



Installation, care and maintenance

2075.050, 2075.490



Flygt



ITT Industries

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 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.

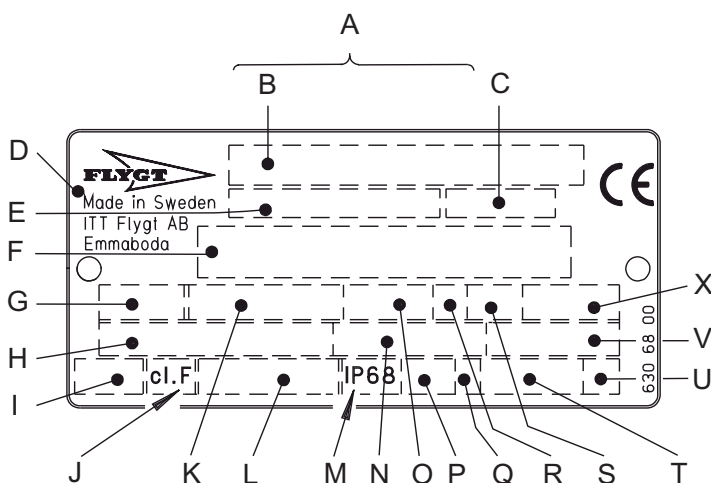
Official approval applies only providing:

- that the product is used 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.

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

CAUTION STATEMENT FOR MSHA

Federal Safety Regulations, as outlined in the applicable provisions of Title 30 of the Code of Federal Regulations, require that in order to maintain “permissibility” of this equipment the following conditions must be satisfied:

1. General Safety

Frequent inspections shall be made. All electrical parts, portable cable and wiring shall be kept in a safe condition. There shall be no openings into the casings of the electrical parts. The machine frame shall be effectively grounded. The power wires shall not be used for grounding. The operating voltage shall match the voltage rating of the motor.

2. Service and Repair

Inspections, service and repairs shall only be made when the portable cable is disconnected from the power supply. Work must be performed by trained personnel (preferably the manufacturer or his agent) to insure that the permissible pump is restored to its original state of safety in regard to all flamearresting paths. Use replacement parts exactly as those furnished by the manufacturer. When cable entries are disturbed on pump or permissible control, they shall be reassembled in the approved manner and with parts identical to the parts of the original certification.

3. Fastenings

All bolts, nuts, screws and threaded covers shall be properly tightened and secured.

4. Cables

A flame-resistant portable cable, bearing a MSHA assigned identification number, adequately protected by an automatic circuit-interrupting device shall be used. Special care shall be taken in handling the cable to guard against mechanical injury and wear.



WARNING!

Failure to restore the permissible equipment to its original state of safety will void the MSHA APPROVAL. The creation of a safety hazard will subject the owner/operator of a mine to citations and penalties under the law.

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PRODUCT DESCRIPTION

Applications

2075 is intended to be used for pumping of water which may contain abrasive particles.

The pump is designed for use in explosive environments in accordance with the following approval:

MSHA Mine Safety and Health Administration, USA

The pump is available in the following versions:

MT = Medium head version

HT = High head version

Liquid temperature: max. 40°C (105°F).

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 (66 ft).

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



WARNING!

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

Design

2075 is a submersible, electric motor-driven pump.

Impellers

The pump is available with the following types of impellers:

three- or sixvane impellers of spring steel or stainless steel.

Shaft seals

The pump has two mechanical seals.

Materials:

Inner seal: tungsten carbide—carbon.

Outer seal: tungsten carbide—tungsten carbide.

Shaft

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

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

Shaft material: stainless steel.

Bearings

The pump bearings are designed for at least 10 000 hours of operation.

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

The upper bearing consists of a single-row 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.

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.

Monitoring equipment

The stator incorporates two thermal switches connected in series.

