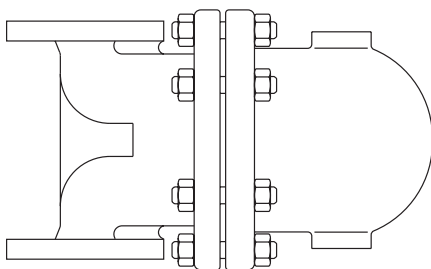


AE44, AE44S, AE46 and AE46S
Automatic Air and Gas vents for Liquid Systems
Installation and Maintenance Instructions



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

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 97/23/EC and carry the CE mark when so required. It should be noted that products rated as 'SEP' are required by the Directive not to carry the CE mark. The products fall within the following Pressure Equipment Directive categories:

Product		Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
AE44 and AE46		SEP	SEP	SEP	SEP
AE44S and AE46S	DN15 and DN20	SEP	SEP	SEP	SEP
	DN25	2	1	SEP	SEP

- i) The AE44, AE44S, AE46 and AE46S range have been specifically designed for use on air or water/condensate which are in Group 2 of the 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.

If parts made from Viton have been subjected to a temperature approaching 315°C (599°F) or higher, it may have decomposed and formed hydrofluoric acid. Avoid skin contact and inhalation of any fumes as the acid will cause deep skin burns and damage the respiratory system.

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 100°C (212°F).

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

1.14 Freezing

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

1.15 Disposal

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

Viton:

- Can be landfilled, when in compliance with National and Local regulations.
- Can be incinerated, but a scrubber must be used to remove Hydrogen Fluoride, which is evolved from the product and with compliance to National and Local regulations.
- Is insoluble in aquatic media.

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 General description

The **AE44**, **AE44S**, **AE46** and **AE46S** are float type automatic air and gas vents for liquid systems. The body and cover castings are produced by a TÜV approved foundry.

Available types and further technical data:

AE44	Cast steel body and cover with viton valve cone.	see Section 2.2, pages 6 and 7
AE44S	Cast steel body and cover with stainless steel valve cone.	
AE46	Stainless steel body and cover with viton valve cone.	see Section 2.3, pages 8 and 9
AE46S	Stainless steel body and cover with stainless steel valve cone.	

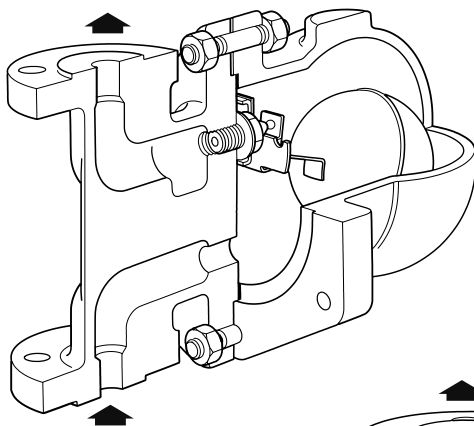
Note: For additional information see the Technical Information Sheets TI-P149-08 and TI-P149-17.

Standards

These products fully comply with the requirements of the European Pressure Equipment Directive 97/23/EC and carry the **CE** mark when so required.

Certification

This product range is available with certification to EN 10204 2.2 for the body and cover as standard and EN 10204 3.1 if specified at the time of ordering.



