

Endress + Hauser Liquiphant M FTL50 and FTL51 Level Switches

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1. About this Publication

These instructions have been prepared according to the following standards:

- BS EN ISO 11442: Technical product documentation. Document management;
- BS EN ISO 12100: Safety of machinery - General principles for design - Risk assessment and risk reduction;
- BS EN 62023: Structuring of technical information and documentation;
- BS EN 82079-1: Preparation of instructions for use. Structuring, content and presentation. General principles and detailed requirements.

1.1. Safety Warnings and Symbols

The system of safety warnings and symbols is based on:

- BS EN ISO 7010: Graphical symbols. Safety colours and safety signs. Registered safety signs;
- BS EN 82079-1: Preparation of instructions for use. Structuring, content and presentation. General principles and detailed requirements.



This indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury if instructions, including recommended precautions, are not followed.



This indicates a hazard with a medium level of risk, which if not avoided, will result in death or serious injury if instructions, including recommended precautions, are not followed. In addition, there is a high risk of damage to the component, product or process.



This indicates a hazard with a low level of risk, which if not avoided, will result in minor or moderate injury if instructions, including recommended precautions, are not followed. In addition, there is a potential risk of damage to the component, product or process.

NOTE: Draws attention to important additional information.

1.2. Units of Measurement

Quantities are expressed in SI units or SI derived units; refer to J & E Hall International Standard JEH-ES-02 Guide to the International System of Units (SI).

1.3. Terminology

Terminology, abbreviations and acronyms are those currently in use throughout the refrigeration and air conditioning industry; refer to J & E Hall International Standard JEH-ES-01 Definition of Terms and Acronyms Used in the Refrigeration Industry.

1.4. Additional Copies

Obtain additional copies of these instructions from J & E Hall International; go to www.jehall.com.

2. Application

The level switch detects the absence or presence of liquid and is used to switch an electrical circuit. There are two main applications:

- Oil separator/reservoir low oil level.
- Detect the presence of oil or liquid refrigerant in the compressor drain line.

The location of the level switch can be found from the system schematic flow diagram, equipment schedule and in Part A : Specification.

This publication is applicable to Liquiphant M FTL50 and FTL51 level switches; it does not cover other Liquiphant variants, for example, FTL5xH, FEL5x etc.

3. Technical Data

3.1. Nomenclature

The nomenclature in Table 1 only refers to level switch assemblies used by J & E Hall International. In practice, there are other possible variations.

		Level Switch Element Code →						
			X	X	X	X	X	X
Model	Compact	50						
	With extension tube	51						
Approval	ATEX/NEPSI II 3G EEx nC IIC T6 WHG	B						
	ATEX/NEPSI II 3G EEx nA IIC T6 WHG	C						
	ATEX II I/2GD Ex ia IIC T6 WHG/IECEx	F						
	ATEX II I/2GD Ex ia IIC T6/IECEx Zone 0/1	G						
	ATEX II IG Ex ia IIC T6	H						
	ATEX II I/2GD Ex d IIC T6/IECEx Zone 0/1	K						
Connection	1½" 300 lbs RF 316/316L flange ANSI B16.5	AD2						
	2" 300 lbs RF 316/316L flange ANSI B16.5	AF2						
	Threaded ANSI 3/4" NPT 316L	GM2						
	Threaded ANSI 1" NPT 316L	GN2						
	71174743 1" 200 lbs RF 316/316L flange ABSI B16.5	YY9						
Probe	Compact: Ra <3.2 µm/126 uin	AA						
	¹ Probe length x mm 316L Ra <3.2 µm/126 uin	¹ BB						
Electronics	Output FEL 52 SIL 3 wire PNP 10 to 55 V dc	2						
	Output FEL 54 SIL relay DPDT 19 to 253 V ac, 29 to 55 V dc	4						
	Output FEL 58 SIL NAMUR + test button (H-L signal)	8						
Cable Entry	F27 IP66/68 316L M20 gland (EEx d> M20 thread)	G1						
	F16 polyester IP66/67 M20 threaded joint	G4						
	F13 IP66/68, F17 IP66/67 M20 gland (EEx d> M20 thread)	G5						
	F15 stainless steel (316L) IP66/67 M20 threaded joint	G6						
Option	Basic version	A						
	EN 10204 - 3.1 material (316L) wetted parts certificate	C						
Identification	² Tag number	+Z1						

¹BB probe length depends on the application. When ordering a new switch always quote the complete level switch nomenclature code and the J & E Hall International contract number.
²Not part of the level switch nomenclature. Tag number physically added to the switch assembly to facilitate identification.

