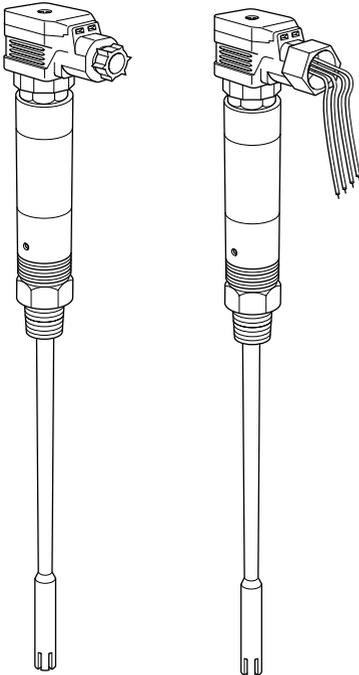


CP30
Conductivity Probe
Installation and Maintenance Instructions



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1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

Do not install the probe outdoors without additional weather protection.

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

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. The products comply with the requirements of the European Pressure Equipment Directive 97/23/EC and fall within category 'SEP'. It should be noted that products within this category are required by the directive not to carry the CE mark.

- i) The products have been specifically designed for use on steam and water, which are in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

If parts made from the PTFE have been subjected to a temperature approaching 260°C (500°F) or higher, they will give off toxic fumes, which if inhaled are likely to cause temporary discomfort. It is essential for a no smoking rule to be enforced in all areas where PTFE is stored, handled, or processed as persons inhaling the fumes from burning tobacco contaminated with PTFE particles can develop 'polymer fume fever'.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures of 350°C (662°F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken, except:

PTFE:

- Can only be disposed of by approved methods, not incineration.
- Keep PTFE waste in a separate container do not mix it with other rubbish, and consign it to a landfill site.

1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

— 2. General product information —

2.1 Description

The Spirax Sarco CP30 probe is supplied in several nominal electrode lengths, and is cut to the exact length required prior to installation. The probe has a 3/8" BSP taper (UL version 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 the BC3100, BC3200, BC3210, BC3150, and BC3250 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 CP30 is approved by Underwriters Laboratory (UL) as an accessory for use with the blowdown controllers. These controllers supply the CP30 with a low voltage limited power source. The UL electrical ratings for the probe are 20 Vdc and 14 Vac at 10 mA.

2.2 Application

The 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 1/2" NPT conduit thread adaptor with four flying leads.

2.3 Available electrode 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	(3/4")
Minimum immersion depth (vertically installed probes)	100 mm	(4")
Maximum cable length (probe to controller)	100 m	(330 ft)
Minimum conductivity	10 µS/cm or 10 ppm	
Protection rating (cable socket)	IP65	

