Technical Bulletin

Issue No: TB201901

Subject: **PEFS Pressure monitoring switch position change - LOP**

Product: PEFS, PEFS F3 and PEFS C6 LOP systems

Parts: 137060 (1550kPa pressure switch) and 87042 (1200kPa pressure switch)

Existing PEFS design criteria

In relation to pressure monitoring switch locations in a PEFS system;

In single or multiple cylinder LOP systems, the low pressure monitoring switch can either be installed;

- in a cylinder valve or
- in the actuation system

The best location for the switch is usually determined during the installation based on a number of factors that include; consideration for ease of access and serviceability of the component.

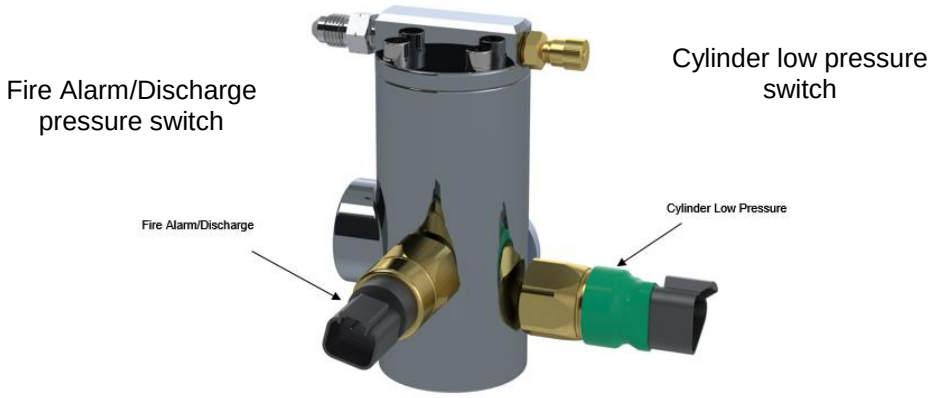


Figure 1.

Change required

- **New installations** - Pressure switch must be installed in the actuation system.

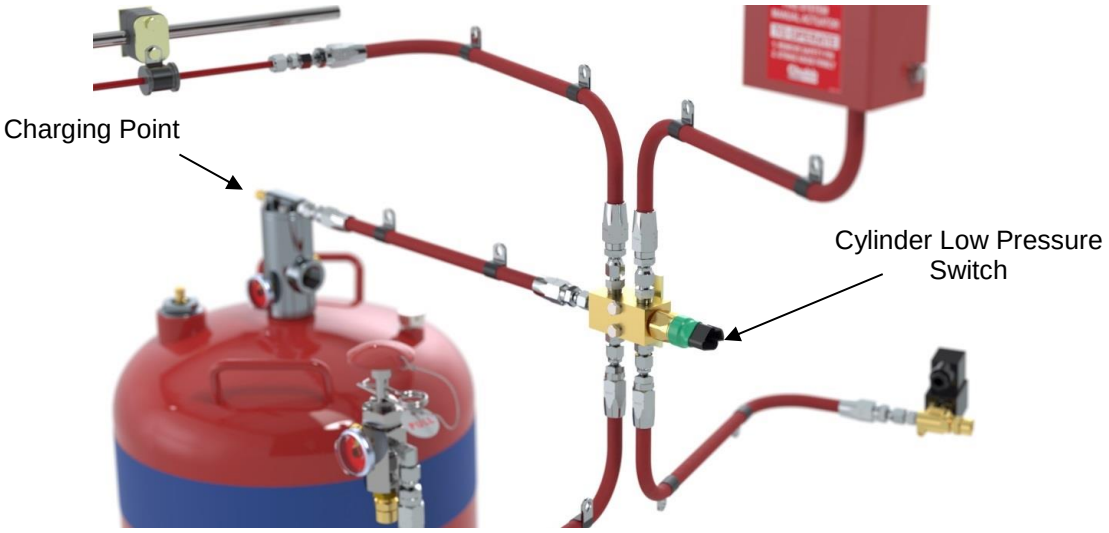
  The switch can be installed in any part of the actuation system but for practical purposes the best locations are in components that already have an available 1/8" NPT port:

  Option 1: Actuation system (manifold block);

