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End of Disclaimer text.

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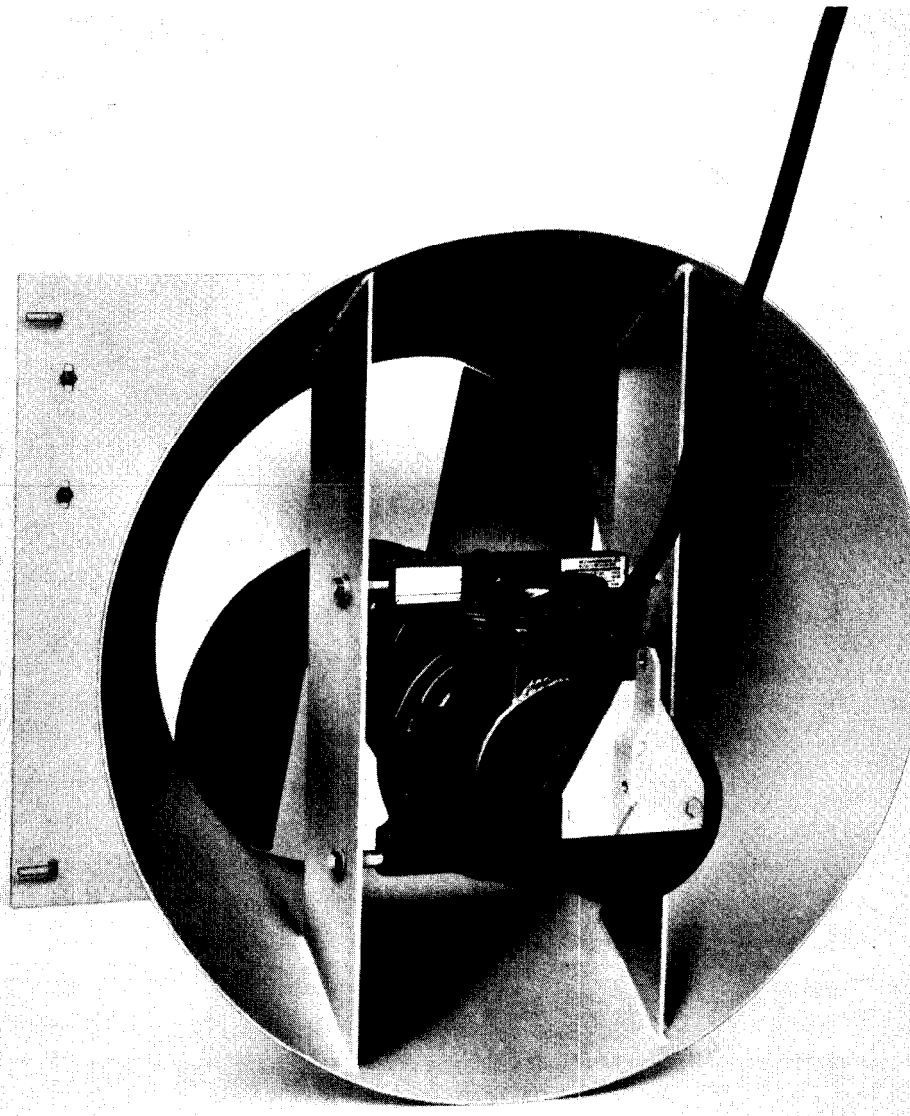
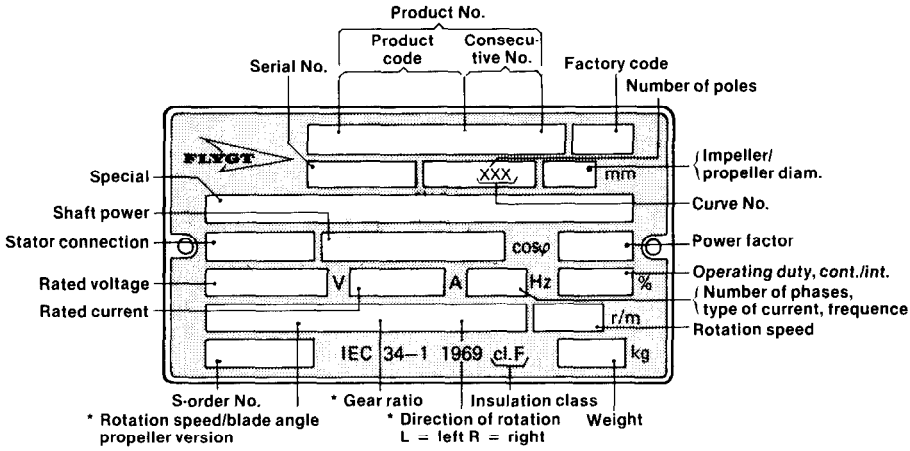
FLYGT

INSTALLATION CARE AND MAINTENANCE



DATA PLATE INTERPRETATION



Flygt undertakes to remedy faults in products sold by Flygt provided:

— that the fault is due to defects in design, materials or workmanship;

— that the fault is reported to Flygt or Flygt's representative during the guarantee period;

— that the product is used only under conditions described in the care and maintenance instructions and in applications for which it is intended;

— that the monitoring equipment incorporated in the product is correctly connected;

— that all service and repair work is done by a workshop authorized by Flygt;

— that genuine Flygt parts are used.

Hence, the guarantee does not cover faults caused by deficient maintenance, improper installation, incorrectly executed repair work or normal wear and tear.

Flygt assumes no liability for either bodily injuries, material damages or economic losses beyond what is stated above.

Flygt guarantees that a spare parts stock will be kept for 15 years after the manufacture of this product has been discontinued.

The manufacturer reserves the right to alter performance, specification or design without notice.

CONTENTS

PRODUCT DESCRIPTION

Design

PP4501.010 is a submersible, electric motordriven pump with reduction gearbox.

Motor

Squirrel-cage 1-phase or 3-phase induction motor for 50 Hz or 60 Hz.

The motor is started by means of direct on-line start or star-delta start.

Regarding starting method: see the data plate.

The motor can be run continuously or intermittently with a maximum of 15 evenly spaced starts per hour.

The stator is insulated in accordance with class F (155°C, 310°F). The motor is designed to supply its rated output at ±5 % variation of the rated voltage. Without overheating the motor, ±10 % variation of the rated voltage can be accepted provided that the motor does not run continuously at full load. The motor is designed to operate with a voltage imbalance of up to 2 % between the phases.

Cooling

The motor is cooled by the surrounding liquid.

Monitoring equipment

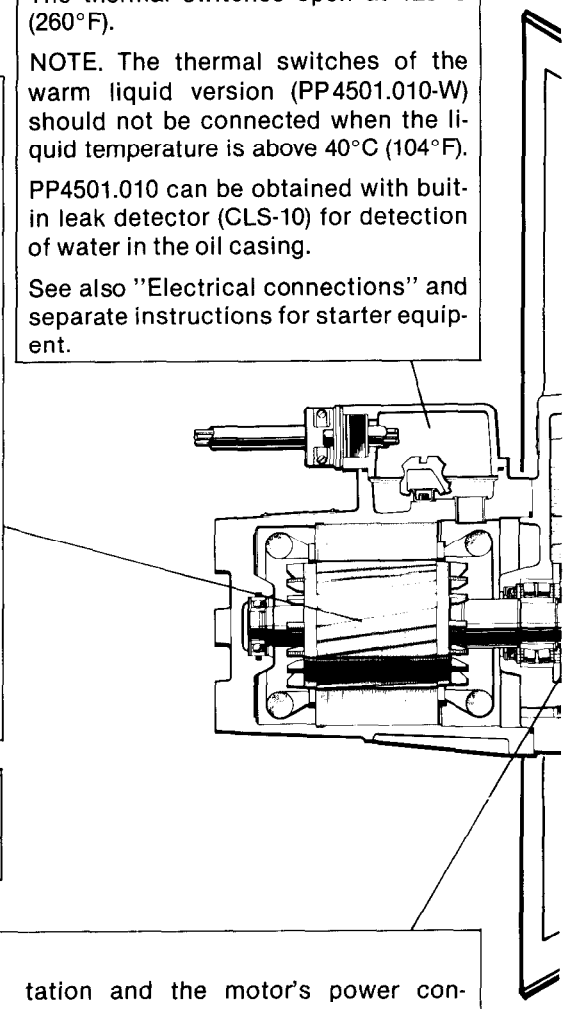
The stator incorporates three thermal switches connected in series.

The thermal switches open at 125°C (260°F).

NOTE. The thermal switches of the warm liquid version (PP4501.010-W) should not be connected when the liquid temperature is above 40°C (104°F).

PP4501.010 can be obtained with built-in leak detector (CLS-10) for detection of water in the oil casing.

See also "Electrical connections" and separate instructions for starter equipent.



Gear unit

The gear is a spur gear with helical teeth. The distance between the motor shaft and the output shaft is fixed, which means that no adjustment of the gear clearance is necessary.

The driver is mounted on the motor shaft and is interchangeable.

The driver has between 17 and 22 teeth.

The gear has between 81 and 83 teeth, depending on the desired speed of rotation and the motor's power consumption.

The gear unit is calculated in accordance with ISO and AGMA, for more than 75 000 hours of operation in continuous service.

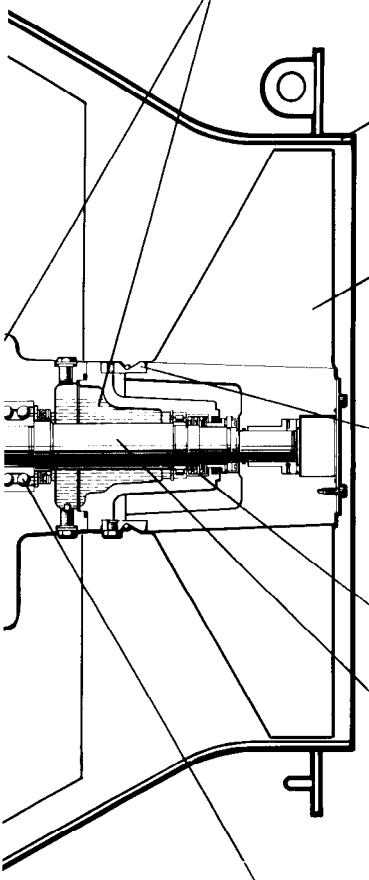
In order to obtain the desired pumping effect, it is important to choose the right motor/propeller/gear combination. See "Technical data".

