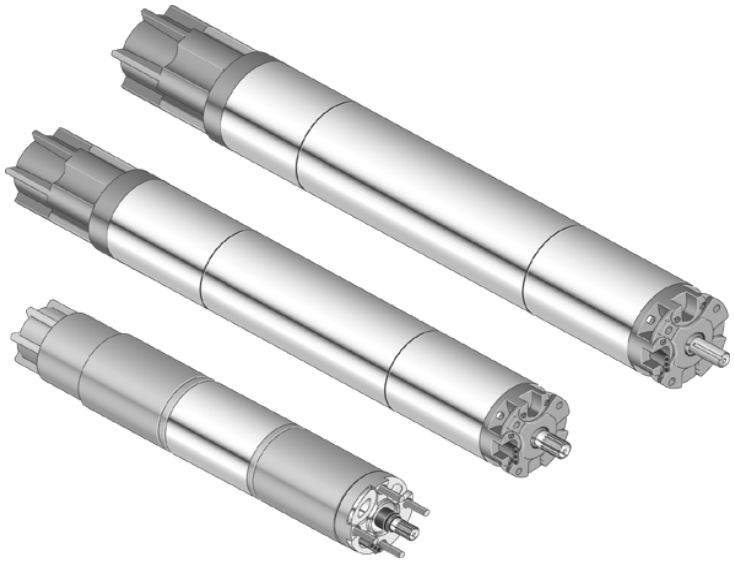

6", 8" and 10" Rewindable Submersible Motors

GB

– Assembly and operating instructions

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Attention: The motors must only be used in strict compliance with these instructions. Keep this manual close at hand, so that you have it available whenever questions arise!

1. Technical information

1.1. Technical data

1.1.1. Design principle:

Rewindable 2-pole asynchronous motor with water lubricated friction bearings, with two different versions of windings:

- Standard: PVC insulated winding wire,
- Optional: PE2/PA insulated winding wire.

Model - No.: 6" 262...,
8" 263...,
10“ 264...

The data 6“, 8“ and 10“ refer to the smallest well tube diameter into which the motor can be submersed. The exact dimensions can be taken from the technical data sheets (see appendix page A,B,C).

Rating: 6" 4 kW to 37 kW
8" 30 kW to 93 kW
10“ 85 kW to 185 kW

Voltage range:
220V ... 690V, 3~ 50 / 60 Hz
Options up to 1000V on request.

Voltage tolerance:
+6%/-10% of UN, i.e. at 380 - 415V
415V + 6% = 440V
380V -10% = 342V

Rotational speed:
approx. 2900 rpm at 50 Hz

Starting variations:
Direct starting
Wye-delta starting

Switching frequency:
Max. switching operations per hour with a minimum off-time of 90 seconds:
6“ 20 switching operations,
8“, 10“ 10 switching operations,

Type of protection:
IP 68 acc. to IEC 60529.

Ambient temperature:
For motors with **PVC insulated** winding wire (standard design):
6“, 8“ 0 ...+30°C,
10“ 0 ...+25°C.

Higher temperatures motors with **PE2/PA insulated** winding wire are available.

motor-size (inch)	Ratings (kW)	cooling flow (m/s)	ambient temp. for winding	
			PVC	PE2 / PA
6"	4 - 15	**0.2**	**30**	50
	18,5 - 30	**0.5**	**30**	50
	37	**0.5**	-	45
8"	30 - 52	**0.2**	**30**	50
	55 - 93	**0.5**	**30**	50
10"	85 - 185	**0.5**	**25**	45

Table 1.1. Media temperature/coolant speed

⚠ Attention! ⚠

A sufficient **coolant speed** along the motor must be assured.
Otherwise the motor will overheat !

Max. axial thrust towards motor:
6" 4 to 26 kW 15,5 KN
30 to 37kW 27,5 KN
8" all motors 45,0 KN
10“ all motors 60,0 KN

8“ and 10“ motors:
With "clockwise" rotation the axial load is reduced to 80% of the nominal loads specified above!

Note:
Almost all pumps operate with anti-clockwise rotation!

Max. axial thrust away from motor:
6" 2,0 KN,
8" 3,0 KN,
10“ 4,4 KN,

ℹ Note ℹ

These data only apply for short term loads of **max. 3 minutes** – this is absolutely sufficient to start the pump.

