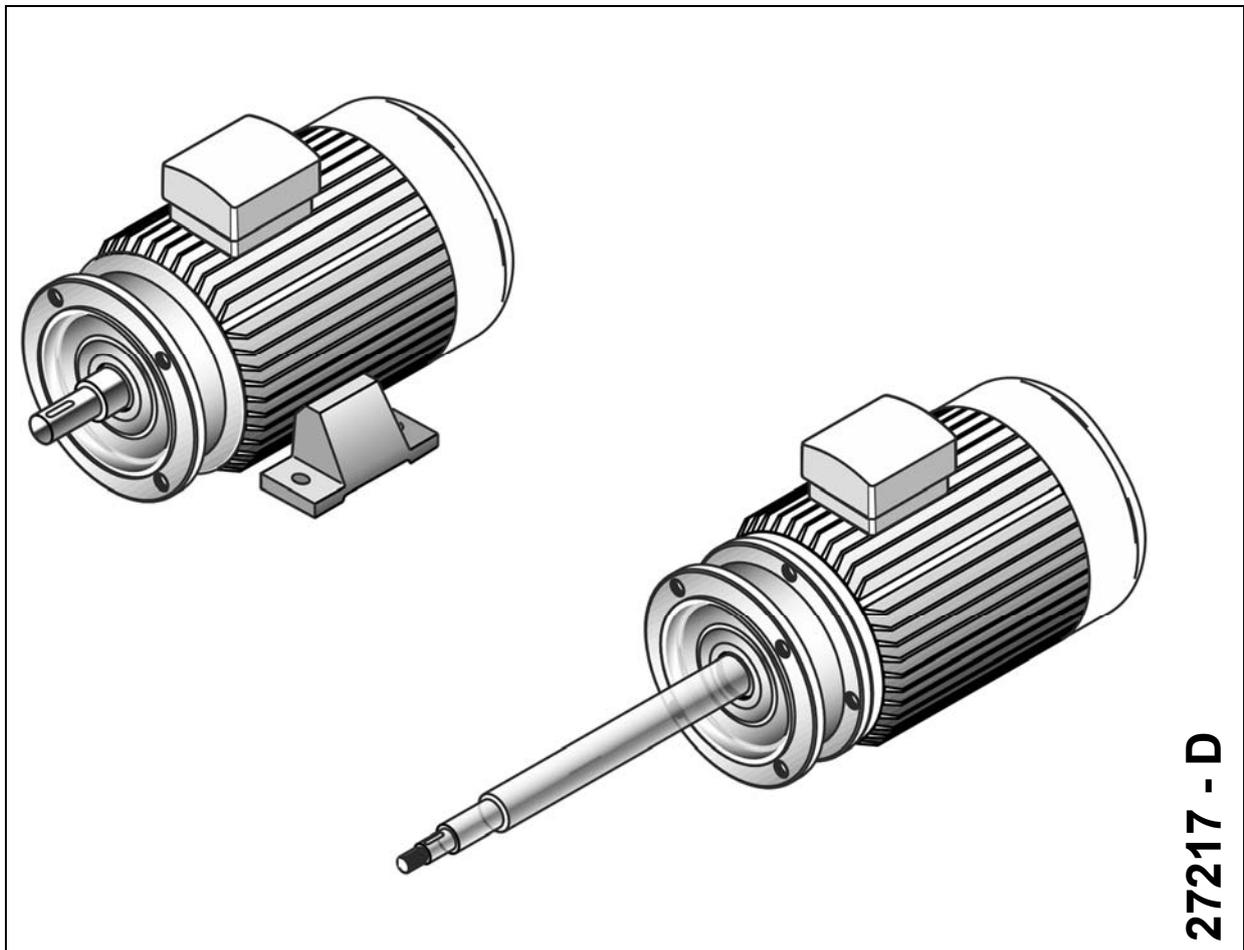


# Pump drives



## Operator's Manual

Translation of the original



27217 - D

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# 1 For your attention

## 1.1 General

The assembly instructions/operator's manual refer to asynchronous motors and exclusively to Schmalenberger special motors. The motor shaft is rigidly connected to the pump shaft and firmly integrated into the pump.

## 1.2 Proper use

The motors serve only as a drive for the centrifugal pumps produced by Schmalenberger.

The motors must not be used for other purposes.

Compliance with the information in these instructions and the associated operator's manual for the pump itself are a prerequisite for trouble-free operation of the pump and the fulfilment of any warranty claims.

The Declaration of Conformity or Declaration of Incorporation included with the pump instructions apply.

# 2 General information

## 2.1 General information



Low voltage machines have dangerous **live** and **rotating** parts, as well as possibly **hot** surfaces. All transport, connection, commissioning and maintenance work must be carried out by **qualified, responsible** technical personnel (observe EN 50110-1 / VDE 0105-1, IEC 60364).

Improper behaviour can cause serious **personal injury and property damage**.

## 2.2 Proper use

The low voltage machines are intended for **commercial** installations. They comply with the harmonised standards of the **EN 60034 / IEC 60034 / DIN VDE 0530** series.



**Use in explosion protection areas is prohibited unless expressly intended for this purpose (observe additional information). The regulations of the EN 60079 / VDE 0170 series apply to these motors.**

Standard motors are designed with a IP 55 protection class, but motors that are not specifically designed for outdoor installation should not be used outdoors. Air-cooled models are designed for ambient temperatures from **-20 °C to +40 °C** and installation altitudes of **< 1000 m** above sea level. Deviating specifications on the rating plate **must** be observed. The conditions at the installation site must comply with **all** rating plate specifications. In case of uncertainty, please contact the manufacturing plant.

Low voltage machines comply with the **Low Voltage Directive 2014 / 35 / EU**. **Commissioning** is prohibited until conformity of the end products with the relevant directives has been established (observe EN 60204 among others). For motors in explosion protection areas, the regulations according to EN 60079 according to **ATEX Directive 2014 / 34 / EU** also apply.

## 2.3 Transport, storage

Any damage detected after delivery must be reported to the transport company immediately; if necessary, commissioning must be omitted. Tighten screwed-in transport eyes firmly. They are designed for the weight of the low voltage machine; do not attach any additional loads. If necessary, use suitable, adequately dimensioned means of transport (e.g. rope guides). Lift motors only at the points provided for this purpose; do not lift on attachments e.g. condensers, cables, terminal boxes, etc.! **Remove existing transport safety devices** before commissioning. Use again for further transport.

If low voltage machines are stored, ensure a **dry, dust-free and low-vibration** ( $V < 0.2$  mm/s) environment (bearing downtime damage). Apply anticorrosive agent to treated surfaces (flange contact surface and free shaft end).

After a longer storage time of the motors (>12 months), the condition of the lubricant in the motor bearings must be checked. If there are visible signs of penetration of moisture or dirt, the bearings must be replaced or regreased.

