IM-S45-08-EN-ISS1
CTLS

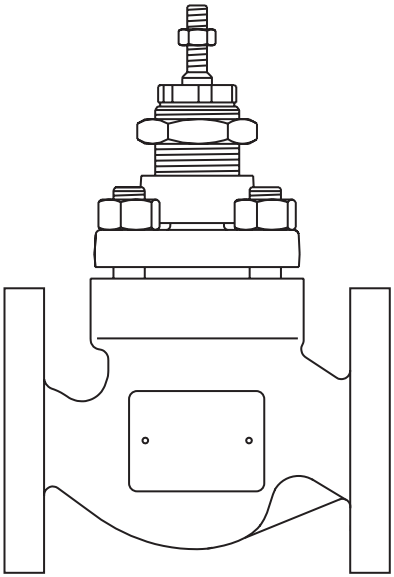
GCV Two-Port Control Valves

K and L Series

EN
English

Original Installation Instructions
819737-00

Contents



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.

Safety note - Handling precautions

PTFE
Within its working temperature range PTFE is a completely inert material, but when heated to its sintering temperature it gives rise to gaseous decomposition products or fumes which can produce unpleasant effects if inhaled. The inhalation of these fumes is easily prevented by applying local exhaust ventilation to atmosphere as near to their source as possible.
Smoking should be prohibited in workshops where PTFE is handled because tobacco contaminated with PTFE will during burning give rise to polymer fumes. It is therefore important to avoid contamination of clothing, especially the pockets, with PTFE and to maintain a reasonable standard or personal cleanliness by washing hands and removing any PTFE particles lodged under the fingernails.

Intended use 1.1

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 on pages 6 to 12 comply with the requirements of the European Pressure Equipment Directive (PED), carry the CE mark when so required and fall within the Pressure Equipment Directive categories stated.

i) **The products have been specifically designed for use with liquids and gases which are in Groups 1 and 2 of the above mentioned Pressure Equipment Directive.The products' use on other fluids may be possible but, if this is contemplated, GESTRA 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) **GESTRA 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.**

KE valves

Product			Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
KE43	PN40	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP	SEP
		DN65 - DN100	2	1	2	SEP
		DN125 - DN200	3	2	2	SEP
		DN250	3	2	2	1
		DN300	3	3	2	1
	PN25	DN200	3	2	2	SEP
		DN250 - DN300	3	2	2	1
	PN16	DN125	2	1	SEP	SEP
		DN150 - DN200	2	1	2	SEP
		DN250 - DN300	3	2	2	SEP
	JIS 20 KS 20	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP	SEP
		DN65 - DN100	2	1	2	SEP
		DN125 - DN200	2	1	2	SEP
		DN250	3	2	2	1
		DN300	3	3	2	1
	JIS 10 KS 10	DN125	2	1	SEP	SEP
		DN150 - DN250	2	1	2	SEP
		DN300	3	2	2	SEP

KE valves (continued)

Product			Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
KE61	PN40	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP	SEP
KE63	PN40	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP	SEP
		DN65 - DN100	2	1	2	SEP
		DN125 - DN200	3	2	2	SEP
		DN250	3	2	2	1
		DN300	3	3	2	1
	PN25	DN200	3	2	2	SEP
		DN250 - DN300	3	2	2	1
	PN16	DN125	2	1	SEP	SEP
		DN150 - DN200	2	1	2	SEP
		DN250 - DN300	3	2	2	SEP
	JIS 20 KS 20	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP	SEP
		DN65 - DN100	2	1	2	SEP
		DN125 - DN200	2	1	2	SEP
		DN200	3	2	2	1
		DN300	3	3	2	1
	JIS 10 KS 10	DN125	2	1	SEP	SEP
		DN150 - DN250	2	1	2	SEP
		DN300	3	2	2	SEP

KE valves (continued)

Product			Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
KE71	PN25	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32 - DN40	1	SEP	SEP	SEP
		DN50	2	1	SEP	SEP
KE73	PN25	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32 - DN40	1	SEP	SEP	SEP
		DN50 - DN80	2	1	SEP	SEP
		DN100 - DN125	2	1	2	SEP
		DN150 - DN200	3	2	2	SEP
	PN16	DN65 - DN125	2	1	SEP	SEP
		DN150 - DN200	2	1	2	SEP
	JIS 10 KS 10	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32 - DN65	1	SEP	SEP	SEP
		DN80 - DN125	2	1	SEP	SEP
		DN150 - DN200	2	1	2	SEP

KEA valves

Product			Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
KEA41 KEA42	ASME 300	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	2	SEP
KEA43	ASME 150	DN150	2	1	2	SEP
		DN200 - DN250	3	2	2	SEP
		DN300	3	3	2	1
	ASME 300	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN100	2	1	2	SEP
		DN150 - DN200	3	2	2	SEP
		DN250	3	2	2	1
		DN300	3	3	2	1
	JIS 20 KS 20	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	1	1	SEP	SEP
		DN65 - DN100	2	1	2	SEP

KEA valves (continued)

Product			Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
KEA61 KEA62	ASME 300	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	2	SEP
KEA63	ASME 150	DN150	2	1	2	SEP
		DN200 - DN250	3	2	2	SEP
		DN300	3	3	2	1
	ASME 300	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40	2	1	SEP	SEP
		DN50 - DN100	2	1	2	SEP
		DN150 - DN200	3	2	2	SEP
		DN250	3	2	2	1
		DN300	3	3	2	1
	JIS 20 KS 20	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP	SEP
		DN65 - DN100	2	1	2	SEP
KEA71	ASME 250	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP	SEP
KEA73	ASME 125	DN15 - DN25	SEP	SEP	SEP	SEP
		DN40 - DN65	1	SEP	SEP	SEP
		DN80 - DN100	2	1	SEP	SEP
		DN150 - DN200	2	1	2	SEP
	ASME 250	DN15 - DN25	SEP	SEP	SEP	SEP
		DN40 - DN65	2	1	SEP	SEP
		DN80 - DN100	2	1	2	SEP
		DN150 - DN200	3	2	2	SEP
	JIS 10 KS 10	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32 - DN65	1	SEP	SEP	SEP
		DN80 - DN100	2	1	SEP	SEP

LE valves

Product			Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
LE31 LE33	PN16	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32 - DN50	1	SEP	SEP	SEP
		DN65 - DN100	2	1	SEP	SEP
LE43 LE63	JIS 10 KS 10	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32 - DN65	1	SEP	SEP	SEP
		DN80 - DN100	2	1	SEP	SEP

LEA valves

Product			Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
LEA31 LEA33	ASME 125 JIS 10 KS 10	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32 - DN65	1	SEP	SEP	SEP
		DN80 - DN100	2	1	SEP	SEP
LEA43 LEA63	ASME 150 JIS 10 KS 10	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32 - DN65	1	SEP	SEP	SEP
		DN80 - DN100	2	1	SEP	SEP

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.

The system 1.6

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.

Pressure systems 1.7

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.

Temperature 1.8

Allow time for temperature to normalise after isolation to avoid the danger of burns and consider whether protective clothing (including safety glasses) is required.

PTFE SEALS

If seals made from PTFE have been subjected to a temperature approaching 260 °C (500 °F) or higher, they will give off toxic fumes, which if inhaled are likely to cause temporary discomfort. It is essential for a no smoking rule to be enforced in all areas where PTFE is stored, handled or processed as persons inhaling the fumes from burning tobacco contaminated with PTFE particles can develop 'polymer fume fever'.

Tools and consumables 1.9

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

Protective clothing 1.10

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.

Permits to work 1.11

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.

Handling 1.12

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 538 °C (1 000 °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. However, if the valve is fitted with a Viton or PTFE seat, special care must be taken to avoid potential health hazards associated with decomposition/burning of these seats.

PTFE:

- **Can only be disposed of by approved methods, not incineration.**
- **Keep PTFE waste in a separate container, do not mix it with other rubbish, and consign it to a landfill site.**

1.16 Returning products

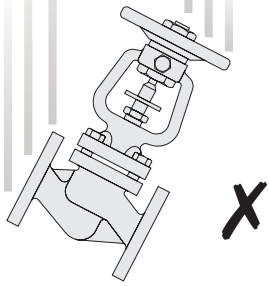
Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to GESTRA they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

1.17 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.

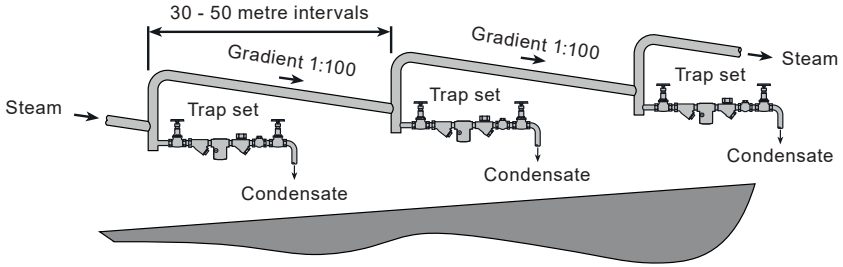
Safe Handling

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.

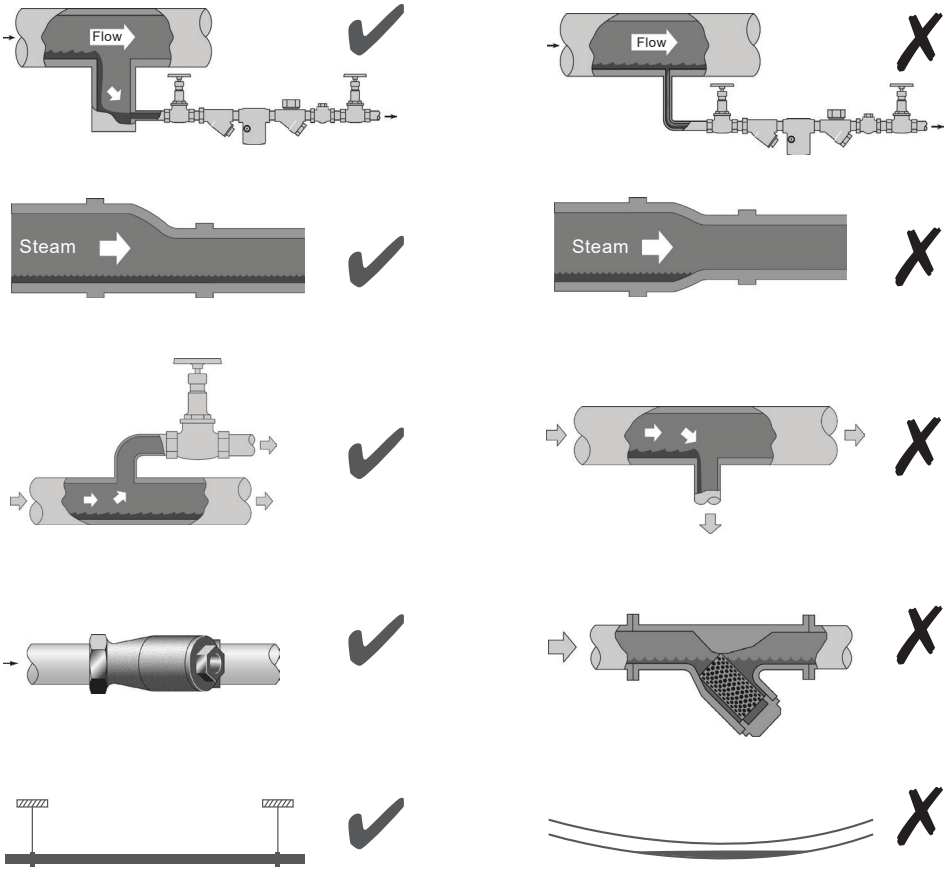


Prevention of waterhammer

Steam trapping on steam mains:

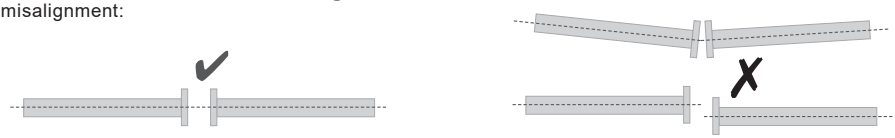


Steam Mains - Do's and Don'ts:



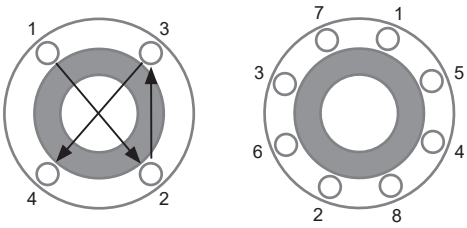
Prevention of tensile stressing

Pipe misalignment:



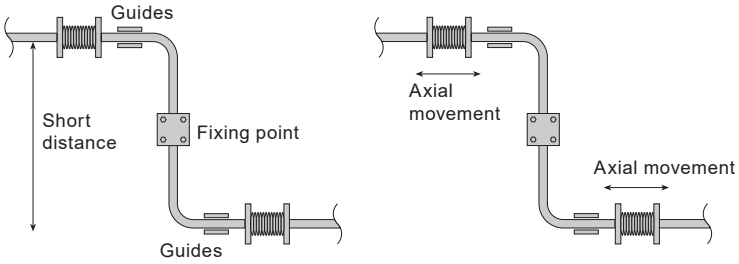
Installing products or re-assembling after maintenance:

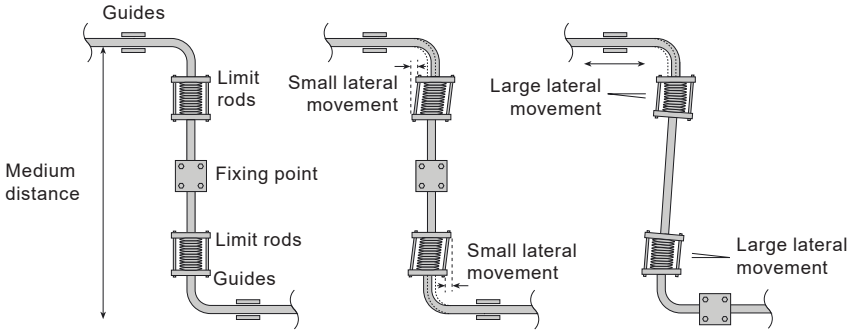
Do not over tighten.
Use correct torque figures.



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

Thermal expansion:





General description 2.1

GCV is a range of two-port single seat globe valves with cage-retained seats conforming to either EN (DIN) or ASME standards. These valves are available as follows:

- DN15 to DN200 (½" to 8") with a choice of three body materials.
- DN250 and DN300 (10" and 12") with a choice of two body materials.

These valves, when used in conjunction with a pneumatic or electric linear actuator provide modulating control or on/off service.

GCV valve characteristic - options:

KE and **KEA**	**Equal percentage (E) -** Suitable for most modulating process control
LE and **LEA**	applications providing good control at low flowrates.
KF and **KFA**	**Fast opening (F) -** For on/off applications only.
KL and **KLA**	**Linear (L) -** Primarily for liquid flow control where the differential
LL and **LLA**	pressures across the valve is constant.

