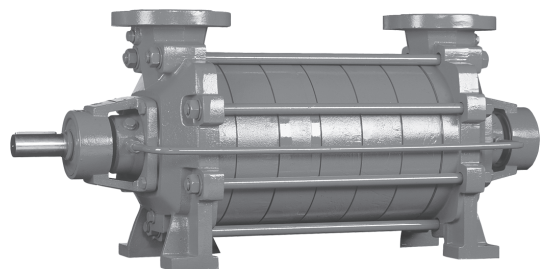
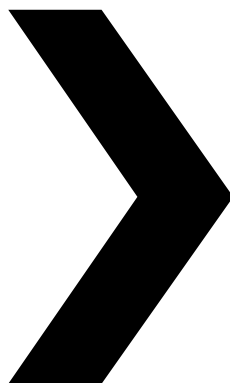


MCH(S)(W)

Horizontal multistage pump



REVISION: MCH/EN (2301) 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

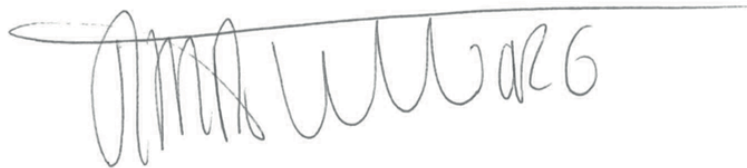
SPX Flow Technology Assen B.V.
Dr. A.F. Philipsweg 51
9403 AD Assen
The Netherlands

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, January 1st 2023



R. van Tilborg,
Managing Director

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.

SPX Flow Technology Assen B.V.
Dr. A. F. Philipsweg 51
9403 AD Assen
The Netherlands
Tel. +31 (0)592 376767
Fax. +31 (0)592 376760

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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!

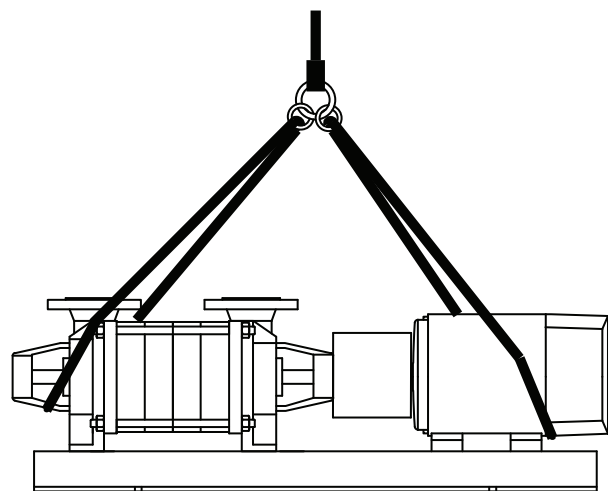


Figure 1: Lifting instructions for pump unit.

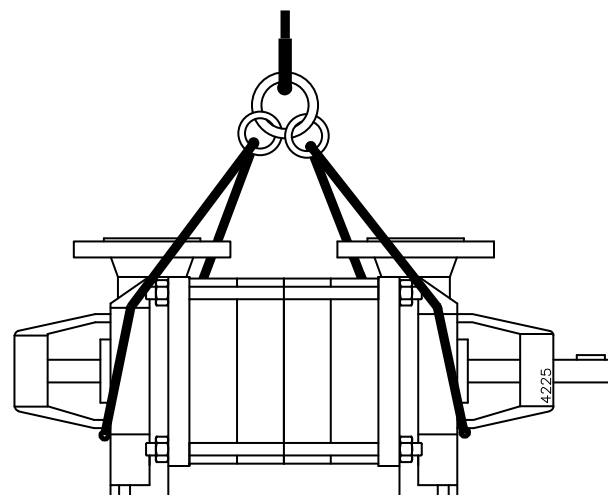


Figure 2: Lifting instructions for single pump.

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 MCH is a range of horizontal high-pressure stage pumps with closed impellers. The range consists of the following 7 basic types:

- MCH 10
- MCH 12,5
- MCH 14a
- MCH 14b
- MCH 16
- MCH 20a
- MCH 20b

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

Flange dimensions, bolt circle and number of holes comply with DIN 2535 ND 40.

The pump is driven by a standard IEC foot motor. The power is transmitted through a flexible coupling. An exception to the above is the MCH 10, which has connections with internal screw thread and is driven by an electric flange motor. Because of their modular lay-out, constructional components are widely interchangeable, even with other types of multistage pumps, such as the MCV or the MCHZ.

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.

Example: **MCH 12,5 x n - 3,2** or **MCHS 20a x n - 8**

Pump family	
MCH	Multi stage Centrifugal Horizontal
Shaft sealing	
	stuffing box packing
S	mechanical seal
W	water-cooled stuffing box
Impeller diameter	
10	impeller diameter in cm
12,5	
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 these 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, except for the MCH 10 series. For the MCH 10 the inlet and outlet casings are provided with holes with an internal screw thread. 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.

The MCH 10 has no connections for barrier liquid, no drain, no wear rings and no suction cover. The inlet casing is equipped directly with a suction aperture and anti-rotation partitions.

2.6.2 Impellers

All types of MCH 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.

2.6.3 Bearing construction

- All MCH/MCHW/MCHS pumps, with the exception of the MCH(S) 10, are designed with 2 grease-lubricated deep-groove ball bearings.
- Depending on the number of pressure stages, the MCH(S) 10 is fitted with either 1 or 2 single-row angular contact bearings on the pressure side. A slide bearing is fitted in the inlet casing on the suction side and this is lubricated by the pumped liquid.
- For the types MCH/MCHW/MCHS 20a and 20b a double-row angular contact bearing is used on the pressure side.
- Pumps with heavy bearing constructions - used for MCH/MCHW/MCHS 14a and 14b - are fitted with 2 single-row angular contact bearings on the pressure side.

- MCH(S) 12,5, 14a/b (with standard bearings) and 20a/b are provided with 2RS1-bearings.
- The MCH 16 and MCHS 16, MCHW 14a/b, MCHW 16 and MCHW 20a/b are fitted with grease nipples so that these bearings can be greased periodically.
- MCH(S) 10: 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.
- **MCHW**: The ball bearings and the ball bearing housings are filled on delivery with a quantity of special grease suitable for high temperatures.
- 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.

2.6.4 Shaft seal

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

- 1 MCH and MCHW
Standardized stuffing box packing rings.
Pumps for which the pressure in the stuffing box becomes too high are designed with a balance pipe.
- 2 MCHS
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:

Table 1: Application area.

	Maximum value
Capacity	100 m ³ /h
Discharge head	340 m

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 150°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.
- For models with a stuffing box, check that the nuts have not been over-tightened. If necessary slacken the nuts and re-tighten them by hand.

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.

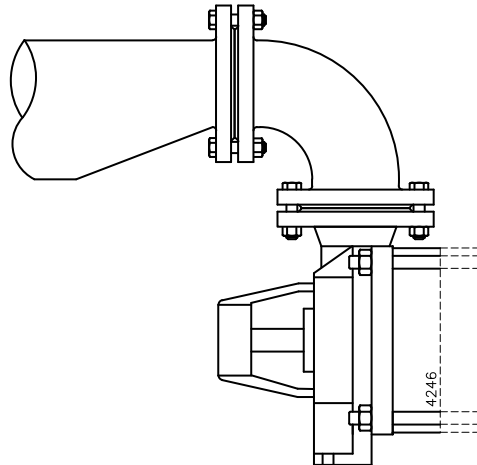


Figure 3: Eccentric reducer to suction flange.

- 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 a cooling jacket (**MCHW**), connect the cooling jacket to the supply and return lines of the cooling system.
- 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 Mounting

3.6.1 Piping

- 1 Fit the gaskets between the flanges and connect the pressure and the suction pipes to the pump.
- 2 Fit the cooling water pipe for the MCHW.

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.

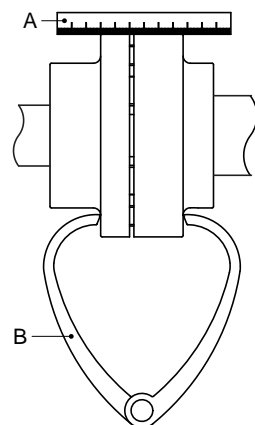


Figure 4: Aligning the coupling by means of a ruler and a pair of outside calipers.

- 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 chapter 7.7.6 "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 2. See also figure 5.

Table 2: 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

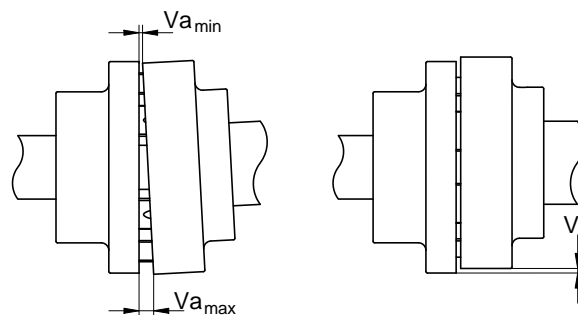


Figure 5: Alignment tolerances standard coupling.

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 (0280)(0350 MCH(W)(S)20a/b) 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

Pump driven by an electric motor:

- Check whether the fuses have been mounted.

4.3 Preparing the pump unit for commissioning

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

4.3.1 Auxiliary connections

- Shaft seal configuration with cooling jacket **MCHW** must be connected to an external cooling liquid system.

4.3.2 Filling the pump

- 1 Fully open the stop valve in the suction pipe. Close the delivery stop valve.
- 2 Fill the pump and the suction pipe with the liquid to be pumped.
- 3 Turn the pump shaft a few times by hand and add more liquid, if necessary.

4.4 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.

4.5 Start-up

- 1 Open the stop valves in the supply and return lines for flushing or cooling liquid, if the pump is connected to a flushing or cooling system. Ensure these systems are switched on and set at the proper values.
- 2 Start the pump.
- 3 As soon as the pump is under pressure, slowly open the delivery stop valve until the working pressure is attained.



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

4.6 Adjustment of shaft sealing

4.6.1 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 nuts (0280)(0350 MCH(W)(S)20a/b) 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).
- 4 Fix the seal guards (0276).



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

4.6.2 Mechanical seal

- A mechanical seal may never show visible leakage.

4.7 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.

4.8 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 nuts (0280)(0350 MCH(W)(S)20a/b) 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

The necessity for post-greasing the ball bearings depends upon the bearing type being applied. See the table below for bearings that require post-greasing. The recommended lubricating schedule is as follows:

Pump type	Bearings	Lubricate after number of operating hours [h]	Quantity of grease [gram] per bearing	Remarks:
MCH(S)10	all bearings	The ball bearings are filled with a quantity of grease on delivery which is sufficient for the duty life of the bearing		In case the pump is overhauled the bearings and bearing chambers have to be cleaned and provided with new grease
MCH(S)14 a/b with reinforced bearing	drive-end bearing	8000	5	
MCH(S)16	all bearings	8000	5	
MCHW14 a/b	all bearings	8000	5	
MCHW16	all bearings	8000	5	
MCHW20 a/b	suction-side bearing	8000	10	
MCHW20 a/b	drive-end bearing	8000	16	
MCH(S)12,5	all bearings	2RS1 bearings, do not require maintenance, post-greasing is not necessary		
MCH(S)14 a/b	all bearings			
MCH(S)14 a/b with reinforced bearing	suction-side bearing			
MCH(S)20 a/b	all bearings			

See paragraph 10.2 "Grease" 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 3: Most frequently occurring failures.

Most common faults	Possible causes, see Table 4.
Pump delivers no liquid	1 2 3 4 5 6 7 8 9 10 11 13 14 17 19 20 21 29
Pump has insufficient volume flow	1 2 3 4 5 6 7 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 6 7 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	6 7 23 25 26 30 31 32 33 43
Packing rings or mechanical seal have to be replaced to often	6 7 23 25 26 30 32 33 34 36 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 4: 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
6	The flush or quench water line to the stuffing box packing is not connected or obstructed
7	The lantern ring in the stuffing box packing has been mounted wrongly
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 ring faulty or worn out
29	Damaged impeller
30	Shaft sleeve on the spot of the packing rings or seal faces of the mechanical seal are worn out or damaged
31	Worn out or dried out 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
35	No water cooling of packing rings at high temperatures
36	Quenching or flushing liquid to the packing rings or the mechanical seal is polluted
37	Axial retaining of impeller 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 worn dorsal blades or excessive inlet pressure
43	Excessive pressure in stuffing box packing space due to too much play in the throttling bush, blocked by-pass or worn dorsal blades

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

- Switch the operating switch near the pump (if available) to "OFF".
- Switch off the pump switch on the switchboard.
- If necessary remove the fuses.
- Hang a danger board near the switchboard cabinet.

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 MCHW



Allow the pump to cool down first!

- 1 Close the cooling water supply.
- 2 Slacken the drain and supply pipes to the cooling water covers and allow the cooling water chamber to empty.

7.2.4 Liquid draining



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 MCH(W)(S) pump can not be drained fully in the horizontal position. If possible place the pump vertically on the bearing cover (0110) and allow it to drain further (MCH(S)10: Place the pump on the inlet casing).

7.3 Dismantling the MCH(S)10

- 1 Open the cover on the terminal box on the motor.
- 2 Disconnect the mains leads. Mark the wires and the associated terminals. This makes it easier when re-connecting.
- 3 Slacken the foundation bolts and the inlet and outlet pipes and remove the pump from the pipes.

7.4 Disassembly MCH(S)10

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 Disassembly of the lantern piece

- 1 Disassemble the supports (1020), the pump can now be placed on the inlet casing (0010) to ease further disassembly.
- 2 Slacken the protective sleeve for the coupling, slide it up and remove the rubber damping strip from between both coupling halves.
- 3 Slacken the bolts and nuts (0690) and remove the electric motor (0680) from the lantern piece (0030).
- 4 Slacken the coupling half (0660) from the pump shaft (0620) and remove the key (0150).
- 5 Remove the upper splash ring (0100) from the pump shaft and slide the lower splash ring down.
- 6 Slacken both bearing covers (0110). Remove the upper bearing cover from the pump shaft, the lower bearing cover will now be free from the shaft.
- 7 Remove the external circlip (0290) and the filling ring (0160) from the pump shaft.
- 8 Using pliers slacken the tie rods (0610) from the lantern piece.
- 9 Lift the lantern piece (0530) vertically from the pump stage. This will draw the bearings from the pump shaft, for 2 up to and including 8 impellers: 1 bearing.
- 10 Remove the bearing cover and the splash ring from the pump shaft.

7.4.2 Disassembling the ball bearings

- 1 Remove the internal circlip (0130) from the bearing housing.
- 2 Push the bearings from the bearing housing using a suitable bush which rests on the outer ring.

7.4.3 Disassembling the stuffing box packing

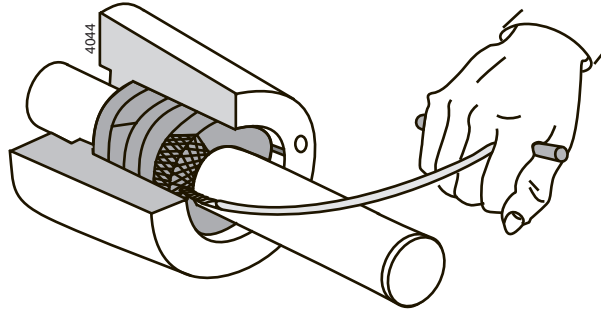


Figure 6: Removal of packing rings with a packing puller.

Proceed as follows if only the packing rings need to be replaced:

- 1 Slacken the nuts and remove the gland (0190).
- 2 Remove the packing rings from the stuffing box. Use the special packing puller for this, see figure 6.

If the reason for disassembly was replacement of the stuffing box packing the new packing can now be fitted. See from paragraph 7.5.4 for this.

If the pump is to be further disassembled then removal of the packing rings will be easier if the outlet casing (0020) is removed from the stage set and the shaft end.

7.4.4 Disassembling the mechanical seal

Before the mechanical seal can be disassembled the lantern piece will have to be removed. See from paragraph 7.4.1 for this.

- 1 Remove the outlet casing (0020) from the pump shaft and remove the static ring from the mechanical seal (0180).
- 2 Slide the rotating ring for the mechanical seal (0180) 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 7.5.3 for this.

7.4.5 Disassembly of the pump stage

- 1 Only for MCHS 10: Measure the distance from the set ring to the reduction in diameter on the shaft. Slacken the lock screw (0170) and remove the set ring (0090).
- 2 Remove the upper stage casing (0510) and the upper impeller (0520). Repeat this operation until all stage covers and impellers have been disassembled. If there are 11 or more impellers there is also an external circlip (0560) and a support ring (0570) on the half of the impeller set.
- 3 Remove the keys (0630, 0640 and if there are 16 impellers: 0650) from the pump shaft.
- 4 Remove the pump shaft from the pump casing and remove the lower external circlip (0560) and the support ring (0570). Remove the tie rods from the inlet casing.
- 5 Unscrew the plug (0220) from the inlet casing and, if replacement is necessary, tap the slide bearing (0060) from the inlet casing (0010) using a bar.
- 6 Remove any residual packing and clean all parts.

7.5 Assembly MCH(S)10

7.5.1 Preparation for assembly

- For the correct torque settings see paragraph 10.1.2 "Tie rod torque"
- For the correct lubricants and locking agents see paragraph 10.2 "Grease" 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 packing.

7.5.2 Pump assembly

- 1 Put a small amount of Loctite 641 in the bearing seat and press the slide bearing (0060) into the inlet casing (0010) using a suitable assembly bush.
- 2 Screw a nut (0160) on one end of all tie rods (0610). Tilt the inlet casing and push the tie rods into the inlet casing from below through the apertures.
- 3 Then place the inlet casing with the foot onto the work surface. Fit a gasket (0600) and fit a stage cover (0510).
- 4 Fit a key (0630) to the end of the pump shaft (0620), on the slide bearing side, and slide an impeller (0520) over the bottom end of the shaft, with the impeller opening pointing to the bottom.
- 5 Fit the support ring (0570) and fix the external circlip (0560) to the bottom of the shaft (0620).
- 6 Place the pump shaft in the slide bearing (0060) into the inlet casing (0010).
- 7 Fit a gasket (0600) to the edge and place a stage casing (0510) on the pressure bracket.
- 8 Fit an impeller (0520), the inlet opening of the impeller must be pointing down.



If the impellers have different diameters then those with the largest diameters are fitted in the bottom of the pump

- 9 If required for the impeller set, fit the keys (0640 and 0650). If the pump is designed with 11 impellers or more, the impeller set is divided by an extra support ring (0570) and an external circlip (0560).
- 10 Repeat the steps 7 and 8 until all impellers and stage covers have been fitted.
- 11 If mechanical seals have to be fitted then proceed with paragraph 7.5.4
- 12 Fit the set ring (0090), adjust this to X mm from the underside of the set ring to the reduction in diameter in the pump shaft. Lock the set ring with the lock screw (0170).
- 13 Fit a gasket (0600) and place the outlet casing (0020) on the stage set. Place the outlet opening in the correct position with regard to the suction opening, see dimensional sketch in chapter 8 "Dimensions".



For an MCHS type pump slide the outlet casing vertically over the pump shaft in order not to damage the mechanical seal.

- 14 Fit the internal circlip (0130) and the lower bearing cover (0110) into the lantern piece (0030).
- 15 Place the lantern piece (0030) over the shaft end on the inlet casing. Watch the position of the tie rods.
- 16 Screw the tie rods (0610) into the lantern piece.

7.5.3 Assembling the mechanical seal MCHS



When assembling the mechanical seal pay good attention to the following points:

- A mechanical seal is a vulnerable component, leave the seal in the original packing 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 pump shaft and the bearing seat.
- **Never place the slide rings on the slide surfaces!**

Proceed as follows:

- 1 Fit the set ring (0090), adjust this to the distance from the bottom of the set ring to reduction in the shaft diameter of the pump shaft measured in step 1 of paragraph 7.4.5. Lock the set ring with the lock screw (0170).
- 2 Fit the rotating part of the seal (0180) with the sliding surface pointing upwards. When fitting this watch out for sharp edges on the groove for the external circlip (0120). Lightly grease the O-ring with acid-free grease.



Grease must not be allowed to get on the sliding surfaces!

- 3 Fit the static ring of the mechanical seal (0180) into the outlet casing (0020), with the sliding surface pointing outward.
- 4 Assemble the outlet casing and the lantern piece, see from step 13 of paragraph 7.5.2.

7.5.4 Assembling the stuffing box packing MCH

- 1 Grease the packing rings and the stuffing box with graphite grease or silicone grease.
- 2 Bend the packing rings axially open, see figure 7 and fit these around the pump shaft. Ensure that the cuts are always at 90° with regard to each other.
- 3 Press the packing rings well home. Use a suitable gland for this.
- 4 Put some assembly grease on the thread and fit the studs (0200), the gland (0190) and the nuts (0210). **Do not tighten the nuts to much!**

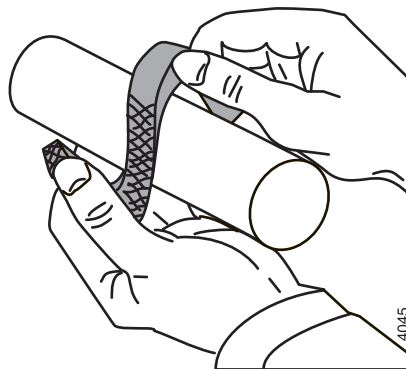


Figure 7: Axially bending open packing rings.

7.5.5 Assembling the bearing construction

! **If the bearing does not need to be replaced, the bearing and the bearing housing will still have to be cleaned and provided with new grease.**

- 1 Fit the splash ring (0100) over the pump shaft.
- 2 Grease the bearings on both sides with ball bearing grease. For the correct type of grease see paragraph 10.2 "Grease".
- 3 Fit the bearings (0210) one by one using a suitable assembly bush, which rests on both the inner and outer rings of the bearing. Up to and including 8 impellers there is only one ball bearing.