Oil casing

The oil lubricates and cools the seals, bearings and gears and acts as an additional barrier against penetrating liquid.

Inlet cone

The motor unit is delivered mounted in the inlet cone. The motor unit can be raised and lowered from the cone without removing the propeller.



Propeller

The propeller is two-bladed with an outside diameter of 780 mm (30.7″).

Material: cast iron or stainless steel.

The propeller is designed to give the greatest possible pumping effect in relation to the motor output in question.

The front edges of the propeller blades are backward-curved to prevent the propeller from clogging.

Non-clogging propeller hub

The propeller hub is equipped with cutting rings to prevent clogging of the hub area.

Two different versions for different applications are available.

Shaft seals

The pump has one mechanical seal and two lip seals.

Material, mechanical seal:
tungsten carbide — tungsten carbide

Bearings

The pump's bearings are designed for at least 25 000 hours of operation.

The motor shaft bearing consists of a single-row deep-groove ball bearing as the inner bearing and a spherical roller bearing as the outer bearing.

The propeller shaft is carried in a double row angular contact ball bearing as inner bearing and a single-row cylindrical roller bearing as outer bearing.

Shafts

The motor shaft is delivered with the rotor as an integral part.

The motor shaft is completely sealed and will not come into contact with the surrounding liquid.

Material:

Motor shaft: steel for hardening and tempering.

Propeller shaft of stainless steel.

Applications

PP4501.010 is intended to be used for:

— clean water pumping at land drainage.

— irrigation and controlling of water course systems.

— sewage sludge pumping.

— recirculation within vaste handling processes.

Liquid temperature: max. 40°C (104°F)

The pump is also available in a version for liquid temperatures up to 90°C (195°F). PP4501.010-W warm liquid, this version has certain operational limitations which are stated on a plate on these pumps.

The pH of the liquid: 6—11.

Depth of immersion: maximum 40 m 130 ft).

Total (hydraulic) head: maximum 1 m (3.3 ft).

The pump should always work completely submerged in the liquid.

The pump must not be used in explosive or flammable environments or with flammable liquids.

For other applications, contact your nearest Flygt representative for information.

Technical data

Propeller code combinations

The four figure combination code is built up as follows:

1st digit **Motor**	2nd and 3rd digit **Gear module** **Gear wheel/Pinion**	4th digit **Propeller**
4 = 4 pole 6 = 6 pole	10 = 81/82 teeth 12 = 81/20 teeth 14 = 81/19 teeth 16 = 83/18 teeth 18 = 83/17 teeth	2 = two bladed

Possible combinations and power consumption

NOTE. For a cooled or brand-new mixer, the power consumption can exceed the undermentioned effect values.

50 Hz

Combination	Speed, rpm
4122	358
4142	340
4162	314
4182	297
6102	258
6122	235
6142	223
6162	206
6182	195

60 Hz

Combination	Speed, rpm
4162	380
4182	358
6102	312
6122	284
6142	269
6162	250
6182	235

Max. permissible input power for warm liquid pump (PP 4501.010-W).

Rated output (kW-hp)		Max. input power (kW)		
50 Hz	60 Hz	40°C (104°F)	70°C (158°F)	90°C (194°F)
13.5		15.5	15.5	13.8
	15.0—20.0	17.3	17.3	16.9
8.8		10.5	10.5	10.5
	10.5—14.0	12.5	12.5	12.5

The table shows available motors with current at different voltages.

50 Hz

Stator	Output (kW)	Speed, rpm	Rated current (A)		
			220 V	380 V	660 V
381 26 xx	13.5	1 450	48	28	16
381 33 xx	8.8	950	33	19	11

60 Hz

Stator	Output (kW-hp)	Speed, rpm	Rated current (A)			
			200 V	230 V	460 V	575 V
381 26 xx	15.0—20.0	1 750	62	54	28	22
381 33 xx	10.5—14.0	1 150	44	38	19	15

1 ~ 60 Hz

Stator	Output (kW-hp)	Speed, rpm	Current (A)		
			220 V	230 V	240 V
381 26 12	12.0—16.1	1 750	66	63	60

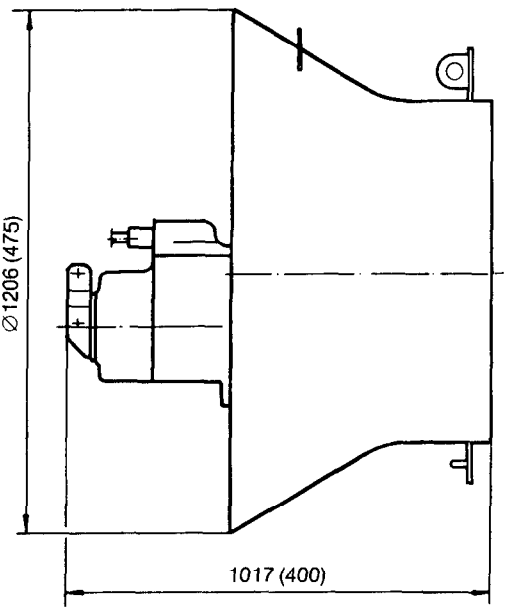
Stator variant	Connection	Rated voltage (V)	
		50 Hz	60 Hz
381 26 12	Y Par.	—	220—230
12	Y Ser.	—	440—460
27	Y	190—220	200—220
29	△	—	220—230
29	Y	—	380
30	△	—	380
32	△	200—208	230—240
32	Y	346—350	400
34	△	220	260
34	Y	380	440—460
35	△	346—350	—
38	△	380	440—460
38	Y	660	—
40	△	400	400
44	△	400—440	480
52	△	550—550	575—600
381 33 29	△	—	220—230
29	Y	—	380
30	△	—	380
32	△	200—208	230—240
32	Y	346—350	400
34	△	220	260
34	Y	380	440—460
35	△	346—350	—
37	Y Par.	—	220—230
37	Y Ser.	—	440—460
38	△	380	440—460
38	Y	660	—
40	△	400	400
44	△	400—440	480
52	△	500—550	575—600

For further information, see "Parts list".

Dimensions and weights

All dimensions are in mm (in).

Weight without motor cable: 460 kg (1014 lb).



TRANSPORTATION AND STORAGE

The pump should be transported and stored on the plate of the cone. Make sure that it cannot fall over.

The pump is frostproof as long as it is operating or is immersed in the liquid. If the pump is taken up when the temperature is below freezing, the propeller may freeze.

A frozen propeller can be thawed by allowing the pump to stand immersed in the liquid for a short period before it is started. Never use an open flame to thaw the pump.

For longer periods of storage, the pump must be protected against moisture and heat. Remove the propeller and grease the end of the shaft with molybdenum disulphide or an equivalent grease. Treat all other untreated surfaces with oil.

Undo the cable entry to prevent the motor cable from being deformed. The propeller should be rotated by hand occasionally (for example every other month) to prevent the sealfaces sticking together. If the pump is stored for more than 6 months, this rotation is mandatory.

After a long period of storage, the pump should be inspected before it is put into operation. Pay special attention to the seals and the cable entry.

Follow instructions under the heading "Before starting".

INSTALLATION

Safety precautions

In order to minimize the risk of accidents in connection with the service and installation work, the following rules should be followed:

1. Never work alone. Use a lifting harness (part No. 84 33 02), safety line (part No. 84 33 03) and a respirator (part No. 84 33 01), as required. Do not ignore the risk of drowning!
2. Make sure that there is sufficient oxygen and that there are no poisonous gases present.
3. Check the explosion risk before welding or using electric hand tools.
4. Do not ignore health hazards. Observe strict cleanliness.
5. Bear in mind the risk of electrical accidents.
6. Make sure that the lifting equipment is in good condition.
7. Provide a suitable barrier around the work area, for example a guard rail.
8. Make sure you have a clear path of retreat!
9. Use safety helmet, safety goggles and protective shoes.
10. All personnel who work with sewage systems should be vaccinated against diseases that can occur.
11. A first-aid kit must be handy.

Follow all other health and safety rules and local codes and practices.

NOTE!
In order to avoid accidents, warning signs for rotating propellers and machines that start automatically must be positioned visibly. The area in the proximinity of the machines should be fenced off.

Handling equipment

Lifting equipment is required for handling the pump.

The lifting device should not have a lifting capacity which is greater than twice the weight of the pump.

Oversize lifting equipment could cause damage if pump gets stuck when being lifted.

Make sure that the lifting equipment is securely anchored.

WARNING! Keep out from under suspended loads.

Installation

The pumps should be installed horizontally on a wall or a diffusor and guided vertically along the wall.

A guide bar arrangement is used for guiding. The plate of the inlet cone directs the pump when guiding and secures the correct position on the fixing plate.

Besides the pump, the PP concept consist of fixing plate and guiding equipment.

— Fixing plate
  The fixing plate function is to fix the inlet cone onto a wall or a diffusor. The fixing plate works as a discharge connection.
— Guiding equipment
  The PP concept uses a similar guiding system as our reliable CP-pumps.
— The guiding equipment consist of guide bars and upper guide bar holders.

Consult your nearest Flygt representative regarding:

— choice of peripheral equipment.
— other problems in connection with installation.

Installation example

NOTE! The end of the cable must not be submerged. Leads have to be above flood level, as water may penetrate through the cable into the junction box or the motor.

Mark out the location of the fixing plate (173) on the wall. Drill holes and tap in expansion bolts (155) for mounting. Mount the fixing plate on the wall. Use a spirit level to make sure it is horizontal.

Carefully measure the correct guide bar length (see drwg). Cut the bars to the right length. The guide bars (177) shall have a diameter of 60.3 mm (23.74 in) and a wall thickness of 3.65 mm (1.44 in).

Fit the rubber sleeves (172) and the washers (170, 171) with the bolt (167). Do not tighten the bolt.

Place one guide bar (177) on the holder in the fixing plate and hold it vertical. Use a plumb line. Put the upper bracket (174) on the guide bar and mark the location of the bracket on the wall.

Drill holes and tap in expansion bolts. Place the guide bar (177) and the bracket (174) in position — put on the washers and tighten the screws (154) loosely enough so the bracket can be adjusted.