Important note: Throughout this document, reference has been made to the standard KE, KEA, LE and LEA control valves. With the exception of trim type, all derivatives are identical.

GCV two-port control valves are compatible with the following actuators and positioners:

Electric	DN15 - DN100: AEL5, AEL6, EL3500, EL5600 and EL7200
	DN125 - DN300: EL5600
Pneumatic	All sizes: PN1000, PN9000
	DN125 - DN300: PN1000, PN9000 and TN2000
Positioners	PP5 (pneumatic) or EP5 (electropneumatic)
	ISP5 (intrinsically safe electropneumatic)
	SP200is, SP400 and SP500 (microprocessor based electropneumatic)
	SP300 (digital communications)

Refer to the relevant Technical Information sheet for further details.

2.2 Technical data

Plug design			Parabolic
Leakage	Metal-to-metal	Standard seat Class IV with the option of Class V	
	Soft seal	Balanced	Class IV
		Unbalanced	Class VI
Rangeability		Equal	50:1
		Linear	30:1
		Fast opening	10:1
Travel		DN15 to DN50 (½" to 2")	20 mm (¾")
		DN65 to DN100 (2½" to 4")	30 mm (1 3/16")
		DN125 to DN300 (5" to 12")	
Pressure/temperature limits		**KE4**_ see Section 2.3	
		KE6_ see Section 2.4	
		KE7_ see Section 2.5	
		KEA4_ see Section 2.6	
		KEA6_ see Section 2.7	
		KEA7_ see Section 2.8	
		LE3_ see Section 2.9	
		LE4_ see Section 2.10	
		LE6_ see Section 2.11	
		LEA3_ see Section 2.12	
		LEA4_ see Section 2.13	
		LEA6_ see Section 2.14	

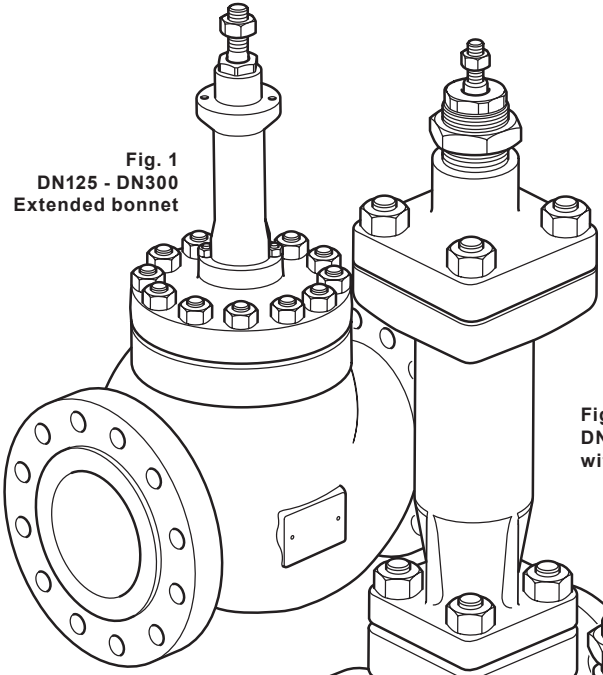


Fig. 1
DN125 - DN300
Extended bonnet

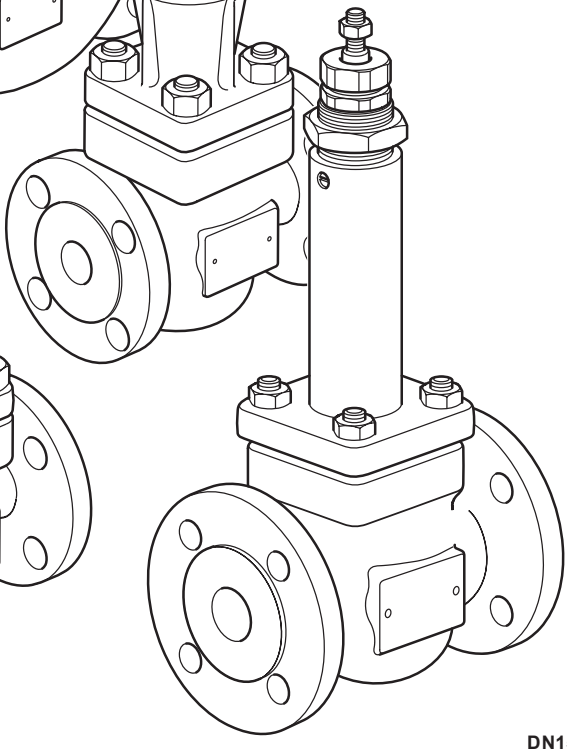


Fig. 2
DN15 - DN100 KE and KEA
with bellows seal (B) and (C)

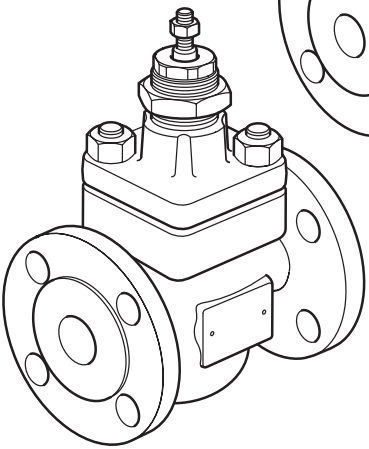
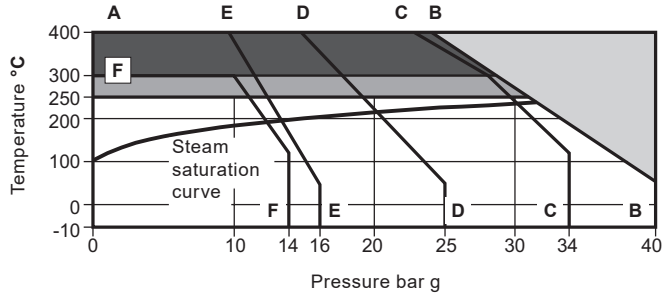


Fig. 3
DN15 to DN100
KE, KEA and LEA valves

Fig. 4
DN15 - DN100
KE, KEA, LE and LEA with bellows seal (D)

2.3 Pressure/temperature limits - KE43 (Carbon steel)



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

High temperature packing is required for use in this region.

High temperature bolting and packing is required for use in this region.

A - B Flanged EN 1092 PN40.

A - C Flanged JIS/KS 20.

A - D Flanged EN 1092 PN25.

A - E Flanged EN 1092 PN16.

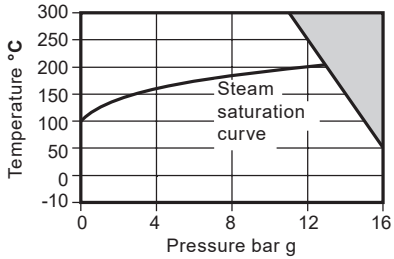
F - F Flanged JIS/KS 10.

Bellows only

Maximum operating temperature

Minimum operating temperature	-10 °C
Note: For lower operating temperatures consult GESTRA.	
Maximum differental pressures	See relevant actuator Technical Information sheet
Maximum cold hydraulic test pressure of:	60 bar g
Warning: If the valve is fitted with a bellows it must be removed if hydraulic testing is to be done.	

Bellows B



Note: When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.

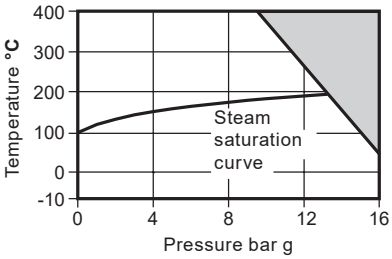
Notes:

1. Where the process fluid temperature is sub-zero and the ambient temperature is below +5 °C, the external moving parts of the valve and actuator must be heat traced to maintain normal operation.
2. When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown in table below.

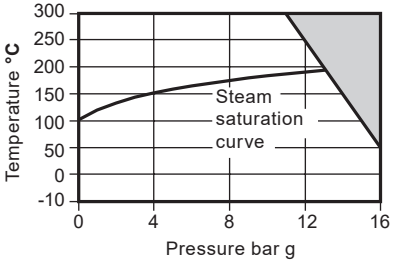
Body design conditions		PN40
Maximum design pressure		40 bar g @ 50 °C
Maximum design temperature		400 °C
Minimum design temperature		-10 °C
Maximum operating temperature	PTFE soft seat (G)	200 °C
	Standard packing PTFE chevron	
	PEEK seat (K and P)	250 °C
	Extended bonnet (E) with PTFE chevron	
	High temperature packing (H)	400 °C
	Extended bonnet (E) with graphite packing	

Note: We recommend that an extended bonnet (E) with graphite packing is used where valve operation is above 300 °C.

Bellows C

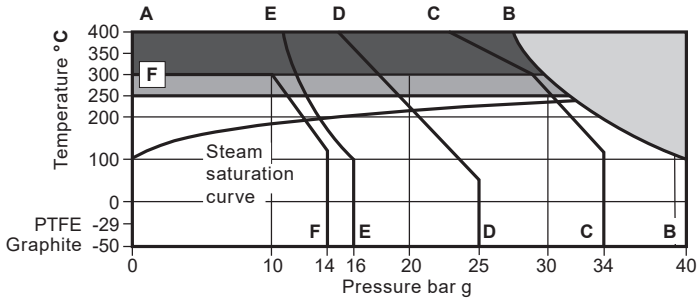


Bellows D



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

2.4 Pressure/temperature limits - KE61 and KE63 (Stainless steel)



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

High temperature packing is required for use in this region.

High temperature bolting and packing is required for use in this region.

A - B Flanged EN 1092 PN40.

A - C Flanged JIS/KS 20.

A - D Flanged EN 1092 PN25.

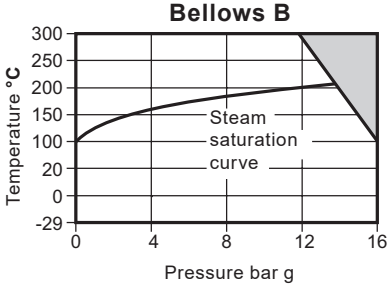
A - E Flanged EN 1092 PN16.

F - F Flanged JIS/KS 10.

Bellows only

Maximum operating temperature

Minimum operating temperature	PTFE packing	-29 °C
	Graphite packing	-50 °C
Note: For lower operating temperatures consult GESTRA.		
Maximum differental pressures		See relevant actuator Technical Information sheet
Maximum cold hydraulic test pressure of:		60 bar g
Warning: If the valve is fitted with a bellows it must be removed if hydraulic testing is to be done.		



Note: When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.

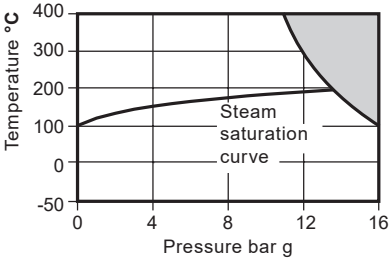
Notes:

1. Where the process fluid temperature is sub-zero and the ambient temperature is below +5 °C, the external moving parts of the valve and actuator must be heat traced to maintain normal operation.
2. When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown in table below.

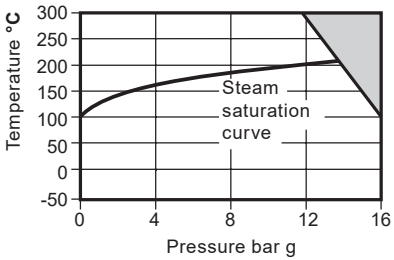
Body design conditions		PN40
Maximum design pressure		40 bar g @ 50 °C
Maximum design temperature		400 °C
Minimum design temperature		-50 °C
Maximum operating temperature	PTFE soft seat (G)	200 °C
	Standard packing PTFE chevron	
	PEEK seat (K and P)	250 °C
	Extended bonnet (E) with PTFE chevron	
	High temperature packing (H)	400 °C
	Extended bonnet (E) with graphite packing	

Note: We recommend that an extended bonnet (E) with graphite packing is used where valve operation is above 300 °C.

Bellows C

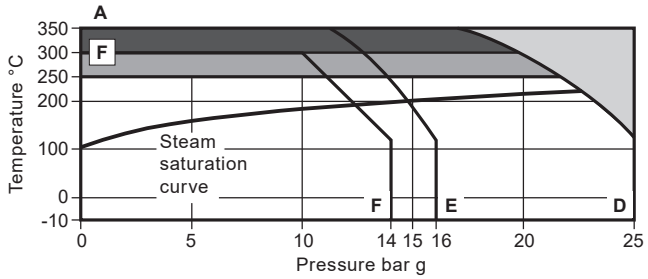


Bellows D



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

2.5 Pressure/temperature limits - KE71 and KE73 (SG iron)



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

High temperature packing is required for use in this region.

High temperature bolting and packing is required for use in this region.

A - D Flanged EN 1092 PN25 and Screwed BSP.

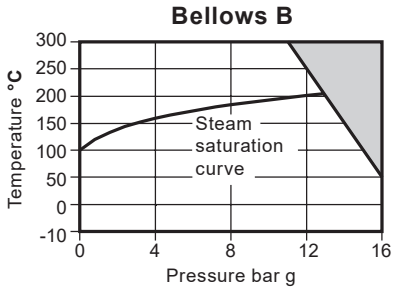
A - E Flanged EN 1092 PN16.

F - F Flanged JIS/KS 10.

Bellows only

Maximum operating temperature

Minimum operating temperature	-10 °C
Note: For lower operating temperatures consult GESTRA.	
Maximum differental pressures	See relevant actuator Technical Information sheet
Maximum cold hydraulic test pressure of:	38 bar g
Warning: If the valve is fitted with a bellows it must be removed if hydraulic testing is to be done.	



Note: When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.

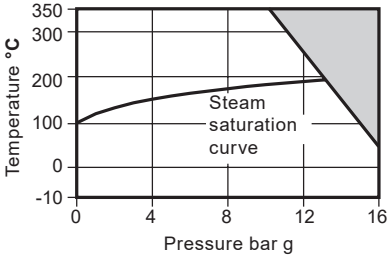
Notes:

1. Where the process fluid temperature is sub-zero and the ambient temperature is below +5 °C, the external moving parts of the valve and actuator must be heat traced to maintain normal operation.
2. When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown in table below.

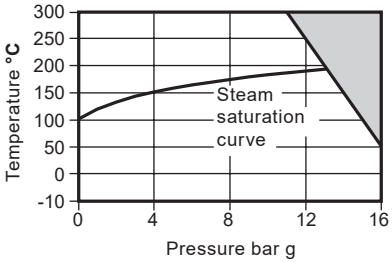
Body design conditions		PN25
Maximum design pressure		25 bar g @ 120 °C
Maximum design temperature		350 °C
Minimum design temperature		-10 °C
Maximum operating temperature	PTFE soft seat (G)	200 °C
	Standard packing PTFE chevron	
	PEEK seat (K and P)	250 °C
	Extended bonnet (E) with PTFE chevron	
	High temperature packing (H)	400 °C
	Extended bonnet (E) with graphite packing	

Note: We recommend that an extended bonnet (E) with graphite packing is used where valve operation is above 300 °C.

