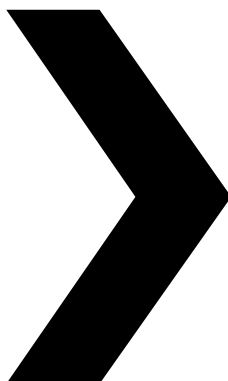


MCHZ

Horizontal self-priming
multistage pump



REVISION: MCHZ/EN (2502) 4.6

EC Declaration of Conformity

(Directive 2006/42/EC, appendix II-A)

Manufacturer

SPX Flow Technology Assen B.V.
Dr. A.F. Philipsweg 51
9403 AD Assen
The Netherlands

hereby declares that all pumps member of product-families, CombiFlex(U)(B), CombiPrime H, CombiMag, CombiMagBloc, CombiPro(L)(M)(V), CombiPrime V, CombiSump, CombiTherm, CombiWell, FRE, FRES, FREF, FREM, KGE(L), KGEF, MCH(W)(S), MCHZ(W)(S), MCV(S) whether delivered without drive, or delivered as an assembly with drive, are in conformity with the provisions of Directive 2006/42/EC (as altered most recently) and where applicable the following directives and standards:

- EC directive 2014/35/EU, "Electric equipment for use within certain voltage limits"
- EC directive 2014/30/EU, "ElectroMagnetic Compatibility"
- standards EN-ISO 12100, EN 809
- standard EN 60204-1 if applicable

The pumps to which this declaration refers may only be put into operation after they have been installed in the way prescribed by the manufacturer, and, as the case may be, after the complete system of which these pumps form part, has been made to fulfil all applicable essential Health & Safety requirements.

EC Declaration of Incorporation

(Directive 2006/42/EC, appendix II-B)

Manufacturer

SPX Flow Technology Assen B.V.
Dr. A.F. Philipsweg 51
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The Netherlands

hereby declares that the partly completed pump (Back-Pull-Out unit), member of product-families CombiFlex(U)(B), CombiPrime H, CombiMag, CombiMagBloc, CombiTherm, CombiPro(L)(M)(V), CombiPrime V, FRE, FRES, FREF, FREM, KGE(L), KGEF is in conformity with the provisions of Directive 2006/42/EC as well as with the following standards:

- EN-ISO 12100, EN 809

and that this partly completed pump is meant to be incorporated into the specified pump unit and may only be put into use after the complete machine of which the pump under consideration forms part has been made and declared to comply with all Directives.

These declarations are issued under the sole responsibility of the manufacturer
Assen, October 1st 2024



H. Hoving,
Director Operations.

Instruction manual

All technical and technological information in this manual as well as possible drawings made available by us remain our property and shall not be used (otherwise than for the operation of this pump), copied, duplicated, made available to or brought to the notice of third parties without our prior written consent.

SPX FLOW is a global multi-industry manufacturing leader. The company's highly-specialized, engineered products and innovative technologies are helping to meet rising global demand for electricity and processed foods and beverages, particularly in emerging markets.

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1 Introduction

1.1 Preface

This manual is intended for technicians and maintenance staff and for those who are in charge of ordering spare parts.

This manual contains important and useful information for the proper operation and maintenance of this pump. It also contains important instructions to prevent potential accidents and damage, and to ensure safe and fault-free operation of this pump.



Read this manual carefully before commissioning the pump, familiarize yourself with the operation of the pump and strictly obey the instructions!

The data published here comply with the most recent information at the time of going to press. However they may be subject to later modifications.

SPXFLOW reserves the right to change the construction and design of the products at any time without being obliged to change earlier deliveries accordingly.

1.2 Safety

This manual contains instructions for working safely with the pump. Operators and maintenance staff must be familiar with these instructions.

Installation, operation and maintenance has to be done by qualified and well prepared personnel.

Below is a list of the symbols used for those instructions and their meaning:



Personal danger for the user. Strict and prompt observance of the corresponding instruction is imperative!



Risk of damage or poor operation of the pump. Follow the corresponding instruction to avoid this risk.



Useful instruction or tip for the user.

Items which require extra attention are shown in **bold print**.

This manual has been compiled by SPXFLOW with the utmost care. Nevertheless SPXFLOW cannot guarantee the completeness of this information and therefore assumes no liability for possible deficiencies in this manual. The buyer/user shall at all times be responsible for testing the information and for taking any additional and/or deviating safety measures. SPXFLOW reserves the right to change safety instructions.

1.3 Guarantee

SPXFLOW shall not be bound to any guarantee other than the guarantee accepted by SPXFLOW. In particular, SPXFLOW will not assume any liability for explicit and/or implicit guarantees such as but not limited to the marketability and/or suitability of the products supplied.

The guarantee will be cancelled immediately and legally if:

- Service and/or maintenance is not undertaken in strict accordance with the instructions.
- The pump is not installed and operated in accordance with the instructions.
- Necessary repairs are not undertaken by our personnel or are undertaken without our prior written permission.
- Modifications are made to the products supplied without our prior written permission.
- The spare parts used are not original SPXFLOW parts.
- Additives or lubricants used are other than those prescribed.
- The products supplied are not used in accordance with their nature and/or purpose.
- The products supplied have been used amateurishly, carelessly, improperly and/or negligently.
- The products supplied become defective due to external circumstances beyond our control.

All parts which are liable to wear are excluded from guarantee. Furthermore, all deliveries are subject to our "General conditions of delivery and payment", which will be forwarded to you free of charge on request.

1.4 Inspection of delivered items

Check the consignment immediately on arrival for damage and conformity with the advice note. In case of damage and/or missing parts, have a report drawn up by the carrier at once.

1.5 Instructions for transport and storage

1.5.1 Weight

A pump or a pump unit is generally too heavy to be moved by hand. Therefore, use the correct transport and lifting equipment. Weight of the pump or pump unit are shown on the label on the cover of this manual.

1.5.2 Use of pallets

Usually a pump or pump unit is shipped on a pallet. Leave it on the pallet as long as possible to avoid damages and to facilitate possible internal transport.



When using a forklift always set the forks as far apart as possible and lift the package with both forks to prevent it from toppling over! Avoid jolting the pump when moving it!

1.5.3 Hoisting

When hoisting a pump or complete pump units the straps must be fixed in accordance with figure 1 and figure 2.



When lifting a pump or a complete pump unit always use a proper and sound lifting device, approved to bear the total weight of the load!



Never go underneath a load that is being lifted!



If the electric motor is provided with a lifting eye, this lifting eye is intended only for the purpose of carrying out service activities to the electric motor! The lifting eye is designed to bear the weight of the electric motor only! It is NOT permitted to lift a complete pump unit at the lifting eye of an electric motor!

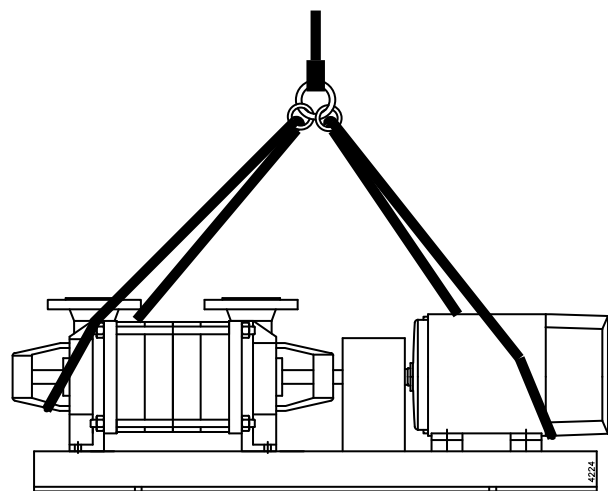


Figure 1: Lifting instructions for pump unit.

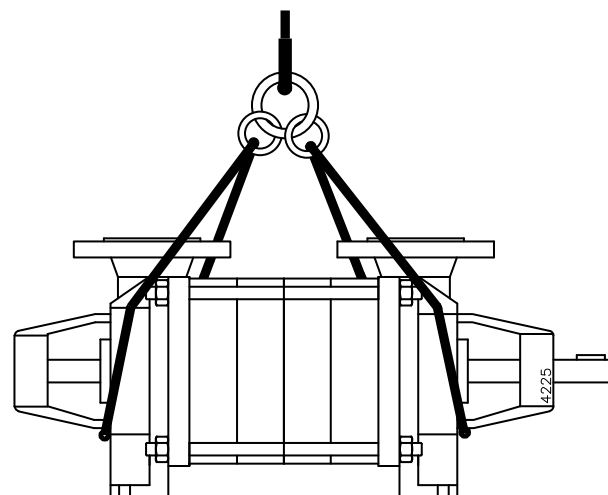


Figure 2: Lifting instructions for single pump.

1.5.4 Storage

If the pump is not to be used immediately the pump shaft must be turned by hand twice per week.

1.6 **Ordering parts**

This manual contains a survey of the spare parts recommended by SPXFLOW as well as the instructions for ordering them. A fax-order form is included in this manual.

You should always state all data stamped on the type plate when ordering parts and in any other correspondence regarding the pump.

➤ *This data is also printed on the label on the front of this manual.*

If you have any questions or require further information with regard to specific subjects, then do not hesitate to contact SPXFLOW.

2 General

2.1 Pump description

The MCHZ is a range of horizontal high-pressure stage pumps with closed impellers. The range consists of the following 6 basic types:

- MCHZ 12,5
- MCHZ 14a
- MCHZ 14b
- MCHZ 16
- MCHZ 20a
- MCHZ 20b

Each basic type can be designed with one or more pressure stages.

Flange dimensions, bolt circle and number of holes are according DIN 2535 ND 40.

The pump is driven by a standard IEC foot motor. The power is transmitted through a flexible coupling.

Due to the modular design of the construction parts there is a high level of interchangeability, even with other types of multistage pumps, such as the MCV or the MCH.

2.2 Applications

The pump can be used for the following applications:

- warm and hot water supply systems.
- air-conditioning.
- cooling for land and marine installations.
- water supply for industry, water supply companies, agriculture and horticulture.
- spraying installations.
- washing and condensing installations.
- pressure increasing installations.
- in the process industry, general industry, road and marine construction.

2.3 Type code

Pumps are available in various designs. The main characteristics of the pump are shown in the type code.

Examples: **MCHZ 12,5 x n - 3,2** or **MCHZS 20a x n - 8**

| Pump family | |
|-------------------|---|
| MCHZ | Multi stage Centrifugal Horizontal Z (Self-priming) |
| Shaft sealing | |
| | stuffing box packing |
| S | mechanical seal |
| Impeller diameter | |
| 12,5 | impeller diameter in cm |
| 14 | |
| 16 | |
| 20 | |
| Impeller width | |
| | standard impeller |
| a | narrow impeller |
| b | wide impeller |
| Number of stages | |
| n | number of stages |
| n,7 | n+1 impellers, of which the first has a reduced diameter (70% of full diameter in this example) |
| Connections | |
| 3,2 | diameter suction and pressure connection in cm |
| 5 | |
| 6,5 | |
| 8 | |

2.4 Serial number

Serial number of the pump or pump unit are shown on the name plate off the pump and on the label on the cover of this manual.

Example: **19-001160**

| | |
|--------|---------------------|
| 19 | year of manufacture |
| 001160 | unique number |

2.5 Liquids

In general the MCHZ pumps are suitable for pumping clean liquids, such as:

- spring water, cold and hot water.
- various cooling liquids.
- caustic soda.
- petrol, kerosene, petroleum.

These liquids must not affect the materials used. For the materials used see the appropriate parts list in chapter 9 "Parts".



We advise against using the pump for an application which differs from that for which the pump was originally supplied, without discussing this with your supplier first! Using a pump in a system or under system conditions (liquid, system pressure, temperature, etc.) for which it has not been designed can create danger for the user!

2.6 Construction

2.6.1 Pump section

The pump section is assembled from an inlet and outlet casing and a number of sections or stage casings with cast vanes. The inlet and outlet casings are fitted with a cast suction and pressure flange. The support for the inlet and outlet casings are in a vertical centre line with the suction and the pressure pipes.

The inlet and outlet casings are fitted with connections for pressure gauge, balance pipe, possible barrier liquid and drain.

By using guide blades the radial forces on the rotor can be disregarded over the entire capacity curve.

The stage casings are fitted with exchangeable wear rings. To prevent turbulence and for the benefit of the required NPSH values, there is a suction cover with 2 anti-rotation partitions located in front of the first impeller.

2.6.2 Self-priming section

The self-priming section contains a built-in vacuum pump which operates according to the liquid ring principle. Air or gas which is sucked in is discharged immediately via the pressure pipe, provided there is no back-pressure.

2.6.3 Impellers

All types of MCHZ pumps, are fitted with closed impellers, designed with 2 sealing edges and balance holes. As a result of this the axial forces on the rotor are reduced to a minimum. The remaining forces are taken up by an axially mounted bearing. The impellers are held on the shaft by 2 stainless steel external circlips.

2.6.4 Bearing construction

- All pumps are designed with 2 grease-lubricated deep-groove ball bearings.
- For the types MCHZ(S) 20a and 20b a double-row angular contact bearing is used on the pressure side.
- Pumps with heavy bearing constructions - used for MCHZ(S) 14a and 14b - are fitted with 2 single-row angular contact bearings on the pressure side.
- MCHZ(S) 12,5, 14a/b (with standard bearings) and 20a/b (inlet side) are provided with 2RS1-bearings.
- The MCHZ(S) 14a/b (heavy bearing) and 16 are fitted with grease nipples so that these bearings can be greased periodically.
- The bearing housings are fitted with 2 holes so that the stuffing box is easy to access.

- The bearing on the pressure side is axially fixed.
- The bearing is sealed by means of rubber V-rings.

2.6.5 Shaft seal

The shaft seal for the MCHZ is available in 2 variants:

1 MCHZ

Standardized stuffing box packing rings.

Pumps for which the pressure in the stuffing box becomes too high are designed with a balance pipe.

2 MCHZS

Mechanical seal with bellows

Cooling and lubrication of this seal is undertaken by circulation of the pumped liquid via a balance pipe.

2.7 Application area

The application area globally looks as follows:

| | Maximum value |
|----------------|---|
| Capacity | 100 m ³ /h |
| Discharge head | 340 m |
| Suction head | 8 m (for water of 15°C and provided that air which is drawn in is discharged without back-pressure) |

However, the maximum allowable pressures and temperatures depend strongly on the selected materials and components. Also working conditions may cause differences. For more detailed information see paragraph 10.5 "Permissible pressure and temperature".

2.8 Re-use

The pump may only be used for other applications after prior consultation with SPXFLOW or your supplier. Since the lastly pumped medium is not always known, the following instructions should be observed:

- 1 Flush the pump properly
- 2 Make sure the flushing liquid is discharged safely (environment!)



Take adequate precautions and use the appropriate personal protection means (rubber gloves, spectacles)!

2.9 Scrapping

If it has been decided to scrap a pump, the same procedure as for paragraph 2.8 "Re-use" should be followed.

3 Installation

3.1 Safety

- Read this manual carefully prior to installation and commissioning. Non-observance of these instructions can result in serious damage to the pump and this will not be covered under the terms of our guarantee. Follow the instructions given step by step.
- Ensure that the pump can not be started if work has to be undertaken to the pump during installation and the rotating parts are insufficiently guarded.
- Depending on the design the pumps are suitable for liquids with a temperature of up to 120°C. When installing the pump unit to work at 65°C and above the user should ensure that appropriate protection measures and warnings are fitted to prevent contact with the hot pump parts.
- If there is danger of static electricity, the entire pump unit must be earthed.
- If the pumped liquid is harmful to men or the environment, take appropriate measures to drain the pump safely. Possible leakage liquid from the shaft seal should also be discharged safely.

3.2 Preservation

In order to prevent corrosion, the inside of the pump is treated with a preserving agent before leaving the factory. Before commissioning the pump remove any preserving agents and flush the pump thoroughly with hot water.

3.3 Environment

- The foundation must be hard, level and flat.
- The area in which the pump is installed must be sufficiently ventilated. An ambient temperature or air humidity which is too high, or a dusty environment, can have a detrimental effect on the operation of the electric motor.
- There should be sufficient space around the pump unit to operate and if necessary repair it.
- Behind the cooling air inlet of the motor there must be a free area of at least 1/4 of the electric motor diameter, to ensure unobstructed air supply.

3.4 Piping

- The piping to the suction and delivery connections must fit exactly and must not be subject to stress during operation.
- The passage of the suction pipe must be amply dimensioned. This pipe should be as short as possible and run towards the pump in such a way that no air pockets can arise. If this is not possible, a venting facility should be provided at the highest point of the pipe. If the inside diameter of the suction pipe is larger than the suction connection of the pump, an eccentric reducer should be applied to prevent air pockets and whirls. See figure 3.

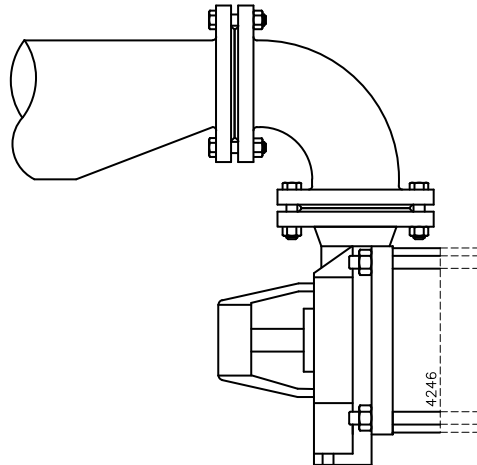


Figure 3: Eccentric reducer to suction flange.

- The maximum allowable system pressure is stated in paragraph 10.5 "Permissible pressure and temperature". If there is a risk that this pressure might be exceeded, for instance because of an excessive inlet pressure, appropriate measures should be taken by mounting a safety valve in the piping.
- Sudden changes in the rate of flow can lead to high pressure impulses in the pump and the piping (water shock). Therefore, do not use quick-acting closing devices, valves etc.

3.5 Accessories

- Fit any parts that may have been supplied separately.
- If the liquid does not flow towards the pump, fit a foot valve at the bottom of the suction pipe. If necessary, combine this foot valve with a suction strainer to prevent impurities from being drawn in.
- When mounting, place temporarily (for the first 24 operating hours) a fine gauze between suction flange and suction pipe to prevent internal pump parts from being damaged by foreign matter. If the risk of damage continues to exist, fit a permanent filter.
- In case the pump is provided with an isolation, special attention has to be paid To temperature limits of shaft seal and bearing.

3.6 Installation

3.6.1 Piping

Fit the gaskets between the flanges and connect the pressure and the suction pipes to the pump.

3.6.2 Installation of a pump unit

Pump and motor shafts of complete pump units are adjusted perfectly in line in the works.

- 1 In case of permanent arrangement place the base plate level on the foundation with the aid of shims.
- 2 Carefully tighten the nuts on the foundation bolts.
- 3 Check the alignment of pump and motor shafts and if necessary realign, see paragraph 3.6.4 "Alignment of the coupling".

3.6.3 Assembling a pump unit

If the pump and the electric motor still have to be assembled, do the following:

- 1 Fit both halves of the coupling to the pump shaft and the motor shaft respectively. For tightening moment of the set screw see paragraph 10.1.3 "Tightening moments set screw from coupling".
- 2 If the shaft height of the pump is not equal to the IEC size of the motor, level up the difference by placing properly sized spacers under the pump or under the motor feet.
- 3 Place the pump on the base plate. Fix the pump to the base plate.
- 4 Place the electric motor on the base plate. Move the motor to obtain a gap of 3 mm between both coupling halves.
- 5 Place copper shims under the feet of the electric motor. Fix the electric motor to the base plate.
- 6 Align the coupling in accordance with the following instructions.

3.6.4 Alignment of the coupling

- 1 Place a ruler (A) on the coupling. Place or remove as many copper shims as is necessary to bring the electric motor to the correct height so that the straight edge touches both coupling halves over the entire length, see figure 4.

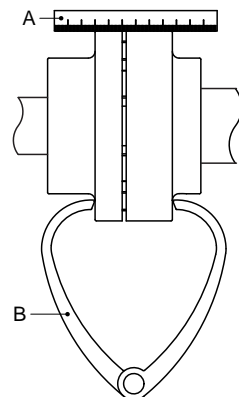


Figure 4: *Aligning the coupling by means of a ruler and a pair of outside calipers.*

- 2 Repeat the same check on both sides of the coupling at the height of the shaft. Move the electric motor so that the straight edge touches both coupling halves over the entire length.

- 3 Check the alignment once again using a pair of external callipers (B) at 2 diametrical opposite points on the sides of the coupling halves, see figure 4.
- 4 Fit the guard. See paragraph 7.3.2 "Assembling the guard".

3.6.5 Tolerances for aligning the coupling

The maximum allowable tolerances for the alignment of the coupling halves are shown in Table 1. See also figure 5.

Table 1: Alignment tolerances

| External diameter of coupling [mm] | V | | V _{a_max} - V _{a_min} [mm] | V _{r_max} [mm] |
|------------------------------------|----------|----------|--|-------------------------|
| | min [mm] | max [mm] | | |
| 81-95 | 2 | 4 | 0,15 | 0,15 |
| 96-110 | 2 | 4 | 0,18 | 0,18 |
| 111-130 | 2 | 4 | 0,21 | 0,21 |
| 131-140 | 2 | 4 | 0,24 | 0,24 |
| 141-160 | 2 | 6 | 0,27 | 0,27 |
| 161-180 | 2 | 6 | 0,30 | 0,30 |
| 181-200 | 2 | 6 | 0,34 | 0,34 |
| 201-225 | 2 | 6 | 0,38 | 0,38 |

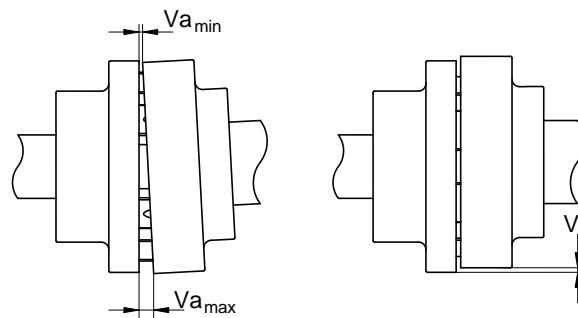


Figure 5: Alignment tolerances standard coupling.

3.7 Connection of the electric motor



The electric motor must be connected to the mains by an approved electrician, according to the locally prevailing regulations of the electricity company.

- Refer to the instruction manual belonging to the electric motor.
- If possible, fit a working switch as close as possible to the pump.

4 Commissioning

4.1 Inspection of the pump

- Construction with stuffing box packing: Remove the seal guards (0276). Check whether the nuts (1810) have not been over tightened. If necessary, loosen these nuts and tighten them again by hand. Fit the seal guards (0276).
- Check whether the pump shaft turns freely. Do this by turning the shaft end at the coupling a few times by hand.

4.2 Inspection of the motor

- Check whether the fuses have been mounted.

4.3 Checking the sense of rotation



Beware of possible non-screened rotating parts, when checking the sense of rotation!

