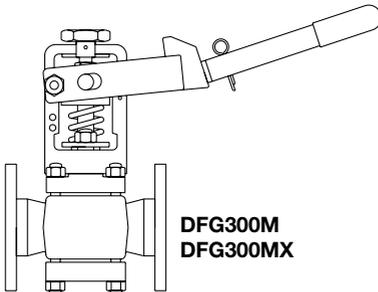
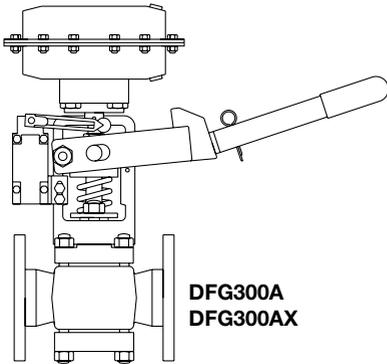


DFG300
Automatic or Manual Actuated
Boiler Blowdown Valves
Installation and Maintenance Instructions



- 1. Safety information*
- 2. General product information*
- 3. Installation*
- 4. Operation*
- 5. Maintenance*
- 6. 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 European Pressure Equipment Directive categories:

	Product	Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
DFG300A	DN25 and DN32	2	SEP	SEP	SEP
	DN40 and DN50	2	1	SEP	SEP
DFG300AX	DN25	2	SEP	SEP	SEP
DFG300M	DN25 and DN32	2	SEP	SEP	SEP
	DN40 and DN50	2	1	SEP	SEP
DFG300MX	DN25	2	SEP	SEP	SEP

- i) The DFG300A and DFG300M have been specifically designed for use on air, water/condensate, diathermic oil and/or other fluids which are in Group 2 of the European Pressure Equipment Directive.
The products' use on other fluids which are in Group 1 and 2 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 and the request must be stated at the time of order placement.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

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 239°C (462°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.

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

The DFG300 is specifically designed for the removal of suspended/deposited solids and water from the bottom of steam boilers. The valve has been designed for spring-to-close on power failure. The manual version can be upgraded to an automatic version.

Available types

DFG300A	DN25, DN32, DN40 and DN50 steel bodied air/water actuated valve supplied with manual actuation lever.
DFG300AX	DN25 stainless steel bodied air/water actuated valve supplied with manual actuation lever.
DFG300M	DN25, DN32, DN40 and DN50 steel bodied manually actuated valve complete with lever (can be automated).
DFG300MX	DN25 stainless steel bodied manually actuated valve complete with lever (can be automated).

When used with a Spirax Sarco blowdown controller the automatic version provides timed control of suspended solids blowdown, ensuring that the recommended blowdown occurs with the minimum of heat loss and avoids duplication and omissions. The valve can be fitted with a mechanical switchbox. This can be linked to the blowdown controller or a BMS system to indicate when the valve has not closed.

3-way solenoid valve - A ¼" 3-way solenoid valve is an available option that may be either directly mounted on the actuator or remotely fitted.

Actuator - The actuator incorporates a rolling diaphragm that ensures a linear operation over the full operating stroke. The actuator can be air or water actuated. The air must, however, be dry and clean. Any other non-corrosive gas can also be used as the operating medium. If water is used, it must be clean, oil and contaminant free and at a temperature of below 70°C (158°F).

Switch box - A switch box containing a microswitch can be optionally mounted below the actuator on a bracket, and allows connection to a blowdown controller or a building management system if required. The microswitch is set to indicate whether the valve is 'closed' or not fully closed. Note: it does not indicate that the valve is 'fully open'. The microswitch is adjustable.

Manual override lever - A manual override lever is provided with the DFM300 valve. In some countries (including the UK), regulations state that only one lever is permissible within the boiler house. If more than one DFM300 valve is used additional levers should be removed from the boiler house. When not in use the lever should be removed from the valve and stored in a safe place.

2.2 Sizes and pipe connections

DN25, DN32, DN40 and DN50 flanged EN 1092 PN40.