Bellows C

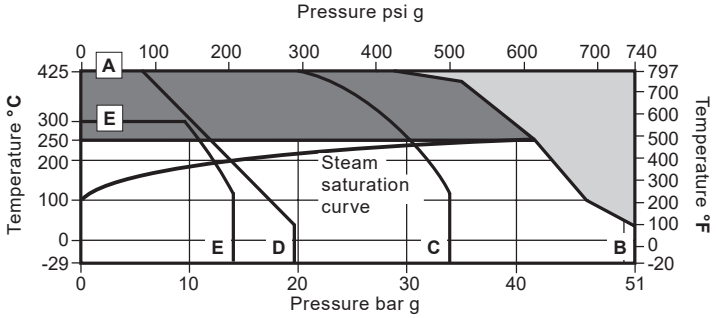


Bellows D



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

2.6 Pressure/temperature limits - KEA41, KEA42 and KEA43 (Carbon steel)



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

Graphite stem sealing is required for use in this region.

A - B Flanged ASME 300 and Screwed NPT and SW.

A - C Flanged JIS/KS 20.

A - D Flanged ASME 150.

E - E Flanged JIS/KS 10.

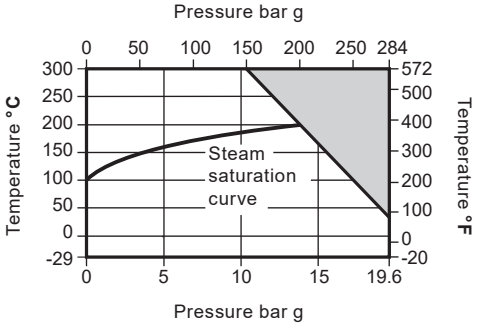
Bellows only

Maximum operating temperature

Minimum operating temperature	-29 °C	(-20 °F)
Note: For lower operating temperatures consult GESTRA.		
Maximum differental pressures	See relevant actuator Technical Information sheet	
Maximum cold hydraulic test pressure of:	77 bar g	(1 100 psi g)

Warning: If the valve is fitted with a bellows it must be removed if hydraulic testing is to be done.

Bellows B



Note: When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.

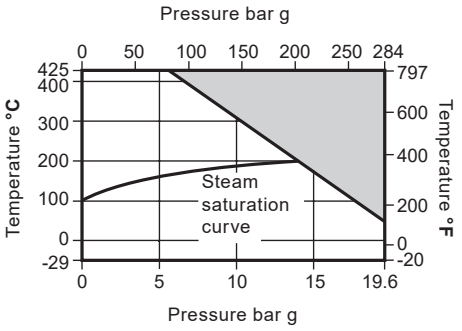
Notes:

1. Where the process fluid temperature is sub-zero and the ambient temperature is below +5 °C (41 °F), the external moving parts of the valve and actuator must be heat traced to maintain normal operation.
2. When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.
3. As standard the KEA, KFA, KLA series two-port control valves are supplied with the PTFE stem sealing option.

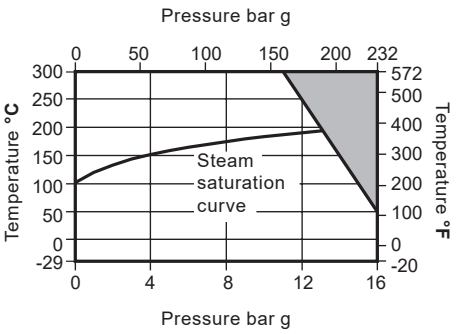
Body design conditions			ASME 150 and ASME 300
Maximum design pressure	ASME 150 (6" to 12" only)	19.6 bar g @ 38 °C	(284 psi g @ 100 °F)
	ASME 300	51.1 bar g @ 38 °C	(740 psi g @ 100 °F)
Maximum design temperature		425 °C	(800 °F)
Minimum design temperature		-29 °C	(-20 °F)
Maximum operating temperature	PTFE soft seat (G)	200 °C	(392 °F)
	Standard packing PTFE chevron PEEK seat (K and P) Extended bonnet (E) with PTFE chevron	250 °C	(482 °F)
	Graphite packing (H) Extended bonnet (E) with graphite packing	425 °C	(800 °F)

Note: We recommend that an extended bonnet (E) with graphite packing is used where valve operation is above 300 °C (572 °F).

Bellows C

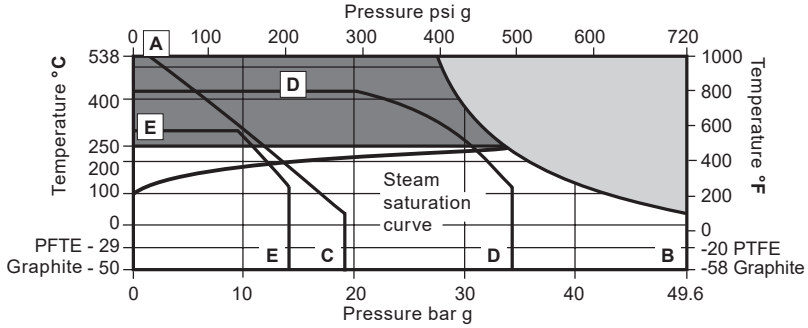


Bellows D



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

2.7 Pressure/temperature limits - KEA61, KEA62 and KEA63 (Stainless steel)



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

Graphite stem sealing is required for use in this region.

A - B Flanged ASME 300 and Screwed NPT and SW.

A - C Flanged ASME 150.

A - D Flanged JIS/KS 20.

E - E Flanged JIS/KS 10.

Bellows only

Maximum operating temperature

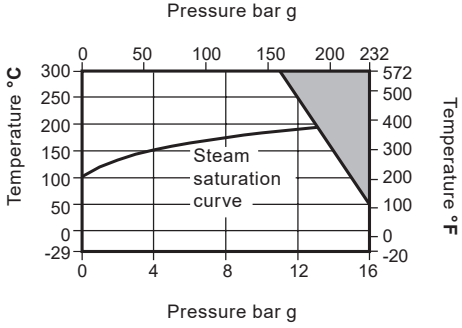
Minimum operating temperature	PTFE packing	-29 °C	(-20 °F)
	Graphite packing	-50 °C	(-58 °F)

Note:
For lower operating temperatures consult GESTRA.

Maximum differential pressures	See relevant actuator Technical Information sheet
Maximum cold hydraulic test pressure of:	75 bar g (1 087.5 psi g)

Warning: If the valve is fitted with a bellows it must be removed if hydraulic testing is to be done.

Bellows B



Note: When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.

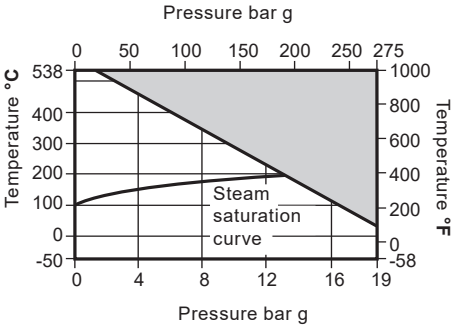
Notes:

1. Where the process fluid temperature is sub-zero and the ambient temperature is below +5 °C (41 °F), the external moving parts of the valve and actuator must be heat traced to maintain normal operation.
2. When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.
3. As standard the KEA, KFA, KLA series two-port control valves are supplied with the PTFE stem sealing option.

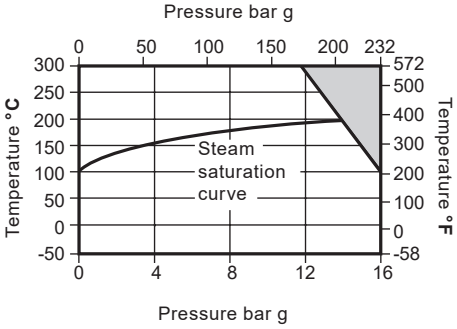
Body design conditions			ASME 150 and ASME 300
Maximum design pressure	ASME 150 (6" to 12" only)	19.6 bar g @ 38 °C	(275 psi g @ 100 °F)
	ASME 300	49.6 bar g @ 38 °C	(720 psi g @ 100 °F)
Maximum design temperature		538 °C	(1000 °F)
Minimum design temperature		-50 °C	(-58 °F)
Maximum operating temperature	PTFE soft seat (G)	200 °C	(392 °F)
	Standard packing PTFE chevron PEEK seat (K and P) Extended bonnet (E) with PTFE chevron	250 °C	(482 °F)
	Graphite packing (H) Extended bonnet (E) with graphite packing	538 °C	(1000 °F)

Note: We recommend that an extended bonnet (E) with graphite packing is used where valve operation is above 300 °C (572 °F).

Bellows C

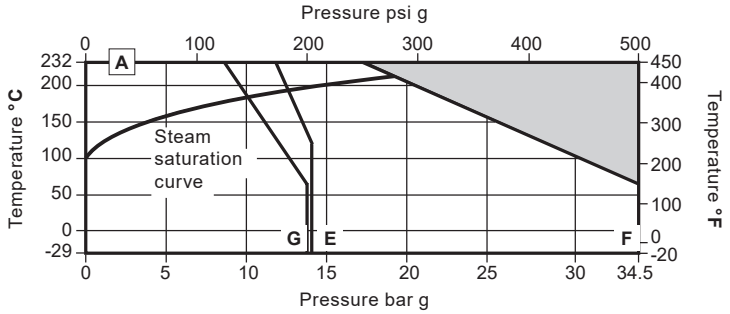


Bellows D



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

2.8 Pressure/temperature limits - KEA71 and KEA73 (SG iron)



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

A - E Flanged JIS/KS 10.

A - F Flanged ASME 250 and Screwed NPT and SW.

A - G Flanged ASME 125.

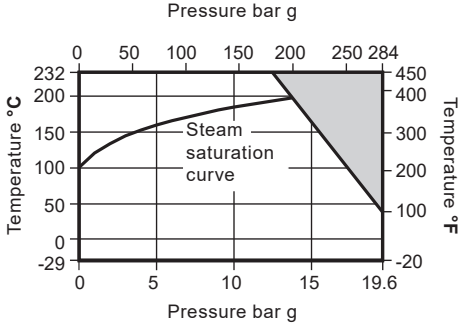
Bellows only

Maximum operating temperature

Minimum operating temperature		-29 °C	(-20 °F)
Note: For lower operating temperatures consult GESTRA.			
Maximum differential pressures		See relevant actuator Technical Information sheet	
Maximum cold hydraulic test pressure of:	ASME 125	20.7 bar g	(300 psi g)
	ASME 250	51.8 bar g	(750 psi g)

Warning: If the valve is fitted with a bellows it must be removed if hydraulic testing is to be done.

Bellows B



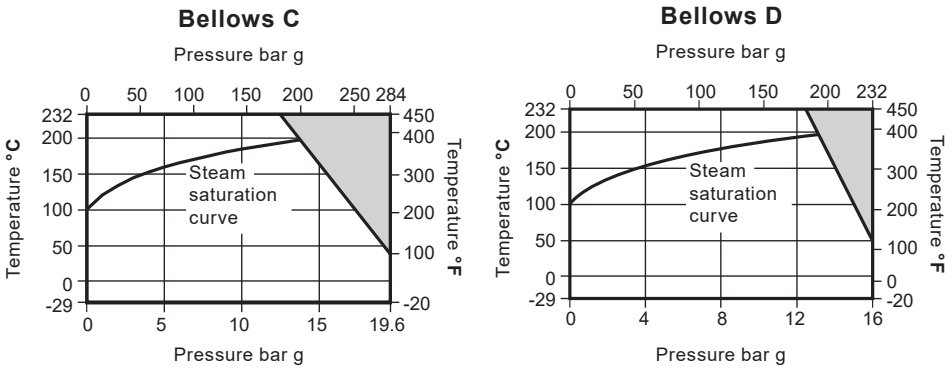
Note: When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.

Notes:

1. Where the process fluid temperature is sub-zero and the ambient temperature is below +5 °C (41 °F), the external moving parts of the valve and actuator must be heat traced to maintain normal operation.
2. When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.
3. As standard the KEA, KFA, KLA series two-port control valves are supplied with the PTFE stem sealing option.

Body design conditions			ASME 125 and ASME 250
Maximum design pressure	ASME 125	13.8 bar g @ 65 °C	(200 psi g @ 150 °F)
	ASME 250	34.5 bar g @ 65 °C	(500 psi g @ 150 °F)
Maximum design temperature		232 °C	(450 °F)
Minimum design temperature		-20 °C	(-29 °F)
Maximum operating temperature	PTFE soft seat (G)	200 °C	(392 °F)
	Standard packing PTFE chevron	232 °C	(450 °F)
	PEEK seat (K and P)		
	Extended bonnet (E) with PTFE chevron		
	Graphite packing (H)		
	Extended bonnet (E) with graphite packing		

Note: We recommend that an extended bonnet (E) with graphite packing is used where valve operation is above 300 °C (572 °F).

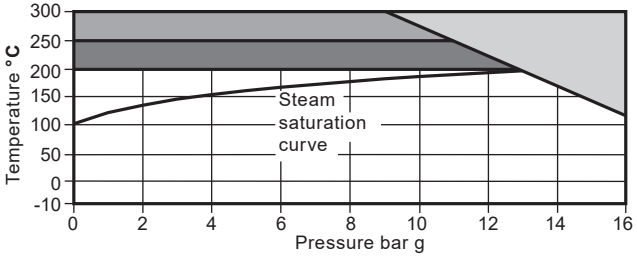


The product **must not** be used in this region.

2.9 Pressure/temperature limits - LE31 and LE33 (Cast iron valve body)

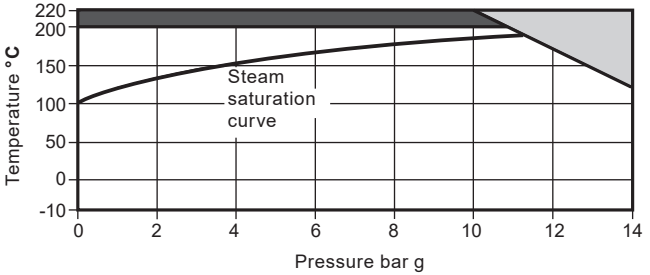
Body design conditions			PN16
Maximum design pressure			16 bar g @ 120 °C
Maximum design temperature			300 °C @ 9.6 bar g
Minimum design temperature			-10 °C
Maximum operating temperature	Standard packing PTFE chevron	- Option **P** or **N**	250 °C
	PTFE soft seat	- Option **G**	200 °C
	PEEK soft seat	- Option **K** or **P**	250 °C
	Graphite packing	- Option **H**	300 °C
	Extended bonnet with PTFE chevron	- Option **E**	250 °C
	Extended bonnet with graphite packing	- Option **E**	300 °C
	Bellows	- Option **D**	300 °C
Minimum operating temperature	**Note:** For lower operating temperatures consult GESTRA		-10 °C
Maximum differential pressures			See relevant actuator Technical Information sheet.
Maximum cold hydraulic test pressure of:			24 bar g

Screwed BSP
Flanged EN 1092 PN16



Note: When the process fluid temperature is sub-zero and the ambient temperature is below +5 °C, the external moving parts of the valve and actuator must be heat traced to maintain normal operation.

