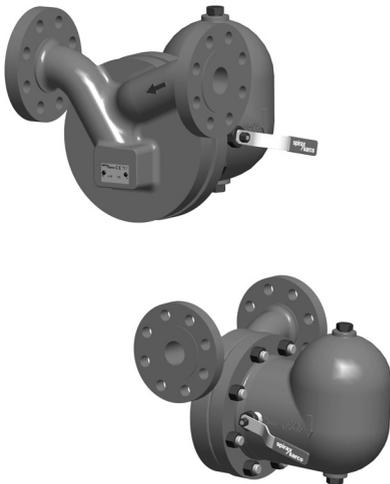




FTC23 Carbon Steel Ball Float Trap Installation and Maintenance Instructions

The PED Directive 97/23/EC is repealed and replaced by the new **PED Directive 2014/68/EU** with effect from 19 July 2016.



1. Safety information
2. General product information
3. Installation
4. Commissioning
5. Operation
6. Maintenance
7. Spare parts

ATTENZIONE

Lavorare in sicurezza con apparecchiature in ghisa e vapore

Working safely with cast iron products on steam

Informazioni di sicurezza supplementari - *Additional Informations for safety*

Lavorare in sicurezza con prodotti in ghisa per linee vapore

I prodotti di ghisa sono comunemente presenti in molti sistemi a vapore.

Se installati correttamente, in accordo alle migliori pratiche ingegneristiche, sono dispositivi totalmente sicuri.

Tuttavia la ghisa, a causa delle sue proprietà meccaniche, è meno malleabile di altri materiali come la ghisa sferoidale o l'acciaio al carbonio.

Di seguito sono indicate le migliori pratiche ingegneristiche necessarie per evitare i colpi d'ariete e garantire condizioni di lavoro sicure sui sistemi a vapore.

Movimentazione in sicurezza

La ghisa è un materiale fragile: in caso di caduta accidentale il prodotto in ghisa non è più utilizzabile. Per informazioni più dettagliate consultare il manuale d'istruzioni del prodotto.

Rimuovere la targhetta prima di effettuare la messa in servizio.

Working safely with cast iron products on steam

Cast iron products are commonly found on steam and condensate systems.

If installed correctly using good steam engineering practices, it is perfectly safe.

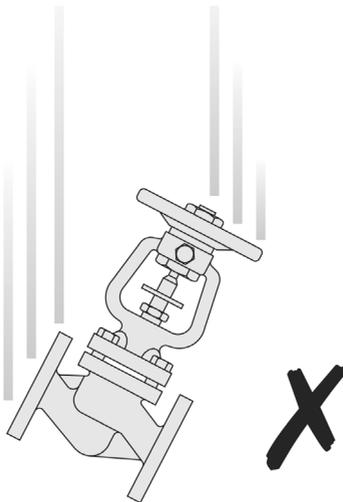
However, because of its mechanical properties, it is less forgiving compared to other materials such as SG iron or carbon steel.

The following are the good engineering practices required to prevent waterhammer and ensure safe working conditions on a steam system.

Safe Handling

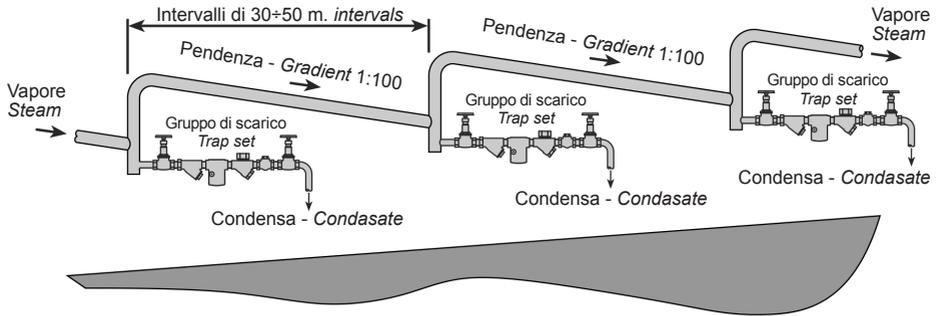
Cast Iron is a brittle material. If the product is dropped during installation and there is any risk of damage the product should not be used unless it is fully inspected and pressure tested by the manufacturer.