2.3 Technical data

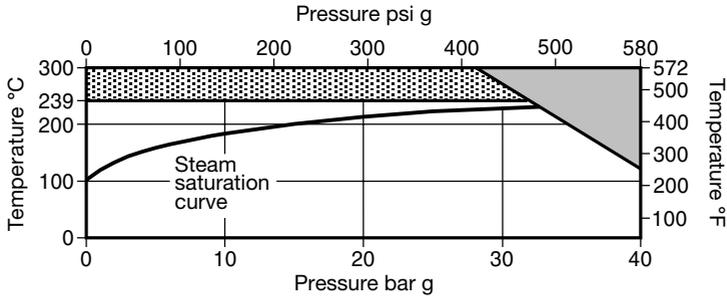
Solenoid valve	Supply voltage	24 Vdc, 24 Vac, 230 Vac or 110 Vac
	Protection rating (with connector)	IP65
Mechanical switch	Supply voltage	600 Vac and 250 Vdc max
	Protection rating (body)	IP67
Blowdown timer controller	Supply voltage	230 Vac or 115 Vac
	Protection rating (housing)	IP40

2.4 K_Vs values

Valve size	DN25	DN32	DN40	DN50
Seat diameter	25 mm (1")	40 mm (1½")	40 mm (1½")	40 mm (1½")
K_Vs values	17	20	24	30

For conversion: C_V (UK) = $K_V \times 0.963$ C_V (US) = $K_V \times 1.156$

2.5 Pressure / temperature limits



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

 The product should not be used in this region or beyond its operating range as damage to the internals may occur.

Body design conditions			PN40
PMA	Maximum allowable pressure	40 bar g @ 120°C	(580 psi g @ 248°F)
TMA	Maximum allowable temperature	300°C @ 27.5 bar g	(572°F @ 399 psi g)
	Minimum allowable temperature	0°C	(32°F)
PMO	Maximum operating pressure	32 bar g @ 239°C	(464 psi g @ 462°F)
TMO	Maximum operating temperature	239°C @ 32 bar g	(462°F @ 464 psi g)
	Ambient operating temperature range	-20°C to +90°C	(-4°F to +194°F)
	Maximum operating air / water pressure	6 bar g	(87 psi g)
		Differential pressure (ΔP) across the valve	Minimum air pressure
		10 bar g	4 bar g
		15 bar g	4.5 bar g
	Metric	20 bar g	5 bar g
		25 bar g	5.5 bar g
		30 bar g	6 bar g
	Minimum air pressure	32 bar g	6 bar g
		145 psi g	58 psi g
		217 psi g	65 psi g
		290 psi g	72 psi g
	Imperial	362 psi g	80 psi g
		435 psi g	87 psi g
		464 psi g	87 psi g
	Maximum temperature for a water actuated valve	70°C	(158°F)
	Designed for a maximum cold hydraulic test pressure of 60 bar g		(870 psi g)

2.6 Materials

No.	Part	Material	
1	Body	A or M	Steel GP 240 GH
		AX or MX	Stainless steel AISI 316
2	Valve seat	DN25	Stellited stainless steel ASTM A479 316
		DN32 to DN50	Stainless steel BS 970 431 S29
3	Bonnet / yoke	Steel	GP 240 GH
4	Actuator housing	Pressed steel	
5	Valve head	Stellited stainless steel	ASTM A479 316
6	Gland seals	Graphite rings	
7	Bottom cover	A or M	Steel GP 240 GH
		AX or MX	Stainless steel AISI 316
8	Spring guide	Steel	Fe 37B
9	Spring	Spring steel	
10	Gland follower	Stainless steel	ASTM A479 316
11	Stuffing box flange	Steel	Fe 37B
12	Body nuts	Steel	ASTM A194 2H
13	Body studs	Steel	ASTM A193 B7
14	Body gasket	Graphite	
15	Diaphragm	Fabric reinforced nitrile rubber	