Table 1 Level Switch Nomenclature

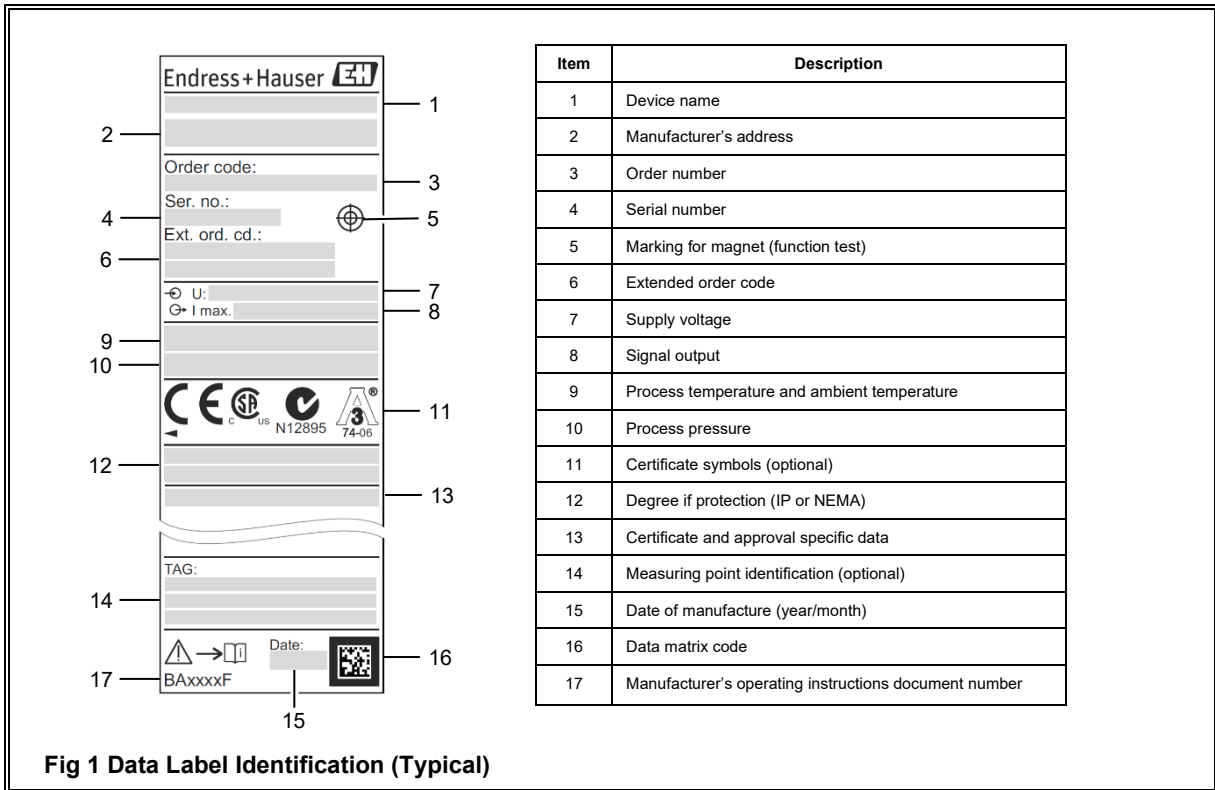


Fig 1 Data Label Identification (Typical)

3.1. Switching Point

Refer to Fig 2.

The switching point A depends on the orientation of the forks. The dimensions in the diagrams are for fresh water at 25.0 °C and 1.0 bar. High viscosity fluids may incur a switching delay. Ensure that the fluid runs easily off the forks.

