

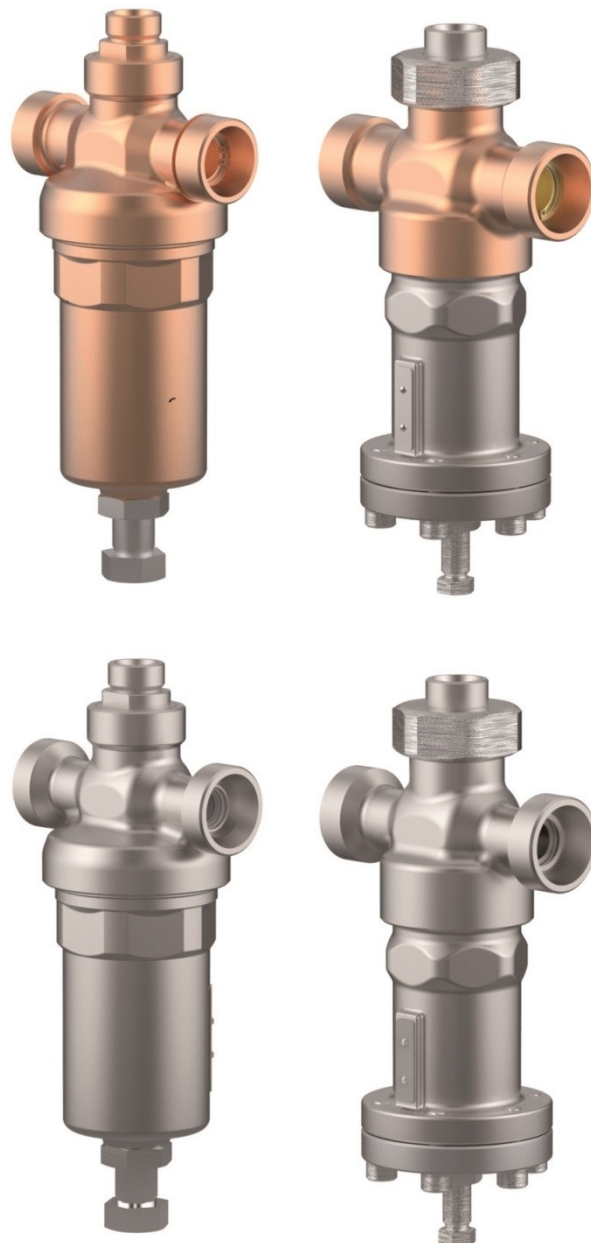
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**Operating instructions**

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**Combined pressure regulator**

**4182 / 4186**





**READ CAREFULLY BEFORE USE! RETAIN FOR FUTURE REFERENCE!**

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2nd issue 04/2019

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# 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

For accessories, refer to the respective manufacturer's documentation.

## 1.3 Hazard levels

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

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

# 2 Safety

## 2.1 Intended use

The valve is intended for installation in a pipeline or pressure vessel 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 mounting 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 on 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
- ▶ Define and use additional protective equipment depending on the application 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 spare parts 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 combined pressure regulator being flung away!

- ▶ Before dismantling the combined pressure 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 combined pressure 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.

## **⚠️ WARNING**

### **Risk of injury if maintenance work is done incorrectly!**

Incorrect maintenance can lead to serious injury and considerable material damage.

- ▶ Before the start of work, ensure there is sufficient room for doing the work.
- ▶ Ensure the space around the work is tidy and clean! Parts and tools in loose piles or lying around are hazard sources.
- ▶ If parts have been removed, take care to assemble correctly and re-install all attachment items.
- ▶ Before putting back into service, ensure:
  - All maintenance work has been carried out and completed.
  - There are no persons in the hazard area.
  - All covers and safety devices are installed and operating correctly.

## **⚠️ 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 sizing.

### **Condensation in air conditioning, cooling and refrigeration plants.**

Icing!

Blocking of the actuation mechanism!

- ▶ Damage due to corrosion!
- ▶ Insulate valves with diffusion-tight material

### **Improper mounting.**

Damage to the valve!

- ▶ Remove cover caps before mounting.
- ▶ Clean the sealing surfaces.
- ▶ Protect the body against hammering.

### **Painting of valves and pipelines.**

Functional impairment of the valve / loss of information!