If the storage period is > 4 years, the bearings must be replaced. If possible, e.g. if the motor is to be operated with a frequency converter, a grease distribution run of approx. 10 min. at 50 % nominal speed is generally recommended. Measure insulation resistance before commissioning. Dry the winding for values < 1.5 megaohm.

## 2.4 Installation

Ensure even support, good base mounting or flange mounting and exact alignment for direct coupling. Foundations must be designed to avoid deformation and resonance when the motor and driven machine are coupled. Normally the weight of a base frame is about 30 % of the total machine group to be installed on it. The driven machine and motor mass have a very strong influence on the resonance frequency. Turn motor shaft **by hand**, listen for unusual grinding noises. **Check direction of rotation** (observe "Electrical connection" section).

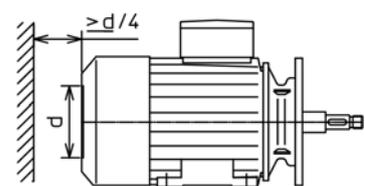
Mount or dismount the couplings **only** with suitable devices (heating!) and cover with a **contact safety device**.



Our block motors (pumps without shaft coupling) are balanced with a full key. The balancing of the standard motors is carried out with half-key balancing in accordance with the standards.

The design with shaft end pointing downwards (e.g. IM V1) must be equipped with a cover **by the customer** to prevent foreign bodies from falling into the fan.

Ventilation must **not be obstructed**; e.g. exhaust air from adjacent units must not be immediately sucked in again.



d = air inlet opening

## 2.5 Electrical connection

All work may only be carried out by **qualified** personnel on the **stationary** low voltage machine when it is **disconnected** and secured **against being switched on again**. This also applies to auxiliary circuits (e.g. space heating).

The available mains voltage and frequency must correspond to the rated data given on the motor rating plate. Motor operation is permitted in accordance with IEC 60034-1 or VDE 0530 with the voltage and frequency specifications on the rating plate plus a tolerance of  $\pm 5\%$  with respect to voltage and  $\pm 2\%$  with respect to frequency without a reduction in performance.

The electromagnetic compatibility of motors is influenced by the following factors with regard to interference emission.

- Depending on the type of converter (manufacturer and equipment), interference emissions can occur during converter operation. In this respect, the instructions of the converter manufacturers for EMC-compliant operation must be observed. Non-sinusoidal supply voltages during converter operation also increase the motor operating temperature.

Deviations from the curve shape symmetry increase heating and influence electromagnetic compatibility.

If thermal monitoring elements such as PTCs have been installed in the winding (customer's special request), this is noted on the rating plate and the connection of these elements must be made according to the circuit diagram. Observe wiring and deviating specifications on the rating plate as well as the extended connection diagram in the terminal box.

The connection must be made in such a way that a **permanently secure** electrical connection is maintained (no protruding wire ends); use assigned cable end fittings. Establish safe **protective conductor connection!**

There must be **no** foreign bodies, dirt or moisture in the terminal box. Junction boxes and unused cable entry openings must be sealed so that they are **dust-tight and watertight**. For trial operation without output elements, **secure the key**.

### 2.5.1 Operation on the converter:

For motors of the A, N, L and R standard model series, suitability for converter operation as "general purpose motors" according to VDE 0530-25 (IEC/TS 60034-25) for supply voltages up to and including 480 V is given. For a more precise clarification, the adjacent limit voltage characteristic curve can be used. The voltage peaks generated by the converter can be unfavourably influenced in their size by the cable between the converter and the electrical machine. In the "converter-line motor" system, the maximum value of the voltage peaks at the motor connection terminals must not exceed the values of the limit voltage characteristic shown.

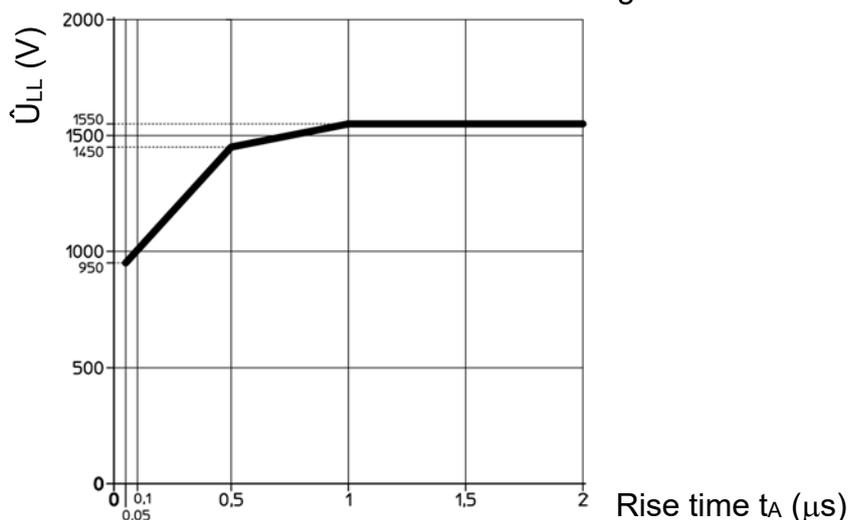


Fig. 1: Limit characteristic curve of the permissible pulse voltage  $\hat{U}_{LL}$  at the motor terminals as a function of the rise time  $t_A$  (diagram from VDE 0530-25)

If there are changes compared to normal operation (e.g. **increased temperatures, noises, vibrations**) determine the cause, possibly consult the manufacturer. Do not deactivate protective devices, even in trial operation. In **case of doubt**, switch off the low voltage machine. If there is a lot of dirt, clean the airways regularly.

Regrease bearings with relubrication device while the **low voltage machine is running**. Observe lubricants, lubrication intervals and grease quantities (lubrication plate). Bearings with lifetime lubrication (2Z or 2RS bearings) should be replaced after 20,000 hours, but at the latest after 3-4 years or according to the manufacturer's specifications.

## 2.6 Warranty

The warranty requires that these safety and commissioning instructions are observed as well as the instructions for any additional equipment. Further details are given in the following sections of the operator's manual.

The operator's manual contains information which is necessary for qualified personnel when using the electrical machines in industrial plants. Additional information and instructions for the use of the machines and non-commercial equipment are not contained in this operator's manual.

## 2.7 Model

The low voltage motors with cage rotor are surface cooled and equipped with grease lubricated roller bearings.

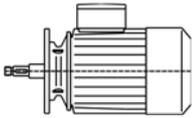
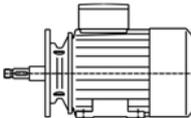
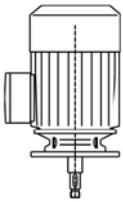
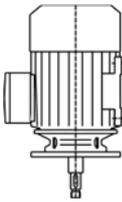
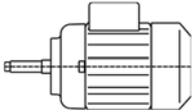
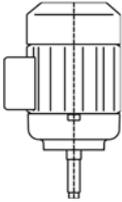
## 2.8 Designs

The table shows the most common designs. The basic design is indicated on the rating plate according to Code I, DIN EN 60034-7.

