FLYGT

Installation, care and maintenance

2201.320, 2201.320-U

Flygt

ITT Industries

890258/03

GUARANTEE

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 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.

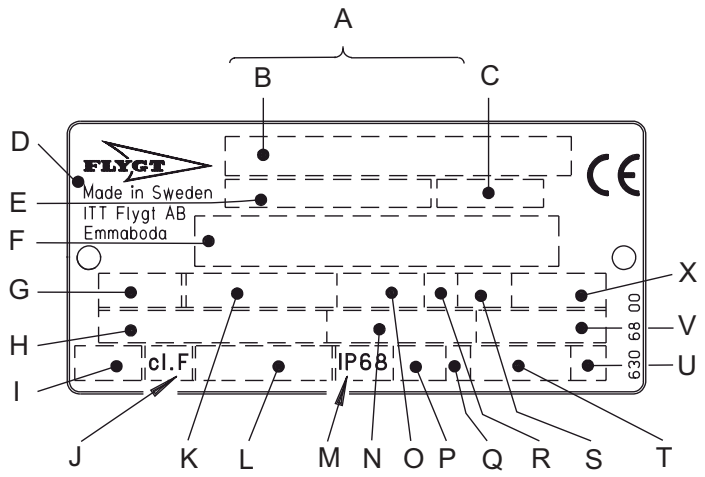
Flygt assumes no liability for either bodily injuries, material damages or economic losses beyond what is stated above.

Flygt guarantees that a spare parts stock will be kept for 10 years after the manufacture of this product has been discontinued.

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

DATA PLATE INTERPRETATION

GENERAL DATA PLATE



A	Serial number
B	Product code + Number
C	Curve code / Propeller code
D	Country of origin
E	Product number
F	Additional information
G	Phase; Type of current; Frequency
H	Rated voltage
I	Thermal protection
J	Thermal class
K	Rated shaft power
L	International standard
M	Degree of protection
N	Rated current
O	Rated speed
P	Max. submergence
Q	Direction of rotation: L=left, R=right
R	Duty class
S	Duty factor
T	Product weight
U	Locked rotor code letter
V	Power factor
X	Max. ambient temperature

CONTENTS

PRODUCT DESCRIPTION

Applications

2201.320 is intended to be used for pumping of water which may contain abrasive particles.

Liquid temperature: max. 40°C (103°F)

The pump is also available in POLYLIFE version, U2201.320, with polyurethane coated wear parts.

Liquid density: Max. 1100 kg/m^3 (9.2 lb per US gal.)

The pumped liquid may contain particles up to a size which corresponds to the throughlet of the pump. This applies to ST pumps.

The pumped liquid may contain particles up to a size which corresponds to the openings in the strainer. This applies to MT and HT pumps.

The pH of the pumped liquid: 6—11.

Depth of immersion: max. 20 m (66 ft).

Pumps with a swirl-type impeller may not be operated at a too low discharge head, since this causes overloading of the motor. This applies to ST pumps. See “Technical data”.

WARNING!
The pump shall not be used in explosive or flammable environments or with flammable liquids.

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

Motor data

The table gives rated current and starting current. 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.

Motor 3 ~ 50 Hz, 2900 rpm, 37 kW		
Voltage V	Rated current A	Starting current A
380Δ	67	375
400Δ	64	310
415Δ	61	325
440Δ	58	350
500Δ	51	305
550Δ	46	285
1000Δ	25	132
1100Δ	23	145
Motor 3 ~ 60 Hz, 3400 rpm 42.7 kW (58 hp)		
440Δ	68	375
460Δ	65	395
575	52	305

The overload protection (motor protection breaker) shall be set to the motor’s operating current, but no higher than the motor’s rated current as given on the data plate.

Design

2201.320 is a submersible, electric motor-driven pump.

Impellers

The pump is available with the following types of impellers:

— heavy-duty impeller, designed especially for abrasive particles, ST pumps.
— radial-flow impeller of chromium-alloyed hardened cast iron. Alternative: hardened nodular iron or austentic nodular iron (NI-resist), HT pumps.
mixed-flow impeller of chromium-alloyed cast iron.

Shaft seals

The pump has two mechanical seals which provide the isolation necessary between the electric motor and the pumped liquid.

Materials:

Inner seal: tungsten carbide — carbon.

Outer seal: tungsten carbide — tungsten carbide.

Shaft

Shaft material: stainless steel.

Bearings

The pump bearings are designed for at least 15 000 hours of operation.

The lower bearing consists of two single-row angular-contact ball bearing.

The upper bearing consists of one deep-groove ball bearing.

Oil casing

The oil lubricates and cools the seals and acts as a buffer between the pump casing and the electric motor.

Pressure build-up within the oil casing is reduced by means of a built-in air volume.

Motor

Squirrel-cage 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.

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 IEC, 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 (according to IEC 34-1).

Monitoring equipment

The stator incorporates three thermal protectors connected in series.

The thermal protectors:

open at 125°C (260°F)
close at 70°C (160°F)

The monitoring equipment shall be of a design that makes automatic restart impossible.

See also “Electrical connections” and separate instructions for starters.

Cooling

ST version

The stator is cooled by the circulation of a portion of the pumped liquid in the space between the stator casing and the cooling jacket. The air between the outer casing and the stator casing is evacuated through a vent pipe that runs from the valve housing down to the suction side of the pump.

MT and HT versions

The stator is cooled by the pumped liquid passing through the space between the stator casing and the outer casing.

MT version

Air is evacuated through two valves on the top part of the pump.

NOTE!
Make sure that the monitoring equipment incorporated in the product is correctly connected.

Technical data

The pump curves show:

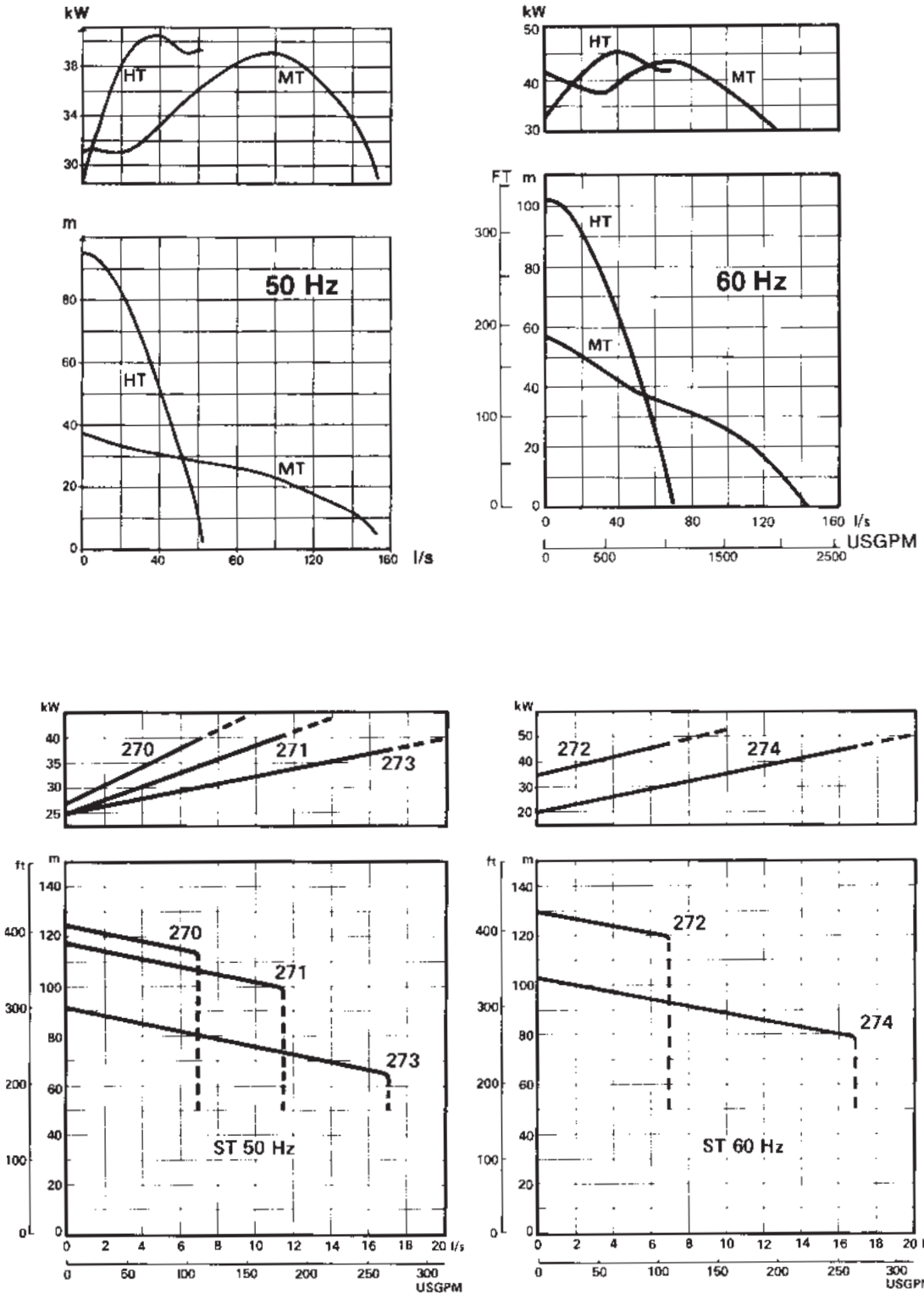
— input power at various operating points.
— flow rate versus total head.

Note: ST pumps may not be operated at a head lower than 50 m (164 ft).