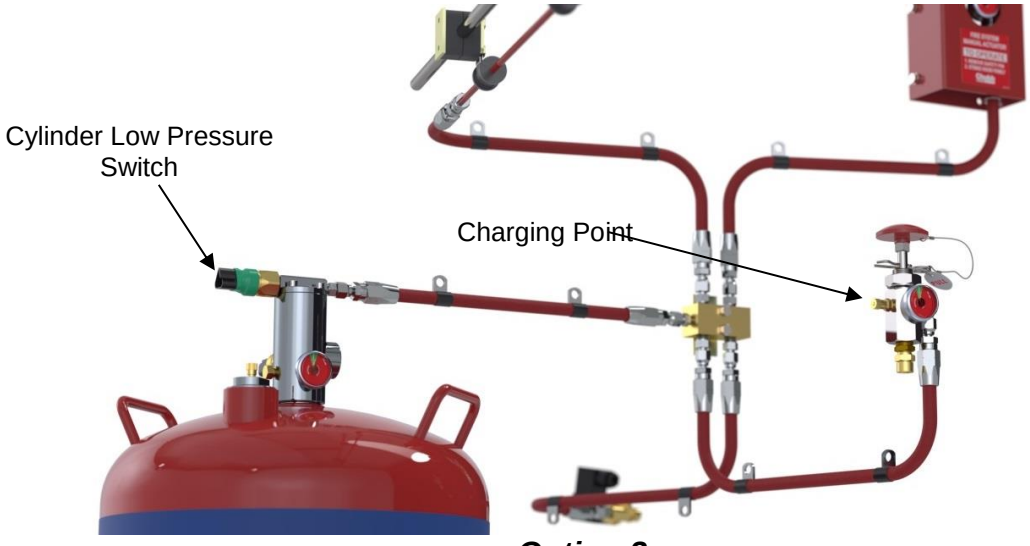
  ***Option 2*:** Pressurising port in the LOP Valve (but only if a second port is available to charge the system), or;

  Option 3: Pressuring port in the LOP Manual Actuator

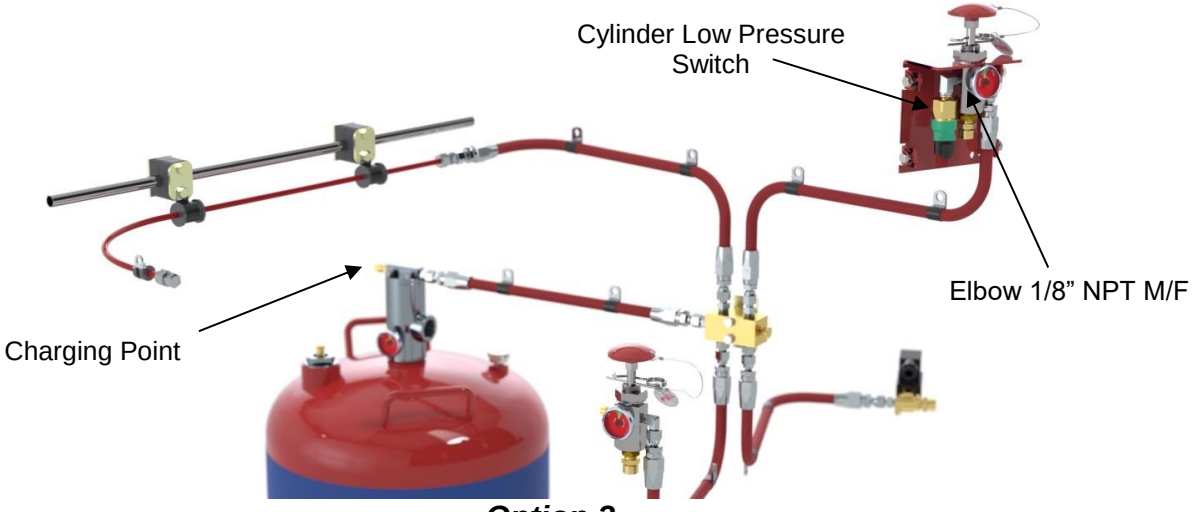
Note: *Refer images on the next page for further clarification.*



Option 1



Option 2



Option 3

- **Existing installations** – Any cylinder low pressure switch that is located in a LOP valve should be moved to the LOP valve pressurising port (Option 2 above) but only if a second charging port is available to pressurise the system.

