system and rectify as required.

Pneumatic system
Open the air regulator by turning the regulator thumb wheel in a clockwise direction until 7 bar (approximately 100 psi) is indicated on the pressure gauge. Lock the regulator in this position by pushing the thumb wheel down until it is locked. Check for any air leaks in the new system and rectify as required.

At the control box module, the indicators should be as follows:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>High differential pressure</td>
<td>Green</td>
</tr>
<tr>
<td>System reset when green</td>
<td>Red</td>
</tr>
<tr>
<td>System overridden when yellow</td>
<td>Black</td>
</tr>
</tbody>
</table>

In the following state, the existing dead man system should be inoperative.

Setting the system
Insert the key into the “System Shut Down Reset” control and rotate clockwise. Hold in the operated position until the “system reset when Green” indicator has changed from red to green. Release the control and remove the key. The system is now set for operation and the existing dead man system should now been enabled. The reset indicator should stay green until the system is triggered by a high DP. Should the air system pressure decay to zero during prolonged periods of no operation, the reset indicator will revert to the red condition but will return to green again once the air system has been recharged.

Testing the Shut down system
Following the operators in house procedures for carrying out a full scale deflection test of the existing differential pressure gauge, operate the vehicle to induce a 22 psi differential across the filter/Differential pressure gauge. When 22 psi is reached the shut down system will trigger and terminate dead man control and thus fuel flow. Once triggered, the indicators on the control box module will revert to the following:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>High differential pressure</td>
<td>Red (momentarily whilst 22 psi is applied)</td>
</tr>
<tr>
<td>System reset when green</td>
<td>Red</td>
</tr>
<tr>
<td>System overridden when yellow</td>
<td>Black</td>
</tr>
</tbody>
</table>

Once triggered, the vehicle dead man system can only be re-instated by using the key operated reset control on the control box module. However, it is first recommended that the root cause of the high differential pressure is first investigated and resolved.
Override facility
The high differential pressure shut down system can be overridden for the purposes of carrying out differential pressure gauge piston free movement tests by the following means.

1. Insert the key into the Shut down system override on/off control and turn to the on position. The override indicator will turn from black to yellow indicating that the system is now overridden.

2. To turn off the override function, turn the key switch back to the off position and remove the key. The pneumatic indicator must return to the black position.