Tighten the bolt (178) in the upper bracket holding the bar so that it doesn't rotate.

Check that the guide bar is vertical. Tighten the screw (178) for the upper bracket.

Install the other guide bar. Place the guide bar on the holder in the fixing plate. Measure the centre-to-centre distance between the guide bars, which should be 1028 mm, measured both at the bottom and the top.

Place the upper bracket (175) in position. Mark the location of the bracket on the wall. Drill holes and tap in expansion bolts.

Put the guide bar and the bracket in place — put on washers and tighten the screws (154) loosely enough so that the position of the bracket can be adjusted.

Tighten the bolt (178) in the bracket holding the bar so that it doesn't rotate.

Check the centre-to-centre distance between the guide bars (1028 mm). Tighten the nuts (167) on the bracket.

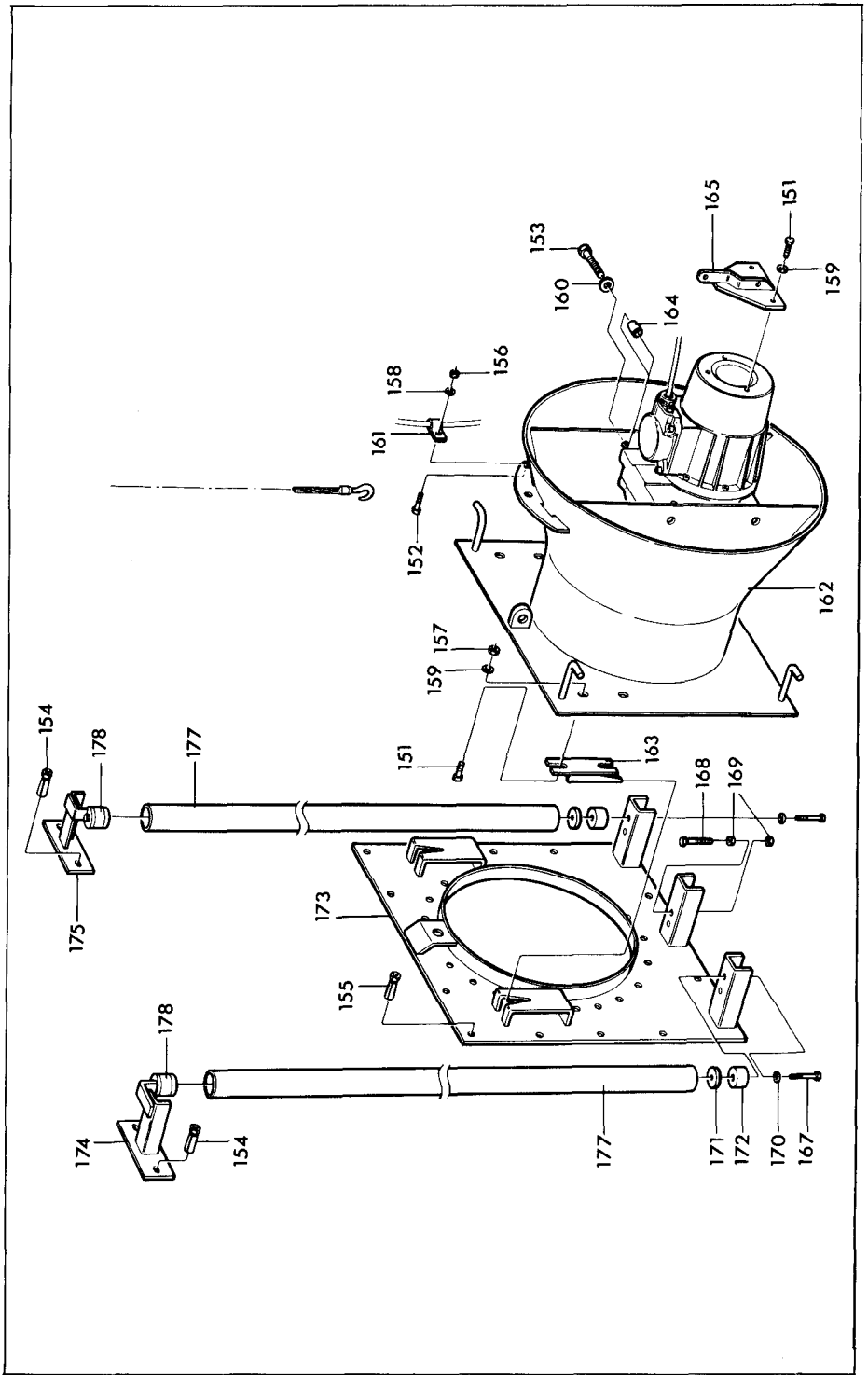
Connect a lifting tackle so that the hook comes midway between the guide bars and 480 mm from the wall. Secure the motor cable with the cone's cable holder (161).

Fit the hooks (163) on the plate of the inlet cone.

Lift the pump so that it slips on to the guide bars. Lower the pump so that the two hooks on the cone hook into the hooks on the fixing plate.

Check that the cone is aligned with the hole in the fixing plate.

The cone can be adjusted in height with the screw and nut (168, 169). When there is no diffenence in height between the cone and the fixing plate, lock the position of the screw with the nut.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Push on the upper part of the cone so that the cone seals tightly against the fixing plate. Adjust the hooks (163) so that the cone stays in this position.

Push on the guide bar at the lower bracket so that the lower part of the cone seals tightly against the fixing plate. Tighten screw (167).

Measure the center-to-center distance between the guide bars before tightening screw (167) on the other guide bar.

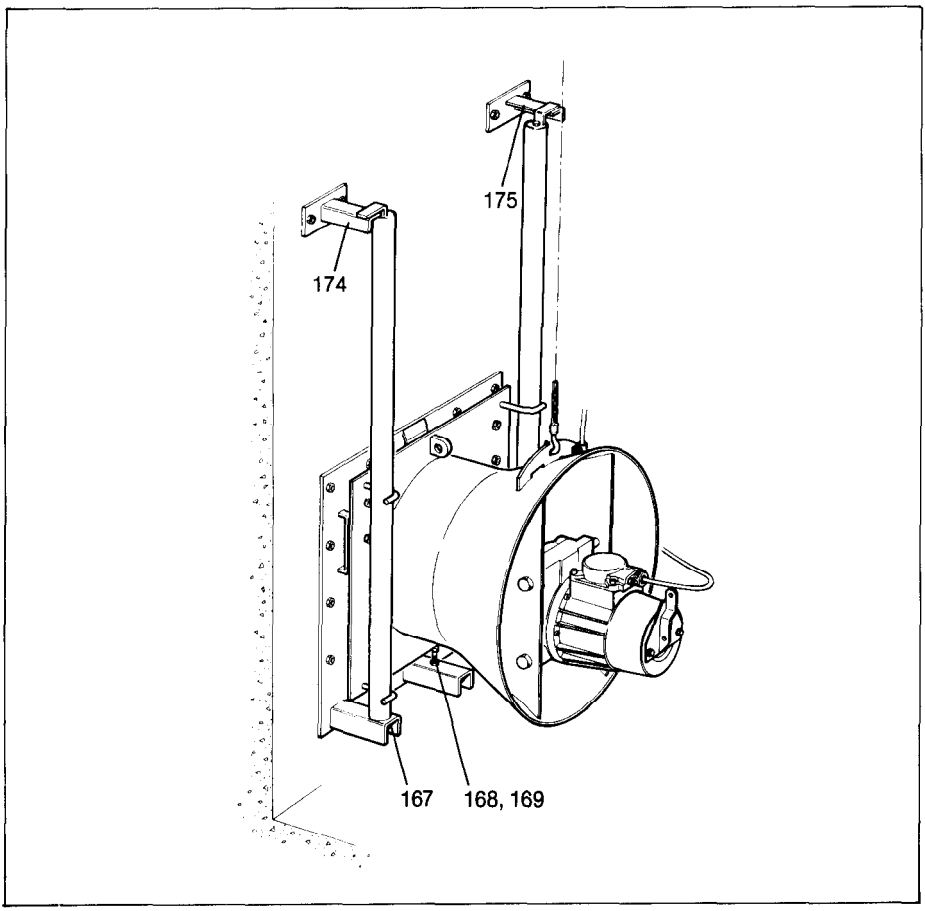
A clearance of no more than 2—3 mm may exist between the cone and the fixing plate on no more than 1/3 of the circumference.

It is important that the guide bars be parallel.

Slip the stocking over the end of the motor cable and pull up the cable so that it is taut.

Fasten the stocking's snap hook to the bracket (174 or 175).

Make sure that the cable is not kinked or pinched and cannot be sucked into the propeller.



Electrical connections

All electrical work shall be carried out under the supervision of an authorized electrician.

Local codes and regulations must be observed.

Check that the mains voltage and frequence agree with the specifications on the data plate.

The motor can be connected for different voltages as shown on the data plate.

If intermittent operation is prescribed (see data plate), the pump should be provided with control equipment that provides such operation.

Under no circumstances may the starting equipment be installed in the pump pit.

Install the motor cable as illustrated in the figure.

To avoid leakage into the pump, check:

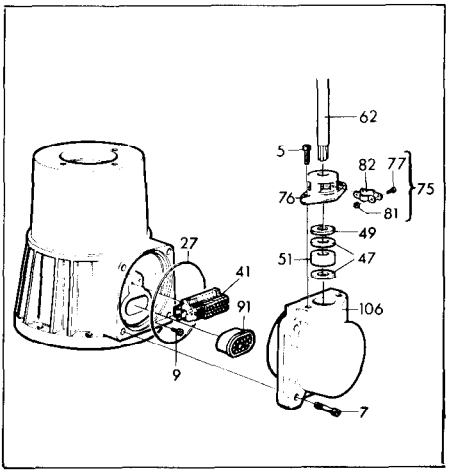
— that the cable entry seal sleeve and washers conform to the outside diameter of the cable. See the parts list.

— that the outer sheath on the cable is not damaged. When refitting a cable which has been used before, **always** cut off a short piece of the cable so that the cable entry sleeve does not seal onto the cable at the same point again.

NOTE! For safety reasons, the earth lead should be approx. 70 mm (2.7") longer than the phase leads. If the motor cable is jerked loose by mistake, the earth lead should be the last to come loose from its terminal. This applies to both ends of the cable.