- 1 The sense of rotation of the pump is indicated by an arrow. Check whether the sense of rotation of the motor corresponds with that of the pump.
- 2 Let the motor run for only a short time and check the sense of rotation.
- 3 If the sense of rotation is **not** correct, alter the sense of rotation. See the instructions in the user manual belonging to the electric motor.
- 4 Fit the guard.

4.4 Start-up

Proceed as follows, both when the unit is put into operation for the first time and after the pump has been overhauled:

- 1 Fully open the stop valve in the pressure and suction pipe.
- 2 Fill the pump with the liquid to be pumped.
- 3 Turn the pump shaft a few times by hand and add more liquid, if necessary.
- 4 Start the pump.
- 5 As soon as the pump is under pressure, if necessary, adjust the delivery stop valve in order to obtain the desired the working pressure.



Make sure that when a pump is running, rotating parts are always properly screened off by the guard!

4.5 Adjustment of shaft sealing

4.5.1 Stuffing box packing

After the pump is started, the stuffing box packing will show a certain amount of leakage. Because of the expansion of the packing fibres, this leakage will gradually decrease. Make sure that the stuffing box packing never runs dry. To prevent this, loosen the gland nuts to the extent that the stuffing box packing leaks by drops. As soon as the pump has reached the proper temperature (and leakage is still too much) the gland can be adjusted permanently:

- 1 Tighten both nuts, one after the other, a quarter turn.
- 2 Wait 15 minutes after each adjustment before making the next adjustment.
- 3 Continue in this way until an acceptable leakage by drops has been attained (10/20 cm³/h).



Adjustment of stuffing box packing has to be done with running pump. Take great care not to touch moving parts.

4.5.2 Mechanical seal

- A mechanical seal may never show visible leakage.

4.6 Pump in operation

When the pump is in operation, pay attention to the following:

- The pump should never run dry.
- Never use a stop valve in the suction line to control pump output. The stop valve should always be fully opened during operation.
- Check whether the absolute inlet pressure is sufficient, to prevent vaporization in the pump.
- Check whether the pressure difference between suction and delivery side corresponds with the specifications of the pump's duty point.

4.7 Noise

The noise production of a pump depends to a great extent on the operating conditions. The values stated in paragraph 10.7 "Noise data" are based on normal operation of the pump, driven by an electric motor. In case the pump is driven by a combustion engine, or in case it is used outside the normal operation area, as well as in case of cavitation, the noise level may exceed 85 dB(A). In that case precautions should be taken, like building a noise-barrier around the unit or wearing hearing protection.

5 Maintenance

5.1 Daily maintenance

Regularly check the outlet pressure.



No water should get into the terminal box of the electric motor when the pump room is sprayed clean! Never spray water on hot pump parts! The sudden cooling down may cause them to burst and hot water may flow out!



Flawed maintenance will result in shorter lifespan, possible break down and in any event loss of warranty.

5.2 Shaft sealing

5.2.1 Stuffing box packing

Do not tighten the gland nuts any more after the running-in period and adjustment. If in time the stuffing box packing starts to leak excessively, new packing rings have to be mounted instead of further tightening the nuts!

5.2.2 Mechanical seal

A mechanical seal generally requires no maintenance, however, **it should never be allowed to run dry**. If there are no problems, do not dismantle the mechanical seal. As the seal faces have run in on one another dismantling usually implicates replacement of the mechanical seal. If a mechanical seal shows any leakage it has to be replaced.

5.3 Environmental influences

- Regularly clean the filter in the suction pipe or the suction strainer at the bottom of the suction pipe, as the inlet pressure may become too low if the filter or the suction strainer is fouled.
- If there is a risk that the pumped liquid expands during solidification or freezing, the pump has to be drained and, if necessary, flushed after it has been put out of service.
- If the pump is out of service for a long time, it has to be preserved.
- Check motor for accumulation of dust or dirt, which might influence motor temperature.

5.4 Lubrication of the bearings

5.4.1 MCHZ(S) 12,5 - 14a/b (standard bearings) - 20a/b

These pump types are provided with 2RS1 bearings which are filled with grease for their entire duty life and **which do not require any maintenance.**

5.4.2 MCHZ(S) 16

The ball bearings and the ball bearing housing are filled with a quantity of grease on delivery which is sufficient for the life of the bearing. In case the pump is overhauled, the bearings and bearing chambers have to be cleaned and provided with new grease. See paragraph 10.2 "Post-greasing of ball bearings" for recommended greases.

5.4.3 MCHZ(S) 14a/b with heavy bearing construction

These pump types are fitted with grease nipples so that the bearings can be greased periodically. After every 8000 operating hours 5 grammes of grease must be added to each bearing. In case the pump is overhauled, the bearings and bearing chambers **on drive side** have to be cleaned and provided with new grease. See paragraph 10.2 "Post-greasing of ball bearings" for recommended greases.

5.5 Noise

If a pump starts making noise, this may point to certain problems with the pump unit. A crackling noise can indicate cavitation or excessive motor noise can indicate deterioration of the bearings.

5.6 Motor

Check motor specifications for start-stop frequency.

5.7 Faults



The pump, of which you want to determine the fault, may be hot or under pressure. Take the appropriate precautions first and protect yourself with the proper safety devices (safety goggles, gloves, protective clothing)!

To determine the source of the malfunctioning of the pump, proceed as follows:

- 1 Switch off the power supply to the pump unit. Lock the working switch with a padlock or remove the fuse.
- 2 Close the stop valves.
- 3 Determine the nature of the fault.
- 4 Try to determine the cause of the fault with chapter 6 "Problem solving" and take the appropriate measures or contact your installer.

6 Problem solving

Faults in a pump installation can have various causes. The fault may not be in the pump, it may also be caused by the pipe system or the operating conditions. Firstly, always check that installation has been executed in accordance with the instructions in this manual and that the operating conditions still correspond with the specifications for which the pump was purchased.

In general, breakdowns in a pump installation are attributable to the following causes:

- Faults with the pump.
- Breakdowns or faults in the pipe system.
- Faults due to incorrect installation or commissioning.
- Faults due to incorrect choice of pump.

A number of the most frequently occurring failures as well as their possible causes are shown in the table below.

Table 2: Most frequently occurring failures.

| Most common faults | Possible causes, see Table 3. |
|---|--|
| Pump delivers no liquid | 1 2 3 4 5 8 9 10 11 13 14 17 19 20 21 29 |
| Pump has insufficient volume flow | 1 2 3 4 5 8 9 10 11 13 14 15 17 19 20 21 28 29 |
| Pump has insufficient head | 2 4 5 13 14 17 19 28 29 |
| Pump stops after start up | 1 2 3 4 5 8 9 10 11 |
| Pump has higher power consumption than normal | 12 15 16 17 18 22 23 24 25 26 27 32 34 38 39 |
| Pump has lower power consumption than normal | 13 14 15 16 17 18 20 21 28 29 |
| The stuffing box packing is leaking excessively | 23 25 26 30 31 32 33 43 |
| Packing rings or mechanical seal have to be replaced to often | 23 25 26 30 32 33 34 41 |
| Pump vibrates or is noisy | 1 9 10 11 15 18 19 20 22 23 24 25 26 27 29 37 38 39 40 |
| Bearings wear too much or become hot | 23 24 25 26 27 37 38 39 40 42 |
| Pump running rough hot or seizes | 23 24 25 26 27 34 37 38 39 40 42 |

Table 3: Possible causes of pump failures.

| | Possible causes |
|----|--|
| 1 | Pump or suction pipe is not sufficiently filled or de-aerated |
| 2 | Gas or air coming from the liquid |
| 3 | Air lock in the suction pipe |
| 4 | Air leak in the suction pipe |
| 5 | The pump takes in air through the stuffing box packing |
| 8 | The manometric suction head is too high |
| 9 | Suction pipe or suction strainer is blocked |
| 10 | Insufficient immersion of foot valve or suction pipe during operation of the pump |
| 11 | NPSH available too low |
| 12 | Speed too high |
| 13 | Speed too low |
| 14 | Wrong sense of rotation |
| 15 | Pump does not operate at the right duty point |
| 16 | Liquid density differs from the calculated liquid density |
| 17 | Liquid viscosity differs from the calculated liquid viscosity |
| 18 | Pump operates when the liquid flow is too low |
| 19 | Wrong pump selection |
| 20 | Obstruction in impeller or pump casing |
| 21 | Obstruction in the piping |
| 22 | Wrong installation of the pump unit |
| 23 | Pump and motor not well aligned |
| 24 | Rotating part running out of true |
| 25 | Imbalance in rotating parts (for instance: impeller or coupling) |
| 26 | Pump shaft is running out of true |
| 27 | Bearings faulty or worn out |
| 28 | Casing wear rings faulty or worn out |
| 29 | Damaged impeller |
| 30 | Shaft on the spot of the stuffing box packing rings or seal faces of the mechanical seal are worn out or damaged |
| 31 | Worn out or dried out stuffing box packing rings |
| 32 | Not well packed stuffing box packing or bad mounting of the mechanical seal |
| 33 | Stuffing box packing type or mechanical seal not suitable for the pumped liquid or operation circumstances |
| 34 | Gland or mechanical seal cover has been tightened too much or crookedly |
| 37 | Axial retaining of impellers or pump shaft is defective |
| 38 | The bearings have been mounted wrongly |
| 39 | Too much or too little bearing lubrication |
| 40 | Wrong or polluted lubricant |
| 41 | Impurities in the liquid get into the stuffing box packing |
| 42 | Too high axial force because of excessive inlet pressure |
| 43 | Excessive pressure in stuffing box packing space due to too much play in the throttling bush or blocked by-pass |

7 Disassembly and assembly

7.1 Special tools

Assembly and disassembly work requires no special tools. However, such tools can make certain jobs easier, for instance replacing the shaft seal. If such is the case it will be indicated in the text.

7.2 Precautionary measures

Before the pump can be repaired it must first be dismantled. The following measures are required for this:

7.2.1 Switch off the power supply

- 1 Switch off the power supply to the pump by placing the pump switch on the control box to the "OFF" position, or if an operating switch is fitted by turning this "OFF".
- 2 Remove the fuses.
- 3 Fit a warning board onto the control box.

7.2.2 Pipe support

If the entire pump has to be removed check that the pipes are supported. If this is not the case, then ensure sufficient support and fixing points for the pipes first.

7.2.3 Draining the liquid



If the liquid being pumped is hot, then allow the pump to cool down further before proceeding. Make sure you do not come into contact with the pumped liquid if this is hot or of an unknown composition!

- 1 Close any relevant stop cocks.
- 2 Drain the pump until no more liquid flows out.



An MCHZ(S) pump can not be drained fully in the horizontal position. If possible place the pump vertically on the bearing cover and allow it to drain further.

7.3 Disassembling / assembling guard

7.3.1 Disassembling the guard

- 1 Loosen bolts (0960). See figure 8.
- 2 Remove both jackets (0270). See figure 6.

7.3.2 Assembling the guard

- 1 Fit the jacket (0270) at motor side. The annular groove must be located at motor side.

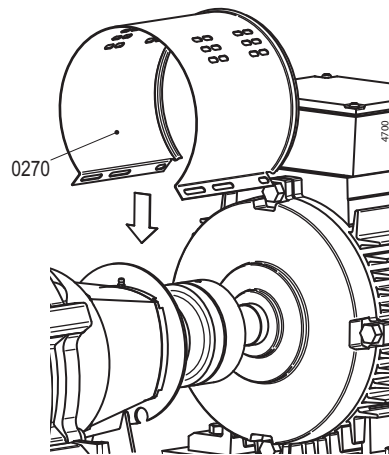


Figure 6: Fitting the jacket at motor side.

- 2 Place the assembly plate (0280) over the motor shaft and fit it into the annular groove of the jacket.

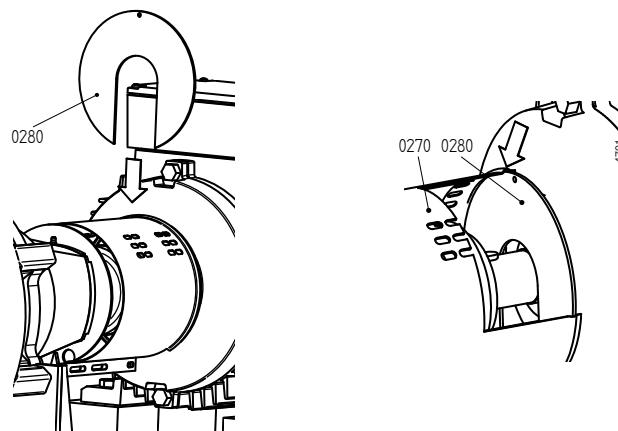


Figure 7: Fitting the assembly plate at motor side.

- 3 Close the jacket and fit bolt (0960). See figure 8.

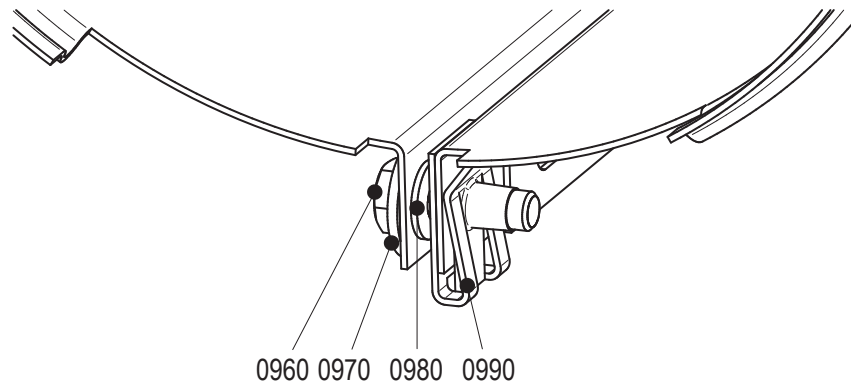


Figure 8: Fitting jacket.

- 4 Fit the jacket (0270) at pump side. Place it over the present jacket at motor side. The annular groove must be located at pump side.

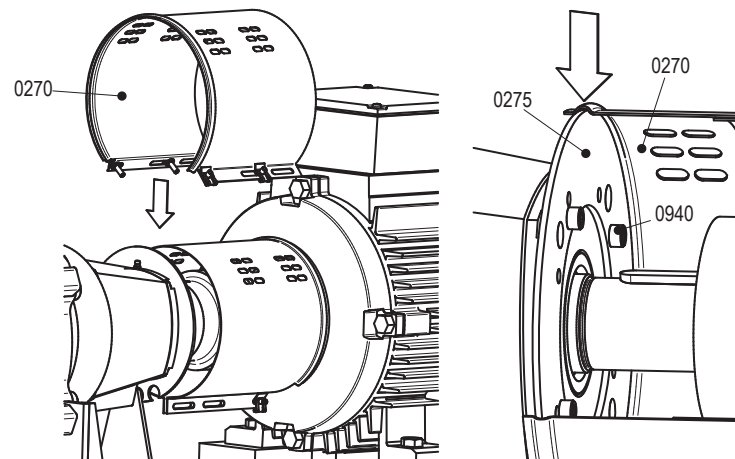


Figure 9: Fitting the jacket at pump side.

- 5 Close the jacket and fit a bolt (0230) and fit bolt (0960). See figure 8.

- 6 Slide the jacket at motor side towards the motor as far as possible. Fix both jackets with bolt (0960).

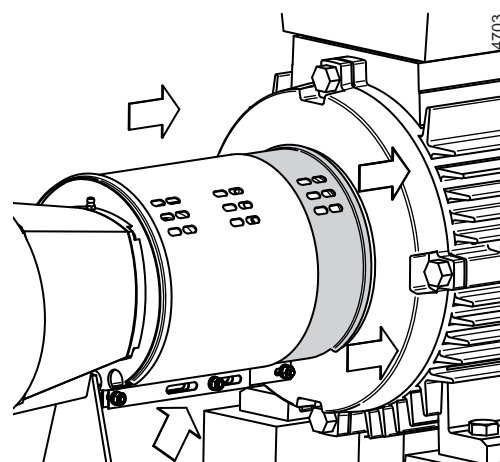


Figure 10: Adjusting the jacket at motor side.

7.4 Disassembling the MCHZ(S)12,5-14a/b-16



Make sure that the power supply to the pump is switched off and that no one can switch the pump on again unintentionally!

If there is no illustration with the instruction, the item numbers used relate to the illustrations in the parts list for this pump, in chapter 9 "Parts".

7.4.1 Replacing the stuffing box packing MCHZ

If the pump has to be further dismantled then replacement of the packing rings will be easier if the bearing housings (0010) are removed.

If only the packing rings have to be replaced then the pump does not need to be disconnected from the pipe work and it can remain on the foundation. Proceed as follows, this applies for both sides of the pump:

- 1 Remove the seal guards (0276).
- 2 Remove the gland nuts (0280) and pull the gland (0120) backwards.
- 3 Remove the packing rings (0140) from the stuffing box. Use the special packing puller for this, see figure 11.

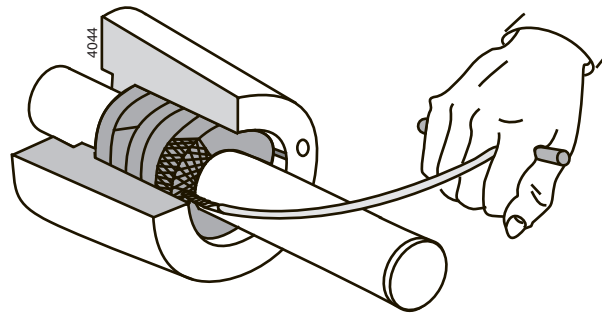


Figure 11: Removing stuffing box packing rings.

- 4 Clean the stuffing box and then grease it with graphite grease or silicone grease. Also grease the new packing rings.
- 5 Bend open the first packing ring as shown in figure 12 and fit it around the shaft. Thoroughly press the ring home using a suitable piece of halved tube.
- 6 Fit the other rings. Press these well home one by one. Ensure that the cuts are at 90° with regard to each other.
- 7 Press the gland against the last packing ring and tighten the gland nuts one by one by hand.
- 8 Fit the seal guards (0276).

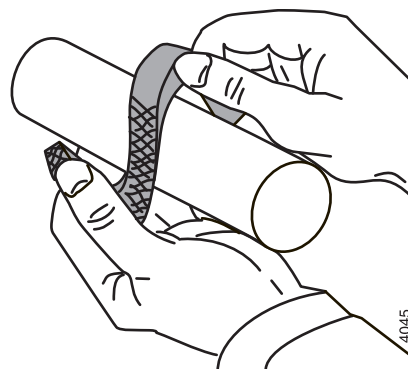


Figure 12: Bending open of a stuffing box packing ring.

7.4.2 Replacing the mechanical seal MCHZS

If only a mechanical seal has to be replaced the pump will have to be disassembled first. Then the relevant bearing housing will have to be removed. For this see paragraph 7.4.4 and paragraph 7.4.8. Then see paragraph 7.4.6 for disassembly of the mechanical seal.

7.4.3 Disassembling the pump

- 1 Uncouple the inlet and outlet pipes. Make sure that they are sufficiently supported.
- 2 Slacken the foundation bolts and remove the pump from the pipe work.
- 3 Remove the seal guards (0276).

7.4.4 Disassembling the bearing housing on the drive side

- 1 Uncouple the coupling half from the pump shaft (0570) and remove the key (0200).
- 2 Only for MCHZS: Slacken the balance pipe (0670).
- 3 Place the pump vertically in a support, with the shaft end up.
- 4 Remove the rubber V-ring and the bearing cover (0110).
- 5 Slide the inner rubber V-ring over the shaft and slacken the inner bearing cover (0110). This is now free from the pump shaft.
- 6 Remove the outer external circlip (0220) and the filling ring (0100) from the pump shaft.
- 7 Slacken the bolts (0290) and pull the bearing housing (0010) vertically from the pump section. The bearing will be pulled from the pump shaft.
- 8 Remove the lower external circlip (0220) and the filling ring (0100) from the pump shaft.
- 9 Remove the bearing cover and the rubber V-ring from the pump shaft.
- 10 Only for MCHZ: Disassemble the gland (0130) and the packing rings (0150).

7.4.5 Disassembly of the ball bearing

- 1 Remove both internal circlips (0230) from the bearing bracket.
- 2 Using a suitable bush which rests on the outer ring, press the bearing out of the bearing bracket.

7.4.6 Disassembling the mechanical seal MCHZS

- 1 Remove the seal cover (0050) from the pump shaft and remove the static ring from the mechanical seal.
- 2 Slide the rotating ring for the mechanical seal (0130) off the pump shaft.

If the reason for disassembly was to replace the mechanical seal, the new mechanical seal can now be fitted. See from paragraph 7.5.5 for this.

7.4.7 Disassembling the set of stage casings

- 1 Uncouple the balance pipe (0720) if fitted.
- 2 Only for MCHZS: Slacken the adjustment screw (0300) and remove the set ring (0060).
- 3 Unscrew the nuts (0750) from the tie rods (0740). For MCHZ(S) 12.5 x 1-3, MCHZ(S) 14a/b x 1-3 and MCHZ(S) 16 x 1: disassemble bolts and nuts (0770).
- 4 Remove the pump casing (0020) from the stage set. Using a suitable bush, press or tap the throttling bush (0070) out of the inlet casing.
- 5 Remove the external circlip (0090) and any throttling sleeve (0600) from the pump shaft.
- 6 Remove the end cover (0030) and the air wheel (0040). Remove the key (0730) from the shaft.
- 7 Remove the pump cover (0530) and remove the external circlip (0090).
- 8 Remove all impellers (0520), stage casings (0510) and keys (0730).
- 9 Remove the suction cover (0020) from the pump casing (0500).

7.4.8 Disassembling the bearing housing on the suction side

- 1 Position the pump casing with the shaft horizontally.
- 2 Remove the rear bearing cover (0120).
- 3 Continue from step 5 of paragraph 7.4.4.

7.4.9 Disassembling the ball bearing on the suction side

See paragraph 7.4.5, with the exception of step 1.

7.4.10 Disassembling the mechanical seal on the MCHZS suction side

See paragraph 7.4.6.

7.5 Assembly the MCHZ(S)12,5-14a/b-16

7.5.1 Preparation for assembly

For the correct torque settings see paragraph 10.1.1 "Tightening moments for bolts and nuts" and paragraph 10.1.2 "Tie rod torque".

For the correct lubricants and locking agents see paragraph 10.2 "Post-greasing of ball bearings" and paragraph 10.3 "Recommended locking liquids"

! For assembly all relevant parts should always be clean and undamaged. Leave bearings and seals for as long as possible in the packaging. If the bearing does not need to be replaced, the bearing and the bearing housing will have to be cleaned and provided with new grease.

