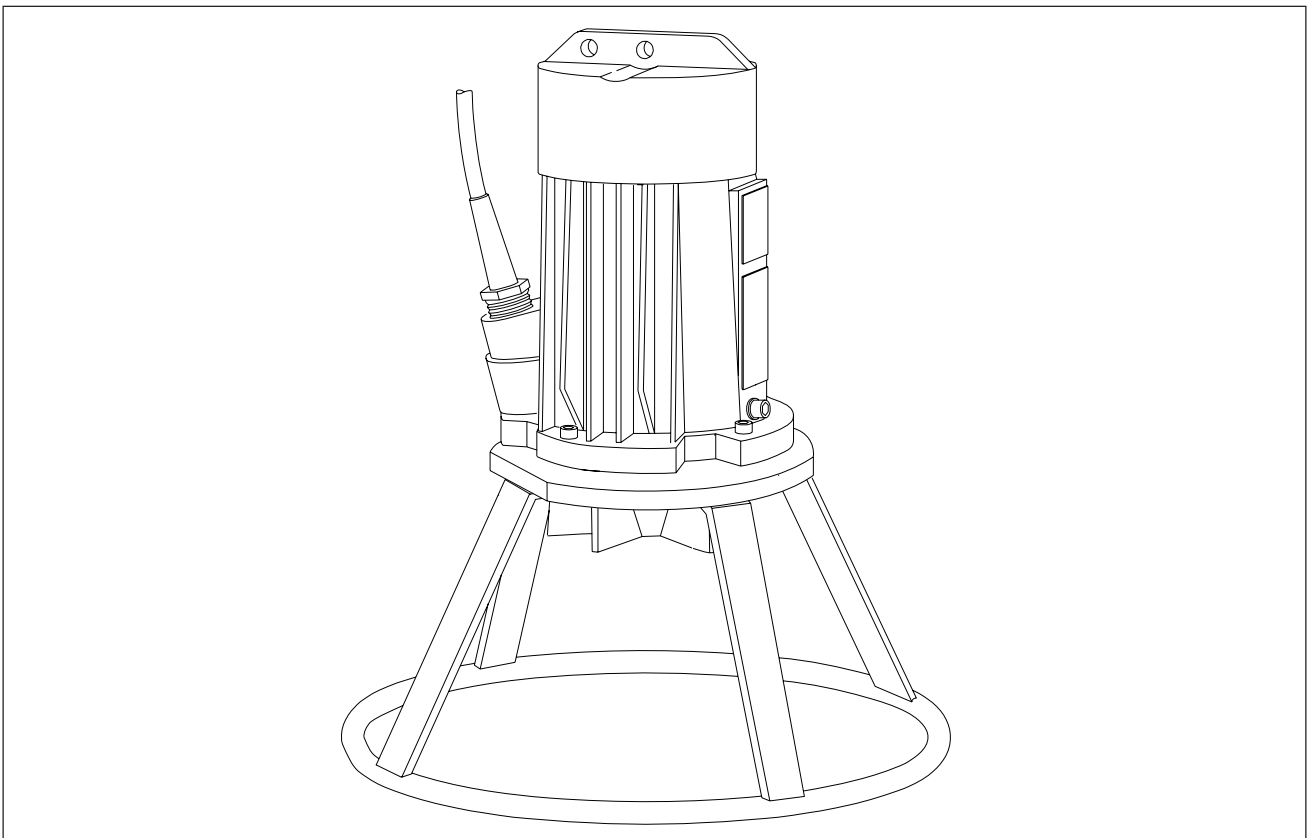




OPERATION
&
MAINTENANCE MANUAL
RM-SERIES

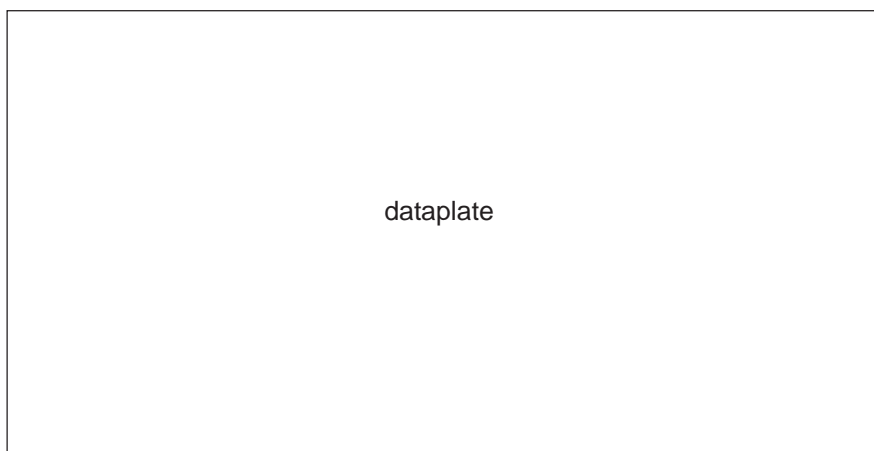


CE-DECLARATION OF CONFORMITY

ITT W&WW Alphen B.V.
Produktieweg 5
P.O. Box 140
2400 AC Alphen aan den Rijn
The Netherlands

Herewith declares that:

Submersible mixer type RM in basic version,



is in compliance with the standards

EN 292-1, EN 292-2
EN 809
EN 60204-1

according to

- the Machinery Directive 98/37/EEC.
- the Low Voltage Directive 2006/95/EC.
- the EMC-Directive 2004/108/EC.

Only use this product in conjunction with a control panel and an installation that is declared to be conform the Machinery Directive, the Low Voltage Directive and the EMC-Directive !

The Netherlands, Alphen aan den Rijn,

F. Visser, Managing Director



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1. FOREWORD

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

The RM mixers are designed to create a strong flow to keep both the floating and settled solids in suspension, to keep sumps clean without the need for manual cleaning.

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

This manual contains different warnings and safety precaution.

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



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



The RM-mixer in basic version may not be used in a potentially explosive atmosphere. Instead, use a ROBOT flameproof mixer!

When ordering spareparts, always quote.

1. Type
2. Code
3. Serial number

This information is found on the dataplate.

(See appendix 1)

Sectional drawings and partslists are available on request.

All products manufactured by ITT W&WW Alphen 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.

ITT W&WW Alphen B.V.
Produktieweg 5
P.O. Box 140
2400 AC Alphen aan den Rijn
The Netherlands

2. GUARANTEE

We refer to the warranty agreement with your local dealer.

3. SAFETY AND ENVIRONMENT

3.1 Symbols

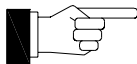
* In this manual



General warning
Danger !



Electrical hazard !



Attention !

* On the mixer



Danger of physical injury
Rotating parts !



Electrical hazard !



