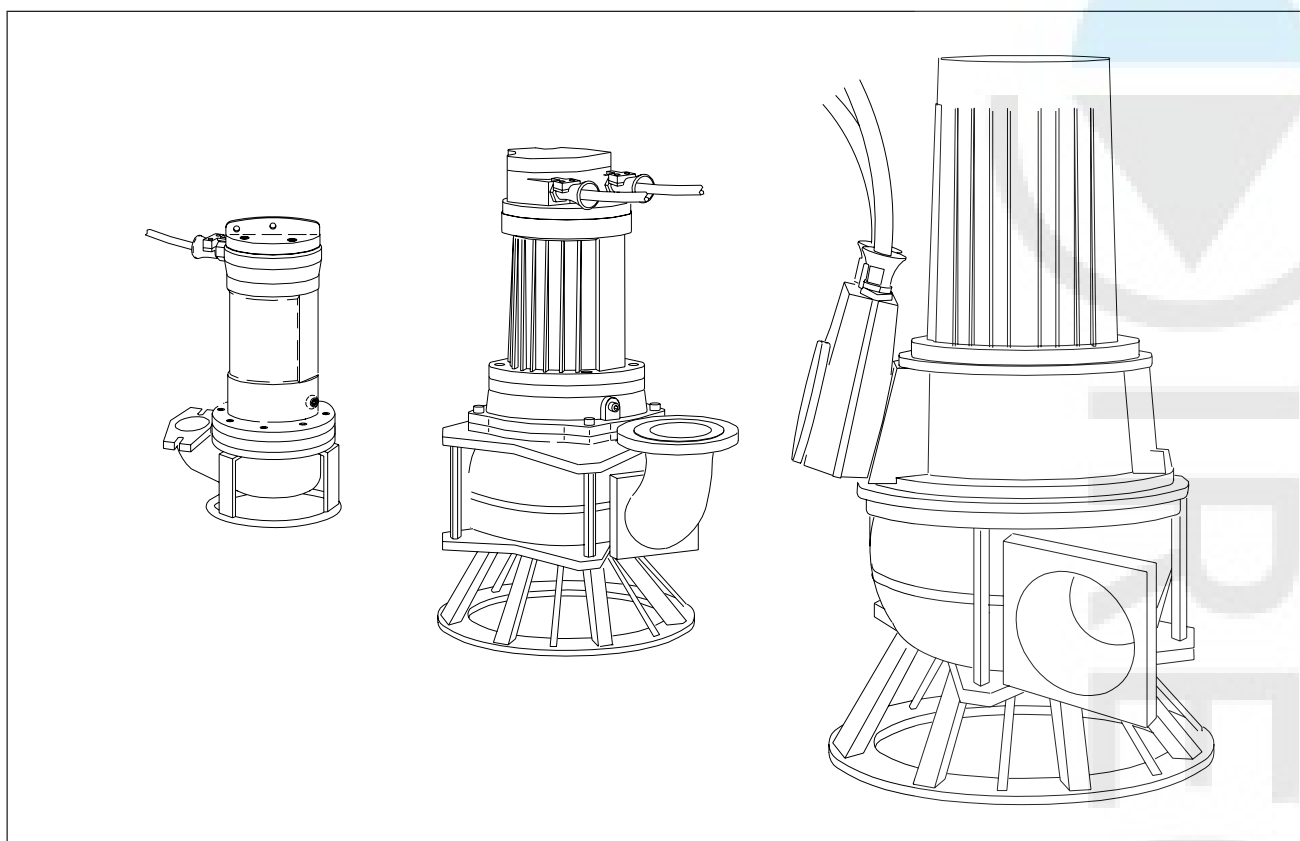




OPERATION & MAINTENANCE MANUAL

RD-SERIES EXPLOSION PROOF VERSION (Ex)



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1. FOREWORD

You are to be congratulated on choosing a ROBOT pump, which will undoubtedly serve you both reliably and economically for a long time, providing you observe the Maintenance Instructions given in this manual.

The RD-pump is a dredging pump, designed for the transport of highly abrasive solids.

Proper use and maintenance will prolong the operational life of your ROBOT pump.

This manual contains different warnings and safety precaution.

Read this manual properly, so that dangerous situations, physical injury or damage can be avoided.



The RD-pump is designed for professional use only. Service and maintenance may only be done by authorized personnel, after reading this manual.



The RD-pump in explosion proof version may be used in a potentially explosive atmosphere, group II category 2 (zone 1).



Pay attention to the right temperature and group classification, see EN 60079-0.

2. GUARANTEE

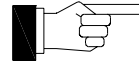
We refer to the warranty agreement with your local dealer.

When ordering spare parts, always quote.

1. Pump type
2. Code
3. Serial number

This information is found on the dataplate. (See appendix 1)

Sectional drawings and parts lists are available on request.



Only use original spare parts to maintain the explosion safety !

All products manufactured by Robot Pumps B.V. are made with great care and according to our high internal standards. Should you however have any suggestions concerning our pump range or this instruction manual which will contribute to the quality of our product please do not hesitate to contact us.




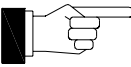


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3. SAFETY AND ENVIRONMENT

3.1 Symbols

* In this manual	* On the pump
 <p>General warning Danger !</p>	 <p>Danger of physical injury Rotating parts !</p>
 <p>Electrical hazard !</p>	 <p>Electrical hazard !</p>
 <p>Attention !</p>	 <p>Explosion proof pump</p>
	 <p>EC-conformity symbol</p>

3.2 General safety instructions

- * Only trained and authorized personnel may install and maintain the pump after carefully reading this manual.
- * Only use the pump for its intended purpose and under the regulated circumstances.
- * Don't go near rotating parts.
- * Clean the pump before maintenance and inspection.
- * Observe the local regulations when working with aggressive, corrosive, toxic, flammable and explosive chemicals.
- * Never remove safety signs, keep them clean.
- * Always connect to a grounded circuit.
- * Before maintenance and inspection always disconnect the pump from the mains.
- * Use a proper hoist for lifting and handling the pump.
- * Do not leave a large loop of cable in the sump, as the pump may eventually damage it.
- * Never drop the loose cable end in water. The water may enter the cable and finally enter the motor housing, eventually causing motor failure.

3.3 Environment

Parts which are replaced during repair, maintenance or renewal, could contain materials which could be harmful to the environment.

Please take care in the disposal of these parts. Do this in accordance with the local environmental regulations.

4. TECHNICAL DATA

4.1 General

The RD-pump is dredging pump, specially designed for transport of highly abrasive solids

Apart from dredging, the pump can be used in mining, construction works and industry.

The impeller leaves a wide unobstructed passage through the volute, in which a strong vortex is created that carries most of the solids.

Explosion proof pumps can be used in a potentially explosive atmosphere. The parts that can ignite an explosive atmosphere are placed in an enclosure which can withstand the pressure developed during an internal explosion of an explosive mixture and which prevents the transmission of the explosion to the explosive atmosphere surrounding the enclosure by means of the flame proof joints.

Construction:

The explosion proof motors are build according to the European Standards EN 60079-0: 2006, EN 60079-1: 2007, EN 60079-7: 2007 category II 2 G Ex de IIB c T4.

- The motorhousing is according to EN 60079-1, flameproof enclosure "d".
- The cable connectionbox is according to EN 60079-7, increased safety "e".
- High efficiency motor, standard class F insulation (up to 155°C) with two sets of thermostwitches.
- Ambient temperature: 0 - 40°C.
- Two independent mechanical seals, running in oil, form an effective barrier between pump and motor.
- Heavy duty bearings, greased for life.
- Agitator, to feed the impeller with solids.
- All hydraulic components in Nihard 4.
- Vanes at the backside prevent solids entering the seal area and reduce the pressure on the seal.

Certificate numbers:

RD20: KEMA 03ATEX2220 X

RD40: KEMA 03ATEX2221 X

RD60: KEMA 04ATEX2252 X

4.2 Main parts

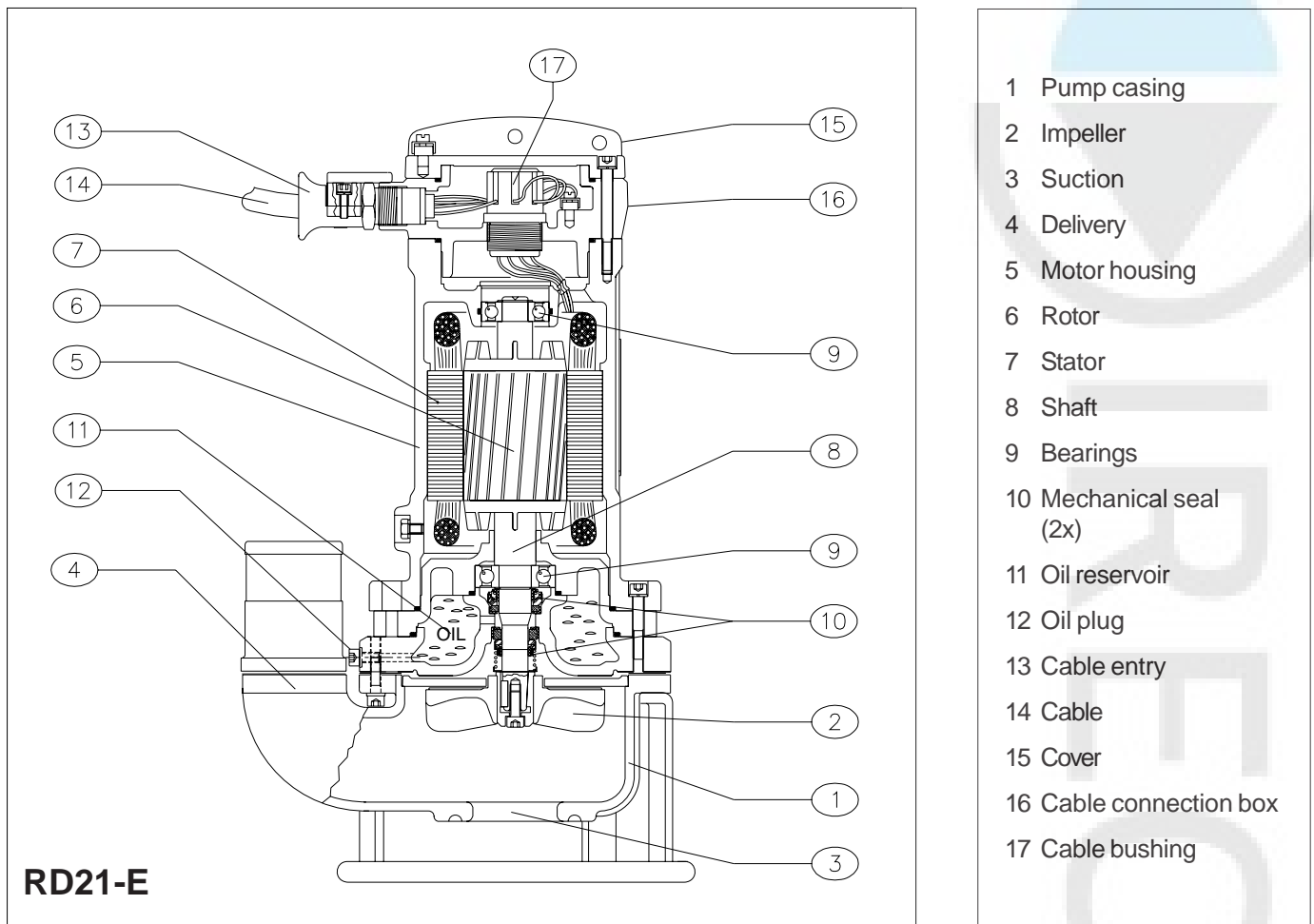


Fig. 4.1

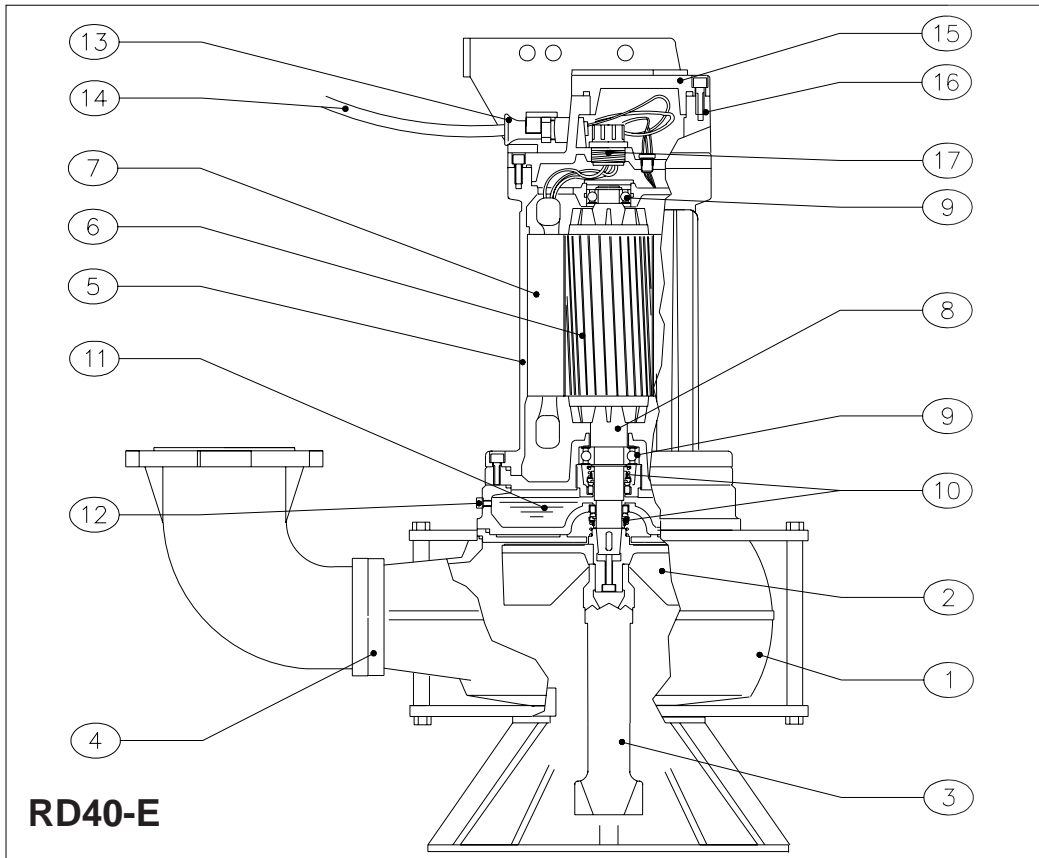


Fig. 4.2

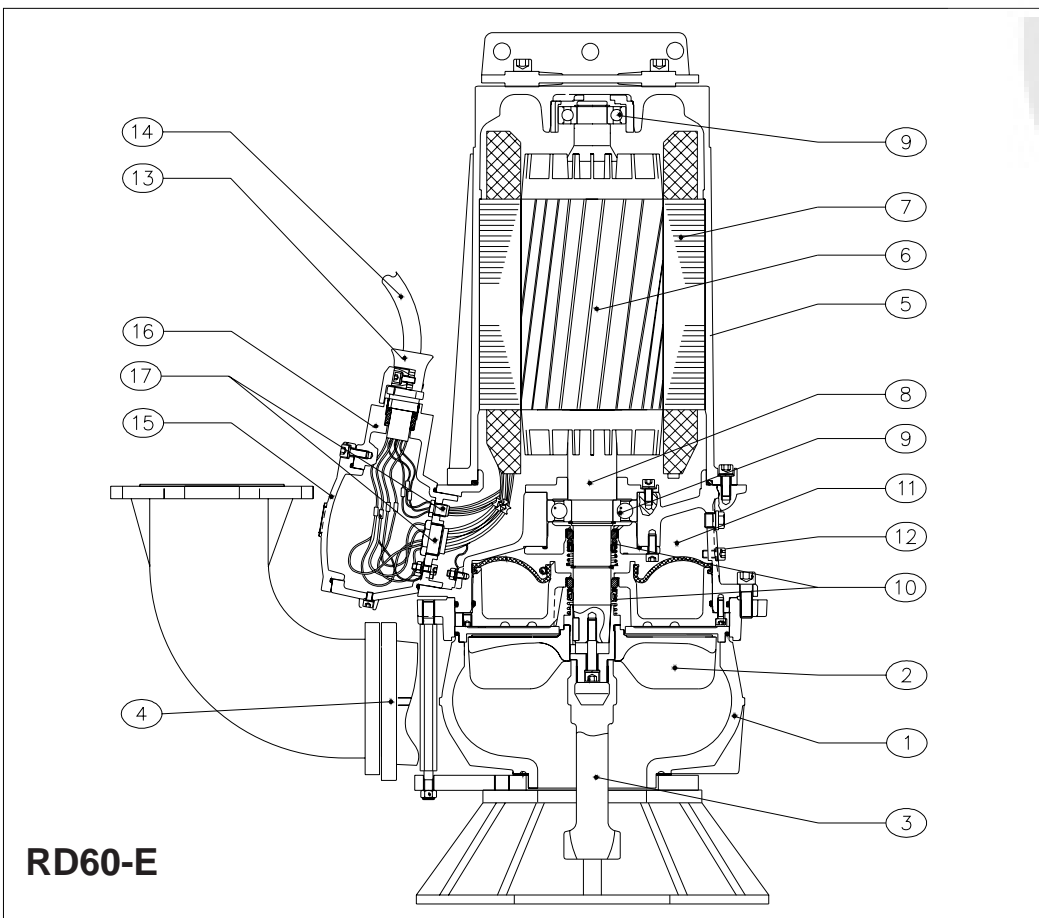


Fig. 4.3

- 1 Pump casing
- 2 Impeller
- 3 Suction
- 4 Delivery
- 5 Motor housing
- 6 Rotor
- 7 Stator
- 8 Shaft
- 9 Bearings
- 10 Mechanical seal (2x)
- 11 Oil reservoir
- 12 Oil plug
- 13 Cable entry
- 14 Cable
- 15 Cover
- 16 Cable connection box
- 17 Cable bushing

5. FIRST PUMP START

After unpacking the pump, carry out the following check points:

5.1 Delivery check

Check for possible transport damage and especially check that the cable has not been nicked or damaged.

Check for complete delivery. When the delivery is incomplete or damaged, please, contact your dealer immediately.

5.2 Oil level

Check the oil level. (see 7.5)

5.3 Power supply

Before making the electrical connections, check if the line voltage and frequency are the same as on the pump dataplate.

For examples of electrical diagrams and pump cable coding, see appendix 2 and 3.

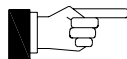
5.4 Thermostwitches

The pump is standardly supplied with 2 sets of thermostwitches, each with a different switch temperature. The thermostwitches ensure that the pump under all conditions meet the needs of temperature class T4. The set with the lower switch temperature, the controller, protects the motor from overheating. After cooling down, the motor may start automatically. The set with the higher switch temperature, the limiter, switches the pump off when the maximum temperature is reached. This will only happen when the controller thermostwitches are out of order. Automatic re-starting after cooling down is not allowed. Examples of electrical diagrams are in appendix 2 and 3. Contact rating: max. 250V-1.6A
The contacts are normally closed.

5.5 Cable entry

Especially when the pump has been in store for a long time, the cable gland should be checked and if necessary tightened (see 7.4).

5.6 Electrical connection



The electrical connection of the permanently connected unterminated cable shall be made in a certified enclosure in type of explosion protection flameproof enclosure "d" or increased safety "e".

5.7 Motor protection

The pump should always be connected to the line by means of a suitable motor protection circuit breaker. If the pump is started direct on line (DOL), the protection breaker should be set to the current, as given on the dataplate.

For star delta start (YD), it is good practice to install the over current relay directly after the main contactor. In this case, the pump is also adequately protected in star-connection. The maximum setting of the over current relay is 0.6x the current as given on the dataplate.

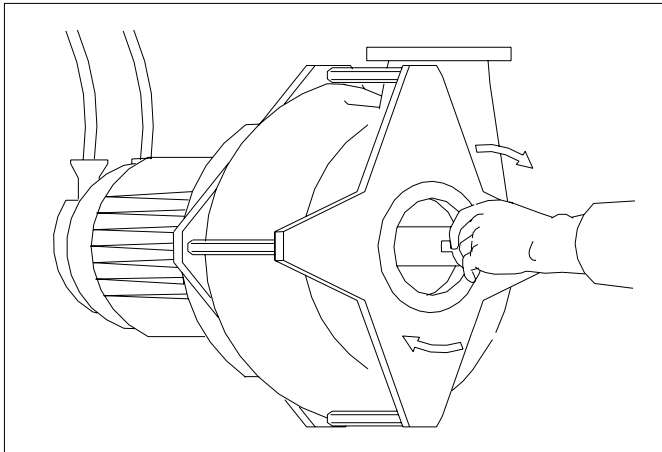


Fig. 5.1

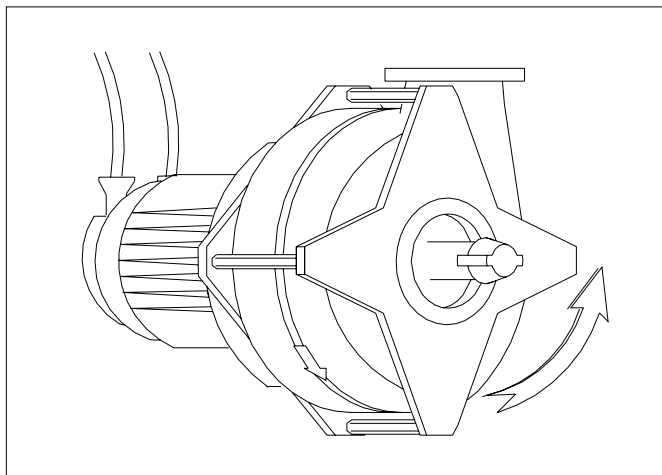


Fig. 5.2

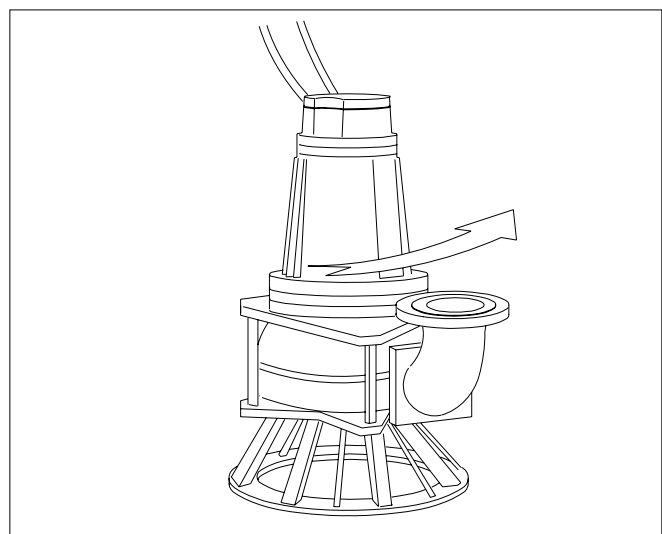


Fig. 5.3

5.8 Motor check

If in doubt about the condition of the motor or cable, Megger test motorwindings against grounding wire. The phase resistance against grounding wire should be at least 1 MOhm.

Turn the impeller clockwise by hand, using a proper socket wrench (see fig.5.1)

This should be possible without much force. With this procedure sticking mechanical seal surfaces will be loosened smoothly.

5.9 Installation parts

Check if all components for your installation are delivered. See also chapter 6.

5.10 Direction of rotation

A correct direction of rotation is essential for proper operation. This can be checked as follows:

- Put the pump in horizontal position and start the pump.
Looking on the impeller through the suction opening, the correct direction of rotation is counter clockwise
(See arrow on pumpcasing, Fig. 5.2).

or:

- Starting the pump will give a recoil on the pump frame.
Looking at the motor (in vertical position see Fig. 5.3), the recoil is counter clockwise.



Take care !
The recoil can be very powerful !
Don't go near rotating parts !

5.11 Current check

Note the max. current from the dataplate. Apply an ammeter to one of the phase wires during normal operation. Check that the current is not higher than the value on the dataplate. (see appendix 1). If so check for:

- voltage (too low ?)
- specific gravity or viscosity of the fluid (too high ?)
- blocked impeller ?
- direction of rotation correct ?

If the problem cannot be solved contact your dealer.

5.12 Medium temp. / max.motorload

The maximum medium temperature for flameproof pumps is 40°C. Above this temperature the Robot flameproof pumps may not be used.

5.13 Start frequency

When the pump is controlled by level regulators, the on and off levels should be adjusted in such a way, that the pump does not do more than 15 starts an hour.

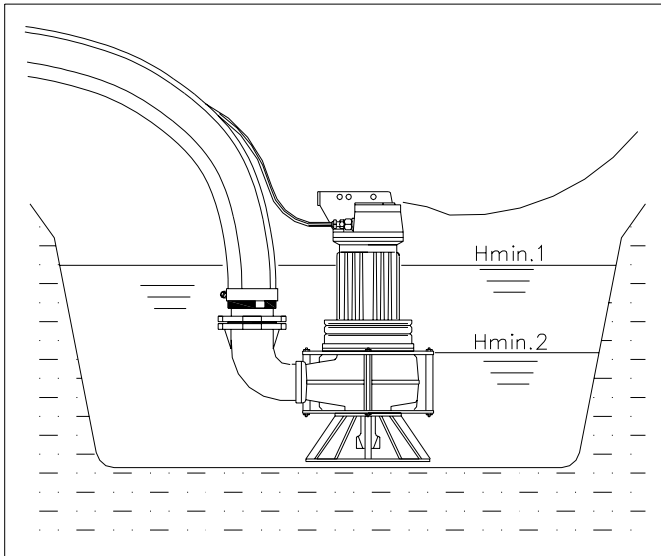


Fig. 5.4

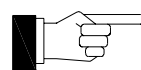
5.14 Min. and max. submersion depth

The motor housing should be at least 2/3 submerged for continuous operation at full load (see Hmin.1 Fig. 5.4).