! **Make sure the bearings are in the correct position: the inner ring of the ball bearing must be fitted with the smallest diameter on the bottom, see figure 8.**

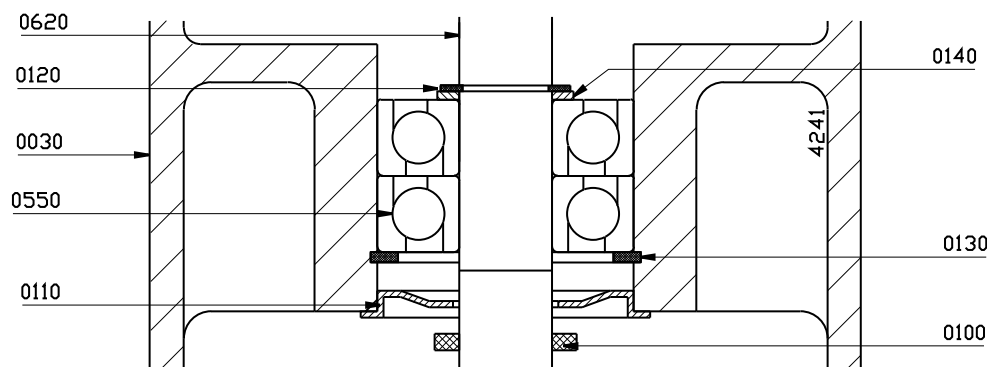


Figure 8: Mounting the ball bearings

- 4 Fit the filling ring (0140) and the external circlip (0120) to the pump shaft.
- 5 Fit the outermost bearing cover (0110) and the splash ring (0100).
- 6 Secure the tie rods in their final position by tilting the pump and tightening the nuts (0160) on the bottom.

7.6 Fitting the electric motor MCH(S)10

Proceed as follows:

- 1 Fit the key (0150) and fix the lower part of the coupling (0660) to the pump shaft.
- 2 Slide the sleeve over the motor shaft and then fix the other part of the coupling (0670) to the motor shaft.
- 3 Place the electric motor on the lantern piece. Make sure that the face of the electric motor fits correctly into the lantern piece. There must be a gap of **3 mm** between both coupling halves. Secure the coupling halves.
- 4 Fit the rubber damping ring between both coupling halves.
- 5 Slide the sleeve over the lower coupling half and secure it.
- 6 Secure the electric motor to the lantern piece using the nuts and bolts (0690). Alignment is not required due to the fitted joints.
- 7 Fit the support (1020)

7.7 Disassembling and assembly MCH(W)(S)12,5-14a/b-16-20

7.7.1 Disassembling the guard

- 1 Loosen bolts (0960). See figure 12.
- 2 Remove both jackets (0270). See figure 10.

7.7.2 Disassembling the pump

- 1 Disconnect possible flushing and/or cooling lines.
- 2 Uncouple the inlet and outlet pipes. Make sure that they are sufficiently supported.
- 3 Slacken the foundation bolts and remove the pump from the pipe work.
- 4 Remove the coupling half from the pump shaft with a coupling puller and remove the coupling key (0200)(0260 MCH(W)(S)20a/b).
- 5 Unscrew bolts (0940) and remove the assembly plate (0275) from the bearing housing (0010). See figure 13.

7.7.3 Disassembling the seal guards

Remove the seal guards (0276).

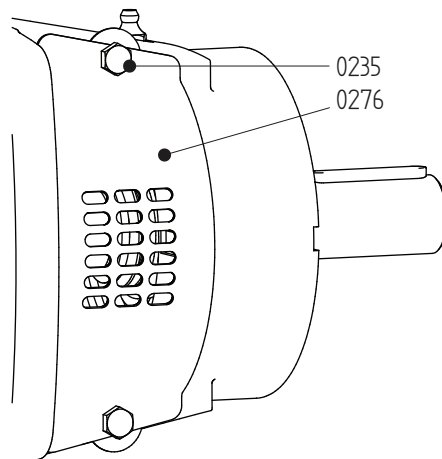


Figure 9: Remove the seal guards.

7.7.4 Assembling the pump

- 1 Place the pump back in its place.
- 2 Reconnect the flushing and/or cooling lines.
- 3 Fit the assembly plate (0275) to the bearing housing (0010) with bolts (0940). See figure 13.
- 4 Fit the coupling key (0200)(0260 MCH(W)(S)20a/b) and fit the coupling half onto the pump shaft.
- 5 Check the alignment of pump and motor shaft, see paragraph 3.6.4 "Alignment of the coupling". If necessary, realign.

7.7.5 Assembling the seal guards

Fit the seal guards (0276).

7.7.6 Assembling the guard

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

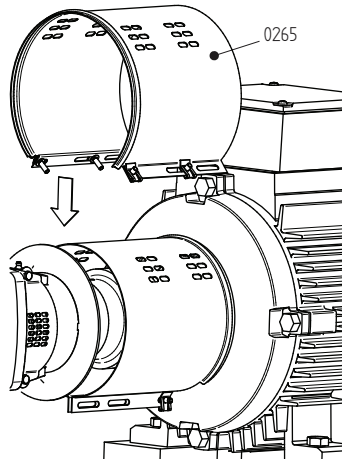


Figure 10: Fitting the jacket at motor side.

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

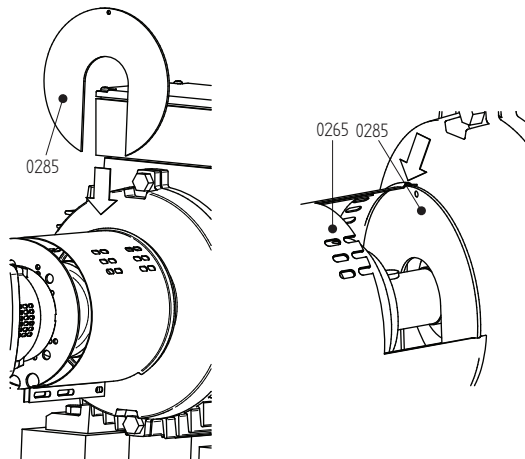


Figure 11: Fitting the assembly plate at motor side.

- 3 Close the jacket and fit bolt (0960). See figure 12.

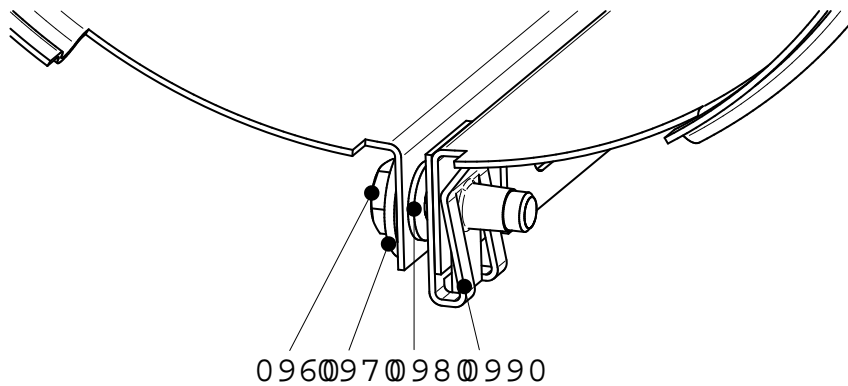


Figure 12: Fitting jacket.

- 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.

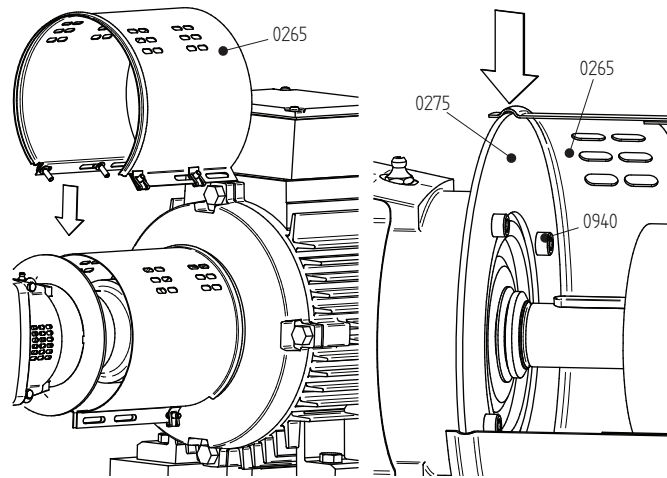


Figure 13: Fitting the jacket at pump side.

- 5 Close the jacket and fit a bolt (0230) and fit bolt (0960). See figure 12.
- 6 Slide the jacket at motor side towards the motor as far as possible. Fix both jackets with bolt (0960).

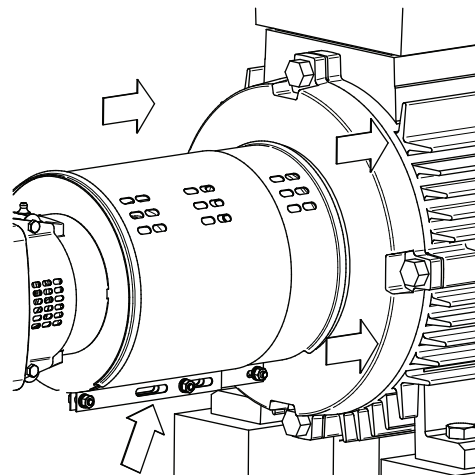


Figure 14: Adjusting the jacket at motor side.

7.8 Disassembling the MCH(W)(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".

7.8.1 Replacing the stuffing box packing MCH-MCHW

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 nuts (0280) and pull the gland (0120) backwards.
- 2 Remove the packing rings (0140) from the stuffing box. Use the special packing puller for this, see figure 6.
- 3 Clean the stuffing box and then grease it with graphite grease or silicone grease. Also grease the new packing rings.
- 4 Bend open the first packing ring as shown in figure 7 and fit it around the shaft. Thoroughly press the ring home using a suitable piece of halved tube.
- 5 Fit the other rings. Press these well home one by one. Ensure that the cuts are at 90° with regard to each other.
- 6 Press the gland against the last packing ring and tighten the nuts one by one by hand.

7.8.2 Replacing the mechanical seal MCHS

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 7.8.3 and paragraph 7.8.7. Then see paragraph 7.8.5 for disassembly of the mechanical seal.

7.8.3 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 MCHS: 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 (0100).
- 5 Slide the inner rubber V-ring over the shaft and slacken the inner bearing cover (0100). This is now free from the pump shaft.
- 6 Remove the outer external circlip (0220) and the filling ring (0090) from the pump shaft.
- 7 Slacken the bolts (0270) 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 (0090) from the pump shaft.
- 9 Remove the bearing cover and the rubber V-ring from the pump shaft.
- 10 Only for MCH: Disassemble the gland (0120).
- 11 Only for MCHW: Disassemble the cooling water cover (0030) together with the gland (0120).

- 7.8.4 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.
- 7.8.5 Disassembling the mechanical seal MCHS
- 1 Remove the seal cover (0030) 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 7.9.6 for this.
- 7.8.6 Disassembling the set of stage casings
- 1 Uncouple the balance pipe (0720) if fitted.
 - 2 Only for MCHS: Slacken the adjustment screw (0280) and remove the set ring (0060).
 - 3 Remove the nuts (0750) (MCH14a/bx4: (0770) from the tie rod (0740) (MCH14a/bx4: bolts (0770)).
 - 4 Remove the pump casing (0020) from the stage set. Using a suitable bush, press or tap the throttling bush (0050) out of the inlet casing.
 - 5 Remove the external circlip (0080) and any throttling sleeve (0600) from the pump shaft.
 - 6 Remove the upper stage casing (0510) and the upper impeller (0520). Remove the key (0730) from the shaft. Repeat this operation until all stage covers and impellers have been disassembled.
 - 7 Remove the suction cover (0020) from the pump casing (0500).
- 7.8.7 Disassembling the bearing housing on the suction side
- 1 Position the pump casing with the shaft horizontally.
 - 2 Remove the rear bearing cover (0110).
 - 3 Continue from step 5 of paragraph 7.8.3.
- 7.8.8 Disassembling the ball bearing on the suction side
- See paragraph 7.8.4, with the exception of step 1.
- 7.8.9 Disassembling the mechanical seal on the MCHS suction side
- See paragraph 7.8.5.

7.9 Assembly

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 "Grease" 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 packing. 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.**

7.9.2 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 15

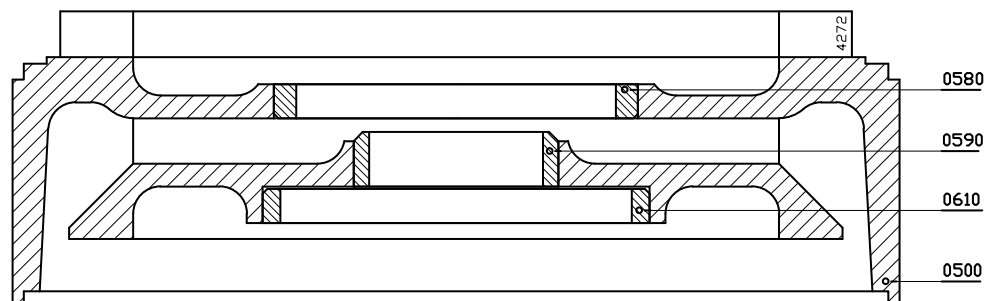


Figure 15: Fitting the wear rings.

- 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).

! **The wear rings (0580) and (0590) are NOT fitted for the cover which is directly behind the pressure bracket (0020, on the drive side): Wear ring (0580) is not fitted, because there is no impeller on that side of the cover. The throttling bush (0050) which is fitted into the pressure bracket is fitted into the edge for the wear ring (0590).**

7.9.3 Pump assembly

- 1 Place a little Loctite 641 on the fitting face of the throttling bush (0050) and fit the throttling bush into the pump casing (0020) for the drive side.
- 2 Fit the external circlip (0080) 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 on:
MCH(W)(S) 12,5 MCH(W)(S) 14a and 14b	for 8 stages and higher
MCH (W)(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).

7.9.4 Assembling the stuffing box packing MCH

- 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 16.
- 2 Fit the gland (0120). Tighten the nuts (0280) by hand.
- 3 Proceed with paragraph 7.9.7.

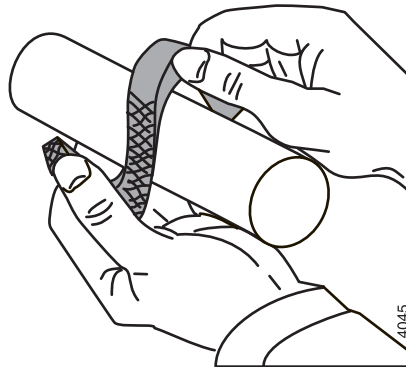


Figure 16: Axially bending open packing rings.

7.9.5 Assemble the water-cooled stuffing box packing MCHW

- 1 First of all see steps 1 and 2 of paragraph 7.9.4.
- 2 Fit the O-rings (0300) into the covers (0030).
- 3 Fit the gasket (0150) and place the cooling water cover (0030) in the pump bracket.
- 4 Proceed with paragraph 7.9.7.

7.9.6 Assembling the mechanical seal MCHS



A mechanical seal is a vulnerable precision component. Leave the seal in the original packing 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 by using the adjustment screw (0280). For the correct distance see the value **mj** in the table below:

Type	mj (=drive side)
MCHS 12,5 x n - 3,2	49,5
MCHS 14 a x n - 5	51
MCHS 14 b x n - 5	51
MCHS 16 x n - 6,5	56

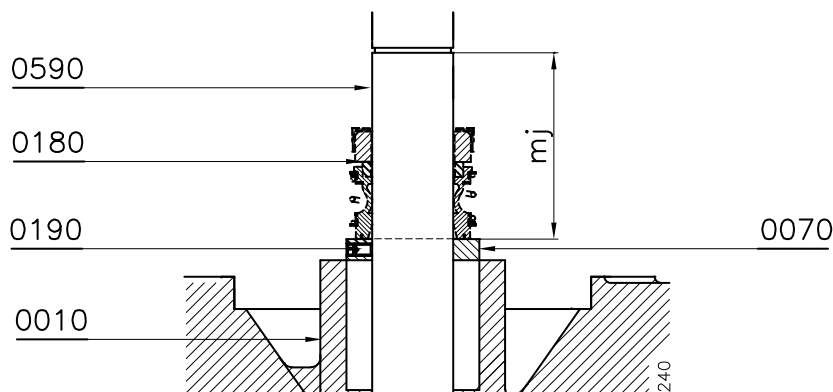


Figure 17: Distance mj.

- 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 (0030), with the sliding surface pointing out.
- 5 Fit the gasket (0120) and fit the cover (0030) into the pressure bracket.
- 6 Proceed with paragraph 7.9.7.

7.9.7 Assembling the bearing construction

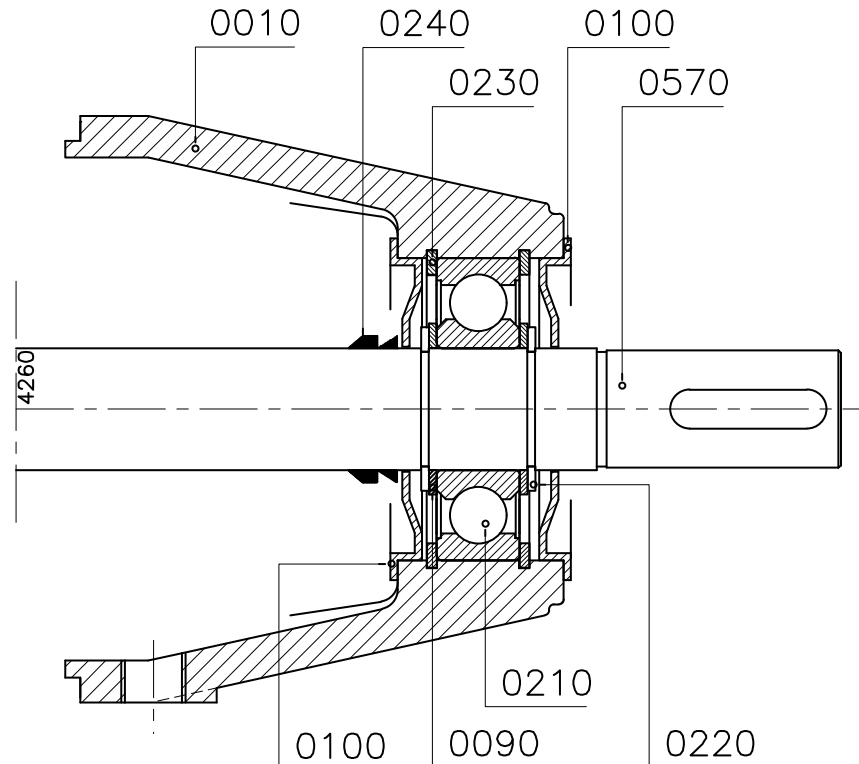


Figure 18: Bearing construction.

See figure 18.

- 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 using 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 (0090).
- 6 Grease the bearing on both sides with ball bearing grease. For the correct type of grease see paragraph 10.2 "Grease".
- 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 (0090) and external circlip (0220) to the pump shaft.
- 9 Fit the internal circlip (0230) into the bearing housing.
- 10 Fit the outermost bearing cover (0100) and the rubber V-ring (0240), with the narrow opening pointing to the outside of the pump.

7.9.8 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 the gasket (0660) and fit a stage casing (0510) on the pressure bracket.
- 3 Fit a key (0730) in the pump shaft and fit an impeller (0520), the inlet opening of the impeller must point up.
- 4 Repeat steps 2 and 3 until the last impeller has been fitted.
- 5 Secure the impeller set by fitting an external circlip (0080) to the pump shaft.
- 6 Fit a gasket (0660) and place the suction cover (0500) on the stage set.
- 7 Fit a gasket (0660) to the inlet casing using assembly grease. Place the inlet casing (0020) over the shaft end on the stage set.
- 8 Fit the tie rods (0740) by using the nuts (0750) (MCH14a/bx4: bolts and nuts (0770)).
- 9 For the remaining operations see paragraph 7.9.4. With the exception of the following points:
 - The value **mj** from step 1 of paragraph 7.9.6 is replaced by the value **mh**, for which the correct values are shown in the table below:

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

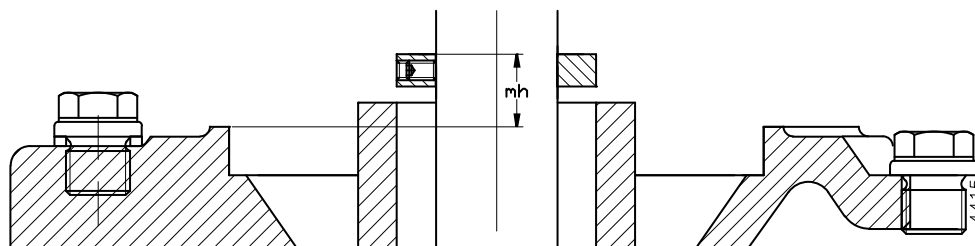


Figure 19: Distance mh.

- Steps 9 and 10 of paragraph 7.9.7 replaced by: Fit the closed bearing cover (0110)
- 10 Fit the by-pass pipe (0670) if present.

7.10 Disassembling MCH(W)(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".

7.10.1 Replacing the stuffing box packing MCH-MCHW

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

7.10.2 Replacing the mechanical seal MCHS

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 7.10.3 and paragraph 7.10.7. Then see paragraph 7.10.5 for disassembly of the mechanical seal.

7.10.3 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 MCHS: 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 MCH: Disassemble the gland (0140).
- 11 Only for MCHW: Disassemble the cooling water cover (0040) together with the gland (0140).

7.10.4 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.

7.10.5 Disassembling the mechanical seal MCHS

- 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 (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 7.11.6 for this.

7.10.6 Disassembling the set of stage casings

- 1 Uncouple the balance pipe (0670) if fitted.
- 2 Only for MCHS: Slacken the adjustment screw (0330) and remove the set ring (0090).
- 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 upper stage casing (0510) and the upper impeller (0520). Remove the key (0730) from the shaft. Repeat this operation until all stage covers and impellers have been disassembled.
- 7 Remove the suction cover (0030) from the pump casing (0500).

7.10.7 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 7.10.3.

7.10.8 Disassembling the ball bearing on the suction side

See paragraph 7.10.4, with the exception of step 1.

7.10.9 Disassembling the mechanical seal on the MCHS suction side

See paragraph 7.10.5, for which item no. (0160) now becomes: item no. (0150).

7.11 Assembling the MCH(W)(S)14a/b heavy bearing construction

7.11.1 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 "Grease" 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 packing. 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.**

7.11.2 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 15.

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).

! **The wear rings (0580) and (0590) are NOT fitted for the cover which is directly behind the pressure bracket (0030, on the drive side): Wear ring (0580) is not fitted, because there is no impeller on that side of the cover. The throttling bush (0060) which is fitted into the pressure bracket is fitted into the edge for the wear ring (0590).**

7.11.3 Pump assembly

- 1 Place a little Loctite 641 on the fitting face of the throttling bush (0050) 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).

7.11.4 Assembling the stuffing box packing MCH

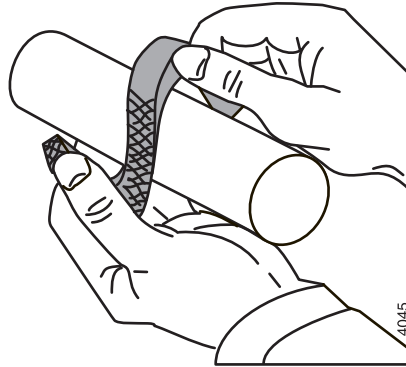


Figure 20: Axially bending open packing rings.

