FLYGT

Installation, care and maintenance

2201.011, 2201.011-U

Flygt

ITT Industries

890251/10

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.

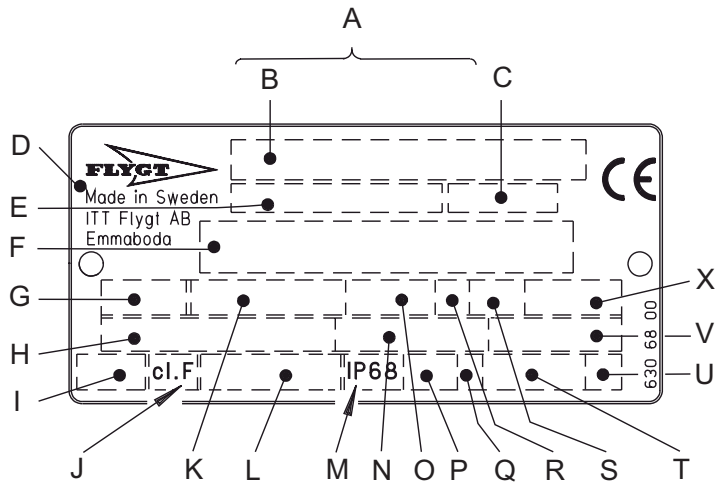
Hence, the guarantee does not cover faults caused by deficient maintenance, improper installation, incorrectly executed repair work or normal wear and tear.

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



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 3
- Applications 3
- Dimensions and weights 3
- Motor data 3
- Design 4

TRANSPORTATION AND STORAGE 4

INSTALLATION 5
- Safety precautions 5
- Pump installation 5

ELECTRICAL CONNECTIONS 6

OPERATION 9

CARE AND MAINTENANCE 10
- Safety precautions 10
- Inspection 10
- Changing the oil 12
- Replacing the impeller 13

ACCESSORIES AND TOOLS 16

FAULT TRACING (TROUBLESHOOTING) 17

SERVICE LOG 20

EXPLODED VIEW 21

PRODUCT DESCRIPTION

Applications

2201.011 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 POLY-LIFE version 2201.011-U, with polyurethane coated wear parts.

Liquid density: Max. 1100 kg/m³ (9.2 lb per US gal.).

The pumped liquid may contain particles up to a size which corresponds to the openings in the strainer.

The pH of the pumped liquid: 5–8

Depth of immersion: max. 20 m (65 ft).

The pumps shall not be used in explosive or flammable environments or with flammable liquids.

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

WARNING!
Only Ex-approved pumps may be used in an explosive or flammable environment.

Motor data

MT, HT
50 Hz, 37 kW, 2920 rpm

Voltage V	Rated Current A	Starting Current A
220	116	650
230	112	740
380	67	375
400	65	430
415	61	325
500	51	305
550	46	285

60 Hz, 43 kW, (58 hp) 3500 rpm

Voltage V	Rated Current A	Starting Current A
220	135	750
380	78	435
440	68	375
460	65	395
575	52	305

LT
50 Hz, 30 kW, 1465 rpm

Voltage V	Rated Current A	Starting Current A
200	124	1020
220	111	880
230	98	745
380	62	505
400	56	430
415	56	410
500	46	325

60 Hz, 37 kW, (50 hp) 1760 rpm

Voltage V	Rated Current A	Starting Current A
220	128	1062
380	78	655
440	64	495
460	63	525
575	48	335

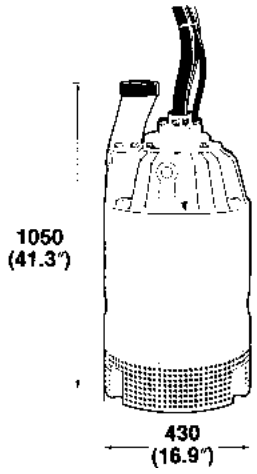
Dimensions and weights

All dimensions are in mm (in). See the table.

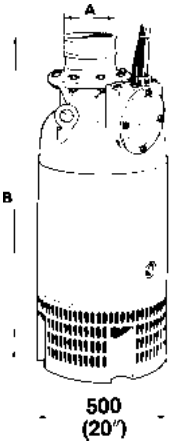
Weight in kg (lb) without motor cable and discharge connection:
MT: 280 (618)
HT: 240 (530)
LT : 285 (628)

For further information, see ”Parts list”.

HT



LT, MT	
A	B
6"	1253 (49.3)
8"	1253 (49.3)
R6 = BSP.Pl.6; NPT6	1153 (45.4)
R8 = BSP.Pl.8; NPT8	1153 (45.4)



Design

2201.011 is a submersible, electric motor-driven pump.

Impellers

The pump is available with the following types of impellers:

radial-flow impeller of hardened nodular iron. HT-version.

mixed-flow impeller of chromium-alloyed cast iron. LT and MT-version.

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 – tungsten carbide.

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 a two single-row angular-contact ball bearings for mounting as a pair.

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.

1. Motor

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

The motor is started by means of: direct on-line 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 to class F, 155°C (311°F).

The motor is designed to supply its rated output at ± 5 % variation of the rated voltage, ± 10 % variation of the rated voltage, in respect of the temperature, can be accepted provided the motor does not run continuously under 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).

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

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

Cooling

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

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.

WARNING!
Always lift the pump by its carrying handle or 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”.

Technical data

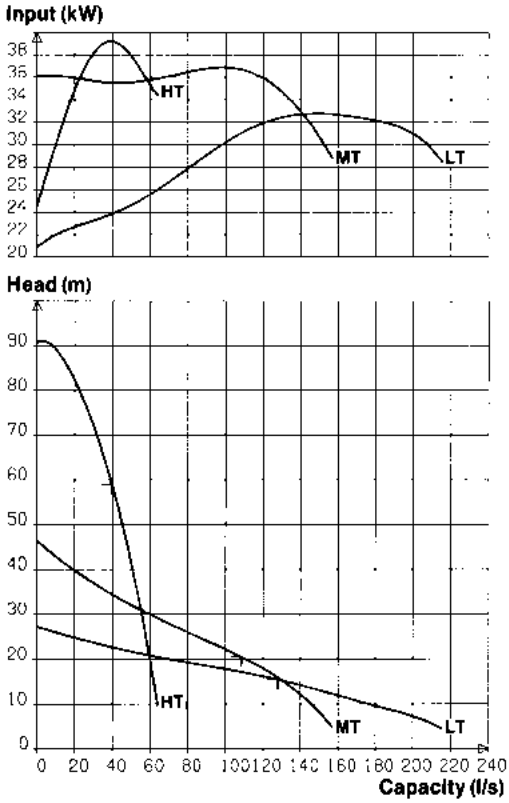
The pump curves show:

