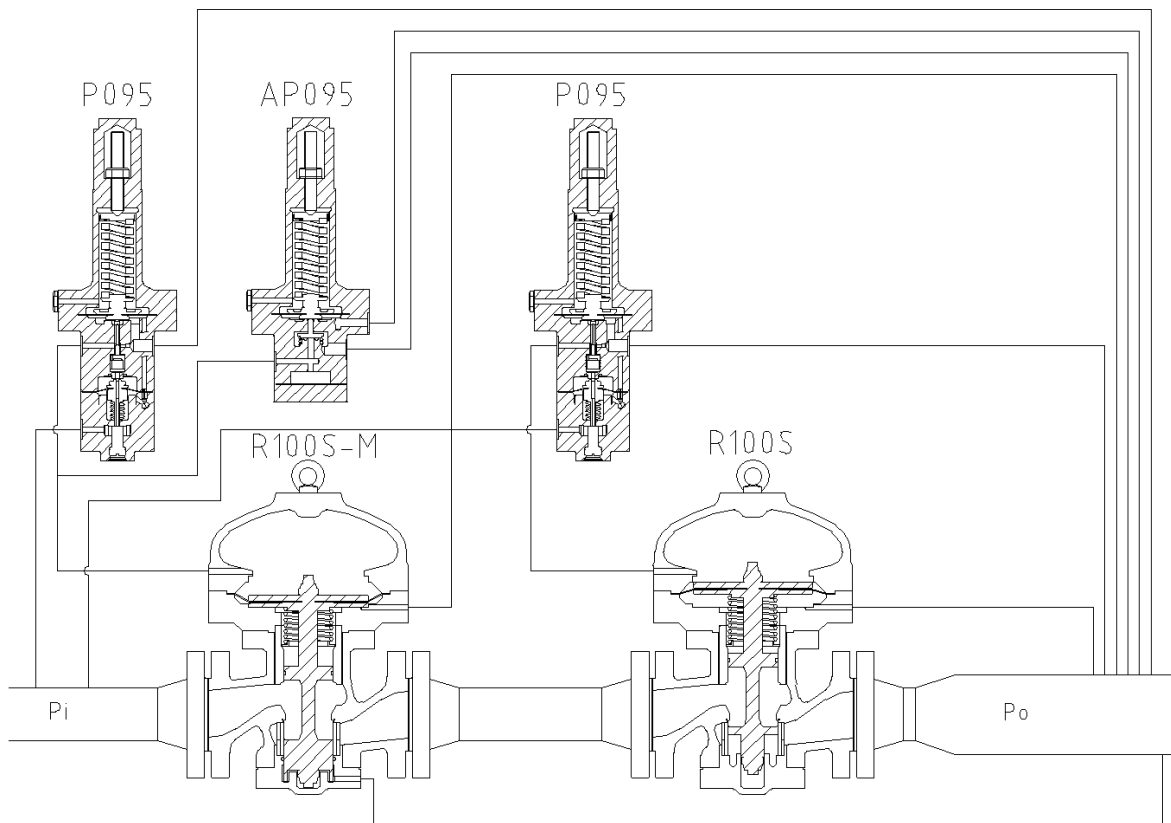

Gas Pressure Regulating System HON R100S - (M) Dome type

OPERATING AND MAINTENANCE MANUAL



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While great care has been taken in composing the text and illustration, Honeywell does not accept liability any inaccuracies.

1 Technical specifications

1.1 System components

Active regulating system:

Gas pressure regulator HON R100S

Pilot (also called pressure control regulator) HON P095-xPS-y

Monitor regulator system:

Monitor regulator execution HON R100S-M

Pilot (also called pressure control regulator) HON P095-xPS-y

Acceleration pilot HON AP095-xP-y (optional)

1.2 Area of application

Gas pressure regulating and metering installations for inlet pressures up to 1450 PSI or 100 bar where high demands are set for reliability in operation as well as regulating precision. Both active regulating and the monitor regulator system are medium controlled.

Besides its application in transport and distribution systems, the Honeywell regulating system is especially suitable for gas pressure reduction at end users where a combination of stability and a high speed of response is required at a strongly varying demand pattern.

In addition, the regulating system is highly suitable in those situations where a very small pressure drop across the installation is required. This often concerns bottlenecks in the transport and distribution network. The Honeywell basic regulating system requires less than 7.2 PSI or 0.5 bar pressure difference to be able to function. Moreover, the system has a high regulating precision, enabling pressure equation within an installation to be kept within limits. A predictive calculation or simulation may be made for critical situations.

Because of its unique construction, the silent execution of the regulating system is especially suitable for situations where high demands are set to the level of acoustic pressure and/or capacity. If required sales engineers can make a predictive calculation of the acoustic pressure level belonging to the process conditions concerned. The monitor regulator system may also be supplied in a silent execution.

The addition of a monitor regulator to the system ensures greater operational reliability combined with overpressure protection. If the active regulating system open fails, the monitor regulator takes over pressure control and the gas supply is not cut off like with safety valves. The acceleration pilot is used in those cases when quick take-over is required. The pilot for a monitor regulator is the same as for the active regulator.

Both the active and monitor regulators are gas controlled regulators where regulation consists of a direct solid regulating circuit and an indirect regulating circuit which realises high regulating precision because of its integrating action.

Applications of the HON P095

The most common application is its use as a pressure control regulator (pilot) for its own medium-controlled gas pressure reducing devices. The HON P095-xPS is optimised for use with a HON R100S(M) gas pressure regulator but experience has taught that it also functions extremely well on other types (makes) of gas pressure regulators. The HON P095-xPS is suitable for inlet pressures up to 1450 PSI or 100 bar and controlled outlet pressures up to 870 PSI or 60 bar.

Other applications are:

A

The HON P095-xPS as a two-stage gas pressure regulator with a small capacity suitable for inlet pressures up to 1450 PSI or 100 bar and controlled outlet pressures up to 870 PSI or 60 bar.

B

The HON AP095-xP as a 1-stage regulator without stabiliser with as its function limitation regulator or as a working monitor acceleration pilot.

The limitation regulator serves to limit the flow in a gas pressure reducing device and to prevent overloading of a turbine gas meter.

The working monitor acceleration pilot serves to take over the function of the regulator in a working monitor arrangement at the instant it fails open. The working monitor arrangement consists of an active monitor, which takes care of the initial pressure reduction and a regulator which finally regulates the required outlet pressure.

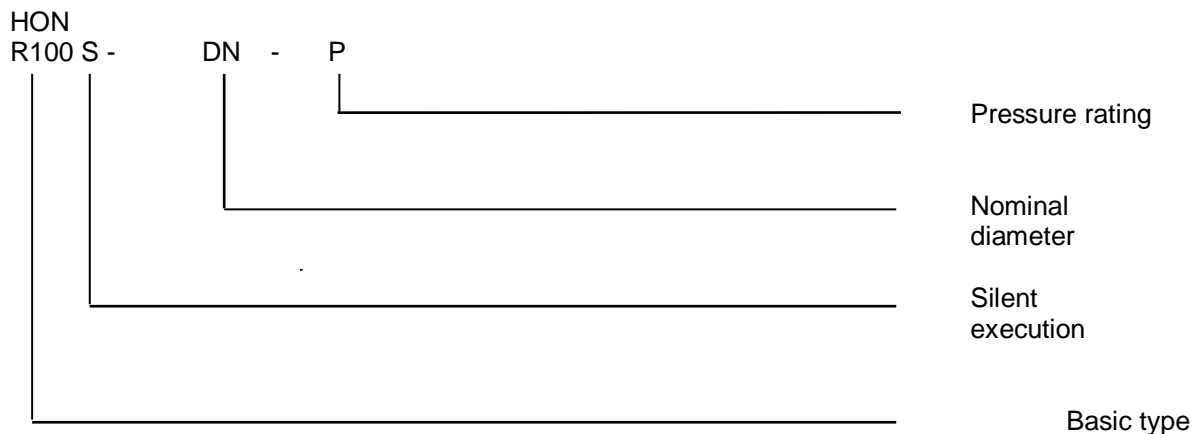
C

An execution with pneumatic, or electronic, drive is also available, thus allowing for the possibility of remotely adjusting the set point. The type indication of this execution is PL095-xPS.

You may contact the sales department for a fuller description of A, B and C applications. This documentation is aimed at the main use of the HON P095 only that is as a pressure control regulator.

1.3 Type indication system components

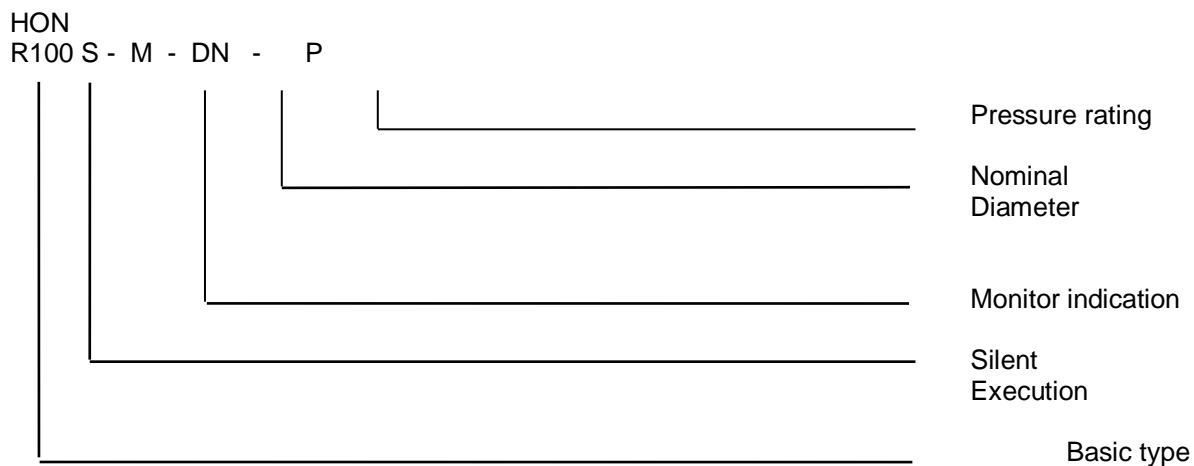
Active regulator



Example: HON R100S-4"-600

A silent execution of the Honeywell gas pressure regulator with a nominal diameter of 4" and belonging to pressure rating ANSI 600

Monitor regulator

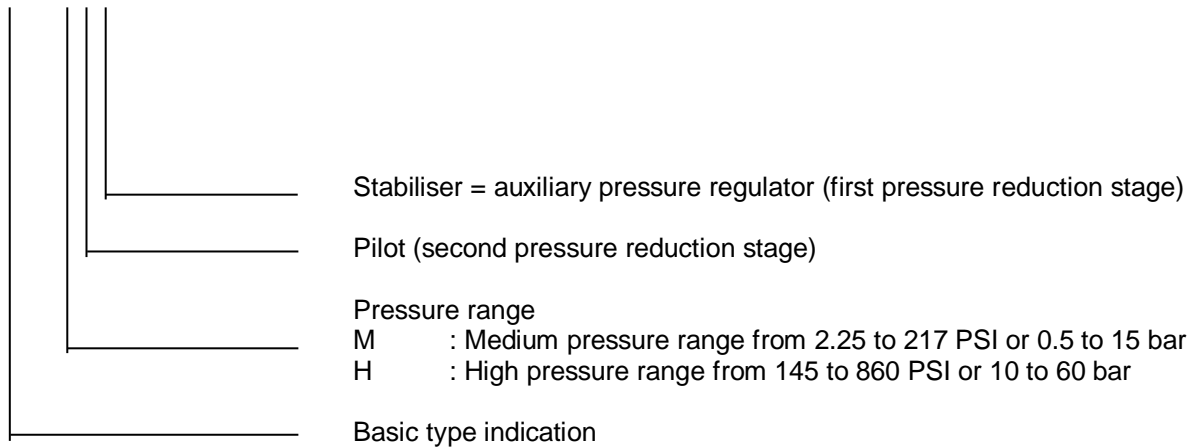


Example: HON R100S-M-4"-600

A silent execution of the Honeywell monitor regulator with a nominal diameter of 4" and belonging to pressure rating ANSI 600

Pilot

HON
P095 – x PS



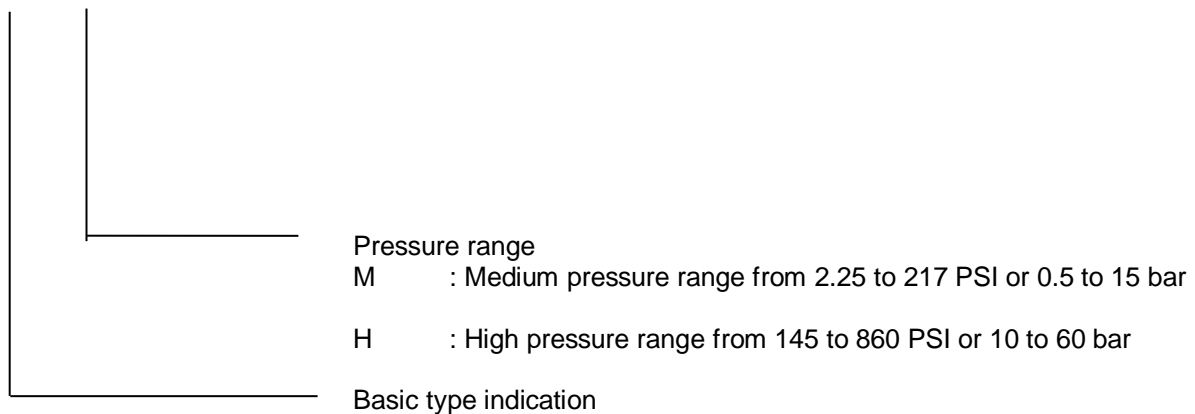
Example:

HON P095-MPS

A pilot with stabilizer for a pressure range up to 174 PSI or 12 bar, carried out with a breather opening to the environment and a connection for a breather pipe and an extra seal at the adjusting screw (if unacceptable, in case of diaphragm fracture, that a small flow runs into the arrangement space).

Acceleration pilot:

HON
AP095 - xP



Example:

HON AP095-MP

An acceleration pilot for a pressure range up to 217 PSI or 15 bar, carried out with a breather opening to the environment and a connection for a breather pipe and an extra seal at the adjusting screw (if unacceptable, in case of diaphragm fracture, that a small flow runs into the arrangement space).

1.4 Technical specifications regulating system

Pressure category regulators	: ANSI 300 \ ANSI 600***
Pressure category pilots	: ANSI 600 \ PN 100
Nominal diameter regulators	: 1/2" up to 8" ****
Range stabiliser pressure pilots	: Po + 29 PSI up to Po + 87 PSI
: Po + 2.0 bar up to Po + 6.0 bar	
Inlet pressure	: up to 1450 PSI or 100 bar
Outlet pressure range (Wh)	: from 7.25 to 870 PSI or 0.5 to 60 bar
Operating temperature	: -31° to +212° Fahrenheit or -20° to +60°C

Design	: acc. DIN EN334, B16.5, B16.34
Maintenance interval	: approx. 4 years under normal operating conditions **

Regulating character	: direct + indirect
Failing behaviour at main diaphragm fracture	: fail to close, spring closing (FO at request)

Minimum required pressure difference across regulating system for proper operation	: 7.25 PSI or 0.5 bar
--	-----------------------

Classification according to EN334:

	Precision Category	Closing pressure Category	Closing pressure Zone
Po < 14.5 PSI / 1 bar	AC5	SG10	SZ=5 *)
Po < 43.5 PSI / 3 bar	AC5	SG10	SZ=5 *)
Po ≥ 43.5 PSI / 3	AC1*	SG5*	SZ=5 *)

*) values are given for standard configuration of pilot/regulator and test rig acc.EN334

Classification according to PED:

Category	Precision Category	Closing pressure
Po < 43.5 PSI / 3 bar	RG5	SG10
Po ≥ 43.5 PSI / 3 bar	RG1	SG2.5

*

Precision depends on process conditions.

High precisions are only guaranteed for applications with a wide temperature range and temperatures far below 32° Fahrenheit 0° C if the pilots are heated.

**

Clean and dry natural gas without constituents damaging to the materials used.

Other pressure categories are available on request.