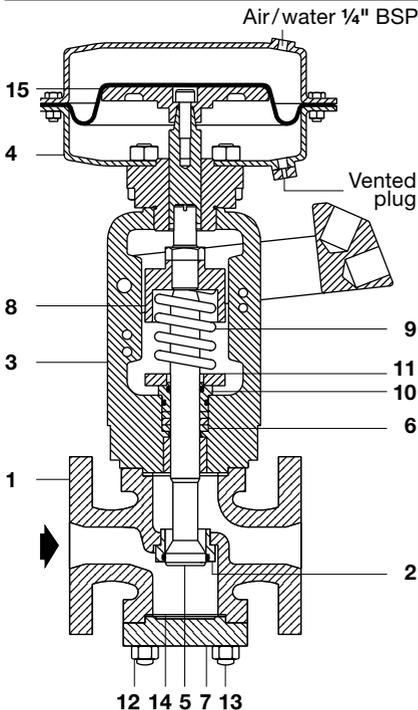


Fig. 1 DFG300A and DFG300AX DN25

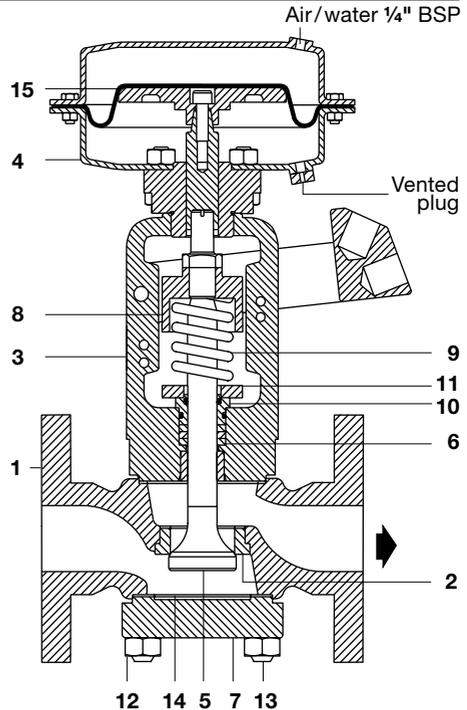


Fig. 2 DFG300A DN32 to DN50

3. Installation

WARNING

Read Section 1, 'Safety information' before attempting any installation.

3.1 General

The valve should preferably be installed with the actuator vertically above the pipework and having the arrow pointing in the direction of flow as indicated on the valve body, but it can also be fitted in other positions, except upside down. Install the valve between matching flanges taking care to ensure correct alignment.

The valve should be installed in such a position as to allow full access to both actuator and valve for maintenance purposes.

WARNING: The actuator housing must only be pressurised on the opposite side of the diaphragm to the springs.

The air/water supply to the solenoid valve/actuator must be in 10 mm (3/8") minimum diameter pipe.

The air/water inlet connection	1/4" BSP (G)
Actuator maximum air pressure	6 bar g (87 psi g)

3.2 Water actuation

For water actuation a suitable 3-way solenoid valve must be used. We recommend the Spirax Sarco WAV1 solenoid valve.

Maximum water temperature onto the actuator should be 70°C (158°F). If water hotter than 70°C (158°F) is being used a cooling leg/water seal pot should be used.

A suitable water seal pot is the Spirax Sarco WS4.

3.3 Switch box - optional extra

Refer to Figure 3 for product assembly and proceed as follows:

- Disconnect the air supply from the pneumatic actuator.
- Loosen and unscrew the locking grub screw and then the actuator.
- The actuator can now be removed.
- Fit the mounting bracket over the top of the actuator yoke with the special tongue pointing vertically downwards, so that the bracket doesn't move.
- Then install the switch box below the mounting bracket on the opposite side of the yoke to the grub screw.
- Refit and fully tighten the actuator.
- Replace and tighten the grub screw.
- The mechanical switch should be located in such a position as to allow the correct sliding of the roller on the upper surface of the fork arm. This action takes place on the opposite side of the yoke to the grub screw, towards the hand lever connection, as shown in Figure 3.
- Adjust the switch lever stroke so that vertical movement of the fork causes the switch to operate.
- Tighten the bracket bolts. Take care to ensure that the switch roller is correctly located, so that it slides without any interference and always remains within its working line of the fork arm.
- The switch terminal connections are shown in the Installation and Maintenance Instructions for the switch box.

