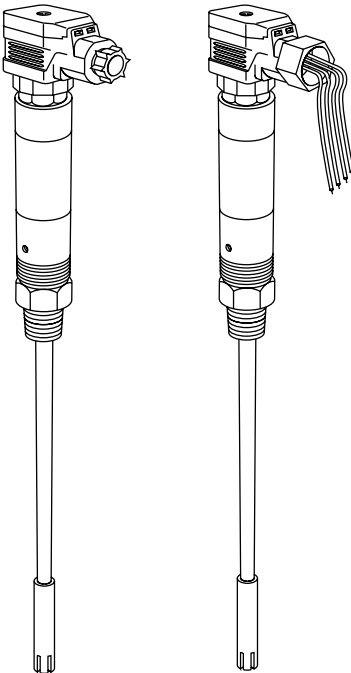


CP30

Conductivity Probe

Installation and Maintenance Instructions



1. *General safety information*
2. *General product information*
3. *Installation*
4. *Wiring diagrams*
5. *Maintenance*
6. *Fault finding*
7. *Spares*

1. Safety information

Your attention is drawn to the relevant Supplementary Safety Information Sheet supplied with the product as well as to any National or local regulations.

Safe operation of the product depends on it being properly installed, commissioned, and maintained by a qualified person in compliance with the operating instructions.

It is essential to comply with general installation and safety instructions for pipeline and plant construction, as well as to make proper use of tools and safety equipment.

The product is designed and constructed to withstand the forces encountered during normal use. Use of the product for any other purpose, or failure to install the product in accordance with these Installation and Maintenance Instructions, could cause damage to the product, will invalidate the CE marking, and may cause injury or fatality to personnel. This product contains materials including PTFE which can give off toxic fumes if exposed to excessive heat.

2. General product information

2.1 Description

Probes are supplied in several nominal tip lengths, and may be cut to the exact length required prior to installation. The CP30 probe has a $\frac{3}{8}$ " BSP taper (UL version $\frac{1}{2}$ " NPT) connection and may be installed in a probe elbow, a screwed flange, or directly in a boiler connection.

The CP30 can be used with BC3100, BC3200 or BC3210 blowdown controllers which have a probe cleaning facility (UK Patent no. 2276943).

This causes any scale on the probe to become porous or fall off, allowing the probe to continue to sense at its original calibration level. **WARNING: This feature is not a substitute for a proper boiler water treatment regime. If scale forms on a probe, it is also forming inside the boiler, and a competent water treatment specialist must be consulted to avoid a potentially dangerous situation.**

The probe is approved by Underwriters Laboratory (UL) as an accessory for use with the BC1100, BC3200 and the BC3210 blowdown controllers. These controllers supply the probe with a low voltage limited power source. The UL electrical ratings for the probe are 20 Vdc and 14 Vac at 10mA.

2.2 Application

The Spirax Sarco CP30 conductivity probe is used in conjunction with a controller to measure the conductivity (or TDS) of water, usually in a steam boiler, for the purpose of monitoring and controlling blowdown. A DIN 43650 cable socket is supplied with each unit and is provided with a Pg 11 cable gland, or, for the UL Listed version, a $\frac{1}{2}$ " NPT conduit thread adaptor with four flying leads.

2.3 Available tip lengths mm (inches)

300 (11.8), 500 (19.7) 1 000 (39.4) and 1 500 (59.0).

2.4 Limiting conditions

Maximum boiler pressure	32 bar g	(464 psi g)
Maximum temperature	239°C	(462°F)
Maximum ambient temperature	70°C	(158°F)
Minimum tip distance from boiler tubes	20 mm	($\frac{3}{4}$ ")
Minimum immersion depth (vertically installed probes)	100 mm	(4")
Maximum cable length (probe to controller)	100 m	(330 ft)
Minimum conductivity	10 μ S/cm or 10 ppm	
Protection rating (cable socket)	IP65	

