
Operating instructions

Combi regulator

4186 / 4182



READ CAREFULLY BEFORE USE! RETAIN FOR FUTURE REFERENCE!

© 2018 HEROSE GMBH
ARMATUREN UND METALLE
Elly-Heuss-Knapp-Straße 12
23843 Bad Oldesloe
Germany

Phone: +49 4531 509 – 0
Fax: +49 4531 509 – 120
E-mail: info@herose.com
Web: www.herose.com

1st issue 07/2018

The transmission or duplication of this document and the reuse or communication of its content are forbidden unless expressly permitted. Any violations shall result in liability for damages. All rights in the event of patent, utility model or registered design are reserved.



Table of contents

1 About these instructions 4

2 Safety 4

3 Transport and storage 7

4 Description of the valve 7

5 Assembly 11

6 Operation 12

7 Maintenance and service 14

8 Disassembly and disposal 16

1 About these instructions

1.1 Principles

The operating instructions are part of the valve named on the front page.




1.2 Applicable documents

Document	Contents
Catalogue page	Description of the valve

Refer to the manufacturer's documentation for accessories.

1.3 Hazard levels

The warning notes are marked and classified according to the following hazard levels:

Symbol	Explanation
 DANGER	Identifies a hazard with a high risk level that will result in death or serious injury.
 WARNING	Identifies a hazard with a moderate risk level that will result in death or serious injury.
 CAUTION	Identifies a hazard with a low risk level that will result in a minor or moderate injury.
NOTICE	Identifies a risk to property. Damage to property may occur if this note is ignored.

2 Safety

2.1 Intended use

The valve is intended for installation in a pipeline system for the automatic regulation of the tank pressure – both increasing and decreasing the pressure - without auxiliary energy. The permissible operating conditions are specified in these operating instructions.

The valve is suitable for the media listed in these operating instructions; see section 4.5 "Media". Operating conditions and applications deviating from these require the approval of the manufacturer.

Only media may be employed to which the materials used for the valve body and seals are resistant. Contaminated media or usage outside of the pressure and temperature specifications can lead to damage to the valve body and seals.

Avoidance of foreseeable incorrect use

- ▶ Never exceed the permissible usage limits specified in the data sheet or in the documentation with regard to pressure, temperature, etc.
- ▶ Follow all safety instructions and operating procedures in these operating instructions.

2.2 Meaning of the operating instructions

The operating instructions are to be read and followed by the responsible technical personnel before installation and start-up. As part of the valve the operating instructions must always be available close to it. People could be seriously injured or killed if the operating instructions are not followed.

- ▶ Read and observe the operating instructions before using the valve.
- ▶ Retain the operating instructions and make sure they are available.
- ▶ Pass on the operating instructions to subsequent users.

2.3 Instructions for people who work with the valve

People could be seriously injured or killed if the valve is used improperly. In order to avoid accidents, all persons who work with the valve must meet the following minimum requirements.

- They are physically capable of controlling the valve.
- They can safely carry out the work with the valve within the scope of these operating instructions.
- They understand the operating principles of the valve within the scope of their work and are able to recognise and avoid the hazards of the work.
- They have understood the operating instructions and are able to implement the information of the operating instructions accordingly.

2.4 Personal protective equipment

Missing or unsuitable personal protective equipment increases the risk of damage to health and injuries to people.

- ▶ The following protective equipment is to be provided and worn during work:
 - Protective clothing
 - Safety shoes
- ▶ Set out and use additional protective equipment depending on the utilisation and the media:
 - Safety gloves
 - Eye protection
 - Ear protection
- ▶ Wear the specified personal protective equipment for all work on the valve.

2.5 Additional equipment and spare parts

Additional equipment and accessories not conforming to the manufacturer's requirements can negatively affect the operational safety of the valve and cause accidents.

- ▶ In order to ensure operational safety, use original parts or parts that conform to the manufacturer's requirements. If in doubt, have these confirmed by the dealer or manufacturer.

2.6 Adhere to the technical thresholds

If the technical thresholds for the valve are not adhered to, the valve may sustain damage, accidents may be caused and people may be seriously injured or killed.

- ▶ Adhere to the thresholds. See section "4 Description of the valve".

2.7 Safety instructions

DANGER

Hazardous medium.

Escaping operating medium can lead to poisoning, burns and caustic burns!