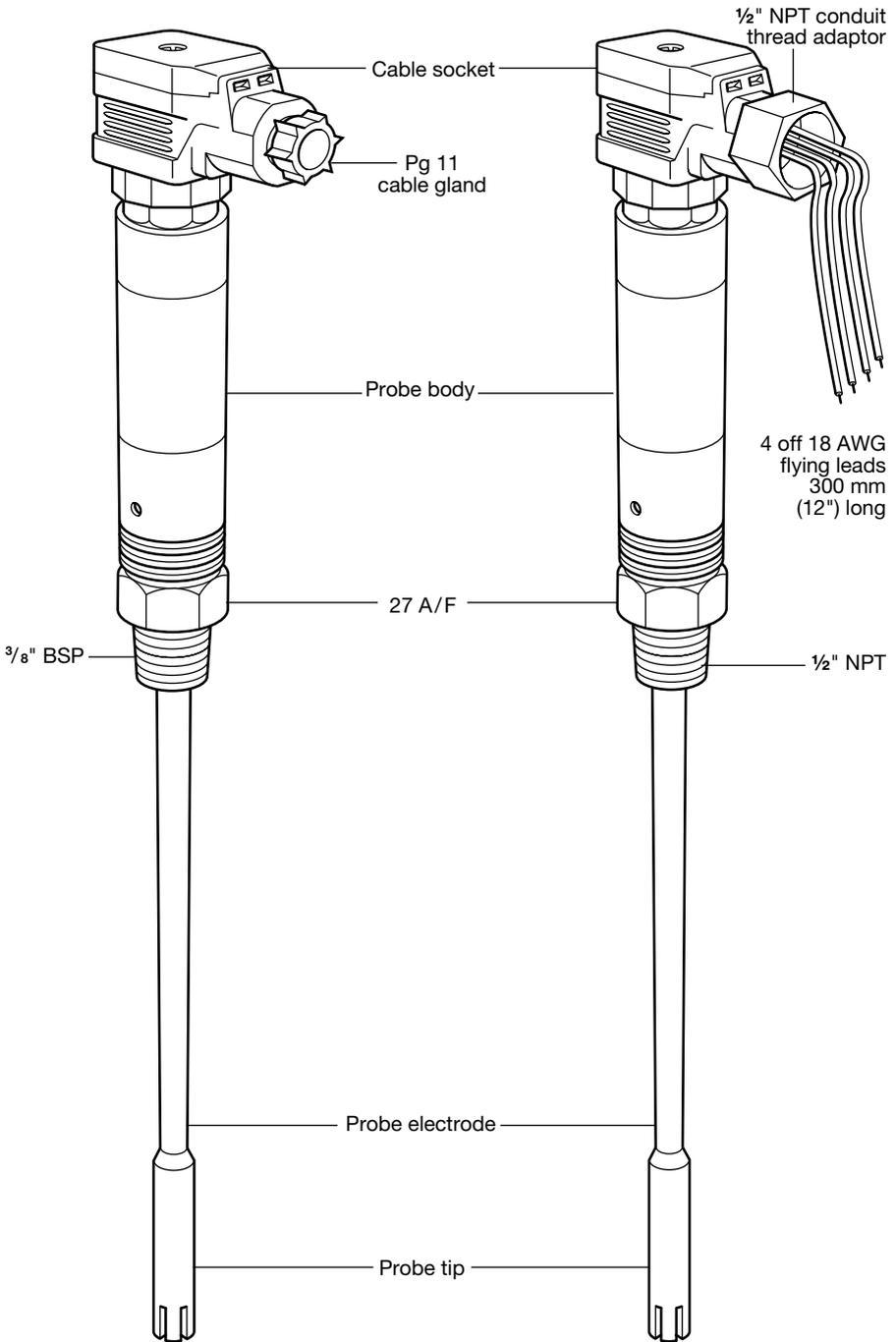


Fig. 1
CP30 Standard version

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:

- Remove the label from the probe tip before installation.

Probes 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 (¾") away from any boiler tubes. Vertically installed probes must be immersed to a minimum depth of 100 mm (4").

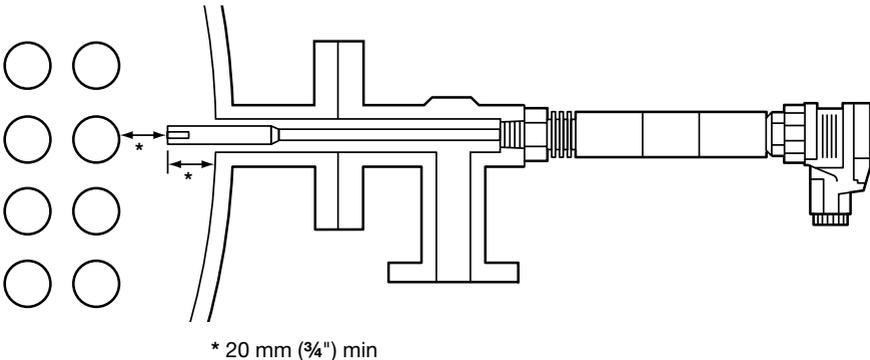


Fig. 3 Typical installation showing probe mounted in probe elbow (¾" BSP only)

3.1 Cutting the probe electrode to length

Caution:-

The PTFE probe tip is retained on the electrode by an internal spring, and can only be turned freely in one direction. This may be clockwise or anticlockwise, depending on which way the spring is fitted. Damage will occur if the tip is turned forcibly, or removed without being turned at the same time.

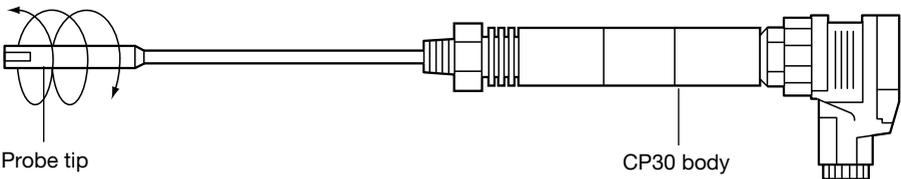


Fig. 4

To remove the probe tip:

Turn the probe tip, and, at the same time pull the probe tip off the probe rod (see Figure 4).

Note: it will only turn easily in one direction.

Do not attempt to remove the spring from the probe tip.

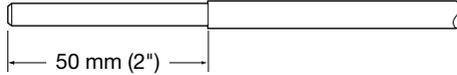
Step 1 Cut the electrode to the required length and chamfer the end.

Fig. 5



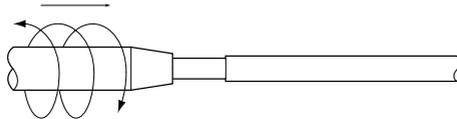
Step 2 Cut back the PTFE sleeving 50 mm (2") from the end of the electrode (Figure 6).

Fig. 6



Step 3 Fit the probe tip and spring by winding it into the electrode (Figure 7).

Fig. 7



Step 4 Check the end of the electrode is flush with the end of the probe tip (Figure 8).
A little free play is normal.

