

COOLPOWER

5/100, 5/100 T, 7/25, 140 T, 50

Cold Heads

Installation and Operating Instructions GA12119_002_A3

Part Numbers

893 04

893 05

129 78

842 040

842 030

842050V000X



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This is the original installation and operating instructions.

Obligation to Provide Information

Before installing and commissioning the COOLPOWER, carefully read these Operating Instructions and follow the information so as to ensure optimum and safe working right from the start.

The Oerlikon Leybold Vacuum **COOLPOWER** has been designed for safe and efficient operation when used properly and in accordance with these Operating Instructions. It is the responsibility of the user to carefully read and strictly observe all safety precautions described in this section and throughout the Operating Instructions. The pump **must only be operated in the proper condition and under the conditions described in the Operating Instructions**. It must be operated and maintained by trained personnel only. Consult local, state, and national agencies regarding specific requirements and regulations. Address any further safety, operation and/or maintenance questions to our nearest office.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE is used to notify users of installation, operation, programming or maintenance information that is important, but not hazard related.

We reserve the right to alter the design or any data given in these Operating Instructions. The illustrations are not binding.

Retain the Operating Instructions for further use.

NOTICE



DANGER



WARNING



CAUTION



NOTICE



Safety information



WARNING

0 Important Safety Information

0.1 Mechanical hazards

1. The cold head and the pressure lines are pressurised to a helium filling pressure of up to 16 bar during standstill and up to 28 bar during operation.
 2. Even after switching off, cold head and pressure lines remain pressurised up to a filling pressure of 16 bar.
 3. Fit or disassemble the pressure lines only after having switched off the compressor unit first.
 4. Releasing the pressure lines while the cold head is cold may, when warmed, cause a pressure rise which may exceed the permissible operating pressure of 28 bar.
 5. The cold head must only be operated with the specified compressors, pressure lines and electrical connecting lines.
 6. For its conforming utilisation the cold head must be installed within an insulating vacuum. The operator is responsible for properly designing the vacuum vessel.
 7. All lines which are used (electric lines and pressure lines) must be undamaged.
 8. Do not lay flexible pressure lines along passageways – risk of damage and corrosion!
 9. Always maintain a bending radius of at least 20 cm – risk of pinching!
 10. Do not damage the pressure lines with pointed or sharp items!
 11. Do not repair pressure lines!
 12. Do not install any damaged pressure lines!
 13. After disassembly, provide the self-sealing fittings with protection caps.
 14. Pressurised parts of the cold head must not be processed mechanically or thermally.
-

0.2 Electrical hazards

1. The electrical connections must only be provided by a trained electrician in accordance with VDE 0105 according to the guidelines of VDE 0100 (or corresponding to the harmonised national standards and guidelines which apply in the country where the equipment is being operated).
2. The electrical connecting line between the compressor unit and the cold head must only be connected or disconnected provided the compressor unit was switched off first and reliably disconnected from the mains power. Risk of suffering an electric shock. Moreover, compressor unit and cold head may suffer damage.
3. Un-authorized conversions and modifications to the equipment are prohibited for safety reasons.
Hazardous voltages are present inside the cold head. In case of contact, death or severe injury can result.
4. After all servicing work, running of an electrical safety test is mandatory.
5. Do not expose the cold head to splash or drip water.
6. Lay the connecting lines so that they cannot be damaged. Protect the lines against humidity and contact with water.
7. When storing the cold head and the connecting cables in a humid atmosphere then these components may corrode. Corrosion forms conductive deposits which can result in short-circuits or reduced insulation of voltage carrying parts.

WARNING



0.3 Thermal hazards

1. During operation the cold stages become very cold, touching will cause skin injury. Never operate the cold head without insulating vacuum.
2. The cold head motor or the low pressure helium connection can get hot (50 to 60 °C approx.). Protect parts from being touched inadvertently and leave these to cool down before beginning any maintenance work on the instrumentation.

CAUTION



Safety information



DANGER

0.4 Hazards caused by materials and substances

1. When draining out helium do not direct the gas in the direction of persons or components. Compressed gas at high concentrations can have a suffocating effect. Do not breathe in helium at high concentrations!
2. The cold head may suffer contamination from the process or due to environmental influences. Contaminated parts can cause health impairments and environmental damage. Before beginning with the work inform yourself about any possible contamination. When handling contaminated components, observe the pertinent regulations and comply with the protective measures.
3. When using the regeneration heaters from Oerlikon Leybold Vacuum, note the safety precautions detailed in the enclosed Operating Instructions.

CAUTION



0.5 Danger of ignition

1. Risk of explosion!
The cold head in its standard version is not suited for operation in explosion hazard areas. Please consult us if planning such a use.

CAUTION



0.6 Dangers in connection with safety-related measures and precautions

1. The insulating vacuum must be provided with a safety valve which opens
 - when a leak occurs between the high-pressure helium and the insulating vacuum
 - when frozen gases which collect because of leaks in the insulating vacuum are released when shutting down and warming the cold head.
2. The safety valve present at the cold head must not be blocked or modified.
3. The cold head is operated through the connected compressor. In the event of a brief mains power failure the compressor will automatically revert to its previous operating status.

NOTICE



0.7 Risk of damage to the cold head

1. Only very high purity helium (with a purity of 99.999% or higher) must be used.
 2. Operate the cold heads with the permissible settings at the compressor only. The cold heads described operate off three-phase mains power. For this refer to the notes in the Operating Instructions for the compressor.
 3. Operating the cold head motor without connected helium circuit will cause a thermal overload of the cold head motor and damage to the cold head.
 4. Do not confuse high-pressure and low-pressure connections. Confusing these can cause damage in the cold head.
-

1 Description

Gifford-McMahon cryogenerators consist of:

- the cold head,
- the compressor unit,
- and flexlines.

1.1 Design and Function

The cold heads COOLPOWER 5/100 (T), COOLPOWER 7/25, COOLPOWER 140 T and COOLPOWER 50 generate in connection with a compressor unit “cryogenic” temperatures, i.e. temperatures below 120 K (K = Kelvin).

The COOLPOWER 5/100 (T) and 7/25 units are of a two-stage design, the COOLPOWER 140 T and 50 are of a single-stage design.

A cold head is utilized e.g. to refrigerate samples or to cool shielding plates or cryopanels.

A pair of flexlines connect it to a compressor unit. Cold head, flexlines and compressor unit are equipped with self-sealing fittings and are filled with high-purity, high-pressure helium gas.

Oerlikon Leybold Vacuum cryogenerators operate in a closed helium gas cycle according to the Gifford-McMahon principle. In this process, helium gas is compressed in a compressor. The pressure is then decreased in the cold head to generate low temperatures.

Gifford-McMahon principle

A rotating control valve (1/8) controls the movement of the displacer, the expansion of the helium gas in the cold head, and the pneumatic drive of the displacement piston. The control valve is mounted on the shaft of a synchronous motor (1/9) which is supplied with electric power from the compressor unit.

Control valve

The frequency of the compressor piston movement is 2 Hz at a line frequency of 50 Hz, 2.4 Hz at a line frequency of 60 Hz.

For the two-stage cold heads, the displacer pistons of the 1st (1/3) and 2nd stage (1/6) are mechanically interconnected.

A safety valve (1/11) protects the cold head against excessively high helium pressure.

Safety valve

The cold head has a weld-on pipe (1/7) or a flange for mounting on the system.

The refrigerating capacity of the refrigeration stages depends on the temperature. Fig. 4 shows the characteristic curves for refrigerating capacity.

