
Operating instructions

**Angle safety valve
for cryogenic applications**



IMPORTANT

Read carefully before use.

Retain for later use.

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1 About these instructions

1.1 Principles

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




1.2 Applicable documents

Document	Contents
Catalogue page	Description of the safety 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
 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 notice is ignored.

2 Safety

2.1 Intended use

The safety valve protects the vessel and pipework systems against impermissible excessive pressure. The permissible operating conditions are specified in these operating instructions.

The safety 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.
- ▶ Warranty claims against HEROSE GMBH will be rejected if the HEROSE seal is broken by unauthorised companies.

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 safety valve the operating instructions must be available in their vicinity. People could be seriously injured or killed if the operating instructions are not followed.

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

2.3 Requirements for persons who work with the safety valve

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

- They must be physically able to control the safety valve.
- They are able to safely carry out the work with the safety valve within the scope of these operating instructions.
- They understand the operating principles of the safety valve works within the scope of their work and can recognise and avoid the hazards associated with 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 safety 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 safety 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 safety valve are not adhered to, the safety valve may sustain damage, accidents may be caused and people may be seriously injured or killed.

- ▶ Adhere to the thresholds. See chapter "4 Description of the safety 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.
- ▶ Stand to the side of or behind the valve during lifting.
- ▶ The outlet must be free.

Flammable media and dusts.

Risk of sustaining burns!

- ▶ Avoid potential sources of ignition in the immediate vicinity of the safety valve.
- ▶ Attach warning signs.

Risk of injury due to pressure.

Injury due to the valve being flung away!

- ▶ Depressurise and empty all supply lines before dismantling the valve.
- ▶ Make sure that the system is depressurised.
- ▶ Secure against being pressurised again.
- ▶ Do not bend over the valve when dismantling.

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.

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 safety valves.

Risk of injury due to thermal influences!

- ▶ Insulate the safety valve.
- ▶ Attach warning signs.

Medium escaping at high speed and high/low temperature.

Risk of injury!

- ▶ Wear the prescribed protective equipment
- ▶ Secure the discharge area

NOTICE

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

Safety valve body leaking or broken!

- ▶ 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 the safety valve diffusion-tight

Improper mounting.

Damage to the safety valve!

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

Painting of safety valves and pipelines.

Impairment of the function of the safety valve / loss of information!

- ▶ Protect stem, plastic parts and type plate against the application of paint.

Exceeding the maximum permissible operating conditions.

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

3.3 Storage

- ▶ Store the safety 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 safety valve

Refer to the respective catalogue page for further detailed information.




4.1 Structure

Design

Directly acting angle type safety valve, spring-loaded.

4.2 Valving marking

The safety valves are provided with an individual marking for identification.

Symbol	Explanation
e.g. G1/2	Connection size
PN.....	Rated working pressure (max. permissible operating pressure)
	Manufacturer's mark "HEROSE"
e.g. 1.4301	Material no.
CE 0045	CE mark, ID of notified body
Π 0045 beP	PI valving marking, number of notified body, in-house testing service
O2	For use with oxygen
e.g. 06381	Type
e.g. 01.18	Year of construction MM/YY
TÜV SV XX – XXX	Component identification
e.g. EN13648-1:xxxx	Applied standard: date of issue
-.....°C +.....°C	Temperature, min. / max.
 	UV stamp holder, National Board Registered
S/G/L F/K/S	Intended for steams, gases, liquids Intended for free-flowing, grainy, dusty goods
AD 2000 / ASME	Rules and regulations for performance data
Axx.x	Narrowest flow area A in mm ²
e.g. x.xx bar xx PSI	Test pressure
0.xx	Certified coefficient of discharge K_{dr}
x.xxx	Coefficient of discharge <i>Rated Slope</i>
xxx Nm ³ /h xxx SCFM	Volumetric flow rate
10% / 5%	Normal lift / full lift
e.g. 1.8 mm	Rated travel
e.g. SN: 01234567	Serial no.
CRN XXXXXX.XX	Canada approval no.
TSF700D36-2021	Manufacturing permit for special devices – People's Republic of China

4.3 Intended use

Safety valves protect vessels and pipework systems against impermissible excess pressure. Safety valves represent the last line of safety for a vessel or pipework system. They should be capable of preventing impermissible excess pressure when all other upstream regulating, control and monitoring devices have failed. In order to ensure this operability, safety valves require special attention during their mounting and maintenance.

A safety valve is a piece of equipment with a safety function for protecting pressure equipment when the permissible limits are exceeded and is thus subject to Directive 2014/68/EU (Pressure equipment directive) of the European Parliament and of the Council, article 2, section 4.