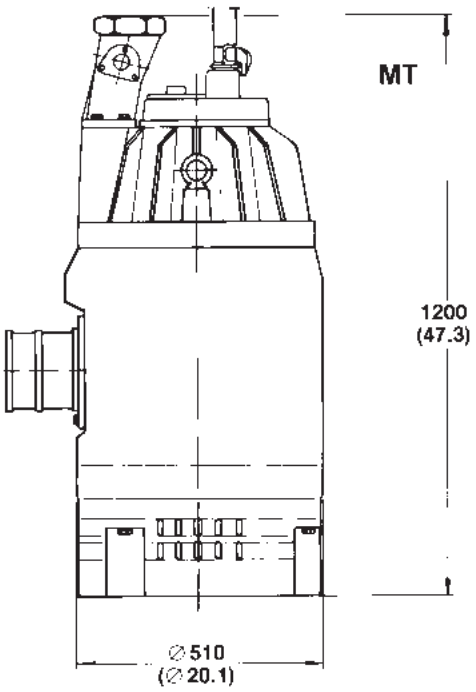
The following abbreviations are used:

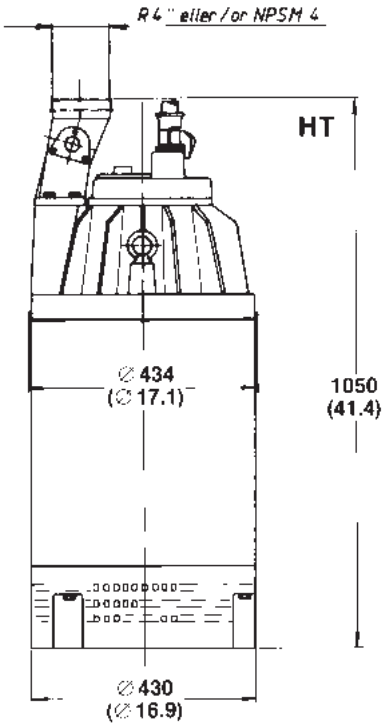
MT = medium-head version
HT = high-head version
ST = super-head version

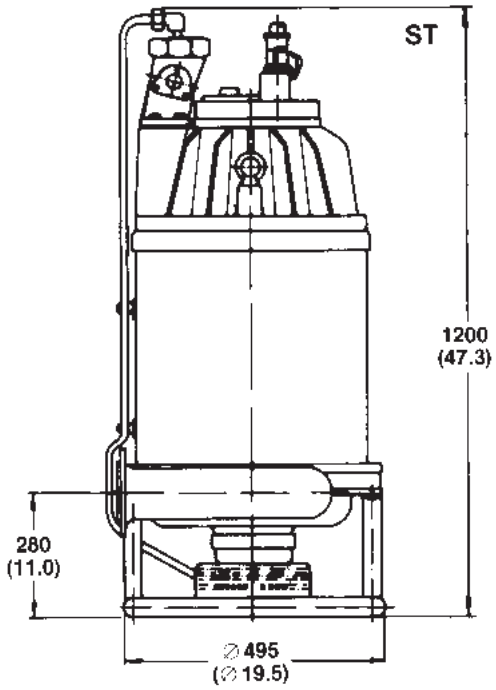
For further information, see ”Parts list”.



Dimensions and weights







All dimensions are in mm (in).

Weight in kg (lb) without motor cable and discharge connection:

MT	HT	ST
445 (980)	350 (770)	415 (915)

TRANSPORTATION AND STORAGE

The pump may be transported and stored in a vertical or horizontal position. Make sure that it cannot roll or fall over.

Always lift the pump by its lifting eyes, never by the motor cable or the hose.

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 impeller may freeze. The pump shall be operated for a short period after being taken up in order to expel all remaining water.

A frozen impeller 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. The impeller should be rotated by hand occasionally (for example every other month) to prevent the seals from 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 the 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. Make sure the lifting equipment is in good condition.
2. Be aware of the risk of electrical accidents.
3. Use a safety helmet, safety goggles and protective shoes.

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

At certain installations and operations points on the pump curve the noise level 70 dB, or for the actual pump specified noise level, can be exceeded.

Pump installation

Run the cables so that they do not have any sharp bends and are not pinched.

Connect the discharge connection and motor cable. See “Electrical connections”.

Lower the pump into the sump.

Place the pump on a base which will prevent it from sinking into a soft sump bottom. Alternatively, the pump can be suspended by its lifting eyes just above the sump bottom.

For tandem connection of pumps, see “Accessories and tools”.

Consult your nearest Flygt representative regarding:

— choice of peripheral equipment.

— other problems in connection with installation.

ELECTRICAL CONNECTIONS

WARNING!
All electrical equipment must be earthed. This applies to both pump equipment and any monitoring equipment.
Failure to heed this warning may cause a lethal accident. Make sure that the earth lead is correctly connected by testing it.

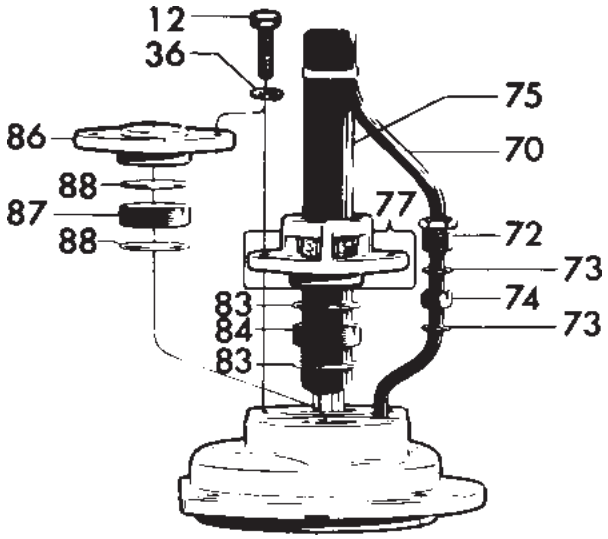
All electrical work shall be carried out under the supervision of an authorized electrician.

Local codes and regulations shall be complied with.

Check that the main(line) voltage and frequence agree with the specifications on the pump data plate.

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

Install the motor cable and the control cable as illustrated in the figure.

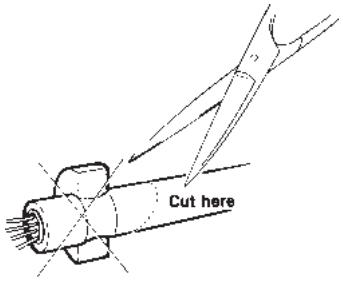


NOTE!
For safety reasons, the earth lead should be approx. 100 mm (3.94″) longer than the phase leads. If the motor cable is jerked loose by mistake, the earth lead should be the last lead to come loose from its terminal. This applies to both ends of the cabel.

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 jacket 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 seal sleeve does not close around the cable at the same point again.



Connect the motor cable to the terminal board connections U1, V1, W1 and earth. Mount the closing links as illustrated.

Closing links are not used with 9 stator lead tandem coupling.

If star-delta start is used, both motor cables are connected as shown below. Closing links are not used with stardelta start.

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

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

Install the cover (125).

Tighten the screws (12) and the gland nut (72) so that the cable entry unit bottoms out.

Check the direction of rotation, see “Inspection”. If the impeller rotates in the wrong direction, transpose two phase leads.

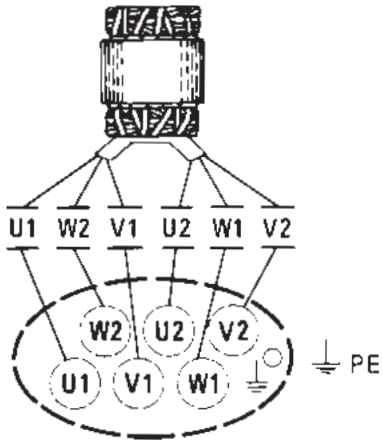
Remember that the starting surge with the direct-on line start can be up to six times higher than the rated current. Make sure that the fuses or circuit breakers are of the proper amperage.

NOTE!
Make sure that the monitoring equipment incorporated in the product is correctly connected.

The stator leads are colour-coded as follows:

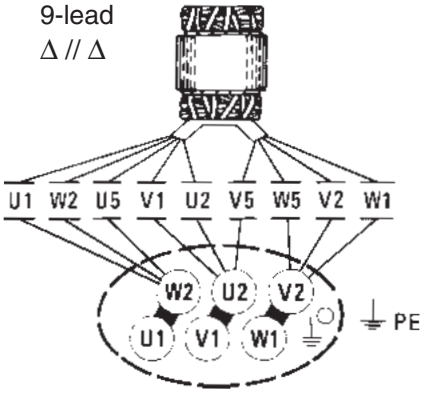
9-lead ◀	U1 = Red	▶ 6-lead	
	V1 = Brown		
	W1 = Yellow		
	U2 = Green		
	V2 = Blue		
	W2 = Black		
	U5 = Red		
	V5 = Brown		
	W5 = Yellow		

The stator leads are connected to the terminal boards as follows:

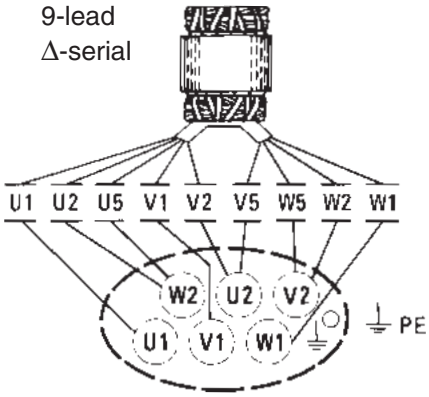


6 stator lead. Connection to the terminal board.