EC-conformity symbol

3.2 General safety instructions

- * Only trained and authorized personnel may install and maintain the mixer after carefully reading this manual.
- * Only use the mixer for its intended purpose and under the regulated circumstances.
- * Don't go near rotating parts.
- * Clean the mixer 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 mixer from the mains.
- * Use a proper hoist for lifting and handling the mixer.
- * Do not leave a large loop of cable in the sump, as the mixer may eventually damage it.
- * Never drop the loose cable end in water. The water may enter the cable and finally enter the motorhousing, 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 RM-mixer creates a powerful radial flow at impeller level with a nearly equally strong flow in the opposite direction just above the floor level. This strong flow will whirl up the settled solids and sludge and mix them with the water throughout the sump. At the same time, it creates sufficient turbulence at the water surface to prevent the formation of a floating layer.

Construction:

- High efficiency motor, standard class F insulation (up to 155 °C).
- Two independent mechanical seals, running in oil, form an effective barrier between mixer and motor.
- Heavy duty bearings, greased for life.
- Clog-free vortex impeller.
- Vanes at the backside prevent solids entering the seal area and reduce the pressure on the seal.

4.2 Main parts

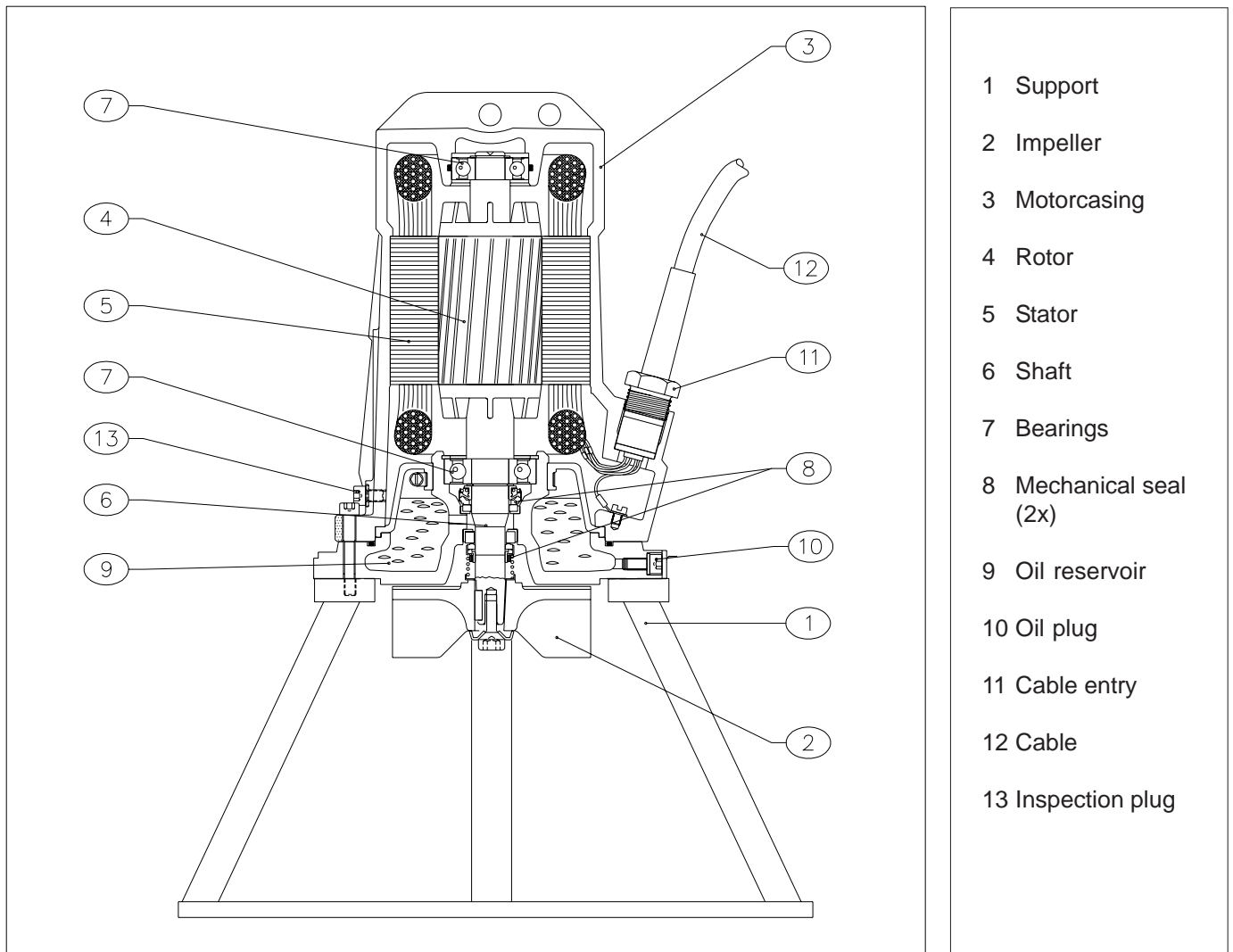


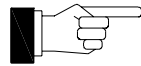
Fig. 4.1

5. FIRST START

After unpacking the mixer, 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 dataplate.

If thermostats are supplied make sure that they are correctly connected.

For examples of electrical diagrams and cable coding, see appendix 2, 3 and 4.

5.4 Thermostwitches

Check if the mixer is equipped with thermostwitches (optional).

Contact rating: max. 250V-1.6A

The contacts are normally closed.

5.5 Cable entry

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

5.6 Motor protection

The motor should always be connected to the line by means of a suitable motor protection circuitbreaker.

If the mixer 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 overcurrent relay directly after the main contactor. In this case, the mixer is also adequately protected in star-connection. The maximum setting of the overcurrent relay is 0.6x the current as given on the dataplate.

It is good practice to set the protection breaker at a 10% lower current, because all breakers require at least 110% of the adjusted current before tripping.