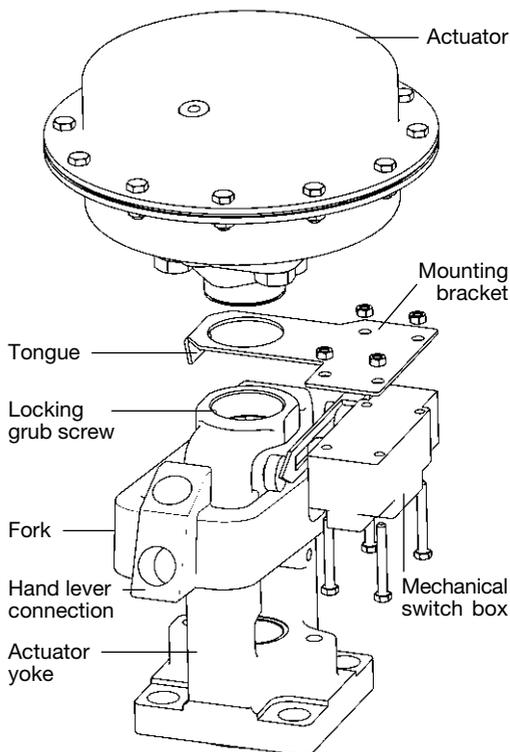


Fig. 3 Mechanical switch mounting

4. Operation

The frequency of bottom blowdown normally depends upon the boiler operating regime and the boiler manufacturers instructions, as a minimum it is typically done once a day for up to five seconds.

The air / water supply is switched on by the solenoid valve, causing the piston to move against the spring pressure.

The valve spindle (attached to the piston) moves the valve cone away from the seat, opening the valve fully. As the valve is opened, a scraper ring removes any deposits on the valve stem protecting the seals. On release of the air / water pressure, the springs return the valve to the closed position.

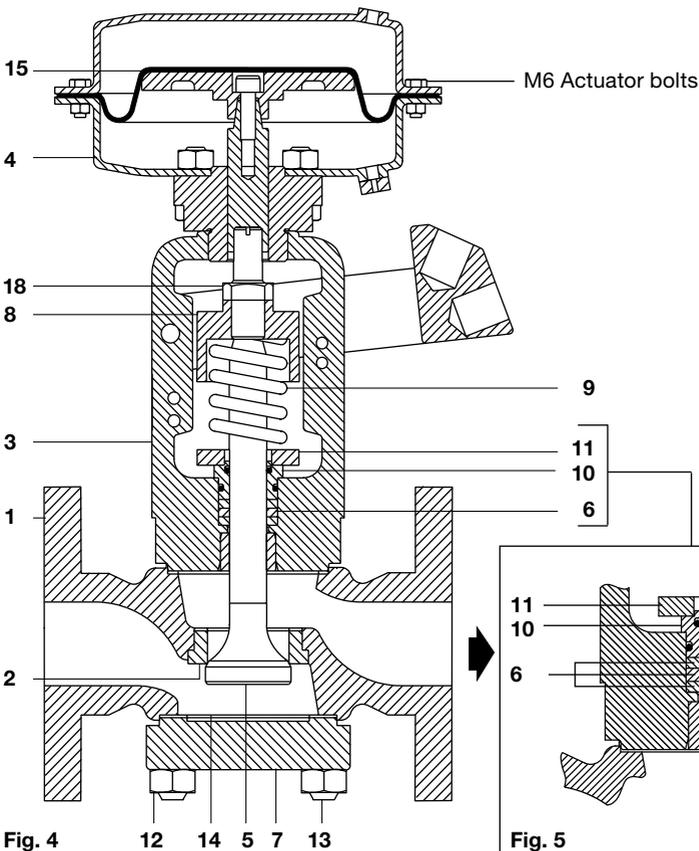
The solenoid valve has an override switch, which is pushed in and then turned to lock it, allowing the DFG300A or DFG300AX to be operated independently of an electricity supply. The manual override lever is pushed downwards to lift the stem and open the valve.

5. Maintenance

WARNING

Read Section 1, 'Safety information' before attempting any maintenance work.

Isolate the actuator electrically and pneumatically before any maintenance is carried out.



5.1 General

Periodically check that all fasteners remain tight. No routine maintenance is required. However periodic inspections of all parts are recommended.

5.2 Overhauling the valve

Please refer to Figure 4 for location of parts for the following replacement procedures or fitting of accessories.

