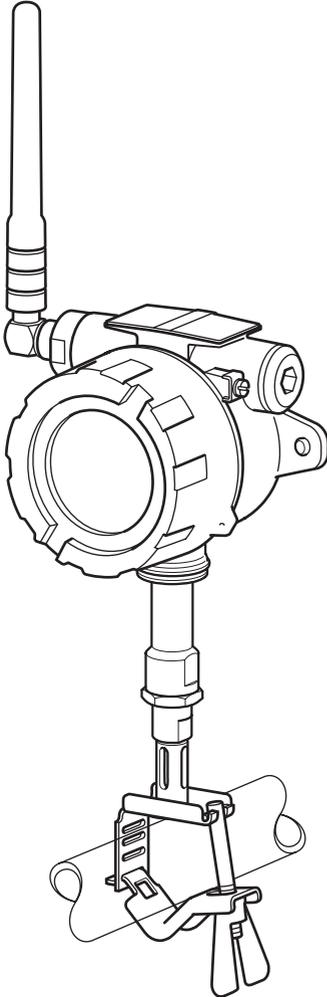


spirax sarco

STAPS

Wireless Head Unit for ISA100.11a applications Quick Installation Guide



1. Safety information
2. General product information
3. Installation of head
4. Spare parts
5. Certification and approvals
6. Technical data

Software copyright

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Open source software

This product uses open source software that is based on Freertos general public license (GPL), etc.

Terms and conditions of GPL

For details of GPL, visit the website: <http://www.freertos.org/a00114.html>

Operation guarantee

According to the terms and conditions of the license shown above, we do not guarantee the operation of open source software itself.

Information on respective open source license software

For module names and source codes of open source software that is used in this product, please contact us.

1. Safety information

Safe operation of this unit can only be guaranteed if it is properly installed, commissioned and maintained by a qualified person (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.

Registered Address - Spirax-Sarco Limited,

Charlton House,
Charlton Kings,
Cheltenham,
Gloucestershire,
UK,
GL53 8ER

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



marking, and may cause injury or fatality to personnel.

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.

- i) The product has been specifically designed for use on saturated steam systems.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values.
- 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.

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 the danger of burns and consider whether protective clothing (including safety glasses) is required.

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 427 °C (800 °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

This product does not contain fluid that will freeze, however lower temperatures will affect the product performance. Do not subject the product to temperatures below the stated minimum.

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. The product should be recycled in line with local legislation. Special attention should be paid to the battery, see Section 1.17.

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. Refer to Section 1.17 with regards to shipping/returning of the lithium batteries.

1.17 Battery

The Head unit is powered by a Lithium battery (Tadiran SL-2880).

Handling considerations:

- Do not crush, pierce, short (+) and (-) battery terminals with conductive (i.e. metal) goods.
- Do not directly heat or solder.
- Do not throw into a fire.
- Do not mix batteries of different types and brands.
- Do not mix new and used batteries.
- Keep batteries in non-conductive (i.e. plastic) trays.
- Do not subject the battery to temperatures above 100 °C

Storage

Store in a cool (preferably below 30 °C), dry, clean and well-ventilated area.

Environmental consideration

As with any battery, local environmental regulations must be adhered to with regard to disposal of spent batteries. Special attention must be paid not to mix with other types of batteries. Battery hazards remain even when the cells are discharged.

Shipping considerations

Transport of Lithium batteries is regulated by many authorities. i.e.:

- ADR (European Ground Transportation),
- IATA (International Air Transport Association),
- ICAO (International Civil Aviation Organisation) and the Regulations concerning the International Carriage of Dangerous Goods by Rail (Intergovernmental Organisation for International Carriage by Rail).

It is the responsibility of the shipper to ensure that these regulations are followed.

1.18 Use of non genuine components or spare parts

This product is certified by a number of health and safety regulatory bodies for health and safety and environmental purposes. To maintain the approvals only genuine components and spare parts must be used. This includes consumable items such as the Tadiran battery and power supplies.

2. General product information

2.1 General description

The STAPS wireless steam trap monitoring system has been designed to efficiently monitor and evaluate steam trap operation. It surveys the operation of the steam trap at regular intervals and identifies poor performance that can cause reduced plant efficiency and increased energy consumption. It can diagnose both failed-open steam traps that leak live steam, and those that have failed-closed or are blocked, resulting in waterlogging, leading to plant damage, product spoilage and health and safety concerns.

Using non-intrusive installation technology combined with ISA100.11a 2.4 GHz wireless network, it is an ideal solution for steam trap monitoring. It is suitable for use with all types of steam trap and can be connected to pipework up to 100 mm (4"), via an adjustable clamp.

How does it work?

A head unit assembly mounted on the pipe upstream of the trap to be monitored 'listens' to the sound signature of the trap in operation. This sound signature is categorised and the trap condition and steam loss are transmitted via 2.4 GHz (ISA100.11a) wireless network. The trap condition and steam loss data is available via the ISA100.11a network.

Each STAPS head unit assembly is powered by a long life Lithium battery (typical battery life of over 3 years). The device is ISA100.11a compliant, and is capable of seamlessly joining and being part of existing and new ISA100.11a compliant networks. It is capable of acting as an ISA100.11a routing device if and when required to extend the radius of the network, but this will have an effect on the expected lifetime of the battery. To maximise battery lifetime, the device should be set to act as an ISA100.11a I/O (end node) only device with the routing functionality turned off.

The steam trap data of each device is passed over to the ISA100.11a network Manager via a backbone router (Access Point), and is made available to the backbone network via interface(s) of the ISA100.11a network Gateway.

2.2 STAPS head unit assembly

The STAPS head unit includes the head unit and the sensor and clamp that must be connected to the steam pipe upstream of the steam trap that it is monitoring. The pipe clamp is available in four sizes to suit: ½" - 1¼", 1½", 2" - 2½" and 3" - 4".