Flanged JIS/KS 10



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

High temperature graphite packing is required for use in this region.
Note: Soft seated valves cannot be used in this region.

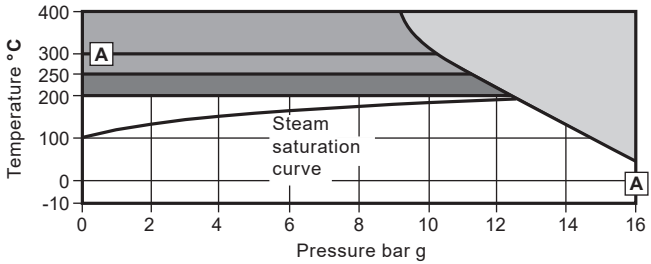
PTFE soft seated valves are limited to a maximum operating temperature of 200 °C.

2.10 Pressure/temperature limits - LE43 (Carbon steel valve body)

Body design conditions			PN16
Maximum design pressure			16 bar g @ 50 °C
Maximum design temperature			400 °C @ 9.5 bar g
Minimum design temperature			-10 °C
Maximum operating temperature	Standard packing PTFE chevron	- Option **P** or **N**	250 °C
	PTFE soft seat	- Option **G**	200 °C
	PEEK soft seat	- Option **K** or **P**	250 °C
	Graphite packing	- Option **H**	400 °C
	Extended bonnet with PTFE chevron	- Option **E**	250 °C
	Extended bonnet with graphite packing	- Option **E**	400 °C
	Bellows (**A** - **A** on the Flanged EN 1092 PN16 chart)	- Option **D**	300 °C
Minimum operating temperature	**Note:** For lower operating temperatures consult GESTRA		-10 °C
Maximum differential pressures			See relevant actuator Technical Information sheet.
Maximum cold hydraulic test pressure of:			24 bar g

For valve operating above 300 °C extended bonnet is recommended for actuator suitability.

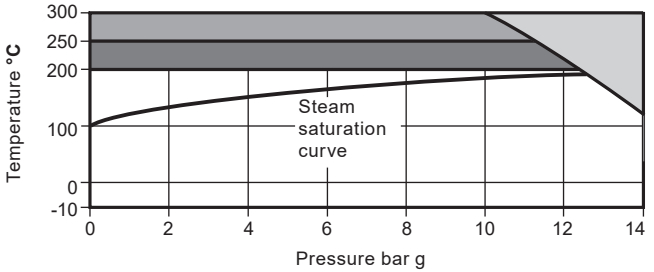
Flanged EN 1092 PN16



Please note - Bellows sealed valves (Option **D**) are limited to **A** - **A**.

Note: When the process fluid temperature is sub-zero and the ambient temperature is below +5 °C, the external moving parts of the valve and actuator must be heat traced to maintain normal operation.

Flanged JIS/KS 10



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

High temperature graphite packing is required for use in this region.
Note: Soft seated valves cannot be used in this region.

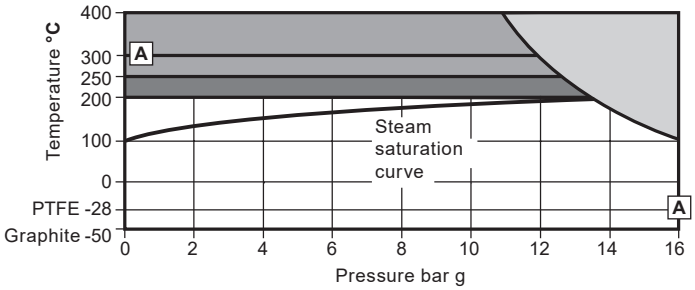
PTFE soft seated valves are limited to a maximum operating temperature of 200 °C.

2.11 Pressure/temperature limits - LE63 (Carbon steel valve body

Body design conditions			PN16
Maximum design pressure			16 bar g @ 50 °C
Maximum design temperature			400 °C @ 10.9 bar g
Minimum design temperature			-50 °C
Maximum operating temperature	Standard packing PTFE chevron	- Option **P** or **N**	250 °C
	PTFE soft seat	- Option **G**	200 °C
	PEEK soft seat	- Option **K** or **P**	250 °C
	Graphite packing	- Option **H**	400 °C
	Extended bonnet with PTFE chevron	- Option **E**	250 °C
	Extended bonnet with graphite packing	- Option **E**	400 °C
	Bellows (**A** - **A** on the Flanged EN 1092 PN16 chart)	- Option **D**	300 °C
Minimum operating temperature **Note:** For lower operating temperatures consult GESTRA		PTFE packing	-28 °C
		Graphite packing	-50 °C
Maximum differential pressures			See relevant actuator Technical Information sheet.
Maximum cold hydraulic test pressure of:			24 bar g

For valve operating above 300 °C extended bonnet is recommended for actuator suitability.

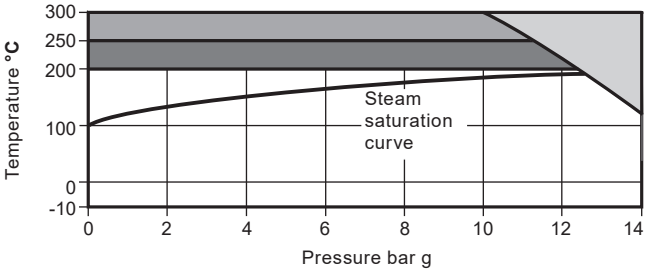
Flanged EN 1092 PN16



Please note - Bellows sealed valves (Option **D**) are limited to **A** - **A**.

Note: When the process fluid temperature is sub-zero and the ambient temperature is below +5 °C, the external moving parts of the valve and actuator must be heat traced to maintain normal operation.

Flanged JIS/KS 10



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

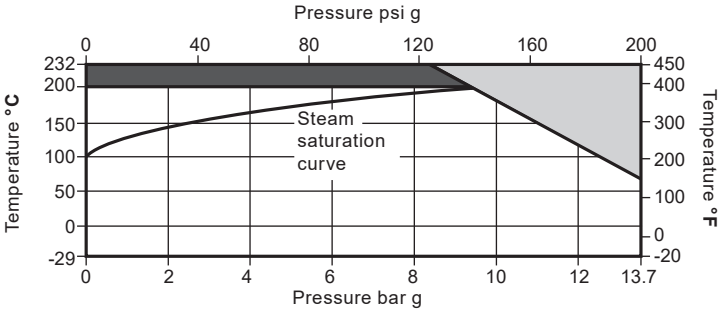
High temperature graphite packing is required for use in this region.
Note: Soft seated valves cannot be used in this region.

PTFE soft seated valves are limited to a maximum operating temperature of 200 °C.

2.12 Pressure/temperature limits - LEA31 and LEA33 (Carbon steel valve body)

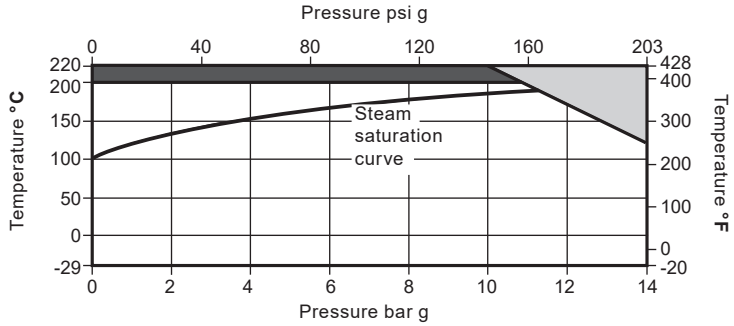
Body design conditions				ASME 125
Maximum design pressure			13.7 bar g @ 65 °C	(200 psi g @ 150 °F)
Maximum design temperature			232 °C @ 8.6 bar g	(450 °F @ 125 psi g)
Minimum design temperature			-28 °C	(-20 °F)
Maximum operating temperature	Standard packing PTFE chevron	- Option **P** or **N**	232 °C	(450 °F)
	PTFE soft seat	- Option **G**	200 °C	(392 °F)
	PEEK soft seat	- Option **K** or **P**	232 °C	(450 °F)
	Graphite packing	- Option **H**	232 °C	(450 °F)
	Extended bonnet with PTFE chevron	- Option **E**	232 °C	(450 °F)
	Extended bonnet with graphite packing	- Option **E**	232 °C	(450 °F)
	Bellows	- Option **D**	232 °C	(450 °F)
Minimum operating temperature	**Note:** For lower operating temperatures consult GESTRA		-29 °C	(-20 °F)
Maximum differential pressures			See relevant actuator Technical Information sheet.	
Maximum cold hydraulic test pressure of:			21 bar g	(300 psi g)

Screwed NPT
Flanged ASME class 125



Note: When the process fluid temperature is sub-zero and the ambient temperature is below +5 °C (41 °F), the external moving parts of the valve and actuator must be heat traced to maintain normal operation.

Flanged JIS/KS 10



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

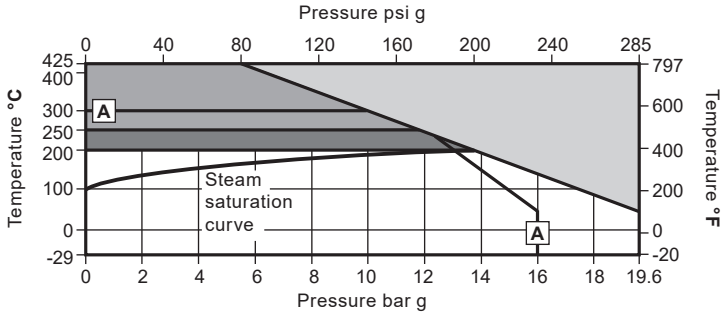
PTFE soft seated valves are limited to a maximum operating temperature of 200 °C (482 °F).

2.13 Pressure/temperature limits - LEA43 (Carbon steel valve body)

Body design conditions				ASME 150
Maximum design pressure			19.6 bar g @ 38 °C	(285 psi g @ 100 °F)
Maximum design temperature			425 °C @ 5.5 bar g	(800 °F @ 80 psi g)
Minimum design temperature			-29 °C	(-20 °F)
Maximum operating temperature	Standard packing PTFE chevron	- Option **P** or **N**	250 °C	(482 °F)
	PTFE soft seat	- Option **G**	200 °C	(392 °F)
	PEEK soft seat	- Option **K** or **P**	250 °C	(482 °F)
	Graphite packing	- Option **H**	425 °C	(800 °F)
	Extended bonnet with PTFE chevron	- Option **E**	250 °C	(482 °F)
	Extended bonnet with graphite packing	- Option **E**	425 °C	(800 °F)
	Bellows (**A** - **A** on the Flanged ASME Class-150 chart)	- Option **D**	300 °C	(572 °F)
Minimum operating temperature	**Note:** For lower operating temperatures consult GESTRA		-28 °C	(-20 °F)
Maximum differential pressures			See relevant actuator Technical Information sheet.	
Maximum cold hydraulic test pressure of:			29.5 bar g	(428 psi g)

For valve operating above 300 °C (572 °F) extended bonnet is recommended for actuator suitability.

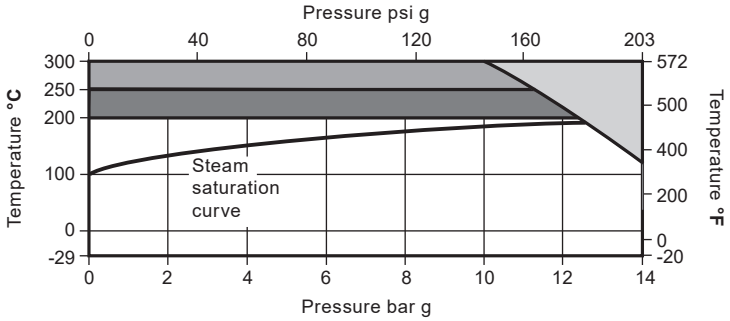
Flanged ASME class 150



Please note - Bellows sealed valves (Option **D**) are limited to **A** - **A**.

Note: When the process fluid temperature is sub-zero and the ambient temperature is below +5 °C (41 °F), the external moving parts of the valve and actuator must be heat traced to maintain normal operation.

Flanged JIS/KS 10



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

High temperature graphite packing is required for use in this region.
Note: Soft seated valves cannot be used in this region.

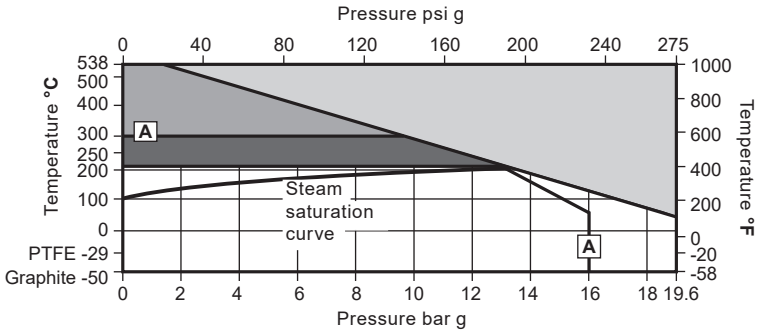
PTFE soft seated valves are limited to a maximum operating temperature of 200 °C (482 °F).

2.14 Pressure/temperature limits - LEA63 (Carbon steel valve body)

Body design conditions				ASME 150
Maximum design pressure			19.6 bar g @ 38 °C	(285 psi g @ 100 °F)
Maximum design temperature			538 °C @ 1.3 bar g	(1 000 °F @ 20 psi g)
Minimum design temperature			-50 °C	(-58 °F)
Maximum operating temperature	Standard packing PTFE chevron	- Option **P** or **N**	250 °C	(482 °F)
	PTFE soft seat	- Option **G**	200 °C	(392 °F)
	PEEK soft seat	- Option **K** or **P**	250 °C	(482 °F)
	Graphite packing	- Option **H**	538 °C	(1 000 °F)
	Extended bonnet with PTFE chevron	- Option **E**	250 °C	(482 °F)
	Extended bonnet with graphite packing	- Option **E**	538 °C	(1 000 °F)
	Bellows (**A** - **A** on the LEA63 chart)	- Option **D**	300 °C	(572 °F)
Minimum operating temperature	**Note:** For lower operating temperatures consult GESTRA		-28 °C	(-20 °F)
			-50 °C	(-58 °F)
Maximum differential pressures			See relevant actuator Technical Information sheet.	
Maximum cold hydraulic test pressure of:			28.4 bar g	(413 psi g)

For valve operating above 300 °C (572 °F) extended bonnet is recommended for actuator suitability.

