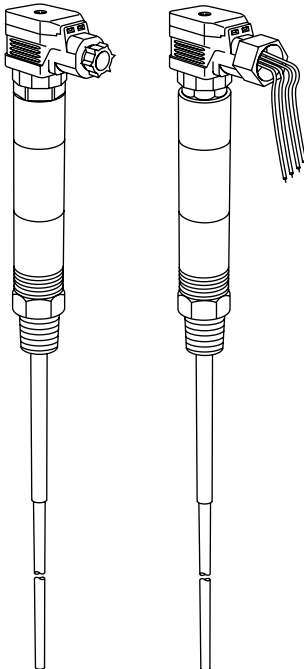


LP31

Level Probe

Installation and Maintenance Instructions



1. *General safety information*
2. *General product information*
3. *Installation*
4. *Wiring*
5. *Maintenance*

— 1. *General safety information* —

Your attention is drawn to Safety Information Leaflet IM-GCM-10, as well as to any National or Regional regulations.

The boiler must be depressurised and vented to atmosphere before installation of the probe. Wherever possible the boiler manufacturer should be consulted for advice on the working and alarm water levels.

Under certain circumstances the water level in a boiler can be different to that shown in the gauge glass.

Separate literature is available from Spirax Sarco on this subject.

Do not install the probe outdoors without additional weather protection.

Drain/vent holes must be kept clear - do not cover.

— 2. *General product information* —

2.1 General description

The Spirax Sarco LP31 is used with an LC3000 controller to provide a high-integrity, self-monitoring alarm for high water levels in steam boilers and other vessels.

The probe is supplied in three nominal tip lengths, and is cut to the exact length required prior to installation.

The standard LP31 (non-UL listed version) can also be used as a simple (non self-monitoring) high or low level probe with a suitable controller.

2.2 Available tip lengths mm (in)

500 (19.7), 1000 (39.4) and 1500 (59).

2.3 Limiting conditions

Maximum boiler pressure	32 bar g	(464 psi g)
Maximum temperature	239°C	(462°F)
Maximum ambient temperature	70°C	(158°F)
Maximum probe cable length	50 metres	(164 ft)
Cable socket protection rating	IP65	

2.4 How the LP31 works

2.4.1 LP31 used as a high water alarm with LC3000 controller:

In normal operation as a high level alarm probe:

- The tip is above the water level.
- There is a high resistance path to earth.

If the water level rises to touch the probe tip:

- The resistance path to earth becomes low.
- The alarm relays in the controller are de-energised.
- The high alarm sounds.

The integrity of the LP31 and its wiring are monitored by the LC3000 controller, and an alarm is signalled if a fault occurs.

2.4.2 LP31 used as a low or high water alarm with LC1000/LC1300 controller:

The LP31 works in the same way, (low resistance in water, high resistance out of water), **but its integrity is not monitored.**