Also available up to 16"

1.5 Technical specifications regulators

Dimensions & weight

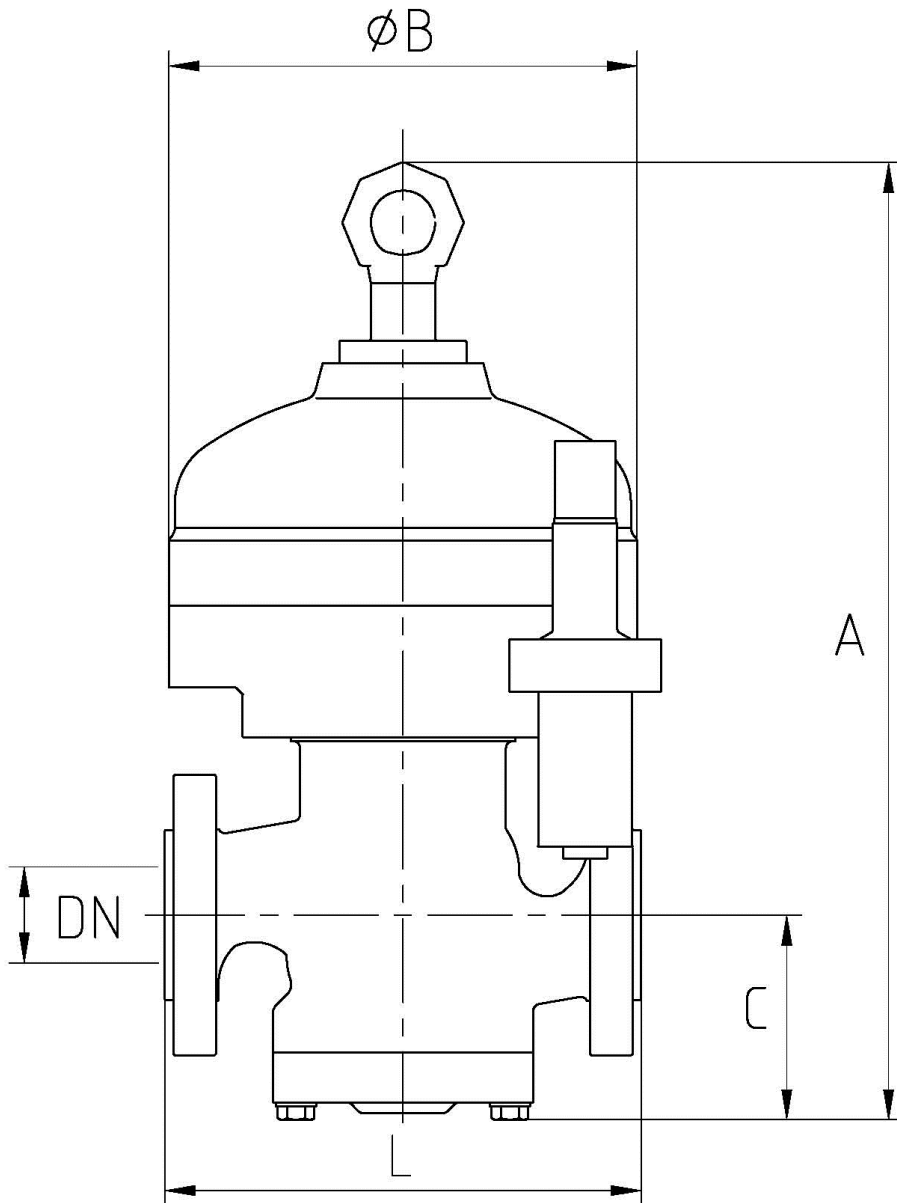


Figure 1: dimensional drawing regulators HON R100S/R100S-M

DN	A		B		C		L		Weight			
									Cl.300		Cl.600	
									kg	Lb	kg	Lb
1"	507	19,96	230	9,06	95	3,74	216	8,50	50	110,23	50	110,23
2"	647	25,47	290	11,42	120	4,72	292	11,50	93	205,03	95	209,44
3"	747	29,41	350	13,78	150	5,91	356	14,02	157	346,13	160	352,74
4"	832	32,76	430	16,93	175	6,89	432	17,01	270	595,25	280	617,29
6"	1087	42,80	625	24,61	250	9,84	559	22,01	661	1457,25	690	1521,19
8"	1317	51,85	655	25,79	310	12,20	660	25,98	910	2006,20	950	2094,39

Table1: dimensions and weight regulators HON R100S / R100S-M

Materials regulators

Pressurised parts	: Steel 3.1 certified
Guides	: Bronze
Other internal components	: Mainly steel (SS trim on request)
Diaphragm	: NBR with nylon insert
O-rings	: FPM and NBR

Execution of the regulating system for corrosive media on request

1.6 Technical specifications pilot HON P095

Set point range stabilizer pressure: Po +29 to Po +87 PSI or Po +2 to Po +6 bar

Set point range outlet pressure:

Art.number	Range (MPS) PSI	Range (MPS) barg	Colour
	PSI	Bar	
850523ST12660	7.25 - 36.25	0.5 - 2.5	green
850523ST12670	21.75 - 72.52	1.5 - 5.0	blue
850523ST12680	43.51 - 159.54	3.0 - 11.0	red
850523ST12690	87.02 - 217.56	6.0 - 15.0	yellow
Art.number	Range (HPS) PSI	Range (HPS) barg	Colour
850523ST12680	145.04 - 507.63	10 - 35	red
850523ST12690	290.08 - 870.23	20 - 60	yellow

Table2: set point range pilot HON P095-xPS (x='M' or x='H')

If the required set point lies in the overlapping range between two springs, it is recommended to take the spring with the lowest set point range. This way maximum regulating precision is achieved. This also applies in the event that the required Po lies in the overlapping range of the two pilot types MPS and HPS. In this case it is recommended to opt for the MPS execution. As far as construction is concerned, the MPS and HPS types only differ in their diaphragm package, which makes it easy to alter a MPS into a HPS type and vice versa.

Weight: approx. 17.6 lbs or 8 kg

Dimensions:

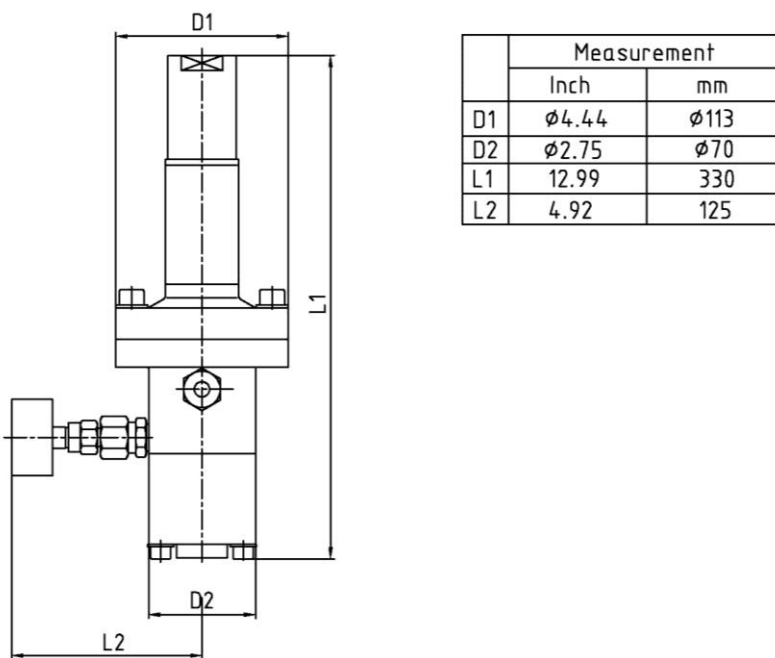


Figure 2: dimensional drawing HON P095-xPS

Properties:

non bleed
 suitable for air to open regulating systems

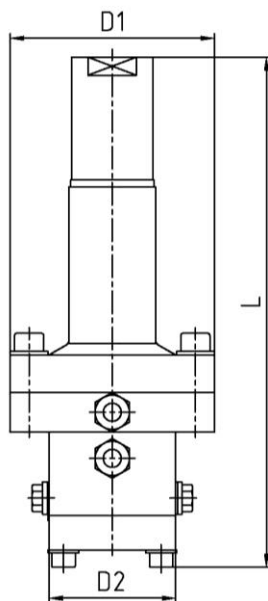
Materials:

Pressurised parts : Steel, 3.1 certified
 Guides : brass
 Internal components : Mainly stainless steel
 Diaphragm : NBR with nylon insert
 O-rings : FPM and NBR

1.7 Technical specifications acceleration pilot HON AP095-Xp

Set point range response pressure: see 0 in Page 18.

Weight: approx. 11 lbs or 5 kg

Dimensions:

	Measurement	
	Inch	mm
D1	ø4.44	ø113
D2	ø2.75	ø70
L	12.99	285

Figure 3: dimensional drawing HON AP095-xP

Materials:

Pressurised parts : Steel, 3.1 certified
 Guides : brass
 Internal components : Mainly stainless steel
 Diaphragm : NBR with nylon insert
 O-rings : FPM and NBR

2 Principal of operating

2.1 General

The entire regulating system consists of an active regulator with pilot (HON R100S + HON P095), a monitor regulator with pilot (HON R100S-M + HON P095) and, if required an acceleration pilot (HON AP095-xP).

As far as construction is concerned, the monitor regulator and active regulator are practically identical with the exception of the valve system which is balanced in the monitor regulator. The pilots belonging to the monitor regulator and active regulator are entirely identical.

Under normal circumstances the active regulator is in operation, the monitor is fully open and the acceleration pilot stand-by.

The acceleration pilot HON AP095-xP serves to accelerate the response of monitor regulation at the instant the main regulating system fails.

2.2 Principle of single stage pressure reduction system

See Figure 4:

At a constant outlet pressure P_o valve (10) allows passage of a flow volume equal to the gas offtake. The forces over the main diaphragm (8) are in equilibrium. The equilibrium is determined by the control pressure (7) on the one hand and the outlet pressure P_o plus spring (9) on the other hand. If more gas is taken off at the outlet side, the outlet pressure drops. Because of feedback of the outlet pressure to the active regulator, valve (10) will open further and allow more gas to pass. The diaphragm movement will increase the volume in the control chamber (7) and further pressed down return spring (9). A new equilibrium occurs at a lower regulated outlet pressure P_o . Pressure control regulator HON P095 ensures that the outlet pressure is adjusted to the set point value, for a reduction of the outlet pressure P_o also results in a lower position of the diaphragm (3). Because of this, supply valve (4) allows a larger gas flow to pass than the gas flow able to discharge to the outlet through the internal restriction. This results in a rise of the pressure in the control chamber (7) until the outlet pressure P_o is practically equal to the required value set by means of the adjusting screw (1).

The system responds in reverse order at a drop of gas off take.

The first control stage of the pilot, called the inlet pressure regulator or stabiliser (6), maintains a fixed difference between the regulated pressure and the feeding pressure for pilot valve (4), called the auxiliary pressure or stabiliser pressure (5).

When gas off take discontinues entirely, the main valve (10) and the pilot valve (4) close, as well as the inlet pressure regulator (6). Via an internal run-off restriction in the pressure control regulator, the pressure in the control chamber (7) is exchanged with P_o so that spring (9) can close valve (10).

Under normal operating conditions there is always a very small runoff from the control chamber (7) to the outlet (P_o) so that very stable regulation is obtained.

Before the first control stage there is a fine filter preventing soiling of the pressure control regulator.

The required outlet pressure can easily be set with spring (2) and adjusting screw (1).

The pilot is available in 2 basic executions: the HON P095-MPS and HON P095-HPS. The pilots are mutually different in the set point range of the regulated pressure. As far as construction is concerned, both pilots are identical with the exception of the second stage diaphragm package. The same series of springs (2) is available for both types of pilot. Each spring corresponds to a section of the total set point range (see also chapter 1 Technical specifications).

The HON P095-xPS is provided with a breather. It can also be supplied with a straight screw-in coupling for a breather pipe at connection 4.

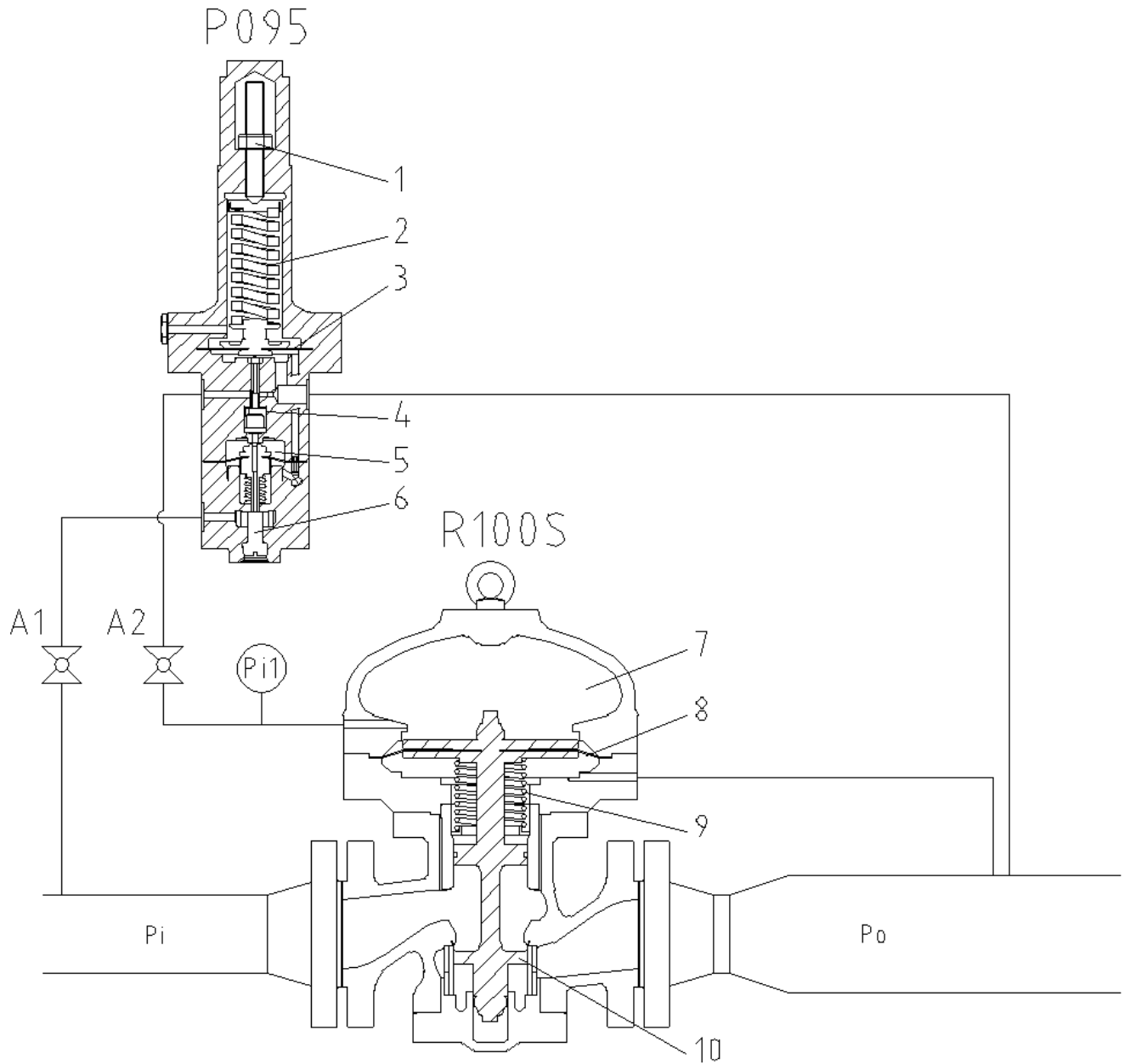


Figure 4: Schematic diagram single stage pressure reduction with HON R100S + HON P095 xPS
A1+A2+Pi1 recommended

2.3 Principle of wide-open monitor regulating system

Normal operation

Wide-open monitor

See Figure 5:

The working generally:

The working of the wide-open monitor regulating system is identical to that of the single stage pressure reduction system.

Monitor take-over:

If the active regulating system open fails, outlet pressure P_o rises. When P_o has risen up to the set point of the monitor pilot HON P095-xPS, pilot valve (11) will close, resulting in a decrease of the control chamber pressure (13). As the monitor valve (14) is fully open in normal operation (i.e. functioning active regulator) and is limited by a metal stop, it will take a while before it is actually going to close. In order to speed up this process, the acceleration pilot will start acting as soon as pressure P_o rises above the set point set by means of the adjusting screw (15). By means of valve (16), this acceleration pilot creates an extra flow from the control chamber to the outlet, which makes the control chamber pressure drop faster and valve (14) close quicker. The valve will close up to the point when P_o has gone down again to the set monitor set point. Valve (16) closes the instant that outlet pressure P_o drops again until just below the set point of the acceleration pilot HON AP095-xP. Therefore, it is always closed when the monitor regulator is regulating normally and, accordingly, does not contribute to regulation. After the take-over, pressure P_t in the pipe-piece between monitor regulator and active regulator will be practically equal to the outlet pressure P_o .

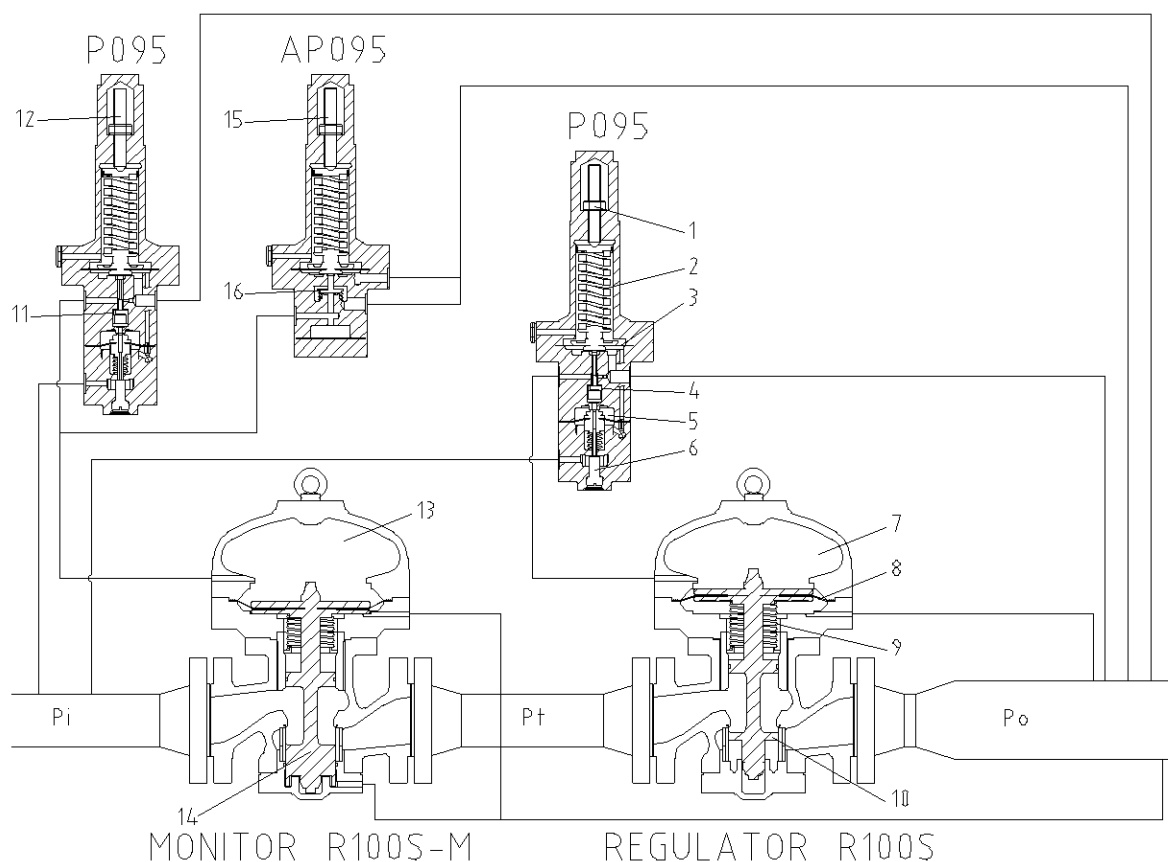


Figure 5: Schematic diagram wide-open monitor regulating system with:

HON (R100S+P095-xPS) + HON (R100SM+P095-xPS+AP095-xP)

3 INSTALLATION

3.1 Connection signal lines

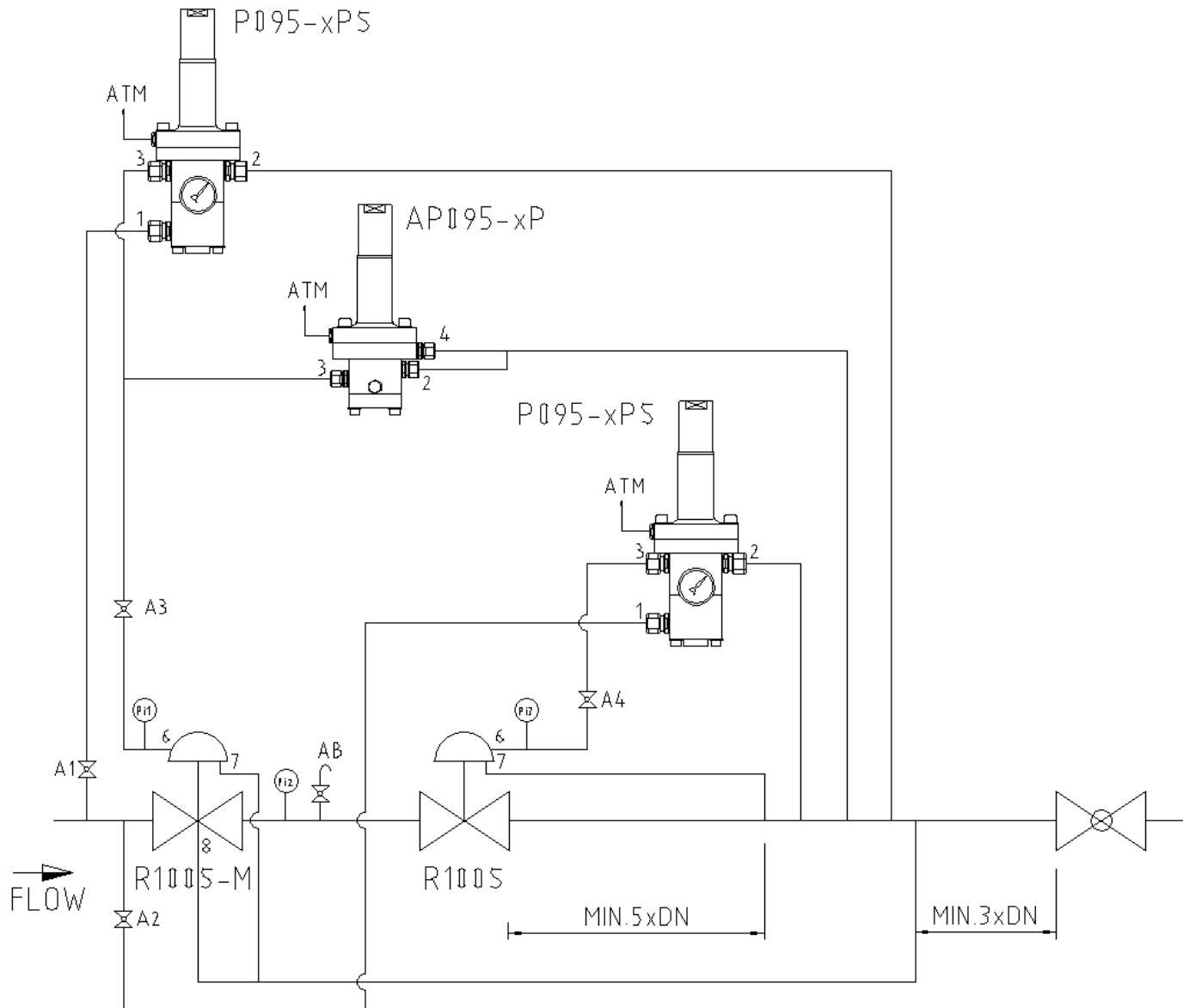


Figure 6: Connection diagram Honeywell gas pressure regulating system with monitor regulator
 A1 - A4 recommended
 Pi1 - Pi3 recommended

The connections of the instrumentation lines on the outlet pipe-piece must be situated at least 5 x the nominal diameter of the outlet pipe (DN) from the expansion pipe-piece behind the active regulator and at least 3 x the nominal pipe diameter before the next interference (e.g. the end valve).

The connections to the outlet pipe-piece between active regulator and end valve may be distributed around the periphery of the outlet pipe-piece with the exception of the bottom. Metering line 2 of both HON P095 and numbers 4 of the HON AP095 should not be combined.

For practical reasons it is recommended to fit a pressure gauge and manual blow-off on the pipe-piece between the monitor regulator and active regulator (Pi2 and AB, Figure 6:). This way it is easy to see whether the monitor regulator and/or the active regulator is in operation and to check the monitor valve for tightness.

Also for practical reasons it is recommended to mount a valve (A1 and A2) in the feeding line of the pilots in order to be able, in case of leakage, to easily determine which component is leaking.

If required, Honeywell can supply such valves. These valves meet high safety demands and are 'self (spring) opening', thus preventing any failure to open the valve when the regulating system is put back in operation. These valves are available under type indication ZV-O.

For ease of inspection and replacement of the valve seal, it is recommended:

A in applications with an outlet pressure < 145.04 PSI or 10 bar, to mount a valve in the pipeline between connection 3 of the pilot and connection 6 of the active regulator/monitor regulator (A3 and A4)

B in applications with an outlet pressure >= 145 PSI or 10 bar, to mount an extra valve which, in an unpressurised situation, can easily put a pressure of approximately 14.5 PSI or 1 bar in the control chamber of the regulator/pilot.

Depending on the weight of the regulators, it is recommended to make provisions for hoisting facilities on location.

NB. In the remainder of this documentation it is taken for granted that above mentioned practical provisions have been made.

The size of the connections has been shown in Table3: to Table6:.

Connection	Size	Function
0	1/4"BSP	pressure gauge connection stabiliser pressure
1	1/4"BSP	feeding inlet pressure Pi
2	1/4"BSP	measuring outlet pressure Po
3	1/4"BSP	feeding control chamber

Table3: Connections pilot HON P095-xPS

Connection	Size	Function
2	1/4"BSP	blow off from control chamber to outlet pressure Po
3	1/4"BSP	connection control chamber
4	1/4"BSP	measuring outlet pressure Po

Table4: Connections acceleration pilot HON AP095-xP

Connection	Size	Function
6	1/4"BSP	connection control chamber
7	1/2"BSP	measuring outlet pressure Po

Table5: Connections gas pressure regulator HON R100S

Connection	Size	Function
6	1/4" BSP	connection control chamber
7	1/2" BSP	measuring outlet pressure Po
8	1/4" BSP	outlet pressure Po to balance valve

Table6: Connections monitor regulator HON R100S-M

)* Size will be changed into 1/4"BSP

3.2 Some remarks

- In applications where the ambient temperature may drop far below 0 degrees Celcius, the indicated precision may only be achieved when the pilots are heated. In this case we can think of outside installations.
- Depending on the gas composition, gas temperature in combination with the process pressure drop, it may be necessary to provide the pilots' feeding with a preheater. This to prevent possible freezing.
- For all 10 mm instrumentation pipe, 12 mm or 1/2" may also be used.

As the active regulator and monitor regulator are very similar, type indication is not only stamped into the nameplate, but also in large letters on the housing of the regulators. To highlight this indication, and thus prevent any mistakes in practice, it is strongly advised to mark this indication with a different, eye-catching colour. (only if the unit is purchased as a system).

- If the HON P095 is used as a pressure control regulator in combination with a gas pressure regulator other than type HON R100S, the nominal diameter of the instrumentation pipe for bottom coupling of the regulator (connection 7) should be 16 mm minimum. The capacity of the HON P095 may be adapted on request.
- The distance between the regulator (incl. reducing pipe) and the connection of the bottom-coupling of the regulator (7) and the pilot (2) should be at least 5 x the nominal diameter of the outlet pipe-piece.
- If allowed, when using the HON P095 in combination with the HON R100S and regulated pressures < 145.04 PSI or 10 bar, it is useful to mount a valve in the control line (connection 3 of the HON P095 and connection 6 of the regulator). By closing this valve, before de-pressurising the regulating line, the valve of the regulator remains open. In this way it is easy to inspect or replace the valve rubber. In addition, the valve may be used in the event of a failure analysis.
- For regulated outlet pressures ≥ 145.04 PSI or 10 bar, it is possible to make special provisions to fill the control chamber with gas after the regulating line has been unpressurised. A pressure of 14.5 PSI or 1 bar is more than enough to fully open the valve (maximum 13.53 PSI or 9 bar).
- In addition, it is also useful to mount a valve in the feeding line of the pilot (connection 1). In this way it is very easy to find out whether the pilot or the regulator is untight in case of leakage (see chapter 6 on failure).

4 Operation regulating system

4.1 Commissioning notes (Single stage pressure reduction system)

Warning

Never pressurize a reducing run by first opening the outlet block valve. This may provoke overload of the valve internals and diaphragms.

Pressurizing and depressurizing needs time, don't push it !

Before getting started:

The reducing run between the slam shut or inlet block valve and the outlet block valve should be completely depressurized (check if the outlet block valve is closed).

To depressurize the run:

- Isolate the gas run and slightly open the purge valve
- Do not relax the set point adjusting screw of the pilot until after the run is depressurized.

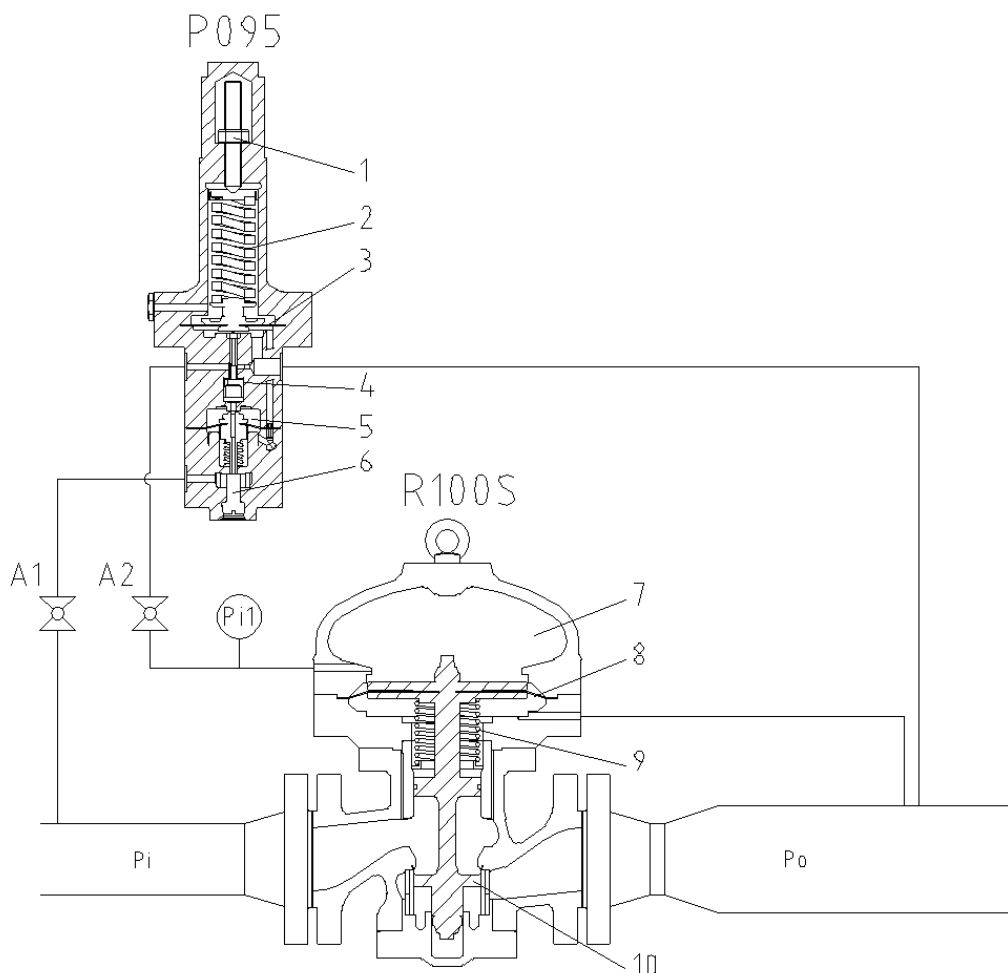


Figure 7: Schematic diagram HON-R100S + HON P095-xPS

A1 + A2 +Pi1 recommended

Recommendations:

Prior to commissioning and start-up consider the following:

- Any water residue left from hydrostatic testing will cause trouble to the operation of both main line valves and pilots; therefore purge and dry the upstream pipe line thoroughly and increase the outlet temperature temporarily.
- Any particles left from welding, grinding, tapping or any solid contamination resulting from corrosion in the piping between filter and regulator (also the heat exchanger) will damage the valve disc and/or its guide cylinder, therefore clean this part thoroughly.

Should contamination be found then act as follows to minimize damage:

- Remove bottom cover (incl. silencer and cage) of main line valve.
- Remove valve plug and stem guide spacer.
- Purge the run thoroughly via the open regulator.
- Assemble the regulator without silencer and cage.
- Refit the silencer and cage only if contamination can be excluded.

Check all instrument lines for proper arrangement and all fittings for proper connection
Provide 'emergency' spares

Sequence of Commissioning

1. Remove closure nut, then fully unscrew the adjusting screw (1) on top of the pilot
2. Preset the auxiliary pressure of the pilot:
 - Fully turn the adjusting screw (located at bottom of the pilot) inward (CW)* carefully until it just stops on to the seat inside
 - Then screw the adjusting screw out again (turning CCW)** one (1) complete turn
3. Slowly pressurize the regulator and pilot by either cracking the upstream block valve or opening the bypass over the slam shut valve(s).
4. Adjust the auxiliary pressure:

The minimum setting for the auxiliary pressure differential on HON P095 pilots should be as follows :

Note: "Differential" refers to the difference between the set point of the auxiliary pressure and the set point pressure of the pilot.

- 29 to 87 PSI or 2 to 6 bar normal range for general purpose
- 29 PSI or 2 bar lower end of range, used to slow-down pilot response (small regulators)
- 87 PSI or 6 bar higher end of range, used to speed-up pilot response (large regulators)

Adjustment notes:

- adjust pilots for active regulators to approx. 43 PSI or 3 bar pressure differential
- adjust pilots for monitor regulators to approx. 58 PSI or 4 bar pressure differential
- make adjustments to the auxiliary pressure adjusting screw only when the pilot is operating (supplying condition)
- adjust the set screw carefully, checking after each adjustment for lock-up

Check if fine-tuning is required after commissioning the equipment

- adjust auxiliary pressure differential to slow-down or speed-up the pilot response
- if the aux. setting has been adjusted, then correct the set point

So without the need for adjustment the auxiliary pressure differential should range between 43 PSI or 3 and 58 PSI or 4 bar above outlet pressure

) * CW = ClockWise

) ** CCW = Counter ClockWise

5. Check the regulator for lock-up.
 - First unload or relax the set spring of the pilot.
 - Slowly apply full inlet pressure to the upstream side of the regulator by either cracking the block valve or opening the bypass of the slam shut valve.
 - Check the downstream pressure for leakage of the MLV* and the pilot
6. If necessary **slowly** turn adjusting screw of pilot (1) CW to increase the outlet pressure above the UPSO** setting of the slam shut valve(s).
7. Open the slam shut valve.
8. Check or set the slam shut valve.
 - Increase the outlet pressure to the OPSO*** setting by slowly turning the adjusting screw (1) of the pilot CW.
 - For adjustment itself consult the manual of the relevant slam shut.
 - Repeat this action to test the safety relief valve (to be blocked while testing the SSV).
9. Check and test the regulator.
 - Slightly open the purge valve and decrease the outlet pressure by slowly turning the adjusting screw (1) of pilot CCW.
 - Close the purge valve to check the regulator and pilot for lock-up (tightness).
10. Check operation by opening the outlet block valve
Normally the regulator will be set slightly lower than the network pressure. The pilot setting can be increased and fine-adjusted to its set point after fully opening the outlet block valve
11. After completing commissioning lock the adjust screw with the closure nut
12. To take the run out of operation and depressurize it, act as follows:
 - Close the inlet block valve
 - Allow the pressure upstream of the regulator to drop to outlet pressure
 - Close the block valve in the supply to the pilot (if provided)
 - Close the outlet block valve
 - Slightly open the downstream purge valve to depressurize the run

)*MLV=Main Line Valve

)**UPSO= Under Pressure Set Operation

)***OPSO= Over Pressure Set Operation

4.2 Commissioning notes (Wide-open monitor regulating system)

Warning

Never pressurize a reducing run by first opening the outlet block valve. This may provoke overload of the valve internals and diaphragms.

Pressurizing and depressurizing needs time, don't push it !

Before getting started:

The reducing run between the slam shut or inlet block valve and the outlet block valve should be completely depressurized (check if the outlet block valve is closed).

To depressurize the run:

- Isolate the gas run and slightly open the purge valve
- Do not relax the set point adjusting screw of the pilot until after the run is depressurized.