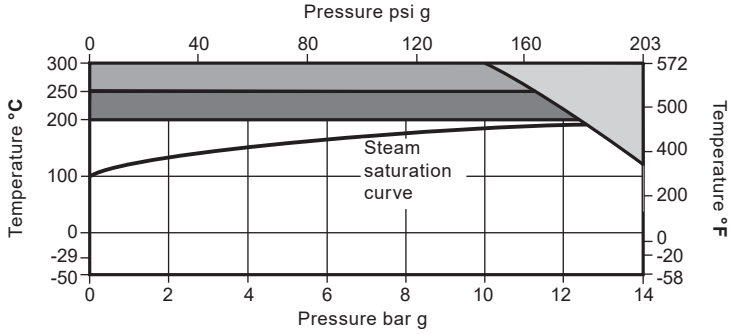
Flanged ASME class 150



Please note - Bellows sealed valves (Option **D**) are limited to **A** - **A**.

Note: When the process fluid temperature is sub-zero and the ambient temperature is below +5 °C (41 °F), the external moving parts of the valve and actuator must be heat traced to maintain normal operation.

Flanged JIS/KS 10



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

High temperature graphite packing is required for use in this region.
Note: Soft seated valves cannot be used in this region.

PTFE soft seated valves are limited to a maximum operating temperature of 200 °C (482 °F).

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. **Do not exceed the performance rating of the valve.** 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 Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

3.3 Determine the correct installation situation and the direction of fluid flow. The valve should preferably be installed along a horizontal pipeline with the valve mounted above the pipe (see Figure 3). When mounting an actuator to the valve body, the actuator Installation and Maintenance Instructions must be followed.

3.4 **Bypass arrangements** - It is recommended that isolating valves be fitted upstream and downstream of the control valve, together with a manual bypass control valve. This enables the process to be controlled manually using the bypass valve while the pneumatic valve is isolated for maintenance.

3.5 Support pipework should be used to prevent stresses being exerted on the valve body. **Note:** If a DN125 to DN300 valve is to be installed in vertical pipework the actuator will require additional support.

3.6 Ensure adequate space is provided for the removal of the actuator from the valve body for maintenance purposes:

3.7 Isolate connecting pipework. Ensure it is clean from dirt, scale etc. Any debris entering the valve may damage the head seal preventing the specified shut off.

3.8 Open isolation valves slowly, until normal operating conditions are achieved.

3.9 Check for leaks and correct operation.

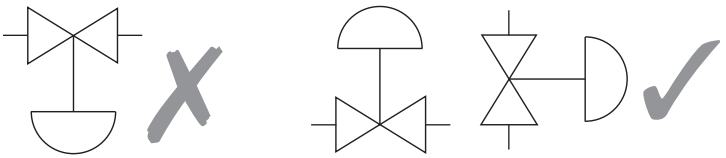
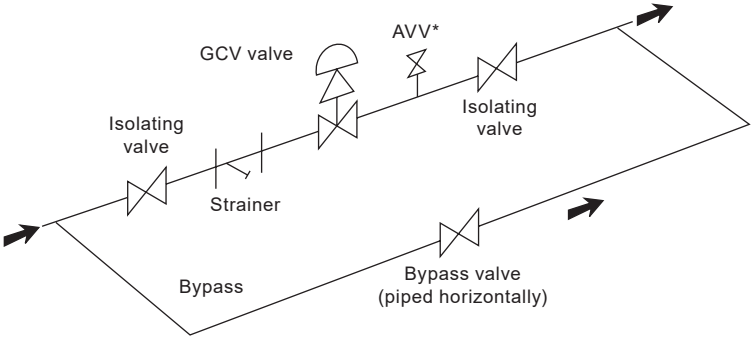


Fig. 3



* Anti-vacuum valve recommended for steam installations.

Fig. 4

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

Warning for all stainless steel valves

The 316 type stainless steel used in the construction of these products particularly for screwed or close fitting parts, is very susceptible to galling or cold welding. This is an inherent characterisitic of this type of material and great care should therefore be taken when dismantling or reassembling. If the application permits, it is recommended that a light smear of a PTFE based grease is applied to any mating parts before reassembly.

General 4.1

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance frequency depends on the severity of the service conditions. This section provides instructions on replacement packing, stem, plug and seat and bellows. All maintenance operations can be performed with the valve body in the line.

Annually

The valve should be inspected for wear and tear replacing any worn or damaged parts such as valve plug and stem, valve seat and gland seals, refer to Section 6 'Spare parts'.

Note 1: High temperature graphite packed seals are subject to wear during normal operation. We therefore recommend the graphite packing be replaced during this routine inspection to prevent premature failure of the packing during normal operation.

Note 2: It is recommended that all soft seals and gaskets be replaced whenever the valve is disassembled.

Table 1 Recommended tightening torques - Control valve sizes DN15 to DN100

GCV valve size	**Torque (N m)**	
	LE	**LEA, KE and KEA**
DN15 - DN25	70	100
DN32 - DN50	90	130
DN65 - DN80	110	130
DN100	110	130

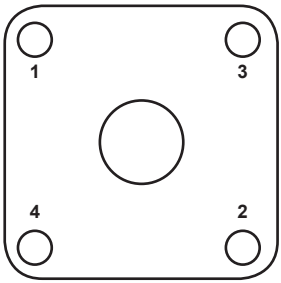


Fig. 5 Bonnet tightening sequence

4.2 Removal of valve bonnet

Note: This procedure is necessary before carrying out any of the maintenance procedures detailed below:

- Ensure that the valve is depressurised and clear of media and isolate it both upstream and downstream.
- **Caution:** care should be taken when disassembling the valve in case of residual pressure being trapped between the isolation points.
- Remove the actuator from the valve. Refer to the Installation and Maintenance Instructions covering GESTRA actuators.
- Unscrew the gland nut (**18**).
- Undo and remove the bonnet nuts (**27**) or the bolt if it is the LE valve.
- Remove the bonnet (**2**) and plug and stem assembly (**8**).
- Remove and discard the body gasket.

4.3 Replacement of PTFE gland packings (reference Figure 8)

- Remove the lock-nut (**3**), gland nut (**18**), 'O' rings (**15** and **17**) and scraper ring (**19**) from the gland nut, ensuring that the grooves are clean and undamaged, replace with new items. The use of silicone grease on the 'O' rings is recommended.
- Withdraw the gland components and discard (**9, 10, 12** and **14**).
- Clean the gland cavity and fit new gland components in the order shown in Figure 8.

  Note that the lower bearing must be fitted with the radiused edge downwards. When fitting the chevron seals they should be inserted with correct orientation (see Figure 8), one at a time to ease the assembly process.
- Apply a light smear of anti-seize lubricant to the gland nut threads before screwing it in two or three turns. At this stage the packing must not be significantly compressed.
- Final adjustment of the gland must be carried out after refitting the bonnet as detailed in Section 4.6.

4.4 Replacement of graphite gland packing (reference Figure 9)

- Remove the lock-nut (**3**), gland nut (**18**) and scraper ring (**19**) from the gland nut, ensuring that the groove is clean and undamaged, replace with new item.
- Remove the upper Stellite bearing (**9**) and retain, withdraw the graphite packing (**14**) and discard. Remove the spacer and lower bearing (**16**). Clean and examine these components and the upper bearing replacing any that show signs of damage or deterioration.
- Clean the gland cavity and reassemble the gland components in the order shown in Figure 10.

  Note that the lower bearing must be fitted with the radiused edge downwards. When fitting the graphite seals, the scarf joints in each seal must be offset from the one below by 90°.
- Apply a light smear of anti-seize lubricant to the gland nut threads before screwing it in sufficiently to seat and hold the packing without compressing them.
- Final adjustment of the gland must be carried out after refitting the bonnet as detailed in Section 4.6.

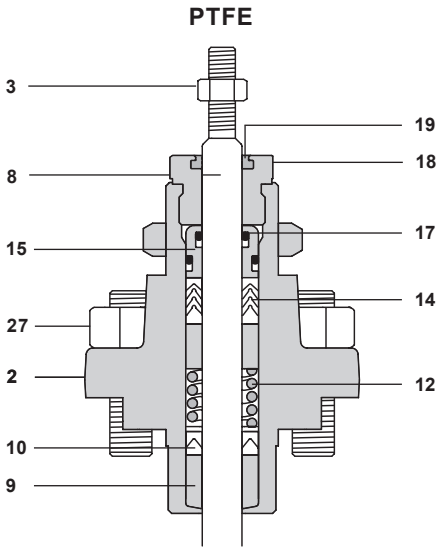


Fig. 8

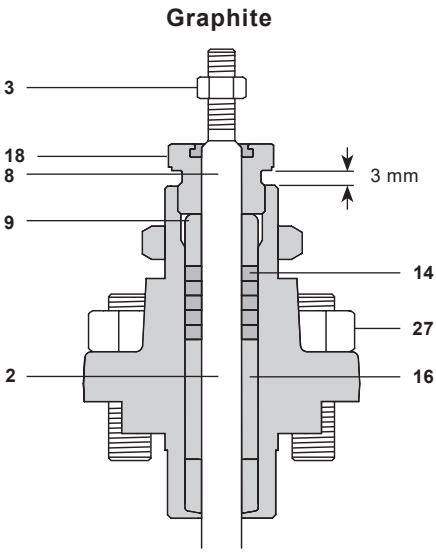


Fig. 9

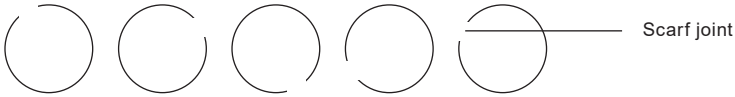


Fig. 10

4.5 Removal and refitting of the valve plug/ stem assembly and seat

- Lift out the seat retaining cage (**5**) followed by the seat (**6**).
- Remove the seat back gasket (**7**) and discard.
- Clean all components, including the seat recess in the valve body.
- Examine the seat and plug/stem assembly for damage or deterioration and renew as necessary.

  Note: Score marks or scaly deposits on the valve stem will lead to early failure of the gland seals and damage to seat and plug sealing faces will result in leakage rates higher than those specified for the valve.
- Fit a new seat gasket (**7**) in the body seat recess followed by the seat (**6**).
- Refit the cage (**5**) ensuring that the flow windows are lower most and that it sits squarely on the seat without impinging on the valve body.

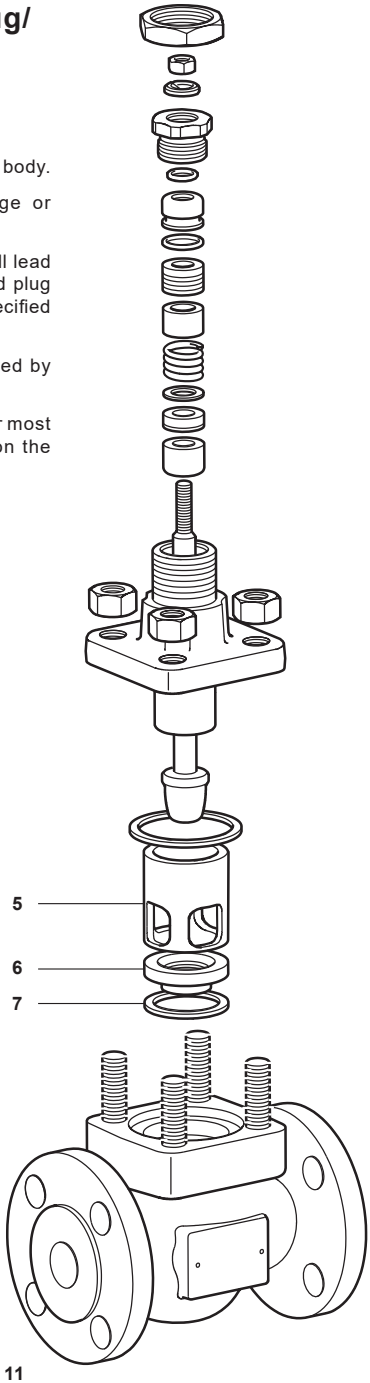
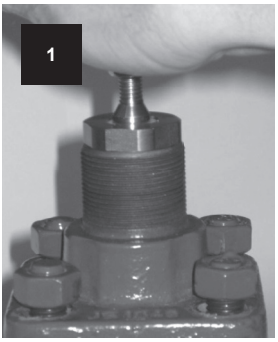


Fig. 11

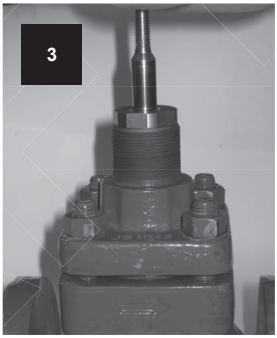
Caution: The following must be carefully followed to enable the correct reassembly of the control valve, and the subsequent test that is required to ensure that the plug moves freely inside the valve seat:

- Fit new bonnet gasket.
- Ensure the plug stem is fully extended without the upper stem threads making contact with stem seals on the top of the bonnet.
- Replace the bonnet and stem assembly to the valve body, locating the plug centrally into the seat.
- Holding the Plug in position, push the bonnet down on to the valve body.
- Proceed to tighten the bonnet into position by following Step 1 through to 7:

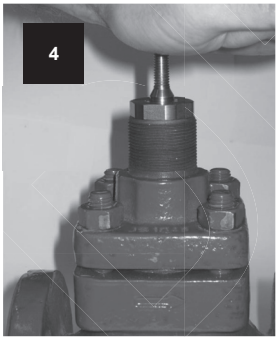


Fit bonnet nuts.

Finger tighten opposing bonnet nuts or bolts evenly in pairs.

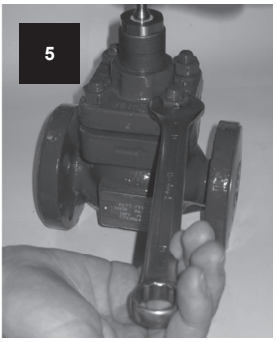


Raise the stem to the highest position.

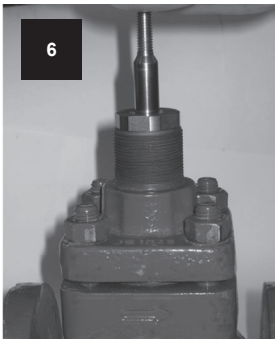


Firmly and briskly push the stem fully down.

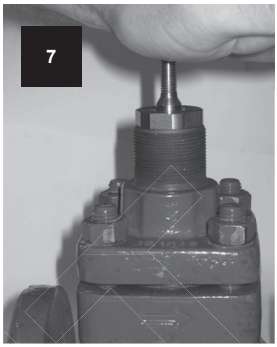
Repeat Steps 1 to 4 finger tightening bonnet nuts or bolts individually until tight.



Using a spanner lightly and evenly tighten each bolt or nut by 45°, following the sequence illustrated in Figure 5, page 37.