1. **Actuator** – Ensure the actuator is vented and isolated and simply unscrew the actuator (4) from the valve.
2. **Actuator diaphragm (15)** – Open the actuator by removing the M6 bolts. Ensure the inside of the actuator is clean and apply grease to the operating piston and piston guide. Replace the diaphragm and the actuator lid and replace and tighten the bolts evenly (see Table 1 - Recommended tightening torques, page 12).
3. **Gland seals (6):**
 - Remove the actuator (DFG300A and DFG300AX) or the stop nut on top of the manual version (DFG300M and DFG300MX).
 - Remove the lever by unscrewing the bolts attached to the spring guide (8) and the lever hinge.
 - Unscrew the spring guide lock-nut (18).
 - Mark the position of the spring guide on the valve spindle. Using a screwdriver inserted in the slot on top of the spindle to avoid rotation, unscrew the spring guide (8).
 - Unscrew the 4 x M14 nuts and remove the spring guide, spring, stuffing box flange (11), gland follower (10) and gland seals (6).
 - Ensure all parts are clean, in particular the seal locating faces.
 - Insert the new gland seals as shown in Figure 5. Reassembly the gland follower and stuffing box flange taking care that the gland follower is correctly located in the stuffing box flange.
 - Re-assemble the spring and spring guide in the bonnet/yoke assembly.
 - Ensure the spindle is clean and lubricated and replace the bonnet gasket. Carefully assemble the Yoke assembly over the spindle.
 - Using the screwdriver to avoid rotation of the spindle tighten the spring guide until it is at it's original marked position and lock its position with the lock nut.
 - Tighten the 4 x M14 nuts and replace the lever ensuring it is correctly attached to the spring guide.
 - Replace the actuator (DFG300A and DFG300AX) or the stop nut (DFG300M and DFG300MX).

Warning: Do not operate the lever without the actuator or stop nut reassembled.

4. Replacement of the switchbox:

- Isolate the electrical supply.
- Disconnect the wiring to the switchbox.
- Unscrew the 4 screws that attach the switchbox to the square support bracket.
- Mount and attach the new switchbox.
- Adjust the position of the lever in order to operate the switch at the desired position.
- If further adjustment is required loosen the screws on the support bracket that connects to the yoke and move the switch box assembly. Tighten the screws when the desired position is reached.
- Restore the electrical connections and the electrical supply.

6. Spare parts

Spare parts

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

Available spares

Stuffing box packing (3 off)	6
Actuator diaphragm	15
Gaskets kit (2 sets)	14
Mechanical switch (without mounting kit)	
Manual actuation lever	

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the type and size of the valve.

Example: 1 off Actuator diaphragm for a Spirax Sarco DN40 DFG300A automatic boiler blowdown valve.

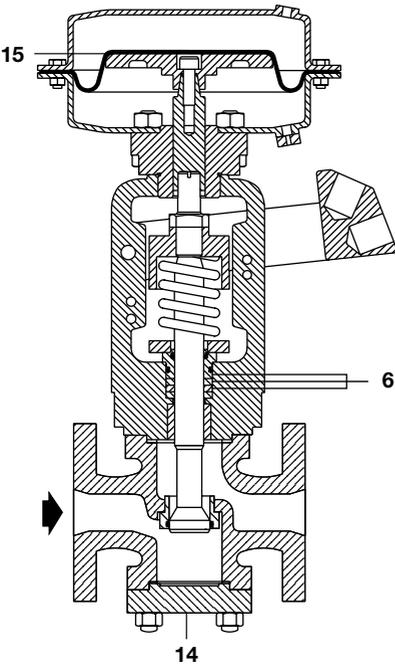


Fig. 6 DFG300A and DFG300AX DN25

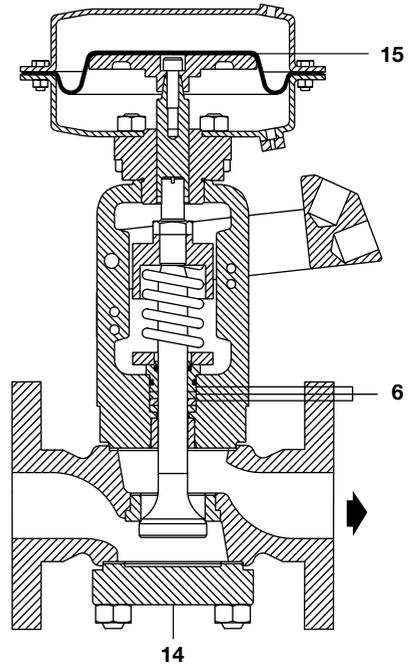


Fig. 7 DFG300A DN32 to DN50

Table 1 Recommended tightening torques

Part	 mm		N m	lbf ft
Actuator bolts	10 A/F	M6	5 - 6	3.5 - 4.5
Body nuts	22 A/F	M14	70	51.5
Lever hinge nuts	17 A/F	M10	5	3.5
Spring guide	10 A/F	M12	25	18.5