Check on the data plate which connection, Y or △, is valid for the voltage supply.

Connect the motor cable to the terminal board connections U1, V1, W1 and earth.

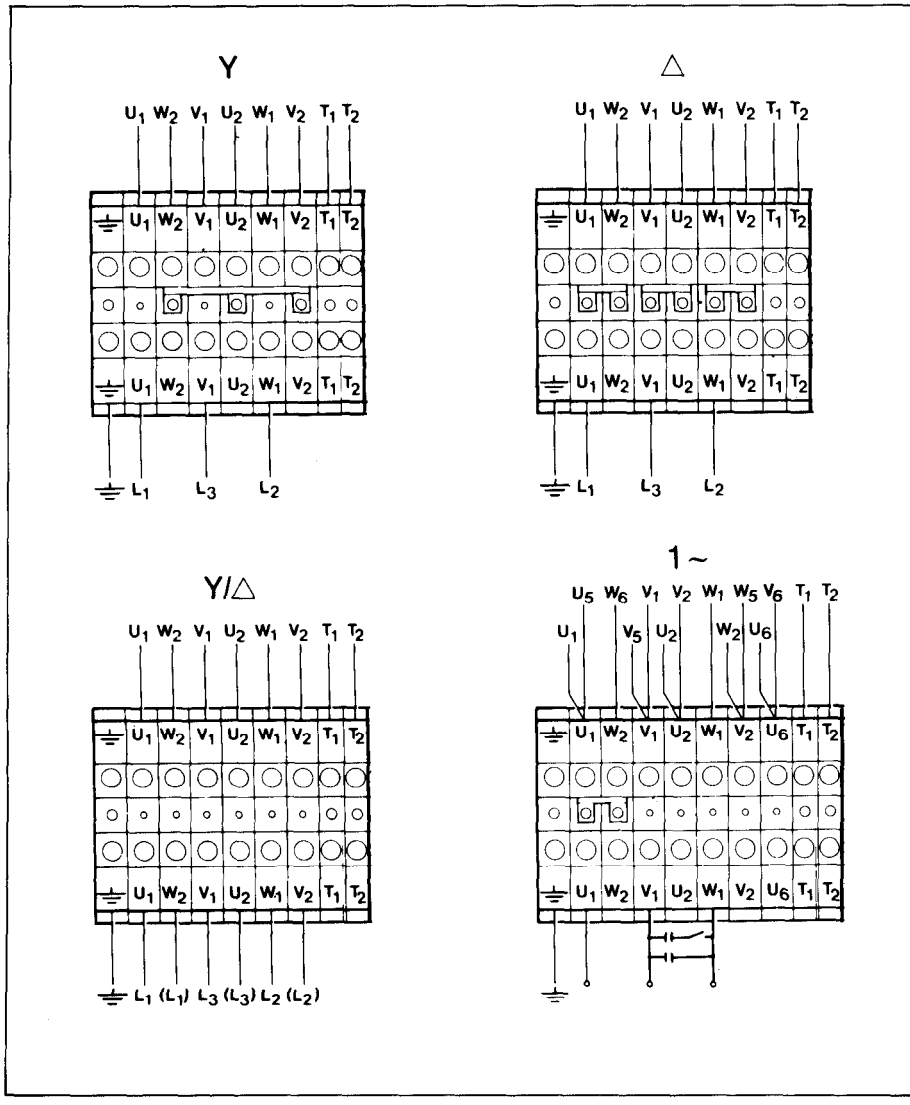


Connect the leads from the motor control circuit to T1 and T2.

Three thermal switches are incorporated in the stator. The thermal switches are normally closed. The thermal switches can be connected to max. 250V, breaking current max. 4A at power factor 0.6.

Flygt recommends the thermal protectors to be connected to 24V over separate fuses to protect the other automatic equipment.

Make sure that the mixer is correctly earthed (grounded).

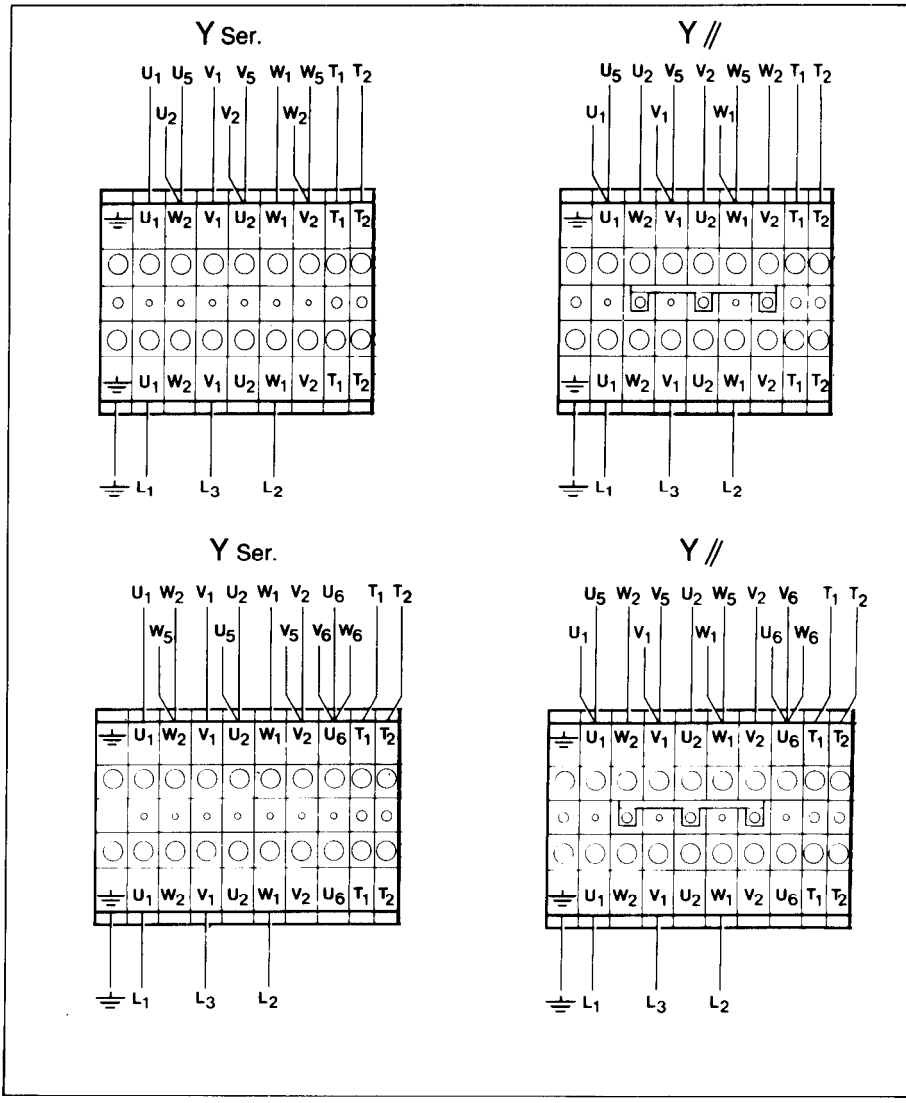


Stator connection

The stator leads are colour-marked as follows:

U1	— red	U5	— red
V1	— brown	V5	— brown
W1	— yellow	W5	— yellow
U2	— green	U6	— green
V2	— blue	V6	— blue
W2	— black	W6	— black

The stator leads are connected to the terminal board as illustrated in the figure.



Motor cable

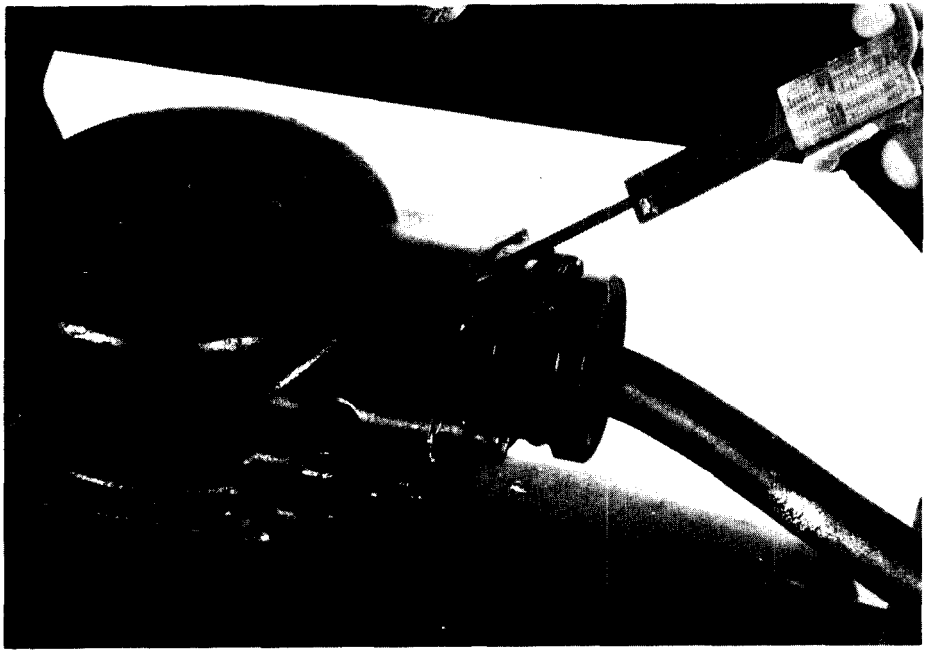
The motor cable are marked as follows:

		(for USA)
Brown	= L1	(red)
Black	= L2	(black)
Blue	= L3	(white)
Black	= T1	(blue)
Black	= T2	(orange)
Black	= Isol.	(yellow)
Yellow/ Green	= ⏚	(green)

Leads not in use must be isolated.

Install the cover (106).

Tighten the screws (5) so that the cable entry unit forms an effective seal.



Connect the motor cable to the starter equipment. Check the direction of rotation, see "Before starting".

If the direction of rotation is wrong, transpose two of the phase leads.

Whith a clockwise phase sequence L1-L3-L2, the propeller will rotate correctly, i.e. clockwise as viewed from the motor side.

Check the phase sequence in the mains with a phase sequence indicator.

For 1-phase pump rotating in wrong direction, please contact your nearest Flygt representative.

Remember that the starting surge with the direct-on line start can be up to six times higher than the rated current. Make sure that the fuses or circuit breakers are of the proper amperage.

