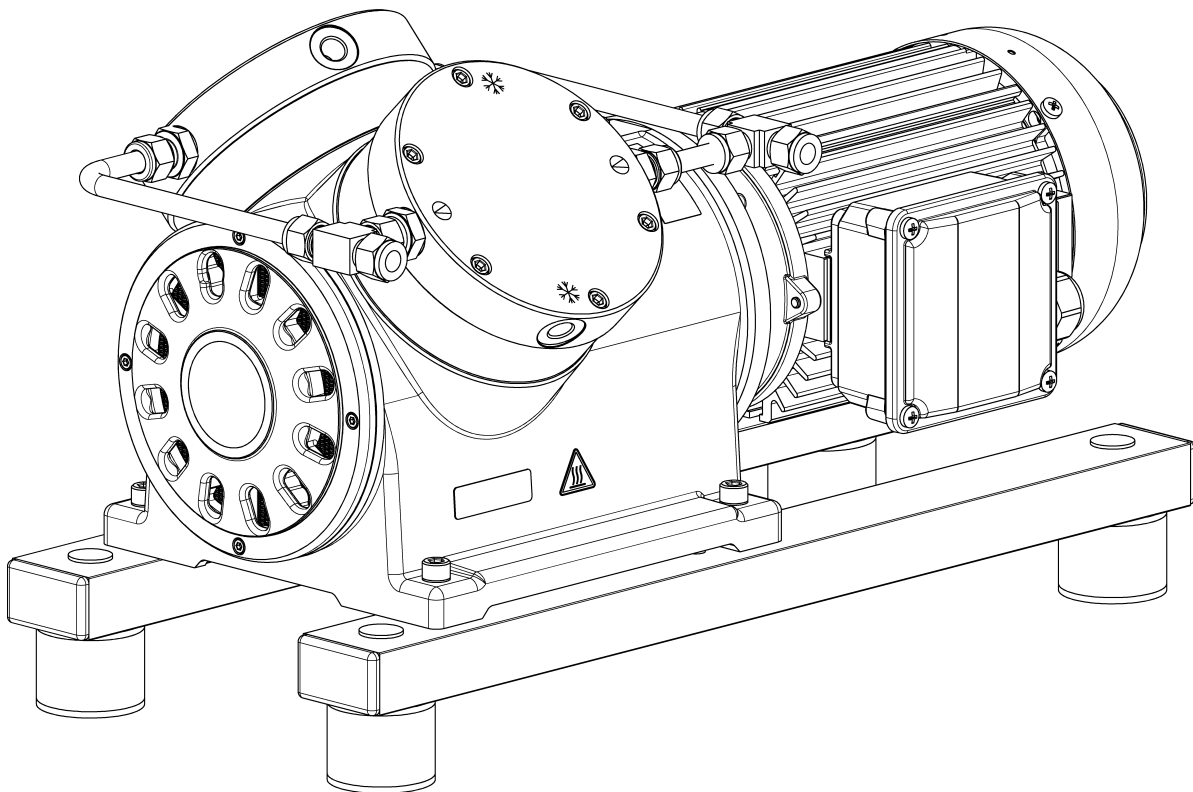


Process

N630
TRANSLATION OF ORIGINAL OPERATING AND
INSTALLATION INSTRUCTION
ENGLISH

DIAPHRAGM PUMP



Notice!

Before operating the pump and the accessories, read the operating and installation instructions and observe the safety notices!

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1 About this document

1.1 Using the operating and installation instructions

The operating and installation instructions are part of the pump.

- In the event of uncertainties with regard to the content of the operating and installation instructions, please contact the manufacturer (contact data: see www.knf.com). Please have the type designation and serial number of the pump ready.
- Read the operating and installation instructions before you commission the pump.
- Give the operating and installation instructions to the next owner.
- Keep the operating and installation instructions within reach at all times.

Project pumps For customer-specific project pumps (pump models that begin with "PJ" or "PM"), there may be deviations from the operating and installation instructions.

- For project pumps, also observe the agreed specifications.

1.2 Symbols and markings

Warning notice



A notice that warns you of danger is located here.

Possible consequences of a failure to observe the warning notice are specified here. The signal word, e.g., warning, indicates the danger level.

- Measures for avoiding the danger and its consequences are specified here.

Danger levels

Signal word	Meaning	Consequences if not observed
DANGER	warns of immediate danger	Death or serious injury or serious damage will result.
WARNING	warns of possible danger	Death or serious injury or serious damage are possible.
CAUTION	warns of a possibly dangerous situation	Minor injuries or damage are possible.

Tab.1

Explanations of pictograms

Pictogram	Meaning
	Warning of hand injuries through crushing
	Warning of hot surface
	Warning of electrical voltage
	Warning of explosive materials
	Observe the operating instructions

Tab.3

Other notices and symbols

→ An activity to be carried out is specified here (a step).

1. The first step of an activity to be carried out is specified here.
Follow other sequentially numbered steps.

i This symbol indicates important information.

2 Use

2.1 Proper use

The pumps are intended exclusively for delivering gases and vapors.

Responsibility of the owner

Operating parameters and conditions

Only install and operate the pumps in accordance with the operating parameters and conditions described in Chapter 4 *Technical data*.

Only pumps that are fully assembled and in the condition as delivered are allowed to be operated.

Make sure that the installation location is dry and that the pump is protected against rain, splash water, gushing water, dripping water and other contaminants.

The tightness of the connections between the pipes of the application and the pump (and the electrical connection of the pump) must be checked at regular intervals. Leaky connections carry the risk of releasing dangerous gases and vapors from the pump system.

Requirements for the pumped medium

Before pumping a medium, check whether the medium can be pumped without danger in the case of the specific application.

When doing so, take heed of any change in the condition of the aggregate (condensation, crystallization).

Before using a medium, check the compatibility of the medium-contacting components (see 4 *Technical data*) with the medium.

Risk of dangerous gas mixtures during pump operation if diaphragm breaks: Depending on the medium being transferred, breakage of the diaphragm can result in a dangerous mixture if the medium mixes with the air in the compressor housing or the surroundings.

Deliver only gases that remain stable under the pressures and temperatures that occur in the pump.

Frequency converter

Pumps with three-phase motor are designed for operation with frequency converter in the speed range 500 – 1500 rpm (50 Hz) or 600 – 1800 rpm (60 Hz) (see also Chapter 7.2 *Electrical connection*).

2.2 Improper use

The pumps are not allowed to be operated in explosive atmospheres.

The pumps are not suitable for delivering:

- Dusts
- Fluids
- Aerosols
- Biological and microbiological substances
- Fuel
- Explosive substances and flammable materials
- Fibers
- Oxidants
- Food

Pumps that can generate both a vacuum and overpressure must not be used for the simultaneous generation of a vacuum and overpressure. This function can be made possible on a project basis following consultation with KNF Customer Service.

No overpressure may be applied to the suction side of the pump. This function can be made possible on a project basis following consultation with KNF Customer Service.

Pumps with capacitor motor are not intended for operation with a frequency converter.

3 Safety



Observe the safety instructions in the Chapters *7 Installation and Connection* and *8.1 Operation*.

The pumps are built in accordance with the generally recognized rules of engineering and the occupational health and safety and accident prevention regulations. Nevertheless, dangers can arise during their use that lead to injuries to the user or third parties or to damage to the pump or other property.

Only use the pumps if in technically perfect condition, in accordance with their intended use, in a safety-conscious and danger-conscious manner and in compliance with the operating and installation instructions.

The components that are to be connected to the pumps must be designed according to the pneumatic data of the pumps.

When connecting the pumps to the electrical mains, observe the corresponding safety rules.

Personnel Make sure that only trained and instructed personnel or qualified personnel work on the pumps. This applies, in particular, to assembly, connection and servicing work.

Make sure that the personnel have read and understood the operating and installation instructions, especially the Chapter *Safety*.

Working in a safety conscious manner Observe the regulations on accident prevention and safety during all work on the pumps and during operation.

Avoid contact with the heads and housing parts as the pump heats up during operation.

When working on the pump, make certain that the pump is disconnected from the mains and is de-energized.

Make certain that no dangers arise from flows when gas connections are open, from the effects of noise or from hot, corrosive, dangerous and environmentally hazardous gases.

Make sure that EMC-compliant installation of the pump is guaranteed at all times and that no danger situation can arise as a result.

Handling of hazardous media Upon breakage of the diaphragm and/or leaks, the transferred medium mixes with the air in the surroundings and/or in the pump housing. Make sure that a dangerous situation cannot arise as a result.

When pumping hazardous media, observe the safety regulations for the handling of these media.

Handling of combustible media Take heed that the pumps are not designed to be explosion-proof.

Make certain that the temperature of the medium is always sufficiently below the ignition temperature of the medium so as to prevent ignition or explosion. This also applies for abnormal operating situations.

Bear in mind that the temperature of the medium increases when the pump compresses the medium.

Therefore, make certain that the temperature of the medium also remains sufficiently below the ignition temperature of the medium even when it is compressed to the maximum permissible operating pressure of the pump. The maximum permissible operating pressure of the pump is stated in Chapter *4 Technical data*.

Make certain that the permissible ambient temperature (*4 Technical data*) is not exceeded.

If applicable, also take into consideration external energy sources (e.g. radiation sources) that could additionally heat the medium.

In case of doubt, contact KNF Customer Service.

Environmental protection	Store and dispose of all replacement parts in accordance with the environmental regulations. Observe the respective national and international regulations. This applies in particular to parts that are contaminated with toxic substances.
EU/EC directives/standards	The pumps comply with Directive 2011/65/EU.  The following harmonized standards are met: ▪ DIN EN 60204-1 ▪ DIN EN 61000-6-1/2/3/4 ▪ DIN EN 50581 ▪ EN 60034-30-1 (only pumps with three-phase motor) ▪ DIN EN 1012-2 ▪ DIN EN 12100 ▪ EN 60034-1
Customer service and repairs	The pumps are maintenance-free. KNF does, however, recommend periodically inspecting the pumps for conspicuous changes in the noises and vibrations. Only have repairs to the pumps performed by the responsible KNF Customer Service. Housings with live components may only be opened by specialist personnel. Use only original parts from KNF during servicing work.

4 Technical data

4.1 Technical data

Pump materials

N630SP/STE

N630.1.2SP/STE

N630.3SP/STE

N630.15SP/STE

Assembly	Material SP	Material ST
Head plate, intermediate plate	Stainless steel	Stainless steel
Diaphragm	EPDM	PTFE
Reed valves	Stainless steel	Stainless steel
Valve stopper	Stainless steel	Stainless steel
Slotted cap screw	Stainless steel	Stainless steel
O-ring	FPM	FPM
Retainer plate	Stainless steel	Stainless steel
Retainer plate screw	Stainless steel	Stainless steel
Electrical connection (only 630.1.2/.3/.15)	Stainless steel	Stainless steel

Tab.5

Pneumatic values

Parameter	Value N630SP N630ST	Value N630.1.2SP N630.1.2ST	Value N630.3SP N630.3ST	Value N630.15SP N630.15ST
Max. permissible operating pressure [bar rel*] -Continuous operation	7.0	7.0	0.5	12
Ultimate vacuum [mbar abs.]	120	120	25	70
Delivery rate at atm. pressure [L/min]** -50 Hz	30	58	30	30
-60 Hz	35	68	35	35

Tab.7 *bar rel related to 1013 hPa

**Liters in standard state (1013 hPa, 20°C)

Pneumatic connections

Pump type	Value
N630, N630.3, N630.15	Thread size G 1/4*
N603.1.2	For hose dia. 10

Tab.9 *Acc. to ISO 228

Connection for water cooling

Pump type	Value	Value
N630	Thread size G 1/4*	Hose ID 9
N630.1.2	Thread size G 1/4*	Hose ID 9
N630.3	Thread size G 1/4*	Hose ID 9
N630.15	Thread size G 1/4*	Hose ID 9

Tab.11 *Acc. to ISO 228

Electrical data for pumps with a capacitor motor**N630**

Parameter	Value	Value	Value	Value
Voltage [V]*	100	115	220	230
Frequency [Hz]*	50/60	60	60	50
Power P ₁ [W]	**	**	**	520
Current consumption [A]	**	**	**	3.9
Motor protection class	See motor type plate			
Max. permissible mains voltage fluctuations	See operating instructions for the motor			

Tab.13 *For further voltage and frequency variants, see type plate

**See type plate

N630.1.2

Parameter	Value	Value	Value	Value
Voltage [V]*	100	115	220	230
Frequency [Hz]*	50/60	60	60	50
Power P ₁ [W]	**	**	**	670
Current consumption [A]	**	**	**	4.2
Motor protection class	See motor type plate			
Max. permissible mains voltage fluctuations	See operating instructions for the motor			

Tab.15 *For further voltage and frequency variants, see type plate

**See type plate

N630.3

Parameter	Value	Value	Value	Value
Voltage [V]*	100	115	220	230
Frequency [Hz]*	50/60	60	60	50
Power P ₁ [W]	**	**	**	520
Current consumption [A]	**	**	**	3.9
Motor protection class	See motor type plate			
Max. permissible mains voltage fluctuations	See operating instructions for the motor			

Tab.17 *For further voltage and frequency variants, see type plate

**See type plate

Electrical data for pumps with a three-phase motor**N630**

Parameter	Value	Value	Value	Value
Voltage [V]*	200/346	277/480	220/380	230/400
Frequency [Hz]*	50/60	60	60	50
Power P ₁ [W]	**	**	**	340
Current consumption [A]	**	**	**	3.3/1.9
Motor protection class	See motor type plate			
Max. permissible mains voltage fluctuations	See operating instructions for the motor			

Tab. 19 *For further voltage and frequency variants, see type plate

**See type plate

N630.1.2

Parameter	Value	Value	Value	Value
Voltage [V]*	200/346	277/480	220/380	230/400
Frequency [Hz]*	50/60	60	60	50
Power P ₁ [W]	**	**	**	510
Current consumption [A]	**	**	**	3.3/1.9
Motor protection class	See motor type plate			
Max. permissible mains voltage fluctuations	See operating instructions for the motor			

Tab. 21 *For further voltage and frequency variants, see type plate

**See type plate

N630.3

Parameter	Value	Value	Value	Value
Voltage [V]*	200/346	277/480	220/380	230/400
Frequency [Hz]*	50/60	60	60	50
Power P ₁ [W]	**	**	**	340
Current consumption [A]	**	**	**	3.3/1.9
Motor protection class	See motor type plate			
Max. permissible mains voltage fluctuations	See operating instructions for the motor			

Tab. 23 *For further voltage and frequency variants, see type plate

**See type plate

N630.15

Parameter	Value	Value	Value	Value	Value
Voltage [V]*	200/346	200/346	277/480	220/380	230/400
Frequency [Hz]*	50	60	60	60	50
Power P ₁ [W]	**	**	**	**	620
Current consumption [A]	**	**	**	**	6,15/3.55
Motor protection class	See motor type plate				
Max. permissible mains voltage fluctuations	See operating instructions for the motor				

Tab.25 *For further voltage and frequency variants, see type plate

**See type plate

Thermal switch/PTC thermistor sensor



The motors are equipped as standard with a thermal switch (capacitor motor) or with PTC thermistor sensor (three-phase motor) to monitor against overheating (see operating instructions for the motor).

Weight

Pump type	Weight [kg] SP/ST
N630	Approx. 36
N630.1.2	Approx. 45
N630.3	Approx. 45
N630.15	Approx. 55

Tab.27 Weight

Other parameters

Parameter	Value
Permissible ambient temperature [°C]	
- without water cooling	+ 5 to + 40
- with water cooling (three-phase motor)	+ 5 to + 60
- with water cooling (condenser motor)	+ 5 to + 50
Permissible medium temperature [°C]	
- without water cooling	+ 5 to + 40
- with water cooling	+ 5 to + 60
Max. surface temperature* [°C]	+ 85
Dimensions	See Chapter 7.1 <i>Installing the pump</i>
Gas tightness** of the pump head (Leak rate): N630.9, N630.1.2.9, N630.3.9, N630.15.9	< 6 x 10 ⁻³ mbar L/s***
N630.13, N630.1.2.13, N630.3.13, N630.15.13	< 5 x 10 ⁻⁵ mbar L/s***
Highest permissible relative air humidity of the environment	80% for temperatures up to 31°C, decreasing linearly to 50% at 40°C.
Maximum installation altitude [m above sea level]	See operating instructions for the motor
Protection class of pump	IP20

Tab.29 *To reduce the surface temperature of the pump heads and to extend the service life of the diaphragm, you can optionally attach a water cooling system (see Chapter 7.4 *Connecting water cooling (optional)*).

**The gas tightness of the pump head is no longer ensured after the pump head is opened or after changing diaphragm and reed valves. A leak test can be used to determine whether the original gas tightness has been re-achieved.

***Values apply for helium leak test

Start-up against pressure/
vacuum



Please contact KNF Customer Service.

5 Design and function

Design

- 1 Pneumatic pump outlet
- 2 Pneumatic pump inlet
- 3 Electrical terminal box
- 4 Motor
- 5 Motor fan cowl
- 6 Connection for water cooling

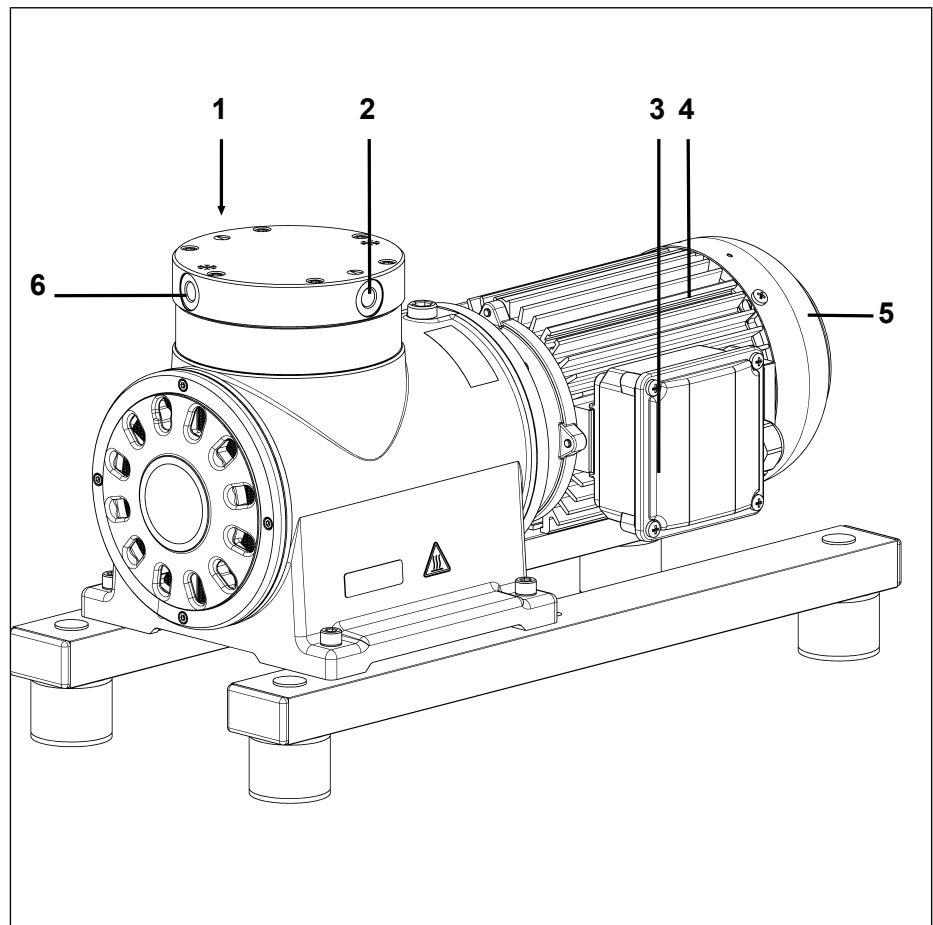


Fig.1 Design N630

- 1 Union nut
- 2 Connection for water cooling
- 3 Pneumatic head connection
- 4 Pneumatic pump inlet
- 5 Motor
- 6 Motor fan cowl
- 7 Electrical terminal box
- 8 Pneumatic pump outlet