**Fig. 1 AE44 and AE46
DN15 and DN20 shown**

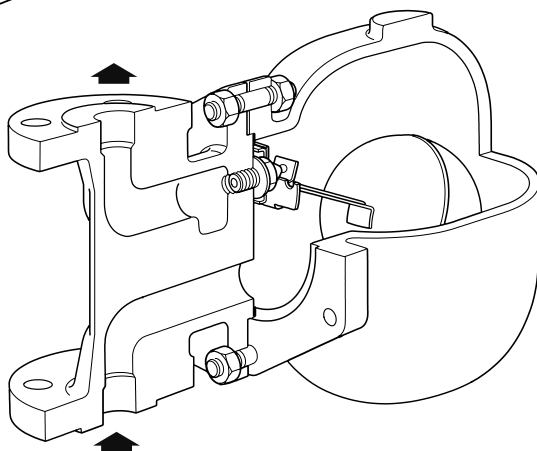


Fig. 2 AE44S and AE46S DN25 shown

2.2 AE44 and AE44S - Cast steel

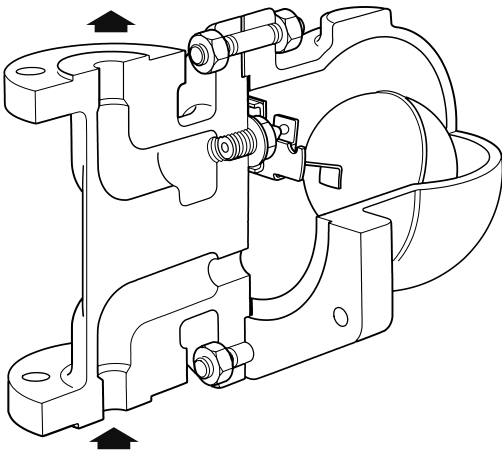


Fig. 3 AE44
DN15 and DN20 shown

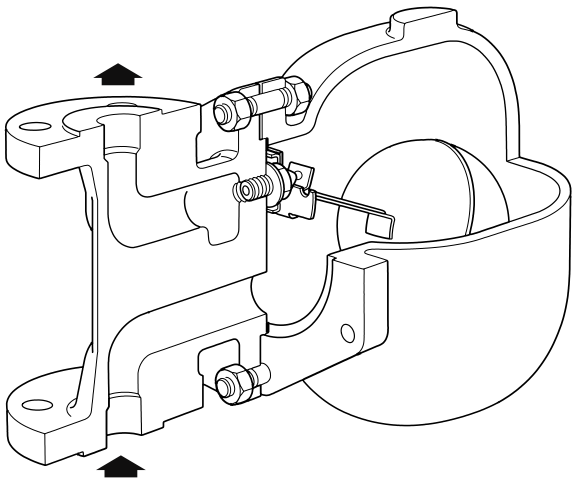
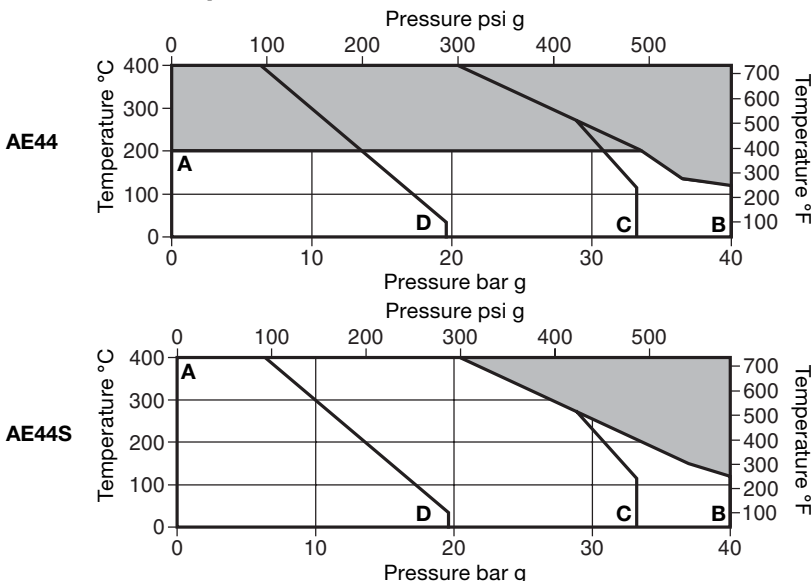


Fig. 4 AE44S DN25 shown

Sizes and pipe connections

Model	Sizes	Flange DIN face-to-face connections	Balance pipe	Valve cone
AE44	DN15 and DN20	EN 1092 PN40	½" BSP	Viton
		ANSI 150	½" NPT	
		ANSI 300	½" NPT	
AE44S	DN15, DN20 and DN25	EN 1092 PN40	½" BSP	Stainless steel
		ANSI 150	½" NPT	
		ANSI 300	½" NPT	

Pressure/temperature limits - AE44 and AE44S



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

A - B Flanged EN 1092 PN40 and ANSI 300. **A - C** Flanged JIS/KS 20. **A - D** Flanged ANSI 150.