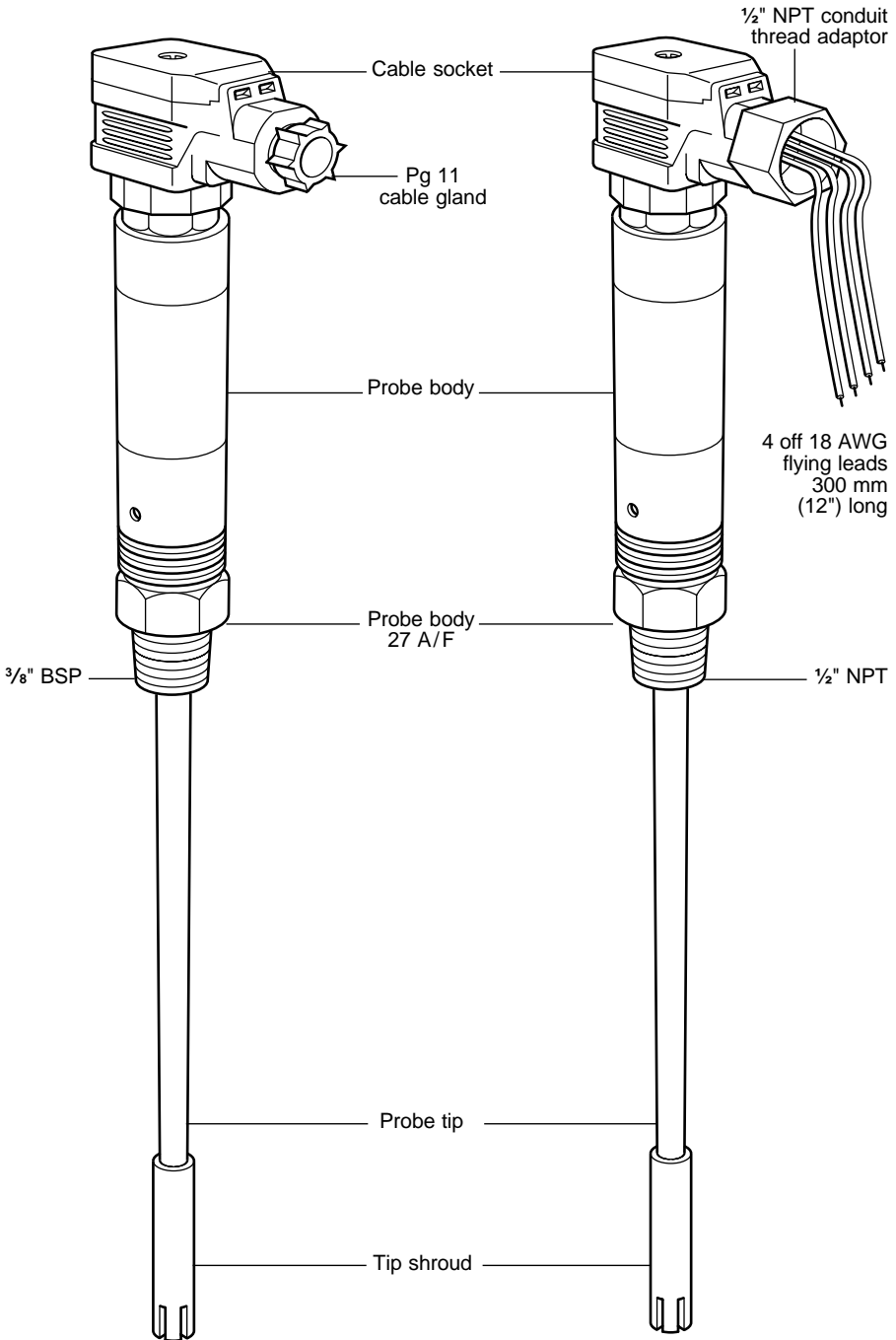


Fig. 1
CP30 Standard version

Fig. 2
CP30 UL version

3. Installation

WARNING: Do not install the probe outdoors without additional weather protection.

WARNING: The boiler must be depressurised and vented to atmosphere before installation of the probe. Wherever possible the boiler manufacturer must be consulted for advice on the positioning of the probe and the optimum TDS level.

Caution:

- Do not remove the tip shroud from the probe, as it is difficult to replace.
- Do remove the tip shroud label before installation.

Probes with a tip length of up to 500 mm (20") can be installed vertically or horizontally. Longer probes must be installed vertically.

The probe must be installed in a position where it can sense the conductivity of the boiler water, away from the feedwater inlet if possible. The probe tip should be at least 20 mm (3/4") away from any boiler tubes. Vertically installed probes must be immersed to a minimum depth of 100 mm (4").

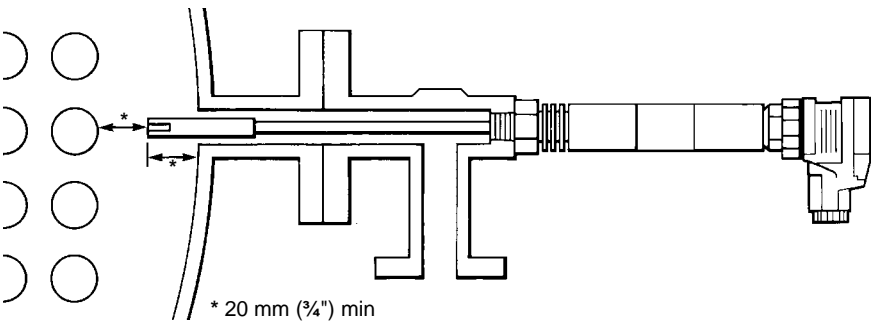


Fig. 3 Typical installation showing probe mounted in probe elbow (3/8" BSP only)

3.1 Cutting the probe tip to length

Caution:-

The PTFE tip shroud is retained on the probe tip by an internal spring, and can be turned freely in an anticlockwise direction only (see Fig. 4).