Sound level: ≤ 70 dB(A)

Cable:
KTW- and VDE-tested cables are included in the product line.
6" **4,0m** motor cable
8", 10“ **6,0m** motor cable
The product line does not include ground conductors for all power ranges! All motors have been prepared for external grounding.

Motor filling fluid:
The filling fluid consists of 70% water and 30% propylene glycol.

Weight:
Please refer to the technical data sheets (see appendix pages A, B, C).

Connecting flange:
- 6", 8":NEMA flange (see appendix page A, B).
- 10“:Flange (matching all common pumps) (see appendix page C).

Installation position:
vertical (shaft only upward) and inclined all the way to horizontal installation.

⚠ Attention! ⚠

The installation of the pump must ensure sufficient axial loading of the motor.

The 8“ and 10“ motors are only suitable for "horizontal installation" in combination with additional equipment.
To ensure total submersion of the winding fluid must be fed from an external source via...
- a directly attached supply tank on top of the bearing plate and on the axial thrust housing,
- a piping system to a central supply container.

All necessary connections are provided.

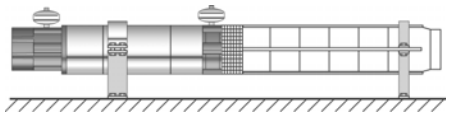

Figure 1.1. Horizontal installation with water supply container

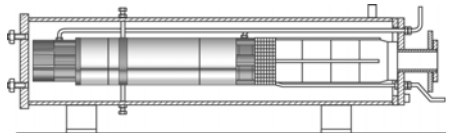

Figure 1.2. Horizontal installation with cooling tube

⚠ Attention! ⚠

8“ motors with 93kW and **10“ motors with 185kW** must not be used in horizontal position for static reasons!

Note:
For "horizontal applications" up to 150 kW the "encapsulated motor" from Franklin Electric is the technically better alternative!

1.2. Options

Special materials:
- AISI 316 complete stainless steel design
- 6“ with SiC mechanical seal (standard for 8" and 10")

Special voltages:
up to 1000V on request.

Special temperatures:
With higher media temperatures, operation is only permitted if you
- use a **special winding PE2/PA**,
- **de-rate the power**
- increase the **coolant speed** (see appendix pages D, E).

⚠ Attention! ⚠

Under no circumstances must the winding be heated up above the max. permissible temperature (see appendix page D, E) - neither during operation, nor during storage! Otherwise the motor filling may escape because of expansion and the motor may suffer damage!

Temperature monitoring:
is accomplished by a PT100 resistor element measuring the temperature of the filling fluid in the upper area of the stator winding. Retrofitting is easily possible. (PT100 is not included in the scope of delivery, i.e. it must be ordered separately!) (see appendix page F).

Due to the use of three-phase four-wire technology the measuring result is neither affected by the line resistances, nor by their temperature related fluctuations.

The required temperature sensing device (available from speciality dealers) must be set to the following temperatures:
- PVC insulated winding wire 55°C
- PE2 / PA insulated winding wire 75°C

2. Strict compliance is required!

2.1. Application

Electric submersible motors from Franklin have been exclusively designed to drive equipment under water.

2.1.1. Typical applications

Typical applications for equipment (e.g. pumps) driven by submersible motors include:

- **drinking water supply** in cities and communities, also pumping of river water,
- **wells** in waterworks, private houses, and in agriculture,
- **agitators** in water processing,
- **water supply** in dairies, breweries and mineral water filling plants as well as in industrial cooling circuits,
- ground water pumping stations
- **sprinkling systems** in gardening, agriculture and forestry as well as fish ponds,
- **dewatering** in civil engineering and mining,
- **booster pump systems** in industry (with pump inside a pressure housing),
- **fountains**, also with horizontal installation. In this case the special regulations for the safety of electric equipment in fountains must be observed.

2.1.2. Permitted media

The submersible motors must **only** be used in clean, highly fluid media, such as

- **drinking** and **process water.**

2.1.3. Inadmissible media

Under no circumstances must the submersible motors be used in any other media,

- especially not for the conveyance of **air, explosive media** or **waste water.**
- For applications in **aggressive media** motors made of V4A-steel (AISI 316) are available. The correct selection of material is the sole responsibility of the customer. Corrosion is also possible on V4A-steel.
- Superior materials on request.