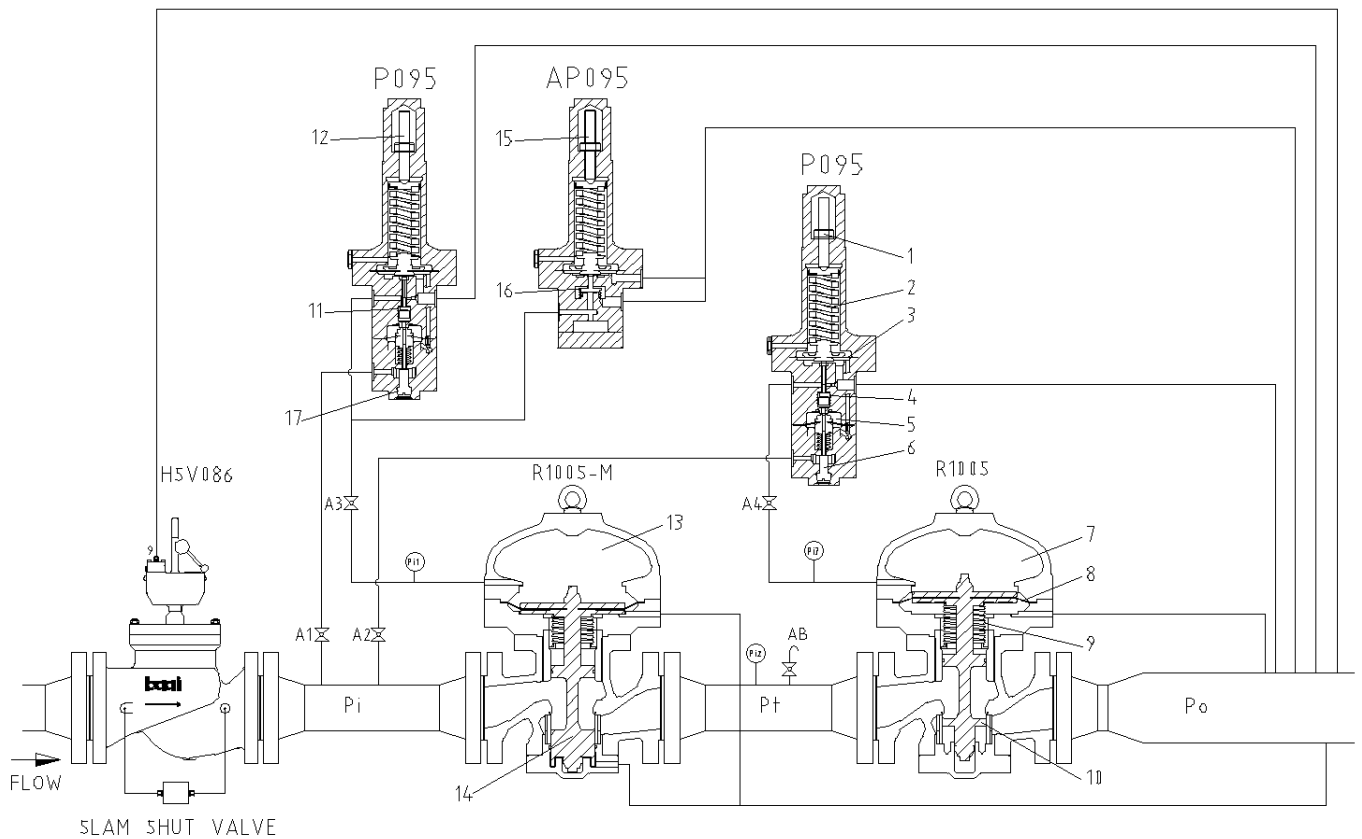


Figure 8: Schematic diagram wide-open monitor regulating system with:

HON R100S (+HON P095-xPS) +HON R100SM (+HON P095-xPS+HON AP095-xP)
 A1 – A4 + Pi1-P12 recommended

Recommendations:

Prior to commissioning and start-up consider the following:

- Any water residue left from hydrostatic testing will cause trouble to the operation of both main line valves and pilots; therefore purge and dry the upstream pipe line thoroughly and increase the outlet temperature temporarily.
- Any particles left from welding, grinding, tapping or any solid contamination resulting from corrosion in the piping between filter and regulator (also the heat exchanger) will damage the valve disc and/or its guide cylinder, therefore clean this part thoroughly.

Should contamination be found then act as follows to minimize damage:

- Remove bottom cover (incl. silencer and cage) of the monitor main line valve.
- Remove piston, valve plug and stem guiding.
- Purge the run thoroughly via the open monitor.
- Assemble the monitor without silencer and cage.
- Refit the silencer and cage only if contamination can be excluded.
- Repeat this action for the regulator.

Check all instrument lines for proper arrangement and all fittings for proper connection
Provide 'emergency' spares

Sequence of Commissioning

1. Remove closure nut, then fully unscrew the adjusting screw (1) on top of the pilot from both the regulator and monitor
2. Turn adjusting screw (15) of the accelerator fully inwards (CW)
3. Preset the auxiliary pressure of the pilot:
 - Fully turn the adjusting screw (located at bottom of the pilot) inward (CW) carefully until it just stops on to the seat inside
 - Then screw the adjusting screw out again (CCW) one (1) complete turn
4. Slowly pressurize upstream of the monitor by either cracking the upstream block valve or opening the bypass over the slam shut valve(s)
5. Adjust the auxiliary pressure:

The minimum setting for the auxiliary pressure differential on HON P095 pilots should be as follows :

Note: "Differential" refers to the difference between the set point of the auxiliary pressure and the set point pressure of the pilot.

- 29 to 87 PSI or 2 to 6 bar above the regulator set point is the normal range for general purpose
- 29 PSI or 2 bar lower end of range, used to slow-down pilot response (small regulators)
- 87 PSI or 6 bar higher end of range, used to speed-up pilot response (large regulators)

Adjustment notes:

- adjust pilots for active regulators to approx. 43.5 PSI or 3 bar pressure differential
- adjust pilots for monitor regulators to approx. 58 PSI or 4 bar pressure differential
- make adjustments to the auxiliary pressure adjusting screw only when the pilot is operating (supplying condition)
- adjust the set screw carefully, and slowly. Checking after each adjustment for lock-up

Check if fine-tuning is required after commissioning the equipment

- adjust auxiliary pressure differential to slow-down or speed-up the pilot response
- if the aux. setting has been adjusted, then correct the set point

So without the need for adjustment the auxiliary pressure differential should range between 43.5 PSI or 3 bar and 58 PSI or 4 bar above outlet pressure

6. Check the monitor for lock-up.
 - Completely unwind the adjustment screws of both the active and the monitor pilots
 - Slowly apply full inlet pressure to upstream of the monitor by either cracking the upstream block valve or opening the bypass of the slam shut valve.
 - Check the intermediate pressure for leakage of the MLV
 - Check the downstream pressure for leakage of both pilots
 - Take note that test valves A1 and A2 enable differentiation between the pilots.

7. Check the regulator MLV for lock-up.
 - Put full inlet pressure upstream of the regulator by tensioning the set spring of the monitor pilot temporarily until it opens.
 - Completely unwind the adjustment screws of both the active and the monitor pilots
 - Use the bypass valve of the slam shut valve if necessary to repressurize upstream of the monitor.
 - check the outlet pressure for leakage of the MLV

Note that the regulator pilot has been checked already

8. Fail the regulator wide-open
 - By advancing the adjusting screw (1) fully inward. Open the purge valve slightly to depressurize the outlet and vent the pilot bleed of the regulator

9. If necessary *slowly* turn adjusting screw of pilot (12) CW to increase the outlet pressure above the UPSO setting of the slam shut valve(s).

10. Open the slam shut valve.

11. Check or set the slam shut valve.
 - Increase the outlet pressure to the OPSO setting by slowly advancing the adjust screw (12) of the monitor pilot.
 - For adjusting it consult the manual of the relevant slam shut valve.
 - Repeat this action to test the safety relief valve (to be blocked while testing the SSV)
12. Check or set the accelerator.
 - Decrease the outlet pressure to the accelerator setting by slowly backing out the adjust screw (12) of the monitor pilot
 - Now open the purge valve enough to open the monitor MLV
 - Back out the adjust screw (15) of the accelerator until it interferes with the pressure control.
 - A slight drop in the outlet pressure indicates activation of the accelerator pilot
13. Set and check the monitor.
 - Decrease the outlet pressure by slowly backing out the adjusting screw of the monitor pilot (12) CCW.
 - Open and close the purge valve to check the monitor for response
 - Be aware of the pilot bleed from the active regulator which is searching for a higher set point at this time.
14. Set and check the regulator.
 - Decrease the outlet pressure by slowly backing out the adjusting screw of the regulator pilot (1) CCW.
 - Take note that the regulator does not have an accelerator pilot to speed-up take over.
 - Open the purge valve enough to vent the pilot bleed of the monitor.
 - A rise of the intermediate pressure indicates take-over
 - Open and close the purge valve to check the regulator for response.
 - Be aware of the pilot bleed from the monitor regulator which is searching for a higher set point at this time.
15. Check the system for lock-up.
 - Close the purge valve.
 - Check the outlet pressure for leakage.
 - The outlet pressure will first rise to regulator lock-up, then rise to monitor lock-up.
 - A further rise will occur as the pressure from the monitor motorization is equalized with the outlet pressure.
 - You may vent temporarily a little to reduce this outlet pressure to monitor lock-up
16. Check operation.
 - Slowly open the outlet block valve. Normally the regulator will first be set a slightly lower than the network pressure. The pilot setting can be increased and adjusted to its final set point after fully opening the outlet block valve.
17. After completing commissioning
 - Lock the adjust screws with the closure nuts provided for this purpose.
18. To take the run out of operation and depressurize it, act as follows:
 - Close the inlet block valve.
 - Allow the pressure upstream of the regulators to drop to outlet pressure.
 - Close the block valve in the supply to the pilots (if provided).
 - Close the outlet block valve.
 - Slightly open the downstream purge valve to depressurize the run.

4.3 Recommendations choice of set points

Set point pilot for regulator HON P095: x bar

Regulator:

The set point of the regulator should be chosen low enough to enable trouble-free relatching of the slam shut. (The minimum relatching differential)

Set point pilot for monitor HON P095: (x+14.5) PSI or (x+1) bar

Monitor:

The set point of the monitor regulator should be chosen high enough to avoid interference during dynamic response of the regulator.

Set point acceleration pilot for monitor:

The following set point is advised:

Set point HON AP095-MP/HP : (x+29) PSI or (x+2) bar

4.4 Taking out of operation for servicing purposes

During or before depressurising the regulating system it is **not allowed** to screw back the adjusting screw of the HON P095, otherwise the stabilizer part will be unnecessarily loaded.

1. Close the safety shut-off valve. Wait until the pressure in the pipe-piece before the monitor regulator is equal to the mains pressure. Then close the end valve.

If gas supply has to continue, the active regulator of any second line will take over regulating.

2. De-pressurize the installation by opening a manual blow-off at the (inlet and) outlet side of the line.

Warning

CAREFUL: Some pressure may temporarily remain in the control chamber of both the active regulator and monitor regulator (connections 6, Figure 6:).

Therefore always watch pressure gauges Pi1 and Pi3.

If any gas pressure remains, these spaces can be de-pressurized by opening the bleed screws on the pressure gauge cocks.

4.5 Commissioning pre-set regulating line

This procedure can be followed when the set point of the active regulator and monitor regulator have been pre-set and re-setting or adjusting is not necessary.

Starting situation: system or regulating line is completely unpressurised.

1. **Slowly** bring the part before the monitor regulator up to pressure by means of the bypass of the safety shut-off valve.
2. The outlet pressure will now slowly rise. When it is equal to the set point of the active regulator, the safety shut-off valve(s) can first be opened and then *slowly* the end valve.

4.6 Putting stand-by (seasonal demand)

If you opt for putting a station stand-by due to seasonal demand, it is recommended to lower the set point of the active regulator(s). However, it should always be taken into account that the monitor pilot always bleeds a little to the outlet side trying to reach it's set point. (N.B. the system is non-bleed in a fully closed situation).

4.7 Adjusting stabilizer pressure \ auxiliary pressure

The auxiliary pressure is the output of the first control stage of the HON P095 and is adjustable between approx. 2 and 87 PSI or 6 bar above the outlet pressure. The 1st stage of the pilot determines the accuracy of the regulator and can be changed by adjusting it's setting with screws (6) and (17).

- High settings (turn CCW) result in higher amplification which equals improved accuracy and faster response of the pilot control loop. However settings that are too high may provoke instability.
- Low settings (turn CW) result in lower amplification which equals more stability and slower response of the pilot control loop. Settings that are too low may disable a valve to open (partly or fully).

Always check if the setting of the auxiliary pressure differential meets the installed operating conditions during set-up and testing. See also 'commissioning notes'

The amount of care to be taken while adjusting the auxiliary pressure must be accentuated as this may cause many problems during commissioning and start-up.

Mind that, by adjusting the stabilizer pressure, the set point of the relevant pilot also changes and in case of the monitor pilot, the set point of the acceleration pilot also changes. Adjustment of these set points after the stabiliser pressure has been changed is therefore essential.

4.8 Exchanging set point spring HON P095

A situation may occur when it is required to exchange the set point spring of the HON P095 because, for instance, to realise another regulated outlet pressure or influence the pilot action.

For this exchange, it is easy to unscrew the adjusting screw (1, 12 or 15 of fig.5 page15) and then the screw swivel in the spring housing. It is not necessary to depressurise the installation! However, the regulating line must be taken out of operation.

When exchanging the set point spring of the acceleration pilot HON AP095 and the HON P095 belonging to the monitor regulator, the installation must be re-tested.

4.9 Periodic function test

Testing active regulator and monitor regulator for tightness

Characteristic of the regulating system with monitor regulator is that the closing pressure of the system corresponds to the closing pressure of the monitor regulator. The monitor regulator and active regulator, as a combination, can easily be tested for tightness by slowly closing the end valve of the line.

Tightness active regulator and pilots:

The outlet pressure may no longer run up after the pressure on the pressure gauge on the monitor regulator is equal to the outlet pressure (takes some minutes, depending on the size of the monitor regulator). Is this the case after all, and pressure gauge Pi2 on the pipe-piece between monitor regulator and active regulator indicates that the pressure is dropping, then there is leakage over the active regulator. Otherwise there is leakage over one of the pilots (apart from leakages over the bypasses, if present).

Tightness monitor regulator:

Open the valve (blow-off) on the pipe-piece between monitor regulator and active regulator and let the pressure in the pipe-piece drop until almost equal to the outlet pressure. Close this valve and wait for some minutes. If the pressure in this pipe-piece (Pt) increases, the monitor valve is untight.

In case of leakage you are referred to chapter 6 on failure.

4.10 Increase of the outlet pressure at zero offtake

See also Figure 6: and Figure 7:

It should be taken into account that under normal conditions and at zero offtake the pilot of the monitor regulator always bleeds a little until outlet pressure is as high as monitor set point. ***The closing pressure of the regulating system is therefore always the closing pressure of the monitor regulator.***

If at zero off take the outlet pressure still increases after a few minutes, then there is leakage in one of the components of the regulating system. (Assuming that the bypasses are not leaking)

First of all, find out which component is not tight.

1. HON AP095

Fully screw in adjusting screw 16 of the acceleration pilot HON AP095-xP. If the outlet pressure still increases, this acceleration pilot can be ruled out. If not, the internal sealing of the acceleration pilot has to be inspected.

2. HON P095

A

If there are valves in the feeding lines of the pilots HON P095-xPS (connection 1, valves A1 and A2) this simplifies the analysis. Close these valves and slightly screw in the adjusting screw of both pilots in order to exchange the pressure in the stabiliser space with the outlet pressure. If the outlet pressure still increases after some time, the main regulator is bound to be leaking.

If this is not the case, open the valve in the feeding line of the regulator-pilot A2. If the outlet pressure increases, the pilot of the active regulator is leaking. If not, the pilot of the monitor regulator is leaking.

B

If there are no valves in the feeding line of the pilots (connection 1, Figure 7:), the line must be taken out of operation and unpressurised. Next, fully unscrew the adjusting screws of both the monitor and the regulator pilots. Unscrew the coupling on connection 2 of both pilots. Put some pressure before the monitor regulator. Check at both pilots whether there is a flow at the pilot side of connection 2. If so, then the pilot has a leak.

3. Active regulator HON R100S

If neither of the pilots has a leakage, then check the pressure gauge on the pipe-piece between active regulator and monitor regulator. Should it indicate a decreasing pressure while the pressure before the monitor regulator remains constant, then the active regulator is leaking.

5 Maintenance

5.1 General

5.1.1 Life and types of maintenance work

Under normal operating conditions, when the medium is clean and dry and does not contain any constituents which are harmful to the materials applied, life without any maintenance is 4 years minimum.

Generally, seals and diaphragms (the so-called soft parts) are to be replaced during maintenance work.

Honeywell sales have composed special spare-part sets for its equipment which already contains all the necessary parts for standard maintenance.

5.1.2 Maintenance requirements

Honeywell equipment has been designed in such a way that no special tools are required for maintenance. Valves and pistons are provided with tapped holes to which simple pulling tools may be connected.

Lubricants:

Weicon Anti Seitze
Unisilikon TK44 N2

Oil:

Shell Madrela GS 68 or Tellus 15

Adhesive:

Loctite 243

5.1.3 General maintenance regulations

Unless otherwise indicated, all screw and bolt connections $< 1/2''$ are to be greased with a graphite-containing high-pressure grease. We would advise Unisilikon TK44 N2.

Screw and bolt connections $> 1/2''$ are to be greased with copper-containing grease. We would advise Weicon Anti Seitze.

For both assembly and preservation purposes, all O-rings are to be greased with a suitable product. We would advise Unisilikon TK44 N2.

All guiding surfaces are to be treated with suitable grease. We usually advise Unisilikon TK44 N2.
Normally, the guiding surfaces must be greased very thinly.

5.2 Disassembly and assembly

5.2.1 General

Place all loose internal components on a clean cloth during assembly, prevent sand or other dirt from soiling these components or from damaging them. Clean all disassembled components well and then grease them as per the directions.

5.2.2 Disassembly and assembly pilot

There is no need to de-pressurise the entire installation in order to replace the set spring for any process adaptation. The lock nut can simply be removed and a new set spring fitted. For details you are referred to Appendix A (Page 32).