7.5.2 Sub-assembly of stage casings

Use a suitable assembly bush for inserting the wear rings. The flat side of the wear rings must be positioned equally with the flat side of the cover, see figure 13

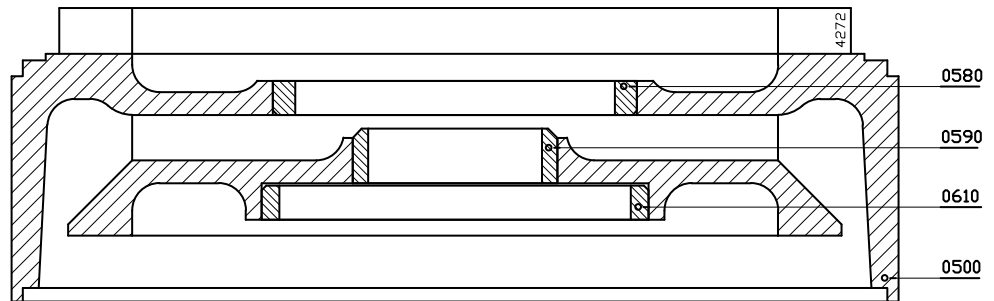


Figure 13: Fitting the wear rings.

- 1 Fit the small wear rings (0590) into the covers (0510).
- 2 Fit a wear ring (0580) into the suction cover (0500).
- 3 Fit the wear rings (0580) and (0610) into the covers (0510).
- 4 Fit the wear rings (0610) into the pump cover (0530).

7.5.3 Pump assembly

- 1 Place a little Loctite 641 on the fitting face of the throttling bush (0070) and fit the throttling bush into the pump casing (0020) for the drive side.
- 2 Fit the external circlip (0090) to the shaft (0570).
- 3 Fix the throttling sleeve (0600) to the shaft with a few drops of liquid locking agent. The throttling sleeve is not used on all models, see below for a list:

| Pump type | Throttling sleeve used: |
|-------------------------------------|--------------------------|
| MCHZ(S) 12,5 MCHZ(S) 14a and 14b | for 8 stages and higher |
| MCHZ(S) 16 | from 5 stages and higher |

- 4 Push the pump shaft (0570) with the drive side from the inside out through the pressure bracket (0020).

7.5.4 Assembling the stuffing box packing MCHZ

- 1 Fit the 5 packing rings. Place the packing rings with the openings offset. The packing rings may only be bent open axially, see figure 12.
- 2 Fit the gland (0130). Tighten the nuts (0280) by hand.
- 3 Proceed with paragraph 7.5.6.

7.5.5 Assembling the mechanical seal MCHZS

!

A mechanical seal is a vulnerable precision component. Leave the seal in the original packaging until you start with the actual assembly. Ensure that the working environment is dust free and that the parts and tools are clean. Remove any paint from the components. Never place the slide rings on the slide surfaces!

- 1 Fit the set ring (0060) and lock this with the adjustment screw (0280), see figure 14. For the correct distance see the value **mj** in the table below:

| Pump type | mj (=drive side) |
|----------------------|------------------|
| MCHZS 12,5 x n - 3,2 | 49,5 |
| MCHZS 14 a x n - 5 | 51 |
| MCHZS 14 b x n - 5 | 51 |
| MCHZS 16 x n - 6,5 | 56 |

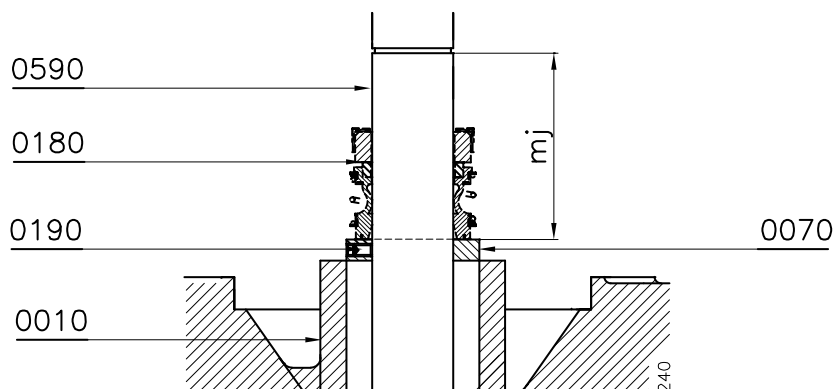


Figure 14: Distance mj.

- 2 Before fitting check whether the grooves for the external circlips (0220) have any sharp edges.
- 3 Wet the clean shaft with some low-surface-tension water (add detergent) and feed the bellows part of the seal (0140) with a slight twist in clockwise direction onto the shaft. **Apply pressure or tension during assembly via the rear end of the spring only.** The sliding surface must face towards the shaft end, drive side.
- 4 Wet the seal chamber with some low-surface-tension water (add detergent) and fit the static ring of the mechanical seal (0140) into the seal cover (0050), with the sliding surface pointing out.
- 5 Fit the gasket (0150) and fit the cover (0050) into the pressure bracket.
- 6 Proceed with paragraph 7.5.6.

7.5.6 Assembling the bearing construction

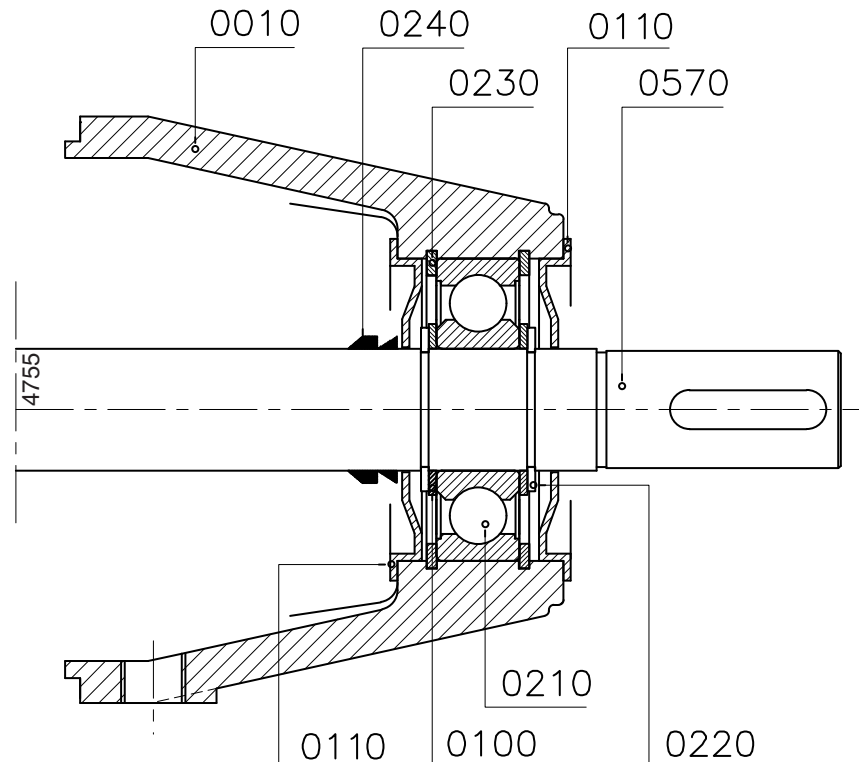


Figure 15: Bearing construction.

See figure 15.

- 1 Fit the bearing cover (0100) to the inside of the bearing housing for the drive side, this is the part which has the arrow for the direction of rotation.
- 2 Fit an internal circlip (0230) into the inner groove in the bearing housing.
- 3 Fix this bearing housing (0010) to the pressure bracket with the bolts (0290).
- 4 Fit the rubber V-ring (0240) over the pump shaft, with the narrow opening pointing to the inside of the pump.
- 5 Fit the external circlip (0220) into the rear of the 2 grooves on the pump shaft and fit the filling ring (0100).
- 6 Grease the bearing on both sides with ball bearing grease (**not for 2RS-1 type bearings!**). For the correct type of grease see paragraph 10.2 "Post-greasing of ball bearings".
- 7 Fit the bearing (0210) over the pump shaft and into the seat of the bearing housing using a suitable assembly bush which rests on both the inner and outer rings of the bearing.
- 8 Fit the other filling ring (0100) and external circlip (0220) to the pump shaft.
- 9 Fit the internal circlip (0230) into the bearing housing.
- 10 Fit the outermost bearing cover (0110) and the rubber V-ring (0240), with the narrow opening pointing to the outside of the pump.

7.5.7 Assembling the stage set

- 1 Fit the sub-assembly which you have just assembled with the shaft vertically, drive side down. Use a support for this with an opening to provide space for the shaft end.
- 2 Fit a gasket (0660) and place the suction cover (0030). This is pressed over the throttling sleeve (0070).
- 3 Fit a key (0730) to the pump shaft and fit the air wheel (0040) to the shaft. Fit the external circlip (0090) to the shaft.
- 4 Fit the gasket (0160) and fit the pump cover (0530). **Make sure the gasket is in the correct position!**
- 5 Fit a key (0730) in the pump shaft and fit an impeller (0520), the inlet opening of the impeller must point up.
- 6 Fit the gasket (0660) and fit a stage casing (0510) on the pressure bracket.
- 7 Repeat steps 5 and 6 until the last impeller has been fitted.
- 8 Secure the impeller set by fitting an external circlip (0090) to the pump shaft.
- 9 Fit a gasket (0660) and place the suction cover (0500) on the stage set.
- 10 Fit a gasket (0660) to the inlet casing using assembly grease. Place the inlet casing (0020) over the shaft end on the stage set.
- 11 Fit the tie rods (0740) with the nuts (0750). For MCHZ(S) 12.5 x 1-3, MCHZ(S) 14a/b x 1-3 and MCHZ(S) 16 x 1: fit the bolts and nuts (0770).
- 12 For the remaining operations see paragraph 7.5.4. With the exception of the following points:
 - The value **mj** from step 1 of paragraph 7.5.5 is replaced by the value **mh**, for which the correct values are shown in the table below:

| Pump type | mh (=non-drive side) |
|----------------------|----------------------|
| MCHZS 12,5 x n - 3,2 | 20,2 |
| MCHZS 14 a x n - 5 | 18,7 |
| MCHZS 14 b x n - 5 | 18,7 |
| MCHZS 16 x n - 6,5 | 14 |

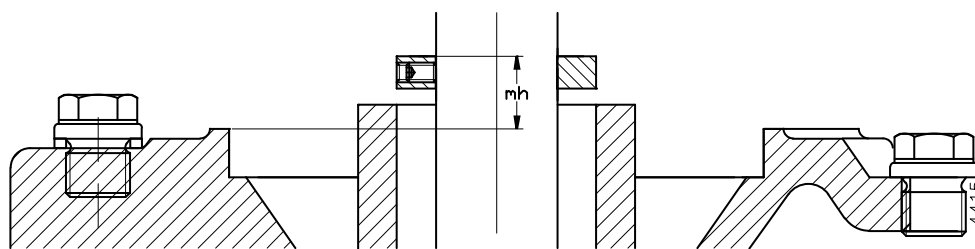


Figure 16: Distance mh.

- Steps 9 and 10 of paragraph 7.5.6 replaced by: Fit the closed bearing cover (0120)
- 13 Fit the by-pass pipe (0670) if present.
 - 14 Fit the seal guards (0276).

7.6 Disassembling MCHZ(S) 14a/b heavy bearing construction



Make sure that the power supply to the pump is switched off and that no one can switch the pump on again unintentionally!

If there is no illustration with the instruction, the item numbers used relate to the illustrations in the parts list for this pump, in chapter 9 "Parts".

7.6.1 Replacing the stuffing box packing MCHZ

If the pump has to be dismantled further then replacement of the packing rings will be easier if the bearing housings (0020 and 0010) have been removed.

If only the packing rings have to be replaced then the pump does not need to be disconnected from the pipe work and it can remain on the foundation. Proceed as follows, this applies for both sides of the pump:

- 1 Remove the seal guards (0276).
- 2 Remove the gland nuts (0280) and pull the gland (0140) backwards.
- 3 Remove the packing rings (0160) from the stuffing box. Use the special packing puller for this, see figure 11.
- 4 Clean the stuffing box and then grease it with graphite grease or silicone grease. Also grease the new packing rings.
- 5 Bend open the first packing ring as shown in figure 12 and fit it around the shaft. Thoroughly press the ring home using a suitable piece of halved tube.
- 6 Fit the other rings. Press these well home one by one. Ensure that the cuts are at 90° with regard to each other.
- 7 Press the gland against the last packing ring and tighten the gland nuts one by one by hand.
- 8 Fit the seal guards (0276).

7.6.2 Replacing the mechanical seal MCHZS

If only a mechanical seal has to be replaced the pump will have to be disassembled first. Then the relevant bearing housing will have to be removed. For this see paragraph 7.6.4 and paragraph 7.6.8. Then see paragraph 7.6.6 for disassembly of the mechanical seal.

7.6.3 Disassembling the pump

- 1 Uncouple the inlet and outlet pipes. Make sure that they are sufficiently supported.
- 2 Slacken the foundation bolts and remove the pump from the pipe work.

7.6.4 Disassembling the bearing housing on the drive side

- 1 Uncouple the coupling half from the pump shaft (0570) and remove the key (0200).
- 2 Only for MCHZS: Slacken the balance pipe (0670).
- 3 Place the pump vertically in a support, with the shaft end up.
- 4 Remove the rubber V-ring (0250) and the bearing cover (0080).
- 5 Slide the inner rubber V-ring over the shaft and slacken the inner bearing cover (0120). This is now free from the pump shaft.
- 6 Remove the outer external circlip (0230) and the filling ring (0110) from the pump shaft.
- 7 Slacken the bolts (0300) and pull the bearing housing (0020) vertically from the pump section. The bearings will be pulled from the pump shaft.
- 8 Remove the lower external circlip (0230) and the filling ring (0110) from the pump shaft.

- 9 Remove the bearing cover and the rubber V-ring from the pump shaft.
 - 10 Only for MCHZ: Disassemble the gland (0140) and remove the packing rings (0160).
- 7.6.5 Disassembling the ball bearings
- 1 Remove both internal circlips (0240) from the bearing bracket.
 - 2 Using a suitable bush, resting on the outer ring of the bearing, press the bearings out of the bearing bracket.
- 7.6.6 Disassembling the mechanical seal MCHZS
- 1 Remove the seal cover (0090) from the pump shaft and remove the static ring from the mechanical seal.
 - 2 Slide the rotating ring for the mechanical seal (0160) off the pump shaft.
- If the reason for disassembly was to replace the mechanical seal, the new mechanical seal can now be fitted. See from paragraph 7.7.5 for this.
- 7.6.7 Disassembling the set of stage casings
- 1 Uncouple the balance pipe (0670) if fitted.
 - 2 Only for MCHZS: Slacken the adjustment screw (0330) and remove the set ring (0190).
 - 3 Unscrew the nuts (0750) from the tie rods (0740).
 - 4 Remove the pump casing (0030) from the stage set. Using a suitable bush, press or tap the throttling bush (0060) out of the inlet casing.
 - 5 Remove the external circlip (0100) and any throttling sleeve (0600) from the pump shaft.
 - 6 Remove the end cover (0040) and the air wheel (0050). Remove the key (0730) from the shaft and remove the gasket (0180).
 - 7 Remove the pump cover (0530) and remove the external circlip (0090).
 - 8 Remove all impellers (0520), stage casings (0510) and keys (0730).
 - 9 Remove the suction cover (0500) from the pump casing (0030).
- 7.6.8 Disassembling the bearing housing on the suction side
- 1 Position the pump casing with the shaft horizontally.
 - 2 Remove the rear bearing cover (0130).
 - 3 Continue from step 5 of paragraph 7.6.4.
- 7.6.9 Disassembling the ball bearing on the suction side
- See paragraph 7.6.5, with the exception of step 1.
- 7.6.10 Disassembling the mechanical seal on the MCHZS suction side
- See paragraph 7.6.6, for which item no. (0160) now becomes: item no. (0150).

7.7 Assembling the MCHZ(S)14a/b heavy bearing construction

7.7.1 Preparation for assembly

For the correct torque settings see paragraph 10.1.1 "Tightening moments for bolts and nuts" and paragraph 10.1.2 "Tie rod torque".

For the correct lubricants and locking agents see paragraph 10.2 "Post-greasing of ball bearings" and paragraph 10.3 "Recommended locking liquids".

! **For assembly all relevant parts should always be clean and undamaged. Leave bearings and seals for as long as possible in the packaging. If the bearing does not need to be replaced the bearing and the bearing housing will have to be cleaned and provided with new grease. The bearing at the non-drive end is a 2RS1 type bearing and does not require any maintenance.**

7.7.2 Sub-assembly of stage casings

Use a suitable assembly bush for inserting the wear rings. The flat side of the wear rings must be positioned equally with the flat side of the cover, see figure 13.

Steps 2 and 3 are only applicable for design Q (= with bronze impellers)

- 1 Fit the small wear rings (0590) into the covers (0510).
- 2 Fit a wear ring (0580) into the suction cover (0500).
- 3 Fit the wear rings (0580) and (0610) into the covers (0510).
- 4 Fit the wear rings (0610) into the pump cover (0530).

7.7.3 Pump assembly

- 1 Place a little Loctite 641 on the fitting face of the throttling bush (0060) and fit the throttling bush into the pump casing (0030) for the drive side.
- 2 Fit the external circlip (0100) to the shaft (0570).
- 3 Fix the throttling sleeve (0600) to the shaft with a few drops of liquid locking agent. This throttling sleeve is used from 8 stages and higher.
- 4 Push the pump shaft (0570) with the drive side from the inside out through the pressure bracket (0030).

7.7.4 Assembling the stuffing box packing MCHZ

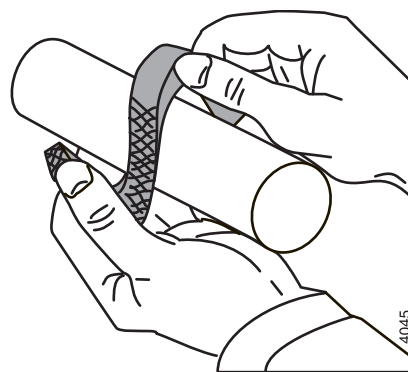


Figure 17: Bending open a stuffing box packing ring.

- 1 Fit the 5 packing rings. Place the packing rings with the openings offset. The packing rings may only be bent open axially, see figure 17.
- 2 Fit the gland (0140). Tighten the nuts (0290) by hand.
- 3 Proceed with paragraph 7.7.6.

7.7.5 Assembling the mechanical seal MCHZS



A mechanical seal is a vulnerable precision component. Leave the seal in the original packaging until you start with the actual assembly. Ensure that the working environment is dust free and that the parts and tools are clean. Remove any paint from the components. Never place the slide rings on the slide surfaces!

- 1 Fit the set ring (0190) and lock this with the adjustment screw (0330).
The distance **mj** from the top of the set ring to the bottom of the external circlip groove must be **54 mm**.
- 2 Before fitting check whether the grooves for the external circlips (0220) have any sharp edges.
- 3 Wet the clean shaft with some low-surface-tension water (add detergent) and feed the bellows part of the seal (0160) with a slight twist in clockwise direction onto the shaft. **Apply pressure or tension during assembly via the rear end of the spring only.** The sliding surface must face towards the shaft end, drive side.
- 4 Wet the seal chamber with some low-surface-tension water (add detergent) and fit the static ring of the mechanical seal (0160) into the seal cover (0090), with the sliding surface pointing out.
- 5 Fit the gasket (0140) and fit the cover (0090) into the pressure bracket.
- 6 Proceed with paragraph 7.7.6.

7.7.6 Assembling the bearing construction on the drive side

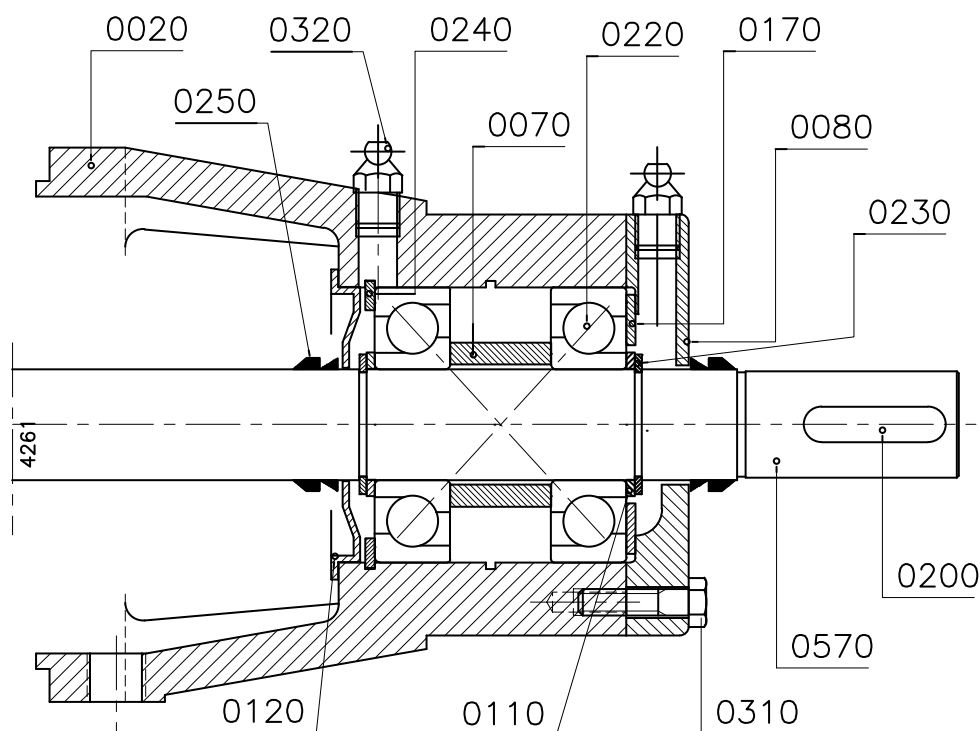


Figure 18: Assembly of the reinforced bearing construction.

See figure 18.

- 1 Fit the rubber V-ring (0250) over the pump shaft on the drive side, with the narrow opening pointing to the inside of the pump.

- 2 Fit an internal circlip (0240) into the inner groove in the long bearing housing (0020) and fit the bearing cover (0120) to the inside of this bearing housing.
- 3 Fix the bearing housing (0020) to the pressure bracket with the bolts (0300).
- 4 Fit the external circlip (0230) into the inner of the 2 grooves on the pump shaft on the drive side and then fit the filling ring (0110).
- 5 Grease the bearings on both sides with ball bearing grease. For the correct type of grease see paragraph 10.2 "Post-greasing of ball bearings".



Attention: Both bearings have to be fitted in X-arrangement. This means that both bearings have to be turned with the largest diameters facing each other.

- 6 Fit the first of the two bearings (0220) over the pump shaft and into the seat of the bearing housing using a suitable assembly bush which rests on both the inner and outer rings of the bearing.
- 7 Fit the spacer sleeve (0070) and fit the second of the two bearings (0220).
- 8 Fit the other filling ring (0110) and external circlip (0230) to the pump shaft.
- 9 Fit the waved ring (0170) into the bearing housing.
- 10 Fit the outer bearing cover (0080) with bolts (0310). Fit the rubber V-ring (0240), with the narrow opening pointing to the outside of the pump.