- ▶ Protect stem, plastic parts and type plate against 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 allowable 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 control valve without auxiliary energy.

Component	Design
Body	Straight flow type, input A – output B, output C parallel, 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	Year of construction 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 combined pressure regulator is for the automatic regulation of pressure in stationary tanks used for liquefied cryogenic technical gases. Without additional auxiliary energy, the combined pressure 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 combined pressure 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 combined pressure 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 combined pressure 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% ( $\Rightarrow$ max. 5.5 bar), the safety function responds and relieves the pressure in the corresponding pipe section.

Flow direction A $\rightarrow$ B+C

### 4.4 Operational data

Type	Nominal pressure	Temperature		Environment		Operating pressure		
		Min.	Max.	Min.	Max.			
4182-1	PN 50	-196 °C	+60 °C		-40 °C	+65 °C	38 bar	30 bar (O <sub>2</sub> )
4186-1	PN 50		+200 °C	+60 °C (O <sub>2</sub> )				
4182-3	PN 50		+60 °C					
4186-3	PN 40		+200 °C	+60 °C (O <sub>2</sub> )				

Type	K <sub>v</sub> value	C <sub>v</sub> value	Safety function set pressure	Overflow function set pressure	Operating pressure ranges
4182-1	1.7 m <sup>3</sup> /h	2.0 gal/min	Set point + 5.0 bar + 10%	Set point +0.5 bar	1 – 12 bar 6 – 24 bar 16 – 38 bar
4186-1	1.2 m <sup>3</sup> /h	1.4 gal/min			
4182-3	3.2 m <sup>3</sup> /h	3.7 gal/min			
4186-3					2 – 10 bar 8 – 22 bar 20 – 38 bar