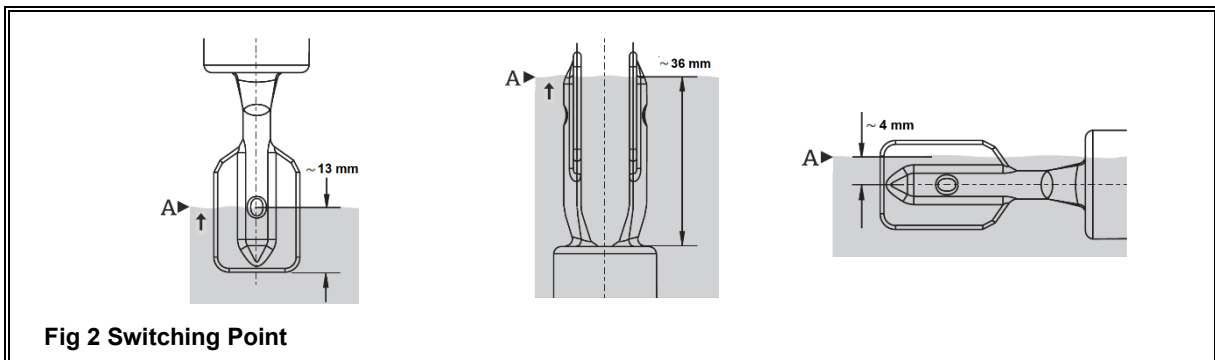
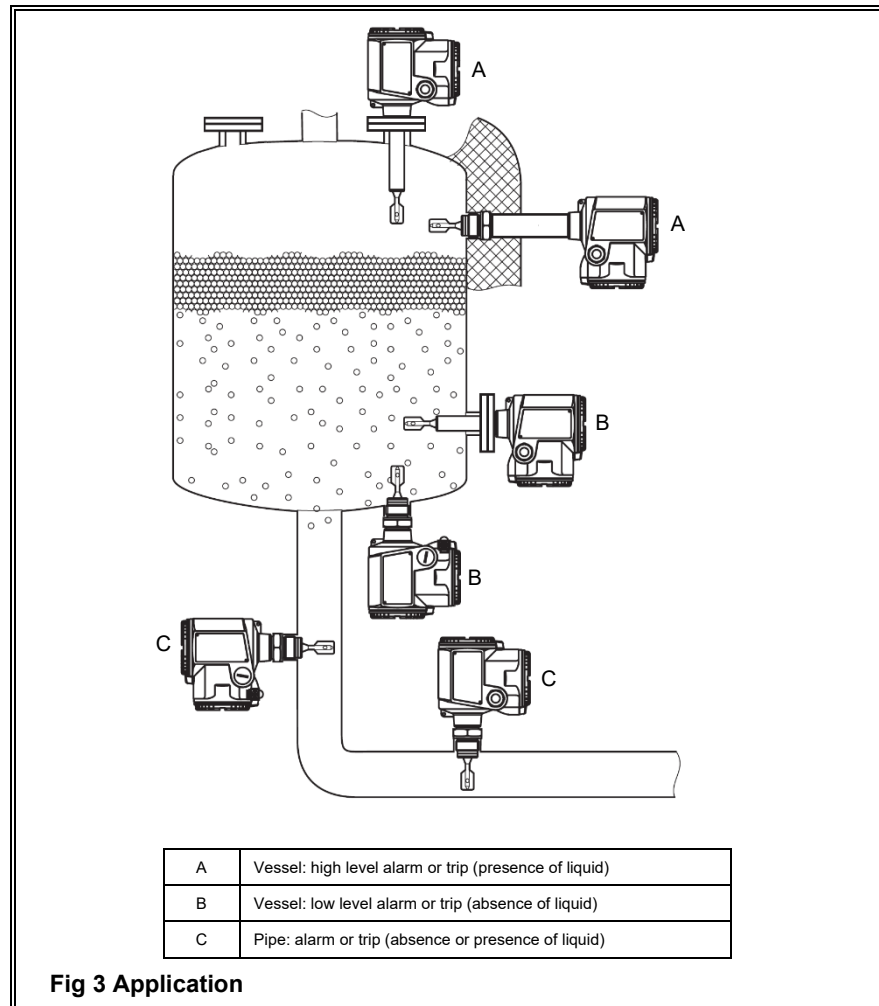


Fig 2 Switching Point

4. Application

The level switch can be installed in a tank, vessel or pipeline; see Fig 3.



5. Operation

The forks are excited piezo electrically and vibrates at its intrinsic resonant frequency. When the forks are immersed in a fluid, for example, oil or liquid refrigerant, this frequency changes; the change is detected and converted into a switching action.

With the switch mounted horizontally in the wall of a pipe or vessel, the switching point depends on the liquid level above the centre line of the switch; refer to Fig 5.

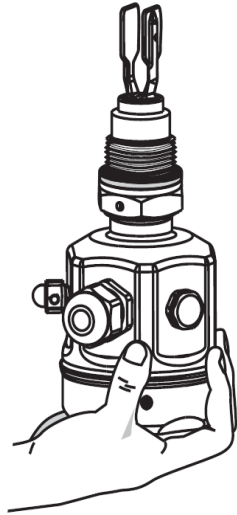
6. Installation

6.1.

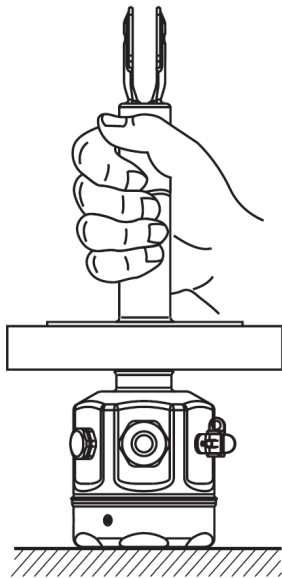
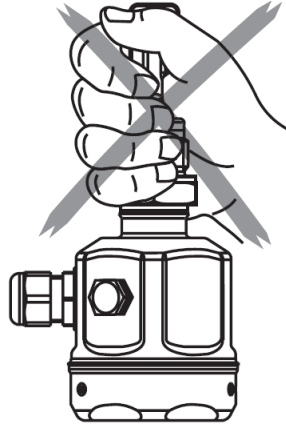
Handling the Level Switch

Refer to Fig 4.

