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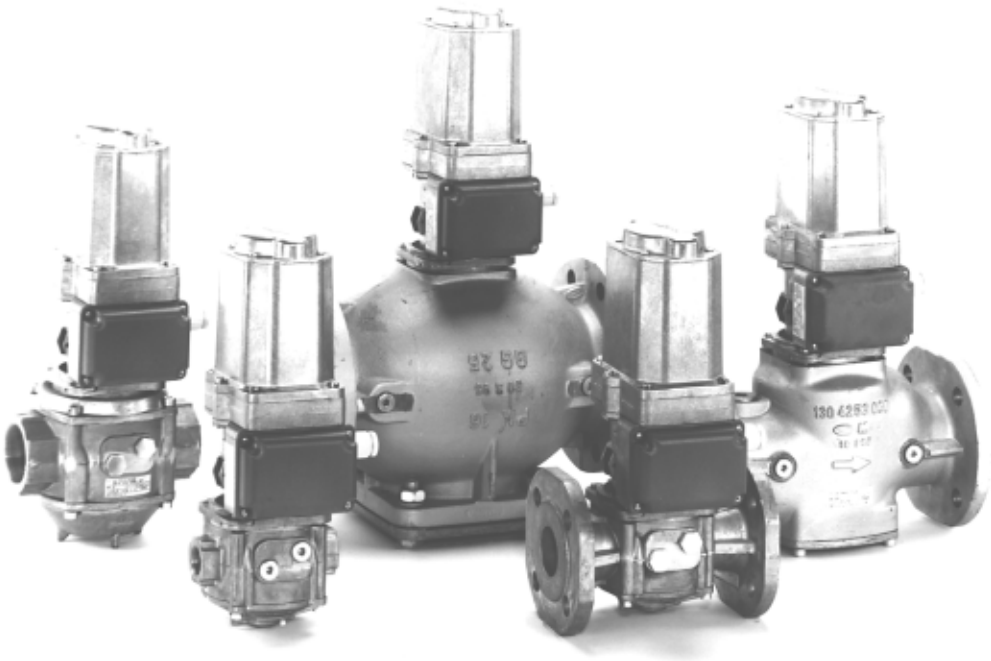
Electro- Hydraulic Actuator Gas Valves GH-5000



Electro-Hydraulic Actuator Gas Valve GH-5000-....

Function

Normally closed (NC). Single seat valve, fast closing, slow opening.
Sturdy and reliable electro-hydraulic actuator.
EC type-tested and certified as safety shut-off valve Class A (EN 161).

Models

- Threaded valve bodies Rp ¾ to Rp 3 and flanged valve bodies DN 40-150
- Actuator-Versions:
  - On - Off * / **
  - On - Low - Off *
  - Ignition - On - Low - Off

  * Closed Position Indicator (CPI) available

  ** with switch for Manual Restart available

Applications

Typical applications include commercial and industrial boilers, burners, ovens, rooftop units, make up air heaters, hot water heaters, kilns, and paint booths.

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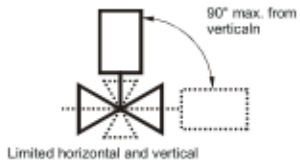
Specifications

Product	GH-5000 Electro-Hydraulic Actuator Valve
Media	Gas families to DVGW-Arbeitsblatt G 260/I. 1., 2. and 3. Gas family.
Max. operating pressure	Rp ¾ - 2 ½ & DN 40-65 1000 mbar Rp 3 & DN 80-100 800 mbar DN 125 650 mbar DN 150 350 mbar
Permissible ambient temperature	-10 to +60°C (14 to 140°F)
Valve sizes	Threaded connections Rp ¾, 1, 1 ½, 2, 2 ½, 3: ISO 7-1:1994 Flanges DN 40, 50, 65, 80, 100, 125, 150: ISO 7005 PN 16, DIN EN 1092-2
Valve torsion group	Group 2
Valve class	A
Pressure taps	Valve body: Rp 1/4 (ISO 7-1:1994)
Materials	Valve body: die-cast aluminium EN AC-43400 or EN AC-47100, DIN EN 1706 (Rp ¾ to 2 and DN 40-50) cast iron EN-GJS-400-15, DIN EN 1563 (Rp 2½ to 3 and DN 65-80 and valves **GH-57..** DN100-150) cast iron EN-GJL-250, DIN EN 1561 (valves **GH-54..** DN100-150) Seals, diaphragm: NBR
Filter	Standard Strainer: 1 mm (0.04 in). mesh (steel)
Mounting position	 **ATTENTION:** See also Valve position label!
Operating voltages	120 V +6% / -10% 50/60 Hz 230 V +6% / -10% 50/60 Hz
Power consumption	200 W on opening action 15 W in opened state
Compression fitting	EN 50262
Enclosure	IP 54 (NEMA 1)
Operating time rating	100% ED
Duty cycles	3 min^{-1} (Rp ¾ - 1½, DN 40) 2 min^{-1} (Rp 2-3, DN 50-80) 1 min^{-1} (DN 100-150)
Opening time	Rp ¾ - 1½, DN 40: < 6,5 s Rp 2-3, DN 50-80: < 8 s DN100-150: < 13 s
Closing time	< 1 s
Agency Listing	EC-Type Approval
Specification Standards	Pressure Equipment (97/23/EC) Appliances burning gaseous fuels (90/396/EC): EN 161 Electromagnetic compatibility (89/336/EC) Low voltage equipment (73/23/EC)

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damage resulting from misapplication or misuse of its products.

We reserve the right to make technical changes without warning.

Code Key

Flange Size	Product Code Number (Excluding Voltage)*	Actuator Configuration	Max. Operating Pressure (mbar)	Opening Time (s)	Stroke (mm)
DN 40	GH-5120-11_0	On-Off	1,000	≤ 6.5	14
	GH-5120-13_1	On-Low-Off			
	GH-5129-14_1	On-Low-Off + CPI			
	GH-5120-15_1	Ignition On-Low-Off			
	GH-5129-16_0	On-Off + CPI			
	GH-5129-19_0	On-Off + CPI + MR			
DN 50	GH-5220-21_0	On-Off	1,000	≤ 8	22
	GH-5220-23_1	On-Low-Off			
	GH-5229-24_1	On-Low-Off + CPI			
	GH-5220-25_1	Ignition On-Low-Off			
	GH-5229-26_0	On-Off + CPI			
	GH-5229-29_0	On-Off + CPI + MR			
DN 65	GH-5620-31_1	On-Off	1,000	≤ 8	22
	GH-5620-33_1	On-Low-Off			
	GH-5629-34_1	On-Low-Off + CPI			
	GH-5620-35_1	Ignition On-Low-Off			
	GH-5629-36_1	On-Off + CPI			
	GH-5629-39_1	On-Off + CPI + MR			
DN 80	GH-5620-41_1	On-Off	800	≤ 8	22
	GH-5620-43_1	On-Low-Off			
	GH-5629-44_1	On-Low-Off + CPI			
	GH-5620-45_1	Ignition On-Low-Off			
	GH-5629-46_1	On-Off + CPI			
	GH-5629-49_1	On-Off + CPI + MR			
DN 100 **	GH-5420-51_0	On-Off	800	≤ 13	36
	GH-5420-53_1	On-Low-Off			
	GH-5429-54_1	On-Low-Off + CPI			
	GH-5420-55_1	Ignition On-Low-Off			
	GH-5429-56_0	On-Off + CPI			
	GH-5429-59_0	On-Off + CPI + MR			
DN 125 **	GH-5420-61_0	On-Off	650	≤ 13	36
	GH-5420-63_1	On-Low-Off			
	GH-5429-64_1	On-Low-Off + CPI			
	GH-5420-65_1	Ignition On-Low-Off			
	GH-5429-66_0	On-Off + CPI			
	GH-5429-69_0	On-Off + CPI + MR			
DN 150 **	GH-5420-71_0	On-Off	350	≤ 13	36
	GH-5420-73_1	On-Low-Off			
	GH-5429-74_1	On-Low-Off + CPI			
	GH-5420-75_1	Ignition On-Low-Off			
	GH-5429-76_0	On-Off + CPI			
	GH-5429-79_0	On-Off + CPI + MR			

Continued on next page …

* Complete Product Code Number by inserting a 1 or 3 for the blank number.
1 = **230 VAC** (50/60 Hz) models and **3** = **120 VAC** (50/60 Hz) models.

** Material of valve body EN-GJL-250, DIN EN 1561

CPI = Closed Position Indicator
MR = with switch for manual restart

Flange Size	Product Code Number (Excluding Voltage)*	Actuator Configuration	Max. Operating Pressure (mbar)	Opening Time (s)	Stroke (mm)
DN 100 **	GH-5720-51_0	On-Off	800	≤ 13	36
	GH-5720-53_1	On-Low-Off			
	GH-5729-54_1	On-Low-Off + CPI			
	GH-5720-55_1	Ignition On-Low-Off			
	GH-5729-56_0	On-Off + CPI			
	GH-5729-59_0	On-Off + CPI + MR			
DN 125 **	GH-5720-61_0	On-Off	650	≤ 13	36
	GH-5720-63_1	On-Low-Off			
	GH-5729-64_1	On-Low-Off + CPI			
	GH-5720-65_1	Ignition On-Low-Off			
	GH-5729-66_0	On-Off + CPI			
	GH-5729-69_0	On-Off + CPI + MR			
DN 150 **	GH-5720-71_0	On-Off	350	≤ 13	36
	GH-5720-73_1	On-Low-Off			
	GH-5729-74_1	On-Low-Off + CPI			
	GH-5720-75_1	Ignition On-Low-Off			
	GH-5729-76_0	On-Off + CPI			
	GH-5729-79_0	On-Off + CPI + MR			

* Complete Product Code Number by inserting a 1 or 3 for the blank number.
1 = **230 VAC** (50/60 Hz) models and **3** = **120 VAC** (50/60 Hz) models.