It is good practice, whenever possible to keep the motor housing completely under water.

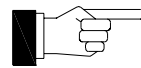
This is not applicable if the pump is equipped with a cooling system.

For interrupted level controlled operation, less cooling is required. We recommend not to run the pump with the water level below the top of the volute in order to avoid air being drawn in (see Hmin.2 Fig. 5.4).



Do not run the pump with the water level below the top of the volute for sufficient sealing cooling and to avoid air being drawn in.

Air in the discharge pipes might impair performance.



The maximum submersion depth is 20m / 60ft.

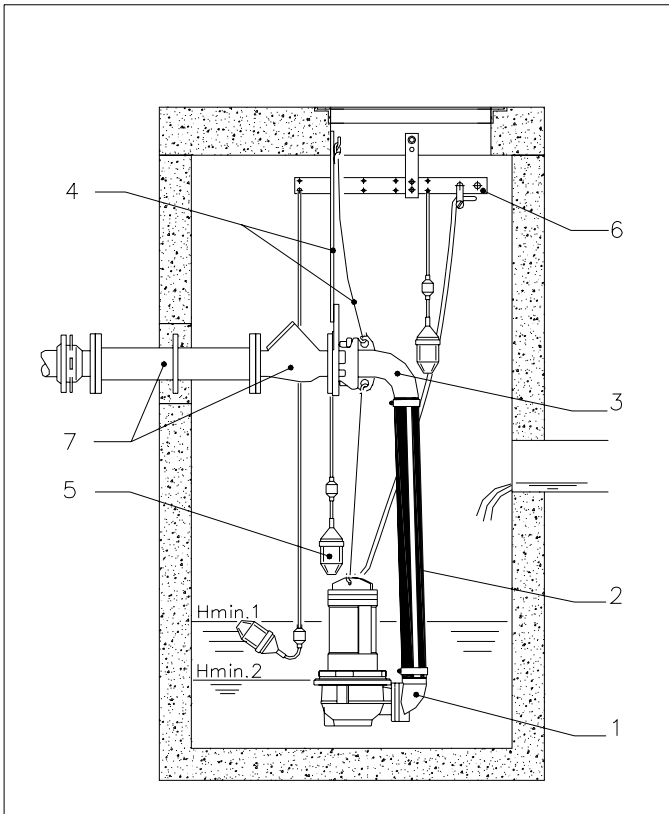


Fig. 6.1

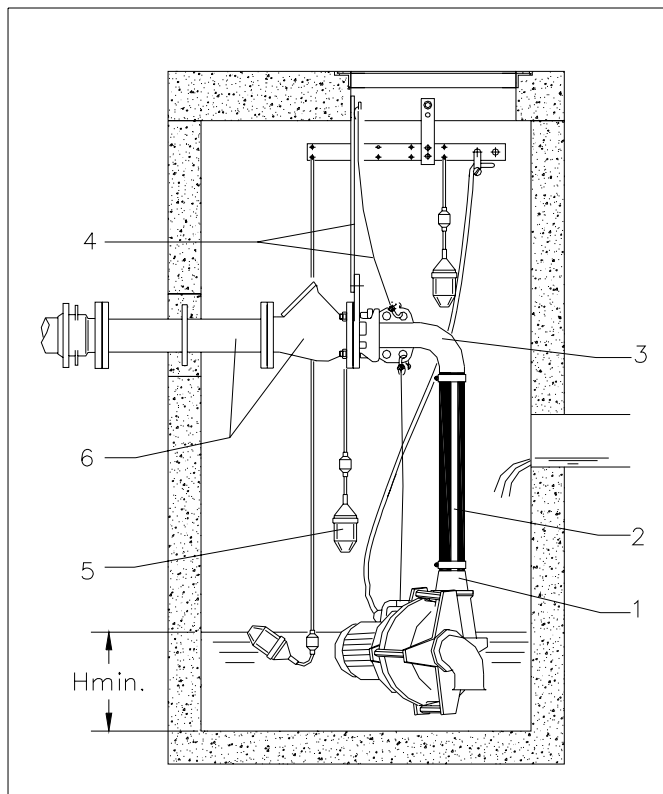


Fig. 6.2

6. INSTALLATION OPTIONS

For the submersible pump the following installations are possible:

- H Stationary wet installation with a header coupling type HK.
- V Stationary wet installation with a guide bar quick release coupling type V.
- F Freestanding wet installation.
- T Transportable wet installation.
- A Stationary immersible installation.

6.1 INSTALLATION - H

Stationary wet installation with a ROBOT quick release header coupling type HK.

A flexible hose connects pump and coupling.

The RD20 pumps will have a vertical position, see Fig. 6.1. All other RD pumps are horizontally placed, see Fig. 6.2.

Except for the pump the following components are necessary:

1. Hose connection, which is fastened to the pump;
2. Flexible hose, between pump and coupling;
3. Header coupling, consisting of coupling bend, rubber joint and a fixed coupling part;
4. Suspension bracket and chain, for lifting the pump;
5. "Intrinsic safe" level regulators for start-, stop- and alarm-signals;
6. Suspension for level regulators and power supply cable;
7. Piping, non return valve, bends etc.

Check points before operating:

- Ensure a good free passage beneath the suction elbow of the pump (at least the same as the suction diameter).
- Adjust the start- and stop levels in such a way that the motor does not make more than 15 starts per hour .
- Check that the motor is adequately cooled. The motor housing should be at least 2/3 submerged for continuous operation at full load (see Hmin.1 Fig. 6.1).

It is good practice, whenever possible to keep the motor housing completely under water.

For interrupted level controlled operation, less cooling is required. We recommend not to run the pump with the water level below the top of the volute in order to avoid air being drawn in (see Hmin.2 Fig. 6.1).

Air in the discharge pipes might impair performance.

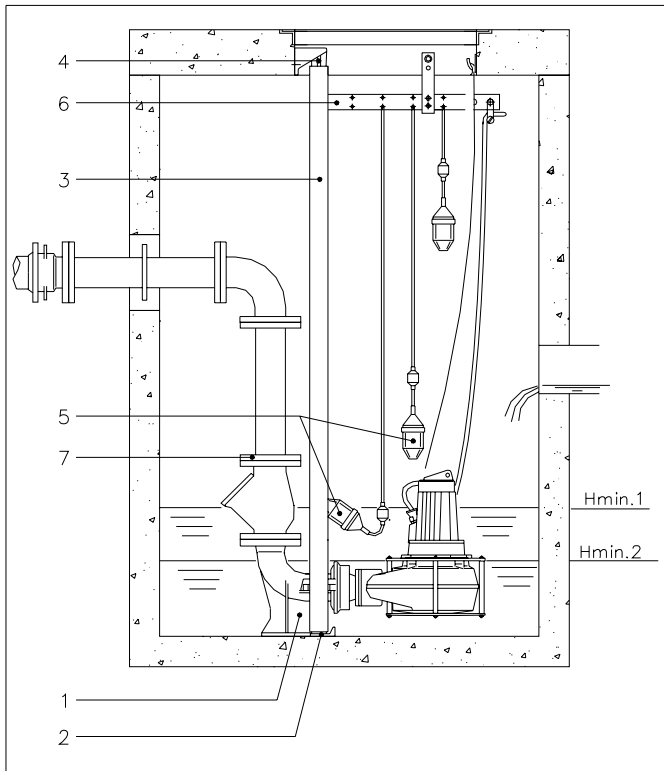


Fig. 6.3

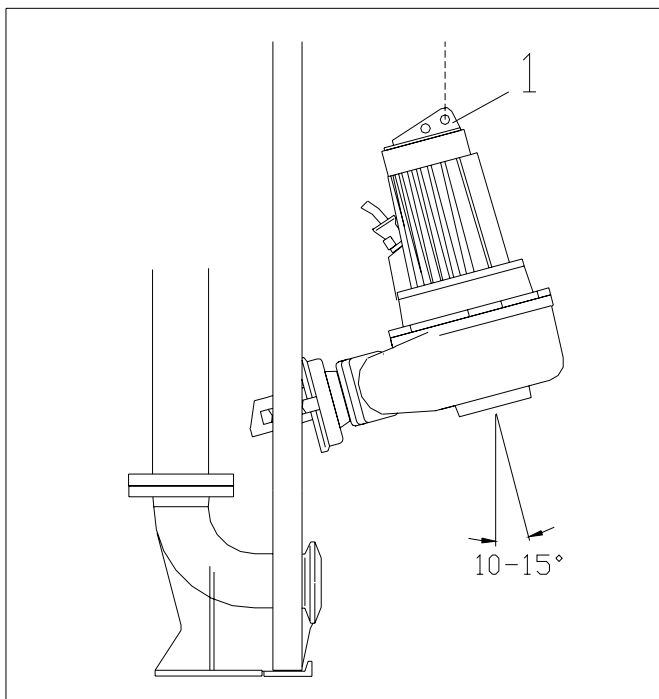


Fig. 6.4

6.2 INSTALLATION -V

Stationary wet installation with a ROBOT quick release guide bar coupling type -V. The pump is automatically coupled to the discharge.

Except for the pump the following components are necessary:

1. Bottom elbow, rubber joint and coupling adapter;
2. Guide bar foundation plate;
3. Two guide bars;
4. Top bracket, mounted within the well cover clearance;
5. "Intrinsic safe" level regulators for start-, stop- and alarm-signals;
6. Suspension for level regulators and power supply cables;
7. Piping, non return valve, discharge bends etc.

Check points before operating:

- The guide bars must stand vertical (maximum tolerance 3°).
- The installation angle must be about 10-15° (see Fig. 6.4). If necessary, this angle can be changed by alteration of the position of the lifting hook on the suspension bracket on top of the motor (pos. 1).
- Adjust the start- and stop levels in such a way that the motor does not make more than 15 starts per hour.
- Check that the motor is adequately cooled. The motor housing should be at least 2/3 submerged for continuous operation at full load (see Hmin.1 Fig. 6.3).

It is good practice, whenever possible to keep the motor housing completely under water. For interrupted level controlled operation, less cooling is required. We recommend not to run the pump with the water level below the top of the volute in order to avoid air being drawn in (see Hmin.2 Fig. 6.3). Air in the discharge pipes might impair performance.

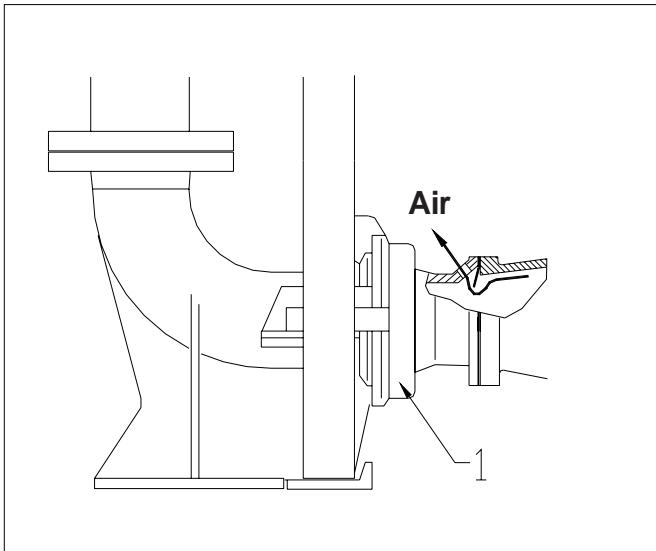


Fig. 6.5

6.3 Check point installation - V

In some applications it is possible that the pump will not work due to presence of air in the volute.

Lifting the pump a bit (10-20mm) while running may solve the problem.

When the problem repeats, an air venthole can be drilled in the coupling adapter and a special gasket must be fitted. (see fig. 6.5).

When air is present, this will escape through the hole. When the fluid arrives, the special gasket will close the hole.