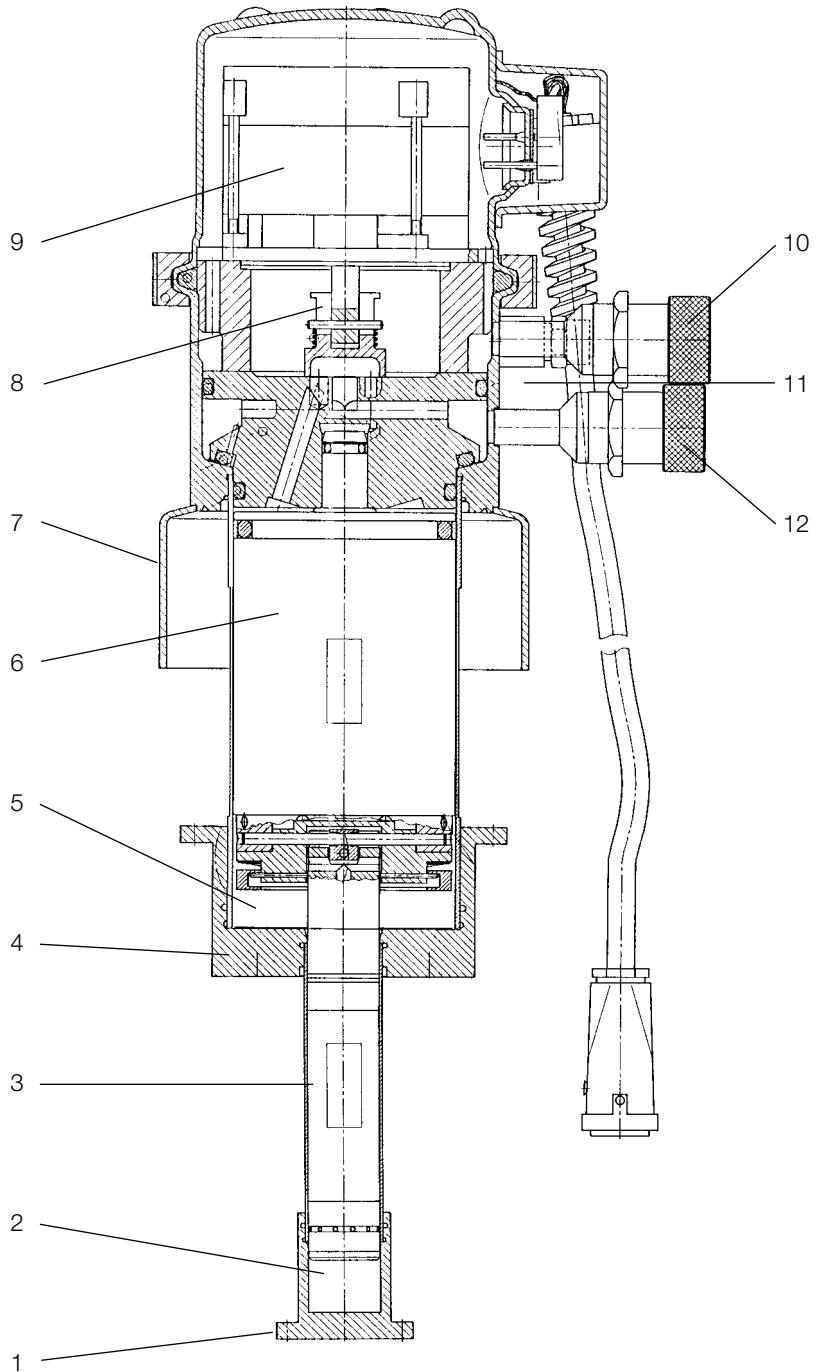
1.2 Standard Specification

Gifford-McMahon cold head with copper flanges, safety valve and power cord with plug for connection to the compressor unit.

The cold head is filled with 16 bars of ultra-pure helium (99.999 % purity or higher).

The COOLPOWER 5/100 (T) and 140 T have a mounted electrical cable with plug for connection to the compressor unit.

Description



- 1 2nd (refrigeration) stage, copper flange
- 2 Expansion volume, 2nd stage
- 3 Displacer piston, 2nd stage
- 4 1st (refrigeration) stage, copper flange
- 5 Expansion volume, 1st stage
- 6 Displacer piston, 1st stage
- 7 Weld-on pipe
(Flange for Part Nos. 893 04 and 842 030)
- 8 Control valve
- 9 Synchronous motor
- 10 Helium high-pressure connection
- 11 Safety valve
- 12 Helium low-pressure connection

Fig. 1 Two-stage Gifford-McMahon cold head COOLPOWER 5/100 (Part No. 893 05; schematic diagram)

1.3 Technical Data

Cold head COOLPOWER Part No.	5/100 893 04	5/100 893 05	5/100 T 129 78	140 T 842 030
Compressor unit COOLPAK	6000, 6200	6000, 6200	6000, 6200	6000, 6200
Refrigerating capacity at 50/60 Hz				
1st stage at 80 K, approx.	100 W	100 W	100 W	140 W
1st stage at 20 K, approx.	–	–	–	20 W
2nd stage at 20 K, approx.	6 W	6 W	7 W	–
2nd stage at 10 K, approx.	–	–	3 W	–
Lowest achievable temperature, approx.				
1st stage	≤ 35 K	≤ 35 K	≤ 35 K	≤ 15 K
2nd stage	≤ 10 K	≤ 10 K	6 K	–
Cooldown time of 2nd stage to 20 K, approx. to 20 K, approx.	20 min –	20 min –	20 min –	– 55 min
Permissible ambient temperature	10-40 °C			
He filling pressure at room temperature 1)	16(-1) bar			
Opening pressure of safety valve	28 bar			
He connections: Self-sealing fittings	1/2", m 2)			
Weight excluding power cord, approx.	8 kg			
Connection for mounting on the system	Flange DN 160 ISO-K	Weld-on pipe Ø 130 mm	Weld-on pipe Ø 130 mm	Flange DN 160 ISO-K
Holes with a thread M4 at the copper flanges				
1st stage	16	16	16	8
2nd stage	6	6	6	–
Length of power cord to the compressor unit	4.5 m			
Type of protection provided by the housing DIN/VDE Standard 0470-1	IP 52			

1) State of delivery; for filling pressure during operation refer to the Operating Instructions for the compressor unit.

2) f = female coupling, m = male coupling; Type „Aeroquip series 5400“ or compatible types

Description

Cold head COOLPOWER Part No.	7/25 842 040	50 842050V0000
Compressor unit COOLPAK	2000, 2200	2000, 2200
Refrigerating capacity at 50/60 Hz		
1st stage at 80 K, approx.	25 W	50 W
1st stage at 20 K, approx.	–	–
2nd stage at 20 K, approx.	7 W	–
2nd stage at 10 K, approx.	–	–
Lowest achievable temperature, approx.		
1st stage	≤ 35 K	≤ 25 K
2nd stage	≤ 10 K	–
Cooldown time		
of 1st stage to 20 K, approx.		20 min
of 2nd stage to 20 K, approx.	20 min	
Permissible ambient temperature	10-40 °C	
He filling pressure at room temperature 1)		
Opening pressure of safety valve	28 bar	
He connections:		
Self-sealing fittings	1/2", m 2)	
Weight excluding power cord, approx.	8 kg	
Connection for mounting on the system	Weld-on pipe Ø 130 mm	Weld-on pipe Ø 130 mm
Holes with a thread M4 at the copper flanges		
1st stage	8	8
2nd stage	6	–
Length of power cord to the compressor unit	–	–
Type of protection provided by the housing	DIN/VDE Standard 0470-1 IP 52	

1) State of delivery; for filling pressure during operation refer to the Operating Instructions for the compressor unit.