- 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 (0140). Tighten the nuts (0290) by hand.
- 3 Proceed with paragraph 7.11.7.

7.11.5 Assemble the water-cooled stuffing box packing MCHW

- 1 See steps 1 and 2 of paragraph 7.11.4.
- 2 Fit the O-rings (0330) into the covers (0040).
- 3 Fit the gasket (0180) and place the cooling water cover (0040) in the pump bracket.
- 4 Proceed with paragraph 7.11.7.

7.11.6 Assembling the mechanical seal MCHS



A mechanical seal is a vulnerable precision component. Leave the seal in the original packing 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 (0090) and lock this by using 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 (0040), with the sliding surface pointing out.
- 5 Fit the gasket (0140) and fit the cover (0040) into the pressure bracket.
- 6 Proceed with paragraph 7.11.7.

7.11.7 Assembling the bearing construction on the drive side

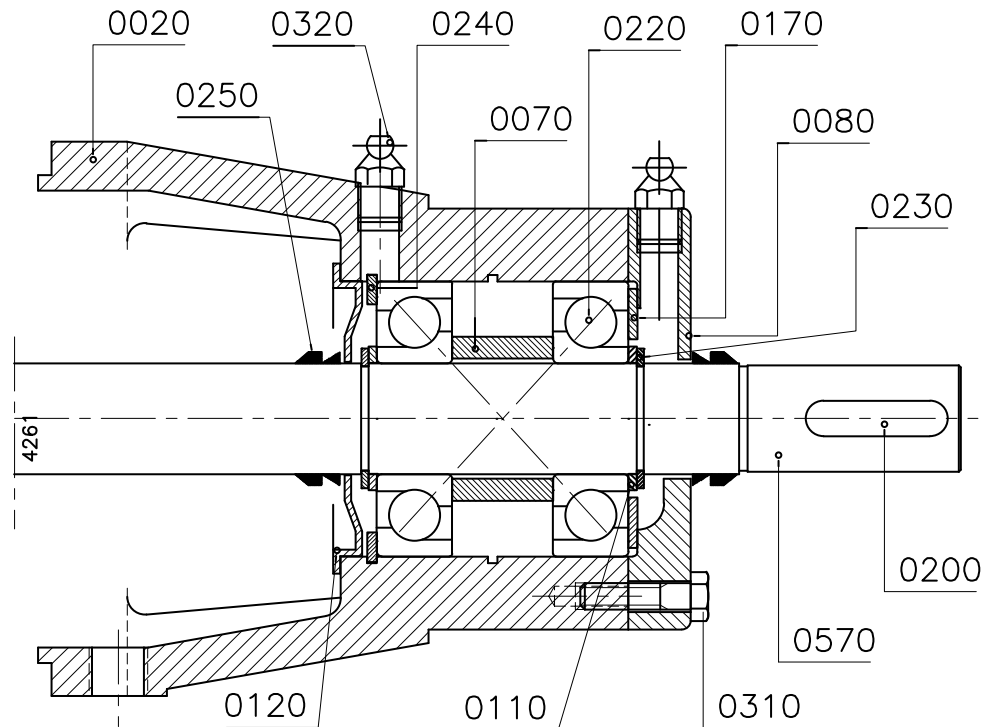


Figure 21: Assembly of the reinforced bearing construction.

See figure 21.

- 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 using 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 "Grease".



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) by using bolts (0310). Fit the rubber V-ring (0250), with the narrow opening pointing to the outside of the pump.

7.11.8 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 the gasket (0660) and fit a stage casing (0510) on the pressure bracket.
- 3 Fit a key (0730) in the pump shaft and fit an impeller (0520), the inlet opening of the impeller must point up.
- 4 Repeat steps 2 and 3 until the last impeller has been fitted.
- 5 Secure the impeller set by fitting an external circlip (0080) to the pump shaft.
- 6 Fit a gasket (0660) and place the suction cover (0500) on the stage set.
- 7 Fit a gasket (0660) to the inlet casing using assembly grease. Place the inlet casing (0030) over the shaft end on the stage set.
- 8 Fit the tie rods (0740) using the nuts (0750).
- 9 For assembly of the other seal see paragraph 7.11.4 to paragraph 7.11.6. With the exception of the following point:
 - The value **mj** from step 1 of paragraph 7.11.6 now becomes **18,7**.

7.11.9 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 using 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 For **MCHW** only: Grease the bearing on both sides with ball bearing grease. For the correct type of grease see paragraph 10.2 "Grease".
- 6 Fit the bearing (0210) using a suitable mounting bush which rests on both the inner and outer rings of the bearing.
- 7 Fit the second filling ring (0110) and fit the external circlip (0230) onto the pump shaft.
- 8 Fit the outer bearing cover (0130).
- 9 Fit the by pass pipe (0670) if present.

7.12 Disassembling the MCH(W)(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".

7.12.1 Replacing the stuffing box packing MCH-MCHW

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

7.12.2 Replacing the mechanical seal MCHS

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 7.8.3 and paragraph 7.8.7. Then see paragraph 7.8.5 for disassembly of the mechanical seal.

7.12.3 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 MCHS: 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 (0090) from the pump shaft.
- 9 Remove the bearing cover and the rubber V-ring from the pump shaft.
- 10 Only for MCH: Disassemble the gland (0170).
- 11 Only for MCHW: Disassemble the cooling water cover (0030) together with the gland (0170).

- 7.12.4 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.
- 7.12.5 Disassembling the mechanical seal MCHS
- 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 7.13.6 for this.
- 7.12.6 Disassembling the set of stage casings
- 1 Uncouple the balance pipe (0650) if fitted.
 - 2 Only for MCHS: 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 upper stage casing (0510) and the upper impeller (0520). Remove the key (0660) from the shaft. Repeat this operation until all stage covers and impellers have been disassembled.
 - 7 Remove the suction cover (0500) from the pump casing (0020) on the suction side.
- 7.12.7 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 7.12.3.
- 7.12.8 Disassembling the ball bearing on the suction side
- See paragraph 7.12.4, with exception of step 1, whereby item no. (0280) now becomes: item no. (0270).
- 7.12.9 Disassembling the mechanical seal on the MCHS suction side
- See paragraph 7.12.5, whereby item no. (0230) becomes item no. (0220).

7.13 Assembling the MCH(W)(S) 20a/b

7.13.1 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 "Grease" 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 packing. If the bearings does not need to be replaced, for pump type MCHW the bearings and the bearing housings will have to be cleaned and provided with new grease.**

7.13.2 Sub-assembly of stage casings

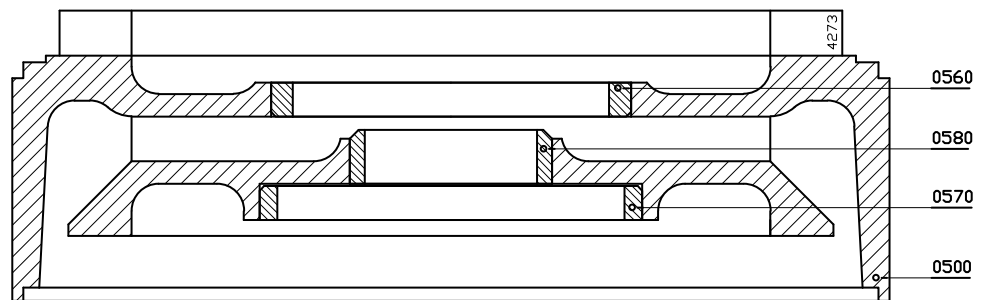


Figure 22: Fitting the wear rings

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 22.

- 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).

! **The wear rings (0560) and (0580) are NOT fitted for the cover which is directly behind the pressure bracket (0020, on the drive side): Wear ring (0560) is not fitted, because there is no impeller on that side of the cover. The throttling bush (0100) which is fitted into the pressure bracket is fitted into the edge for the wear ring (0580).**

7.13.3 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).

7.13.4 Assembling the stuffing box packing MCH

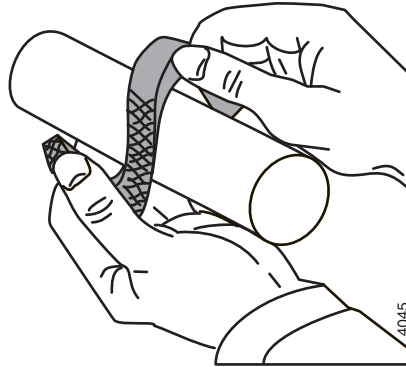


Figure 23: Axially bending open packing rings.

- 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 23.
- 2 Fit the gland (0170). Tighten the nuts (0350) by hand.
- 3 Proceed with paragraph 7.13.7.

7.13.5 Assembling the water-cooled stuffing box packing MCHW

- 1 First of all see steps 1 and 2 of paragraph 7.13.4.
- 2 Fit the O-rings (0390) into the covers (0030).
- 3 Fit the gasket (0200) and place the cooling water cover (0030) into the pump casing.
- 4 Proceed with paragraph 7.13.7.

7.13.6 Assembling the mechanical seal MCHS



A mechanical seal is a vulnerable precision component. Leave the seal in the original packing 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 this by using 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 (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 (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 (0030), with the sliding surface pointing out.
- 5 Fit the gasket (0200) and fit the cover (0030) into the pressure bracket.
- 6 Proceed with paragraph 7.13.7.

7.13.7 Assembling the bearing construction

See figure 24.

- 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 using 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 For MCHW only: Grease the bearings on both sides with ball bearing grease. For the correct type of grease see paragraph 10.2 "Grease"
- 7 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.
- 8 Fit the other filling ring (0160) and external circlip (0290) to the pump shaft.
- 9 Fit the internal circlip (0300) into the bearing housing.
- 10 Fit the outermost bearing cover (0140) and the rubber V-ring (0310), with the narrow opening pointing to the outside of the pump.

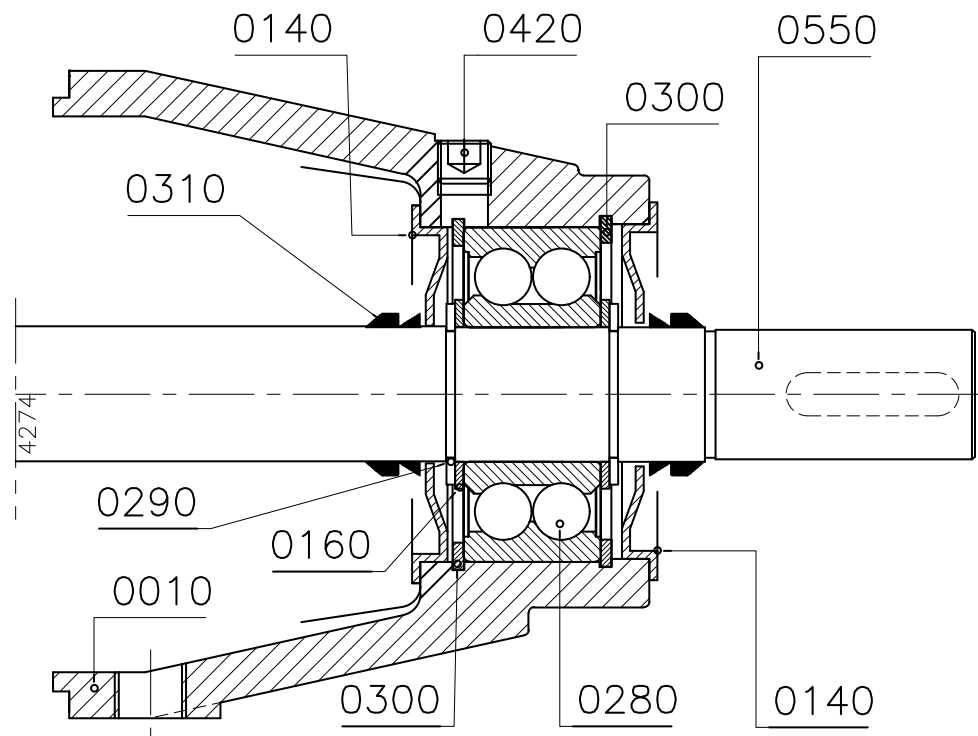


Figure 24: Assembly of the double row ball bearing.

7.13.8 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 the gasket (0600) and fit a stage casing (0510) on the pressure bracket.
- 3 Fit a key (0660) in the pump shaft and fit an impeller (0520), the inlet opening of the impeller must point up.
- 4 Repeat steps 2 and 3 until the last impeller has been fitted.
- 5 Secure the impeller set by fitting an external circlip (0130) to the pump shaft.
- 6 Fit a gasket (0600) and place the suction cover (0500) on the stage set.
- 7 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.
- 8 Fit the tie rods (0670 and 0680) using the nuts (0690).
- 9 For the remaining operations see paragraph 7.13.4. 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 7.13.7 replaced by: Fit the closed bearing cover (0150).
- 10 Fit the by pass pipe (0650) if present.

8 Dimensions

8.1 Pump-motor unit MCH(S) 10

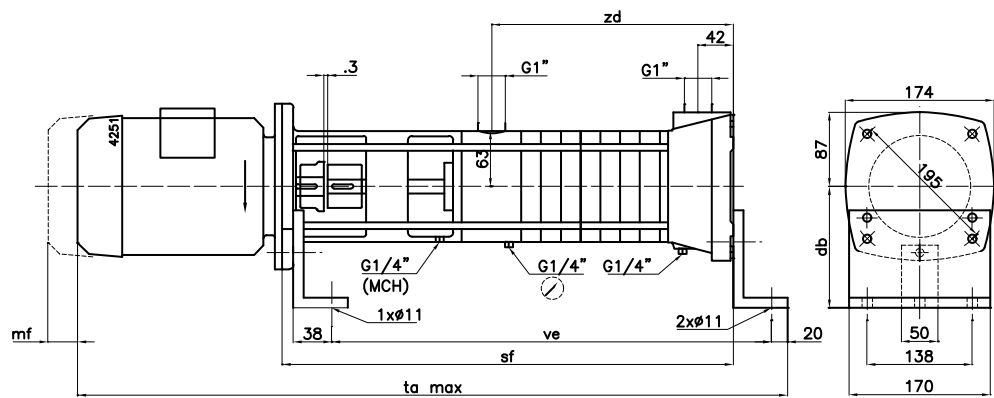


Figure 25: Pump-motor unit MCH(S) 10.

MCH(S)	IEC motor	db	mf	sf	ta max	ve	zd
10 x 2	80 - F 165	120	70	425	711	404	180
10 x 3	80 - F 165	120	70	425	711	404	180
10 x 4	80 - F 165	120	70	448	734	427	203
10 x 4	90S - F 165	120	80	448	756	427	203
10 x 5	80 - F 165	120	70	471	757	450	226
10 x 5	90S - F 165	120	80	471	779	450	226
10 x 5	90L - F 165	120	80	471	803	450	226
10 x 6	90S - F 165	120	80	494	802	473	249
10 x 6	90L - F 165	120	80	494	826	473	249
10 x 8	90L - F 165	120	80	563	895	542	318
10 x 8	100L - F 215	145	90	573	939	550	318
10 x 9	90L - F 165	120	80	563	895	542	318
10 x 9	112M - F 215	145	90	573	965	550	318
10 x 11	100L - F 215	145	90	666	1032	643	411
10 x 11	112M - F 215	145	90	666	1058	643	411
10 x 12	100L - F 215	145	90	666	1032	643	411
10 x 12	112M - F 215	145	90	666	1058	643	411
10 x 14	112M - F 215	145	90	712	1104	689	457
10 x 16	112M - F 215	145	90	759	1151	736	504

ta_{max} = Motor length based on DIN 42677, could be different due to applied motor make

8.2 Pump dimensions MCH(S)(W) 12,5

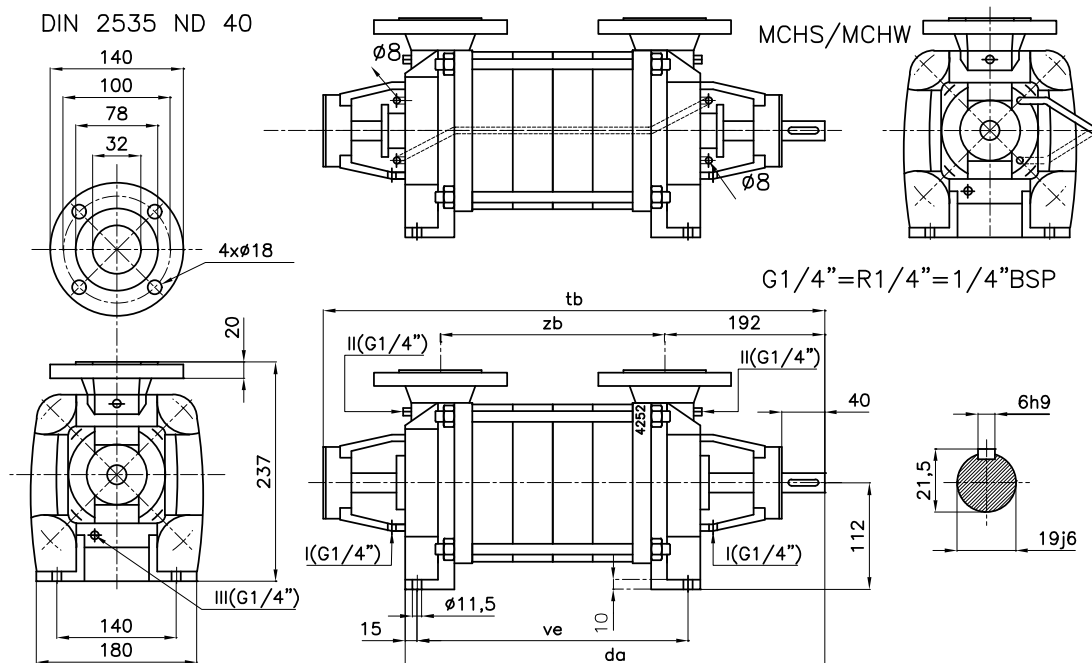


Figure 26: Pump dimensions MCH(S)(W) 12,5.

I= leakage water drain

II= pressure gauge connection

III= drain plug

MCH(S)(W)	da	tb	ve	zb	[kg]
12,5 x 1	405	507	227	169	31
12,5 x 2	405	507	227	169	32
12,5 x 3	450	552	272	214	36
12,5 x 4	495	597	317	259	40
12,5 x 5	540	642	362	304	44
12,5 x 6	585	687	407	349	48
12,5 x 7	630	732	452	394	52
12,5 x 8	675	777	497	439	56
12,5 x 9	720	822	542	484	60
12,5 x 10	765	867	587	529	64

8.3 Pump dimensions MCH(S)(W) 14a/b

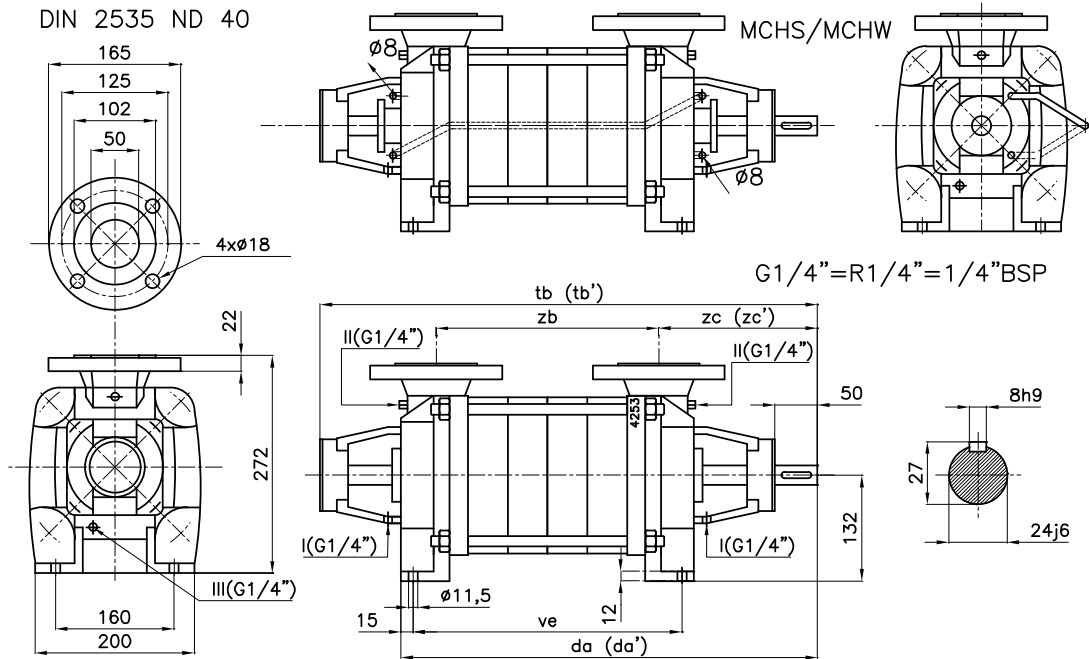


Figure 27: Pump dimensions MCH(S)(W) 14a/b.

I= leakage water drain

II= pressure gauge connection

III= drain plug

MCH(S)(W)	da	da'	tb	tb'	ve	zb	zc	zc'	[kg]
14a/b x 1	425		527		237	179	202		39
14a/b x 2	425		527		237	179	202		40
14a/b x 3	475		577		287	229	202		46
14a/b x 4	525		627		337	279	202		52
14a/b x 5	575	621	677	723	387	329	202	248	58
14a/b x 6	625	671	727	773	437	379	202	248	64
14a/b x 7	675	721	777	823	487	429	202	248	70
14a/b x 8		771		873	537	479		248	78
14a/b x 9		821		923	587	529		248	84
14a/b x 10		871		973	637	579		248	90

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

8.4 Pump dimensions MCH(S)(W) 16

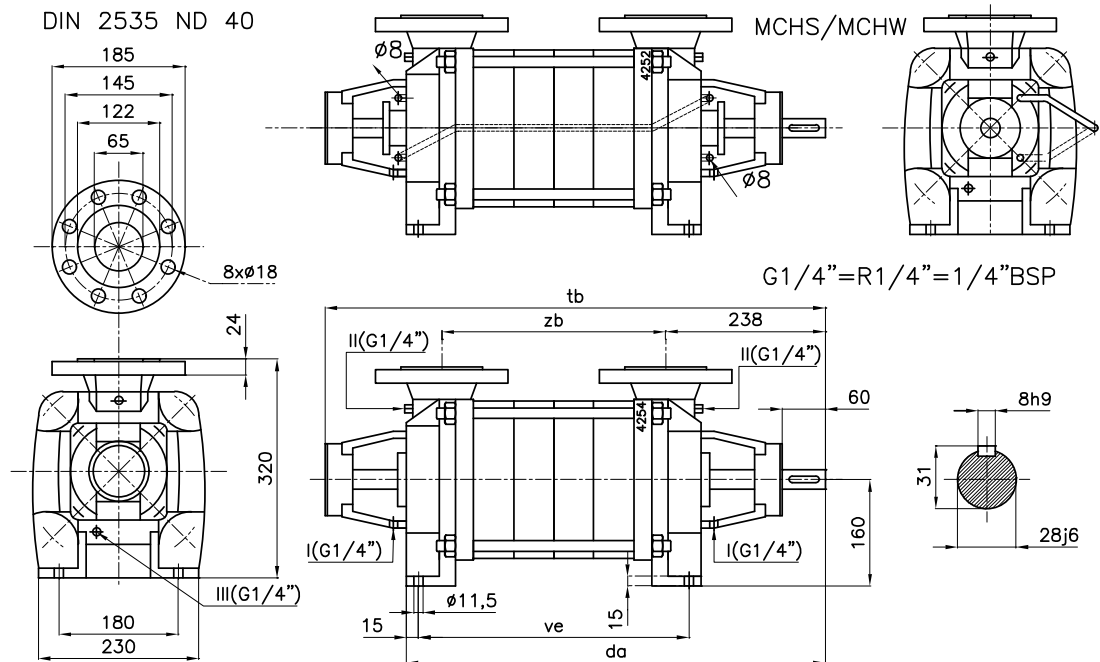


Figure 28: Pump dimensions MCH(S)(W) 16.