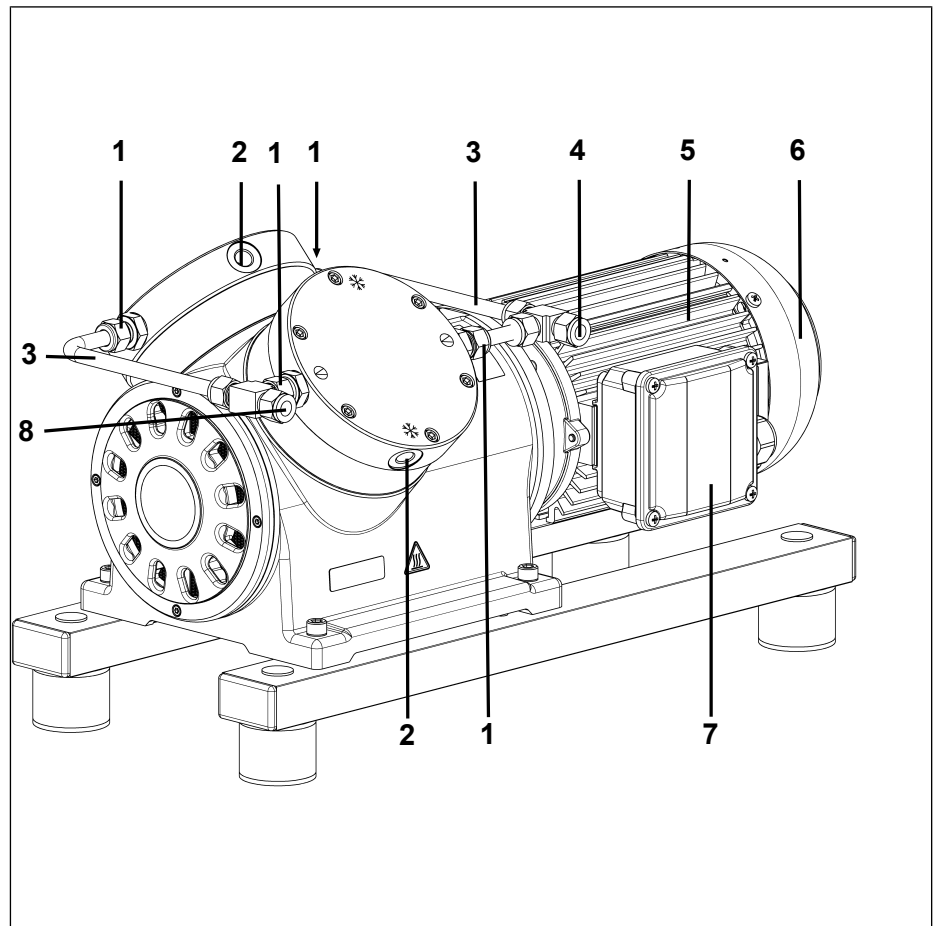


Fig.2 Design N630.1.2

- 1 Pneumatic pump outlet
- 2 Connection for water cooling
- 3 Union nut
- 4 Pneumatic head connection
- 5 Motor
- 6 Motor fan cowl
- 7 Electrical terminal box
- 8 Pneumatic pump inlet

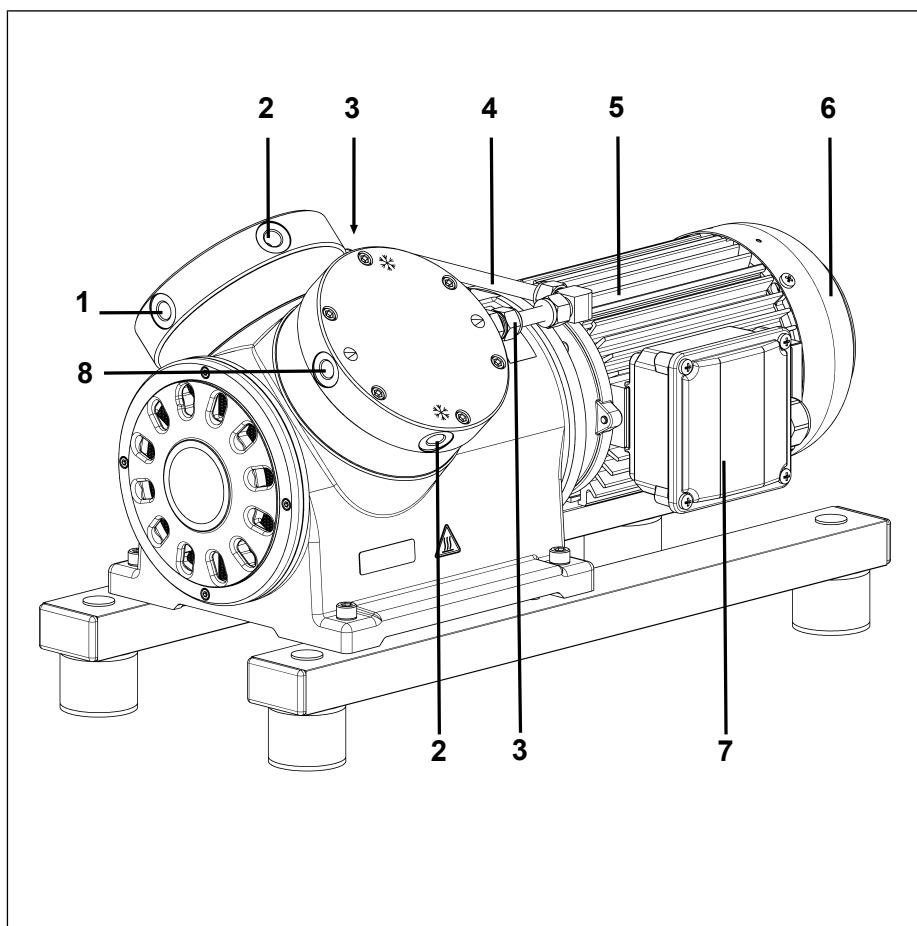


Fig.3 Design N630.3

- 1 Pneumatic pump inlet
- 2 Connection for water cooling
- 3 Union nut
- 4 Pneumatic head connection
- 5 Motor
- 6 Motor fan cowl
- 7 Electrical terminal box
- 8 Pneumatic pump outlet

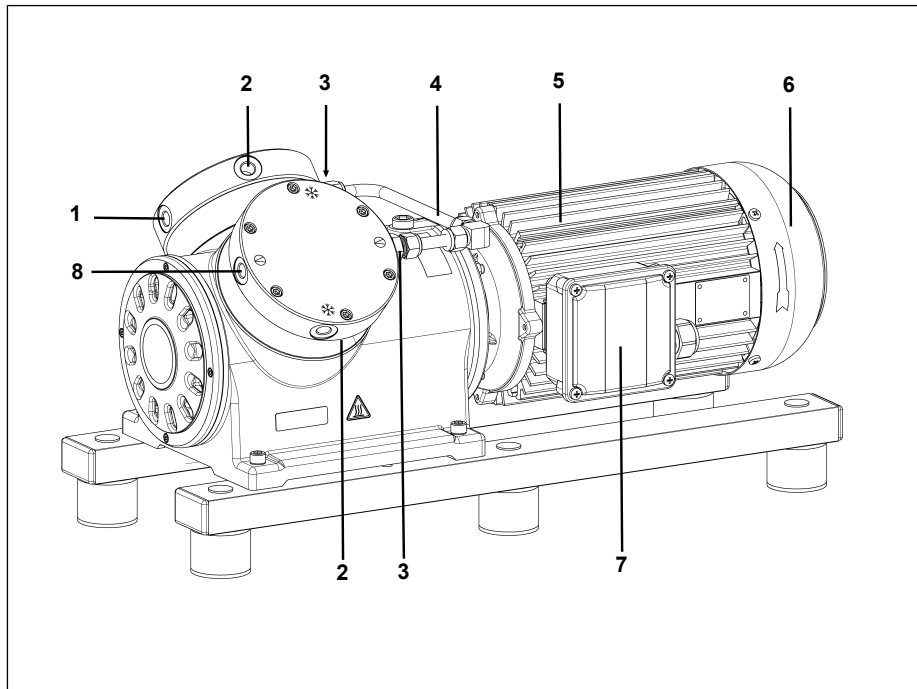


Fig.4 Design N630.15

Function of a diaphragm pump

- 1 Outlet valve
- 2 Inlet valve
- 3 Transfer chamber
- 4 Diaphragm
- 5 Eccentric
- 6 Connecting rod
- 7 Pump drive

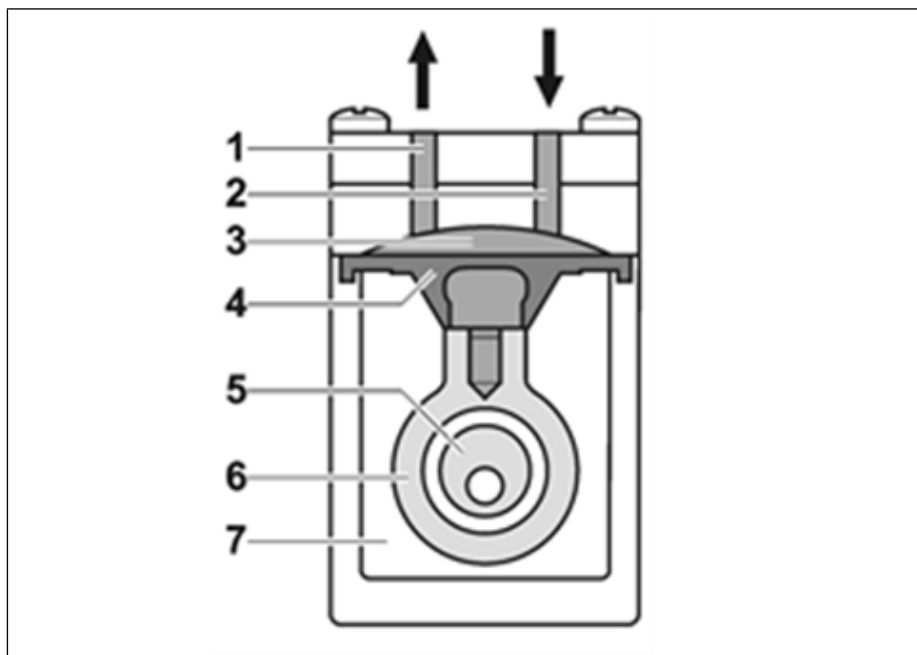


Fig.5 Function of a diaphragm pump

Diaphragm pumps transfer, compress (depending on the version) and evacuate gases and vapors.

The elastic diaphragm (4) is moved up and down by the eccentric (5) and the connecting rod (6). In the downwards stroke, it aspirates the gas to be transferred via the inlet valve (2). In the upwards stroke, the diaphragm presses the medium out of the pump head via the outlet valve (1). The transfer chamber (3) is hermetically separated from the pump drive (7) by the diaphragm.

6 Transport

General



Personal injury and/or property damage due to incorrect or improper transport of the pump

In the event of incorrect or improper transport, the pump can fall down, be damaged or injure persons.

- Use suitable auxiliary means if necessary (carrying strap, lifting gear, etc.).
- Where appropriate, wear suitable personal protective equipment (e.g., safety shoes, safety gloves).



Risk of injury from sharp edges on the packaging

There is a risk of injury from cutting on the sharp edges when grabbing corners or when opening the packaging.

- Where appropriate, wear suitable personal protective equipment (e.g., safety shoes, safety gloves).

Only for two-headed pumps:



Personal injury and/or property damage due to incorrect or improper transport of the pump

If the pump is raised and/or carried on the connection during transport, leaks and/or damages to the pump may result.

- Do not carry the pump on the pneumatic connection.

-
- Transport the pump in the original packaging to the installation location.
 - Store the original packaging of the pump (e.g., for later storage).
 - Inspect the pump for transport damage after receiving it.
 - Document any transport damage in writing.
 - Remove any transport safeguards on the pump prior to commissioning.

Parameter

Parameter	Value
Storage temperature [°C]	+ 5 to + 40
Transport temperature [°C]	- 10 to + 60
Permissible humidity (non-condensing) [%]	30 to 85

Tab.31 Transport parameters

Before putting into operation, make sure that the pump has reached the ambient temperature (4 *Technical data*).

Transporting with lifting eyebolt

1. Remove the M12 screw (1).

1 M12 screw

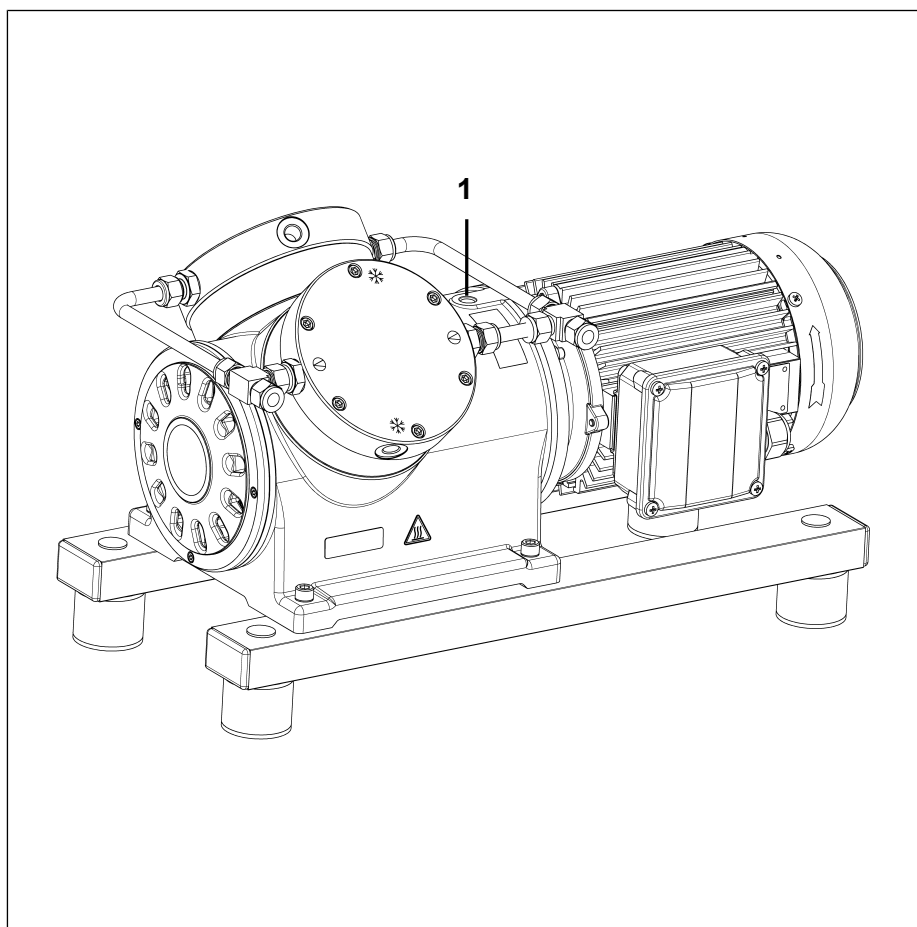


Fig.6 Unscrew the M12 screw (pump illustrated as an example)

2. Screw the lifting ring (2) hand-tight into the threaded hole.



The transport ring (2) is included in the packing.

2 Lifting ring

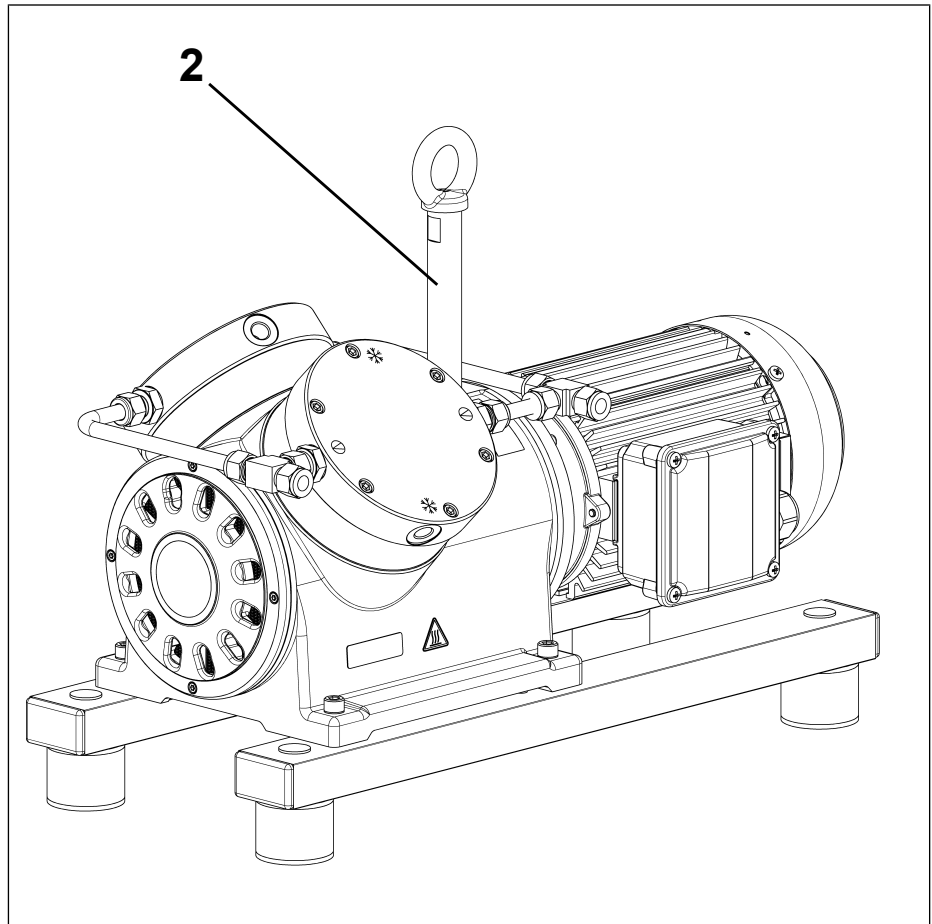


Fig.7 Transport by the lifting ring

3. Lift the pump out of the packaging with the aid of lifting gear.
4. Lower the pump carefully at the installation location.
5. Remove the lifting ring (2).
6. Screw the M12 screw (1) back into the thread.

7 Installation and connection

Install the pumps only in accordance with the operating parameters and conditions described in Chapter 4 *Technical data*.

→ Observe the safety instructions (see Chapter 3 *Safety*).



Risk of dangerous gas mixtures during pump operation

Depending on the medium being transferred, breakage of the media-contacting components can result in a dangerous mixture if the medium mixes with the air in the compressor housing or the surroundings.

→ Before using a medium, check the compatibility of the media-contacting components (see 4 *Technical data*) with the medium.

7.1 Installing the pump

→ Store the pump at the installation site prior to installation to bring it up to the ambient temperature.