Please remove label before commissioning

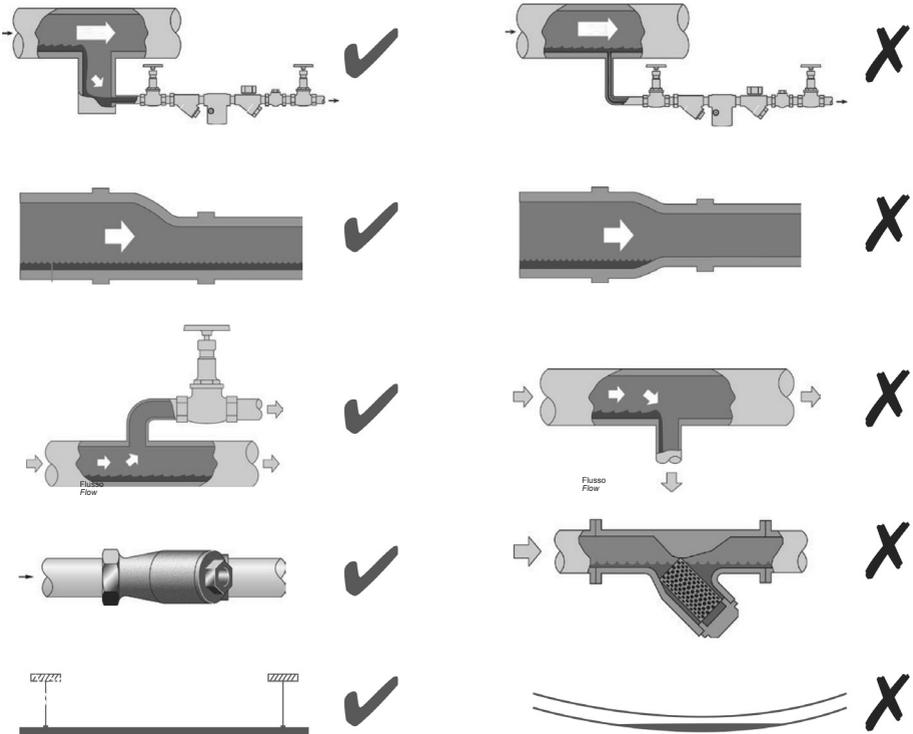


Prevenzione dai colpi d'ariete - *Prevention of water hammer*

Scarico condensa nelle linee vapore - *Steam trapping on steam mains:*



Esempi di esecuzioni corrette (✓) ed errate (✗) sulle linee vapore: *Steam Mains - Do's and Don't's:*



Prevenzione delle sollecitazioni di trazione

Prevention of tensile stressing

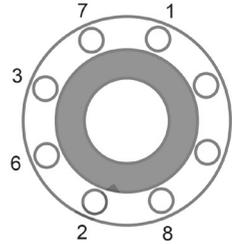
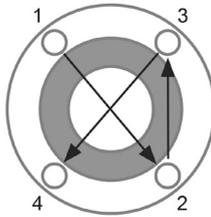
Evitare il disallineamento delle tubazioni - *Pipe misalignment*:

Installazione dei prodotti o loro rimontaggio post-manutenzione:
Installing products or re-assembling after maintenance:



Evitare l'eccessivo serraggio.
Utilizzare le coppie di serraggio raccomandate.