- ▶ Wear the prescribed protective equipment.
- ▶ Provide suitable collecting containers.

Risk of injury due to pressure.

Injury due to the combi regulator being flung away!

- ▶ Before dismantling the combi regulator, all supply pipes must be depressurised and if necessary emptied as well.
- ▶ Make sure that the system is depressurised.
- ▶ Secure against being pressurised again.
- ▶ Do not bend over the combi regulator when dismantling it.

⚠️ WARNING

Harmful and/or hot/cold conveyed media, lubricants and fuels

Hazardous for persons and the environment!

- ▶ Collect and dispose of rinsing medium and any residual media.
- ▶ Wear protective clothing and a protective mask.
- ▶ Observe legal regulations regarding the disposal of harmful media.

⚠️ CAUTION

Cold/hot pipelines and/or valves.

Risk of injury due to thermal influences!

- ▶ Insulate valves.
- ▶ Attach warning signs.

Medium escaping at high speed and high/low temperature.

Risk of injury!

- ▶ Wear the prescribed protective equipment

NOTICE

Impermissible stresses arising from operating conditions and extensions / added structures.

Leakage or rupture of the valve body!

- ▶ Provide suitable support.
- ▶ Additional loads, such as traffic, wind or earthquakes, are not explicitly taken into account by default and require separate dimensioning.

Condensation in air conditioning, cooling and refrigeration plants.

Icing!

Blocking of the actuation mechanism!

- ▶ Damage due to corrosion!
- ▶ Insulate valves with impermeable material

Improper installation.

Damage to the valve!

- ▶ Remove cover caps before installation.
- ▶ Clean the sealing surfaces.
- ▶ Protect the body and bonnet from impacts.

Painting of valves and pipelines.

Functional impairment of the valve / loss of information!

- ▶ Protect spindle, plastic parts and type plate from the application of paint.

Impermissible stress

Damage to the control mechanism!

- ▶ Do not use the valve as a foothold.

Exceeding the maximum permissible operating conditions.

Damage to the valve!

- ▶ The maximum permissible operating pressure must not be exceeded, and the minimum and maximum permissible operating temperatures must be observed.

3 Transport and storage

3.1 Inspection of condition on delivery

- ▶ Inspect the valve for damage upon receipt.
In case of transport damage, determine and document the precise extent of the damage, and report it immediately to the supplying dealer/carrier and the insurer.

3.2 Transportation

- ▶ Transport the valve in the packaging supplied.
The valve is delivered ready to operate with lateral connections protected by cover caps.
- ▶ Protect the valve against shocks, impacts, vibrations and dirt.
- ▶ Adhere to a transport temperature range of -20 °C to +65 °C.

3.3 Storage

- ▶ Store the valve in a clean and dry place.
- ▶ Make use of a desiccant or heating in damp storerooms to prevent the formation of condensation.
- ▶ Adhere to a storage temperature range of -20 °C to +65 °C.

4 Description of the valve

Refer to the respective catalogue page for further detailed information.

4.1 Structure



Design

Pressure regulating valve without auxiliary energy.

Component	Design
Body	Straight flow type, input A – output B, output C right-angled, central axis A-B

4.2 Marking

The valves are provided with an individual marking for identification.

Symbol	Explanation
DN	Nominal size
PN.....	Rated working pressure (max. permissible operating pressure)
-.....°C +.....°C	Temperature
	Manufacturer's mark "HEROSE"
01/18	Date of manufacture MM/YY
12345	Type
01234567	Serial no.
 0045	CE-mark, ID of notified body
e.g. CF8 / 1.4308	Material

4.3 Intended use

The HEROSE combi regulator is for the automatic regulation of pressure in stationary tanks used for liquefied cryogenic technical gases. Without additional auxiliary energy, the combi regulator aims to maintain a predefined set operating pressure despite the operation of the tank and temperature influences in the tank.

In addition to the pressure build-up and the pressure relief/overflow functions, the combi regulator has a safety function that protects the pipeline and its components on the inlet side.

4.3.1 Pressure build-up function

If the tank pressure falls below the set operating pressure, the combi regulator opens in order to restore the set operating pressure.

Flow direction A→B

4.3.2 Pressure relief / overflow function

If the tank pressure exceeds the set operating pressure by 0.5 bar, the overflow function of the combi regulator trips in order to restore the set operating pressure.