** Material of valve body EN-GJS-400, DIN EN 1563

CPI = Closed Position Indicator
MR = with switch for manual restart

Threaded Size	Product Code Number (Excluding Voltage)*	Actuator Configuration	Max. Operating Pressure (mbar)	Opening Time (s)	Stroke (mm)
Rp ¾	GH-5110-21_0	On-Off	1,000	≤ 6.5	14
	GH-5110-23_1	On-Low-Off			
	GH-5119-24_1	On-Low-Off + CPI			
	GH-5110-25_1	Ignition On-Low-Off			
	GH-5119-26_0	On-Off + CPI			
	GH-5119-29_0	On-Off + CPI + MR			
Rp 1	GH-5110-31_0	On-Off	1,000	≤ 6.5	14
	GH-5110-33_1	On-Low-Off			
	GH-5119-34_1	On-Low-Off + CPI			
	GH-5110-35_1	Ignition On-Low-Off			
	GH-5119-36_0	On-Off + CPI			
	GH-5119-39_0	On-Off + CPI + MR			
Rp 1 ½	GH-5110-51_0	On-Off	1,000	≤ 6.5	14
	GH-5110-53_1	On-Low-Off			
	GH-5119-54_1	On-Low-Off + CPI			
	GH-5110-55_1	Ignition On-Low-Off			
	GH-5119-56_0	On-Off + CPI			
	GH-5119-59_0	On-Off + CPI + MR			
Rp 2	GH-5210-61_0	On-Off	1,000	≤ 8	22
	GH-5210-63_1	On-Low-Off			
	GH-5219-64_1	On-Low-Off + CPI			
	GH-5210-65_1	Ignition On-Low-Off			
	GH-5219-66_0	On-Off + CPI			
	GH-5219-69_0	On-Off + CPI + MR			
Rp 2 ½	GH-5610-71_1	On-Off	1,000	≤ 8	22
	GH-5610-73_1	On-Low-Off			
	GH-5619-74_1	On-Low-Off + CPI			
	GH-5610-75_1	Ignition On-Low-Off			
	GH-5619-76_1	On-Off + CPI			
	GH-5619-79_1	On-Off + CPI + MR			
Rp 3	GH-5610-81_1	On-Off	800	≤ 8	22
	GH-5610-83_1	On-Low-Off			
	GH-5619-84_1	On-Low-Off + CPI			
	GH-5610-85_1	Ignition On-Low-Off			
	GH-5619-86_1	On-Off + CPI			
	GH-5619-89_1	On-Off + CPI + MR			

* Complete Product Code Number by inserting a 1 or 3 for the blank number.
1 = **230 VAC** (50/60 Hz) models and **3** = **120 VAC** (50/60 Hz) models.

CPI = Closed Position Indicator
MR = with switch for manual restart

Safety Instructions

Definition of symbols

 This symbol indicates cautionary information. The statements WARNING, ATTENTION, CAUTION indicate a potentially hazardous situation with the risk of property damage, injuries or death.

 WARNING: **Carefully read and follow all instructions in this sheet and all instructions on the appliance. This unit must be installed by authorised service personnel in accordance with the regulations in force. Incorrect installation, adjustment, modification, operation or maintenance may cause fire, explosions, property damage, and injuries or death. All repairs, adjustments and servicing must be made in conjunction with the gas appliance and in accordance with the appliance manufacturer's instructions.**
Keep operating instructions in a safe place.

 CAUTION: It is possible to use **fluids** other than stated in the chapter Specifications but, this must first be confirmed by the manufacturer.
In places where it is necessary to **withstand high temperatures**, the gas valves must be preceded for instance, by a thermally activated shutting-off device for gas. It may be necessary to discuss these measures with the manufacturer.

- Storage and transport temperature -20°C to 65°C, dry and free of dirt. Protect the valve from adverse weather conditions e.g. rain, splash water (otherwise use drying agent).
- Protect against external forces (shock, Vibration etc.). Do not damage the surface
- Ensure that valve body and piping are free of impurities, see also chapter Troubleshooting.
- Ensure installation without tension and torque.
- Do not use the valve as a step or fixation point. Only piping supports it.
- Protect valve from dust or dirt on construction sites. Provide strainer or filter upstream of valve.
- Use compensators to balance thermal expansion of piping.

Installation

⚠ WARNING: **Explosion hazard.** To prevent leakage of upstream gas, shut off the gas supply at the main manual shutoff valve before installing or servicing the GH-5000 valve.

⚠ CAUTION: **Equipment damage.** To prevent damage to the valve when mounting to pipework, do not use a wrench on any surface other than the casting flats provided at the inlet and outlet ends of the valve body.

IMPORTANT: Ensure that the drilled holes in the actuator cover are not covered. These holes are necessary for ventilation and must not be covered by paint or other materials.

Perform the following procedure to install the GH-5000 valve.

- Ensure that the specified maximum ambient temperature is not exceeded (see Table 1).
- Ensure that the power supply voltage is compatible with the required control valve voltage.
- Ensure the gas flows through the valve body in the direction indicated by the arrow on the valve body. Leakage can occur if the valve is installed with the gas flow in the opposite direction of the arrow.

IMPORTANT: Do not install the actuator upside down. Install vertically wherever possible.

- The GH-5000 valve contains hydraulic fluid that the pump needs to operate the valve. Therefore, the valve may be mounted horizontally with the actuator pointed up (vertical) or in one plane in positions that do not exceed 90° from vertical. See Figure 1 and the valve position label.
- The valve may also be mounted vertically in any position around its axis, provided that the actuator is mounted to the valve within the range indicated on the valve label. To provide application flexibility in mounting, the actuator of the valve may be removed and rotated. However, the mounting of the valve must still be within the range indicated on the valve label.

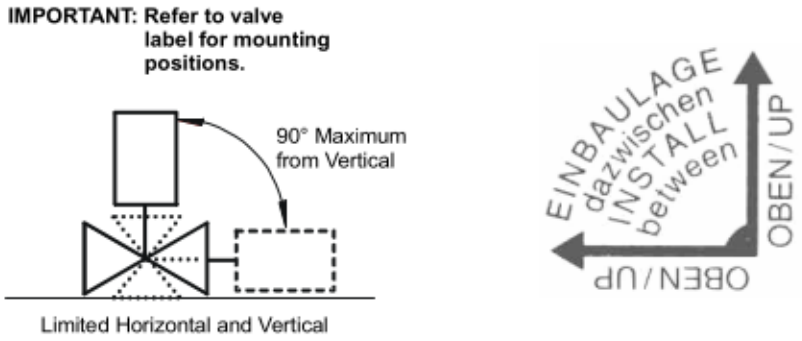


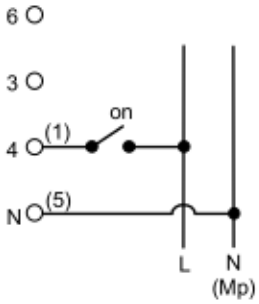
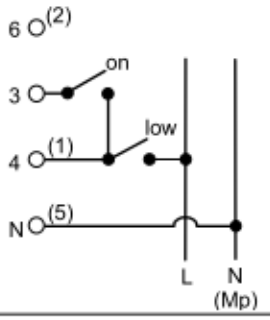
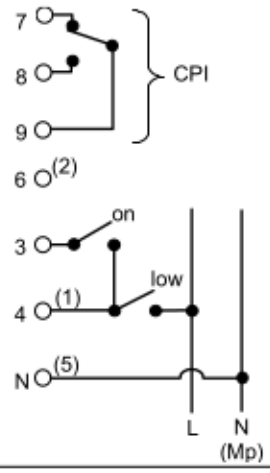
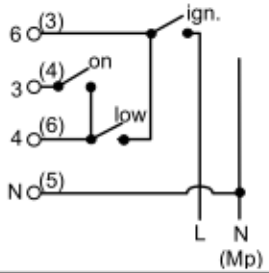
Figure 1: Mounting position

- If installing a valve with threaded connections, use an approved pipe joint sealing compound on male threads before assembly. An optional thread lubricant may have been factory applied to the first two or three threads of the inlet and outlet to avoid galling. Ensure that excess compound is removed. Threads of pipe and nipples must be smooth and free of tears and burrs. Steam clean all piping to remove foreign substances such as cutting oil or thread chips.
- If installing a valve with flanged connections, ensure that all mating surfaces are free from burrs and loose particles. Ensure that gaskets and O-ring seats are correctly positioned in mating flanges. Ensure that approved jointing compounds are not excessively applied.
- Check for leakage before making any valve adjustments. Close the upstream shutoff cock. Connect air tubing with a maximum of 70 mbar(1 psi) pressure to the inlet pressure connection. Paint the pipe connection to the valve with a rich soap and water solution (or use acceptable gas leak detection equipment). Open the upstream shutoff cock. If bubbles occur, this is an indication of a gas leak. To stop a leak, tighten joints and pipe connections. Replace the part if the leak cannot be stopped.
- Make wiring connections. Refer to the Wiring section for specific wiring instructions.

Wiring

⚠ WARNING: **Shock hazard.** Disconnect the power supply before making electrical connections to avoid electrical shock or equipment damage. Ensure that the operating voltage is identical to the information on the product identification label.

Make wiring connections in accordance with Table 1.