When installing, ensure correct mounting according to the design.

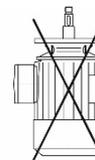
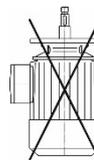
The IM V1, IM B35 and IM V18 basic designs can also be operated in the following other installation positions:

- IM V1 in IM B5
- IM B35 in IM V15
- IM V18 in IM B14

<b>Flange motors</b>			
<b>FF flange with through-holes</b>		All sizes	
IM B5 - Horizontal shaft		IM B35 - Horizontal shaft - Feet on the ground	
IM V1 - Vertical shaft downwards		IM V15 - Vertical shaft downwards - Feet at the wall	
<b>FT-flange with threaded holes</b>		Size ≤ 160	
IM B14 - Horizontal shaft		IM V18 - Vertical shaft downwards	



**Attention!**  
Never install in the  
" motor downwards" position.



## 2.9 Transport

Lifting eyes are provided on motors from size 100 for transport.



Check whether screwed lifting eyes are tightened firmly. Only attach motors to these lifting eyes. Always use two existing lifting eyes together.

The motor lifting eyes are **only suitable for the motor weight**. Additional components and loads attached to the motor must not be lifted with these lifting eyes.

### 2.9.1 Checking before set-up

Check whether the motor has been damaged during transport.

If external damage is detected after delivery, the transport company must be notified immediately.

#### **Prevent faults and thus avoid personal injury and property damage.**



The person responsible for system must ensure the following

- The safety instructions and operator's manual are available and observed.
- National accident prevention regulations are observed, e.g. those of the employers' liability insurance associations: "General regulations" (VBG 1 or BGV A1) and "Electrical systems and equipment (VBG 4 or BGV A2 + A3)".
- Operating conditions and technical data according to the order are observed.
- Protective devices are used.
- Prescribed maintenance work is carried out.

## 3 Set-up, assembly, installation

### 3.1 Set-up

Compare rating plate specifications with the available current type, voltage, frequency as well as the required power, speed and operating mode. Only use the motor in accordance with the stamped protection class according to EN 60034-5 / IEC 60034-5 / DIN VDE 0530-5 and only in the design provided by the manufacturer according to EN 60034-7 / IEC 60034-7 / DIN VDE 0530-7.



Maximum permissible coolant temperature (room temperature at installation site) 40 °C and permissible installation altitude up to 1000 m above sea level\* according to EN 60034-1 / IEC 60034-1 / DIN VDE 0530-1.

\* For other values, see rating plate



It must be ensured that the cooling air can flow unhindered to the air inlet openings and freely out through the air outlet openings and cannot be drawn in again directly. Cooling fins, suction and discharge openings must be protected against blockages and coarse dust.

### 3.2 Assembly

#### 3.2.1 Assembly on pump

##### 3.2.1.1 Preparations

The motor is normally supplied complete with the front bearing ("A" side).

Thoroughly clean the shaft and shaft ends to remove the corrosion protection agent. Make sure that the solvent does not get into the bearings.

Clean the flange surfaces on the pump housing or the bearing bracket.

Check that the flange connection of pump/bearing bracket and drive motor have the same dimensions.

Check whether the protection class of the motor corresponds to the requirements on site or in the plant.

Remove the parts to be reused from the old drive, e.g. impeller, mechanical seal, shaft protection sleeve, etc.

Check all dismantled parts that you want to reuse for wear and visible damage. Replace defective parts with new ones.

##### 3.2.1.2 Assembly

Place the motor on the connection flange of the pump housing or the counter flange of the bearing bracket. Make sure that the fit is correct.

##### **Flange centring edge tolerance according to EN 50347 (DIN 42948)**

- ISO j6 for  $\varnothing \leq 230$  mm
- ISO h6 for  $\varnothing > 230$  mm

Tighten the fastening screws evenly crosswise. The tightening torque depends on the screw diameter and should never be exceeded.

### Tightening torques for standard threads DIN 13

Thread:	Tightening torque [Nm] for screws:		
	on plastic parts	on cast parts	on bare steel parts
<b>M8</b>	7	10 - 15	20
<b>M10</b>	8	25 - 35	40
<b>M12</b>	10	30 - 40	70
<b>M16</b>	--	60 - 90	160
<b>M20</b>	--	80 - 110	--

These figures apply to new screws, unlubricated. The table values do not apply if deviating values are indicated on complete drawings or by other instructions.

Mount the parts removed from the old drive onto the motor shaft. Observe the installation instructions in the operator's manual of the centrifugal pump, see "**Repair**" chapter. After completion of assembly, check the free running of the motor by hand by turning the pump impeller through the suction opening.

If this work is completed without complaint, the pump can be reinstalled in the pipework system.

## 3.3 Installation

The connection must be carried out by a specialist in accordance with the applicable safety regulations. The relevant installation and operating regulations as well as local, national and international regulations must be observed.



Observe rating plate specifications!

Observe information in the documentation, dimension drawing!

Observe rated current for circuit breaker setting!

Connect motors according to the circuit diagram provided in the terminal box!

The motor must be protected against impermissible heating, e.g. with a motor protection switch.

Protective winding contacts do not provide protection when the rotor is blocked.

## 4 Electrical connection

### 4.1 Connection, insulation resistance

The terminal box of the motor normally contains a terminal plate with 6 terminals for motors with one speed.

Example: Voltage specifications 400/230 V (Y/Δ).

This means:

for star connection **Y**

high voltage.

Example: 400 V

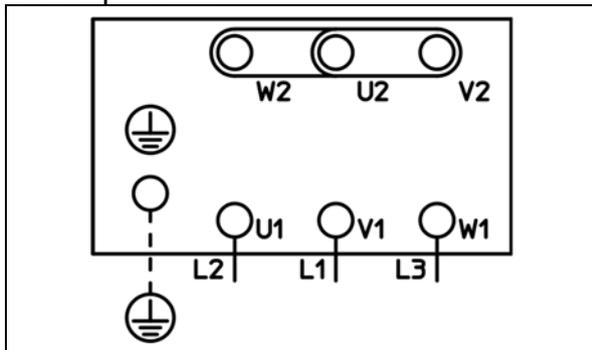


Fig. 2: Connection diagram for Schmalenberger pumps in circuit Y

for delta connection **Δ**

low voltage.