2) f = female coupling, m = male coupling; Type „Aeroquip series 5400“ or compatible types

1.4 Ordering Data

	Part No.
Cold head COOLPOWER 5/100	
with flange DN 160 ISO-K	893 04
with weld-on pipe	893 05
Cold head COOLPOWER 5/100 T	129 78
Cold head COOLPOWER 7/25	842 040
Cold head COOLPOWER 50	
with flange DN 100 CF-R	842050V0001
with weld-on pipe	842050V0000
Cold head COOLPOWER 140 T	842 030
Other flanges	upon request

Compressor units for COOLPOWER 5/100 T and 140 T

COOLPAK 6000-H	400 V, 50 Hz, 3ph, 470 V, 60 Hz, 3ph	840000V6001
COOLPAK 6200-H	200 V ¹⁾ , 50 Hz, 3ph, 200/230 V, 60 Hz, 3ph	840000V6201

Compressor units for COOLPOWER 7/25

Water cooling		
COOLPAK 2000	230 V, 50 Hz, 1ph	840000V2000
COOLPAK 2200	208 V, 60 Hz, 1ph	840000V2200
Air cooling		
COOLPAK 2000 A	230 V, 50 Hz, 1ph	840000V2010
COOLPAK 2200 A	208 V, 60 Hz, 1ph	840000V2210

Mains power cord for COOLPAK 6000		
3.5 m long, 4x4mm ² , with CE plug (32 A/6h, 3+N+PE)		893 95
3.5 m long, 4xAWG 12, with NEMA plug (L16-20P, 20 A/480 V)		893 96

Mains power cord for COOLPAK 6200 (also suitable for COOLPAK 6000 with conductor ferrules (4xAWG 10)		
10 m long		840 111
20 m long		840 112

COOLPAK: water-cooled compressor unit. The helium connections of the compressor units listed here are m ²⁾ 1/2", 1/2" self-sealing fittings.

Flexlines, in each case, 1 pair with f ²⁾ Aeroquip fittings		
FL 4.5 (1/2", 1/2"), 4.5 m long		892 87
FL 9.0 (1/2", 1/2"), 9 m long		892 88
Electrical connection cable for COOLPOWER 7/25, 4.5 m long	400 000 323	
Electric extension cable for the cold-head power cord, 4.5 m long		893 74

Further accessories for the connection and operation of cold heads: See the Operating Instructions for the compressor unit.

¹⁾ Operation at 230 V, 50 Hz is possible with additional measures.

²⁾ f = female coupling, m = male coupling; Type „Aeroquip series 5400“ or compatible types