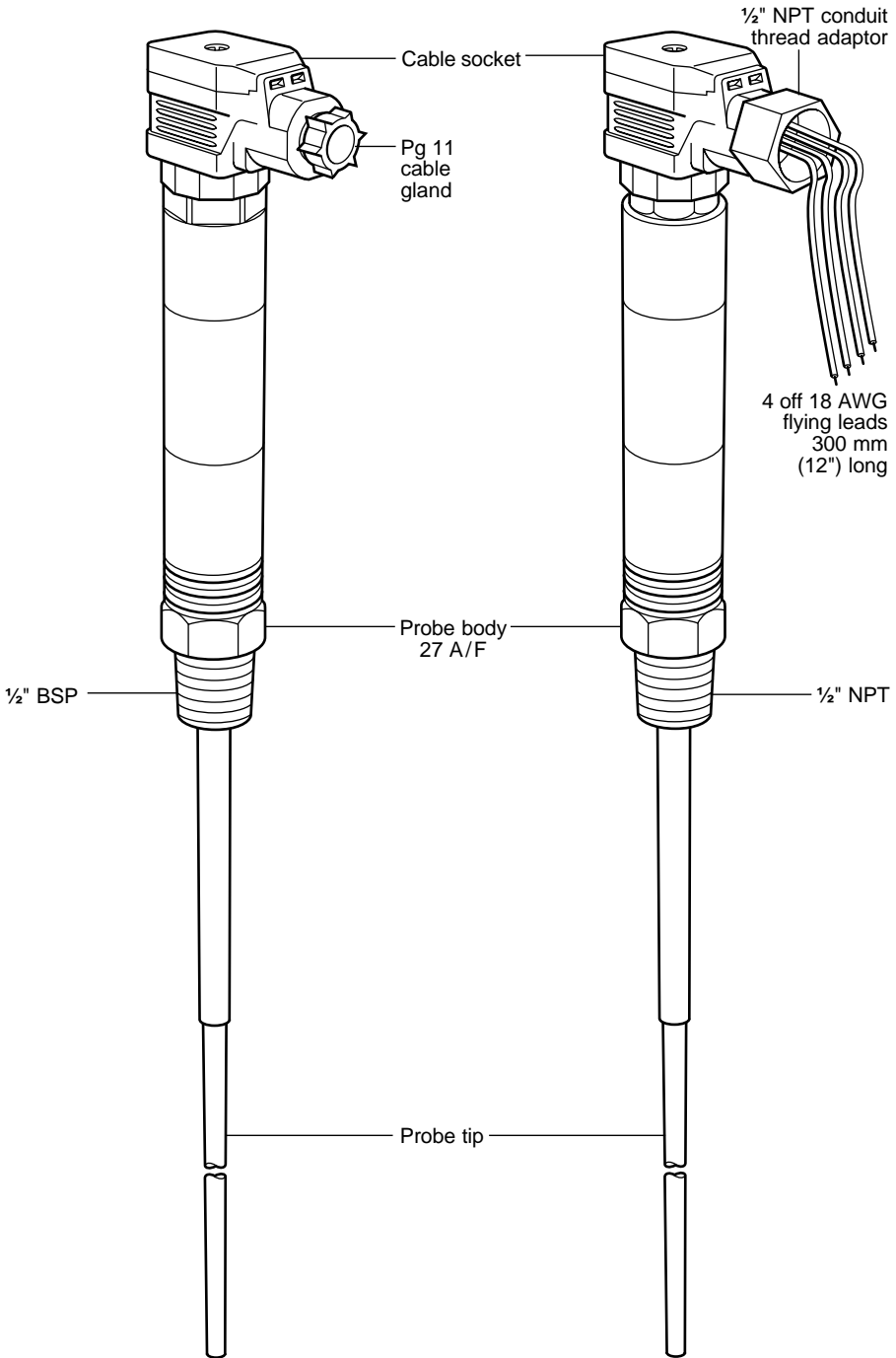


Fig. 1
LP31 Standard version

Fig. 2
LP31 UL/FM version

3. Installation

Before proceeding with any installation or maintenance read Section 1, 'General safety information'.

The probe is normally installed directly in the boiler shell, in a protection tube of at least 80 mm (3") diameter, but can be mounted in an external chamber if regulations permit. The switching level is at the extreme end of the tip.

A DIN 43650 cable socket is supplied with each unit and is provided with a Pg 11 cable gland, or, for the UL/FM version, a ½" NPT conduit thread adaptor with four flying leads.

In most shell boilers the water will 'swell' when it is firing, such that the actual water level will be higher than the level shown in the gauge glass. In practice this can be up to 50 mm (2") in very large boilers, reducing to about 10 mm (¾") in smaller ones. This difference in levels needs to be taken into consideration when cutting the probe tip to length.

When the probe is to be installed in the boiler, ensure it is positioned at least 1 metre (39") from any safety valve or steam take-off, as increased localised water levels may occur.

3.1 Procedure

3.1.1 Caution:

It is essential that the PTFE probe tip sleeving is not damaged during probe tip cutting.

