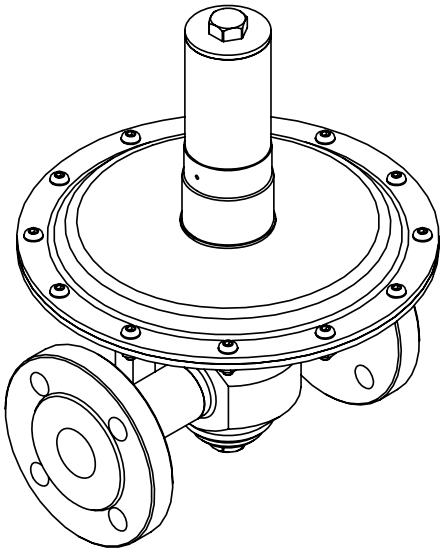
Inertisation /
Tankblanketing regulators

USER MANUAL
TBRS(H)8

Read the complete manual before installing and using the regulator.



WARNING

INCORRECT OR IMPROPER USE OF THIS PRODUCT CAN CAUSE SERIOUS PERSONAL INJURY AND PROPERTY DAMAGE.

Due to the variety of operating conditions and applications for this product, the user is solely responsible for making the final proper decisions concerning the correct assembly and functioning of the product and assuring that all the performance, safety and warning requirements are met.

- Users must be trained and equipped for the handling, use and servicing of pressure products and systems.
- Users must contact their gas or liquid supplier for specific safety precautions and instructions.
- Gaseous media should be free of excessive moisture to prevent icing at high flow.
- Always wear the appropriate protective clothing, including safety glasses, gloves etc. if required.
- Follow the applicable safety and maintenance procedures.
- Obey specific local regulations.
- Do not exceed the maximum inlet and outlet pressure of the product or its accessories.
- Operate within the temperature limits and other conditions specified for the product.
- Do not to drop or damage the product in any other way. This may negatively effect the performance of the product which can cause the product to malfunction.
- Venting fluids and gases can be dangerous. Vent to a safe environment away from people. Ensure adequate ventilation.
- This product is not oxygen clean and therefore not suitable for oxygen service.

If there are questions or problems regarding the installation, operation and maintenance these should be directed to the proper authority on site before continuing.

CONTENTS

1 Introduction

1.1 Detailed description

This regulator is a diaphragm sensing spring loaded pressure regulator, designed for low outlet pressure at medium gaseous flow. It is ideal for highly accurate control of pressure because of it's large effective sensing area. Combined with a balanced valve and low friction valve guidance, the regulator is ideal for use in low pressure tankblanketing.
The regulator comprises a body and spring housing bolted together and has a removable seat and valve. The product is designed to be used between -20 ºC and +80 ºC, whether ambient temperature or media temperature.

The TBRS8 comes standard with a soft seat, for leak tight shut-off in zero flow conditions. The regulator can stand high inletpressure, because of the balanced valve.

The maximum in- and outlet pressure for the TBRS(H)8 are:

- Inlet pressure TBRSH8 (5 mm seat) vacuum – 16 bar
- Inlet pressure TBRS8 (8 mm seat) vacuum – 6 bar
- Outlet pressure 0 – 6 bar

Make sure the downstream pressure cannot exceed 6 bar as the max. allowable working pressure for the diaphragm enclosure is 6 bar.

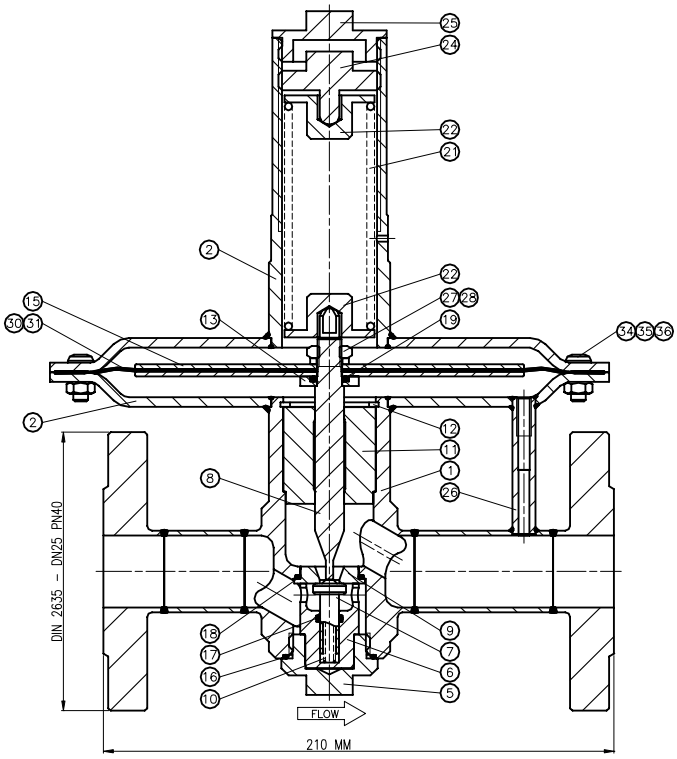
Standard features:

- ss 316L throughout
- diaphragm sensing
- 4 outlet ranges
- suction tube
- internal pressure sensing

1.2 Special features and options

- different line connections

1.3 Typical picture of the TBRS8 (standard)



1	body assembly	13	seal housing	27	ring		
2	springhousing assembly	15	diaphragm plate	28	nut		
5	bodyplug	16	o-ring	30	diaphragm		
6	balance housing	17	o-ring	31	support diaphragm		
7	valve assembly	18	o-ring	34	nut		
8	valve stem	19	o-ring	35	ring		
9	valve seat	21	setspring	36	socket head screw		
10	valve spring	22	springguide				
11	valve guiding ring	24	setscrew				
12	retaining ring	25	springhousing cover				

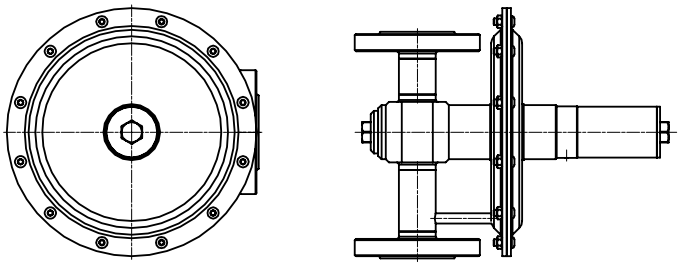
2 Installation

WARNING

A PRESSURE REGULATOR IS NOT A SHUT-OFF VALVE AND SHOULD NOT BE USED AS SUCH

2.1 Points of attention before installation

This regulator can be equipped with different options and connections.
Before installing the regulator you, should fully understand the options and the suitability of your particular regulator and its suitability for the application.



sketch with mounting modes

- The preferred mounting position of the regulator is vertical with the springhousing facing horizontal. (see above sketch). The reason is the weight of the diaphragm plate, in this position it does not effect the regulation.
- It may be necessary to remove the regulator from the system during maintenance or service. Make sure that this is possible.
- The regulator is suitable for gases. Check if the materials on the assembly drawing, which came with the regulator, are compatible with the used media.
- The product is designed to be used between -20 ºC and +80 ºC, whether ambient temperature or media temperature. In all other cases consult SWAGELOK B.V..
- The regulator is standard not oxygen clean and is not suitable for oxygen use.

2.2 Oxygen service

- Specification of materials in regulators for oxygen service is the user's responsibility. SWAGELOK B.V. can perform cleaning for Oxygen service based on ASTM-G93LevelC/CGA4.1 at additional cost.

2.3 Installation instructions

- Verify that the regulator, the connections and its accessories are undamaged.
- Verify that the regulator and its accessories are suitable for the system operating pressure and have the proper connections.
- Carefully clean all pipes and connections. **Any swarf, lint, wire etc. may cause seat leakage.**
- Verify the flow direction of the system and mount the TBRS8 accordingly.
- Securely make the appropriate connections to the regulator in accordance with the procedures recommended by the manufacturer of the connections.
- Make sure the downstream pressure cannot exceed 6 bar.
- Shut-off valves should be mounted in the system for service or maintenance.
- If earthing is required, connect an earth wire under a springhousing bolt.

3 Operation

3.1 Required tools for operation

Use a socket wrench (19 mm) with an extended piece to change the setpressure.

3.2 Points of attention before operation

- The regulator can be hot or cold, depending on the environmental temperature and the used media temperature. Take the necessary precautions before operating or touching the product.
- The regulator is a non-venting type; a shut-off valve on the outlet side must be opened to relief the pressure on the outlet side.
- When the pressure has been set in a no-flow situation, the pressure will drop when gas starts to flow. This phenomenon is usually referred to as the "**lock-up**" and does not indicate a problem with the regulator.
- A decrease in the flow will result in a rise of the outlet pressure. An increase in the flow will result in a fall of the outlet pressure and is usually referred to as the "**droop**".
  This phenomenon does not indicate a problem with the regulator.
- A decrease of the inlet pressure will result in a rise of the outlet pressure.
  An increase of the inlet pressure will result in a fall of the outlet pressure.
  This phenomenon is usually referred to as the "**dependency**" and does not indicate a problem with the regulator.

3.3 Changing the setpressure

- Check the supply of medium at the inlet side.
  Make sure the inlet pressure is higher than the required outlet pressure and that the inlet pressure does not exceed the maximum allowable inlet pressure. Open the shut-off valve at the inlet side.
- Slightly open a shut-off valve, in the system at the outlet side, to allow a minimal flow.
- Turn the setscrew clockwise to increase the setpressure.
  Turn the setscrew counterclockwise to decrease the set pressure.

4 Maintenance

WARNING

INCORRECT OR IMPROPER REPAIR OR SERVICING OF THIS PRODUCT CAN CAUSE SERIOUS PERSONAL INJURY AND PROPERTY DAMAGE.