Mounting dimensions → For mounting dimensions, see the following illustrations:

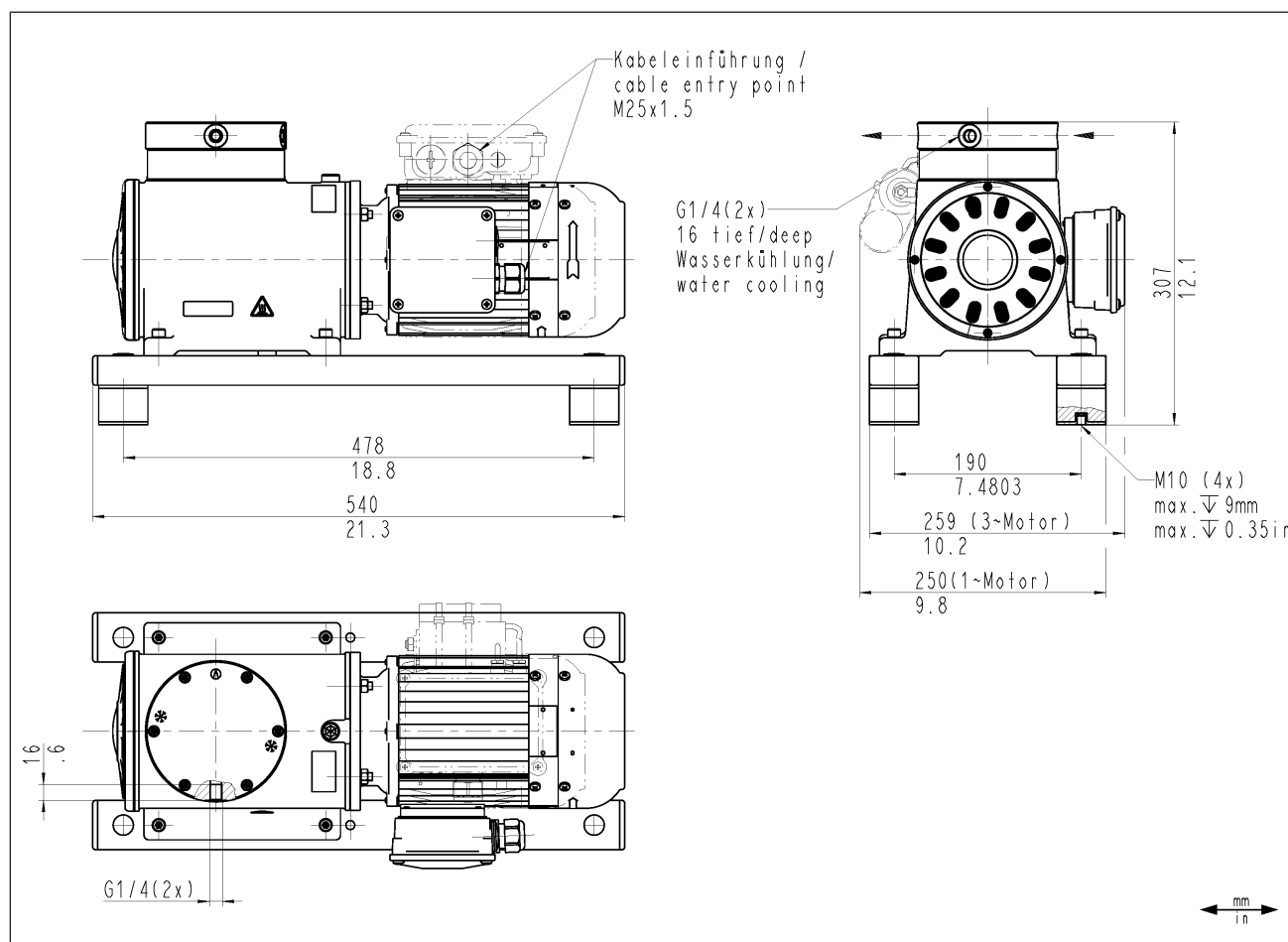


Fig.8 Mounting dimensions pump series N630

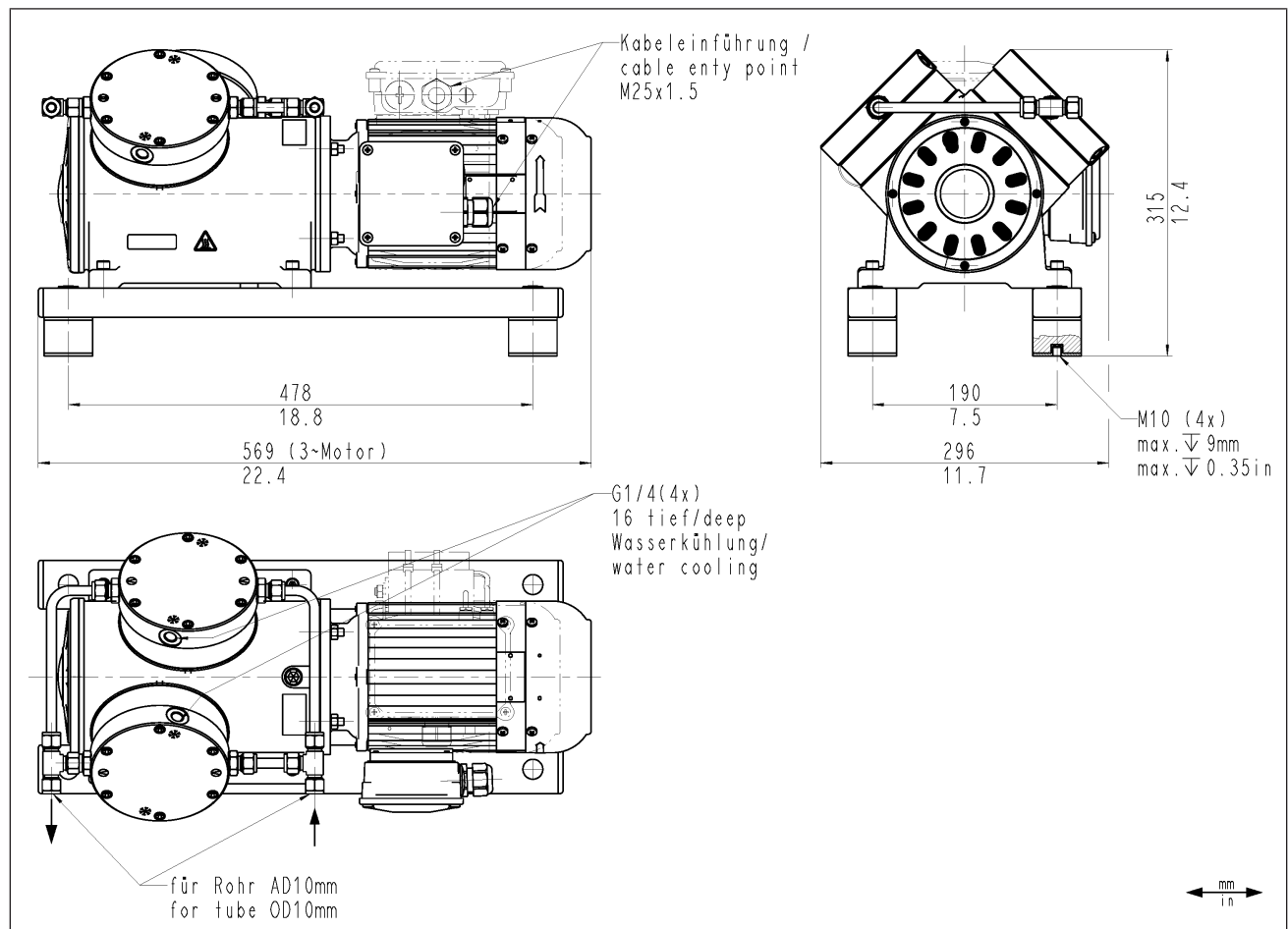


Fig.9 Mounting dimensions pump series N630.1.2

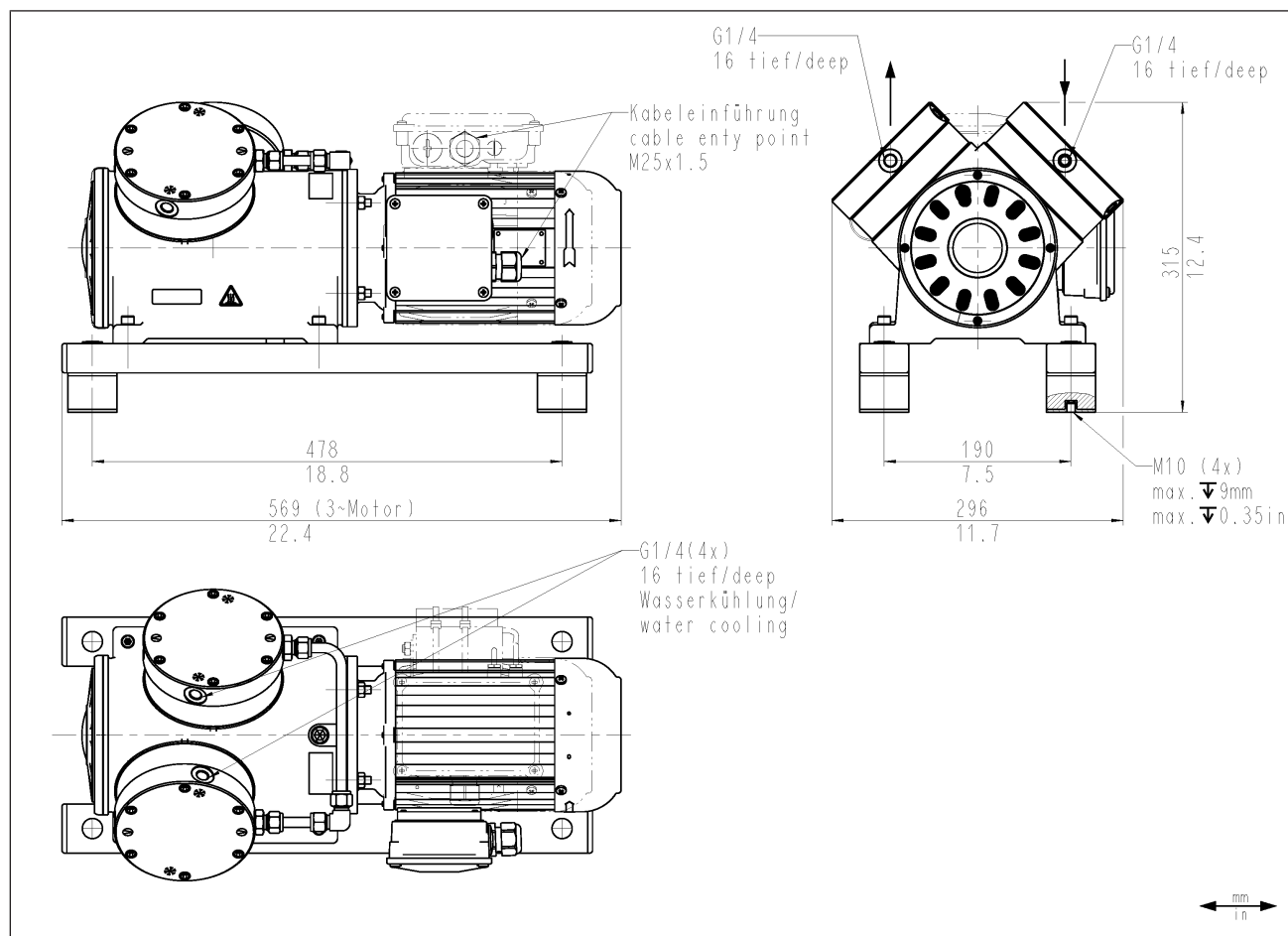


Fig.10 Mounting dimensions pump series N630.3

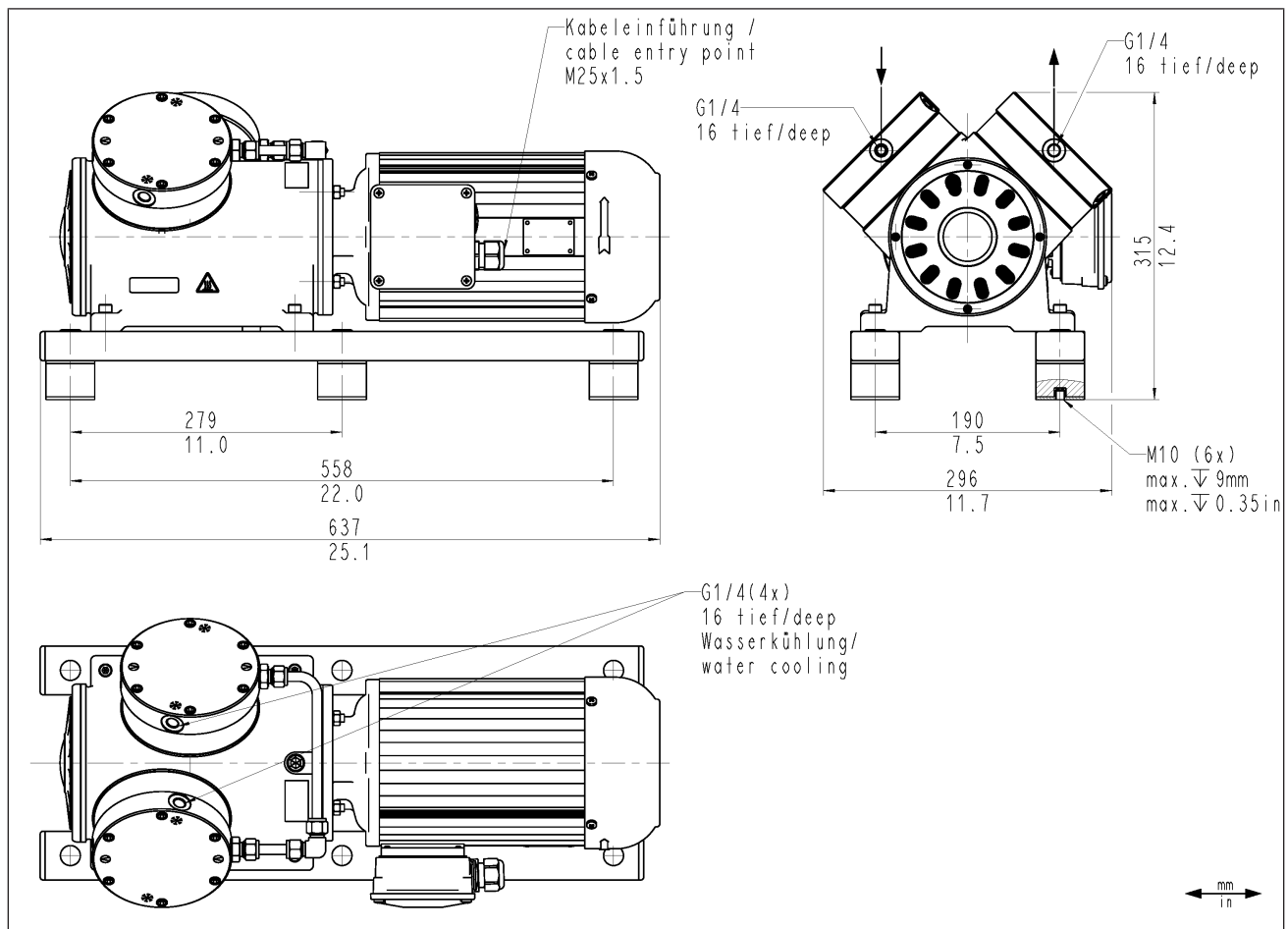


Fig.11 Mounting dimensions pump series N630.15

Cooling air supply



Danger of burning on hot surfaces

Hot surfaces could occur if the pump overheats.

→ When installing the pump, make sure that sufficient cooling air infeed and discharge is ensured.

Immediate environment of the hot pump parts

→ During installation, make sure that no combustible or thermally deformable objects are positioned in the immediate environment of the hot pump parts (head, motor).

Installation location

→ Make sure that the installation location is dry and that the pump is protected against rain, splash water, gushing water, dripping water and other contaminants.

→ Make sure that the installation location is accessible for service.

→ Make sure that access to moving parts is prevented.



The IP protection class of the pump motor is specified on the type plate.

→ Mount the pump at the highest point in the system to prevent condensate from collecting in the pump head.

→ Protect the pump from dust.

→ Protect the pump from vibration and impact.

- Installation position → The pump can be mounted in the illustrated installation position. Fasten the pump with metallic screws at the illustrated attachment points.



Personal injury and/or property damage from vibrations

Pump vibrations, in combination with adjacent components, can result in crushing and/or damage to these components.

- Make sure that pump vibrations cannot lead to dangers in combination with adjacent components.

- Protection against foreign objects → Protect the pump against contact and the ingress of foreign bodies.

7.2 Electrical connection



Danger to life from electric shock

- Only have the pump connected by an authorized specialist.

- Only have the pump connected if the power supply is disconnected.

- When connecting to a power source, observe the applicable standards, directives, regulations and technical standards.
- When connecting to a power source, carefully read and observe the motor operating instructions (including the notice on insulation resistance measurement).
- Install in the electrical wiring system a device to disconnect the pump motor from the electrical supply network (in acc. with EN 60335-1).
- Protect the pump motors in accordance with EN 60204-1 (overcurrent protection, overload protection).

i Refer to the type plate for the maximum current consumption of the pump.

- It is recommended that an additional EMERGENCY-STOP device be installed.
- Mount the pumps in such a way that it is not possible to touch the electrically live parts (electrical connection).

- Fastening the connection cables → Fasten the connection cables so that
- the cables do not come into contact with movable or hot parts.
 - the cables cannot be worn or damaged on sharp corners or edges

- no tensile and pressure forces are exerted on the connection point of the cables (strain relief)
- Thermal switch/PTC thermistor sensor
- i** The motors are equipped as standard with a thermal switch (capacitor motor) or with PTC thermistor sensor (three-phase motor) to monitor against overheating (see operating instructions for the motor).
 - i** The three-phase motors are suitable for operation with frequency converters (see operating instructions for the motor).

Connecting the pump

1. Compare the data of the supply voltage with the information on the motor type plate. See the pump type plate for the maximum current consumption of the pump.
- i** For the permissible deviation of the supply voltage, see operating instructions for motor.
2. Open the terminal box cover.
3. Connect the ground conductor to the pump motor.
4. Connect the electrical power cables in accordance with the operating instructions for the motor.
- i** Set the direction of rotation according to the arrow on the fan cowl (see 7.1 *Installing the pump* and the motor operating instructions).
5. Close the terminal box cover again.

7.3 Pneumatic connection



Personal injury or property damage through ejected plugs

If not removed, the plugs on the pressure side of the pump can be ejected during operation by the resulting overpressure.

→ Remove the plugs during installation.

→ Wear appropriate personal protective equipment.

- | | |
|------------------------|--|
| Connected components | → Only connect components to the pump that are designed for the pneumatic data and thermal requirements of the pump. (see Chapter 4 <i>Technical data</i>). |
| Pressure relief device | → Protect the compressors by means of a pressure relief device between the pressure-side connections of the compressor and the first shut-off valve. |
| Pump discharge | → If the pump is being used as a vacuum pump, safely (relating to the medium and noise) discharge the possibly hot pump discharge via the pneumatic outlet of the pump. |
| Decoupling | → KNF recommends mechanically decoupling the pump from the pipe system, e.g., through the use of flexible hoses or pipes. In this way it is possible to prevent the transfer of possible pump vibrations and noises to the system. |

Connecting the pump



A marking on the pump head indicates the flow direction.



Risk of injury from mixing up suction side and pressure side

Mixing up the suction side and pressure side can result in breakage of connected components on the suction side and pressure side.

→ Observe the marking of inlet and outlet on the pump head.

1. Remove the protective plugs from the hose connection threads.
2. Connect the suction line and the pressure line (for mounting dimensions, see Chapter 4 *Technical data*).
3. Lay the suction line and pressure line with a descent so that no condensate can run into the pump.



Pneumatic noises can be reduced or dissipated by using a silencer (see Chapter 11.2 *Accessories*).

7.4 Connecting water cooling (optional)

Ambient temperature / gas
temperature
+ 40°C to + 60°C

→ Connect the water cooling to prevent damage to the diaphragm.



Water cooling (see 11.2 *Accessories*) can increase the service life of the diaphragm, particularly with high pressures or high ambient temperature.

Operating parameters

Parameter	Value
Water temperature [°C]	+ 5 to + 30
Water pressure [bar pos.]	<1.0
Water flow rate [L/min]	> 1.0

Tab.33 Recommended parameters for connecting the water cooling

1. Connect the water cooling to the envisaged hose connections.

→ Safely drain the water discharge.



The flow direction is allowed in both directions.