Body design conditions				PN40
PMA	Maximum allowable pressure		40 bar g @ 120°C	(580 psi g @ 248°F)
TMA	Maximum allowable temperature		400°C @ 20 bar g	(752°F @ 290 psi g)
Minimum allowable temperature			0°C	(32°F)
PMO	Maximum operating pressure		40 bar g @ 120°C	(580 psi g @ 248°F)
TMO	Maximum operating temperature	AE44	200°C @ 34 bar g	(392°F @ 493 psi g)
		AE44S	400°C @ 20 bar g	(752°F @ 290 psi g)
Minimum operating temperature			0°C	(32°F)
		Size	DN15 and DN20	DN25
ΔPMX	Maximum differential pressure (with a specific gravity of 1.0)	3.5 bar	-	AE44S-3.5
		5.3 bar	-	AE44S-5.3
		7.8 bar	-	AE44S-7.8
		16.7 bar	-	AE44S-16.7
		21.0 bar	AE44 or AE44S-21	-
Minimum specific gravity of liquid		0.6 (Note: The ΔPMX is affected by the specific gravity)		
Designed for a maximum cold hydraulic test pressure of:		ANSI 150	30 bar g	(435 psi g)
		JIS/KS 20	60 bar g	(870 psi g)
		PN40/ANSI 300	60 bar g	(870 psi g)

Note: With internals fitted, test pressure must not exceed Δ PMX

Caution: The automatic air and gas vent in its complete operational form must not be subjected to a pressure greater than 48 bar g (696 psi g) otherwise damage to the internal mechanism may result.