7.7.7 Assembling the stage set

- 1 Fit the sub-assembly which you have just assembled with the shaft vertically, drive side down. Use a support for this with an opening to provide space for the shaft end.
- 2 Fit a gasket (0660) and place the suction cover (0040). This is pressed over the throttling sleeve (0060).
- 3 Fit a key (0730) to the pump shaft and fit the air wheel (0050) to the shaft. Fit the external circlip (0100) to the shaft.
- 4 Fit the gasket (0180) and fit the pump cover (0530). **Make sure the gasket is in the correct position!**
- 5 Fit a key (0730) in the pump shaft and fit an impeller (0520), the inlet opening of the impeller must point up.
- 6 Fit the gasket (0660) and fit a stage casing (0510) on the pressure bracket.
- 7 Repeat steps 5 and 6 until the last impeller has been fitted.
- 8 Secure the impeller set by fitting an external circlip (0100) to the pump shaft.
- 9 Fit a gasket (0660) and place the suction cover (0500) on the stage set.
- 10 Fit a gasket (0660) to the inlet casing using assembly grease. Place the inlet casing (0030) over the shaft end on the stage set.
- 11 Fit the tie rods (0740) with the nuts (0750).
- 12 For assembly of the other seal see paragraph 7.7.4 to paragraph 7.7.5. With the exception of the following point:
 - The value **mj** from step 1 of paragraph 7.7.5 now becomes **18,7**.

7.7.8 Assembling the bearing construction on the suction side

- 1 Fit the rubber V-ring (0250) over the pump shaft, with the narrow opening pointing to the inside of the pump.
- 2 Fit the bearing cover (0120) to the inside of the small bearing housing (0010).
- 3 Fix the bearing housing (0010) to the pressure bracket with the bolts (0300).
- 4 Fit the external circlip (0230) into the inner of the 2 grooves on the pump shaft and fit a filling ring (0110).
- 5 Fit the bearing (0210) using a suitable mounting bush which rests on both the inner and outer rings of the bearing.
- 6 Fit the second filling ring (0110) and fit the external circlip (0230) onto the pump shaft.
- 7 Fit the outer bearing cover (0130).
- 8 Fit the by-pass pipe (0670) if present.
- 9 Fit the seal guards (0276).

7.8 Disassembling the MCHZ(S)20a/b



Make sure that the power supply to the pump is switched off and that no one can switch the pump on again unintentionally!

If there is no illustration with the instruction, the item numbers used relate to the illustrations in the parts list for this pump, in chapter 9 "Parts".

7.8.1 Replacing the stuffing box packing MCHZ

If the pump has to be further dismantled then replacement of the packing rings will be easier if the bearing housings (0010) are removed.

If only the packing rings have to be replaced then the pump does not need to be disconnected from the pipe work and it can remain on the foundation.

Proceed as follows, this applies for both sides of the pump:

- 1 Remove the seal guards (0276).
- 2 Remove the gland nuts (0350) and pull the gland (0170) backwards.
- 3 Remove the packing rings (0190) from the stuffing box. Use the special packing puller for this, see figure 11.
- 4 Clean the stuffing box and then grease it with graphite grease or silicone grease. Also grease the new packing rings.
- 5 Bend open the first packing ring as shown in figure 12 and fit it around the shaft. Thoroughly press the ring home using a suitable piece of halved tube.
- 6 Fit the other rings. Press these well home one by one. Ensure that the cuts are at 90° with regard to each other.
- 7 Press the gland against the last packing ring and tighten the gland nuts one by one by hand.
- 8 Fit the seal guards (0276).

7.8.2 Replacing the mechanical seal MCHZS

If only a mechanical seal has to be replaced the pump will have to be disassembled first. Then the relevant bearing housing will have to be removed. For this see paragraph 7.4.4 and paragraph 7.4.8. Then see paragraph 7.4.6 for disassembly of the mechanical seal.

- 7.8.3 Disassembling the MCHZ(S)
- 1 Uncouple the inlet and outlet pipes. Make sure that they are sufficiently supported.
 - 2 Slacken the foundation bolts and remove the pump from the pipe work.
- 7.8.4 Disassembling the bearing housing on the drive side
- 1 Uncouple the coupling halve from the pump shaft (0550) and remove the key (0260).
 - 2 Only for MCHZS: Slacken the balance pipe (0620).
 - 3 Place the pump vertically in a support, with the shaft end up.
 - 4 Remove the rubber V-ring (0310) and the bearing cover (0140).
 - 5 Slide the inner rubber V-ring over the shaft and slacken the inner bearing cover (0140). This is now free from the pump shaft.
 - 6 Remove the outer external circlip (0290) and the filling ring (0160) from the pump shaft.
 - 7 Slacken the bolts (0360) and pull the bearing housing (0010) vertically from the pump section. The bearing will be pulled from the pump shaft.
 - 8 Remove the lower external circlip (0290) and the filling ring (0160) from the pump shaft.
 - 9 Remove the bearing cover and the rubber V-ring from the pump shaft.
 - 10 Only for MCHZ: Disassemble the gland (0170).
- 7.8.5 Disassembly of the ball bearing
- 1 Remove both internal circlips (0300) from the bearing bracket.
 - 2 Using a suitable bush which rests on the outer ring of the bearing, press the bearing (0280) out of the bearing bracket.
- 7.8.6 Disassembling the mechanical seal MCHZS
- 1 Remove the seal cover (0040) from the pump shaft and remove the static ring from the mechanical seal.
 - 2 Slide the rotating ring for the mechanical seal (0230) off the pump shaft.
- If the reason for disassembly was to replace the mechanical seal, the new mechanical seal can now be fitted. See from paragraph 7.9.5 for this.
- 7.8.7 Disassembling the set of stage casings
- 1 Uncouple the balance pipe (0650) if fitted.
 - 2 Only for MCHZS: Slacken the adjustment screw (0400) and remove the set ring (0120).
 - 3 Unscrew the nuts (0690) from the tie rods (0670 and 0680).
 - 4 Remove the pump casing (0020) from the stage set. Using a suitable bush press or tap the throttling bush (0100) from the pump casing.
 - 5 Remove the external circlip (0130) and any throttling sleeve (0110) from the pump shaft.
 - 6 Remove the end cover (0060) and remove the air-wheel (0070). Remove the key (0660) from the shaft and remove the gasket (0210).
 - 7 Remove the pump cover (0050) and remove the external circlip (0130).
 - 8 Remove all impellers (0520), stage casings (0510) and keys (0660).
 - 9 Remove the suction cover (0500) from the pump casing (0020) on the suction side.

7.8.8 Disassembling the bearing housing on the suction side

- 1 Position the pump casing with the shaft horizontally.
- 2 Remove the rear bearing cover (0150).
- 3 Continue from step 5 of paragraph 7.8.4.

7.8.9 Disassembling the ball bearing on the suction side

See paragraph 7.8.5, with exception of step 1, whereby item no. (0280) now becomes: item no. (0270).

7.8.10 Disassembling the mechanical seal on the MCHZS suction side

See paragraph 7.8.6, whereby item no. (0230) becomes item no. (0220).

7.9 Assembling the MCHZ(S) 20a/b

7.9.1 Preparation for assembly

For the correct torque settings see paragraph 10.1.1 "Tightening moments for bolts and nuts" and paragraph 10.1.2 "Tie rod torque". For the correct lubricants and locking agents see paragraph 10.2 "Post-greasing of ball bearings" and paragraph 10.3 "Recommended locking liquids".



For assembly all relevant parts should always be clean and undamaged. Leave bearings and seals for as long as possible in the packaging.

7.9.2 Sub-assembly of stage casings

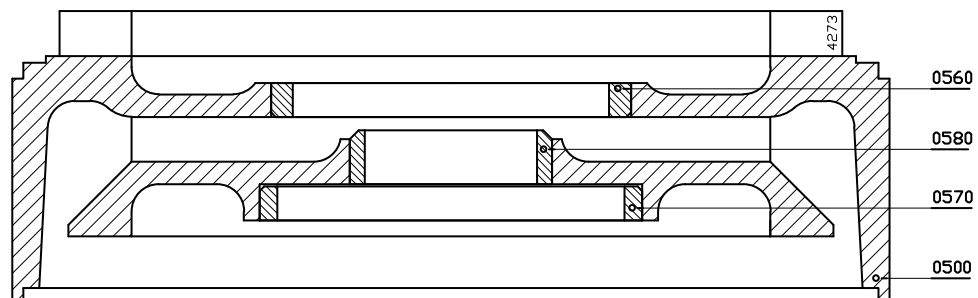


Figure 19: Fitting the wear rings

Use a suitable assembly bush for inserting the wear rings. The flat side of the wear rings must be positioned equally with the flat side of the cover, see figure 19.

- 1 Fit the small wear rings (0580) into the covers (0510).
- 2 Fit a wear ring (0560) into the suction cover (0500).
- 3 Fit the wear rings (0560) and (0570) into the covers (0510).
- 4 Fit a wear ring (0570) into the pump cover (0050).

7.9.3 Pump assembly

- 1 Place a little Loctite 641 on the fitting face of the throttling bush (0100) and fit the throttling bush into the pump casing (0020) for the drive side.
- 2 Fit the external circlip (0130) to the shaft (0550).
- 3 Fix the throttling sleeve (0110) to the shaft with a few drops of liquid locking agent.
- 4 Push the pump shaft (0550) with the drive side from the inside out through the pressure bracket (0020).

7.9.4 Assembling the stuffing box packing MCHZ

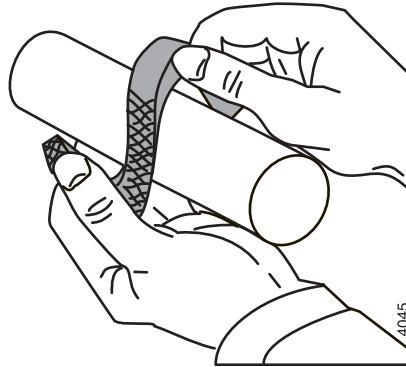


Figure 20: Bending open of gland packing rings.

- 1 Fit the 5 packing rings. Place the packing rings with the openings offset. The packing rings may only be bent open axially, see figure 20.
- 2 Fit the gland (0170). Tighten the nuts (0350) by hand.
- 3 Proceed with paragraph 7.9.6.

7.9.5 Assembling the mechanical seal MCHZS



A mechanical seal is a vulnerable precision component. Leave the seal in the original packaging until you start with the actual assembly. Ensure that the working environment is dust free and that the parts and tools are clean. Remove any paint from the components. Never place the slide rings on the slide surfaces and never touch the slide surfaces with ones fingers!

- 1 Fit the set ring (0120) and lock it with the adjustment screw (0400). The distance between the set ring and the nearest external circlip groove must be **64,5 mm**.
- 2 Before fitting check whether the grooves for the external circlips (0290) have any sharp edges.
- 3 Wet the clean shaft with some low-surface-tension water (add detergent) and feed the bellows part of the seal (0230) with a slight twist in clockwise direction onto the shaft. **Apply pressure or tension during assembly via the rear end of the spring only.** The sliding surface must face towards the shaft end, drive side.
- 4 Wet the seal chamber with some low-surface-tension water (add detergent) and fit the static ring of the mechanical seal (0230) into the seal cover (0040), with the sliding surface pointing out.
- 5 Fit the gasket (0200) and fit the cover (0040) into the pressure bracket.
- 6 Proceed with paragraph 7.9.6.

7.9.6 Assembling the bearing construction

See figure 21.

- 1 Fit the bearing cover (0140) to the inside of the bearing housing for the drive side, this is the part which has the arrow for the direction of rotation.
- 2 Fit an internal circlip (0300) into the inner groove in the bearing housing.
- 3 Fix this bearing housing (0010) to the pressure bracket with the bolts (0360).
- 4 Fit the rubber V-ring (0310) over the pump shaft, with the narrow opening pointing to the inside of the pump.
- 5 Fit the external circlip (0290) into the inner of the 2 grooves on the pump shaft and fit the filling ring (0160).
- 6 Fit the bearing (0280) over the pump shaft and into the seat of the bearing housing using a suitable assembly bush which rests on both the inner and outer rings of the bearing.
- 7 Fit the other filling ring (0160) and external circlip (0290) to the pump shaft.
- 8 Fit the internal circlip (0300) into the bearing housing.
- 9 Fit the outermost bearing cover (0140) and the rubber V-ring (0310), with the narrow opening pointing to the outside of the pump.

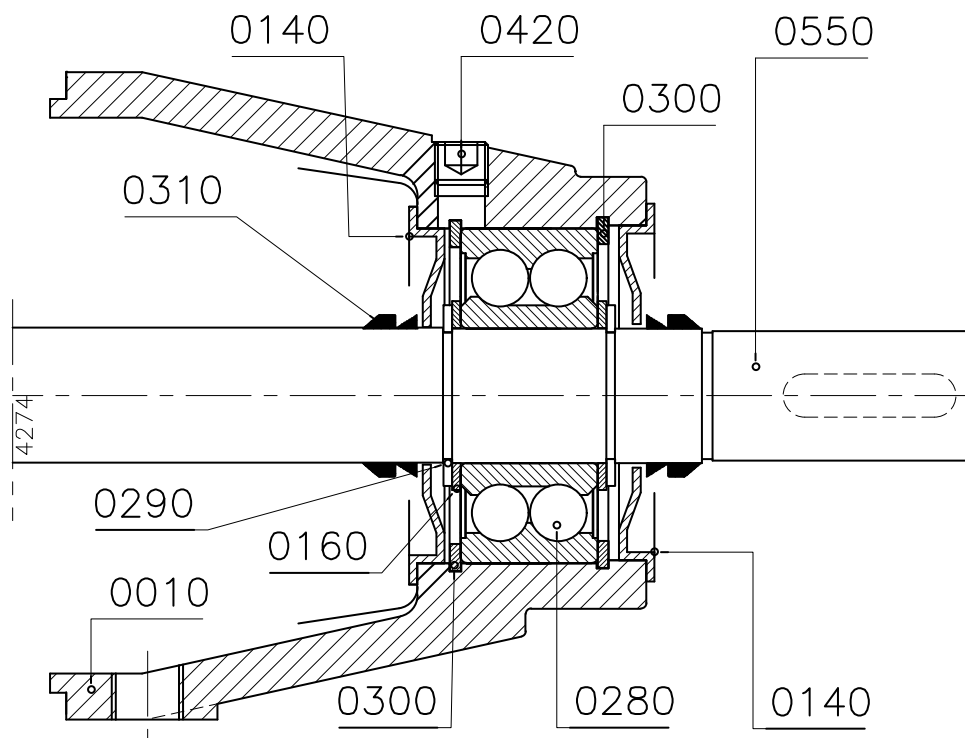


Figure 21: Assembly of the double row ball bearing.

7.9.7 Assembling the stage set

- 1 Fit the sub-assembly which you have just assembled with the shaft vertically, drive side down. Use a support for this with an opening to provide space for the shaft end.
- 2 Fit a gasket (0600) and place the suction cover (0060). This is pressed over the throttling sleeve (0100).
- 3 Fit a key (0660) to the pump shaft and fit the air wheel (0070) to the shaft. Fit the external circlip (0130) to the shaft.
- 4 Fit the gasket (0600) and fit the pump cover (0050). **Make sure the gasket is in the correct position!**
- 5 Fit a key (0660) in the pump shaft and fit an impeller (0520), the inlet opening of the impeller must point up.
- 6 Fit the gasket (0600) and fit a stage casing (0510) on the pressure bracket.
- 7 Repeat steps 5 and 6 until the last impeller has been fitted.
- 8 Secure the impeller set by fitting an external circlip (0130) to the pump shaft.
- 9 Fit a gasket (0600) and place the suction cover (0500) on the stage set.
- 10 Fit a gasket (0600) into the inlet casing using assembly grease. Place the pump casing suction side (0020) over the shaft end on the stage set.
- 11 Fit the tie rods (0670 and 0680) with the nuts (0690).
- 12 For the remaining operations see paragraph 7.9.4. With the exception of the following points:
 - The set ring must be fitted with a distance of **8 mm** between the top of the set ring and the edge of the stuffing box in the pump casing.
 - Steps 9 and 10 of paragraph 7.9.6 replaced by: Fit the closed bearing cover (0150).
- 13 Fit the by-pass pipe (0650) if present.
- 14 Fit the seal guards (0276).

8 Dimensions

8.1 Dimensions MCHZ(S) 12,5

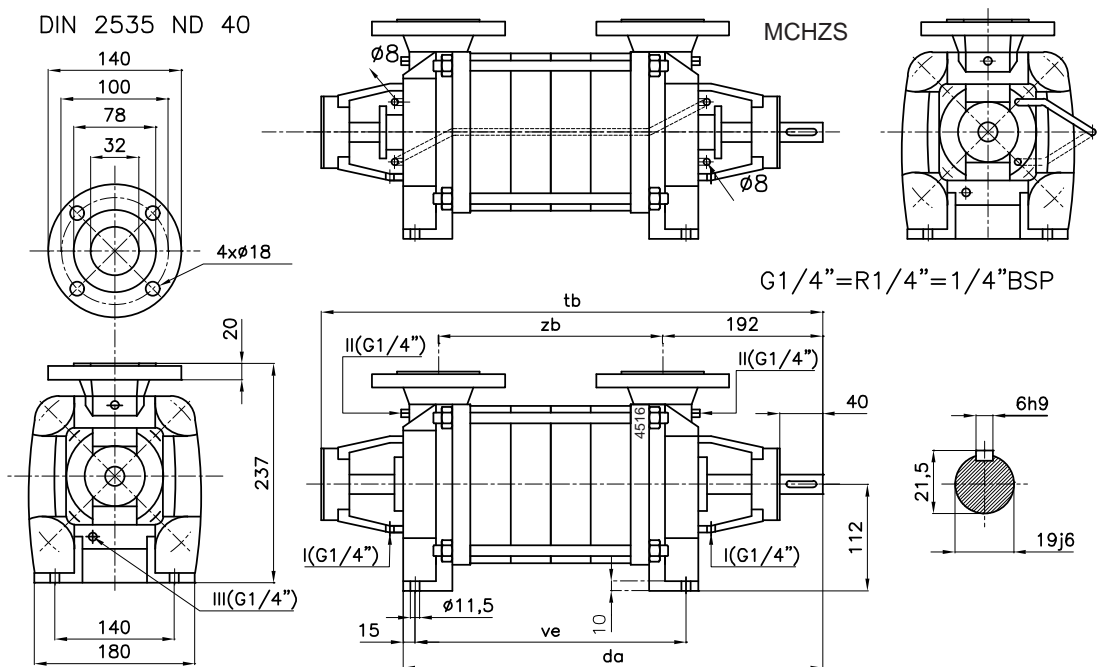


Figure 22: Dimensions sketch MCHZ(S) 12,5.

I= leakage water drain

II= pressure gauge connection

III= drain plug

| MCHZ(S) | da | tb | ve | zb | [kg] |
|----------|-----|-----|-----|-----|------|
| 12,5 x 1 | 405 | 507 | 227 | 169 | 35 |
| 12,5 x 2 | 450 | 552 | 272 | 214 | 39 |
| 12,5 x 3 | 495 | 597 | 317 | 259 | 43 |
| 12,5 x 4 | 540 | 642 | 362 | 304 | 47 |
| 12,5 x 5 | 585 | 687 | 407 | 349 | 51 |
| 12,5 x 6 | 630 | 732 | 452 | 394 | 55 |
| 12,5 x 7 | 675 | 777 | 497 | 439 | 59 |
| 12,5 x 8 | 720 | 822 | 542 | 484 | 63 |
| 12,5 x 9 | 765 | 867 | 587 | 529 | 67 |

8.2 Dimensions MCHZ(S) 14a/b

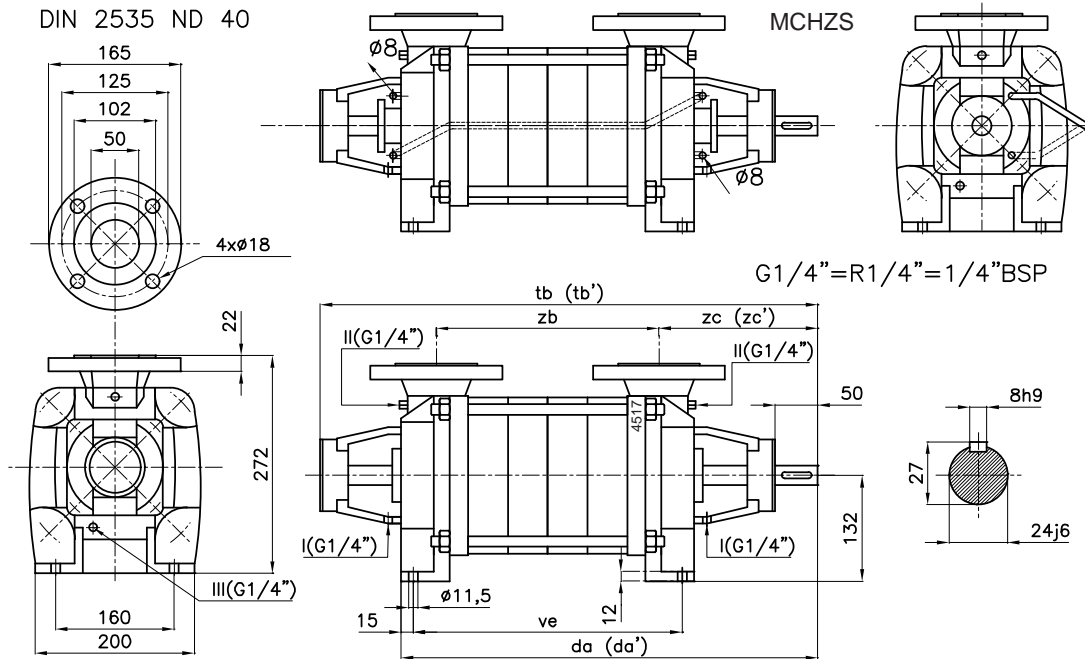


Figure 23: Dimensions sketch MCHZ(S) 14a/b.