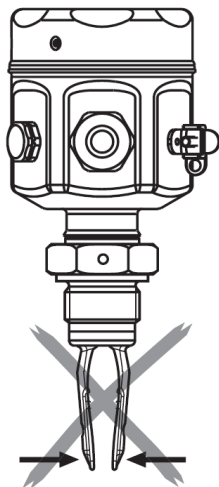
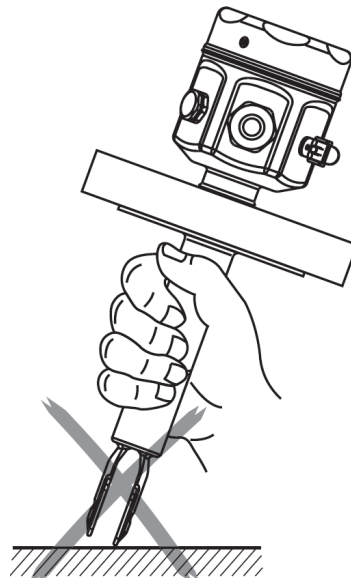
- Hold the level switch by the switch housing, flange or extension tube, not by the forks;
- Do not bend or distort the forks, protect them during installation and maintenance;
- Do not use the level switch as a ladder or climbing aid;
- Do not attempt to shorten or lengthen the forks.



Hold the level switch by the body, not by the fork



Protect the fork from damage, contact with hard surfaces etc



Do not bend or distort the fork tines

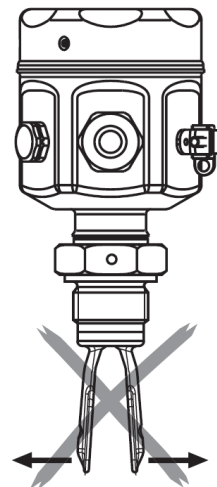
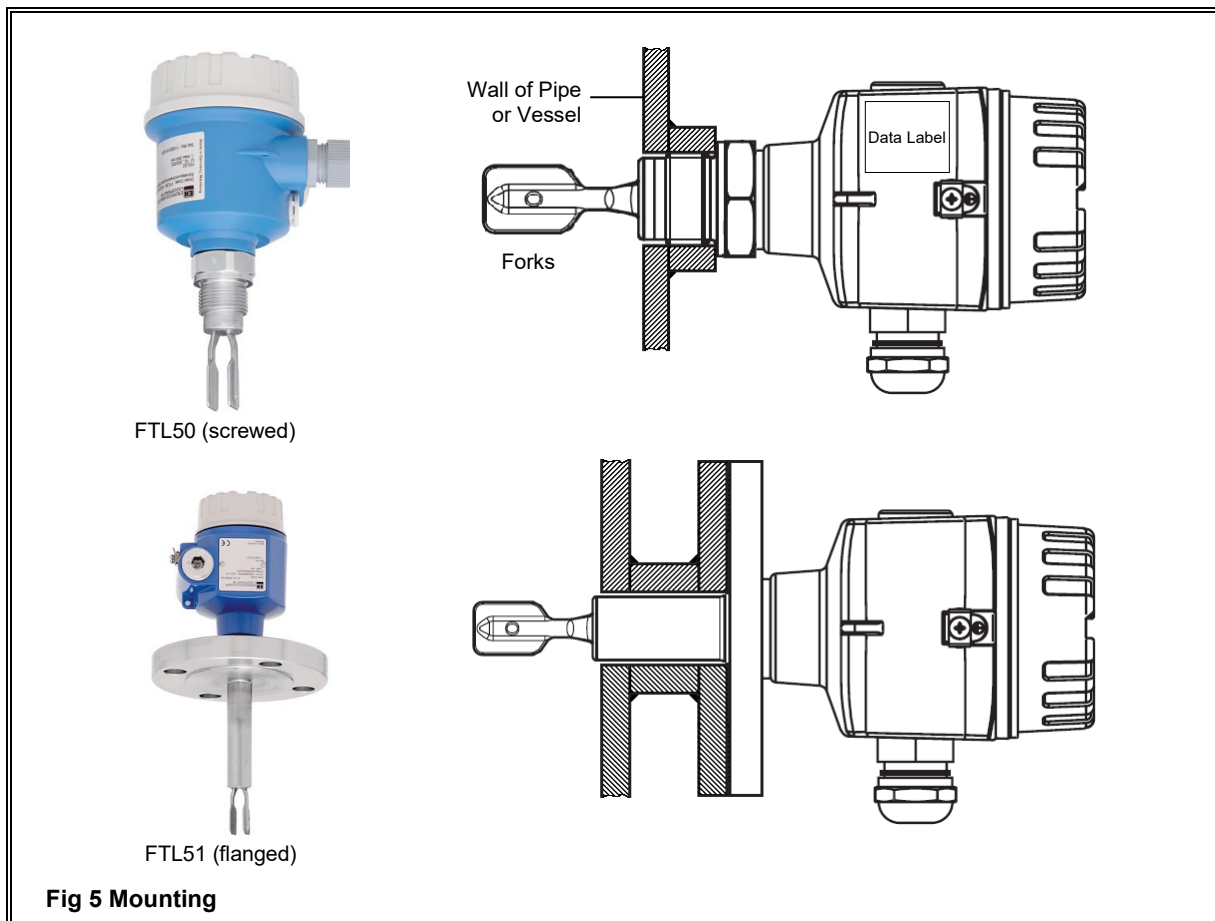