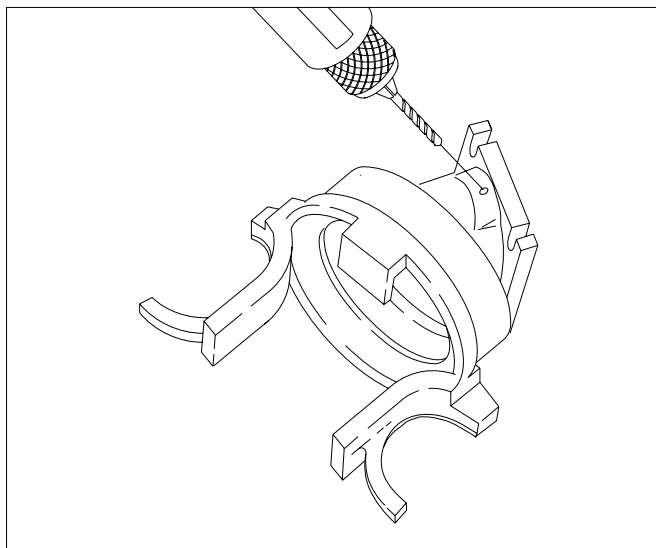


Fig. 6.6

- Take part (1) (fig.6.6).
- Drill a 8mm hole in the cast boss on top of the coupling adapter.
- Deburr the hole.

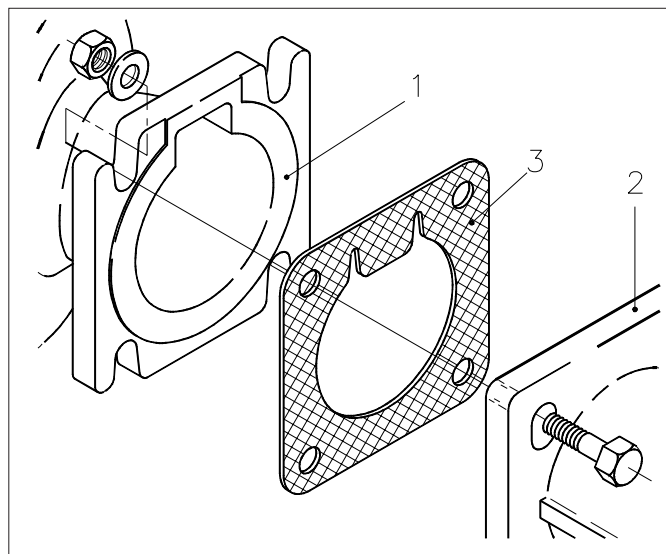


Fig. 6.7

- Place a special gasket (3) (Fig. 6.7)
- Mount the coupling adapter (1) to the pump (2).

Part numbers for special gaskets.

Coupling type:	part number:
V 65/ V 80	761-056
V 100	761-057
V 150	761-058

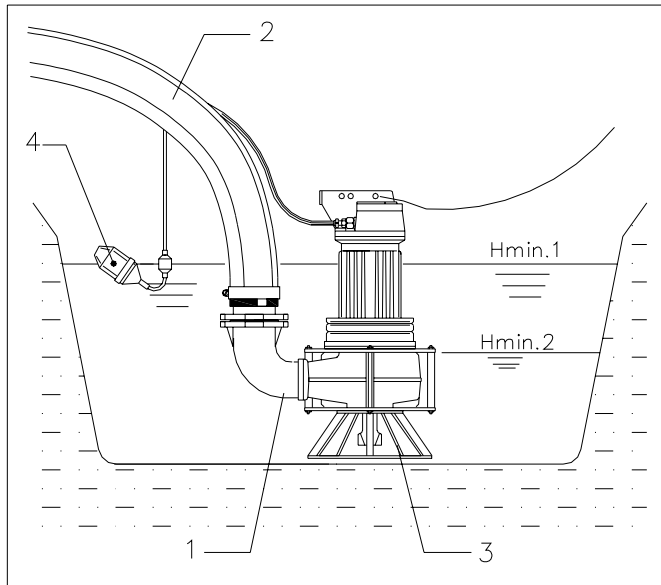


Fig. 6.8

6.4 INSTALLATION - F

Free standing: semi-permanent fixed wet installation.

Except for the pump the following components are necessary:

1. Hose or threaded connection, which is fastened to the pump;
2. Flexible hose or pipe;
3. Pump support;
4. "Intrinsic safe" level regulators.

Check points before operating:

- Adjust the start- and stop levels in such a way that the motor does not make more than 15 starts per hour.
- Check that the motor is adequately cooled. The motor housing should be at least 2/3 submerged for continuous operation at full load (see Hmin.1 Fig. 6.8).

It is good practice, whenever possible to keep the motor housing completely under water.

For interrupted level controlled operation, less cooling is required. We recommend not to run the pump with the water level below the top of the volute in order to avoid air being drawn in (see Hmin.2 Fig. 6.8). Air in the discharge pipes might impair performance.

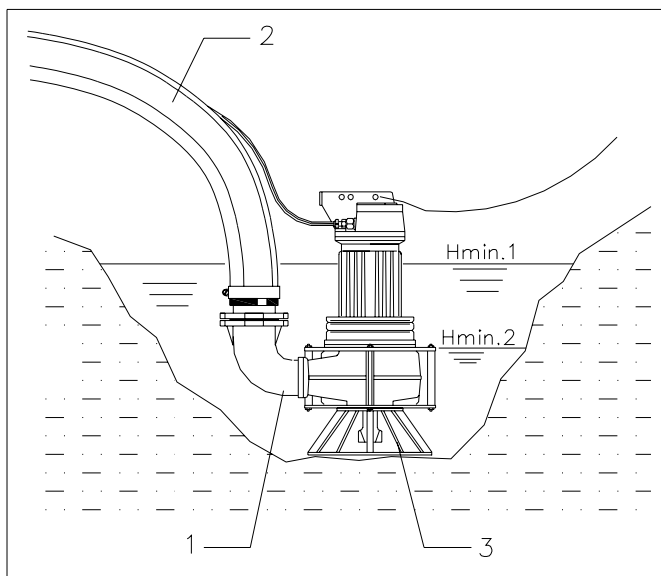


Fig. 6.9

6.5 INSTALLATION - T

Transportable wet installation.

Except for the pump the following components are necessary:

1. Hose connection, which is fastened to the pump;
2. Flexible hose;
3. Pump support.

Check points before operating:

- Do not let the pump bury itself in the mud.
- Do not leave a large loop of the cable in the sump, as the pump may eventually damage it.
- Check that the motor is adequately cooled. The motor housing should be at least 2/3 submerged for continuous operation at full load (see Hmin.1 Fig. 6.9).

It is good practice, whenever possible to keep the motor housing completely under water.

For interrupted level controlled operation, less cooling is required. We recommend not to run the pump with the water level below the top of the volute in order to avoid air being drawn in (see Hmin.2 Fig. 6.9). Air in the discharge pipes might impair performance.

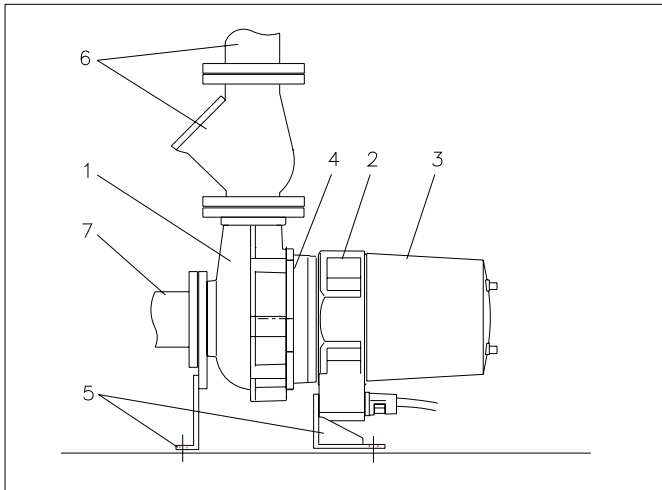


Fig. 6.10

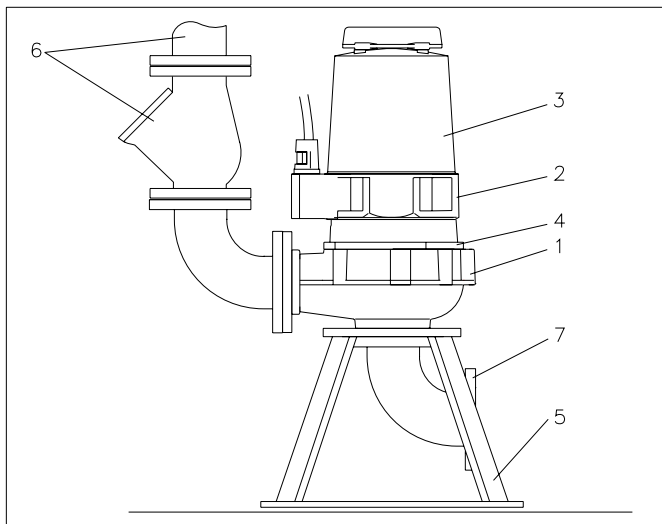


Fig. 6.11

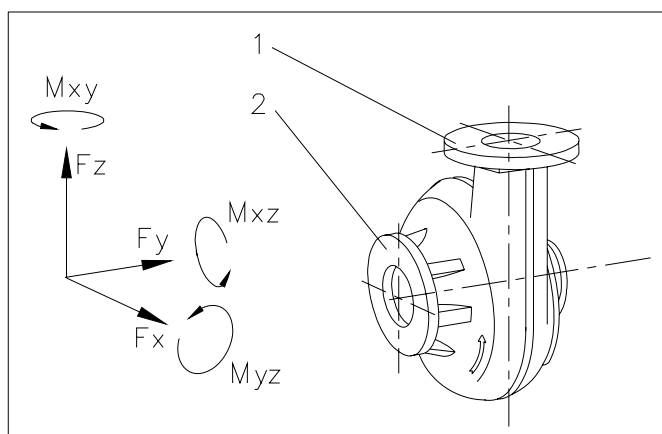


Fig. 6.12

6.6 Installation - A

Stationary immersible installation, horizontal, see fig. 6.10 or vertical, see fig. 6.11.

This installation is only possible if the pump is equipped with a cooling system.

The main components are :

1. pump casing
2. motor unit
3. cooling system
4. seal housing
5. pump support
6. discharge pipe line
7. suction pipe line
8. "Intrinsic safe" level regulators for start-, stop- and alarm signals

Check points before operating:

- In line position of the discharge and suction pump flanges.
- Forces on the pump flanges may not exceed the values in par. 6.7.
- Adjust the start- and stop levels in such a way that the motor does not make more than 15 starts per hour.

If maintenance and/or inspection is necessary, as described in chapter 7, we recommend to disconnect the motor unit from the pump casing.

This can easily be done by removing the nuts of the seal housing-pump casing connection.

6.7 Flange forces and moments for stationary immersible pumps

Because of the pipe line system, specific forces on the discharge and suction flanges of the pump will occur: The forces (F) and moments (M) may not exceed the values of table below.

1. Forces F_x , F_y en F_z
2. Moments M_{xy} , M_{xz} en M_{yz}

See fig. 6.12

- (1) is the discharge flange
(2) is the suction flange

Pump type	F_x [N]	F_y [N]	F_z [N]	M_{xy} [Nm]	M_{xz} [Nm]	M_{yz} [Nm]
RD60	1200	1200	2800	1100	1100	1200

7. MAINTENANCE

7.1 General



Always disconnect the pump from the mains before inspection or disassembly.



Clean the pump thoroughly.



The motor housing can be hot when the pump is just switched off.



Repairs should only be done by certified workshops!

7.2 Maintenance schedule

- * After the first 100 running hours:
 - Check the oil level (see chapter 7.5).
If there is more than a few drops of water in it, contact your dealer.
- * Every year or 1000 running hours:
 - Check the oil and oil level (see chapter 7.5).
If there is more than a few cm³ water in it, contact your dealer.
 - Refresh the oil every year or when it is no longer transparent. (see chapter 7.6)

7.3 Lubricants

- * The bearings are greased for life and need no refill.
- * The oil reservoir is filled with ExxonMobil Marcol 152
Viscosity: 32 cSt.
When another kind of oil is used this is marked on a label on the pump.

Oil quantities:

RD 20: 0.6 L.
RD 40: 1.5 L.
RD 60: 2.4 L.