5.2.3 Disassembly and assembly regulator and monitor *

To simplify assembly and disassembly of the regulator, built into the regulating installation, the construction has been opted for where all components can be removed upwards (with the exception of the bottom cover).

For instance, after unscrewing the nuts below the top flange of the valve body, the diaphragm housing can be removed upwards, complete with all internal parts.

Mounting this unit is to be done with care to prevent damage to the "O"-ring around the guide bush.

It is also possible to remove the components one by one.

The compensation piston of the regulator is lubricated with oil (Shell Gas Compressor oil S 4 RN 68). When the regulator has been completely disassembled, this oil has been lost and after fitting the compensation piston the space above this piston has to be refilled. For details you are referred to Appendix B (page 33).

Recommended bolt preload on pressurized parts refer to Appendix C(page 34).

After completion of maintenance and after a tightness test, the regulating system can be re-tested and taken into operation.

* Only to be done by certified engineers

Appendix A

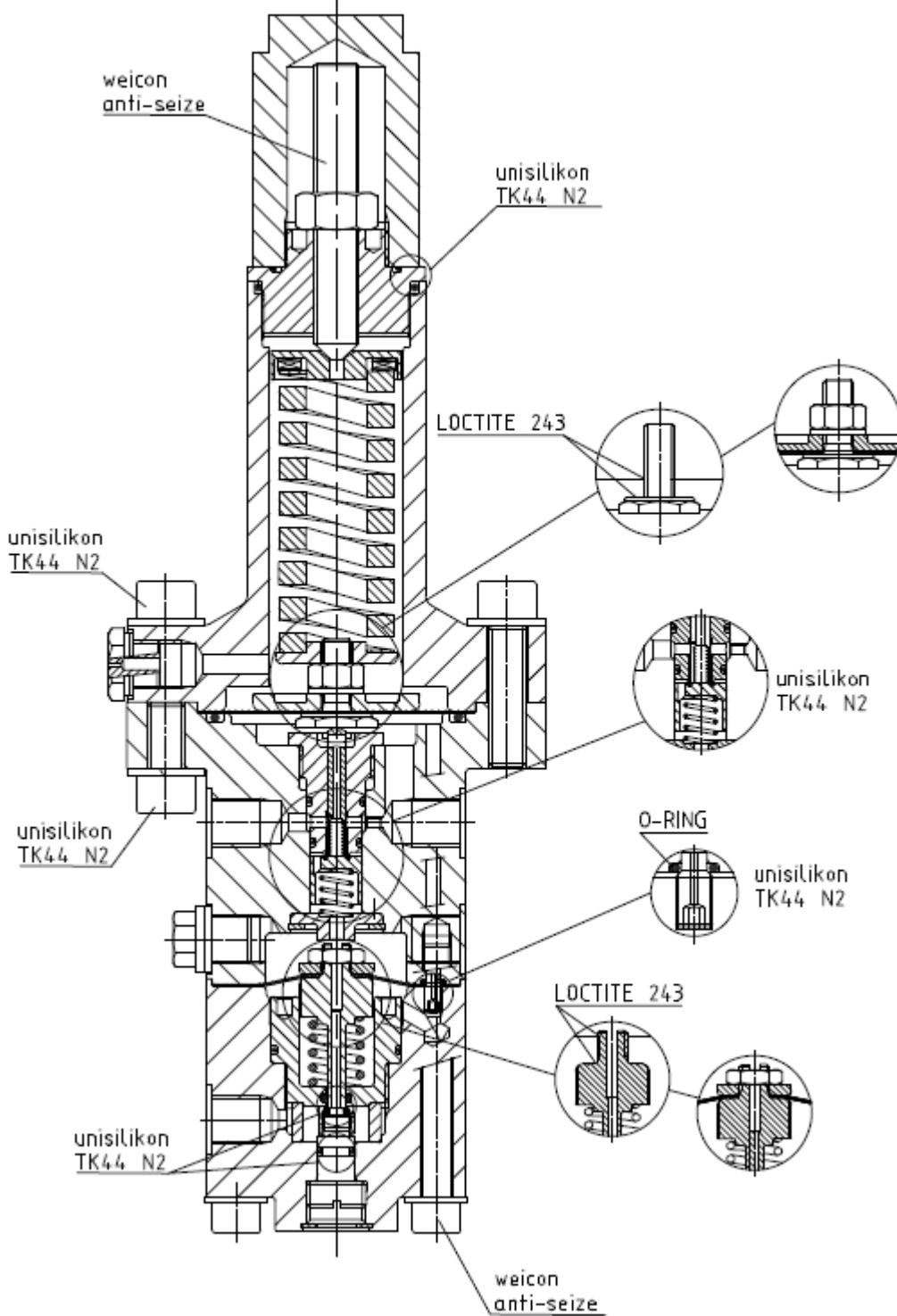


Figure 9: P095 lubricant drawing

Appendix B

— Thread to be greased with: weicon anti-seize

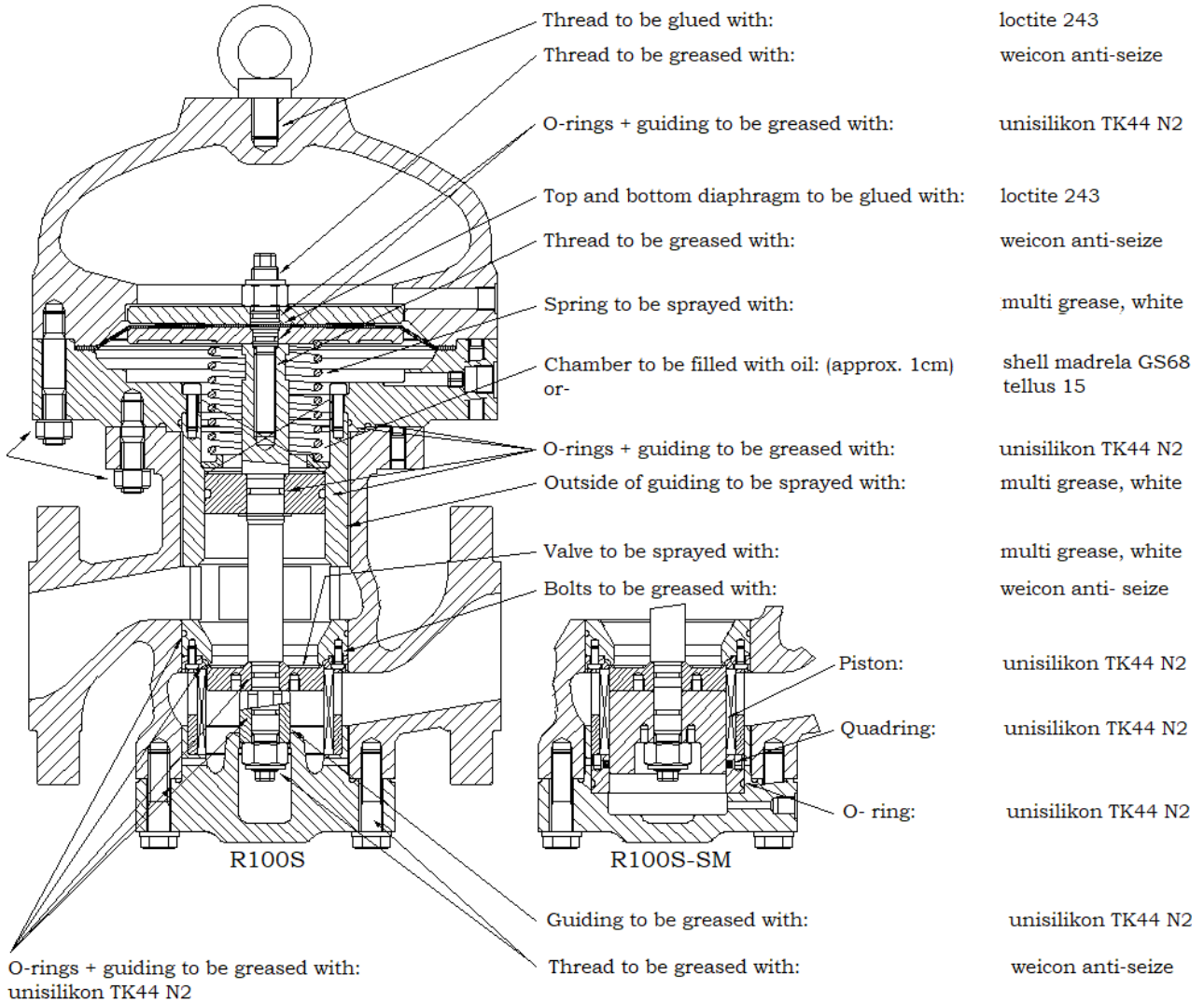


Figure 10: R100 dome type lubricant drawing

Appendix C

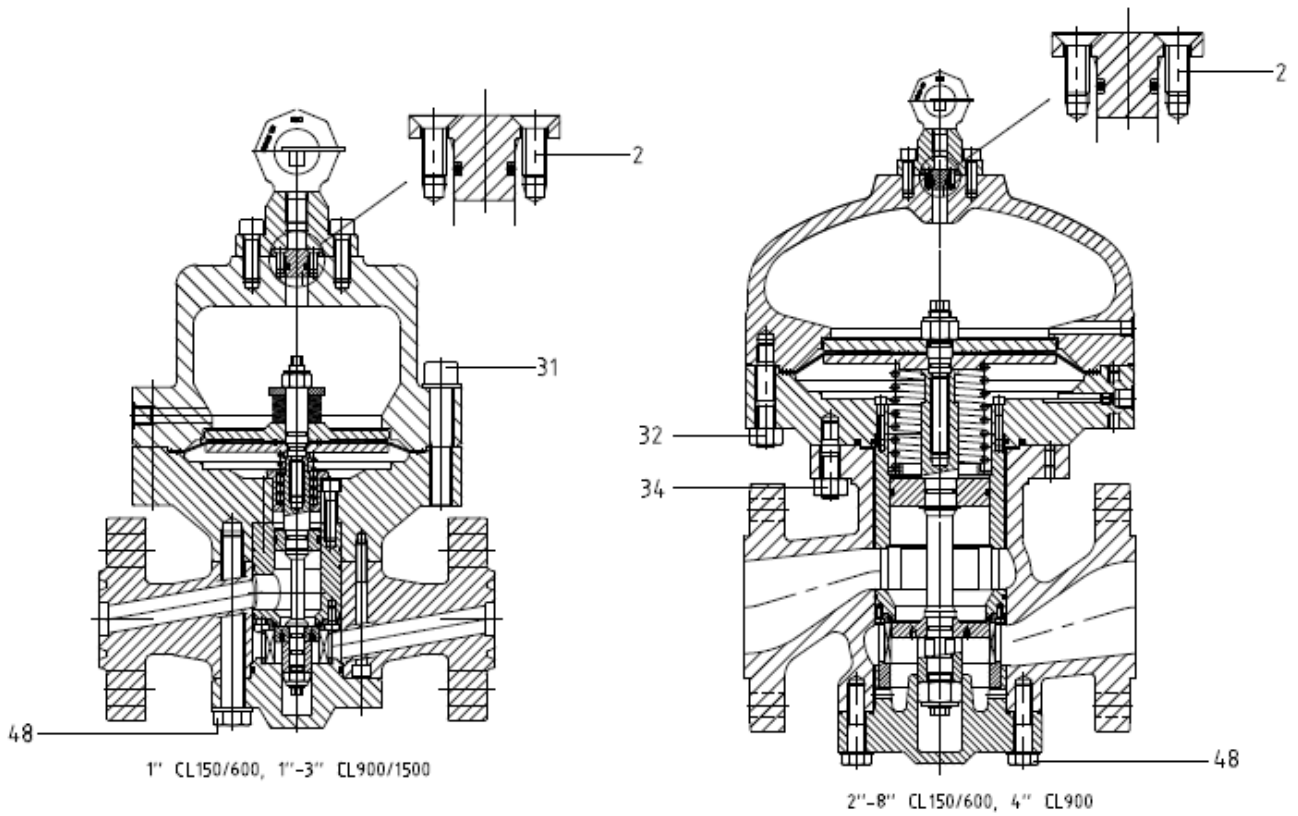


Figure 11: Bolt for pressure retaining part of R100 dome type

R100 dome type regulator bolt torque(Nm)					
Size	Rating	Pos.			
		2	31 or 32	34	48
1"	CL150/600	1.5	130		70
	CL900/1500	4	190		180
2"	CL150/600	1.5	105	110	90
	CL900/1500	4	390		400
3"	CL150/600	1.5	210	190	190
	CL900/1500	4	390		400
4"	CL150/600	1.5	380	310	310
	CL900	4	400	450	450
6"	CL150/600	1.5	1300	630	450
8"	CL150/600	1.5	930	390	340

Table7: Recommended bolt preload for pressure retaining part

5.3 Off-line tightness test pilot

The off-line tightness test is optional.

If a feeding line (instruments air or the medium itself) is available, an off-line tightness test can be done. This feeding line can then be connected to connection 1 of the pilot (see Figure 13: for pilot connections). Unscrew the closure nut and ensure that the adjusting screw is completely unscrewed (1).

The pilot pressure gauge should now indicate the stabiliser pressure (auxiliary pressure). This should be in the set range from 29 PSI to 87 PSI or 2 to 6 bar. If there is no pressure in this space, it is possible that stabilizer valve 37 remains stuck. The stabiliser pressure depends somewhat on the inlet pressure which makes small deviations from the above range possible.

The stabilizer pressure should not increase, otherwise the stabilizer seal is leaking.

Also check whether there is flow from connections 2 and 3. The seal of the second regulating stage is leaking (valve 29 and guide 15) if this is the case.

Now slightly screw in the set screw so that the pilot is going to supply and completely unscrew it again. Re-check for leakage.

The off-line tightness test is always followed by the in-line tightness test.

5.4 In-line tightness test pilot

Internal tightness:

Put the pilot back into the installation, with completely unscrewed adjusting screw (1). Ensure that the regulator has inlet pressure. The outlet pressure should not increase. If so, then there is leakage across the pilot or the regulator.

If there is a valve in the feeding line of the pilot (connection 1) it is easy to find out which component is leaking. Close it and slightly screw in the adjusting screw of the pilot to exchange the pressure in the stabilizer chamber with the outlet pressure. Next, de-pressurise the outlet side again and wait for a few minutes. If the outlet pressure has risen again, the regulator is leaking. In this case you should consult the chapter on maintenance in this manual. Otherwise the pilot is leaking.

If there is no valve in the feeding line of the pilot, you can remove the pipe on connection 2 of the pilot and feel whether there is flow from connection 2. If so, there is a good chance that the pilot seal of the second stage is leaking. If not, the regulator is most probably leaking.

In the event of leakage across the pilot, it will have to be removed again for inspection.

Check the pressure gauge of the pilot. The stabiliser pressure has to be within the range from 29 to 87 PSI or 2 to 6 bar and should not increase otherwise there is a leak across the stabiliser seal.

Following this, the whole regulating system may be tested for internal tightness at the required set point by means of the normal testing procedure as described in the user manual of the regulating system.

Having established leakage it is, in the case of a valve in the feeding line of the pilot, again rather easy to find out which component is leaking. Close this valve and open the manual blow-off until the pressure has dropped below the set point. Wait for a few minutes. If the outlet pressure has increased again, the regulator is leaking. In this case you should consult the chapter on maintenance in this manual. Otherwise the pilot is leaking. If there is no valve in the feeding line, it will not be possible in this situation to find out which component is leaking.

External tightness:

For an external tightness test, all partitions between the different pressurised parts of the pilot should be soaped down or sprayed with a leak-detection spray. Also do this for all couplings, bolt holes, breather opening and the stabiliser set screw (pos. 39, Figure 12:).

5.5 Spare-part sets

5.5.1 General

For standard maintenance, Honeywell has put together spare-part sets. The spare parts can be ordered with below mentioned numbers.

When ordering the parts, the following particulars must be supplied:

- Type of regulator, stating connection diameter and pressure stage.
- Manufacturing number and year of construction.
- If no complete set is ordered, the position number and the drawing to which this number relates and the required number of items.