Description

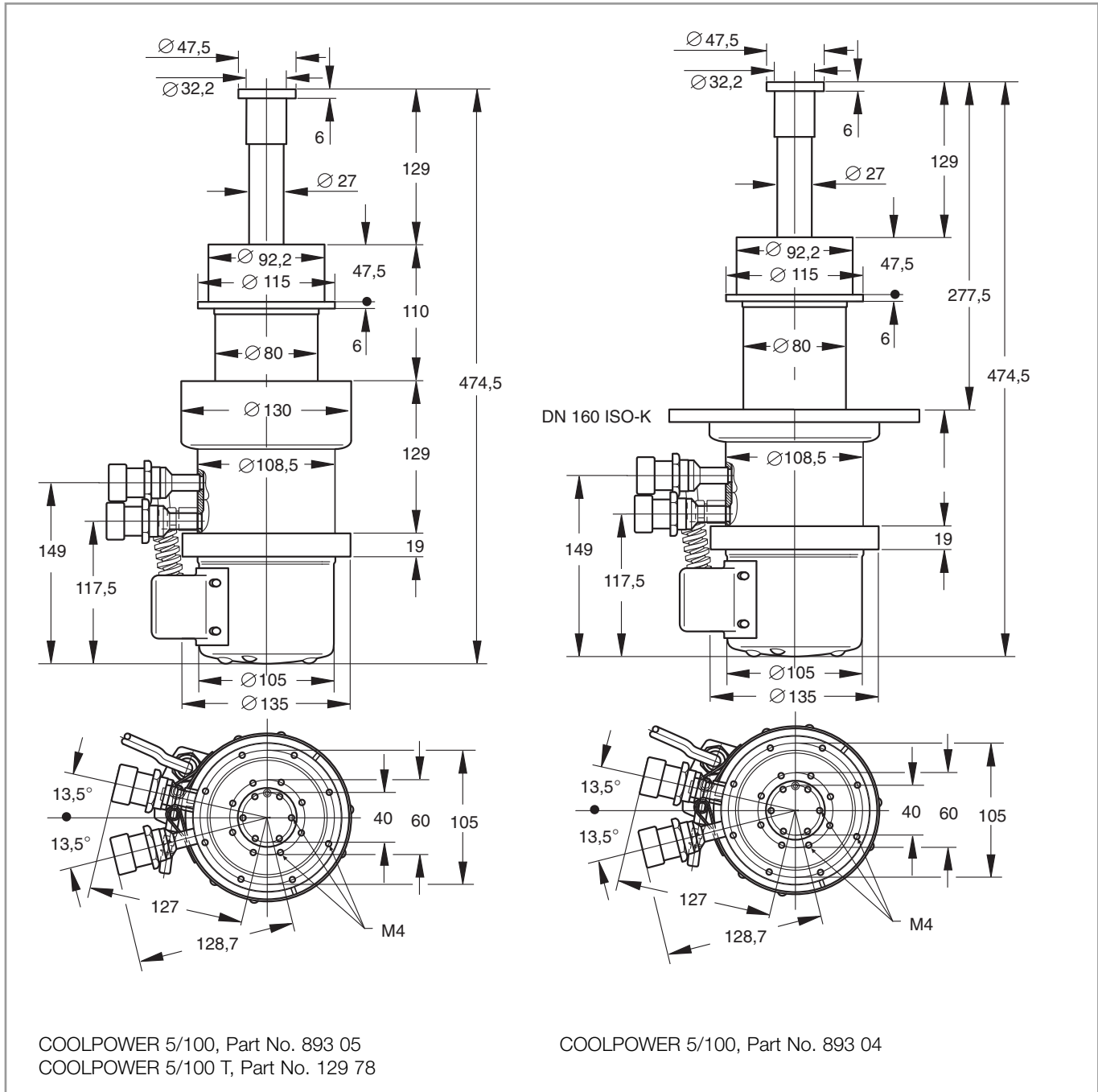


Fig. 2a Dimensional Drawing , dimensions in mm

Description

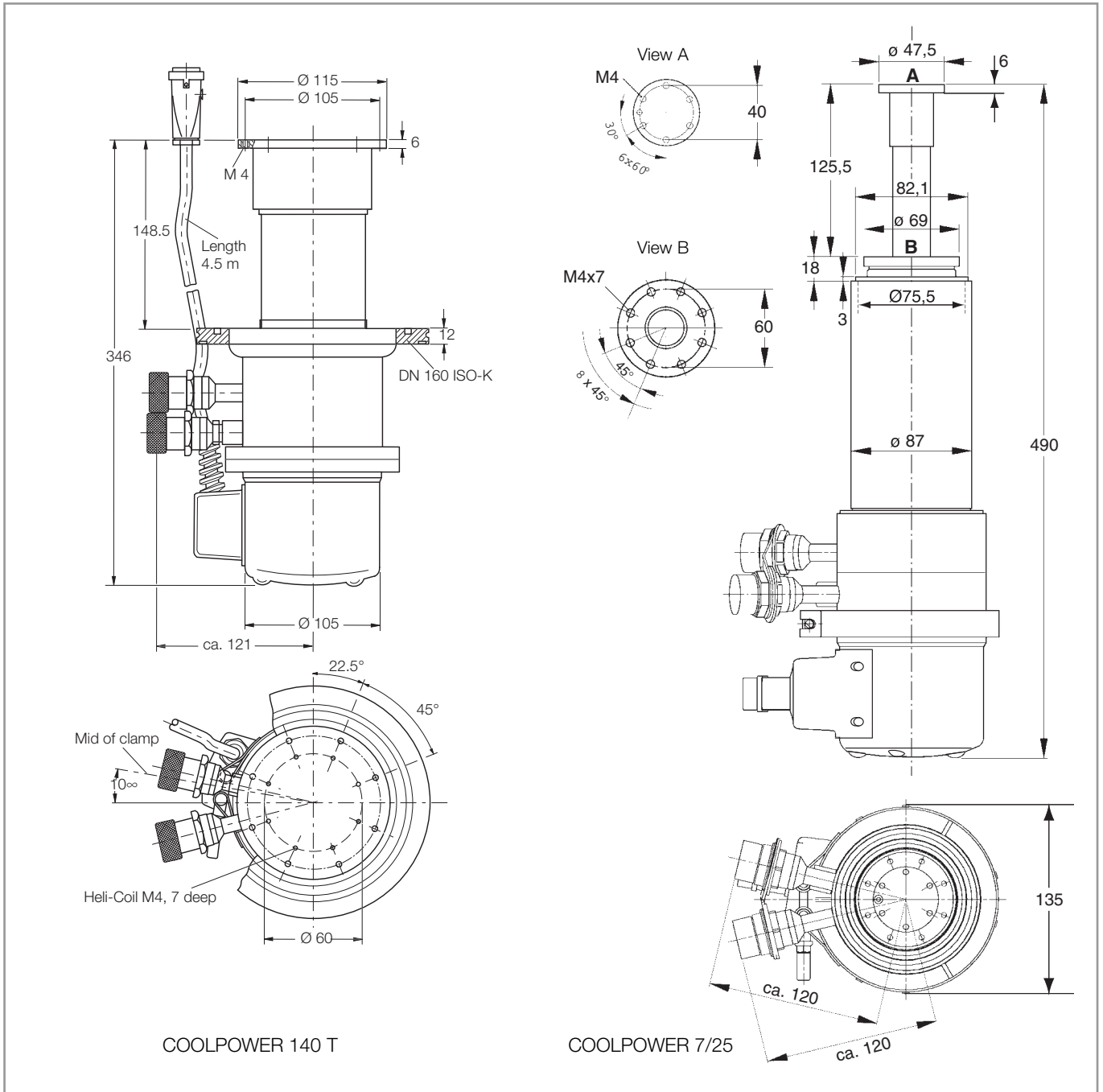


Fig. 2b Dimensional Drawing , dimensions in mm

Description

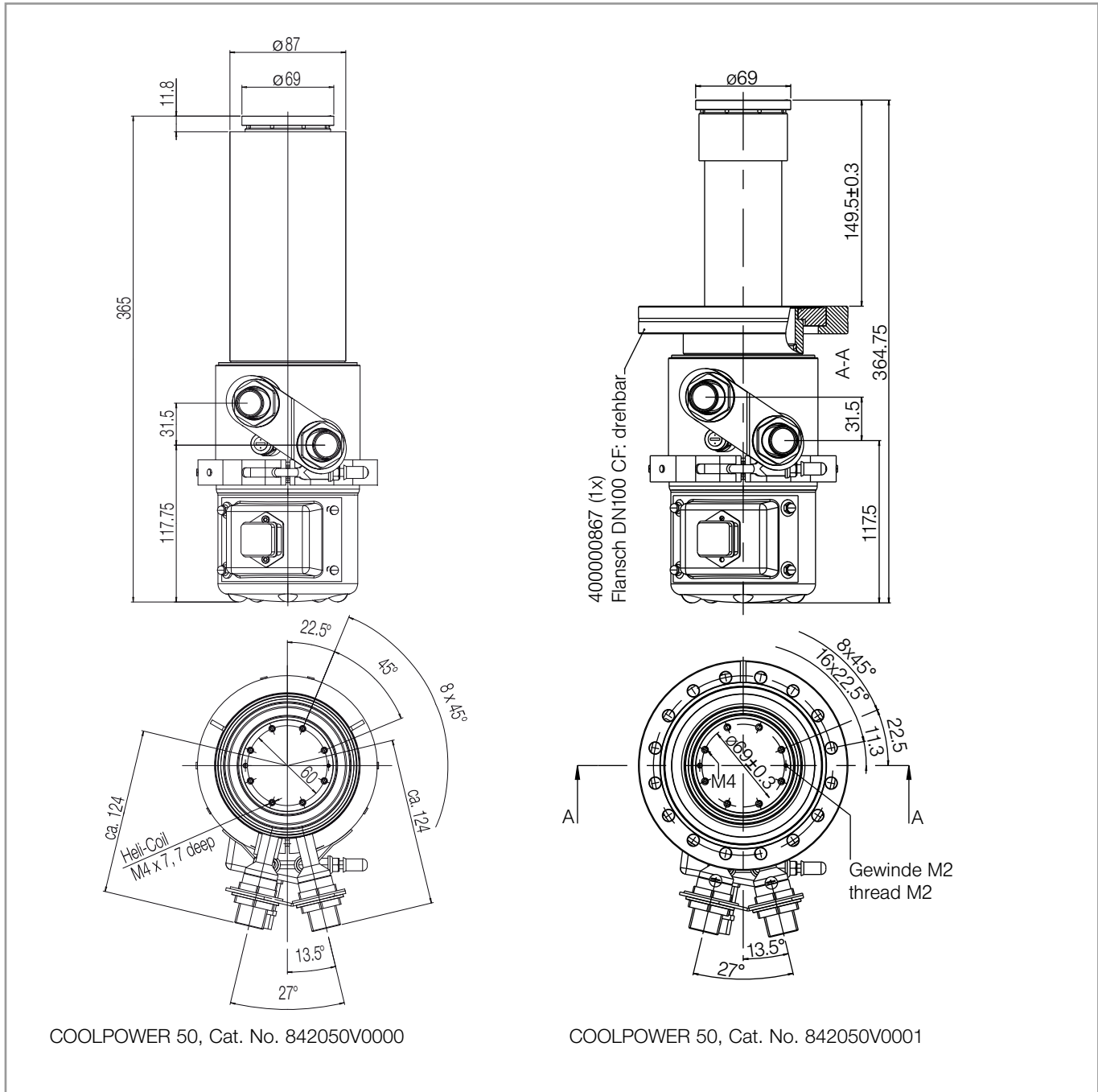


Fig. 2c Dimensional Drawing , dimensions in mm

Transportation and Storing

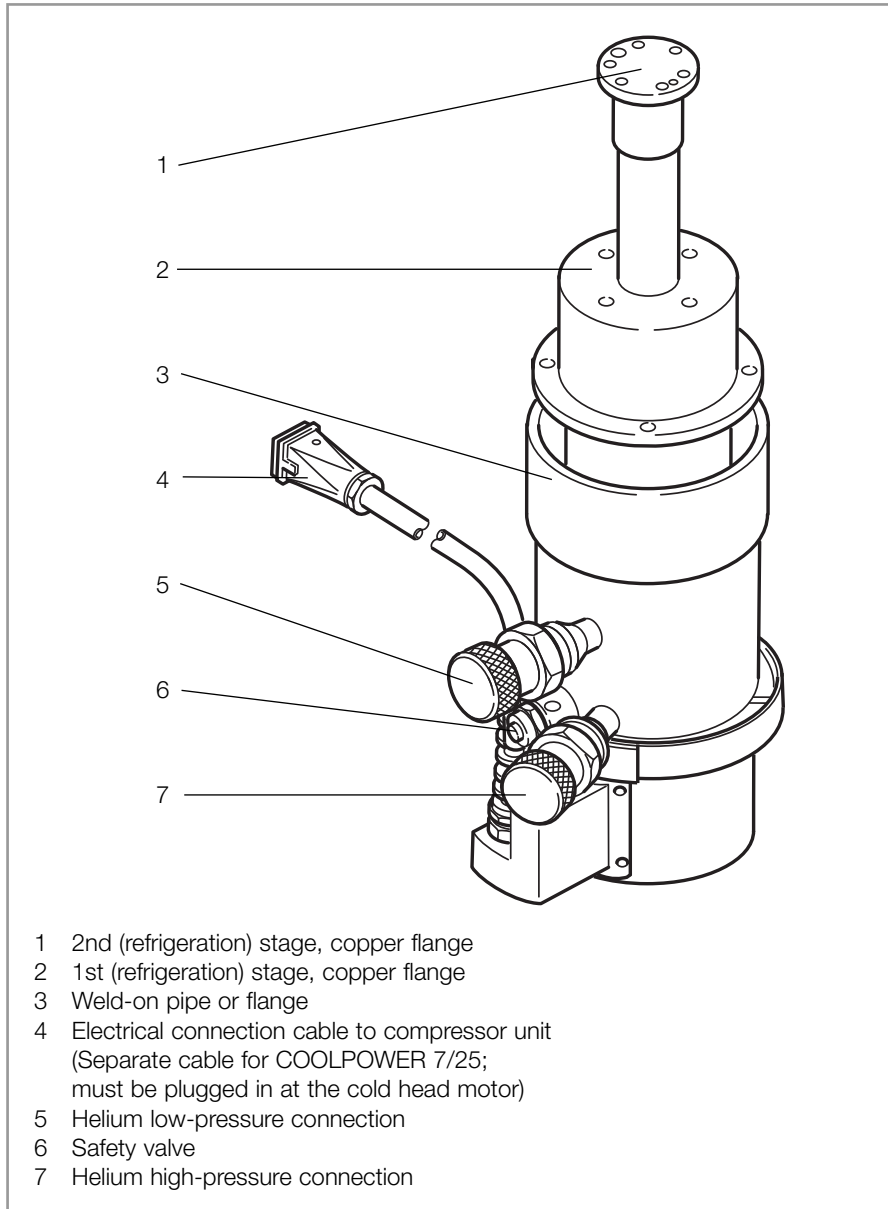


Fig. 3 Cold Head COOLPOWER 5/100

2 Transportation and Storing

Storing and transporting the cold head

Store the cold head in a dry place at temperatures between $-20\text{ }^{\circ}\text{C}$ and $+50\text{ }^{\circ}\text{C}$; during transportation avoid exposure to shock and vibration.

Due to the limited stability of the cold head, always use suitable props or supports (such as the original packaging) for storage and shipment.

The cold head must not be picked up by the second cooling stage for shipment. It can be handled at the motor and the connection flange.

Installation

3 Installation

3.1 Conforming Utilization

1. The cold head generates in connection with a compressor unit “cryogenic” temperatures, i.e. temperatures below 120 K (K = Kelvin).
2. The cold head has been designed for operation with a very high purity helium (purity 99.999% or higher). Compressors and connected cold heads have been designed to be operated in indoor rooms.
3. The cold head must, when being operated, be firmly installed to the insulating vacuum, respectively welded to it.
4. The cold head must only be operated with the compressors, pressure lines and electric connecting lines specified for it. Connecting other components requires prior approval by Oerlikon Leybold Vacuum.

3.1.1 Non-conforming utilization

Non-conforming utilizations for the cold head are among others:

1. Safety devices must not be disabled.
2. Use of helium which is not pure (a purity of 99.999 % or higher is required) or other gases.
3. Operation at helium pressures higher than those specified.
4. Use of the cold head in environments which demand a type of protection in excess of IP 54 and altitude above 1000 m.
5. Operation without connected helium pressure lines and compressor.
6. Removal, covering or obstructing warning information.