2.1.4. Media temperature

depends on size, performance range of winding insulation and coolant speed (see technical data).

2.1.5. Cooling tube

The coolant speed is determined by well diameter and displacement of pump.

If the required minimum coolant flow speed cannot be reached, e.g. if the inlet opening of the well is above the motor or the well has a large diameter, a cooling tube is required.

This should enclose the motor completely and the water inlet opening of the pump in such a way, that a forced cooling of the motor is assured. (see illustration) The tube material may be steel or plastic.

Figure 2.3. Cooling tube

2.2. Application related requirements

- **The max. submersion depth** below water level must not exceed **350 m**. Deeper submersion depths on request!
- **Switching frequency** (see technical data)
- **Provide for at least one spring loaded check valve in the riser tube**, if the pump has not already been fitted with such a valve. The first check valve may be **max. 7 m** away from the pump, further valves should be installed at distances of **50 m** each.
- In wells with highly variable water inflow we recommend the installation of a level sensor, in order to avoid **dry running** of motor and pump.

⚠ Attention! ⚠

Dry running will immediately damage motor and pump!

2.3. Duties of the personnel

Before unpacking, installing, connecting or starting the submersible motor:

Strictly comply with the information in this manual!

In case of non-compliance with these instructions operating errors can lead to:

- **danger** to health and life caused by electrical or mechanical effects,
- **damage** to motor and adjacent installations and
- **disturbances** during operation. Always remember that you are **responsible** for other human beings, if you perform work on electric systems or if you order others to do so! The operations described in this manual **require expert knowledge,** equivalent to a professional education of a **skilled electrician** or **a technician for electric machinery**!

Electric installation work must therefore only be carried out by professional personnel!

2.4. Requirements of the EC-Directives

Submersible motors are components, which are in accordance with the EC-Directive "Machines". You may therefore only start operation of the motor after ...

- you have manufactured a **complete machine**, e.g. connected the motor with the equipment to be driven,
- the **protection requirements** demanded by the applicable EC-directives are met,
- you have certified compliance with the protection requirements by issuing an **EC Declaration of Conformity**,
- and after you have made this clearly visible by attaching the **CE-Sign**!

3. Storage and unpacking

3.1. Storing the motor

Correct storage of the motor is a prerequisite for trouble-free operation in the future.

- Store the motor in its **original packaging** until the day of installation.
- When standing the motor upright make sure that it **cannot fall over** (shaft always upward!).
- Do not subject the motor to direct sunlight or other heat sources. **Under no circumstances must the motor be heated up higher than 60 °C!** Otherwise motor fluid may escape because of expansion and the motor would be damaged during later use.
- Make sure that the **storage temperature with original filling** does not drop below **-15 °C**.

3.2. Unpacking the motor

⚠ Risk of injury! ⚠

Consider the weight of the motor. Use only permitted lifting gear. Do not step under loads being lifted. Take the motor carefully out of its packaging in order to avoid damage.

3.3. Check

after unpacking for external damage, for example

- on **diaphragm cover**
- on **housing**
- on **top end bell**
- on **connection** or **motor cable**

If you find any damage you must **not** assemble or start operation of the motor. Otherwise the motor or the complete unit may be unsafe because of this damage. A damaged motor causes the risk of injury and a **threat to life.**

4. Assembling the motor

4.1. Required tools

For the necessary inspections and correct assembly, the following tools are required:

- Filling Kit 308 726 102 (only for 6“ motors)
- Insulation measuring unit: 500 VDC, display up to min. 200 MΩ

4.2. Inspection before assembly

4.2.1. Determine the age of the motor.

The age of the motor is visible from the **DATE CODE**, which is etched above the nameplate:

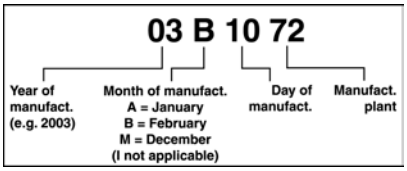

Figure 4.1. Manufacturing data

4.2.2. Check motor filling fluid

You can top off the motor with clean tap water, however, the original fluid from Franklin Electric is more suitable. (Id.-No. 308 353 820 - 20 litre drums)

Filling quantities:

- 6“ approx. 5 litres
- 8“ approx. 10 litres
- 10“ approx. 16 litres

Note:
Do not use distilled water to fill the motor!