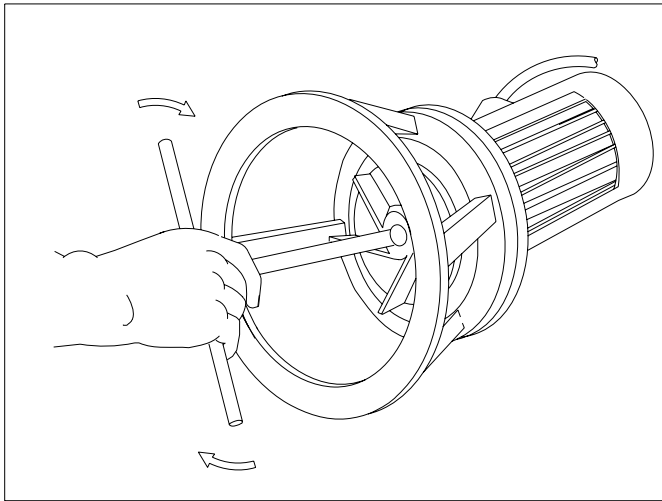


Fig. 5.1

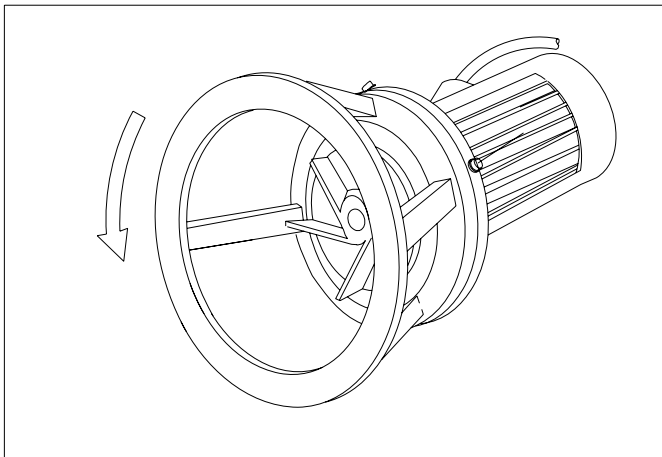


Fig. 5.2

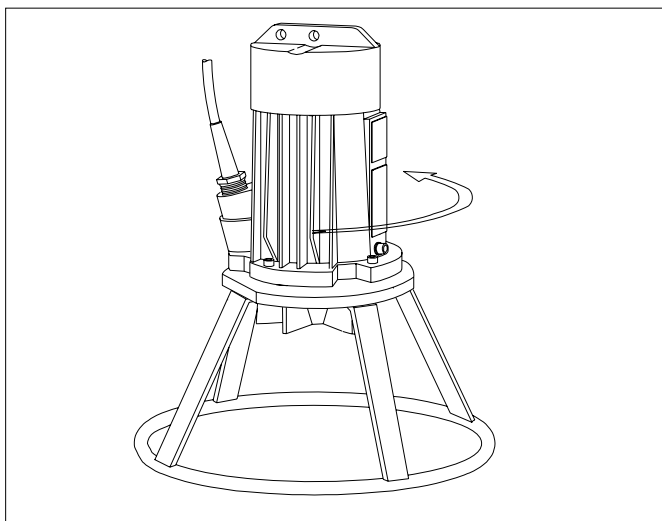


Fig. 5.3

5.7 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.

5.8 Installation parts

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

5.9 Direction of rotation

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

- Put the mixer in horizontal position and start the motor.
Looking on the impeller, the correct direction of rotation is counter-clockwise. (See arrow Fig. 5.2).

or:

- Starting the motor will give a recoil on the 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 !

5.10 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.

5.11 Medium temp. / max.motorload

When the medium temperature is higher than 40°C, the maximum motorload must be reduced.

The relationship between medium temperature and maximum absorbed motor current is shown below.

Check the reading of the dataplate against the reading of an Ammeter.

If the motor current exceeds the max. motorcurrent from the table below the mixer is not suitable or the motorcurrent must be reduced.

The motorcurrent can be reduced by installing a smaller impeller. Contact your dealer.

Temperature		Max.motorcurrent %
°C	°F	
40	104	100
50	122	95
60	144	90
70	158	80
80	176	70

5.12 Start frequency

When the mixer 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 20 starts an hour.

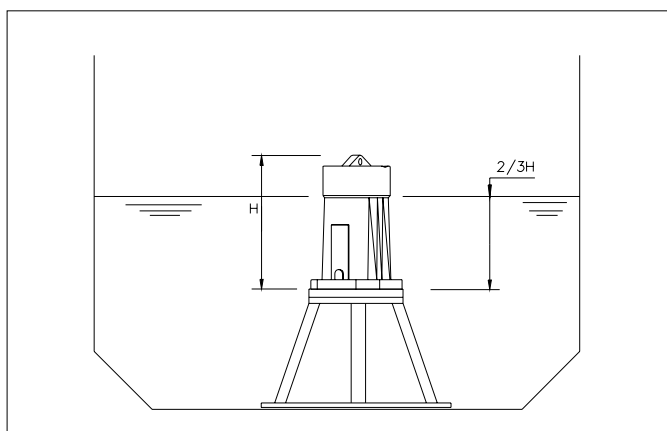


Fig. 5.4

5.13 Min. and max. submersion depth

The motorhousing should be at least 2/3 submerged for continuous operation at full load (see Fig. 5.4). It is good practice, whenever possible to keep the motorhousing completely under water.

For interrupted level controlled operation, less cooling is required.

The maximum submersion depth is 20m / 60ft.

6. INSTALLATION

6.1 How to use the RM mixers

Prior to switching on the pumps in a pumpstation, the mixer is activated. The running time depends on many factors, such as sump dimensions, sump lay-out and characteristics of the wastewater.

The optimum running time should be established under site conditions for the specific application. In general running times will vary from one to several minutes. The mixer is switched-off when the pump starts, however in very deep sumps or at high level differences, it is recommended to switch the mixers on again, shortly before the minimum water level is reached so that the floating layer will be destroyed more effectively.

The use of benching can have a positive effect on preventing the formation of a floating crust, as the flow created by the mixer will be forced upwards thereby creating more turbulence at the water surface.

The mixer should be used every pump cycle or every other cycle.

Initially it may require a few pump cycles to completely remove an existing floating layer.

6.2 Sump dimensions

The RM-mixers can be used in many different sump lay-outs. When not obstructed by pumps and or pipe work, the effective flow extends to a distance as shown in the table below.

Mixer type	Power input (cleanwater) 50Hz / 60Hz	Effective distance Y
RM21DC	1.8kW / 1.9kW	3.0m /10ft
RM21DD	2.5kW / 3.1kW	3.5m /12ft
RM21DG	3.8kW / 4.5kW	4.5m /15ft

The mixers can be placed either in the centre of the sump or alternatively off centre. We recommend whenever possible to maintain a minimum distance to the nearest wall of 1 m (3 ft).

7. MAINTENANCE

7.1 General



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



Clean the mixer thoroughly.



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

7.2 Maintenance schedule

- * After the first 20 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 6 months or 500 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 motor.

Oil quantity:

RM 20: 0.6 L.

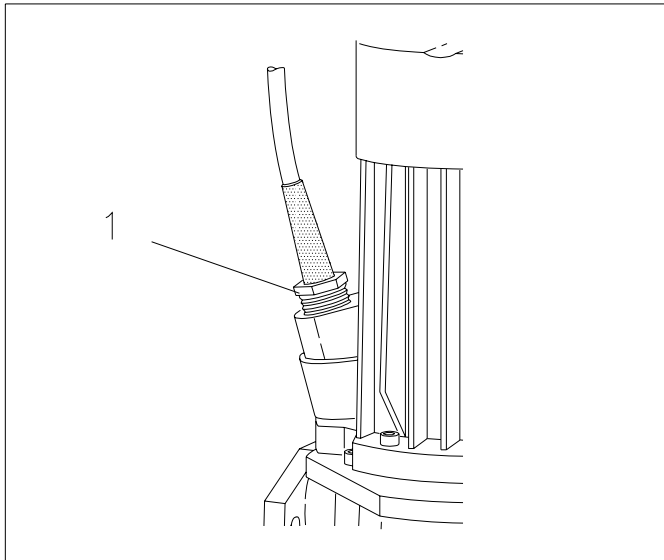


Fig. 7.1

7.4 Cable entry

Especially when the mixer 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 Cable entry without cable clamp

See fig. 7.1

Turn the hexagon head of the entry (1) for 1/6 of a turn clockwise using the right tool.