Mounting dimensions For mounting dimensions, see the following dimensioned drawings:

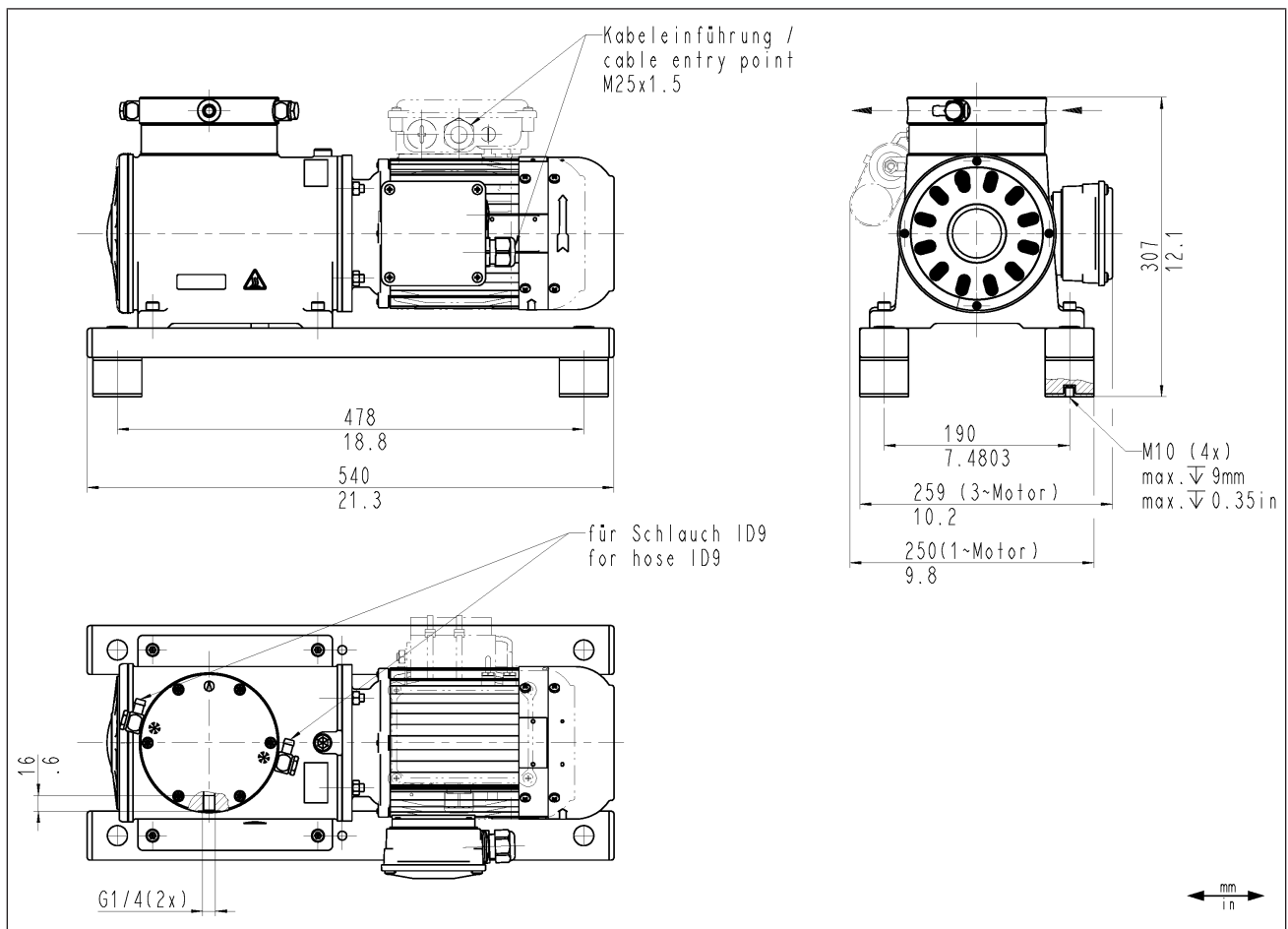


Fig.12 Mounting dimensions pump series N630

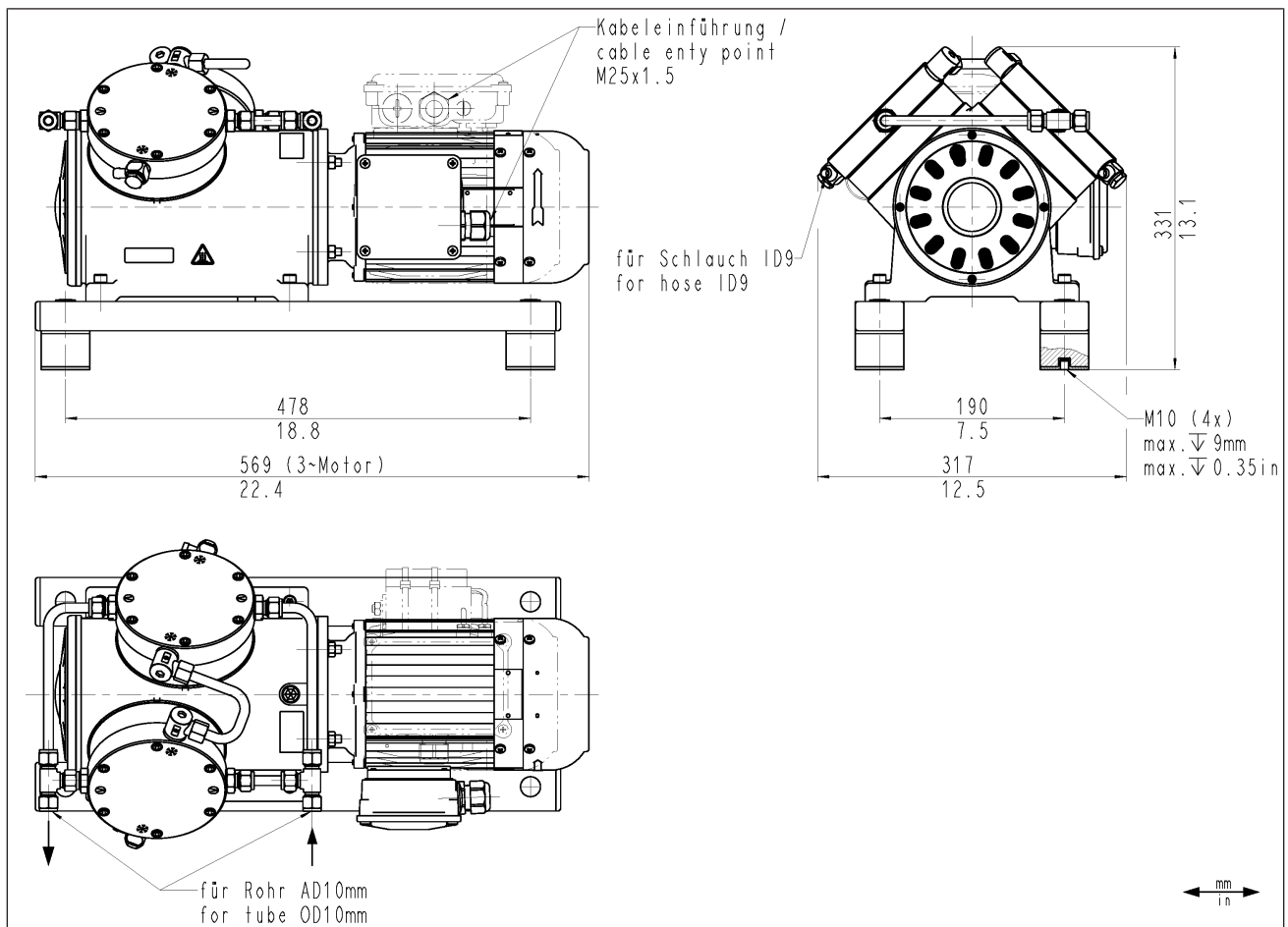


Fig.13 Mounting dimensions pump series N630.1.2

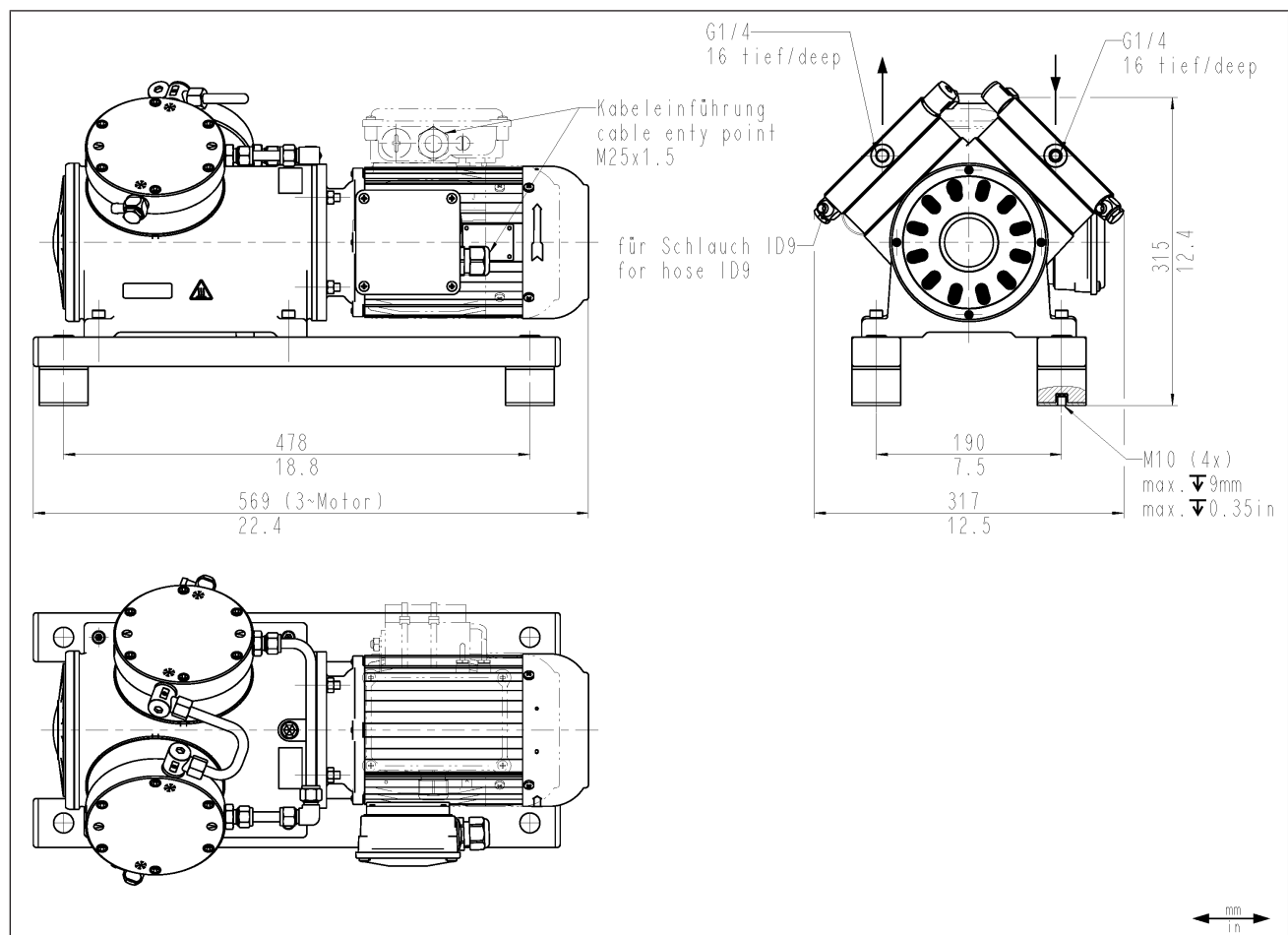


Fig.14 Mounting dimensions pump series N630.3

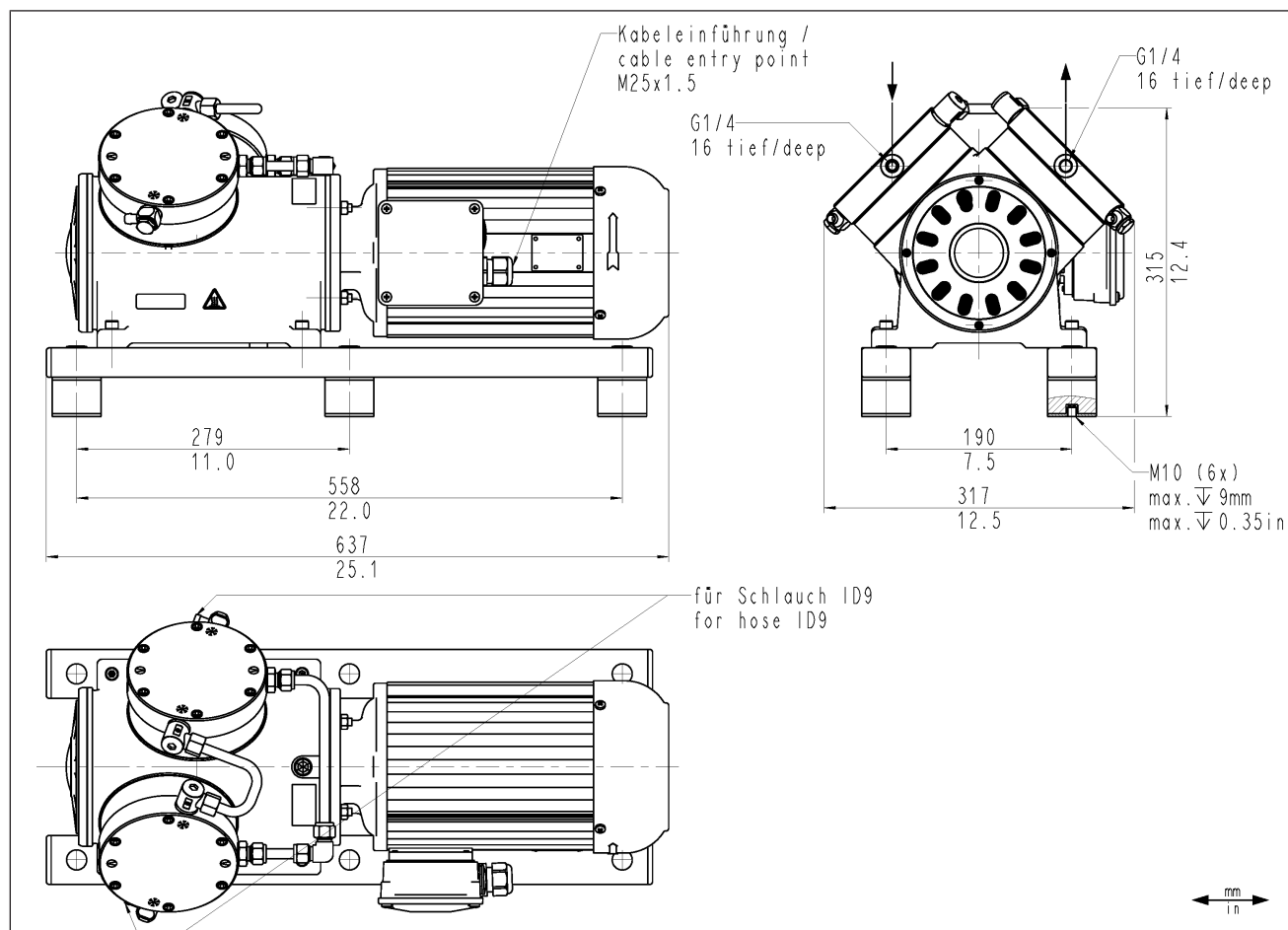


Fig.15 Mounting dimensions pump series N630.15

8 Operation

8.1 General



Risk of burns from hot pump parts and/or hot medium

Some pump parts may be hot during or after operation of the pump.

- Allow the pump to cool after operation.
- Take protective measures to protect against touching hot parts.



Injury to eyes

Coming too close to the inlet/outlet of the pump may result in injury to the eyes due to the present vacuum/operating pressure.

- Do not look into the pump inlet/outlet during operation.

- Only operate the pumps under the operating parameters and operating conditions as described in Chapter 4 *Technical data*.
- Ensure the proper use of the pumps (See Chapter 2.1 *Proper use*).
- Eliminate the possibility of improper use of the pumps (see Chapter 2.2 *Improper use*).
- Observe the safety instructions (Chapter 3 *Safety*).



Risk of pump head bursting due to excessive pressure increase

- Do not exceed the maximum permissible operating pressure (see 4 *Technical data*).
- Monitor the pressure during operation.
- If the pressure exceeds the maximum permissible operating pressure of the pump: immediately switch off the pump and remedy the fault (see Chapter 10 *Troubleshooting*).
- Only throttle or regulate the air or gas quantity on the suction line to prevent the maximum permissible operating pressure from being exceeded.
- If the air quantity or gas quantity on the pressure line is throttled or regulated, make sure that the maximum permissible operating pressure at the pump is not exceeded.
- Ensure that the pump outlet is not closed or restricted.

i Excessive pressure, with all of the associated hazards, can be prevented by means of a bypass line with a pressure relief valve between the pressure side and suction side of the pump. Further information is available from KNF Customer Service (contact data: see www.knf.com).



Risk of dangerous gas mixtures during pump operation if diaphragm breaks

If the diaphragm should break, the medium will mix with the air in the compressor housing or in the surroundings.

- Stop pump immediately.
- Replace the diaphragm prior to further operation (see Chapter 9 *Servicing*).

i Because the diaphragm is a wear part, diaphragm breakage may occur at any time.

i Operation with open suction-side gas connection can result in contaminants and objects being drawn in.

Pump stoppage → When the pump is at a standstill, establish normal atmospheric pressure in the lines.

Start-up against pressure/
vacuum **i** Please contact KNF Customer Service.

Vapors as medium The service life of the diaphragm can be extended, if no condensate forms in the pump. Therefore:

- Perform any work with saturated or near-saturated vapors only with a warm pump.

- KNF recommends: When pumping corrosive media, flush the pump before switching off (see Chapter 9.2.1 *Flushing the pump*) to extend the service life of the diaphragm.

8.2 Information on switching the pump on and off

Switching on the pump

i The pump must not be started up against pressure or vacuum during switch-on. This also applies during operation after a brief power failure. If a pump starts up against pressure or vacuum, the pump may block, thereby activating the thermal switch or triggering device for the PTC thermistor sensors and switching off the pump.

- Ensure that normal atmospheric pressure is present in the lines when switching on.

Switching off/decommissioning the pump

- Establish normal atmospheric pressure in the lines (relieve pump pneumatically).

- Recommissioning → Before recommissioning, observe the applicable standards, guidelines, regulations and technical standards at the electrical connection.
- Inspecting the pump → Inspect the pump periodically for external damage or leakage.

9 Servicing

9.1 Servicing schedule



Danger of injury through not using genuine spare parts

The functionality of the pump and its safety will be lost, if genuine spare parts are not used.
The validity of the CE conformity is rendered void if genuine parts are not used.

→ Use only genuine spare parts from KNF for servicing work.

Component	Servicing interval
Pump	→ Inspect the pump periodically for external damage or leakage → Check regularly for conspicuous changes in the noise and vibrations.
Gas connections	→ Inspect the pump periodically for external damage or leakage
Diaphragm and reed valves	→ Change at the latest when the pump capacity decreases. → Change, if the pressure or delivery rate of the pump changes for no apparent reason.
Motor mount	→ See the operating and installation instructions for the motor; inquire with the manufacturer of the motor if necessary

Tab.35

9.2 Cleaning

9.2.1 Flushing the pump

When transferring dangerous and environmentally hazardous media, KNF recommends flushing the pump at atmospheric pressure for a few minutes prior to switch-off (if necessary for safety reasons: with an inert gas) to extend the service life of the diaphragm.

→ Discharge the media safely.

9.2.2 Cleaning the pump



CAUTION

Risk of burns from hot pump parts

The pump head or motor may still be hot after operation of the pump.

→ Allow the pump to cool after operation.



WARNING

Health hazard due to dangerous substances in the pump

Depending on the medium being transferred, caustic burns or poisoning is possible.

→ Wear protective equipment if necessary, e.g., protective gloves, goggles.

→ Clean the pump with suitable measures.



During cleaning work, ensure that no fluids enter the interior of the housing.

→ Solvents should only be used during cleaning if head materials are not corroded (ensure resistance of the material).

→ If possible, the parts should be cleaned dry with a cloth. Solvents should not be used during cleaning because they could attack the plastic parts.

→ If there is any compressed air left, blow out the parts.

9.3 Changing diaphragm and reed valves

Requirements

→ Disconnect the motor from mains and ensure that it is voltage-free.

→ Allow the pump and the motor to cool.

→ Clean the pump and free the pump of hazardous materials.

→ Remove the hoses/pipes from the pneumatic pump inlet and outlet.

With multi-headed pumps, the parts of the various pump heads could get mixed up.

→ Change the parts of the individual pump heads that are to be exchanged one after the next.



Health hazard due to dangerous substances in the pump

Depending on the medium being transferred, caustic burns or poisoning is possible.

→ Wear protective equipment if necessary, e.g., protective gloves, goggles.

→ Clean the pump with suitable measures.



Risk of burns from hot pump parts

The pump head or motor may still be hot after operation of the pump.

→ Allow the pump to cool after operation.



For two-headed pumps:

Servicing work should generally be performed on both heads at the same time.