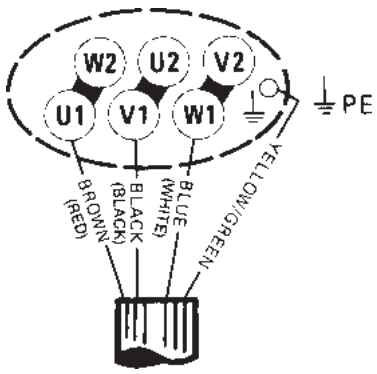
9-lead
Δ // Δ



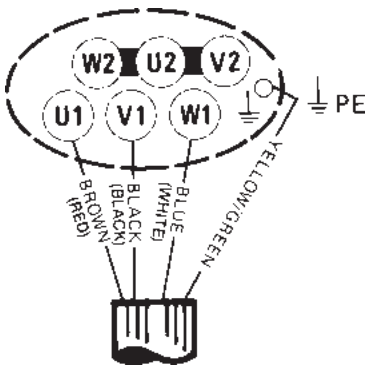
9-lead
Δ-serial



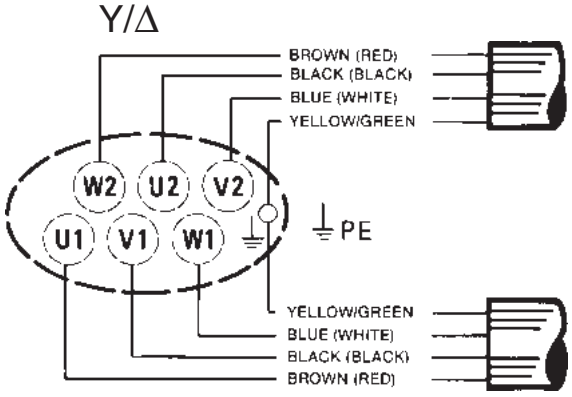
Δ



Y



Y/Δ



OPERATION

Before starting

Check the oil level in the oil casing.

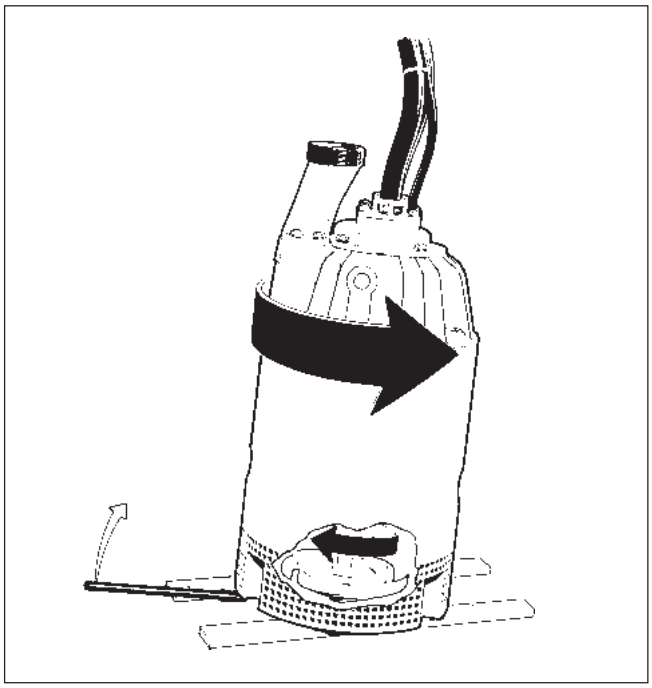
Remove the fuses or open the circuit breaker and check that the impeller can be rotated by hand.

Check that the monitoring equipment (if any) works.

Check the direction of rotation. See the figure. The impeller shall rotate clockwise, as viewed from above. When started, the pump will jerk in the opposite direction to the direction in which the impeller rotates.

Beware!
The starting jerk on large pumps can be powerful!

The above measures are described under “Inspection”.



In order to avoid sedimentation when the pumped medium contains solid particles, the velocity of the medium in the discharge line should be:

Mixture	Min. velocity in discharge line
1. Water + coarse gravel	4 m/s (13.2 ft/s)
2. Water + gravel	3.5 m/s (11.5 ft/s)
3. Water + sand	
3a. Sand particles <0.1 mm (<0.004″)	1.5 m/s (5.0 ft/s)
3b. Sand particles <0.6 mm (<0.024″)	2.5 m/s (8.25 ft/s)

The pump can be provided with level regulation in order to prevent unnecessary wear on the hydraulic components.

Cleaning

If the pump has been running in very dirty water, let it run for a while in clean water, or flush it through the discharge connection. If clay, cement or other similar dirt is left in the pump it may clog the impeller sealings preventing the pump from working.

CARE AND MAINTENANCE

The figures in parentheses are item numbers and refer to the cutaway figure.

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.

NOTE for Ex-version
All work on the explosion-proof motor section must be performed by authorized Flygt personnel or personnel authorized by Flygt.

Flygt renounces all responsibility for work done by untrained, unauthorized personnel.

Inspection

Regular inspection and preventive maintenance ensure more reliable operation.

The pump should be inspected at least every sixth month, more frequently under severe operating conditions.

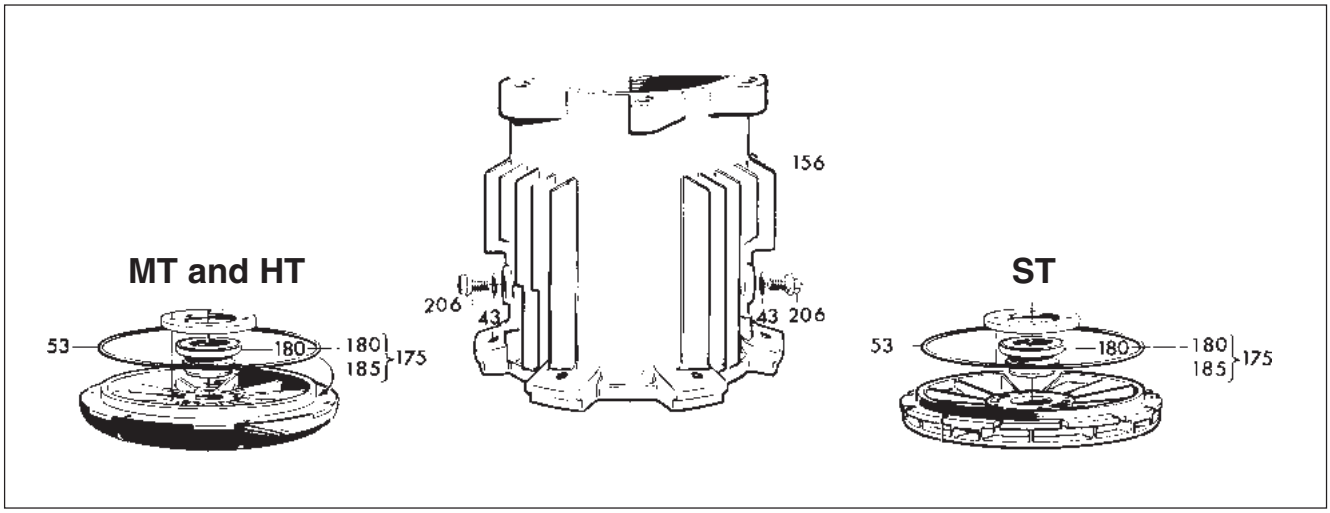
Under normal operating conditions, the pump should have a major overhaul in a service shop once a year.

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.

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 lifting eyes.
Pump casing and impeller	Replace worn parts if they impair function. Wear on the impeller and the parts around it necessitates fine adjustment of the impeller or replacement of worn parts. See “Replacing the impeller” and “Replacing the diffuser”.
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 reaches up to the oil hole when the pump is lying down with the oil hol “OIL FILLING” up. Add oil as needed. Se “Changing the oil”.
Condition of the oil	A check of the condition of the oil can show whether there has been any leakage. Maximum permissible leakage is 0.05 ml/h (0.0017 oz/h). 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. Change the oil if it contains too much water, i.e., is heavily emulsified (cream-like), or if the water has settled out. 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 (206) is not sufficiently tight. — that an O-ring (45), (53) or its sealing surface is damaged. — that the lower seal (175) is damaged. Contact a Flygt service shop.
Liquid in the stator casing	**WARNING. If there has been a leakage, the stator casing may be under pressure. Hold a rag over the inspection screw to prevent splatter. See “Safety precautions” for additional information.**



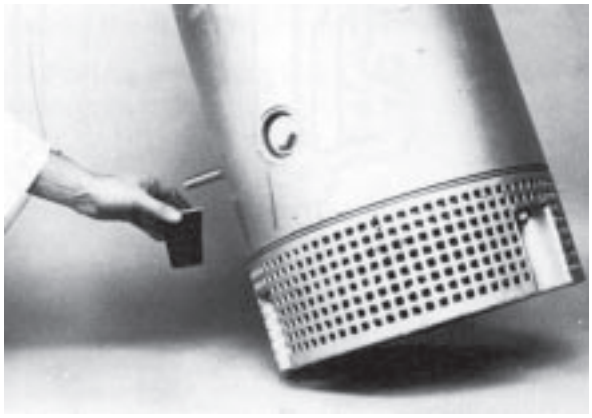
Inspection of	Action

Remove the plug (40), the hole is marked “INSP”, the seal ring (41), the inspection screw (206) and the O ring (43). Screw in the oil drainage tube.

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

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

— that the inspection screw (206) is not sufficiently tight.



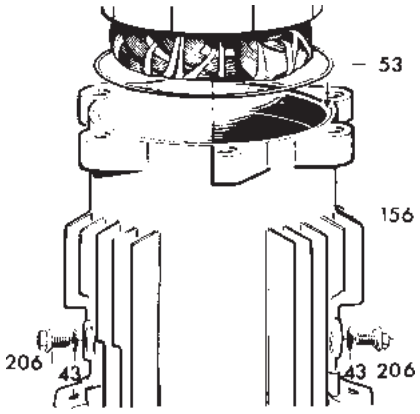
— that an O-ring (43/53) is damaged.

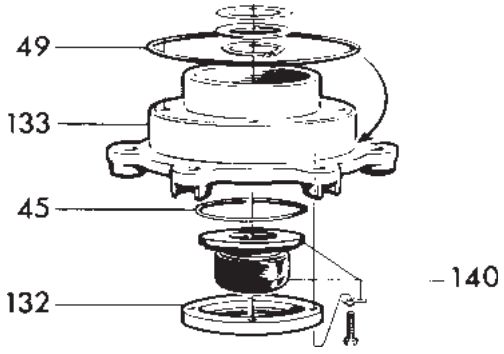
— that the cable entry is leaking.