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

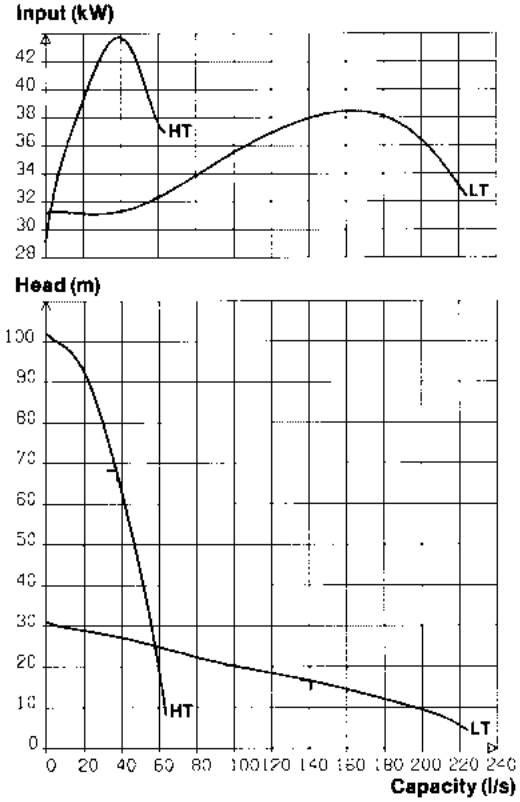
The following abbreviations are used:

LT = low-head version
MT = medium-head version
HT = high-head version

50 Hz LT, MT, HT



60 Hz LT, HT



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 operation points on the pump curve the noise level 70 dB, or for the actual pump specifiec noise level, can be exceeded.

Pump installation

Run the cables so that they do not have any sharp bends and are no 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 eyebolts 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 frequency agree with the specifications on the pump 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 shall be provided with a control equipment that provides such operation.

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

Install the motor cable and the control cable as illustrated in the figures, page 25 and 26.

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.

WARNING!
For safety reasons, the earth lead should be approx. 100 mm (4″) 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 cable.

Check on the data plate which connection, Y or Δ, is valid for the voltage supply. Then depending on voltage arrange the connection on the terminal board in accordance with the figures.

Connect the motor cable to the terminal board as illustrated in the figure. Mount the closing links in accordande with the figure.

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

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

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. 6A at a power factor 0.6. Flygt recommends the thermal protectors to be connected to 24V over separate fuse to protect the other automatic equipment.

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

Install the cover (107) alt. (94).

Tighten the nuts (12) so that the cable entry unit bottoms out.

Connect the motor cable and the control 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.

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. See table.

The overload protection (motor protection breaker) shall always be set to the motor’s rated current as given on the data plate.

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

Electrical connections

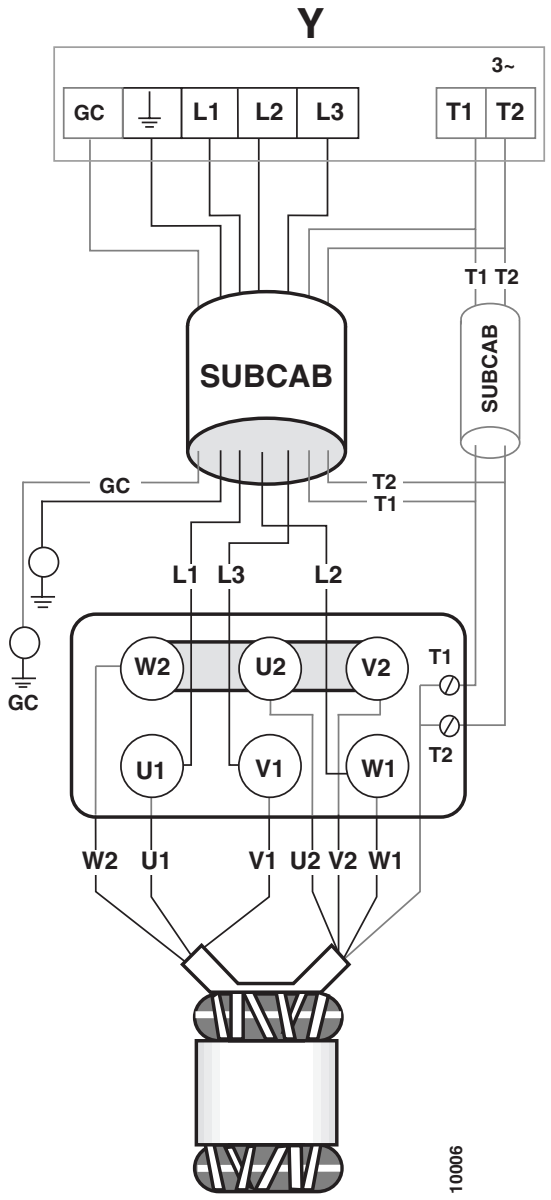
SUBCAB 4G/SUBCAB AWG*:

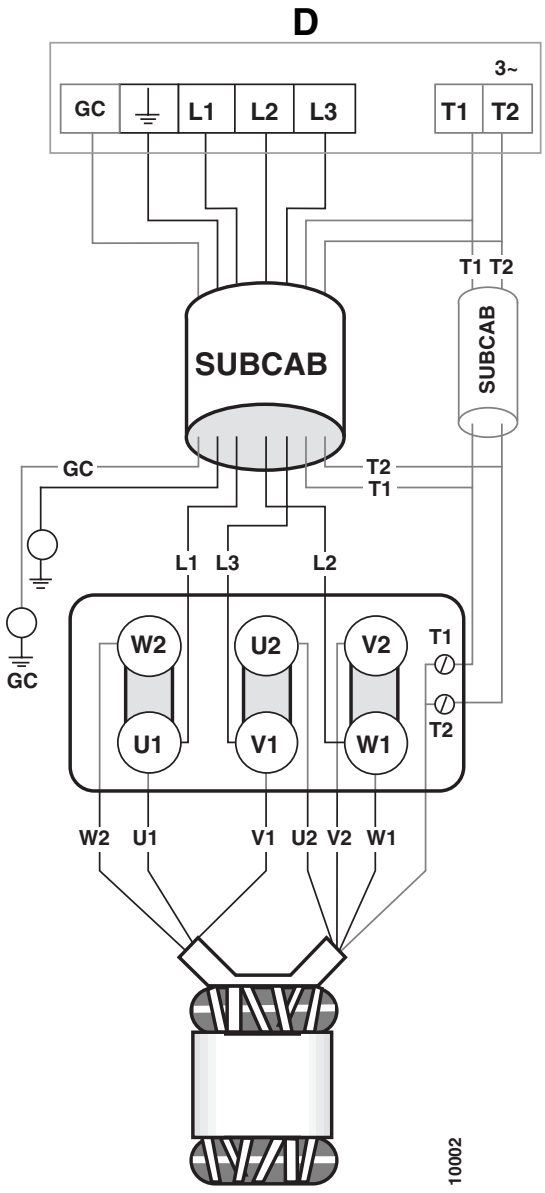
Mains	Lead	Pump terminal board
L1	Brown (Red*)	U1
L2	Blue (White*)	W1
L3	Black (Black*)	V1
Earth	Yellow/green	
Groundcheck	Yellow*	GC
T1	Black/orange*	T1
T2	Black/blue*	T2