  When: At the next annual service or as requested by a system owner.

  If the switch is unable to be installed in the LOP valve pressuring port it will need to be installed elsewhere in the actuation system – refer to Options 1 & 3 above.

Reason for change

An issue with the cylinder low pressure switch was identified during a service call where a pressure leak developed in one of the cylinders of a multiple cylinder installation and the pressure switch that was located in the adjacent cylinder valve did not activate when expected.

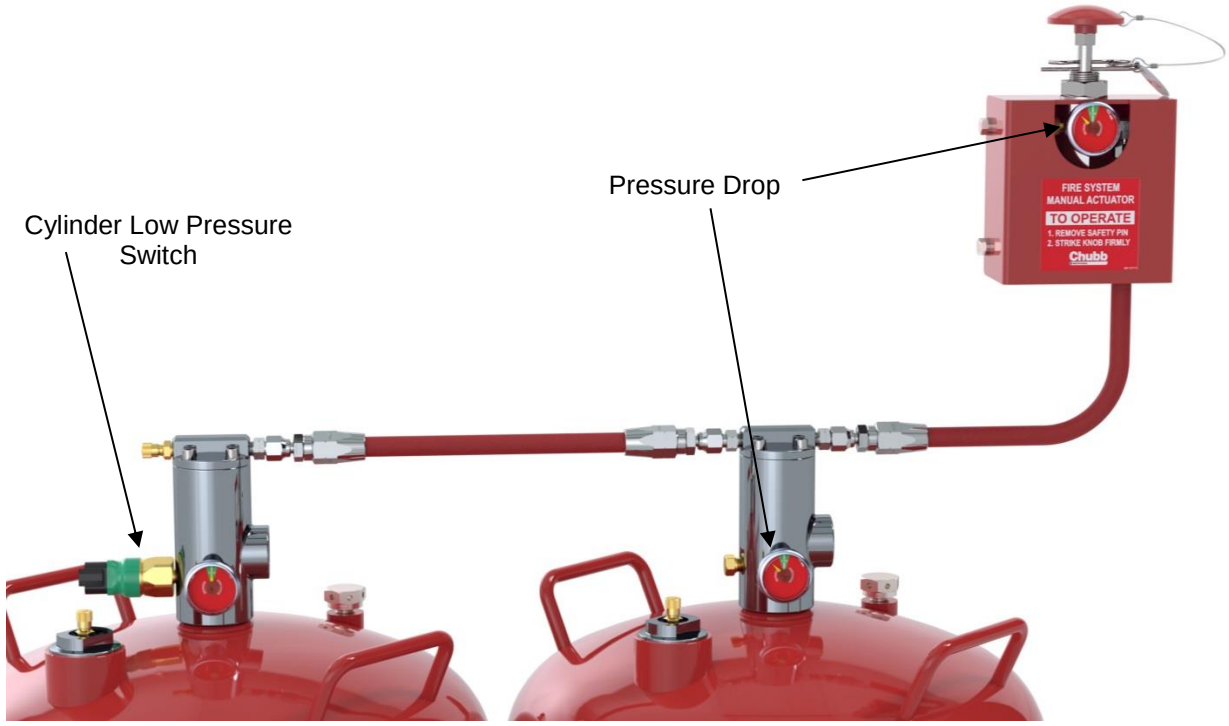


Figure 2

Each LOP valve has a floating check valve inside the piston assembly (Refer Figure 3). The intent of this floating check valve is to allow pressure to pass between the cylinders and the actuation system to account for small pressure changes due to temperature variations and minute leaks. Minute leaks occur due to the small molecular size of nitrogen (propellant) which can permeate through rubber seals and hose over long periods of time.

In a normal charged state there should be equal pressure in the cylinders and actuation network.