Example: 230 V

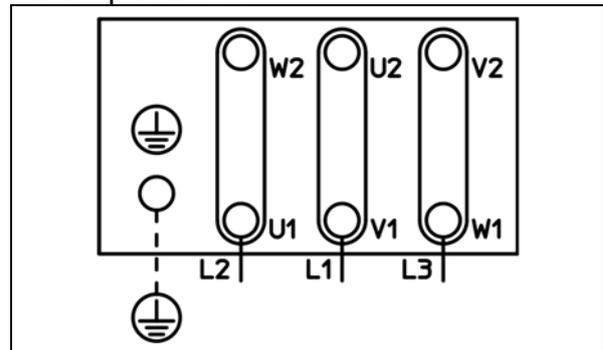


Fig. 3: Connection diagram for Schmalenberger pumps in circuit Δ



Each motor contains a circuit diagram in the terminal box. The temperature sensors for monitoring the winding or bearing temperature, which are installed on special order, must be connected via the additional terminals provided in the terminal box. The connection is made according to the existing circuit diagram. **For motors with explosion-proof design, only ATEX-certified terminal plates are to be used. The cable glands and plugs in the terminal box must also be certified according to ATEX.** Strain relief must be provided for the connecting cables and the supply line cross-sections must be adapted to the rated current intensity.

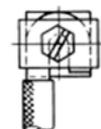


Depending on the thread size, the screw connections must be tightened to the tightening torques specified below:

Thread size	M4	M5	M6	M8	M10
Torque	1.2 Nm	2 Nm	3 Nm	6 Nm	10 Nm.

It is essential to connect the protective conductor to the marked protective conductor terminal according to DIN VDE 0100. Use the original seal when closing the terminal box. Seal inlet openings that are not required so that they are dust-tight and watertight.

For terminal boards with U-shaped terminal brackets, the conductors to be connected must be placed under the terminal brackets bent in a U-shape. See sketch!



After long periods of storage or downtime, the insulation resistance of the winding, phase to phase and phase to ground, must be measured before commissioning. Moist windings can lead to leakage currents, flashovers and breakdown. The insulation resistance of the stator winding must be at least 1.5 megaohm for motors for 220-1000 V measured at a winding temperature of 20 °C. For lower values, the winding must be dried. The condition of the motor insulation can be reliably determined with suitable measuring instruments by determining the polarisation index or the dielectric absorption current (DAR).

## 4.2 Direction of rotation

The pumps are only suitable for one direction of rotation.



Always check the direction of rotation **after** connection and **before** commissioning. The correct direction of rotation is marked by an arrow on the motor hood.

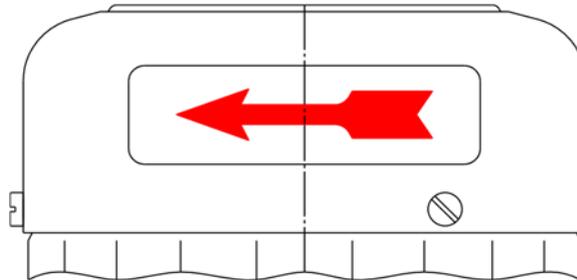


Fig. 4: Examples: Arrow on the motor hood for clockwise rotation



In accordance with VDE 0530-8, the three-phase motors are always switched for anti-clockwise rotation when viewed from the motor hood. If the pumps are to rotate to the right when viewed from the motor hood (Fig. 4), any two phases e.g. L1 and L2, of the mains cable in the motor terminal box must be interchanged.

Connection for clockwise rotation, see Fig. 2 and Fig. 3.

Also observe the information in the operator's manual of the centrifugal pump, "**Electrical connection**" chapter, direction of rotation check topic.

### 4.3 Change of direction of rotation

The direction of rotation can be reversed for direct activation and pole-changing motors with separate windings by exchanging any mains conductor on the motor terminal board.

For motors with star/delta start-up and pole-changing motors with Dahlander winding, 2 mains conductors must be exchanged at the feed to the motor switch.

For forced ventilation, the direction of rotation is marked separately by an arrow on the forced ventilation unit.

### 4.4 Check before commissioning



- Observe rating plate specifications!
- Check that the voltage and frequency of the motor correspond to the mains values.
- Check that the direction of rotation is correct and that the limit speed is not exceeded during converter operation.
- Check that the motor is properly protected!
- Check and ensure that with star/delta start-up, due to the risk of impermissible operating loads, the changeover from star to delta only takes place when the starting current of the star stage has decayed.
- Check that the electrical connections are firmly tightened and that the monitoring equipment is properly connected and adjusted!
- Check coolant temperature!
- Check that additional equipment - if present - is functional.
- Check that air intake openings and cooling surfaces are clean!
- Check that protective measures have been implemented; grounding!
- Check that the motor is properly secured!
- Check that the terminal box cover is firmly closed, the cable entry and the unused cable entry openings at the terminal box are properly sealed.

### 4.5 Bearings and lubrication

The bearings of surface-cooled motors up to size 160M have permanent lubrication as standard. For normal coolant temperatures (-20 °C to +40 °C, see EN 60034-1 / IEC 60034-1 / DIN VDE 0530-1 or sec. 2.2 of these instructions) the bearings are filled with grease at the manufacturing plant, which under normal conditions only needs to be renewed after several years.

For surface-cooled motors with relubrication device, relubrication is carried out using a grease gun via the 636 grease nipples attached to the bearing shields.

**Only carry out relubrication during operation.**



The relubrication interval, grease quantity and grease quality are indicated on the information plates on the motor.  
However, relubrication must be carried out at least once a year.



Extending the relubrication interval endangers the bearing and carries the risk that the sealing caused by the grease deteriorates and dust can penetrate into the bearing. After a long downtime period it is also recommended to carry out relubrication for brand-new motors during commissioning. Note the saponification type of the lubricant. Relubrication with a grease of a different saponification base leads to signs of decomposition and cancellation of the lubricating effect when mixed and can lead to the destruction of the bearings.



**Faulty bearings must be replaced!**

## 4.6 Condensation water holes

Depending on the installation position, the condensation water holes are located in the A-side or B-side bearing shield or housing.

Condensation water drain holes must be located at the lowest point of the motor after installation. Open the closed condensation water holes from time to time for drainage, then close them again.

## 4.7 Connection spaces, terminals, cooling air ducts



- At certain intervals depending on the operating conditions:
- Check that the connection spaces and terminals are clean
  - Check that the electrical connections are tight
  - Clean the cooling air ducts.

The suction openings and the cooling surfaces must be protected against clogging and contamination.

Do not use sharp-edged tools for cleaning.

## 4.8 Additional equipment

Temperature sensors and forced ventilation are only available on special order. Additional equipment must be connected according to the valid circuit diagram. The regulations and instructions in the "Connection" section apply to the connection.