Spare parts

Spare part*	Item designation**	Quantity
Diaphragm	(12)	1 (per pump head)
Washer (ST head only)	(19)	1 (per pump head)
O-ring	(2)	2 (per pump head)
O-ring (only .13)	(3)	1 (per pump head)
O-ring (only .13)	(5)	1 (per pump head)
O-ring	(7)	2 (per pump head)
Reed valve	(17)	2 (per pump head)
Valve stopper	(18)	2 (per pump head)
Retainer plate screw	(10)	1 (per pump head)
Slotted cap screw	(16)	2 (per pump head)

Tab.37 *According to spare parts list, Chapter 11.1 Spare parts

** Acc. to Fig. 16

Tool and material

Quantity	Tool/material
1	TORX ® T30 screwdriver with torque indicator
1	Size 5 Allen key with torque indicator
1	Screwdriver blade width 5.5 mm
1	Felt-tip pen
1	19 mm open end wrench (only for two-headed pumps)

Tab.39 *According to accessories list, Chapter 11.2 Accessories

- 1 Head plate
- 2 O-ring
- 3 O-ring (only .13)
- 4 Retainer plate
- 5 O-ring (only .13)
- 6 Conrod plate, top
- 7 O-ring
- 8 Connecting rod
- 9 Shim rings
- 10 Retainer plate screw
- 11 Housing
- 12 Operating diaphragm
- 13 Intermediate plate
- 14 Cylindrical pin
- 15 Hexagon socket head cap screws
- 16 Slotted cap screw
- 17 Reed valve
- 18 Valve stopper
- 19 Washer (ST head only)

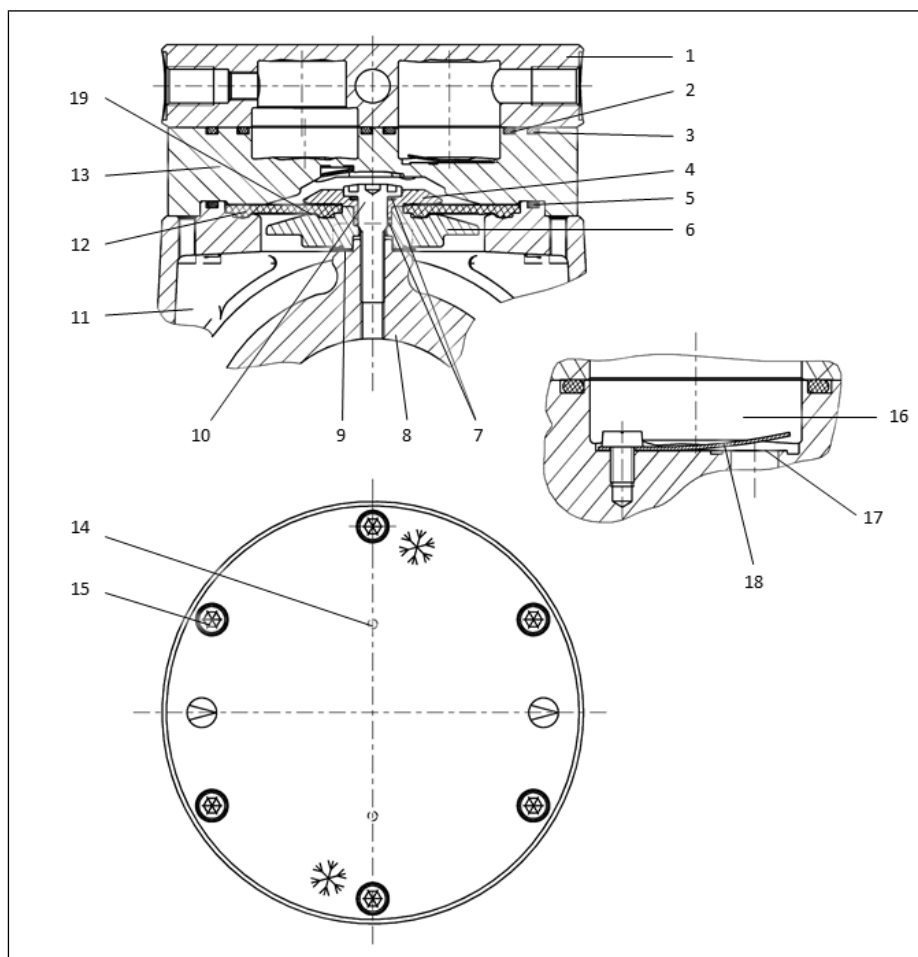


Fig.16 Components of the pump head

i The following item numbers refer to Fig. 16 unless specified otherwise.

Removing the pump head

1. Accessing the fan blades:
Loosen the fastening screws of the motor fan cowl (see Fig. 1) and remove the cowl.
2. Only for two-headed pumps:
Remove the pneumatic connection between the pump heads; to do this, mark the union nuts according to Fig. 17 and loosen them.
3. Mark head plate (1), intermediate plate (13) and housing (11) with a continuous line made with a felt-tip pen.
This helps avoid incorrect assembly later.
4. Loosen the six hexagon socket head cap screws (15) by turning them counterclockwise with the Allen key; remove the head plate (1) and intermediate plate (13).
5. For two-headed pumps:
Perform steps 3 and 4 for the second pump head.

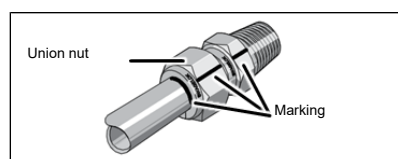


Fig.17 Marking of the union nuts

Changing the diaphragm

1. Loosen the retainer plate screw (10) by turning it counterclockwise with the Torx key.
2. Remove the O-rings (7), retainer plate (4), washer (19) and diaphragm (12).
3. Remove the O-rings (7) from the retainer plate screw (10).

4. Only .13:
Remove the O-ring (5) from the housing (11).
5. Check all parts for soiling and clean them if necessary.
6. Turn the fan blade to move the conrod plate (6) to the middle position.
7. Place the new diaphragm (12) on the conrod plate (6).
8. Place the washer (19) on the diaphragm (12).
9. Insert the new O-ring (7) in the conrod plate (6).
10. Only .13:
Insert the new O-ring (5) in the housing (11).
11. Put on the retainer plate (4).
12. Insert the new O-ring (7) in the retainer plate (4).
13. Screw the retainer plate screw (10) into the connecting rod (8).
14. Tighten the retainer plate screw (10) (tightening torque: 11 Nm).
15. For two-headed pumps:
Perform steps 1 to 13 for the second pump head.

Changing reed valves

1. Remove the two O-rings (2) from the intermediate plate (13).
2. Only .13:
Remove the O-ring (3) from the intermediate plate (13).
3. Loosen the two screws (16) and remove the reed valves (17) and valve stoppers (18) from the intermediate plate (13).
4. On the suction side and pressure side, mount the new reed valves (17) and valve stoppers (18) with the slotted cap screw (16, tightening torque: 2 Nm).

i Make certain that the reed valves (17) and valve stoppers (18) are placed symmetrically on the valve hole.

5. For two-headed pumps:
Perform steps 1 to 4 for the second pump head.

Mounting the pump head

1. Place the intermediate plate (13) on the housing (11) in accordance with the felt-tip pen marking (diaphragm should be held in the middle position by holding the fan blade).
2. Insert the two new O-rings (2) in the intermediate plate (13).
3. Only .13:
Insert the new O-ring (3) in the intermediate plate (13).
4. Place the head plate (1) on the intermediate plate (13) in accordance with the felt-tip pen marking and the orientation predefined by the cylindrical pins (14).
5. Screw in the hexagon socket head cap screws (15) by one to two turns.
6. Tighten the hexagon socket head cap screws (15) crosswise (tightening torque: 11 Nm).
7. Check the pump for smooth running by turning the fan wheel.
8. For two-headed pumps:
Perform steps 1 to 7 for the second pump head.
9. Mount the motor fan cowl (see Fig. 1).

10. For two-headed pumps:

Remount the pneumatic connection between the pump heads. In doing so, retighten the union nuts to the original position (as marked during disassembly, see Fig. 17).

- i** To ensure the required gas tightness of the pump following servicing, a leak test is to be performed.



Risk of injury and poisoning from leaks

- Before recommissioning the pump, check the pump heads and pneumatic connections for leaks. Leaks may lead to poisoning, chemical burns or similar injuries.
-

10 Troubleshooting



DANGER

Danger to life from electric shock

- All work on the pump may only be performed by an authorized specialist.
- Disconnect the pump power supply before working on the pump.
- Check and ensure that no voltage is present.

→ Check the pump (see following tables).

Pump not delivering	
Cause	Fault remedy
Pump is not connected to the electrical mains.	→ Connect the pump to the electrical mains.
No voltage in the electrical mains.	→ Check the room fuse and switch it on if necessary.
Connections or lines are blocked.	→ Check the connections and lines. → Remove the blockage.
External valve is closed or filter is clogged.	→ Check external valves and filters.
Condensate has collected in the pump head.	→ Separate the source of the condensate from the pump. → Flush the pump with air at atmospheric pressure for a few minutes (if necessary for safety reasons: with an inert gas). → Install the pump at the highest location in the system.
Diaphragm or reed valves are worn or defective.	→ Change the diaphragm and valve springs (see Chapter Changing diaphragm and reed valves).
Thermal switch or triggering device for PTC thermistor sensor of the motor has tripped.	→ Disconnect the pump from the electrical mains network. → Let the pump cool down. → Determine the cause of the overheating and eliminate the cause.

Tab.41

Delivery rate, pressure or vacuum too low	
The pump is not achieving the delivery rate specified in the technical specifications or on the data sheet.	
Cause	Fault remedy
Condensate has collected in the pump head.	→ Separate the source of the condensate from the pump. → Flush the pump with air at atmospheric pressure for a few minutes (if necessary for safety reasons: with an inert gas). → Install the pump at the highest location in the system.
There is overpressure on the pressure side and at the same time vacuum or pressure above atmospheric pressure on the suction side.	→ Change the pneumatic conditions.
Pneumatic lines or connection parts have insufficient cross-sections or are throttled.	→ Disconnect the pump from the system to determine the output values. → Eliminate throttling (e.g. valve) if necessary. → Use lines or connection parts with a larger cross-section, if necessary.
Leaks occur at connections, lines or pump head.	→ Eliminate the leaks.
Connections or lines are completely or partially clogged.	→ Check the connections and lines. → Remove any parts and particles that are causing clogging.
Head parts are soiled.	→ Clean the head components.
Operating diaphragm broken	→ Shut down the pump immediately.
Diaphragm or reed valves are worn or defective.	→ Change the diaphragm and valve springs (see Chapter Changing diaphragm and reed valves).

Tab.43

Pump exhibiting changed running noises and vibrations.	
Cause	Fault remedy
Pump bearing worn or defective.	→ Determine the cause. → Contact KNF Customer Service.
Motor worn or defective.	→ See operating instructions for the motor.
Coupling worn or defective.	→ Contact KNF Customer Service.

Tab.45

Fault cannot be rectified

If you are unable to identify any of the specified causes, send the pump to KNF Customer Service (contact data: see www.knf.com).

1. Flush the pump with air at atmospheric pressure for a few minutes (if necessary for safety reasons: with inert gas) to free the pump head of dangerous or aggressive gases (see Chapter 9.2.1 *Flushing the pump*).
2. Clean the pump (see Chapter 9.2.2 *Cleaning the pump*).
3. Send the pump together with completed Health and Safety Clearance and Decontamination Form to KNF, specifying the pumped medium.

11 Spare parts and accessories

11.1 Spare parts

Parts	Item number*	Quantity N630	Quantity N630.1.2/.3/.15
Diaphragm	(12)	1	2
Washer (ST head only)	(19)	1	2
Reed valves	(17)	2	4
Valve stopper	(18)	2	4
O-ring (D10 x 2.0)	(7)	2	4
O-ring (D38 x 3)	(2)	2	4
O-ring (105 x 3) (only .13)	(3), (5)	2	4
Slotted cap screw	(16)	2	4

Tab.47 *See Chapter 9.3 Changing diaphragm and reed valves

Spare parts set	Ordering number
N630ST.9E	321887
N630.1.2/.3/.15ST.9E	321882
N630SP.9E	321874
N630SP.13E	321875
N630ST.13E	321878
N630.1.2/.3SP.9E	321879
N630.1.2/.3SP.13E	321880
N630.1.2/.3ST.13E	321883
N630.15SP.9E	321884
N630.15SP.13E	321885
N630.15ST.13E	321901

Tab.49

Spare part	Item number*	Ordering number
Sprocket for coupling		322095
Retainer plate screw	(10)	314279

Tab.51

11.2 Accessories

Accessories	Order number
Water cooling connection:	
N630	310064
N630.1.2	310443
N630.3	310443
N630.15	310443
Suction filter G1/4	316661
Wrench for retainer plate	321664
Test adapter for coupling	322184

Tab.53

12 Returns

Prerequisite for repairing a pump by KNF is a completed Decontamination Form.

This is made available on the KNF website as a download.

- To find the form, select your country on the overview page (www.knf.com).

You can find the Decontamination Form in the download area.

If you have questions, please contact your sales partner (contact data: see www.knf.com).

13 Appendix

For further information, see also

- Betriebsanleitung Drehstrommotor DE-EN.pdf
- CE-Erklärung Drehstrommotor DE-EN.pdf
- Betriebsanleitung Kondensatormotor DE-EN.pdf
- CE-Erklärung Kondensatormotor DE-EN.pdf

Betriebsanleitung für Drehstrommotoren (IE2 + IE3 nach IEC 60034-30-1)

Operating Instructions for three-phase-motors
(IE2 + IE3 according to IEC 60034-30-1)

Baugröße / Frame size

**HEF IE2 80 L/.. - HEF IE2 355 L/..
HEF IE3 80 L/.. - HEF IE3 355 L/..**

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Achtung

Die in dieser Betriebsanleitung enthaltenen Sicherheitshinweise sind unbedingt zu beachten!

Sonderausführungen und Bauvarianten können in technischen Details von der Grundtype abweichen. Bei eventuell auftretenden Unklarheiten wird dringend empfohlen sich mit der EMOD Motoren GmbH in Verbindung zu setzen. Hierbei grundsätzlich Motortype und Motornummer angeben. Herstellungsjahr (Produktionsjahr) siehe Motortypenschild.

1 Allgemeine Hinweise

1.1 Anwendungsbereich

Die Motoren können entsprechend der auf dem Leistungsschild gestempelten Schutzart, der vom Hersteller vorgesehenen Bauform laut Katalog oder den Angaben des Kunden eingesetzt werden. Beim Einsatz von Sondermotoren gelten zusätzlich die Angaben in Angebot und Auftragsbestätigung.

1.2 Sicherheit



Warnung

Die Aufstellung, Inbetriebnahme, Wartung und Reparatur darf nur von qualifiziertem, auf Grund seiner Ausbildung und Erfahrung geeignetem Personal durchgeführt werden.

Hierbei sind besonders zu beachten:

- die technischen Daten und Angaben über die zulässige Verwendung (Inbetriebnahme-, Umgebungs- und Betriebsbedingungen), die u.a. im Katalog, der Betriebsanleitung, den Schildangaben und der übrigen Produktdokumentation enthalten sind,
- die einschlägigen Errichtungs- und Unfallverhütungsvorschriften,
- der fachgerechte Einsatz von Werkzeugen, Hebe- und Transporteinrichtungen,
- das Anbringen eines Berührungsschutzes im eingebauten Zustand, bei Gefährdung von Personen durch bewegliche Teile,
- die Benutzung persönlicher Schutzausrüstung.

2 Transport und Lagerung

2.1 Transport



Warnung

Beim Transport der komplett montierten Antriebseinheit nur die dafür vorgesehenen Hebeösen benutzen. Komplette Antriebseinheiten nicht an den Motortransportösen anheben.

Die Motoren sind nach Eingang auf Transportschäden zu prüfen. Eventuell vorhandene Schäden grundsätzlich schriftlich aufnehmen.

Motoren mit Zylinderrollenlagern werden durch eine Transportsicherung gegen Lagerschäden geschützt. Vor dem Aufziehen der Übertragungselemente bzw. der Inbetriebnahme ist die Transportsicherung zu entfernen.

2.2 Lagerung

Der Lagerort sollte nach Möglichkeit trocken, sauber, temperaturkonstant und erschütterungsfrei sein.

Damit der Schmierfilm in der Motorlagerung und den Dichtungssystemen nicht abreißt, sollte bei längerer Einlagerungszeit die Motorwelle von Hand, z.B. in monatlichen Abständen, um einige Umdrehungen gedreht werden.

Die Wälzlager der Motoren sollten neu gefettet bzw. erneuert werden, wenn der Zeitraum zwischen Lieferung und Inbetriebnahme mehr als 4 Jahre beträgt. Bei ungünstigen Lagerungsbedingungen verringert sich dieser Zeitraum erheblich.

2.3 Überprüfung des Isolationswiderstandes



Warnung

Bei der Messung des Isolationswiderstandes und unmittelbar danach haben die Klemmen teilweise gefährliche Spannungen und dürfen nicht berührt werden!

Vor Inbetriebnahme des Motors, nach längerer Lagerungsdauer oder Stillstandzeit (größer 6 Monate), muß der Isolationswiderstand der Wicklung ermittelt werden. Wicklung mittels Isolationswertmeßgerät (max. Gleichspannung 500 V) gegen Masse prüfen.

Ist der Mindest-Isolationswiderstand bei einer Wicklungstemperatur von 25 °C kleiner als 30 MΩ oder bei einer Wicklungstemperatur von 75 °C kleiner als 1 MΩ muß die Motorwicklung getrocknet werden bis der erforderliche Mindestisolationswiderstand erreicht ist.

Die Wicklungstemperatur darf hierbei 80 °C nicht überschreiten!

Damit bei geschlossenen Motoren ein Luftaustausch erfolgen kann Lagerschild lösen. Bei Trocknung der Wicklung durch Anschluß an Niederspannung sind Anweisungen des Lieferwerkes einzuholen.

Nach einem Austrocknen der Wicklung ist eine Wartung der Lager erforderlich (siehe entsprechendes Kapitel!).

3 Montage und Inbetriebnahme



Warnung

Alle Arbeiten am Motor nur im elektrisch spannungslosen Zustand durchführen!

3.1 Aufstellung

3.1.1 Standort

Die Motoren sollen leicht zugänglich, bei Umgebungs- bzw. Kühlmiteltemperaturen von max. +60°C aufgestellt bzw. angebaut werden. Aufstellhöhe max. 1000 m (ü.NN).

Die Kühlluft muss ungehindert zu- und abströmen können und darf nicht unmittelbar wieder angesaugt werden. Die Luftein- und Luftaustrittsöffnungen sowie die Kanäle zwischen den Kühlrippen sind von Verschmutzung freizuhalten.

Bei Aufstellung mit Wellenende nach oben und unten muß gewährleistet sein, daß in das obere Lager kein Wasser eindringen kann.

3.2 Befestigung von Motoren

Fußmotoren müssen auf ebener, erschütterungsfreier Auflagefläche aufgestellt und befestigt werden. Alle Befestigungsfüße müssen planflächig aufliegen; gegebenenfalls zum Ausgleich dünne Bleche unterlegen.

Bei Flanschmotoren ist auf Planlauf des Gegenflansches zu achten. Planlauffehler können zu Lagerschäden bzw. zum Ausfall von Dichtungssystemen führen.

3.3 Kondenswasser-Abflußlöcher

Es ist darauf zu achten, daß vorhandene Kondenswasser-Abflußlöcher nach der Montage an der tiefsten Stelle des Motors liegen und von Verunreinigungen freizuhalten sind.

Verschlossene Kondenswasser-Abflußlöcher sind von Zeit zu Zeit zu öffnen und danach wieder zu verschließen.

3.4 Auswuchtung



Warnung

Wird ein Motor ohne Antriebselement in Betrieb genommen, so ist die Paßfeder gegen Herausschleudern zu sichern.

Maßnahmen zum Berührungsschutz bei rotierenden Bauteilen beachten!

Die Motorwellen sind am Wellenspiegel entsprechend DIN ISO 8821 mit der Auswuchart gekennzeichnet:

Auswuchtung mit halber Passfeder „H“

Auswuchtung mit voller Passfeder „F“

Bei Montage des Abtriebsesementes auf entsprechende Auswuchart achten!

3.5 Elektrischer Anschluß

Netzspannung und -frequenz müssen mit den Daten auf dem Leistungsschild übereinstimmen. $\pm 5\%$ Spannungs- und/oder $\pm 2\%$ Frequenzabweichung sind zulässig.

Ein Anschlußplan befindet sich bei jedem Motor. Anschluß des Motors und der Steuerung, Überlastungsschutz und Erdung sind nach den VDE- und Installationsvorschriften sowie den Bestimmungen der EVU's vorzunehmen.

Die Drehrichtung des abtriebseitigen Wellenendes ist vor der Inbetriebnahme zu überprüfen. Die Umkehr der Drehrichtung ist durch vertauschen von zwei beliebigen Netzzuleitungen möglich.

Die zur Zugentlastung oder als Verdrehenschutz für die Zuleitungen vorgesehenen Einführungsteile sind ordnungsgemäß anzuwenden. Nicht benötigte Einführungsöffnungen verschließen.

Anziehdrehmomente für Schraubenverbindungen der Klemmbrettanschlüsse siehe Bild 2

3.6 Motorschutz

Eingebaute Kaltleiter entsprechend dem im Anschlußkastendeckel bzw. dem beim Motor befindlichen Anschlußplan mit dem Auslösegerät verbinden. Eventuell erforderliche Durchgangsprüfungen nur mit Meßbrücke (max. 2,5 V) durchführen.

Ist zum Motorschutz ein Temperaturwächter als Öffner vorgesehen, so ist dieser entsprechend dem Anschlußplan mit dem Hilfsstromkreis in Reihe zu schalten (min. 25 max. 250 V 1,6 A).

3.7 Inbetriebnahme



Warnung

Vorsicht Verbrennungsgefahr!
An der Motoroberfläche können hohe Temperaturen von über 80 °C auftreten.

Bei Bedarf Berührungsschutz vorsehen!

3.7.1 Montage der Übertragungselemente

Zum Auf- und Abziehen der Übertragungselemente nur geeignete Werkzeuge und Vorrichtungen verwenden. Auf die Motorlagerung darf kein Druck oder Schlag übertragen werden.

3.7.2 Ausrichten bei Kupplungsbetrieb

Bei Kupplungsbetrieb sind die Wellen axial und radial gegeneinander auszurichten. Das Einstellen der Luft zwischen den Kupplungshälften ist nach den Angaben der Kupplungshersteller vorzunehmen.