- Ensure the water is at the required alarm level, including any increase in level due to 'swelling'.
- Mark a metal rod with a water soluble felt pen, and dip the boiler to find the depth from the top of the probe mounting flange to the water level. Alternatively, obtain this depth by transferring the level from the gauge glass.
- Measuring from the underside of the probe body, cut the probe tip to 15 mm (½") less than the dipped length with a fine hacksaw and de-burr the end. See fig. 3. This takes the thread engagement into account.

Note: The minimum sleeved probe length is 30 mm (1 ⅛"), and the minimum exposed tip length 40 mm (1 ½"). Install the probe in a ½" BSP (standard version) or ½" NPT (UL/FM version) female connection.

3.1.2 Install the probe as follows:

- Ensure both male and female threads are in good condition.
- Use up to three turns (no more) of PTFE thread sealing tape on the probe thread.
WARNINGS: Do not use excessive tape. Do not use paste type jointing compound.
- Fit and tighten the probe by hand initially - use a suitable spanner to tighten the probe. Under no circumstances use a pipe wrench.
- Due to the nature of a taper/parallel joint it is not possible to recommend tightening torque figures.
- Do not overtighten - there should always be visible thread on the probe.
- **Note:** The probe thread will not 'bottom out' (i.e. probe body hexagon contacts the face of the female screwed connection), unless there is excessive wear or an out-of-tolerance female thread, in which case it will be necessary to replace or re-work the flange or connection.

3.1.3 Subsequent removal and refitting:

WARNING: Ensure boiler or vessel is de-pressurised and vented to atmosphere before attempting to unscrew or remove the probe.

- Always use the correct size spanner - not a pipe wrench.
- Inspect male and female threads for signs of damage, which may have occurred through overtightening, leading to torn threads or even localised cold welding (galling/picking up).
- If damage has occurred replace the probe.