I= leakage water drain

II= pressure gauge connection

III= drain plug

MCH(S)(W)	da	tb	ve	zb	[kg]
16 x 1 - 6,5	495	624	267	217	46
16 x 2 - 6,5	495	624	267	217	54
16 x 3 - 6,5	555	684	327	277	62
16 x 4 - 6,5	615	744	387	337	70
16 x 5 - 6,5	675	804	447	397	78
16 x 6 - 6,5	735	864	507	457	86
16 x 7 - 6,5	795	924	567	517	94
16 x 8 - 6,5	955	984	627	577	102
16 x 9 - 6,5	915	1044	687	637	110
16 x 10 - 6,5	975	1104	747	697	118

8.6 Pump-motor unit MCH(S)(W) 12,5

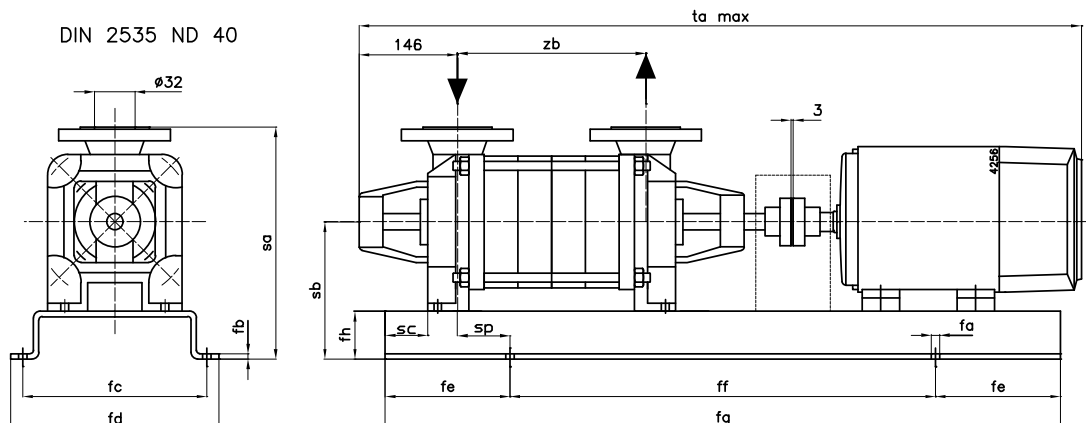


Figure 30: Pump-motor unit MCH(S)(W) 12,5.

MCH(S)(W)	IEC motor	fa	fb	fc	fd	fe	ff	fg	fh	sa	sb	sc	sp	ta max	zb
12,5 x 1	71	15	5	290	334	105	500	710	40	277	152	0	44	764	169
	80	15	5	290	334	105	500	710	40	277	152	0	44	806	169
12,5 x 2	71	15	5	290	334	105	500	710	40	277	152	0	44	764	169
	90S	15	5	290	334	105	500	710	40	277	152	0	44	846	169
12,5 x 3	90L	15	5	290	334	105	500	710	40	277	152	0	44	858	169
	71	15	5	290	334	105	500	710	40	277	152	0	44	809	214
12,5 x 4	90S	15	5	290	334	105	500	710	40	277	152	0	44	891	214
	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
	71	15	5	290	334	105	500	710	40	277	152	0	44	854	259
12,5 x 5	80	19	5	300	348	120	560	800	40	277	152	0	44	896	259
	90L	19	5	300	348	120	560	800	40	277	152	0	44	948	259
	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
	71	19	5	300	348	120	560	800	40	277	152	0	44	899	304
12,5 x 6	80	19	5	300	348	120	560	800	40	277	152	0	44	941	304
	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
	71	19	5	300	348	120	560	800	40	277	152	0	44	944	349
12,5 x 7	80	19	6	350	398	135	630	900	50	287	162	0	44	986	349
	112M	19	8	425	473	145	710	1000	63	300	175	0	44	1122	349
	132S	19	8	425	473	145	710	1000	63	320	195	0	44	1176	349
	80	19	6	350	398	135	630	900	50	287	162	0	44	1031	394
12,5 x 8	90S	19	6	350	398	135	630	900	50	287	162	0	44	1071	394
	112M	19	8	425	473	145	710	1000	63	300	175	0	44	1167	394
	132S	19	8	425	473	145	710	1000	63	320	195	0	44	1221	394
	80	19	8	420	473	145	710	1000	63	300	175	0	44	1076	439
12,5 x 9	90S	19	8	425	473	145	710	1000	63	300	175	0	44	1116	439
	132S	19	10	425	475	160	800	1120	70	327	202	0	44	1266	439
	80	19	8	425	473	145	710	1000	63	300	175	0	44	1121	484
12,5 x 10	90S	19	8	425	473	145	710	1000	63	300	175	0	44	1161	484
	132S	19	10	425	475	160	800	1120	70	327	202	0	44	1311	484
	80	19	10	425	475	160	800	1120	70	307	182	0	44	1166	529
12,5 x 10	90S	19	10	425	475	160	800	1120	70	307	182	0	44	1206	529
	132S	24	10	435	495	175	900	1250	70	327	202	0	44	1356	529

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

8.7 Pump-motor unit MCH(S)(W) 14a

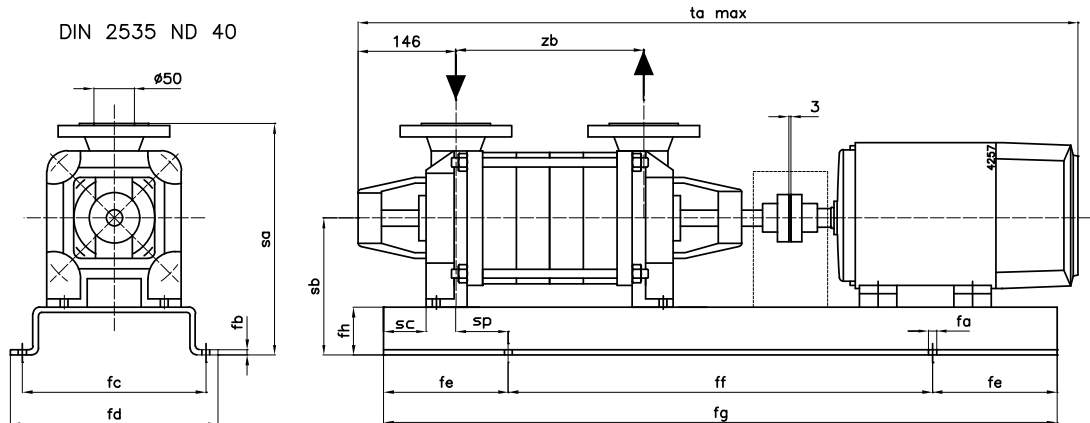


Figure 31: Pump-motor unit MCH(S)(W) 14a.

MCH(S)(W)	IEC motor	fa	fb	fc	fd	fe	ff	fg	fh	sa	sb	sc	sp	ta _{max}	zb
14a x 1	71	15	5	290	334	105	500	710	40	312	172	0	44	784	179
	90S	15	5	290	334	105	500	710	40	312	172	0	44	866	179
	90L	15	5	290	334	105	500	710	40	312	172	0	44	878	179
14a x 2	71	15	5	290	334	105	500	710	40	312	172	0	44	784	179
	80	15	5	290	334	105	500	710	40	312	172	0	44	826	179
	100L	19	5	300	348	120	560	800	40	312	172	0	44	932	179
14a x 3	112M	19	5	300	348	120	560	800	40	312	172	0	44	962	179
	80	19	5	300	348	120	560	800	40	312	172	0	44	876	229
14a x 4	90S	19	5	300	348	120	560	800	40	312	172	0	44	916	229
	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
	80	19	5	300	348	120	560	800	40	312	172	0	44	926	279
14a x 5	90S	19	5	300	348	120	560	800	40	312	172	0	44	966	279
	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 6	80	19	6	350	398	135	630	900	50	322	182	0	44	976	329
	90S	19	6	350	398	135	630	900	50	322	182	0	44	1016	329
	90L	19	6	350	398	135	630	900	50	322	182	0	44	1028	329
	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 7	90S	19	6	350	398	135	630	900	50	322	182	0	44	1066	379
	90S	19	8	425	473	145	710	1000	63	335	195	0	44	1112	379
	90L	19	8	425	473	145	710	1000	63	335	195	0	44	1078	379
	132S	19	8	425	473	145	710	1000	63	335	195	0	44	1216	379
	132S	19	10	425	475	160	800	1120	70	312	172	0	44	1262	379
	160M	19	10	425	475	160	800	1120	70	370	230	0	44	1382	379
14a x 8	160M	24	10	435	495	175	900	1250	70	370	230	0	44	1428	379
	90S	19	8	425	473	145	710	1000	63	335	195	0	44	1116	429
	90L	19	8	425	473	145	710	1000	63	335	195	0	44	1128	429
	100L	19	8	425	473	145	710	1000	63	335	195	0	44	1182	429
	100L	19	10	425	475	160	800	1120	70	312	172	0	44	1228	429
160M	24	10	435	495	175	900	1250	70	370	230	0	44	1432	429	

MCH(S)(W)	IEC motor	fa	fb	fc	fd	fe	ff	fg	fh	sa	sb	sc	sp	ta _{max}	zb
14a x 8	90L	19	10	425	475	160	800	1120	70	312	172	0	44	1224	479
	100L	19	10	425	475	160	800	1120	70	312	172	0	44	1278	479
	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 9	90L	19	10	425	475	160	800	1120	70	312	172	0	44	1274	529
	100L	24	10	435	495	175	900	1250	70	342	202	0	44	1328	529
	160M	24	10	435	495	200	1000	1400	80	380	240	0	44	1578	529
14a x 10	90L	24	10	435	495	175	900	1250	70	342	202	0	44	1324	579
	100L	24	10	435	495	175	900	1250	70	342	202	0	44	1378	579
	160M	24	10	435	495	200	1000	1400	80	380	240	0	44	1628	579

90S, 100L, 132S and 160M = Pump with heavy bearing construction

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

8.8 Pump-motor unit MCH(S)(W) 14b

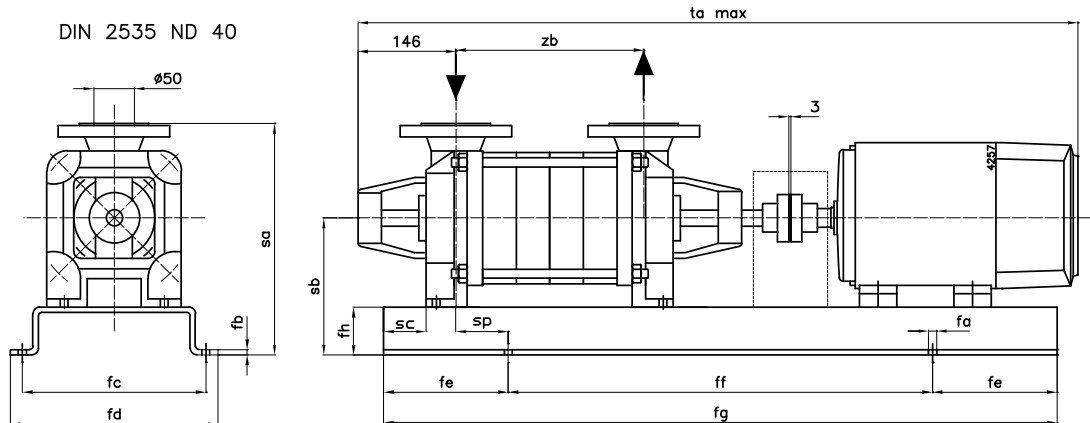


Figure 32: Pump-motor unit MCH(S)(W) 14b.

MCH(S)(W)	IEC motor	fa	fb	fc	fd	fe	ff	fg	fh	sa	sb	sc	sp	ta _{max}	zb
14b x 1	71	15	5	290	334	105	500	710	40	312	172	0	44	784	179
	90L	15	5	290	334	105	500	710	40	312	172	0	44	878	179
	100L	19	5	300	348	120	560	800	40	312	172	0	44	932	179
14b x 2	80	15	5	290	334	105	500	710	40	312	172	0	44	826	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 3	80	19	5	300	348	120	560	800	40	312	172	0	44	876	229
	90S	19	5	300	348	120	560	800	40	312	172	0	44	916	229
	132S	19	6	350	398	135	630	900	50	322	182	0	44	1066	229
	160M	19	8	425	473	145	710	1000	63	363	223	0	44	1232	229
14b x 4	90S	19	5	300	348	120	560	800	40	312	172	0	44	966	279
	90L	19	6	350	398	135	630	900	50	322	182	0	44	978	279
	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 5	90S	19	6	350	398	135	630	900	50	322	182	0	44	1016	329
	90L	19	6	350	398	135	630	900	50	322	182	0	44	1028	329
	100L	19	6	350	398	135	630	900	50	322	182	0	44	1082	329
	100L	19	8	425	473	145	710	1000	63	335	195	0	44	1128	329
	160M	19	10	425	475	160	800	1120	70	370	230	0	44	1332	329
14b x 6	90L	19	8	425	473	145	710	1000	63	335	195	0	44	1078	379
	100L	19	8	425	473	145	710	1000	63	335	195	0	44	1132	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
	160L	24	10	435	495	175	900	1250	70	370	230	0	44	1402	379
14b x 7	90L	19	8	425	473	145	710	1000	63	335	195	0	44	1128	429
	100L	19	8	425	473	145	710	1000	63	335	195	0	44	1182	429
	100L	19	10	425	475	160	800	1120	70	342	202	0	44	1228	429
	160M	24	10	435	495	175	900	1250	70	370	230	0	44	1432	429
	180M	24	10	485	545	175	900	1250	80	400	260	0	44	1492	429
	180M	24	10	435	495	200	1000	1400	80	400	260	0	44	1538	429

MCH(S)(W)	IEC motor	fa	fb	fc	fd	fe	ff	fg	fh	sa	sb	sc	sp	ta _{max}	zb
14b x 8	100L	19	10	425	475	160	800	1120	70	342	202	0	44	1278	479
	160M	24	10	435	495	200	1000	1400	80	380	240	0	44	1825	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
	200L	24	10	535	595	200	1000	1400	90	430	290	0	44	1666	479
14b x 9	100L	24	10	435	495	175	900	1250	70	342	202	0	44	1328	529
	112M	24	10	435	495	175	900	1250	70	342	202	0	44	1358	529
	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
14b x 10	100L	24	10	435	495	175	900	1250	70	342	202	0	44	1378	579
	112M	24	10	435	495	175	900	1250	70	342	202	0	44	1408	579
	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

100L, 160M and 180M = Pump with heavy bearing construction

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

8.9 Pump-motor unit MCH(S)(W) 16

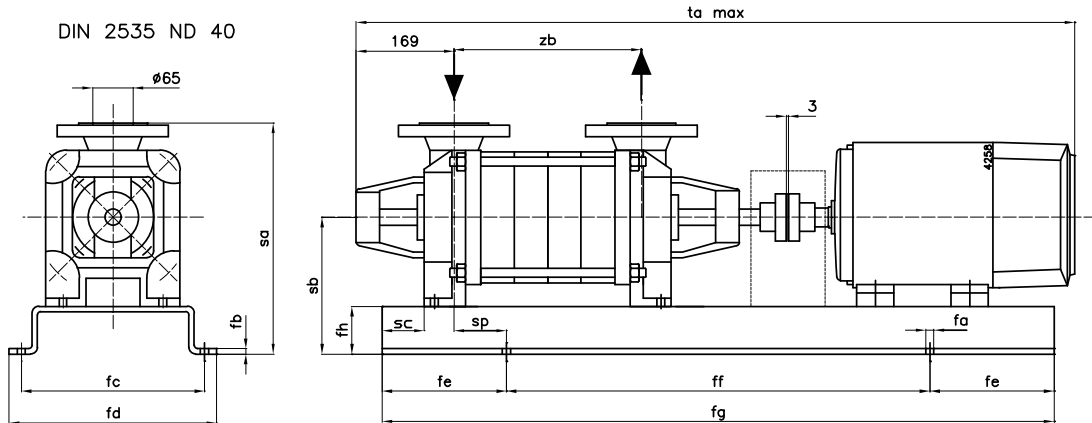


Figure 33: Pump-motor unit MCH(S)(W) 16.

MCH(S)(W)	IEC motor	fa	fb	fc	fd	fe	ff	fg	fh	sa	sb	sc	sp	ta _{max}	zb
16 x 1	71	19	6	350	398	135	630	900	50	370	210	0	40	881	217
	80	19	6	350	398	135	630	900	50	370	210	0	40	923	217
	112M	19	6	350	398	135	630	900	50	370	210	0	40	1059	217
	132S	19	6	350	398	135	630	900	50	370	210	0	40	1113	217
16 x 2	80	19	6	350	398	135	630	900	50	370	210	0	40	923	217
	90S	19	6	350	398	135	630	900	50	370	210	0	40	963	217
	90L	19	6	350	398	135	630	900	50	370	210	0	40	975	217
	132S	19	6	350	398	135	630	900	50	370	210	0	40	1113	217
16 x 3	160M	19	8	425	473	145	710	1000	63	383	223	0	40	1279	217
	90S	19	6	350	398	135	630	900	50	370	210	0	40	1023	277
	90L	19	6	350	398	135	630	900	50	370	210	0	40	1035	277
	100L	19	6	350	398	135	630	900	50	370	210	0	40	1089	277
16 x 4	160M	19	10	425	475	160	800	1120	70	390	230	0	40	1339	277
	160L	19	10	425	475	160	800	1120	70	390	230	0	40	1359	277
	90L	19	6	350	398	135	630	900	50	370	210	0	40	1095	337
	100L	19	8	425	473	145	710	1000	63	383	223	0	40	1149	337
	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 5	180M	24	10	485	545	175	900	1250	80	420	260	0	40	1459	337
	200L	24	10	535	595	200	1000	1400	90	450	290	0	40	1537	337
	100L	19	8	425	473	145	710	1000	63	383	223	0	40	1209	397
	112M	19	8	425	473	145	710	1000	63	383	223	0	40	1239	397
	160L	24	10	435	495	175	900	1250	70	390	230	0	40	1479	397
	180M	24	10	485	545	175	900	1250	80	420	260	0	40	1519	397
16 x 6	200L	24	10	535	595	200	1000	1400	90	450	290	0	40	1597	397
	100L	19	10	425	475	160	800	1120	70	390	230	0	40	1269	457
	112M	19	10	425	475	160	800	1120	70	390	230	0	40	1299	457
	132S	19	10	425	475	160	800	1120	70	390	230	0	40	1353	457
	180M	24	10	535	595	200	1000	1400	90	430	270	0	40	1579	457

MCH(S)(W)	IEC motor	fa	fb	fc	fd	fe	ff	fg	fh	sa	sb	sc	sp	ta _{max}	zb
16 x 7	100L	19	10	425	475	160	800	1120	70	390	230	0	40	1329	517
	112M	19	10	425	475	160	800	1120	70	390	230	0	40	1359	517
	132S	24	10	435	495	175	900	1250	70	390	230	0	40	1413	517
	200L	24	10	590	658	240	1120	1600	100	460	300	0	40	1717	517
	225M	24	10	590	658	240	1120	1600	100	485	325	0	40	1831	517
16 x 8	100L	24	10	435	495	175	900	1250	70	390	230	0	40	1389	577
	112M	24	10	435	495	175	900	1250	70	390	230	0	40	1419	577
	132S	24	10	435	495	175	900	1250	70	390	230	0	40	1473	577
	132M	24	10	435	495	200	1000	1400	80	400	240	0	40	1507	577
	200L	24	10	590	658	240	1120	1600	100	460	300	0	40	1777	577
16 x 9	112M	24	10	435	495	175	900	1250	70	390	230	0	40	1479	637
	132S	24	10	435	495	200	1000	1400	80	400	240	0	40	1533	637
	132M	24	10	435	495	200	1000	1400	80	400	240	0	40	1567	637
	200L	24	10	590	658	240	1120	1600	100	460	300	0	40	1837	637
16 x 10	112M	24	10	435	495	200	1000	1400	80	400	240	0	40	1539	697
	132S	24	10	435	495	200	1000	1400	80	400	240	0	40	1593	697
	132M	24	10	435	495	200	1000	1400	80	400	240	0	40	1627	697
	200L	24	10	590	658	240	1120	1600	100	460	300	0	40	1897	697
	225M	24	10	720	788	240	1120	1650	130	515	355	0	40	2011	697

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

8.10 Pump-motor unit MCH(S)(W) 20a

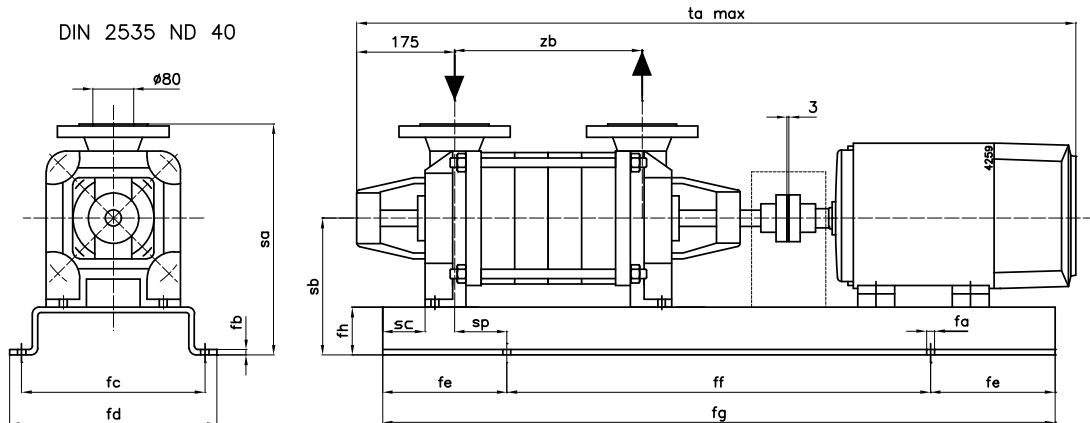


Figure 34: Pump-motor unit MCH(S)(W) 20a.