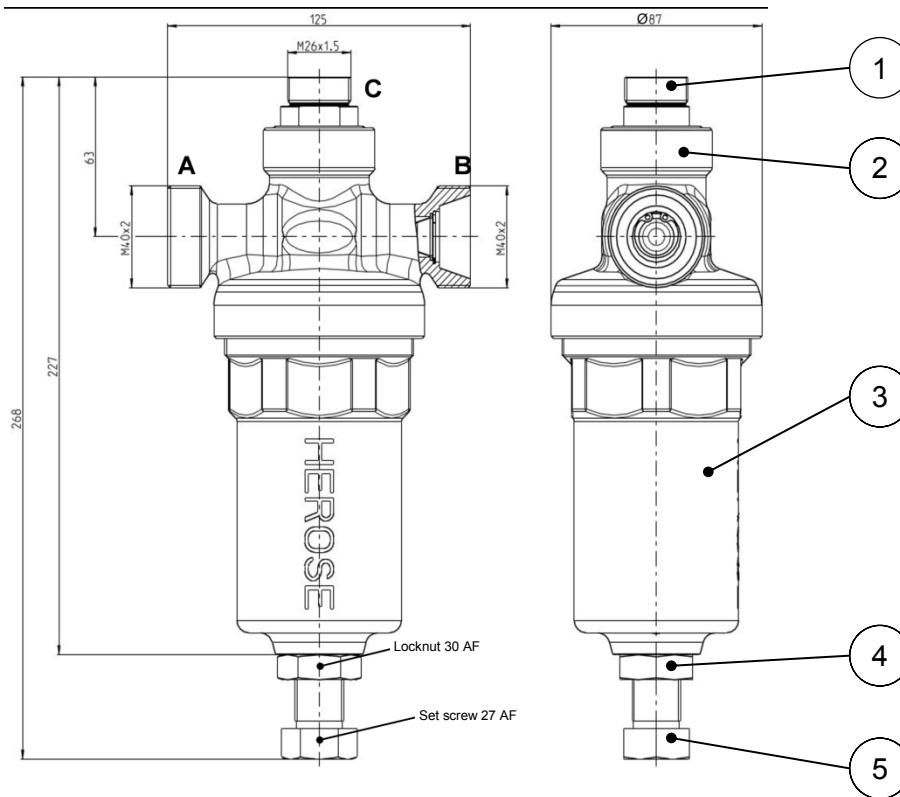
### 4.5 Media

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,

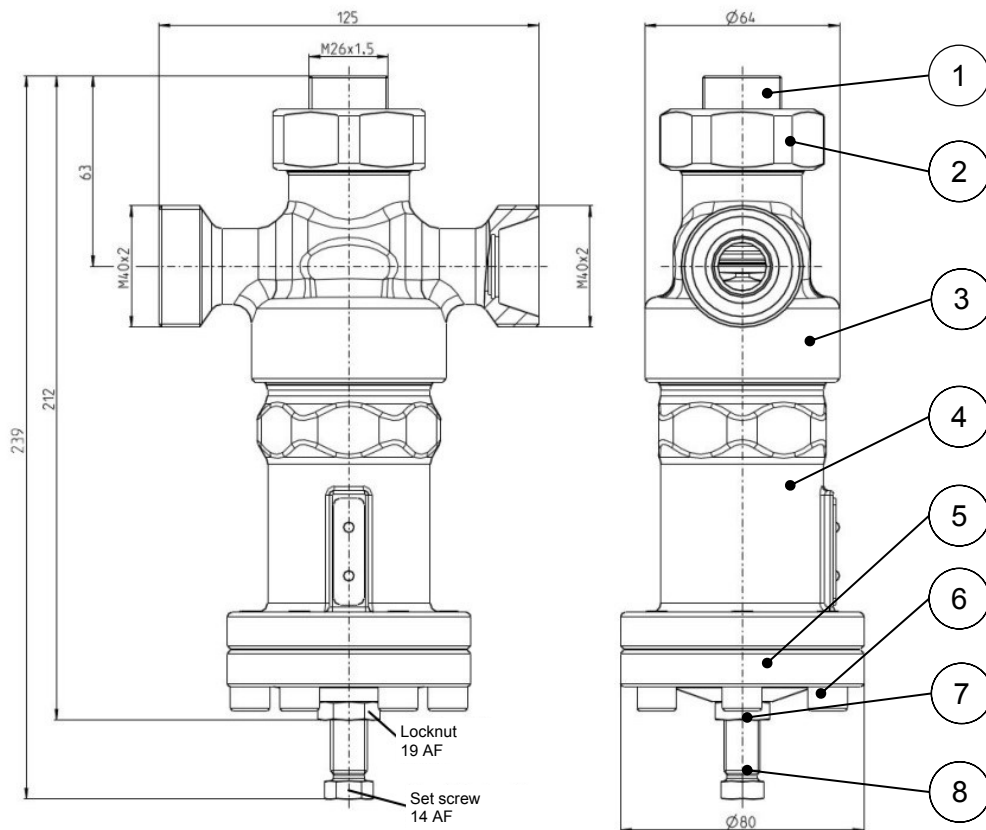
## 4.6 Materials

### 4.6.1 4182-1 / 4186-1



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

4.6.2 4182-3 / 4186-3



Part no.	Name	Material 4182-3	Material 4186-3
1	Connecting nipple	CC493K	1.4571
2	Union nut	1.4301	
3	Body	CC491K	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 mounting and use.

## 5 Assembly

### 5.1 Installation position

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

### 5.2 Notices regarding the mounting

- ▶ Use suitable tools.
  - Open-ended spanners
  - Torque wrench
- ▶ Clean tools before the installation
- ▶ Open the packaging only directly before the mounting. Freedom from oil and grease for oxygen (O<sub>2</sub>)  
Valves for oxygen are permanently marked with "O<sub>2</sub>".
- ▶ Only install the valve if the maximum operating pressure and operating conditions correspond to the marking on the valve.
- ▶ Remove protective caps or covers before mounting.
- ▶ 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 O<sub>2</sub>.
- ▶ Connect pipelines in a force-free and torque-free manner.  
Stress-free mounting.
- ▶ In order to ensure trouble-free operation, no impermissible static, thermal or dynamic stresses may be transmitted to the valve. Observe reaction forces.
- ▶ Temperature-dependent changes in length in the pipework system must be compensated with expansion joints.
- ▶ The valve is supported by the pipework 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, G11/4, 1 1/4" NPT	100 Nm
B	M40x2, G11/4, 1 1/4" NPT	100 Nm
C	M26x1, G3/4, 3/4" NPT	80 Nm