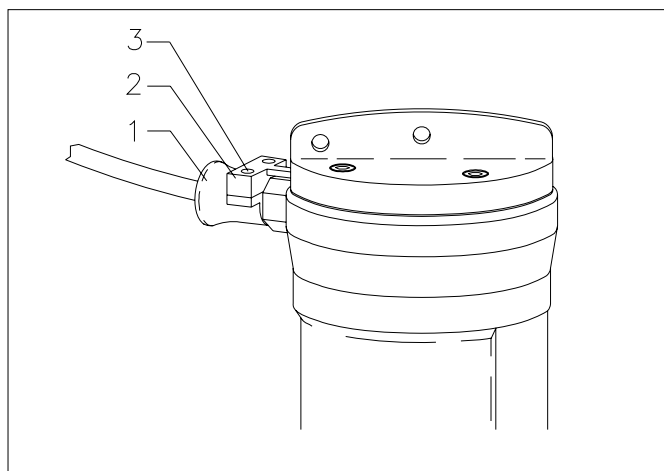


Fig. 7.1

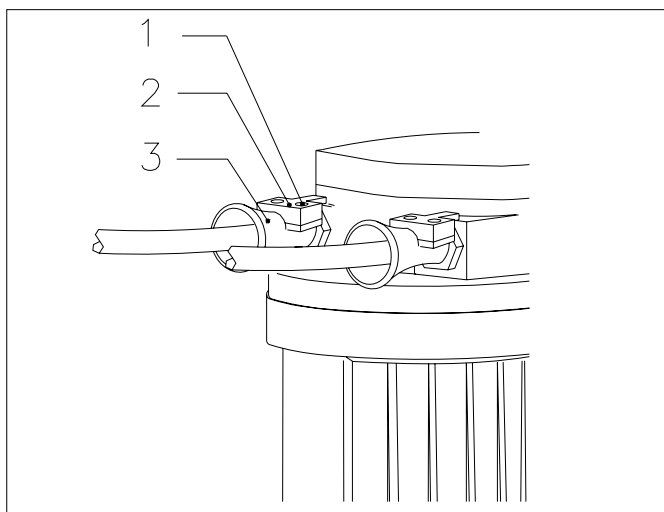


Fig. 7.2

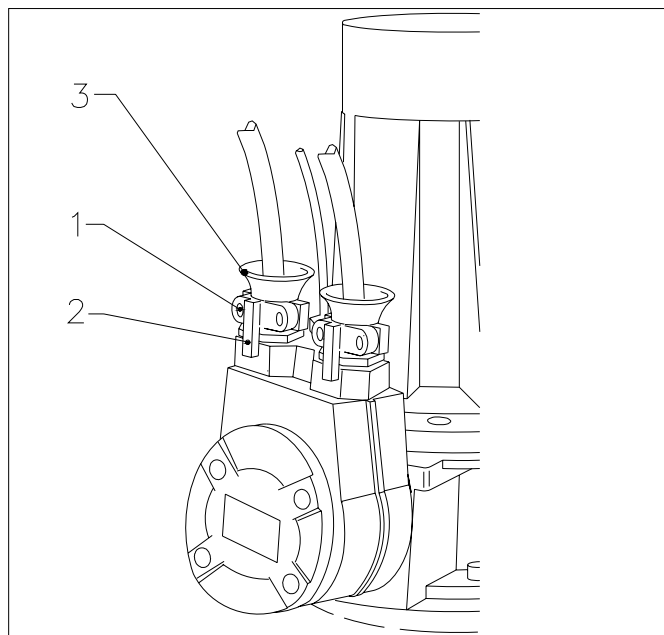


Fig. 7.3

7.4 Cable entry

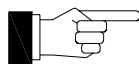
Especially when the pump has been in use for a long time, the compression of the rubber cable seal might be diminished, which can cause leakage. By screwing-in the cable entry the seal will be retained.

7.4.1 RD 20

Unscrew the 2 hexagon socket screws (3).
Remove the cable clamp (2).
Turn the hexagon head of the entry (1) clockwise, using the right tool, so far that it is possible to replace the cable clamp again.
Screw-in the 2 hexagon socket screws

7.4.2 RD 40

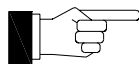
Unscrew the 2 hexagon socket screws (1).
Remove the cable clamp (2).
Turn the hexagon head of the entry (1) clockwise, using the right tool, so far that it is possible to replace the cable clamp again.
Screw-in the 2 hexagon socket screws (1).



It is possible that your pump is fitted with 1 cable .

7.4.3 RD 60

Unscrew the 2 hexagon socket screws (1).
Remove the cable clamp (2).
Turn the hexagon head of the entry (1) clockwise, using the right tool, so far that it is possible to replace the cable clamp again.
Screw-in the 2 hexagon socket screws (1).



It is possible that your pump is fitted with only 2 cables.

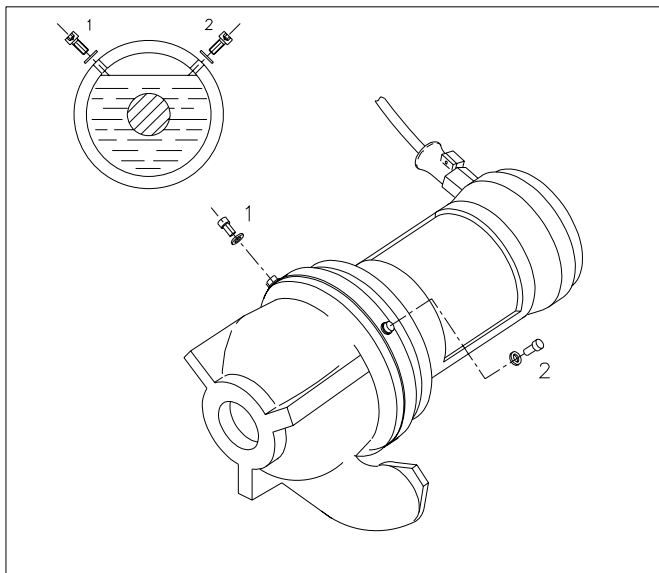


Fig. 7.4

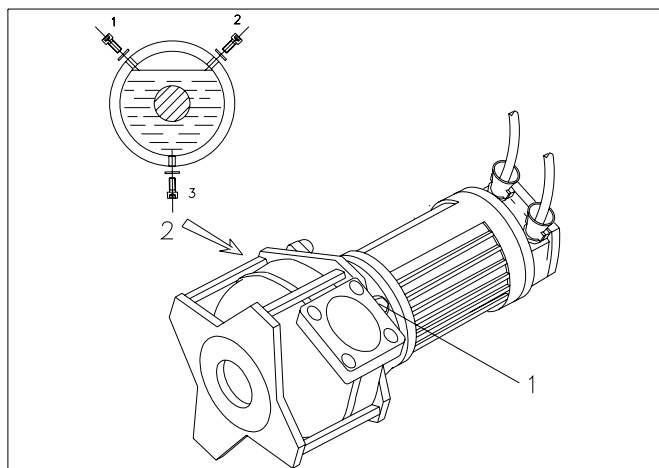


Fig. 7.5

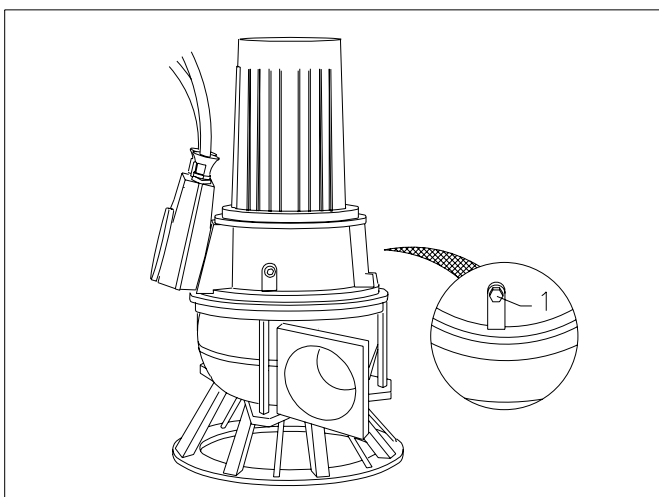


Fig. 7.6

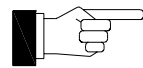
7.5 Oil level

7.5.1 RD 20

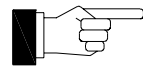
Put the pump in a horizontal position so that the 2 hexagonal socket screws are on top (see fig.7.4). Unscrew the level plug (1) and the vent plug (2).

The oil level should be at the lower side of the openings (see drawing).

By turning the pump a bit this should be visible. If not so fill up to the right level.



Always use the right kind of oil !



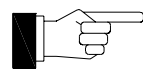
It is possible that your pump is fitted with 3 plugs. For oil check see 7.5.2

7.5.2 RD 40

Put the pump in a horizontal position so that 2 hexagonal socket screws are on top and one at the bottom (see fig.7.5). Unscrew the level plug (1) and the vent plug (2).

The oil level should be at the lower side of the openings (see drawing). By turning the pump a bit this should be visible.

If not so fill up to the right level.

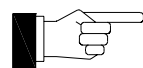


Always use the right kind of oil !

7.5.3 RD 60

Put the pump in a vertical position. Unscrew the M20 oil plug (1) which can be found at the opposite side of the cable entry box (see fig. 7.6).

The oil level should be at the lower side of the opening. If not so fill up to the right level.



Always use the right kind of oil !



Ensure that the pump is fully supported to prevent it from falling over !

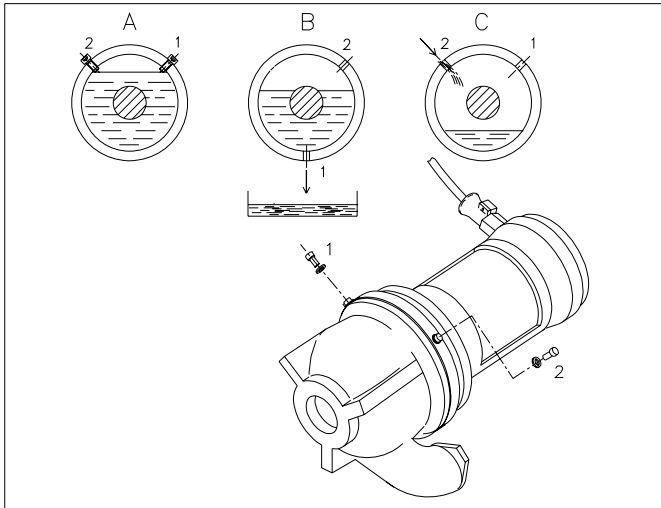


Fig. 7.7

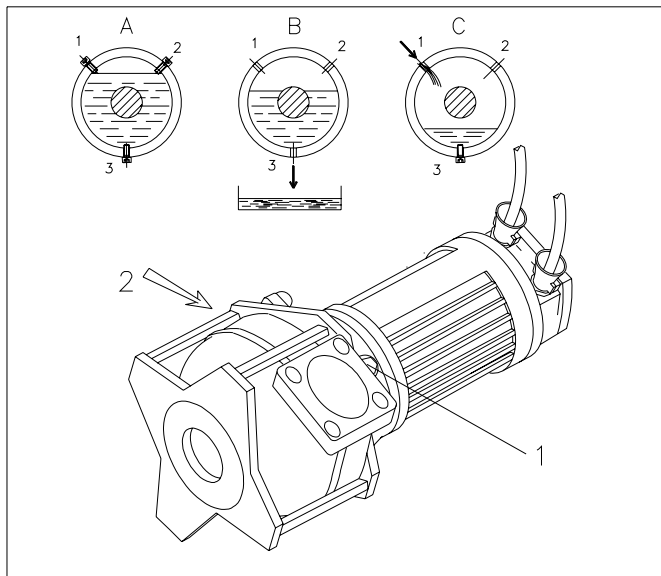


Fig. 7.8

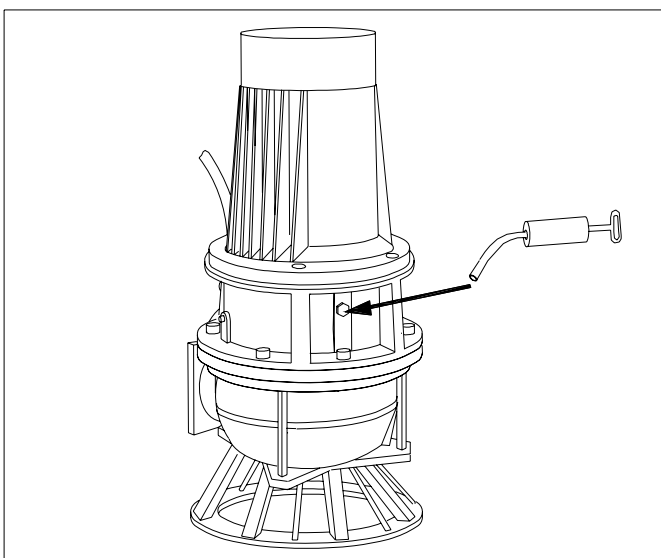

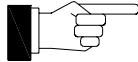



Fig. 7.9

7.6 Oil change

-  Collection, storage and removal of the oil should be done according to the regulations of the local authorities.
-  When necessary replace the sealing rings.
-  Always use the right kind of oil ! (see chapter 7.3).

7.6.1 RD 20

Put the pump in a horizontal position so that one of oil plugs is at the bottom (fig.7.7 position B).
Remove the vent plug (2).
Put a receiving bin underneath the drain plug (1).
Remove the plug and drain the oil.
Rotate the pump so that the 2 openings are on top (fig.7.7 position C).