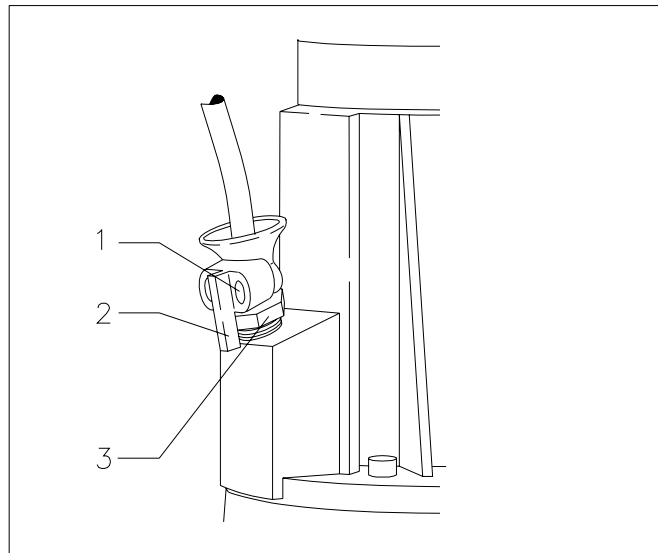


Fig. 7.2

7.4.2 Cable entry with cable clamp

See fig. 7.2

Unscrew the 2 hexagon socket screws (1).

Remove the cable clamp (2).

Turn the hexagon head of the entry (3) 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).

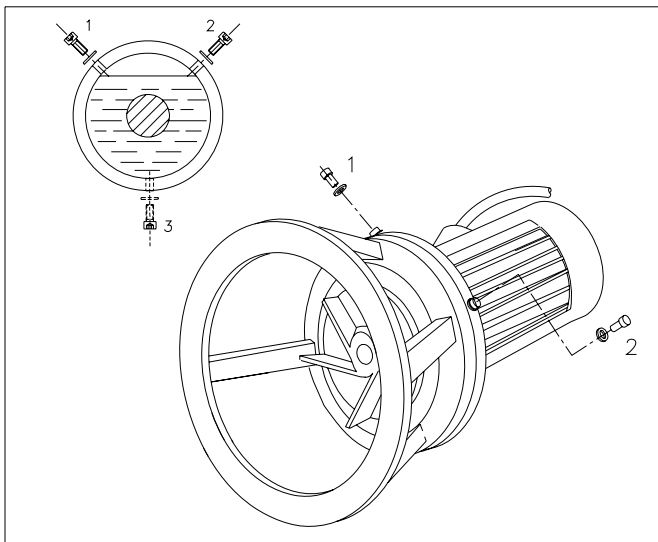


Fig. 7.3

7.5 Oil level

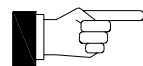
Put the mixer in a horizontal position so that the 2 hexagonal socket screws are on top (see fig.7.3).

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 motor a bit this should be visible.

If not so fill up to the right level.



Always use the right kind of oil !

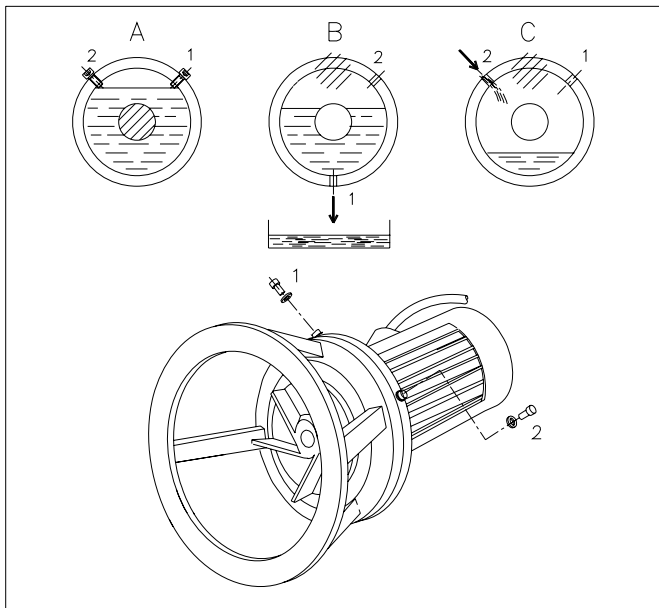


Fig. 7.4

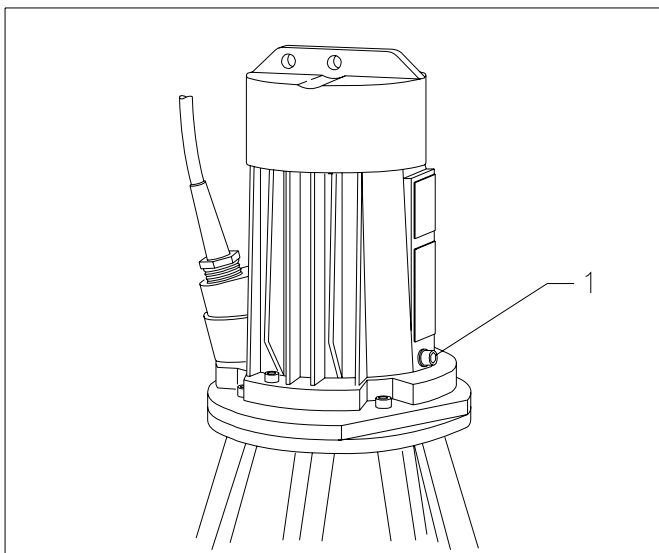


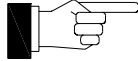


Fig. 7.5

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).

Put the mixer in a horizontal position so that one of oil plugs is at the bottom (fig.7.4 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 mixer so that the 2 openings are on top (Fig.7.4 position C).

Refill the oilhousing.

The oil level should be at the lower side of the openings. (fig.7.4 position A).

Replace the plugs.

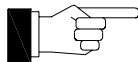
7.7 Motor housing

Unscrew the inspection plug of the motorhousing (see Fig. 7.5 pos 1).

Put the motor in horizontal position with the inspection opening downwards.

If water is present this will come out this way.

A small amount of water, due to condensation, is permissible.