5.5.2 Spare-part set HON P095

The spare-part set can be ordered under the following numbers:

Type	Number
HON P095 HPS/MPS	939401S115080

The contents of these sets are specified in the parts list in paragraph 5.6

5.5.3 Spare-part set HON AP095

The spare-part set can be ordered under the following numbers:

Type	Number
HON AP095 HP/MP	939401S134270

The contents of these sets are specified in the parts list in paragraph 5.7

5.5.4 Spare-part sets HON R100S(M)

The spare-part sets can be ordered under the following numbers:

Type	Number	Type	Number
HON R100S 1"	939402S141830	HON R100SM 1"	939402S141840
HON R100S 2"	939402S116920	HON R100SM 2"	939402S127880
HON R100S 3"	939402S116930	HON R100SM 3"	939402S127890
HON R100S 4"	939402S116940	HON R100SM 4"	939402S115200
HON R100S 6"	939402S116950	HON R100SM 6"	939402S127480
HON R100S 8"	939402S116960	HON R100SM 8"	939402S127910

The contents of these sets are specified in the parts list in paragraph 5.8 and 5.9

5.6 HON

P095 MPS/ HPS

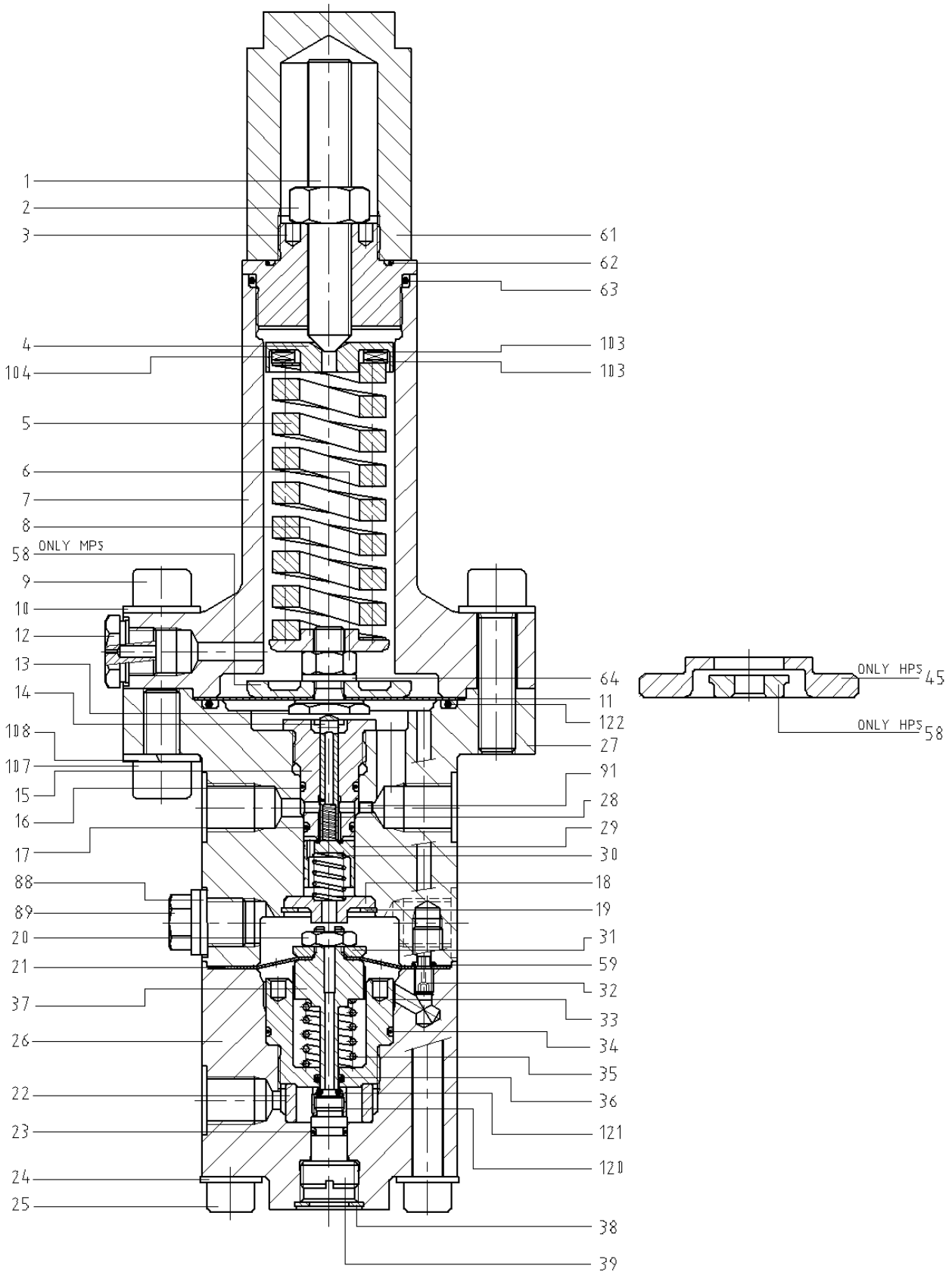


Figure 12: Position numbers HON P095

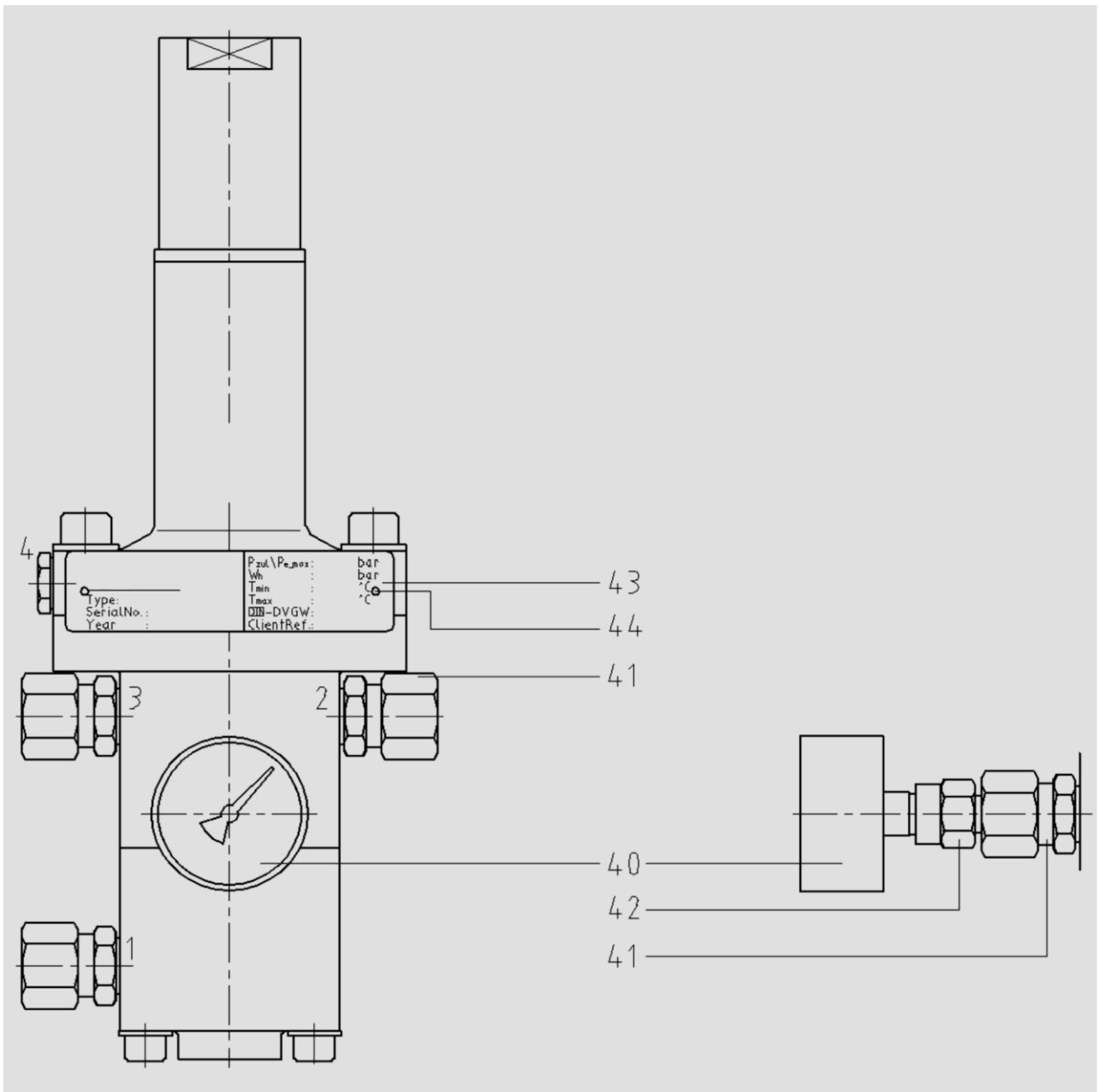


Figure 13: position numbers HON P095 continued

5.6.1 Parts list HON P095 MPS/ HPS

Pos	Name	Code no	Spare
1	Set screw	8303010000031	
2	Hexagon nut	8201340120125	
3	Lock nut	8103004114690	
4	Spring seat	8103004135980	
5	Compression spring	see user manual	
6	Hexagon nut	8251080080001	
7	Spring housing	8103203133680	
8	Spring seat	8103004114670	
9	Socket screw	8207160100040	
10	Washer	8238093100001	
11	Diaphragm	8103004112450	x
12	Plug	8103000112330	
13	Bolt	8103004111840	
14	Valve stem (0,5mm) hole	8103004111860	
14	✓ Valve stem (1,0mm) hole	8103004144750	
15	Housing	8103004111850	
16	O-ring	8401012401014	x
17	O-ring	8401010801013	x
18	Retaining plate	8103004111880	
19	Circlip	8236050025001	
20	Low hexagon nut	8251090080001	
21	Diaphragm	8103004151780	x
22	Filter	8103004112130	x
23	O-ring	8401006801000	x
24	Washer	8238093080001	
25	Socket screw	8207160080070	
26	Housing stabilizer	8611189018000	
27	Housing second pressure stage	8103202133700	
28	Compression spring	8501210109700	
29	Valve (1,0mm) hole	9303504109910	
29	✓ Valve (2mm) hole	9303504139250	
29	✓ Valve (3,5mm) hole	9303504141450	x
30	Compression spring	8501220217600	
31	Spring disk	8103004112110	
32	Restriction	8103000114650	
33	Guide	8103004111900	
34	O-ring	8401031501026	x
35	O-ring	8501220228900	

36	O-ring	8401004501008	x
37	Valve	8103004133530	x
38	Retaining ring	8251437018001	
39	Adjusting screw	8103004142690	x
40	Pressure gauge	7503021132164	
41	Coupling	customer de- pendent	
42	Pressure gauge screwed coupling	customer de- pendent	
43	Type plate	8101004146730	
44	Drive screw	8227410025004	
45	Reducing ring	8103004114660 (HON P095-HPS only)	
58	Diaphragm disc	8103004116530 (HON P095-MPS only) 81.03.00.4114680 (HON P095-HPS only)	
59	O-ring	8401003701007	x
61	Sealing nut	8103004114700	
62	O-ring	8401031501026	x
63	O-ring	8401039402129	x
64	Washer	8251930080001	
88	Plug	8207670063001	
89	Washer	8250302130018	
91	Adjusting screw	8207850030004	
103	Thrust washer	8302010000006	
104	Trust bearing	8302010000004	
107	Socket screw	8207160100020	
108	Spring washer	8237020100001	
120	Nut	8103004142700	x
121	O-ring	8405003701007	x
122	O-ring	8401059903229	x

5.7 HON AP095 MP/ HP

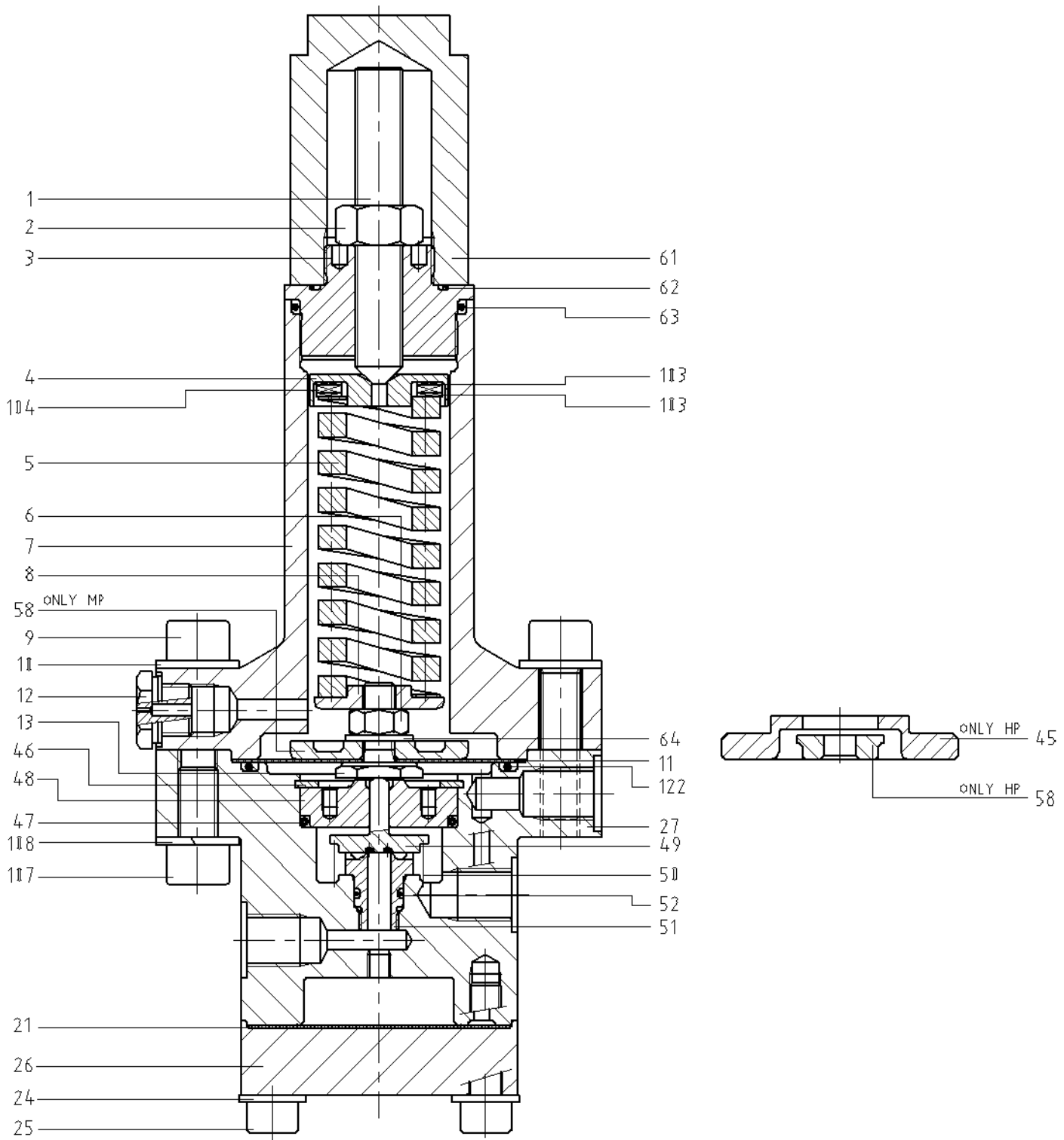


Figure 14: Position numbers HON AP095

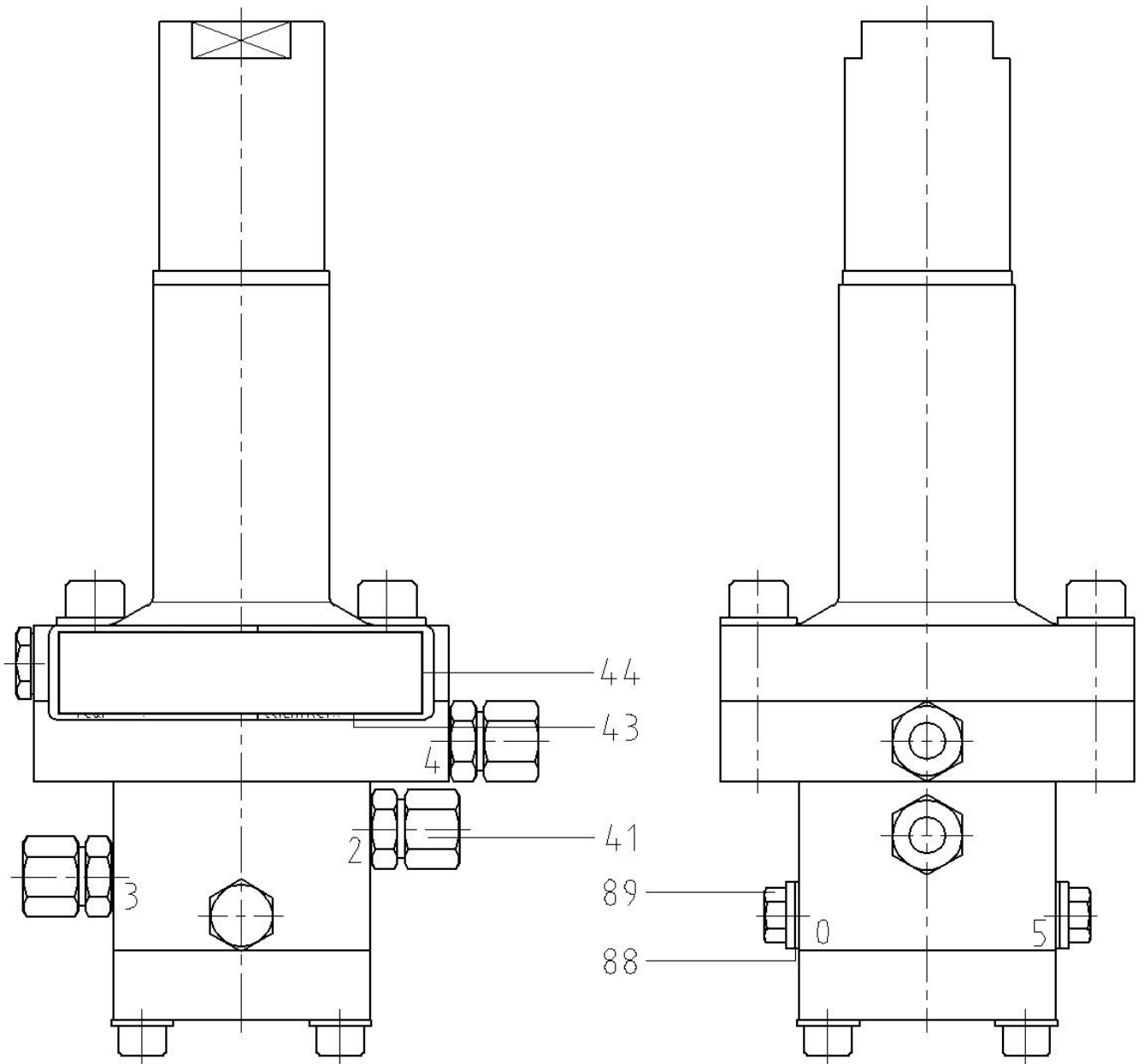


Figure 15: position numbers HON AP095 continued

5.7.1 Parts list HON AP095 MP/ HP

Pos	Name	Code no	Spare
1	Set screw	8303010000031	
2	Hexagon nut	8201340120125	
3	Lock nut	8103004114690	
4	Spring seat	8103004135980	
5	Compression spring	see user manual	
6	Hexagon nut	8251080080001	
7	Spring housing	8103203133680	
8	Spring seat	8103004114670	
9	Socket screw	8207160100040	
10	Washer	8238093100001	
11	Diaphragm	8103004112450	
12	Plug	8103004112330	
13	Bolt	8103004111840	
21	Diaphragm	8103000113470	x
24	Washer	8238093080001	
25	Socket screw	8207160080030	
26	Cover	8103204113420	
27	Housing	8103202113370	
43	Type plate	8101004146730	
44	Drive screw	8227410025004	
45	Reducing ring	8103004114660 (HON P095-HP only)	
46	Circlip	8236050040001	
47	O-ring	8401034503220	x
48	Guide	8103004113340	
49	Valve	9303504113530	x
50	Spring	8501114114640	
51	Nozzle	8103004113360	
52	O-ring	8401009301012	x
58	Diaphragm disc	8103004116530 (HON P095-MP only) 8103004114680 (HON P095-HP only)	
61	Sealing nut	8103004114700	
62	O-ring	8401031501026	x
63	O-ring	8401039402129	x
64	Washer	8251930080001	
88	Plug	8207670063001	
89	Washer	8250302130018	
103	Thrust washer	8302010000006	
104	Trust bearing	8302010000004	
107	Socket screw	8207160100020	
108	Spring washer	8237020100001	
122	O-ring	8401059903229	x