Refill the oil housing.
The oil level should be at the lower side of the openings (fig.7.7 position A).

Replace the plugs.

7.6.2 RD 40

Put the pump in a horizontal position so that the drain plug (3) is at the bottom (Fig.7.8 position A).
Remove the vent plugs (1) and (2).
Put a receiving bin underneath the drain plug.
Remove the plug and drain the oil.

Replace the drain plug.

Refill the oil housing.
The oil level should be at the lower side of the openings (Fig.7.8 position A).

Replace the plugs.

7.6.3 RD 60

Place the pump in vertical position and unscrew the M20 plug (Fig.7.6).
Use a small hand pump to suck-out the oil as good as possible.
(A small amount of oil will remain and is only to drain in horizontal position.)
Refill the oil housing using the small hand pump again.
The oil level should be near the lower side of the opening.
Replace the plug.

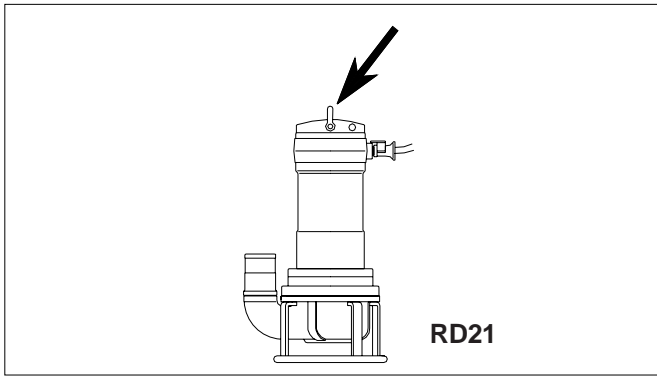


Fig. 8.1

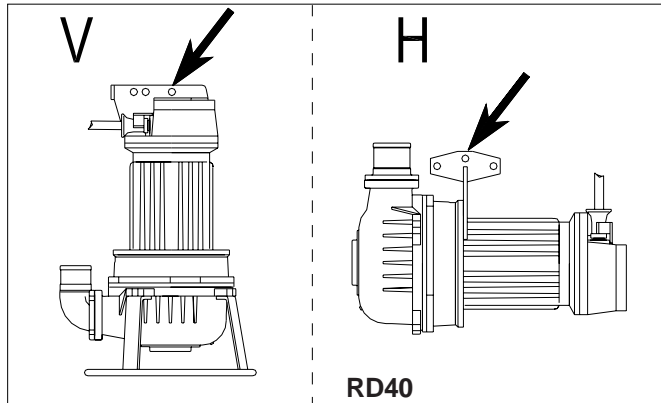


Fig. 8.2

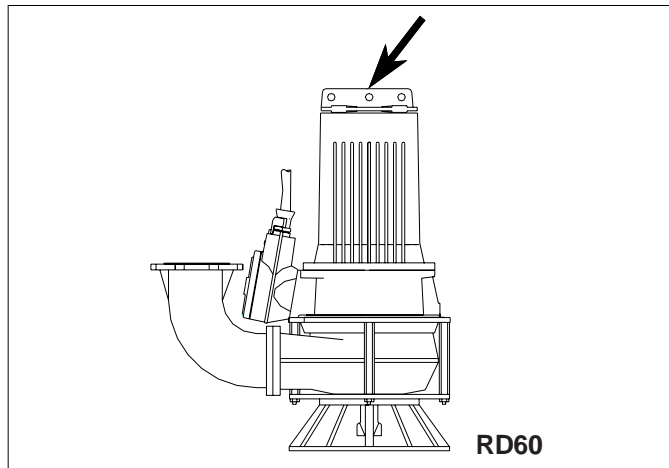


Fig. 8.3

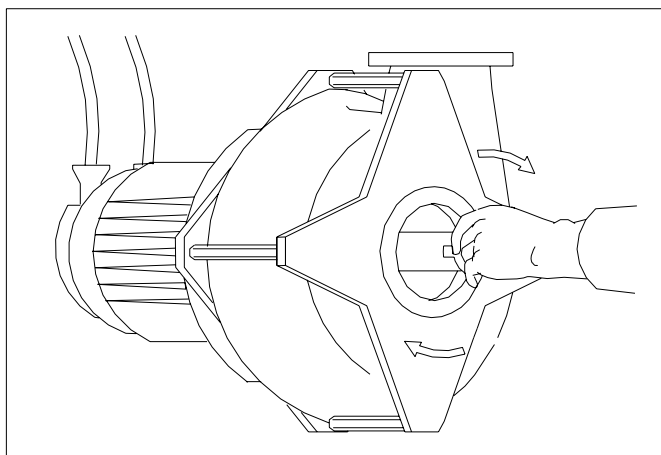
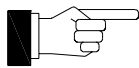
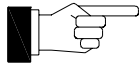
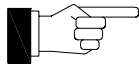


Fig. 8.4

7.7 Motor housing

-  The flame proof pump motors may not be opened by unauthorized personnel!
-  The cable entry box can be checked for water ingress. Do this outside the hazardous surrounding!
-  In case of doubt about the condition of the motor, contact your dealer.

8. TRANSPORT AND STORAGE

The pump can be transported and stored in both horizontal and vertical position.



Never lift the pump by the motor cable or discharge hose. Always use the suspension bracket ! See Fig.8.1, 8.2 and 8.3.

In case of long storage, the pump must be protected against moisture and heat.

Before storing the pump clean it with a waterjet and check the motor housing for water ingress (see chapter 7.7) .

On a regular base (every three months), turn the impeller by hand, this is necessary to prevent sticking of the mechanical seal surfaces (see Fig. 8.4).

After 6 months of storage, a general inspection is advised, before installing the pump. Follow the instructions of chapter 5.

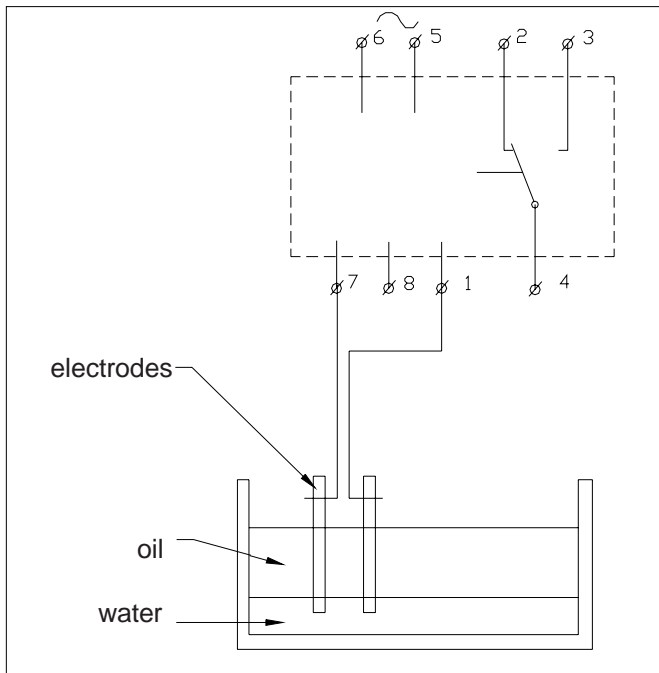


Fig. 9.1

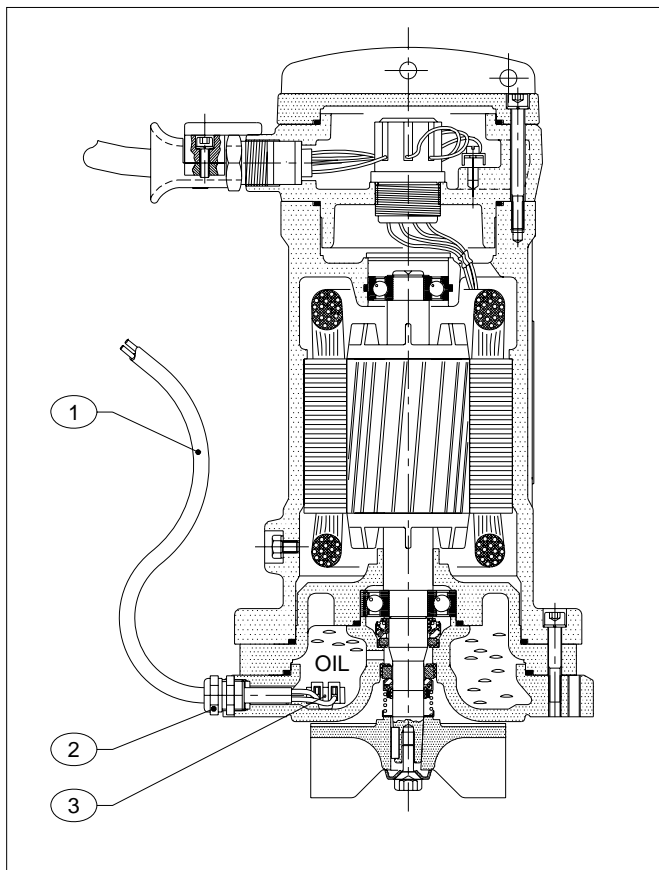


Fig. 9.2

9. OPTIONS

9.1 Waterdetector

As a safeguard against water ingress into the motor, the pump can be equipped with a waterdetector.

When your pump is equipped with a waterdetector, this can be found on the dataplate.

See appendix 1: at position 1 a "W" is stamped as fore last character. The waterdetector detects water which might have entered the oil housing or motor housing due to seal failure or cable damage.

The water detector causes the pump to switch off, before damage to the motor is done.



The water detector must be connected to a "intrinsic safe" circuit

The probes itself are a non-active electrodes, placed in oil housing. It is used in conjunction with a relay in the control circuit that measures the resistance between the electrodes.

If only air or oil is present, the resistance is over 5000 Ohm. If water enters, the resistance will decrease to as low as 300 to 500 Ohm

No water present:

- high resistance between terminals 1 and 7 (>5000 Ohm)
- terminals 2 and 4 closed
- terminals 3 and 4 open

Water present:

- low resistance between terminals 1 and 7 (300-500 Ohm)
- terminals 2 and 4 open
- terminals 3 and 4 closed

See Fig. 9.2.

The blue cable (1) is connected to the oil housing by means of a special watertight entry (2).

The "intrinsic safe" electrodes (3) are inside the oil housing.

9.2 Thermistors

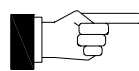
Instead of thermoswitches, the pump can be equipped with thermistors (on special request).

This will be marked with a "U" on the dataplate at position 1 as last character.

Normally the resistance is about 200-500 Ohm.

When the switch-off temperature is reached the resistance will be between 1650-4000 Ohm.

The maximum voltage is 7.5V.



A thermistor is not a circuit breaker but a resistance.

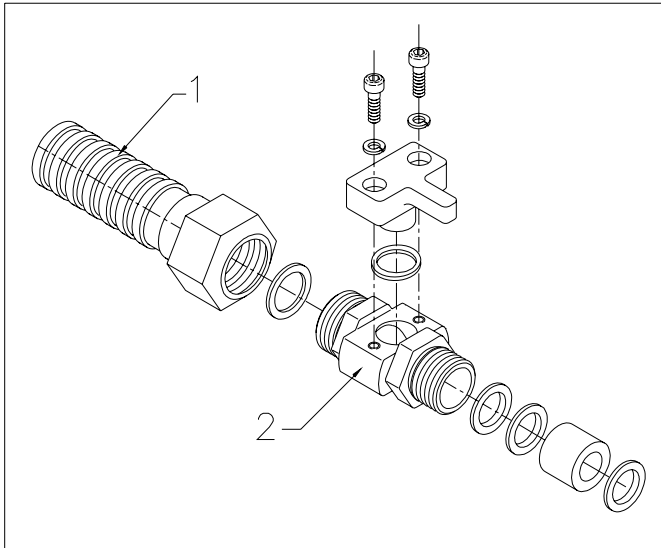


Fig. 9.3

9.3 Cable protection

When chemical or mechanical protection for the cable is needed a tube can be fitted around the cable (Fig. 9.3 pos 1).

This is a flexible stainless steel tube (1) connected to a special cable entry (Fig.9.3 pos 2).

9.4 Special oil

Upon request the oil housing can be filled with a special oil. If so, a label on the pump shows which kind of oil is used.

9.5 Version with cooling system

The following cooling versions are possible:

- * external cooling system
- * external cooling system with seal flushing

9.5.1 External cooling system

As an option the pump could be obtained with an external cooling system. In this case a motor housing with cooling jacket is installed. At least 20 l/min water with a maximum temperature of 40°C and about 1 bar pressure is circulated through the cooling jacket.

For this purpose two 1/2" connections are supplied on the bearing housing.

The right-hand site is the inlet opening.