*Do not over tighten.
Use correct torque figures.*



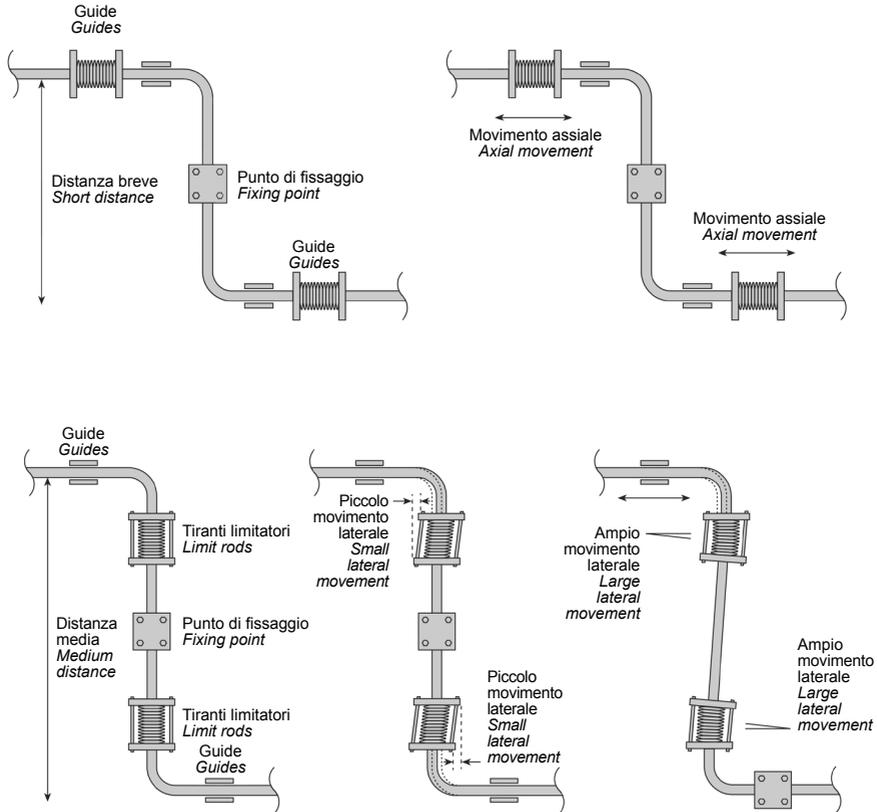
Per garantire l'uniformità del carico e dell'allineamento, i bulloni delle flange devono essere serrati in modo graduale e in sequenza, come indicato in figura.

Flange bolts should be gradually tightened across diameters to ensure even load and alignment.

Dilatazioni termiche - *Thermal expansion:*

Gli esempi mostrano l'uso corretto dei compensatori di dilatazione. Si consiglia di richiedere una consulenza specialistica ai tecnici dell'azienda che produce i compensatori di dilatazione.

Examples showing the use of expansion bellows. It is highly recommended that expert advise is sought from the bellows manufacturer.



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 on this document) 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. These products comply with the requirements of the European Pressure Equipment Directive 97/23/EC and carry the CE mark when so required. The products fall within the following Pressure Equipment Directive categories:

Product	Group 1 Gases	Group 1 Liquids	Group 2 Gases	Group 2 Liquids
FTC23 DN40	2	SEP	1	SEP
FTC23 DN50	2	2	1	SEP

- I) The product has been specifically designed for use on steam, air or condensate which are in Group 2 of the Pressure Equipment Directive. It has been also categorized for mediums which are in Group 1 of the above mentioned Directive. In case of use with mediums of Group 1, please contact Spirax Sarco in order to confirm suitability of the product for the intended application.
- 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 before installation.

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. 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 very high temperatures (350°C). 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 Safety information - Product specific

See the specific details relating to the product in the following "Maintenance" section.

1.16 Disposal

The product is recyclable. No ecological hazard is anticipated with the disposal of this product providing due care is taken.

In the event that, during the operation, the trap comes into contact with harmful substances, you will need to dispose it in accordance with regulations under the current legislation.