Actuator Configuration	Terminal Markings	Terminal Connections	Wiring Diagram
On-Off	6	None	
	3	None	
	4	On-Off	
	N	System Neutral	
On-Low-Off	6	None	
	3	On-Off	
	4	Low-Position	
	N	System Neutral	
On-Low-Off + CPI	7	Opening Contact	
	8	Closing Contact	
	9	Common	
	6	None	
	3	On-Off	
	4	Low-Position	
	N	System Neutral	
Ign. On-Low-Off	6	Ignition Position	
	3	On-Off	
	4	Low-Position	
	N	System Neutral	

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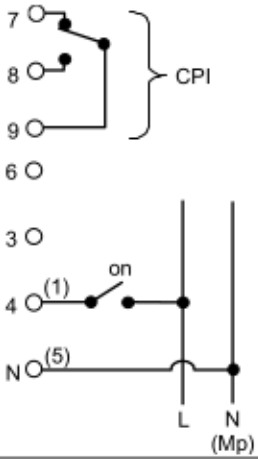
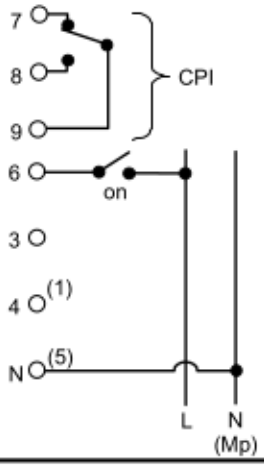
Actuator Configuration	Terminal Markings	Terminal Connections	Wiring Diagram
On-Off + CPI	7	Opening Contact	
	8	Closing Contact	
	9	Common	
	6	None	
	3	None	
	4	On-Off	
	N	System Neutral	
On-Off + CPI + MR	7	Opening Contact	
	8	Closing Contact	
	9	Common	
	6	On-Off	
	3	None	
	4	None	
	N	System Neutral	

Table 1: Electrical connections

With the gas line closed, apply power to the actuator and move the valve at least three times through the complete stroke range to ensure faultless operation.

Checkout Procedure

WARNING: **Fire or explosion hazard.** Avoid personal injury or property damage by ensuring that the valve functions properly and there are no gas leaks. Follow this checkout procedure before leaving the installation.

- Close the upstream shutoff cock and connect air tubing with a maximum of 1 psi (70 mbar) pressure to the inlet pressure connection.
- Paint the pipe connections of the valve with a rich soap and water solution (or use acceptable gas leak detection equipment) to check for leakage. Open the upstream shutoff cock. If bubbles occur, this is an indication of a gas leak. To stop a leak, tighten joints and pipe connections. Replace the part if the leak cannot be stopped.
- Refer to the *Adjustments* section to make any necessary valve setting adjustments.

WARNING: **Fire or explosion hazard.** Valve settings must be in accordance with the manufacturer's specifications.

- Before leaving the installation, observe at least three complete operating cycles to ensure that all components are functioning correctly.

Adjustments

⚠ WARNING: **All repairs, adjustments and servicing must be made in conjunction with the gas appliance and in accordance with the appliance manufacturer's instructions. Only authorized personnel should make adjustments in accordance with the regulations in force.**

⚠ WARNING: **Explosion hazard.** The minimum flow rate of the valve must not be adjusted below the minimum safe working rate of the appliance.

The GH-5000 valve can be adjusted through the use of three adjustable switches located inside the terminal box of the actuator. The screws of these switches adjust the stroke, which affect the flow rate, depending on the version of the actuator. (See Figure 2). Loosen the four screws of the terminal box cover and remove it to access the adjustable switches.

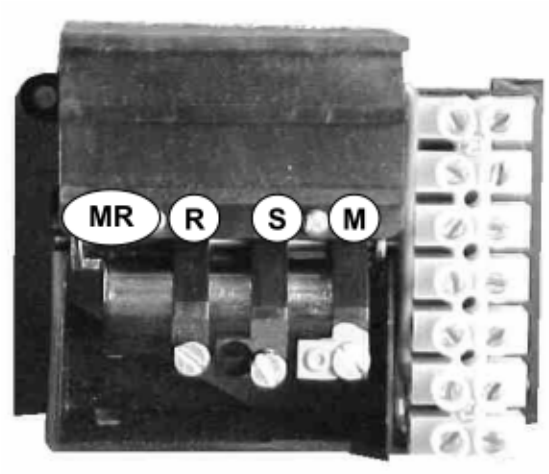


Figure 2: Switches

M **Maximum Flow**
Factory set: full flow
Do not make any adjustments on the sealed grub screw!

S **Feed back position** / CPI
Factory set is approx. 0.5 mm

OR

Ignition Stage
Factory set is approx. 3 mm

R **Reduced Stage**
Factory set is approx. 3 mm
or 5.5 mm at models with ignition stage

MR **Manual Restart**
(switch is not illustrated)
Factory set is approx. 3 sec. running time
Do not make any adjustments on the sealed screw!

⚠ Do not adjust the switches S and R below 3 mm stroke to obtain safe working of the appliance.
Do not make any adjustments on the sealed grub screw (M)!
Do not make any adjustments on the sealed screw (MR)!

Switch M

The valve is factory set to full flow. To adjust the maximum flow rate, turn the 'M' (Maximum Flow) screw. Turn the screw clockwise to reduce and counterclockwise to increase the flow rate.

Switch S

For **CPI** versions the 'S' screw head is factory set and sealed.
If new adjustment is required, first make sure that the actuator is mounted on the valve and switched off. Connect a suitable test circuit between terminals 8 and 9:

- Terminal contacts 8 and 9 opened: turn the adjustment screw clockwise until the contacts just are closed. Now turn the adjustment screw one full turn counterclockwise.
- Terminal contacts 8 and 9 closed: turn the adjustment screw counterclockwise until the contacts are opened. Turn the adjustment screw clockwise until the contacts just are closed. Now turn the adjustment screw one full turn counterclockwise.

Energise the actuator and cycle on/off. The terminal contacts 8 and 9 have to be opened in the off position of the actuator. Otherwise repeat the adjustments and cycle on/off. Finally seal the screw head and remove the test circuit.

In a similar way, the 'S' switch can be used as an **auxiliary signal switch** for any actuator stroke position. Turn the 'S' screw clockwise for a signal at a higher stroke or flow. Turning counterclockwise reduces stroke or flow level to activate the switch.
To adjust the **ignition flow**, turn the 'S' screw. Turn the screw clockwise to reduce and counterclockwise to increase the flow required for proper ignition.

Switch R

To adjust the **reduced flow rate** or low fire position, turn the 'R' ('Reduced') screw. Turn the screw clockwise to reduce and counterclockwise to increase the flow for stage one.

Switch MR

The switch MR for Manual Restart stops gas from being automatically released again after a power cut.
For Manual Restart operate the red button on the terminal box cover for at least 3 seconds to drive the gas valve to the open position, see Figure 3.
Should the button not be held long enough the gas valve will automatically return to the closed position.

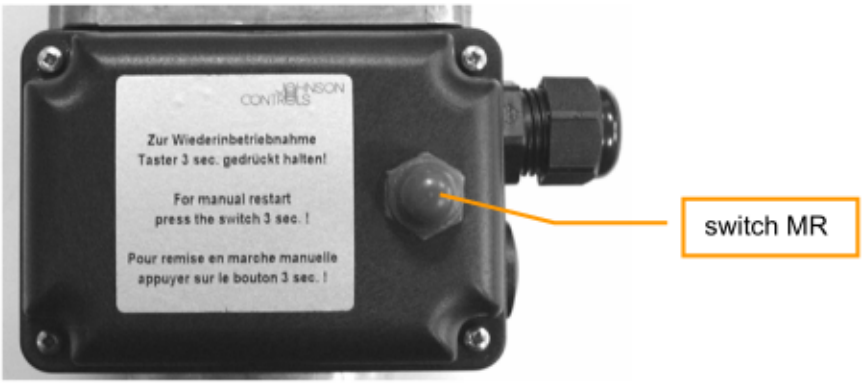


Figure 3: switch MR for Manual Restart

Repairs and Replacement

⚠ WARNING: **All repairs, adjustments and servicing must be made in conjunction with the gas appliance and in accordance with the appliance manufacturer's instructions. Only authorized personnel should make adjustments in accordance with the regulations in force.**

Field repairs must not be made, except to replace the filter, valve seat plug, gasket, terminal box, or actuator. For a replacement part, contact the nearest Johnson Controls representative or the original equipment manufacturer.

⚠ WARNING: **Fire or explosion hazard.** Shut off the gas supply at the main manual shutoff valve before servicing the valve.
Only a trained service professional should perform these repair or replacement procedures.

Valve Servicing
Follow the model-specific procedure to service the valve. Perform this procedure with each recommended inspection or at a minimum each annual functional inspection.

DN 40-80 Flanged Body and All Threaded Body Models

- Close the upstream shutoff cock and disconnect power to the actuator.

⚠ CAUTION: **Personal injury hazard.** The valve cover contains a compressed spring. Improper disassembly could cause the valve cover and spring to fly off resulting in personal injury or equipment damage.

- Remove two diagonally opposed mounting screws from the bottom valve cover and replace them with two long bolts with screwed-on nuts. See Table 5 for bolt dimensions. Screw the nuts down against the valve cover.

