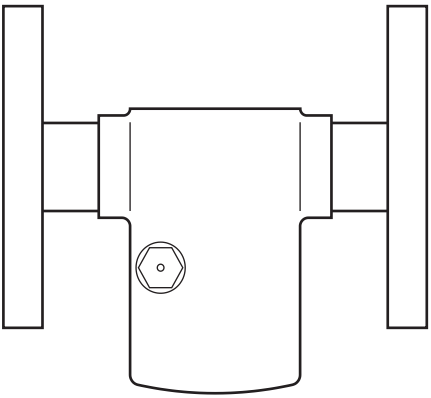
Spiratec ST14, ST16 and ST17 Sensor Chambers and Sensors

Installation and Maintenance Instructions



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.

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 listed below comply with the requirements of the European Pressure Equipment Directive 2014/68/EU, and carry the CE marks when so required.

The products fall within the following Pressure Equipment Directive categories:

Product		Group 2 Gases	Group 2 Liquids
ST14, ST16 and ST17	DN15 - DN25	SEP	SEP
ST14	DN40 - DN50	1	SEP

Product marking per ATEX Directive 94/9/EC Ex II 2G CT3.

i) **The product has been specifically designed for use on steam, compressed air and water/ condensate which are in Group 2 of the above mentioned Pressure Equipment Directive**

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.

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 and who has had specific training on pressurised systems.

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 these products may reach temperatures of 200 °C (392 °F).
These 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.

Please visit the Spirax Sarco product compliance web pages
https://www.spiraxsarco.com/product-compliance
for up to date information on any substances of concern that may be contained within this product. Where no additional information is provided on the Spirax Sarco product compliance web page, this product may be safely recycled and/or disposed providing due care is taken. Always check your local recycling and disposal regulations.

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 Spiratec trap fault detection system is designed to operate on saturated steam systems only, to indicate whether a steam trap is leaking steam. When combined with the R1C or R16C automatic trap monitor and WLS1 waterlogging sensor assembly, it will detect if a steam trap has failed closed or is blocked.

As standard - The sensor chamber will be supplied with the sensor connection on the right hand side of the chamber when viewed from the direction of flow. **Optionally -** If it has been requested, when placing an order, that the chamber is to be supplied with the sensor on the opposite side it will have **'L'** added to its nomenclature i.e. **½" ST141L**.

Chambers are available in two configurations:

- Fitted with an SS1 standard sensor for steam leak detection only.
- Without a sensor fitted. A WLS1 waterlogging sensor assembly is available separately for steam leak and waterlogging applications.

2.2 Spiratec sensor description

Spiratec sensors are designed to fit into Spiratec sensor chambers as part of the Spiratec trap fault detection system.

Available types:

SS1 standard sensor	For the detection of steam leaks when used in conjunction with a sensor chamber and a Type 30 or Type 40 hand held indicator, R1C or R16C automatic trap monitor. SS1's are normally supplied already fitted into the sensor chamber.
WLS1 waterlogging sensor assembly	For the detection of steam leaks or traps that have failed closed or are blocked when used in conjunction with an R1C or R16C automatic trap monitor. WLS1's are normally supplied as separate items for fitting into a sensor chamber on site.
Note:	Sensor chambers without sensors are available from stock.
Optional extras	A sensor blanking plug is available at extra cost, to protect the external connection of the SS1 standard sensor chamber from dirt.

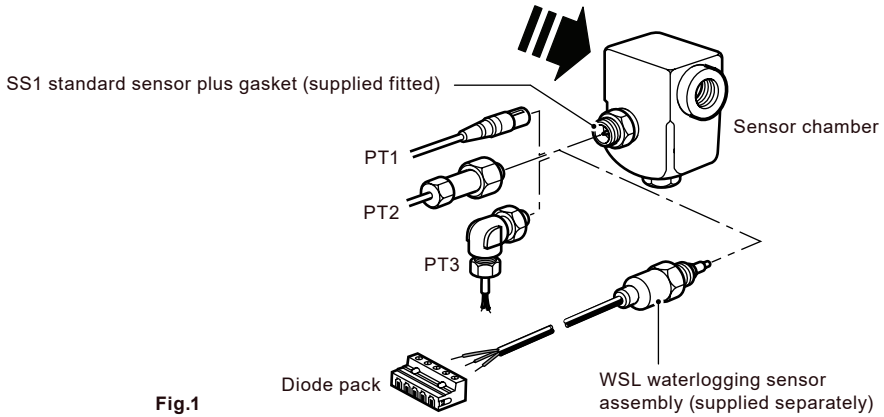


Fig.1

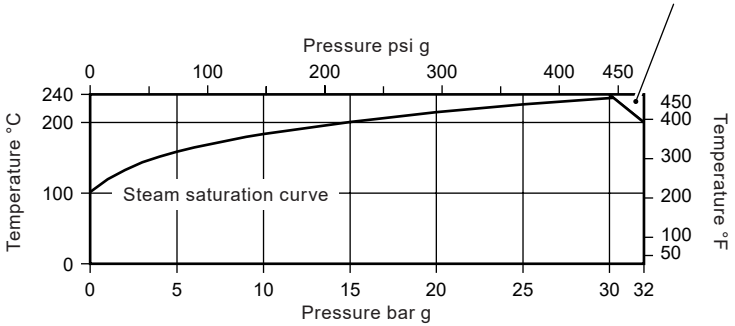
2.3 Sensor chambers and sensors - Available types, sizes and pipe connections