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

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

Stator lead	Connection on terminal board
U1, red	U1
V1, brown	V1
W1, yellow	W1
V2, blue	V2
W2, black	W2
Us, green	U2





Electrical connections

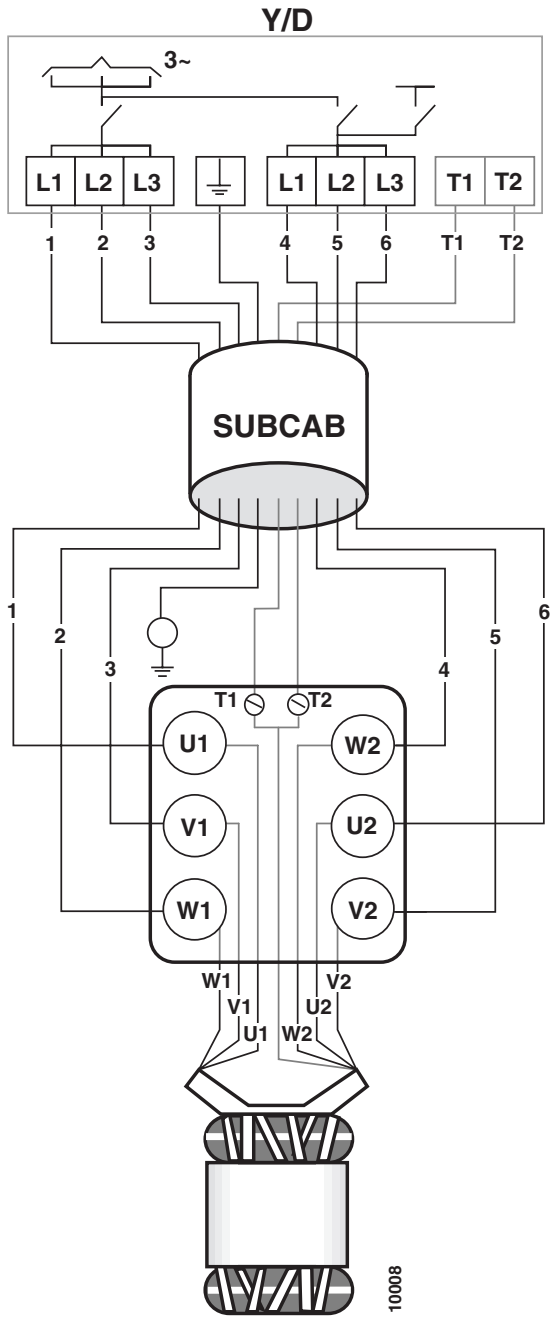
SUBCAB 7G

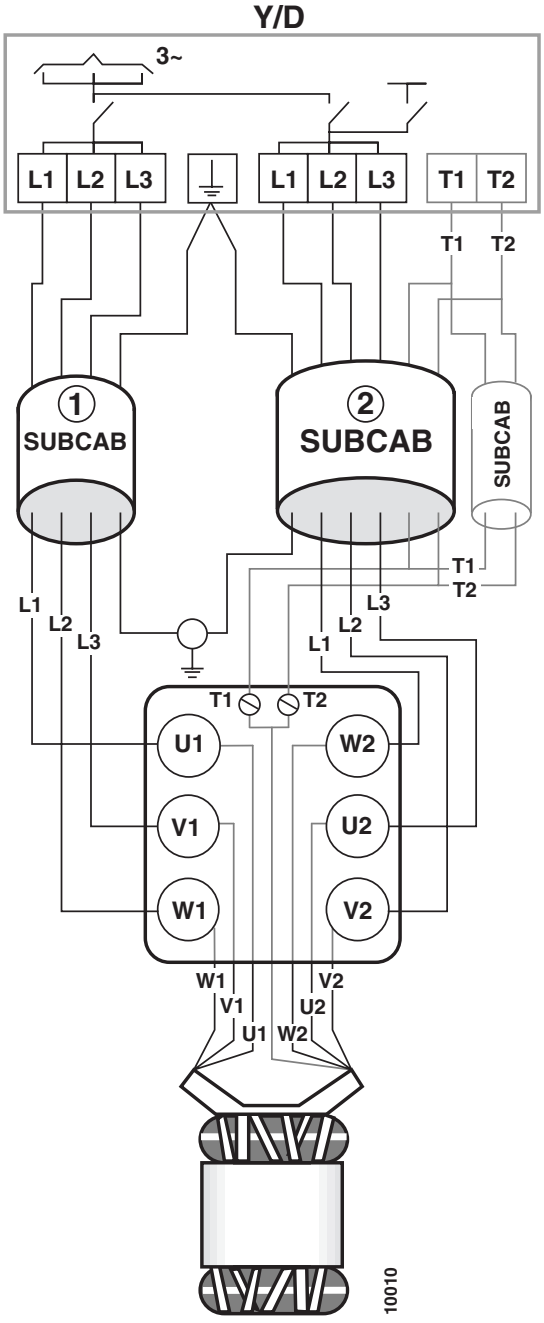
Mains	Lead	Pump terminal board
L1	Black 1	U1
L2	Black 2	W1
L3	Black 3	V1
L1	Black 4	W2
L2	Black 5	V2
L3	Black 6	U2
Earth	Yellow/green	⏚
T1	Black T1	T1
T2	Black T2	T2

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

The stator leads are colour-marked as follows:

U1 (S1) - red
V1 (S2) - brown
W1 (S3) - yellow
U2 (S6) - green
V2 (S4) - blue
W2 (S5) - black





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.

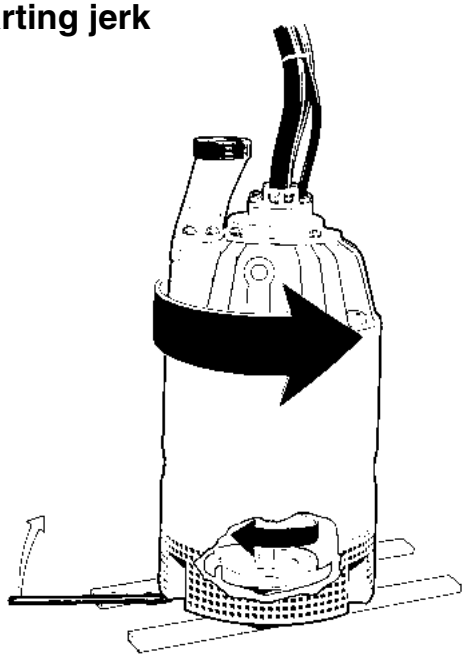
Check that the monitoring equipment (if any) works.