2.3 AE46 and AE46S - Stainless steel

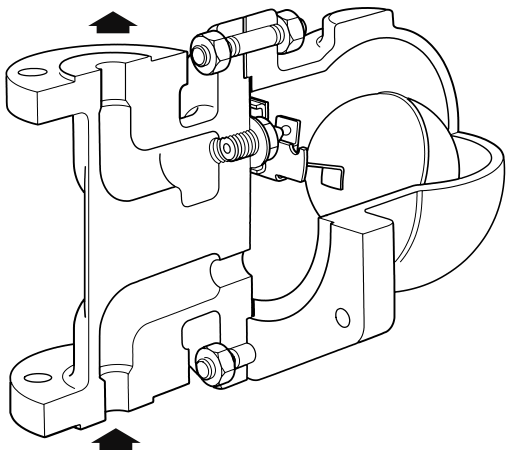


Fig. 5 AE46
DN15 and DN20 shown

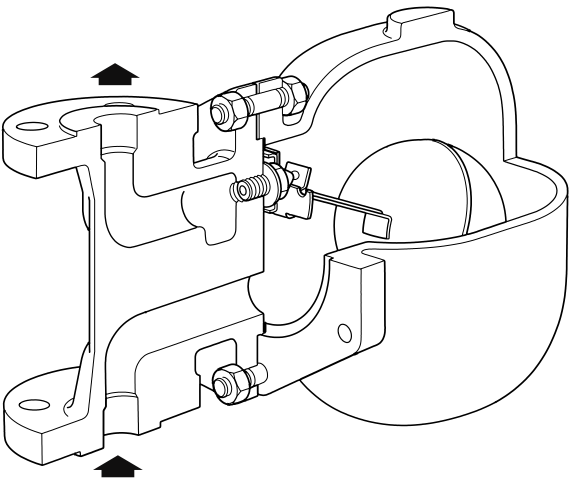
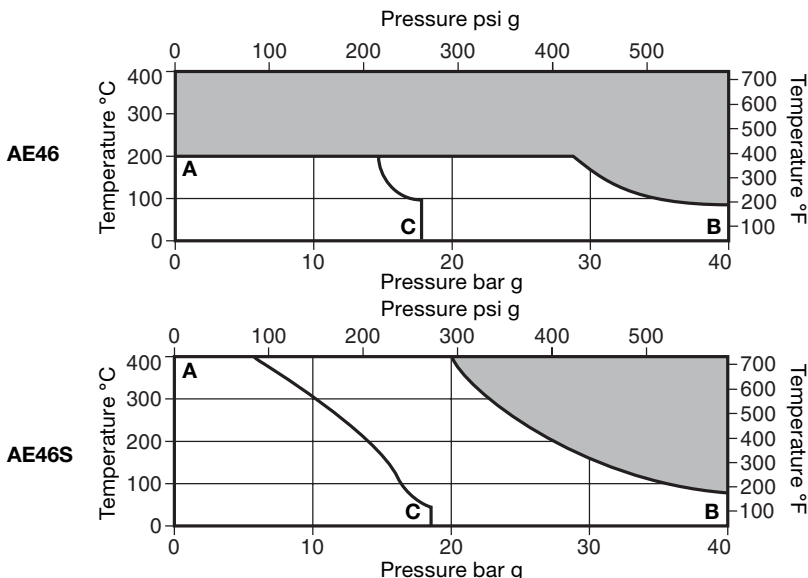


Fig. 5 AE46S DN25 shown

Sizes and pipe connections

Model	Sizes	Flange DIN face-to-face connections	Balance pipe	Valve cone
AE46	DN15 and DN20	EN 1092 PN40	½" BSP	Viton
		ANSI 150	½" NPT	
		ANSI 300	½" NPT	
AE46S	DN15, DN20 and DN25	EN 1092 PN40	½" BSP	Stainless steel
		ANSI 150	½" NPT	
		ANSI 300	½" NPT	

Pressure/temperature limits - AE46 and AE46S



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

A - B Flanged EN 1092 PN40 and ANSI 300. **A - C** Flanged ANSI 150 (DN15 to DN25 only).

Body design conditions				PN40
PMA	Maximum allowable pressure		40 bar g @ 80°C	(580 psi g @ 176°F)
TMA	Maximum allowable temperature	AE46	200°C @ 29 bar g	(392°F @ 420 psi g)
		AE46S	400°C @ 20 bar g	(752°F @ 290 psi g)
Minimum allowable temperature			0°C	(32°F)
PMO	Maximum operating pressure		40 bar g @ 80°C	(580 psi g @ 176°F)
TMO	Maximum operating temperature	AE46	200°C @ 29 bar g	(392°F @ 420 psi g)
		AE46S	400°C @ 20 bar g	(752°F @ 290 psi g)
Minimum operating temperature			0°C	(32°F)

Note: For lower operating temperatures consult Spirax Sarco.

		Size	DN15 and DN20	DN25
Δ PMX	Maximum	3.5 bar	-	AE46S-3.5
	differential pressure	5.3 bar	-	AE46S-5.3
	(with a specific	7.8 bar	-	AE46S-7.8
	gravity of 1.0)	16.7 bar	-	AE46S-16.7
		21.0 bar	AE46 or AE46S-21	-
Minimum specific gravity of liquid		0.6	(Note: The Δ PMX is affected by the specific gravity)	
		PN40	60 bar g	(870 psi g)
Designed for a maximum		ANSI 300	60 bar g	(870 psi g)
cold hydraulic test pressure of:		ANSI 150	30 bar g	(435 psi g)

Note: With internals fitted, test pressure must not exceed Δ PMX

Caution: The automatic air and gas vent in its complete operational form must not be subjected to a pressure greater than 48 bar g (696 psi g) otherwise damage to the internal mechanism may result.