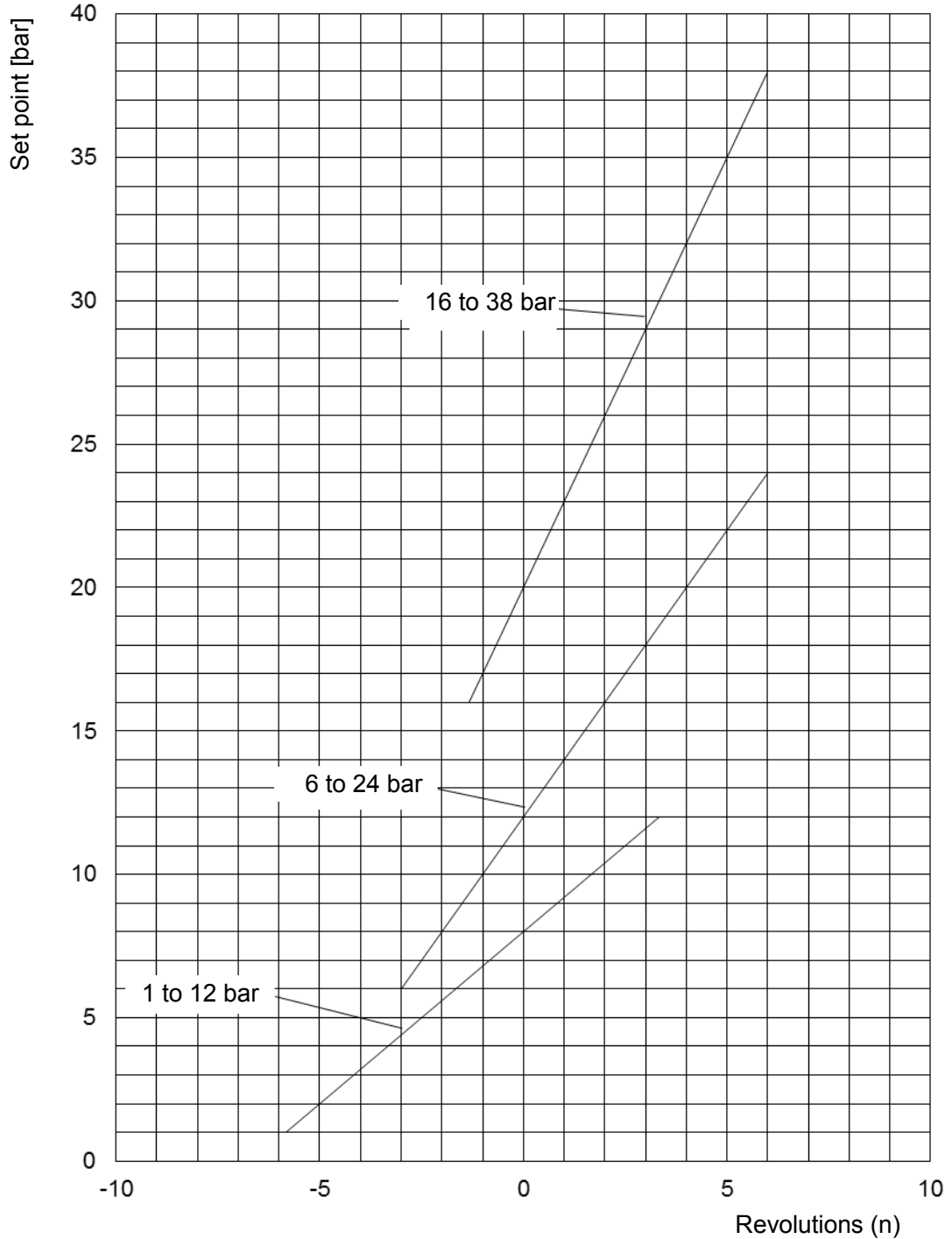
## 6 Operation

In the delivery state the combined pressure regulator is preset to an operating pressure setpoint (see chapters 6.1 and 6.2). At the customer's request the combined pressure regulator will be set to an operating pressure setpoint specified by the customer.