 More water is an indication of leakage of the construction. Oil is an indication of seal failure between motorhousing and oil chamber. If so, contact your dealer.

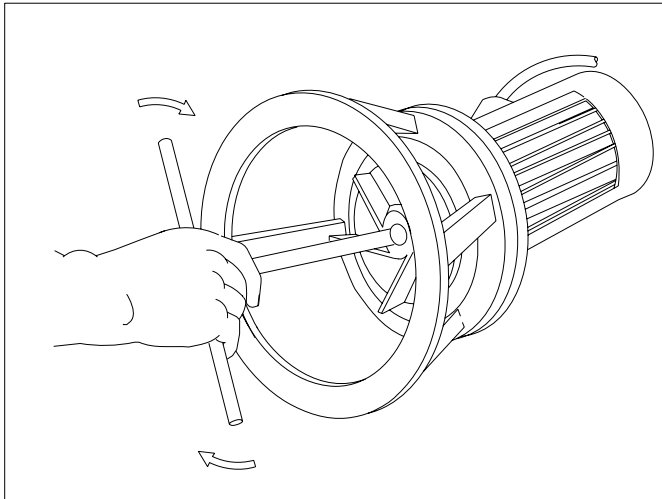


Fig. 8.1

8. TRANSPORT AND STORAGE

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



Never lift the mixer by the motorcable.
Always use the suspension bracket !

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

Before storing the mixer 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. 8.1). After 6 months of storage, a general inspection is advised, before installing the mixer. Follow the instructions of chapter 5.

9. OPTIONS

9.1 Waterdetector

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

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

See appendix 1: at position 24 a "W" is stamped.

The waterdetector detects water which might have entered the oilhousing or motorhousing due to seal failure or cable damage.

The waterdetector causes the mixer to switch off, before damage to the motor is done.

The probe itself is a non-active electrode, placed in oil and motorhousing. It is used in conjunction with a relay in the control circuit that measures the resistance between probe and frame.

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

We advise to use OMRON relay 61 F-GP or an equivalent.
This relay switches at 5000 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

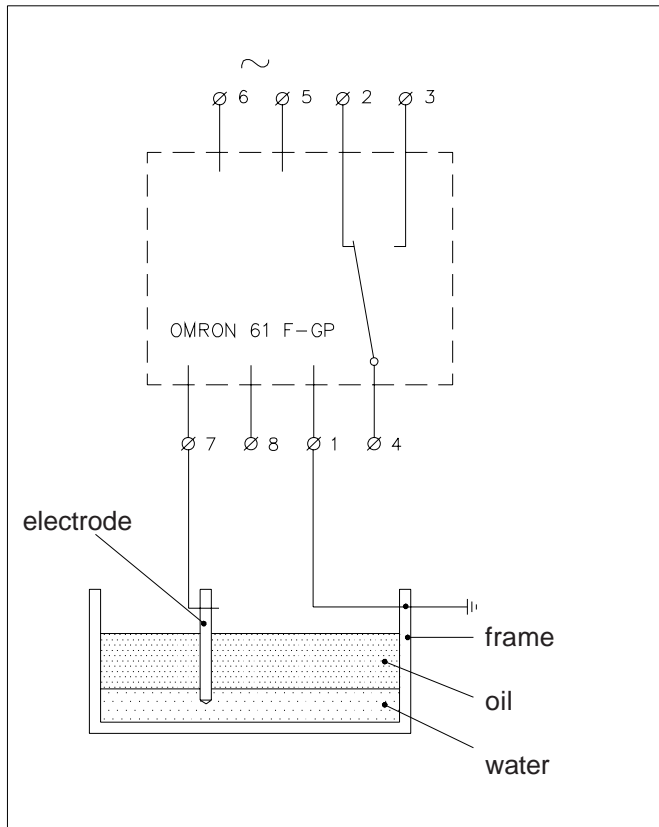


Fig. 9.1

9.2 Thermoswitches

Thermoswitches are optional .

When your mixer is equipped with thermoswitches, a "T" is stamped at position 24 on the dataplate. (see appendix 1). A copy of your dataplate is on page 2. For connection values see par. 5.4.

9.3 Thermistors

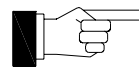
Instead of thermoswitches, the motor can be equipped with thermistors (on special request).

This will be marked with a "U" on the dataplate at position 24 .

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.

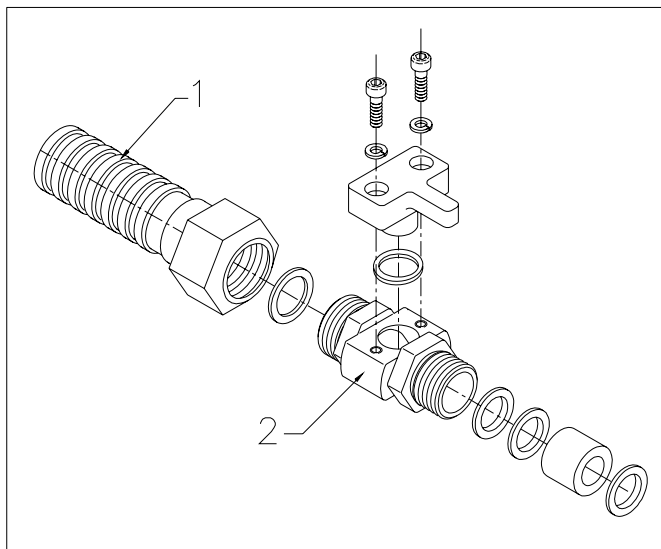


Fig. 9.2

9.4 Cable protection

When chemical or mechanical protection for the cable is needed a tube can be fitted around the cable (Fig. 9.2 pos 1).

This is a flexible stainless steel tube (1) connected to a special cable entry (Fig.9.2 pos 2).

When your pump is equipped with a cable protection, a "3" is stamped on the dataplate at position 24.

See appendix 1

9.5 Special oil

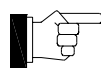
Upon request the oil housing can be filled with a special oil. If so, a label on the pump shows which kind of oil is used.

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 mixer make sure it cannot start unexpectedly!



When starting the mixer ensure nobody goes near rotating parts.