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



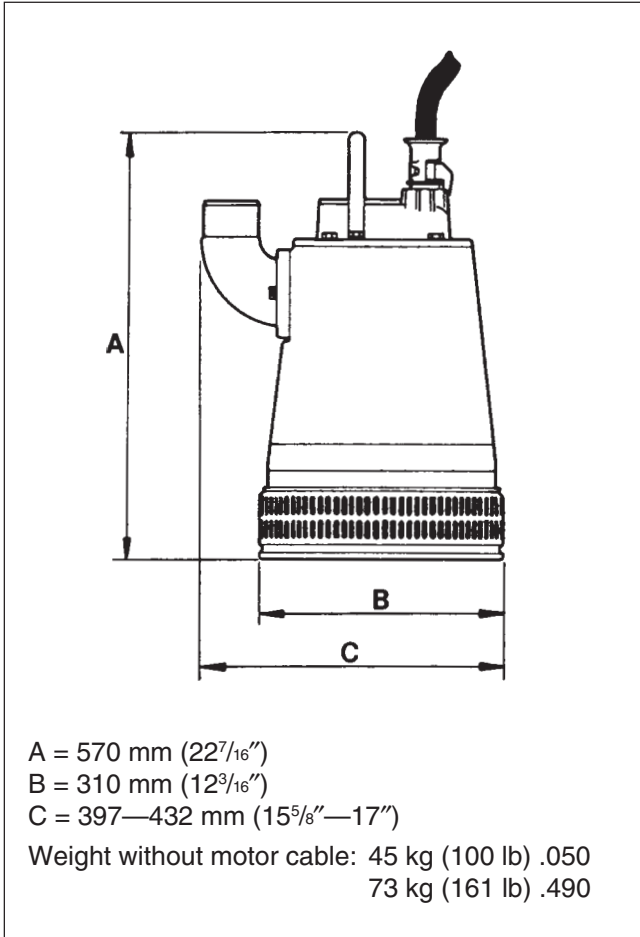
NOTE!

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.

Dimensions and weights



Technical data

The pump curves show:

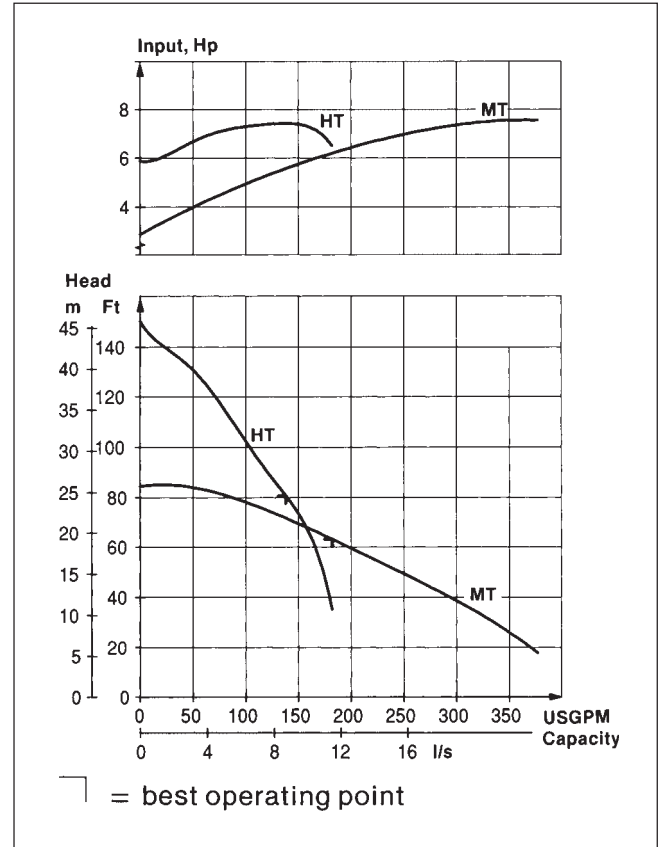
- input power at various operating points.
- flow rate versus total head.

The following abbreviations are used:

MT = medium-head version

HT = high-head version

For further information, see "Parts list".



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 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”.

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.
4. Do not ignore the risk of drowning.
5. A first-aid kit must be handy.



At certain installations and operation 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 handle 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

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

Local codes and regulations shall be complied with.



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.



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

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.

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 exploded 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 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.



NOTE!
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 Y or Δ .

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.

Make sure that the pump is correctly earthed (grounded) Install the cover (33).

Tighten the cable entry unit so that it 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.

The tables 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.

The overload protection (motor protection breaker) shall for direct-on-line start be set to the motor's rated current as given on the data plate.