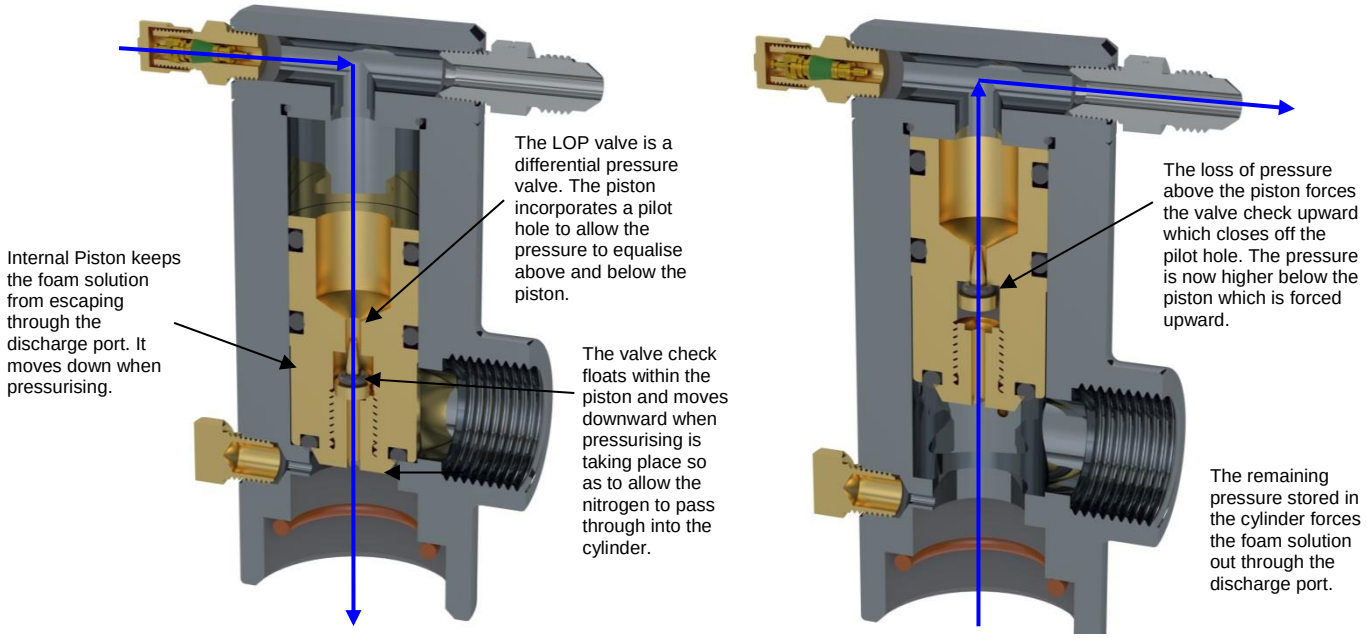


Figure 3

Based on the open design of the pressure system it was previously considered that only one low pressure switch was required in each installation.

It has now been proven through testing that there is a possibility that the internal check valve in our LOP cylinder valve may prevent a cylinder from acting as a pressure reservoir for the actuation system. As such, the monitoring for a low pressure condition from a cylinder valve (Fig 4) may not always detect a low pressure condition.

