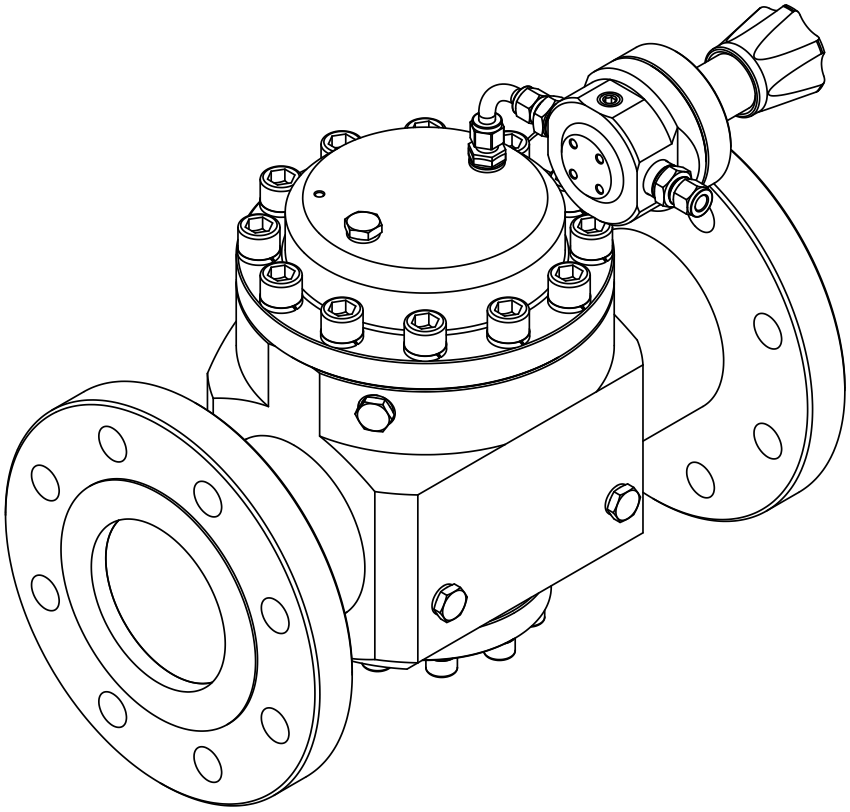
RHPS Series
BD(H)F40
User Manual



Read the complete manual before installing and using the regulator.

WARNING

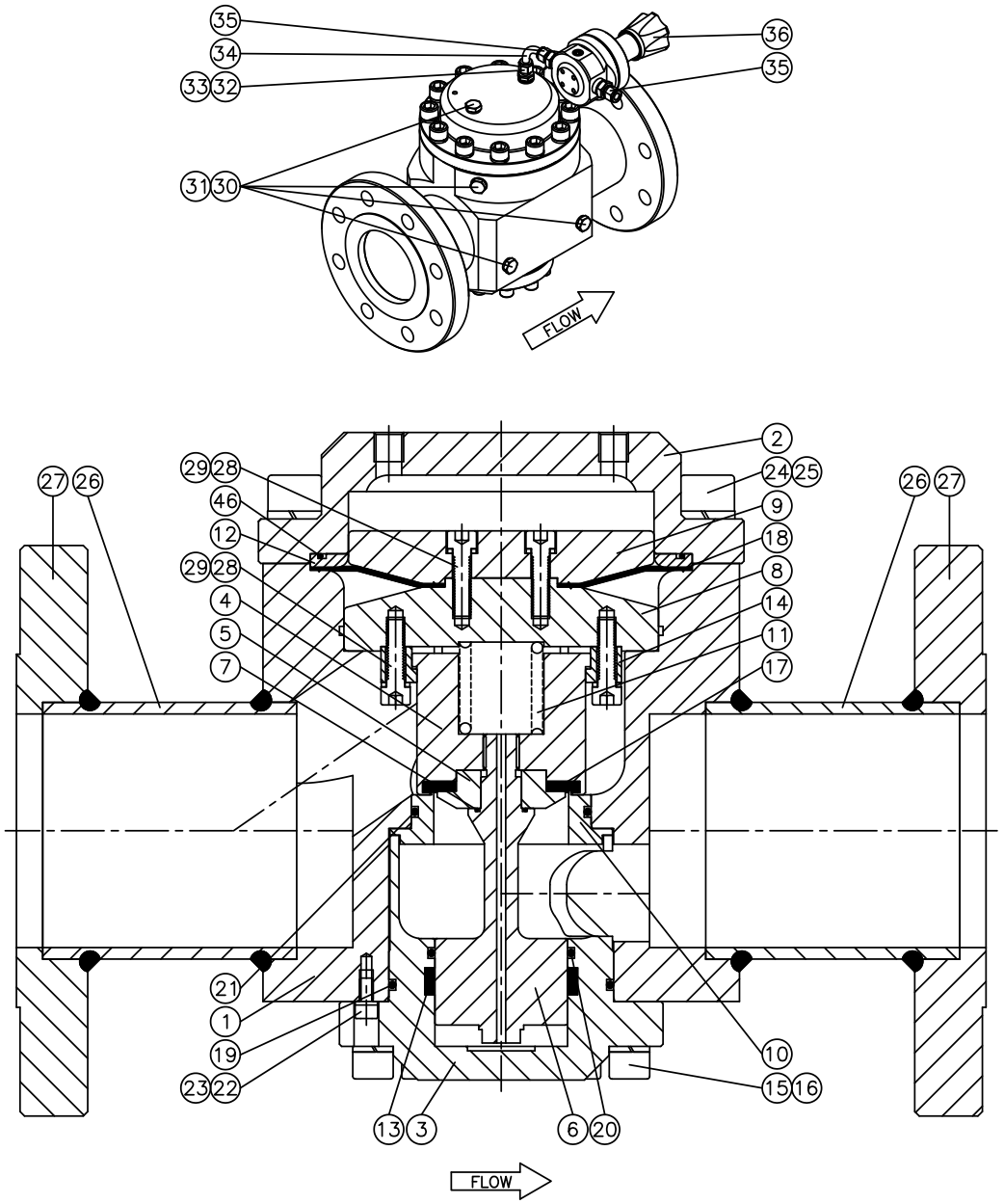
Before removing a regulator from the system for service, you must