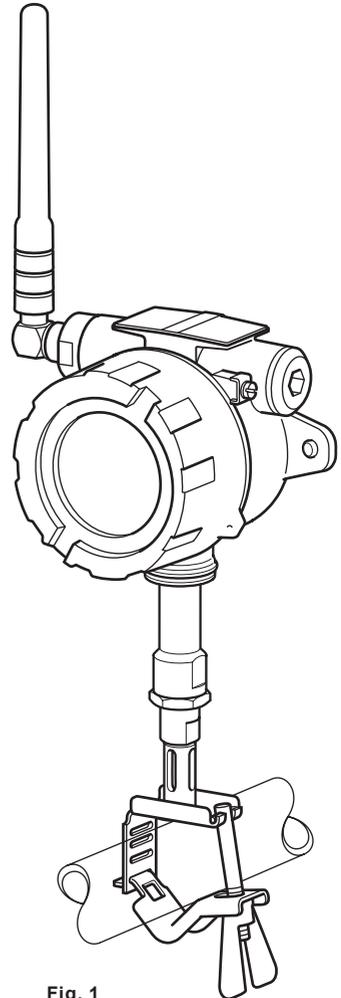


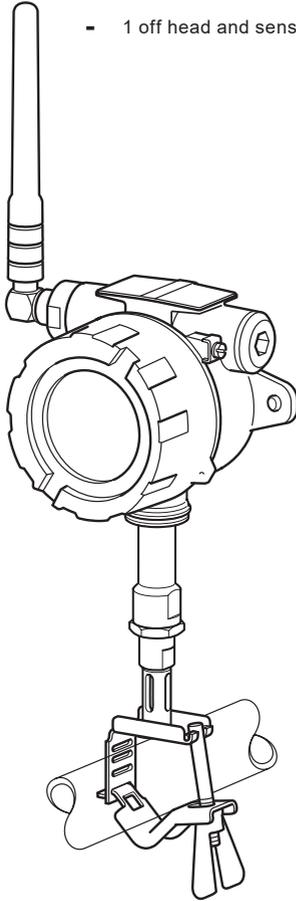
Fig. 1

3. Installation of the head unit assembly

Note: Before actioning any installation observe the 'Safety information' in Section 1.

The STAPS sensor includes the following parts:

- 1 off head and sensor assembly, including the head unit and sensor.



Slot used for size of pipe:

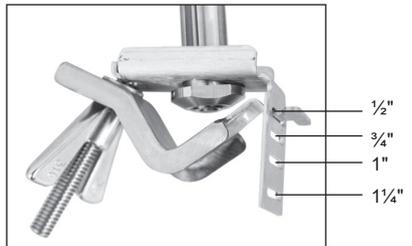
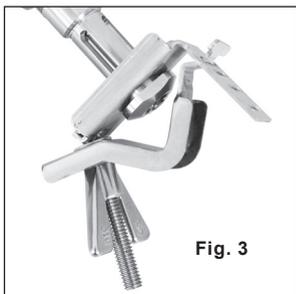


Fig. 2



- 1 off lower clamp with 'T' bolt and wing nut.
Size ½" - 1¼"



- Larger sizes use a top clamp with jubilee clips.
Size 1½" to 4"



Fig. 5
Clamp for use with a Spirax Sarco STS17 or STS17.2 compact pipeline steam trapping station.



- A Tadiran SL-2880 3.6 V battery will be required to power each head, and is supplied loose within the box.

Fig. 6

- **The weather** - The head unit is IP66 rated.
- **Wireless signal obstructions** - Will adjacent buildings, pipework or other objects obstruct the wireless signal from reaching the nearest access point.
- **Interference** - Is there any electrical or radio interference that may affect the performance of the STAPS head unit.
- **Access** - Is there sufficient access to the head to change the batteries for maintenance?
- **Installation** - Is there sufficient room at the sensor at the top for the head to be mounted on the pipe?
- **Lagging** - Ensure that any pipe lagging in the area where the STAPS head is to be fitted is removed before fitting. DO NOT re-lag the STAPS head unit, including the clamp and stem.

3.1 Fitting the battery to the sensor head

The head unit assembly requires a Tadiran SL-2880 3.6 V battery to function.

Note: The head unit needs to be powered to be commissioned. However if the complete 'system' (receiver and DCS) is not in service, the battery should be removed until required. Failure to do so will considerably reduce battery life.

3.1.1 Unscrew the head cover retaining screw.



Fig. 7

3.1.2 Turn head cover anticlockwise to unscrew.



Fig. 8

- Lift housing lid.



Fig. 9

3.1.3 Unscrew EMC shield screws.



Fig. 10

- Lift EMC shield.



Fig. 11

3.1.4 Ensure all packaging is removed and fit battery into holder in the head unit. Ensure that the battery is in the correct orientation as per the orientation marker (+ to top).
Note: Only use a Tadiran SL-2880 Lithium Thionyl Chloride 3.6 V battery.

It is normal for the LED to light momentarily when the battery is fitted (see Section 3.1.7 for information on the operation of the LED).

3.1.5 Refit the EMC shield and tighten screws.

3.1.6 Refit the cover and retaining screw. Check that the 'O' ring seal is in good condition before refitting the cover. Make sure that Molykote 111 Compound is applied to the threads to ensure an air tight seal and the the cover is correctly seated in place.

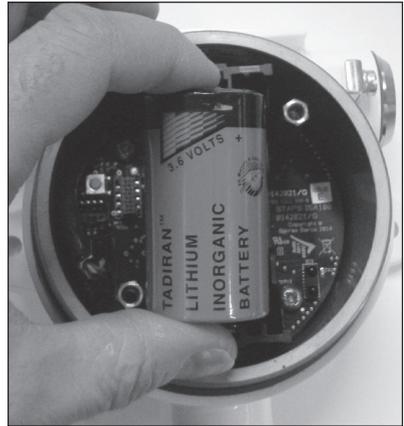


Fig. 12

3.1.7 Button and LED Function

The button (Top left - Figure 13) will perform a number of functions dependent on the length of time it is held and whether it is pressed before the battery is inserted.