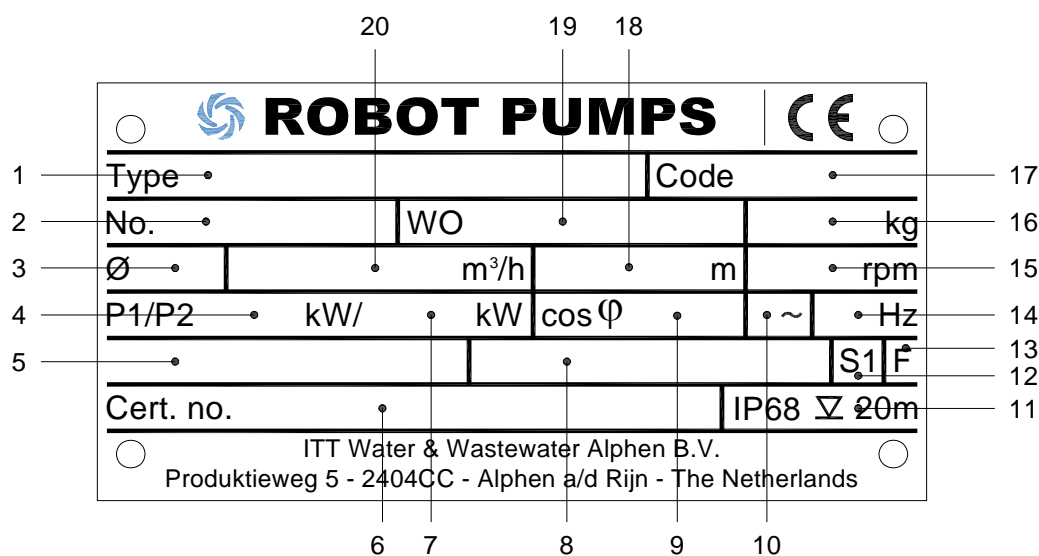
Observe local electrical and safety regulations!

PROBLEM	POSSIBLE CAUSE	REQUIRED ACTION	CHECKPOINTS
Mixer 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
Mixer 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
Mixer 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 mixer	* 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
	Mixer failure	Check mixer	* Impeller blocked * Viscosity or spec. gravity too high * Wrong direction of rotation

APPENDIX 1: Dataplate

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

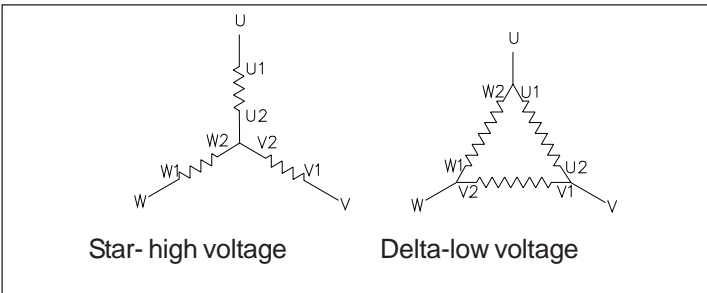
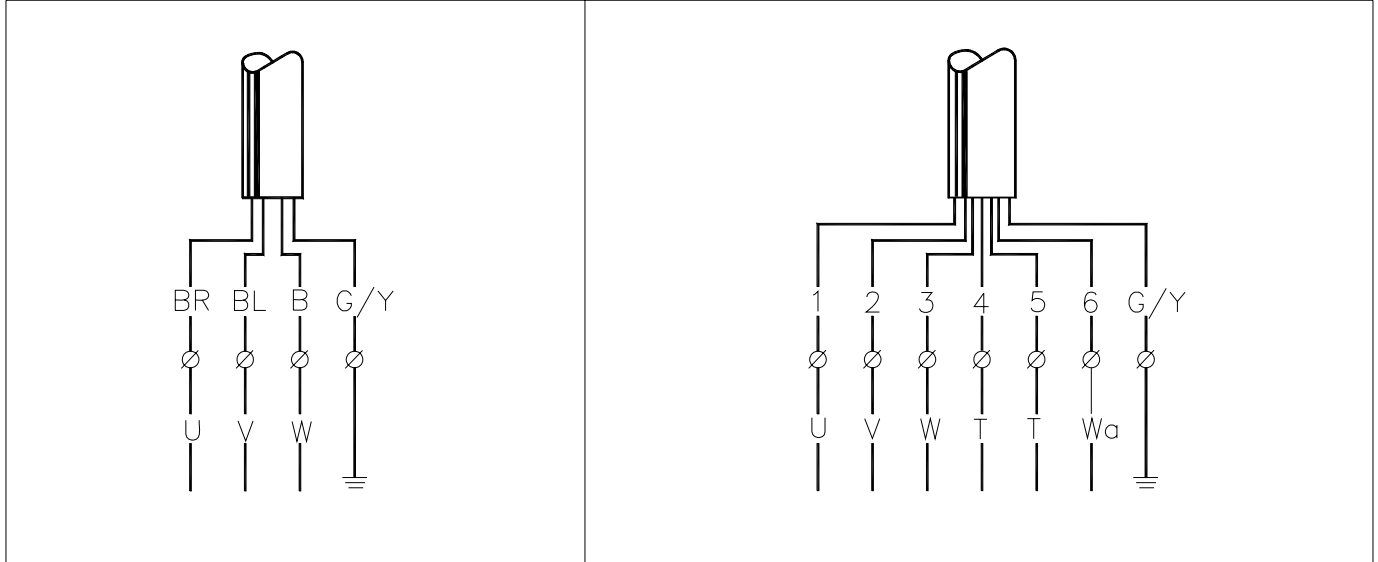
The dataplate of a RM20 mixer can be found on the motorhousing at the opposite side of the cable entry.



Nr. Description	Units	Remarks
1 Mixer 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		only for flameproof mixers
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 Mixer weight	kg	excl. accessories
17 Mixer code		
18 Head in duty point	m	
19 Factory code		
20 Capacity in duty point	m ³ /h	