To avoid damage, the shroud must be turned, and only in the free direction, as it is moved up or down the probe tip.

There is no need to remove the tip shroud from the probe tip when cutting to length.

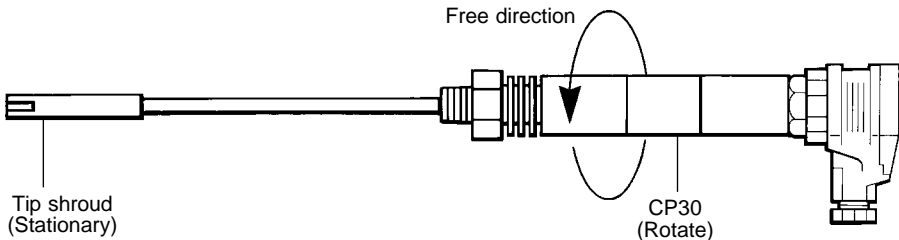


Fig. 4

Step 1

Measure the required probe tip length, and cut the PTFE tip sleeving 50 mm (2") back from this position. (Fig. 5).

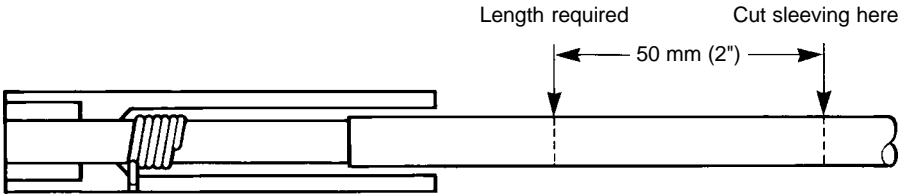


Fig. 5

Step 2

Remove the length of PTFE by cutting round it with a sharp knife, then slitting it lengthways. (Fig. 6).

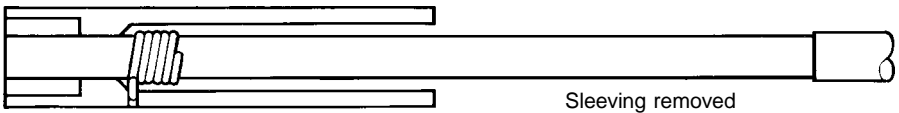


Fig. 6

Step 3

Slide the tip shroud towards the probe body as far as it will go easily, while turning it anticlockwise. The internal spring will then be touching the PTFE tip sleeving. (Fig. 7). Cut the probe tip to length using a fine hacksaw, and de-burr the end.

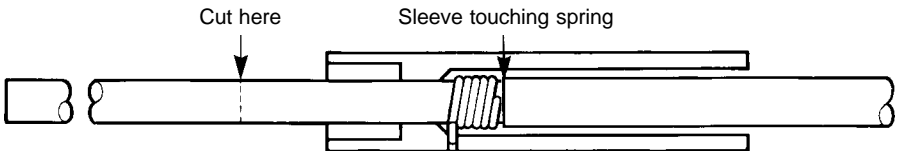


Fig. 7

Step 4

Adjust the tip shroud so that it is flush with the end of the probe tip. Some free play is normal. (Fig. 8).

Shroud flush with cut end

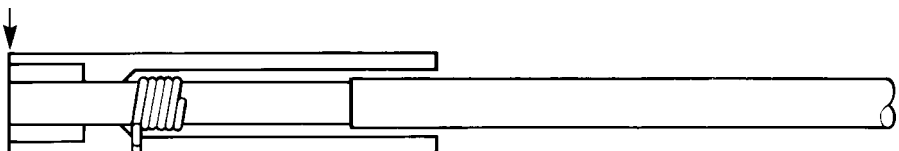


Fig. 8

3.2 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.
WARNING: 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.