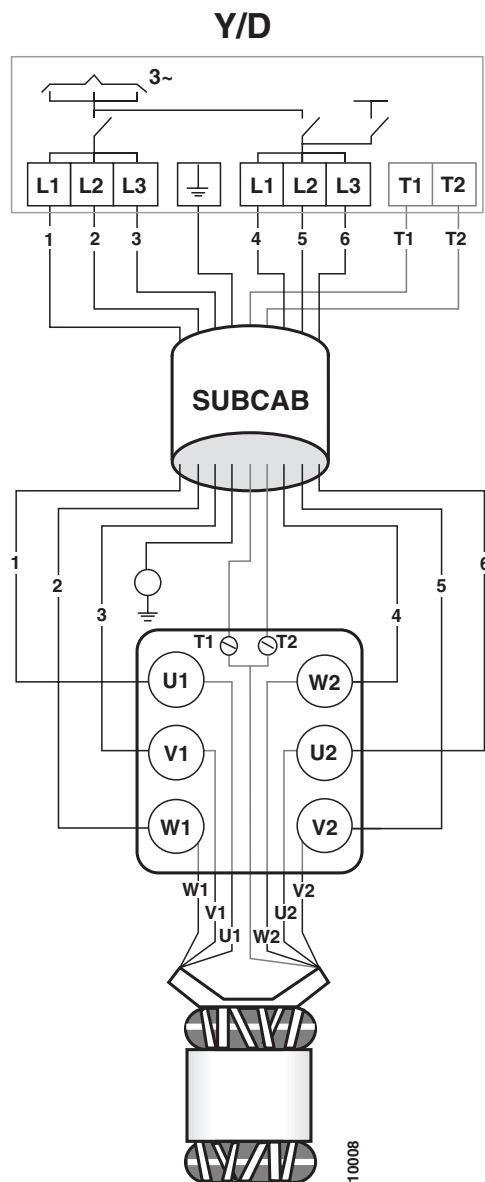
NOTE!
Make sure that the monitoring equipment incorporated in the product is correctly connected.

50/60 Hz, 3~ with terminal board

SUBCAB/SUBCAB AWG*:

Mains	Lead	Pump terminal board	The stator leads are colour-marked as follows:
L1	Black	U1	U1, red
L2	Black	W1	V1, brown
L3	Black	V1	W1, yellow
L1	Black	W2	V2, blue
L2	Black	V2	W2, black
L3	Black	U2	U2, green
Earth (PE)	Yellow/Green	PE	
T1	Black	T1	
T2	Black	T2	

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



50/60 Hz, 3~ with terminal board

SUBCAB/SUBCAB AWG*:

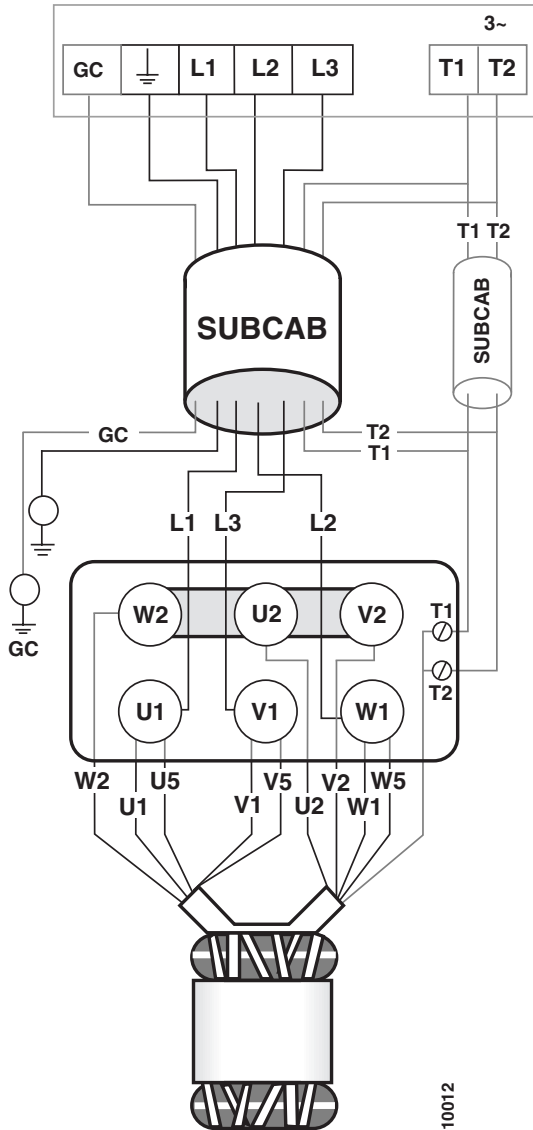
Mains	Lead	Pump terminal board
L1	Brown (Red*)	U1
L2	Blue (White*)	W1
L3	Black (Black*)	V1
Earth (PE)	Yellow/Green	PE
Groundcheck	Yellow*	GC
T1	Black (Orange*)	T1
T2	Black (Blue*)	T2

The stator leads are colour-marked as follows:

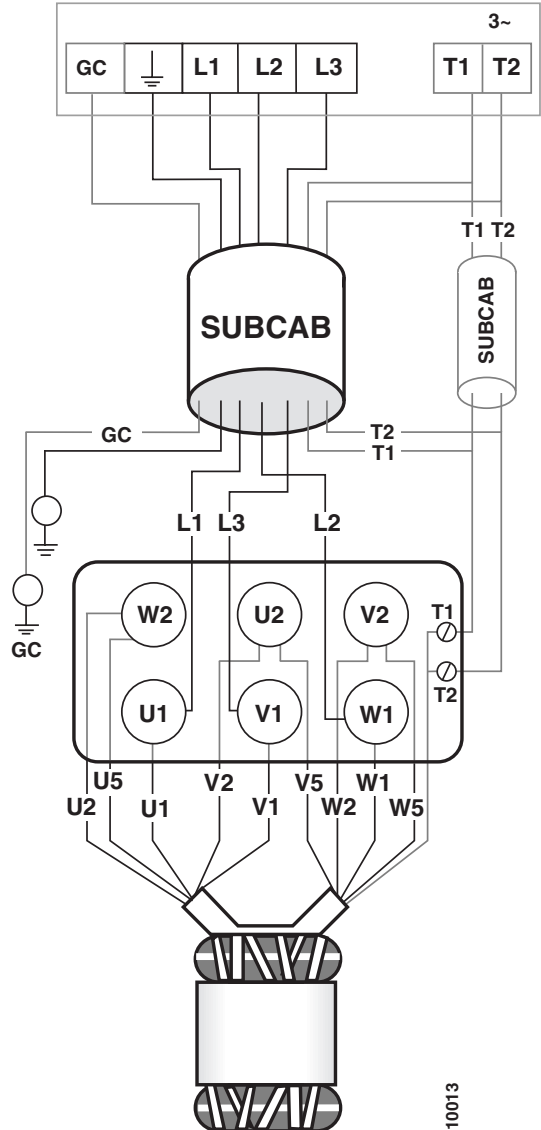
- U1, red
- V1, brown
- W1, yellow
- U2, green
- V2, blue
- W2, black
- U5, red
- V5, brown
- W5, yellow

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

**500V Y//
230V Y//**



**1000V Yser.
460V Yser.**

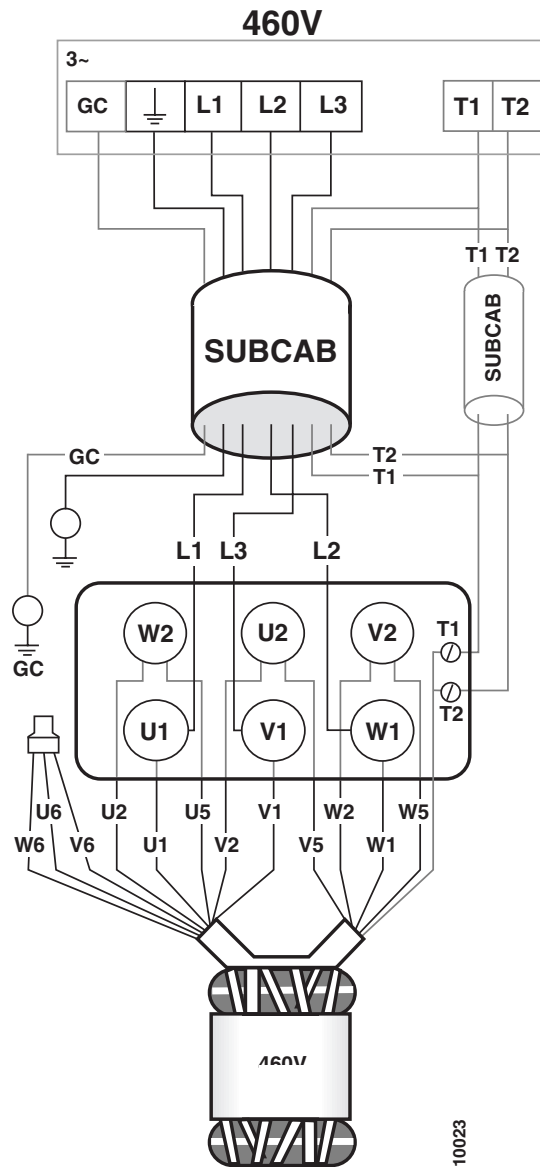


50/60 Hz, 3~ with terminal board

SUBCAB/SUBCAB AWG*:

Mains	Lead	Pump terminal board	The stator leads are colour-marked as follows:
L1	Brown (Red*)	U1	U1, red
L2	Blue (White*)	W1	V1, brown
L3	Black (Black*)	V1	W1, yellow
Earth (PE)	Yellow/Green	PE	U2, green
Groundcheck	Yellow*	GC	V2, blue
T1	Black (Orange*)	T1	W2, black
T2	Black (Blue*)	T2	U5, red
			V5, brown
			W5, yellow
			U6, green
			V6, blue
			W6, black

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



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OPERATION

Before starting

Check the oil level in the oil casing.