Valve Model	Bolt	Distance to relax spring(s)
DN 40 flanged body	M 6 x 60	approx. 55 mm
DN 50 flanged body	M 8 x 80	approx. 70 mm
DN 65 & DN 80 flanged body	M 8 x 70	approx. 50 mm
Rp ¾ to 1 ½ threaded body	M 6 x 60	approx. 55 mm
Rp 2 threaded body	M 8 x 80	approx. 70 mm
Rp 2 ½ to 3 threaded body	M 8 x 70	approx. 50 mm

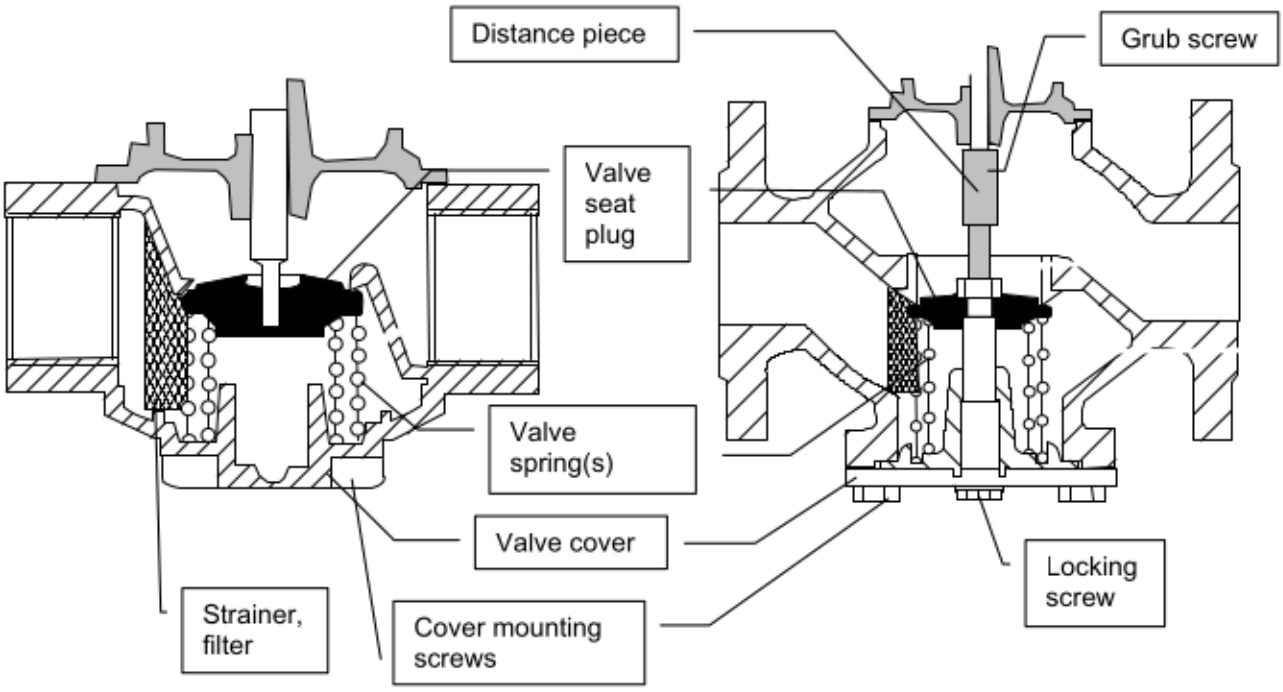
Table 2: Bolt dimensions

- With the two bolts in place, remove the other two mounting screws.
- Uniformly back off the nuts of the two bolts to lower the valve cover and relax the spring. See Table 2 for approximate distance required to fully relax the spring.
- With the spring relaxed, remove the two bolts, valve cover, valve spring, valve seat plug, and filter. Refer to model-specific figures (Figure 4) for part identification.
- Clean or replace valve seat plug, filter, and gasket. (Figure 4)
- Check the surface of the valve seat plug. If the seat plug or seal is damaged in anyway, replace it. Contact Johnson Controls for replacement part numbers.
- Ensure that the valve seat plug bore is free of foreign matter before installing it on the valve stem. Re-insert valve seat plug, filter, and gasket.

- Place the valve spring inside the valve body and secure it with the valve cover and two opposing bolts. Ensure that the valve seat plug is not tilted.
- Uniformly tighten the nuts of the two bolts to raise the valve cover and compress the spring.
- With the valve cover in position against the valve body, insert two of the mounting screws into the available cover holes.
- Remove the two bolts and replace them with the other two mounting screws. Ensure that the valve body and cover are sealed.
- Open the upstream shutoff cock and check for leakage along the valve cover. (Refer to the Checkout Procedure section).
- Observe at least three complete operating cycles to ensure that all components are functioning correctly.

Valve Model	Valve Cover	Locking screw	Flanged ring actuator
Rp ¾ - 1½ und DN 40	10 Nm	-	5 Nm
Rp 2- 3 und DN 50 - 80	25 Nm	-	5 Nm
DN100 -150	25 Nm	8 Nm	5 Nm

Table 3: Torques



Flanged bodies DN40-80 and all threaded valve bodies

Flanged valve bodies DN100-150

Figure 4: Detailed drawing

DN100-150 Flanged Body Models

- Close the upstream shutoff cock and disconnect power to the actuator.

CAUTION: **Personal injury hazard.** The valve cover contains a compressed spring. Improper disassembly could cause the valve cover and spring to fly off resulting in personal injury or equipment damage.

- Unscrew the sealed locking screw from the bottom valve cover and replace it with a centering disk (disk to DIN 9021- 8,4 or JCI part number 130 2069 010) and screw M 6, see Table 4 and Figure 4.

Valve Model	**Bolt**
DN100 Flanschventil GH-5**4**..	M6 x 55
DN125 Flanschventil GH-5**4**.. DN100-150 Flanschventile GH-5**7**..	M6 x 60
DN150 Flanschventil GH-5**4**..	M6 x 70

Table 4: Bolt dimensions

- Tighten the screw three turns past the stop so that the valve seat plug lifts off the valve seat, securing the valve spring.
- Remove the valve cover mounting screws.
- Remove the valve cover, valve spring, valve seat plug, and filter. Refer to Figure 4 for part identification.
- Clean or replace valve seat plug and seal, filter, and gasket.
- Check the surface of the valve seat plug. If the seat plug is damaged in anyway, replace it. Contact Johnson Controls for replacement part numbers.
- Ensure that the valve seat plug bore is free of foreign matter before installing it on the valve stem. Re-insert valve seat plug, filter, and gasket.
- Place the valve spring inside the valve body and secure it with the valve cover and two opposing mounting screws. Ensure that the valve seat plug is not tilted.
- Insert the other two mounting screws. Ensure that the valve body and cover are sealed. For torque refer to Table 3.
- Remove the screw and centering disk inserted and replace it with the locking screw. For torque refer to Table 3. The locking screw has to be sealed.
- Open the upstream shutoff cock and check for leakage along the valve cover. (Refer to the Checkout Procedure section).
- Observe at least three complete operating cycles to ensure that all components are functioning correctly.

Terminal Box Replacement

CAUTION: **Equipment damage hazard.** Ensure that the replacement terminal box matches the existing one in every respect.

CAUTION: **Equipment damage hazard.** Label all wires prior to disconnection when servicing valves. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

Follow the procedure below to replace the terminal box.

- Close the upstream shutoff cock, disconnect power to the actuator.
- Remove the terminal box cover by loosen the four cover screws.
- Disconnect field wiring. Disconnect the flat plugs from the plug connector. See Figure 5.
- Loosen the four terminal box mounting screws. Lift the key lever and pull out the terminal box.
- Connect the flat plugs of the new terminal box to the plug connector in accordance with Figure 6. Please note that the Th and 2 pins are towards the front and the 1 and N pins are towards the back of the terminal box.

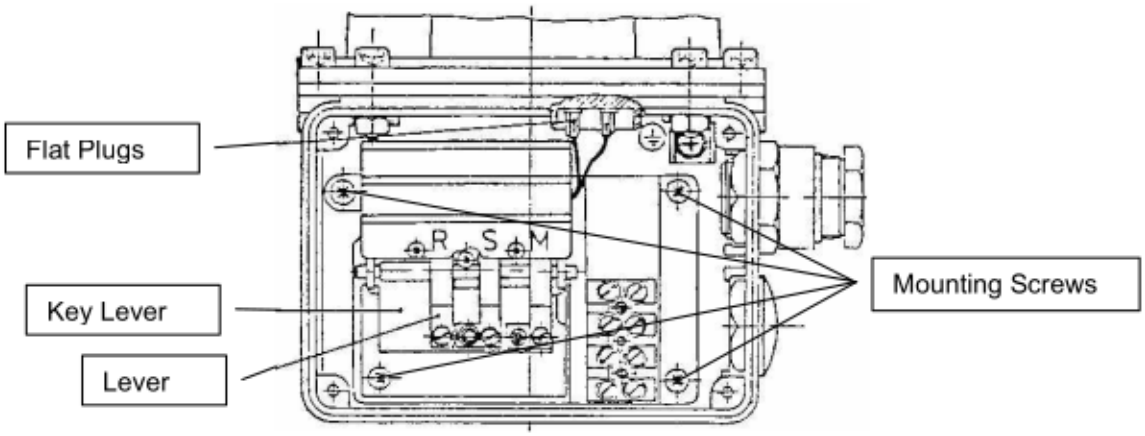


Figure 5: Terminal box

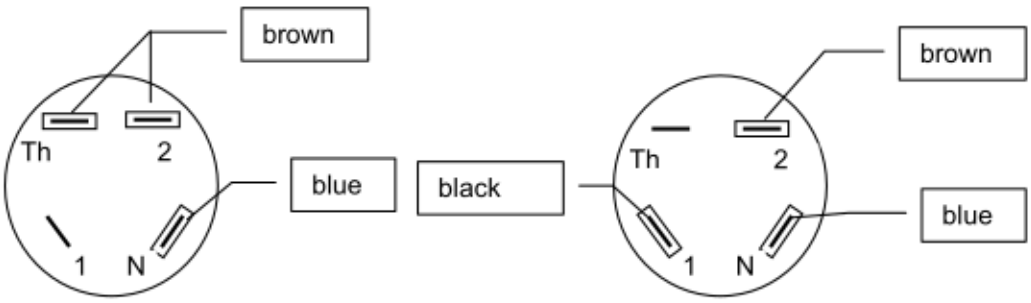


Figure 6: Flat plug connector

- Lift the key lever and insert the replacement terminal box into the housing. Ensure that the back of the key lever is inserted into the opening in the back of the housing.
- Attach the terminal box to the housing using the four mounting screws. Tighten the screws in the numbered order shown in to ensure that the terminal box is flat.
- Connect field wiring to the terminal box.
- If necessary, make switch adjustments. Refer to the Adjustments section for details.
- Reattach the terminal box cover by tightening the four cover screws.
- Apply power to the actuator and open the upstream shutoff cock.
- Observe at least three complete operating cycles to ensure that all components are functioning correctly.