3.3 Subsequent removal and refitting

WARNING: Ensure boiler or vessel is depressurised and vented to atmosphere before attempting to unscrew or remove the probe:

- Always use 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.
- **Ensure drain/vent holes are clear - do not cover.**

4. Wiring diagrams

* See controller Installation and Maintenance Instructions for complete wiring details

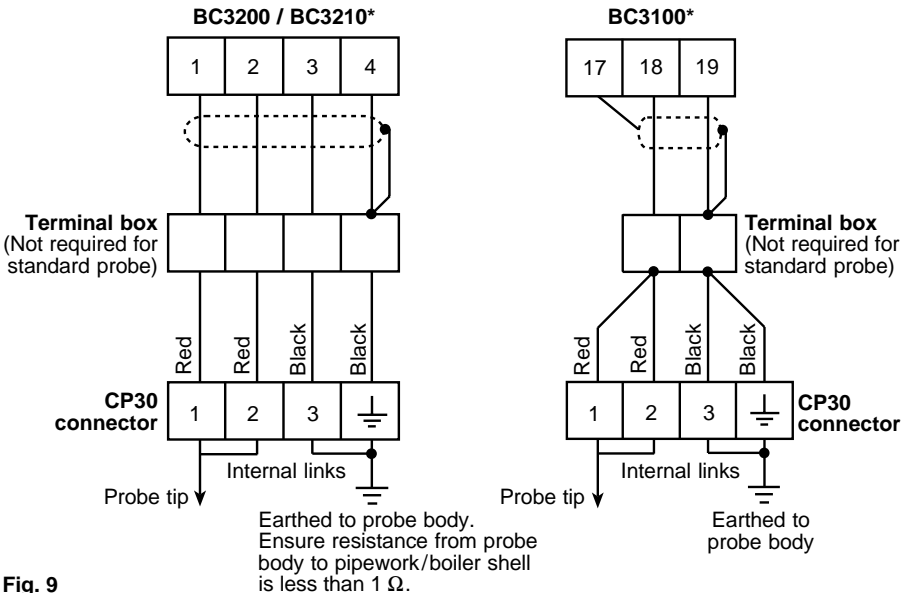


Fig. 9

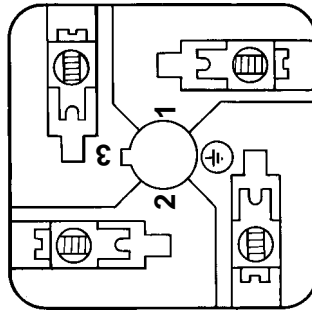


Fig. 10 View of connector block removed from cable socket

4.1 Wiring

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 100 metres (330 ft). Pirelli FP 200 or Delta Crompton Firetuf OHLs are two suitable types for the standard CP30. For the UL version Class 1 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 the gasket is always present when reconnecting the cable socket, and that 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 CP30 may be rotated in 90° steps to facilitate wiring:

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

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

4.2 Additional wiring information – UL 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 metal conduit is required between the probe and the 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 standard CP30. 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.

5. Maintenance

Frequent maintenance of the probe should not be necessary.

If scale does form on the probe tip it is a sure indication that scale is also forming elsewhere in the boiler, and advice on the boiler water treatment should be obtained without delay. Some Spirax Sarco controllers are available with a probe conditioning option (UK Patent No. 2276943) which minimises the effects of probe scaling, but this is not a substitute for adequate boiler water treatment.

- Remove the probe once a year and rotate the tip shroud back, turning it anticlockwise only, to expose the end of the probe tip, (as shown in Step 3, page 5).
- Clean the probe tip with fine emery cloth.
- Clean the PTFE tip shroud and sleeving with a cloth or a bristle brush.
- Ensure that the tip shroud is flush with the end of the probe tip before refitting the probe.

6. Fault finding

In many cases, problems on installation can be traced to incorrect wiring, so a check is recommended of all wiring, and any necessary links in the controller.

The Spirax Sarco MS1 conductivity meter and extension lead (described in separate literature) may be used to check the ac resistance of an installed probe to determine its condition.

To carry out a continuity check on the probe, check from the probe tip to plug terminals 1 and 2, and from the probe body to plug terminals 3 and earth.

7. Spares

A spare tip shroud and spring assembly is available, Part No. 4031280.

To fit the tip shroud assembly proceed as follows:

- Chamfer the end of the probe tip.
- Ensure the tang of the spring is approximately at 90° to the spring. If not, gently straighten it with a pair of long nose pliers.
- Hold the CP30 horizontally with the probe tip facing away from you.
- Slide the spring onto the probe tip while turning the CP30 **anticlockwise**, leaving the tang overhanging the end of the probe tip by one or two coils.
- Hook the tip shroud over the tang and push it slowly into position over the spring, turning the CP30 **clockwise** until the tang of the spring is felt to engage in the locating hole in the tip shroud.
- Turn the CP30 **anticlockwise** and slide the tip shroud so that it is flush with the end of the probe tip.