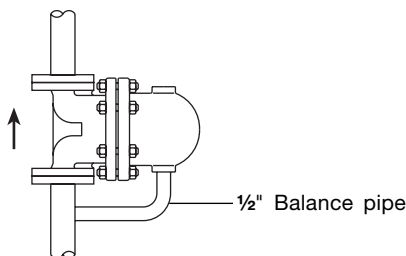
3. Installation

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 protective covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.
- 3.4** The automatic air and gas vent must be fitted into a vertical pipeline above the point being vented with the direction of flow upward as indicated on the body so that the float mechanism is free to rise and fall in a vertical plane. The arrow on the name-plate must point downwards. The low point of the cover is provided with a ½" tapping for a balance pipe which is essential for satisfactory operation. The balance pipe must be connected between the inlet pipe and the tapping provided on the cover as shown in Figure 7.

Fig. 7



As with all automatic air vents, dribbling may occur if the valve becomes fouled with dirt. For this reason it is recommended that a drip pipe is fitted to the outlet discharging to a safe place (see Figure 8).

Because of the way automatic air vents operate they all dribble water when discharging air. This is perfectly normal, because of this we recommend piping the discharge to a drain via an air break.

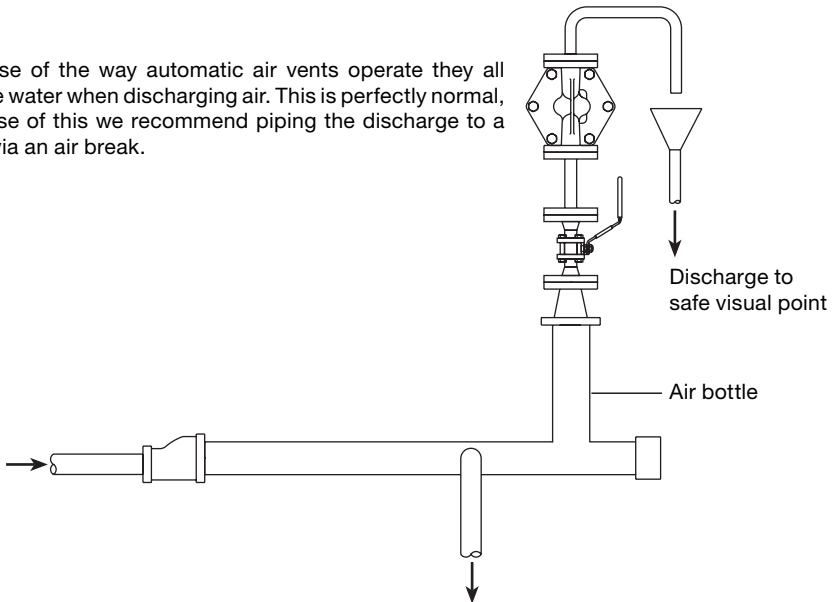


Fig. 8 Typical application showing an AE44 or AE46 on a high temperature hot water (HTHW) system.

4. Commissioning

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

5. Operation

Spirax Sarco automatic air eliminators utilise a simple, but well proven, float and lever valve assembly which opens to air and gases and closes tightly against water. Once fitted they require no adjustment, either on start-up or during subsequent running. Operation is totally automatic over a variety of light or heavy duty applications.

6. Maintenance

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

Warning

The cover gasket contains a thin stainless steel support ring which may cause physical injury if not handled and disposed of carefully.

6.1 General information

All work must be carried out by a suitably competent person. Before starting work ensure that suitable tools are available. Use only Spirax Sarco replacement parts. Before attempting to work on the automatic air eliminator ensure that it is isolated from the rest of the pressurised system (repairs can be carried out with the automatic air eliminator in the pipeline). Allow time for the temperature of the automatic air eliminator to normalise.



The unit has a long service life and the only maintenance that is normally required is the occasional cleaning or replacement of the valve and seat assembly.