Flow direction B→C

4.3.3 Safety function

If the pressure in the pipe on the inlet side (downstream of connection A) exceeds the set operating pressure of the tank by 5 bar + 10% (⇒max. 5.5 bar), the safety function responds and relieves the pressure in the corresponding pipe section.

Flow direction A→B+C

4.4 Operating data

Valve	Rated pressure	Temperature		Environment	Max. operating pressure	
4186-1	PN 50	-196 °C to +200 °C	-196 °C to +60 °C (O ₂)	-40 °C to +65 °C	38 bar	30 bar (O ₂)
4186-3	PN 40					
4182-1	PN 50	-196 °C to +60 °C			38 bar	

Valve	K _{vs} value	C _v value	Safety function set pressure	Overflow function set pressure	Operating pressure ranges
4186-1	1.2 m ³ /h	1.4 gal/min	Set value + 5.0 bar + 10%	Set value +0.5 bar	1 – 12 bar 6 – 24 bar 16 – 28 bar
4186-3	3.2 m ³ /h	3.7 gal/min			2 – 10 bar 8 – 22 bar 20 – 38 bar
4182-1	1.7 m ³ /h	2.0 gal/min			1 – 12 bar 6 – 24 bar 16 – 38 bar

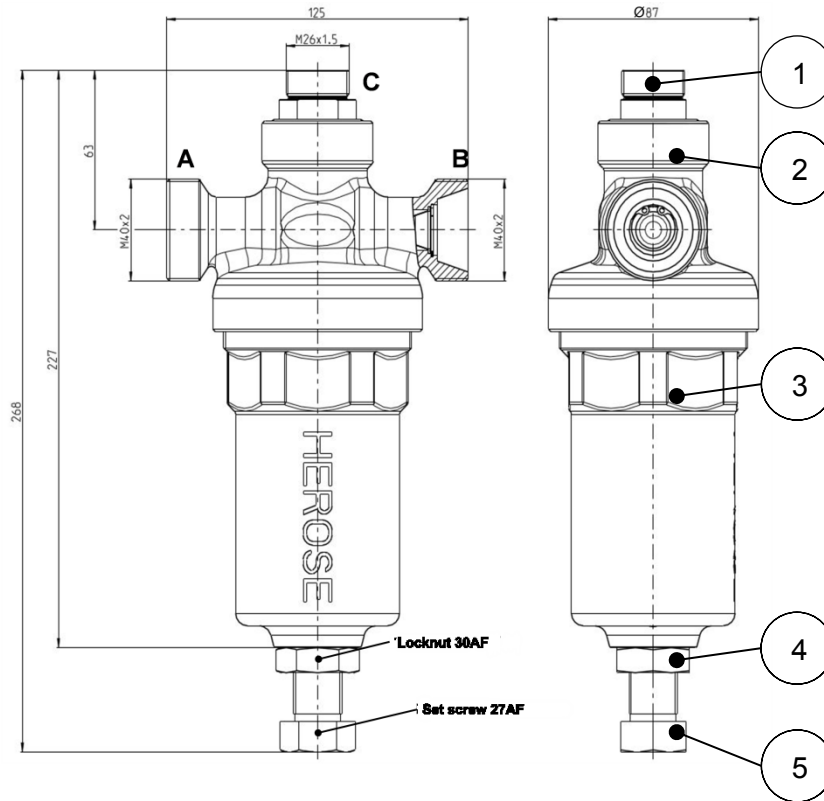
4.5 Media

Gases, cryogenic liquefied gases and their gas mixtures, such as:

Name
Argon
Chlorotrifluoromethane,
Nitrous oxide,
Ethane,
Ethylene,
Carbon dioxide,
Carbon monoxide,
Krypton,
Methane,
Oxygen,
Nitrogen,
Trifluoromethane,