I= leakage water drain

II= pressure gauge connection

III= drain plug

| MCHZ(S) | da | da' | tb | tb' | ve | zb | zc | zc' | [kg] |
|-----------|-----|------------|-----|------------|-----|-----|-----|------------|------|
| 14a/b x 1 | 425 | | 527 | | 237 | 179 | 202 | | 44 |
| 14a/b x 2 | 475 | | 577 | | 287 | 229 | 202 | | 50 |
| 14a/b x 3 | 525 | | 627 | | 337 | 279 | 202 | | 56 |
| 14a/b x 4 | 575 | | 677 | | 387 | 329 | 202 | | 62 |
| 14a/b x 5 | 625 | 671 | 727 | 773 | 437 | 379 | 202 | 248 | 68 |
| 14a/b x 6 | 675 | 721 | 777 | 823 | 487 | 429 | 202 | 248 | 74 |
| 14a/b x 7 | | 771 | | 873 | 537 | 479 | | 248 | 82 |
| 14a/b x 8 | | 821 | | 923 | 587 | 529 | | 248 | 88 |
| 14a/b x 9 | | 871 | | 973 | 637 | 579 | | 248 | 94 |

da', tb' and zc' = Pump with heavy bearing construction

8.3 Dimensions MCHZ(S) 16

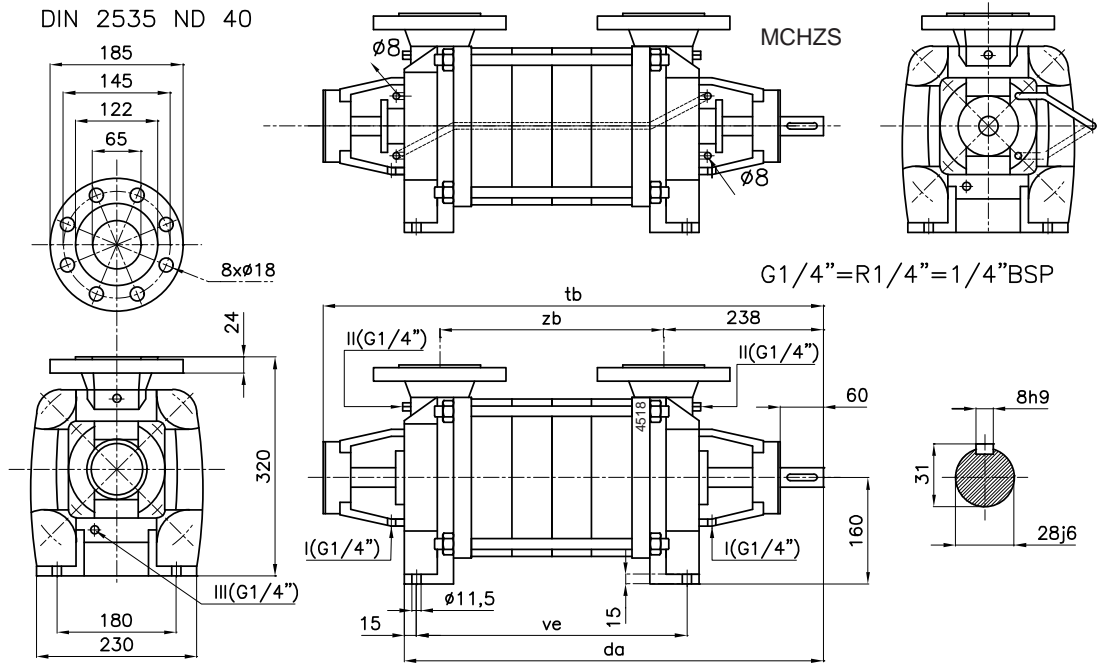


Figure 24: Dimensions sketch MCHZ(S) 16.

I= leakage water drain

II= pressure gauge connection

III= drain plug

| MCHZ(S) | da | tb | ve | zb | [kg] |
|--------------|-----|------|-----|-----|------|
| 16 x 1 - 6,5 | 495 | 624 | 267 | 217 | 59 |
| 16 x 2 - 6,5 | 555 | 684 | 327 | 277 | 67 |
| 16 x 3 - 6,5 | 615 | 744 | 387 | 337 | 75 |
| 16 x 4 - 6,5 | 675 | 804 | 447 | 397 | 83 |
| 16 x 5 - 6,5 | 735 | 864 | 507 | 457 | 91 |
| 16 x 6 - 6,5 | 795 | 924 | 567 | 517 | 99 |
| 16 x 7 - 6,5 | 955 | 984 | 627 | 577 | 107 |
| 16 x 8 - 6,5 | 915 | 1044 | 687 | 637 | 115 |
| 16 x 9 - 6,5 | 975 | 1104 | 747 | 697 | 123 |

8.4 Dimensions MCHZ(S) 20

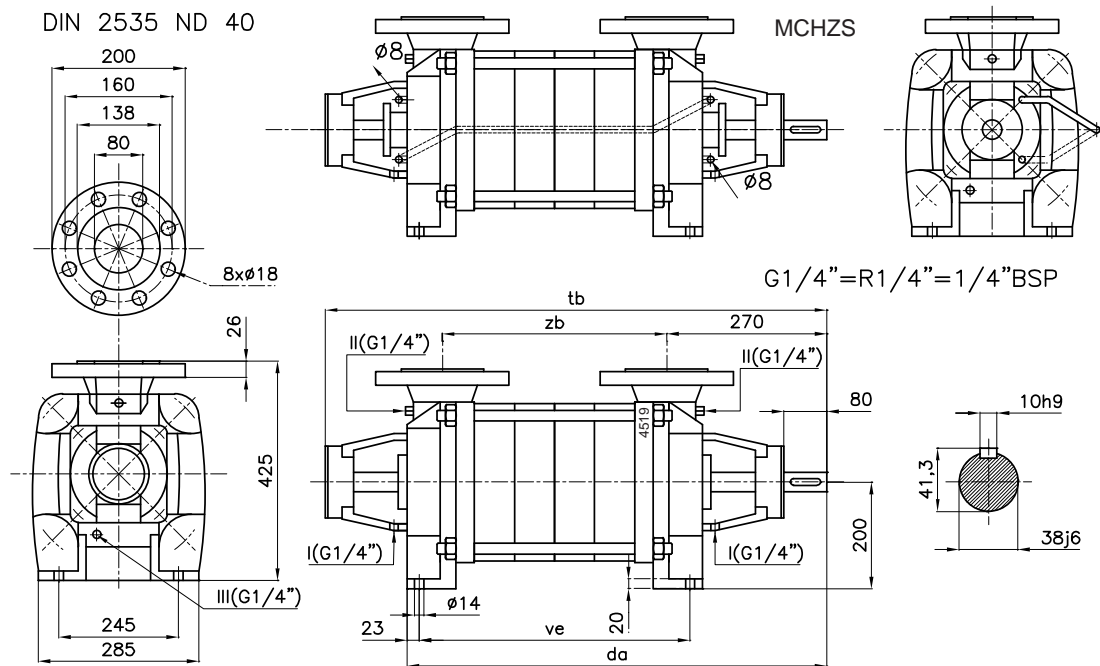


Figure 25: Dimensions sketch MCHZ(S) 20a/b.

I= leakage water drain

II= pressure gauge connection

III= drain plug

| MCHZ(S) | da | tb | ve | zb | [kg] |
|-----------|-----|-----|-----|-----|------|
| 20a/b x 1 | 600 | 727 | 332 | 282 | 133 |
| 20a/b x 2 | 675 | 802 | 407 | 357 | 152 |
| 20a/b x 3 | 750 | 877 | 482 | 432 | 171 |
| 20a/b x 4 | 825 | 952 | 557 | 507 | 190 |

8.5 Dimensions of unit MCHZ(S) 12,5

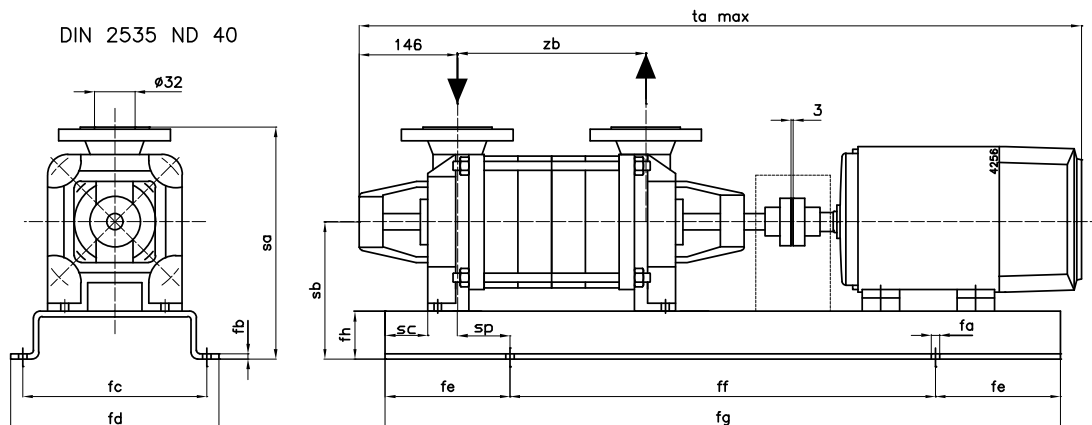


Figure 26: Dimensions sketch unit MCHZ(S) 12,5.

| MCHZ(S) | IEC motor | fa | fb | fc | fd | fe | ff | fg | fh | sa | sb | sc | sp | ta _{max} | zb |
|----------|-----------|----|----|-----|-----|-----|-----|------|----|-----|-----|----|----|-------------------|-----|
| 12,5 x 1 | 90S | 15 | 5 | 290 | 334 | 105 | 500 | 710 | 40 | 277 | 152 | 0 | 44 | 846 | 169 |
| | 90L | 15 | 5 | 290 | 334 | 105 | 500 | 710 | 40 | 277 | 152 | 0 | 44 | 858 | 169 |
| 12,5 x 2 | 90L | 19 | 5 | 300 | 348 | 120 | 560 | 800 | 40 | 277 | 152 | 0 | 44 | 903 | 214 |
| | 100L | 19 | 5 | 300 | 348 | 120 | 560 | 800 | 40 | 277 | 152 | 0 | 44 | 957 | 214 |
| 12,5 x 3 | 100L | 19 | 6 | 350 | 398 | 135 | 630 | 900 | 50 | 287 | 162 | 0 | 44 | 1002 | 259 |
| | 112M | 19 | 6 | 350 | 398 | 135 | 630 | 900 | 50 | 287 | 162 | 0 | 44 | 1032 | 259 |
| 12,5 x 4 | 100L | 19 | 6 | 350 | 398 | 135 | 630 | 900 | 50 | 287 | 162 | 0 | 44 | 1047 | 304 |
| | 112M | 19 | 6 | 350 | 398 | 135 | 630 | 900 | 50 | 287 | 162 | 0 | 44 | 1077 | 304 |
| | 132S | 19 | 6 | 350 | 398 | 135 | 630 | 900 | 50 | 307 | 182 | 0 | 44 | 1131 | 304 |
| 12,5 x 5 | 112M | 19 | 8 | 425 | 473 | 145 | 710 | 1000 | 63 | 300 | 175 | 0 | 44 | 1122 | 349 |
| | 132S | 19 | 8 | 425 | 473 | 145 | 710 | 1000 | 63 | 300 | 195 | 0 | 44 | 1176 | 349 |
| 12,5 x 6 | 112M | 19 | 8 | 425 | 473 | 145 | 710 | 1000 | 63 | 300 | 175 | 0 | 44 | 1167 | 394 |
| | 132S | 19 | 8 | 425 | 473 | 145 | 710 | 1000 | 63 | 300 | 195 | 0 | 44 | 1221 | 394 |
| 12,5 x 7 | 132S | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 307 | 202 | 0 | 44 | 1266 | 439 |
| 12,5 x 8 | 132S | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 307 | 202 | 0 | 44 | 1311 | 484 |
| 12,5 x 9 | 132S | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 307 | 202 | 0 | 44 | 1356 | 529 |

ta_{max} = Motor length based on DIN 42673, could be different due to applied motor make.

8.6 Dimensions of unit MCHZ(S) 14a

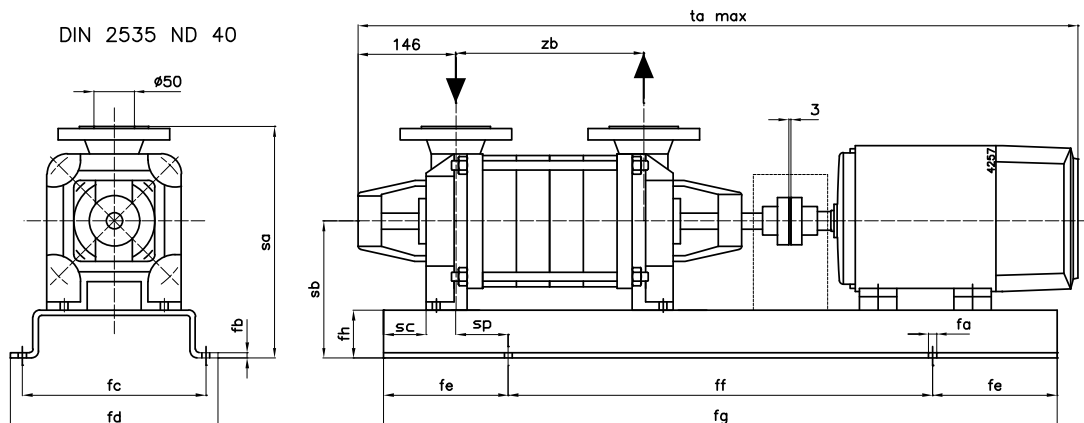


Figure 27: Dimensions sketch unit MCHZ(S) 14a.

| MCHZ(S) | IEC motor | fa | fb | fc | fd | fe | ff | fg | fh | sa | sb | sc | sp | ta _{max} | zb |
|---------|-------------|----|----|-----|-----|-----|------|------|----|-----|-----|----|----|-------------------|-----|
| 14a x 1 | 100L | 19 | 5 | 300 | 348 | 120 | 560 | 800 | 40 | 312 | 172 | 0 | 44 | 932 | 179 |
| | 112M | 19 | 5 | 300 | 348 | 120 | 560 | 800 | 40 | 312 | 172 | 0 | 44 | 962 | 179 |
| 14a x 2 | 112M | 19 | 5 | 300 | 348 | 120 | 560 | 800 | 40 | 312 | 172 | 0 | 44 | 1012 | 229 |
| | 132S | 19 | 6 | 350 | 398 | 135 | 630 | 900 | 50 | 322 | 182 | 0 | 44 | 1066 | 229 |
| 14a x 3 | 132S | 19 | 6 | 350 | 398 | 135 | 630 | 900 | 50 | 322 | 182 | 0 | 44 | 1116 | 279 |
| | 160M | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 370 | 230 | 0 | 44 | 1282 | 279 |
| 14a x 4 | 132S | 19 | 8 | 425 | 473 | 145 | 710 | 1000 | 63 | 335 | 195 | 0 | 44 | 1166 | 329 |
| | 160M | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 370 | 230 | 0 | 44 | 1332 | 329 |
| 14a x 5 | 132S | 19 | 8 | 425 | 473 | 145 | 710 | 1000 | 63 | 335 | 195 | 0 | 44 | 1216 | 379 |
| | 132S | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 342 | 202 | 0 | 44 | 1262 | 379 |
| | 160M | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 370 | 230 | 0 | 44 | 1382 | 379 |
| | 160M | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 370 | 230 | 0 | 44 | 1428 | 379 |
| 14a x 6 | 160M | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 370 | 230 | 0 | 44 | 1432 | 429 |
| 14a x 7 | 160M | 24 | 10 | 435 | 495 | 200 | 1000 | 1400 | 80 | 380 | 240 | 0 | 44 | 1528 | 479 |
| | 160L | 24 | 10 | 435 | 495 | 200 | 1000 | 1400 | 80 | 380 | 240 | 0 | 44 | 1548 | 479 |
| 14a x 8 | 160M | 24 | 10 | 435 | 495 | 200 | 1000 | 1400 | 80 | 380 | 240 | 0 | 44 | 1578 | 529 |
| | 160L | 24 | 10 | 435 | 495 | 200 | 1000 | 1400 | 80 | 380 | 240 | 0 | 44 | 1598 | 529 |
| 14a x 9 | 160M | 24 | 10 | 435 | 495 | 200 | 1000 | 1400 | 80 | 380 | 240 | 0 | 44 | 1628 | 579 |

132S and 160M = Pump with heavy bearing construction

ta_{max} = Motor length based on DIN 42673, could be different due to applied motor make.

8.7 Dimensions of unit MCHZ(S) 14b

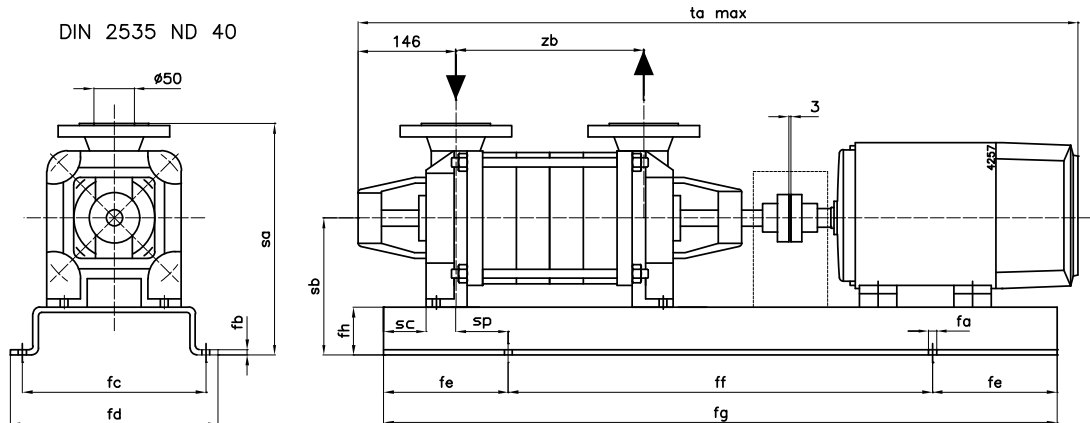


Figure 28: Dimensions sketch unit MCHZ(S) 14b.

| MCHZ(S) | IEC motor | fa | fb | fc | fd | fe | ff | fg | fh | sa | sb | sc | sp | ta _{max} | zb |
|---------|-------------|----|----|-----|-----|-----|------|------|-----|-----|-----|----|----|-------------------|-----|
| 14b x 1 | 100L | 19 | 5 | 300 | 348 | 120 | 560 | 800 | 40 | 312 | 172 | 0 | 44 | 932 | 179 |
| | 112M | 19 | 5 | 300 | 348 | 120 | 560 | 800 | 40 | 312 | 172 | 0 | 44 | 962 | 179 |
| | 132S | 19 | 6 | 350 | 398 | 135 | 630 | 900 | 50 | 322 | 182 | 0 | 44 | 1016 | 179 |
| 14b x 2 | 132S | 19 | 6 | 350 | 398 | 135 | 630 | 900 | 50 | 322 | 182 | 0 | 44 | 1066 | 229 |
| 14b x 3 | 132S | 19 | 6 | 350 | 398 | 135 | 630 | 900 | 50 | 322 | 182 | 0 | 44 | 1116 | 279 |
| | 160M | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 370 | 230 | 0 | 44 | 1282 | 279 |
| 14b x 4 | 132S | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 370 | 230 | 0 | 44 | 1166 | 329 |
| 14b x 5 | 160M | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 370 | 230 | 0 | 44 | 1382 | 379 |
| | 160M | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 370 | 230 | 0 | 44 | 1428 | 379 |
| | 160L | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 370 | 230 | 0 | 44 | 1402 | 379 |
| 14b x 6 | 160M | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 370 | 230 | 0 | 44 | 1432 | 429 |
| | 160L | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 370 | 230 | 0 | 44 | 1452 | 429 |
| | 180M | 24 | 10 | 485 | 545 | 175 | 900 | 1250 | 80 | 400 | 260 | 0 | 44 | 1492 | 429 |
| | 180M | 24 | 10 | 535 | 595 | 200 | 1000 | 1400 | 90 | 410 | 270 | 0 | 44 | 1538 | 429 |
| 14b x 7 | 160M | 24 | 10 | 435 | 495 | 200 | 1000 | 1400 | 80 | 380 | 240 | 0 | 44 | 1528 | 479 |
| | 160L | 24 | 10 | 435 | 495 | 200 | 1000 | 1400 | 80 | 380 | 240 | 0 | 44 | 1548 | 479 |
| | 180M | 24 | 10 | 535 | 595 | 200 | 1000 | 1400 | 90 | 410 | 270 | 0 | 44 | 1588 | 479 |
| 14b x 8 | 160L | 24 | 10 | 435 | 495 | 200 | 1000 | 1400 | 80 | 380 | 240 | 0 | 44 | 1598 | 529 |
| | 180M | 24 | 10 | 535 | 595 | 200 | 1000 | 1400 | 90 | 410 | 270 | 0 | 44 | 1638 | 529 |
| 14b x 9 | 160L | 24 | 10 | 435 | 495 | 200 | 1000 | 1400 | 80 | 380 | 240 | 0 | 44 | 1648 | 579 |
| | 180M | 24 | 10 | 590 | 658 | 240 | 1120 | 1600 | 100 | 420 | 280 | 0 | 44 | 1688 | 579 |

160M and 180M = Pump with heavy bearing construction

ta_{max} = Motor length based on DIN 42673, could be different due to applied motor make.

8.8 Dimensions of unit MCHZ(S) 16

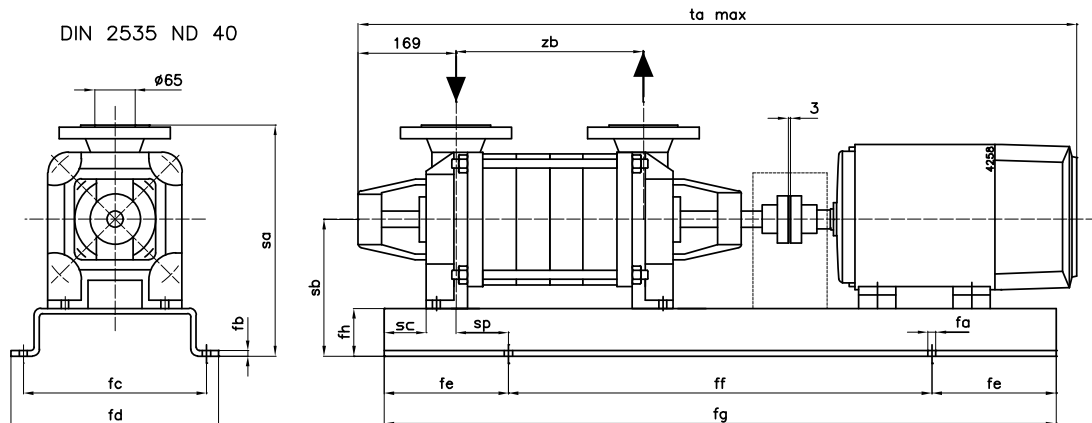


Figure 29: Dimensions sketch unit MCHZ(S) 16.

| MCHZ(S) | IEC motor | fa | fb | fc | fd | fe | ff | fg | fh | sa | sb | sc | sp | ta _{max} | zb |
|---------|-----------|----|----|-----|-----|-----|------|------|-----|-----|-----|----|----|-------------------|-----|
| 16 x 1 | 132S | 19 | 6 | 350 | 398 | 135 | 630 | 900 | 50 | 370 | 210 | 0 | 40 | 1113 | 217 |
| 16 x 2 | 160M | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 390 | 230 | 0 | 40 | 1339 | 277 |
| 16 x 3 | 160M | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 390 | 230 | 0 | 40 | 1399 | 337 |
| | 160L | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 390 | 230 | 0 | 40 | 1419 | 337 |
| 16 x 4 | 160M | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 390 | 230 | 0 | 40 | 1459 | 397 |
| | 160L | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 390 | 230 | 0 | 40 | 1479 | 397 |
| | 180M | 24 | 10 | 435 | 545 | 175 | 900 | 1250 | 80 | 400 | 260 | 0 | 40 | 1519 | 397 |
| | 200L | 24 | 10 | 535 | 595 | 200 | 1000 | 1400 | 90 | 410 | 290 | 0 | 40 | 1597 | 397 |
| 16 x 5 | 160L | 24 | 10 | 435 | 495 | 200 | 1000 | 1400 | 80 | 400 | 240 | 0 | 40 | 1539 | 397 |
| | 180M | 24 | 10 | 535 | 595 | 200 | 1000 | 1400 | 90 | 410 | 270 | 0 | 40 | 1579 | 457 |
| | 200L | 24 | 10 | 535 | 595 | 200 | 1000 | 1400 | 90 | 410 | 290 | 0 | 40 | 1657 | 457 |
| 16 x 6 | 180M | 24 | 10 | 535 | 595 | 200 | 1000 | 1400 | 90 | 410 | 270 | 0 | 40 | 1639 | 457 |
| | 200L | 24 | 10 | 590 | 658 | 240 | 1120 | 1600 | 100 | 420 | 300 | 0 | 40 | 1717 | 517 |
| 16 x 7 | 200L | 24 | 10 | 590 | 658 | 240 | 1120 | 1600 | 100 | 420 | 300 | 0 | 40 | 1777 | 577 |
| 16 x 8 | 200L | 24 | 10 | 590 | 658 | 240 | 1120 | 1600 | 100 | 420 | 300 | 0 | 40 | 1837 | 637 |
| 16 x 9 | 200L | 24 | 10 | 590 | 658 | 240 | 1120 | 1600 | 100 | 420 | 300 | 0 | 40 | 1897 | 697 |

ta_{max} = Motor length based on DIN 42673, could be different due to applied motor make.