Check the direction of rotation. See the figure. When started, the pump will jerk in the opposite direction to the direction in which the impeller rotates.

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

The above measures are described under ”Inspection”.

Starting jerk



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 (13.1 ft/s)
2. Water + gravel		3.5 m/s (11.5 ft/s)
3. Water + sand		
Sand particles	< 0.1 mm (0.004 in)	1.5 m/s (4.9 ft/s)
Sand particles	< 0.6 mm (0.024 in)	2.5 m/s (8.2 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 and sealings preventing the pump from working.

CARE AND MAINTENANCE

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

Safety precautions

WARNING!
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.

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, chains and wire ropes.
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 hole up. The hole is marked ”OIL FILLING”. Add oil as needed. See ”Changing the oil”.
Condition of the oil	A check of the condition of the oil can show whether there has been any leakage. Maximun 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 (36) is not sufficiently tight. — that an O-ring (20) or its sealing surface is damaged. — that an O-ring (30) or its sealing surface is damaged. — that the lower seal (62) 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 plug (23), from the hole marked ”INSP”, the seal ring (24), the inspection screw (36) and the O-ring (20). 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 (36) is not sufficiently tight. — that the O-ring (20) or its sealing surface is damaged. — that an O-ring (30) is damaged. — that the cable entry is leaking. If there is oil in the stator casing, the cause may be: — that the inner seal (70) is damaged. Contact a Flygt service shop. — that an O-ring (28) is damaged.
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 (53) closes around a new position on the cable. As illustrated in the figure. — replace the seal sleeve (53). — check that the seal sleeve (53) and the washers (52) conform to the outside diameter of the cables.

Inspection of	Action
Cables	Replace the cable if the outer jacket is damaged. Make sure that the cable does not have any sharp bends and is 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.
Starter equipment	If faulty, contact an electrician.
Rotation direction of pump (requires voltage)	Transpose two phase leads if the impeller is rotating 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 M.

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 (23), and washer (24) from the oil hole. Marked ”OIL DRAINING”.

Unscrew the oil casing screw (36) and remove O-ring (20).

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

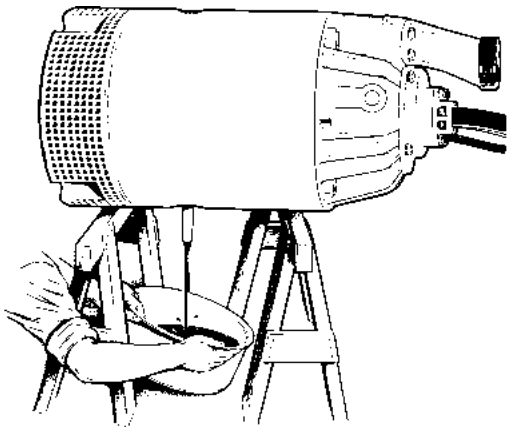
Turn the pump so that the oil drainage tube points downwards.

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

Fill up with 5 litres (5.3 US quarts) of new oil. The hole is marked ”OIL FILLING”. Always replace the gaskets under the oil casing screws. Place the screws back in. Tightening torque: 10—20 Nm (8—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.



Replacing the impeller

Removing the impeller

WARNING!
Worn impellers often have very sharp edges.

Lay the pump on its side.

Remove nuts (12) and pull off the strainer (96).

Remove nuts (12) alt. (13).

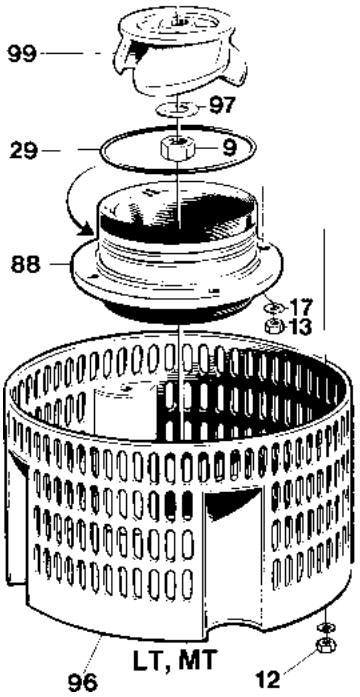
Remove washers (16) alt. (17), lower diffuser (88) and O-ring (29).

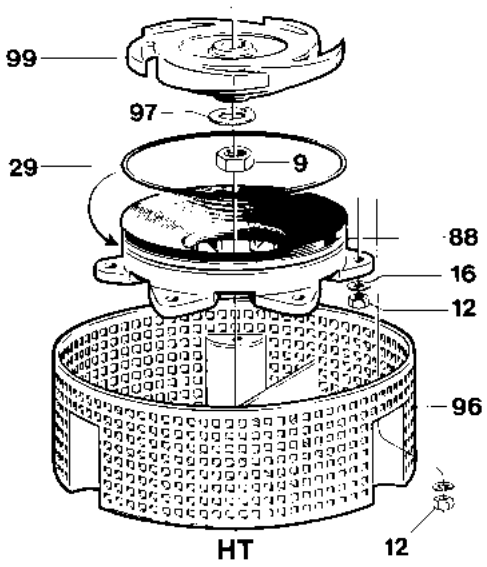
Remove impeller nut (9).

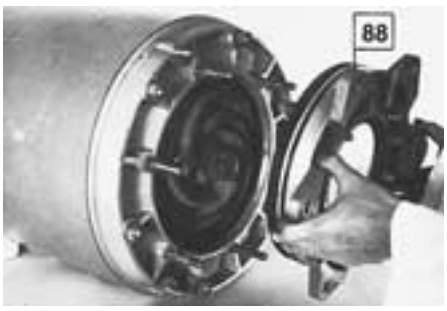
Remove washers (97).

Puff off the impeller.

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







Use impeller-puller 84 13 60

Installing the impeller

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

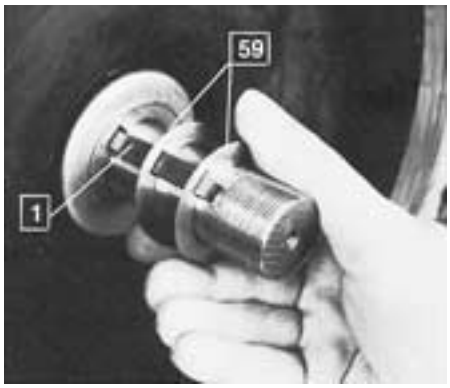
Clean and oil all sealing surfaces and O-rings.

Check:

— that an appropriate number of adjusting washers (59) are on the shaft.