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.

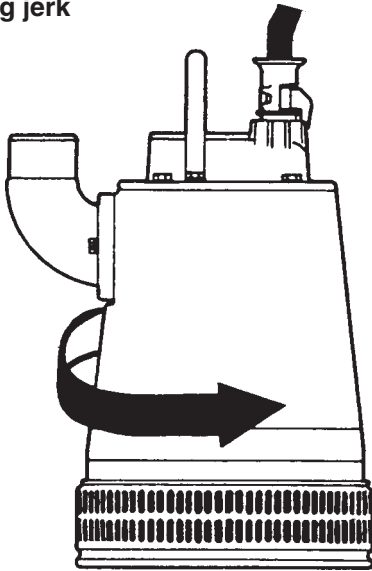
When started, the pump will jerk in the opposite direction to the direction in which the impeller rotates.



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 (13.2 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 (5.0 ft/s)
Sand particles <0.6 mm (0.024 in)	2.5 m/s (8.2 ft/s)

Choose dimensions of the discharge line to give the pumped liquid at least this velocity.

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 seal 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.

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 power supply must be locked off and tagged with the supervisor's name.

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

- make sure that the pump has been thoroughly cleaned.
- follow local safety regulations.



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

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

Inspection

Regular inspection and preventive maintenance ensure more reliable operation.

The pump should be inspected at least twice a year, more frequently under severe operating conditions.

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

Service contract

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

Recommended inspections:

Inspection of	Action
Visible parts on pump and installation	<p>Replace or fix worn and damaged parts. Make sure that all screws, bolts and nuts are tight. Check the condition of carrying handle, chains and wire ropes.</p>
Pump casing and impeller	<p>Replace worn parts if they impair function.</p> <p>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”.</p>
Oil quantity	<p>Oil casing</p> <div style="border: 1px solid black; padding: 5px;">  <p>WARNING. If the seal leaks, the oil casing may be under pressure. Hold a rag over the oil plug in order to prevent splatter. See “Safety precautions” for additional information.</p> </div>
Condition of the oil	<p>Check that the oil reaches up to the oil hole.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>If the oil contains too much water again, the fault may be:</p> <ul style="list-style-type: none"> — that an oil screw (1) is not sufficiently tight. — that the washer (48) of an oil screw or its sealing surface is damaged. — that the O-ring (55, 56) or its sealing surface is damaged. — that the lower seal (3) is damaged. Contact a Flygt service shop.
Cooling system	<p>Rinse and clean if the flow through the system has been partly restricted.</p>

Inspection of	Action
Cable entry	<p>Make sure that the cable clamps are tight.</p> <p>If the cable entry leaks:</p> <ul style="list-style-type: none"> — check that the entry is firmly tightened into its bottom-most position. — cut a piece of the cable off so that the seal sleeve (65) closes around a new position on the cable. — replace the seal sleeve (65). — check that the seal sleeve (65) and the washers (66) conform to the outside diameter of the cables.
Cables	<p>Replace the cable if the outer jacket is damaged. Make sure that the cables do not have any sharp bends and are not pinched.</p>
Level sensors or other level equipment	<p>Check function. Clean, adjust, replace or repair damaged level sensing equipment. Follow the instructions for the level sensing equipment in question.</p> <p>Note! The level sensor contains a mercury switch. Damaged sensors should therefore be disposed of in a proper manner.</p>
Starter equipment	<p>If faulty, contact an electrician.</p>
Rotation direction of pump (requires voltage)	<p>Transpose two phase leads if the impeller does not rotate clockwise as viewed from above. 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.</p>
Pipes, valves and other peripheral equipment	<p>Repair faults and notify supervisor of any faults or defects.</p>
Insulation resistance in the stator	<p>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.</p>

Changing the oil

Oil casing



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 screw (48) and washer (48) from one of the oil holes.

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 up with 0.6 litres (0.65 US quarts) of new oil.

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.

Always replace the O-rings of the oil hole screws. Put the screws back and tighten them. Tightening torque 20—30 Nm (15—22 ft lb).