7. Standstill or storing the cold head without having sealed it off suitably and dried it. When stored in a humid atmosphere there is the risk of corrosion.
8. Cold head, cables and pressure lines must not be used to climb onto the system.
9. The use of compressors, cables, helium pressure lines and other accessories not approved as original accessories from Oerlikon Leybold Vacuum.
10. Conversions, modifications and maintenance work by personnel not authorised by Oerlikon Leybold Vacuum.

CAUTION

Any non-conforming utilisation of coldhead, cryo pumps and accessories can result in severe injury and may cause damage to components.

3.2 Unpacking and Checking the Delivery

Unpack the equipment immediately after delivery, even if it is to be put into operation at a later date.

Before doing so, examine the shipping container for any external damage.

Then completely remove the packaging materials. The shipping container and packaging materials must be kept in the case of return shipments becoming necessary.

Check that the equipment is complete and carefully examine it visually.

If any damage is discovered, report it immediately to the forwarding agent and insurer. If the damaged part has to be replaced, please get in touch with Oerlikon Leybold Vacuum.

In order to prevent the formation of condensate, leave the cold head to warm up to room temperature before installing it.

Installation

3.3 Connecting the cold head

Insulation vacuum

The cold head can be installed in any position. The cold head is delivered complete with a weld-on pipe or with a flange for installation in a system.

The copper flanges have holes with an M4 thread. They are used to fasten parts to be cooled.

Connect the cold head to the compressor unit. Refer to the Operating Instructions for the compressor unit.

The refrigerating stages have to be thermally vacuum insulated from the environment ($p \leq 5 \cdot 10^{-2} \text{ mbar}$) to be able to cool the cold heads. We will gladly be of assistance in selecting a suitable vacuum pump.

NOTICE



Do not interchange the high-pressure- with the low-pressure connections. Wrong connection may damage the cold head.