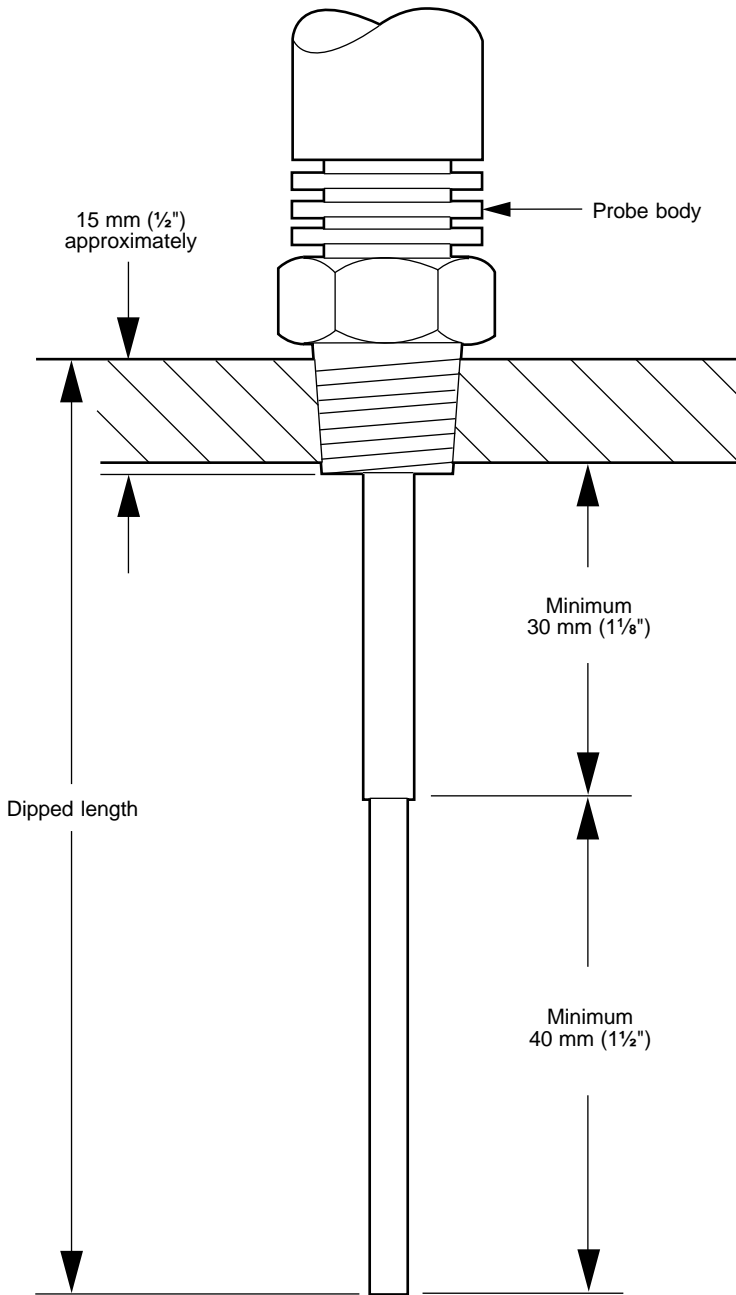


Fig. 3 Installation

4. Wiring

Refer to the relevant controller documentation/wiring diagram for full details.

Cabling should be installed in accordance with BS 6739 - Instrumentation in Process Control Systems: Installation design and practice or local equivalent. For the US and Canadian installations the probe must be wired in accordance with the National and Local Electrical Code (NEC) or the Canadian Electrical Code (CEC).

Wiring should be carried out using 2 or 4 core, 1 mm² (18-16 AWG), high temperature screened cable, with a maximum length of 50 metres (165 ft). Pirelli FP 200 or Delta Crompton Firetuf OHLS are two suitable types for the standard LP31. For the UL/FM version NEC Class I screened cable with a suitable temperature rating (75°C/167°F minimum) must be used to connect the terminal box to the controller.

Ensure that sufficient cable length is provided to allow removal of the cable socket and to ensure that no strain is placed on the unit.

To unplug the cable socket, remove the central screw.

Note: To provide environmental protection the probe is supplied with a gasket between the cable socket and the probe connector. To maintain environmental integrity, ensure gasket is always present when reconnecting cable socket and all contact surfaces are clean and undamaged.

To gain access to the connector block within the cable socket, remove the central screw and withdraw the hinged cover.

The connector block on the standard LP31 maybe rotated in 90° steps to facilitate wiring:

- Remove the retaining screw and withdraw the socket.
- Remove connector block and reposition as required.

It is not possible to rotate the connector block on the UL/FM version.

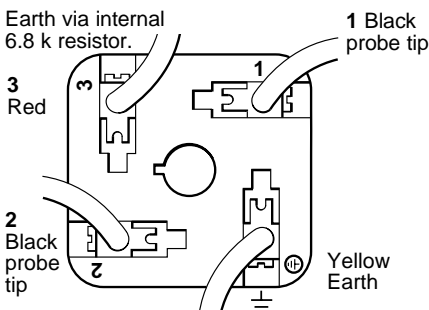


Fig. 4 Connector block removed from cable connector. Wired for use with an LC3000 controller as a high integrity, self-monitoring high level probe.

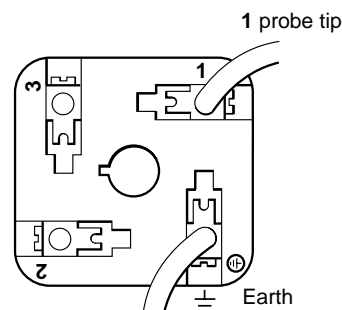


Fig. 5 Connector block removed from cable connector. Wired for use as a simple (non-self-monitoring) high or low level probe.

4.1 Additional wiring information - UL/FM version

The socket is supplied with four 18 AWG, 300 mm (12") long colour coded flying leads. These are to be cut to length and connected to a suitable metal terminal box. A length of flexible UL listed metal conduit is required between the probe and terminal box to provide environmental protection and easy electrical connection. The cable socket is provided with a ½" NPT conduit adaptor for this purpose.