⚠ Attention! ⚠

When filling and draining the motor fluid (water-antifreeze mixture) wear safety goggles!

Properly support the motor!

4.2.2.1 6“ motor

6“ motors are fitted with 2 valves at the top end bell, a filler valve (2) to the left of the grounding screw and a pressure relief valve to the right.

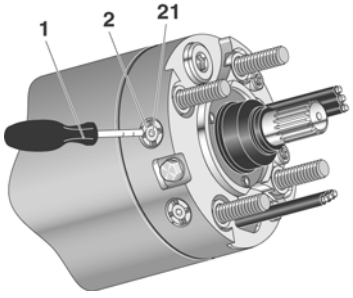

Figure 4.2. Bleeding the motor

Bleeding:

- Lay the motor in horizontal position and support it so that the filling valve (2) is in top position.
- Unscrew filter plug (21) from filler valve (2).
- Press test pin (1) carefully into filler valve (2), until air and some fluid comes out.

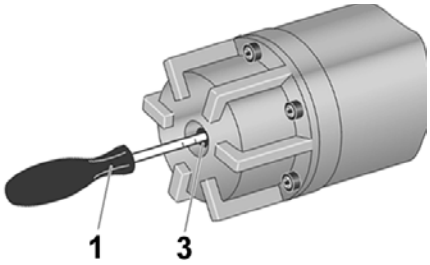

Figure 4.3. Checking motor fluid

Inspection:

- Insert the test pin (1) through the middle diaphragm housing bore (3) until a resistance can be felt and measure the actual diaphragm distance to the edge of the bore in the diaphragm cover. If the measuring result does not comply with the **nominal value: 35 mm +/- 2 mm**, fill up or bleed fluid as required.

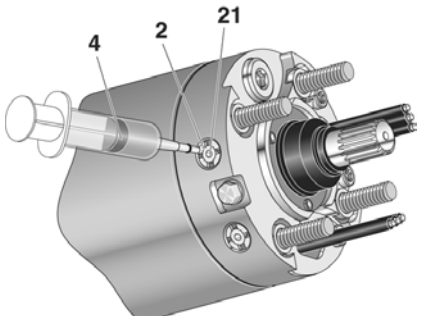

Figure 4.4. Filling up motor fluid

Filling up:

- Attach the filling syringe (4) to filling valve (2) and fill up motor fluid, until the value of the diaphragm position is smaller than the nominal value.

Regulation:

- Now adjust the diaphragm position to the **nominal value by bleeding off (see bleeding) or filling up: 35mm +/- 2mm**
  Finally reinsert filter plug (21) into filling valve (2).

Note:
The 316 design is only fitted with a filling valve which is closed with a plug instead of a filter.

4.2.2.2 8“ and 10“ motor

8“ and 10“ motors are fitted with 2 plugs in the top end bell, one in the front face (22) and one on the circumference (23).

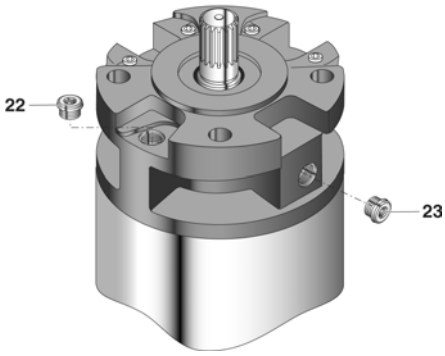

Figure 4.5. Checking motor fluid

Inspection:

- Stand the motor vertically and unscrew plug (23). If the water level is visible the motor is sufficiently filled.

Filling up:

- Unscrew plug (22) and fill the motor, until fluid starts to run out through the lateral bore. Then screw both plugs back in.

4.3. Assembly of motor and pump (equipment)

⚠ Attention! ⚠

These instructions can only describe operations referring solely to the motor. You must therefore also follow the **assembly instructions of the pump manufacturer** when assembling motor and pump.