After each tightening sequence lift the stem fully.



Firmly and briskly push the stem fully down.

- Repeat Steps 5, 6 and 7 until the bonnet nuts or bolts have an even tension.
- Continue Steps 5, 6 and 7 but use a torque wrench set at 10% of maximum required torque setting.
- Again, repeat Steps 5, 6 and 7, incrementally increasing the torque value to 20%, 40%, 60%, 80% and finally 100% of the required torque value (as specified in Table 1).
- Pull the plug off its seat, rotate by 120° and slowly push it back down into the seat checking for any signs of resistance as the plug comes into contact with the seat.
- Repeat the above Step, three more times.
- If any resistance is felt, this can indicate the plug and seat is misaligned and the process will need repeating.
- Tighten the gland nut (**18**) until:
  - i) PTFE gland assembly: Metal-to-metal contact with the bonnet is achieved.
  - ii) Graphite gland assembly: A gap of 3 mm between the underside of the gland nut and the bonnet is achieved. See Figure 12.
- Refit the lock-nut (**3**).
- Reinstall the actuator.
- Bring the valve back into service.
- Check for leakage at the gland.

Note: Recheck the graphite seals and retighten the gland if necessary after a few hundred cycles as the seals fully bed in.

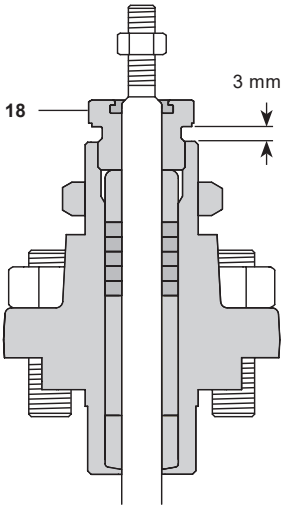


Fig. 12

Bellows sealed valves

Note: These valves are fitted with a bellows stem seal as the primary seal together with a graphite stem seal. Any leakage from the stem will indicate a failure of the bellows seal.

4.7.1 Procedure for renewing the bellows (B) and (C) assembly:

- Isolate the valve on both sides.
  Caution: care should be taken in removing the valve bonnet since fluid under pressure may be trapped between the two isolating valves.
- Remove the actuator from the valve. Refer to the Installation and Maintenance Instructions covering GESTRA actuators.
- Remove the lock-nut (**3**).
- Loosen the gland nut (**18**).
- Remove the 4 bonnet nuts (**27**).
- Gently remove the bonnet leaving the plug stem exposed.
- Remove the body nuts (**7**) and remove the bellows bonnet from the valve body.
- Grip the stem from the top. Push the stem (**8**) down to expose a lock-nut (**26**). Release the lock-nut and unscrew the plug from the stem.
- Remove and replace the bellows (**21**) from the bellows housing (**29**).
- Grip and push the new stem (**8**) to expose the thread - using Loctite retainer 620, screw in the plug.
- Tighten lock-nut (**26**) to 20 N m.
- Replace seat gasket (see Section 4.2.1) and bonnet gasket (**4**) then re-assemble the bellows housing to the valve body. Finger tighten in sequence, refer to the note under bonnet nut torque setting, (see Table 1, page 41).
- Fit new stem seals in accordance with Section 4.2.
- Slide the bonnet (**2**) over the stem (**8**) and replace the body nuts (**27**) and tighten, in sequence, referring to Table 1.
- Bring the valve back into service.
- Check for leakage at the gland.

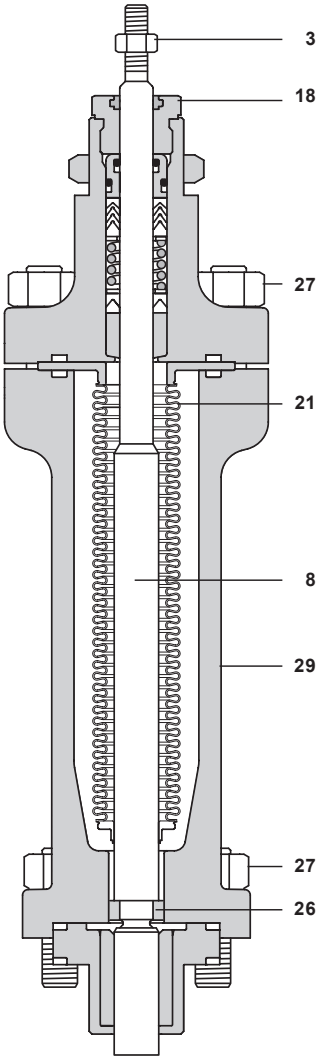


Fig. 13

4.7.2 Procedure for renewing the bellows (D) assembly:

- Isolate the valve on both sides.
- Remove the actuator from the valve. Refer to the Installation and Maintenance Instructions covering GESTRA actuators.
- Remove in order: lock-nut (**8**), gland nut (**9**), gland nut spacer (**19**), the anti-rotation pin (**16**).

  Caution: care should be taken in removing the valve bonnet since fluid under pressure may be remain inside between the valve body and bellows assembly (**5**).
- Remove the bonnet nuts (**15**) the bellows housing (**2**). Remove bonnet and bellows, alternatively if the bellows are to remain in place then apply pressure to stem and remove bonnet.
- Remove the bellows assembly (**5**), cage (**20**), the seat (**4**) and the gasket (**7**).
- Clean the gasket surfaces (**7**) seat (**4**) bonnet gasket (**12**), then remove graphite packing rings (**17**).
- Re-assemble in order: gasket (**7**), seat (**4**), cage (**20**), bonnet gasket (**12**), bellows assembly (5), the bellows cover gasket (**13**).
- Clean the internals of the bellows housing (**2**) with particular attention to the mating surfaces of the bellows cover gasket.
- Fit the bellows housing (**2**) ensuring that the hole in the anti-rotation pin (**16**) aligns with the milled flat on the bellows assembly (**5**).
- Screw in the anti-rotation pin (**16**) until finger tight, screw the gland nut spacer (**19**) and tighten to the torque indicated in Table 1 (page 37), insert new graphite packing rings (**17**) and screw the gland nut (**9**).
- Push the plug on to the seat to obtain correct alignment of the parts, then tighten in sequence to the torque previewed in Table 1. Re-fit bonnet nuts (**15**) and bellows housing (**2**).
- Re-fit the actuator. Refer to the Installation and Maintenance Instructions covering GESTRA actuators. Attention: In order to avoid damage to the bellows, do not rotate the stem.

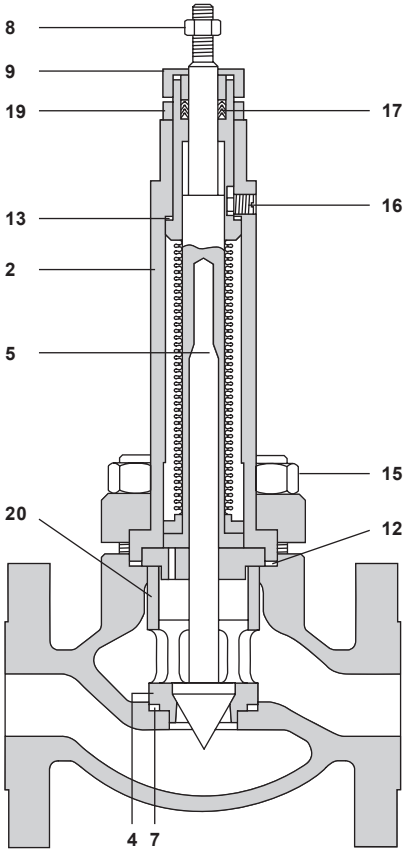


Fig. 14

Important: When ordering spare bellows, ensure that the gaskets are also ordered.

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

General 5.1

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance frequency depends on the severity of the service conditions. This Section provides instructions on the replacement of the packing, stem, plug and seat. All maintenance operations can be performed with the valve body in the line.

Note: It is recommended that all soft seals and gaskets are replaced whenever the valve is disassembled.

Annually

The valve should be inspected for wear and tear replacing any worn or damaged parts such as valve plug and stem, valve seat and gland seals, refer to Section 6 'Spare parts'.

Note 1: High temperature graphite packed seals are subject to wear during normal operation. We therefore recommend the graphite packing be replaced during this routine inspection to prevent premature failure of the packing during normal operation.

Note 2: It is recommended that all soft seals and gaskets be replaced whenever the valve is disassembled.

Table 2 Recommended tightening torques - Control valve sizes DN125 to DN300

	DN125	DN150	DN200 to DN300
KE	203 N m	211 N m	265 N m
KEA	-	245 N m	365 N m

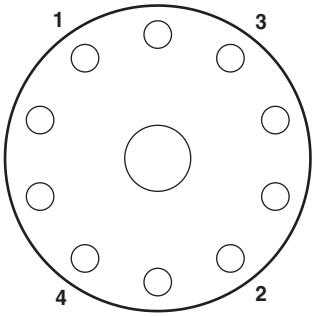


Fig. 15 DN125 to DN300

5.2 Removal of the valve bonnet

Note: This procedure is necessary before carrying out any of the maintenance procedures detailed below:

- Ensure that the valve is depressurised and clear of media and isolate it both upstream and downstream. **Caution:** care should be taken when disassembling the valve in case of residual pressure being trapped between the isolation points.
- Remove the actuator from the valve. Refer to the Installation and Maintenance Instructions covering GESTRA actuators.
- Loosen the gland nut (**11**).
- Undo and remove the bonnet nuts (**21**).
- Using suitable lifting equipment, remove the bonnet (**2**) with the plug and stem assembly (**3**). **Note:** for balanced valves the cage will most likely be attached to the plug (due to the tight fit of the balanced seal).

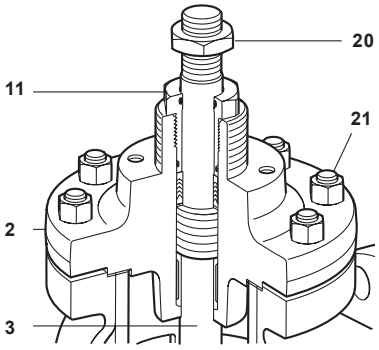


Fig. 16

5.3 Replacement of PTFE gland packings (reference Figure 18)

- Remove the lock-nut from the stem (**20**), and withdraw the plug stem assembly (with cage on balanced versions).
- Remove the 'O' rings (**17** and **18**) from the gland nut, ensuring that the grooves are clean and undamaged, replace with new items. The use of silicone grease on the 'O' rings is recommended.
- Withdraw the PTFE packing (**12**) and discard. Remove all metal components, washer (**14**), spring (**8**), bearing (**9**) and spacers (**10**) carefully noting how many components have been removed as it will differ on each valve size. Clean and examine these components replacing any that show signs of damage or deterioration.
- Clean the gland cavity and reassemble the gland components in the order shown in Figure 17. **Note** that the lower bearing must be fitted with the radius edge downwards. When fitting the chevron seals they should be inserted one at a time (see Figure 19). It may be necessary to compress the spring and seat using the gland nut after fitting two or three chevrons and to repeat this at similar intervals until all PTFE components are in place.
- Apply a light smear of anti-seize lubricant to the gland nut threads before screwing it two or three turns. At this stage the packing must not be significantly compressed.
- Final adjustment of the gland must be carried out after refitting the bonnet as detailed in Section 5.6.

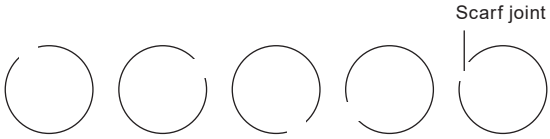


Fig. 17

Replacement of graphite gland packings (reference Figure 20)

- Remove the lock-nut from the stem (**20**), and withdraw the plug stem assembly (with cage on balanced versions).
- Withdraw the graphite packing (**26**) and discard. Remove all metal components, washer (**14**) and spacers (**10**) carefully noting how many components have been removed as it will differ on each valve size. Clean and examine these components replacing any that show signs of damage or deterioration.
- Clean the gland cavity and reassemble the gland components in the order shown in Figure 17. **Note** that the lower bearing must be fitted with the radiused edge downwards. When fitting the graphite seals, the scarf joints in each seal must be offset from the one below by 90°.
- Apply a light smear of anti-seize lubricant to the gland nut threads before screwing it in sufficiently to seat and hold the packing without compressing it.
- Final adjustment of the gland must be carried out after refitting the bonnet as detailed in Section 5.6.

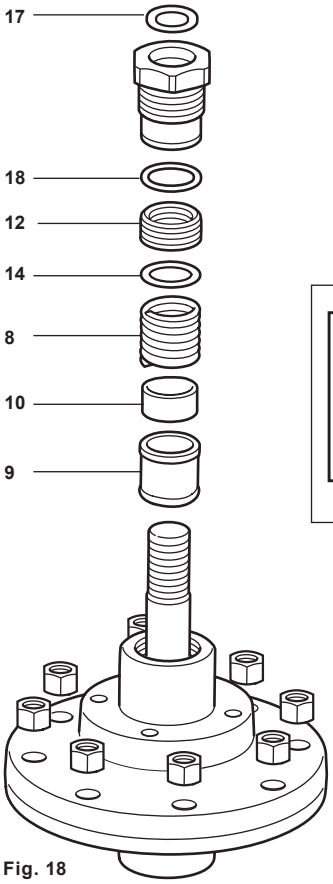


Fig. 18

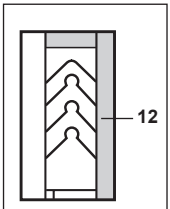


Fig. 19

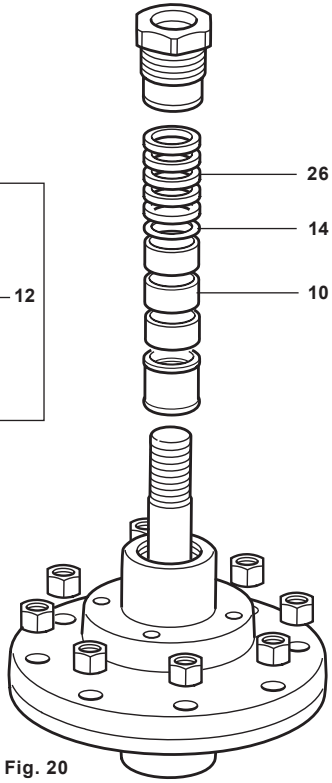


Fig. 20

5.5 Procedure for removal and refitting of valve plug/stem assembly and seat

5.5.1 Unbalanced valves

- Using lifting equipment as appropriate, withdraw the plug/stem assembly (**3**).
- Lift out the cage (**4**) followed by the seat (**6**).
- Remove the seat back gasket (**16**) and discard.
- Clean all the components, including the seat recess in the valve body.
- Examine the seat and plug/stem assembly for damage or deterioration and renew as necessary.
  Note: Score marks or scaly deposits on the valve stem will lead to early failure of the gland seals and damage to seat and plug sealing faces will result in leakage rates higher than those specified for the valve.
- Fit a new seat gasket (**16**) in the body seat recess followed by the seat (**6**).
- Refit the cage (**4**) ensuring that the flow windows are lower most and that it sits squarely on the seat without impinging on the valve body.
- Lower the plug/stem assembly squarely onto the seat ring ensuring that the stem is left vertical.