5.8 HON R100S(M) 1"

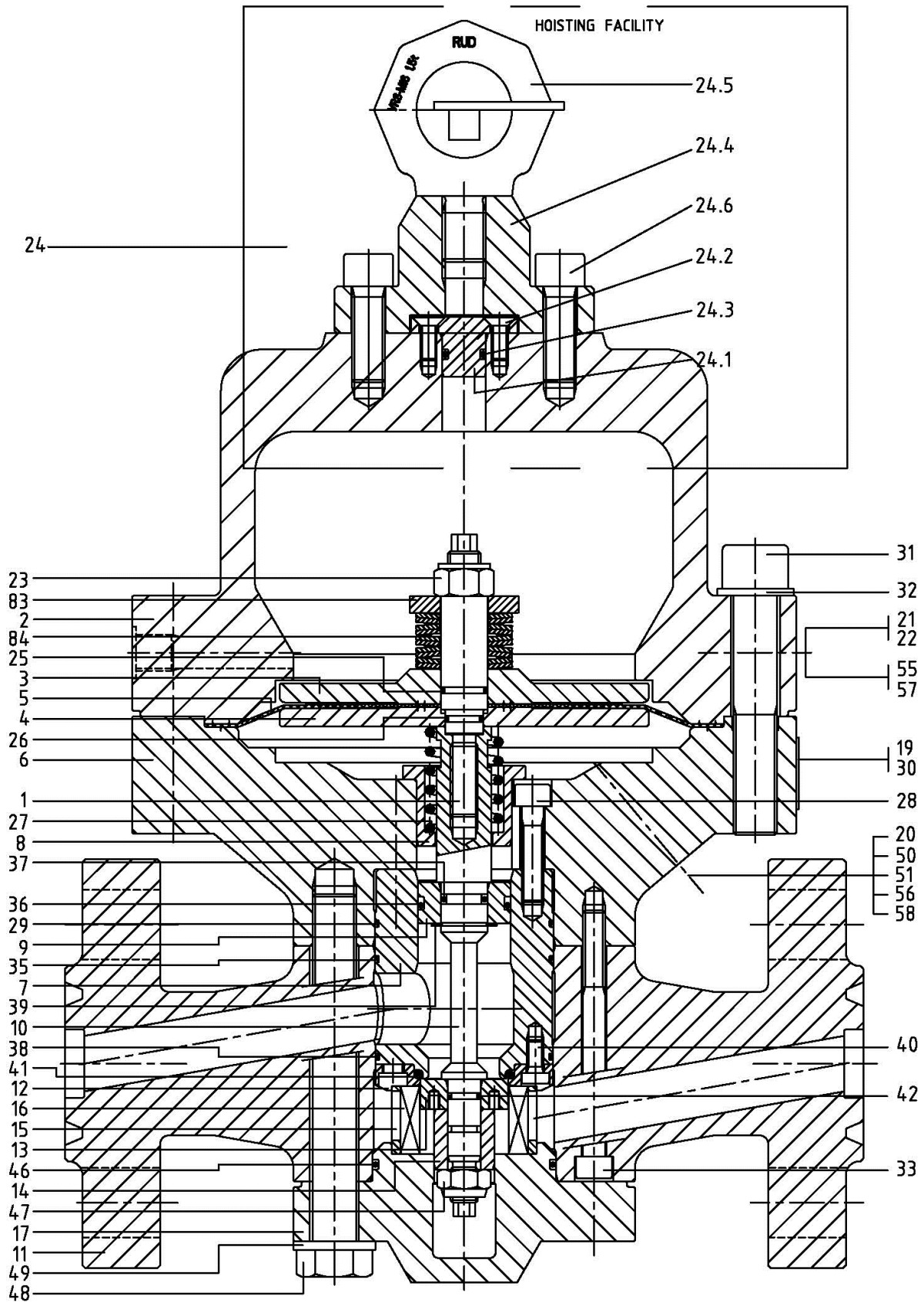


Figure 16: Component drawing HON R100S-1"

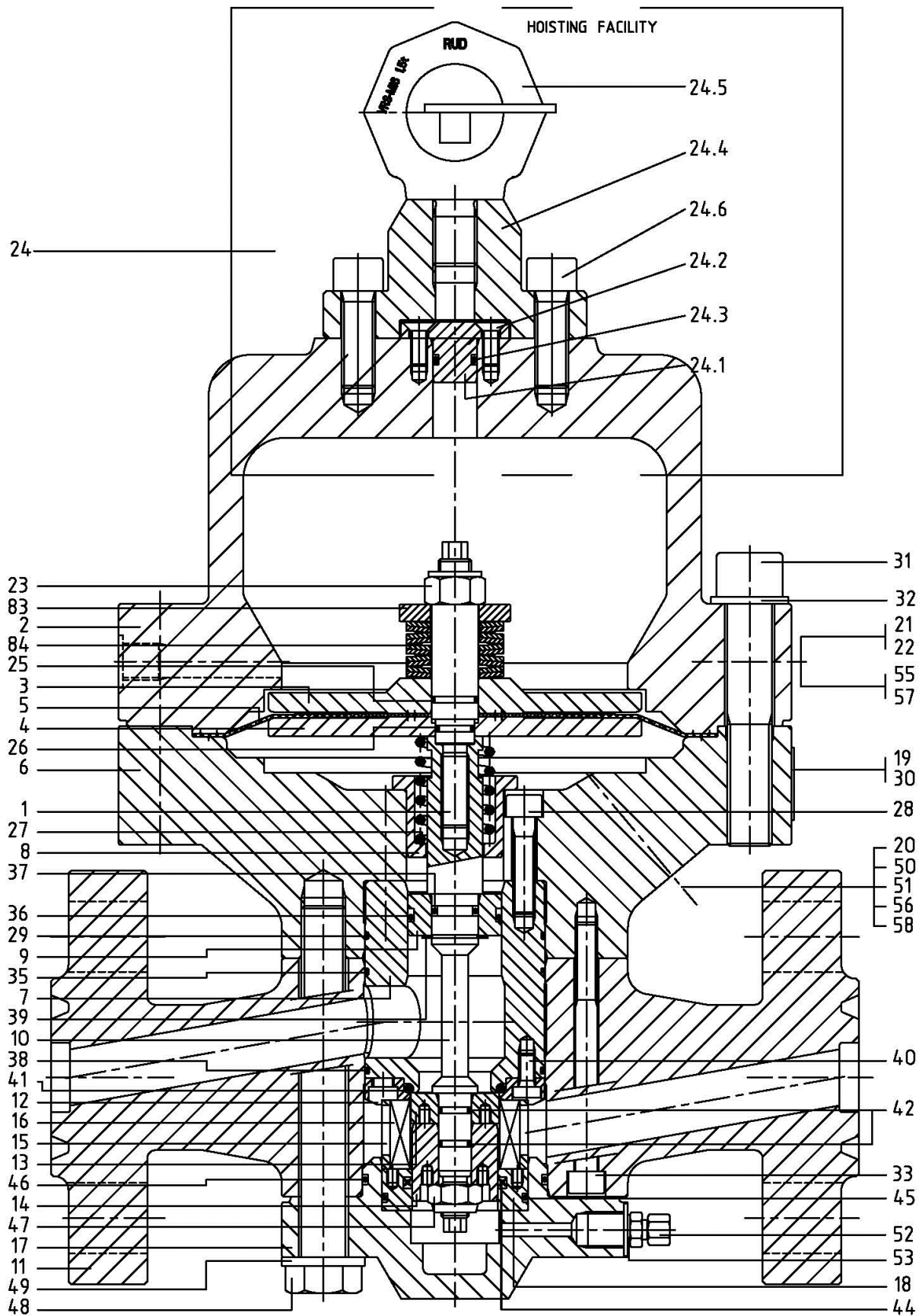


Figure 17: Component drawing HON R100SM-1"

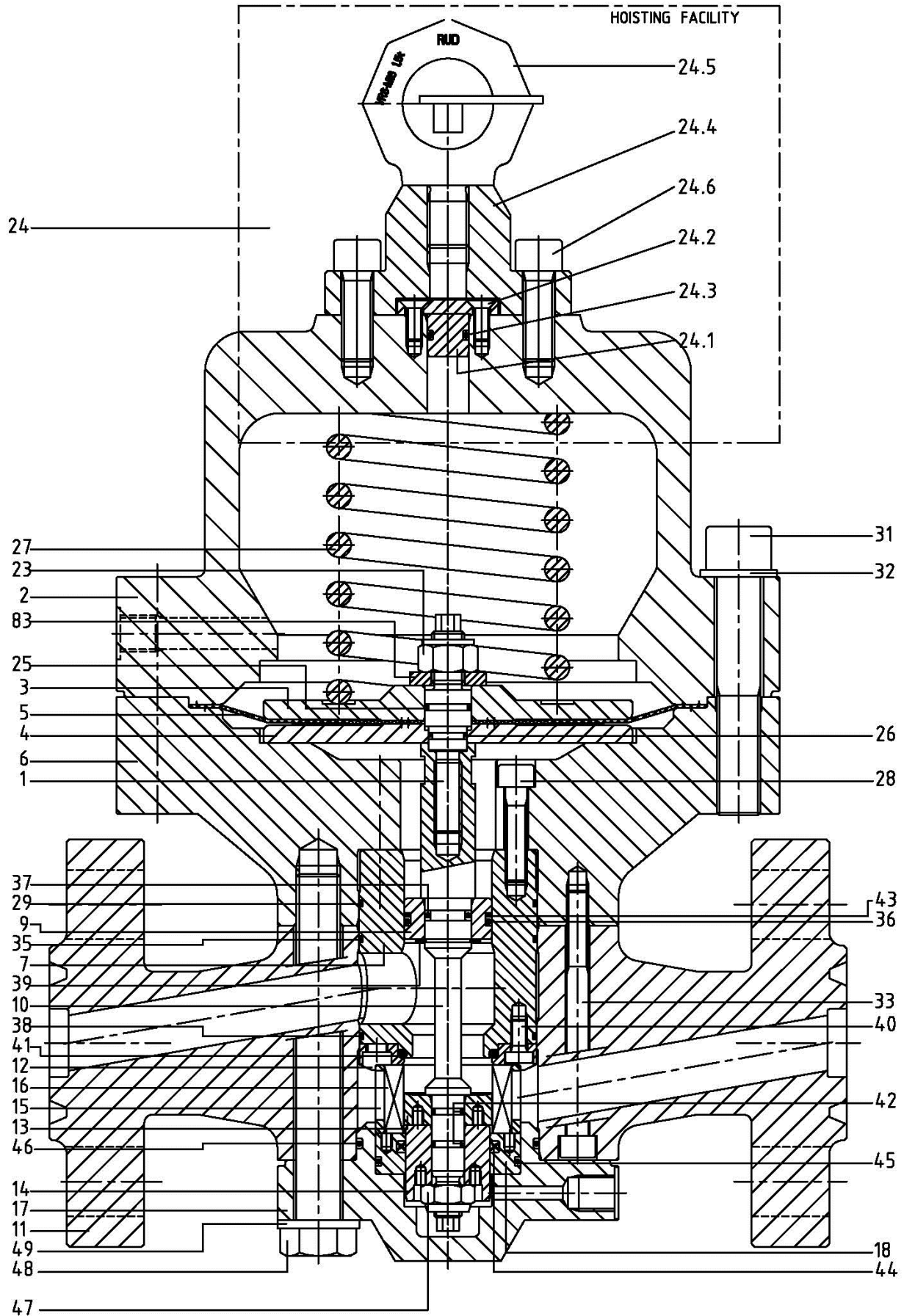


Figure 18: Component drawing HON R100S-SO-1

5.8.1 Parts list HON R100S (M) 1”

See Figure 9: and Figure 10: for component drawing.

PARTS LIST HON R100S(M) 1”					
HON R100S			HON R100SM		
Pos	Name	Spare	Pos	Name	Spare
01	Diaphragm fastening rod		01	Diaphragm fastening rod	
02	Dome		02	Dome	
03	Top diaphragm disc		03	Top diaphragm disc	
04	Bottom diaphragm disc		04	Bottom diaphragm disc	
05	Diaphragm	x	05	Diaphragm	x
06	Diaphragm housing		06	Diaphragm housing	
07	Guide bush		07	Guide bush	
08	Spring seat		08	Spring seat	
09	Compensation piston		09	Compensation piston	
10	Valve stem		10	Valve stem	
11	Valve body		11	Valve body	
12	Valve rubber holder		12	Valve rubber holder	
13	Valve		13	Valve	
14	Valve stem guide bush		14	Bottom compensation	
15	Support cage		15	Support cage	
16	Silencer		16	Silencer	
17	Bottom cover		17	Bottom cover	
18	--		18	Guiding	
19	Name plate		19	Name plate	
20	Restriction		20	Restriction	
21	Elbow coupling		21	Elbow coupling	
22	Washer		22	Washer	
23	Lock nut		23	Lock nut	
24	Hoisting facility		24	Hoisting facility	
25	O-ring	x	25	O-ring	x
26	O-ring	x	26	O-ring	x
27	Spring		27	Spring	
28	Socket head screw		28	Socket head screw	
29	O-ring	x	29	O-ring	x
30	Drive screw		30	Drive screw	
31	Socket head screw		31	Socket head screw	
32	Washer		32	Washer	
33	Socket head screw		33	Socket head screw	
35	O-ring	x	35	O-ring	x
36	O-ring	x	36	O-ring	x
37	O-ring	x	37	O-ring	x
38	O-ring	x	38	O-ring	x
39	Circlip		39	Circlip	
40	Socket "low" head screw	x	40	Socket "low"head screw	x
41	O-ring	x	41	O-ring	x
42	O-ring	x	42	O-ring	x
44	--		44	Quad-ring	x
45	--		45	O-ring	x
46	O-ring	x	46	O-ring	x
47	Locking nut		47	Locking nut	
48	Hexacon bolt		48	Hexacon bolt	
49	Washer		49	Washer	
50	Straight coupling		50	Straight coupling	
51	Washer		51	Washer	
52	--		52	Straight coupling	
53	--		53	Washer	
55	Plug		55	Plug	
56	Plug		56	Plug	
57	Washer		57	Washer	
58	Washer		58	Washer	
79	Cap		79	Cap	
83	Spring seat		83	Spring seat	
84	Disc spring		84	Disc spring	

5.9 HON R100S(M) 2" t/m 8"

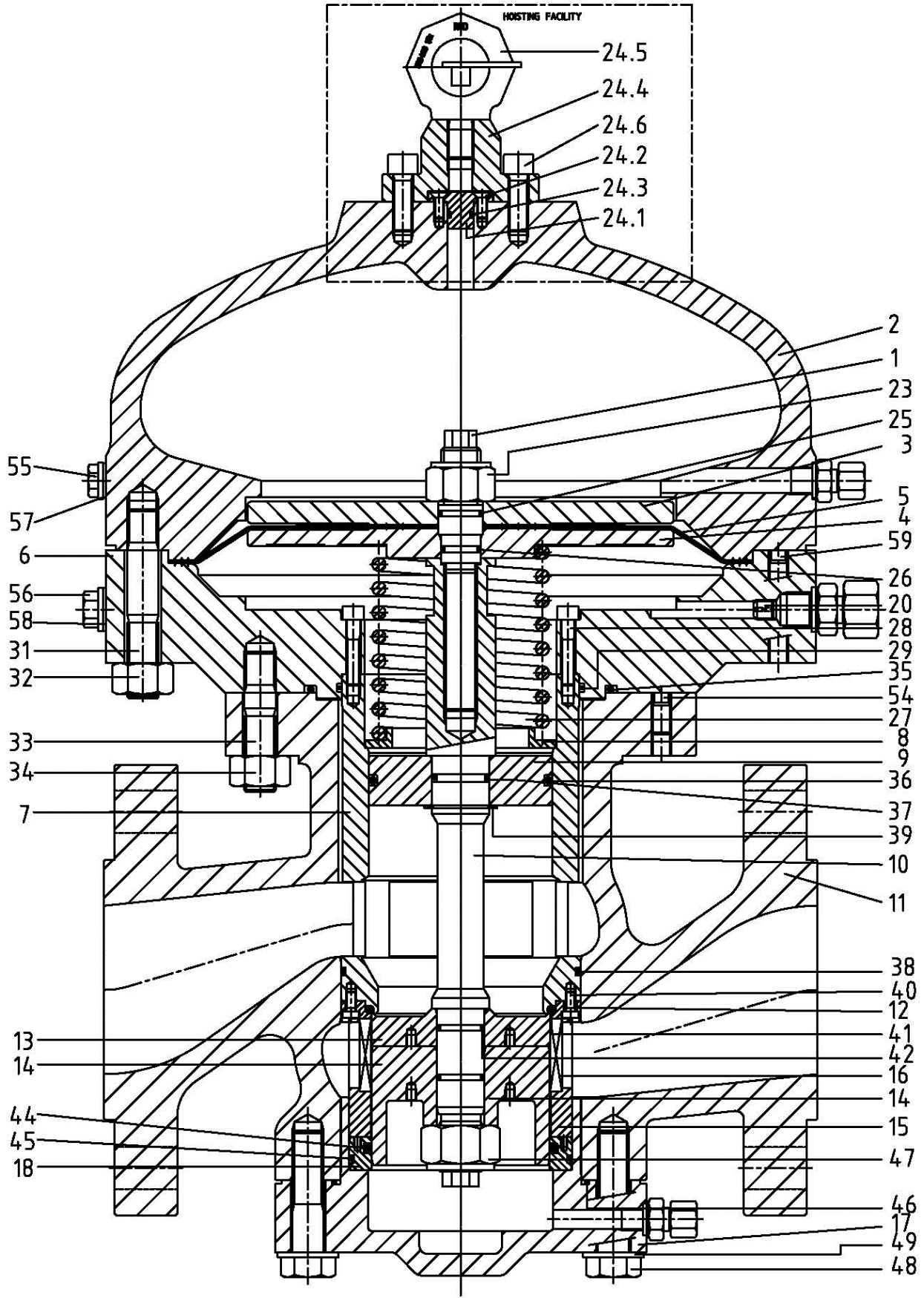


Figure 19: Component drawing HON R100S-2" to 8"

