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Issue 5 - 2013

spirax sarco

SK - SL Series
Inverted bucket steam traps
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The PED Directive 97/23/EC is repealed and replaced by the new **PED Directive 2014/68/EU** with effect from 19 July 2016.

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.

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.

Movimentazione in sicurezza

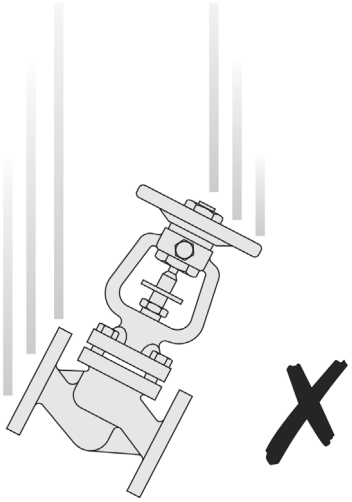
La ghisa è un materiale fragile: in caso di caduta accidentale il prodotto in ghisa non è più utilizzabile. Per informazioni più dettagliate consultare il manuale d'istruzioni del prodotto.

Rimuovere la targhetta prima di effettuare la messa in servizio.

Safe Handling

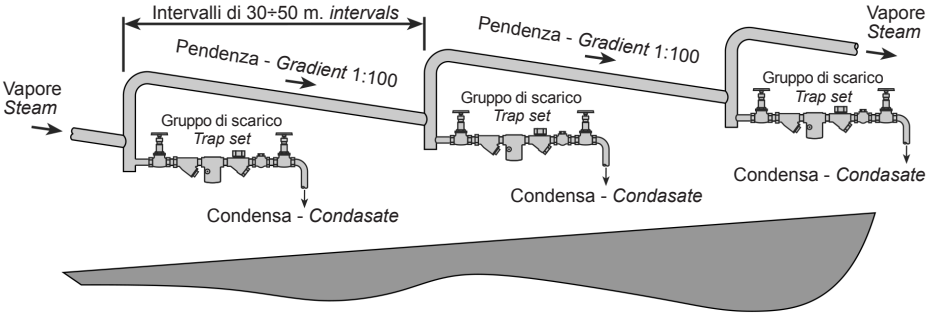
Cast Iron is a brittle material. If the product is dropped during installation and there is any risk of damage the product should not be used unless it is fully inspected and pressure tested by the manufacturer.