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

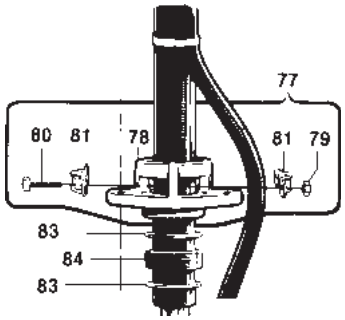
— that the inner seal (140) is damaged. Contact a Flygt service shop

— that an O-ring (49/45) is damaged





Inspection of	Action
Cooling system	Rinse and clean if the flow through the system has been partly restricted.
Cable entry	Make sure that the cable clamps are tight.



If the cable entry leaks:

— check that the entry is tightened so it bottoms out.

— cut a piece of the cable off so that the seal sleeve (84) closes around a new position on the cable.

— replace the seal sleeve (84).

— check that the seal sleeve (84) and the washers (83) conform to the outside diameter of the cables.

Cables	Replace the cable if the outer jacket is damaged. Make sure that the cables do not have any sharp bends and are not pinched.
Level sensors or other level equipment	Check function. Clean, adjust, replace or repair damaged level sensing equipment. Follow the instructions for the level sensing equipment in question. NOTE! The level sensor contains a mercury switch. Damaged sensors should therefore be disposed of in a proper manner.
Starter equipment	If faulty, contact an electrician.
Rotation direction of pump (requires voltage)	Transpose two phase leads if the impeller rotates in the wrong direction. Rotation in the wrong direction reduces the capacity of the pump and the motor may be overloaded. Check the direction of rotation every time the pump is reconnected.
Pipes, valves 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 MΩ.

Changing the oil

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

Lay the pump on its side on a bench or over two supports.

Remove the plug (40) marked “OIL DRAINING” and washer (41) from one of the oil holes.

Unscrew the oil casing screw (206). Remove the O-ring (43).

Screw in the oil drainage tube (the tube is included with the pump at delivery).

Turn the pump so that the oil hole faces downwards.

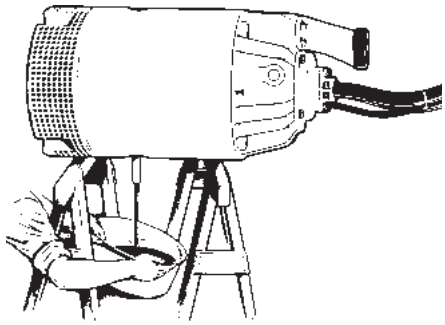
It is easier to drain the oil if the other oil hole screw is also removed.

Fill with 5 litres (5.3 quarts) of new oil. Always replace the O-rings under the oil casing screws. Place the screws back in. Don’t forget O-rings and washers. Tightening torque 10—20 Nm (7—14 ft lb).

A paraffin oil with viscosity close to ISO VG15 is recommended (e.g. Mobil Whiterex 309). The pump is delivered from factory with this type of oil.

In applications where poisonous properties are of less concern, a mineral oil with viscosity up to ISO VG32 can be used.

Draining the oil



Replacing the wear ring

(ST pumps only)

Remove the screws (64) and the washers (37).

Lift off the base stand (135) and the nozzle support (170).

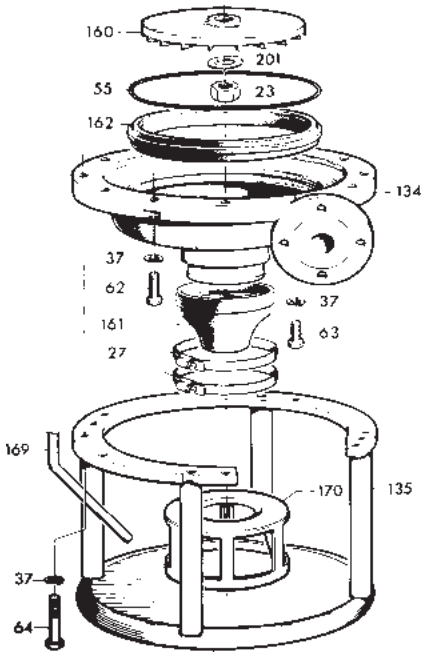
Remove the screws (62) and the washers (37).

Remove the screw (63) and the washer (37).

Lift off the pump casing (134).

Remove the O-ring (55). Carefully prize and lift up the wear ring (162).

The new wear ring shall be mounted in the pump casing so that the arrow stamped on the top side of the ring points towards the arrow cast into the casing, which is located next to the bolt hole nearest the discharge flange. See figure.



Replacing the impeller

(ST pumps)

See “Replacing the wear ring”.

Then continue by bending down the tab washer (201) and unscrewing the impeller nut (23).

Pull off the impeller.

Use impeller puller 84 13 60 or pry off carefully with two strong screwdrivers or bars.

Replacing the impeller

(MT and HT)

The POLY-LIFE version of this pump has a product code starting with U, (see the data plate on the pump). Make sure that spare parts with spare part numbers marked (U), in the spare parts list, are used.

When the new wear parts are fitted, a clearance must be provided between the impeller and the oil casing bottom and between the impeller and the lower diffuser. The clearance should be 0.2—0.3 mm.

Check after fitting that the impeller can rotate freely.

The polyurethane covering is extremely resistant to wear. If the impeller does not rotate completely freely, friction will generate a great deal of heat. The result can be that the wear parts are deformed or that the impeller gets stuck, resulting in damages to the pump.

Removing the impeller

WARNING!
Worn impellers often have very sharp edges.

Lay the pump on its side.

Remove screws (10) and pull off the strainer (127).

Remove nuts (22/21).

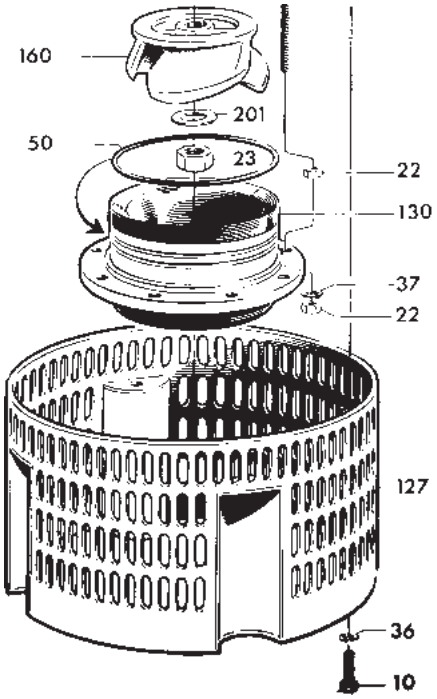
Remove washers (37/36) lower diffuser (130) and O-ring (50/52).

Remove impeller nut (23).

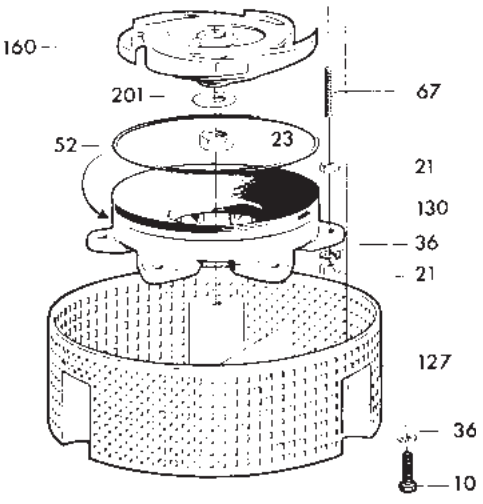
Remove lock washer (201).

Pull off the impeller.

Use impeller puller 84 13 60 or pry off carefully with two strong screwdrivers or bars.



MT



HT

Installing the impeller

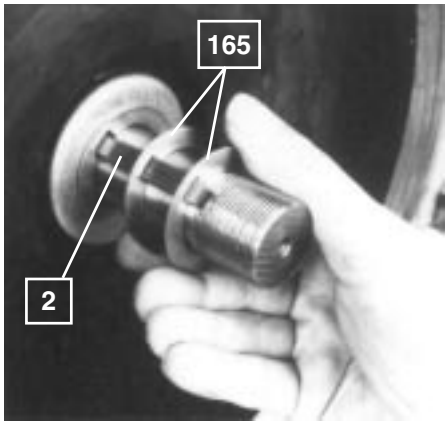
Make sure that the end of the shaft is clean and free of burrs. Polish off any flaws. Clean and oil all sealing surfaces and O-rings.

Check:

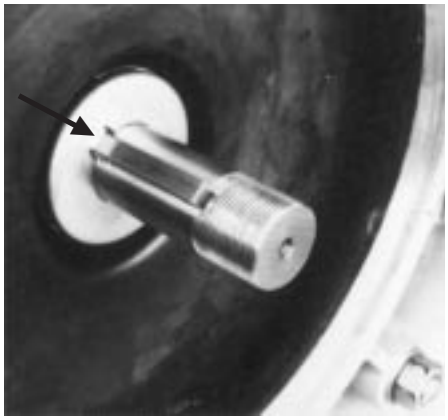
— that the key (2) is seated in the keyway on the shaft.

— that an appropriate number of adjusting washers (165) are on the shaft. (Does not apply to ST).

Grease end of shaft and impeller hub.



Check that the outher seal's driving pin is aligned with the key (2). Push the impeller carefully without turning the shaft in relation to the driving ring so that the pin fits into the impeller keyway.