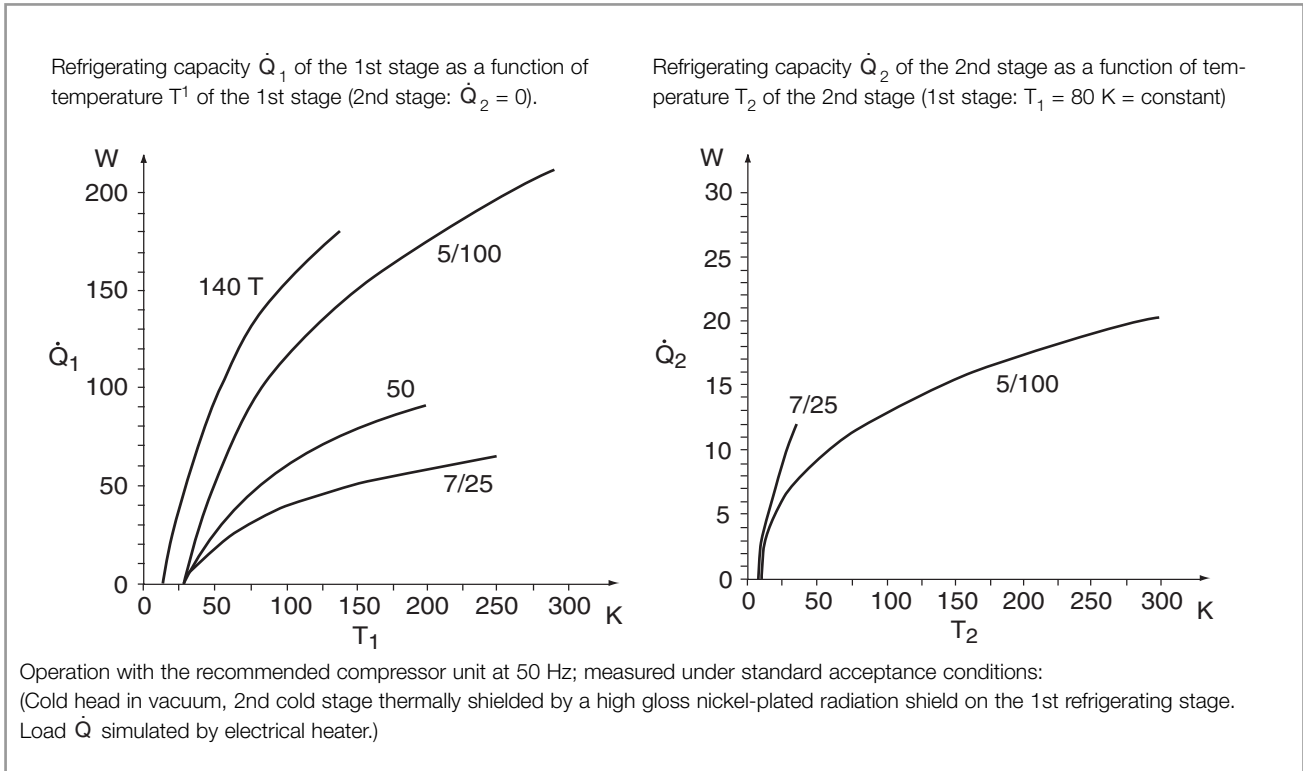


Fig. 4 Refrigerating capacities as a function of the temperature

3.4 Electrical Connection

Please note the safety information given in Section 0.2.

CAUTION



Before connecting the electrical connection cable, check to ensure that the compressor unit is set for the correct line voltage. Refer to the compressor unit operating instructions for details.

Installation

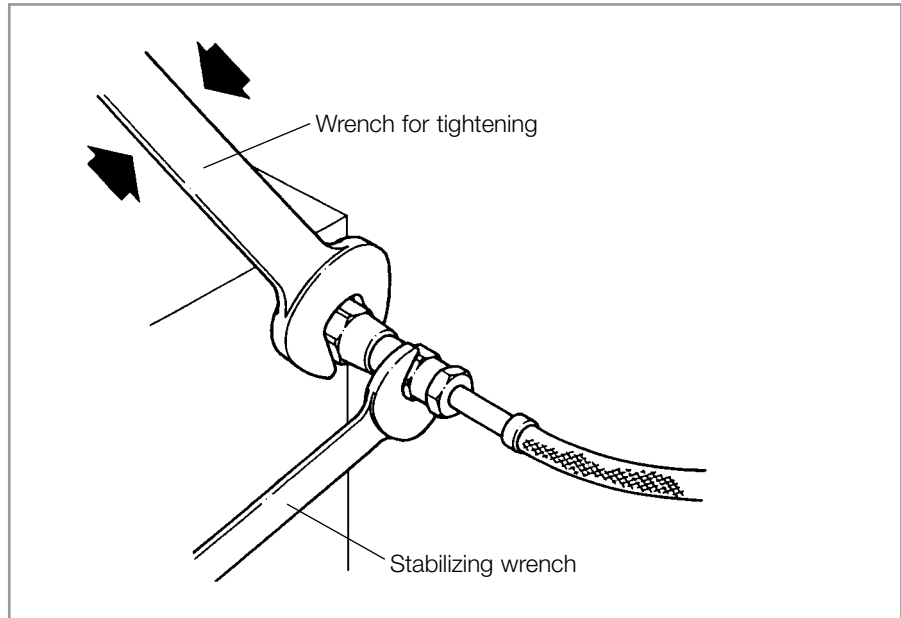


Fig. 5 Mounting the self-sealing couplings

CAUTION



3.5 Installing the Flexible Pressure Lines

Use flexlines from Oerlikon Leybold Vacuum only.

Replace any damaged flexlines.

Working instructions for self-sealing screw fittings

The interconnecting cables and elements possess self-sealing screw fittings. The connections can be opened and closed without helium escaping.

Remove the protective caps from the screw fittings.

Keep the protective caps in a safe place.

Check all connections for dust and dirt particles and clean them as necessary using a clean, lint-free cloth or a soft, clean brush.

Do not use solvents to clean the connections! The connections must not be greased or oiled.

Check the correct fit of the flat gaskets in the screwed fittings with external thread. Replace missing or damaged gaskets.

To mount the pressure lines, only use the supplied fork wrenches or fork wrenches approved by Oerlikon Leybold Vacuum.

Only connect or disconnect pressure lines if the compressor unit is turned off and the pressure is below 28 bar.

Do not twist the pressure lines.

When fixing the screw fittings, use one wrench for tightening and a second wrench for countering; see Figs. 5 and 6.

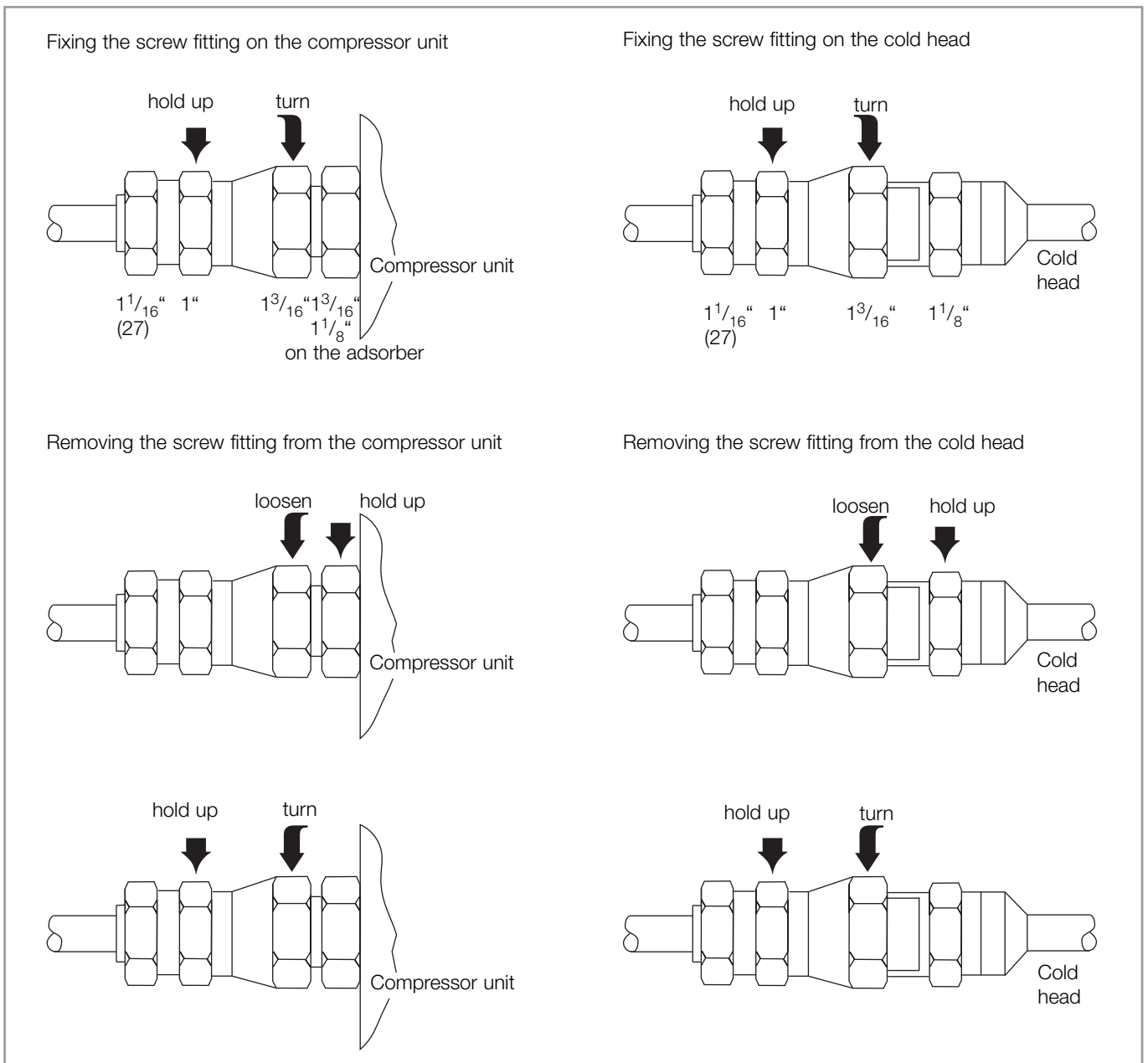


Fig. 6 Mounting and removing self-sealing screw fittings

1/2" screw fitting:

- For tightening, use a $1\frac{3}{16}$ " wrench;
- for holding up, use a 1" wrench.