⚠ Caution! ⚠

For your safety! **Do not use the motor with damaged equipment or parts**. The high driving forces may otherwise cause accidents with a considerable risk of **injury or threat to life!**

4.3.1. Preparatory test

- Remove the shaft guard.
- Before assembly turn the motor shaft by hand - it must rotate freely after overcoming the static friction. If not, perform troubleshooting to find the cause!
- Make sure that the mating surfaces of the parts to be connected are free of dirt and dust.

4.3.2. Assembly

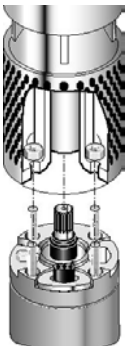

Figure 4.6. Assembly of motor and pump 6“

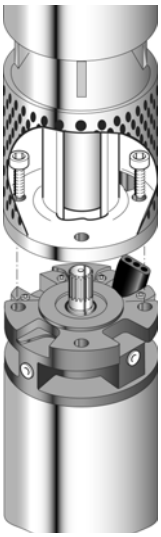

Figure 4.7. Assembly of motor and pump 8“, 10“

1. Cover the inner part of the coupling on the device with water resistant, acid free grease (e.g. Mobil FM 102, Texaco, Cygnus 2661, Gleitmo 746).

The grease minimizes friction and provides additional protection against entry of sand.

When assembling motor and pump make sure that the splined section (on 6“ or 8“ motors) is covered with an O-ring. This O-ring prevents sand and dirt from entering into the splined section of the shaft. Couplings for 6“ and 8“ motors are available from Franklin Electric. Consult your pump manufacturer for 10“ couplings.

2. Align pump and motor shafts to each other and join pump and motor together.

⚠ Attention! ⚠

Pump and motor shafts should not form a **rigid connection** (coupling) in the axial direction. The coupling should be fastened on the pump shaft and slide on the motor shaft.

Use only fastening screws of corresponding quality class and dimensions, as approved by the equipment manufacturer. Comply with the tightening torques specified by the equipment manufacturer.

Connection for pump assembly:

- 6“ Studs M12
- 8“ Bore Ø 17,5 mm
- 10“ Bore Ø 22,0 mm

3. Bolt motor and device together and tighten the fastening screws crosswise, as specified.

4.3.1. Final tests

If the coupling location is freely accessible during operation you must protect it adequately **against contact!**

4.4. Motor cable

⚠ Threat to life! ⚠

The cable must under no circumstances touch any sharp edges.

Route the cable along the pump and protect it with the cable guard against damage. Please also observe the specifications of the pump manufacturer.

⚠ Attention! ⚠

Motors of some power ranges are delivered without a ground conductor.

The customer must ensure the correct connection of a ground conductor. For this purpose the motor is fitted with a ground screw.

4.5. Extending the motor cable

The motor cable can be extended by the customer.

⚠ Attention! ⚠

During operation the cable supplied with the motor must always be **covered** by the pumped fluid for cooling.

Use only lead extensions which are

- made of suitable **material** for the **application**,
- **approved** for the **temperatures** occurring in your medium.

Protect the cable connection against the entry of water. For this purpose **shrink tubes, potting compounds** or prefabricated **cable armatures** are commercially available.

When choosing such items, ensure not only sufficient **voltage resistance,** but also their **suitability** for the medium (especially in the case of drinking water).

Observe the instructions of the respective supplier concerning the use of insulating material.

For the required **cable cross sections** the tables (see appendix page G) are only intended as recommendations. The electrician is solely responsible for the correct selection and dimensioning of the cable!

The specified minimum cross section according to IEC 364-5-523 must be taken into account.

In this respect observe the information issued by the pump manufacturer.

4.6. Measuring the insulation resistance

Perform this measurement before and while the assembled unit is **lowered** to the place of application.

1. Before lowering the unit connect one measuring cable to the ground conductor.
2. Make sure that the contact is clean.
3. Connect the other measuring cable successively to each conductor of the connected motor cable.

The motor is ok if the insulation resistance at 20 °C is at least:

- **200 MΩ** on a **new** motor,
- **20 MΩ** on an **installed** motor and
- **2 MΩ** on a **used** motor.