Fig 4 Handling

6.1. Mounting Examples



6.1. Orientation

Position the level switch with the fork vertical to the surface of the liquid (oil or refrigerant). Markings are provided on the switch to ensure correct alignment; refer to Fig 6 for installation details.

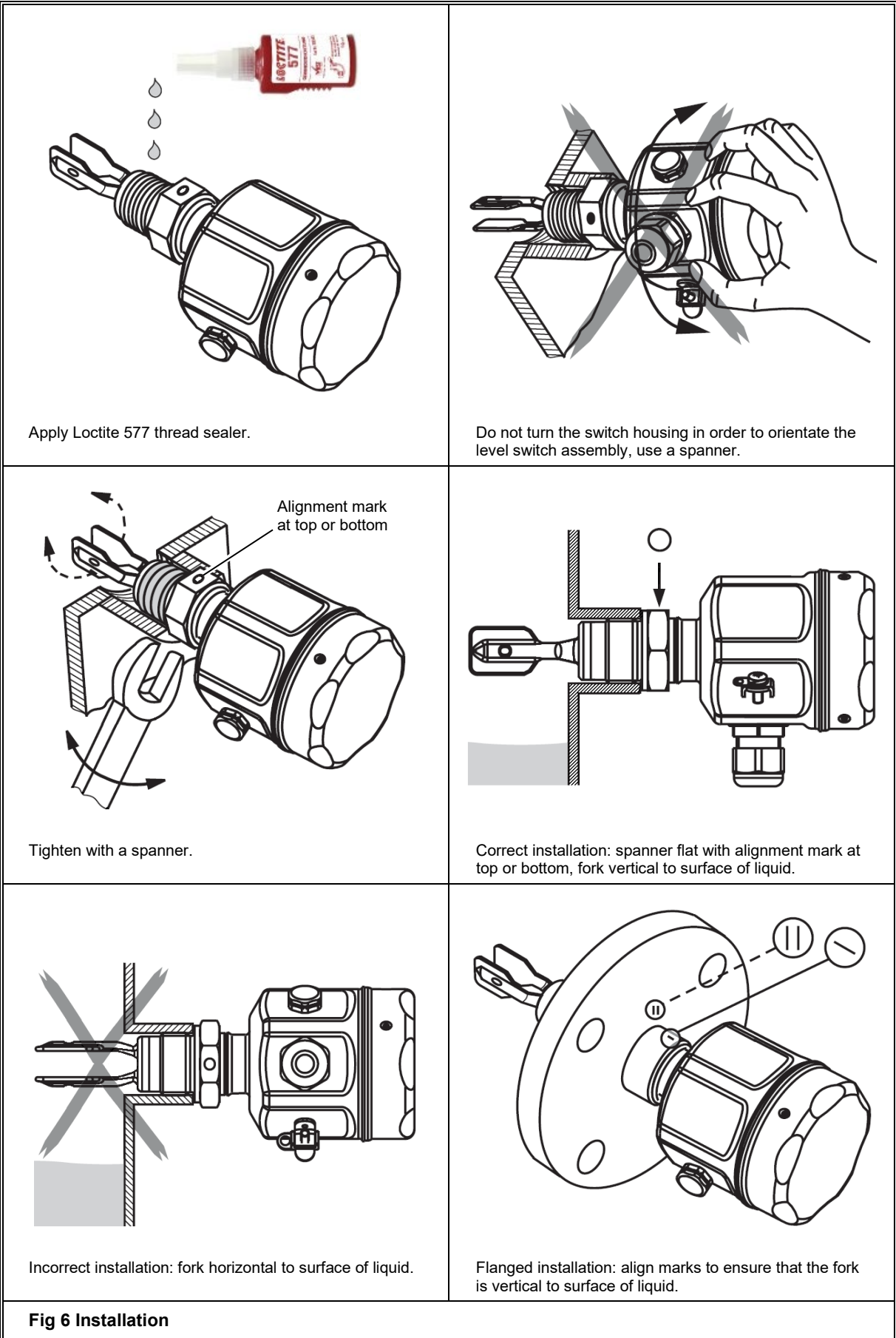
Allow adequate space for transmitter removal and for access to the terminal box cover.

6.2. Wiring

Basic wiring connections are shown in Fig 7.