5.5.2 Balanced valves

- Using lifting equipment as appropriate, withdraw the plug/stem assembly (**3**) taking care not to let the cage fall back into the valve body.
- Remove and discard the upper cage seal (**19**).
- Remove and discard the balance seal (**31**).
- Lift out the seat (**6**).
- Remove the seat gasket (**16**) and discard.
- Clean all the components, including the seat recess in the valve body.
- Examine the cage, seat and plug/stem assembly for damage or deterioration and renew as necessary.
  Note: Score marks or scaly deposits on the cage internal surface or valve stem will lead to early failure of the seals and damage to the seat and plug sealing faces will result in leakage rates higher than those specified for the valve.
- Fit a new seat gasket (**16**) in the body seat recess followed by the seat (6).
- Refit the cage (**4**) ensuring that the flow windows are lower most and that it sits squarely on the seat without impinging on the valve body.
- Fit a new balance seal (**31**) into the plug groove.
- Refit the plug/stem into the cage ensuring that the balanced seal is not damaged during this process - **Note:** a light smear of silicone grease on the inner surface of the cage will aid fitting. The plug/stem assembly should easily move up and down in the cage, using moderate hand force, until it is located in the seat.
- Fit a new upper cage seal (**19**).

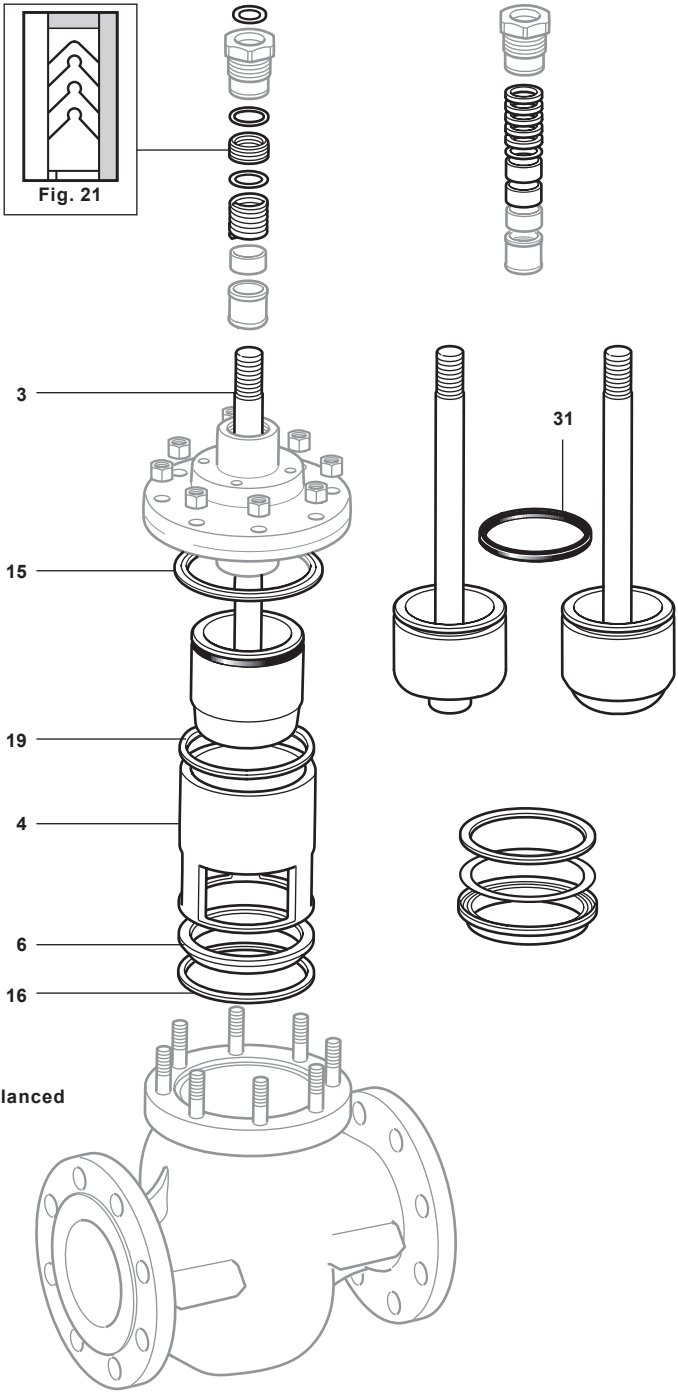


Fig. 22 Balanced

5.6 Refitting the bonnet

- Fit a new bonnet gasket (**15**).
- Using appropriate lifting equipment, carefully lower the bonnet into place over the valve stem. Care must be taken not to damage the new gland packing at this stage. **Note:** that the actuator mounting hole orientation should be in line with the valve flow axis.
- By hand tightening only, refit the bonnet nuts (**21**) to secure the bonnet in place.
- Raise the plug and stem assembly fully and forcefully push it back into the seat to align the internal components. Repeat a further two times. Re-tighten all bonnet nuts, hand tight.
- Apply a load to the stem (preferably replace the actuator), then re-tighten the bonnet nuts in sequence (see Figure 15 and Table 2).
- Tighten the bonnet nuts to 30% of required torque setting following a diametrically opposed sequence (see Figure 15 and Table 2).
- Repeat the above, using 60% of the required torque.
- Repeat the above, apply maximum torque value for the appropriate valve size.
- Raise the plug and stem assembly fully and forcefully push it back into the seat, repeat a further two times.
- Tighten the gland nut (**11**) until:

  i) PTFE gland assembly: metal-to-metal contact with the bonnet is achieved.

  ii) Graphite gland assembly: a gap of 3 mm between the underside of the gland nut and the bonnet is achieved. See Figure 23.
- Refit the lock-nut (**20**).
- Reinstall the actuator.
- Bring the valve back into service.
- Check for leakage at the gland.

Note: Recheck the graphite seals and retighten the gland if necessary after a few hundred cycles as the seals fully bed in.

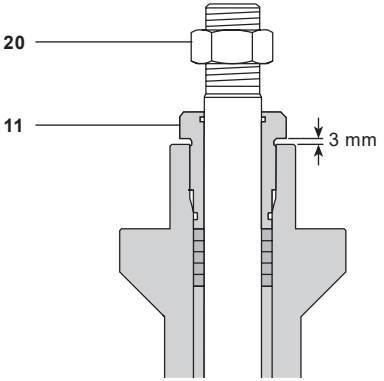


Fig. 23

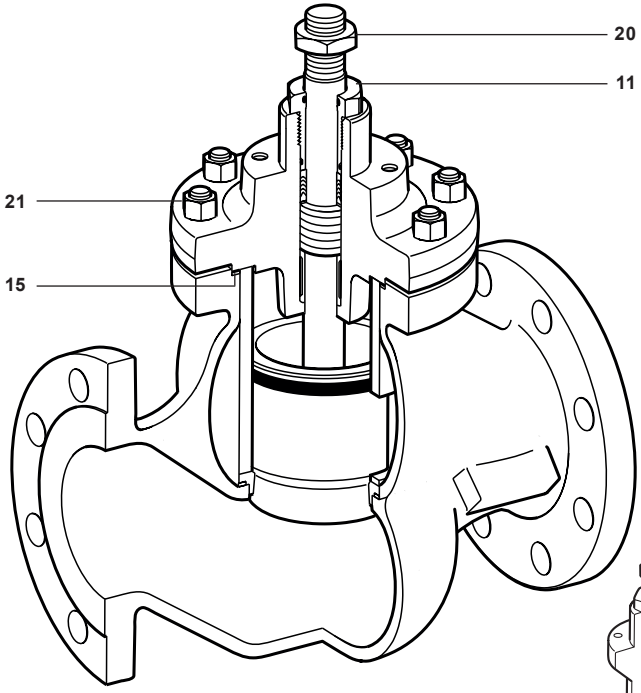


Fig. 24 Balanced valve shown

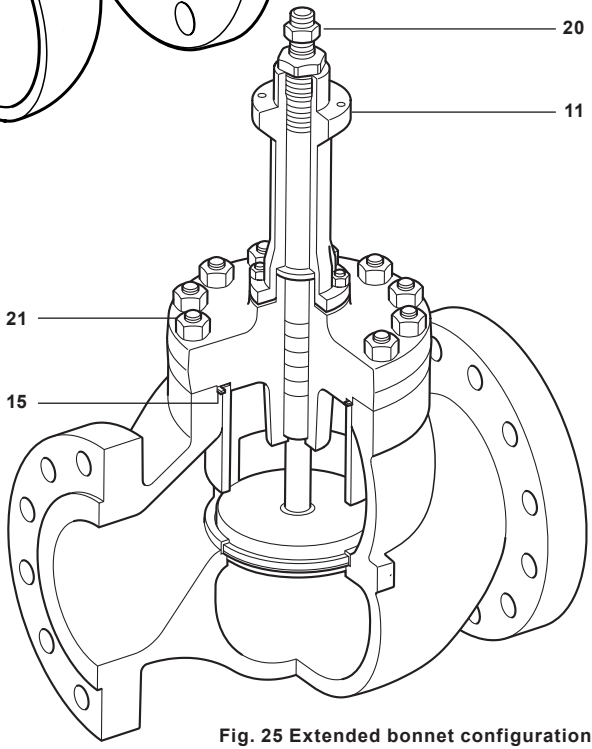


Fig. 25 Extended bonnet configuration

6 Spare parts

6.1 Spare parts

DN15 to DN100 GCV

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

Note: When placing an order for spare parts please specify clearly the full product description as found on the label of the valve body, as this will ensure that the correct spare parts are supplied.

Available spares - K and L series

Actuator clamping nut		**A**
Gasket set (Non-bellows sealed)		**B, G**
Stem seal kits	**PTFE** chevrons and gasket set	**C**
	Graphite packing and gasket set	**C2**
PTFE to Graphite conversion kit		**C1**
Plug stem	*** Equal percentage trim** (No gaskets supplied)	**D, E**
	Fast opening trim and seat kit (No gaskets supplied)	**D1, E**
	Linear trim (No gaskets supplied)	**D2, E**
	PTFE or **PEEK** soft seat seal	**H**
Stem packing and gasket		**B, G, C1**
		B, G, C
		B, G, C2
Balanced seal set (part not shown)		
Soft seat set		**H1**

***** Specify if reduced trim.

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 valve including the full product description of the product.

Example: 1 - PTFE stem seal kit for a GESTRA 1" GCV two-port LEA31 PTSUSS.2 Cv 12 control valve.

How to fit spares
Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.

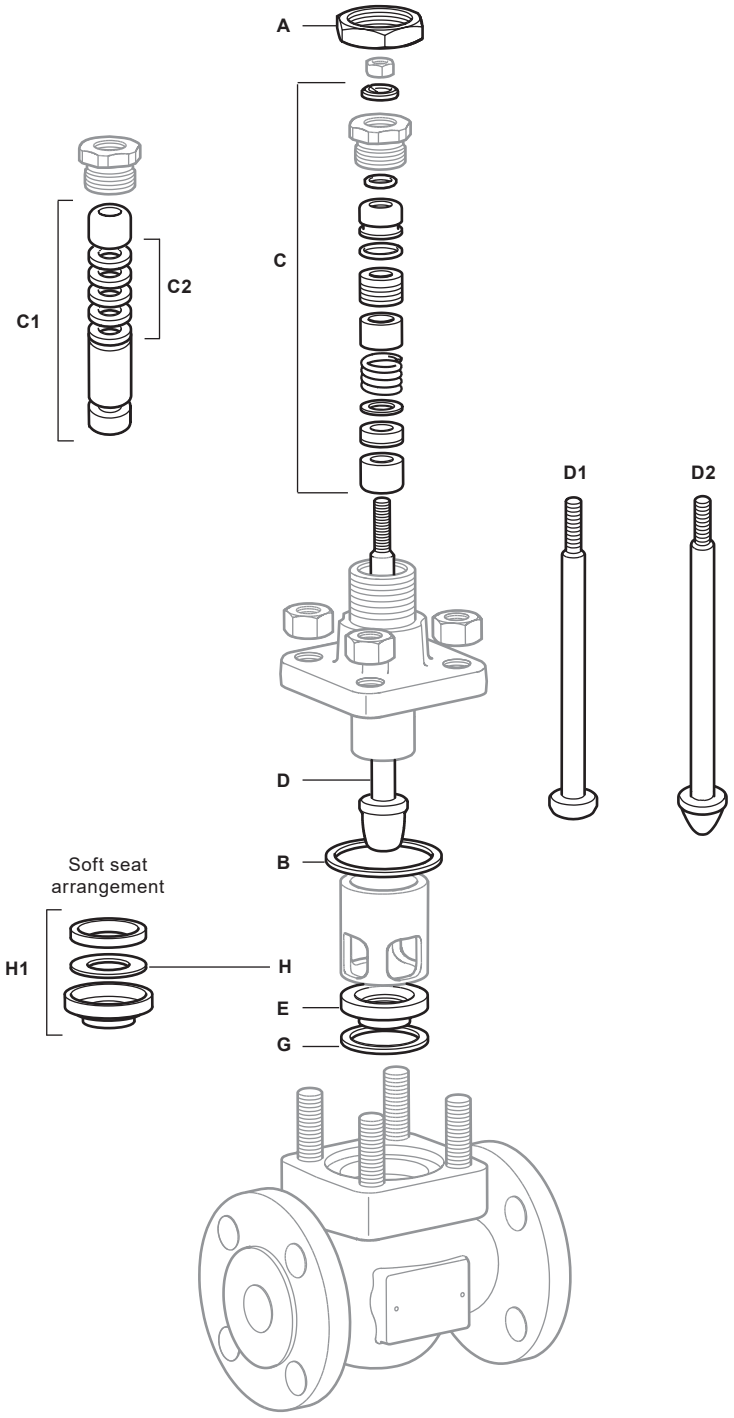


Fig. 26

6.2 Spare parts

DN15 to DN100 GCV with bellows seal (B and C)

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

Note: When placing an order for spare parts please specify clearly the full product description as found on the label of the valve body, as this will ensure that the correct spare parts are supplied.

Available spares - KE and KEA

Actuator clamping nut		**A**
Gasket set (Bellows sealed)		**B, G**
Stem seal kit	**Graphite** packing and gasket set	**C2**
PTFE to Graphite conversion kit		**C1**
Plug stem and seat kit	*** Equal percentage trim** (No gaskets supplied)	**D3, E**
	Fast opening trim (No gaskets supplied)	**D4, E**
	Linear trim (No gaskets supplied)	**D5, E**
Bellows seal assembly		**F**
PTFE or **PEEK** soft seat seal		**H**
Stem packing and gasket		**B, G, C1**
		B, G, C
		B, G, C2
Balanced seal set (part not shown)		
Soft seat set		**H1**

***** Specify if reduced trim.

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 valve including the full product description of the product.