WARNING:

The flying leads supplied with the probe are rated to 221°F (105°C). This temperature rating must not be exceeded.

The flexible conduit and terminal box are not to incorporate any other control wiring as this may damage or reduce the performance of the product.

It is not possible to rotate the cable socket in 90° steps, as with the non-listed LP31.

To do so may damage the internal wiring.

Ensure that any condensation which might build up in the conduit network is prevented from accumulating in the probe cable connector and terminal box.

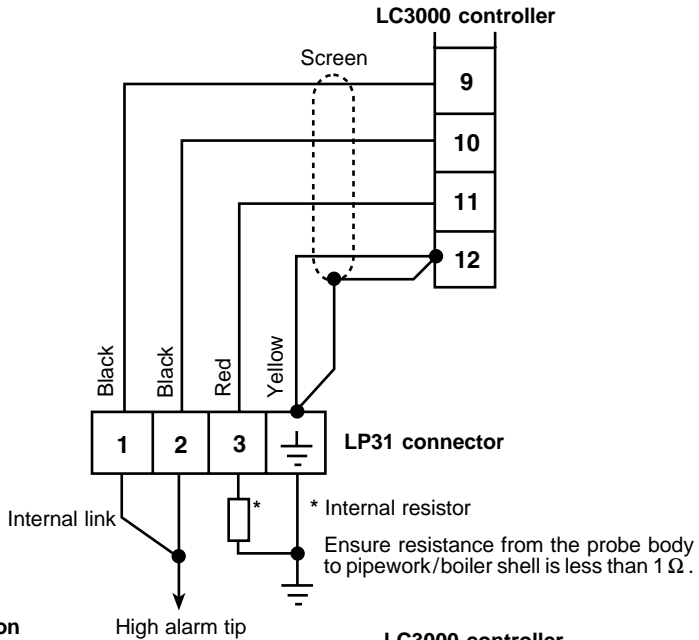


Fig. 6
Standard version

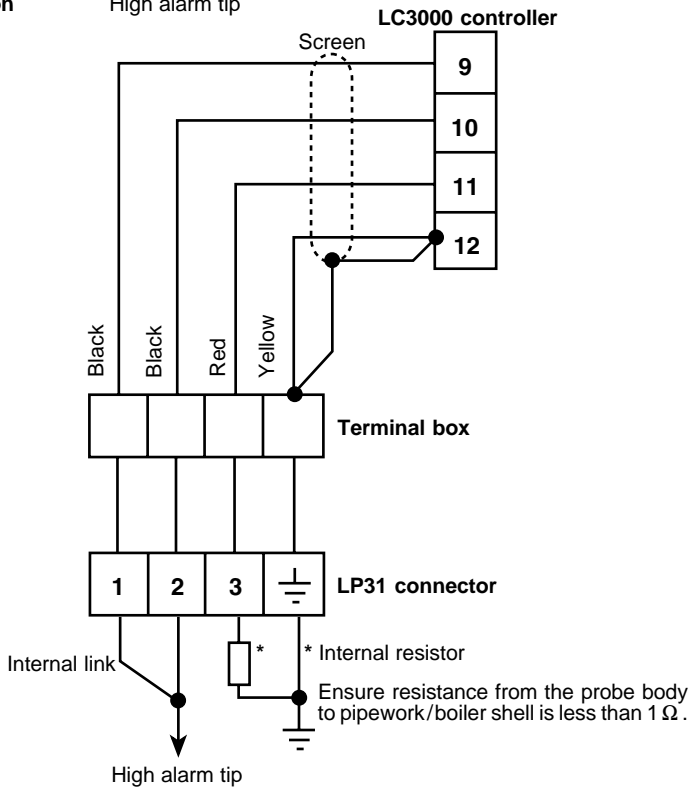


Fig. 7
UL/FM version

5. *Maintenance*

No special maintenance is required. Steam boiler water level controls, however, do require regular testing and inspection.

For specific testing instruction for Spirax Sarco systems please see separate literature.