The cooling system is self venting, providing that in- and outlet are not exchanged.

The cooling flow is only required while the pump is running.

If the cooling water temperature exceeds 45°C the amount of cooling water should be established on site. The difference between in- and outlet temperature should be less than 10°C.

The maximum medium temperature should not exceed 80°C.

Alternatively the pump could be ordered in a version that discharges the cooling water through the pump. With this arrangement, the mechanical seal and the backside of the impeller are kept clear from dirt contaminations. The required cooling water pressure varies with pump type and operating conditions. It will not exceed the suction pressure plus 2/3 of the manometric pumphead.

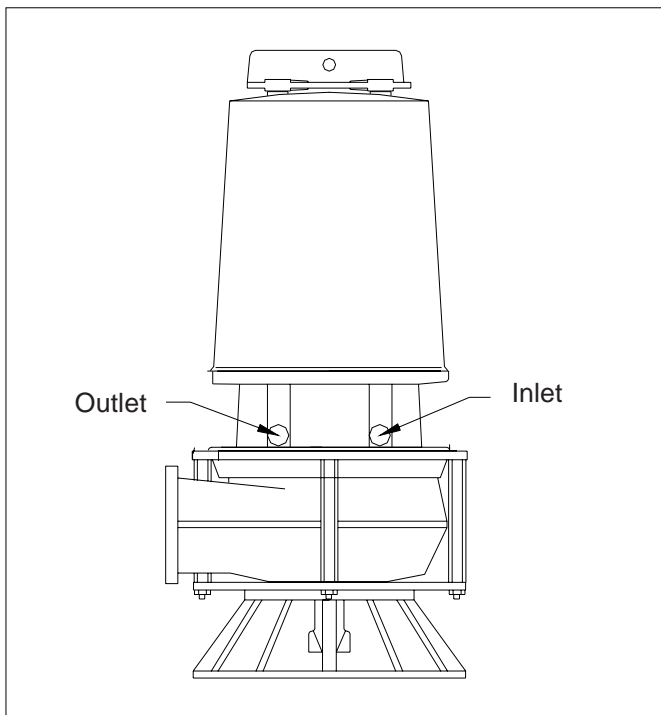


Fig. 9.4

10. TROUBLE SHOOTING

10.1 Safety



When working on the motor, make sure that the power is switched off.



Only qualified electricians may do the electrical work.



When working on the pump make sure it cannot start unexpectedly!



When starting the pump ensure nobody goes near rotating parts.

Observe local electrical, safety and Ex-regulations!

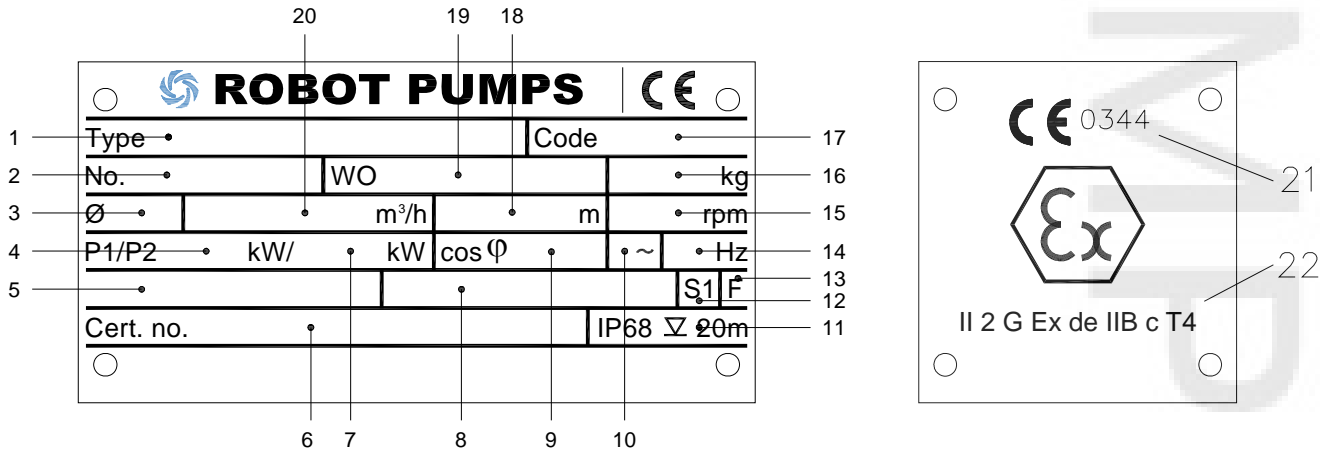
10.2 Trouble shooting list

PROBLEM	POSSIBLE CAUSE	REQUIRED ACTION	CHECKPOINTS
Pump does not start	No voltage on motor terminals	Check power supply	* No power * Main isolator switch * Fuses
		Check motor protection	* Earth leakage relay * Motor protection relay * Motor temperature * Water detector
		Check start-and stop signals	* Too low waterlevel * Obstructed level switches * Switches interchanged * Control panel
	Motor failure	Check motor wiring	* Continuity and isolation * Phase resistance
Pump does not stop	No stop signal	Check level regulation	* Float switches * Control panel
	Wrong start- and stop level	Check level regulation	* Obstructed level switches * Adjust start- and stop level * Power supply not stable
Pump starts and stops repeatedly	Fault in power supply	Check power supply	* Low voltage * Not all 3 phases available * Setting of motor protection
	Motor overloaded	Check pump	* Wrong direction of rotation * Impeller blocked * Protection in automatic reset mode
	Motor overheated	Check cooling Check motor	* Continuity and isolation * Fuses
Current too high	Fault in power supply	Check power supply	* Low voltage
	Pump failure	Check pump	* Impeller blocked * Viscosity or spec. gravity too high * Wrong direction of rotation
Pump runs but no flow or too low flow	Clogging or air lock	Check discharge and coupling	* Discharge obstructed * Valve fully or partly closed * Air pocket in pump or discharge * Coupling leaks
	Pump failure	Check pump	* Impeller or volute blocked * Pump is sucking too much air * Worn or broken impeller
	Fault in power supply	Check power supply	* Control panel * Fuses * Low voltage
	Too low capacity	Check discharge	* Discharge obstructed * Valve fully or partly closed * Air pocket
High level alarm	Pump failure	Check pump	* Impeller or volute blocked * Pump is sucking too much air * Worn or broken impeller * Worn or broken bearings
	Fault in power supply	Check power supply	* Fuses * Control panel
	Motor failure	Check motor	* Continuity and isolation

APPENDIX 1: Dataplate

The main characteristics of the pump are given on the dataplate.
At the first page of this book a label is found containing all the relevant information.

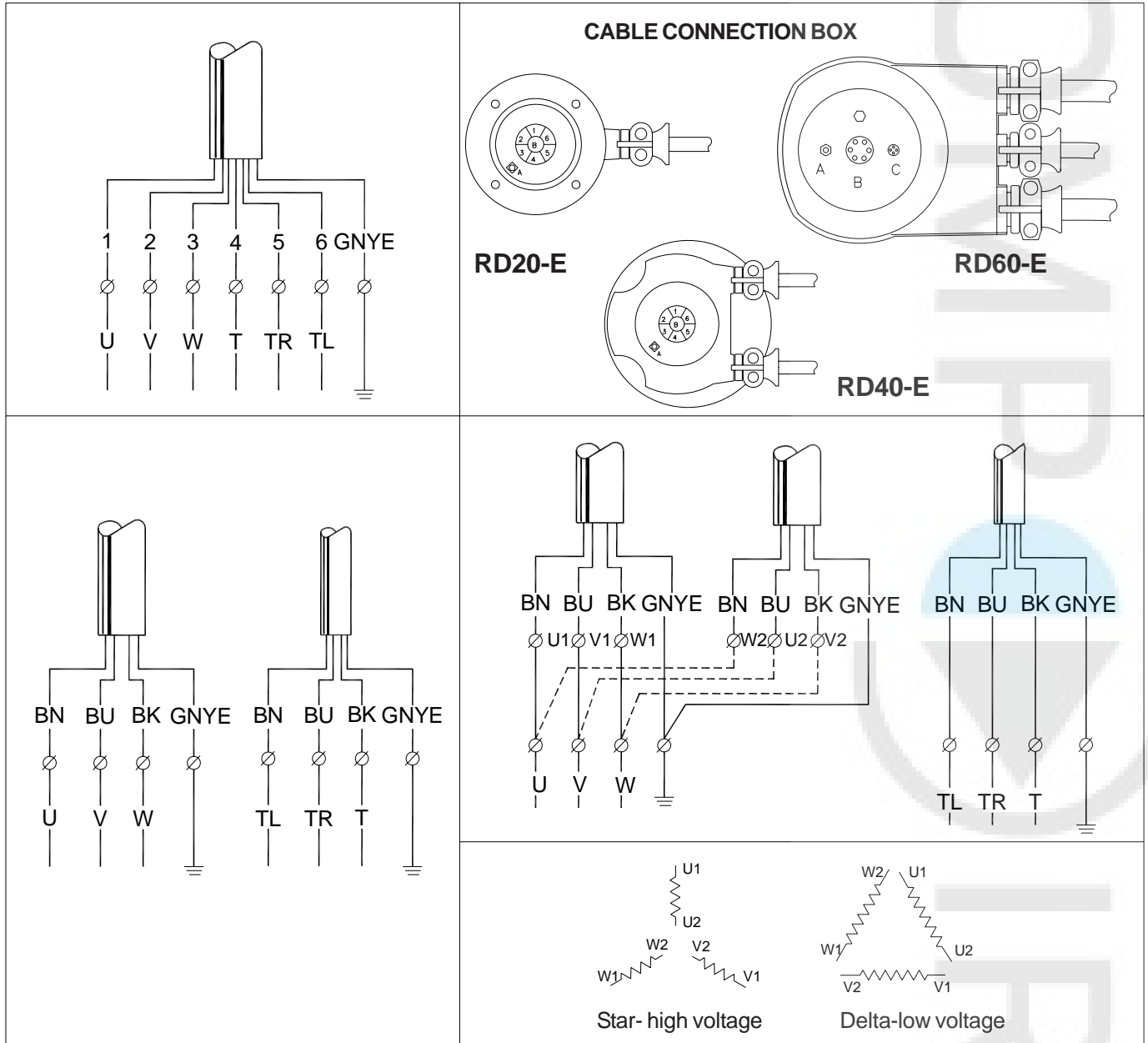
The dataplate of an RD20 and RD40 pump is at one of the side of the motor housing.
The dataplate of an RD60 pump can be found on the bearing housing.



Nr. Description	Units	Remarks
1 Pump type		
2 Serial number		first 2 numbers are year of production
3 Impeller diameter	mm	
4 Rated electrical power	kW	
5 Rated voltage, current and connection	V, A	Y = motor in star
6 Certificate number		
7 Rated shaft power	kW	
8 Rated voltage, current and connection	V, A	Δ = motor in delta.
9 Power factor		
10 Number of phases		
11 Degree of protection		submersible (20m)
12 Type of duty cycle		S1 =continue
13 Temperature class		F =155°C
14 Frequency	Hz	
15 Speed	rpm	
16 Pump weight	kg	excl. accessories
17 Pumpcode		
18 Head in duty point	m	
19 Factory code		
20 Capacity in duty point	m³/h	
21 Code notified body		KEMA Quality B.V.
22 Ex-category		II 2 G Ex de IIB c T4

APPENDIX 2; Direct-on-line start motor (DOL)