Removing the impeller



WARNING!
Worn impellers often have very sharp edges.

Lay the pump on its side. Unscrew the nuts (43) under the strainer (25).

Pull off the strainer (25) and remove the four springs (24).



Unscrew the nuts (43) on the lower diffuser (19).
Remove the spring washers (46) under the nuts. Pry
off and remove the lower diffuser (19)



Unscrew the nuts (43) on the diffuser ring (18).
Remove the washers (23).



Pry off and remove the diffuser ring.



Knock back the folded washer (49) and remove the
impeller nut (7). Use a selfgrip wrench to lock the
impeller.



Use impeller puller (203 16 40) or pry of carefully with two strong screwdrivers or bars.



The upper diffuser (21) can now be removed.



Installing the impeller

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

Check:

- that the key (36) is seated in the keyway on the shaft.
- that an appropriate number of adjusting washers (10) are on the shaft.

Grease end of shaft and impeller hub.

Press the impeller onto the shaft with the impeller nut.

Make sure that the upper diffuser is centered and on its right place on the oil house bottom.

Tighten the impeller nut.

Check that the impeller can be rotated by hand.



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 (10).

Install the diffuser ring (18).

Check that the impeller can easily be rotated by hand.

Screw the adjusting nuts (43) down toward the bottom of the studs (14).

Press the lower diffuser (19) against the impeller.

Screw the adjusting nuts (43) so that they lie flush against the lower diffuser.

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

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.

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

Install the strainer.

More extensive repairs require special tools and should be carried out by an authorized service technician. More extensive repairs and modifications are described in the Flygt Workshop Manual.



ACCESSORIES AND TOOLS

Zinc anode set

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

Order No. 290 12 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

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

Order No.	Description
203 16 40	Impeller puller
398 22 00	Shaft-seal tool
398 23 00	Shaft-seal tool
398 51 00	Shaft-seal tool
84 13 60	Puller

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.

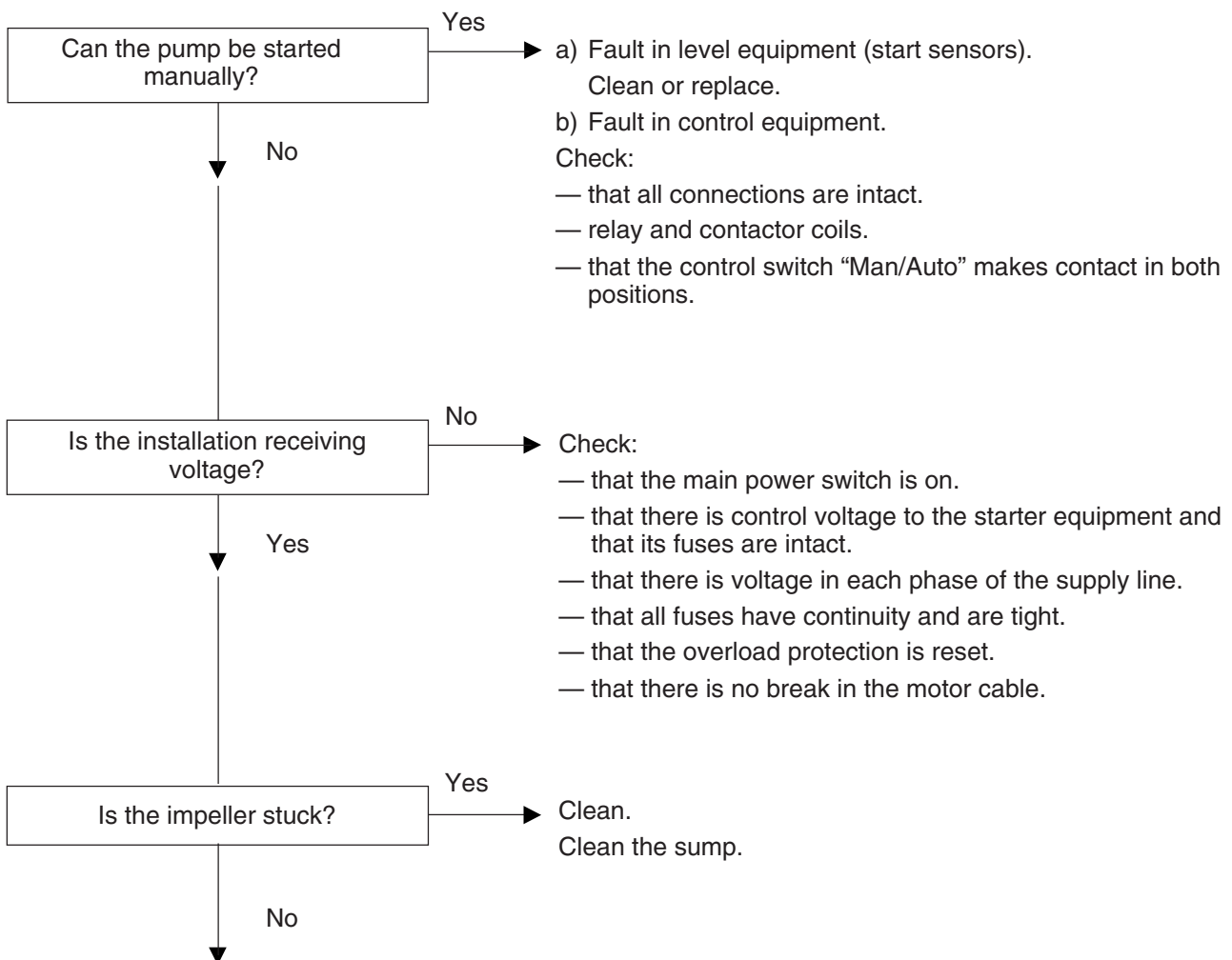
Use the following checklist as an aid to fault tracing. It is assumed that the pump and installation have formerly functioned satisfactorily.