- **depressurize system**
- **purge the system to remove any residual system media left in the regulator.**

Contents

Introduction

Representative drawing of the standard BD(H)F40



1	body	11	overtravel spring	21	o-ring	31	blindplug 1/4" bsp
2	dome	12	clamp ring	22	ring	32	bonded seal
3	bottomplate	13	guide ring	23	socket head cap screw	33	male connector
4	valve case	14	retaining ring	24	ring	34	tube 3/8”
5	valve case ring	15	ring	25	socket head cap screw	35	male connector
6	valve stem	16	socket head cap screw	26	tube	36	pilot regulator
7	valve assembly o-ring	17	valve insert	27	flange	37	
8	bodyplate	18	diaphragm	28	ring	38	
9	domeplate	19	o-ring	29	socket head cap screw	39	
10	seat	20	o-ring	30	o-ring	40	

Dome loading with differential pressure

A differential pressure dome loaded regulator has a set spring inside the dome.
The set spring is used to maintain a desired pressure difference between the dome pressure and the outlet pressure.
Usually the dome pressure is a reference pressure taken elsewhere out of the system.

Installation

WARNING

When installing a Swagelok® self-venting regulator, position the vent connection or line away from operating personnel. Operating personnel must protect themselves from exposure to system fluids.

CAUTION

Do not use the regulator as a shutoff device.

CAUTION

When using the BDH20 or BDHF25 with an inlet pressure higher than 200 bar (2 902 psig), a safety valve must be installed in the outlet line, because the outlet pressure may not exceed 200 bar (2 902 psig).

Connections to System

The preferred mounting position of the regulator is horizontal with the dome facing upwards.

If grounding is required, connect a ground wire under a dome bolt.

Filling the dome

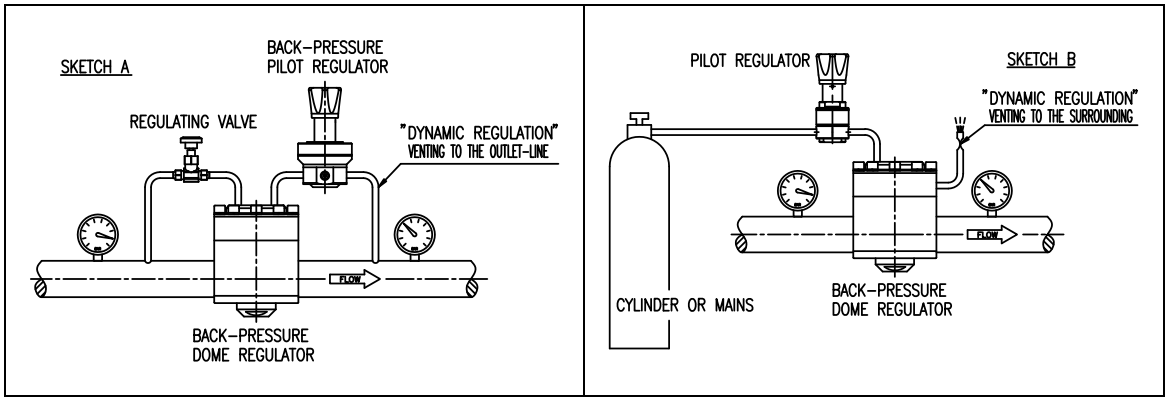
The dome can be filled in different ways.