Actuator Replacement

⚠ CAUTION: **Equipment damage hazard.** Label all wires prior to disconnection when servicing valves. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing. Follow the procedure below to replace the actuator.

- Close the upstream shutoff cock and disconnect power to the actuator.
- Remove the terminal box cover by loosening four cover screws.
- Disconnect field wiring. As you disconnect each wire, label it with the correct terminal designation.
- Remove the four fixing screws from the flanged ring and lift off the actuator and flanged ring.
- If the actuator is equipped with an extension piece: loosen the grub screw from the extension piece and remove the extension piece from the actuator stem. See Figure 4.

⚠ CAUTION: **Equipment damage hazard.** The extension piece must be retained when replacing the actuator. The stem length is critical to proper closing of the valve. There must be a minimum clearance of 1 mm between the valve stem and valve seat plug.

- Push the extension piece onto the stem of the replacement actuator and tighten the grub screw.
- Place the actuator, without seal, onto the valve body. It must rest firmly on the valve body. If the actuator does not rest firmly, clean the bore of the valve body.
- Clean the seal and place it on the valve body.
- Place the flanged ring and actuator on the valve body and loosely tighten the fixing screws (torque see Table 3).
- Turn the actuator to the preferred position and evenly tighten the fixing screws in a diagonally opposed pattern.
- Open the upstream shutoff cock and check for leakage along the flanged ring. (Refer to the Checkout Procedure section).
- Remove the cover of the terminal box by loosening the four cover screws.
- Connect field wiring to the terminal box.
- If necessary, make switch adjustments. Refer to the Adjustments section for details.
- Reattach the terminal box cover by tightening the four cover screw.
- Apply power to the actuator.
- Observe at least three complete operating cycles to ensure that all components are functioning correctly.

Spare Parts, Replacement Actuators

Electro- Hydraulic Actuator Gas Valve Code Number * (Size)	Replacement Actuator Code Number *	Replacement Terminal - Box Code Number	Terminal - Box Function
GH – 51.. – 2._. (¾ inch / Rp ¾)	AH – 5100 – 01_0	130 3430 111	On-Off
	AH – 5100 – 03_0	130 3430 131	On-Low-Off
GH – 51.. – 3._. (1 inch / Rp 1)	AH – 5100 – 05_0	130 3430 151	Ignition-On-Low-Off
GH – 51.. – 5._. (1½ inch / Rp 1½)	AH – 5109 – 04_0	130 3431 141	On-Low-Off+CPI **
GH – 51.. – 1._. (1½ inch / DN 40)	AH – 5109 – 06_0	130 3431 161	On-Off+CPI **
	AH – 5109 – 09_0	130 3431 191	On-Off+CPI ** +MR ***
GH – 52.. – 6._. (2 inch / Rp 2)	AH – 5200 – 01_0	130 3430 211	On-Off
GH – 52.. – 2._. (2 inch / DN 50)	AH – 5200 – 03_0	130 3430 231	On-Low-Off
GH – 56.. – 7._. (2½ inch / Rp 2½)	AH – 5200 – 05_0	130 3430 251	Ignition-On-Low-Off
GH – 56.. – 3._. (2½ inch / DN 65)	AH – 5209 – 04_0	130 3431 241	On-Low-Off+CPI **
GH – 56.. – 8._. (3 inch / Rp 3)	AH – 5209 – 06_0	130 3431 261	On-Off+CPI **
GH – 56.. – 4._. (3 inch / DN 80)	AH – 5209 – 09_0	130 3431 291	On-Off+CPI ** +MR ***
GH – 54.. – 5._. (4 inch / DN 100)	AH – 5400 – 01_0	130 3430 411	On-Off
GH – 54.. – 6._. (5 inch / DN 125)	AH – 5400 – 03_0	130 3430 431	On-Low-Off
GH – 54.. – 7._. (6 inch / DN 150)	AH – 5400 – 05_0	130 3430 451	Ignition-On-Low-Off
GH – 57.. – 5._. (4 inch / DN 100)	AH – 5409 – 04_0	130 3431 441	On-Low-Off+CPI **
GH – 57.. – 6._. (5 inch / DN 125)	AH – 5409 – 06_0	130 3431 461	On-Off+CPI **
GH – 57.. – 7._. (6 inch / DN 150)	AH – 5409 – 09_0	130 3431 491	On-Off+CPI ** +MR ***

* Excluding Voltage, complete Code Number by inserting a **1** or **3** for the blank digit.
1 = 230 VAC (50/60 Hz) models and **3** = 120 VAC (50/60 Hz) models.
** CPI = Closed Position Indicator
*** MR = with switch for manual restart

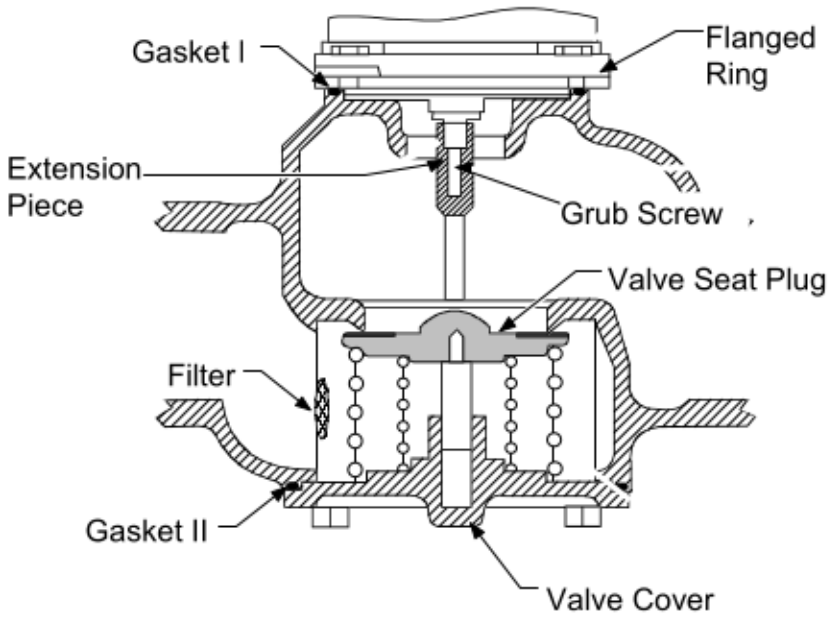


Figure 7: Detailed drawing, spare parts

Electro- Hydraulic Actuator Gas Valve (Size)	Extension Piece	Grub	Filter	Flanged Ring
GH – 51.. – 2... (¾ inch / Rp ¾)	- - - -	- - - -	130 3015 010	2 x 130 2160 010
GH – 51.. – 3... (1 inch / Rp 1)				
GH – 51.. – 5... (1½ inch / Rp 1½)				
GH – 51.. – 1... (1½ inch / DN 40)				
GH – 52.. – 6... (2 inch / Rp 2)	130 3083 010	212 4649 111	130 3055 010	
GH – 52.. – 2... (2 inch / DN 50)				
GH – 56.. – 7... (2½ inch / Rp 2½)	130 4413 010		130 4256 010	
GH – 56.. – 3... (2½ inch / DN 65)				
GH – 56.. – 8... (3 inch / Rp 3)				
GH – 56.. – 4... (3 inch / DN 80)				
GH – 54.. – 5... (4 inch / DN 100)	130 2162 010		130 2156 010	
GH – 54.. – 6... (5 inch / DN 125)	130 2136 010		130 2157 010	
GH – 54.. – 7... (6 inch / DN 150)	130 2137 010		130 2158 010	
GH – 57.. – 5... (4 inch / DN 100)	130 5497 010		130 5373 010	
GH – 57.. – 6... (5 inch / DN 125)	130 5498 010		130 2157 010	
GH – 57.. – 7... (6 inch / DN 150)	130 5499 010		130 2158 010	

Electro- Hydraulic Actuator Gas Valve (Size)	Valve Seat Plug (flat)	Valve Seat Plug (contoured)	Gasket I Actuator - Valve	Gasket II Valve - Cover
GH – 51.. – 2... (¾ inch / Rp ¾)	130 3067 011	130 4433 011	130 3165 010	130 3165 010
GH – 51.. – 3... (1 inch / Rp 1)		130 4432 011		
GH – 51.. – 5... (1½ inch / Rp 1½)		130 4429 011		
GH – 51.. – 1... (1½ inch / DN 40)				
GH – 52.. – 6... (2 inch / Rp 2)	130 3069 031	130 4428 011	130 3165 010	130 3166 010
GH – 52.. – 2... (2 inch / DN 50)				
GH – 56.. – 7... (2½ inch / Rp 2½)	- - - -.	130 4411 011	130 2811 010	130 4306 010
GH – 56.. – 3... (2½ inch / DN 65)				
GH – 56.. – 8... (3 inch / Rp 3)		130 4417 011		
GH – 56.. – 4... (3 inch / DN 80)				
GH – 54.. – 5... (4 inch / DN 100) GH – 57.. – 5... (4 inch / DN 100)	130 2276 131	130 4425 111	130 2811 010	130 2131 010
GH – 54.. – 6... (5 inch / DN 125) GH – 57.. – 6... (5 inch / DN 125)	130 2277 131	130 4424 111		130 2132 010
GH – 54.. – 7... (6 inch / DN 150) GH – 57.. – 7... (6 inch / DN 150)	130 2278 111	130 4423 111		130 2133 010