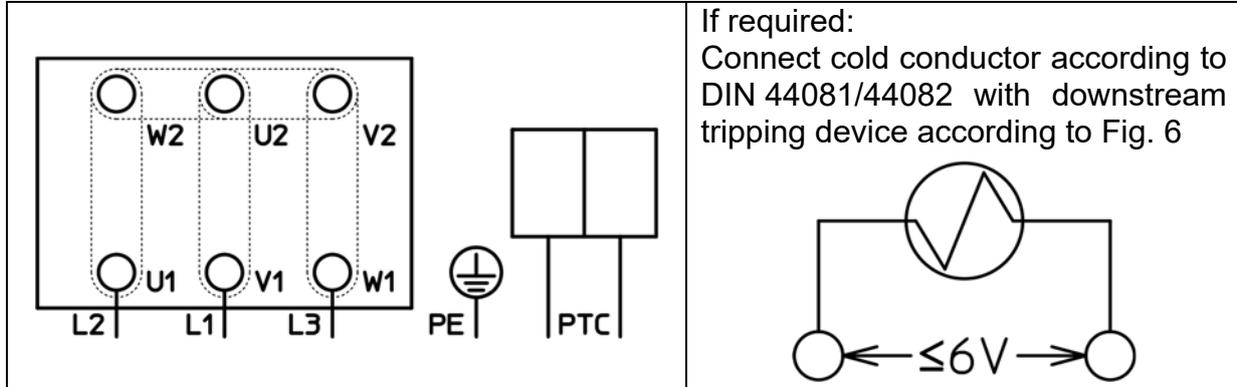


Fig. 5:

If required:  
Connect cold conductor according to DIN 44081/44082 with downstream tripping device according to Fig. 6

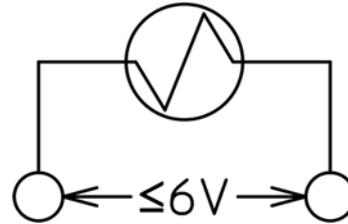


Fig. 6: Connection diagram for cold conductors

## 4.9 Spare parts

When ordering spare parts, always specify type, motor number and spare part designation. The type and motor number can be found on the rating plate.

# 5 Notes for explosion-proof motors

## 5.1 General

The increased danger in areas subject to the danger of explosion requires particularly careful attention to the general safety and commissioning instructions which apply specifically to the ex-motors (ex topic).



### Attention!

For explosion protection areas according to Directive 2014 / 34 / EU, special additional operating instructions for the pumps and for the motor must be observed.

## 5.2 Proper use



Explosion-proof electrical machines comply with the standards of the EN 60034, EN 60079 / VDE 0170 series. They may only be used in areas subject to the danger of explosion in accordance with the relevant supervisory authority. This supervisory authority is also responsible for determining the risk of explosion (zone classification).

Type of ignition protection, temperature class and special requirements are specified on the rating plate or in the conformity or EC type examination certificate.

## 6 Maintenance

### 6.1 Maintenance work



**Caution!**

Before starting any work on the motor, the motor must be disconnected from the power supply and secured against unintentional switch-on.

### 6.2 Motor bearings



Observe information in section 4.5 of this manual!

Relubricate the roller bearings in the AS flange with 15 g (7212) and 25 g (7310) high temperature grease (-40 °C to 180 °C, e.g. A72 Asonic). Relubrication via grease nipple 636.

#### 6.2.1 Replacing bearings at the B-bearing shield

To change the bearing in the **B-bearing shield**, proceed as follows:

- Remove the fan hood, fan and tolerance ring.
- Remove the tie rods/fastening screws depending on motor size.
- Remove the B-bearing shield from the stator.
- Pull the B-bearing shield off the motor shaft.
- Dismantle the shim.
- Remove defective bearing, clean B-bearing shield and replace bearing with a new one. (For data, see chapter 8 Spare parts).
- Clean all parts and reassemble in reverse order.
- Before installing the fan hood on the fan wheel, turn it and check that the motor/pump runs freely.

#### 6.2.2 Replacing bearings at the A-bearing shield

A bearing replacement at the A-bearing shield can only be carried out when the pump is disassembled.

Observe the instructions and the procedure in the "**Repair**" chapter of the operator's manual for the centrifugal pump.

After removing the pump and dismantling the impeller and shaft seal, the motor can be separated from the pump.

Proceed as follows to change the **A-side motor bearing**:

- Remove the fan hood, fan and tolerance ring.
- Remove the tie rods/fastening screws depending on motor size.
- Remove the B-bearing shield from the stator.
- Pull the B-bearing shield off the motor shaft.
- Remove the A-bearing shield from the stator.
- Remove the stator from the A-bearing shield.
- Remove the bearing cover/safety ring in the A-bearing shield.
- Pull the A-bearing shield off the motor shaft.
- Remove defective bearing, clean A-bearing shield and replace bearing with a new one. (For data, see chapter 8 Spare parts).
- Replace motor shaft seal.
- Clean, dry and electrically check the stator winding (see section 2.3).

- Clean all other parts and reassemble in reverse order.
- Install the motor/pump unit according to the instructions in the operator's manual for the centrifugal pump; "**Repair**" chapter.
- Check for free movement of motor and pump.
- Installation of the pump into the pipework system.



**Use only original spare parts for repairs!**

### **Note**

If you need the help of our customer service, please prepare the following data:

- Rating plate data, motor/pump no.
- Extent of the fault
- When and how did the fault occur
- The probable cause.

Observe the recommendations and information in the operator's manual for all work on Schmalenberger motors.

Ask our customer service for advice in good time before you start work that is not clear to you!

### **Customer Service:**

Please visit our homepage at:  
[www.schmalenberger.de](http://www.schmalenberger.de)

Address of main office:

Schmalenberger GmbH+Co. KG  
Postfach 2380  
D-72072 Tübingen, Germany  
Phone: + 49 (0) 7071 - 7008-0  
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## 7 Faults and remedies

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
Motor does not start	Supply line interrupted Fuse defective Motor protection has tripped Motor protection does not switch, fault in the controller	Check and correct connections Replace fuse Check motor protection setting, correct if necessary Check the controller of the motor protection, eliminate faults if necessary
Motor does not start or only starts with difficulty	Motor designed for delta connection but connected as star/incorrect connection 1 or 2 phases missing Counter torque too high Mains voltage too low	Check and correct connection Check pump load torque Check and improve mains conditions, check supply line cross sections
Motor starts only in delta connection, not in star connection	Torque for star connection too small Contact fault on switch	If delta switching current is not too high, switch on directly, otherwise check motor/pump design Eliminate fault
Wrong direction of rotation	Motor connected incorrectly	Replace two phases in the terminal box
Motor hums and has high current consumption	Winding defective, rotor jammed, pump stuck	Take the motor to a specialist workshop for repair
Fuses or motor protection tripped	Short circuit in the supply line or motor Motor connected incorrectly Earth fault in the motor Overload	Eliminate the short circuit, take the motor to a specialist workshop Correct the circuit Have the engine repaired in a specialist workshop Compare rating plate data
Speed reduction under load	Motor overload Mains voltage drops	Carry out power measurement, if necessary check motor/pump design Check the mains, increase the cross-section of the supply cable