Refer to J & E Hall International certified wiring diagrams for electrical connections specific to this application. Take particular care regarding the termination of screened cable; refer to the notes on the wiring diagrams.

Segregate control wiring from power wiring, do not run together.



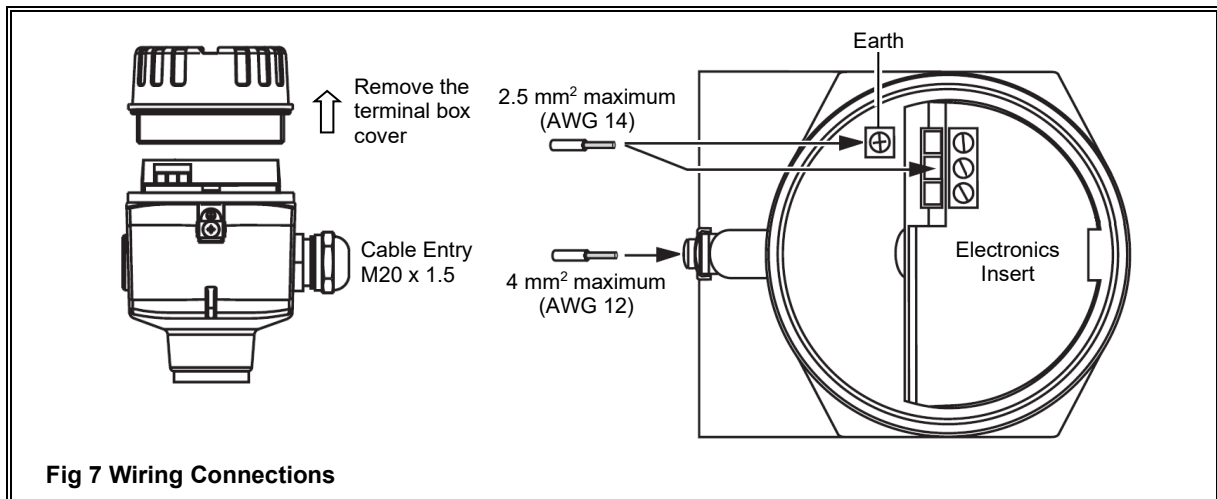


Fig 7 Wiring Connections

6.3. Electronic Inserts

The interchangeable electronics insert provides different switch functions and LED indication of status.

6.3.1. FEL 51, FEL 52, FEL 54 and FEL 55 Electronics Inserts

Fitted with 2 switches.

Provided with 2 LED's

Green LED

Indicates the operating status.

Red LED

Indicates the switching status, flashes in the event of corrosion damage or if the electronics are defective.

6.3.2. FEL 58 Electronics Insert

Fitted with 2 switches.

Provided with 2 LED's

Green LED

Flashes quickly to indicate the operating status, flashes slowly in the event of corrosion damage or if the electronics are defective.

Yellow LED

Indicates the switching status. Test button – breaks the connection.