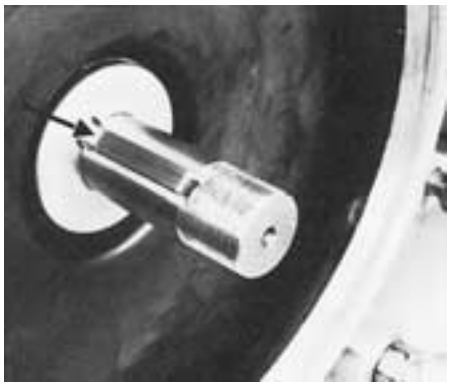
— that the key (1) is seated in the shaft keyway on the shaft.

Grease end of shaft and impeller hub.



Check that the outer seal's driving pin is aligned with the key (1).

Push the impeller carefully without turning the shaft in relation to the driving ring so that the pin fits into the impeller keyway.

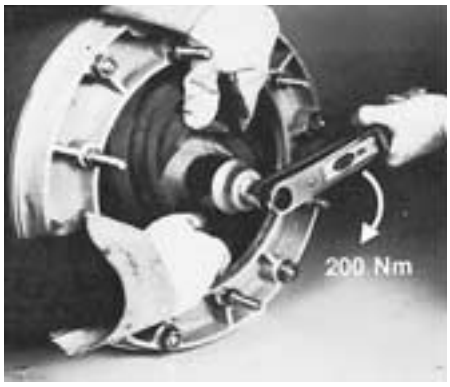


Fit washer (97) and nut (9).

Tighten the impeller nut.

Tightening torque 200 Nm (150 ft lb).

Secure with washer (97).



Adjusting the impeller

The clearance between the impeller and the oil casing bottom should be minimal when the impeller is tightened. The clearance can be adjusted with the adjusting washers (59).

Check that the impeller can easily be rotated by hand.

Screw the adjusting nuts (13) down toward the bottom of the studs (38)

Fit the O-ring (29).

Press the lower diffuser (88) against the impeller.

Screw the adjusting nuts (13) alt. (12) so that they lie flush against the lower diffuser.

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

Place washers (17) alt. (16) and nuts (13) alt. (12) on the studs.

Tighten the nuts (13) alt. (12) evenly all around .

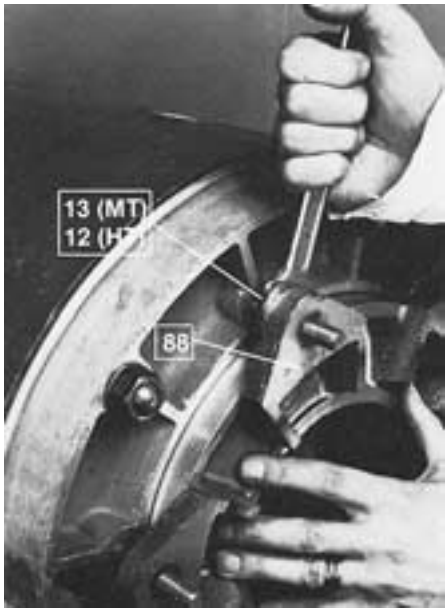
The clearance between the impeller and the lower diffuser shall be as little as possible.

Check that the impeller can easily be rotated by hand.

Install: Strainer (96).

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

Removing the diffuser

Eventually remove the impeller, see ”Removing the impeller”.

Unscrew the nuts (13).

Remove washers (17).

Remove diffuser (84).

Installing the diffuser

Screw the diffuser in place with the nuts (13).

Do not forget to put back washers (17). For further instructions, see ”Installing the impeller”.

More extensive repairs and modifications are described in the Flygt Workshop Manual.

ACCESSORIES AND TOOLS

Tandem operation

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

Max. permissible operating pressure is 1.2 MPa (170 psi).

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
337 06 00	R 4 = BSP.Pl.4
337 06 01	4–8 NPSM
337 06 02	6"
337 06 06	R 6 = BSP.Pl.6
337 06 07	NPT 6"
337 06 03	8"
337 06 04	R 8 = BSP.Pl.8
337 06 05	NPT 8"

Zinc anode set

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

Order No. 290 15 00.

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 12 69	Socket wrench n = 24 mm length = 160 mm
80 38 02	Parallel pin
84 12 75	Socket wrench n = 30 mm
84 13 87	Socket M8, n = 13
84 13 92	Socket M12, n = 19
84 13 96	Socket M16, n = 24
84 15 55	Extension bar length = 125 mm
84 15 61	Swivel handle length = 310 mm
84 11 43	Combination wrench n = 24 mm
84 11 41	Combination wrench n = 19 mm
84 16 73	Screwdriver width = 10 mm
84 13 60	Impeller puller
84 15 64	Torque wrench max. 225 Nm (165 ft.lb.)
336 94 00	Oil drainage tube

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.

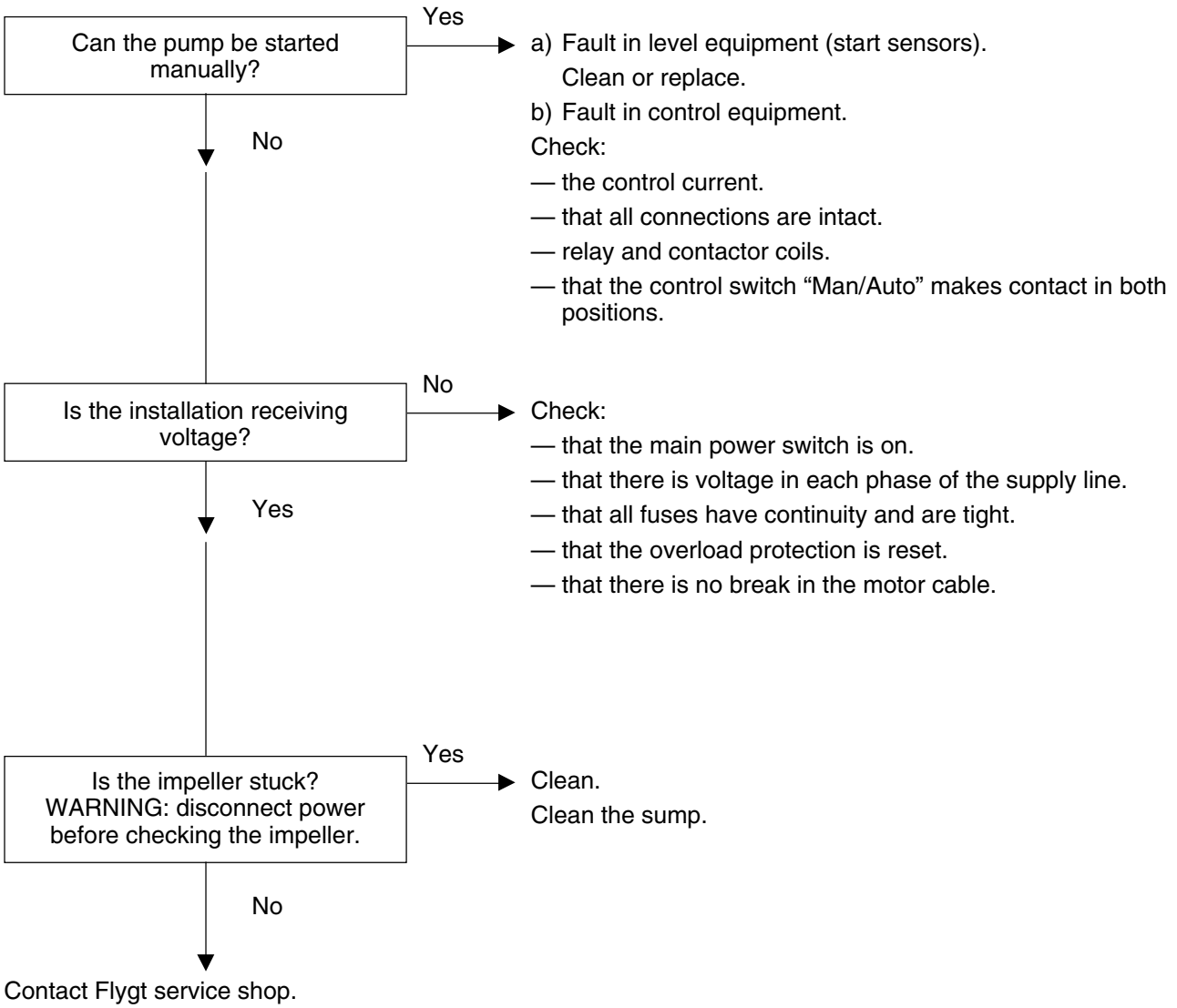
Always make sure that there is no one near the pump when the power supply is turned on.