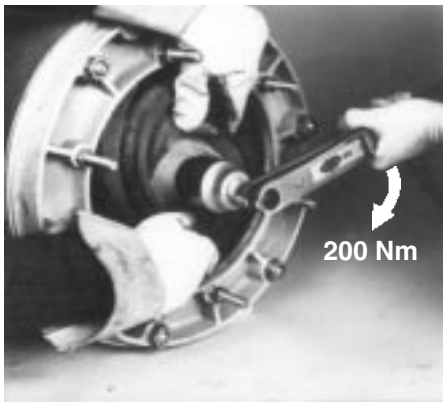


Fit washer (201), nut (23).

Tighten the impeller nut.

Tightening torque 200 Nm (150 ft lb).

Secure with washer (201).



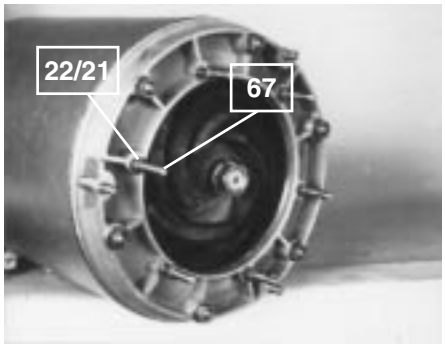
Adjusting the impeller (MT and HT pumps only).

The clearence between the impeller and the oil casing bottom should be minimal when the impeller is tightened. The clearence can be adjusted with the adjusting washers (165).

Check that the impeller can easily be rotaded by hand.

Screw the adjusting nuts (22/21) down toward the bottom on the studs (67).

Fit O-ring (50/52).



Press the lower diffuser (130) against the impeller.

Screw the adjusting nuts so that they lie flush against the lower diffuser.

Back off all adjusting nuts another half-turn (counter-clockwise).

Place washers (37/36) and nuts (22/21) on the studs.

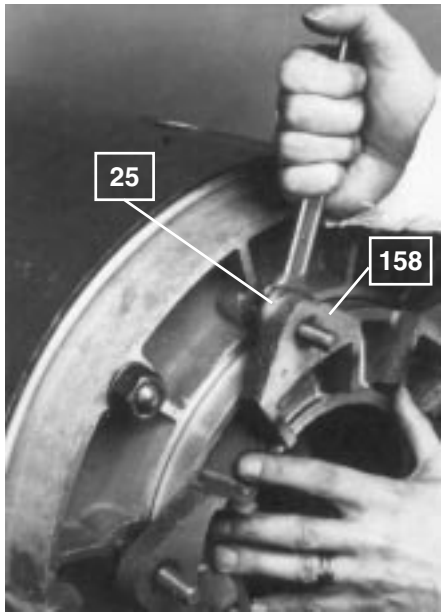
Tighten the nuts evenly all around.

Check that the impeller can easily be rotated by hand.

Install: Strainer (127).

In order for the pump to perform at maximum capacity, the impeller must be adjusted regularly.

It is particularly important that the clearance between the lower diffuser and the impeller is kept to a minimum.



Replacing the diffuser

(MT and HT pumps only)

Removing the diffuser

Remove the impeller, see “Removing the impeller”.

Remove the screws (65) and the washers (37).

Remove the diffuser (118).

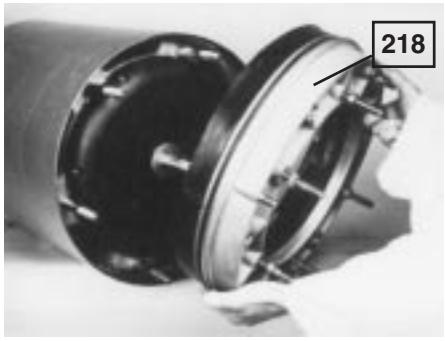
Installing the diffuser

Screw the diffuser in place with the screws (65).

Tightening torque 200 Nm (150 ft lb).

Do not forget to put back washers (37). For further instructions, see “Fitting the impeller”.

More extensive repairs require special tools and should be carried out by an authorized service technician.



Tandem operation

The delivery head can be increased by connecting two or three pumps in tandem.

Max. permissible operating pressure is 1.2 MPa (174 psi) for MT and HT. 1.7 MPa (246 psi) for ST.

The vertical distances between the pumps should be approximately equal.

See special brochure that describes the procedure for tandem connection.

The following complete connection units are available for tandem connection:

Order No.	Intended for	Pump
415 12 00	R2	ST
337 06 08	R4	HT
337 06 09	4—8 NPSM	HT
337 06 10	R8	MT
337 06 11	NPT 8-8	MT

Installing the connection unit for tandem operation

ST pumps (415 12 00).

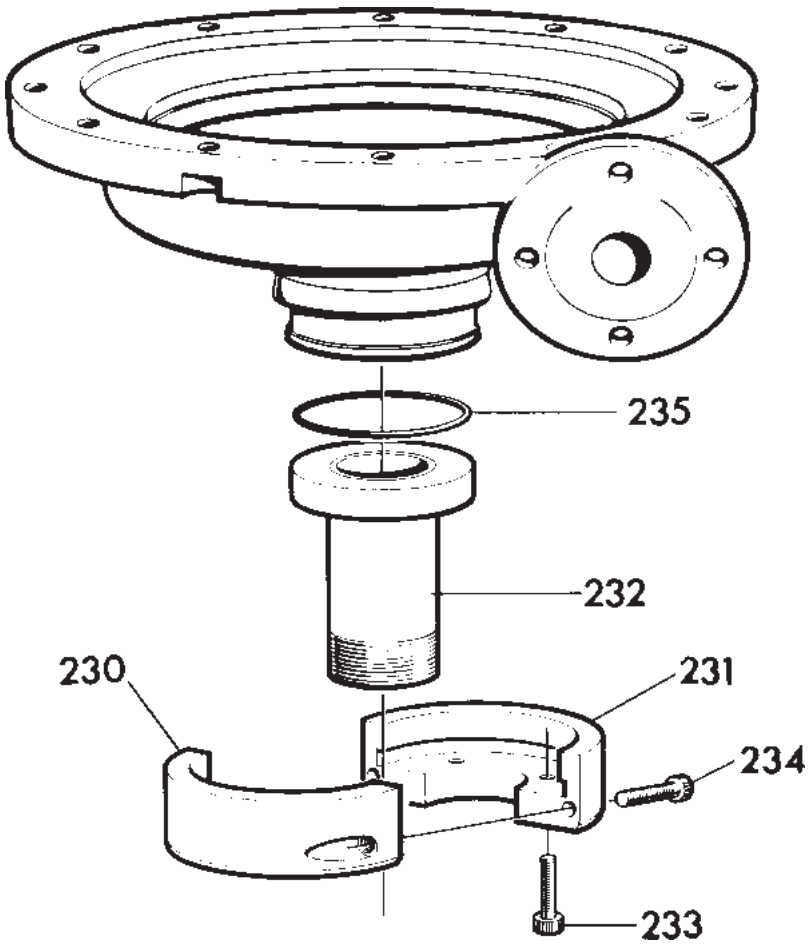
Remove the base stand (135), the nozzle support (170) and the inlet bell (161).

Install connection unit 415 12 00 for tandem connection on the pump casing (134) as shown in the figure.

The connection unit consists of the following parts:

Item No.	Denomination	Parts No.
230	Connection flange	425 59 00
231	Connection flange	425 59 01
232	Pipe, compl.	425 60 00
233	Screw, 4 pcs	82 00 53
234	Screw, 2 pcs	82 00 32
235	O-ring 90.0 × 7.0	82 79 02

ST



MT pumps 337 06 10 (8″ BSP)
or 337 06 11 (NPT 8-8).

Remove the suction strainer (127) and the lower diffuser (130), screw the studs (67) into the empty threaded holes (4 holes) in the diffuser (118), screw a nut (22) onto every empty stud. Press the lower diffuser (130) against the impeller and set all eight adjusting nuts as instructed under the heading “Adjusting the impeller”. Fit the gasket (212) and the tandem connection flange (210 or 215) as shown in the figure.

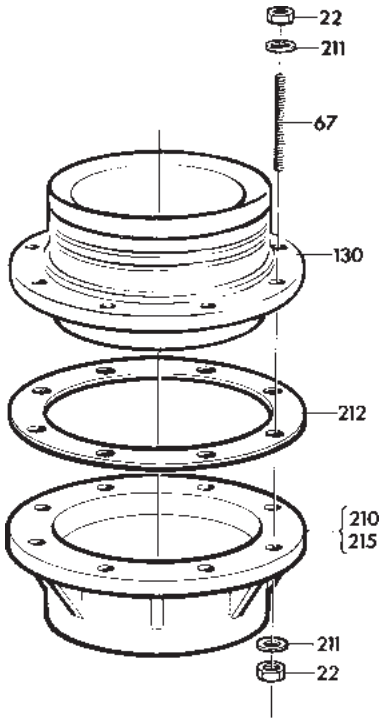
Fit the lock washers (37), the washers (211) and the nuts (22).

Tighten the nuts evenly all around.

The connection unit consists of the following parts:

Item No.	Denomination	Parts No.
22	Nut, 8 pcs	82 23 61
67	Stud, 4 pcs	84 46 92
211	Washer, 4 pcs	82 35 23
212	Packing	214 27 01
210 alt.	Flange (R8″)	385 20 02
215	Flange (NPT 8-8)	385 20 03

Tandem connection unit MT



HT pumps 337 06 08 (4″ BSP)
or 337 06 09 (NPSM 4-8)

Remove the suction strainer (127). Remove the nuts (21) and the lock washers (36) on the underside of the lower diffuser (130). Fit the O-ring (221) and the tandem connection flange (220 or 225) as shown in the figure.