- The set screw of the combined pressure 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

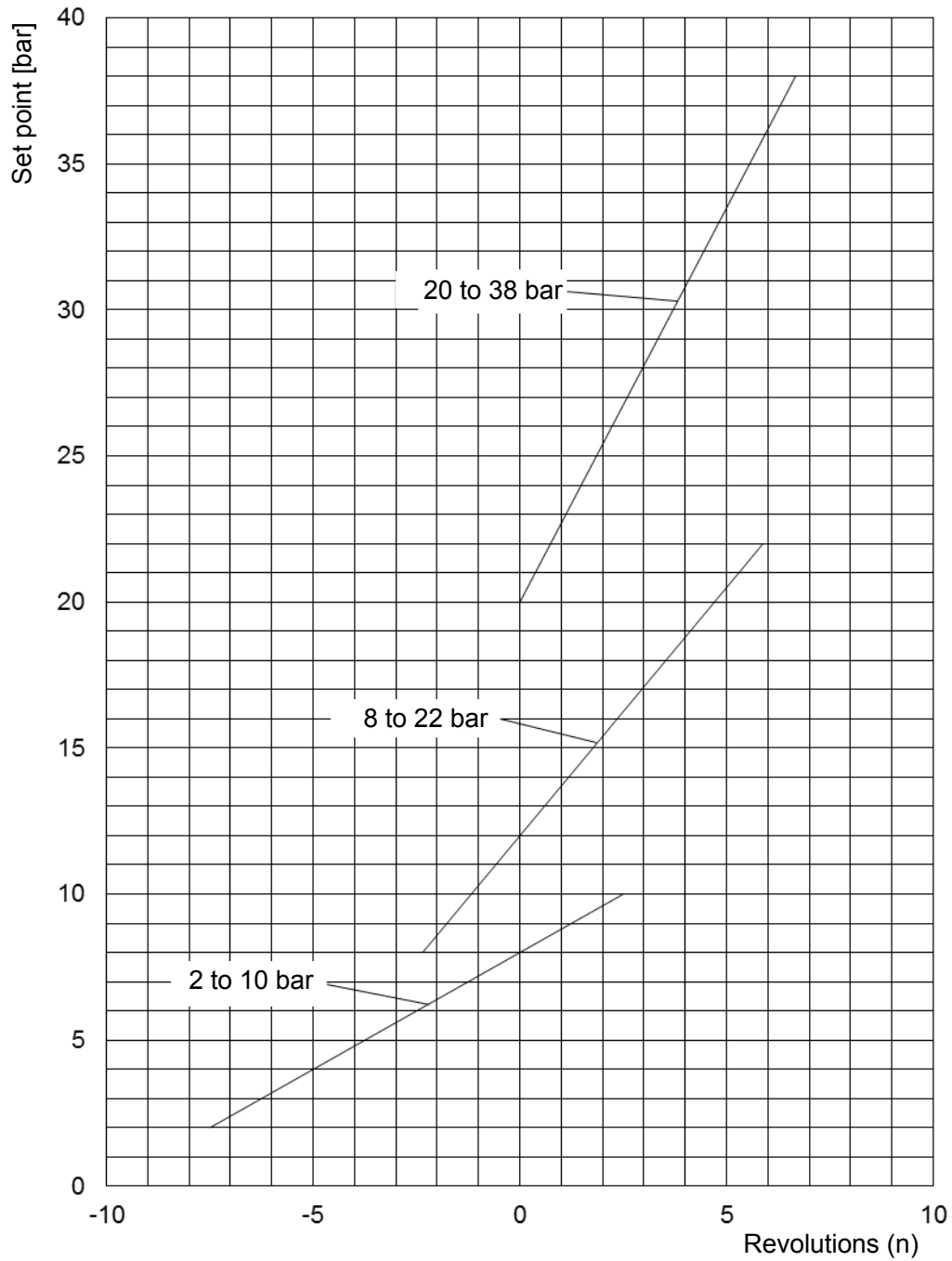
- Counter clockwise rotation  
Operating pressure setpoint is lowered
- ▶ Secure the set screw with the locknut after setting the desired operating pressure setpoint.
- The change of the set point per revolution of the screw is to be taken either from the table or from the setting diagram.
- When using manometers in the plant system, it is recommended to set the combined pressure regulator with the help of the manometer. If the system does not offer this option, the operating pressure setpoint can be set on the basis of the setting diagrams.