1. This can be done by taking the gas pressure from the system and feeding this through a regulating valve into the dome. A spring loaded backpressure regulator controls the dome pressure.
   This is shown in sketch A.
2. In liquid systems the gas pressure for manual dome loading can be taken from a cylinder or mains. A spring loaded pressure regulator controls the dome pressure. This is shown in sketch B.

The best results will be achieved by allowing a flow to continuously pass through the pilot regulator. This flow can either be vented or, in gas systems, fed back through an orifice into the downstream piping.
This is usually referred to as "**dynamic regulation**".

CAUTION

It is not recommended to place a gauge on the dome to set or check the inlet pressure. Because of forces in the regulator, the dome pressure will always be lower than the inlet pressure. Place a gauge in the inlet line to set or check the inlet pressure.



External feedback

CAUTION

When using the regulator with external feedback, option –EF, make sure that the outlet pressure can be fed back to the external feedback connection before applying pressure to the regulator. Failing to do so may lead to damage and non-functioning of the regulator as the inlet pressure will be put straight through to the outlet.

The purpose of the external feedback on a pressure regulator is to get a more accurate regulation of the outlet pressure. This can be achieved by sensing the outlet pressure downstream of the regulator and feeding it back to the regulator. For this purpose Swagelok has provided a special connection, marked on the regulator itself as "external feedback".

Connecting the external feedback

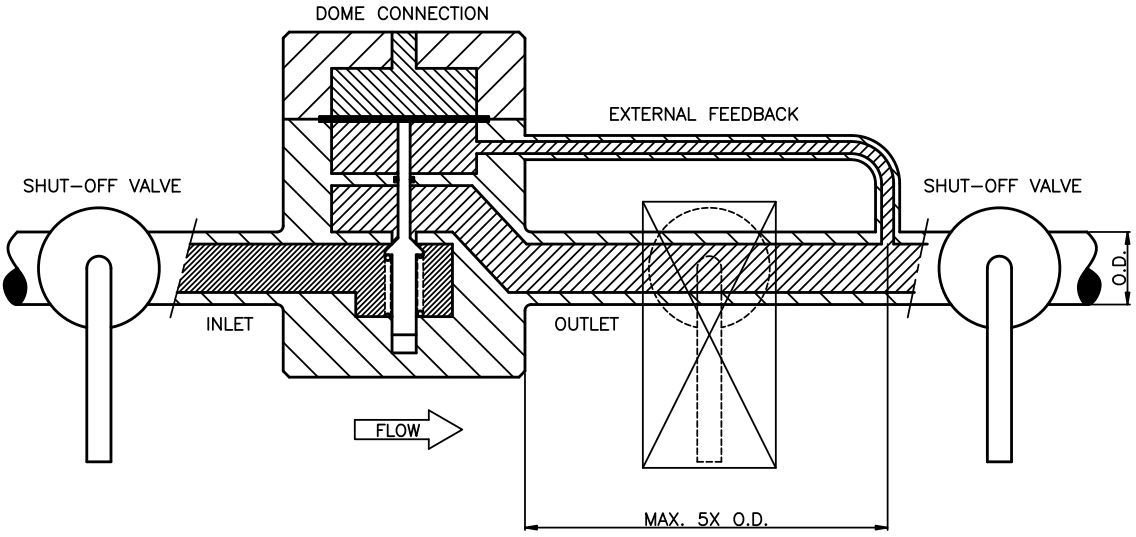
The external feedback must be installed as follows:

- The external feedback is to be connected in a turbulence-free zone in the downstream piping, at a maximum distance of 5x the outside diameter of the down stream piping.
- The external feedback must be connected on top of the downstream piping.

CAUTION

Never connect the external feedback line downstream of a shut-off valve.

Principle sketch of external feedback:



Operation

Note: All directions are when viewed from above.