6.2 How to clean/replace the valve and seat assembly:

- Once the eliminator has been isolated, undo the cover studs and nuts (2) and lift off the cover (4).
- Remove the existing main valve assembly with float, by undoing the pivot frame assembly set screws (7), and the valve seat (5) and assess if it needs cleaning or replacing.
- The soft valve cone (item 9, AE44/AE46 only) is easily changed once the float (8) has been removed.
- Using a little jointing paste on the thread and gasket (6), fit the valve seat (5) to the body (1).
- Attach the support frame (15) and pivot frame (16) to the body (1) using the assembly set screws (7) but do not tighten.
- Fit the float arm (8) to the pivot frame (16) using the pin (17) and by moving the complete assembly, centre the valve cone onto the seat orifice. Tighten the assembly set screws (7) to the recommended torque (see Table 1).
- Check the operation by raising and lowering the float several times, making sure that the valve cone is centring properly on the seat.
- When reassembling the cover (4) to the body (1) make sure that all joint faces are clean. Always use a new gasket (3).
Note: On reassembly make sure that the **dowel** (see Figure 9) is located into the body.
- Tighten the cover studs and nuts (2) uniformly to the recommended torque (see Table 1).
- When maintenance is complete open isolation valves, allowing system pressure to build up slowly.
- Check for leaks.

After maintenance ensure that the system is fully functioning.

Table 1 Recommended tightening torques

Item No.	Part	or		N m	(lbf ft)
					
2	Cover studs and nuts	17 A/F	M10 x 60	19 - 21	(13.6 - 15.0)
5	Valve seat	17 A/F	M12 x 8	50 - 55	(36 - 40)
7	Pivot screws	Cheesehead	M5 x 20	2.5 - 2.8	(1.8 - 2.0)