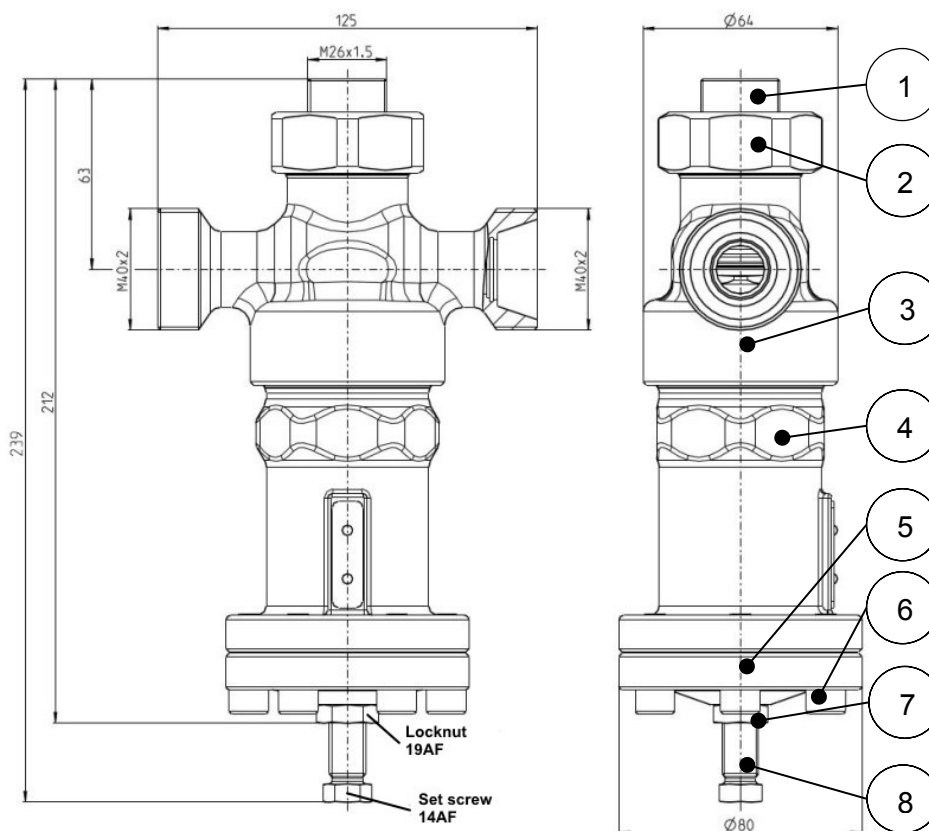
4.6 Materials

4186-1 / 4182-1



Part no.	Name	Material 4186-1	Material 4182-1
1	Connecting nipple	1.4571	CC493K
2	Body	1.4308/CF8	CC491K
3	Spring cover	1.4408/CF8M	CC491K
4	Locknut 30 AF	A2-70	
5	Set screw 27 AF	1.4301	

4186-3



Part no.	Name	Material
		4186-3
1	Connecting nipple	1.4571
2	Union nut	1.4301
3	Body	1.4308/CF8
4	Spring cover	1.4408/CF8M
5	Flange cover	1.4308/CF8
6	Cheesehead bolt M8	A2-70
7	Locknut 19 AF	A2-70
8	Set screw 14 AF	1.4301

4.7 Scope of delivery

- Valve
- Operating instructions

4.8 Dimensions and weights

- ▶ See catalogue page

4.9 Lifetime

The user is obligated to use Herose products only for their intended purpose.

In this case, a technical service life may be assumed in accordance with the underlying product standards (e.g. EN1626 for shut-off valves and EN ISO 4126-1 for safety valves).

The technical service life can be restarted several times through the exchange of wearing parts within the context of the maintenance intervals, and lifetimes of more than 10 years can be achieved.

If products are stored for a period exceeding 3 years, then the plastic components and elastomer sealing elements fitted to the product should be replaced as a precautionary measure before installation and use.

5 Assembly

5.1 Installation position

With regard to the installation position, pay attention to the flow direction arrow. Installation of the valve in the vertical position. The outlet "C" points vertically upwards.