1.17 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 FTC23 is a carbon steel ball float steam trap having stainless steel cover and internals it is suitable for use with saturated and superheated steam, on process equipments, and is the first choice for drainage of temperature controlled systems. This trap is ideal to solve problems caused by dirt steam carrying solid and incondensable contaminants (salts and gasses), that lead quickly to fouling and accumulation of sediment and debris, resulting in failure of the internal mechanism (This trap is typically used on geothermal steam). The main feature is the innovative self-cleaning floating closure mechanism, which allows automatic safe operation even in cases of severe contamination of the steam. Furthermore, the position and size of main valve and seat makes easier the discharge of the condensate and of any solid contaminant. The trap is able to modulate the condensate flow adapting immediately to sudden and large variations of flow and pressure. Another key feature is the external manual lever that allows to fully open the plug regardless of the presence or absence of condensate in the device. In this way it is allowed both the removal of any sediment interior and checking the proper operation of the unit.

Standards

This product fully complies with the requirements of the European Pressure Equipment 97/23/EC and carries the CE mark when so required.

Approvals

This product is available, on request, with certification as defined in EN 10204 2.2 or EN 10204 3.1.

Note: all certification/inspection requirements must be stated at the time of order placement.

Versions

FTC23-07, FTC23-23

Special executions available on request.

Sizes and pipe connections

Flanged EN 1092 PN 40

Flanged ASME B16.5, Class 150

Flanged ASME B16.5, Class 300, standard

DN 40 and 50 - 1½" and 2"

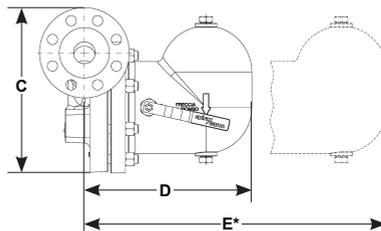
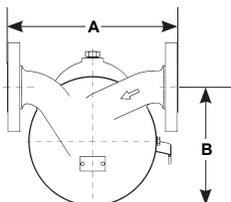
2.2 Pressure/temperature limits

PMA - Maximum allowable pressure	@ 350°C	50 bar g*
TMA - Maximum allowable temperature	@ 32 bar g	425°C*
Minimum allowable temperature		-10°C
PMO - Maximum operating pressure	@ 350°C	23 bar g*
Minimum operating temperature, danger of freezing considered		0°C
ΔPMX - Maximum differential pressure	FTC23-7	7 bar
	FTC23-23	23 bar g*
Designed for a maximum cold hydraulic test pressure of		75 bar g

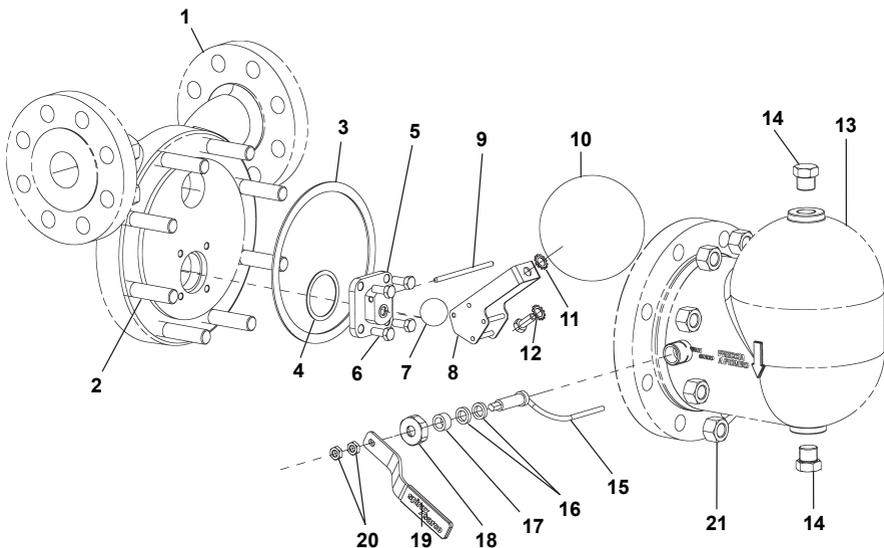
* **Note:** maximum operating pressure can be limited by the rating chosen for the flanges.