SWAGELOK B.V. recommends the product to be removed from the system and to be shipped to SWAGELOK B.V. for service or maintenance as all regulators must pass rigid acceptance tests before leaving the factory.
All repairs and servicing of this product must be performed by factory certified personnel and tested for operation and leakage.
If this procedure is not followed for any reason, or if any customer changes are made to the product, SWAGELOK B.V. cannot assume responsibility for the performance or safety of a customer repaired product or for any damage resulting from failure of the product.

The product should be checked periodically for proper and safe operation.
It is the users sole responsibility to determine the frequency of maintenance based on the application.

RECOMMENDATION

SWAGELOK B.V. RECOMMENDS TO HAVE SPARE-PART KITS READILY AVAILABLE ON SITE.

All regulators require maintenance at scheduled intervals. Annual maintenance is recommended under normal use.
From experience SWAGELOK B.V. can tell that especially during the start-up of a system, the demand for spare-part kits is there.
Despite all the effort taken to assure a clean system, there is usually some debris left in the system, which can damage the regulator.
Having spare-part kits on site will save time and money, as the downtime of the system will be reduced to a minimum, whether during start-up or normal operation.

4.1 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 5
- socket wrenches 10 / 17 / 19
- snap ring pliers for retaining ring 38
- media and temperature compatible lubricant for reassembling threaded parts
- media and temperature compatible lubricant for o-rings
- soapy water for leak-testing

4.2 Points of attention before removal from the system

- SWAGELOK B.V. recommends removing the regulator from the installation.
- Make sure that a spare-part kit is present.
- Check if the used media is hazardous or toxic.
  If required take the necessary safety precautions to ensure a safe workspace and your personal safety.
  Vent to a safe environment, away from people and ensure adequate ventilation.
- Follow your system safety, maintenance or special local procedures when removing the regulator.
- The product can be hot or cold, depending on the environmental temperature and the used media temperature. Take the necessary precautions before operating or touching the product.

4.3 Removal from the system

- Isolate the regulator from all pressure sources by closing the appropriate valves.
- Turn the setscrew counterclockwise to decrease the setpressure; a shut-off valve on the downstream side must be opened to relief the pressure.
- Make sure, the inlet and outlet pressure are both reduced to zero and the setscrew is turned counterclockwise until there is no more spring force on the setscrew.

4.4 Disassembly

- Loosen the socket head screws (12 pcs.M6) and remove the springhousing and the setspring.
- Loosen the nut on the valve stem and remove the diaphragmplate, diaphragm and valve stem.
- Remove the retaining ring, and take out the valve guiding ring.
- Loosen the bodyplug from the body and remove the bodyplug and seat.
- Remove from the balance housing, the valve assembly and the valve spring.
- Pull the balance housing out of the bodyplug, by placing a screwdriver through the holes of the balance housing.

4.5 Inspection of disassembled parts

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

4.6 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 lubricated a little before assembly, this to avoid galling of threads.
- All o-rings need to be lubricated a little to improve the lifetime of the o-ring and the performance of the regulator.

4.7 Assembly

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

4.8 Recommended torques

-	Bodyplug	40 Nm
-	Nut on the diaphragmscrew - M10	10 Nm
-	Socket head cap screws - 16 pcs M06	10 Nm
-	Springhousing cover	15 Nm

4.9 Testing

Check the TBRS8 for leakage across the seat, bodyplug and the diaphragm.
Check the required outletpressure range and function.

- Maintain a test pressure on the upstream side of the regulator.
- Turn the setscrew clockwise, till there is 50% of the outletpressure range.
- Stop turning the setscrew. The outletpressure may not rise more then the closing pressure.
- Turn the setscrew clockwise, and stop when the maximum outletpressure is reached.
- Check for leakage across the diaphragm and check the small hole in the springhousing for bubbles by using a little soapy water.
- Check for leakage across the bodyplug.

If there is leakage across the seat or the diaphragm, the damaged parts must be replaced.

5 Trouble shooting

Problem:	The outlet pressure creeps up, without turning the adjustment knob.
Cause:	A damaged valve and/or seat.
Solution:	Replace the valve assembly

Problem:	Controlled pressure drops off sharply even when the flow is within regulator capabilities.
Cause:	Not enough inlet pressure.
Solution:	Make sure there is enough.

Problem:	Constant leak through the hole at the side of the springhousing.
Cause:	Damaged diaphragm, or not enough torque on the nut on the diaphragmscrew.
Solution:	Replace the diaphragm, or tighten the nut.

Problem:	The required outlet pressure can not be reached.
Cause:	The inlet pressure is not high enough.
Solution:	Make sure that the inlet pressure is sufficient.

Problem:	The outlet pressure rises too much when going from a dynamic to a static situation.
Cause:	There is too much flow in the dynamic situation.
Solution:	Check the specific application data with the flow curves in our documentation. A regulator with external feedback will solve or improve this problem.

Problem:	The outlet pressure does not drop when the setscrew is turned counterclockwise.
Cause:	The regulator is standard non-venting.
Solution:	A shut-off valve in the outlet line must be opened to reduce the outlet pressure.

Warranty Information

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