5.2 Notes regarding the installation

- ▶ Use suitable tools.
 - Open-ended spanners
 - Torque wrench
- ▶ Clean tools before the installation
- ▶ Open the packaging only directly before the installation. Freedom from oil and grease for oxygen (O₂)
Valves for oxygen are permanently marked with "O₂".
- ▶ Only install the valve if the maximum operating pressure and usage conditions correspond to the marking on the valve.
- ▶ Remove protective caps or covers before assembly.
- ▶ Inspect the valve for dirt and damage. DO NOT install a damaged or dirty valve.
- ▶ Remove any dirt and residues from the pipeline and valve in order to prevent leaks.
- ▶ Avoid damaging the connections.
The sealing surfaces must remain clean and intact.
- ▶ Seal the valve with suitable seals.
No sealant (sealing tape, liquid sealing tape) may enter the valve.
Respect the suitability for use with O₂.
- ▶ Connecting pipelines must only be connected in a force-free and torque-free manner during operation.
Stress-free installation.
- ▶ In order to ensure trouble-free operation, no impermissible static, thermal or dynamic stresses may be transmitted to the valve. Observe reactive forces.
- ▶ Temperature-dependent changes in length in the pipeline system must be compensated with expansion joints.
- ▶ The valve is supported by the pipeline system.
- ▶ The valve must be protected against dirt and damage during construction work.
- ▶ Check the leak-tightness.

Tightening torques

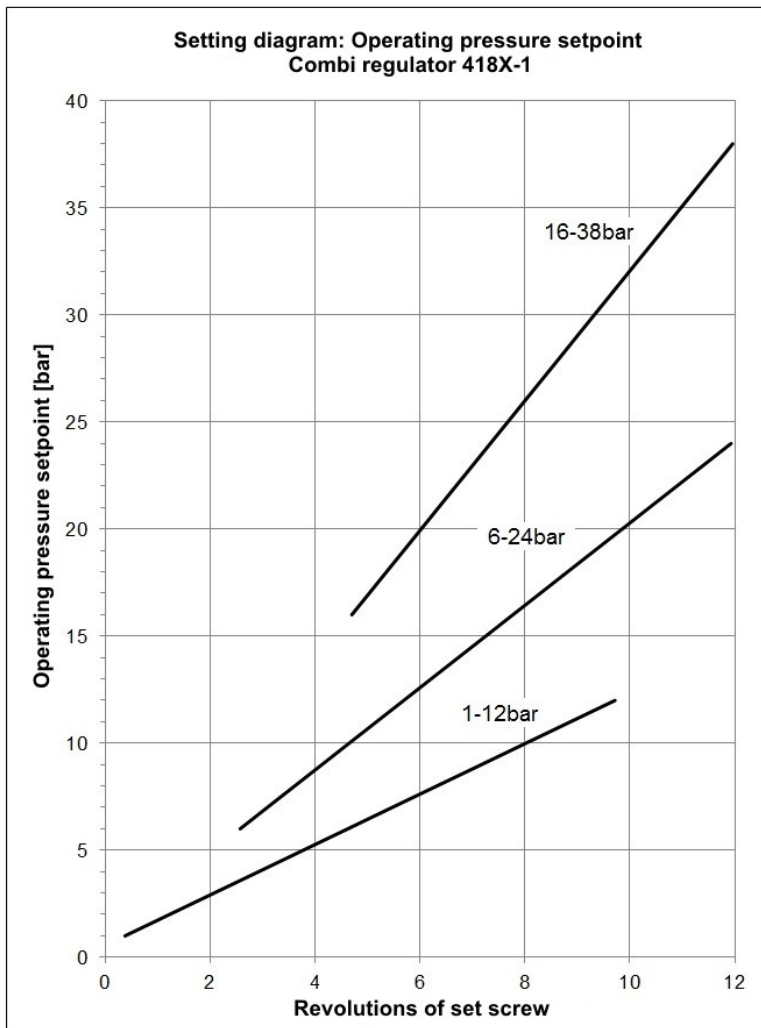
Connection	Thread	Max. perm. tightening torque [Nm]
A	M40x2, G1 1/4, 1 1/4" NPT	100 Nm
B	M40x2, G1 1/4, 1 1/4" NPT	100 Nm
C	M26x1, G3/4, 3/4" NPT	80 Nm