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



WARNING!
Disconnect power before checking the impeller.

2. Pump starts but motor protection trips

Is the motor protection set too low? (Check with data plate)
- Yes → Adjust.
- No ↓

Is the impeller difficult to rotate by hand? WARNING: disconnect power before checking the impeller
- No → Clean the impeller.
  Clean out the sump.
  Check that the impeller is not adjusted too tight.
  If anything else is wrong, contact Flygt service shop.
- Yes ↓

Is the installation receiving full voltage on all three phases?
- No → Notify an electrician.
- Yes ↓

Are the phase currents uneven or too high?
- Yes → Contact Flygt service shop.
- No ↓

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 ↓

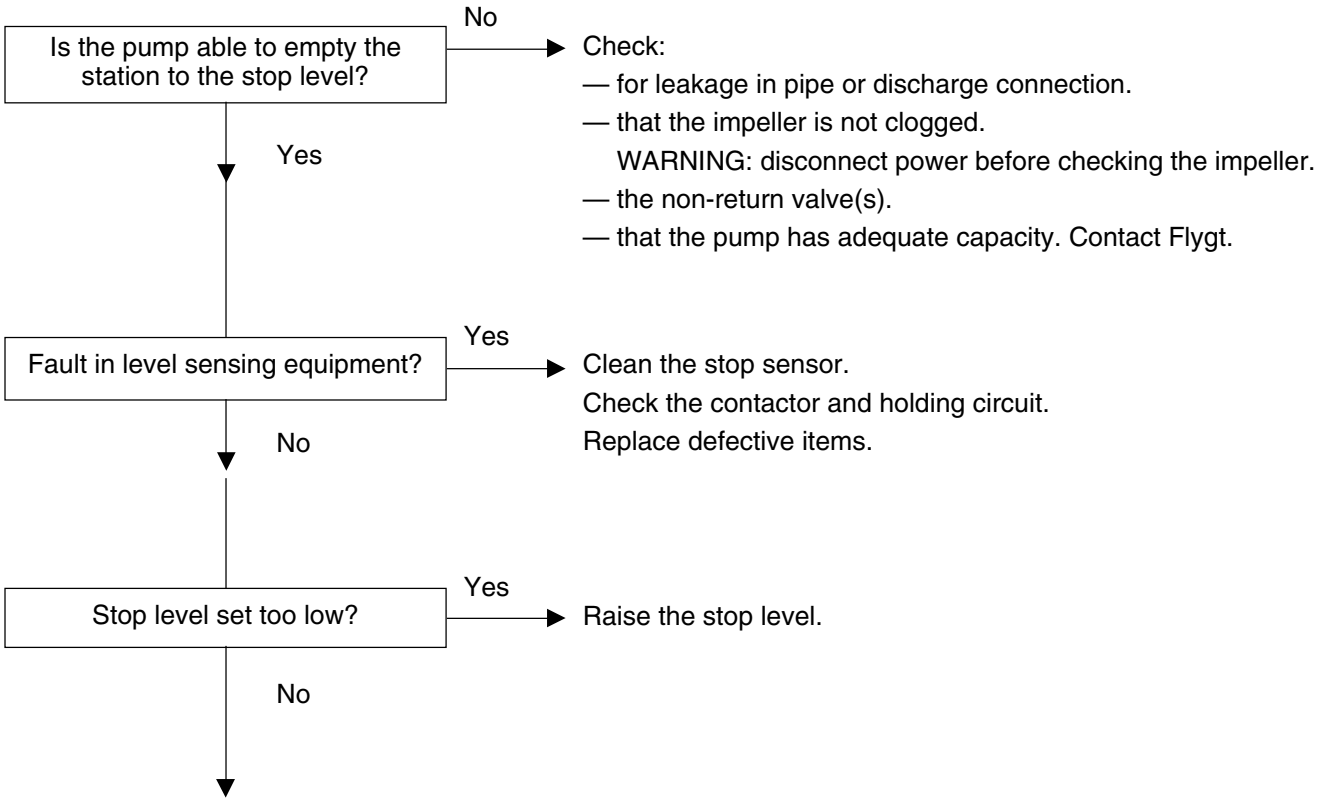
Is the density of the pumped liquid too high? (Max density 1100 kg/m^3, i.e. 70 lb/ft^3)
- Yes → Dilute the liquid.
  Change to a more suitable pump.
  Contact Flygt.
- No ↓

Fault in bimetals in motor protection?
- Yes → Replace defective bimetals.
- No ↓

Contact Flygt service shop.