4.4 Operational data

Type	d ₀ [mm]	Pressure range [bar]	Max. back pressure [%]	Temperature [°C]		Medium
06001/06011	6.0	5.0 to 55	3%	-196 °C to +65 °C		See section "4.5 Media"
06002/06006/ 06012/06016		1.0 to 55		-196 °C to +150 °C		
06381 06386/06387 06416/06417	10.5	0.2 to 25		-196 °C to +185 °C		
06386/06387 06416/06417	14.0	0.2 to 40				
06388/06418 06383/06413 06430/06435	7.0	3.3 to 50		PTFE- TFM -60 °C to +150 °C	PTFE- carbon; PCTFE -196 °C to +185 °C	
	10.5	2.9 to 50				
	15.0					
06388/06418	23.0	2.0 to 50				
06389/06419	7.0	20 to 25		-196 °C to +185 °C		
	10.5	1.8 to 5.99		-196 °C to +60 °C		
		6.0 to 40				
06420/06421 06425/06426 06440/06441 06445/06446	7.0	0.4 to 50		-196 °C to +185 °C		
	10.5	0.4 to 2.99				
	14.0	3.0 to 50				
	18.0	0.4 to 40				
	23.0	0.4 to 10	-196 °C to +150 °C			
06474/06478	6.0	0.4 to 55				
06800/06801 06805/06806	12.5	3.0 to 25.0	15%	-270 °C to +225 °C		
	15.0					
	20.0					
	23.0					

4.5 Media

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

Name
Argon
Chlorotrifluoromethane
Nitrous oxide
Ethane
Ethylene
Helium
Carbon dioxide
Carbon monoxide
Krypton
Air
LPG
LNG
Methane
Neon
Oxygen,
Nitrogen,
Trifluoromethane,
Hydrogen
Xenon

4.6 Materials

- ▶ See catalogue page.

4.7 Scope of delivery

- Safety valve.
- Operating instructions.

4.8 Dimensions and weights

- ▶ See catalogue page.

4.9 Lifetime

The user is obligated to use Herose products 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 synthetic material components and elastomer sealing elements fitted to the product should be replaced as a precautionary measure before mounting and use.

5 Assembly

Other assembly steps may be necessary depending on the plant and type of safety valve. In the following instructions only the major assembly steps are summarised. The instructions are intended only for coarse orientation. The gasket manufacturer's data must be observed. Safety valves that are subject to special cleaning regulations may only be unpacked shortly before assembly. When unpacking, it must be ensured that the packaging is intact up to this point and that the safety valve is not contaminated. In addition, it must be ensured that the cleanliness requirements are also met during the assembly and that the safety valve is not contaminated.

5.1 Installation position

Type	Installation position
06001/06011/ 06002/06006/ 06012/06016	The safety valves can be installed vertically or in a horizontal installation position with the outlet facing downwards.
06381 06383/06413 06386/06387 06388/06418 06389/06419 06416/06417 06430/06435	Vertical The safety valves 06388, 06383, 06430 and 06418, 06413, 06435 can also be installed in a horizontal installation position with the outlet facing downwards.
06420/06421 06425/06426 06440/06441 06445/06446	The safety valves can be installed vertically or in a horizontal installation position with the outlet facing downwards.
06474/06478	The safety valves can be installed vertically or in a horizontal installation position with the outlet facing downwards.
06800/06801 06805/06806	Vertical

5.2 Notices regarding the mounting

- ▶ Use suitable tools.
 - Open-ended spanner,
 - Torque wrench.
- ▶ Clean tools before the mounting
- ▶ Open the packaging only directly before the mounting. Free from oil and grease for oxygen (O₂). Safety valves for oxygen are permanently marked with "O₂". Take note of the HEROSE information sheet "O₂ instructions".
- ▶ Install the safety valve only if the maximum operating pressure and operating conditions correspond to the marking on the safety valve.
- ▶ Remove protective caps or covers before mounting.
- ▶ Check the safety valve for dirt and damage. DO NOT install damaged or dirty safety valves.
- ▶ Remove dirt and residues from the pipeline and safety valve in order to prevent leaks.
- ▶ Avoid damaging the connections. The sealing surfaces must remain clean and intact.
- ▶ Seal the safety valve using suitable seals. No sealant (sealing tape, liquid sealing tape) may enter the safety valve. Respect the suitability for use with O₂.
- ▶ 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 safety valve. Observe reaction forces.
- ▶ Temperature-dependent changes in length in the pipework system must be compensated with expansion joints.
- ▶ The safety valve is supported by the pipework system.
- ▶ The safety valve must be protected against dirt and damage during construction work.
- ▶ Check the leak-tightness.