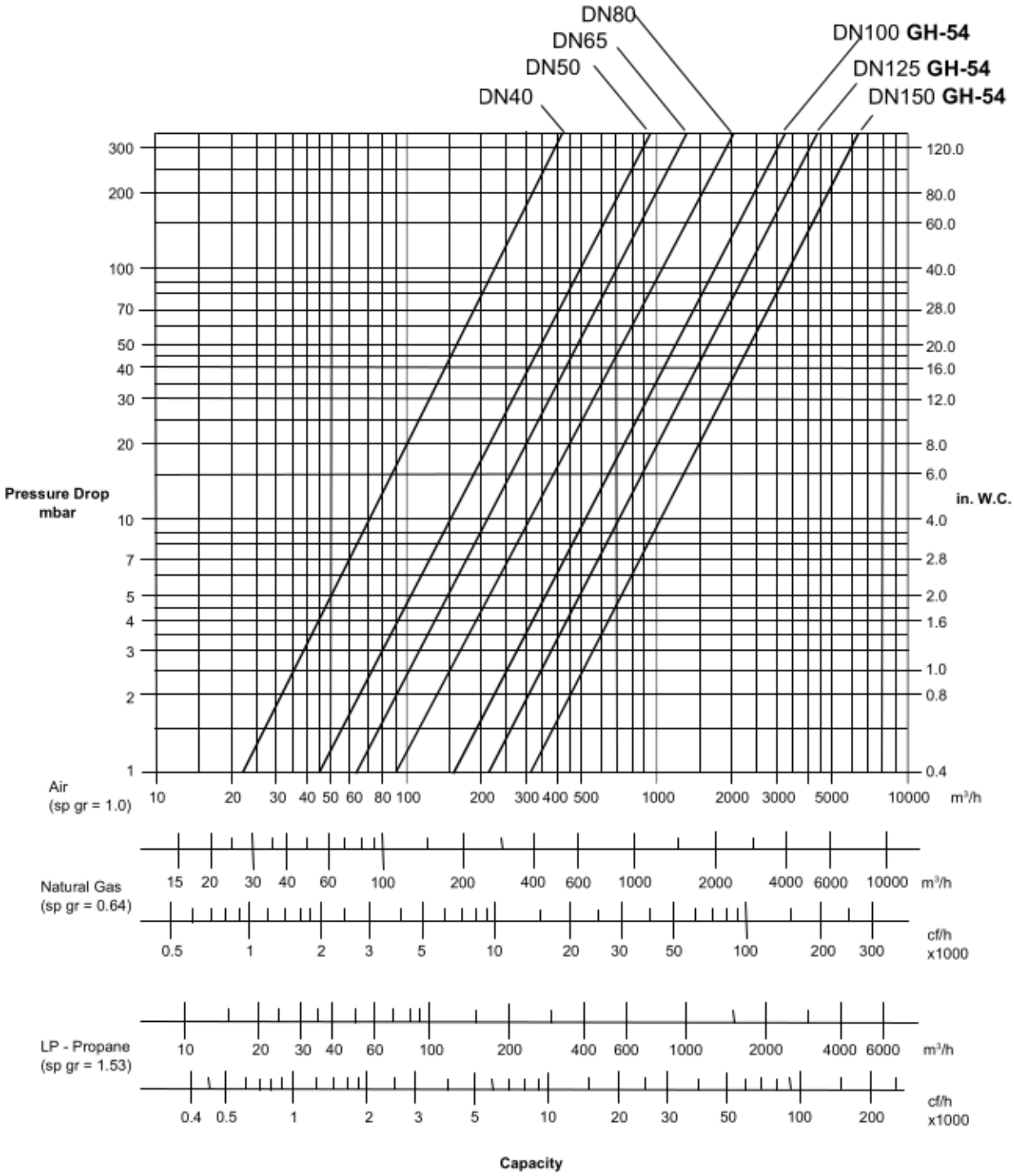
See also Figure 7.

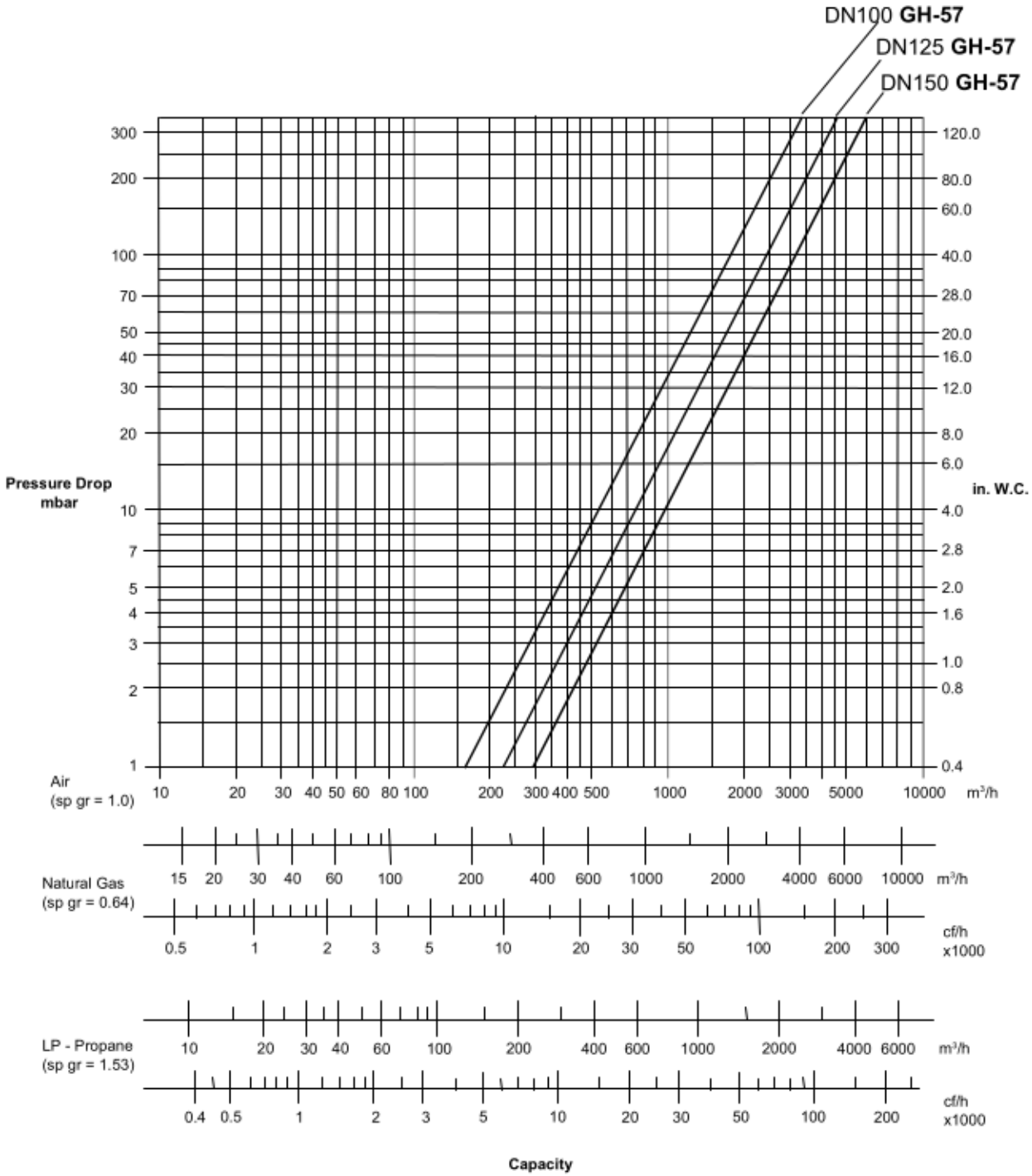
Troubleshooting

Symptom	Possible Cause	Corrective Action
Motor does not run	Supply voltage incorrect or missing	Check switches, fuses, circuit breakers, and actuator wiring connections (refer to Table 1)
	Flow rate set too low	Turn the 'M' adjustment screw counterclockwise to increase the flow rate (refer to chapter Adjustments)
	Internal defect	Replace actuator (refer to chapter Actuator Replacement)
Motor runs but valve does not open	Operating pressure too high	Verify that the maximum operating pressure is not exceeded (refer to chapter Specifications)
	Incorrect mounting position of horizontal actuator	Turn actuator. Observe mounting positions as indicated on actuator label
	Stroke setting set below 3 mm	Turn the 'R' or 'S' adjustment screw counterclockwise to increase the stroke (refer to chapter Adjustments)
	Flow direction	Check flow direction: the flow direction is indicated by an arrow on the valve body
	Internal defect	Replace actuator (refer to chapter Actuator Replacement)
Motor does not turn off	Limit switch defective	Replace terminal box (refer to chapter Repairs and Replacement)
Actuator moves through Low Position	Incorrect wiring	Check wiring (refer to Table 1)
	Switch defect	Replace terminal box (refer to chapter Repairs and Replacement)
Leakage	Flanges, fittings	Replace seals or screws or **replace valve**
Inner leakage	Dirt on valve seat	**Replace valve**
	Flow direction	Check flow direction: the flow direction is indicated by an arrow on the valve body