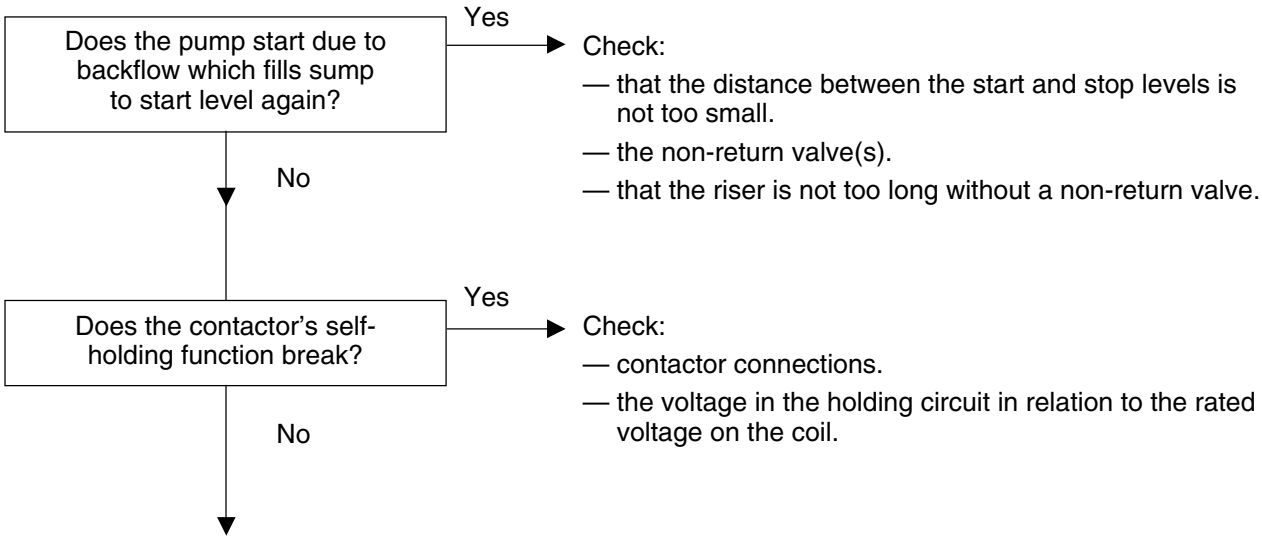
WARNING!
Disconnect power before checking the impeller.

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.

WARNING!
Disconnect power before checking the impeller.

5. Pump runs but delivers too little or no water

Check:

— direction of rotation of 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 impeller, 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.