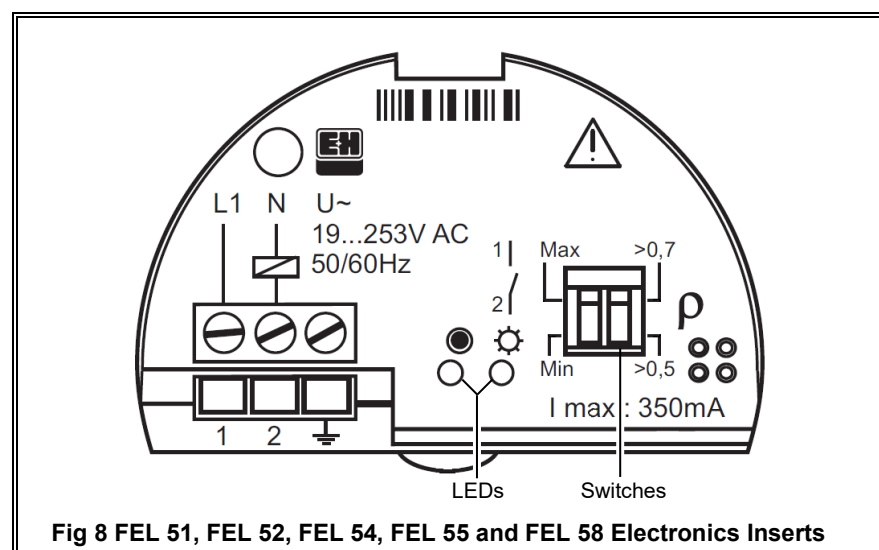


Fig 8 FEL 51, FEL 52, FEL 54, FEL 55 and FEL 58 Electronics Inserts

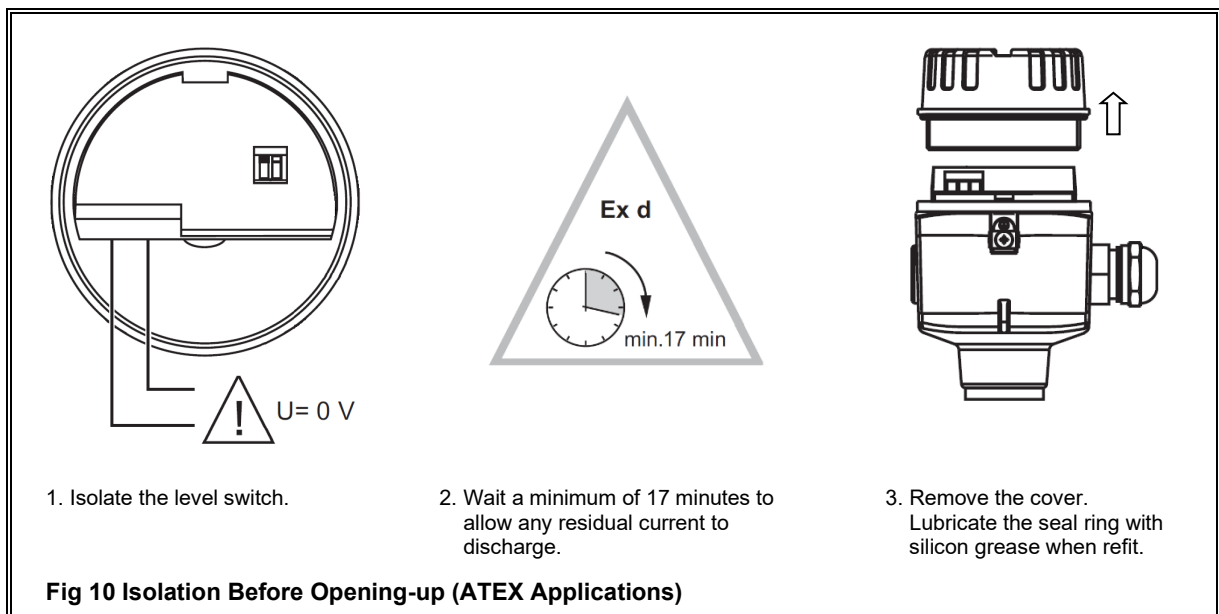
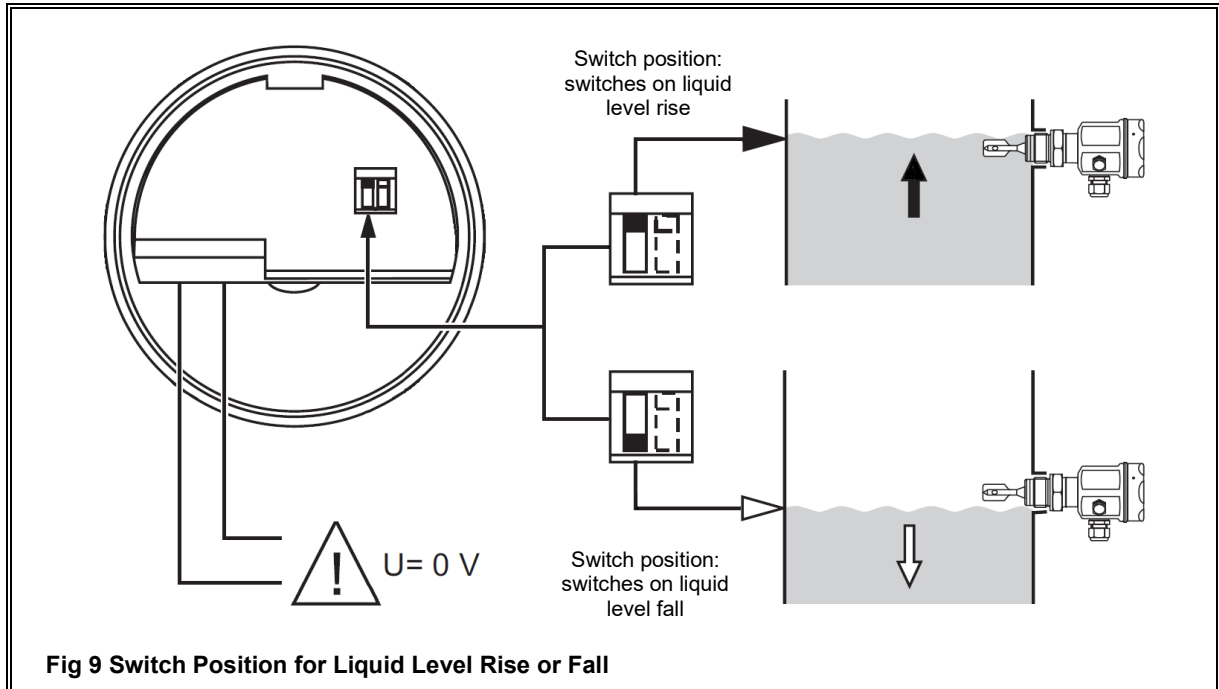
7. Adjustment

Set the switch to actuate on liquid level rise or fall; refer to Fig 9.