Please remove label before commissioning

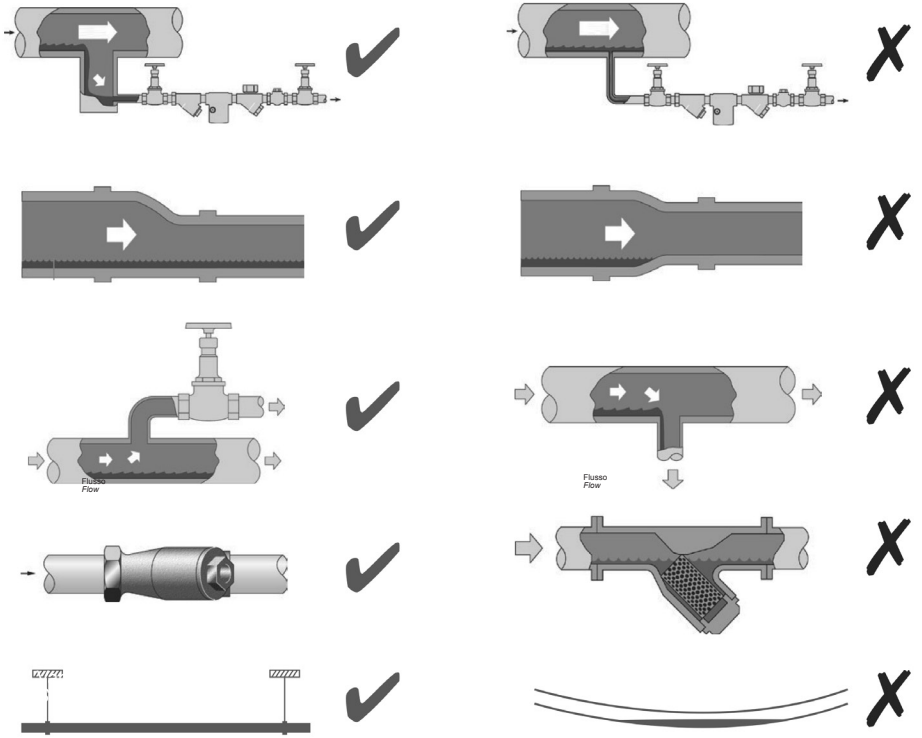


Prevenzione dai colpi d'ariete - *Prevention of water hammer*

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



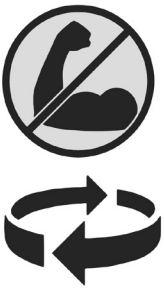
Esempi di esecuzioni corrette (✔) ed errate (✗) sulle linee vapore: *Steam Mains - Do's and Dont's:*



Prevenzione delle sollecitazioni di trazione
Prevention of tensile stressing

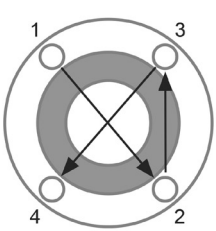
Evitare il disallineamento delle tubazioni - *Pipe misalignment:*

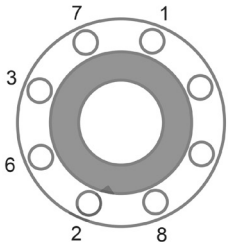
Installazione dei prodotti o loro rimontaggio post-manutenzione:
Installing products or re-assembling after maintenance:



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

Do not over tighten. Use correct torque figures.





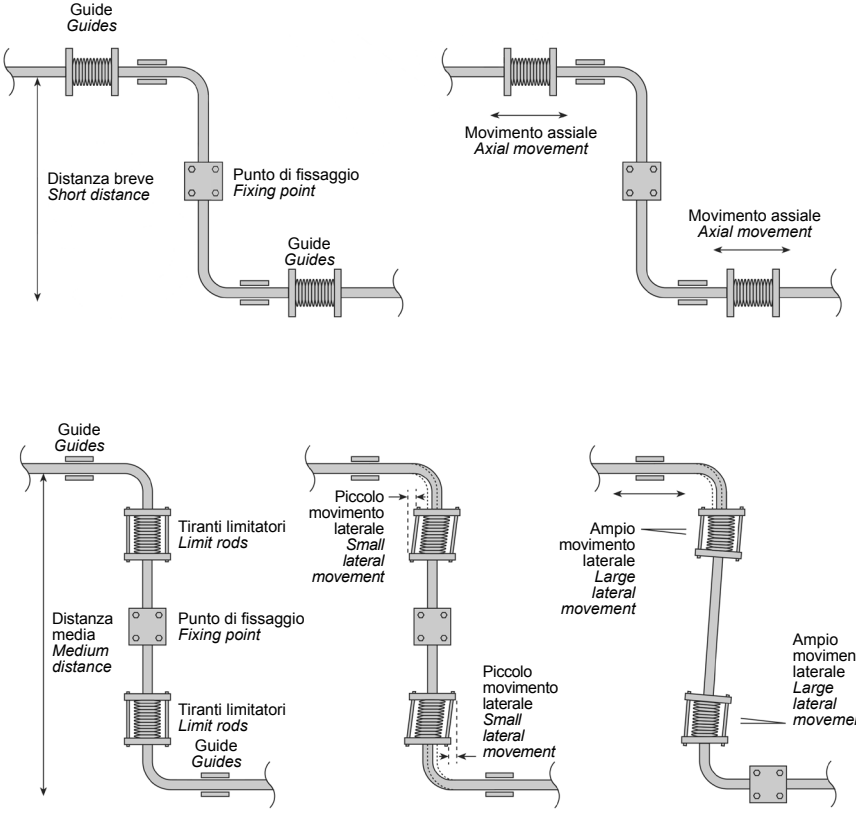
Per garantire l'uniformità del carico e dell'allineamento, i bulloni delle flange devono essere serrati in modo graduale e in sequenza, come indicato in figura.