2.3 Dimensions/weights (approximate) in mm and kg

DN	A	B	C	D	E*	Weight
1½" e 2" - 40 and 50	320	220	305	310	560	40,0



* Withdrawal distance for cover removal



2.4 Materials

N°	Parts	Material	Designation
1	Body	Carbon steel	ASTM A216 WBC
		Stainless steel	ASTM A351 CF8 (on request)
2	Studs	Carbon steel	ASTM A193 B7
3	Body gasket		Exfoliated graphite reinforced steel
4	Seat gasket		Exfoliated graphite reinforced steel
5	Seat	Stainless steel	ASTM A479 316
6	Seat screws	Stainless steel	AISI 304
7	Ball	Stainless steel	AISI 316
8	Float lever	Stainless steel	ASTM A240 316
9	Float lever pin	Stainless steel	ASTM A479 316
10	Float	Stainless steel	AISI 316
11	Washer	Stainless steel	AISI 304
12	Screw	Stainless steel	AISI 304
13	Cover	Stainless steel	ASTM A351 CF8
14	Plug (½")	Carbon steel	ASTM A105
15	Internal lever	Stainless steel	AISI 316
16	Graphite packing seals	Graphite	Graphite
17	Spacer	Stainless steel	AISI 316
18	Gland nut	Stainless steel	AISI 316
19	Manual lever	Stainless steel	ASTM A240 304
20	Nut and locknut	Stainless steel	AISI 304
21	Nut	Carbon steel	ASTM A194 8M

2.5 Capacities

Capacities (kg/h)

The condensate discharge capacities shown below are based on the actual temperature of operation.

Differential pressure (bar g)	FTC23-7	FTC23-23
0,3	310	n.a.
0,5	490	330
0,7	590	500
1	1.000	700
1,5	1.400	830
2	1.820	1.080
4	2.510	1.550
7	3.000	2.050
10		2.340
13		2.540
15		2.680
18		2.880
21		3.070
23		3.160

The choice of trap should be based on the following data:

- Hourly amount of condensate to be discharged,
- Effective differential pressure

Safety factor: 1,25 ÷ 1,5 with continuous duty; 2 ÷ 3 with intermittent duty.

3. Installation

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

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation.

- 3.1** Check materials, pressure and temperature and their maximum values. If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure that a safety device is included in the system to prevent overpressurisation.
- 3.2** Determine the correct installation situation and the direction of fluid flow.
- 3.3** Remove protection covers from all connections before installation.
- 3.4** The FTC23 trap must be installed below the draining point and respecting the flow direction as shown on the body and with the float lever positioned on an horizontal plane so that it can vertically rise and lower freely.
- 3.5** Insert a strainer with an adequate capacity immediately ahead of the trap to prevent damage to the device's internal components; in systems with steam recovery, it is recommended to mount a flow indicator downstream of the trap to check that it is working.
- 3.6** In order to allow a safe inspection for cleaning or maintenance purpose, install suitable shut-off valve.

- 3.7** Avoid long pipe lengths, especially if arranged horizontally or rising.
- 3.8** With minimum operating pressures, leave a hydrostatic head of at least one meter between the drainage outlet and the trap.
- 3.9** If the device to be drained is fitted with automatic temperature control, add a vacuum breaker.
- 3.10** If the condensate has to be raised to a height above the trap, install a check valve downstream of the trap.
- 3.11** In case condensate return is at a higher level and operating pressure is low (< 1 bar g) or the system is temperature controlled, please consider the adoption of a steam recovery pump.
- 3.12** In order to ensure an efficient discharge of incondensable, it is recommended to connect the balancing connection of the trap to the drained system. For convenience of maintenance it is recommended that a union is fitted in the balance line near to the trap cover.