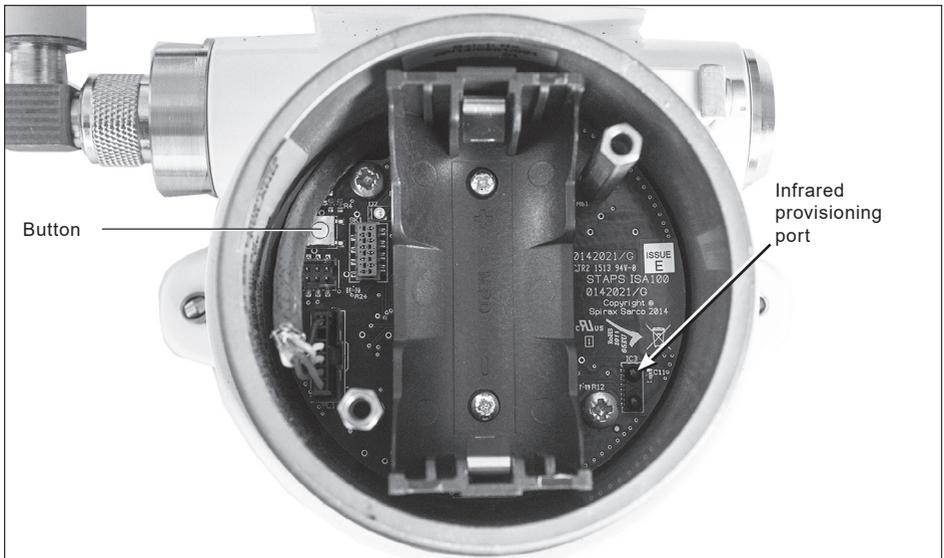


Fig. 13

The LED response – number of flashes, follows the following pattern for each status that it is reporting; 1 flash is bad, 3 flashes are good.

Time pressed	Function	Action
< 0.2 s	None	
0.2 - 5 s	Display status	<p>The LED flashes green rapidly whilst the button is pressed.</p> <p>When the button is released the LED flashes red in sequence to indicate trap condition, battery status and RSSI.</p> <p>Trap condition</p> <ul style="list-style-type: none"> 1 flash: Leak 2 flashes: Warning 3 flashes: Good <p>Battery Status</p> <ul style="list-style-type: none"> 1 flash: Replace 2 flashes: Warning 3 flashes: Good <p>RSSI</p> <ul style="list-style-type: none"> 1 flash: <=-80 dBm 2 flashes: >-80, <=-60 dBm 3 flashes: >-60 dBm
<p>Press and hold the button before fitting the battery. Note: There will be a small delay before the LED begins to flash green.</p>		
5 - 10 s	Remove provisioning	If the button continues to be pressed the LED continues to flash green. The erase occurs after the button is released. The LED flashes red whilst the provisioning is being removed.
15 - 20 s	Reset to factory default	<p>If the button continues to be pressed the LED continues to flash green.</p> <p>The reset occurs after the button is released.</p> <p>The LED flashes red whilst the reset to factory defaults is being applied.</p>
> 20 s	None	

3.2 Attaching the antenna

- Align the antenna pin with the antenna adaptor jack.



Fig. 14

- Screw in knurled antenna nut.

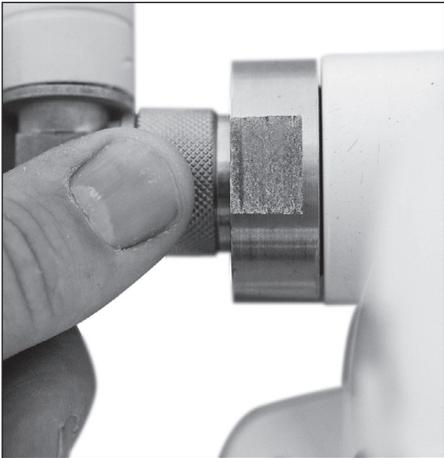


Fig. 15

- Align antenna vertically and ensure the antenna nut is fully tightened.

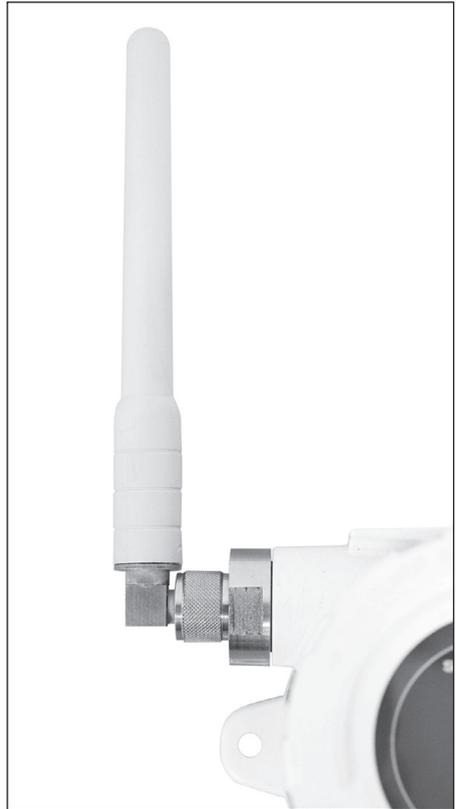


Fig. 16

3.2.1 Fitting a remote mounted antenna

Where the head unit is installed in an area with poor radio reception, an extension cable of up to 3 m length may be used to re-site the antenna and improve reception.

Take the extension cable and attach one end to the antenna adaptor on the head enclosure as shown in Figure 17.

Mount the alternative antenna in the desired position using the pole clamp supplied with the antenna as shown in Figure 18.

Take the loose end of the extension cable and attach to the end of the antenna as shown in Figure 19.