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 dilatzione. 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. General safety information

Installation and Maintenance InstructionsSafe 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 2 Gases	Group 1 Liquids	Group 2 Liquids
SKA, SLA	DN 15 - 20	-	SEP	-	SEP
SKB, SLB	DN 20 - 25	-	SEP	-	SEP
SKC, SLC	DN 25 - 40	-	SEP	-	SEP
SKD, SLD	DN 40 - 50	-	1	-	SEP
SKF, SLF	DN 80	-	1	-	SEP

I) These products have been specifically designed for use on steam, air or condensate / water, which is 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 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 (500°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

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.

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.

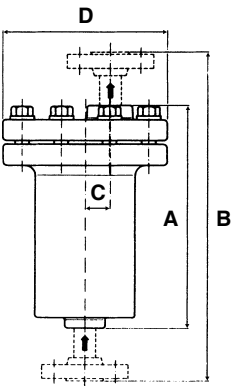
2. General product information

2.1 General description

SK - SL series steam traps are particularly recommended for use with saturated and superheated steam under demanding operating conditions (high pressures and temperatures).
They give easy access for maintenance and cleaning operations.
They are also available with an inbuilt check valve (only for series 55 and 70).

Dimensions (mm) and approximate weights (kg)

Mod.	DN	A	B	C	D	Weight *
SKA SLA	½"	235	380	25	165	18
SKB SLB	¾"	265	440	25	165	24
SKC SLC	1"	345	560	40	210	39
SKD SLD	1½" 2"	415	680	40	265	65
SKF SLF	3"	550	800	60	400	120



* Weights are referred to the standard execution with socket weld connections.

2.2 Sizes and pipe connections

Use	Saturated and superheated steam		
Models and sizes	Models		Measurements
	SKA 40 - SKA 55 - SKA 70	SLA 40 - SLA 55 - SLA 70	½" (DN 15)
	SKB 40 - SKB 55 - SKB 70	SLB 40 - SLB 55 - SLB 70	¾" (DN 20)
	SKC 40 - SKC 55 - SKC 70	SLC 40 - SLC 55 - SLC 70	1" (DN 25)
	SKD 40 - SKD 55 - SKD 70	SLD 40 - SLD 55 - SLD 70	1½" (DN 40) 2" (DN 50)
	SKF 40 - SKF 55 - SKF 70	SLF 40 - SLF 55 - SLF 70	3" (DN 80)
Connections	Standard: socket weld ANSI B 16.11 S.W.		
	On request: flanged: PN 100/160 (UNI 2223/2229) flanged: 600/900/1500 RF (ANSI B 16.5)		

2.3 Limiting conditions

Body design conditions	SK	PMA 90 bar g at 350°C	TMA 425°C at 70 bar g
	SL	PMA 90 bar g at 350°C	TMA 510°C at 70 bar g
	Minimum allowable temperature		-12°C

Maximum values may be limited by the rating of the flanges installed

Note: Versions with higher body ratings are available on request; HP version

2.4 Operating conditions

Maximum operatig condiions	SK	PMO 70 bar g	TMO 425°C	
	SL	PMO 70 bar g	TMO 510°C	
Maximum differentual pressures (ΔPMX)	SKA 40 - SKB 40 - SKC 40 - SKD 40 - SKF 40		SLA 40 - SLB 40 - SLC 40 - SLD 40 - SLF 40	40 bar g
	SKA 55 - SKB 55 - SKC 55 - SKD 55 - SKF 55		SLA 55 - SLB 55 - SLC 55 - SLD 55 - SLF 55	55 bar g
	SKA 70 - SKB 70 - SKC 70 - SKD 70 - SKF 70		SLA 70 - SLB 70 - SLC 70 - SLD 70 - SLF 70	70 bar g
Minimum operating temperature				0°C
On request	Stainless steel inbuilt check valve for series 55 e 70			

Pressure and temperatures according to ISO 6552

Operating values may be limited by the rating of the flanges installed.