Note: If the trap is to discharge to atmosphere ensure it is to a safe place, the discharging fluid may be at a temperature of 100°C (212°F).

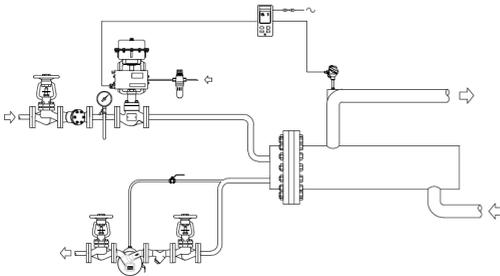


Fig. 1

Drainage of Heat Exchangers

FTC23 is not fitted with internal air eliminator due to his high sensibility to contaminants. For this reason the trap must be vented to the H.E. (Fig. 1).

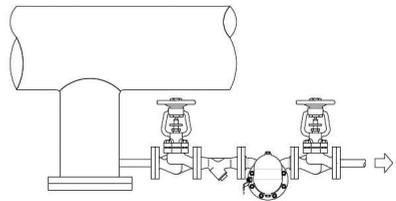


Fig. 2

Drip Trap

In this case, it is not mandatory to vent the trap. It depends on the specific working conditions (Fig. 2).

4. Commissioning

After installation or maintenance ensure that the system is fully functioning. Carry out tests on any alarms or protective devices. Always open isolation valves slowly until normal operating condition are achieved. Check for leaks and correct operation.

5. Operation

Ball float steam traps quickly remove air, have continuous, modulating condensate discharge, and can adapt immediately even to large or sudden variations of flow and pressure. Given the absence of air eliminator, the drainage of incondensable can be ensured by connecting a balance line to the drained system.

6. Maintenance

Note: Before performing any maintenance programme observe the "Safety information" in Section 1.

Safety note: These traps are installed in medium and high pressure steam lines. Personnel doing the maintenance should wear heavy gloves, long sleeve shirt and other equipment designed to protect the wearer (goggles, face shield, etc...) in the event of a leak.

6.1 General information

To ensure the device's long-term, safe operation, an adequate maintenance schedule should be prepared, involving regular inspection and cleaning, for which some important instructions are given below. All work must be carried out or be supervised by a suitable competent person.

Before actioning any maintenance on the trap it must be isolated from both the supply line and return line and any pressure allowed to safely vented to atmosphere. The trap should then be allowed to cool. In case of dangerous contaminants inside condensate, ensure that piping is completely drained before removing the trap. When reassembling, ensure that all joint faces are clean.

6.2 Routine Maintenance

- Clean accurately the insides from sediments and deposits, with regard to seals housings and mechanical components.
- Check that the ball float is not damaged and does not contain water; in case of replacement, do not force the float lever, but remove it by disassembling the split pin and properly blocking it before unscrewing the float nut.
- Check that the mechanism works properly and that the ball plug moves freely to a completely closed position. To replace the main valve assembly, unscrew the four nuts from the bolts. When mounting the new set, check its integrity and the position of the cover gasket, and tighten the nuts uniformly.
- Tighten to the recommended tightening torques (see table below).
- Assemble the body correctly (with down arrow) in accordance with float movement, then slowly open the shut-off valve and gradually reach the normal operating conditions.
- Check for leaks and correct operation. Check periodically that bolts are properly tightened in order to avoid leakage. This check must be performed specially after each cycle start and stop of the plant. In order to avoid risk of leakage from flanges we recommend the adoption of proper flange shields. In case of dangerous contaminants inside condensate, check chemical compatibility of gaskets.

6.3 Use of the manual lever

The manual lever placed on the body of the trap is used to fully open the plug, independently from the presence of condensate in the unit.

This action allows to verify that flow section is free and allows the removal of any sediment. Operate the hand lever for a few seconds by turning from the vertical position of normal operation to horizontal exhaust open. For effective action always bring the lever from one limit position to the opposite (120 °) without forcing the mechanism. In case of leakage from the lever pivot, tighten the packing nut. If such action were not enough, it is necessary to replace the seals.