Tighten all screw fittings up to their stop and then turn them back by 1/4 turn for relief.

If flexible pressure lines need to be routed with bending radii less than 30 cm, install 90° elbows; see Section 1.4

To extend the helium pressure lines, use line couplings; see Section 1.4.

Bundle the flexlines and protect these against tripping and damage.

Installation

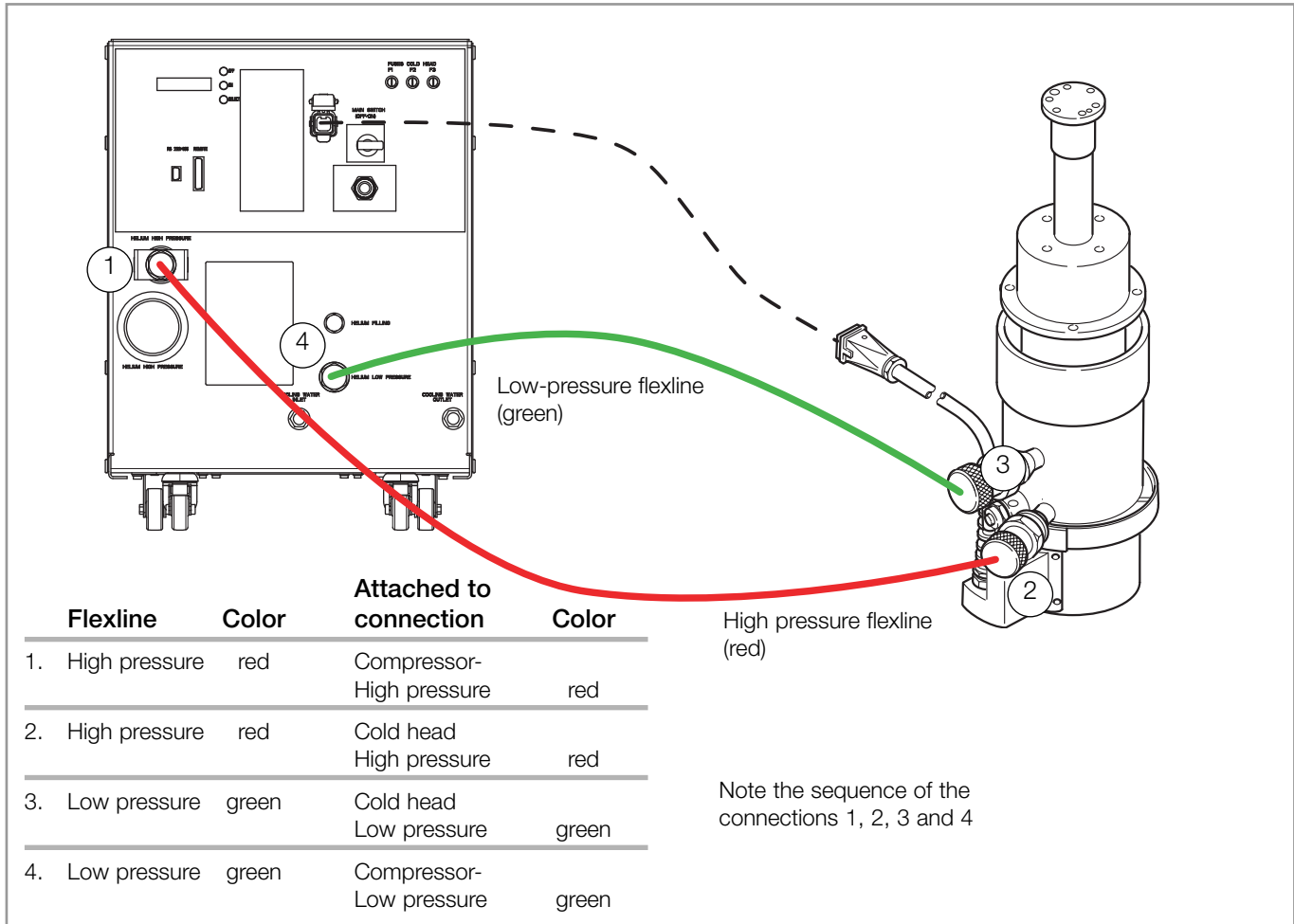


Fig. 7 Connecting the compressor unit and cold head

Connect compressor unit and cold head

Connect the flexlines in sequence, (13/1) to (13/4), corresponding to the direction in which the helium flows.

NOTICE



Do **not** mix up the high- and low-pressure connections. Interchanging these connections can cause damage inside the cold head. Do not use a flexline on the high-pressure side which was ever used on the low-pressure side. Do not connect the high-pressure connection directly to the low-pressure connection (short-circuit). Operation with directly connected high- and low-pressure.

Checking the helium filling pressure

After installation, check the helium filling pressure at the pressure gauge and correct it if required. The correct filling pressures and the filling process are described in the Operating Instructions for the compressor.

Detach flexlines only with the compressor unit switched off, the cold head warmed up, and when the pressure is below 28 bar (406 psig; 2.8 MPa). See Section 4.1 for details. Detach the flexlines by unscrewing the couplings in reverse order.

Once they have been detached, fit protective caps on the couplings.

4 Operation

The cold head is switched on and off with the compressor unit.

For operation, the Operating Instructions for the compressor unit are needed:
 13000547_002_xxx (COOLPAK 6000 H / 6200 H)
 17200020_002_xxx (COOLPAK 2000 / 2200)

Observe the safety information in Section 0.6.3.

CAUTION



Cooldown Time for 2nd Stages

The cooldown time t_0 of the cold head in a vacuum are specified in Section 1.3.

If the thermal load due to radiation is ignored, the cooldown time with components attached can be estimated as described as follows:

$$t = t_0 + \frac{C}{\bar{Q}_2}$$

t_0 =cooldown time of cold head without components

\bar{Q}_2 =average refrigerating capacity of the cold head

C=heat capacity of the additional components between 300 and 20 K

$$C = \sum_i m_i \int_{20 \text{ K}}^{300 \text{ K}} c_i(T) dT$$

m=mass

c(T)=specific heat

The following values can be inserted for the integral:

Material	$\int_{20 \text{ K}}^{300 \text{ K}} c_i(T) dT$
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Copper	79 Ws·g ⁻¹
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Aluminium	170 Ws·g ⁻¹
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Stainless steel	81 Ws·g ⁻¹
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The following values apply for \bar{Q}_2 when operating one cold head with the recommended compressor unit:

COOLPOWER 5/100	10 W ± 10%
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COOLPOWER 7/25	12 W ± 10%
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Maximum Permissible Cold-Head Temperature

The temperature of the cold head must not exceed 50 °C at the refrigerating stages. Higher temperatures may damage components inside the cold head.

Operation

frequent heating

In the event of frequent heating, e.g. when performing the routine regeneration of a cryopump, limit the temperatures to 30 °C at the 1st stage and to 40 °C at the 2nd stage.