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

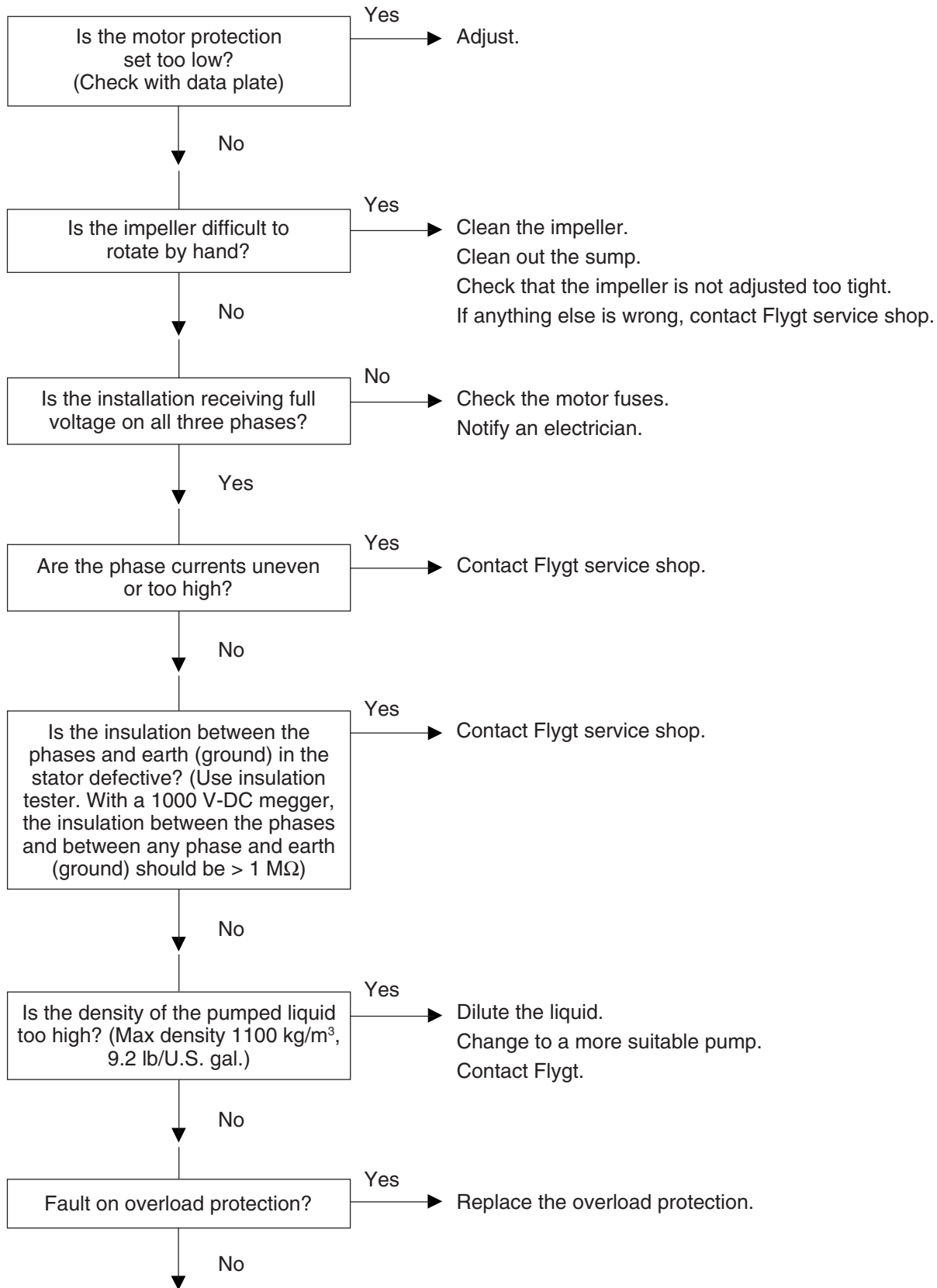


Contact Flygt service shop.

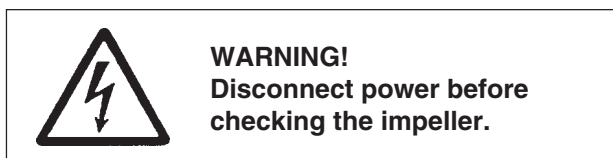