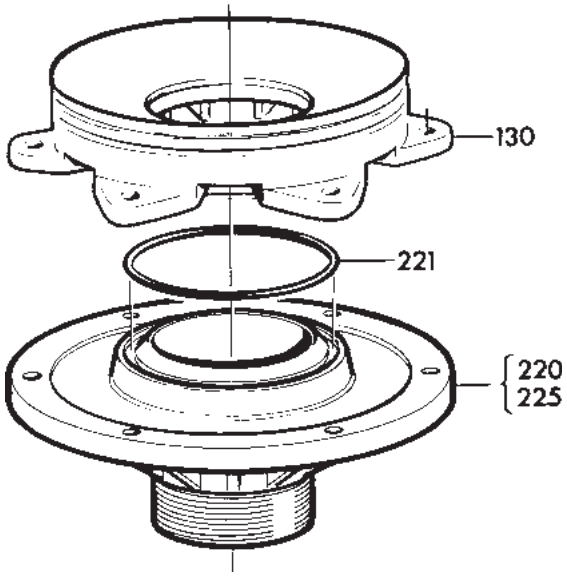
Fit the spring washers (36) and the nuts (21) on the studs (67).

Tighten the nuts evenly all around.

The connection unit consists of the following parts:

Item No.	Denomination	Parts No.
221	O-ring (144.3 x 5.7)	82 74 21
220 alt.	Flange (R4″)	337 05 02
225	Flange (NPSM 4-8)	337 05 03

Tandem connection unit HT



Zinc anode set

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

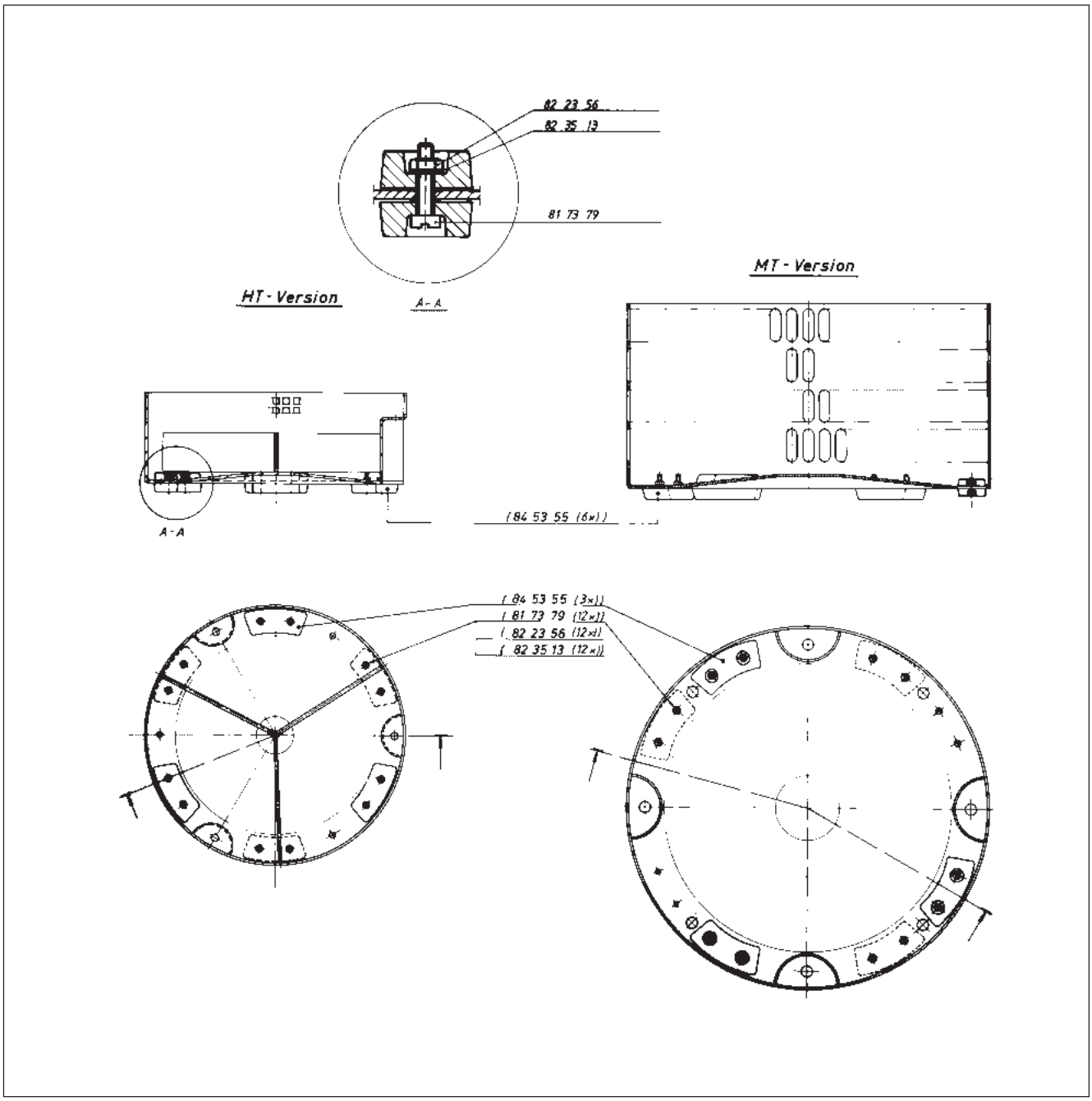
Order No. 290 15 00

Installing zinc anodes

The aodes are installed as shown in the figure.
Six anodes are fitted on the outside and three on the inside of the strainer bottom.

Important!

Brush or grind off paint, grease and dirt or any other coating that might interfere with the electrical contact between the anodes and the strainer.



Level sensor

Flygt supplies level sensors suited for different liquid densities and with different cable lengths. See separate brochure.

Start and control equipment

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

Tools

The following tools are required in order to perform the necessary care and maintenance of the pump:

Order No.	Description
84 13 84	Socket, n = 10
84 13 87	Socket, n = 13
84 13 92	Socket, n = 19
84 13 96	Socket, n = 24
84 15 55	Extension bar, 125 mm
84 15 61	Swivel handle
84 11 41	Combination wrench, n = 19
84 11 43	Combination wrench, n = 24
84 14 31	Adjustable wrench, 18″
84 13 60	Puller
84 15 64	Torque wrench, max. 225 Nm

For further information on tools, see Flygt's Tool Catalogue.

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

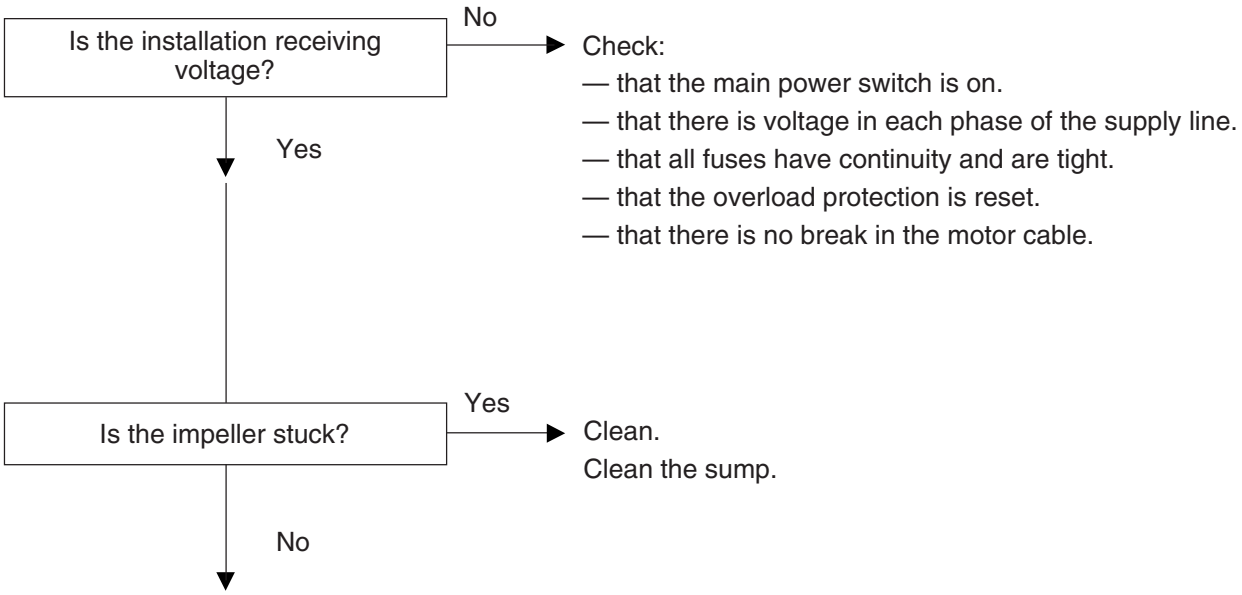
Always make sure that there is no one near the pump when the power supply is turned on.

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

Electrical work shall be performed by an authorized Flygt service electrician.

Follow local safety regulations and observe recommended safety precautions.