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

MOTOR CABLE CONNECTIONS

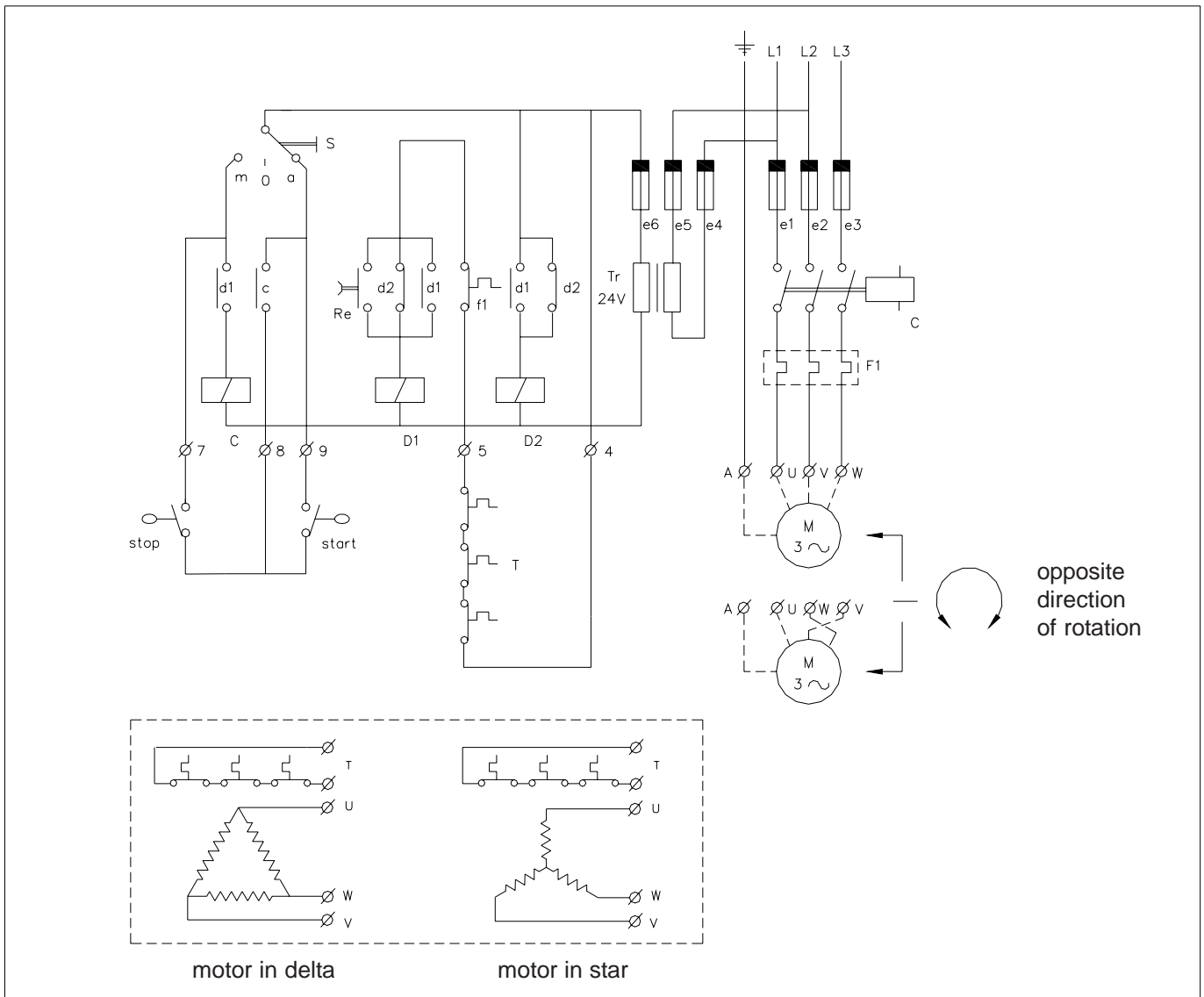


PUMP CABLE	CONTROL PANEL
BR =brown	U,V,W =line
BL =blue(or gray)	T =thermostats
B =black	Wa =water detector
G/Y =green/yellow	⏏ =earth connection

In some situations where a longer motor 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!

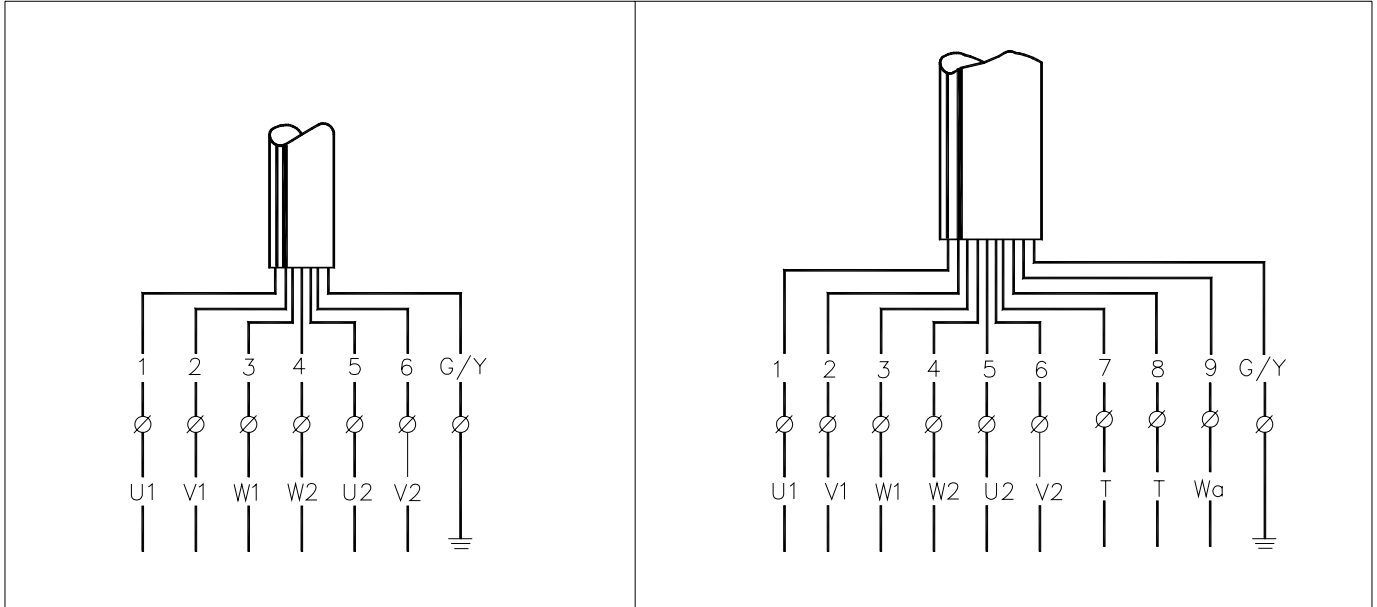
EXAMPLE OF A DIRECT-ON-LINE CONNECTION DIAGRAM



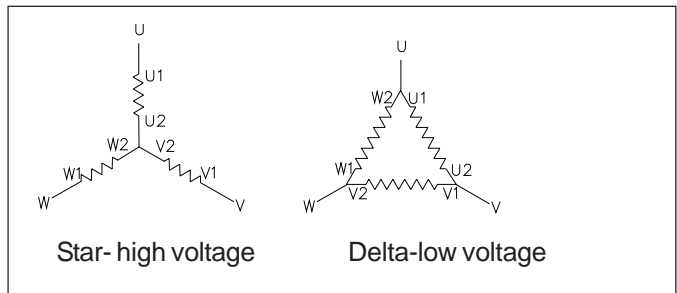
CODING	
e1, e2, e3	Line fuses
e4, e5	Fuses, primary control-circuit
e6	Fuses, secondary control-circuit
C	Maincontactor
F1	Motor protection circuit breaker with manual reset
D1	Auxiliary relay for motor protection
D2	Auxiliary relay for power failure
Tr	Transformer
S	Manual-off -auto selector switch
Start	Level switch pump start
Stop	Level switch pump stop
Re	Reset push button
M	Motor
T	Thermostats (if fitted)

APPENDIX 3; Star-delta start motor (YD)