Tightening torques

			max. tightening torque [Nm]							
			Male thread				Female thread			
Type	Material	Thread	G	NPT	R; Rc	M	G	NPT	R; Rc	
06001/06011 06002/06012 06006/06016	CW617N	1/4"	21	29	28					
		3/8"	50	50	45			45		
		1/2"	100	110	90					
	1.4408	1/4"	34	29	43					
		3/8"	80	70	70				70	
		1/2"	160	130	140					
06381 06383/06413 06386/06416 06387/06417 06388/06418	CW614N	1/2"	39	70	80					
		3/4"	110	180	160					
		1"	200	340	290					
		1 1/4"	500	550	540					
		1 1/2"	1000	720	700					
		2"	1900	1100	1300					
	1.4301	1/2"	60	70	130			70	180	150
		3/4"	180	200	260					
		1"	340	380	470					
		1 1/4"	840	900	870					
		1 1/2"	1600	1100	1100					
		2"	3100	1800	2100					
		M26x1.5				120				
		M30x1.5				230				
	1.4404	M40x2				270				
		M65x1.5				780				
	1.4571	M50x1.5				790				
	CC491K	1"						110	250	440
		1 1/4"						170	390	750
		1 1/2"						220	550	1000
		2"						340	880	1900
	1.4308	1"						230	490	440
		1 1/4"						360	760	750
		1 1/2"						460	1000	1000
		2"						700	1700	1900
	06389/06419	CW614N	1/2"	60	100	90				
			3/4"	190	180	160				
		CC491K	1"	220						
06420/06425 06421/06426 06430/06435 06440/06445 06441/06446	CW614N	1/2"	60	110	90					
		3/4"	130	180	160					
		1"	290	340	290					
		1 1/4"	640	560	550					
	1.4301	1/2"	100	160				70		
		3/4"	210	290				120		
		1"	480	550				240		
		1 1/4"	1000	900				390		
		M26x1.5				100				
	M40x2				240					
	CC491K	1"						110	260	220
		1 1/4"						180	430	
1 1/2"							230	560		

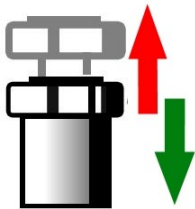
			max. tightening torque [Nm]						
			Male thread			Female thread			
SV-type	Material	Thread	G	NPT	R; Rc	M	G	NPT	R; Rc
06477/06478	1.4301	1/4"	35	46	45				
		3/8"	90	80					
		1/2"	190	180					
		3/4"	290	290	260				
		M18x1,5				70			
		M26x1.5				110			
		M30x1.5				180			
	1.4571	1/4"	38	49	47				
		3/8"	90	80					
		1/2"	200	190					
		3/4"	310	310	280				
		M18x1,5				80			
		M26x1.5				120			
		M30x1.5				200			
	CW614N	1/4"	21	29	28				
		3/8"	50	50					
		1/2"	110	110					
		3/4"	180	180	160				
		M18x1,5				47			
		M26x1.5				60			
		M30x1.5				110			
CC491K	1/2"					36	80	70	
06800/06805 06801/06806	1.4571	1/2"	120	180	160		80	190	
		3/4"	280	310	280		120	310	
		1"	360	580	500		250	580	
		M40x2				280			
	1.4404	M40x1,5				270			
	1.4408	1"					220	490	
		1 1/4"					350	760	
		1 1/2"					450	800	

6 Operation

- ▶ The maximum permissible pressure drop in the supply lines to the safety valves may not exceed the 3% pressure difference between the response pressure and superimposed back pressure on the safety valve.
- ▶ Vibrations are to be avoided.
- ▶ Check the following points prior to start-up:
 - All mounting and installation work are completed.
 - Compare the material, pressure, temperature and installation position with the layout plan for the pipework system.
 - Dirt and residues have been removed from the pipeline and safety valve in order to prevent leaks.

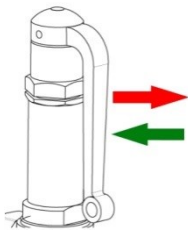
6.1 Liftability (manual actuation for testing)

- Lifiable safety valves are equipped with an appropriate device above the spring cap.
 - ▶ Lifiable safety valves can be made to open at $\geq 85\%$ of the set pressure without aids.
 - ▶ Typical lifting cases are initial commissioning, after breaks in operation and functional testing; the procedure is as follows:



Step 1: Loosen the lifting knob and pull it upwards until blow-off of the operating medium is clearly audible.