## 6.1 Setting diagram 4182-1 / 4186-1



Operating pressure ranges	1-12 bar	6-24 bar	16-38 bar
Preset operating pressure	8 bar	12 bar	20 bar
Change in the operating pressure per revolution	1.2 bar/n	2 bar/n	3 bar/n

## 6.2 Setting diagram 4182-3 / 4186-3



Operating pressure ranges	2-10 bar	8-22 bar	20-38 bar
Preset operating pressure	8 bar	12 bar	20 bar
Change in the operating pressure per revolution	0.8 bar/n	1.7 bar/n	2.7 bar/n

## 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, unions 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

Recommended intervals		
Inspection	Interval	Scope
Inspection	▶ During start-up	<ul style="list-style-type: none"> <li>■ Visual inspection                             <ul style="list-style-type: none"> <li><input type="checkbox"/> of the valve for damage;</li> <li><input type="checkbox"/> of the valving marking for legibility;</li> </ul> </li> <li>■ Leak-tightness                             <ul style="list-style-type: none"> <li><input type="checkbox"/> between body and spring cover</li> <li><input type="checkbox"/> of the connections</li> </ul> </li> <li>■ Check of the operating pressure set point.</li> </ul>
Functional testing	▶ Annually	<ul style="list-style-type: none"> <li>■ Check of the operating pressure set point including a visual inspection.</li> </ul>
External inspection	▶ Every 2 years	<ul style="list-style-type: none"> <li>■ Function and tightness test including visual check.</li> </ul>
Internal inspection	▶ Every 5 years	<ul style="list-style-type: none"> <li>■ Replacement of all sealing elements, including a function and tightness test as well as a visual inspection.</li> </ul>
Hydraulic testing	▶ Every 10 years	<ul style="list-style-type: none"> <li>■ Replacement of all sealing elements, including a function, leak and pressure test as well as an inspection.</li> </ul>

### 7.3 Fault table

Fault	Cause	Remedial action
■ Combined pressure regulator leaking	Bellows leaking due to contaminated medium	▶ Install / clean dirt trap ▶ Replace bellows
■ Leak between body and spring cover	Seal damaged	▶ Replace seal
	Diaphragm damaged	▶ Replace diaphragm and seal
■ Connection "C" leaking	Union nut / connecting nipple loose	▶ Tighten to the specified torque □ Union nut 120 Nm □ Connecting nipple 80 Nm
	Seal damaged	▶ Replace seal
■ 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
	Combined pressure regulator incorrectly configured for the plant conditions	▶ Reconfigure and replace the combined pressure regulator
■ Tank pressure is not restored	Operating pressure setpoint shifted	▶ Restore the operating pressure as described in chapter 6
	Combined pressure regulator incorrectly configured for the plant conditions	▶ Reconfigure and replace the combined pressure regulator
■ Overflow function does not trip	Operating pressure setpoint shifted	▶ Restore the operating pressure as described in chapter 6
	Combined pressure regulator incorrectly configured for the plant conditions	▶ Reconfigure and replace the combined pressure regulator
■ Safety function does not trip	Operating pressure setpoint shifted	▶ Restore the operating pressure as described in chapter 6
	Combined pressure regulator incorrectly configured for the plant conditions	▶ Reconfigure and replace the combined pressure regulator
■ Damage to the inlet/outlet	Transport damage	▶ Replace combined pressure regulator
	Wrong connecting thread / tightening torque too high	▶ Replace combined pressure regulator
	Impermissible forces such as bending or torsional forces are being transmitted.	▶ Install stress-free
■ Reduced flow rate	Screens contaminated	▶ Clean / exchange screens

### 7.4 Spare parts

We require the following details for your spare part orders:

- Article no. of the spare part package,
- desired delivery quantity,
- dispatch and delivery address,
- desired method of dispatch.



## 7.5 Returns / complaints

Use the Service form in case of returns/complaints.



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

## 8 Disassembly and disposal

### 8.1 Notices regarding the disassembly

- ▶ Take note of all national and local safety requirements.
- ▶ The pipework system must be depressurised.
- ▶ The medium and valve must be at ambient temperature.
- ▶ Aerate / flush the pipework system 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 materials:
  - Metal
  - Synthetic material
  - Electronic scrap
  - Greases and lubricating fluids
3. Carry out a sorted disposal of the materials.