MCH(S)(W)	IEC motor	fa	fb	fc	fd	fe	ff	fg	fh	sa	sb	sc	sp	ta _{max}	zb
20a x 1	90S	19	8	425	473	145	710	1000	63	488	263	0	48	991	207
	90L	19	8	425	473	145	710	1000	63	488	263	0	48	1003	207
	100L	19	8	425	473	145	710	1000	63	488	263	0	48	1057	207
	132S	19	8	425	473	145	710	1000	63	488	263	0	48	1141	207
	160M	19	10	425	475	160	800	1120	70	495	270	0	48	1307	207
20a x 2	100L	19	8	425	473	145	710	1000	63	488	263	0	48	1132	282
	112M	19	8	425	473	145	710	1000	63	488	263	0	48	1162	282
	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
	180M	24	10	485	545	175	900	1250	80	505	280	0	48	1442	282
20a x 3	200L	24	10	535	595	200	1000	1400	90	515	290	0	48	1520	282
	100L	19	8	425	473	145	710	1000	63	488	263	0	48	1207	357
	112M	19	8	425	473	145	710	1000	63	488	263	0	48	1237	357
	132S	19	10	425	475	160	800	1120	70	495	270	0	48	1291	357
	132M	19	10	425	475	160	800	1120	70	495	270	0	48	1325	357
20a x 4	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
	112M	19	10	425	475	160	800	1120	70	495	270	0	48	1312	432
	132S	19	10	425	475	160	800	1120	70	495	270	0	48	1366	432
	132M	24	10	435	495	175	900	1250	70	495	270	0	48	1400	432
20a x 5	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
	132S	24	10	435	495	175	900	1250	70	495	270	0	48	1441	507
	132M	24	10	435	495	175	900	1250	70	495	270	0	48	1475	507
	160M	24	10	435	495	200	1000	1400	80	505	280	0	48	1607	507
20a x 6	225M	24	10	590	658	240	1120	1600	100	550	325	0	48	1859	507
	250M	24	10	720	788	240	1120	1650	130	605	380	0	48	1969	507
	132M	24	10	435	495	200	1000	1400	80	505	280	0	48	1550	582
	160M	24	10	435	495	200	1000	1400	80	505	280	0	48	1682	582

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

8.11 Pump-motor unit MCH(S)(W) 20b

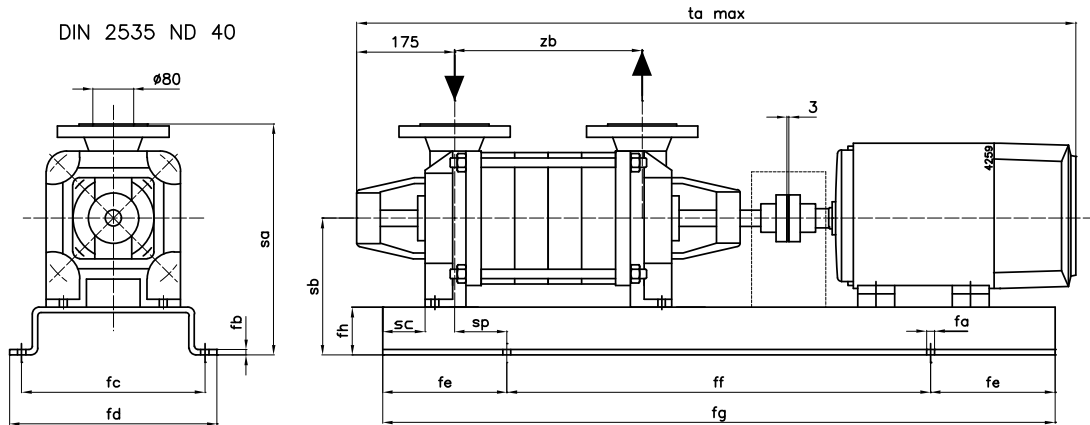


Figure 35: Pump-motor unit MCH(S)(W) 20b.

MCH(S)(W)	IEC motor	fa	fb	fc	fd	fe	ff	fg	fh	sa	sb	sc	sp	ta _{max}	zb
20b x 1	90L	19	8	425	473	145	710	1000	63	488	263	0	48	1003	207
	100L	19	8	425	473	145	710	1000	63	488	263	0	48	1057	207
	160M	19	10	425	475	160	800	1120	70	495	270	0	48	1307	207
	160L	19	10	425	475	160	800	1120	70	495	270	0	48	1327	207
20b x 2	100L	19	8	425	473	145	710	1000	63	488	263	0	48	1132	282
	112M	19	8	425	473	145	710	1000	63	488	263	0	48	1162	282
	132S	19	8	425	473	145	710	1000	63	488	263	0	48	1216	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 3	225M	24	10	590	658	240	1120	1600	100	550	325	0	48	1634	282
	132S	19	10	425	475	160	800	1120	70	495	270	0	48	1291	357
	132M	19	10	425	475	160	800	1120	70	495	270	0	48	1325	357
	160M	24	10	435	495	175	900	1250	70	495	270	0	48	1457	357
	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 4	280S	24	10	720	788	240	1120	1650	130	635	410	0	48	1929	357
	132M	24	10	435	495	175	900	1250	70	495	270	0	48	1400	432
	160M	24	10	435	495	175	900	1250	70	495	270	0	48	1532	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
20b x 5	280S	24	10	720	788	240	1120	1650	130	635	410	0	48	2004	432
	132M	24	10	435	495	175	900	1250	70	495	270	0	48	1475	507
	160M	24	10	435	495	200	1000	1400	80	505	280	0	48	1607	507
	160L	24	10	435	495	200	1000	1400	80	505	280	0	48	1627	507
	250M	24	10	720	788	240	1120	1650	130	605	380	0	48	1969	507
20b x 6	280S	24	10	720	788	240	1120	1650	130	635	410	0	48	2079	507
	160M	24	10	435	495	200	1000	1400	80	505	280	0	48	1682	582
	160L	24	10	590	658	240	1120	1600	100	525	300	0	48	1702	582

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, with the exception of the MCH(S)10):

Cast iron:

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

Bronze:

- Design Q: bronze pump casings, stage covers and impellers

9.3 MCH(S)10

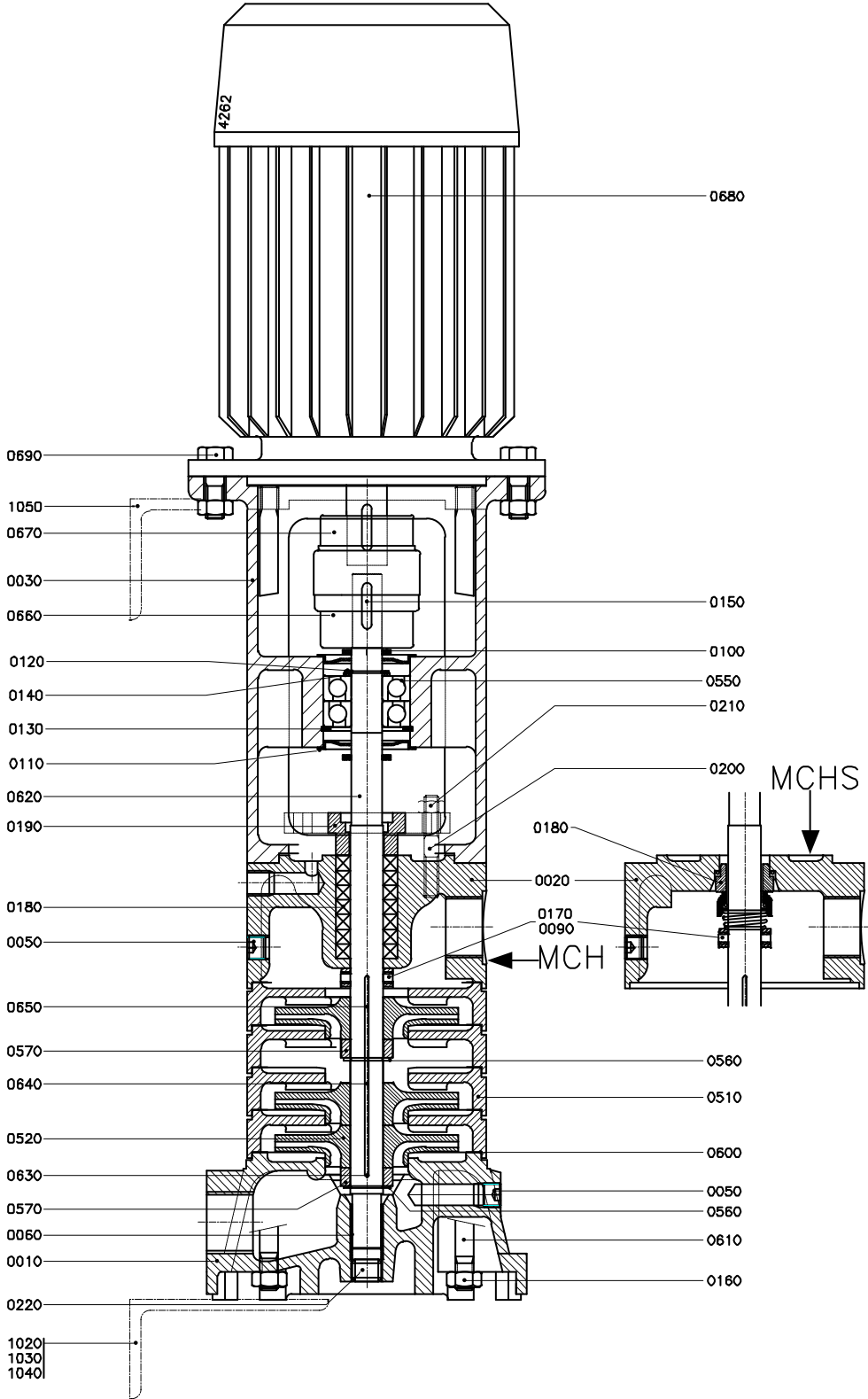


Figure 36: MCH(S) 10.

MCH 10 x 2-9 see figure 36

Item	Quantity	Description	Material
0010	1	inlet casing	cast iron
0020	1	outlet casing	cast iron
0030	1	lantern piece	cast iron
0050	2	plug	steel
0060*	1	slide bearing	bronze / PTFE
0090	1	set ring	bronze
0100*	2	splash ring	rubber
0110	2	bearing cover	steel
0120*	1	external circlip	steel
0130*	1	internal circlip	steel
0140*	1	filling ring	steel
0150*	1	key	steel
0160	4	nut	steel
0170	2	adjustment screw	alloyed steel
0180*	7	packing ring	--
0190	1	gland	cast iron
0200	2	stud	alloyed steel
0210	2	nut	brass
0220	1	plug	steel
0510	n ¹⁾	stage casing	cast iron
0520*	n	impeller	cast iron
0550*	1 ²⁾	ball bearing	--
0560*	1	external circlip	alloyed steel
0570*	1	distance sleeve	bronze
0600*	n+1 ³⁾	packing ring	--
0610*	4	stud	alloyed steel
0620*	1	pump shaft	alloyed steel
0630*	1	key	alloyed steel
0660	1	coupling half pump side	cast iron
0670	1	coupling half motor side	cast iron
0680	1	flange motor	--
0690	4	bolt + nut	steel
1020	1	support	steel
1030	3	bolt	steel
1040	3	nut	steel
1050	1	support	steel

1) for 2 stage and 8 stage design: n+1

2) for 9 stage design: 2

3) for 2 stage and 8 stage design: n+2

MCH 10 x 11-16 see figure 36

Item	Quantity	Description	Material
0010	1	inlet casing	cast iron
0020	1	outlet casing	cast iron
0030	1	lantern piece	cast iron
0050	2	plug	steel
0060*	1	slide bearing	bronze / PTFE
0090	1	set ring	bronze
0100*	2	splash ring	rubber
0110	2	bearing cover	steel
0120*	1	external circlip	steel
0130*	1	internal circlip	steel
0140*	1	filling ring	steel
0150*	1	key	steel
0160	4	nut	steel
0170	2	adjustment screw	alloyed steel
0180*	7	packing ring	--
0190	1	gland	cast iron
0200	2	stud	alloyed steel
0210	2	nut	brass
0220	1	plug	steel
0510	n+1 ¹⁾	stage casing	cast iron
0520*	n	impeller	cast iron
0550*	2	ball bearing	--
0560*	2	external circlip	alloyed steel
0570*	2	distance sleeve	bronze
0600*	n+2 ²⁾	packing ring	--
0610	4	stud	alloyed steel
0620*	1	pump shaft	alloyed steel
0630*	1	key	alloyed steel
0640*	1	key	alloyed steel
0650*	1	key ³⁾	alloyed steel
0660	1	coupling half pump side	cast iron
0670	1	coupling half motor side	cast iron
0680	1	flange motor	--
0690	4	bolt + nut	steel
1020	1	support	steel
1030	2	bolt	steel
1040	2	nut	steel
1050	1	support	steel

1) for 11-stage: n+2

2) for 11-stages: n+3

3) only for 16-stage design

MCHS 10 x 2-9 see figure 36

Item	Quantity	Description	Material
0010	1	inlet casing	cast iron
0020	1	outlet casing	cast iron
0030	1	lantern piece	cast iron
0050	2	plug	steel
0060*	1	slide bearing	bronze / PTFE
0090	1	set ring	bronze
0100*	2	splash ring	rubber
0110	2	bearing cover	steel
0120*	1	external circlip	steel
0130*	1	internal circlip	steel
0140*	1	filling ring	steel
0150*	1	key	steel
0160	4	nut	steel
0170	2	lock screw	alloyed steel
0180*	1	mechanical seal	--
0220	1	plug	steel
0510	n ¹⁾	stage cover	cast iron
0520*	n	impeller	cast iron
0550*	1 ²⁾	ball bearing	--
0560*	1	external circlip	alloyed steel
0570*	1	distance sleeve	bronze
0600*	n+1 ³⁾	packing ring	--
0610	4	stud	alloyed steel
0620*	1	pump shaft	alloyed steel
0630*	1	key	alloyed steel
0660	1	coupling half pump side	cast iron
0670	1	coupling half motor side	cast iron
0680	1	flange motor	--
0690	4	bolt + nut	steel
1020	1	support	steel
1030	3	bolt	steel
1040	3	nut	steel
1050	1	support	steel

1) for 2 and 8-stage design: n+1

2) for 9-stage design: 2

3) for 2 and 8-stage design: n+2

MCHS 10 x 11-16 see figure 36

Item	Quantity	Description	Material
0010	1	inlet casing	cast iron
0020	1	outlet casing	cast iron
0030	1	lantern piece	cast iron
0050	2	plug	steel
0060*	1	slide bearing	bronze / PTFE
0090	1	set ring	bronze
0100*	2	splash ring	rubber
0110	2	bearing cover	steel
0120*	1	external circlip	steel
0130*	1	internal circlip	steel
0140*	1	filling ring	steel
0150*	1	key	steel
0160	4	nut	steel
0170	2	lock screw	alloyed steel
0180*	1	mechanical seal	--
0200*	1	O-ring	rubber
0220	1	plug	steel
0510	n+1 ¹⁾	stage casing	cast iron
0520*	n	impeller	cast iron
0550*	2	ball bearing	--
0560*	2	external circlip	alloyed steel
0570*	2	distance sleeve	bronze
0600*	n+2 ²⁾	packing ring	--
0610	4	stud	alloyed steel
0620*	1	pump shaft	alloyed steel
0630*	1	key	alloyed steel
0640*	1	key	alloyed steel
0650*	1	key ³⁾	alloyed steel
0660	1	coupling half pump side	cast iron
0670	1	coupling half motor side	cast iron
0680	1	flange motor	--
0690	4	bolt + nut	steel
1020	1	support	steel
1030	2	bolt	steel
1040	2	nut	steel
1050	1	support	steel

1) for 11-stage design: n+2

2) for 11-stage design: n+3

3) only for 16-stage design

See figure 37

Item	Quantity	Description	Cast iron	Cast iron + bronze impeller	Bronze
			Design P	Design Q	
0010	2	bearing housing	cast iron		
0020	2	pump casing	cast iron		bronze
0050*	1	throttling bush	bronze		
0080*	2	external circlip	alloyed steel		
0090	4	filling ring	steel		
0100	3	bearing cover	steel		
0110	1	bearing cover	steel		
0120	2	gland	cast iron		bronze
0140*	10	gland packing ring	--		
0200*	1	key	alloyed steel		
0210*	2	ball bearing	--		
0220*	4	external circlip	steel		
0230	2	internal circlip	steel		
0240*	3	V-ring	rubber		
0250	4	plug	steel		brass
0260	4	sealing ring	copper		
0270	4	stud	alloyed steel		
0280	4	nut	brass		
0290	8	tap bolt	steel		
0500	1	suction cover	cast iron		bronze
0510	n ¹⁾	stage casing	cast iron		bronze
0520*	n	impeller	cast iron		bronze
0570*	1	pump shaft	alloyed steel		
0580*	n	wear ring	bronze		
0590*	n-1	wear ring	bronze		
0600	1	throttling sleeve ²⁾	alloyed steel		
0610*	n	wear ring	bronze		
0660*	n+2 ³⁾	packing ring	--		
0720	1	balance pipe ⁴⁾	copper		
0730*	n	key	alloyed steel		
0740	4	tie rod ⁵⁾	alloyed steel		
0750	8	nut ⁵⁾	steel		
0755	4	washer	stainless steel		
0760	2	angle pipe union ⁴⁾	brass		
0770	4	bolt with nut ⁶⁾	steel		
0780	2	plug ⁶⁾	steel		brass
0790	2	sealing ring ⁶⁾	copper		

1) quantity n+1 for 1-stage design

2) only for MCH12,5 x 8-10, MCH14a/b x 4-7 and MCH16 x 5-10

3) quantity n+3 for 1-stage design

4) only for MCH12,5 x 5-10, MCH14a/b x 4-7 and MCH16 x 3-10

5) only for MCH12,5 x 5-10, MCH14a/b x 5-7 and MCH16 x 3-10

6) only for MCH12,5 x 1-4, MCH14a/b x 1-3 and MCH16 x 1-2

See figure 38

Item	Quantity	Description	Cast iron	Cast iron + bronze impeller	Bronze
			Design P	Design Q	
0010	2	bearing housing	cast iron		
0020	2	pump casing	cast iron		bronze
0030	2	cooling water cover	cast iron		
0050*	1	throttling bush	bronze		
0080*	2	external circlip	alloyed steel		
0090	4	filling ring	steel		
0100	3	bearing cover	steel		
0110	1	bearing cover	steel		
0120	2	gland	cast iron		bronze
0140*	12	gland packing ring	--		
0150*	2	packing ring	--		
0200*	1	key	alloyed steel		
0210*	2	ball bearing	--		
0220*	4	external circlip	steel		
0230	2	internal circlip	steel		
0240*	3	V-ring	rubber		
0250	6	plug	steel		brass
0260	6	sealing ring	copper		
0270	4	stud	alloyed steel		
0280	4	nut	brass		
0290	8	tap bolt	steel		
0300*	2	O-ring	rubber		
0310	4	angle pipe union	brass		
0500	1	suction cover	cast iron		bronze
0510	n ¹⁾	stage casing	cast iron		bronze
0520*	n	impeller	cast iron	bronze	
0570*	1	pump shaft	alloyed steel		
0580*	n	wear ring	bronze		
0590*	n-1	wear ring	bronze		
0600	1	throttling sleeve ²⁾	alloyed steel		
0610*	n	wear ring	bronze		
0660*	n+2 ³⁾	packing ring	--		
0670	1	pipe	copper		
0720	1	balance pipe ⁴⁾	copper		
0730*	n	key	alloyed steel		
0740	4	tie rod ⁵⁾	alloyed steel		
0750	8	nut ⁵⁾	steel		
0755	4	washer	stainless steel		
0760	2	angle pipe union ⁴⁾	brass		
0770	4	bolt + nut ⁶⁾	steel		

Item	Quantity	Description	Cast iron	Cast iron + bronze impeller	Bronze
			Design P	Design Q	
0780	2	plug ⁷⁾	steel		brass
0790	2	sealing ring ⁷⁾	copper		

1) quantity n+1 for 1-stage design

2) only for MCHW12,5 x 8-10, MCHW14a/b x 4-10 and MCHW16 x 5-10

3) quantity n+3 for 1-stage design

4) only for MCHW12,5 x 5-10, MCHW14a/b x 4-10 and MCHW16 x 3-10

5) not for MCHW14a/b x 4

6) only for MCHW14a/b x 4

7) only for MCHW12,5 x 1-4, MCHW14a/b x 1-3 and MCHW16 x 1-2

9.6 MCHS 12,5 - 14a/b - 16

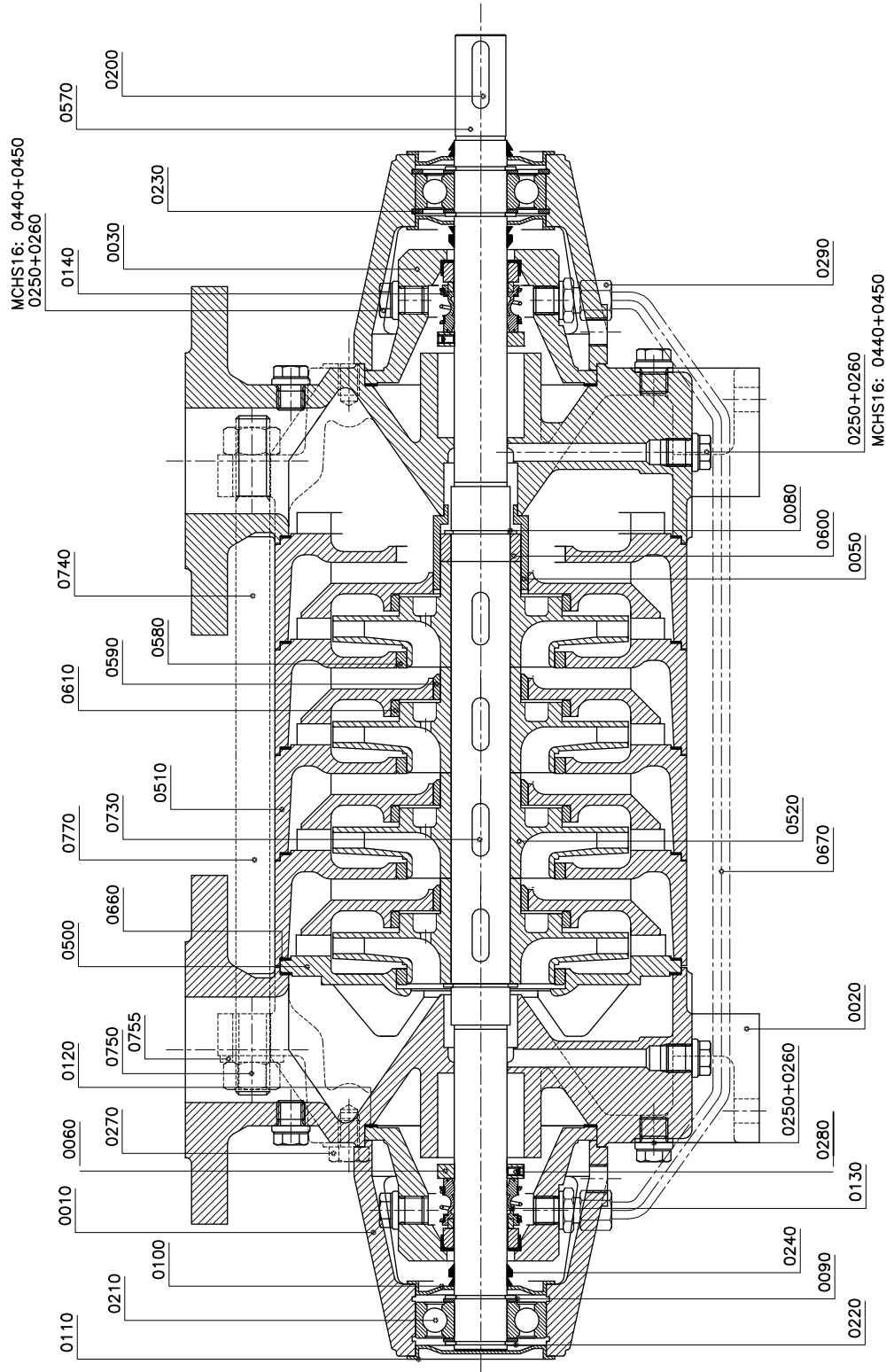


Figure 39: MCHS 12,5 - 14a/b - 16.