Fuse amperage and cable shall be selected in accordance with local rules and regulations.

Note that with long cables, the voltage drop in the cable must be taken into consideration, since the motor's rated voltage is the voltage that is measured at the terminal board in the pump.

The overload protection (motor protection breaker) shall for star-delta start be set to the motor's rated current x 0.58. The rated current is given on the data plate.

Capacitive leakage sensor CLS-10

The pump is available with leakage sensors for sensing the presence of any water in the oil casing.

The CLS-10 is a leakage sensor for detection of water in the oil casing and activates an alarm when the oil contains 10% water. An oil change is recommended within 14 days after an alarm. If the sensor alarms again shortly after the oil change, contact your nearest Flygt representative.

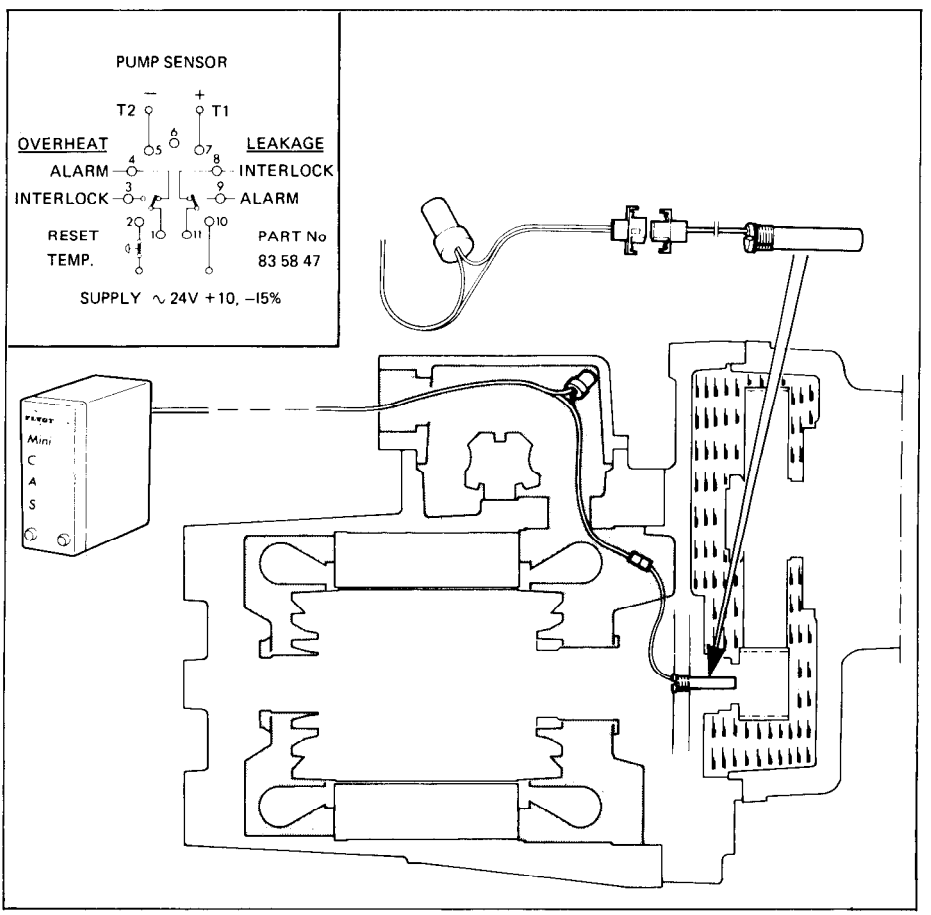
The CLS-10 sensor is mounted in the bearing cage and sticks into the oil casing.

The sensor is connected in series with the thermal switches. They are connected to a Mini CAS alarm relay in accordance with the diagram below.

A plate in the junction box shows that the pump is equipped with sensor.

IMPORTANT! Be careful when disconnecting the pump's motor unit so that the leads are not damaged (disconnect the leads before lifting the rotor assembly and the stator casing completely apart). Also observe caution so that the sensor not is damaged.

Make sure that the leads are not pinched during installation.



Before starting

Check the oil level in the oil casing and in the bearing casing.

Remove the fuses or open the circuit breaker and check that the propeller can be rotated by hand.

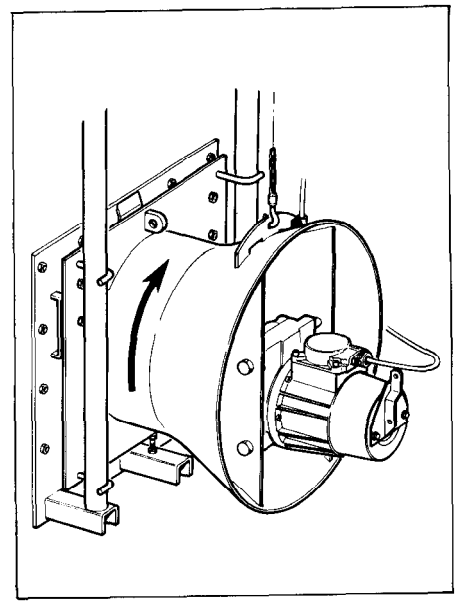
Check that the cable entry is securely tightened.

Check that the monitoring equipment (if any) works.

Check the direction of rotation. See the figure. The propeller should rotate clockwise, as viewed from the motor side.

The pump shall be fixed to the guide bar during test starting.

WARNING! Watch out for the starting jerk, which can be powerful.



OPERATION

Test-run the pump and note the current surge during start-up. At the instant of starting, it is normal for the current to exceed the operating current by 10—20 % for a few seconds. The steady-state current should be less than the rated current.

Excessive current consumption may be caused by:

— too high head
— wrong rotation
— high viscosity or density
— clogged or bad shaped propeller
— an improperly adjusted pump.

Low current might be cased by:

— low RPM
— vortex formation
— low head

Check that the flow is non-turbulent and that the pump does not vibrate.

Vibration can occur due to fairly steady:

— unbalanced propeller
— clogged propeller
— air suction through surface vortex
— disturbance from other pumps, uneven attaching flow or too high head.

Make sure that the pump works completely submerged in the liquid.

In continuous operation, air must not be drawn down by the propeller (a vortex must not form).

CARE AND MAINTENANCE

The numbers in parentheses are item numbers and refer to the exploded view on the inside cover.

Safety precautions

Before starting work on the pump, make sure that the pump is isolated from the power supply and cannot be energized.

NOTE! This applies to the control circuit as well.

The following points are important in connection with work on the pump:

— make sure that the pump has been thoroughly cleaned.
— observe good personal hygiene.
— beware the risk of infection.
— follow local safety regulations.

The pump is designed for use in liquids which can be hazardous to health. In order to prevent injury to the eyes and skin, observe the following points when working on the pump:

— Always wear goggles and rubber gloves.
— Rinse the mixer thoroughly with clean water before starting work.
— Rinse the components in water after disassembly.
— Hold a rag over the oil casing screw (66) and the inspection screw (66) when removing them. Otherwise, pressure that may have built up in the pump due to leakage of liquid into the pump may cause splatter into the eyes or onto skin.

Proceed as follows if you get hazardous chemicals

in your eyes:

— rinse immediately in running water for 15 minutes. Hold your eyelids apart with your fingers.
— contact an eye doctor.

on your skin:
— remove contaminated clothes.
— wash skin with soap and water.
— seek medical attention if required.

Inspection

The pump can be quickly raised and lowered without any mechanical disconnection.

Regular inspection and preventive maintenance ensure more reliable operation.

The oil casing's oil should be changed and the oil screw's magnetic plug should be cleaned after the first 200 hours of operation.

The gear casing's oil should be checked and changed if it is contaminated and the oil screw's magnetic plug should be cleaned after 200 hours of operation.

Under normal operating conditions, the pump should have a major overhaul in a service shop according to the below maintenance schedule. The pump should be inspected more frequently under servere operating conditions.

This requires special tools and should be done by an authorized service shop.

When the pump is new or when the seals have been replaced, inspection is recommended after one week of operation.

Service contract

Flygt or its agent normally offers service agreements in accordance with a preventive maintenance plan. For further information, please contact your Flygt representative.

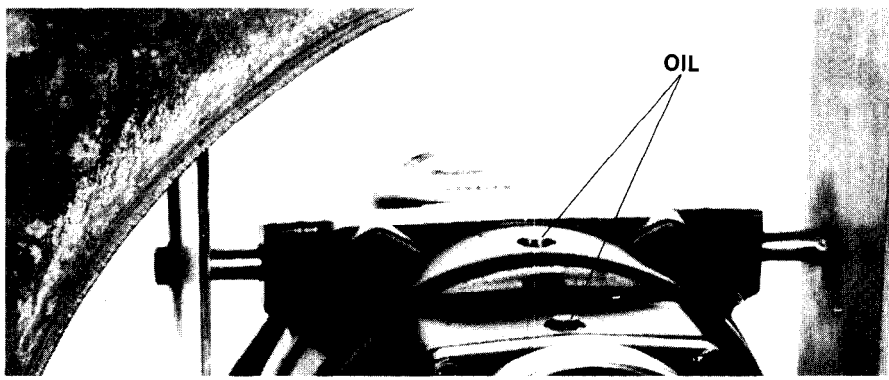
Recommended inspections interval for pumps under normal operating conditions.