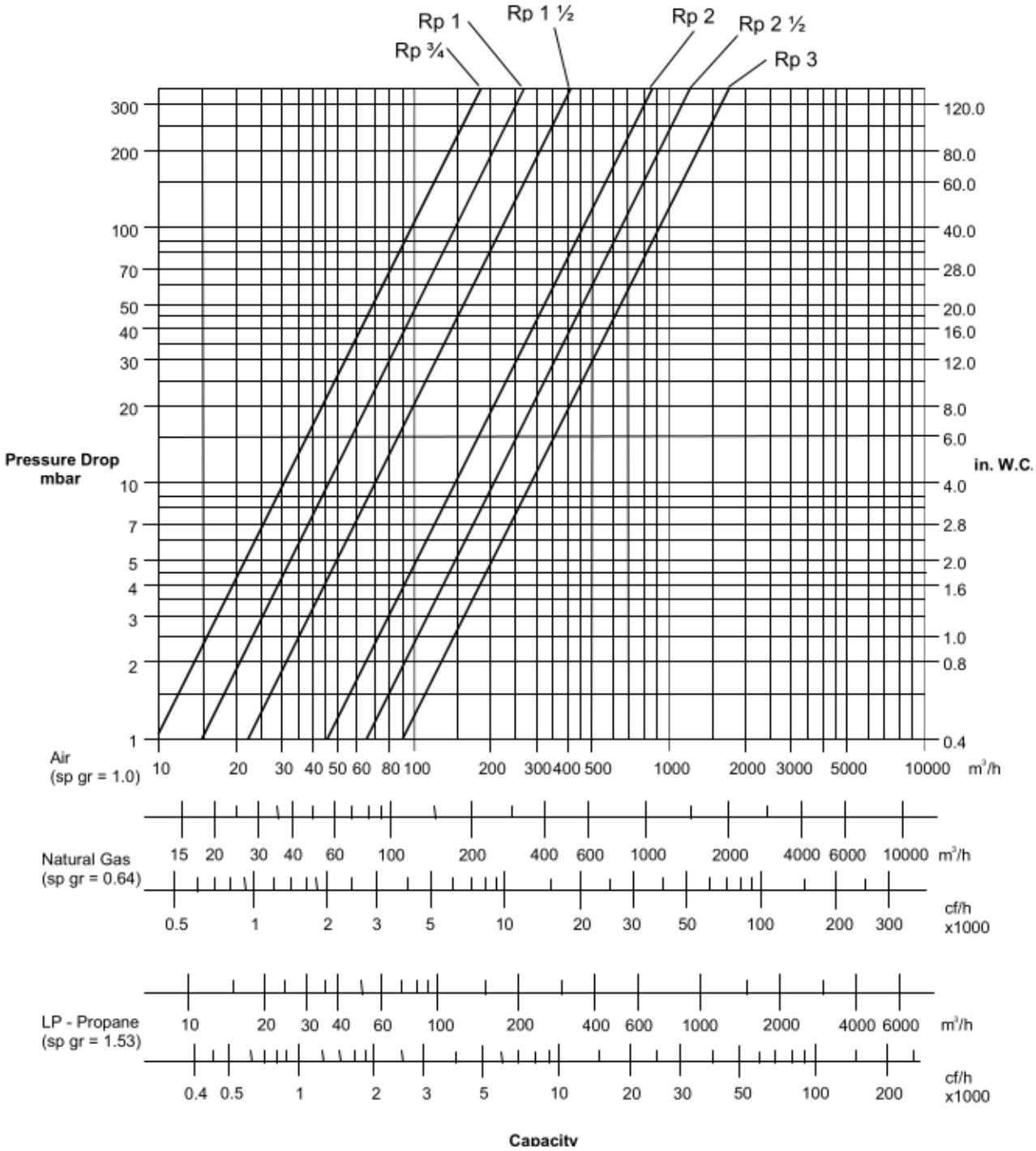
Fault diagnosis	Effects	Cause	Remedial action/Minimising risks
Valve body, flanges, actuator: Cracks, holes, damage, leakage	 **Danger of explosion** Danger of flying shrapnel, danger of poisoning, burns danger, environmental pollution	Piping stressed beyond permitted limits, recoil forces, pressure surges, valves used as fixed point, not permitted pressure and temperature limits	Reduce pressure and stress, change piping position, install compensators, select other materials. The piping must meet all applicable codes/standards (i.e. TRB, TRR). **Replace valve**
Flange fitting not tight, leakage		Improper transport, bending stresses too great, thermal stress	**Replace valve**, ensure that piping is laid free of stress or tension
		Bolts not tightened diagonally	Proper installation in accordance with these operating instructions
Hot surface	Burns danger	Wrong operating voltage, actuator surface becomes hot	**Replace actuator**, check operating voltage

Flow Characteristic flanged valve bodies

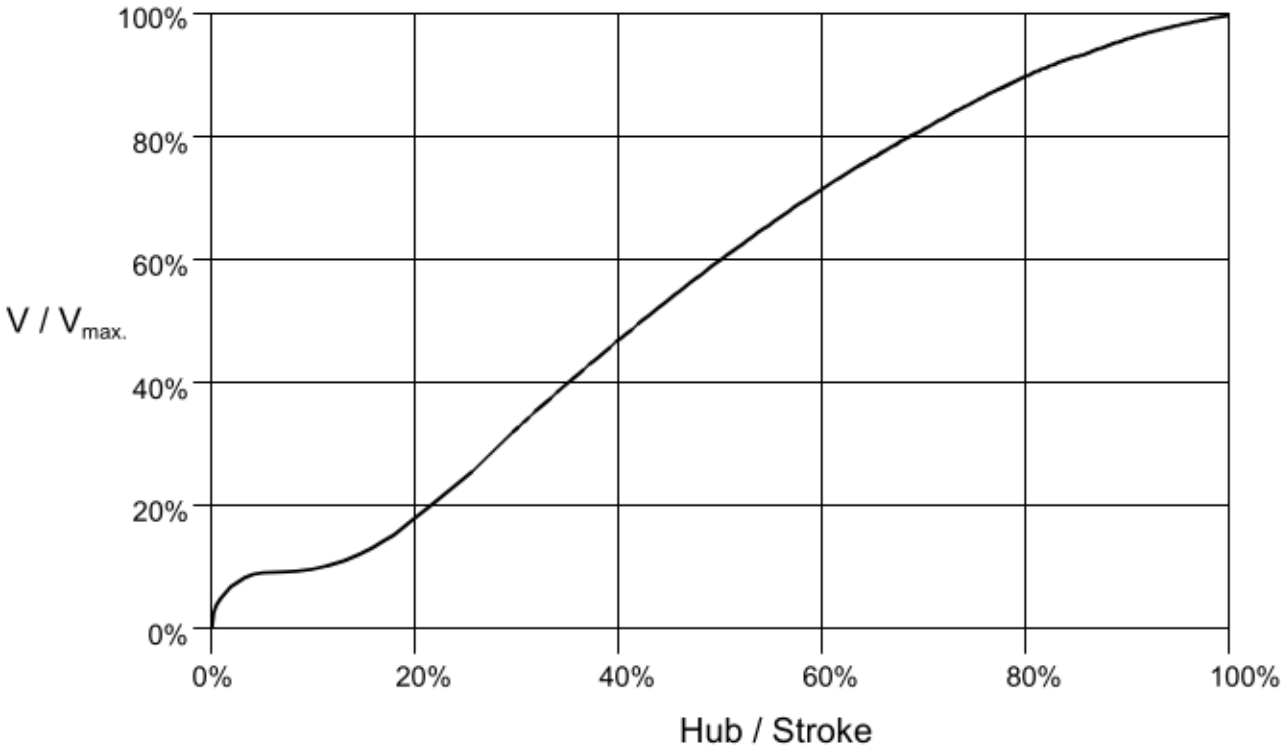



DN100 GH-57
DN125 GH-57
DN150 GH-57
Pressure Drop
mbar
300
200
100
70
50
40
30
20
10
7
5
4
3
2
1
120.0
80.0
60.0
40.0
28.0
20.0
16.0
12.0
8.0
6.0
4.0
2.8
2.0
1.6
1.0
0.8
0.4
in. W.C.
Air
(sp gr = 1.0)
10 20 30 40 50 60 80 100 200 300 400 500 1000 2000 3000 5000 10000 m³/h
Natural Gas
(sp gr = 0.64)
15 20 30 40 60 100 200 400 600 1000 2000 4000 6000 10000 m³/h
0.5 1 2 3 5 10 20 30 50 100 200 300 cf/h x1000
LP - Propane
(sp gr = 1.53)
10 20 30 40 60 100 200 400 600 1000 2000 4000 6000 m³/h
0.4 0.5 1 2 3 5 10 20 30 50 100 200 cf/h x1000
Capacity