Never operate electrical heaters at the stages of the cold head without a temperature monitor or temperature controller. Please consult us when selecting suitable temperature monitors and temperature controllers.

4.1 Removing from Service

Switch off the compressor unit.

Allow the cold head to warm-up before detaching the flexlines.

Loosening the flexlines with the cold head at low temperatures can result in a loss of helium.

CAUTION



Detaching the flexlines with the cold head at low temperature can, when they heat up, result in a rise in pressure beyond the permissible 28 bar (406 psig; 2.8 MPa) operating pressure. All the self-sealing couplings which are not in use shall be provided with protective caps.

5 Maintenance

We recommend installing a complete, new displacer piston after 9,000 hours of operation.

This job can only be performed by Oerlikon Leybold Vacuum Service or appropriately trained service personnel.

Oerlikon Leybold Vacuum offers practical seminars in which simple maintenance, troubleshooting of cold heads and other cryogenic components are covered by qualified instructors. Further details are available upon request.

Improper maintenance negatively affects safety, service life and operability and also voids your warranty.

Following repairs to the electrical circuits the cold head shall not be returned to service before making an electrical safety test. For this reason work such as this may be carried out only by trained and qualified service personnel.

5.1 Oerlikon Leybold Vacuum Service

Whenever you send us in equipment, indicate whether the equipment is contaminated or is free of substances which could pose a health hazard. If it is contaminated, specify exactly which substances are involved. You must use the form we have prepared for this purpose.

A copy of the form has been reproduced at the end of these Operating Instructions: "Declaration of Contamination for Compressors, Vacuum Pumps and Components". Another suitable form is available from www.oerlikon.com → Oerlikon Leybold Vacuum → Documentation → Download Documents.

Attach the form to the equipment or enclose it with the equipment.

This statement detailing the type of contamination is required to satisfy legal requirements and for the protection of our employees.

We must return to the sender any equipment which is not accompanied by a contamination statement.

Oerlikon Leybold Vacuum practical courses

CAUTION



Contamination

Form

Troubleshooting

6 Troubleshooting

Malfunction at the cold head	Possible cause	Fault correction	Repair note
The refrigerating capacity of the cold head is too low.	Helium loss (pressure of helium should be approx. 22 bar when compressor unit is operating).	Refill with ultra-pure helium (99.999 % purity or higher) at compressor unit.	Operating Instructions for the compressor unit.
	Contamination in the cold head.	Use special adapter to relieve the pressure at the cold-head high-pressure intake. Check the control disk and the valve. Purge and refill with ultra-pure helium while the cold-head motor is running.	Trained personnel only.
	Oil adsorber is saturated.	Install a new oil adsorber.	Operating Instructions for the compressor unit.
	Cold-head motor turning in wrong direction.	Proceed as for "contamination"; check direction of rotation.	Trained personnel only.
	Insulating vacuum not in order.	Increase insulating vacuum to $< 10^{-3}$ mbar.	--
	Too much time since displacer piston maintenance last performed.	Install a new displacer piston.	Trained personnel only.
Cold head becomes irregular or noisy.	Control valve worn or control disk dirty.	Install a new control valve or control disk.	Trained personnel only.
	Helium contaminated because adsorber performance inadequate.	Install a new oil adsorber and purge the system as for "contamination". Clean the control disk and control valve.	Trained personnel only.
	Control valve worn or control disk dirty.	Install a new control valve or control disk.	Trained personnel only.
	External magnetic field exists (> 30 mT=300 Gauß).	Reduce the magnetic field or shield the cold head motor and then install a new cold-head motor.	Trained personnel only.

7 Waste Disposal

Persons in possession of waste oil are responsible for disposal according to the relevant standards and regulations.

As far as waste disposal is concerned, the relevant European, national and local regulations are to be observed. We recommend that you entrust transport and disposal of the waste to an authorized waste disposal company.

For decontamination according to the relevant standards, we recommend our Oerlikon Leybold Vacuum Service.

The disposal of electrical and electronic components is subject to the relevant national environmental and safety regulations. No old equipment is withdrawn under the Waste Electrical and Electronic Equipment (WEEE) Regulations. The responsibility for the disposal of old equipment rests with the plant operator.

The cold head incorporates pressurized vessels. When disposing of pressurized vessels, please observe the relevant national safety regulations.

The cold head may have been contaminated by the process or by environmental influences. In this case the equipment must be decontaminated in accordance with the relevant regulations. Oerlikon Leybold Vacuum offers this service at fixed prices. Further details are available on request.

Contaminated parts can be detrimental to health and environment. Before beginning with any work, first find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Separate clean components according to their materials, and dispose of these accordingly. Oerlikon Leybold Vacuum offers this service. Further details are available on request.

When sending any equipment to Oerlikon Leybold Vacuum, observe the regulations given in Section 5.1 "Oerlikon Leybold Vacuum Service".

Contamination

CAUTION



EC Incorporation Declaration

The manufacturer: Oerlikon Leybold Vacuum GmbH
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Germany
Tel.: +49(0)221 347-0
info.vacuum@oerlikon.com

herewith declares that the following product:

Product designation: **Cold head**

Type designation:	P/N
COOLPOWER 7/25	842040, 842040V00xx,
COOLPOWER 5/100	12978, 842021, 842021V00xx, 89304, 89305,
COOLPOWER 140 T	842030, 842030V00xx
COOLPOWER 20	11748
COOLPOWER 50	842050V00xx
RGD 5/100	842020, 89307, 89308, 89309

x= 0 bis 9

complies with the following fundamental requirements of the **EC Machinery Directive (2006/42/EG)**:
Annex I, Paragraph 1.1.2, 1.1.3, 1.1.5, 1.2.6, 1.3.1, 1.3.2, 1.3.4, 1.5.1, 1.5.2, 1.5.4, 1.5.5, 1.6.1, 1.6.3
and 1.7

The following harmonised standard has been applied:

EN 1012-2, 1996 Compressors and vacuum pumps - Safety requirements -
Part 2: Vacuum pumps

The incomplete machine may only be put into operation after it has been determined that the machine into which the incomplete machine shall be installed complies with the regulations laid down in the EC Machinery Directive (2006/42/EG).

The manufacturer commits himself to make the special documentation on the incomplete machine electronically available to national authorities upon request.


The special engineering documentation belonging to the machine was compiled in accordance with Annex VII Part B.

Documentation Officer

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Cologne, dated 2011-01-07

Cologne, dated 2011-01-07


Dr. Monika Mattern-Klosson
Head of Research & Development


Harald Udelhoven
Head of Quality Management

300312872 _002_A1 – 11/2010

EC Declaration of Conformity

The manufacturer: Oerlikon Leybold Vacuum GmbH
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herewith declares that the products specified and listed below which we have placed on the market, comply with the applicable EC Council Directives.

This declaration becomes invalid if modifications are made to the product without agreement of Oerlikon Leybold Vacuum GmbH.

Product designation: **Cold head**

Type designation:	P/N
COOLPOWER 7/25	842040, 842040V00xx,
COOLPOWER 5/100	12978, 842021, 842021V00xx, 89304, 89305,
COOLPOWER 140 T	842030, 842030V00xx
COOLPOWER 20	11748
COOLPOWER 50	842050V00xx
RGD 5/100	842020, 89307, 89308, 89309

x= 0 bis 9

The product complies to the following European Council Directives:

EC-Directive relating to **Low Voltage Directive (2006/95/EC)**

EC-Directive relating to **Pressure Equipment Directive (97/23/EC)**

The following harmonised standard has been applied:

EN 60204-1: 2006 Safety of machinery - Electrical equipment of machines - Part 1: General requirements

Cologne, dated 2011-01-07

Cologne, dated 2011-01-07



Dr. Monika Mattern-Klosson
Head of Research & Development



Harald Udelhoven
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