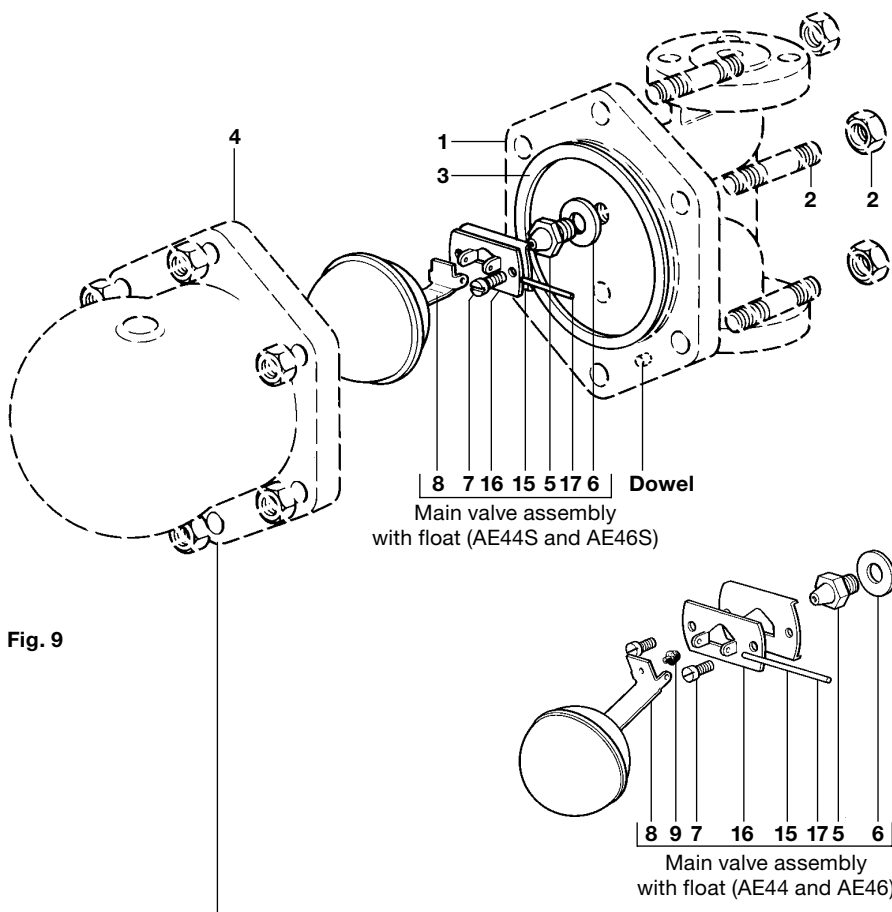


Table 2 Flange bolt hole tappings

Size	ANSI 150	ANSI 300	JIS/KS 20
DN15	1/2" - 13 UNC - 2B	1/2" - 13 - UNC - 2B	M12
DN20	1/2" - 13 UNC - 2B	5/8" - 11 - UNC - 2B	M12
DN25	5/8" - 11 UNC - 2B	5/8" - 11 - UNC - 2B	M16

7. Spare parts

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

Available spares

Soft valve cone	(packet of 3 of each)	AE44 and AE46	9
Main valve assembly with float		AE44 and AE46	5, 6, 7, 8, 9, 15, 16, 17
		AE44S and AE46S	5, 6, 7, 8, 15, 16, 17
Complete set of gaskets (packet of 3 sets)			3, 6

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of automatic air and gas vent.

Example: 1 - Main valve assembly for a DN20 Spirax Sarco AE44 automatic air vent.

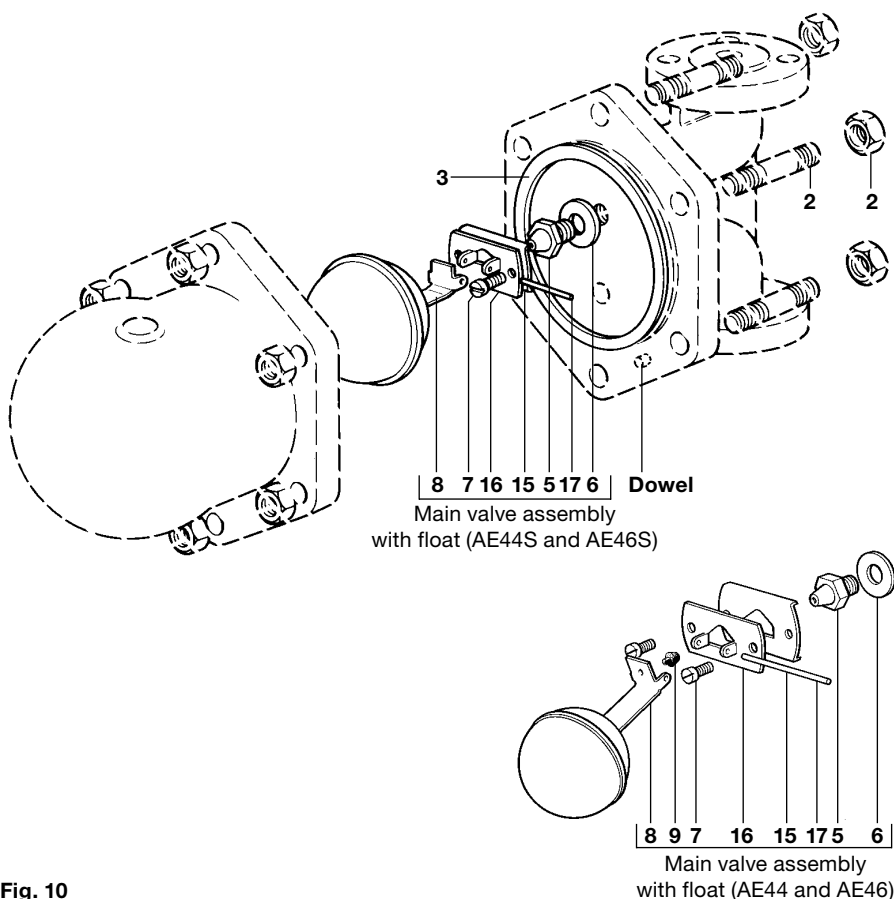


Fig. 10