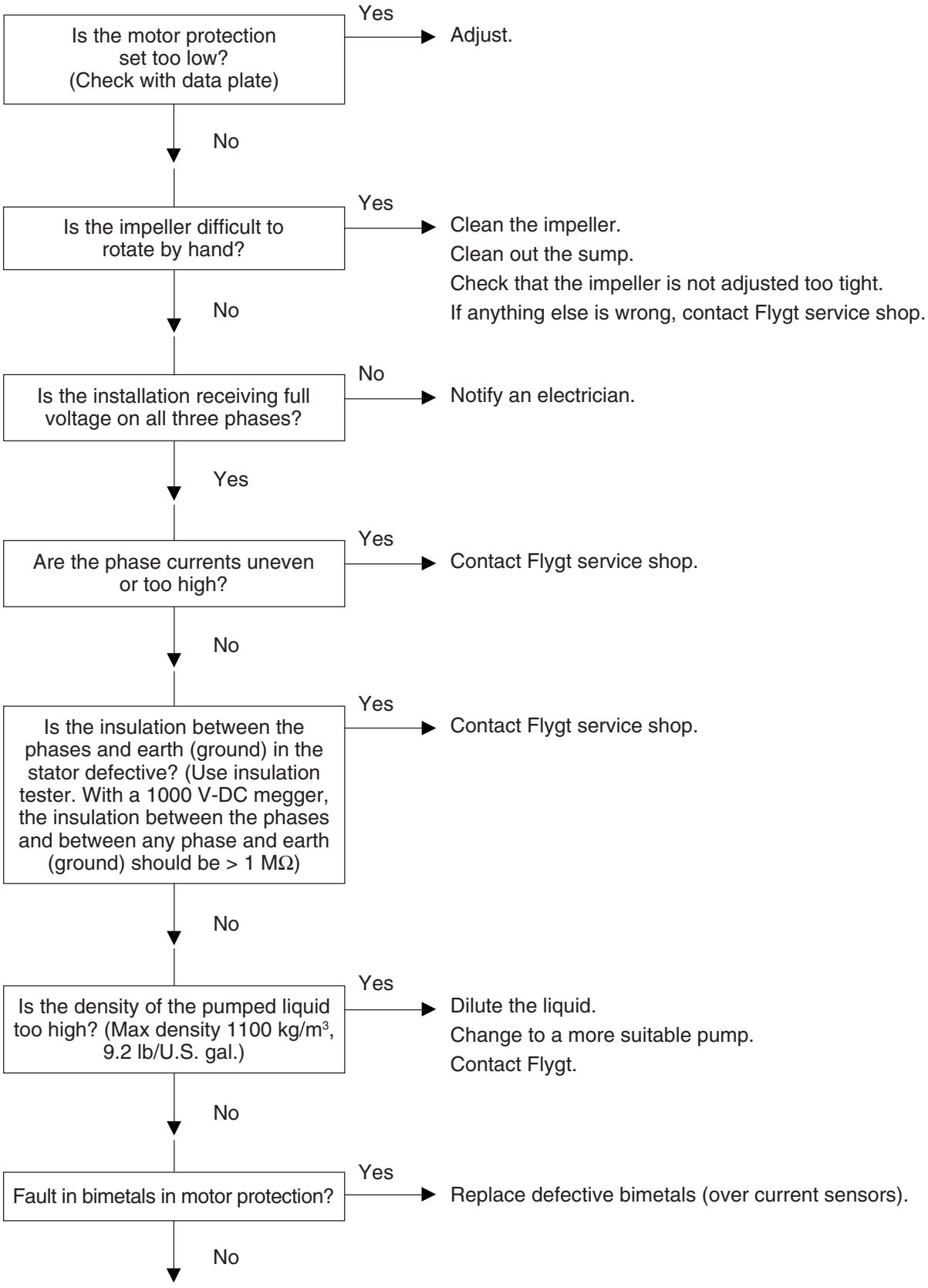
1. Pump fails to start



Contact Flygt service shop.

WARNING!
Disconnect power before checking the impeller.

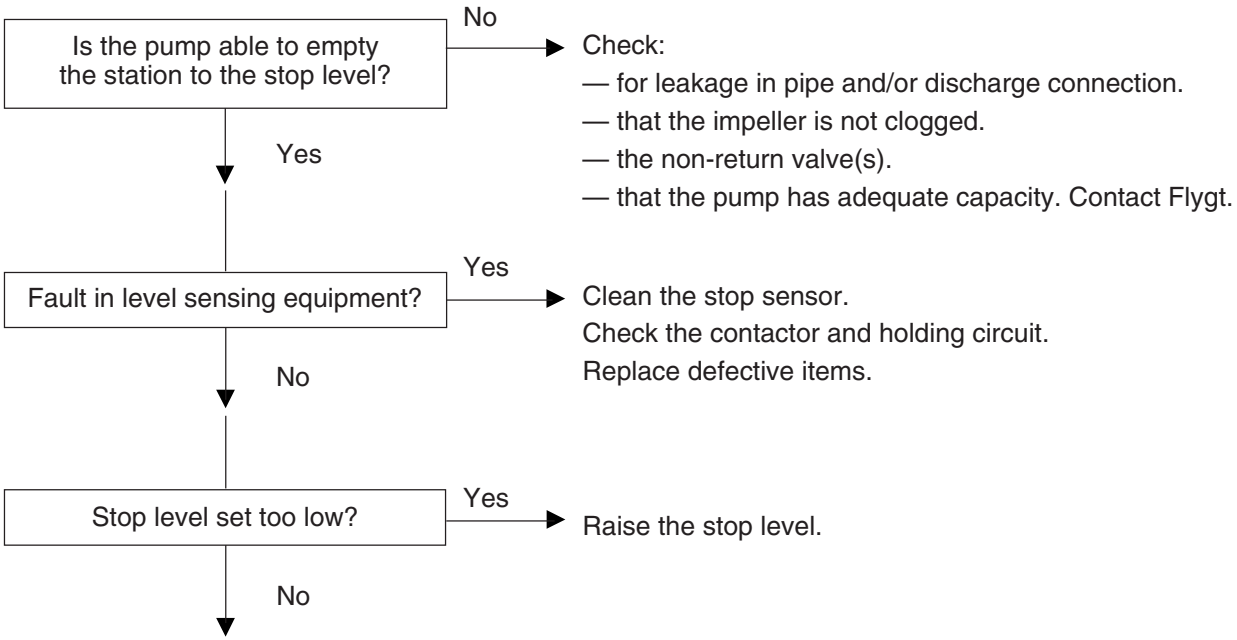
2. Pump starts but motor protection trips



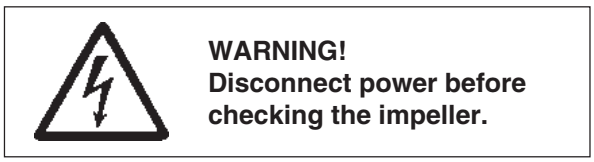
Contact Flygt service shop.

WARNING!
Disconnect power before checking the impeller.

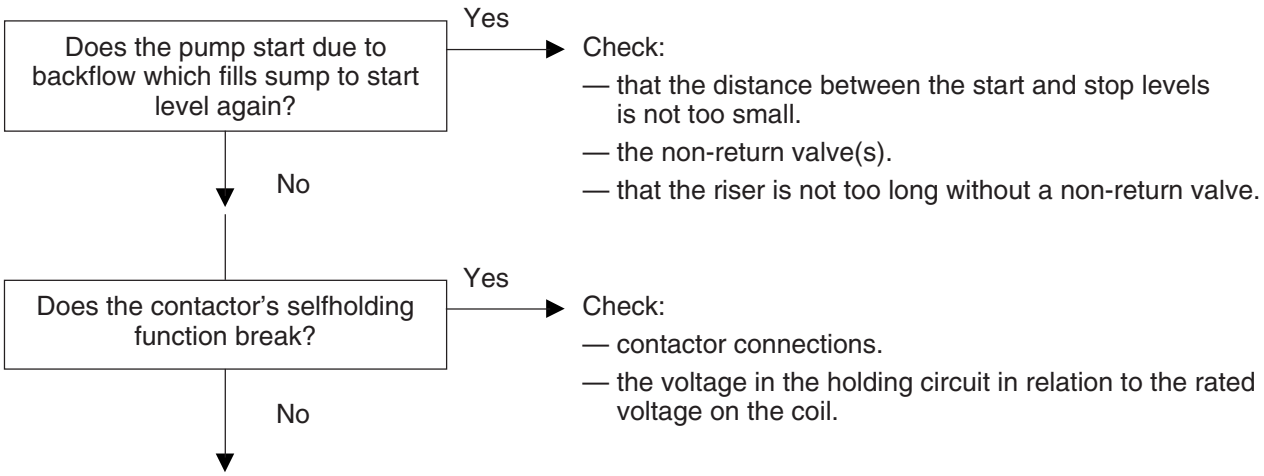
3. The pump does not stop (when using level equipment)



Contact Flygt service shop.



4. The pump starts-stops-starts in rapid sequence (when using level equipment)



Contact Flygt service shop.

5. Pump runs but delivers too little or no water

Check:

— direction of rotation of the pump, see “Before starting”.

— that valves are open and intact.

— that pipes, impeller and strainer are not clogged.

— that the impeller rotates easily.

— that the suction lift has not been altered.

— for leakage in the pump installation.

— for wear on wear ring, impeller, pump casing, suction bottom, diffuser.