Application examples:

- Oil separator/reservoir. Switch on low level;
- Compressor drain line. Switch on high level (presence of oil or liquid refrigerant detected).

Isolate the level switch before removing the cover. For ATEX applications, allow time for residual current to dissipate before opening; refer to Fig 10.



8. Maintenance

No routine maintenance is required other than periodically checking that the switch actuates in the absence or presence of liquid (depending on the application).

8.1. Function Test

If a fault condition is suspected, the function of the switch can be tested by immersing the tuning forks in a vessel containing water. To do this, the level switch must be removed from the system.

WARNING

The level switch is in direct contact with the system environment. DO NOT attempt to unscrew and remove the level switch until it has been isolated and that part of the system cleared of oil/refrigerant. Suitable clothing must be worn; this should include goggles, gloves etc., and, on a system using ammonia refrigerant, a suitable respirator.

Remove the refrigerant from the isolated portion of the system.

- For systems charged with hydrochlorofluorocarbon or hydrofluorocarbon refrigerant, use a pump-out unit to remove the rest of the refrigerant.
- For systems charged with R717 (ammonia) refrigerant, purge off the remaining refrigerant using the apparatus and method illustrated and described under Apparatus for Purging Ammonia Vapour and Draining Oil in publication 5-20 in Section 5 of the plant instruction manual.

After the level switch has been satisfactorily isolated from the rest of the system and the isolated portion cleared of refrigerant, make a mark across the switch body/flange/vessel wall or pipe. Unscrew and remove the level switch.

It is a good idea to blank the open connection to prevent dirt or moisture entering, especially if the connection remains open for a long period.

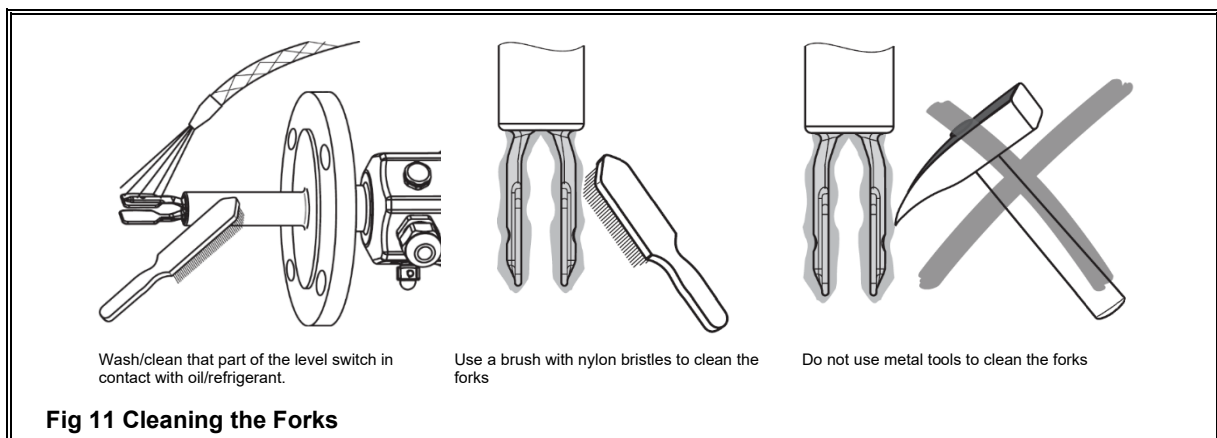
Clean the level switch forks and body as described under Servicing. Test the switch operation by immersing in water. Dry the forks and body, clean the threads on the body before reinstalling as illustrated in Fig 6, lining up the marks made during dismantling.

9. Servicing

If cleaning is required, remove the level switch as described in 8.1.

Use a brush with nylon bristles to remove dirt and residue from the fork. Do not use metal tools or a brush with metal bristles; refer to Fig 11.

When refitting the cover, lubricate the seal ring with silicon grease.



10. Spares

In the event of a fault, if the problem is traced to the level switch rather than faulty wiring, control fault etc., the only option is to replace the level switch assembly.

When ordering a new level switch quote the following information:

- Complete nomenclature code which can be found from the data label fixed to the switch body; refer to Fig 1.
- J & E Hall contract number.

Obtain a new level switch from the address below:

J & E Hall International	Telephone: +44 (0) 1332-253400
Hansard Gate,	Fax: +44 (0) 1332-371061
West Meadows,	Email: spares@jehall.co.uk
Derby,	Website: www.jehall.com
DE21 6JN	
England	

11. Safe Disposal, End-of-life (EOL)

At the end of the level switch's working life, it should not be classed as domestic waste but be disposed of separately by a registered recycling company according to local and currently valid legislation.