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
Motor becomes too warm (temperature measurement)	<p>Overload</p> <p>Insufficient cooling</p> <p>Motor connected in delta instead of star</p> <p>Supply line has contact difficulties (two-phase operation)</p> <p>Fuse has tripped</p> <p>Mains voltage deviates by more than 10% from the nominal voltage</p> <p>Nominal operating mode exceeded (S1 to S9, DIN 57530), e.g. due to excessive switching frequency</p> <p>Insufficient ventilation</p>	<p>Carry out power measurement, if necessary check motor/pump design</p> <p>Ambient temperature too high, clean cooling air ducts</p> <p>Correct the circuit</p> <p>Eliminate loose contact, tighten terminals</p> <p>Replace fuse, search for cause and eliminate</p> <p>Take suitable measures to adjust the mains voltage to the nominal motor voltage, replace motor if necessary</p> <p>Adjust the nominal operating mode of the motor to the operating conditions, if necessary design a new drive</p> <p>Check cooling air ducts, clean if necessary</p>
Motor noise too loud	<p>Rolling bearings dirty or defective</p> <p>Vibration due to imbalance</p> <p>Wear at the pump</p>	<p>Check or replace rolling bearings</p> <p>Eliminate unbalance</p> <p>Perform general overhaul of motor and pump</p>
Motor not running quietly	Machine mounting too unstable	Check attachment

## 8 Spare parts list and drawing

### 8.1 Notes on ordering spare parts

1. When ordering spare parts, please also note any special models

e.g.:

- quiet operation, fan wheel depending on direction of rotation
- other material for fan wheel or BS flange
- - AS flange - in-house flanges for our HL type

The standard model shown may differ from the delivered model. Please refer to your pump specification.

2. "BIT wrench" special tool necessary for tension bolt with ratchet teeth. Only size 063 - 132

3. Type NB - also applies to pump types: FB, SM, WP, F, WK

4. Type Z - also applies to pump types: S, FZ, NZ, SZ, NZ, ZH, KSP, FZC

Item	Size	Type	As flange diameter	Information (see sec. 8.1)
8.2	063	Z	ø 160	1. + 2. + 4.
8.3	071	Z	ø 160	1. + 2. + 4.
8.4	080	Z	ø 160	1. + 2. + 4.
8.5	080	NB	ø 185	1. + 2. + 3.
8.6	090 L	Z	ø 160	1. + 2. + 4.
8.7	090 L	NB	ø 185	1. + 2. + 3.
8.8	100 L	Z	ø 160	1. + 2. + 4.
8.9	100 L	NB	ø 185	1. + 2. + 3.
8.10	112 M	Z	ø 160	1. + 2. + 4.
8.11	112 M	NB	ø 185	1. + 2. + 3.
8.12	132 S, M	NB,	ø 185	1. + 2. + 3.
8.13	132 S, M	NB, Z	ø 250	1. + 2. + 3 + 4.

8.14	160 M, L	NB	ø 185	1. + 3.
8.15	160 M	Z	ø 250	1. + 4.

8.16	160 L	Z	ø 300	1. + 4.
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8.17	180 M, L	NB, Z	ø 300	1. + 3. + 4.
8.18	200 L	NB, Z	ø 300	1. + 3. + 4.