Flow Characteristic threaded valve bodies

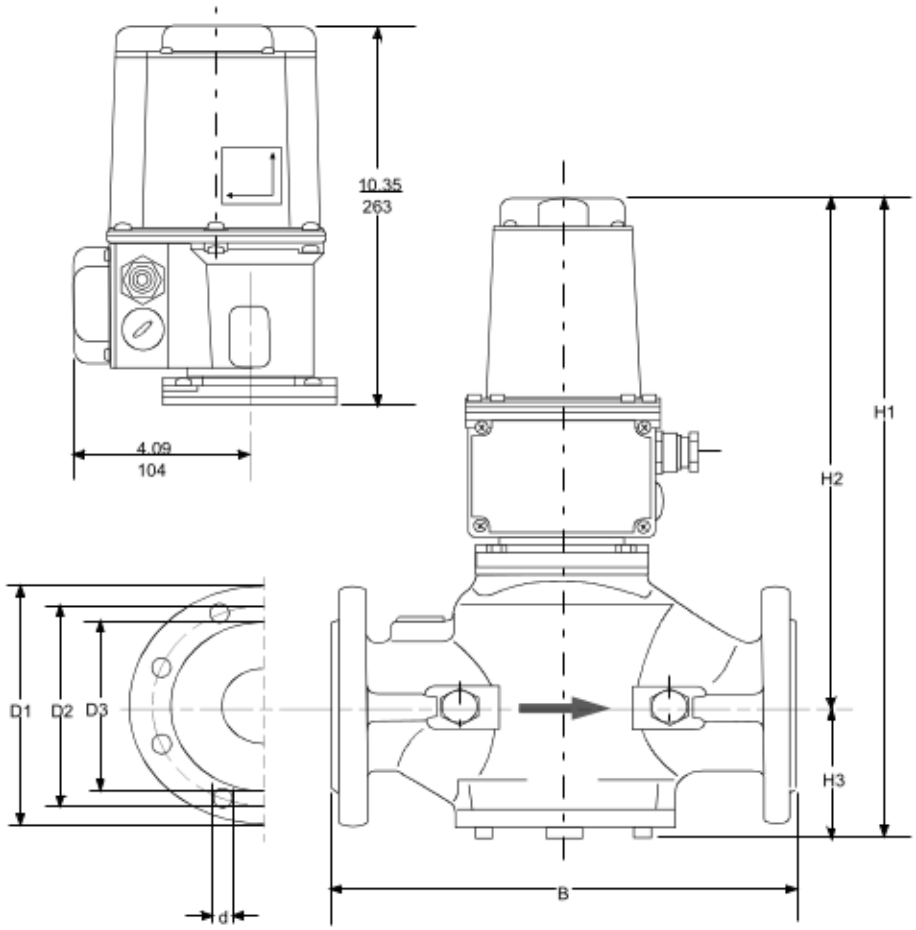


Flow/Stroke Characteristic contour plug



Valves with actuator versions on-off and on-off + CPI are always provided with a flat plug. All other valves are provided with contoured plugs.
Exception: all valve bodies DN65-80 and Rp 2 ½ - 3 are always provided with a contoured plug.

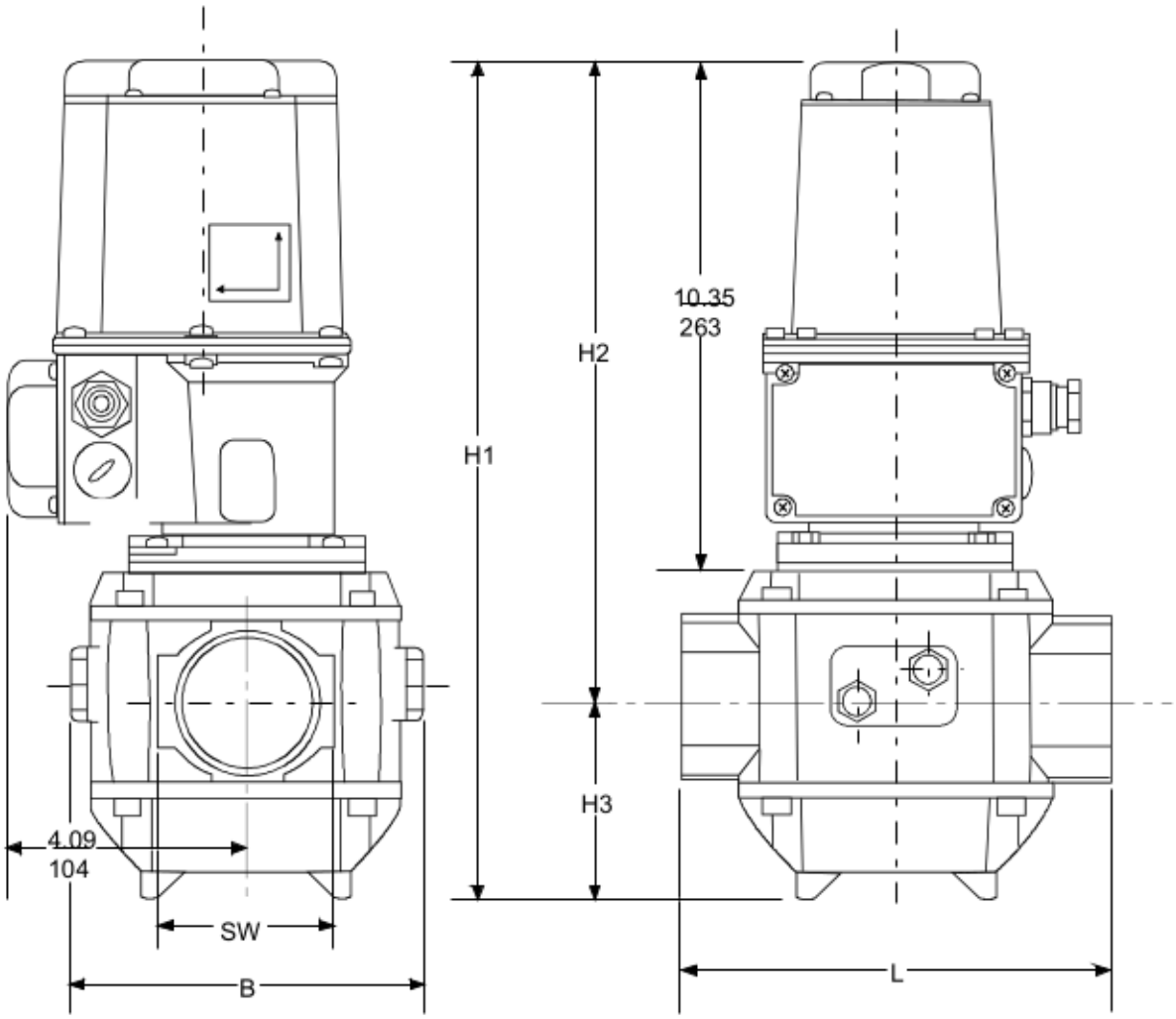
Dimensions and weight of flanged valve bodies DN40-150



Ventiltyp Valve Size	B mm (in).	D1 mm (in).	D2 mm (in).	D3 mm (in).	d mm (in).	H1 mm (in).	H2 mm (in).	H3 mm (in).	Gewicht Weight (kg)
DN40	200 (7.87)	150 (5.91)	110 (4.33)	88 (3.47)	18* (0.71)	367 (14.45)	296 (11.65)	71 (2.80)	6,6
DN50	230 (9.06)	165 (6.50)	125 (4.92)	102 (4.02)	18* (0.71)	415 (16.34)	323 (12.72)	92 (3.62)	8,1
DN65	290 (11.42)	185 (7.28)	145 (5.71)	122 (4.80)	18* (0.71)	451 (17.76)	359 (14.13)	92 (3.62)	20,0
DN80	310 (12.21)	200 (7.87)	160 (6.30)	138 (5.43)	18** (0.71)	451 (17.76)	349 (13.74)	92 (3.62)	22,0
DN100 GH-54..	350 (13.78)	220 (8.66)	180 (7.09)	158 (6.22)	18** (0.71)	527 (20.75)	377 (14.84)	150 (5.91)	42,0
DN125 GH-54..	400 (15.75)	250 (9.84)	210 (8.27)	188 (7.40)	18** (0.71)	555 (21.85)	388 (15.28)	167 (6.58)	64,0
DN150 GH-54..	480 (18.90)	285 (11.22)	240 (9.45)	212 (8.35)	23** (0.91)	622 (24.49)	412 (16.22)	210 (8.27)	93,0
DN100 GH-57..	350 (13.78)	220 (8.66)	180 (7.09)	158 (6.22)	18** (0.71)	498 (19.6)	363 (14.3)	135 (5.31)	35,1
DN125 GH-57..	400 (15.75)	250 (9.84)	210 (8.27)	188 (7.40)	18** (0.71)	536 (21.1)	379 (14.9)	157 (6.18)	50,5
DN150 GH-57..	480 (18.90)	285 (11.22)	240 (9.45)	212 (8.35)	23** (0.91)	576 (22.7)	399 (15.7)	177 (6.97)	81,0

* four bolt holes per flange
** eight bolt holes per flange

Dimensions of threaded valve bodies Rp ¾ to Rp 3



Ventiltyp Valve Size	SW mm (in).	L mm (in).	B mm (in).	H1 mm (in).	H2 mm (in).	H3 mm (in).	Gewicht Weight (kg)
Rp ¾	41 (1.61)	130 (5.12)	119 (4.69)	360 (14.17)	296 (11.65)	64 (2.52)	5,8
Rp 1	50 (1.97)	140 (5.51)	119 (4.69)	360 (14.17)	296 (11.65)	64 (2.52)	5,8
Rp 1 ½	65 (2.56)	150 (5.91)	119 (4.69)	360 (14.17)	296 (11.65)	64 (2.52)	5,8
Rp 2	75 (2.95)	180 (7.09)	153 (6.02)	415 (16.34)	323 (12.72)	92 (3.62)	6,8
Rp 2 ½	95 (3.74)	240 (9.45)	135 (5.32)	451 (17.76)	359 (14.13)	92 (3.62)	16,9
Rp 3	115 (4.53)	280 (11.02)	135 (5.32)	451 (17.76)	359 (14.13)	92 (3.62)	20,7