Step 2: Release the lifting knob and tighten it again.



Step 1: Pull the lifting lever away from the spring cap until blow-off of the operating medium is clearly audible.

Step 2: Release the lifting lever again

7 Maintenance and service

7.1 Safety during cleaning

- ▶ Take note of the specifications in the safety data sheet, the general occupational health and safety rules and the HEROSE information sheet "Use with oxygen" 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 operating company according to the operating conditions.

The recommendations for the functional checking of the safety 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"> ■ Visual inspection <ul style="list-style-type: none"> <input type="checkbox"/> of the valve for damage; <input type="checkbox"/> of the valving marking for legibility; <input type="checkbox"/> for absence of damage to the sealing. ■ Leak-tightness <ul style="list-style-type: none"> <input type="checkbox"/> Union of the valve seat. ■ If existent, actuation of the lifting device.
Functional testing	▶ Annually	<ul style="list-style-type: none"> ■ If present, test of lifting device including visual inspection.
External inspection	▶ Every 2 years	<ul style="list-style-type: none"> ■ Function and tightness test including visual check.
Internal inspection	▶ Every 5 years	<ul style="list-style-type: none"> ■ Replacement of all sealing elements by the manufacturer including functional, tightness test and visual check.
Hydraulic test	▶ Every 10 years	<ul style="list-style-type: none"> ■ Replacement of all sealing elements by the manufacturer including functional, leak-tightness, pressure test and inspection.

7.3 Fault table

Fault	Cause	Remedial action
<ul style="list-style-type: none"> ■ Safety valve does not respond 	Covers have not been removed;	▶ Remove covers.
	Test pressure too high;	▶ Replace the safety valve.
	Back pressure not taken into account;	▶ Replace the safety valve.
<ul style="list-style-type: none"> ■ Not liftable 	Pressure below 85% of the set pressure;	▶ Lifting in the range $\geq 85\%$ of the set pressure without aids.
<ul style="list-style-type: none"> ■ Leak in the seating 	Foreign bodies between cone and seating, contaminated medium;	▶ Remove foreign bodies by briefly lifting / flush the system or replace the safety valve.
	Seating damaged;	▶ Replace the safety valve.
	Cone seal damaged;	▶ Replace the safety valve.
	Safety valve has chattered;	▶ See "Chattering".
<ul style="list-style-type: none"> ■ Damage to the inlet/outlet 	Transport damage;	▶ Replace the safety valve.
	Wrong connecting thread / tightening torque too high;	▶ Replace the safety valve.
	Impermissible forces such as bending or torsional forces are being transmitted;	▶ Install stress-free.
<ul style="list-style-type: none"> ■ Shock waves 	Safety valve not mounted at the highest point;	▶ Install the safety valve at the highest point.
	water not drained correctly or at all;	▶ Attach water drain according to regulations.
<ul style="list-style-type: none"> ■ Constantly blowing off 	Spring corroded by impermissible medium and broken;	▶ Replace the safety valve.
	System pressure too high	▶ Replace the safety valve.
	Seal damaged;	▶ Replace the safety valve.
<ul style="list-style-type: none"> ■ Chattering 	Pressure drop in the inlet line $>3\%$;	▶ Reduce resistance through chamfer or radius in the connecting socket; choose a larger one if necessary. ▶ Shorter inlet line. ▶ Incorrect safety valve; exchange it.
	Seals for inlet and outlet connector too small or not installed centrally;	▶ Change conditions.
	Safety valves are too powerful;	▶ choose smaller safety valves.
	Outlet line too long or diameter too small;	▶ Use a larger nominal diameter or a back-pressure-compensating stainless steel bellows. The max. height is to be specified by the manufacturer.
	Inlet or outlet connector too small;	▶ Dimensions must be larger than the nominal inlet or outlet diameter.
	Back pressure higher than 3%;	▶ Use back-pressure-compensating stainless steel bellows. The max. height is to be specified by the manufacturer.
<ul style="list-style-type: none"> ■ Inadequate capacity 	Safety valves dimensioned incorrectly for the plant conditions;	▶ Re-dimension and replace the safety valve.
	Safety valves not being used in accordance with the applicable regulations;	▶ Change conditions.

7.4 Repairs

Repairs to the safety valves 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 › Service › Product service › Complaints
 E-mail: 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 the safety valve must be at ambient temperature.
- ▶ Aerate / flush the pipework system in the case of corrosive and aggressive media.

8.2 Disposal

1. Dismantle the safety valve.
 - ▶ 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.