- Inlet and set pressure settings are obtained by adjusting pressure in the dome.
  - Increase the pressure in the dome to increase the inlet pressure.
  - Decrease the pressure in the dome to decrease the inlet pressure.
- Icing of the regulator at high flow rates or high pressure drops may occur if the gaseous media or atmosphere contains moisture.
- An auxiliary upstream filter is recommended for use in all but the cleanest of media.
- If the shut-off valve at the outlet side is closed after changing the set pressure, the outlet pressure will rise a little because of the closing force required for bubble-tight closing of the regulator.
  - This phenomenon is usually referred to as the "**lock-up**" and does not indicate a problem with the regulator.
- After flow, the inlet pressure will fall a little under the set pressure.
  This is because of the closing force required for bubble-tight closing of the regulator.
  - This phenomenon is usually referred to as the "**reseat pressure**" and does not indicate a problem with the regulator.
- An increase in the flow will result in a rise of the set pressure.
  A decrease in the flow will result in a fall of the set pressure.
  This is because of the force required for opening the valve of the regulator.
  - This phenomenon is usually referred to as the "**accumulation pressure**" and does not indicate a problem with the regulator.
- An increase of the outlet pressure will result in a fall of the set pressure.
  A decrease of the outlet pressure will result in a rise of the set pressure.
  - This phenomenon is usually referred to as the "**dependency**" and does not indicate a problem with the regulator.

Maintenance

Required tools for maintenance

- a vice to fasten the regulator
- pincers to take out the o-rings
- a torque wrench
- a torque wrench hexagon head key 6, 10 and 14
- media and temperature compatible lubricant for reassembling threaded parts
- media and temperature compatible lubricant for o-rings
- Snoop® liquid leak detector

Disassembly

- Loosen the hexagon socket head screws and remove the dome, dome plate, diaphragm, body plate and valve assembly.
- Loosen the hexagon socket head screws and remove the bottom plate and seat.
- Loosen the hexagon socket head screws in the body plate and dome plate to remove the diaphragm and the valve.

Inspection of disassembled parts

- Check all parts for abnormal wear. Replace parts in case of doubt.

Points of attention before assembly

- All parts must be clean and undamaged before starting assembly.
- SWAGELOK B.V. recommends replacing all o-rings and the diaphragm before assembly.
- All threaded parts must be lightly lubricated before assembly to avoid galling of threads.
- All o-rings need to be lightly lubricated to improve the lifetime of the o-ring and the performance of the regulator.

Assembly

Follow the points for disassembly in reverse order to assemble the regulator.

Recommended torques

CAUTION

Only tighten the bolts or parts if the regulator is completely depressurized.

▪ Hexagon socket head screws M8	25 N·m (221 in.·lb)
▪ Hexagon socket head screws M12	50 N·m (442 in.·lb)
▪ Hexagon socket head screws M16	90 N·m (796 in.·lb)

Testing

Check the regulator for leakage across the seat, with low- and high inlet pressure.
Check the regulator for leakage across the diaphragm, with low- and high outlet pressure.

A well performing BD(H)F40 is 100 % bubble tight.
If there is a leakage across the seat or the diaphragm, the damaged parts must be replaced.

Troubleshooting

Problem:	The outlet pressure creeps up, without increasing the dome pressure.
Cause:	A damaged valve and/or seat and/or bottom plate o-ring and/or seat o-ring.
Solution:	Replace the valve and/or the seat and/or the o-ring.

Problem:	Leakage around the bottom plate.
Cause:	A damaged o-ring.
Solution:	Replace the o-ring.

Problem:	Leakage between the body and the dome.
Cause:	A damaged diaphragm or insufficient torque on the bolts.
Solution:	Replace the diaphragm or tighten the bolts according to the torque specifications.

Problem:	The inlet pressure creeps up, without adjusting the dome pressure. The pilot regulator starts venting, without adjusting the pilot regulator.
Cause:	A damaged diaphragm.
Solution:	Replace the diaphragm.

Problem:	The inlet pressure rises too much when going from a dynamic to a static situation.
Cause:	There is too much flow in the dynamic situation.
Solution:	A larger regulator is required. Check the specific application data with the flow curves in our product literature, if available.

Problem:	The inlet pressure does not drop if the pressure in the dome is lowered.
Cause:	The valve assembly is sticking.
Solution:	Replace the valve assembly.

Problem:	The dome regulator will not relieve at the set point.
Cause:	The valve assembly is sticking or the dome pressure is accidentally adjusted.
Solution:	Replace the valve assembly or re-adjust the dome pressure.

Problem:	The inlet pressure has changed without adjusting the dome pressure.
Cause:	Changes to the outlet pressure will result in changes to the set pressure.
Solution:	Maintain a constant outlet pressure on the regulator. See section “operation” about dependency.

Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty.
For a copy, visit swagelok.com or contact your authorized Swagelok representative.

For additional information, ***see*** ***www.swagelok.com***.

WARNING:

Do not mix/interchange Swagelok products or components not governed by industrial design standards, including Swagelok tube fitting end connections, with those of other manufacturers.

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