**8.2 – 8.13**

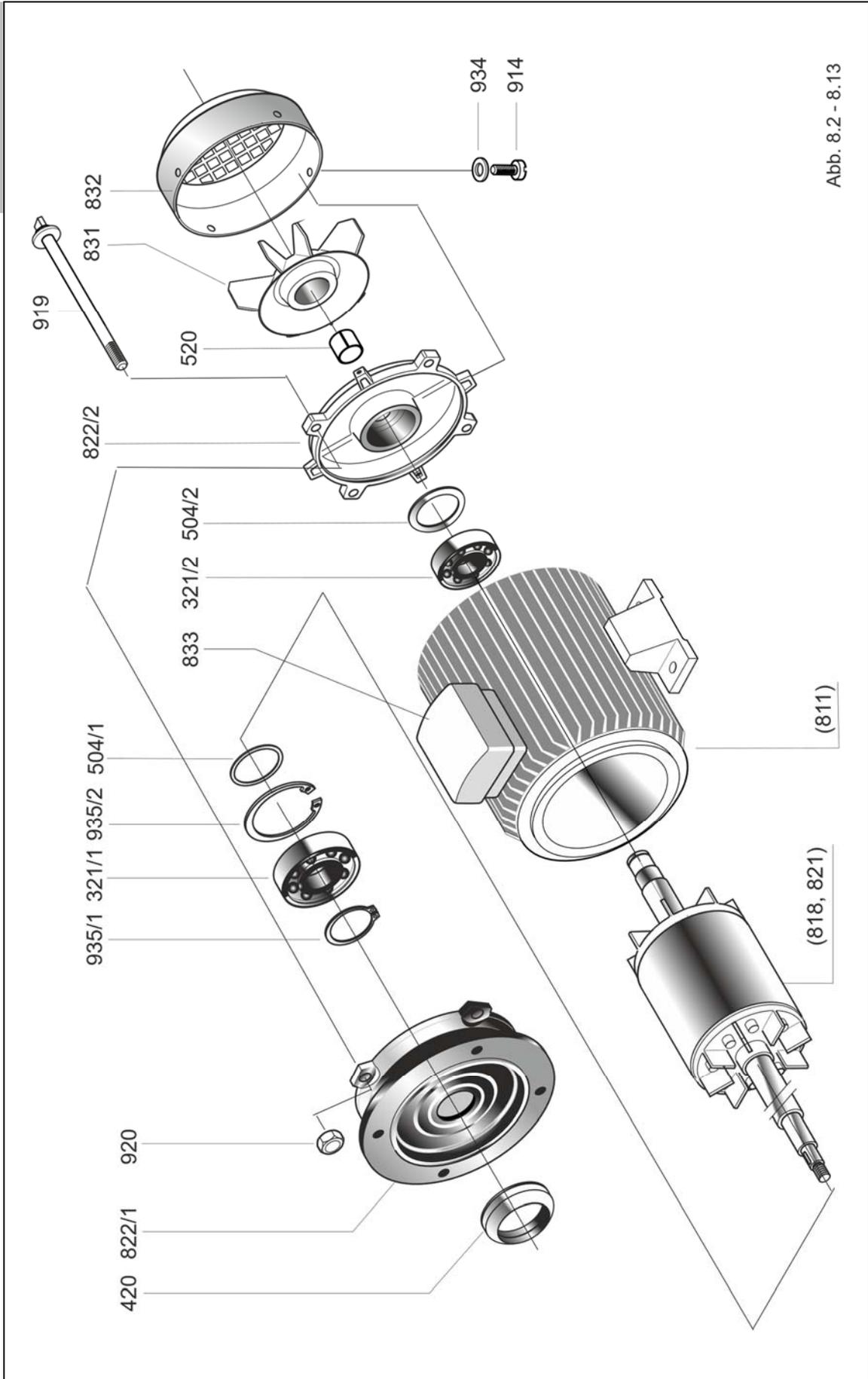


Abb. 8.2 - 8.13

**8.14 – 8.15**

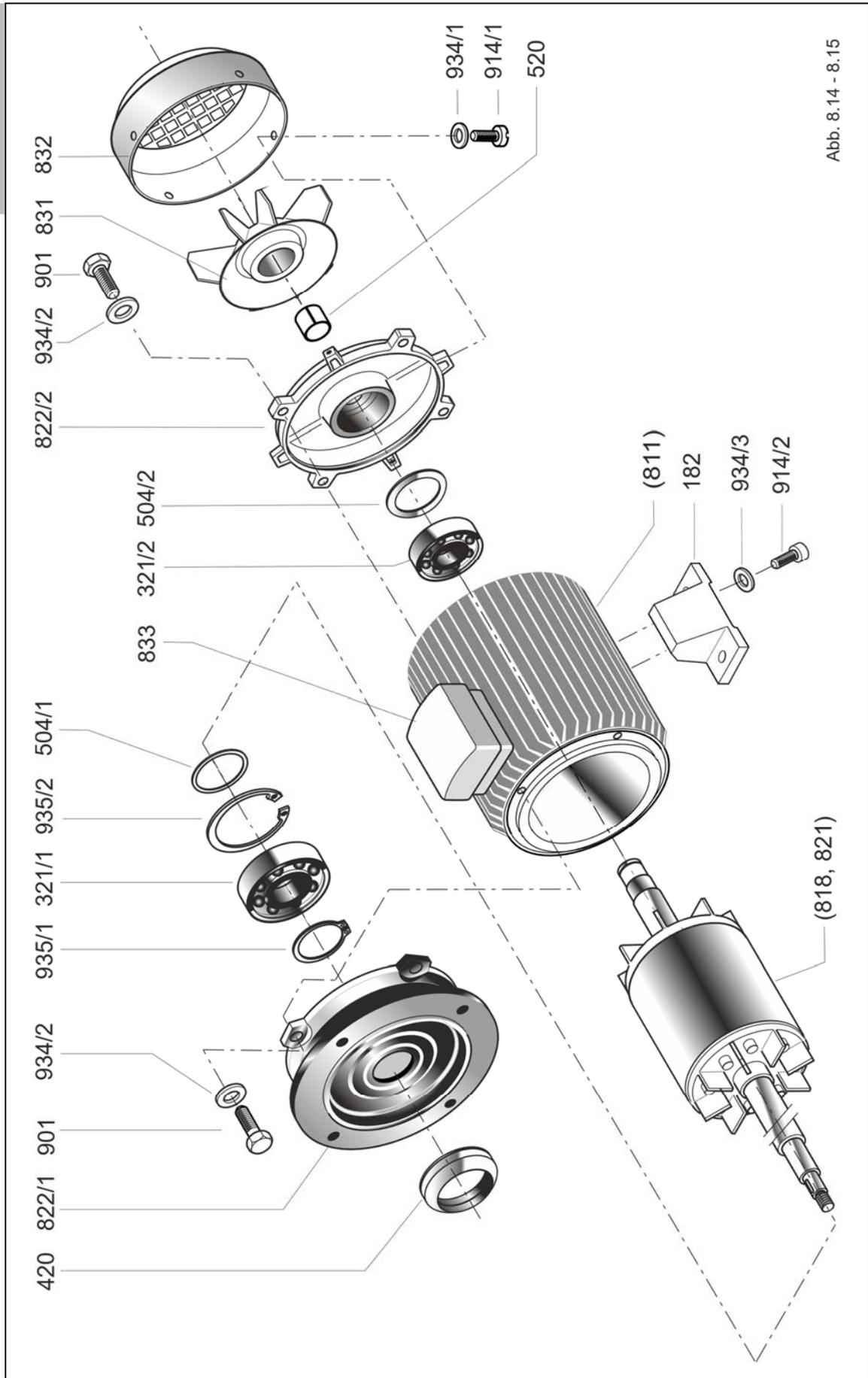


Abb. 8.14 - 8.15

**8.16**

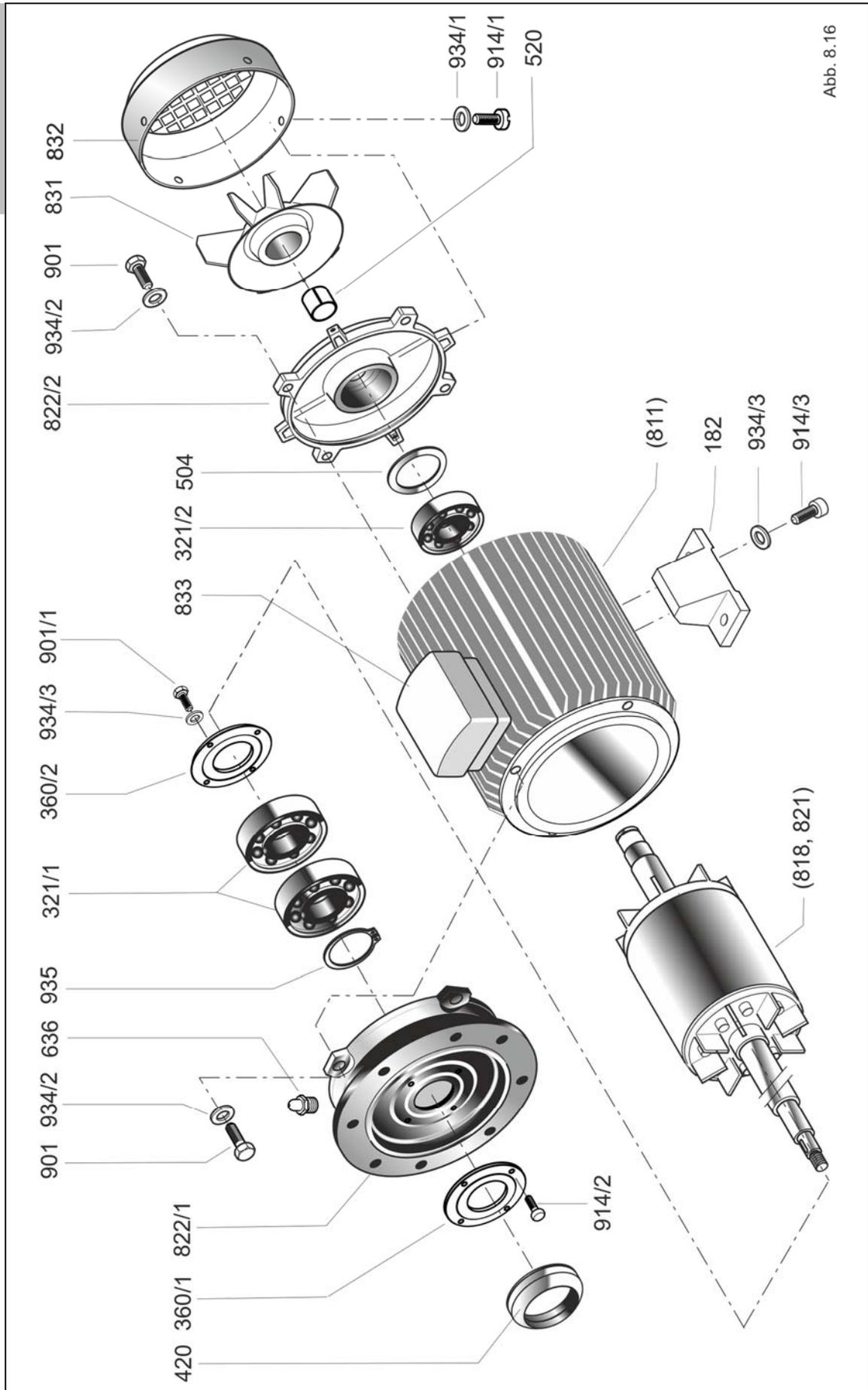


Abb. 8.16

**8.17 – 8.18**

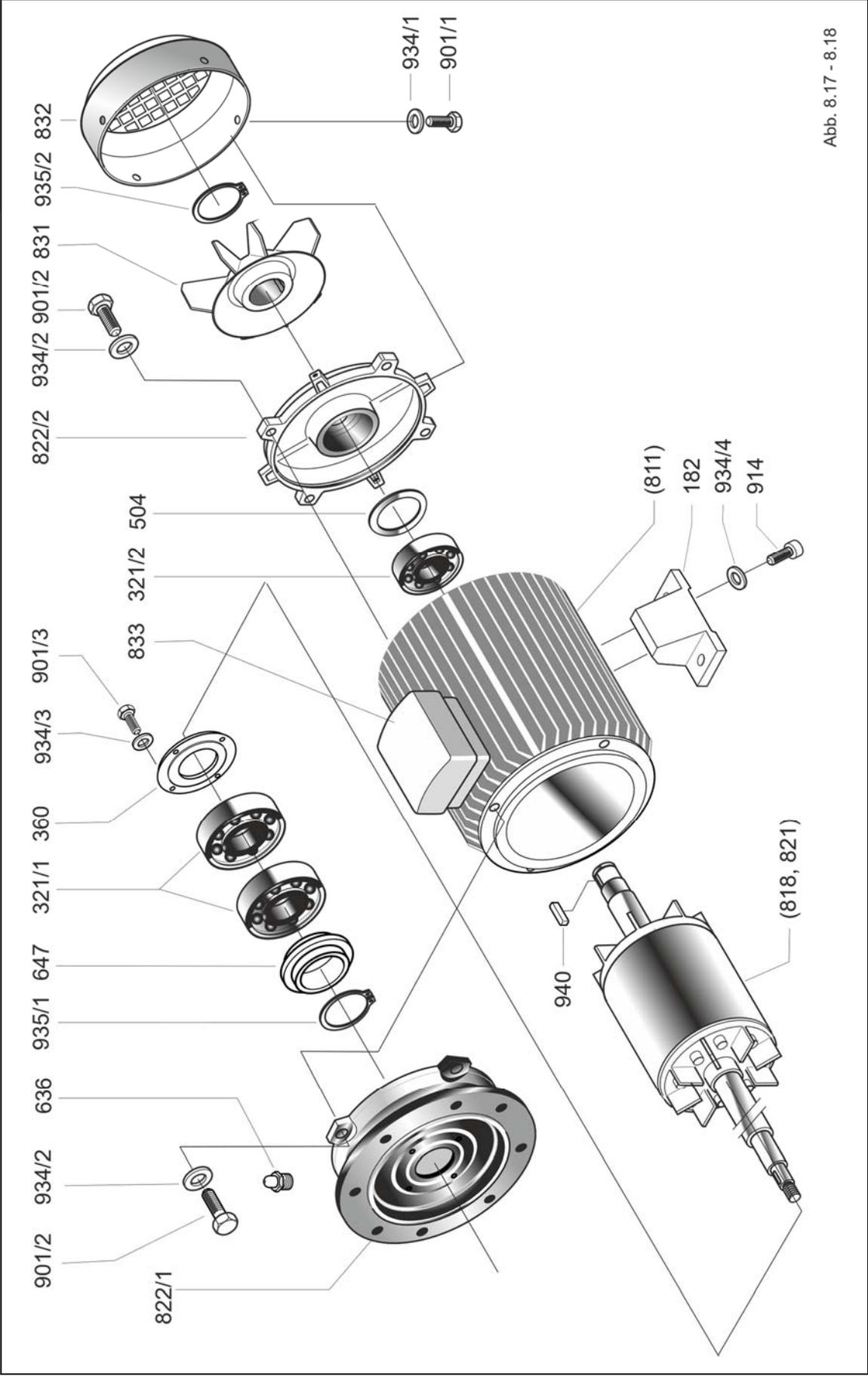


Abb. 8.17 - 8.18

## Complete spare parts list

Pos.:	Qty.	Designation:	Comment:
182	2/-	Motor mount	
321/1	1/2	Ball bearing	
321/2	1	Ball bearing	
360	1	Bearing cover	
360/1	1	Bearing cover	
360/2	1	Bearing cover	
420	1	Shaft sealing ring	
423	1	Labyrinth ring	(only in old model)
504	1	Ball bearing shim	
504/1	1	Supporting ring	
504/2	1/2	Ball bearing shim	
520	1	Tolerance sleeve	
636	1/-	Grease nipple	
647	1	Grease quantity regulator	
811	1	Motor housing with stator package	
818	1	Rotor	
821	1	Rotor package	
822/1	1	Flanged bearing shield AS	
822/2	1	Bearing shield BS	
831	1	Fan wheel	
832	1	Fan hood	
833	1	Terminal box	
901	8	Hexagon screw	
901/1	4	Hexagon screw	
901/2	8/4	Hexagon screw	
901/3	4	Hexagon screw	
914	4/-	Cylinder screw	
914/1	4	Cylinder screw	
914/2	4	Cylinder screw	
914/3	4/-	Cylinder screw	
919	3/4	Tension bolt	(Observe note 2 in sec. 8.1)
920	3/4/-	Hexagon nut	

Pos.:	Qty.	Designation:	Comment:
934	4/-	Snap ring	
934/1	4/-	Snap ring	
934/2	8/-	Snap ring	
934/3	4	Snap ring	
934/4	4	Snap ring	
935	1	Retaining ring	
935/1	1	Retaining ring	
935/2	1	Retaining ring	
940	1	Feather key	

Not all parts are installed in every motor.





Importer:  
IPP - Industrial Process Pumps Ltd.  
22-30 Dunton Close, West Meadows Industrial Estate  
Derby DE21 6XB  
United Kingdom  
[www.ipp-group.com](http://www.ipp-group.com)

Manufacturer:

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