See figure 39

Item	Quantity	Description	Cast iron	Cast iron + bronze impeller	Bronze
			Design P	Design Q	
0010	2	bearing housing	cast iron		
0020	2	pump casing	cast iron		bronze
0030	2	cover for mechanical seal	cast iron		bronze
0050*	1	throttling bush	bronze		
0060*	2	set ring	alloyed steel		
0080*	2	external circlip	alloyed steel		
0090	4	filling ring	steel		
0100	3	bearing cover	steel		
0110	1	bearing cover	steel		
0120*	1	packing ring	--		
0130*	1	mechanical seal	--		
0140*	1	mechanical seal	--		
0200*	1	key	alloyed steel		
0210*	2	ball bearing	--		
0220*	4	external circlip	steel		
0230	2	internal circlip	steel		
0240*	3	V-ring	rubber		
0250	8 ¹⁾	plug	steel		brass
0260	8 ¹⁾	sealing ring	copper		
0270	8	tap bolt	steel		
0280	2	adjustment screw	alloyed steel		
0290	2	pipe union	brass		
0440	4	plug ²⁾	steel		st.st.
0450	4	sealing ring ²⁾	copper		
0500	1	suction cover	cast iron		bronze
0510	n ³⁾	stage casing	cast iron		bronze
0520*	n	impeller	cast iron	bronze	
0570*	1	pump shaft	alloyed steel		
0580*	n	wear ring	bronze		
0590*	n-1	wear ring	bronze		
0600*	1	throttling sleeve ⁴⁾	alloyed steel		
0610*	n	wear ring	bronze		
0660*	n+2 ⁵⁾	packing ring	--		
0670	1	balance pipe	copper		
0730*	n	key	alloyed steel		
0740	4	tie rod ⁶⁾	alloyed steel		
0750	8	nut ⁶⁾	alloyed steel		
0755	4	washer	stainless steel		
0770	4	bolt + nut ⁷⁾	alloyed steel		

st.st. = stainless steel

1) MCHS16 Number 4

2) only for MCHS16

3) quantity n+1 for 1-stage design

4) only for MCHS12,5 x 8-10 and MCHS16 x 5-10

5) quantity n+3 for 1-stage design

6) only for MCHS12,5 x 5-10, MCHS14a/b x 5-7 and MCHS16 x 3-10

7) only for MCHS12,5 x 1-4, MCHS14a/b x 1-4 and MCHS16 x 1-2

9.7 MCH 14a/b with heavy bearing construction

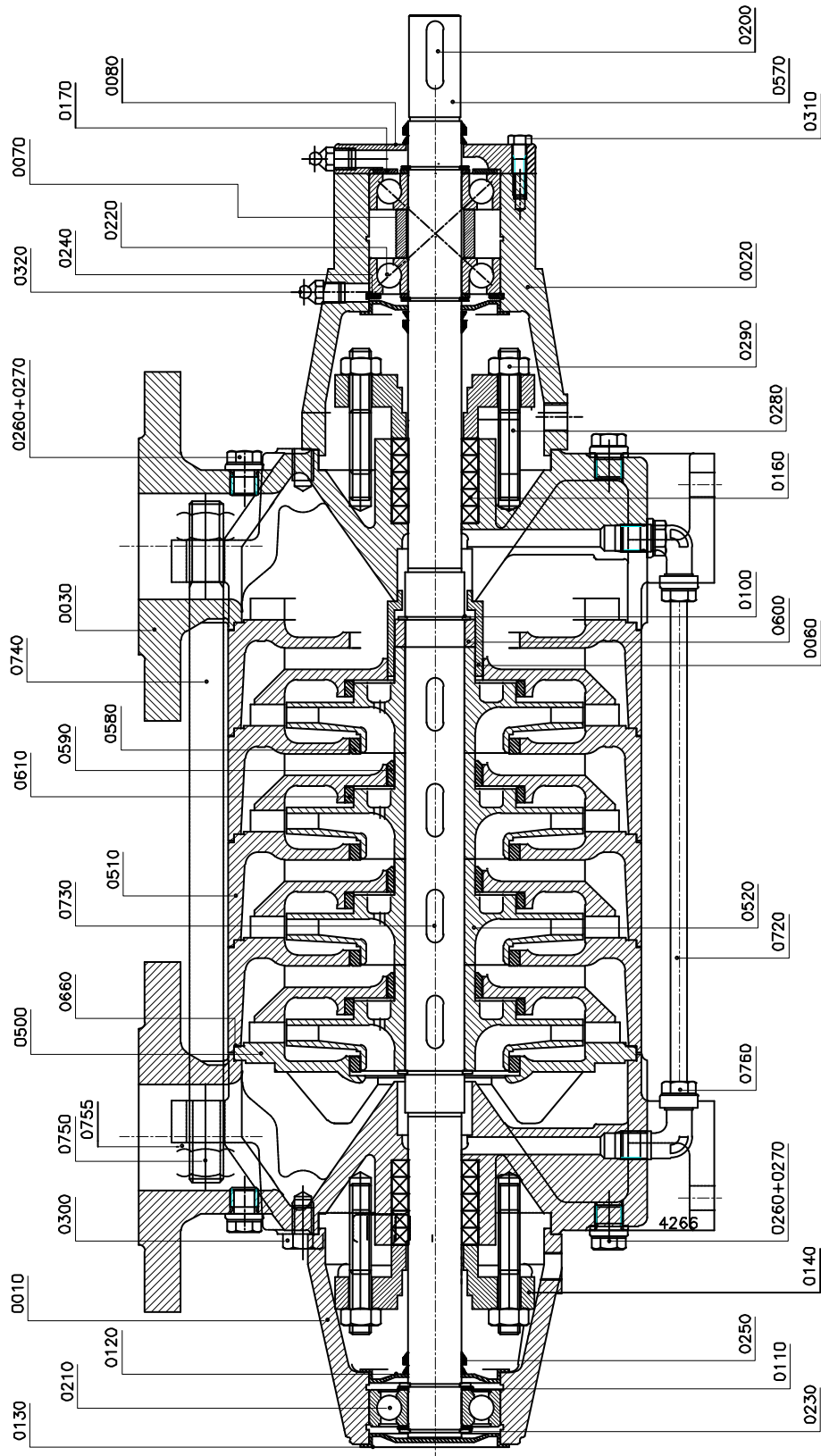


Figure 40: MCH 14a/b with heavy bearing construction.

See figure 40

Item	Quantity	Description	Cast iron	Cast iron + bronze impeller	Bronze
			Design P	Design Q	
0010	1	bearing housing	cast iron		
0020	1	bearing housing	cast iron		
0030	2	pump casing	cast iron	bronze	
0060*	1	throttling bush	bronze		
0070	1	spacer sleeve	steel		
0080	1	bearing cover	steel		
0100*	2	external circlip	alloyed steel		
0110	4	filling ring	steel		
0120	2	bearing cover	steel		
0130	1	bearing cover	steel		
0140	2	gland	cast iron	bronze	
0160*	10	gland packing ring	--		
0170*	1	waved ring	alloyed steel		
0200*	1	key	alloyed steel		
0210*	1	ball bearing	--		
0220*	2	ball bearing	--		
0230*	4	external circlip	steel		
0240	1	internal circlip	steel		
0250*	3	V-ring	rubber		
0260	6	plug	steel	brass	
0270	6	sealing ring	copper		
0280	4	stud	alloyed steel		
0290	4	nut	brass		
0300	4	tap bolt	steel		
0310	4	tap bolt	steel		
0320	3	grease nipple	steel		
0360	4	tap bolt	steel		
0500	1	suction cover	cast iron	bronze	
0510	n	stage casing	cast iron	bronze	
0520*	n	impeller	cast iron	bronze	
0570*	1	pump shaft	alloyed steel		
0580*	n	wear ring	bronze		
0590*	n-1	wear ring	bronze		
0600*	1	throttling ring	alloyed steel		
0610*	n	wear ring	bronze		
0660*	n+2	packing ring	--		
0720	1	pipe	copper		
0730*	n	key	alloyed steel		
0740*	4	stud	alloyed steel		
0750	8	nut	steel		
0755	4	washer	stainless steel		
0760	2	angle pipe union	brass		

9.8 MCHW 14a/b with heavy bearing construction

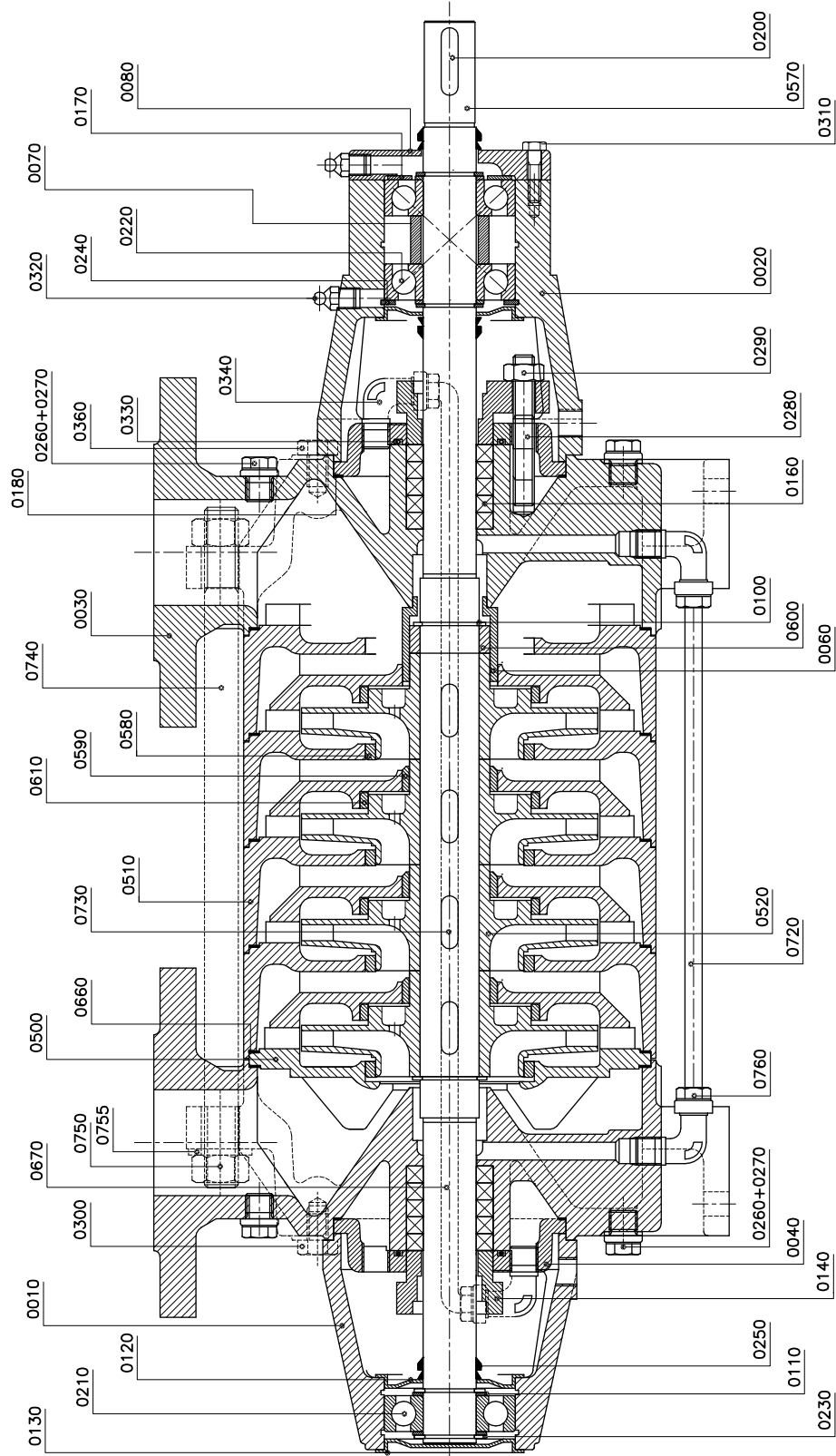


Figure 41: MCHW 14a/b with heavy bearing construction.

See figure 41.

Item	Quantity	Description	Cast iron	Cast iron + bronze impeller	Bronze
			Design P	Design Q	
0010	1	bearing housing	cast iron		
0020	1	bearing housing	cast iron		
0030	2	pump casing	cast iron	bronze	
0040	2	cooling water cover	cast iron		
0060*	1	throttling bush	bronze		
0070	1	spacer sleeve	steel		
0080	1	bearing cover	steel		
0100*	2	external circlip	alloyed steel		
0110	4	filling ring	steel		
0120	2	bearing cover	steel		
0130	1	bearing cover	steel		
0140	2	gland	cast iron	bronze	
0160*	12	gland packing ring	--		
0170*	1	waved ring	alloyed steel		
0180*	2	packing ring	--		
0200*	1	key	alloyed steel		
0210*	1	ball bearing	--		
0220*	2	ball bearing	--		
0230*	4	external circlip	steel		
0240	1	internal circlip	steel		
0250*	3	V-ring	rubber		
0260	4	plug	steel	brass	
0270	4	sealing ring	copper		
0280	4	stud	alloyed steel		
0290	4	nut	brass		
0300	4	tap bolt	steel		
0310	4	tap bolt	steel		
0320	3	grease nipple	steel		
0330*	2	O-ring	rubber		
0340	4	angle pipe union	brass		
0360	4	tap bolt	steel		
0500	1	suction cover	cast iron	bronze	
0510	n	stage casing	cast iron	bronze	
0520*	n	impeller	cast iron	bronze	
0570*	1	pump shaft	alloyed steel		
0580*	n	wear ring	bronze		
0590*	n-1	wear ring	bronze		
0600*	1	throttling ring	alloyed steel		
0610*	n	wear ring	bronze		
0660*	n+2	packing ring	--		
0670	1	pipe	copper		
0720	1	by-pass pipe	copper		
0730*	n	key	alloyed steel		
0740*	4	stud	alloyed steel		
0750	8	nut	steel		
0755	4	washer	stainless steel		
0760	2	angle pipe union	brass		

9.9 MCHS 14a/b with heavy bearing construction

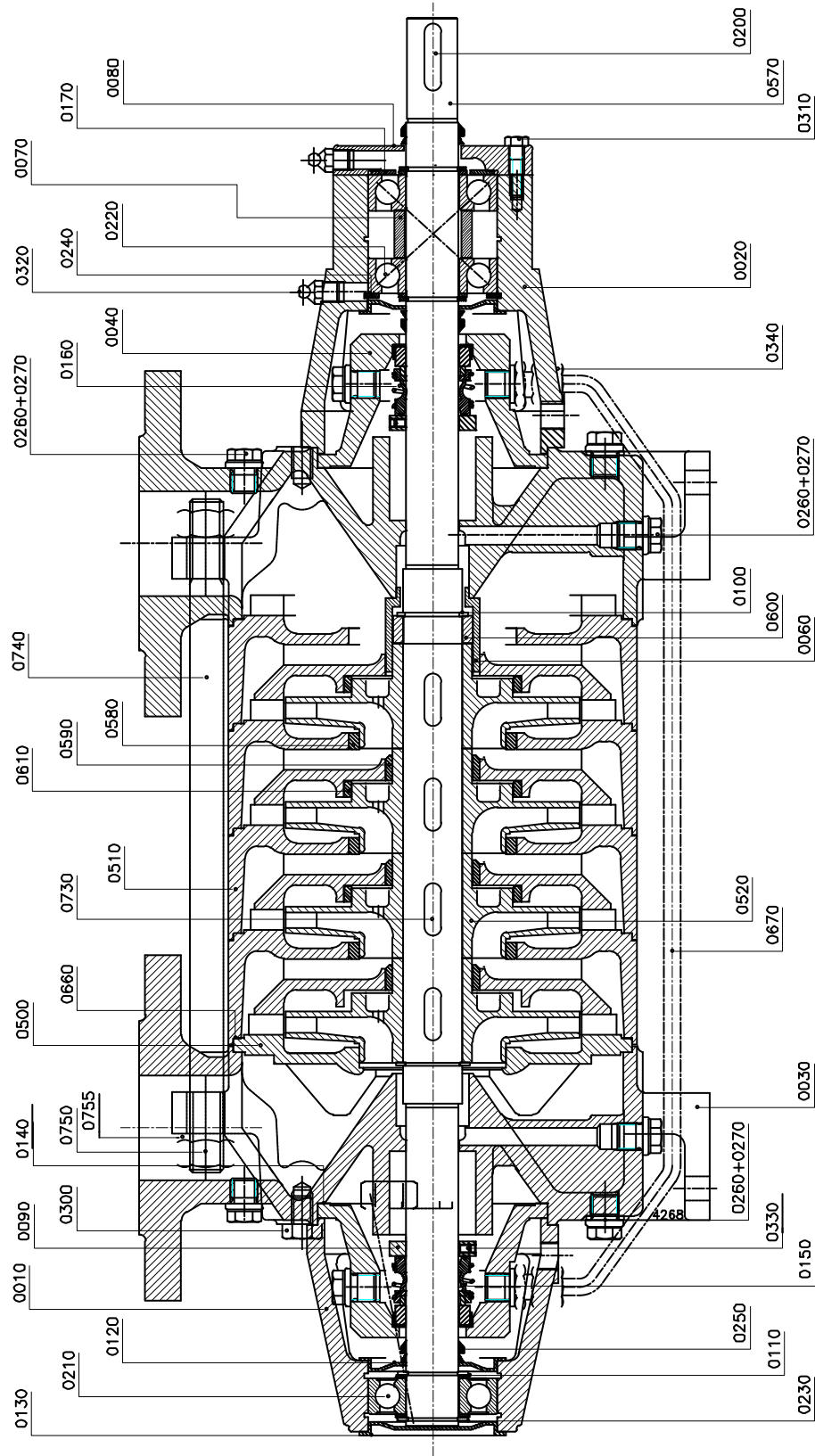


Figure 42: MCHS 14a/b with heavy bearing construction.