5. Electrical connection

5.1. This chapter assumes that

- the motor is correctly assembled, as described in *chapter 4*,
- the insulation resistance of the motor cable has been measured and was found to be OK, as described in *chapter 4*,
- the completely assembled pump has been correctly assembled at the place of application, as described in the instructions of the pump manufacturer.

⚠ Caution! ⚠

For your safety! Before making any connections you must make absolutely sure that **the complete system is free of electric voltage and nobody is able to switch on the electric voltage unintentionally**, while work is carried out on the system. **Do not work on electric installations when there is the risk of a thunderstorm or during a thunderstorm.** Lightning may cause a highly dangerous surge voltage. Neglecting this note will cause a severe **threat to life** by electric shock.

5.2. The power supply

5.2.1. Power supply by connection to power mains

The following tolerances must not be exceeded, as the motor may otherwise be damaged:

- The voltage tolerance is +6% to -10% **(measured on motor terminals).**
- The deviation of the motor current from the mean value of all three currents must not exceed 5%.

5.2.2. Power supply by generator

⚠ Attention! ⚠

The applicable tolerances for supply apply by power mains also for the power supply by generators!

When choosing a generator consider the starting performance of the motor, i.e. **starting current** with a mean **cos φ of 0,5.**

Also make sure that a generator of sufficient power is continously available and that the voltage during start-up must be at least 65% of the nominal voltage.

⚠ Attention! ⚠

We highly recommend coordinating the dimensioning of the system with the generator manufacturer.

Note:
Strict compliance with the switching sequence is mandatory. Always switch the **generator on and off without load**! This means:

- **for starting:** always switch the generator on first and then the motor!
- **for shut down:** always switch the motor off first and then the generator!

5.3. Connecting the motor

Observe also the information on the motor nameplate and design the electric system accordingly.

The following connection examples refer only to the motor itself. They are not recommendations with respect to the upstream control elements!

The person performing the installation is solely responsible for the correct planning and installation of the complete system.

5.3.1. Fusing and motor protection

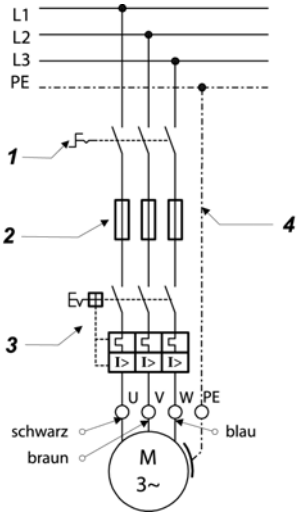

Figure 5.1. Fusing and motor protection

Consider the installation of an external **power main switch (1)**, in order to be able to disconnect the voltage supply at any time - e.g. in case of danger or when working on the installation.

Plan the installation of **fuses (2)** for each individual phase.

Plan the installation of a **motor protection switch (3)**, as explained in the following connection description for the individual models. Also plan the installation of an emergency stop switch, as far as this is specified or found necessary for your application!

5.3.2. Grounding

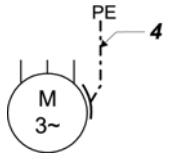

Figure 5.2. Grounding on motor

The motor must be grounded!

When **dimensioning** the **ground connection (4)** pay particular attention to the motor rating.

Rules can be found in IEC 364-5-54.

5.3.3. Surge voltage protection

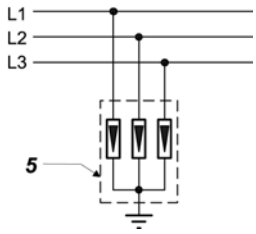

Figure 5.3. Surge voltage protection

Consider the installation of sufficient **surge voltage protection in the voltage supply (lightning protection) (5) according to IEC 60099** .

5.3.4. Connection variations

Franklin Electric motors are suitable for both clockwise and anti-clockwise rotation depending on the connection:

The motor rotates **anti-clockwise** (when viewed on the motor shaft) when:

- the conductor sequence L1 - L2 - L3 has a **right-hand field** (can be checked with a rotating field tester)
- and you connect the motor as shown (L1-U, L2-V, L3-W).