Nur Kupplungen verwenden, die mitterversatz-, winkel-, längs- und drehelastisch sind. Starre Kupplungen sind nicht zulässig und nur in Ausnahmefällen nach Absprache mit dem Hersteller einsetzbar.

3.7.3 Vor Inbetriebnahme ist mindestens zu prüfen ob:

- der Läufer ohne anzustreifen gedreht werden kann,
- der Motor ordnungsgemäß ausgerichtet und montiert ist,
- die Abtriebsselemente richtige Einstellbedingungen haben,
- alle elektrischen Anschlüsse, Verbindungselemente sowie Befestigungsschrauben ordnungsgemäß angezogen und ausgeführt sind,
- vorhandene Zusatzeinrichtungen funktionsfähig sind,
- die Kühlmittelzuführung nicht beeinträchtigt ist,
- Berührungsschutzmaßnahmen für bewegte und spannungsführende Teile getroffen sind.

4 Instandhaltung



Warnung

Alle Arbeiten am Motor nur im abgeschalteten, gegen Wiedereinschalten gesicherten Zustand durchführen!
Neben den Hauptstromkreisen auch auf

eventuell vorhandene Zusatz- oder Hilfsstromkreise, insbesondere Stillstandheizungen achten.

4.1 Inspektion

Je nach Schmutzbefall sind die Motoren regelmäßig entlang der gesamten Oberfläche, z.B. mit trockener Druckluft, zu säubern.

Erste Inspektion im Normalfall nach ca. 500 Betriebsstunden, spätestens 1 Jahr durchführen. Weitere Folgeinspektionen sollten je nach Einsatzbedingungen in geeigneten Intervallen, wie z.B. Nachschmier- bzw. Fettwechselfristen, mindestens jedoch einmal im Jahr durchgeführt werden.

Bei Inspektionen ist zu prüfen, daß

- die technischen Daten laut Typenschild eingehalten werden,
- keine Leckagen (Öl, Fett, Wasser) vorhanden sind,
- sich die Laufgeräusche der Lager sowie die Laufruhe des Motors nicht verschlechtert haben,
- alle Befestigungsschrauben für elektrische und mechanische Verbindungen fest angezogen sind,
- bei Kupplungsbetrieb die Ausrichtung des Motors in den zulässigen Toleranzen liegt.

4.2 Lager

4.2.1 Lager mit Dauerschmierung

Die Lager der Motoren mit Fettdauerschmierung sind unter normalen Betriebsbedingungen 10000 bis 20000 Betriebsstunden, längstens jedoch 3 Jahre wartungsfrei.

Bei Motoren mit zwei Deckscheiben als Lagerabdichtung (2Z-Lager) und einer Drehzahl bis 3600 min⁻¹ sollten die Lager nach 20000 Betriebsstunden, spätestens 3 Jahren erneuert werden.

Bei Motoren mit einer Deckscheibe (Z-Lager) oder einem Lagerabschlußdeckel als Lagerabdichtung sollte,

- bei Drehzahlen bis 1800 min⁻¹ nach 20000 Betriebsstunden,
- bei Drehzahlen bis 3600 min⁻¹ nach 10000 Betriebsstunden,

spätestens jedoch nach 3 Jahren das Fett und wenn erforderlich die Lagerung erneuert werden.

4.2.2 Lager mit Nachschmierung

Bei Motoren mit Nachschmiereinrichtung sind Nachschmierfrist, Fettmenge und Fettqualität durch ein Zusatzschild am Motor angegeben. Falls die im Schmierschild genannten Betriebsstunden innerhalb von 3 Jahren nicht erreicht werden sollte vorzeitig nachgeschmiert werden. Nachschmieren nur bei drehendem Läufer, damit sich das neue Fett im Lager verteilt!

Schmierstoffe (siehe Bild 1)

Das Mischen verschiedener Fettsorten ist zu vermeiden!

Achtung: Beim Nachschmieren der Lager müssen unbedingt die Fettablaßschrauben am Lagerschild AS und BS geöffnet werden!

4.3 Instandsetzung

Ersatzteillisten und normale zeichnerische Darstellungen enthalten keine detaillierten Angaben über Art und Abmessungen der Bauteile. Deshalb beim Demontieren Zuordnung der jeweiligen Bauteile feststellen und diese für den Zusammenbau kennzeichnen.

4.3.1 Lagerwechsel

Motor im erforderlichen Umfang demontieren. Wälzlager mit geeigneter Vorrichtung abziehen und Lagerstellen von Verunreinigungen säubern!

Neues Wälzlager gleichmäßig auf ca. 80 °C erwärmen und aufziehen.

Ca. 50% des freien Raumes im Lager sowie der Fetträume im Lagerschild bzw. Lagerdeckel mit Fett der zugelassenen Qualitäten füllen.

Dichtungselemente (z.B. Wellendichtringe) müssen vor dem Zusammenbau auf Funktion sowie Beschädigung überprüft und bei nicht mehr ausreichender Wirksamkeit erneuert werden.

4.3.2 Fugenabdichtung

Bei Motoren der Schutzart IP56 oder höher (siehe Leistungsschild) müssen die Teilefugen zwischen dem Motorgehäuse und den Lagerschilden durch eine geeignete, nicht aushärtende Dichtungsmasse abgedichtet werden.

5 Ersatzteile

Bei Ersatzteilbestellungen bitte neben der genauen Teilebezeichnung unbedingt Motortype und Motornummer (Daten sind dem Leistungsschild zu entnehmen) angeben.

6 Endgültige Außerbetriebnahme (Demontage, Recycling, Entsorgung)

Motoren grundsätzlich so zerlegen das ein umweltgerechtes Recycling und Entsorgen der Motorkomponenten möglich ist. Bei Recycling und Entsorgung der demontierten Motorkomponenten grundsätzlich die zum Zeitpunkt der endgültigen Außerbetriebnahme gültigen gesetzlichen Vorschriften und Bestimmungen beachten!

English



Important

The safety instructions in this operating manual are to be observed at all times.

Special versions and variants may differ from the basic model in terms of their technical details. In the event of any points being unclear, you are urgently recommended to contact EMOD Motoren GmbH, giving details of the motor type and motor serial number.

Year of production (production year) see motor nameplate.

1. General information

1.1 Area of application

The motors may be used in accordance with the protection type specified on the rating plate, the model quoted by the manufacturer in the catalogue or the details given by the client. When using special motors the details in the quotation and confirmation of order also apply.

1.2 Safety



Warning

The installation, commissioning, maintenance and repair of these motors may only be completed by qualified, suitable personnel who have been trained to do so and have experience of this type of work.

The following points must be given particular consideration:

- the technical data and details on permissible uses (commissioning, ambient and operating conditions) which are given in the catalogue, the operating manual, the plates and the other product documentation,
- the relevant installation and accident prevention regulations,
- the proper use of tools, lifting gear and transport equipment,
- the installation of a contact guard when the motor has been fitted, if there is any risk to persons from moving parts,
- the use of personal safety equipment.

2 Transport and storage

2.1 Transport



Warning

When transporting the completely assembled drive unit only use the lifting eyes provided for this purpose. Complete drive units must not be lifted by the motor transport-eyes.

The motors are to be checked on receipt for transport damage. Any damage must be reported immediately in writing.

Motors with cylindrical roller bearings are protected from bearing damage by a transport guard. Before connecting the transmission elements or commissioning the motor, the transport guard is to be removed.

2.2 Storage

The storage site should, if possible, be dry, clean, kept at a constant temperature and not subject to shocks.

To protect the bearings and the lubricating system, the motor shaft has to be turned around from some rotations from time to time.

The roller bearings in the motors should be greased or replaced if the period between placing the motors in storage and commissioning them exceeds four years. In poor storage conditions this period will be considerably reduced.

2.3 To check the insulation resistance



Warning

When measuring the insulation resistance and immediately afterwards the terminals may be carrying dangerous voltages and must not be

touched.

Before commissioning the motor, after it has been in storage or has not been used for a lengthy period of time (longer than six months) the insulation resistance of the coil must be measured. Check the coil using an insulation resistance measuring instrument (max. direct voltage 500 V) against the earth.

If the minimum insulation resistance at a coil temperature of 25 °C is less than 30 MΩ or less than 1 MΩ at a coil temperature of 75 °C, the motor coil must be dried until the required minimum insulation resistance has been achieved.

The coil temperature must not be allowed to exceed 80 °C. To ensure that air exchange takes place in enclosed motors, loosen the bearing plate. If you wish to dry the coil by connecting it to low voltage, seek assistance from the supplier.

After drying the coil the bearings must be serviced (see relevant section).

3 Installation and commissioning



Warning

Before completing any work on the motor the voltage supply must be disconnected.

3.1 Installation

3.1.1 Site

The motors should be installed/fitted while easily accessible and at an ambient or coolant temperature +60°C. Altitude of site max. 1000 m (above sea level).

The cooling air must be able to flow to and from the motor without hindrance and must not be drawn in again immediately after being fed out of the motor. The air intake and outfeed apertures and the ducts between the cooling ribs are to be kept free of dirt.

If the motor is installed with its shaft ends pointing upwards and downwards, it must be ensured that no water can ingress into the top bearing.

3.2 Securing the motors

Motors with feet must be installed and secured on a flat, shockfree surface. All the securing feet must lie flat on the surface; if necessary place thin sheets of metal beneath the feet to compensate for unevenness.

For flange motors attention must be given to ensuring that the counter flange runs evenly. Even running errors may cause bearing damage or the failure of sealing systems.

3.3 Condensation drain holes

It must be ensured that the existing condensation drain holes are at the lowest point of the motor when it has been installed and are kept free of dirt.

Sealed condensation drain holes are to be opened from time to time and then sealed again.

3.4 Balancing



Warning

If a motor is commissioned without a drive element, the fitted spring is to be secured to prevent it being thrown out.

Take the appropriate action to prevent contact with rotating parts.

The motors are marked on the shaft end face with the kind of balance corresponding to DIN ISO 8821:

Balancing with a half featherkey „H“

Balancing with a full featherkey „F“

If the drive element is connected, consideration must be given to the relevant balancing type.

3.5 Electrical connection

The mains voltage and frequency must comply with the data on the rating plate. Tolerances of $\pm 5\%$ for the voltage and/or $\pm 2\%$ for the frequency are permissible.

A connection diagram is supplied with every motor. The connection of the motor and the controller, overload guard and earth are to comply with the VDE and installation regulations as well as the regulations of the electricity supply companies.

The direction of rotation from the shaft has to be checked before starting. The reversal of the direction of rotation is possible by swapping any two mains wires.

The infeed parts used as a pull-relief and torsion guard for the supply cables are to be used properly. Any infeed apertures which are not required are to be sealed.

The tightening torques for screw connections on the terminal board connectors are shown in Figure 2.

3.6 Motor protection

Connect the integral neutral conductors to the trip unit as shown on the connection diagram in the connection box cover or supplied with the motor. Any puncture tests which are necessary should only be completed using a measurement bridge (max. 2.5 V).

If a temperature monitor is fitted as an opener to protect the motor, it is to be connected in series as shown on the connection diagram to the auxiliary power circuit (min. 25 V max. 250 V 1,6 A).

3.7 Commissioning



Warning

Caution - risk of burns.

Temperatures of over 80 °C can be generated on the surface of the motor.

If necessary fit a contact guard.

3.7.1 To install the transmission elements

Only use suitable tools and equipment to install and remove the transmission element. No pressure or blows must be exerted on the motor bearing.

3.7.2 Alignment for operation with a coupling

For operation with a coupling, the shafts are to be aligned axially and radially against each other. The gap between the coupling halves is to be adjusted as instructed by the coupling manufacturer.

Only use couplings which are elastic to central offset, angled, longitudinal and rotary motion. Rigid couplings are not allowed and may only be used in exceptional cases by agreement with the manufacturer.

3.7.3 Before commissioning at least the following checks are to be made:

- the rotor can be turned without catching,
- the motor has been aligned and installed properly,
- the output elements have correct settings,
- all the electrical connections, connection elements and securing bolts have been properly tightened and made,
- any additional equipment is fully functional,
- the coolant supply is not defective,
- contact guards have been fitted for moving parts and live parts.

4 Maintenance



Warning

Before completing any work on the motor, ensure that it has been switched off and secured to prevent its being switched on again. In addition to the main circuits, this also applies to any additional or auxiliary circuits, particularly standstill heating systems.

4.1 Servicing

Depending on the amount of dirt they generate the motors are to be cleaned on a regular basis over their entire areas, for example using compressed air.

The first service is generally necessary after approx. 500 operating hours, but at the latest after one year. Subsequent servicing is to be carried out at suitable intervals, for example relubricating or grease replacement intervals, but at least once per year.

During services checks are to be made that

- the technical data on the rating plate are observed,
- there are no leaks (oil, grease or water),
- the noises generated by the bearings and the smoothness of the motor have not deteriorated,
- all the securing bolts for electrical and mechanical connections are tight,
- if operating with a coupling, the alignment of the motor is within the permissible tolerances.

4.2 Bearings

4.2.1 Bearings with permanent lubrication

The bearings for motors with permanent lubrication generally require no maintenance in normal operating conditions for between 10000 and 20000 operating hours, but at most for three years.

On motors which have two cover plates acting as bearing seals (2Z bearings) and a speed of up to 3600 rpm, the bearings should be replaced at 20000 operating hours, but at the latest after three years.

On motors which have one cover plate (Z bearings) or a bearing cover seal acting as the bearing seal, the grease and, if necessary, the bearing should be replaced

- after 20000 operating hours if the motor is used at speeds of up to 1800 rpm,
 - after 10000 operating hours if the motor is used at speeds of up to 3600 rpm,
- but at the latest after three years.

4.2.2 Bearings which require lubrication

On motors which have a lubrication device, the lubrication intervals, amount of grease and grease quality are specified on an additional plate on the motor. If the operating hours specified on this plate have not been completed within a period of three years, the lubrication work should be completed. Only lubricate the motor when the rotor is turning so that the new grease is spread in the bearings.

Lubricants (see Figure 1).

Do not mix different types of grease.

Important: The grease outlet plugs on drive-end and non-drive-end side are to be opened when regreasing.

4.3 Repair work

Spare parts lists and normal drawings do not contain any detailed information on the type and dimensions of the components. Therefore, when dismantling the motors, mark the components so that you know which part belongs where to facilitate re-assembly.

4.3.1 To change the bearings

Dismantle the motor as necessary. Pull off the roller bearings using a suitable device and clean the bearing positions of any impurities. Heat the new roller bearings to a temperature of approx. 80 °C and pull them into position.

Fill approx. 50% of the free space in the bearing and the grease chambers in the bearing plate and bearing cover with grease of approved quality.

The sealing elements (eg. shaft sealing rings) must be examined for signs of damage and to ensure that they are fully functional before assembly and if they are no longer adequately effective they are to be replaced.

4.3.2 Joint seal

On motors with a protection type of IP 56 or higher (see rating plate) the part joints between the motor casing and the bearing plates must be sealed with a suitable, non-hardening sealing compound.

5 Spare parts

When ordering spare parts please quote the motor type and motor serial number (this information is shown on the rating plate) in addition to a precise description of the part.

6 Final decommissioning (Dismantling, recycling, disposal)

Disassemble engines always be organized so that an environmentally friendly recycling and disposal of engine components is possible.

Note on recycling and disposal of the dismantled engine components generally at the time of final decommissioning applicable laws and regulations!

Anhang / Appendix

Bild 1: Schmierstoffe

Fig. 1: Lubricants

Betriebsbedingungen Operating conditions	Wärmeklasse Temperature class	Wälzlagerfett / Einsatzbereich Bearing grease / Application
Normal	F	Hochtemperatur- und Langzeitschmierstoff / -40 °C bis +180 °C
Normal		High-temperature and long-term grease / -40 °C to +180 °C
Hohe Temperaturen, extreme Betriebsbedingungen	H	Hochtemperatur- und Langzeitschmierstoff / -20 °C bis +180 °C
High temperatures, extreme operating conditions		High-temperature and long-term grease / -20 °C to +180 °C
Tiefe Temperaturen	F	Tieftemperaturschmierstoff / -50 °C bis +150 °C
Low temperatures		Low-temperature grease / -50 °C to +150 °C

Bild 2: Anziehdrehmomente für Schraubenverbindungen der Klemmbrettanschlüsse

Fig. 2: Tightening torques for the screws and bolts of electrical connections on terminal boards

Gewinde-Ø / Thread-Ø		M4	M5	M6	M8	M10	M12	M16
Anziehdrehmoment / Tightening torque (Nm)	min.	0,8	1,8	2,7	5,5	9,0	14,0	27,0
	max.	1,2	2,5	4,0	8,0	13,0	20,0	40,0

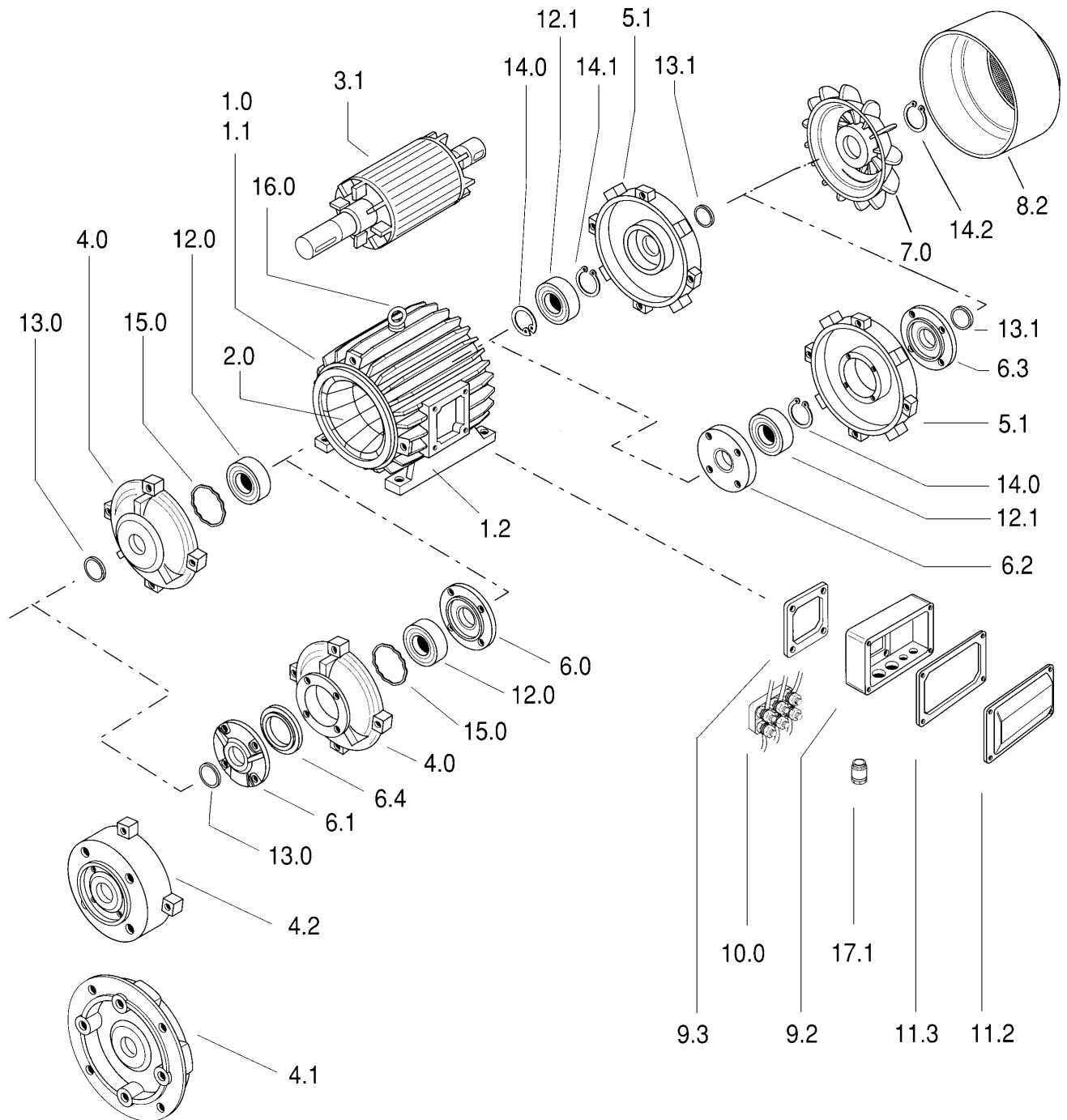
Die Anziehdrehmomente gelten, soweit keine anderen Werte angegeben sind!

The tightening torques apply unless alternative values are specified.