	Type	Body material	Connection	Sizes
Spiratec sensor chamber	**ST141**	Steel	Screwed BSP T Rp (ISO 7-1) or NPT	DN15 to DN50(½" to 2")
	ST142	Steel	Socket weld ends to BS3799	
	ST143	Steel	Flanged EN1092 PN40, ANSI 150, ANSI 300, BS 10 Table H and Table J	
	ST161	Stainless steel	Screwed BSP T Rp (ISO 7-1) or NPT	
	ST162	Stainless steel	Socket weld ends to BS 3799	
	ST163	Stainless steel	Flanged EN1092 PN40, ANSI 150, ANSI 300, BS 10 Table H and Table J **Note:** JIS 20 connections are available on request.	DN15 to DN25(½" to 1")
	ST171	SG iron	Screwed BSP T Rp (ISO 7-1) or NPT	DN15 to DN25(½" to 1")
Spiratec sensor	**SS1**	The SS1 standard sensor is threaded ⅜" parallel BSP for assembly into Spiratec the Spiratec sensor chamber. An external screw thread (M22 x 1.5) is provided to allow permanent installation using the PT2 or PT3 connector. **Three standard types of connector are available for use with the SS1 sensor:**		
Spiratec sensor connections	**WLS1**	Waterlogging sensor assembly is supplied complete with 1 m of high temperature three core cable for connection to an R1C automatic trap monitor. It can also be connected to an R16C automatic trap monitor using a special diode pack.		
	PT1	A plug in connector for use with SS1 standard sensors. Supplied with Type 30 or Type 40 hand held indicators complete with a 1m of sensor high temperature cable and male plug.		
	PT2	A threaded in-line connector for use with SS1 standard sensors for permanent installations for use with R1C or R16C automatic trap monitors (non waterlogging applications only).		
	PT3	A right angled connector for use with SS1 standard sensors for permanent installations for use with R1C or R16C automatic trap monitors (non waterlogging applications only).		

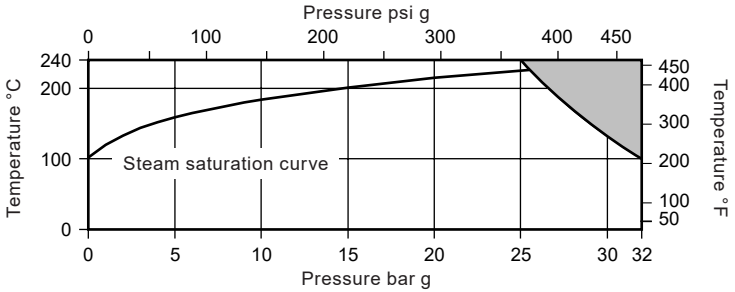
2.4 Pressure/temperature limits

***CRN approved** ST14 DN40 and DN50 units must not be used in this region.

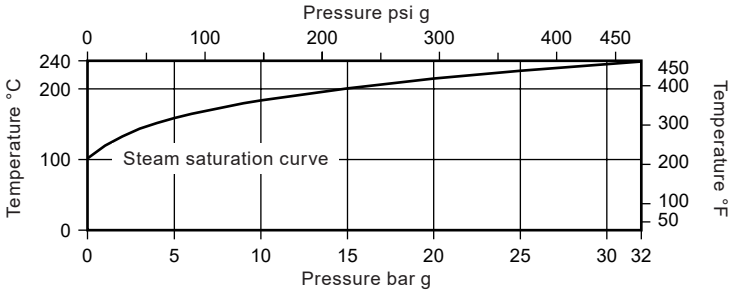
ST14



ST16



ST17



The product **must not** be used in this region.

2.4 Pressure/temperature limits (continued)

Body design conditions					PN40
PMA	Maximum allowable pressure			32 bar g	(464 psi g)
TMA	Maximum allowable temperature			240 °C	(464 °F)
Minimum allowable temperature				0 °C	(32 °F)
PMO	Maximum operating pressure for saturated steam service			32 bar g	(464 psi g)
		ST14	*CRN approved DN40 and DN50	30 bar g	(435 psi g)
		ST16		25 bar g	(362 psi g)
		ST17		32 bar g	(464 psi g)
TMO	Maximum operating temperature			240 °C	(464 °F)
Minimum operating temperature				0 °C	(32 °F)
PMX	Maximum differential pressure is limited to the PMO				
Designed for a maximum cold hydraulic test pressure:				60 bar g	(870 psi g)
Note: With sensor fitted, test pressure must not exceed:				32 bar g	(464 psi g)

3. Installation

3.1 Check materials, pressure, temperature and their maximum values. Do not exceed the performance rating of the sensor chamber.