8.9 Dimensions of unit MCHZ(S) 20a

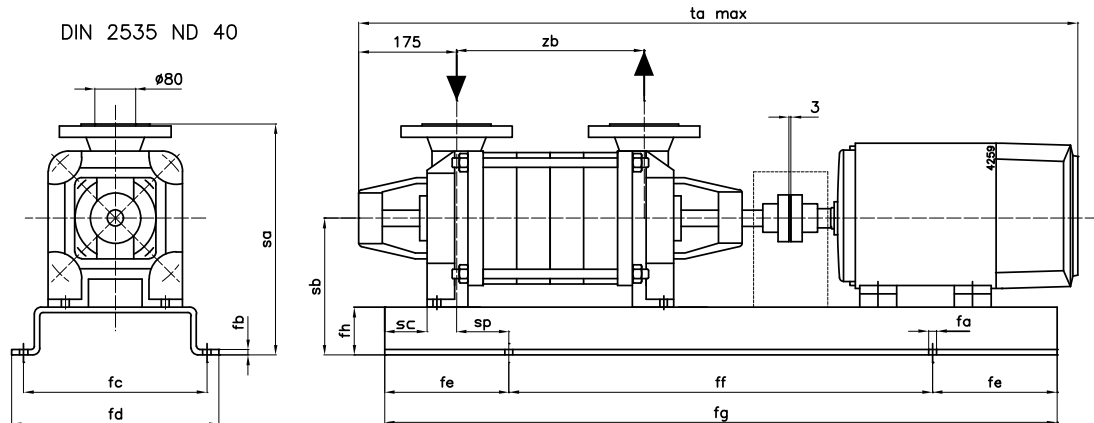


Figure 30: Dimensions sketch unit MCHZ(S) 20a.

| MCHZ(S) | IEC motor | fa | fb | fc | fd | fe | ff | fg | fh | sa | sb | sc | sp | ta _{max} | zb |
|---------|-----------|----|----|-----|-----|-----|------|------|-----|-----|-----|----|----|-------------------|-----|
| 20a x 1 | 160M | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 495 | 270 | 0 | 48 | 1382 | 282 |
| | 160L | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 495 | 270 | 0 | 48 | 1402 | 282 |
| 20a x 2 | 160L | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 495 | 270 | 0 | 48 | 1477 | 357 |
| | 180M | 24 | 10 | 485 | 545 | 175 | 900 | 1250 | 80 | 505 | 280 | 0 | 48 | 1517 | 357 |
| | 200L | 24 | 10 | 535 | 595 | 200 | 1000 | 1400 | 90 | 515 | 290 | 0 | 48 | 1595 | 357 |
| 20a x 3 | 200L | 24 | 10 | 535 | 595 | 200 | 1000 | 1400 | 90 | 515 | 290 | 0 | 48 | 1670 | 432 |
| | 225M | 24 | 10 | 590 | 658 | 240 | 1120 | 1600 | 100 | 550 | 325 | 0 | 48 | 1784 | 432 |
| | 250M | 24 | 10 | 720 | 788 | 240 | 1120 | 1650 | 130 | 605 | 380 | 0 | 48 | 1894 | 432 |
| 20a x 4 | 200L | 24 | 10 | 590 | 658 | 240 | 1120 | 1600 | 100 | 525 | 300 | 0 | 48 | 1745 | 507 |
| | 225M | 24 | 10 | 590 | 658 | 240 | 1120 | 1600 | 100 | 550 | 325 | 0 | 48 | 1859 | 507 |

ta_{max} = Motor length based on DIN 42673, could be different due to applied motor make.

8.10 Dimensions of unit MCHZ(S) 20b

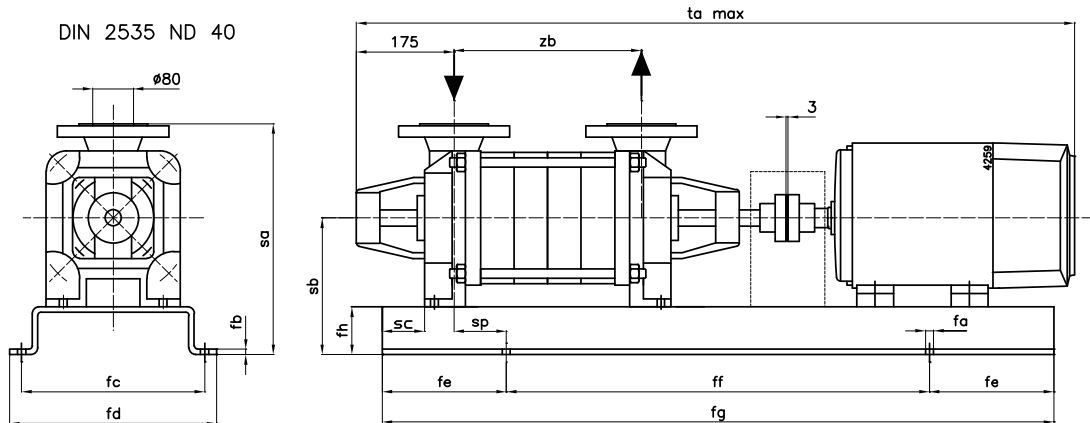


Figure 31: Dimensions sketch unit MCHZ(S) 20b.

| MCHZ(S) IEC motor | fa | fb | fc | fd | fe | ff | fg | fh | sa | sb | sc | sp | ta _{max} | zb | |
|-------------------|------|----|----|-----|-----|-----|------|------|-----|-----|-----|----|-------------------|------|-----|
| 20b x 1 | 160L | 19 | 10 | 425 | 475 | 160 | 800 | 1120 | 70 | 495 | 270 | 0 | 48 | 1402 | 282 |
| | 160M | 24 | 10 | 435 | 495 | 175 | 900 | 1250 | 70 | 495 | 270 | 0 | 48 | 1382 | 282 |
| | 180M | 24 | 10 | 485 | 545 | 175 | 900 | 1250 | 80 | 505 | 280 | 0 | 48 | 1442 | 282 |
| | 200L | 24 | 10 | 535 | 595 | 200 | 1000 | 1400 | 90 | 515 | 290 | 0 | 48 | 1520 | 282 |
| 20b x 2 | 200L | 24 | 10 | 535 | 595 | 200 | 1000 | 1400 | 90 | 515 | 290 | 0 | 48 | 1595 | 357 |
| | 225M | 24 | 10 | 590 | 658 | 240 | 1120 | 1600 | 100 | 550 | 325 | 0 | 48 | 1709 | 357 |
| 20b x 3 | 200L | 24 | 10 | 535 | 595 | 200 | 1000 | 1400 | 90 | 515 | 290 | 0 | 48 | 1670 | 432 |
| | 225M | 24 | 10 | 590 | 658 | 240 | 1120 | 1600 | 100 | 550 | 325 | 0 | 48 | 1784 | 432 |
| | 250M | 24 | 10 | 720 | 788 | 240 | 1120 | 1600 | 130 | 635 | 410 | 0 | 48 | 1894 | 432 |
| | 280S | 24 | 10 | 720 | 788 | 240 | 1120 | 1600 | 130 | 635 | 410 | 0 | 48 | 2004 | 432 |
| 20b x 4 | 250M | 24 | 10 | 590 | 658 | 240 | 1120 | 1600 | 100 | 550 | 325 | 0 | 48 | 1969 | 507 |
| | 280S | 24 | 10 | 720 | 788 | 240 | 1120 | 1600 | 130 | 635 | 410 | 0 | 48 | 2079 | 507 |

ta_{max} = Motor length based on DIN 42673, could be different due to applied motor make.

9 Parts

9.1 Ordering parts

9.1.1 Order form

You can use the order form included in this manual for ordering parts.

When ordering parts always quote the following data:

- 1 Your **address**.
- 2 The **quantity, the item number and the description** of the part.
- 3 The **pump number**. The pump number is stated on the label on the cover of this manual and on the type plate of the pump.
- 4 In the event of different electric motor voltage you should state the correct voltage.

9.1.2 Recommended spare parts

Parts marked with a * are recommended spare parts.

9.2 Designs

The following designs are possible in the parts list below:

Cast iron:

- Design P: cast iron pump casings, stage casings and impellers
- Design Q: cast iron pump casings and stage casings, bronze impellers.

9.3 MCHZ 12,5 - 14a/b - 16

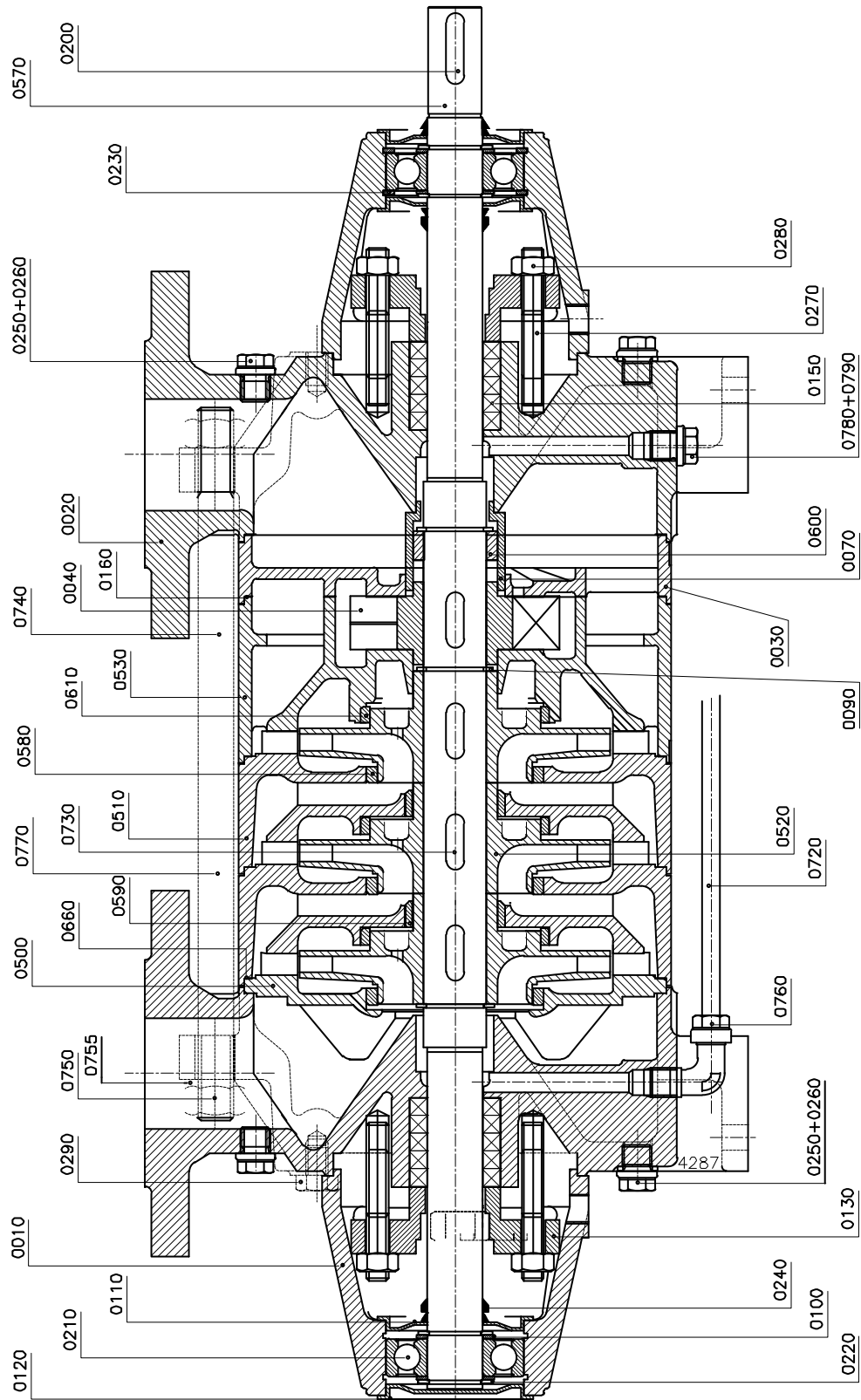


Figure 32: MCHZ 12,5 - 14a/b - 16.

See figure 32

| Item | Quantity | Description | Cast iron | Cast iron + bronze impeller |
|-------|----------|-----------------------------|------------------|--------------------------------|
| | | | Design P | Design Q |
| 0010 | 2 | bearing housing | cast iron | |
| 0020 | 2 | pump casing | cast iron | |
| 0030 | 1 | end cover | cast iron | |
| 0040 | 1 | air-wheel | aluminium bronze | |
| 0070* | 1 | throttling bush | bronze | |
| 0090* | 2 | outer circlip | alloyed steel | |
| 0100* | 4 | filling ring | steel | |
| 0110 | 3 | bearing cover | steel | |
| 0120 | 1 | bearing cover | steel | |
| 0130 | 2 | gland | cast iron | |
| 0150* | 10 | packing ring | -- | |
| 0160* | 1 | gasket | -- | |
| 0200* | 1 | key | alloyed steel | |
| 0210* | 2 | ball bearing | -- | |
| 0220* | 4 | outer circlip | steel | |
| 0230* | 2 | inner circlip | steel | |
| 0240* | 3 | V-ring | rubber | |
| 0250 | 4 | plug | steel | |
| 0260 | 4 | sealing ring | copper | |
| 0270 | 4 | stud | steel | |
| 0280 | 4 | nut | brass | |
| 0290 | 8 | bolt | steel | |
| 0500 | 1 | suction cover | cast iron | |
| 0510 | n-1 | stage casing | cast iron | |
| 0520* | n | impeller | cast iron | bronze |
| 0530 | 1 | pump casing | cast iron | |
| 0570* | 1 | shaft | alloyed steel | |
| 0580* | n | wear ring | bronze | |
| 0590* | n-1 | wear ring | bronze | |
| 0600 | 1 | throttle ring ¹⁾ | alloyed steel | |
| 0610* | n | wear ring | bronze | |
| 0660* | n+3 | gasket | -- | |
| 0720 | 1 | balance pipe ²⁾ | copper | |
| 0730* | n+1 | key | alloyed steel | |
| 0740 | 4 | tie rod ³⁾ | alloyed steel | |
| 0750 | 8 | nut ³⁾ | steel | |
| 0755 | 4 | washer | stainless steel | |
| 0760 | 2 | angle pipe union | brass | |
| 0770 | 4 | bolt with nut ³⁾ | steel | |
| 0780 | 2 | plug ⁴⁾ | steel | |
| 0790 | 2 | sealing ring ⁴⁾ | copper | |

¹⁾ only for MCHZ 12,5 x 8-9 and MCHZ 16 x 5-9

²⁾ only for MCHZ 12,5 x 5-9, MCHZ 14a/b x 4-6 and MCHZ 16 x 3-9

³⁾ not for MCHZ 12,5 x 1-3 and MCHZ 16 x 1

⁴⁾ only for MCHZ 12,5 x 1-4, MCHZ 14a/b x 1-3 and MCHZ 16 x 1-2

9.4 MCHZS 12,5 - 14a/b - 16

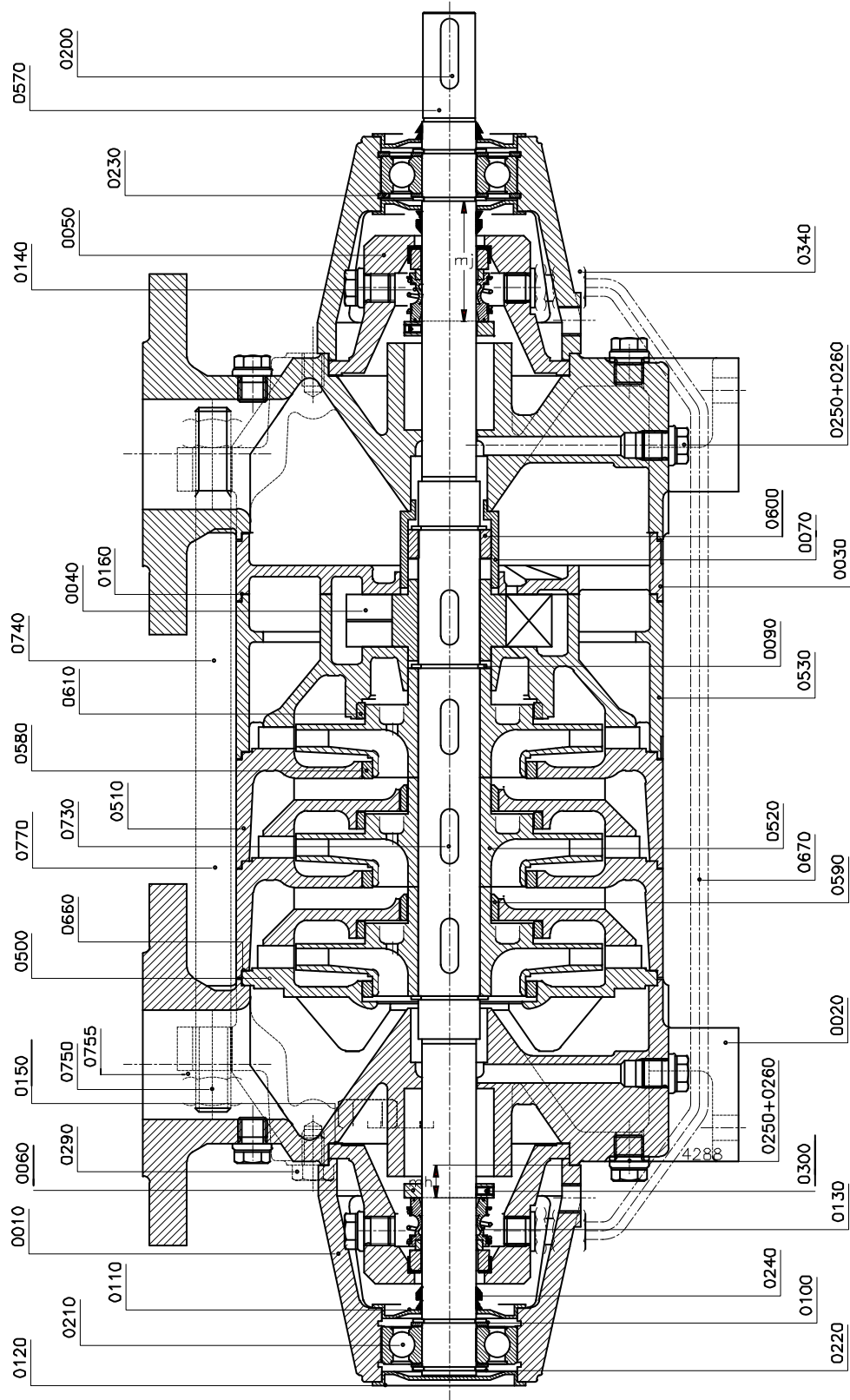


Figure 33: MCHZS 12,5 - 14a/b - 16.