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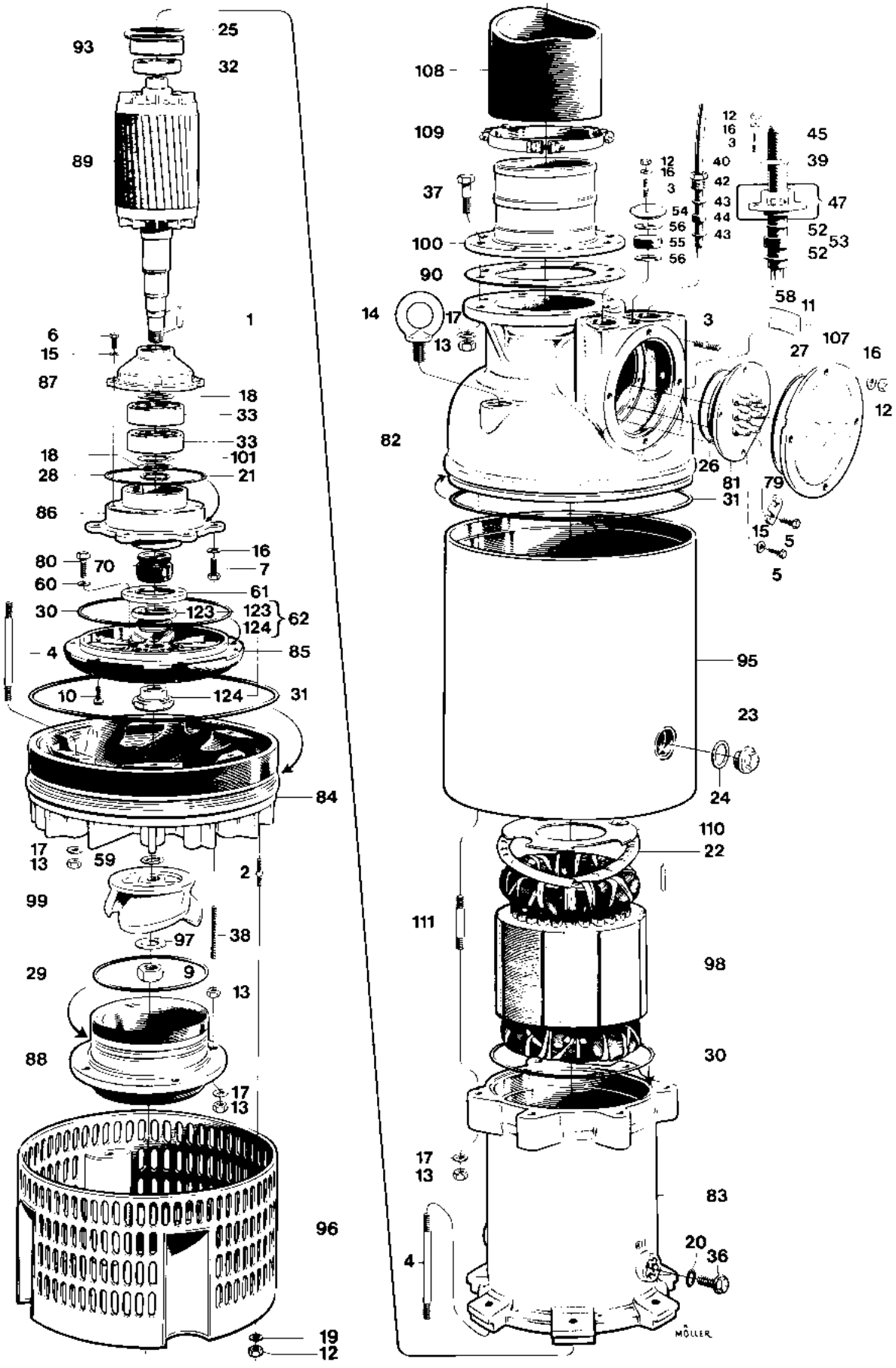
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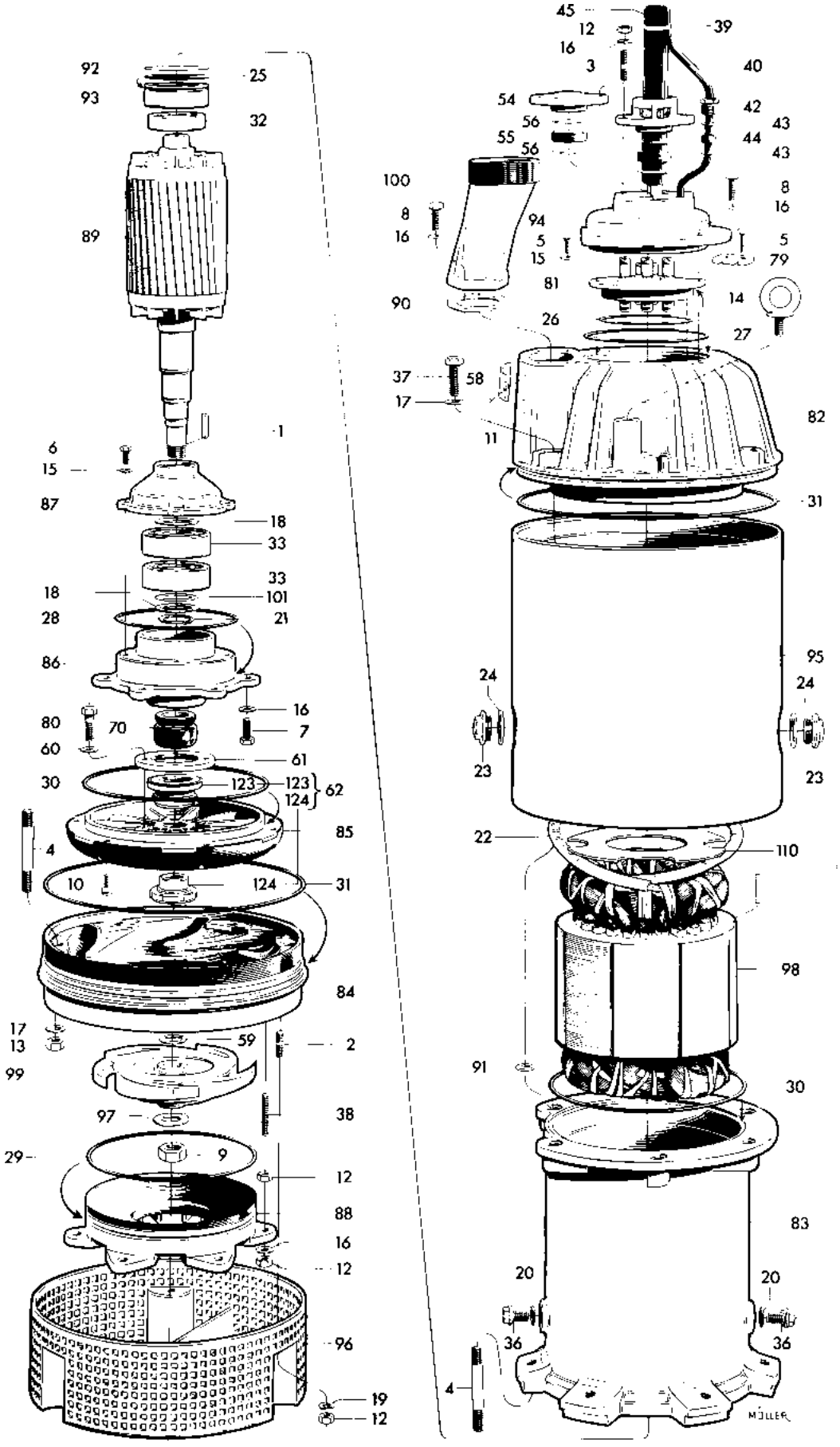
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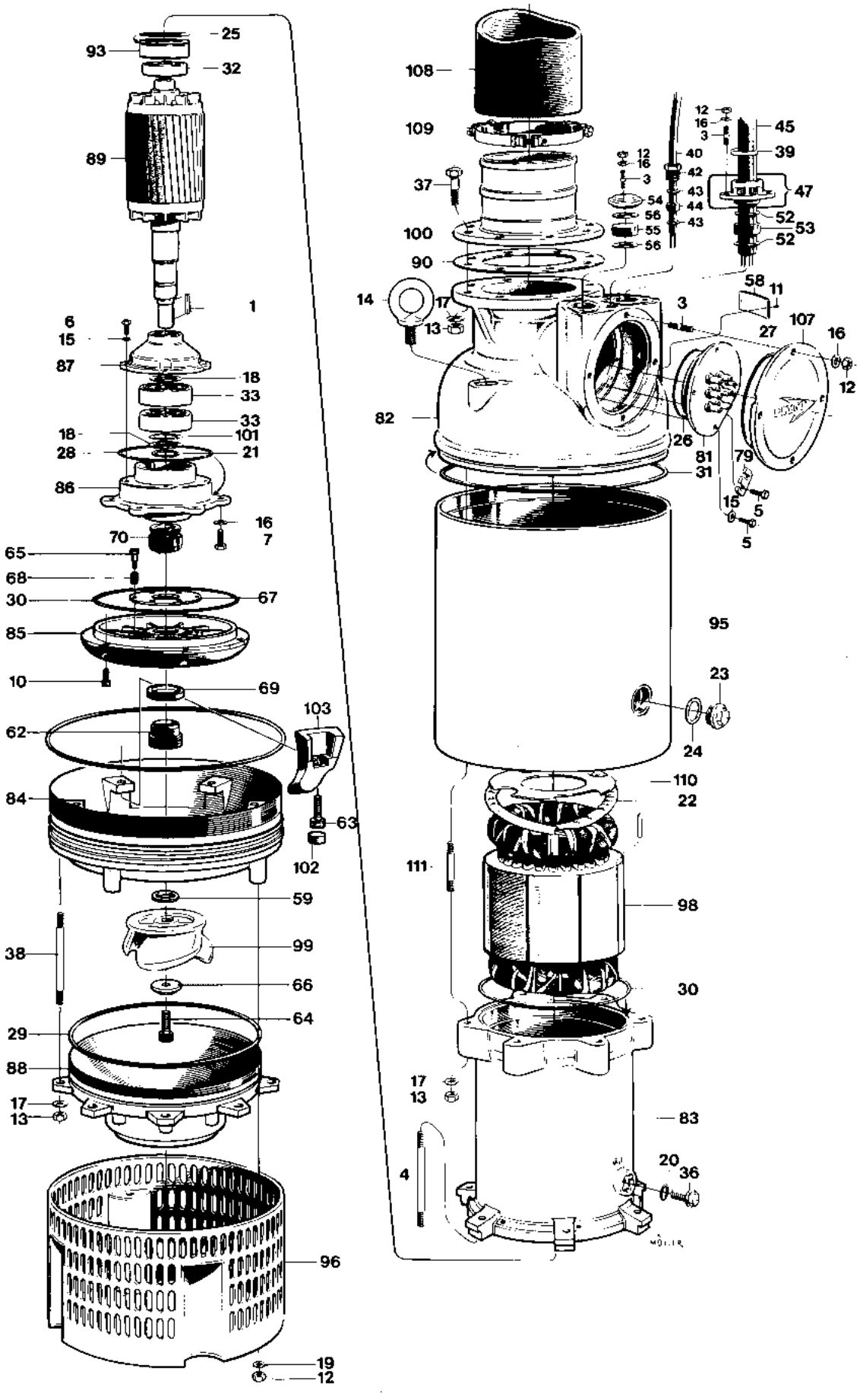
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