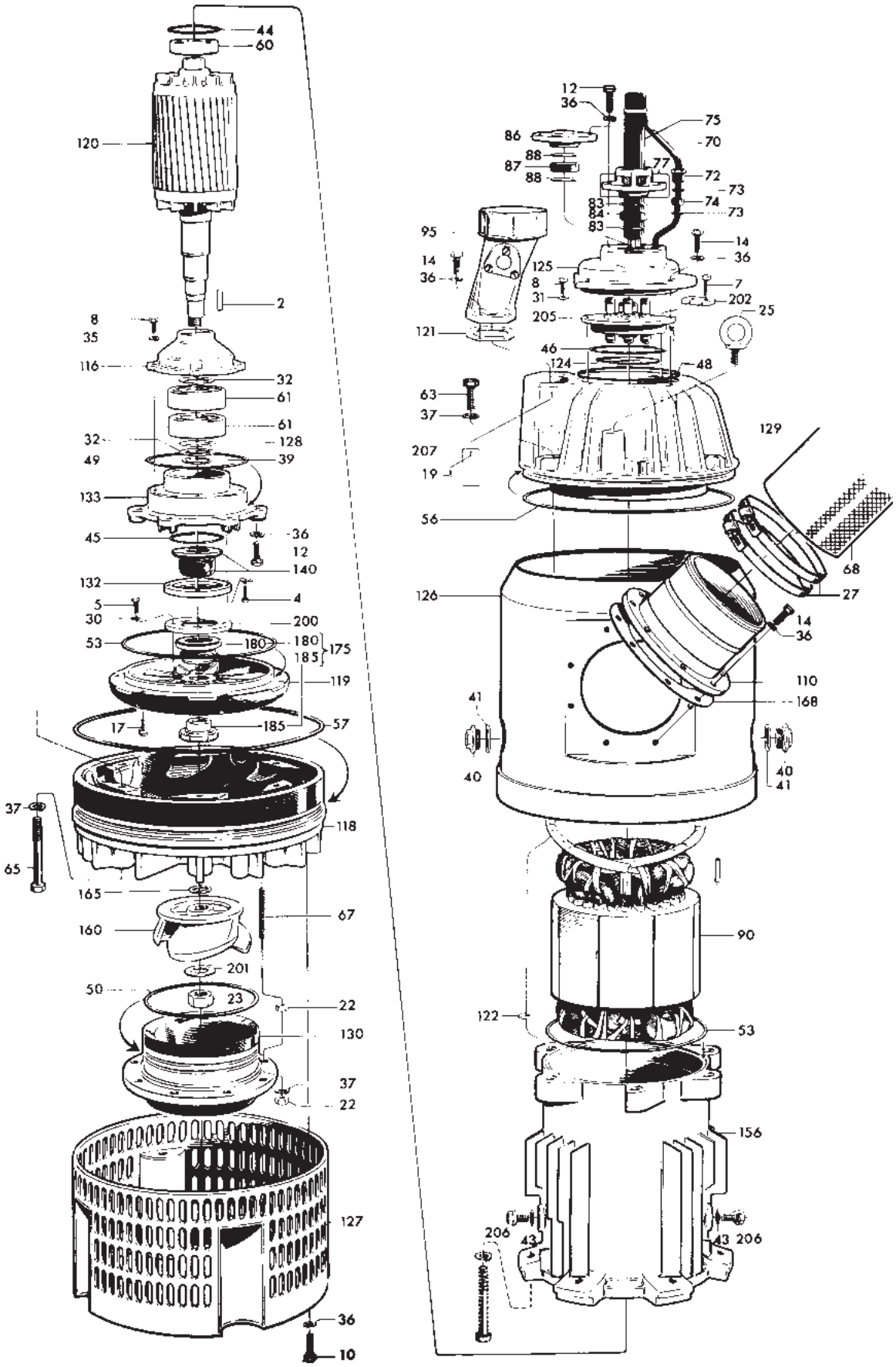
See also under “Inspection”.

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

SERVICE LOG

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

2201.320 MT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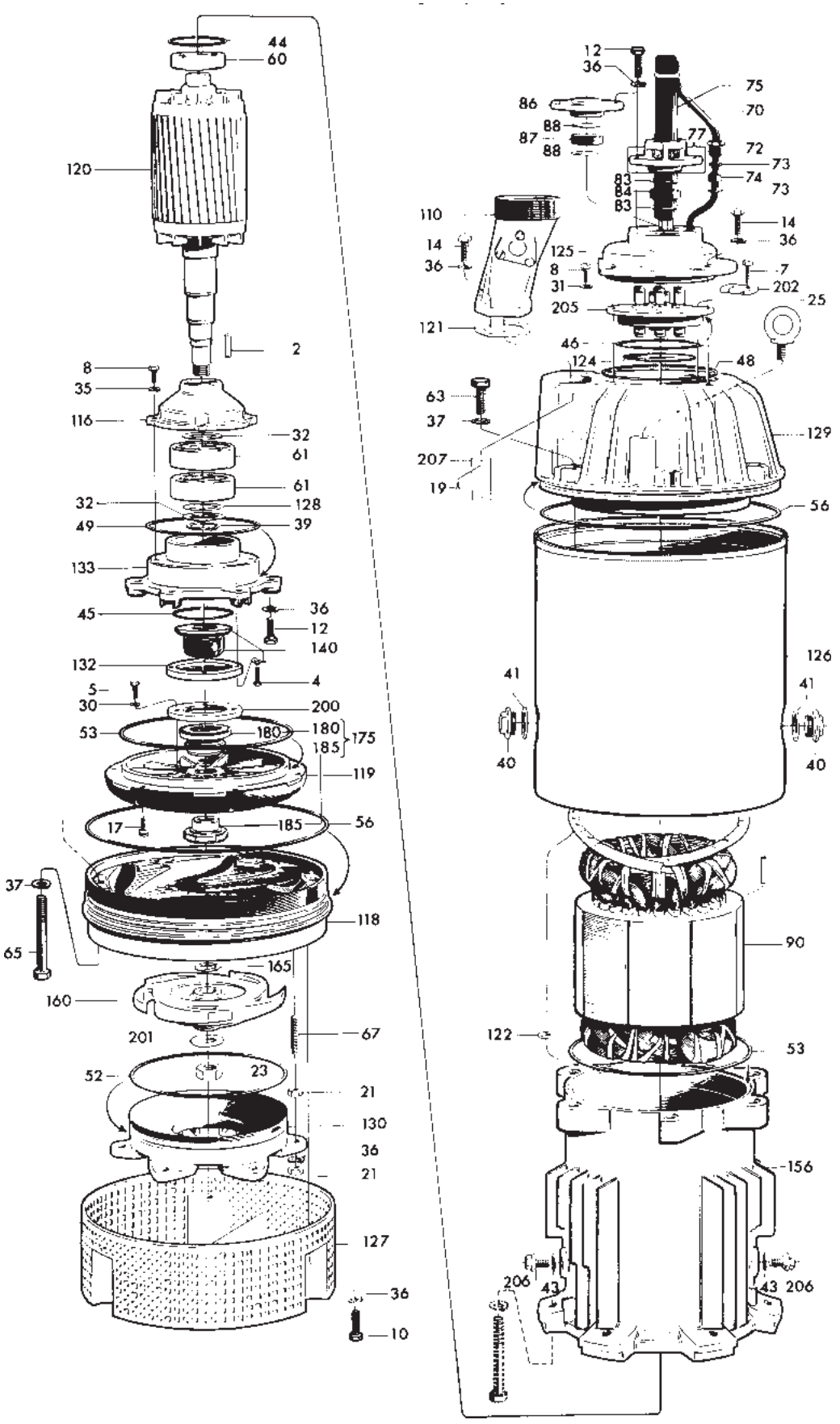
2201.320 HT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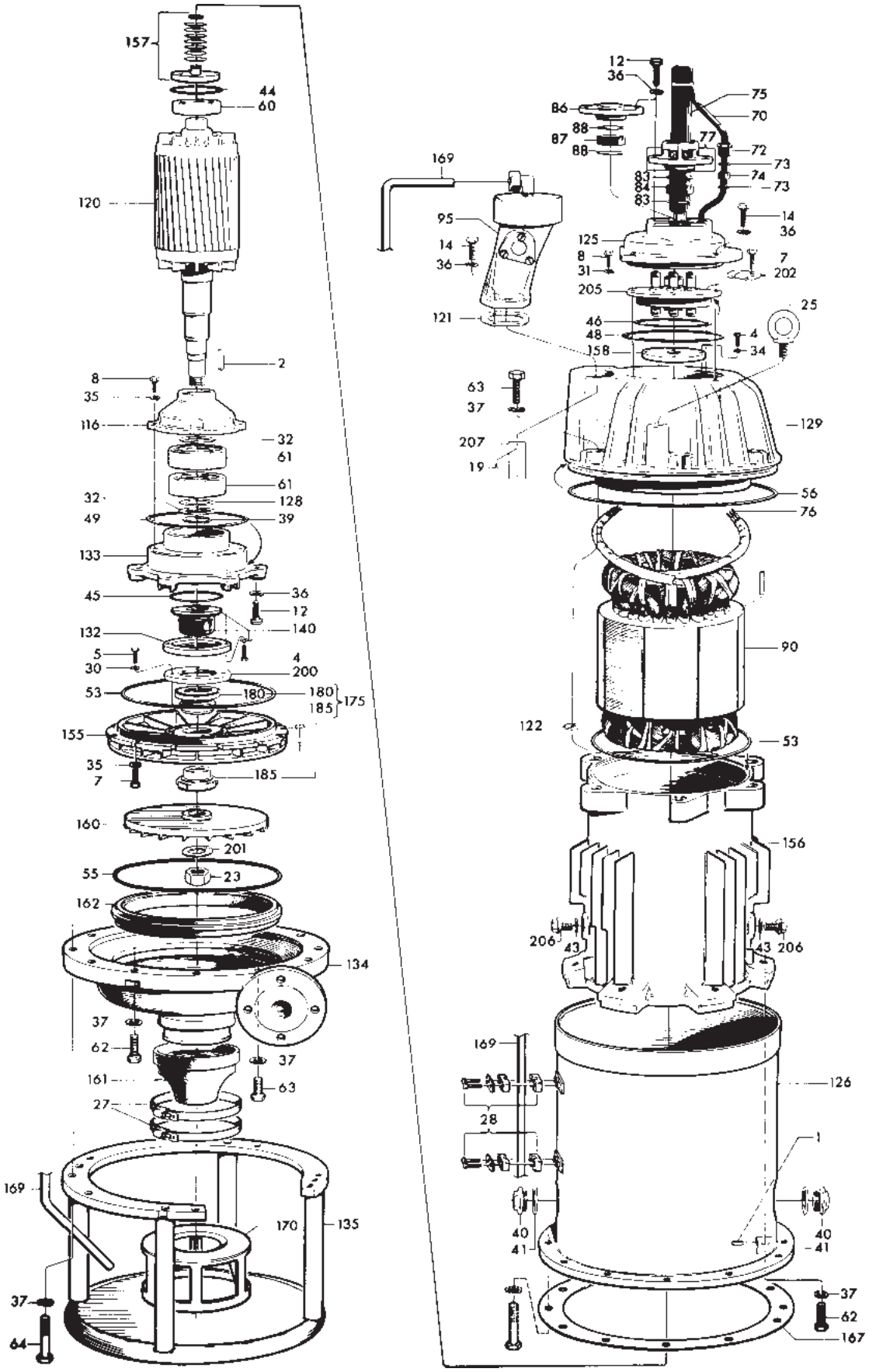
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