See figure 42

Item	Quantity	Description	Cast iron	Cast iron + bronze impeller	Bronze
			Design P	Design Q	
0010	1	bearing housing	cast iron		
0020	1	bearing housing	cast iron		
0030	2	pump casing	cast iron	bronze	
0040	2	cover for mechanical seal	cast iron	bronze	
0060*	1	throttling bush	bronze		
0070	1	spacer sleeve	steel		
0080	1	bearing cover	steel		
0090*	2	set ring	alloyed steel		
0100*	2	external circlip	alloyed steel		
0110	4	filling ring	steel		
0120	2	bearing cover	steel		
0130	1	bearing cover	steel		
0140*	2	packing ring	--		
0150*	1	mechanical seal	--		
0160*	1	mechanical seal	--		
0170*	1	waved ring	alloyed steel		
0200*	1	key	alloyed steel		
0210*	1	ball bearing	--		
0220*	2	ball bearing	--		
0230*	4	external circlip	steel		
0240	1	internal circlip	steel		
0250*	3	V-ring	rubber		
0260	10	plug	steel	brass	
0270	10	sealing ring	copper		
0300	4	tap bolt	steel		
0310	4	tap bolt	steel		
0320	3	grease nipple	steel		
0330	2	adjustment screw	alloyed steel		
0340	2	pipe union	brass		
0360	4	tap bolt	steel		
0500	1	suction cover	cast iron	bronze	
0510	n	stage casing	cast iron	bronze	
0520*	n	impeller	cast iron	bronze	
0570*	1	pump shaft	alloyed steel		
0580*	n	wear ring	bronze		
0590*	n-1	wear ring	bronze		
0600*	1	throttling ring	alloyed steel		
0610*	n	wear ring	bronze		
0660*	n+2	packing ring	--		
0670	1	by-pass pipe	copper		
0730*	n	key	alloyed steel		
0740*	4	stud	alloyed steel		
0750	8	nut	steel		
0755	4	washer	stainless steel		

9.10 MCH 20a/b

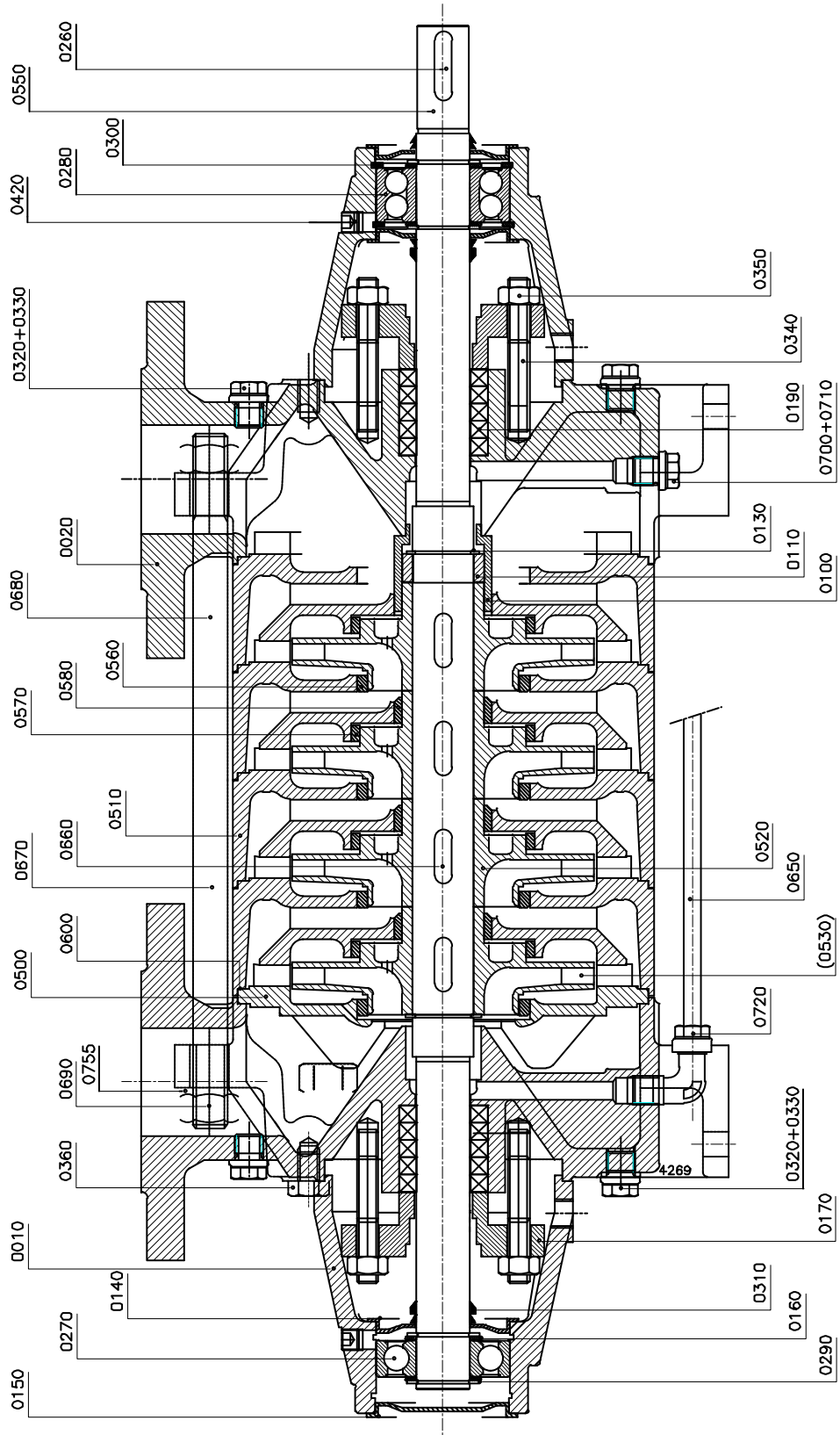


Figure 43: MCH 20 a/b.

See figure 43

Item	Quantity	Description	Material
0010	2	bearing housing	cast iron
0020	2	pump casing	cast iron
0100*	1	throttling bush	bronze
0110*	1	throttling ring	alloyed steel
0130*	2	external 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	gland packing ring	--
0260*	1	key	alloyed steel
0270*	1	ball bearing	--
0280*	1	ball bearing	--
0290*	4	external circlip	steel
0300	2	internal circlip	steel
0310*	3	V-ring	rubber
0320	6	plug	steel
0330	6	sealing ring	copper
0340	4	stud	alloyed steel
0350	4	nut	brass
0360	8	tap bolt	steel
0420	2	plug	steel
0500	1	suction cover	cast iron
0510	n	stage casing	cast iron
0520*	n	impeller	cast iron / bronze
0550*	1	pump shaft	alloyed steel
0560*	n	wear ring	bronze
0570*	n	wear ring	bronze
0580*	n-1	wear ring	bronze
0600*	n+2	packing ring	--
0650	1	balance pipe ¹⁾	copper
0660*	n	key	alloyed steel
0670*	2	stud	alloyed steel
0680*	6	stud	alloyed steel
0690	16	nut	steel
0700	2	plug ²⁾	steel
0710	2	sealing ring ²⁾	copper
0720	2	angle pipe union ¹⁾	brass
0755	8	washer	stainless steel

¹⁾ only for MCH20a/b x 2 to 6

²⁾ only for MCH20a/b x 1

9.11 MCHW 20a/b

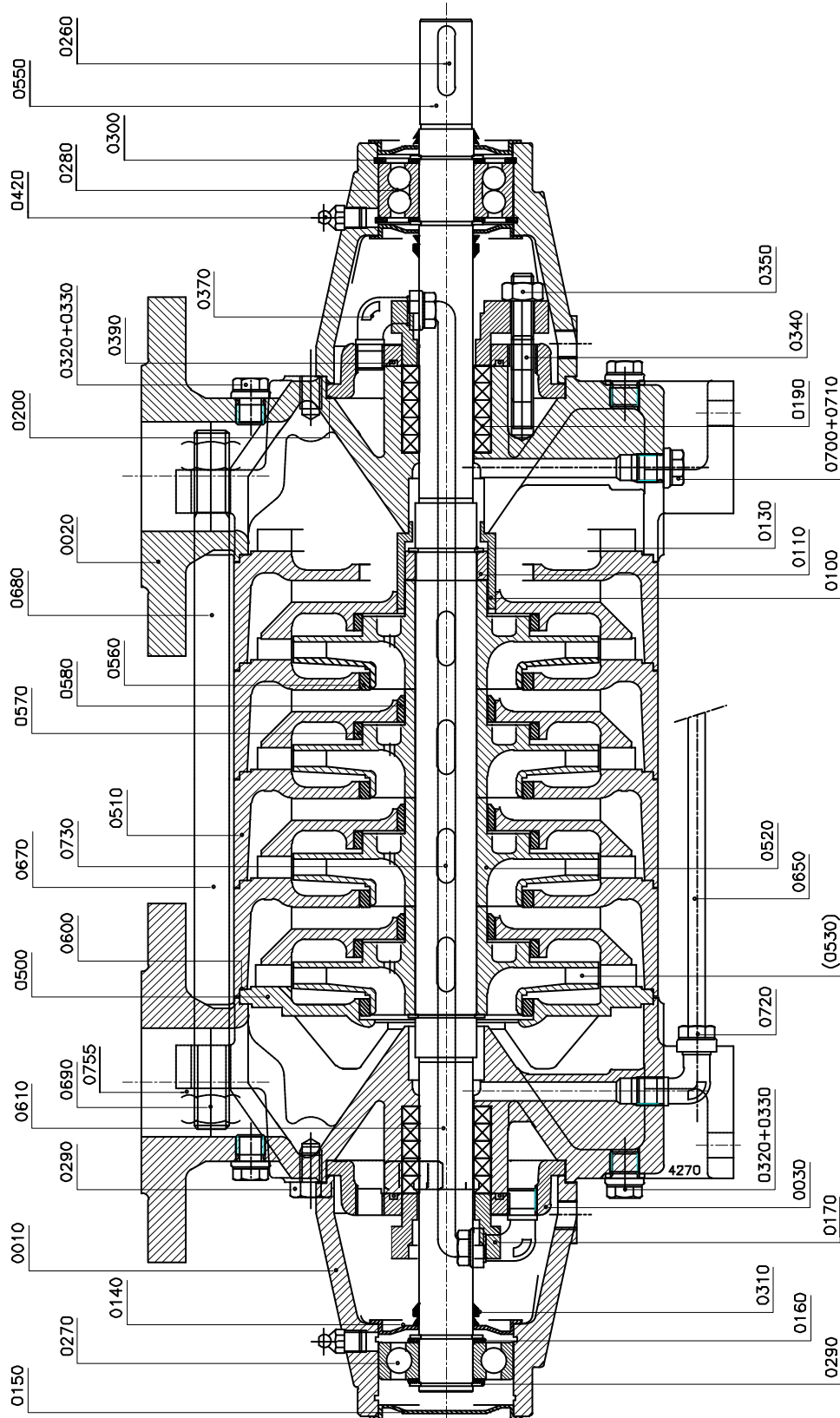


Figure 44: MCHW 20 a/b.

See figure 44

Item	Quantity	Description	Material
0010	2	bearing housing	cast iron
0020	2	pump casing	cast iron
0030	2	cooling water cover	cast iron
0100*	1	throttling bush	bronze
0110*	1	throttling ring	alloyed steel
0130*	2	external 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	gland packing ring	--
0200*	2	packing ring	--
0260*	1	key	alloyed steel
0270*	1	ball bearing	--
0280*	1	ball bearing	--
0290*	4	external circlip	steel
0300	2	internal circlip	steel
0310*	3	V-ring	rubber
0320	4	plug	steel
0330	4	sealing ring	copper
0340	4	stud	alloyed steel
0350	4	nut	brass
0360	8	tap bolt	steel
0370	4	angle pipe union	brass
0390*	2	O-ring	rubber
0420	2	grease nipple	steel
0500	1	suction cover	cast iron
0510	n	stage casing	cast iron
0520*	n	impeller	cast iron / bronze
0550*	1	pump shaft	alloyed steel
0560*	n	wear ring	bronze
0570*	n	wear ring	bronze
0580*	n-1	wear ring	bronze
0600*	n+2	packing ring	--
0610	1	pipe	copper
0650	1	balance pipe ¹⁾	copper
0660*	n	key	alloyed steel
0670*	2	stud	alloyed steel
0680*	6	stud	alloyed steel
0690	16	nut	steel
0700	2	plug ²⁾	steel
0710	2	sealing ring ²⁾	copper
0720	2	angle pipe union ¹⁾	brass
0755	8	washer	stainless steel

1) only for MCHW20a/b x 2 to 6

2) only for MCHW20a/b x 1

9.12 MCHS 20a/b

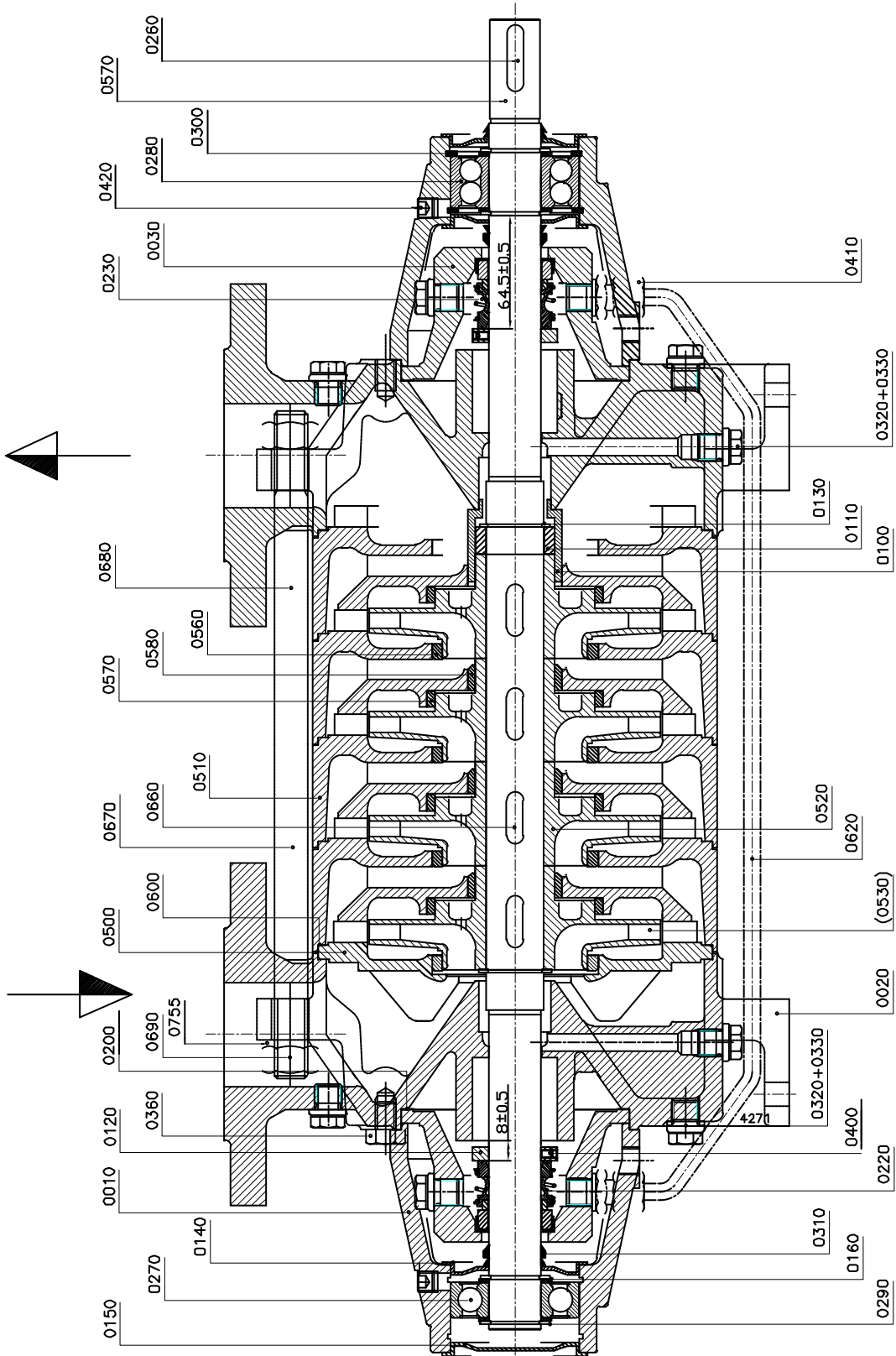


Figure 45: MCHS 20 a/b.

See figure 45.

Item	Quantity	Description	Material
0010	2	bearing housing	cast iron
0020	2	pump casing	cast iron
0040	2	cover for mech. seal	cast iron
0100*	1	throttling bush	bronze
0110*	1	throttling ring	alloyed steel
0130*	2	external circlip	alloyed steel
0140	3	bearing cover	steel
0150	1	bearing cover	steel
0160	4	filling ring	steel
0200*	2	packing ring	--
0220*	1	mechanical seal	--
0230*	1	mechanical seal	--
0260*	1	key	alloyed steel
0270*	1	ball bearing	--
0280*	1	ball bearing	--
0290*	4	external circlip	steel
0300	2	internal circlip	steel
0310*	3	V-ring	rubber
0320	6	plug	steel
0330	6	sealing ring	copper
0360	8	tap bolt	steel
0400	2	adjustment screw	alloyed steel
0410	2	pipe union	brass
0420	2	plug	steel
0500	1	suction cover	cast iron
0510	n	stage casing	cast iron
0520*	n	impeller	cast iron / bronze
0550*	1	pump shaft	alloyed steel
0560*	n	wear ring	bronze
0570*	n	wear ring	bronze
0580*	n-1	wear ring	bronze
0600*	n+2	packing ring	--
0620	1	balance pipe	copper
0660*	n	key	alloyed steel
0670*	2	stud	alloyed steel
0680*	6	stud	alloyed steel
0690	16	nut	steel
0755	8	washer	stainless steel

9.13 MCH(S)(W) 12,5 - 14a/b -16 - 20a/b boiler feed pump

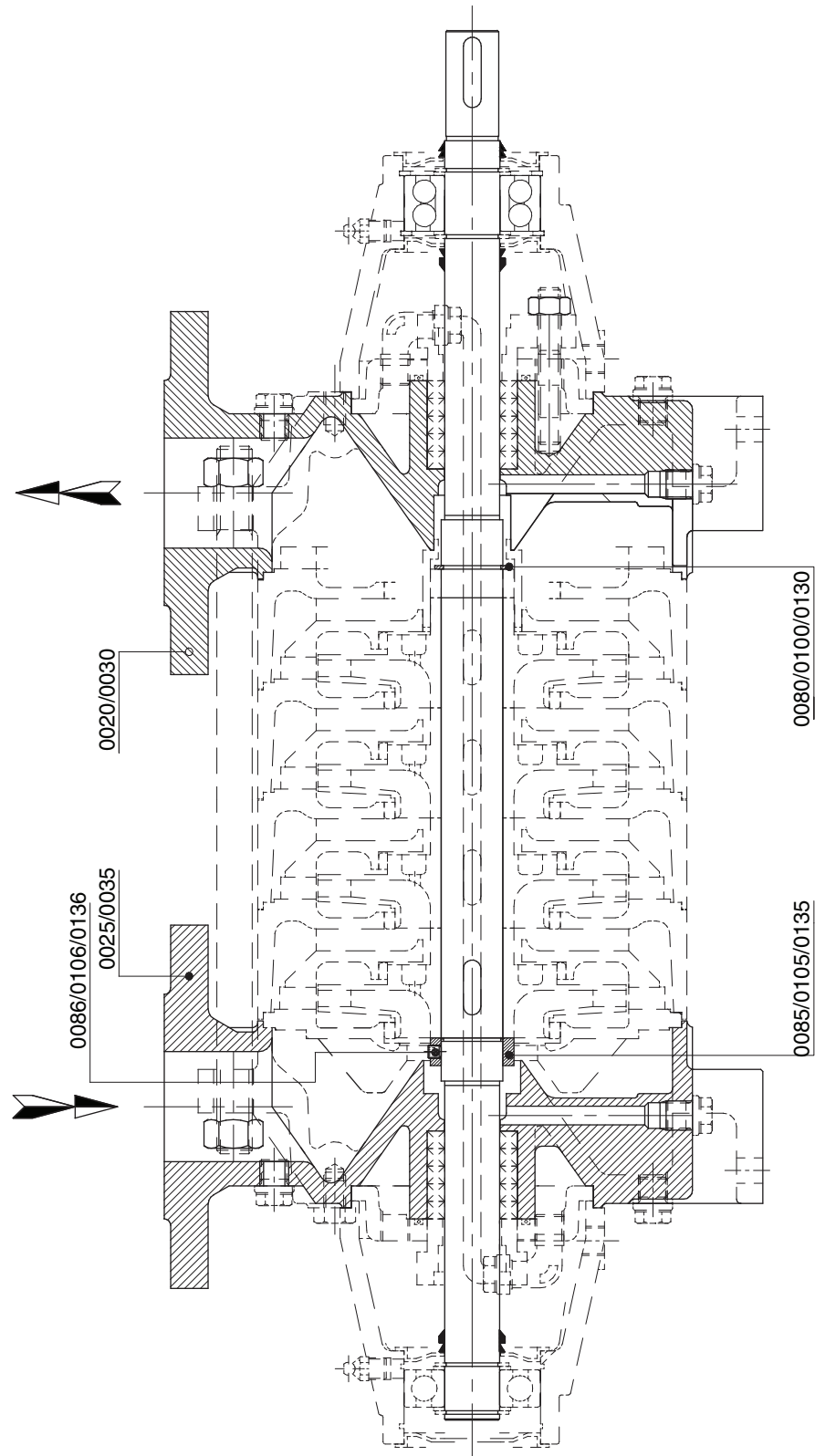


Figure 46: MCH(S)(W) 12,5 - 14a/b -16 - 20a/b boiler feed pump.

See figure 46

Item	Quantity	Description	Material	
0020	1	pump casing ¹⁾	cast iron	bronze
0025	1	pump casing ¹⁾	cast iron	bronze
0030	1	pump casing ²⁾	cast iron	bronze
0035	1	pump casing ²⁾	cast iron	bronze
0080	1	outer circlip	steel alloy	
0085	1	adjusting ring	steel	
0086	3	set screw	stainless steel	

¹⁾ MCH(S)(W)20a/b only cast iron

²⁾ MCH(S)(W)14b only

10 Technical data

10.1 Tightening moments

10.1.1 Tightening moments for bolts and nuts

Table 5: 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 6: Tie rod torque.

Pump type	Torque [Nm]	Screwthread	Material
MCH(W)(S) 10	40 - 54	M10	40CrMo4
MCH(W)(S) 12,5	89 - 118	M16	
MCH(W)(S) 14a/b	99 - 133	M16	
MCH(W)(S) 16	200 - 267	M20	
MCH(W)(S) 20a/b	137 - 183	M20	

10.1.3 Tightening moments set screw from coupling

Table 7: Tightening moments set screw from coupling.

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

10.2 Grease

Table 8: Recommended greases according to NLGI-2 classification.