Tab. 1 - Recommended tightening torques

Item	 \varnothing mm		N m
Stud		M 16 x 70	
Cover nuts	24		90
Seat bolts	13	M 8 x 20	15

6.4 How to fit the Seat Assembly

- Unscrew the 8 cover nuts (21), remove the cover (13) keeping the lever (19) in vertical position downwards and remove the body gasket (3).
- Extract the float lever pin (9) and remove the complete group lever + float.
- Unscrew the 4 seat screws (6), remove the seat (5) and the gasket (4).
- Fit the new seat (5) and gasket (4), tighten the screw (6) to the recommended tightening torques Tab 1.
- Connect the assembly lever + float to the seat with the pin lever (9).
- Fit the new gasket (3).
- Fit the cover (13) with the lever (19) in in vertical position downwards.
- Tighten the nuts (21) to the recommended tightening torques Tab 1.
- Check the proper operation of the lever (19) turning it 90° anticlockwise.

6.5 How to fit the Plug Ball

- Unscrew the 8 cover nuts (21), remove the cover (13) keeping the lever (19) in vertical position downwards and remove the body gasket (3).
- Extract the float lever pin (9) and remove the complete group lever + float.
- Remove from the lever (8) the plug ball (7) and replace it with a new one.
- Connect the assembly lever + float to the seat with the pin lever (9).
- Fit the new gasket (3).
- Fit the cover (13) with the lever (19) in in vertical position downwards.
- Tighten the nuts (21) to the recommended tightening torques Tab 1.
- Check the proper operation of the lever (19) turning it 90° anticlockwise.

6.6 How to fit Float Lever and Pin Assembly

- Unscrew the 8 cover nuts (21), remove the cover (13) keeping the lever (19) in vertical position downwards and remove the body gasket (3).
- Extract the float lever pin (9) and remove the complete group lever + float.
- Remove from the lever (8) the plug ball (7).
- Disconnect the Float (10) from the Lever (8) by unscrewing the screw (12). Remove the washers (11).
- Connect the new Lever (8) to the float (10) using the screw (12) and the washers (11).
- Place the Plug Ball into the lever and then connect the assembly lever + float to the seat with the pin lever (9).
- Fit the new gasket (3).
- Fit the cover (13) with the lever (19) in in vertical position downwards.
- Tighten the nuts (21) to the recommended tightening torques Tab 1.
- Check the proper operation of the lever (19) turning it 90° anticlockwise.

6.7 How to fit the float assembly

- Unscrew the 8 cover nuts (21), remove the cover (13) keeping the lever (19) in vertical position downwards and remove the body gasket (3).
- Extract the float lever pin (9) and remove the complete group lever + float.
- Remove from the lever (8) the plug ball (7).
- Disconnect the Float (10) from the Lever (8) by unscrewing the screw (12). Remove the washers (11).
- Connect the Lever (8) to the new float (10) using the new screw (12) and the new washers (11).
- Place the Plug Ball into the lever and then connect the assembly lever + float to the seat with the pin lever (9).
- Fit the new gasket (3).

-
- Fit the cover (13) with the lever (19) in in vertical position downwards.
 - Tighten the nuts (21) to the recommended tightening torques Tab 1.
 - Check the proper operation of the lever (19) turning it 90° anticlockwise.

6.8 How to fit the manual lever

- Unscrew the 8 cover nuts (21), remove the cover (13) keeping the lever (19) in vertical position downwards and remove the body gasket (3).
- Unscrew nut and locknut (20) and remove lever (19).
- Unscrew the Gland nut (18) and remove the spacer (17) and the graphite packing seals (16).
- Extract the item (15) from the internal side of the cover.
- Insert the new lever (15) from the internal side of the cover.
- Insert on the pin of the lever the graphite packing seals (16), the spacer (17) and finally tighten the gland nut 18.
- Place the lever (19) and then tighten nut and locknut (20).
- Fit the new gasket (3).
- Fit the cover (13) with the lever (19) in in vertical position downwards.
- Tighten the nuts (21) to the recommended tightening torques Tab 1.
- Check the proper operation of the lever (19) turning it 90° anticlockwise.