Bild 3: Ersatzteile

Fig. 3: Spare parts

Teile.-Nr. Part No.	Bezeichnung	Description
1.0	Gehäuse (IMB3)	Casing (IMB3)
1.1	Gehäuse ohne Füße (IMB5 / IMB14)	Casing without feet (IMB5/IMB14)
1.2	Motorfüße	Motor feet
2.0	Statorpaket mit Wicklung	Stator cove with winding
3.1	Rotor mit Welle	Rotor with shaft
4.0.	Lagerschild AS (IMB3)	Endshield drive end (IMB3)
4.1	Flanschlagerschild (IMB5)	Flange endshield (IMB5)
4.2	Flanschlagerschild (IMB14)	Flange endshield (IMB14)
5.1	Lagerschild BS	Endshield non drive end
6.0	Lagerdeckel ASi	Bearing cover drive end internal
6.1	Lagerdeckel ASa	Bearing cover drive end external
6.2	Lagerdeckel BSi	Bearing cover non drive end internal
6.3	Lagerdeckel BSa	Bearing cover non drive end external
6.4	Schleuderscheibe	Grease slinger drive end
7.0	Lüfter (Thermoplast)	Fan (plastic)
7.1	Lüfter (Aluminiumlegierung)	Fan (aluminium alloy)
8.2	Lüfterhaube	Fan cover
8.3	Schutzdach (IMV1)	Protective canopy (IMV1)
9.2	Klemmenkastenrahmen	Terminal box frame
9.3	Klemmenkastenrahmendichtung	Gasket of terminal panel box frame
10.0	Klemmbrett, komplett	Terminal, complete
11.2	Klemmenkastendeckel	Terminal box cover
11.3	Klemmenkastendeckeldichtung	Gasket of terminal panel box cover
12.0	Wälzlager AS	Roller bearings drive end
12.1	Wälzlager BS	Roller bearings non drive end
13.0	Wellendichtring	Shaft seal
13.1	Wellendichtring	Shaft seal
14.0	Sicherungsring (Wälzlager)	Securing ring (roller bearings)
14.1	Sicherungsring (Wälzlager)	Securing ring (roller bearings)
14.2	Sicherungsring (Lüfter)	Securing ring (fan)
15.0	Wellenbandfeder	Spring plate
16.0	Ringschraube	Eye-bolt
17.1	Kabel-Verschraubung	Motor connect plug
Bestellbeispiel: Baugröße : HEF IE2 80L Motor.-Nr. : 6574507 Bauteil : 3.1 Rotor mit Welle Specimen order: Frame size : HEF IE2 80L Motor serial number: 6574507 Component : 3.1 Rotor with shaft		



EG-Konformitätserklärung EC declaration of conformity

Dokument-Nr./Monat.Jahr : 1.51.821.010/01.17
Document-No./Month. Year
Hersteller : EMOD Motoren GmbH
Manufacturer
Anschrift : Zur Kuppe 1
Address D-36364 Bad Salzschlirf
Produktbezeichnung : **Drehstrommotoren**
Product designation *Three-phase motors*
Type (Baugröße) : HEF IE2 80 L/.. – HEF IE2 355 L/..
Type (Frame size) HEF IE3 80 L/.. – HEF IE3 355 L/..

Drehstrommotoren entsprechend Richtlinie 2005/32/EG, Verordnung (EG) Nr. 640/2009 und Verordnung (EU) Nr. 4/2014
Three-phase motors according to Directive 2005/32/EC, Regulation (EC) No. 640/2009 and Regulation (EC) No. 4/2014

Das bezeichnete Produkt stimmt mit den Vorschriften folgender Europäischer Richtlinien überein:
The named product is in conformity with the requirements of the following European Directive:

2014/35/EU

Richtlinie 2014/35/EU des Europäischen Parlaments und des Rates zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt (Neufassung)

2014/35/EU

Directive 2014/35/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits (recast)

2014/30/EU

Richtlinie 2014/30/EU des Europäischen Parlaments und des Rates zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit (Neufassung)

2014/30/EU

Directive 2014/30/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast)

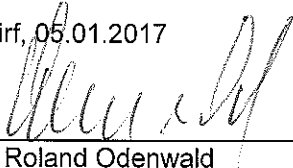
Das bezeichnete Produkt ist entwickelt und gefertigt worden in Übereinstimmung mit folgenden Normen:
The named product is developed and produced in conformity with the following standards:

EN 60034-1:2010 + Cor.:2010	EN 60034-5:2001 + A1 :2007	EN 60034-6:1993
EN 60034-9:2005 + A1 :2007	EN 61000-6-1:2007	EN 61000-6-2:2005
EN 61000-6-3:2007 + A1:2011	EN 61000-6-4:2007 + A1 :2011	EN 60204-1:2006
EN 60034-30-1:2014		

Erstmalige Anbringung der CE-Kennzeichnung: 2010
CE symbol displayed

Aussteller : EMOD Motoren GmbH
Issuer

Ort, Datum : Bad Salzschlirf, 05.01.2017
Place, Date

Unternehmensleitung: 
Management Roland Odenwald

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien und Normen, beinhaltet jedoch keine Zusicherung von Eigenschaften im Sinne der Produkthaftung.

Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

This Declaration certify the conformity with the named directives and standards, but does not contain the assurance of properties within the meaning of product liability.

The safety instructions provided in the product documentation must be observed.

Betriebsanleitung für Einphasenmotoren

Operating Instructions for single-phase motors

Baugrößen (Bg.) 56 112 EAZR

Frame size

Ausgabe / Edition 01.19

Art.-Nr. / Art. No.: 187278

Ident.-Nr. / Ident No.: B.51.820.003

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Achtung

Die in dieser Betriebsanleitung enthaltenen Sicherheitshinweise sind unbedingt zu beachten!

Sonderausführungen und Bauvarianten können in technischen Details von der Grundtype abweichen. Bei eventuell auftretenden Unklarheiten wird dringend empfohlen sich mit der EMOD Motoren GmbH in Verbindung zu setzen. Hierbei grundsätzlich Motortype und Motornummer angeben.

1 Allgemeine Hinweise

1.1 Anwendungsbereich

Die Motoren können entsprechend der auf dem Leistungsschild gestempelten Schutzart, der vom Hersteller vorgesehenen Bauform laut Katalog oder den Angaben des Kunden eingesetzt werden. Beim Einsatz von Sondermotoren gelten zusätzlich die Angaben in Angebot und Auftragsbestätigung.

1.2 Sicherheit



Warnung

Die Aufstellung, Inbetriebnahme, Wartung und Reparatur darf nur von qualifiziertem, auf Grund seiner Ausbildung und Erfahrung geeignetem Personal durchgeführt werden.

Hierbei sind besonders zu beachten:

- die technischen Daten und Angaben über die zulässige Verwendung (Inbetriebnahme-, Umgebungs- und Betriebsbedingungen), die u.a. im Katalog, der Betriebsanleitung, den Schildangaben und der übrigen Produktdokumentation enthalten sind,
- die einschlägigen Errichtungs- und Unfallverhütungsvorschriften,
- der fachgerechte Einsatz von Werkzeugen, Hebe- und Transporteinrichtungen,
- das Anbringen eines Berührungsschutzes im eingebauten Zustand, bei Gefährdung von Personen durch bewegliche Teile,
- die Benutzung persönlicher Schutzausrüstung.

1.3 Baureihen (Kurzbeschreibung)

EHB

Einphasenmotor mit Arbeits- und Hilfswicklung, mit Betriebskondensator.
M_A/M_N ca. 0,3 - 0,7

EAF

Einphasenmotor mit Arbeits- und Hilfswicklung, mit Betriebs- und Anlaufkondensator.
Der Anlaufkondensator wird nach erfolgtem Hochlauf durch den angebauten Fliehkraftschalter abgeschaltet.
M_A/M_N ca. 1,5 - 2,0

EAR

Einphasenmotor mit Arbeits- und Hilfswicklung, mit Betriebs- und Anlaufkondensator.
Der Anlaufkondensator wird nach erfolgtem Hochlauf durch ein stromabhängiges Relais abgeschaltet.
M_A/M_N ca. 1,5 - 2,0

EARZ

Einphasenmotor mit Arbeits- und Hilfswicklung, mit Betriebs- und Anlaufkondensator.
Der Anlaufkondensator wird nach erfolgtem Hochlauf durch ein zeitabhängiges Relais abgeschaltet. Anlaufzeit ist einstellbar.
M_A/M_N ca. 1,5 - 2,0

2 Transport und Lagerung

2.1 Transport



Warnung

Beim Transport der komplett montierten Antriebseinheit nur die dafür vorgesehenen Hebeösen benutzen. Komplette

Antriebseinheiten nicht an den Motortransportösen anheben.

Die Motoren sind nach Eingang auf Transportschäden zu prüfen. Eventuell vorhandene Schäden grundsätzlich schriftlich aufnehmen.

2.2 Lagerung

Der Lagerort sollte nach Möglichkeit trocken, sauber, temperaturkonstant und erschütterungsfrei sein.

Damit der Schmierfilm in der Motorlagerung und den Dichtungssystemen nicht abreißt, sollte bei längerer Einlagerungszeit die Motorwelle von Hand, z.B. in monatlichen Abständen, um einige Umdrehungen gedreht werden.

Die Wälzlager der Motoren sollten neu gefettet bzw. erneuert werden, wenn der Zeitraum zwischen Lieferung und Inbetriebnahme mehr als 4 Jahre beträgt. Bei ungünstigen Lagerungsbedingungen verringert sich dieser Zeitraum erheblich.

2.3 Überprüfung des Isolationswiderstandes



Warnung

Bei der Messung des Isolationswiderstandes und unmittelbar danach haben die Klemmen teilweise gefährliche Spannungen und dürfen nicht berührt werden!

Vor Inbetriebnahme des Motors, nach längerer Lagerungsdauer oder Stillstandzeit (größer 6 Monate), muß der Isolationswiderstand der Wicklung ermittelt werden. Wicklung mittels Isolationswertmeßgerät (max. Gleichspannung 500 V) gegen Masse prüfen.

Ist der Mindest-Isolationswiderstand bei einer Wicklungstemperatur von 25 °C kleiner als 30 MΩ oder bei einer Wicklungstemperatur von 75 °C kleiner als 1 MΩ muß die Motorwicklung getrocknet werden bis der erforderliche Mindestisolationswiderstand erreicht ist.

Die Wicklungstemperatur darf hierbei 80 °C nicht überschreiten! Damit bei geschlossenen Motoren ein Luftaustausch erfolgen kann Lagerschild lösen. Bei Trocknung der Wicklung durch Anschluß an Niederspannung sind Anweisungen des Lieferwerkes einzuholen.

Nach einem Austrocknen der Wicklung ist eine Wartung der Lager erforderlich (siehe entsprechendes Kapitel!).

3 Montage und Inbetriebnahme



Warnung

Alle Arbeiten am Motor nur im elektrisch spannungslosen Zustand durchführen!

3.1 Aufstellung

3.1.1 Standort

Die Motoren sollen leicht zugänglich, bei Umgebungs- bzw. Kühlmitteltemperaturen von max. 50 °C aufgestellt bzw. angebaut werden. Höhere Kühlmittel- bzw. Umgebungstemperaturen bis max. 60 °C, bei entsprechender Leistungsreduzierung, sind nach Rücksprache mit dem Hersteller möglich.

Die Kühlluft muß ungehindert zu- und abströmen können und darf nicht unmittelbar wieder angesaugt werden. Die Luftein- und Luftaustrittsöffnungen sowie die Kanäle zwischen den Kühlrippen sind von Verschmutzung freizuhalten.

Bei Aufstellung mit Wellenende nach oben und unten muß gewährleistet sein, daß in das obere Lager kein Wasser eindringen kann.

3.2 Befestigung von Motoren

Fußmotoren müssen auf ebener, erschütterungsfreier Auflagefläche aufgestellt und befestigt werden. Alle Befestigungsfüße müssen planflächig aufliegen; gegebenenfalls zum Ausgleich dünne Bleche unterlegen.

Bei Flanschmotoren ist auf Planlauf des Gegenflansches zu achten. Planlauffehler können zu Lagerschäden bzw. zum Ausfall von Dichtungssystemen führen.

3.3 Kondenswasser-Abflußlöcher

Es ist darauf zu achten, daß vorhandene Kondenswasser-Abflußlöcher nach der Montage an der tiefsten Stelle des Motors liegen und von Verunreinigungen freizuhalten sind. Verschlossene Kondenswasser-Abflußlöcher sind von Zeit zu Zeit zu öffnen und danach wieder zu verschließen.

3.4 Auswuchtung



Warnung

Wird ein Motor ohne Antriebselement in Betrieb genommen, so ist die Paßfeder gegen Herausschleudern zu sichern.

Maßnahmen zum Berührungsschutz bei rotierenden Bauteilen beachten!

Die Motorwellen sind am Wellenspiegel entsprechend DIN ISO 8821 mit der Auswuchtart gekennzeichnet:

Auswuchtung mit halber Passfeder „H“
Auswuchtung mit voller Passfeder „F“

Bei Montage des Abtriebsesementes auf entsprechende Auswuchtart achten!

3.5 Elektrischer Anschluß

Der elektrische Anschluß darf nur durch einen Fachmann entsprechend den geltenden Sicherheitsvorschriften vorgenommen werden.

Netzspannung und -frequenz müssen mit den Daten auf dem Leistungsschild übereinstimmen. $\pm 5\%$ Spannungs- und/oder $\pm 2\%$ Frequenzabweichung sind zulässig.

Die Abschaltung des Motors muss durch eine komplette Netztrennung aller Phasen erfolgen.

Ein Anschlußplan, Bild 4, befindet sich bei jedem Motor. Anschluß des Motors und der Steuerung, Überlastungsschutz und Erdung sind nach den DIN/EN-, IEC- und Installationsvorschriften, bzw. den landesüblichen, nationalen und internationalen Bestimmungen der elektrischen Versorgungsunternehmen vorzunehmen.

Die Drehrichtung des abtriebseitigen Wellenendes ist vor der Inbetriebnahme zu überprüfen. Die Umkehr der Drehrichtung ist entsprechend dem beigefügten Anschlußplan durchzuführen.

Die zur Zugentlastung oder als Verdrehenschutz für die Zuleitungen vorgesehenen Einführungsteile sind ordnungsgemäß anzuwenden. Nicht benötigte Einführungsöffnungen verschließen.

Anziehdrehmomente für Schraubenverbindungen der Klemmbrettanschlüsse siehe Bild 3

3.6 Motorschutz

Eingebaute Kaltleiter entsprechend dem im Anschlußkastendeckel bzw. dem beim Motor befindlichen Anschlußplan mit dem Auslösegerät verbinden. Eventuell erforderliche Durchgangsprüfungen nur mit Meßbrücke (max. 2,5 V) durchführen.

Ist zum Motorschutz ein Temperaturwächter als Öffner vorgesehen, so ist dieser entsprechend dem Anschlußplan mit dem Hilfsstromkreis in Reihe zu schalten (min. 25 max. 250 V 1,6 A).

Um einen selbstständigen Wiederanlauf des Motors nach dessen Abkühlung und der Rückschaltung der eingebauten Temperaturüberwachung zu verhindern, sind entsprechende schaltungstechnische Maßnahmen zu ergreifen.

3.7 Inbetriebnahme



Warnung

Vorsicht Verbrennungsgefahr!
An der Motoroberfläche können hohe Temperaturen von über 80 °C auftreten.

Bei Bedarf Berührungsschutz vorsehen!

3.7.1 Montage der Übertragungselemente

Zum Auf- und Abziehen der Übertragungselemente nur geeignete Werkzeuge und Vorrichtungen verwenden. Auf die Motorlagerung darf kein Druck oder Schlag übertragen werden.

3.7.2 Ausrichten bei Kupplungsbetrieb

Bei Kupplungsbetrieb sind die Wellen axial und radial gegeneinander auszurichten. Das Einstellen der Luft zwischen den Kupplungshälften ist nach den Angaben der Kupplungshersteller vorzunehmen.

Nur Kupplungen verwenden, die mitterversatz-, winkel-, längs- und drehelastisch sind. Starre Kupplungen sind nicht zulässig und nur in Ausnahmefällen nach Absprache mit dem Hersteller einsetzbar.

3.7.3 Vor Inbetriebnahme ist mindestens zu prüfen ob:

- der Läufer ohne anzustreifen gedreht werden kann,
- der Motor ordnungsgemäß ausgerichtet und montiert ist,
- die Abtriebsselemente richtige Einstellbedingungen haben,
- alle elektrischen Anschlüsse, Verbindungselemente sowie Befestigungsschrauben ordnungsgemäß angezogen und ausgeführt sind,
- vorhandene Zusatzeinrichtungen (z.B. Bremse) funktionsfähig sind,
- die Kühlmittelzuführung nicht beeinträchtigt ist,
- Berührungsschutzmaßnahmen für bewegte und spannungsführende Teile getroffen sind.

4 Instandhaltung



Warnung

Alle Arbeiten am Motor nur im abgeschalteten, gegen Wiedereinschalten gesicherten Zustand durchführen!
Neben den Hauptstromkreisen auch auf

eventuell vorhandene Zusatz- oder Hilfstromkreise, insbesondere Stillstandheizungen achten.

Kondensatoren grundsätzlich entladen, da diese auch nach dem Abschalten des Motors noch unter einer für den Menschen gefährlichen Restspannung stehen können!

4.1 Inspektion

Je nach Schmutzbefall sind die Motoren regelmäßig entlang der gesamten Oberfläche, z.B. mit trockener Druckluft, zu säubern.

Erste Inspektion im Normalfall nach ca. 500 Betriebsstunden, spätestens 1 Jahr durchführen. Weitere Folgeinspektionen sollten je nach Einsatzbedingungen in geeigneten Intervallen, wie z.B. Nachschmier- bzw. Fettwechselrhythmen, mindestens jedoch einmal im Jahr durchgeführt werden.

Bei Inspektionen ist zu prüfen, daß

- die technischen Daten laut Typenschild eingehalten werden,
- keine Leckagen (Öl, Fett, Wasser) vorhanden sind,
- sich die Laufgeräusche der Lager sowie die Laufruhe des Motors nicht verschlechtert haben,
- alle Befestigungsschrauben für elektrische und mechanische Verbindungen fest angezogen sind,
- bei Kupplungsbetrieb die Ausrichtung des Motors in den zulässigen Toleranzen liegt.

4.2 Lager

4.2.1 Lager mit Dauerschmierung

Die Lager der Motoren mit Fettdauerschmierung sind unter normalen Betriebsbedingungen 10000 bis 20000 Betriebsstunden, längstens jedoch 3 Jahre wartungsfrei.

Bei Motoren mit zwei Deckscheiben als Lagerabdichtung (2Z-Lager) und einer Drehzahl bis 3600 min⁻¹ sollten die Lager nach 20000 Betriebsstunden, spätestens 3 Jahren erneuert werden.

Bei Motoren mit einer Deckscheibe (Z-Lager) oder einem Lagerabschlußdeckel als Lagerabdichtung sollte,
-bei Drehzahlen bis 1800 min^{-1} nach 20000 Betriebsstunden,
-bei Drehzahlen bis 3600 min^{-1} nach 10000 Betriebsstunden,
spätestens jedoch nach 3 Jahren das Fett und wenn erforderlich die Lagerung erneuert werden.

4.2.2 Lager mit Nachschmierung

Bei Motoren mit Nachschmiereinrichtung sind Nachschmierfrist, Fettmenge und Fettqualität durch ein Zusatzschild am Motor angegeben. Falls die im Schmierschild genannten Betriebsstunden innerhalb von 3 Jahren nicht erreicht werden sollte vorzeitig nachgeschmiert werden. Nachschmieren nur bei drehendem Läufer, damit sich das neue Fett im Lager verteilt!

Schmierstoffe (siehe Bild 2)

Das Mischen verschiedener Fettsorten ist zu vermeiden!

4.3 Instandsetzung

Ersatzteillisten und normale zeichnerische Darstellungen enthalten keine detaillierten Angaben über Art und Abmessungen der Bauteile. Deshalb beim Demontieren Zuordnung der jeweiligen Bauteile feststellen und diese für den Zusammenbau kennzeichnen.

4.3.1 Lagerwechsel

Motor im erforderlichen Umfang demontieren. Wälzlager mit geeigneter Vorrichtung abziehen und Lagerstellen von Verunreinigungen säubern!

Neues Wälzlager gleichmäßig auf ca. 80°C erwärmen und aufziehen.

Ca. 50% des freien Raumes im Lager sowie der Fetträume im Lager Schild bzw. Lagerdeckel mit Fett der zugelassenen Qualitäten füllen.

Dichtungselemente (z.B. Wellendichtringe) müssen vor dem Zusammenbau auf Funktion sowie Beschädigung überprüft und bei nicht mehr ausreichender Wirksamkeit erneuert werden.