Example: 1 - PTFE stem seal kit for a GESTRA 1" GCV two-port KEA31B TSUSS.2 Cv 12 control valve.

How to fit spares
Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.

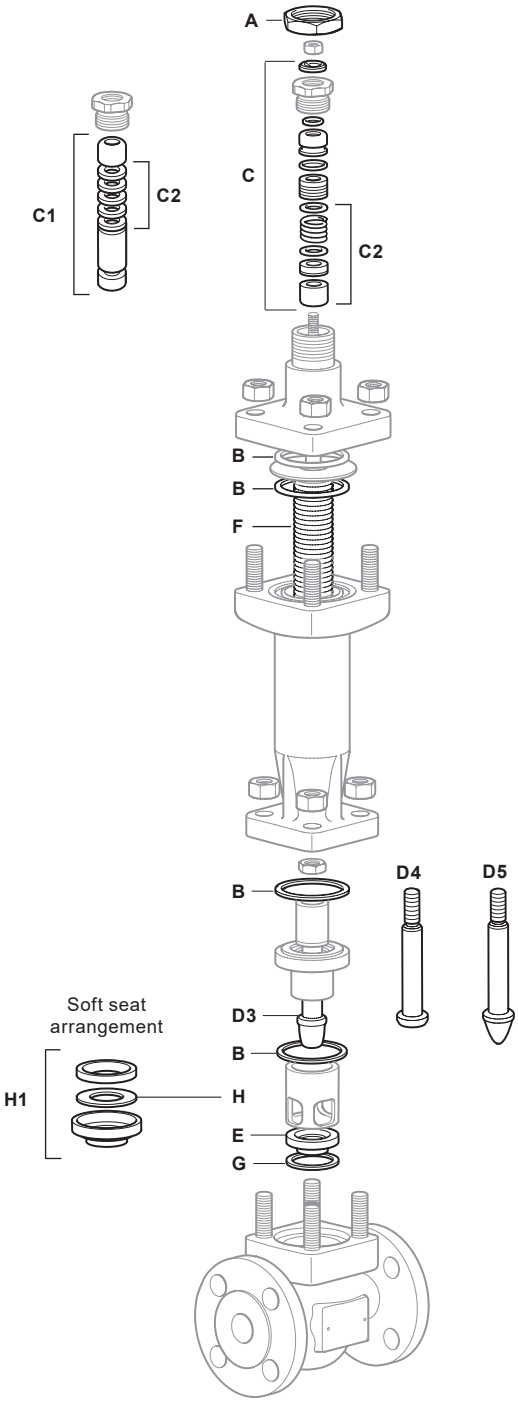


Fig. 27

6.3 Spare parts

GCV with bellows seal (D)

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

Note: When placing an order for spare parts please specify clearly the full product description as found on the label of the valve body, as this will ensure that the correct spare parts are supplied.

Available spares - LEA_D, LFA_D and LLA_D

Actuator clamping nut			**A**
Gasket set (non-bellows sealed)			**B, G**
Stem seal kit	**Graphite** packing and gasket set		**C2**
Plug stem and seat kit	*** Equal percentage trim**	(No gaskets supplied)	**D3, E**
	Fast opening trim	(No gaskets supplied)	**D4, E**
	Linear trim	(No gaskets supplied)	**D5, E**
Bellows seal assembly			**F**
PTFE or **PEEK** soft seat seal			**H**
Balanced seal set (part not shown)			
Soft seat set			**H1**

* Specify if reduced trim.

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 valve including the full product description of the product.

Example: 1 - PTFE stem seal kit for a GESTRA 1" GCV two-port LEA31B TSUSS.2 Cv 12 control valve.

How to fit spares
Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.

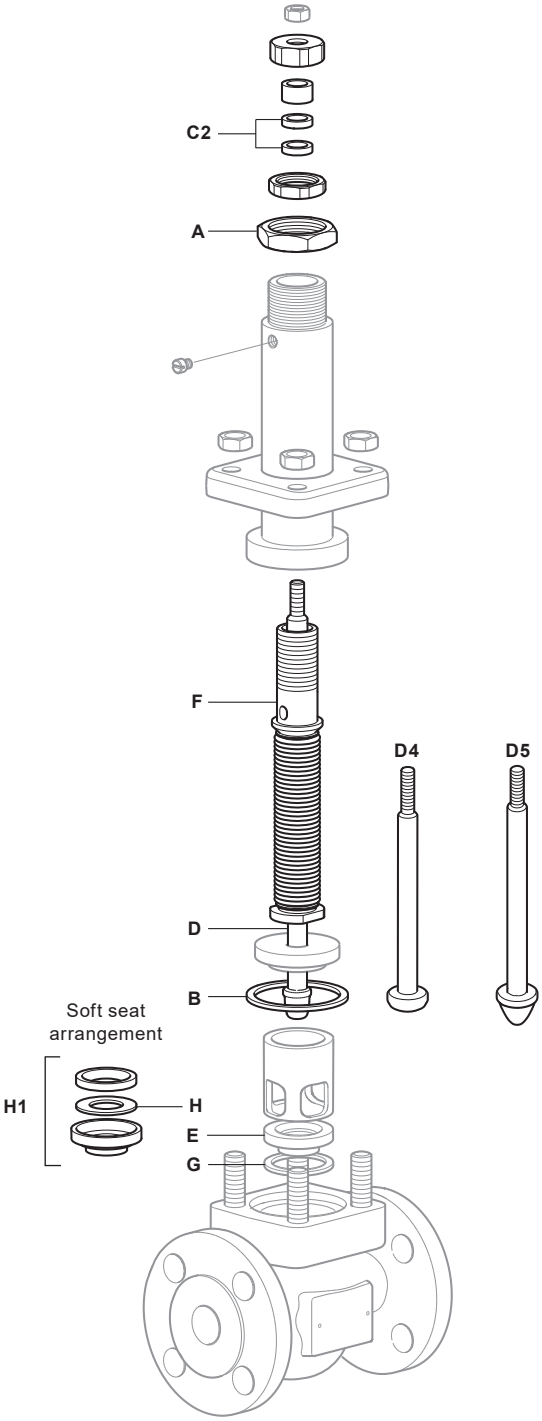


Fig. 28

6.4 Spare parts

DN125 to DN300 GCV unbalanced valve

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

Note: When placing an order for spare parts please specify clearly the full product description as found on the label of the valve body, as this will ensure that the correct spare parts are supplied.

Available spares - K series only

Gasket set		**B, G**
Stem seal	**PTFE** chevrons	**C**
kits	**Graphite** packing	**C2**
PTFE to Graphite conversion kit		**C1**
Plug stem	* **Equal percentage trim** (No gaskets supplied)	**D, E**
	Fast opening trim and seat kit (No gaskets supplied)	**D1, E**
	Linear trim (No gaskets supplied)	**D2, E**
PTFE or **PEEK** soft seat seal		**H**
Soft seat conversion kit (Metal to PTFE or metal to PEEK)		**J**
Cage		**I**
Actuator clamping bolt (part not shown)		

* Specify if reduced trim.

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 valve including the full product description of the product.

Example: 1 - PTFE stem seal kit for a GESTRA DN150 GCV two-port PTSUSS.2 K_V 370 control valve.

How to fit spares
Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.

Total number of spacers	
PTFE sealed valves	**DN125** valves = 0 spacer
	DN150 valves = 1 spacer
	DN200 **DN250** valves = 4 spacers **DN300**
Graphite sealed valves	**DN125** valves = 2 spacers
	DN150 valves = 3 spacers
	DN200 **DN250** valves = 6 spacers **DN300**

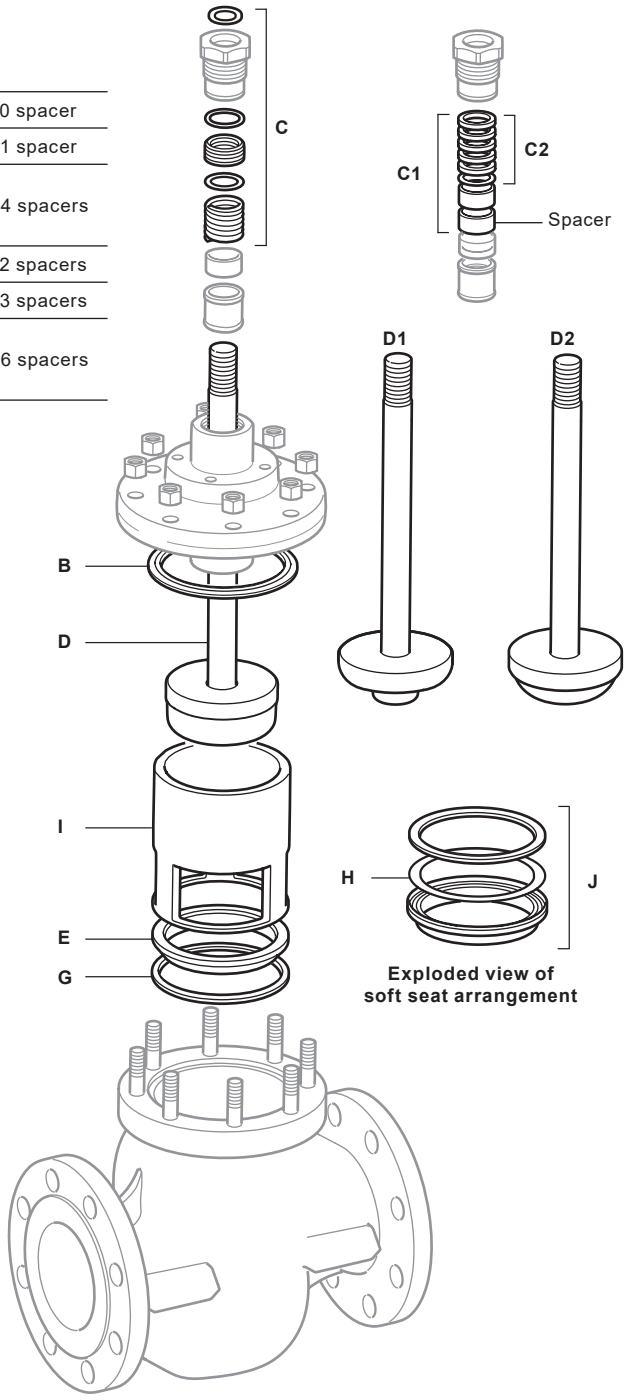


Fig. 29 Unbalanced

6.5 Spare parts

DN125 to DN300 GCV balanced

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

Note: When placing an order for spare parts please specify clearly the full product description as found on the label of the valve body, as this will ensure that the correct spare parts are supplied.

Available spares - K series only

Gasket set		**A, B, G, F**
Stem seal kits	**PTFE** chevrons	**C**
	Graphite packing	**C2**
PTFE to Graphite conversion kit		**C1**
Plug stem and seat kit	* **Balanced equal percentage trim** (No gaskets supplied)	**A, D, E**
	Balanced fast opening trim (No gaskets supplied)	**A, D1, E**
	Balanced linear trim (No gaskets supplied)	**A, D2, E**
PTFE soft seat seal		**H**
Soft seat conversion kit		**J**
Cage		**I**
Actuator clamping bolt (part not shown)		

* Specify if reduced trim.

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 valve including the full product description of the product.

Example: 1 - PTFE stem seal kit for a GESTRA DN150 GCV two-port KE43 PTSBSS.2 Kv 370 control valve.

How to fit spares
Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.

Total number of spacers	
PTFE sealed valves	**DN125** valves = 0 spacer
	DN150 valves = 1 spacer
	DN200 **DN250** valves = 4 spacers **DN300**
Graphite sealed valves	**DN125** valves = 2 spacers
	DN150 valves = 3 spacers
	DN200 **DN250** valves = 6 spacers **DN300**

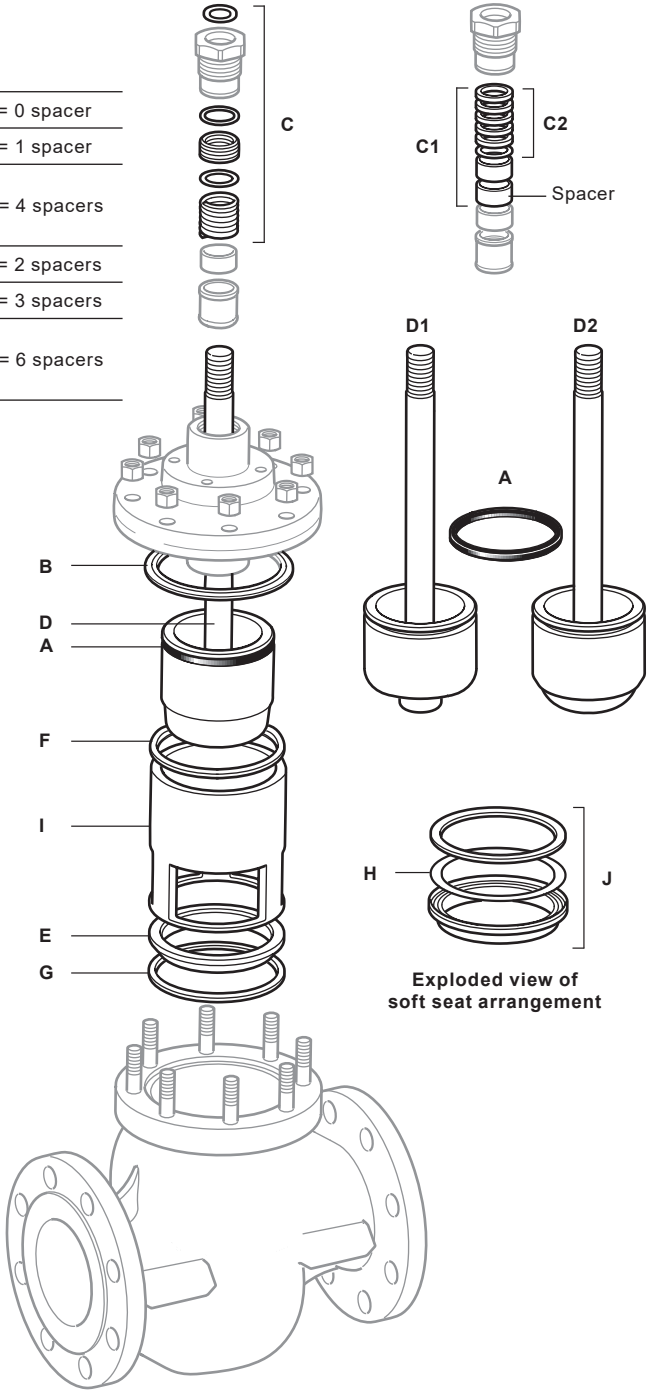


Fig. 30 Balanced

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819737-00/06-2019sxsmp · GESTRA AG · Bremen · Printed in Germany