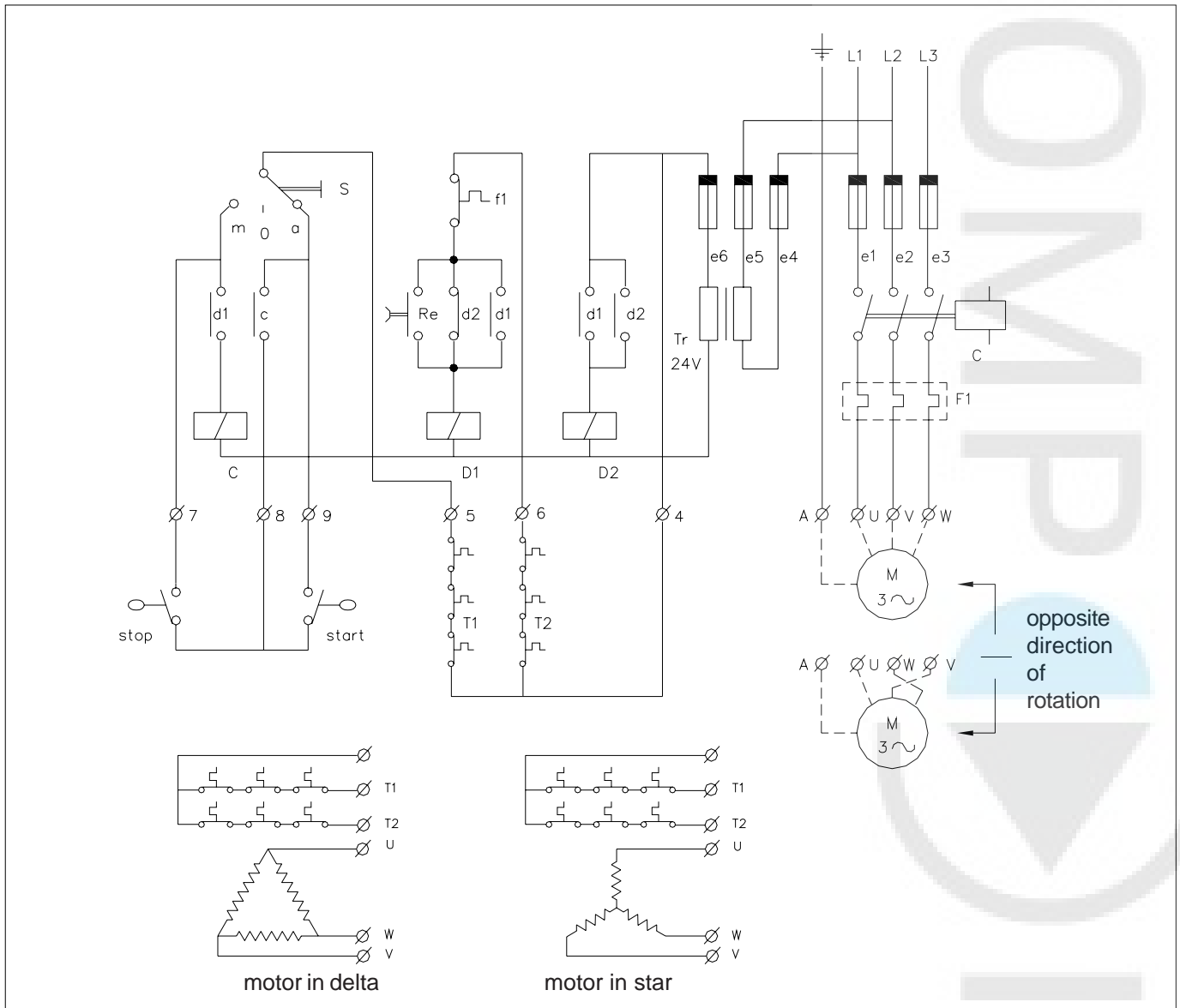
PUMP CABLE CONNECTIONS



PUMP CABLE	CABLE CONNECTION BOX	CONTROL PANEL
BN =brown BU =blue(or grey) BK =black GNYE =green/yellow	B1-B2-B3 =U-V-W B4 =thermostats-common B5 =thermostats-controller B6 =thermostats-limiter A =earth connection	U,V,W =net T =thermostats-common TR =thermostats-controller TL =thermostats-limiter ⏚ =earth connection

In some situations where a longer pump cable is used an extra 10 mm² earth cable is fitted to the motor housing to fulfill the demands of the Low Voltage Directive. Always connect this cable also to the earth connection!

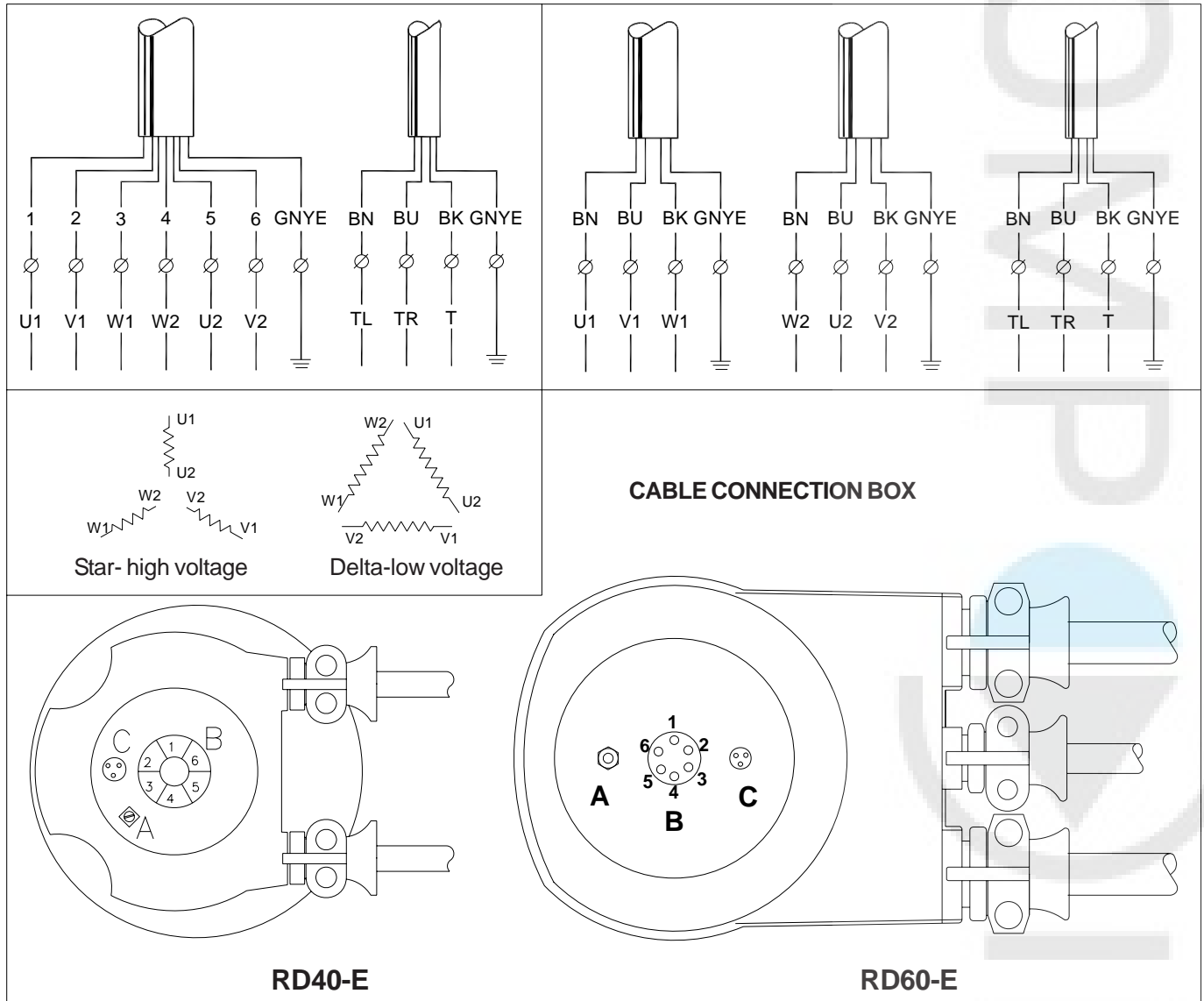
EXAMPLE OF A DIRECT-ON-LINE CONNECTION DIAGRAM



CODING	
e1, e2, e3	Line fuses
e4, e5	Fuses, primary control-circuit
e6	Fuses, secondary control-circuit
C	Main contactor
F1	Motor protection circuit breaker with manual reset
D1	Auxiliary relay for motor protection
D2	Auxiliary relay for power failure
Tr	Transformer
S	Manual-off -auto selector switch
Start	Level switch pump start
Stop	Level switch pump stop
Re	Reset push button
M	Pump motor
T1	Thermoswitches, controller
T2	Thermoswitches, limiter

APPENDIX 3; Star-delta start motor (YD)

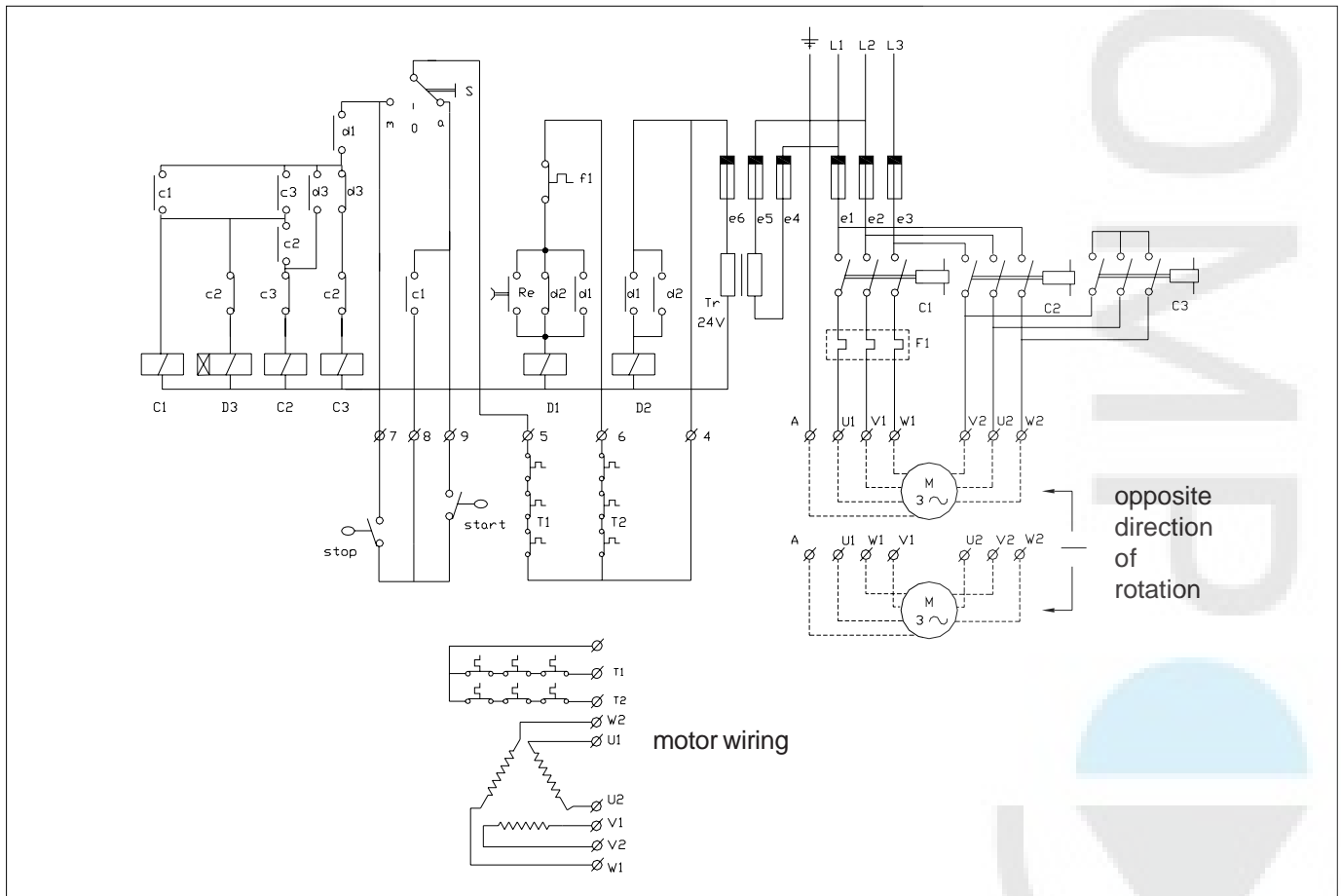
PUMP CABLE CONNECTIONS



PUMP CABLE	CABLE CONNECTION BOX	CONTROL PANEL
BN =brown	B1-B2-B3 =U1-V1-W1	U1,V1,W1 =line
BU =blue (or grey)	B4-B5-B6 =W2-U2-V2	W2,U2,V2 =line
BK =black	C1 = thermostats-common	T = thermostats-common
GNYE =green/yellow	C2 = thermostats-controller	TR = thermostats-controller
	C3 = thermostats-limiter	TL = thermostats-limiter
	A = earth connection	⏏ = earth connection

In some situations where a longer pump cable is used an extra 10 mm² earth cable is fitted to the motor housing to fulfill the demands of the Low Voltage Directive. Always connect this cable also to the earth connection!

EXAMPLE OF A STAR-DELTA CONNECTION DIAGRAM



CODING	
e1, e2, e3	Line fuses
e4, e5	Fuses, primary control-circuit
e6	Fuses, secondary control-circuit
F1	Motor protection circuit breaker with manual reset
C1	Maincontactor
C2	Relay delta connection
C3	Relay star connection
D1	Auxiliary relay for motor protection
D2	Auxiliary relay for power failure
D3	Timer relay star-delta start
Tr	Transformer
S	Manual-off-auto selector switch
Start	Level switch pump start
Stop	Level switch pump stop
Re	Reset push button
M	Pump motor
T1	Thermoswitches, regulator
T2	Thermoswitches, limiter

APPENDIX 4; Notes:

Name	Date	Remarks