The motor rotates **clockwise** (when viewed on the motor shaft) when:

- the conductor sequence L1 - L2 - L3 has a **left-hand field** and you connect the motor as shown,
- or if you interchange the two outer **conductors** (L3 - U, L2 – V, L1- W) on a **right-hand field**.

Connect the motor so that the sense of rotation is in compliance with the pump. The connection example shows the common connection for a right-hand field and anti-clockwise rotation.

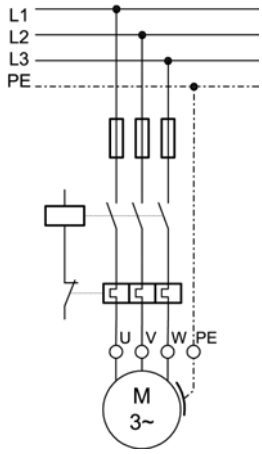

Figure 5.4. Direct starting

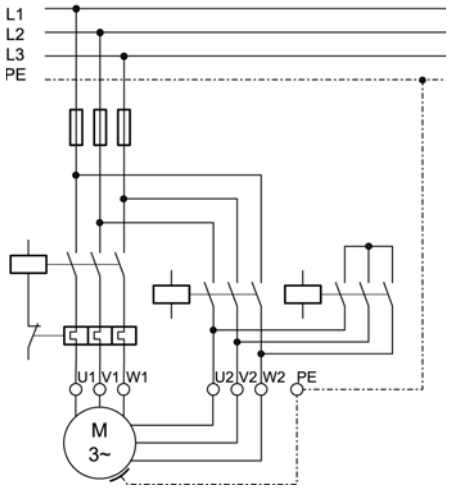

Figure 5.5. Wye-delta starting

A **motor protection switch** (overload relay) is strictly required!
For this purpose use

- only **thermal overload relays** with temperature compensation
- from 20°C to 40°C of triggering class 10A or 10 acc. to IEC 60947-4-1,
- with a **tripping time** of 10 seconds at 500% IN (referring to the cold condition of the bimetal),
- and which are phase failure sensitive.

Set the motor protection unit to the value of the measured operating current, but **do not exceed nominal motor current I_N** (acc. to motor nameplate). We recommend a setting of 90% of the nominal motor current.

5.3.5. Operation with frequency converter

- At all operating points of the control range the motor current must be lower than the **nominal motor current specified on the nameplate**.

- Adjust the frequency converter so that the **limits** of **min. 30Hz** and **max. 60Hz** are not exceeded.
- The **surge voltages** occurring during operation with a frequency converter must be limited to the values described in EN 60034-17 and a **maximum voltage increase of 500V/µs** and a **maximum surge voltage of 1000V.**
- The maximum **acceleration time** from 0Hz to 30Hz as well as the **deceleration time** from 30Hz to 0Hz is **1 second.**
- The additional installation of a filter between frequency converter and motor is necessary if:
  - winding insulation is made of PVC and
  - voltage ≥ 380 V and
  - the switching time < 2 µs and
  - cable length > 15 m.

  For dimensioning of the cable, an additional voltage drop, depending on the apparent resistance of the filter, must be taken into consideration.
- Make sure that the necessary coolant speed at 50 Hz along the motor is also complied with during operation with a frequency converter.
- When connecting and starting the motor for the first time you must strictly observe the **instructions in the operating manual** for the frequency converter.

5.3.6. Connection to soft starter units (softstarter)

If you want to operate the motor with a softstarter, you must observe the following points:

- Set the **start voltage** for the softstarter to **55% of the nominal voltage**
- and set the **acceleration time** as well as the **deceleration time** to **3 seconds maximum**.
- We recommend bridging the softstarter **with a contactor after acceleration**. Otherwise the power dissipation will be too high.

Consult the manufacturer of the softstarter with regard to this.
When connecting and starting up the motor strictly observe the instructions for the respective softstarter!

5.3.7. Thermal monitoring

of the motor filling by PT100 sensor.
(see options in chapter 1.2.)

6. Operation

6.1. This chapter assumes that

- the motor is correctly assembled with the **pump**, as described in *chapter 4*,
- the motor is correctly **connected, fused and protected**, as described in *chapter 5*,
- the **insulation resistance with motor cable has been measured** and was found to be OK, as described in *chapter 4*,
- the completely assembled pump has been correctly **assembled and lowered** at the place of application, as described in the instructions of the pump manufacturer.