2.5 Materials

Materials	Body and cover	SK - Carbon steel ASTM A 105
		SL - Alloy steel ASTM A 182 F 11
	Valve saet and valve	Treated stainless steel AISI 400 series
	Internal components	Stainless steel AISI 304
	Gasket	Asbestos-free fibre

2.6 Condesate discharge capacities (kg/h)

Model		Differential pressure (bar g)								
		10	**15**	**20**	**30**	**40**	**50**	**55**	**60**	**70**
SKA - SLA	**70**	130	140	150	175	200	225	235	250	260
	55	190	210	220	260	300	330	350	-	-
	40	325	345	360	440	500	-	-	-	-
SKB - SLB	**70**	400	500	600	700	800	880	920	940	960
	55	600	750	900	1000	1100	1150	1200	-	-
	40	900	1150	1250	1400	1500	-	-	-	-
SKC - SLC	**70**	700	750	800	950	1050	1150	1200	1250	1300
	55	1100	1150	1200	1300	1550	1700	1750	-	-
	40	1450	1550	1650	1900	2100	-	-	-	-
SKD - SLD	**70**	1800	2100	2300	2600	2850	3050	3150	3250	3350
	55	2200	2600	2900	3450	3900	4200	4400	-	-
	40	3500	4150	4700	5500	6100	-	-	-	-
SKF - SLF	**70**	4950	6300	7200	8550	9400	10100	10400	10800	11200
	55	6500	7900	9300	10750	11700	12800	13200	-	-
	40	8500	10150	11450	13200	14600	-	-	-	-

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

a) - the hourly amount of condensate to be discharged
b) - the effective differential pressure
c) - the safety factor (2 to 3 for intermittent use; 1.5 for continuous use)

3. Installation

It is essential that installation is carried out correctly, observing the instructions given below. Do not let foreign bodies cause the steam trap to malfunction and put it out of service in a short time; flush out pipes before the start up.

3.1 Check that the trap is suitable for the effective maximum differential pressure (ΔPMX) and operating pressure (PMO) in the system.

3.2 Install the trap only vertically with the cover at the top (inlet at the bottom and exit from the top).

3.3 The use of an upstream protection strainer is always recommended, and it is better if preceded by a separation pocket with blow off valve (Fig. 1 and 2), especially in the presence of dirty or high pressures.

3.4 If the trap is used at maximum capacity, the piping downstream of the trap needs to be the proper size.
Generally speaking, one or two DN above the trap connection is enough.

3.5 With very low steam capacities and/or superheated steam, it is advisable to install a check valve upstream of the trap.
This valve is available on request incorporated in the trap.
Prime the trap by pouring a few litres of water into the body, introducing it from the top connection, before connecting the trap to the network.

3.6 If the system is required to operate on a continuous basis, arrange for a shut-off valve to be installed upstream and a bypass; add a downstream valve in the case of piped return line.

3.7 In the case of a raised condensate return system, a check valve should be fitted downstream of the trap (unless it is already installed upstream or incorporated as at point 3.5).

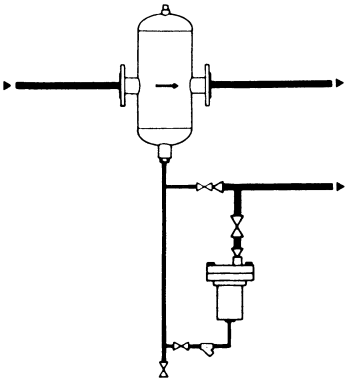


Fig. 1 - Line separator drainage

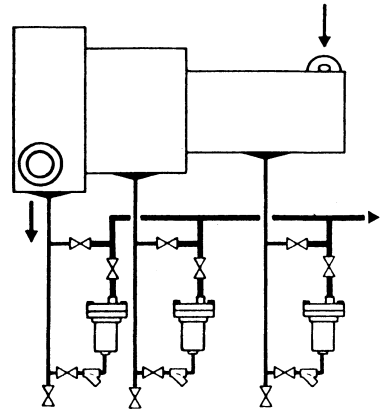


Fig. 2 - Turbine stage drainage

Legend: ⋈ Manual exclusion, by-pass and bleed valves
▽ Protection filters
Note the increased discharge pipe cross-section to allow space for flashing