6 Operation

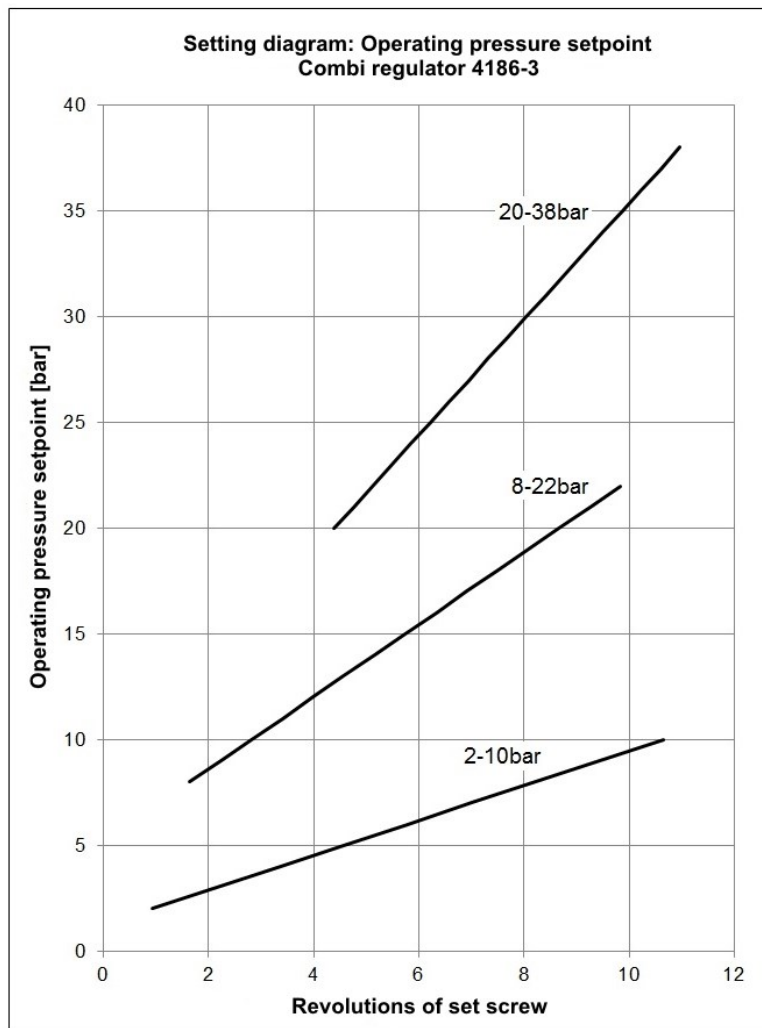
In the delivery state the combi regulator is preset to a defined operating pressure setpoint. At the customer's request the combi regulator will be preset to a specific operating pressure setpoint.

Operating pressure ranges	Combi regulator 4186-1 / 4182-1			Combi regulator 4186-3		
	1-12 bar	6-24 bar	16-38 bar	2-10 bar	8-22 bar	20-38 bar
Preset operating pressure setpoint	8 bar	12 bar	20 bar	8 bar	12 bar	20 bar
Change of operating pressure setpoint per revolution	1.2 bar	2 bar	3 bar	0.8 bar	1.7 bar	2.7 bar

Setting diagram 4186-1 / 4182-1



Setting diagram 4186-3



- The set screw of the combi regulator must be adjusted in order to set or correct an operating pressure setpoint:
 - ▶ To set the operating pressure setpoint, loosen the locknut and adjust the set screw accordingly.
 - Clockwise rotation
Operating pressure setpoint is raised
 - Counter clockwise rotation
Operating pressure setpoint is lowered
 - ▶ Secure the set screw with the lock nut after setting the desired operating pressure setpoint.
- The change of the setpoint per revolution of the screw is to be taken either from the table or from the setting diagram.
- When using manometers in the plant system, it is recommended to set the combi regulator according to the manometer values. If the system does not offer this option, the operating pressure setpoint can be set on the basis of the setting diagrams.

7 Maintenance and service

7.1 Safety during cleaning

- ▶ Take note of the specifications in the safety data sheet and the general occupational health and safety rules if degreasers are used for process-related reasons for the cleaning of bearing parts, fittings and other precision parts.

7.2 Maintenance

The maintenance intervals must be defined by the user according to the operating conditions.

The recommendations for the functional checking of the valves are to be taken from section 7.2.1 "Inspection and maintenance intervals" in these operating instructions.