Pump type	Bearings	
MCH(S) 14 a/b with reinforced bearing	suction side bearing	BP - Energrease LS-EP 2 CHEVRON - Black Pearl Grease EP 2 CHEVRON - Multifak EP-2
MCH(S) 10 MCH(S) 16	all bearings	EXXONMOBIL - Beacon EP 2 (Moly) EXXONMOBIL - Mobilux EP 2 (Moly) SHELL - Gadus S2 V100 2 SKF- LGMT 2 TOTAL - Total Lical EP 2
MCHW all types	all bearings	SKF LGEP 2, or a similar type of grease suitable for temperatures upto 150°C

10.3 Recommended locking liquids

Table 9: Recommended locking liquids

Description	Locking liquid
slide bearing MCH(S)10	Loctite 641
throttling bush	
wear rings	

10.4 Maximum speed

MCH(W)(S)	n_{max} [min ⁻¹]
10 x 2 - 12	3600
10 x 14 - 16	3000
12,5 x 1 - 7	3600
12,5 x 8 - 10	3000
14a x 1 - 8	3600
14a x 9 - 10	3000
14b x 1 - 8	3600
14b x 9 - 10	3000
16 x 1 - 7	3600
16 x 8 - 10	3000
20a x 1 - 3	3600
20a x 4 - 5	3000
20a x 6	1800
20b x 1 - 3	3600
20b x 4 - 5	3000
20b x 6	1800

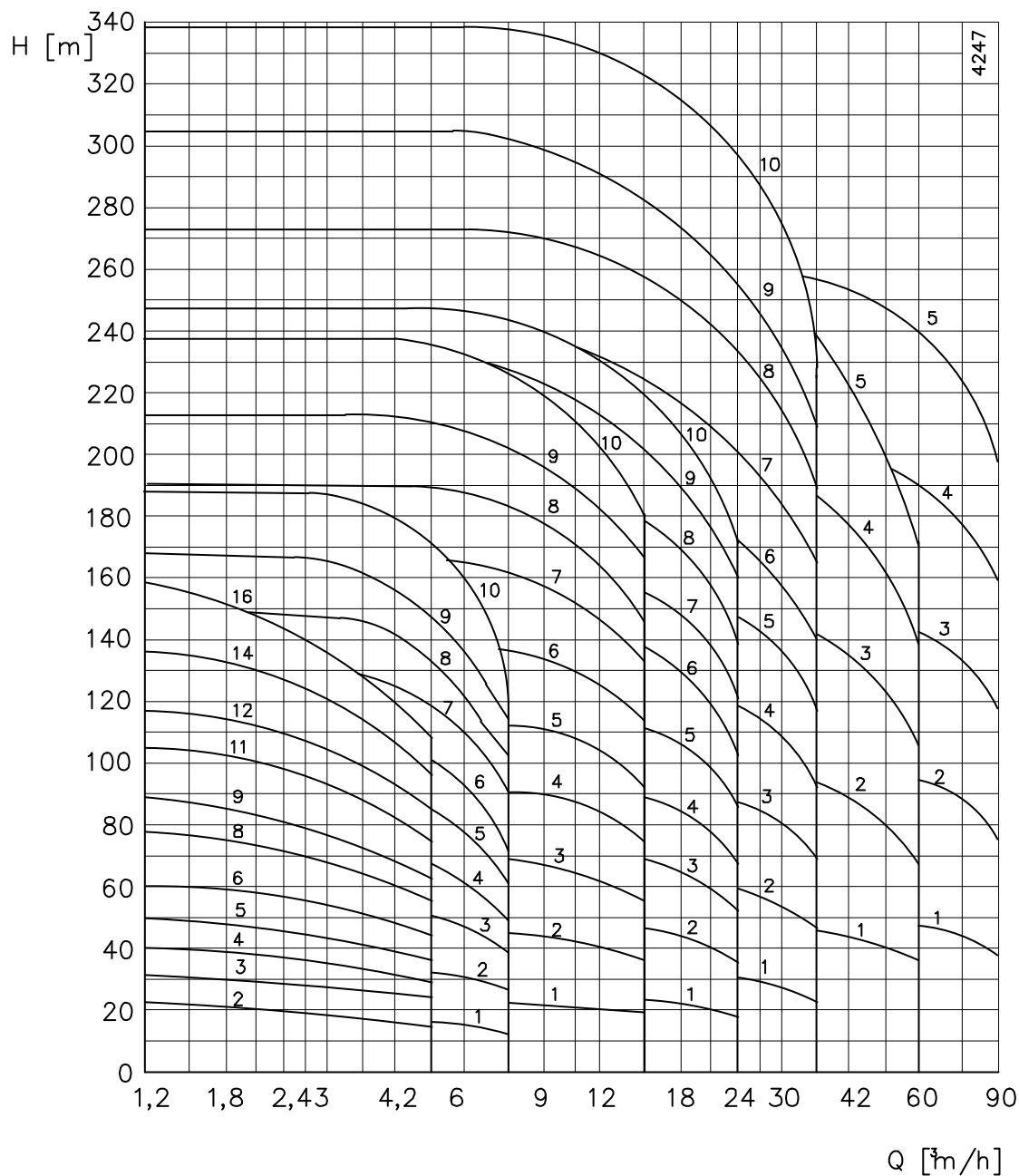
10.5 Permissible pressure and temperature

MCH(W)(S)	MCH 10	MCH 12,5	MCH 14a	MCH 14b	MCH 16	MCH 20a	MCH 20b
max. capacity [m ³ /h]	8	8	16	26	42	65	100
max. head [m]	180	275	250	255	350	250	160
max. inlet pressure [bar]	5	10					
test pressure [bar]	1,5 x working pressure						
min. test pressure [bar]	15						
max. test pressure [bar]	1,5 x working pressure	50					
max. permitted working pressure ^{*)} [bar]	10 (1 - 9 impellers) 25 (11-16 impellers)	40 - (3x inlet pressure)					
temperature range MCH [°C]	-15°C to 105°C						
temperature range MCHS [°C]	-20°C to 120°C						
temperature range MCHW [°C]	-20°C to 150°C						

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

10.6 Hydraulic performance

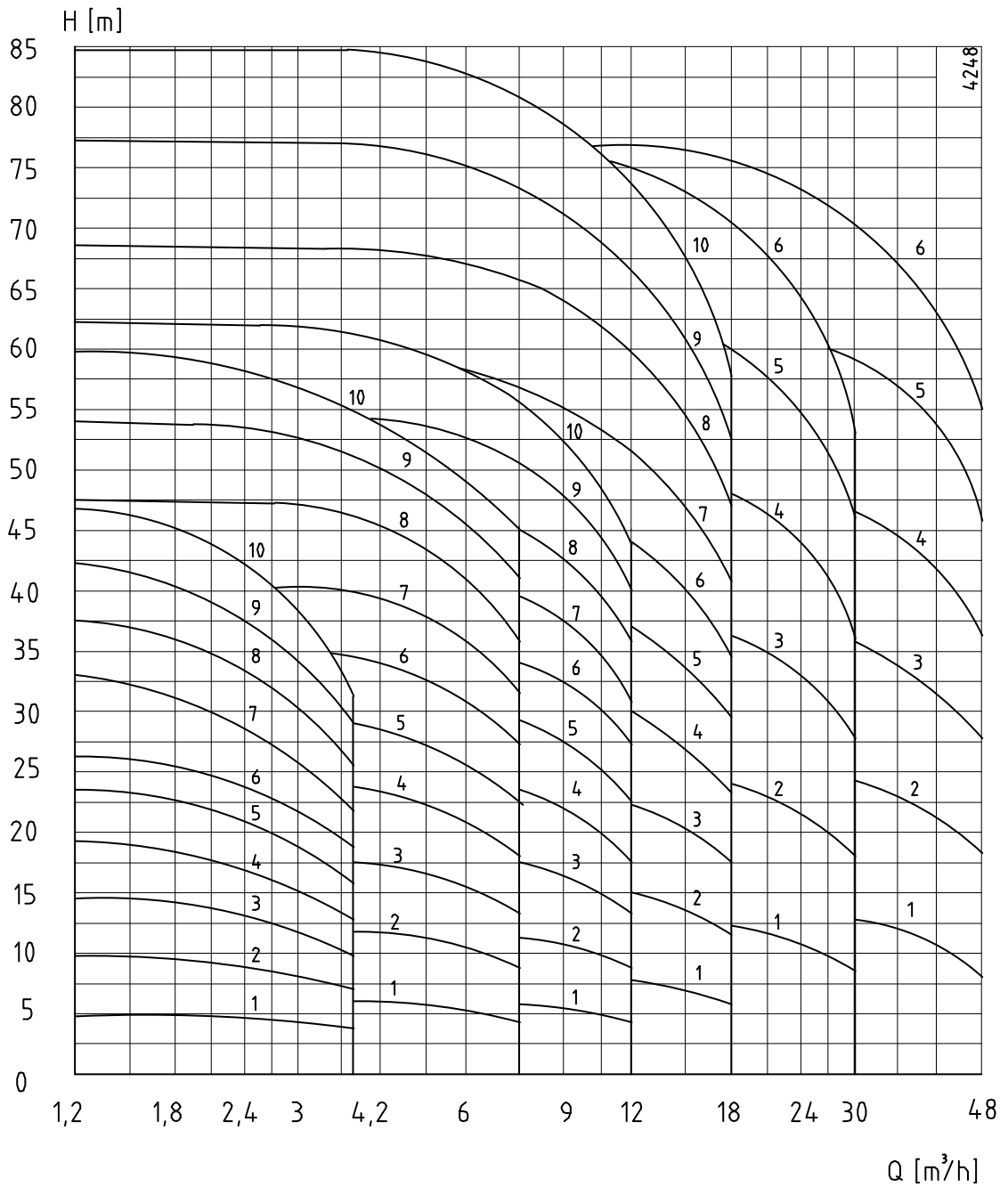
10.6.1 Performance overview 3000 min⁻¹



MCH 10	MCH 12,5	MCH 14a	MCH 14b	MCH 16	MCH 20a	MCH 20b
--------	----------	---------	---------	--------	---------	---------

Figure 47: Performance overview 3000 min⁻¹.

10.6.2 Performance overview 1500 min⁻¹



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

Figure 48: Performance overview 1500 min⁻¹.

10.6.3 Performance overview 3600 min⁻¹

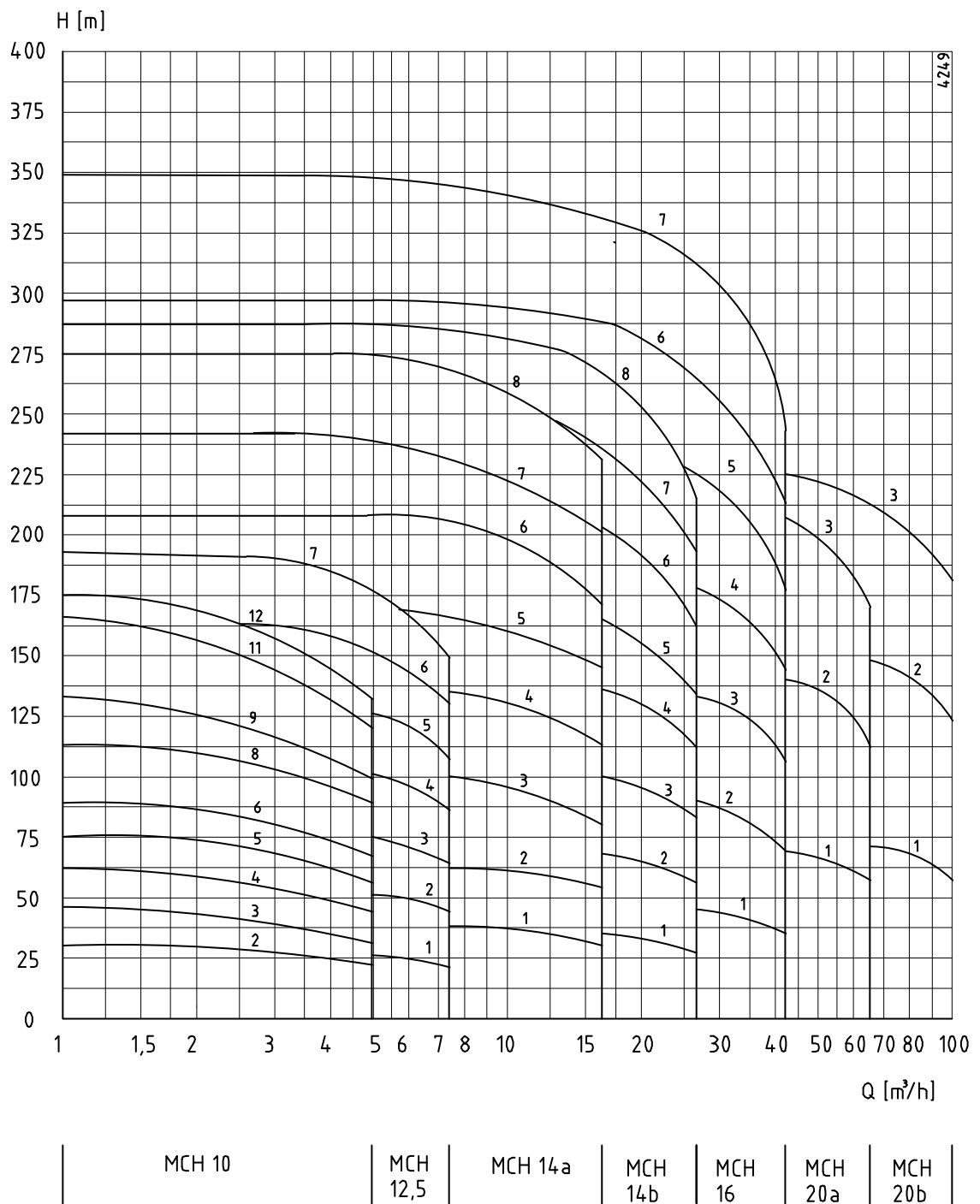


Figure 49: Performance overview 3600 min⁻¹.

10.6.4 Performance overview 1800 min⁻¹

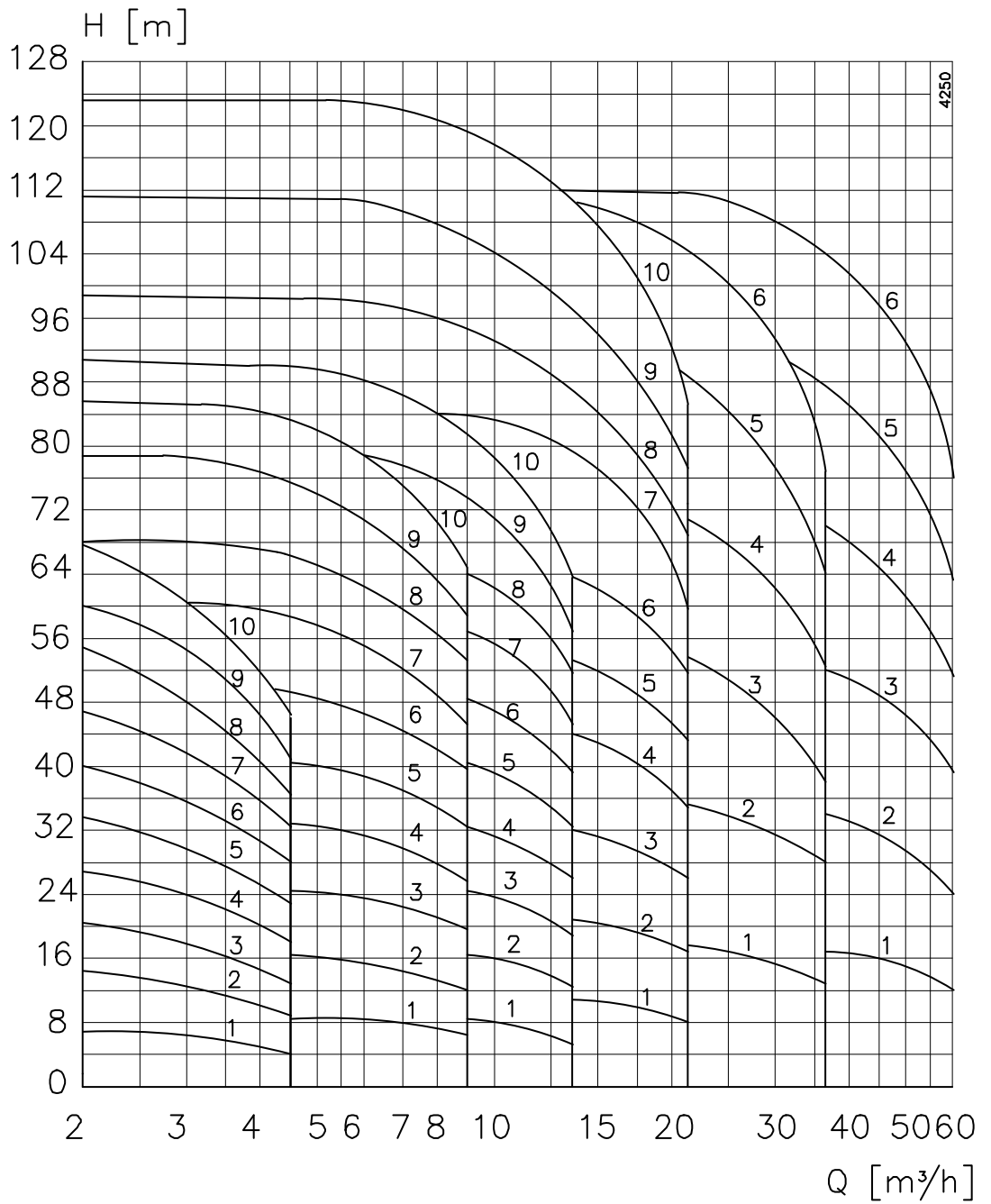


Figure 50: Performance overview 1800 min⁻¹.

10.7 Noise data

10.7.1 Pump noise as a function of pump power

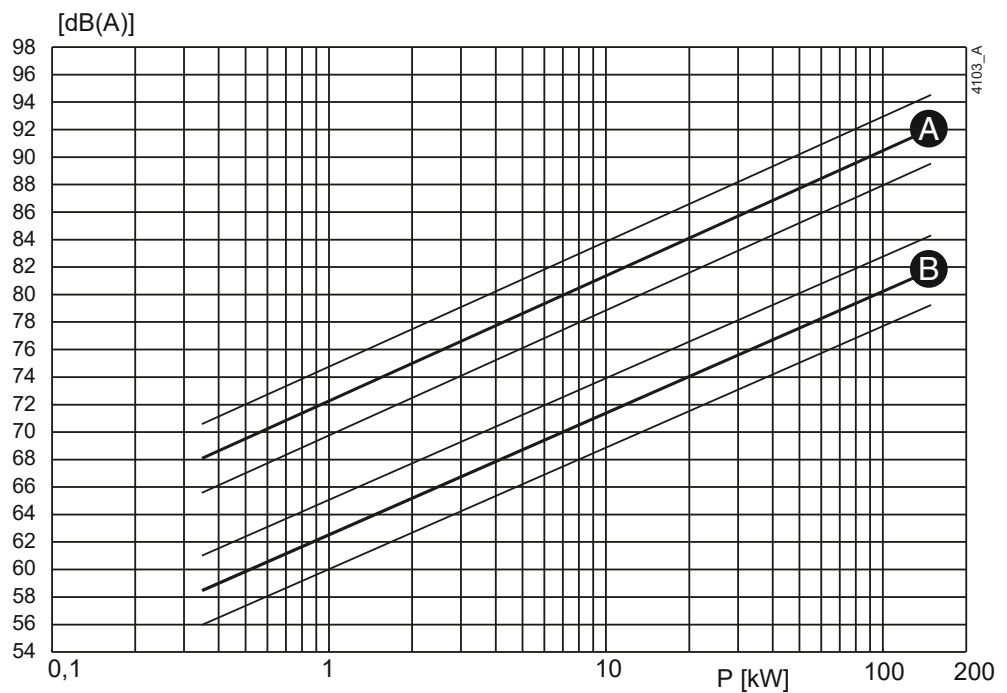


Figure 51: Noise level as function of pump power [kW] at 1450 min⁻¹
A = sound power level, B = sound pressure level.

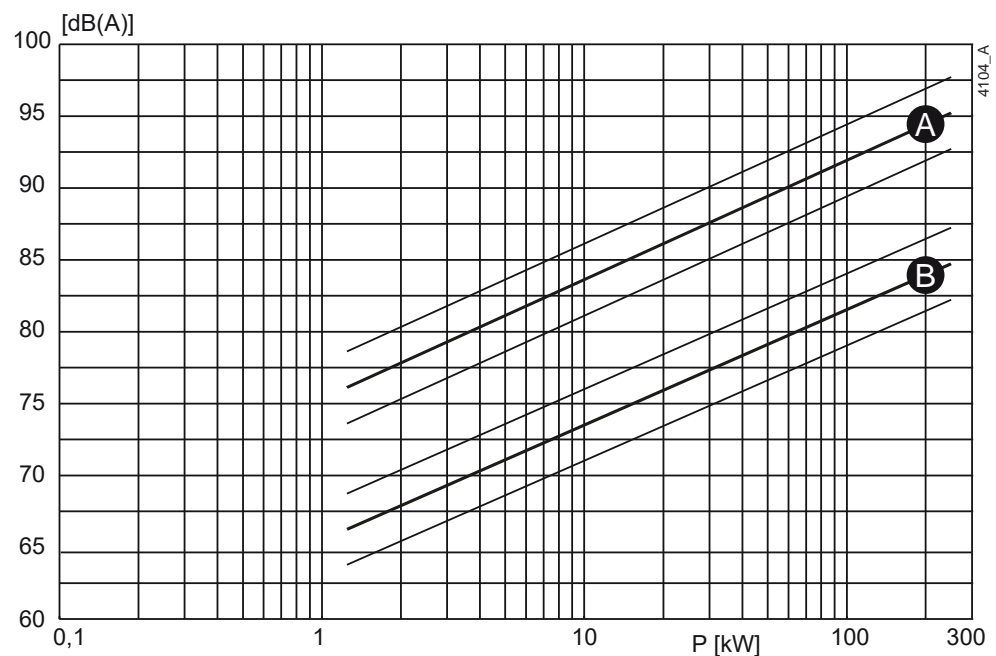


Figure 52: Noise level as function of pump power [kW] at 2900 min⁻¹
A = sound power level, B = sound pressure level.

10.7.2 Noise level of entire pump unit

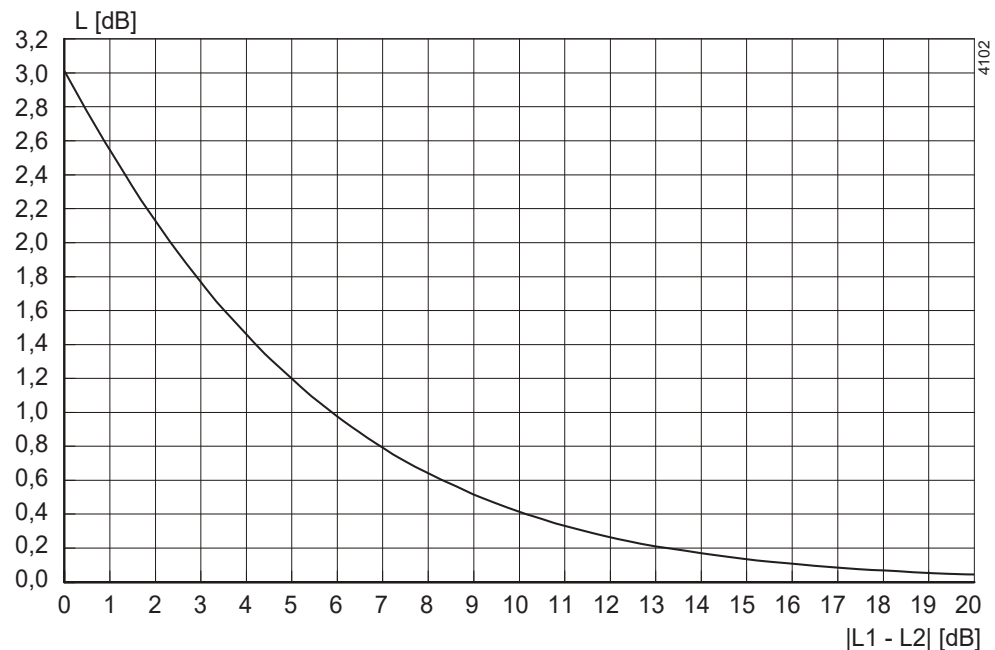


Figure 53: Noise level of entire pump unit.

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 51 or figure 52.
- 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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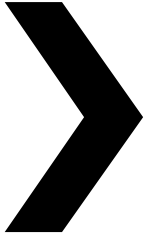
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MCH(S)(W)

Horizontal multistage pump

SPXFLOW®

Dr. A. F. Philipsweg 51
9403 AD Assen
THE NETHERLANDS

P: + 31 (0) 592 37 67 67
F: + 31 (0) 592 37 67 60
E: johnson-pump.nl@spxflow.com

www.spxflow.com/johnson-pump

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