Fig. 17

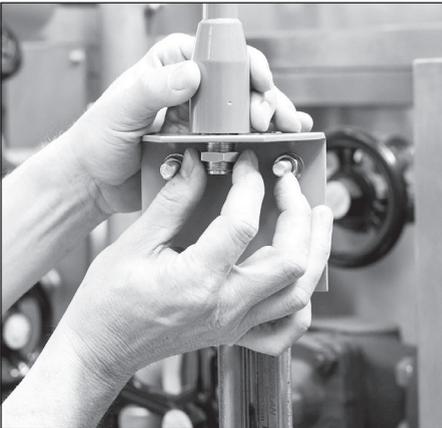


Fig. 18

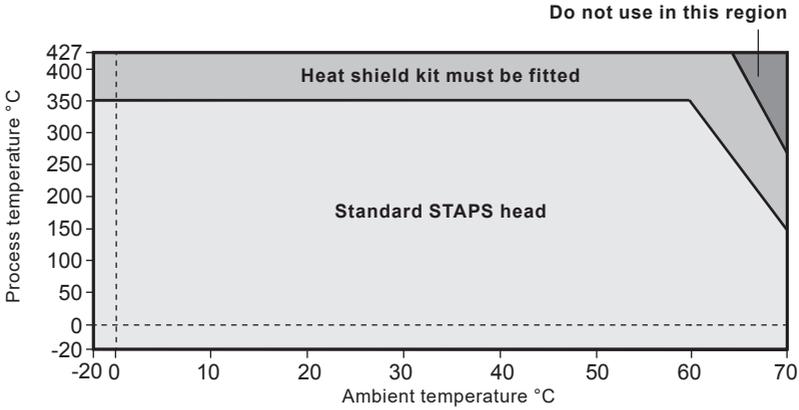


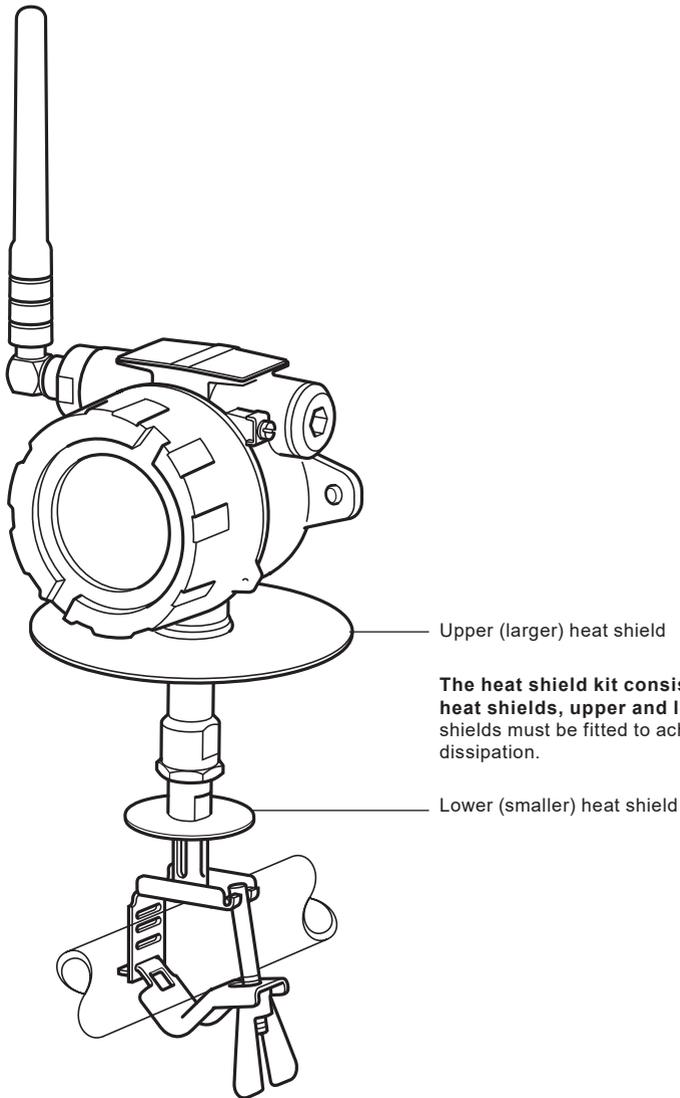
Fig. 19

3.3 Fitting the heat shields

Where process and ambient temperatures exceed the limits of the standard head unit, heat shields must be fitted. See the chart below.

Refer to Section 3.3.1 for the correct installation of the heat shields, taking particular notice of the orientation shown in Figure 31.





Upper (larger) heat shield

Lower (smaller) heat shield

The heat shield kit consists of two individual heat shields, upper and lower. Both heat shields must be fitted to achieve the optimum heat dissipation.

Fig. 20

3.3.1 How to install the heat shields

Remove the fixing clamp retaining nut, ensure the sensor stem does not rotate by using a 16 mm spanner on the flats provided as per Figure 21 and remove the nut as per Figure 22. Failure to do so may affect the factory set loading of the sensor.