4.3.2 Fugenabdichtung

Bei Motoren der Schutzart IP56 oder höher (siehe Leistungsschild) müssen die Teilfugen zwischen dem Motorgehäuse und den Lager Schilden durch eine geeignete, nicht aushärtende Dichtungsmasse abgedichtet werden.

5 Zusatzhinweise für Bremsmotoren



Warnung

Nach dem Anbau der Motoren ist die Bremse auf einwandfreie Funktion zu überprüfen!

5.1 Allgemeines

Die angebaute Einscheiben-Federkraftbremse ist eine Sicherheitsbremse, die bei abgeschalteter Spannung durch Federkraft bremst. Gelüftet wird die Bremse über einen Elektromagneten.

5.2 Schaltung und Anschluß

Der Anschluß des Bremssystems erfolgt über einen im Klemmenkasten eingebauten Gleichrichter, entsprechend dem jeweils beige-fügten Schaltbild. Die anzulegende Anschlußspannung ist auf einem am Motor angebrachten Zusatzschild angegeben.

5.3 Wartung

Die angebauten Bremsen sind bis auf das nachstellen des Luftspaltes "X" (siehe Bild 1) wartungsfrei. Beim überschreiten des maximalen Luftspaltes " X_{max} ", je nach Bremsengröße etwa 0,5 - 1,3 mm, wächst die Ansprechzeit der Bremse stark an bzw. die Bremse lüftet bei ungünstigen Spannungsverhältnissen nicht mehr. Der erforderliche Luftspalt "X" kann bei gelösten Zylinderschrauben (18.11) durch Linksdrehen der Nachstellhülsen (18.12) wieder eingestellt werden.

5.4 Bremsmomenteinstellung

Die stufenlose Bremsmomenteinstellung erfolgt durch Verdrehen der Einstellmutter (18.6) mittels eines Hakenschlüssels. Durch Rechtsdrehung, in Richtung Antriebswelle gesehen, vergrößert sich das Bremsmoment. Durch Linksdrehung verringert sich das Bremsmoment.

6 Ersatzteile

Bei Ersatzteilbestellungen bitte neben der genauen Teilebezeichnung unbedingt Motortype und Motornummer (Daten sind dem Leistungsschild zu entnehmen) angeben.

English

**Important**

The safety instructions in this operating manual are to be observed at all times.

Special versions and variants may differ from the basic model in terms of their technical details. In the event of any points being unclear, you are urgently recommended to contact EMOD Motoren GmbH, giving details of the motor type and motor serial number.

1. General information

1.1 Area of application

The motors may be used in accordance with the protection type specified on the rating plate, the model quoted by the manufacturer in the catalogue or the details given by the client. When using special motors the details in the quotation and confirmation of order also apply.

1.2 Safety

**Warning**

The installation, commissioning, maintenance and repair of these motors may only be completed by qualified, suitable personnel who have been trained to do so and have experience of this type of work.

The following points must be given particular consideration:

- the technical data and details on permissible uses (commissioning, ambient and operating conditions) which are given in the catalogue, the operating manual, the plates and the other product documentation,
- the relevant installation and accident prevention regulations,
- the proper use of tools, lifting gear and transport equipment,
- the installation of a contact guard when the motor has been fitted, if there is any risk to persons from moving parts,
- the use of personal safety equipment.

1.3 Type series (Short description)

EHB

Single-phase motor with power winding and auxiliary winding, with running capacitor.
M_A/M_N approx. 0,4 - 0,6

EAF

Single-phase motor with power winding and auxiliary winding, with running capacitor and starting capacitor.
Starting capacitor is cut off by a centrifugal switch.
M_A/M_N approx. 1,5 - 2,0

EAR

Single-phase motor with power winding and auxiliary winding, with running capacitor and starting capacitor.
Starting capacitor is cut off by a current-dependent relay.
M_A/M_N approx. 1,5 - 2,0

EARZ

Single-phase motor with power winding and auxiliary winding, with running capacitor and starting capacitor.
Starting capacitor is cut off by a time-operated relay. Startup time is adjustable.
M_A/M_N approx. 1,5 - 2,0

2 Transport and storage

2.1 Transport

**Warning**

When transporting the completely assembled drive unit only use the lifting eyes provided for this purpose.

Complete drive units must not be lifted by the motor transport-eyes.

The motors are to be checked on receipt for transport damage. Any damage must be reported immediately in writing.

2.2 Storage

The storage site should, if possible, be dry, clean, kept at a constant temperature and not subject to shocks.

To protect the bearings and the lubricating system, the motor shaft has to be turned around from some rotations from time to time.

The roller bearings in the motors should be greased or replaced if the period between placing the motors in storage and commissioning them exceeds four years. In poor storage conditions this period will be considerably reduced.

2.3 To check the insulation resistance

**Warning**

When measuring the insulation resistance and immediately afterwards the terminals may be carrying dangerous voltages and must not be touched.

Before commissioning the motor, after it has been in storage or has not been used for a lengthy period of time (longer than six months) the insulation resistance of the coil must be measured. Check the coil using an insulation resistance measuring instrument (max. direct voltage 500 V) against the earth.

If the minimum insulation resistance at a coil temperature of 25 °C is less than 30 MΩ or less than 1 MΩ at a coil temperature of 75 °C, the motor coil must be dried until the required minimum insulation resistance has been achieved.

The coil temperature must not be allowed to exceed 80 °C. To ensure that air exchange takes place in enclosed motors, loosen the bearing plate. If you wish to dry the coil by connecting it to low voltage, seek assistance from the supplier.

After drying the coil the bearings must be serviced (see relevant section).

3 Installation and commissioning

**Warning**

Before completing any work on the motor the voltage supply must be disconnected.

3.1 Installation

3.1.1 Site

The motors should be installed where they allow easy access, at ambient and coolant temperatures of max. 50 °C. Higher coolant or ambient temperatures up to max. 60 °C are possible, with an appropriate reduction in power, by agreement with the manufacturer. The cooling air must be able to flow to and from the motor without hindrance and must not be drawn in again immediately after being fed out of the motor. The air intake and outfeed apertures and the ducts between the cooling ribs are to be kept free of dirt.

If the motor is installed with its shaft ends pointing upwards and downwards, it must be ensured that no water can ingress into the top bearing.

3.2 Securing the motors

Motors with feet must be installed and secured on a flat, shockfree surface. All the securing feet must lie flat on the surface; if necessary place thin sheets of metal beneath the feet to compensate for unevenness.

For flange motors attention must be given to ensuring that the counter flange runs evenly. Even running errors may cause bearing damage or the failure of sealing systems.

3.3 Condensation drain holes

It must be ensured that the existing condensation drain holes are at the lowest point of the motor when it has been installed and are kept free of dirt.

Sealed condensation drain holes are to be opened from time to time and then sealed again.

3.4 Balancing



Warning

If a motor is commissioned without a drive element, the fitted spring is to be secured to prevent it being thrown out.

Take the appropriate action to prevent contact with rotating parts.

The motors are marked on the shaft end face with the kind of balance corresponding to DIN ISO 8821:

Balancing with a half featherkey „H“

Balancing with a full featherkey „F“

If the drive element is connected, consideration must be given to the relevant balancing type.

3.5 Electrical connection

The electrical connection may only be performed by a specialist in accordance with current safety regulations.

The mains voltage and frequency must comply with the data on the rating plate. Tolerances of $\pm 5\%$ for the voltage and/or $\pm 2\%$ for the frequency are permissible.

The shutdown of the motor must result by a complete power separation of all phases.

A connection diagram, Figure 4, is supplied with every motor. The connection of the motor and the controller, overload guard and earth are to comply with the DIN/EN, IEC and installation regulations, respectively the country-specific, national and international regulations of the electricity supply companies.

The direction of rotation from the shaft has to be checked before starting. The reversal of the direction of rotation has to be taken analogous to the enclosed connection diagram.

The infeed parts used as a pull-relief and torsion guard for the supply cables are to be used properly. Any infeed apertures which are not required are to be sealed.

The tightening torques for screw connections on the terminal board connectors are shown in Figure 3.

3.6 Motor protection

Connect the integral neutral conductors to the trip unit as shown on the connection diagram in the connection box cover or supplied with the motor. Any puncture tests which are necessary should only be completed using a measurement bridge (max. 2.5 V).

If a temperature monitor is fitted as an opener to protect the motor, it is to be connected in series as shown on the connection diagram to the auxiliary power circuit (min. 25 V max. 250 V 1,6 A).

In order to prevent an independent restart of the motor after it has been cooled down and the downshift of the embedded sensors, appropriate actions are taken.

3.7 Commissioning



Warning

**Caution - risk of burns.
Temperatures of over 80 °C can be generated on the surface of the motor.**

If necessary fit a contact guard.

3.7.1 To install the transmission elements

Only use suitable tools and equipment to install and remove the transmission element. No pressure or blows must be exerted on the motor bearing.

3.7.2 Alignment for operation with a coupling

For operation with a coupling, the shafts are to be aligned axially and radially against each other. The gap between the coupling halves is to be adjusted as instructed by the coupling manufacturer.

Only use couplings which are elastic to central offset, angled, longitudinal and rotary motion. Rigid couplings are not allowed and may only be used in exceptional cases by agreement with the manufacturer.

3.7.3 Before commissioning at least the following checks are to be made:

- the rotor can be turned without catching,
- the motor has been aligned and installed properly,
- the output elements have correct settings,
- all the electrical connections, connection elements and securing bolts have been properly tightened and made,
- any additional equipment (eg. brake) is fully functional,
- the coolant supply is not defective,
- contact guards have been fitted for moving parts and live parts.

4 Maintenance



Warning

Before completing any work on the motor, ensure that it has been switched off and secured to prevent its being switched on again. In addition to the main circuits, this also applies to any additional or auxiliary circuits, particularly standstill heating systems.

The capacitors for single-phase motors can still carry for people dangerous voltage after the motor is switched off, so the capacitor is always to be discharged!

4.1 Servicing

Depending on the amount of dirt they generate the motors are to be cleaned on a regular basis over their entire areas, for example using compressed air.

The first service is generally necessary after approx. 500 operating hours, but at the latest after one year. Subsequent servicing is to be carried out at suitable intervals, for example relubricating or grease replacement intervals, but at least once per year.

During services checks are to be made that

- the technical data on the rating plate are observed,
- there are no leaks (oil, grease or water),
- the noises generated by the bearings and the smoothness of the motor have not deteriorated,
- all the securing bolts for electrical and mechanical connections are tight,
- if operating with a coupling, the alignment of the motor is within the permissible tolerances.

4.2 Bearings

4.2.1 Bearings with permanent lubrication

The bearings for motors with permanent lubrication generally require no maintenance in normal operating conditions for between 10000 and 20000 operating hours, but at most for three years.

On motors which have two cover plates acting as bearing seals (2Z bearings) and a speed of up to 3600 rpm, the bearings should be replaced at 20000 operating hours, but at the latest after three years.

On motors which have one cover plate (Z bearings) or a bearing cover seal acting as the bearing seal, the grease and, if necessary, the bearing should be replaced

- after 20000 operating hours if the motor is used at speeds of up to 1800 rpm,
 - after 10000 operating hours if the motor is used at speeds of up to 3600 rpm,
- but at the latest after three years.

4.2.2 Bearings which require lubrication

On motors which have a lubrication device, the lubrication intervals, amount of grease and grease quality are specified on an additional plate on the motor. If the operating hours specified on this plate have not been completed within a period of three years, the lubrication work should be completed. Only lubricate the motor when the rotor is turning so that the new grease is spread in the bearings.

Lubricants (see Figure 2).

Do not mix different types of grease.

4.3 Repair work

Spare parts lists and normal drawings do not contain any detailed information on the type and dimensions of the components. Therefore, when dismantling the motors, mark the components so that you know which part belongs where to facilitate re-assembly.

4.3.1 To change the bearings

Dismantle the motor as necessary. Pull off the roller bearings using a suitable device and clean the bearing positions of any impurities. Heat the new roller bearings to a temperature of approx. 80 °C and pull them into position.

Fill approx. 50% of the free space in the bearing and the grease chambers in the bearing plate and bearing cover with grease of approved quality.

The sealing elements (eg. shaft sealing rings) must be examined for signs of damage and to ensure that they are fully functional before assembly and if they are no longer adequately effective they are to be replaced.

4.3.2 Joint seal

On motors with a protection type of IP 56 or higher (see rating plate) the part joints between the motor casing and the bearing plates must be sealed with a suitable, non-hardening sealing compound.

5 Additional instructions for brake motors



Warning

After installing the motors the brake is to be checked to ensure that it functions properly.

5.1 General

The installed single-disc spring-loaded brake is a safety brake which is engaged by the force of the spring in the event of a voltage failure. The brake is ventilated by an electromagnet.

5.2 Circuit and connection

The brake system is to be connected using a rectifier fitted in the terminal box, as shown in the enclosed circuit diagram. The connection voltage is shown on an additional plate on the motor.

5.3 Maintenance

The installed brakes require no maintenance apart from the readjustment of the air gap "x" (see Figure 1). If the maximum air gap "x_{max}" (around 0,5 - 1,3 mm depending on the brake size) is exceeded, the tripping time of the brake will be increased drastically or the brake will not ventilate if the voltage conditions are not perfect. The necessary air gap "x" can be reset by undoing the cheese-head screws (18.11) and turning the resetting sleeves (18.12) anti-clockwise.

5.4 Braking torque adjustment

The infinite braking torque adjustment is made by turning the setting nut (18.6) using a hock wrench. By turning it clockwise, looking at it in the direction of the drive shaft, the braking torque will be increased. Turning it anti-clockwise will reduce the braking torque.

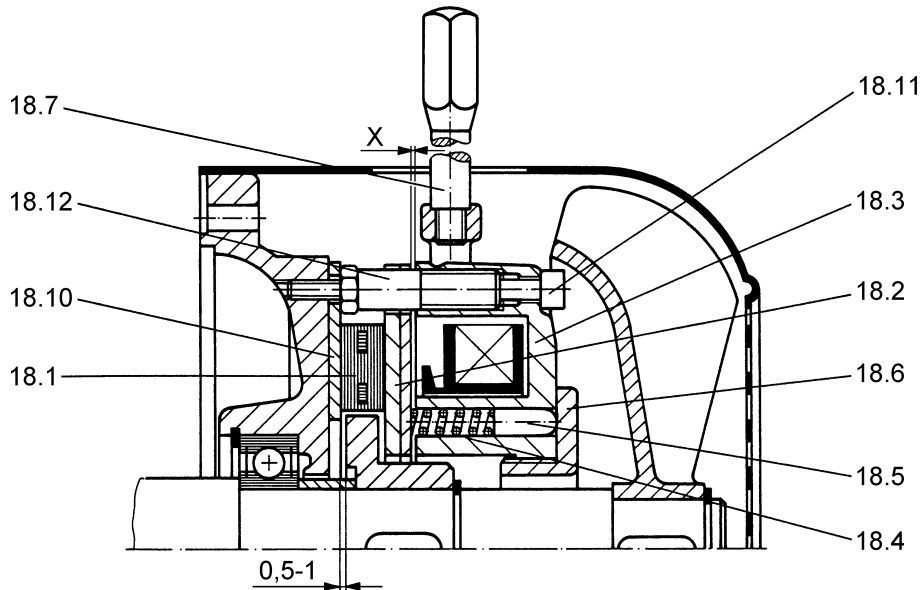
6 Spare parts

When ordering spare parts please quote the motor type and motor serial number (this information is shown on the rating plate) in addition to a precise description of the part.

Anhang / Appendix

Bild 1: Einscheiben-Federkraftbremse

Fig. 1: Single-disc springloaded brake



Bremsmoment / Braking torque (Nm)	2	4	8	16	32	60	80
Luftspalt X / Air gap X (mm)	0,2	0,2	0,2	0,2	0,3	0,3	0,3

Bild 2: Schmierstoffe

Fig. 2: Lubricants

Betriebsbedingungen Operating conditions	Wärmeklasse Temperature class	Wälzlagerfett / Einsatzbereich Bearing grease / Application
Normal	F	Hochtemperatur- und Langzeitschmierstoff / -40 °C bis +180 °C
Normal		High-temperature and long-term grease / -40 °C to +180 °C
Hohe Temperaturen, extreme Betriebsbedingungen	H	Hochtemperatur- und Langzeitschmierstoff / -20 °C bis +180 °C
High temperatures, extreme operating conditions		High-temperature and long-term grease / -20 °C to +180 °C
Tiefe Temperaturen	F	Tiefemperaturschmierstoff / -50 °C bis +150 °C
Low temperatures		Low-temperature grease / -50 °C to +150 °C

Bild 3: Anziehdrehmomente für Schraubenverbindungen der Klemmbrettanschlüsse

Fig. 3: Tightening torques for the screws and bolts of electrical connections on terminal boards

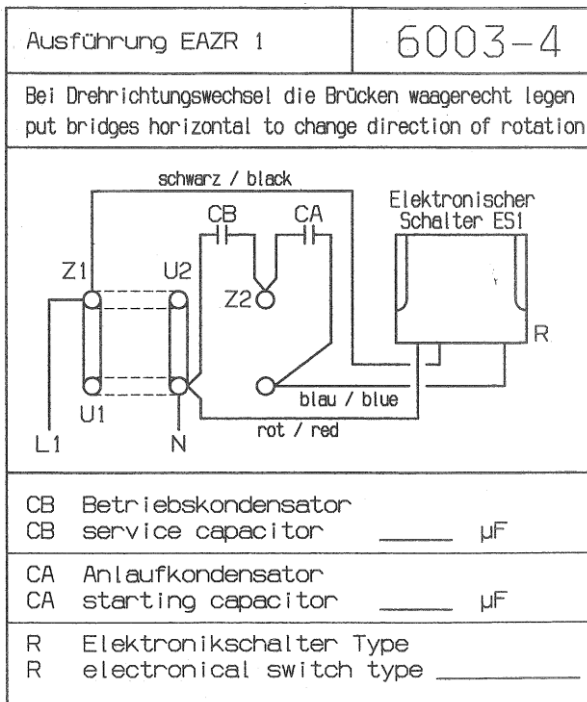
Gewinde-Ø / Thread-Ø		M4	M5	M6	M8	M10
Anziehdrehmoment / Tightening torque (Nm)	min.	0,8	1,8	2,7	5,5	9,0
	max.	1,2	2,5	4,0	8,0	13,0

Die Anziehdrehmomente gelten, soweit keine anderen Werte angegeben sind!

The tightening torques apply unless alternative values are specified.

Bild 4: Anschlußschaltbild

Fig. 2: Connection diagram



EG-Konformitätserklärung EC declaration of conformity

Dokument-Nr./Monat.Jahr : 1.51.820.001/04.18

Document-No./Month.Year

Hersteller : EMOD Motoren GmbH
Manufacturer

Anschrift : Zur Kuppe 1
Address D-36364 Bad Salzschlirf

Produktbezeichnung : **Einphasenmotoren**
Product designation Single phase motors

Type (Baugröße) : 63 EHB .. – 112 EHB ..
Type (Frame size) 63 EAF .. – 112 EAF ..
63 EAR .. – 112 EAR ..
63 EAZR .. – 100 EAZR ..

Das bezeichnete Produkt stimmt mit den Vorschriften folgender Europäischer Richtlinien überein:

The named product is in conformity with the requirements of the following European Directive:

2014/35/EU

Richtlinie 2014/35/EU des Europäischen Parlaments und des Rates zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt (Neufassung)

2014/35/EU

Directive 2014/35/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits (recast)

2014/30/EU

Richtlinie 2014/30/EU des Europäischen Parlaments und des Rates zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit (Neufassung)

2014/30/EU

Directive 2014/30/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast)

Das bezeichnete Produkt ist entwickelt und gefertigt worden in Übereinstimmung mit folgenden Normen:

The named product is developed and produced in conformity with the following standards:

EN 60034-1:2010 + Cor.:2010	EN 60034-5:2001 + A1 :2007	EN 60034-6:1993
EN 60034-9:2005 + A1 :2007	EN 61000-6-1:2007	EN 61000-6-2:2005
EN 61000-6-3:2007 + A1:2011	EN 61000-6-4:2007 + A1 :2011	EN 60204-1:2006

Erstmalige Anbringung der CE-Kennzeichnung: 1996

CE symbol displayed

Aussteller : EMOD Motoren GmbH
Issuer

Ort, Datum : Bad Salzschlirf, 16.04.2018
Place, Date

Unternehmensleitung: _____
Management Reiner Odenwald

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien und Normen, beinhaltet jedoch keine Zusicherung von Eigenschaften im Sinne der Produkthaftung.

Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

This Declaration certify the conformity with the named directives and standards, but does not contain the assurance of properties within the meaning of product liability.

The safety instructions provided in the product documentation must be observed.

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