Temperature	Operating duty	Inspection	Major overhaul
≤40°C (104°F)	Intermittent	Twice a year	Every third year
≤70°C (158°F)*		Twice a year	Once a year
≤90°C (194°F)*		Six times a year	Twice a year

* Warm liquid pump PP4501.010-W

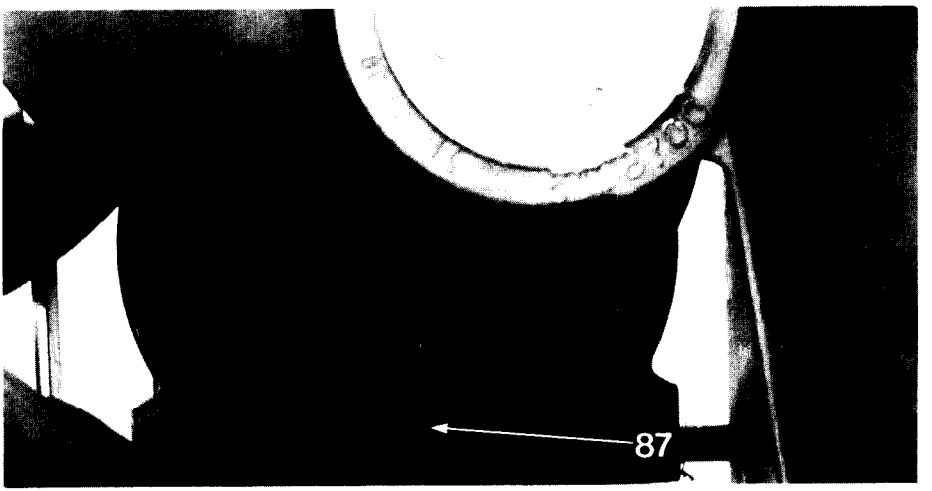
Recommended inspections

Inspection of	Action
Visible parts on pump and installation	Replace or fix worn and damaged parts. Make sure that all screws, bolts and nuts are tight. Check the condition of carrying handle/lifting eyes, chains and wire ropes. Check that the guide bars are vertical. Replace worn parts if they impair function.
Non-clogging rings	If the clearance between the exceeds 1 ± 0.2 mm, adjust see "Replacing the non-clogging rings".
Oil quantity	**WARNING.** If the seal leaks, the oil casing may be under pressure. Hold a rag over the oil casing screw in order to prevent splatter. See "Safety precautions" for additional information. Check that the oil level is visible in the oil hole. Add oil as needed. See "Changing the oil".



Condition of the oil	The gear casing's oil should be changed and the oil screw's magnetic plug should be cleaned after the first 200 hours of operation. A check of the condition of the oil can show whether there has been an increased leakage. **Note!** Air/oil mixture can be confused with water/oil mixture. Insert a tube (or hose) into the oil hole. Cover the top end of the tube and take up a little oil from the bottom.

Inspection of	Action
	Change the oil if it contains too much water, i.e., is heavily emulsified (cream-like), or if the oil housing contains separated water. See "Changing the oil". Check again one week after changing the oil. If the oil contains too much water again, the fault may be: — that an oil screw (86, 87) is not sufficiently tight. — that the O-ring (25) of an oil screw or its sealing surface is damaged. — that an O-ring (31) or its sealing surface is damaged. — that the outer mechanical seal (63) is damaged. Contact a Flygt service shop.



Liquid in the stator casing

WARNING. If there has been leakage, the stator casing may be under pressure. Hold a rag over the inspection screw to prevent splatter. See "Safety precautions" for additional information.

Remove the inspection screw (87) and the O-ring (25).

Tilt the pump so that any liquid in the stator casing can run out through the hole.

If there is water in the stator casing, the cause may be:

— that the inspection screw (87) is not sufficiently tight.

— that the O-ring (25) or its sealing surface is damaged.

— that an O-ring (27) is damaged.

— that the cable entry is leaking.

Inspection of	Action
	If there is oil in the stator casing, the cause may be: — that the inner lip seal (33) is damaged. Contact a Flygt service shop.
Cable entry	Make sure that the cable clamps are tight. If the cable entry leaks: — check that the entry is tightened and forming an effective seal. — cut a piece of the cable off so that the seal sleeve (51) seals onto a new position on the cable. — replace the seal sleeve (51). — check that the seal sleeve (51) and the washers (47) conform to the outside diameter of the cables.
Cables	Replace the cable if the outer sheath is damaged. Make sure that the cables do not have any sharp bends and are not pinched.
Starter equipment	If faulty, contact an electrician.
Monitoring equipment (should be checked often)	Follow the instructions for monitoring equipment. Check: — signals and tripping function. — that relays, lamps, fuses and connections are intact. Replace defective equipment.
Rotation direction of pump (requires voltage)	Transpose two phase leads if the propeller does not rotate clockwise as viewed from the motor side. Rotation in the wrong direction reduces the capacity of the mixer and the motor may be overloaded. Check the direction of rotation every time the mixer is reconnected.
Guide bars and other peripheral equipment	Repair faults and notify supervisor of any faults or defects.
Insulation resistance in the stator	Use insulation tester. With a 1000 V-DC megger the insulation between the phases and between any phase and earth (ground) should be $> 1\ M\Omega$.

Changing the oil

Oil casing

WARNING. If the seal leaks, the oil casing may be under pressure. Hold a rag over the oil casing screw to prevent splatter.

NOTE that oil in the oil casing should be changed for the first time after 200 hours of operation.

The oil can be changed with the motor unit mounted in the inlet cone.

If the motor unit is without the inlet cone, suspend the pump horizontally from an overhead crane.

Unscrew the oil casing screw (86).

It is easier to drain the oil if the oil fill hole screw (87) is also removed.

Fill up with new oil. Always replace the O-rings of the oil hole screws. Put the screws back and tighten them. Tightening torque 10—20 Nm (7.4—14.8 ft lb).

The oil casing holds 5.4 litres (5.8 US quarts) of oil.

Then proceed in the same manner with the bearing casing.

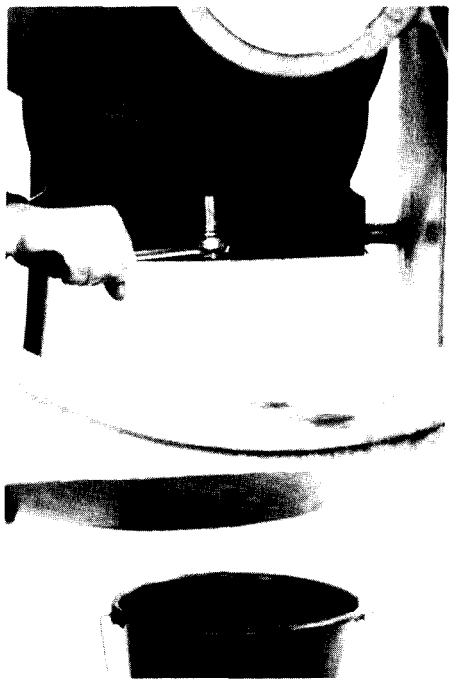
The bearing casing holds 1.08 l (1.15 US quarts) of oil.

Use the following oils:

Mobil SHC 626 at temperatures —20°C → +10°C (—4°F → +50°F).

Mobil SHC 630 at temperatures +0°C → +40°C (+32°F → +104°F).

Mobil SHC 639 at temperatures +25°C → +90°C (+77°F → +194°F).

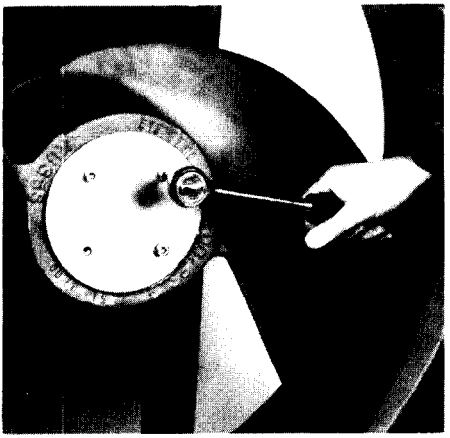


Replacing the propeller

Removing the propeller

Loosen the screws and remove the protective cover (84).

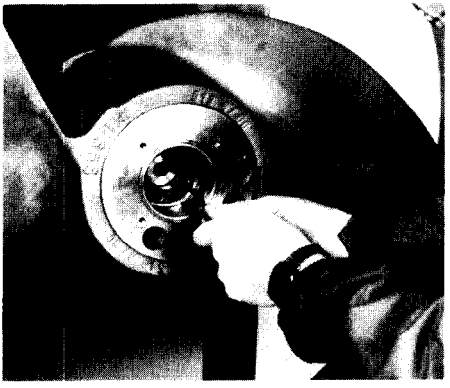
Remove the O-ring (26).



Remove the screws on the locking assembly (48) evenly and in a diagonal pattern, a little at a time.

Move over four of the screws into the previously unused screw holes.

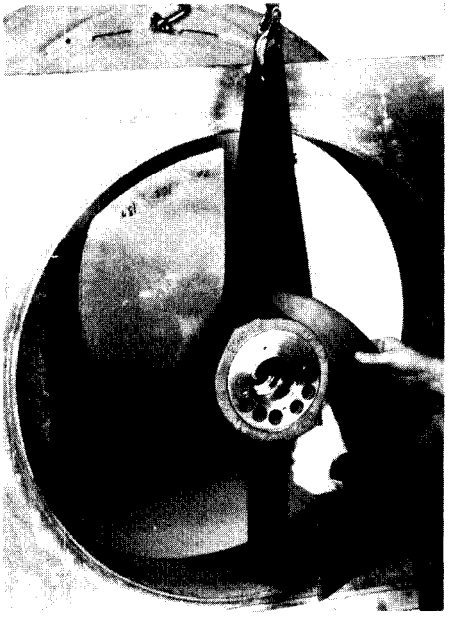
Tighten the screws evenly and in a diagonal pattern until the two-piece locking assembly splits apart.



Lift off the propeller, use an overhead crane (the weight of the propeller is ~ 60 kg (~ 130 lb).

Remove the locking assembly from the propeller hub.

Remove the O-ring from the propeller hub.



Replacing the non-clogging rings

Removing the non-cloging rings

Unscrew the set screws and knoch off the stationary ring from the bearing housing.

Let the ring on the propeller be heated up to 190°C (374°F) so it will be easy to take away.

Installing the non-clogging rings

Rotating ring, all versions

The new rotating ring will be heated up to 190°C (374°F) and placed on the propeller where it will shrink fit after cooling down.

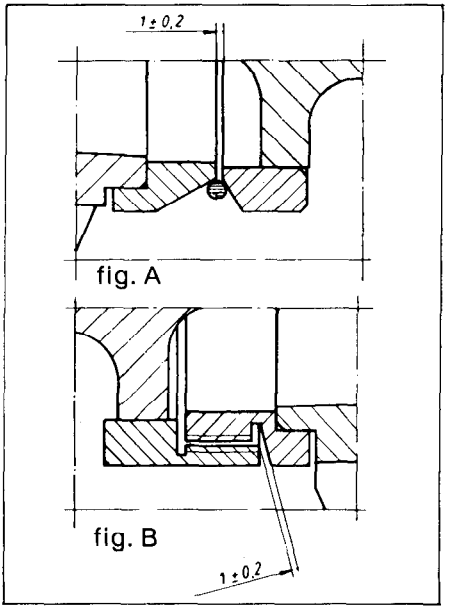
Stationary ring, flush protected version

Place the stationary ring on the bearing housing. Slide the stationary ring on to the bearing housing as long as possible.