6.9 How to fit Stuffing box and manual lever spacer assembly

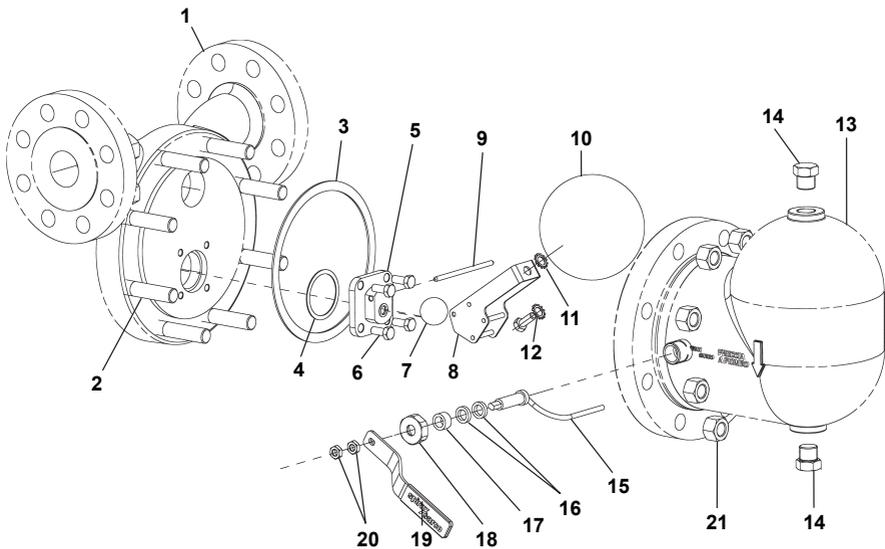
- Unscrew the 8 cover nuts (21), remove the cover (13) keeping the lever (19) in vertical position downwards and remove the body gasket (3).
- Unscrew nut and locknut (20) and remove lever (19).
- Unscrew the Gland nut (18) and remove the spacer (17) and the graphite packing seals (16).
- Insert on the pin of the lever the graphite packing seals (16), the spacer (17) and finally tighten the gland nut 18.
- Place the lever (19) and then tighten nut and locknut (20).
- Fit the new gasket (3).
- Fit the cover (13) with the lever (19) in in vertical position downwards.
- Tighten the nuts (21) to the recommended tightening torques Tab 1.
- Check the proper operation of the lever (19) turning it 90° anticlockwise.

7. Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

Available spares

Seat assembly	5, 6
Plug ball	7
Float lever and pin assembly	8, 9
Float assembly	10, 11, 12
Manual lever kit	15, 16, 17, 18, 19, 20
Stuffing box and manual lever spacer assembly	16, 17
Gaskets set (3 + 3 units)	3, 4



How to order spares

Always order spare parts by using the description given in the table and state the size and type of trap, including pressure range and type of the connections.

Example: N° 1 Ball float and cover gasket assembly for a ball float steam trap Spirax Sarco FTC23-07, DN 1½".

REPAIRS

Please contact our nearest Branch Office or Agent, or directly Spirax-Sarco S.r.l.

Via per Cinisello, 18 - 20834 Nova Milanese (MB) - ITALY - Tel.: +39 0362 49 17.1 - Fax: +39 0362 49 17 307

LOSS OF GUARANTEE

Total or partial disregard of above instructions involves loss of any right to guarantee.

Spirax-Sarco S.r.l. - Via per Cinisello, 18 - 20834 Nova Milanese (MB) - Tel.: 0362 49 17.1 - Fax: 0362 49 17 307