6.2. Before starting operation of the motor...

make sure that

- the motor is fully submerged. The motor must **only be operated under water**!
- the **drop pipe has been blead of air**, in order to avoid water hammer during starting. Otherwise both pump and drop pipe may be damaged.
- the conditions specified by the pump manufacturer have been met.
- all electrical connections and protections **have been checked** and fuses are correctly **adjusted**.
- **no dangerous areas are freely accessible,** especially rotating parts, suction inlets or pressure outlets as well as electrical connections.
- the **media temperature** on motors with original filling does not drop below -8°C.

If these conditions are not met you must not start the motor, since this would cause a risk of accident and/or the motor may be damaged!

6.3. Starting the motor

Once you have checked all above mentioned points and all settings are correct, you may start the motor.
After switching on, measure

- the **operating current** of the motor in each phase,
- the **power main voltage** while the motor is running,
- the **level** of the medium to be pumped.

Switch the motor off immediately if

- the **nominal current** as specified on the nameplate is exceeded,
- **voltage tolerance** of more than +6% / -10% of the nominal voltage is measured. For weak supply networks we recommend the installation of a voltage monitor!
- **dry running** can be expected. In case of irregular supply it is necessary to install a level sensor in order to avoid dry running.
- the deviation of the motor current from the mean value of all three currents exceeds 5%.

6.4. During test operation

Each starting process applies load to the motor. A high switching frequency in particular reduces the life of the motor!

You should therefore make sure that the values specified in the technical data concerning **the switching frequency** are also not exceeded during test operation!

7. Troubleshooting

7.1. General

⚠ Warning! ⚠

For your safety! Please observe the safety instructions mentioned herein. Otherwise there is a risk of accident and a threat to life.

- **Do not perform any work on the motor other than the tasks described in this manual;** otherwise the motor may be damaged, whereby the operating safety of the system can no longer be assured. Due to the very high driving and pump forces **considerable risks for accidents** may arise, **even threats to life** caused by electric shock.
- For troubleshooting and fault rectification on the complete system, you must strictly observe the corresponding notes in the manual of the pump manufacturer!
- **Do not open the motor!** Without the use of special tools the motor cannot be closed again properly. The motor would thereby be destroyed.
- **Do not carry out any changes or modifications to the motor or the electric connections.** Otherwise the safety of the motor can no longer be assured.
- **Work must only be performed with the motor stopped!** Work or inspections do not require that the motor is running.
- **The pump may be contaminated** after it has been pulled out of the medium, so that a health risk cannot be ruled out. **Remaining medium** may have accumulated in cavities, such as the bore at the bottom of the **diaphragm cover**, which may then flow out unexpectedly.
- **Mark and identify contaminated motors** before handing them over to third parties (e.g. return for repair).
- **Disconnect the voltage supply** before starting the work described herein.
- Make sure that nobody **can switch the voltage back on by accident** while work on the system is still in progress!
- Do not work on electric installations when there is the risk of a thunderstorm or during a thunderstorm.
- Make sure that **all guards and safety installations have been completely reinstalled and are fully functional** immediately after completing work.
- For repair work use only **original spare parts from Franklin Electric.**

7.2. What to do!

The motor is **maintenance free.** No preventive or regular service work is required.

7.2.1. In case of electric problems

In case of repetitive switching off, you should have the insulation resistance checked by a specialist, as described.

- Disconnect the motor drop cable from the system and measure **motor and cable** first together. If the insulation resistance is less than **20k**Ω, you must repeat the measurement individually for cable and motor.

Is the problem caused by the cable extension?

- In this case connect a new one, as described.

Is the problem caused by the motor?

- You should generally have the motor repaired in a specialized workshop approved and authorized by Franklin Electric.

  Note:
  In case of a winding fault you may have the motor rewound in a specialized workshop of your choice!

Is it neither caused by motor, nor by cable?

- In this case you should have the electric system checked.

7.2.2. In case of mechanical or hydraulic problems

e.g. unusual noises, rotating failure of the pump or frequent switching on and off of the pump, you must perform troubleshooting on the pump.

In this case refer to the **instructions of the pump manufacturer** to find the cause of the problem.