See figure 33.

| Item | Quantity | Description | Cast iron | Cast iron + bronze impeller |
|-------|----------|-----------------------------|------------------|--------------------------------|
| | | | Design P | Design Q |
| 0010 | 2 | bearing housing | cast iron | |
| 0020 | 2 | pump casing | cast iron | |
| 0030 | 1 | end cover | cast iron | |
| 0040* | 1 | air-wheel | aluminium bronze | |
| 0050 | 2 | mechanical seal cover | cast iron | |
| 0060* | 2 | set ring | alloyed steel | |
| 0070* | 1 | throttling bush | bronze | |
| 0090* | 2 | outer circlip | alloyed steel | |
| 0100* | 4 | filling ring | steel | |
| 0110 | 3 | bearing cover | steel | |
| 0120 | 1 | bearing cover | steel | |
| 0130* | 1 | mechanical seal | -- | |
| 0140* | 1 | mechanical seal | -- | |
| 0150* | 2 | gasket | -- | |
| 0160* | 1 | gasket | -- | |
| 0200* | 1 | key | alloyed steel | |
| 0210* | 2 | ball bearing | -- | |
| 0220* | 4 | outer circlip | steel | |
| 0230* | 2 | inner circlip | steel | |
| 0240* | 3 | V-ring | rubber | |
| 0250 | 8 | plug | copper | |
| 0260 | 8 | sealing ring | copper | |
| 0290 | 8 | bolt | steel | |
| 0300 | 2 | set screw | alloyed steel | |
| 0340 | 2 | pipe union | brass | |
| 0500 | 1 | suction cover | cast iron | |
| 0510 | n-1 | stage casing | cast iron | |
| 0520* | n | impeller | cast iron | bronze |
| 0530 | 1 | pump casing | cast iron | |
| 0570* | 1 | shaft | alloyed steel | |
| 0580* | n | wear ring | bronze | |
| 0590* | n-1 | wear ring | bronze | |
| 0600* | 1 | throttle ring ¹⁾ | alloyed steel | |
| 0610* | n | wear ring | bronze | |
| 0660* | n+3 | gasket | -- | |
| 0670* | 1 | balance pipe | copper | |
| 0730 | n+1 | key | alloyed steel | |
| 0740 | 4 | tie rod ²⁾ | alloyed steel | |
| 0750 | 8 | nut | steel | |
| 0755 | 4 | washer | stainless steel | |
| 0770 | 4 | bolt with nut ³⁾ | steel | |

¹⁾ only for MCHZS 12,5 x 8-9 and MCHZS 16 x 5-9

²⁾ only for MCHZS 12,5 x 4-9, MCHZS 14a/b x 4-9 and MCHZS 16 x 2-9

³⁾ only for MCHZS 12,5 x 1-3, MCHZS 14a/b x 1-3 and MCHZS 16 x 1

9.5 MCHZ 14a/b with heavy bearing construction

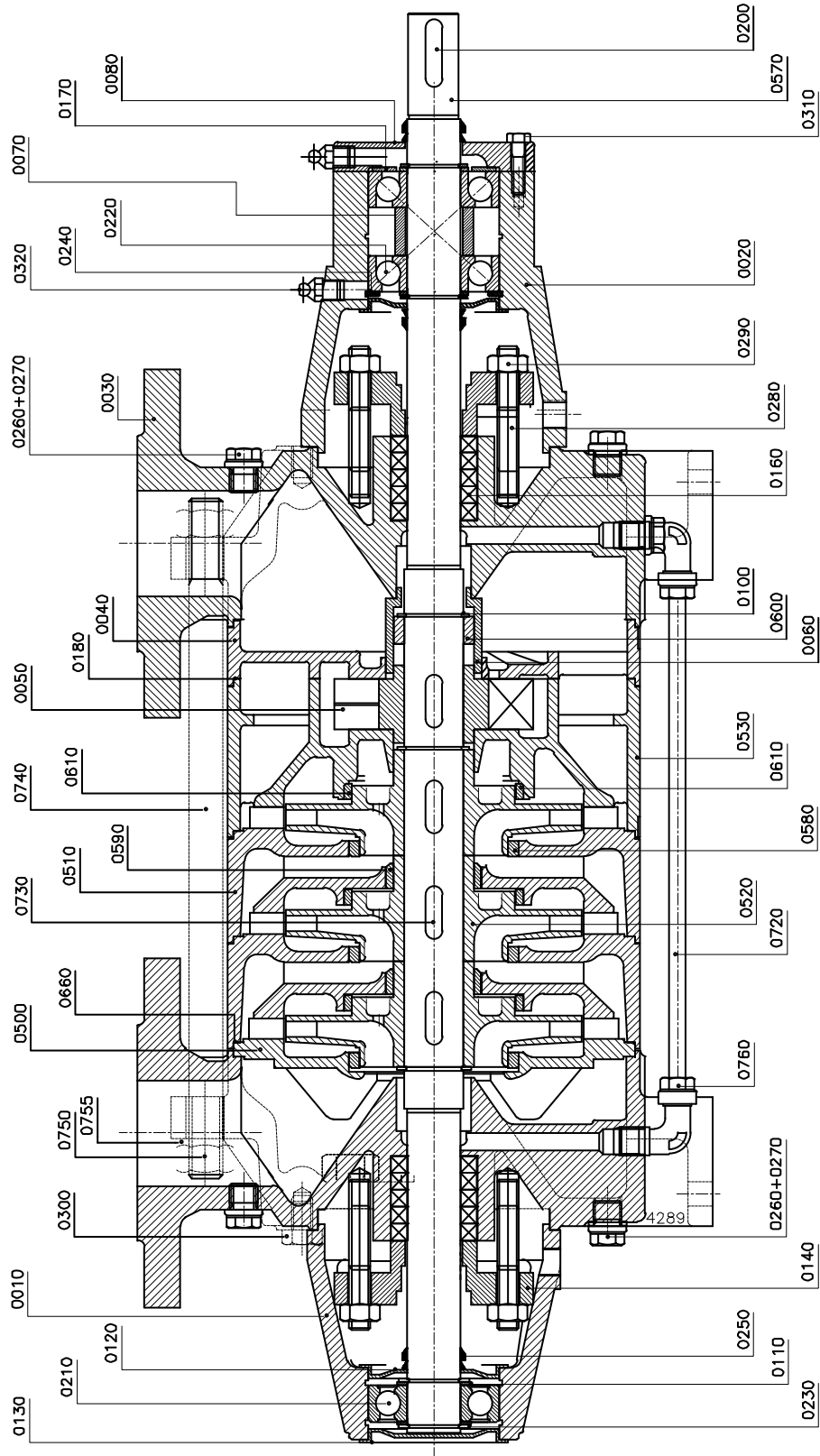


Figure 34: MCHZ 14a/b with heavy bearing construction.

See figure 34.

| Item | Quantity | Description | Cast iron | Cast iron + bronze impeller |
|-------|----------|------------------|------------------|--------------------------------|
| | | | Design P | Design Q |
| 0010 | 1 | bearing housing | cast iron | |
| 0020 | 1 | bearing housing | cast iron | |
| 0030 | 2 | pump casing | cast iron | |
| 0040 | 1 | end cover | cast iron | |
| 0050* | 1 | air-wheel | aluminium bronze | |
| 0060* | 1 | throttling bush | bronze | |
| 0070 | 1 | set ring | steel | |
| 0080 | 1 | bearing cover | steel | |
| 0100* | 3 | outer circlip | alloyed steel | |
| 0110* | 4 | filling ring | steel | |
| 0120 | 2 | bearing cover | steel | |
| 0130 | 1 | bearing cover | steel | |
| 0140 | 2 | gland | cast iron | |
| 0160* | 10 | packing ring | -- | |
| 0170* | 1 | waved ring | alloyed steel | |
| 0180* | 1 | gasket | -- | |
| 0200* | 1 | key | alloyed steel | |
| 0210* | 1 | ball bearing | -- | |
| 0220* | 2 | ball bearing | -- | |
| 0230* | 4 | outer circlip | steel | |
| 0240* | 1 | inner circlip | steel | |
| 0250* | 3 | V-ring | rubber | |
| 0260 | 4 | plug | steel | |
| 0270 | 4 | wear ring | copper | |
| 0280 | 4 | stud | alloyed steel | |
| 0290 | 4 | nut | brass | |
| 0300 | 4 | bolt | steel | |
| 0310 | 4 | bolt | steel | |
| 0320 | 2 | grease nipple | steel | |
| 0360 | 4 | stud | steel | |
| 0500 | 1 | suction cover | cast iron | |
| 0510 | n-1 | stage casing | cast iron | |
| 0520* | n | impeller | cast iron | bronze |
| 0530 | 1 | pump cover | cast iron | |
| 0570* | 1 | shaft | alloyed steel | |
| 0580* | n | wear ring | bronze | |
| 0590* | n-1 | wear ring | bronze | |
| 0600 | 1 | throttle ring | alloyed steel | |
| 0610* | n-1 | wear ring | bronze | |
| 0660* | n+3 | gasket | -- | |
| 0720 | 1 | balance pipe | copper | |
| 0730* | n+1 | key | alloyed steel | |
| 0740 | 4 | tie rod | alloyed steel | |
| 0750 | 8 | nut | steel | |
| 0755 | 4 | washer | stainless steel | |
| 0760 | 2 | angle pipe union | brass | |

9.6 MCHZS 14a/b with heavy bearing construction

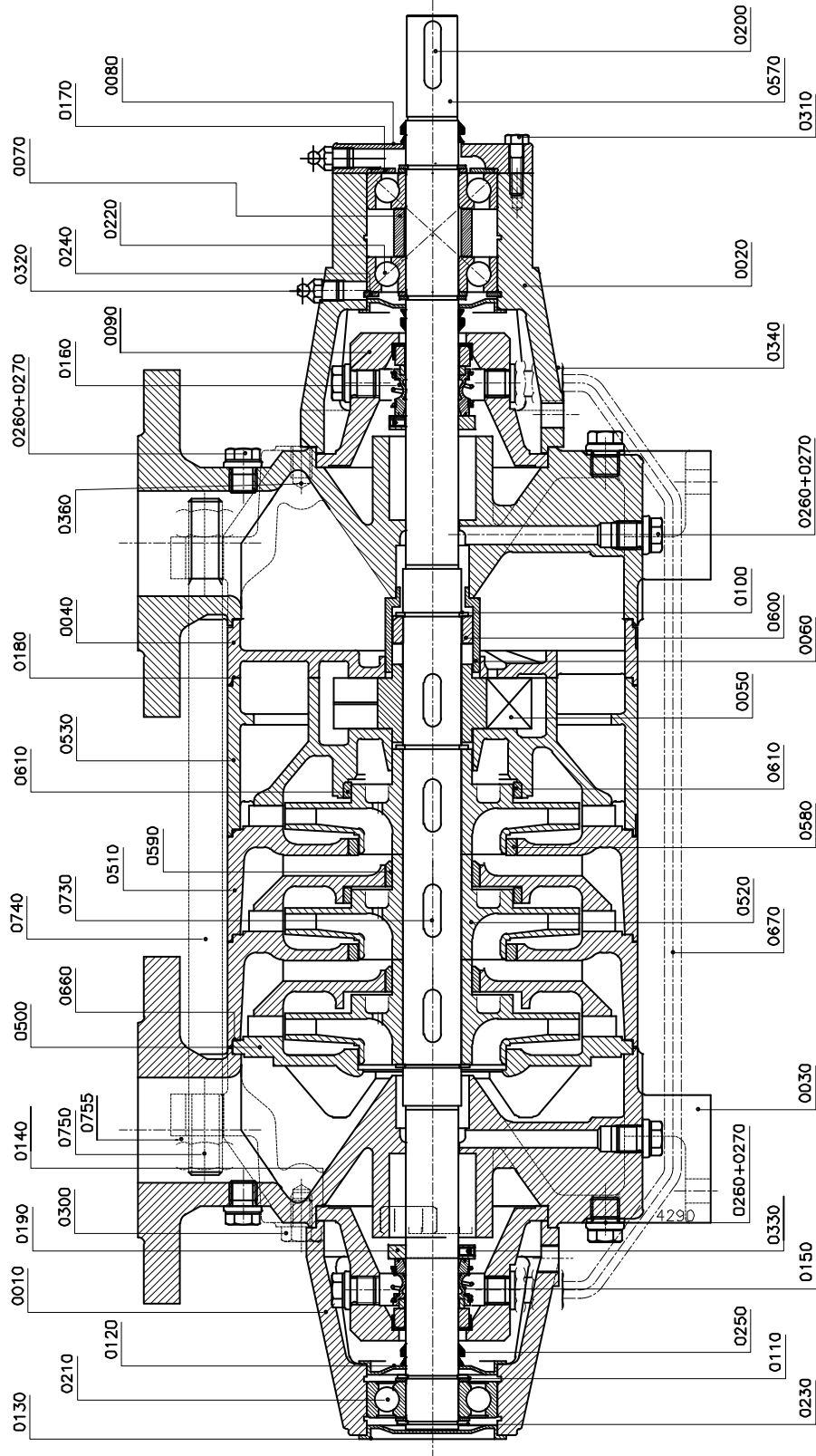


Figure 35: MCHZS 14a/b with heavy bearing construction.

See figure 35.

| Item | Quantity | Description | Cast iron | Cast iron + bronze impeller |
|-------|----------|-----------------------|------------------|--------------------------------|
| | | | Design P | Design Q |
| 0010 | 1 | bearing housing | cast iron | |
| 0020 | 1 | bearing housing | cast iron | |
| 0030 | 2 | pump casing | cast iron | |
| 0040 | 2 | end cover | cast iron | |
| 0050* | 1 | air-wheel | aluminium bronze | |
| 0060* | 1 | throttling bush | bronze | |
| 0070 | 1 | set ring | steel | |
| 0080 | 1 | bearing cover | steel | |
| 0090 | 2 | mechanical seal cover | cast iron | |
| 0100* | 2 | outer circlip | alloyed steel | |
| 0110* | 4 | filling ring | steel | |
| 0120 | 2 | bearing cover | steel | |
| 0130 | 1 | bearing cover | steel | |
| 0140* | 2 | gasket | -- | |
| 0150* | 1 | mechanical seal | -- | |
| 0160* | 1 | mechanical seal | -- | |
| 0170* | 1 | waved ring | alloyed steel | |
| 0180* | 1 | gasket | -- | |
| 0190 | 2 | set ring | alloyed steel | |
| 0200* | 1 | key | alloyed steel | |
| 0210* | 1 | ball bearing | -- | |
| 0220* | 2 | ball bearing | -- | |
| 0230* | 4 | outer circlip | steel | |
| 0240* | 1 | inner circlip | steel | |
| 0250* | 3 | V-ring | rubber | |
| 0260 | 8 | plug | steel | |
| 0270 | 8 | wear ring | copper | |
| 0300 | 4 | bolt | steel | |
| 0310 | 4 | bolt | steel | |
| 0320 | 2 | grease nipple | steel | |
| 0330 | 2 | set screw | alloyed steel | |
| 0340 | 2 | pipe union | brass | |
| 0360 | 4 | bolt | steel | |
| 0500 | 1 | suction cover | cast iron | |
| 0510 | n-1 | stage casing | cast iron | |
| 0520* | n | impeller | cast iron | bronze |
| 0530 | 1 | pump casing | cast iron | |
| 0570* | 1 | shaft | alloyed steel | |
| 0580* | n | wear ring | bronze | |
| 0590* | n-1 | wear ring | bronze | |
| 0600* | 1 | throttle ring | alloyed steel | |
| 0610* | n | wear ring | bronze | |
| 0660* | n+3 | gasket | -- | |
| 0670 | 1 | balance pipe | copper | |
| 0730* | n | key | alloyed steel | |
| 0740 | 4 | tie rod | alloyed steel | |
| 0750 | 8 | nut | steel | |
| 0755 | 4 | washer | stainless steel | |

9.7 MCHZ 20a/b

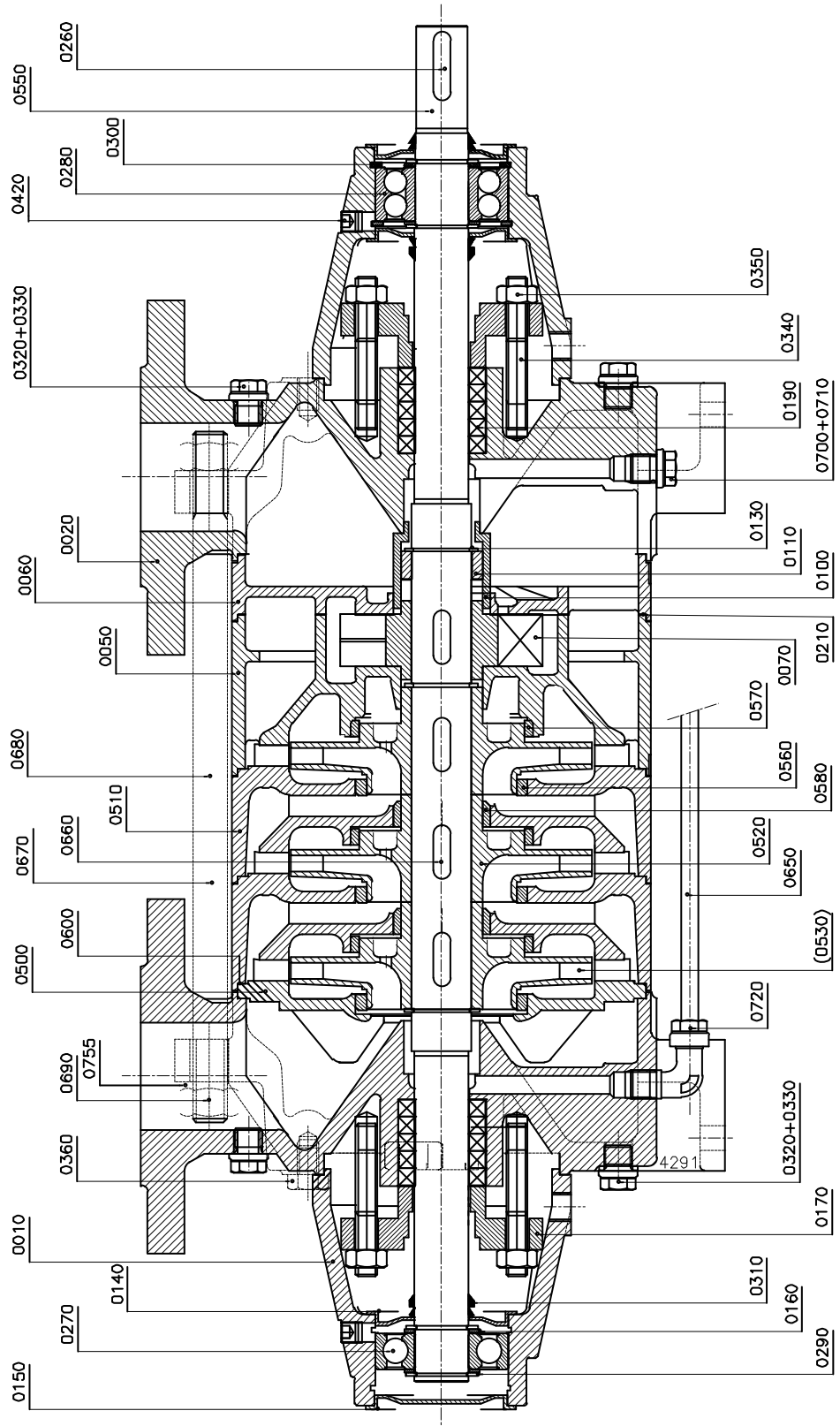


Figure 36: MCHZ 20 a/b.

See figure 36.

| Item | Quantity | Description | Cast iron | Cast iron + bronze impeller |
|-------|----------|--------------------------------|------------------|--------------------------------|
| | | | Design P | Design Q |
| 0010 | 2 | bearing housing | cast iron | |
| 0020 | 2 | pump casing | cast iron | |
| 0050 | 1 | pump casing | cast iron | |
| 0060 | 1 | end cover | cast iron | |
| 0070 | 1 | air-wheel | aluminium bronze | |
| 0100* | 1 | throttling bush | bronze | |
| 0110* | 1 | throttle ring | alloyed steel | |
| 0130* | 3 | outer circlip | alloyed steel | |
| 0140 | 3 | bearing cover | steel | |
| 0150 | 1 | bearing cover | steel | |
| 0160* | 4 | filling ring | steel | |
| 0170 | 2 | gland | cast iron | |
| 0190* | 10 | packing ring | -- | |
| 0210* | 1 | gasket | -- | |
| 0260* | 1 | key | alloyed steel | |
| 0270* | 1 | ball bearing | -- | |
| 0280* | 1 | ball bearing | -- | |
| 0290* | 4 | outer circlip | steel | |
| 0300* | 2 | inner circlip | steel | |
| 0310* | 3 | V-ring | rubber | |
| 0320 | 4 | plug | steel | |
| 0330 | 4 | wear ring | copper | |
| 0340 | 4 | stud | alloyed steel | |
| 0350 | 4 | nut | brass | |
| 0360 | 8 | bolt | steel | |
| 0420 | 2 | plug | steel | |
| 0500 | 1 | suction cover | cast iron | |
| 0510 | n-1 | stage casing | cast iron | |
| 0520* | n | impeller | cast iron | bronze |
| 0550* | 1 | shaft | alloyed steel | |
| 0560* | n | wear ring | bronze | |
| 0570* | n | wear ring | bronze | |
| 0580* | n-1 | wear ring | bronze | |
| 0600* | n+3 | gasket | -- | |
| 0650 | 1 | balance pipe ¹⁾ | copper | |
| 0660* | n+1 | key | alloyed steel | |
| 0670 | 2 | tie rod | alloyed steel | |
| 0680 | 6 | tie rod | alloyed steel | |
| 0690 | 16 | nut | steel | |
| 0700 | 2 | plug ²⁾ | steel | |
| 0710 | 2 | wear ring ²⁾ | copper | |
| 0720 | 2 | angle pipe union ¹⁾ | brass | |
| 0755 | 16 | washer | stainless steel | |

1) only for MCHZ 20a/b x 2 to 4

2) only for MCHZ 20a/b x 1

9.8 MCHZS 20a/b

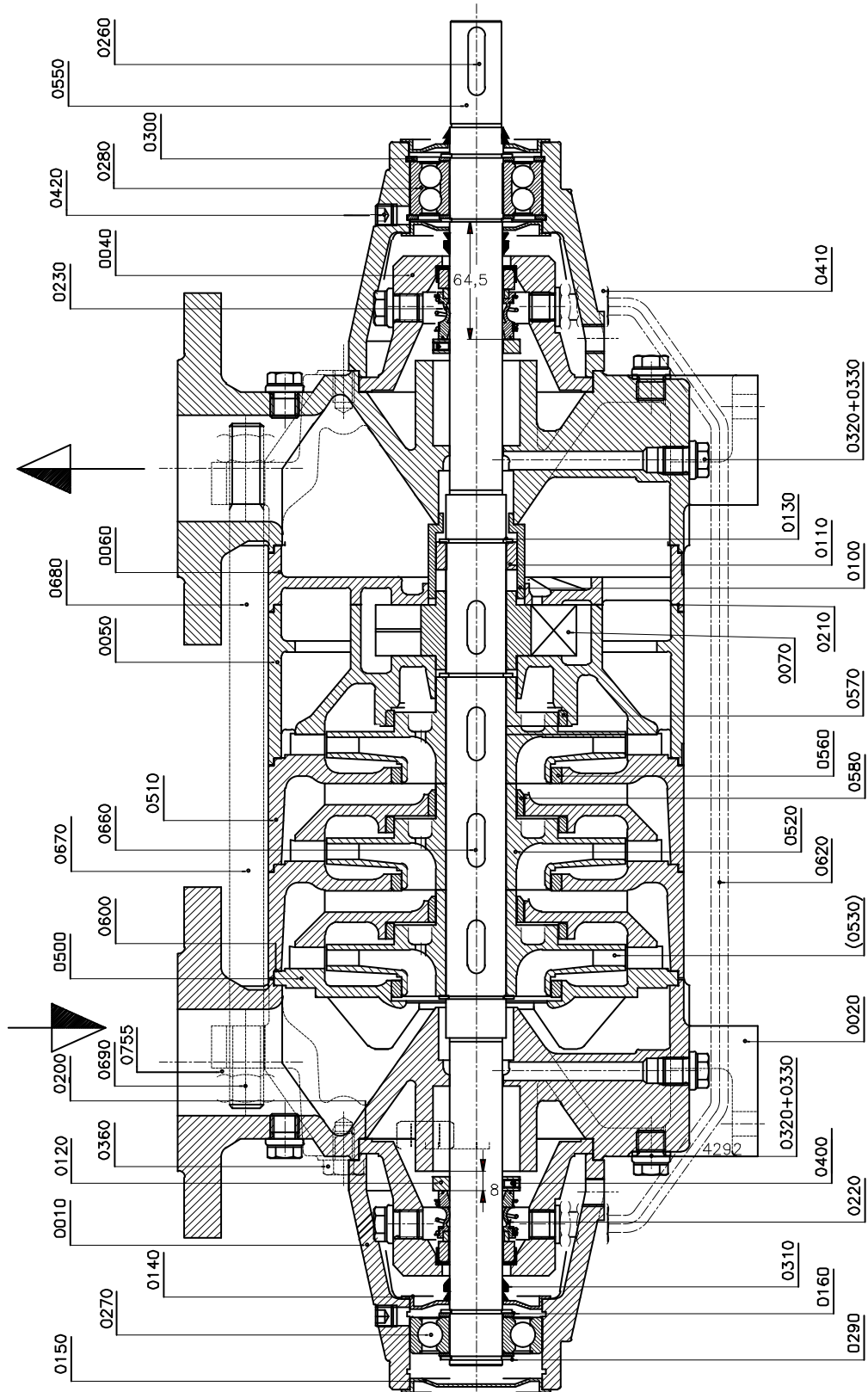


Figure 37: MCHZS 20 a/b.