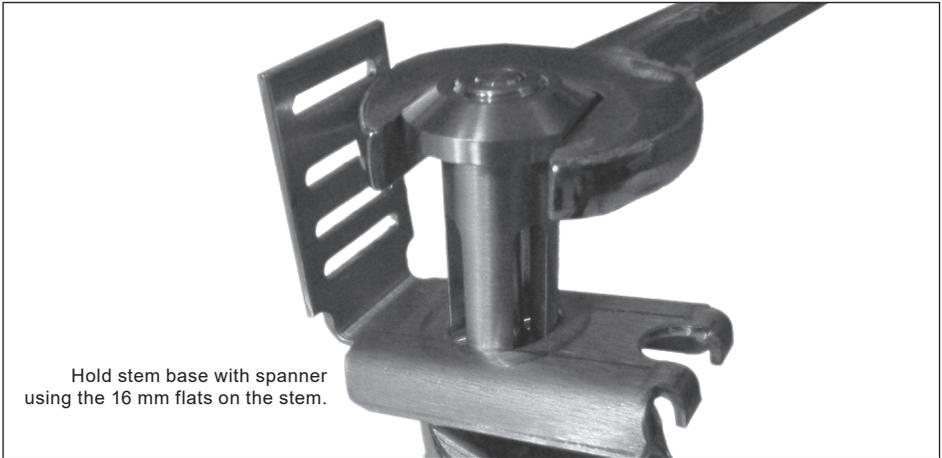


Fig. 21

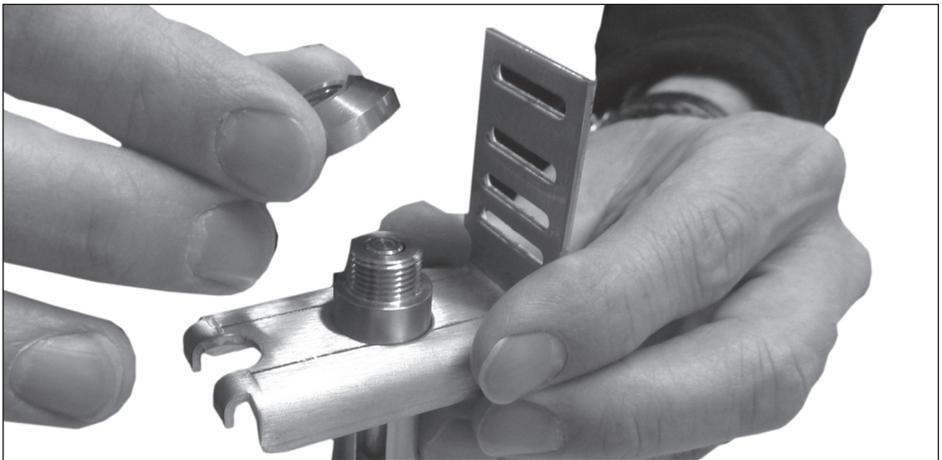


Fig. 22

- Slide the upper heat shield (larger one) over the sensor stem

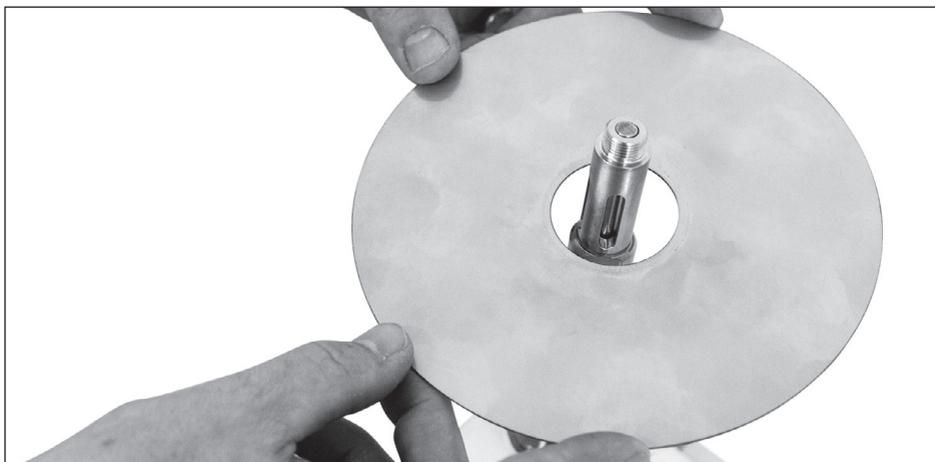


Fig. 23

- Slide larger circlip over sensor stem.



Fig. 24

- Using circlip pliers spread circlip and insert into groove, thus retaining heat shield.



Fig. 25

- Repeat procedure for the lower (smaller) heat shield.



Fig. 26



Fig. 27



Fig. 28

- Replace fixing clamp and retaining nut.

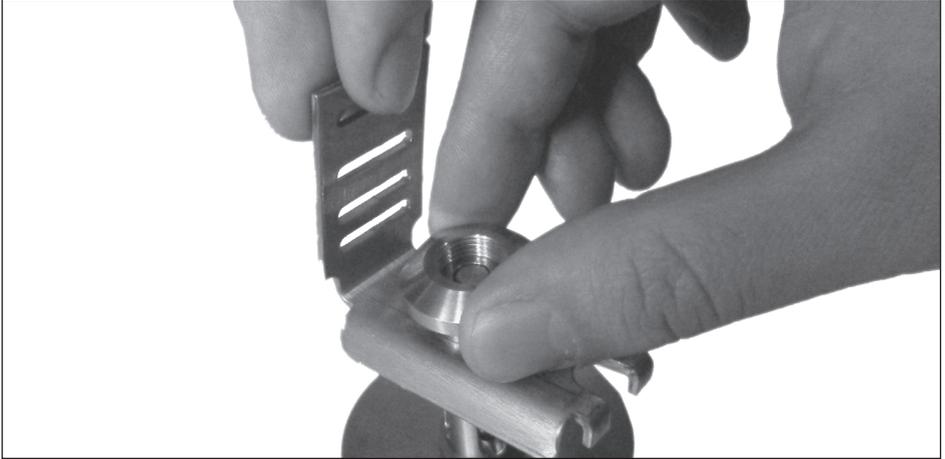


Fig. 29

- Tighten fixing clamp nut to 16 - 18 Nm carefully, ensure the sensor stem does not rotate by using a 16 mm spanner on the flats provided as per Figure 30. Failure to do so may affect the factory set loading of the sensor.



Fig. 30

3.4 Mounting the head unit

Ensure that any pipe lagging is removed from the area where the STAPS head is to be fitted. **DO NOT re-lag the STAPS Head.**

3.4.1 For pipe sizes 1/2" to 1 1/4"

Slide the tongue of the lower clamp into the appropriate slot of the top clamp.

Offer the head unit to the pipe as close as possible but within 150 mm upstream of the steam trap to be monitored (see Figure 35).

Hook the 'T' bolt over the top clamp and tighten the wing nut. The head unit must be installed to suit the ambient process temperature conditions. When used at higher temperatures a heat shield is required, see Table 1 and Figure 31 below.

The standard head should be installed on top of the pipe. It can be angled up to 45° from vertical (90°).

Where the heat shields are required, the head must be fitted at an angle between 0° and 45°, see Figure 31.

Ambient temperature	Maximum process temperature	Heat deflector	Orientation
-20 °C to 65 °C	427 °C	Yes	0° to 45°
-20 °C to 70 °C	270 °C	Yes	0° to 45°
-20 °C to 70 °C	150 °C	No	45° to 90°
-20 °C to 65 °C	250 °C	No	45° to 90°
-20 °C to 60 °C	350 °C	No	45° to 90°

Table 1 Heat Shields

This certification only covers the STAPS ISA 100 wireless device and does not cover the process pipe. The temperature of the process pipes should be separately considered when used in a hazardous area.