3.2 Remove any protective covers.

3.3 Ensure the pipework is free from dirt or other debris.

3.4 Install the sensor chamber immediately upstream of the steam trap, ensure the unit is in a horizontal pipeline with the drain plug downwards. Ensure the direction of flow is in accordance with the flow arrow on the body (refer to Figure 2).
Caution: To avoid damaging of cables, the WLS1 waterlogging sensor assembly should be fitted after the sensor chamber has been fitted in line and tightened to a torque of 50 - 60 Nm (37 - 41 lbf/ ft).

3.5 Support pipework may be required for larger sensor chamber and trap arrangements.

3.6 Ensure adequate space is provided for the removal of the sensor from the chamber body.

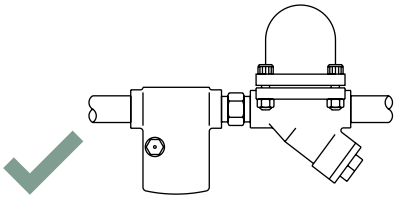


Fig.2 Correct Installation

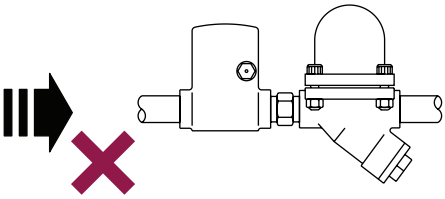


Fig.3 Incorrect installation

4. Commissioning

4.1 Make sure that the sensor chamber has been fitted correctly (see Figure 2, page 9).

4.2 Ensure that the spiratec connector is securely screwed in to the sensor chamber and wired correctly to the trap monitor.

4.3 Open isolation valves slowly, until normal operating conditions are achieved.

4.4 Check for leaks and correct operation.

5. Operation

The SS1 sensor operates on conductivity measurement. Provided the sensor remains submerged in condensate the steam trap will be indicated as working. When the WLS is fitted the unit operates under the same principal, with the exception that it will also detect cold condensate (this indicates that the trap has failed closed).

6. Maintenance

6.1 Maintenance of sensor chamber assembly

It is recommended that the sensor is removed periodically to inspect and clean the insulator. Replace the sensor if the insulator is damaged or eroded. The frequency of this inspection procedure will depend on the nature and rate of flow of the condensate. After removal, the sensor should always be refitted using a new sensor gasket and retightened to a torque of 50 - 56 N m (37 - 41 lbf ft).

7. Spare parts

The spare parts available are detailed below. No other parts are supplied as spares.

Available spares

SS1 standard sensor and gasket	**2,3**
WLS1 waterlogging sensor assembly and gasket	**2,3**
WLS1 diode pack	**4**
Sensor gaskets (packs of 10)	**3**
Sensor blanking plug (optional extra - not shown)	

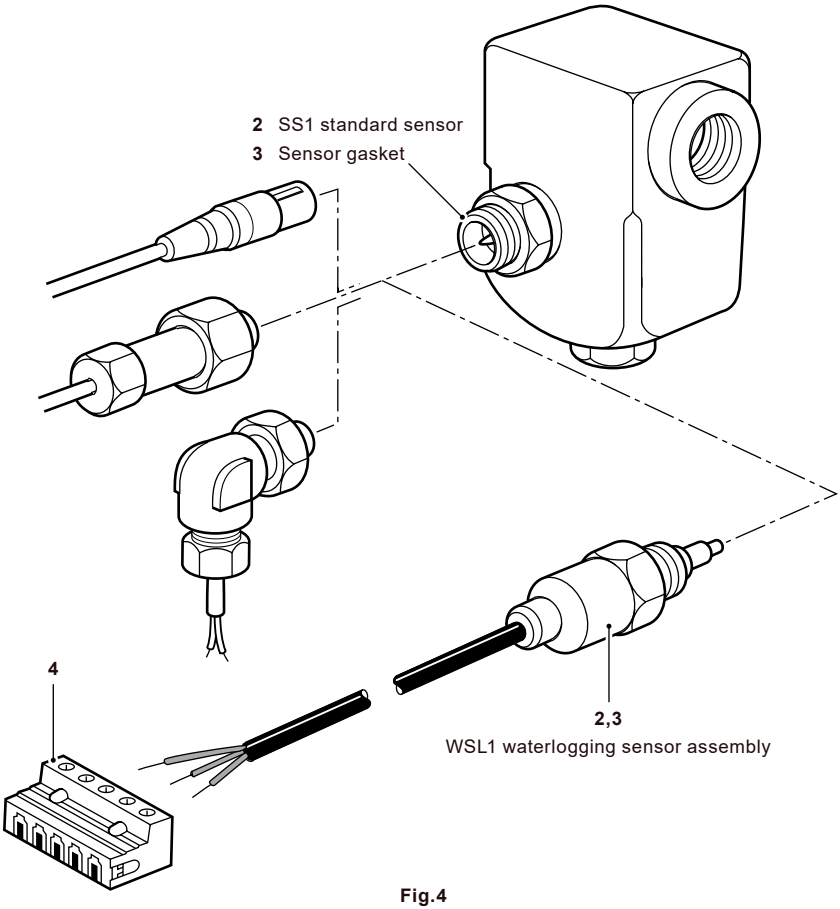


Fig.4