7.2.1 Inspection and maintenance intervals

Inspection	During commissioning	annually	2 years	5 years	10 years
<ul style="list-style-type: none"> ▶ Correspondence to <ul style="list-style-type: none"> <input type="checkbox"/> design drawing, <input type="checkbox"/> specifications, <input type="checkbox"/> type approval, <input type="checkbox"/> marking, 	X	-	-	-	-
<ul style="list-style-type: none"> ▶ Suitability (medium, size, temperature, pressure, setting) 	X	-	-	-	-
<ul style="list-style-type: none"> ▶ Visual inspection <ul style="list-style-type: none"> <input type="checkbox"/> of the valve for damage <input type="checkbox"/> of the marking for legibility 	X	X	X	X	X
<ul style="list-style-type: none"> ▶ Correspondence of the technical data for the valve to the documentation 	X	X	X	X	X
<ul style="list-style-type: none"> ▶ Leak-tightness <ul style="list-style-type: none"> <input type="checkbox"/> between body and spring cover <input type="checkbox"/> of the connections 	X	X	X	X	X
<ul style="list-style-type: none"> ▶ Setting or set pressure 	X	X	X	X	X
<ul style="list-style-type: none"> ▶ Static pressure test with clean water or another suitable liquid 	-	-	-	-	X
<ul style="list-style-type: none"> ▶ Visual examination of the plant components for cracks, inadmissible changes in shape or leaks 	-	-	-	-	X

7.3 Fault table

Fault	Cause	Remedial action
<ul style="list-style-type: none"> ■ Combi regulator leaking 	Bellows leaking due to contaminated medium	<ul style="list-style-type: none"> ▶ Install / clean dirt trap ▶ Replace bellows
<ul style="list-style-type: none"> ■ Leak between body and spring cover 	Seal damaged	▶ Replace seal
	Diaphragm damaged	▶ Replace diaphragm and seal
<ul style="list-style-type: none"> ■ Connection "C" leaking 	Union nut / connecting nipple loose	<ul style="list-style-type: none"> ▶ Tighten to the specified torque <ul style="list-style-type: none"> □ Union nut 120 Nm □ Connecting nipple 80 Nm
	Seal damaged	▶ Replace seal
<ul style="list-style-type: none"> ■ Incorrect set pressure 	Preset to defined operating pressure setpoint	▶ Set desired operating pressure as described in chapter 6
	Operating pressure setpoint shifted	▶ Restore the operating pressure as described in chapter 6
	Combi regulator incorrectly configured for the plant conditions	▶ Reconfigure and replace the combi regulator
<ul style="list-style-type: none"> ■ Tank pressure is not restored 	Operating pressure setpoint shifted	▶ Restore the operating pressure as described in chapter 6
	Combi regulator incorrectly configured for the plant conditions	▶ Reconfigure and replace the combi regulator
<ul style="list-style-type: none"> ■ Overflow function does not trip 	Operating pressure setpoint shifted	▶ Restore the operating pressure as described in chapter 6
	Combi regulator incorrectly configured for the plant conditions	▶ Reconfigure and replace the combi regulator
<ul style="list-style-type: none"> ■ Safety function does not trip 	Operating pressure setpoint shifted	▶ Restore the operating pressure as described in chapter 6
	Combi regulator incorrectly configured for the plant conditions	▶ Reconfigure and replace the combi regulator
<ul style="list-style-type: none"> ■ Damage to the inlet/outlet 	Transport damage	▶ Replace combi regulator
	Wrong connecting thread / tightening torque too high impermissible forces such as bending or torsional forces are being transmitted.	<ul style="list-style-type: none"> ▶ Replace combi regulator ▶ Install stress-free
<ul style="list-style-type: none"> ■ Reduced flow rate 	Screens contaminated	▶ Clean / exchange screens

7.4 Repairs

Repairs to the combi regulator may be carried out only by HEROSE or by specialist workshops authorised by HEROSE and monitored by the regulatory authorities, using only original spare parts.

7.5 Returns / complaints

Use the Service form in case of returns/complaints.



Contact in case of service:
Herose.com › Start › Service › Product service › Complaints
E-mail: service@herose.com
Fax: +49 4531 509 – 9285

8 Disassembly and disposal

8.1 Notes regarding the disassembly

- ▶ Take note of all national and local safety requirements.
- ▶ The pipeline system must be depressurised.
- ▶ The medium and valve must be at ambient temperature.
- ▶ Aerate / flush the pipeline in the case of corrosive and aggressive media.

8.2 Disposal

1. Dismount the valves.
 - ▶ Collect greases and lubricating fluids during dismantling.
2. Separate the valve materials:
 - Metal
 - Plastic
 - Electronic scrap
 - Greases and lubricating fluids
3. Carry out a sorted disposal of the materials.