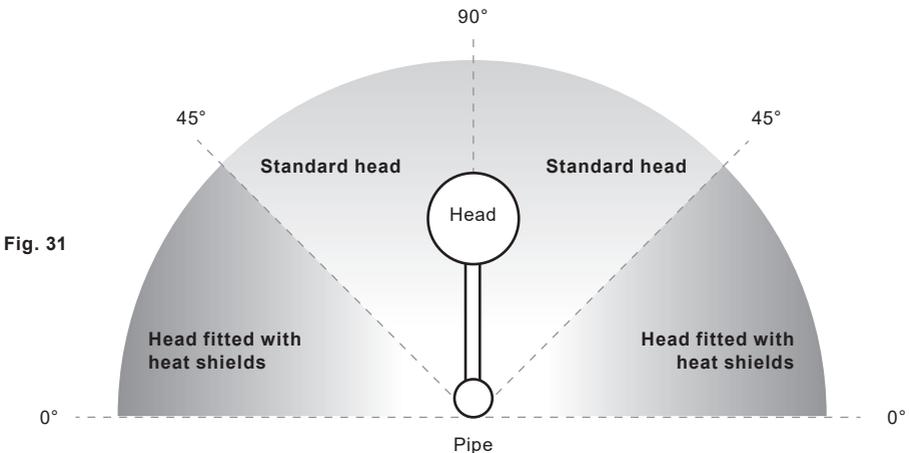


Fig. 31

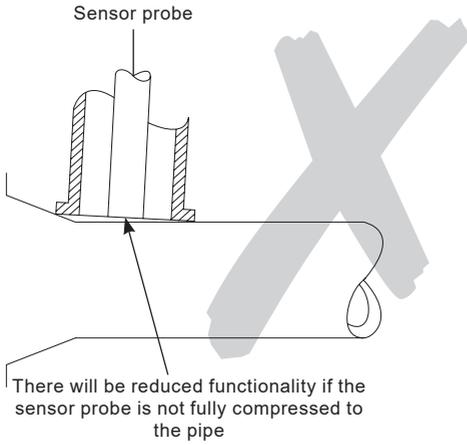


Fig. 32

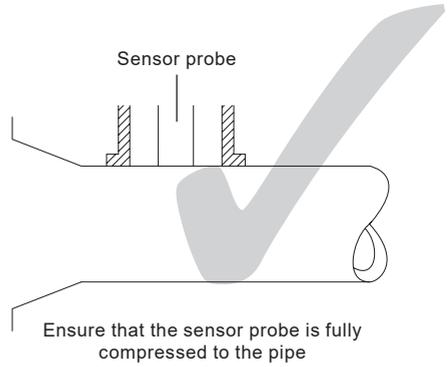


Fig. 33

Caution: If fitted to a hot pipe, recheck that the clamp is tight after 15 minutes.



Fig. 34

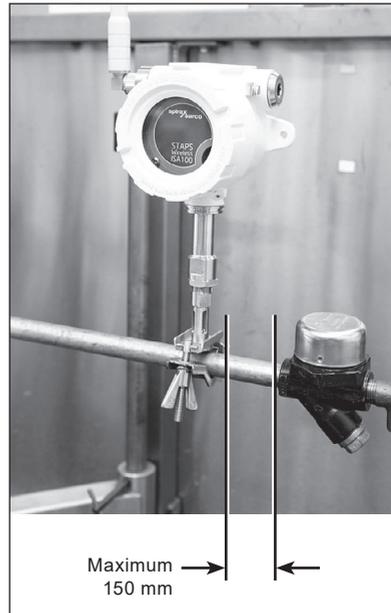


Fig. 35

3.4.2 For pipe sizes 1½", 2" - 2½" and 3" - 4".

The larger sizes use jubilee clips rather than a clamp to attach the head unit to the pipe. Separate the jubilee clips and slide over the pipe and slide them over the pipe, loosely tighten the clips to the pipe, allowing room to push the top clamp under.

Ensure that the head unit is fitted in the orientation that suits the pipe and ambient conditions (see Section 3.4.1).



Fig. 36

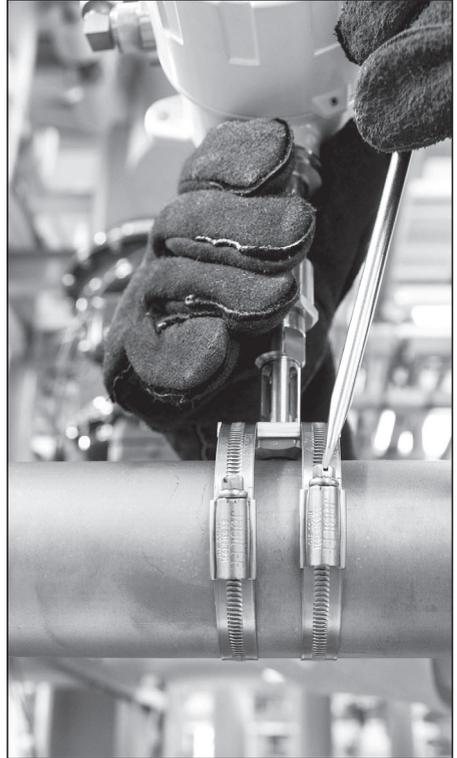


Fig. 37

Caution:

If fitted to a hot pipe, recheck that the clamp is tight after 15 minutes.

3.4.3 For STS17.2 Steam Trapping Station

- STS 17.2 clamp assembly consists of: 'U' bolt, 2 x washers, 2 x nuts and top clamp
- Assemble as shown in Figure 38, positioning the sensor on the STS flange such that the STAPS assembly is as close to vertical as possible. See Figures 39 and 40.
Note: Refer to the temperature table shown in Section 3.3. It is not possible to fit heat shields to the STAPS head when fitted to a STS17.2. Therefore it is not suitable for applications with ambient temperatures above 65 °C.
- Tighten the 'U-bolt' wing nuts firmly.