4. Commissioning

After installation or maintenance, ensure that the system is fully functioning. Carry out tests on any alarms or protective devices.

5. Operation

Operation is completely automatic for the removal of both air and incondensable gases, which, if present in large quantities, may also require the installation of an air eliminator in parallel.
The special valve lever-bucket connection eliminates all friction with the side wall: closure is instantaneous, without steam leaks and operation is with blast type discharges, easily measurable in order to check trap operation.

6. Maintenance

Before undertaking any maintenance on the trap, it must be isolated from both the supply line and return line and any pressure allowed to safely normalise to atmosphere.
The trap should then be allowed to cool. When reassembling, ensure that all joint faces are clean.

6.1 For a complete inspection of the trap, remove the cover by unscrewing the bolts. Clean the valve mechanism of any deposits and fouling, and ensure that the air vent hole (**H**) in the bucket is completely free of obstructions.

6.2 To replace the valve seat, remove the valve mechanism by unscrewing the two screws (**C**).
When replacing the valve seat, it is also advisable to replace the valve plug/lever assembly (**G**) (**E**), which is removed by undoing the split-pin (**D**).
It is also advisable to replace the cover gasket (**I**).

6.3 To replace the bucket (**L**) slip off the top pin fixing it to the lever.

7. Spare parts

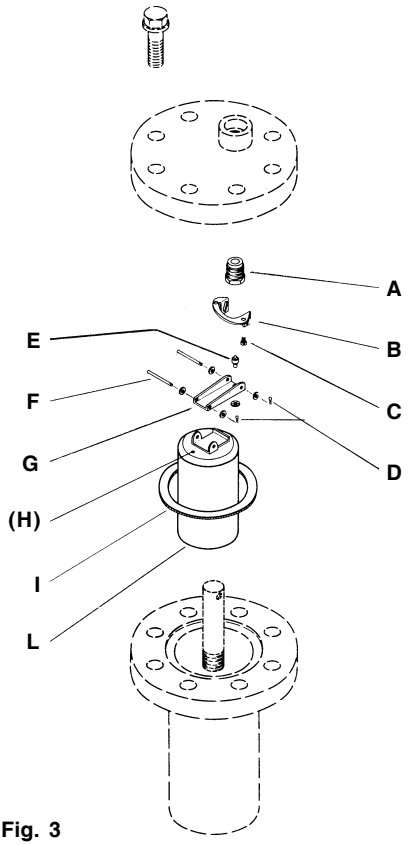


Fig. 3

The available parts are indicated in the table and can be seen in the drawing. They are available according to the grouping given in the table. No other parts can be supplied as a spare part.

Available spares	
Valve assembly	**A, B, C, D, E, F, G, I**
Bucket assembly	**D, F, I, L**
Gasket set (3 pieces)	**I**

A = Valve seat
B = Bracket
C = Bracket screws
D = Split pin
E = Valve head
F = Lever Pin
G = Lever
H = Hole
I = Cover gasket
L = Bucket

How to order spares

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

Example: 1 - Valve assembly for an SLB 55 trap, DN ¾".

REPAIRS
Please contact our nearest Branch Office or Agent, or directly Spirax-Sarco S.r.l.
Via per Cinisello, 18 - 20834 Nova Milanese (MB) - Tel.: 0362 49 17.1 - Fax: 0362 49 17 307

LOSS OF GUARANTEE
Total or partial disregard of above instructions involves loss of any rights to guarantee.