The flush water inlets have to be mounted above the slots in the bearing housing.

Put the O-ring around the rotating ring on the propeller and install the propeller on the shaft.

Adjust the stationary ring with the help of a thickness guage, the clearance must be 1 ± 0.2 mm, see figure A. Lock the ring on the bearing housing with the set screws. Place the O-ring above the slot between the stationary ring and the rotating ring.



Stationary ring, self-cleaning version

The installation of the self-cleaning set is made in the same way as for the flush-protected version, with the exception that no O-ring is used and that the flush water intake is plugged with screws. The clearance must be 1 ± 0,2 mm see the figure B.

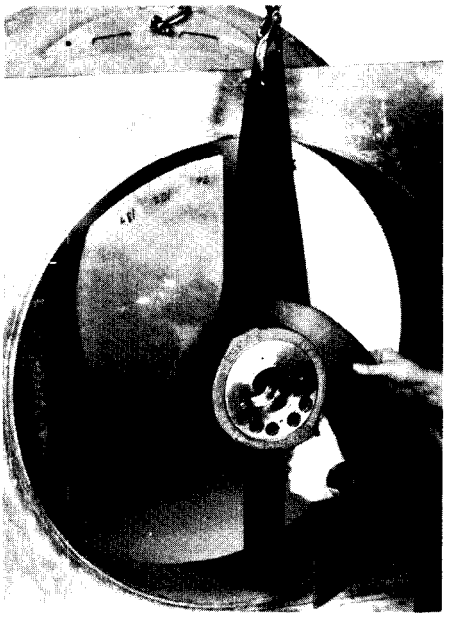
Installing the propeller

Make sure that the end of the shaft is clean and free of burrs. Polish off any flaws with fine emery cloth.

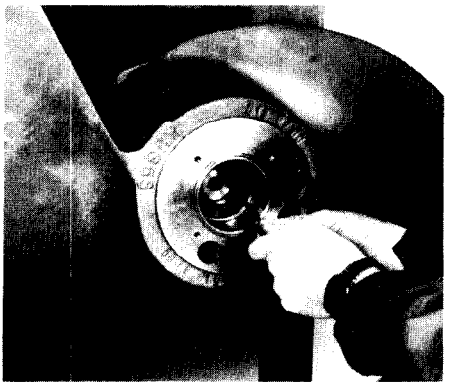
— that the propeller hub's O-ring is undamaged. Replace if necessary.

Push the propeller onto the shaft. Carefully, the O-ring may not be demaged.

Put the locking assembly (58) together. Check that the locking assembly's contact surface against the drive shaft and against the propeller is wiped clean and dry. The screws shall be well lubricated with molybdenum disulphide (MoS_2). Insert the locking assembly into the propeller hub.

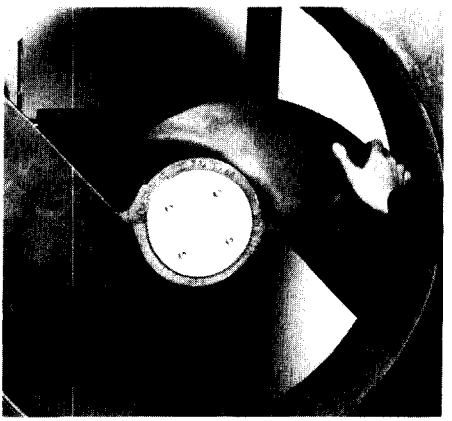


Tighten the screws evently and in a diagonal pattern, frist by hand and then to 9 Nm (6.6 ft lb).



Fit the O-ring and the cover. Tight the screws.

Check that the propeller can be rotated by hand.



ACCESSORIES AND TOOLS

Zinc anode set

In order to reduce corrosion on the mixer, it can be fitted with zinc anodes.

Order No. see "Parts list".

NOTE. Zinc anodes can not be used in warm liquid applications above 60°C (140°F).

Start and control equipment

Flygt has suitable starting and control equipment for the pump. Contact Flygt for further information.

Tools

Besides ordinary standard tools, the following tools are required in order to perform the necessary care and maintenance of the pump:

Order No.	Description
84 15 73	Torque wrench, 4—23 Nm Pre-set to 9 Nm

FAULT TRACING (TROUBLESHOOTING)

A universal instrument (VOM), a test lamp (continuity tester) and a wiring diagram are required in order to carry out fault tracing on the electrical equipment.

Fault tracing should be done with the power supply disconnected and locked off, except for those checks which cannot be performed without voltage.

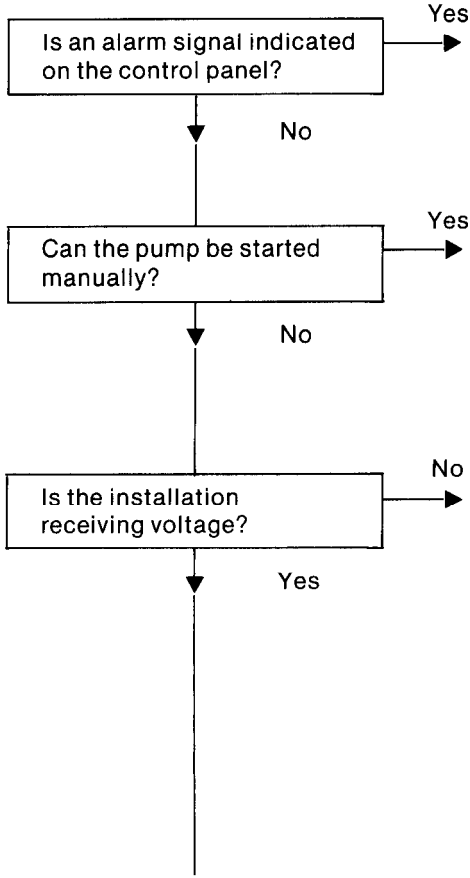
Always make sure that there is no one near the pump when the power supply is turned on.

Use the following checklist as an aid to fault tracing. It is assumed that the mixer and installation have formerly functioned satisfactorily.

Electrical work should be performed by an authorized electrician.

Follow local safety regulations and observe recommended safety precautions.

1. Pump fails to start



Check the cause:

— If there is a fault in the thermal switches, contact a Flygt service shop.

Check that the overload protection is reset.

Fault in control equipment.

Check:

— that all connections are intact.

— relay and contactor coils.

— that the control switch "Man/Auto" makes contact in both positions.

Check:

— that the main power switch is on.

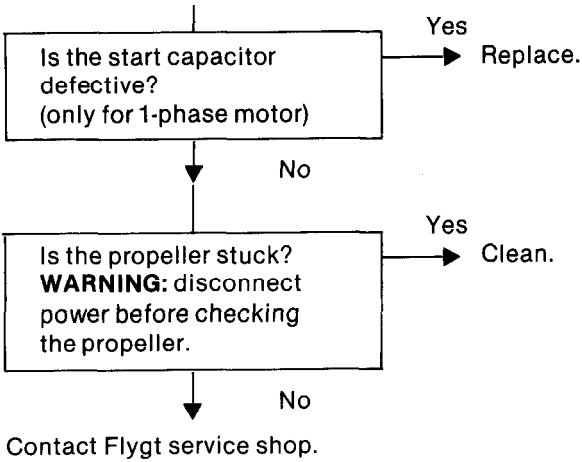
— that there is control voltage to the starter equipment and that its fuses are intact.

— that there is voltage in each phase of the supply line.

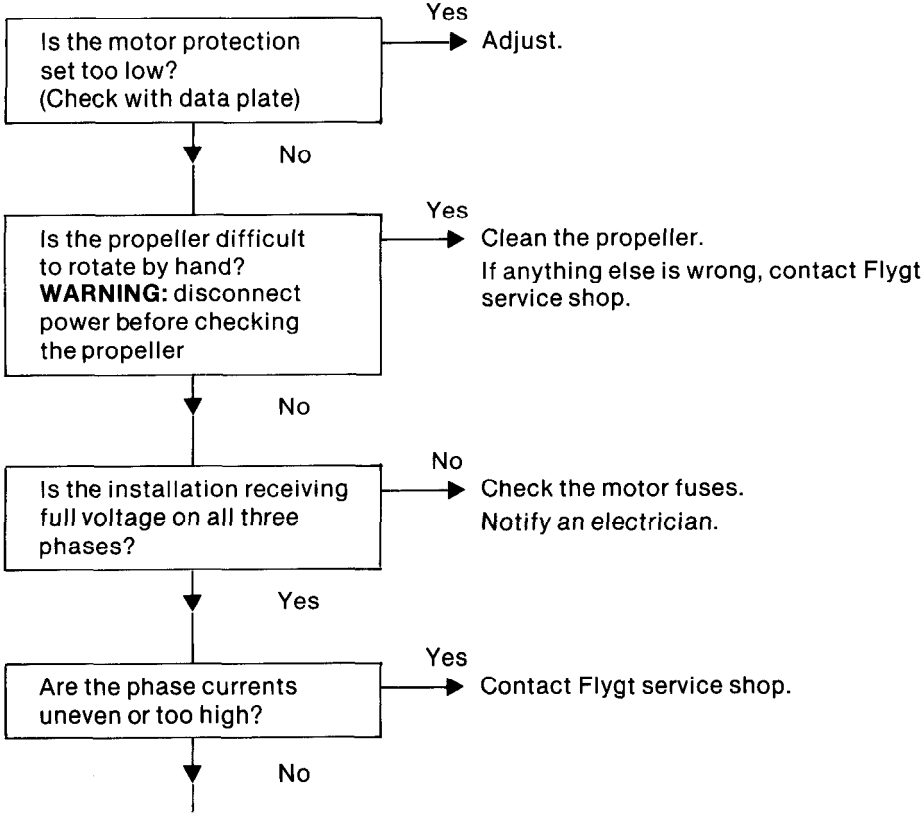
— that all fuses have continuity and are tight.