Fig. 38

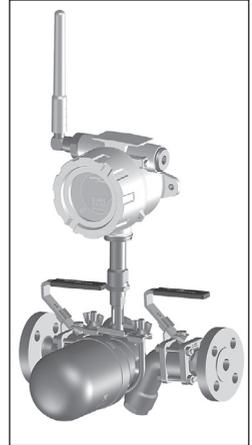


Fig. 39

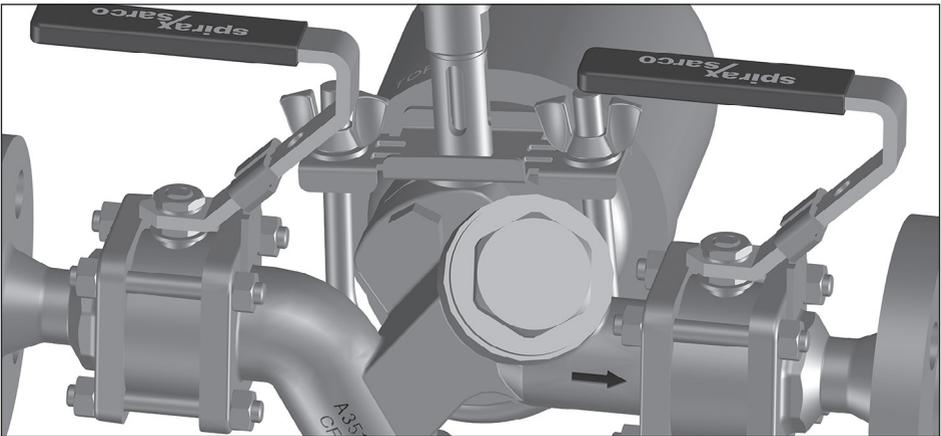


Fig. 40

3.5 MAC ID (EUI-64)

The MAC ID is a unique number to the piece of equipment it is attached to. This cannot be changed and will remain with the product for its lifetime.

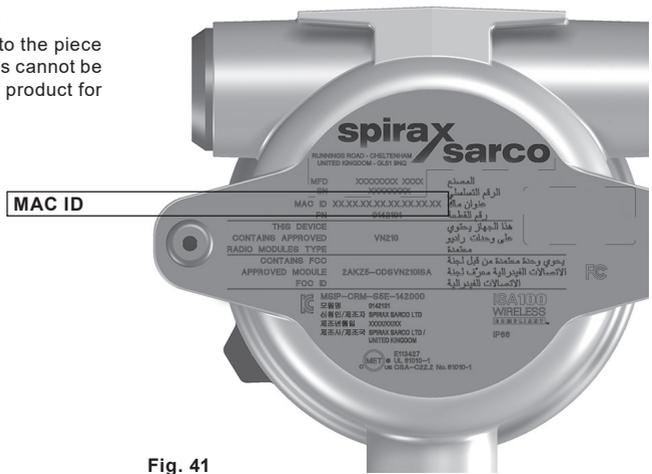


Fig. 41

Important: Make sure that MAC ID is noted against a trap type and reference location. This data will be required when entering or editing the configuration parameters (using the infrared port or wirelessly).

Information required:

1. Location reference or trap tag No.
2. Type of trap.
3. Size of trap orifice.
4. Steam line pressure at the trap that the head is fitted to.
5. Open or closed return line.

3.6 Device provisioning via the infrared port

The STAPS head can be provisioned via its infrared port, accessed through the front glass as per Figure 42.

For full details see separate software IMI.



Fig. 42

4. Spare parts

Only the parts listed below are available for the STAPS ISA100 wireless steam trap monitoring system. No other parts are supplied as spares.

Available spares

Battery (Tadiran SL-2880 3.6 V battery)	11
Enclosure 'O' ring spares kit, (includes Molykote 111 Compound sachet to seal enclosure threads)	10
Clamp, 'T' bolt and wing nut for pipe sizes ½" to 1¼"	4 and 5
Clamp for pipe size 1½"	
Clamp for pipe size 2" and 2½"	12
Clamp for pipe size 3" and 4"	
Clamp for STS17 (trap station)	13
Antenna (standard)	
Antenna +4 dBi	9
Antenna extension cable.	
Heat Shield Kit	14

How to order spares

Always order spare parts by using the description given in the column headed 'Available spares' and state the size and unit nomenclature that they are intended for.

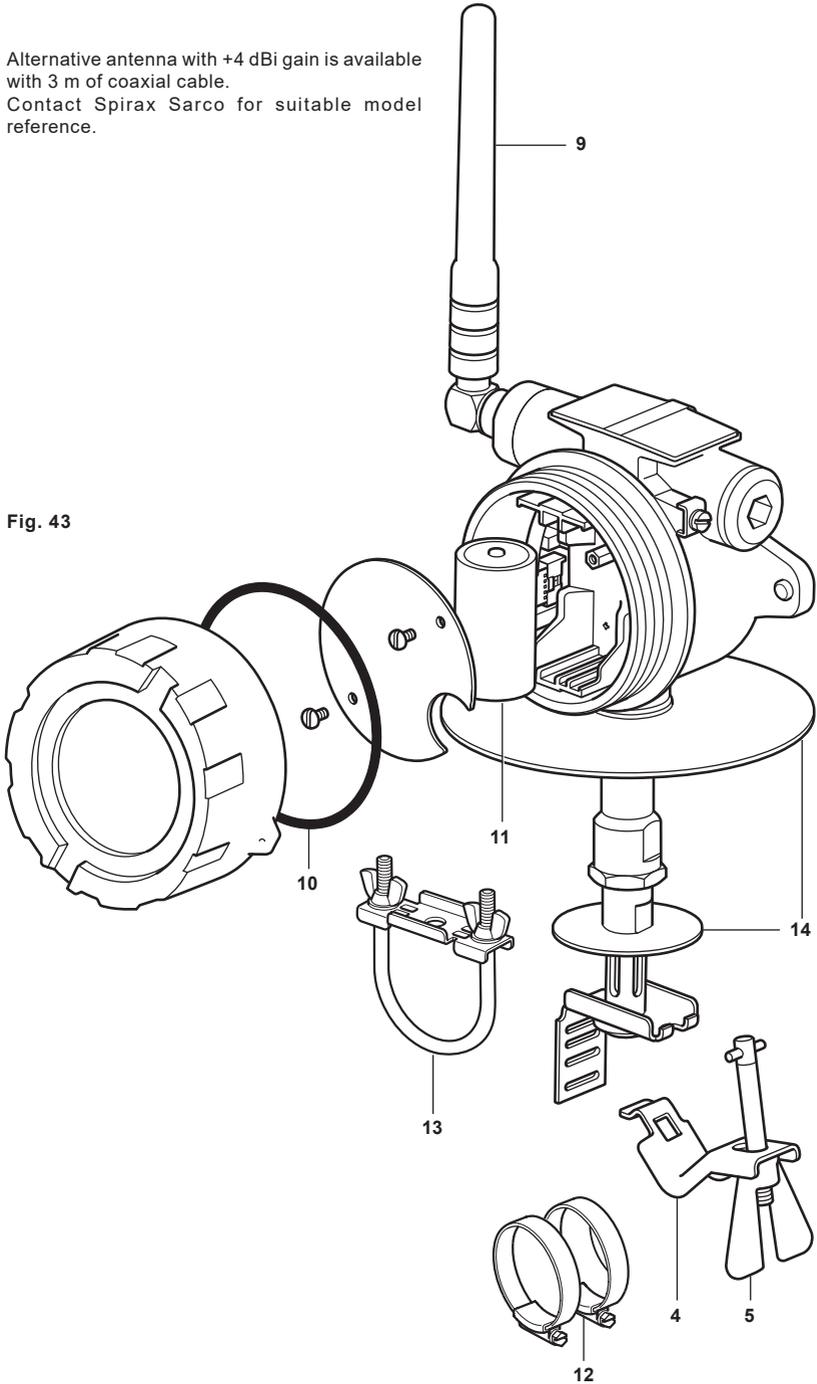
Example:

1 off Battery spares kit (Tadiran SL-2880 3.6 V battery) and 1 off 'O' ring spares kit (Molykote 111 Compound sachet).

These spares are for a STAPS ISA100 wireless steam trap monitoring system.

Alternative antenna with +4 dBi gain is available with 3 m of coaxial cable.
Contact Spirax Sarco for suitable model reference.

Fig. 43



5. Certification and approvals

Certification

IECEX certification	Equipment protection level	IECEX certificate : IECEx SIR 15.0070X
	Gas	Ex ia op is IIC T4 Ga
	Dust	Ex ia IIIC op is T135 °C Da
	Tamb	-20 to +70 °C
	Tprocess	-20 to +427 °C (heat shield must be fitted for higher temperatures, see Note 1 below).
	For use with: Tadiran SL-2880 3.6 V Lithium Thionyl Chloride Battery only.	
	Standards used	IEC 60079-0, IEC 60079-11 and IEC 60079-28

European certification	ATEX Intrinsic Safety 	ATEX certificate : Sira 15ATEX2197X
	Gas	Ex ia op is IIC T4 Ga
	Dust	Ex ia IIIC op is T135 °C Da
	Tamb	-20 to +70 °C
	Tprocess	-20 to +427 °C (heat shield must be fitted for higher temperatures, see Note 1 below).
	For use with: Tadiran SL-2880 3.6 V Lithium Thionyl Chloride Battery only.	
	Standards used	EN 60079-0, EN 60079-11 and EN 60079-28

 <p>UK certification (UKCA EX)</p> 	UKCA certificate	CSAE 21UKEX2184X
	Equipment group	II
	Gas	1G
	Dust	1D
	Ambient temperature	-20 to +70 °C
	Process temperature (max)	-20 to +427 °C (heat shield must be fitted for higher temperatures, see note 1 below)
	For use only with	3.6 V Lithium Thionyl Chloride Battery only.
	Standards	EN 60079-0, EN 60079-11 and EN 60079-28

Note 1: For higher process and ambient temperatures the head and heat shield must be installed as detailed in Sections 3.3 and 3.4.



Warning:

1. The equipment must be inspected and cleaned regularly to prevent the build-up of dust on the product.
2. **Electrostatic Hazard – Wipe only with a damp cloth.**
3. **Only Tadiran SL-2880 3.6 V Lithium Thionyl Chloride batteries are permitted to be used within the STAPS wireless steam trap monitor.**
4. **The enclosure is manufactured from aluminium. In rare cases, ignition sources due to impact and friction sparks could occur. This shall be considered during installation, particularly if the equipment is installed in a zone 0 location.**

Note: The above certification and approvals are only valid if the product is installed using the genuine supplied component parts and accessories, including consumable items such as batteries.

Product marking - continued

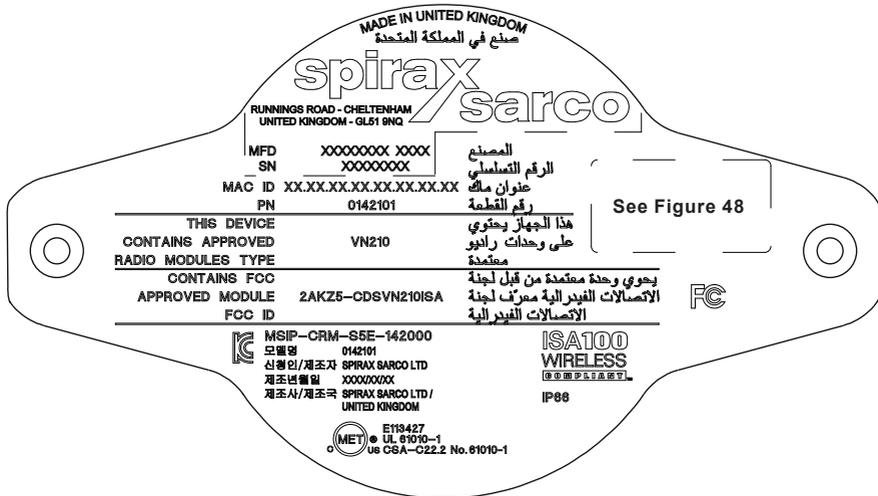


Fig. 46

Fig. 47

**WARNING - USE ONLY
Tadiran SL-2880 BATTERIES**

**AVERTISSEMENT - N'UTILISE QUE
Tadiran SL-2880 BATTERIES**

Fig. 48

IECEX SIR 15.0070X
Ex ia op is IIC T4 Ga
Ex ia III C op is T135°C Da
Sira 15ATEX2197X
CSAE 21UKEX2184X
Tamb= -20°C to +70°C

 II 1GD

 2812

 0891

Gas	Ex ia op is IIC T4 Ga
Dust	Ex ia III C op is T135 °C Da

6. Technical data

Head unit: See Section 3 for mounting options.

Integral battery	Lithium Thionyl Chloride
Maximum altitude	3 000 m (0.7 bar atmospheric)
Ambient temperature range	-20 to +70 °C
Maximum pipe temperature	427 °C
Maximum relative humidity	95% Enclosure rating IP66
Visual indicators	LED