Item	Description	Qty
1	Diaphragm securing rod	1
2	Dome	1
3	Top diaphragm plate	1
4	Bottom diaphragm plate	1
5	Diaphragm	1
6	Diaphragm Housing	1
7	Guide bush	1
8	Spring plate	1
9	Compensation plunger	1
10	Valve shank	1
12	Valve rubber retainer	1
13	Valve	1
14	Lower compensation plunger	1
15	Support cage	1
16	Silencer	1
17	Bottom cover	1
18	Valve guide	1
19	Type plate	1
20	Restriction	2
27	Compression spring	1
23	Lock nut	1
24	Hoisting facility	1
25	O-ring	1
26	O-ring	1
28	Socket-head bolt	8
29	O-ring	1
30	Hammer-drive screw	2
31	Stud bolt	16
32	Nut	16
33	Stud bolt	8
34	Nut	8
35	O-ring	1
36	O-ring	1
37	O-ring	1
38	O-ring	1
39	Circlip	1
40	SS fillister head socket screw low	8
41	O-ring	1
42	O-ring	2
44	Quad ring	1
45	O-ring	1
46	O-ring	1
47	Lock nut	1
48	Hexagon bolt	6
49	Washer	6

54	Socket-head set screw	2
55	Collar plug	1
56	Collar plug	1
57	Copper ring	1
58	Copper ring	1
59	Set screw	2

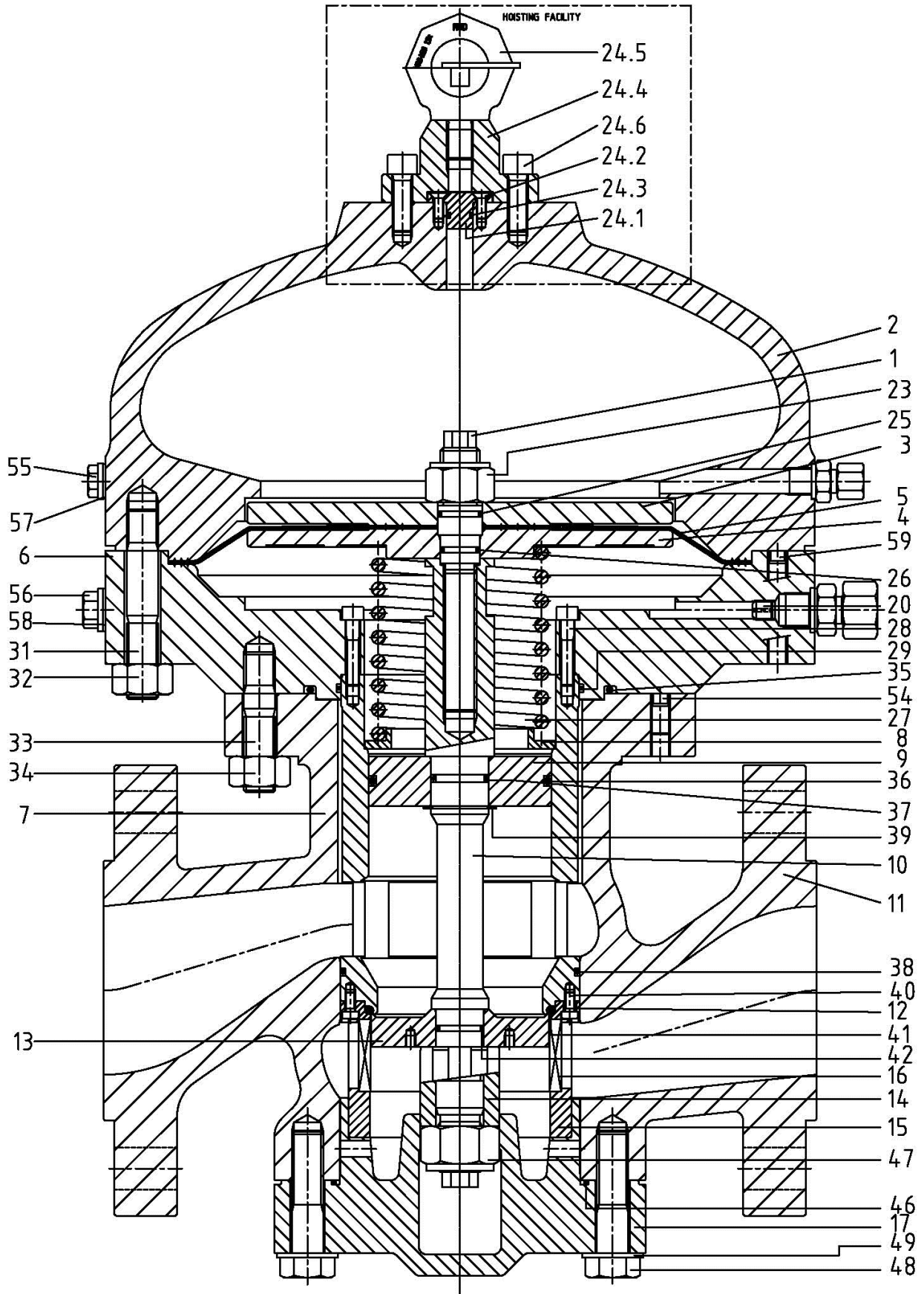


Figure 20: Component drawing HON R100SM- 2" to 8"

Item	Description	Qty
1	Diaphragm securing rod	1
2	Dome	1
3	Top diaphragm plate	1
4	Bottom diaphragm plate	1
5	Diaphragm	1
6	Diaphragm Housing	1
7	Guide bush	1
8	Spring plate	1
9	Compensation plunger	1
10	Valve shank	1
12	Valve rubber retainer	1
13	Valve	1
14	Guide	1
15	Support cage	1
16	Silencer	1
17	Bottom cover	1
19	Type plate	1
20	Restriction	2
27	Compression spring	1
23	Lock nut	1
24	Eye bolt	1
25	O-ring	1
26	O-ring	1
28	Socket-head bolt	8
29	O-ring	1
30	Hammer-drive screw	2
31	Stud bolt	16
32	Nut	16
33	Stud bolt	8
34	Nut	8
35	O-ring	1
36	O-ring	1
37	O-ring	1
38	O-ring	1
39	Circlip	1
40	SS fillister head socket screw low	8
41	O-ring	1
42	O-ring	1
46	O-ring	1
47	Lock nut	1
48	Hexagon bolt	6
49	Washer	6
54	Socket-head set screw	2

55	Collar plug	1
56	Collar plug	1
57	Copper ring	1
58	Copper ring	1
59	Set screw	2

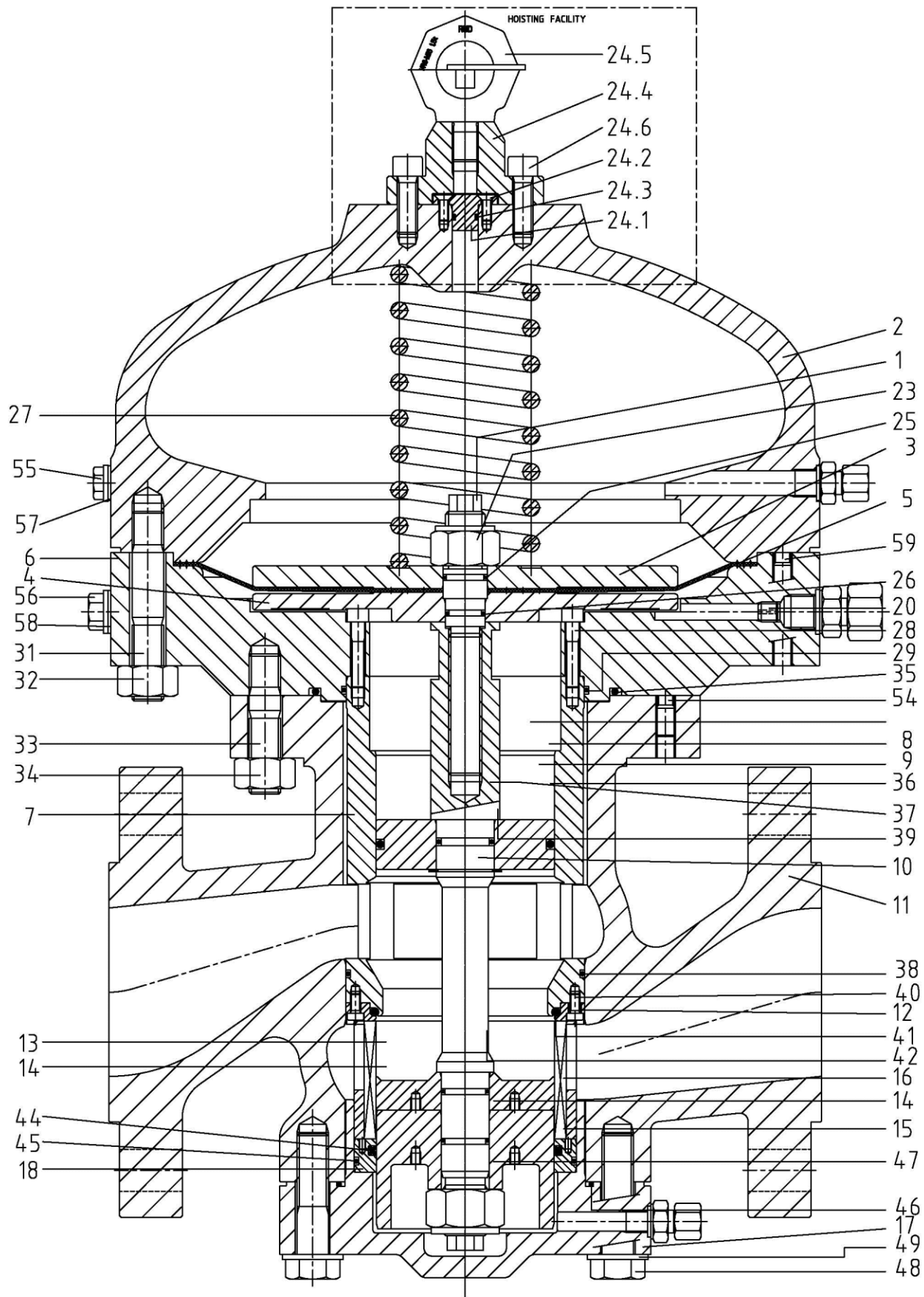


Figure 21: Component drawing HON R100S extra- 2" to 8"

5.9.1 Parts list HON R100S (M) 2" t/m 8"

See Figure 20: and Figure 21: for component drawing.

PARTS LIST HON R100S (M) 2" T/M 8"					
HON R100 (S)			HON R100M		
Pos	Name	Spare	Pos	Name	Spare
01	Diaphragm fastening rod		01	Diaphragm fastening rod	
02	Dome		02	Dome	
03	Top diaphragm disc		03	Top diaphragm disc	
04	Bottom diaphragm disc		04	Bottom diaphragm disc	
05	Diaphragm	x	05	Diaphragm	x
06	Diaphragm housing		06	Diaphragm housing	
07	Guide bush		07	Guide bush	
08	Spring seat		08	--	
09	Compensation piston		09	Top compensation piston	
10	Valve stem		10	Valve stem	
11	Valve body		11	Valve body	
12	Valve rubber holder		12	Valve rubber holder	
13	Valve		13	Valve	
14	Valve stem guide bush		14	Bottom compensation piston	
15	Support cage		15	Support cage	
16	Silencer		16	Silencer	
17	Bottom cover		17	Bottom cover	
18	--		18	Valve guiding	
19	Name plate		19	Name plate	
20	Restriction		20	Restriction	
21	Straight coupling		21	Straight coupling	
22	Ring		22	Ring	
23	Locking nut		23	Locking nut	
24	Hoisting facility		24	Hoisting facility	
25	O-ring	x	25	O-ring	x
26	O-ring	x	26	O-ring	x
27	Spring		27	Spring	
28	Socket head screw		28	Socket head screw	
29	O-ring	x	29	O-ring	x
30	Drive screw		30	Drive screw	
31	Stud bolt		31	Stud bolt	
32	Hexagon nut		32	Hexagon nut	
33	Stud bolt		33	Stud bolt	
34	Hexagon nut		34	Hexagon nut	
35	O-ring	x	35	O-ring	x
36	O-ring	x	36	O-ring	x
37	O-ring	x	37	O-ring	x
38	O-ring	x	38	O-ring	x
39	Circlip		39	Circlip	
40	Socket head screw	x	40	Socket head screw	x
41	O-ring	x	41	O-ring	x
42	O-ring	x	42	O-ring	x
44	--		44	Quad-ring	x
45	--		45	O-ring	x
46	O-ring	x	46	O-ring	x
47	Locking nut		47	Locking nut	
48	Hexagon bolt		48	Hexagon bolt	
49	Washer		49	Washer	
50	Straight coupling		50	Straight coupling	
51	Washer		51	Washer	
52	--		52	Straight coupling	
53	--		53	Washer	
54	Set screw hex.socket		54	Set screw hex.socket	
55	Plug		55	Plug	
56	Plug		56	Plug	
57	Washer		57	Washer	
58	Washer		58	Washer	
59	Set screw		59	Set screw	

6 Failures

Failure	Cause	Solution
Regulated pressure too high	The pilot of the active regulator is set too high.	Slightly turn the adjusting screw of the pilot spring back until the required pressure has been reached.
	The active regulator has failed and the monitor regulator is in operation.	Investigate failing action of the active regulator, and/or pilot
	Only in the event of very low ambient / operating temperatures. The pilot heating has failed.	Repair heating function.
Regulated pressure too low	The pilot of the active regulator is set too low.	Slightly turn the adjusting screw of the pilot in until the required pressure has been reached.
	The pressure drop across the regulating body is less than 7.25 PSI or 0.5 bar.	If possible, increase the inlet pressure or lower set point of pilot.
	The valve of the regulating body is all the way open. The system cannot supply enough pressure.	Heavy soiling of the low-noise cage.
	The set point of the acceleration pilot is too close to the set point of the monitor regulator.	Set the set point of the acceleration pilot higher.
	No inlet pressure.	See if safety shut-off valve has failed or if the monitor regulator is closed or trace its cause.
	Insufficient stabiliser pressure.	Check the stabiliser filter for soil.
	Only in the event of very low ambient / operating temperatures. The pilot heating has failed.	Repair heating function.
Monitor regulator active during normal operation.	Pressure equation between monitor regulator and active regulator has been chosen too tight.	Screw the adjusting screw of the monitor pilot a little further in or the adjusting screw of the regulator pilot a little further out.
	The set point of the acceleration pilot is too close to the set point of the monitor regulator.	Set the set point of the acceleration pilot higher.
Safety shut-off valve responds before the monitor regulator has taken action.	The set point of the acceleration pilot and/or monitor pilot is too high or too close to the set point of the safety shut-off valve.	Set the set point of the acceleration pilot and/or monitor pilot lower or set the set point of the safety shut-off valve higher.
Increasing outlet pressure at zero take off.	A component is untight.	See paragraph 4.10

Failure	Signs	Cause	Solution
High-frequent variations at regulated pressure.	Reciprocating outlet pressure < 0.2 sec.	If reciprocating does not disappear when regulating gas loaded, the cause is in the interaction between process and regulator.	Fit a restriction in the diaphragm housing of the regulator (behind sense-line fitting), start with a 3mm restriction. Instead of restrictions, a needle valve can also be fitted.
High-frequent variations stabiliser pressure	This is often audible by a humming sound from the regulating pilot. On the pressure gauge of the regulating pilot, which indicates the stabiliser pressure, this vibration will also be visible.	Stabiliser is too active.	Fit a smaller restriction in the stabiliser. Standard, the pilot is provided with a 0.7mm restriction. Seal the thread with Loctite 577. Restrictions are available on request.

Failure	Signs	Cause
Low-frequent variations regulated pressure.	Reciprocating of the outlet pressure > 0.2 sec.	Tracing the cause is not easy. It is therefore better to first aim at counteracting the phenomenon step-by-step.
Solution 1	Solution 2	Solution 3
Lower the stabilizer pressure by further screwing in set screw 6. This reduces the effect of the stabiliser pressure on the 2nd control stage of the pilot. This will often solve the problem. If the frequency of the variation is very low, it could also be that the stabilizer pressure is too low.	Let the regulator regulate gas loaded. If reciprocating does not disappear, you have to do with the natural resonance of the regulator. If it does disappear, it definitely has to do with the combination pilot-regulator-process. The solution lies in fitting a restriction plate in connection 3 of the regulator. Start with a 1mm restriction.	If 2 has no effect at all, you can try replacing the pilot spring by a spring with a greater stiffness (higher adjustable outlet pressure).
Solution 4	Solution 5.	
Try a combination of 1, 2, 3.	Another possible cause of reciprocating is increased friction of the movable parts of the regulating system. In this connection you can think of ageing of the dynamic sealings and soil accumulation at the guides. However, this can only be established by carrying out maintenance. Soil accumulation in or badly running of guides is in some cases audible in the form of noise.	