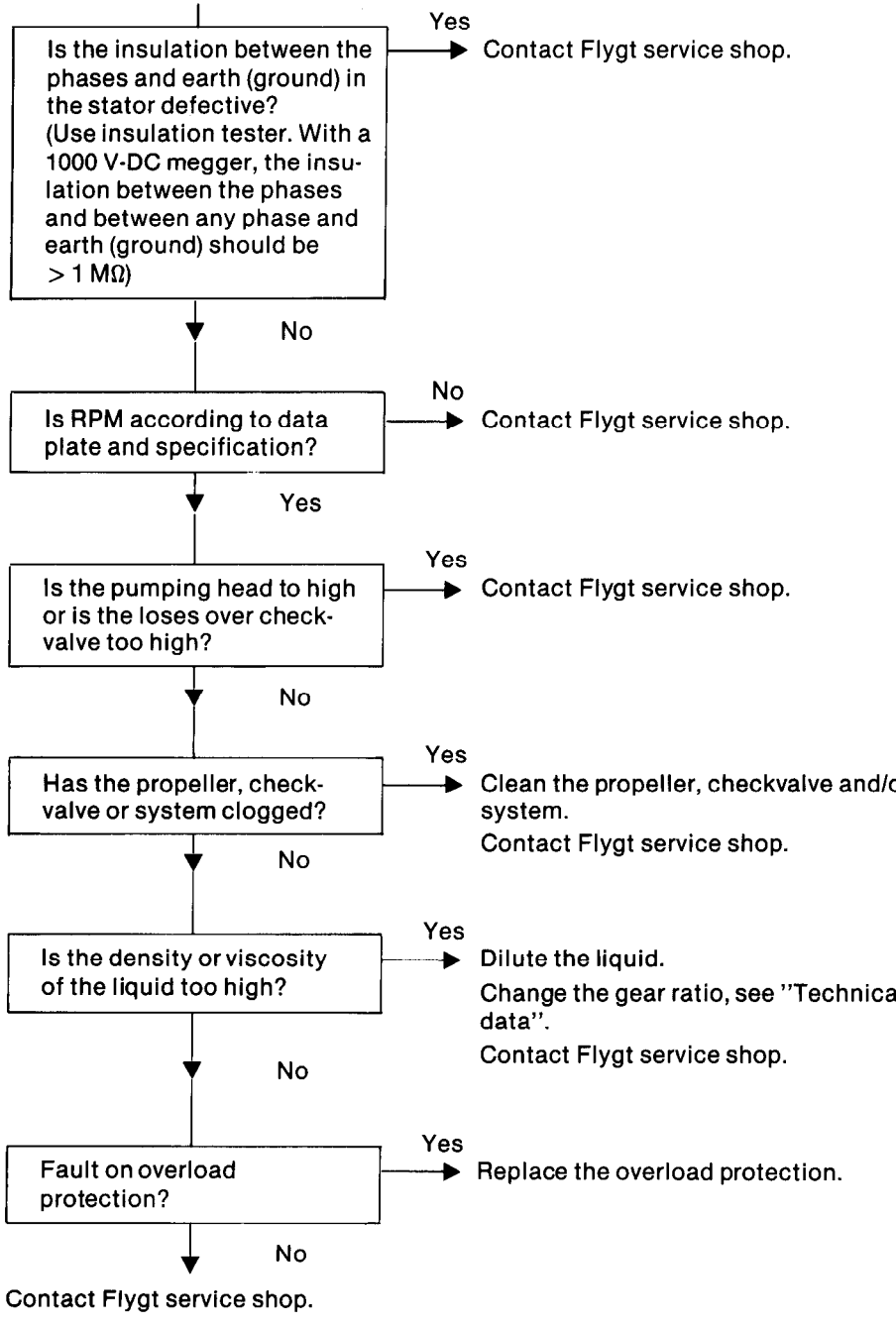
— that the overload protection is reset.

— that there is no break in the motor cable.

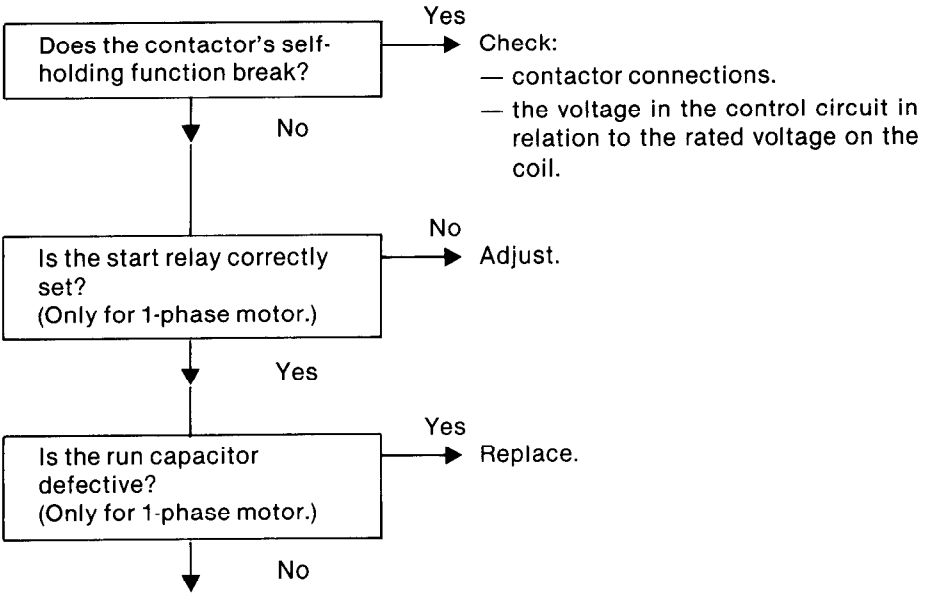


2. Pump starts but motor protection trips




Is the insulation between the phases and earth (ground) in the stator defective? (Use insulation tester. With a 1000 V-DC megger, the insulation between the phases and between any phase and earth (ground) should be > 1 MΩ)
Yes
Contact Flygt service shop.
No
Is RPM according to data plate and specification?
No
Contact Flygt service shop.
Yes
Is the pumping head to high or is the loses over check-valve too high?
Yes
Contact Flygt service shop.
No
Has the propeller, check-valve or system clogged?
Yes
Clean the propeller, checkvalve and/or system.
Contact Flygt service shop.
No
Is the density or viscosity of the liquid too high?
Yes
Dilute the liquid.
Change the gear ratio, see "Technical data".
Contact Flygt service shop.
No
Fault on overload protection?
Yes
Replace the overload protection.
No
Contact Flygt service shop.

3. The pump starts-stops-starts in rapid sequence



See also under "Inspection".

Do not override the motor protection repeatedly if it has tripped.

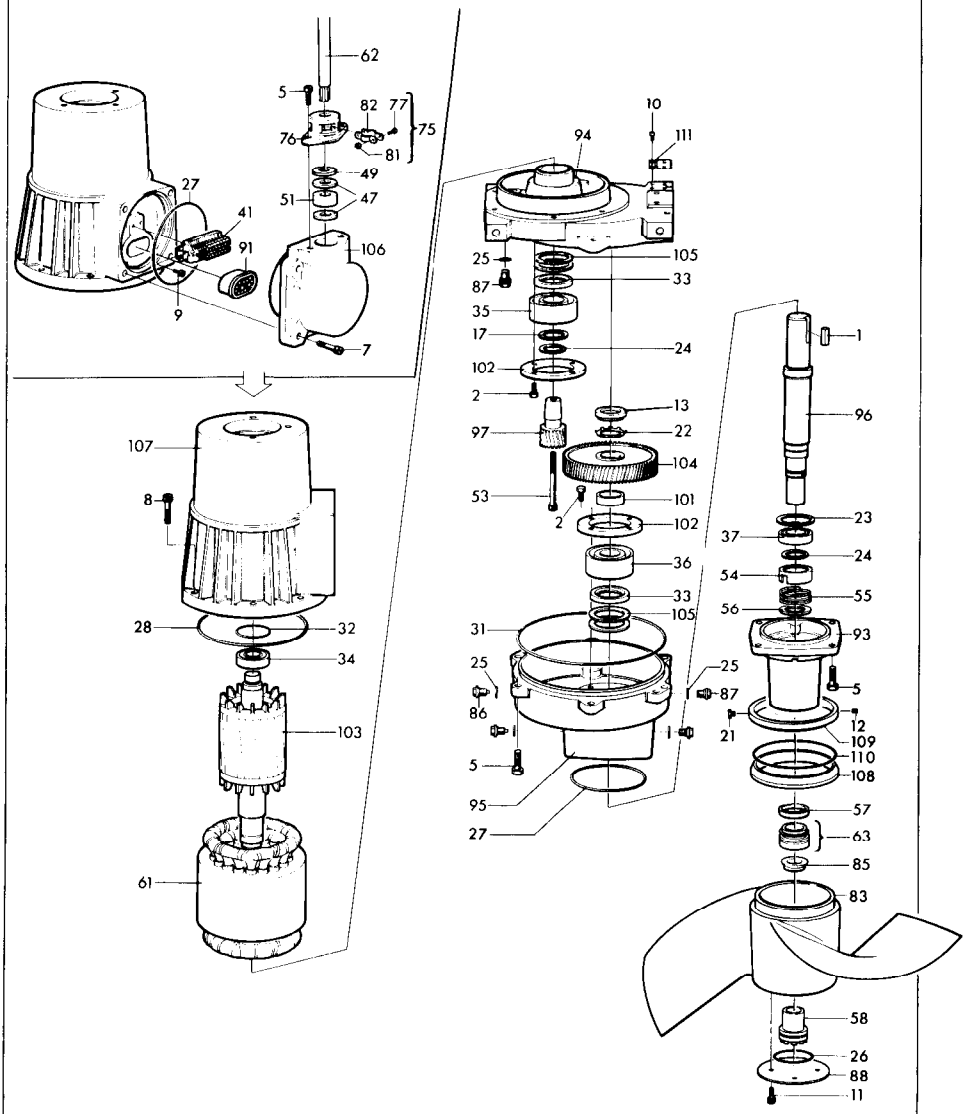
Service log

Most recent service date	Pump No.	Hours of operation	Remarks	Sign.

Service log

Most recent service date	Pump No.	Hours of operation	Remarks	Sign.

PP4501.010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