See figure 37.

| Item | Quantity | Description | Cast iron | Cast iron + bronze impeller |
|-------|----------|-----------------------|------------------|--------------------------------|
| | | | Design P | Design Q |
| 0010 | 2 | bearing housing | cast iron | |
| 0020 | 2 | pump casing | cast iron | |
| 0040 | 2 | mechanical seal cover | cast iron | |
| 0050 | 1 | pump casing | cast iron | |
| 0060 | 1 | end cover | cast iron | |
| 0070* | 1 | air-wheel | aluminium bronze | |
| 0100* | 1 | throttling bush | bronze | |
| 0110* | 1 | throttle ring | alloyed steel | |
| 0120 | 2 | set ring | alloyed steel | |
| 0130* | 3 | outer circlip | alloyed steel | |
| 0140 | 3 | bearing cover | steel | |
| 0150 | 1 | bearing cover | steel | |
| 0160* | 4 | filling ring | steel | |
| 0200* | 2 | gasket | -- | |
| 0210* | 1 | gasket | -- | |
| 0220* | 1 | mechanical seal | -- | |
| 0230* | 1 | mechanical seal | -- | |
| 0260* | 1 | key | alloyed steel | |
| 0270* | 1 | ball bearing | -- | |
| 0280* | 1 | ball bearing | -- | |
| 0290* | 4 | outer circlip | steel | |
| 0300* | 2 | inner circlip | steel | |
| 0310* | 3 | V-ring | rubber | |
| 0320 | 10 | plug | steel | |
| 0330 | 10 | sealing ring | copper | |
| 0360 | 8 | bolt | steel | |
| 0400 | 2 | set screw | alloyed steel | |
| 0410 | 2 | pipe union | brass | |
| 0420 | 2 | plug | steel | |
| 0500 | 1 | suction cover | cast iron | |
| 0510 | n-1 | stage casing | cast iron | |
| 0520* | n | impeller | cast iron | bronze |
| 0550* | 1 | shaft | alloyed steel | |
| 0560* | n | wear ring | bronze | |
| 0570* | n | wear ring | bronze | |
| 0580* | n-1 | wear ring | bronze | |
| 0600* | n+3 | gasket | -- | |
| 0620 | 1 | balance pipe | copper | |
| 0660* | n | key | alloyed steel | |
| 0670 | 2 | tie rod | alloyed steel | |
| 0680 | 6 | tie rod | alloyed steel | |
| 0690 | 16 | nut | steel | |
| 0755 | 16 | washer | stainless steel | |

10 Technical data

10.1 Tightening moments

10.1.1 Tightening moments for bolts and nuts

Table 4: Tightening moments for bolts and nuts.

| Materials | 8.8 | A2, A4 |
|-----------|------------------------|--------|
| Thread | Tightening moment [Nm] | |
| M6 | 9 | 6 |
| M8 | 20 | 14 |
| M10 | 40 | 25 |
| M12 | 69 | 43 |
| M16 | 168 | 105 |

10.1.2 Tie rod torque

Table 5: Tie rod torque

| Pump type | Torque [Nm] | Screwthread | Material |
|---------------|-------------|-------------|----------|
| MCHZ(S) 12,5 | 89 - 118 | M16 | 40CrMo4 |
| MCHZ(S) 14a/b | 99 - 133 | M16 | |
| MCHZ(S) 16 | 200 - 267 | M20 | |
| MCHZ(S) 20a/b | 137 - 183 | M20 | |

10.1.3 Tightening moments set screw from coupling

Table 6: Tightening moments set screw from coupling.

| Size | Tightening moment [Nm] |
|------|------------------------|
| M6 | 4 |
| M8 | 8 |
| M10 | 15 |
| M12 | 25 |
| M16 | 70 |

10.2 Post-greasing of ball bearings

See the table below for bearings that require post-greasing and the appropriate type of grease.

Table 7: Post-greasing of ball bearings.

| Pump type | Bearings | Recommended greases according to NLGI-2 classification. |
|--|-------------------------------|--|
| MCHZ(S)14 a/b with reinforced bearing | bearings at drive side | CASTROL - Spheerol AP2, CHEVRON - Black Pearl Grease EP 2, CHEVRON - MultifaK EP-2, EXXONMOBIL - Beacon EP 2 (Moly), EXXONMOBIL - Mobilux EP 2 (Moly), SHELL - Gadus S2 V100 2, SKF LGMT 2, TOTAL - Total Lical EP 2 |
| MCHZ(S) 16 | all bearings | |

10.3 Recommended locking liquids

Table 8: Recommended locking liquids.

| Description | Locking liquid |
|-----------------|----------------|
| throttling bush | Loctite 641 |
| wear rings | Loctite 641 |

10.4 Maximum speed

Table 9: Maximum speed.

| MCHZ - MCHZS | n_{max} [min ⁻¹] | |
|--------------|--------------------------------|----------------------------|
| | standard bearing construction | heavy bearing construction |
| 12,5 x 1 - 7 | 3600 | |
| 12,5 x 8 - 9 | 3000 | |
| 14a x 1 - 4 | 3600 | |
| 14a x 5 - 6 | 3000 | 3600 |
| 14a x 7 - 8 | | 3600 |
| 14a x 9 | | 3000 |
| 14b x 1 - 4 | 3600 | |
| 14b x 5 - 6 | 3000 | 3600 |
| 14b x 7 - 8 | | 3600 |
| 14b x 9 | | 3000 |
| 16 x 1 - 7 | 3600 | |
| 16 x 8 - 9 | 3000 | |
| 20a x 1 - 3 | 3600 | |
| 20a x 4 | 3000 | |
| 20b x 1 - 3 | 3600 | |
| 20b x 4 | 3000 | |

10.5 Permissible pressure and temperature

Table 10: Permissible pressure and temperature.

| MCHZ(S) | 12,5 | 14a | 14b | 16 | 20a | 20b |
|---|--|------------|------------|-----------|------------|------------|
| max. capacity [m ³ /h] | 8 | 16 | 26 | 42 | 65 | 100 |
| max. head [m] | 275 | 250 | 255 | 350 | 250 | 160 |
| max. inlet pressure [bar] | 10 | | | | | |
| max. suction head [m] | 8 (water of 15°C with air drawn in, discharged without back-pressure) | | | | | |
| test pressure [bar] | 1,5 x working pressure | | | | | |
| min. test pressure [bar] | 15 | | | | | |
| max. test pressure [bar] | 50 | | | | | |
| max. permitted working pressure ^{*)} [bar] | 40 - (3x inlet pressure) | | | | | |
| temperature range MCHZS [°C] | -20°C to +120°C | | | | | |

*) Working pressure is the manometric head for Q=0, increased by the pre-pressure.

10.6 Hydraulic performance

10.6.1 Performance overview 3000 min⁻¹

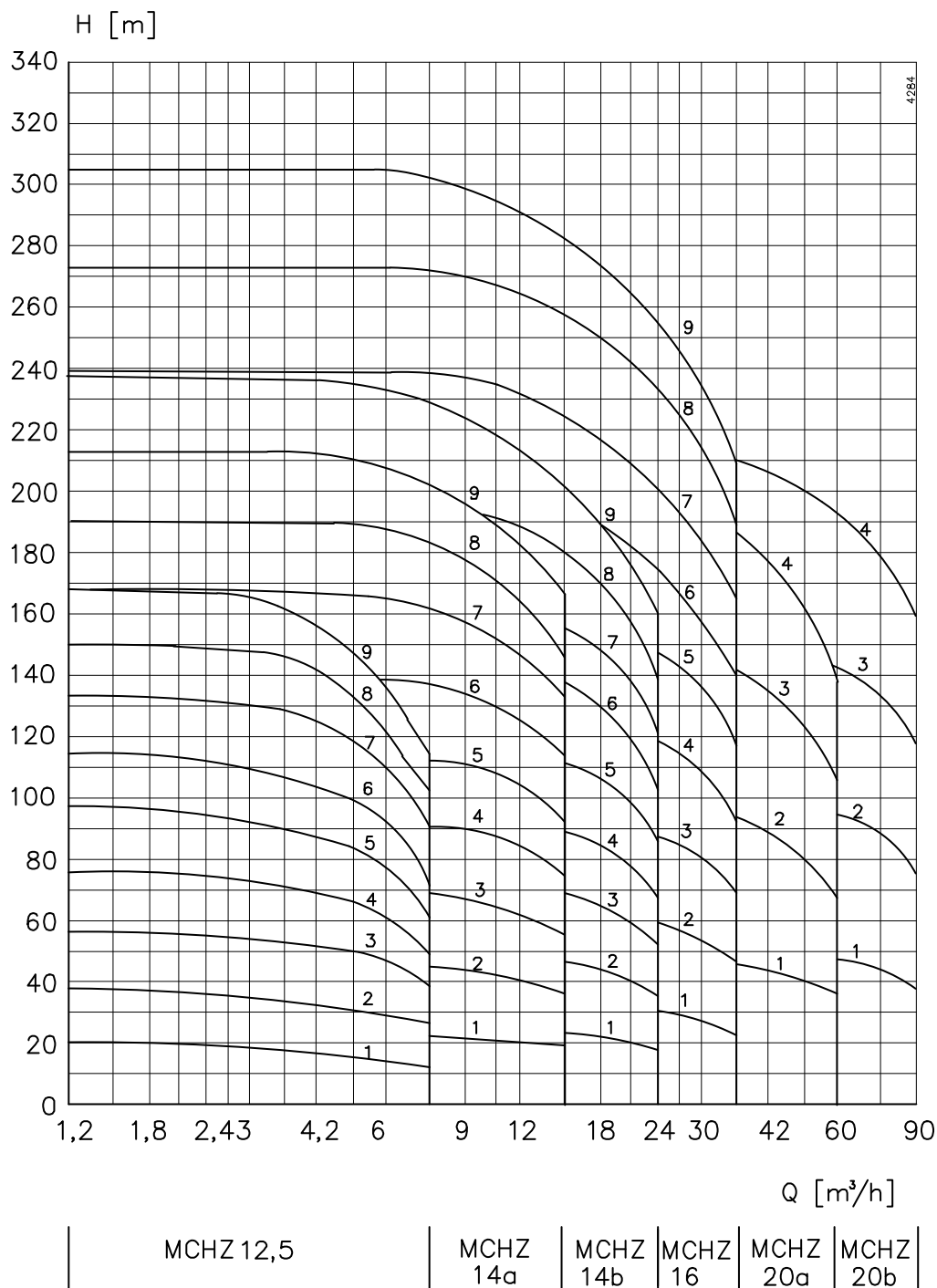


Figure 38: Performance overview 3000 min⁻¹.

10.6.2 Performance overview 3600 min⁻¹

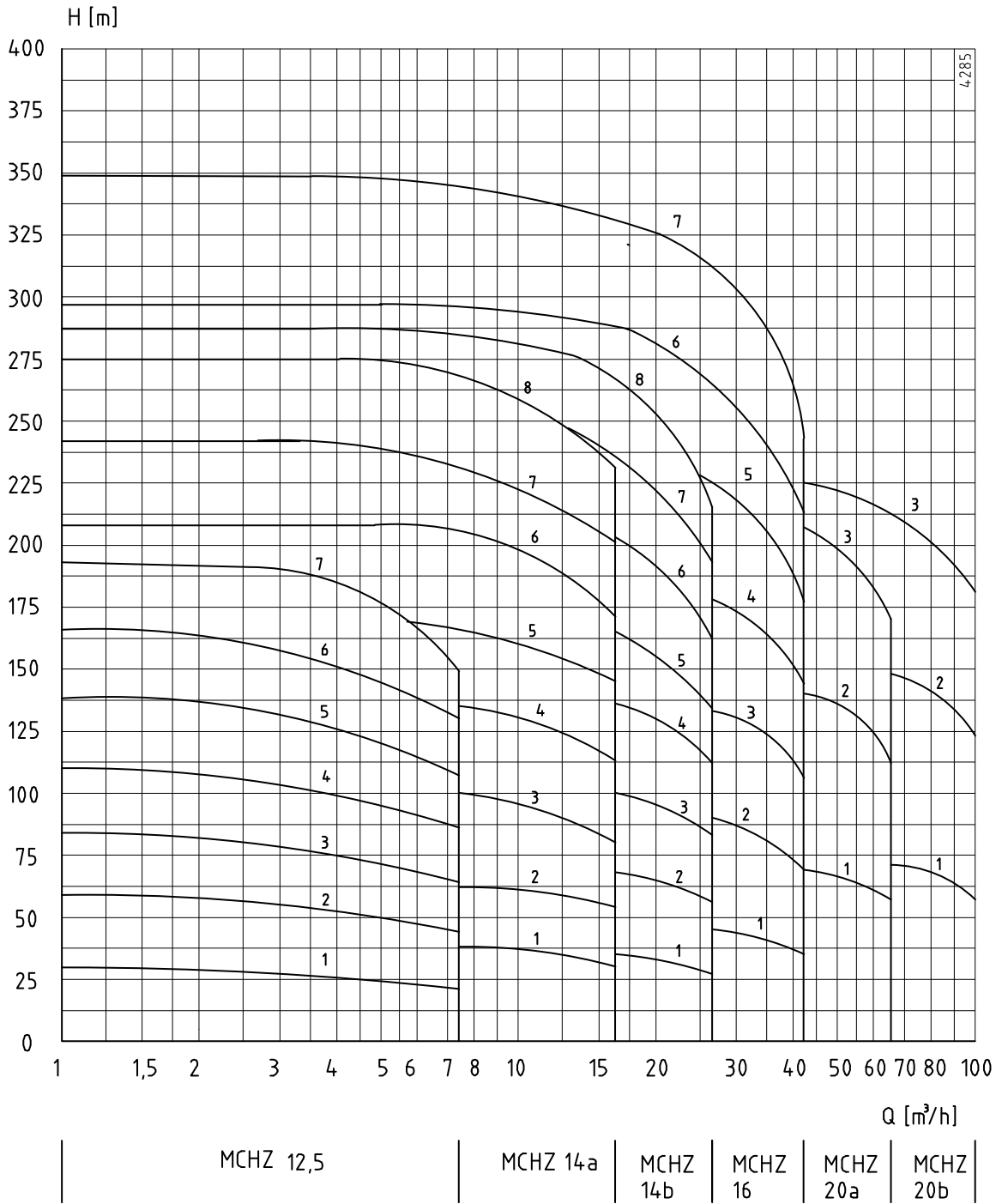


Figure 39: Performance overview 3600 min⁻¹.

10.7 Noise data

10.7.1 Pump noise as a function of pump power

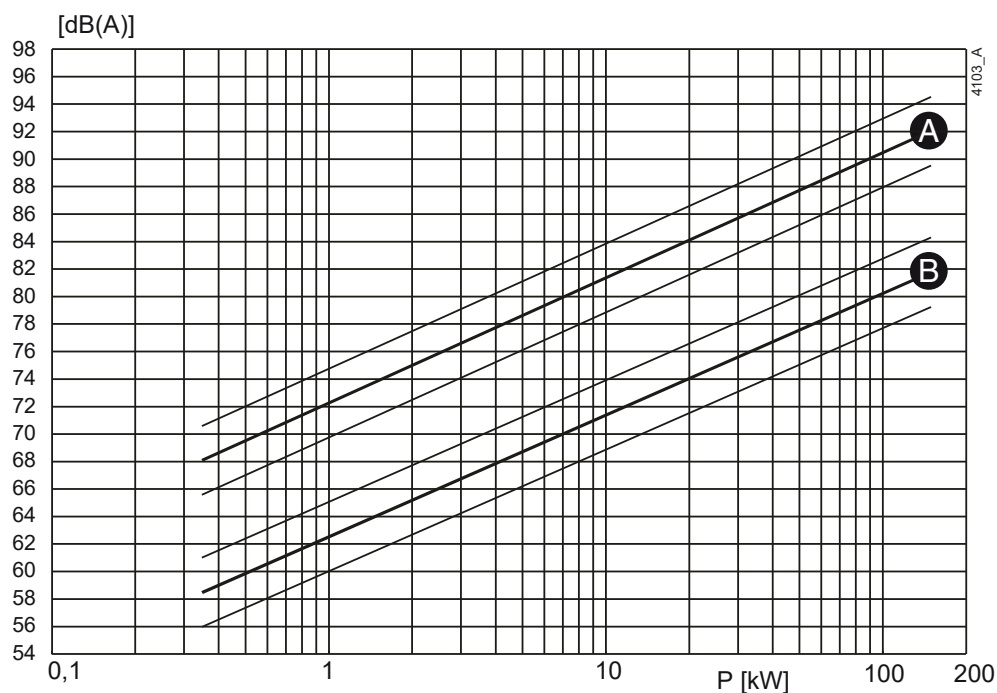


Figure 40: Noise level as function of pump power [kW] at 1450 min⁻¹
A = sound power level, B = sound pressure level.

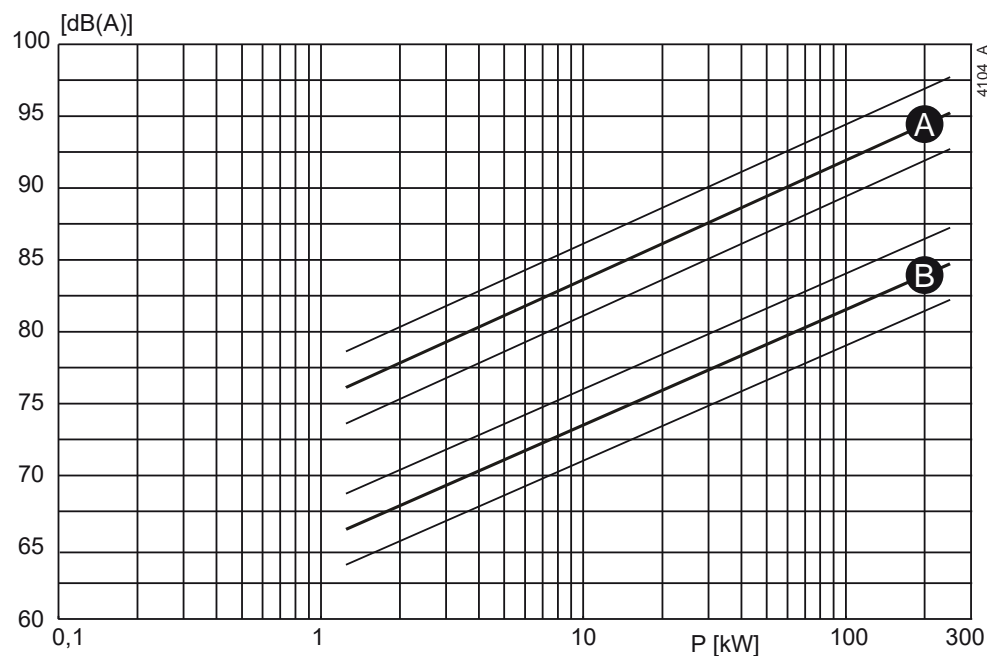


Figure 41: Noise level as function of pump power [kW] at 2900 min⁻¹
A = sound power level, B = sound pressure level.

10.7.2 Noise level of entire pump unit

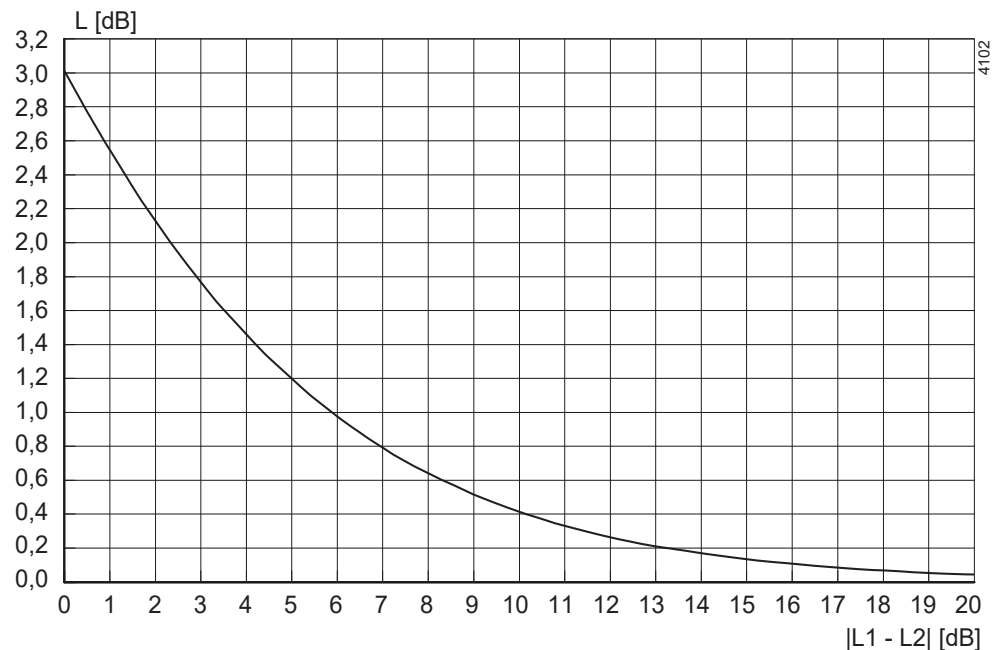


Figure 42: Noise level of entire pump unit.

In order to determine the total noise level of the entire pump unit, the noise level of the motor must be added to that of the pump. This can be easily done by using the graph above.

- 1 Determine the noise level (L_1) of the pump, see figure 40 or figure 41.
- 2 Determine the noise level (L_2) of the motor, see documentation of the motor.
- 3 Determine the difference between both levels $|L_1 - L_2|$.
- 4 Find the differential value on the $|L_1 - L_2|$ -axis and go up to the curve.
- 5 From the curve go left to the L [dB] -axis and read out the value.
- 6 Add this value to the highest value of both noise levels (L_1 or L_2).

Example:

- 1 Pump 75 dB; motor 78 dB.
- 2 $|75-78| = 3$ dB.
- 3 3 dB on the X-axis = 1,75 dB on the Y-axis.
- 4 Highest noise level + 1,75 dB = $78 + 1,75 = 79,75$ dB.

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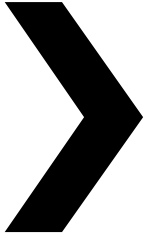
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ISSUED 01/2023
Revision: MCHZ/EN (2502) 4.6

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