MOTOR CABLE CONNECTIONS



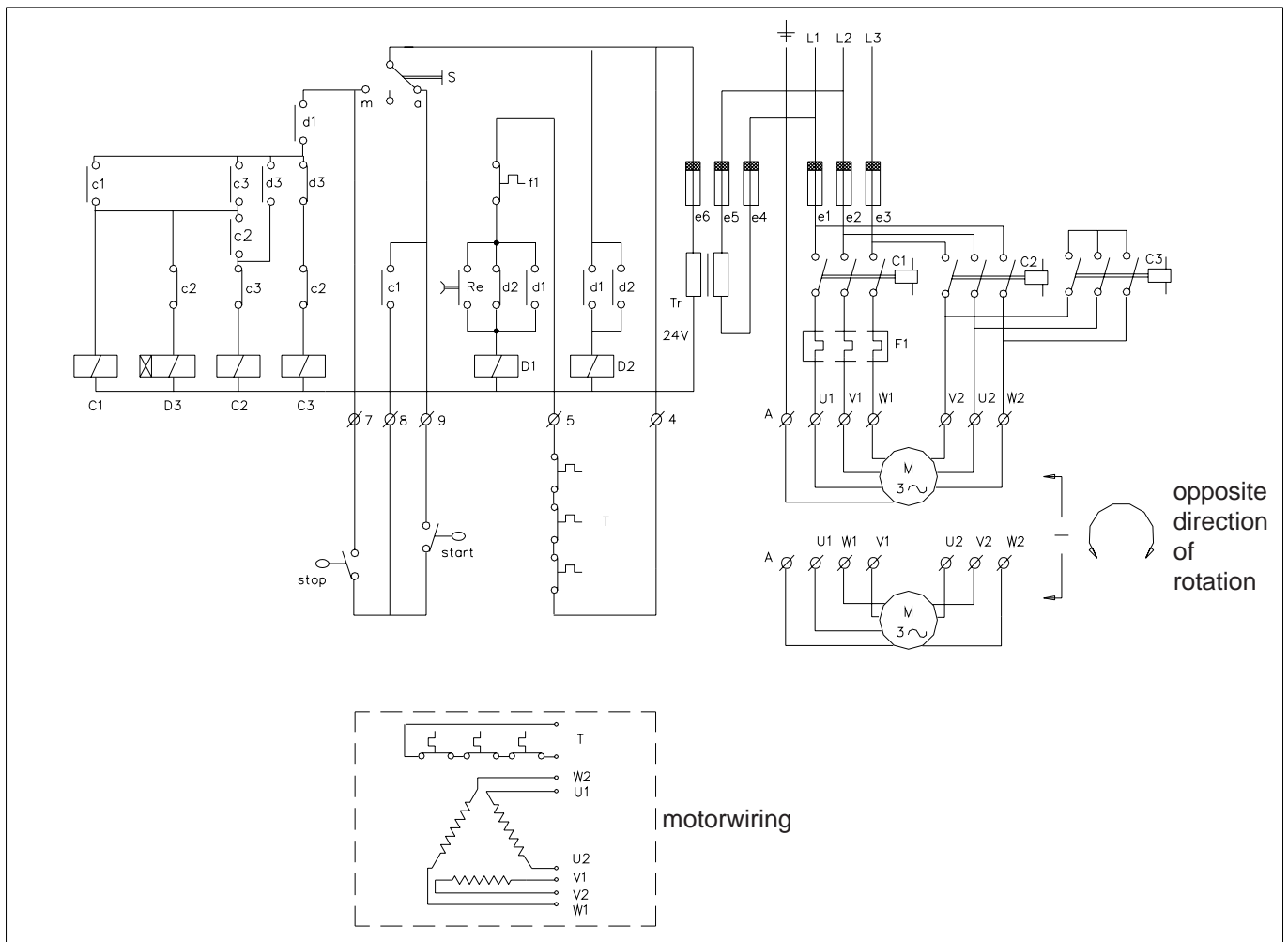
MOTOR CABLE	
BR	= brown
BL	= blue (or gray)
B	= black
G/Y	= green/yellow
CONTROL PANEL	
U,V,W	= line
T	= thermostats
Wa	= water detector
	= earth connection



In some situations where a longer motor cable is used an extra 10 mm² earth cable is fitted to the motorhousing 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

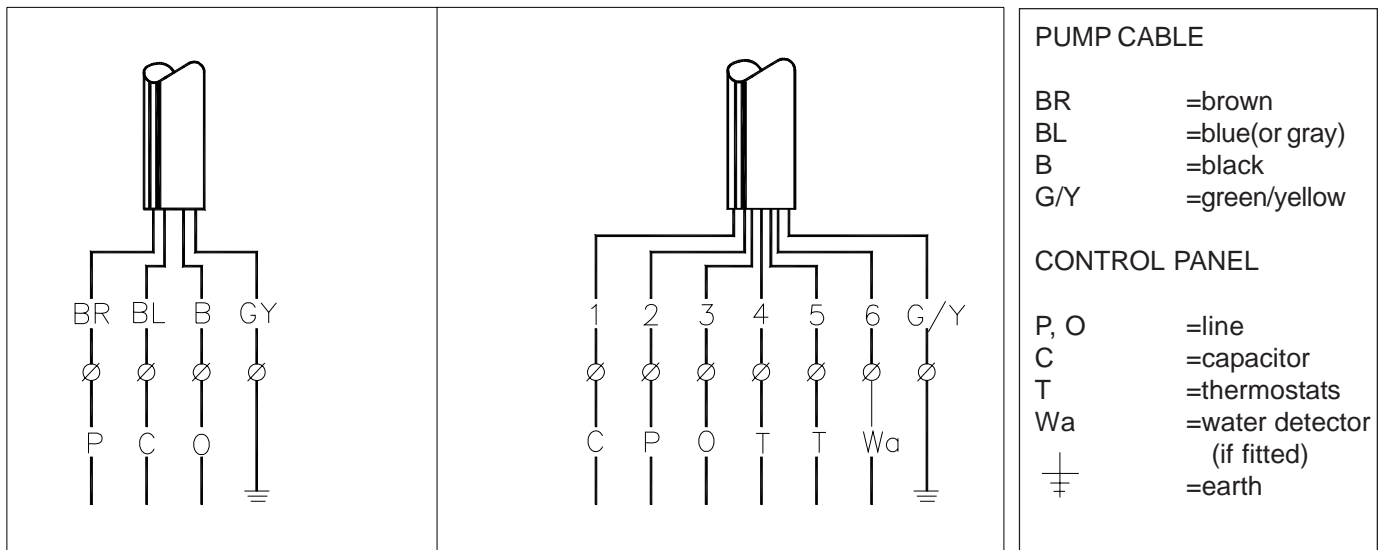


CODING

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	Motor
T	Thermostats (if fitted)

APPENDIX 4; Single phase motor

MOTOR CABLE CONNECTIONS



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

EXAMPLE OF A SINGLE PHASE CONNECTION DIAGRAM