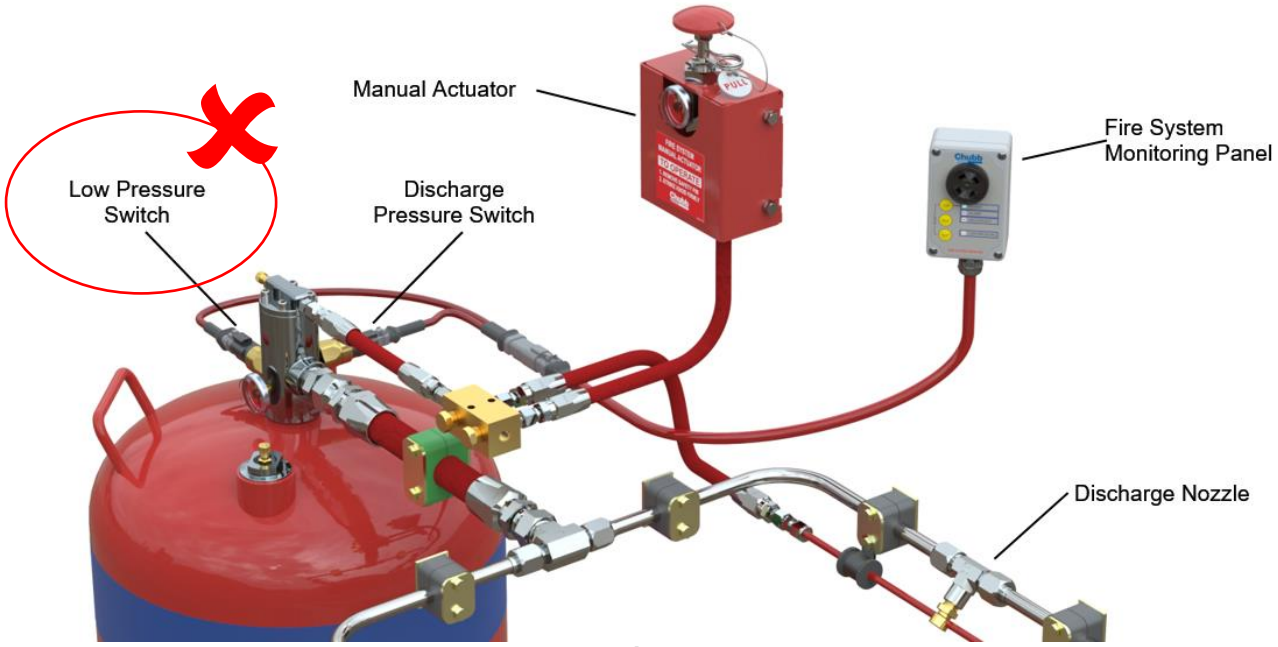


Figure 4

The results from our testing has also proven that in all expected pressure loss conditions, the actuation circuit will **always drop in pressure** making this the best location for a pressure monitoring switch to be installed.

Advice to System Owners

The issue with the position of the monitoring switch **does not affect the system's capability to activate or perform as originally intended in a fire scenario**. The pressure monitoring feature of our system is designed to provide the operator with a visual and audible warning of a pressure issue occurring in the system.

This issue is the first of its type reported in over 20years and based on the results of our failure modes event and critical analysis (FMECA) and our recommended maintenance procedures, any slow pressure leaks in our LOP system will be identified before the equipment is operated provided equipment operators continue to perform the recommended daily/shift start/seat change inspections (Refer Table 2).

FMECA summary

Installation type	Event	Existing risk control / Mitigation
Single Cylinder System	Leak in the actuation circuit: Pressure in the actuation circuit may cause the check valve to close and keep the cylinder pressurised.	Operator daily/shift change/ handover checks (Multiple pressure indicators are installed in the system, including cabin) System will discharge if the leak continues to go undetected – Discharge pressure switch will alert the operator (Fire Alarm Condition)
Multi-Cylinder System	Leak in the actuation circuit: Pressure in the actuation circuit may cause the check valve to close and keep the cylinder pressurised.	
Multi-Cylinder System	Leak in any one of the cylinder assemblies: Pressure may drop in the leaking cylinder assembly and in the actuation circuit. If this occurs, eventually pressure from the actuation circuit will feed into effected cylinder assembly. Once the pressure in the actuation circuit drops the check valve will close in all other cylinder assemblies keeping them pressurised	

Table 1

Recommended operator daily/shift change/hand over checks:

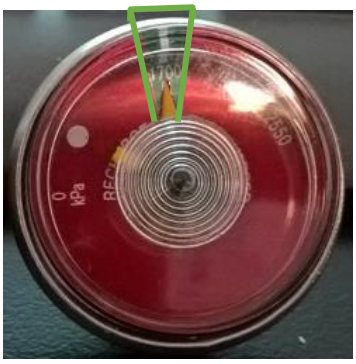
Item	Action	Description
System pressure check	Check all cylinder valves and LOP manual actuator pressure indicators are visible and read in within the normal range (green sector).	
Manual actuators	(a) Check that all pull pins are in place and secure (No anti-tamper seals on BMA sites). (b) Physically check that all manual actuators are secure, clean, undamaged and accessible.	
Fire panel	(a) Check that all indicators show normal condition. (b) Check that all panels are secure, clean, undamaged and accessible.	

Table 2

Effective Date: Immediately

Issue Date: 6th May 2019