Probe tip flush
with the end of
the electrode

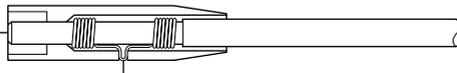


Fig. 8

Spring tang visible in hole

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

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.

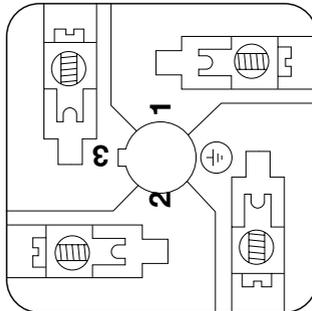


Fig. 9 View of connector block removed from cable socket

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.

*See controller Installation and Maintenance Instructions for complete wiring details

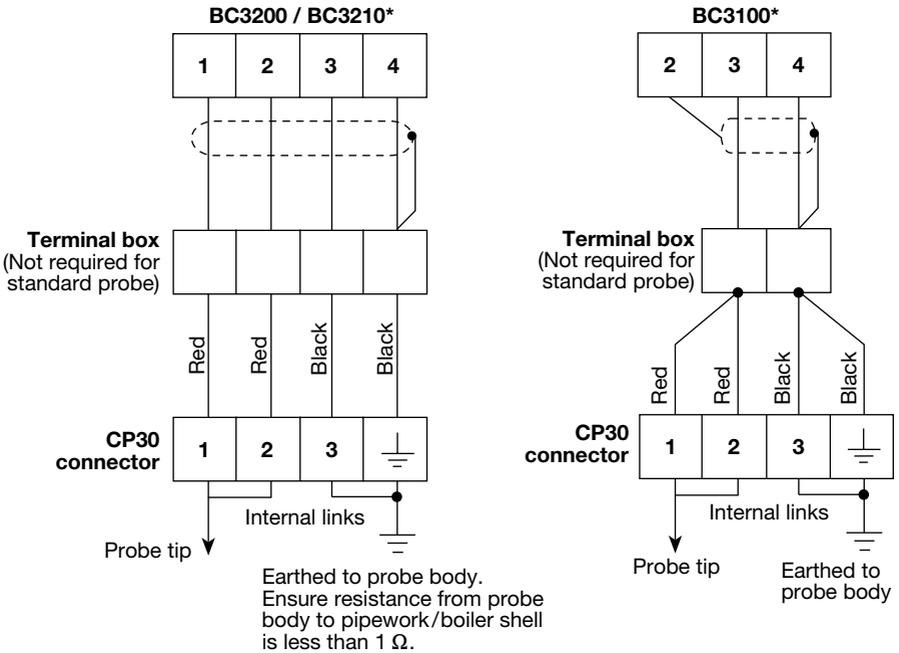


Fig. 10

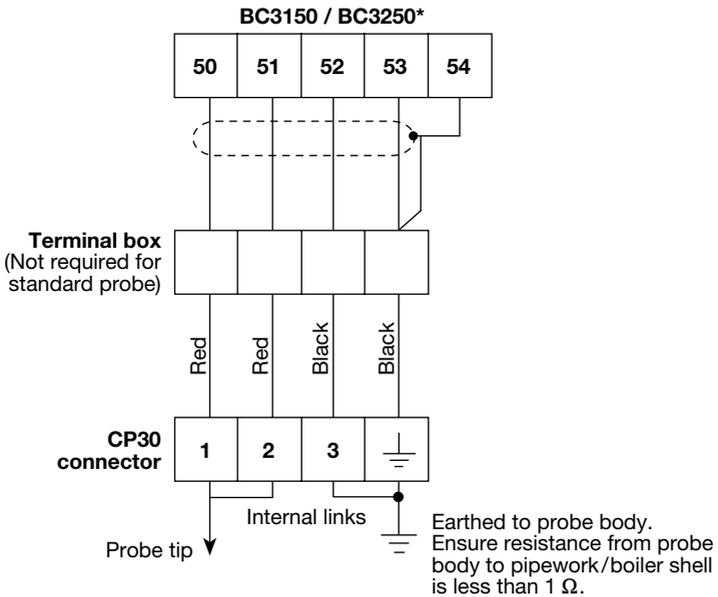


Fig. 11

5. Maintenance

Probe body cleaning instructions - Use a cloth dampened with tap / de-ionised water or isopropyl alcohol. Use of other cleaning materials could damage the product and invalidate the warranty.

Frequent maintenance of the probe should not be necessary. However if scale does form on the electrode 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 take off the probe tip (see Section 3.1).
- Clean the end of the electrode with fine emery cloth.
- Clean the PTFE probe tip and sleeving with a cloth or a bristle brush.
- Ensure that the probe tip is flush with the end of the electrode 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. Spare parts

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

To fit the probe rod:

- Clean and chamfer the end of the electrode.
- Push the probe tip/spring assembly onto the electrode, turning at the same time, until the end of the probe rod is level with the end of the tip shroud (see Figure 8 on page 9). The tip/spring assembly will turn easily in one direction only.

A little free play is normal.