WARNING!
Disconnect power before checking the impeller.

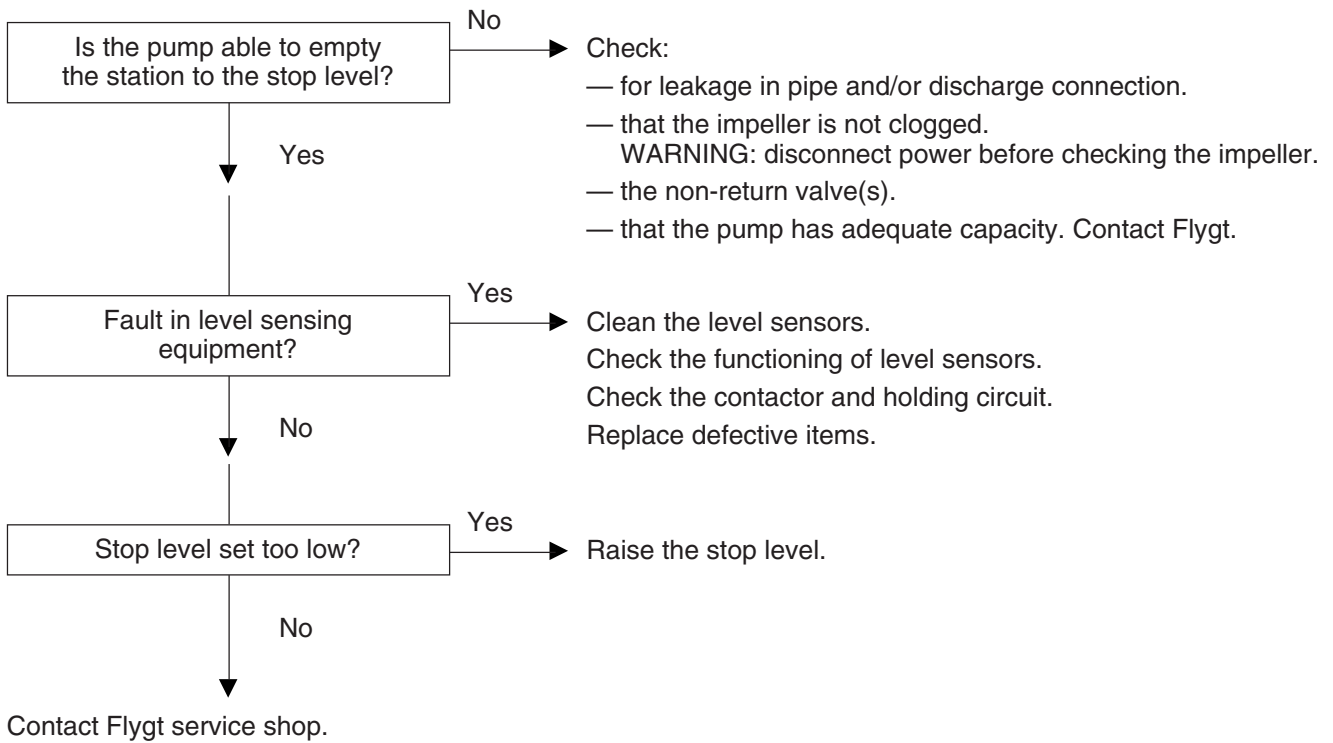
2. Pump starts but motor protection trips



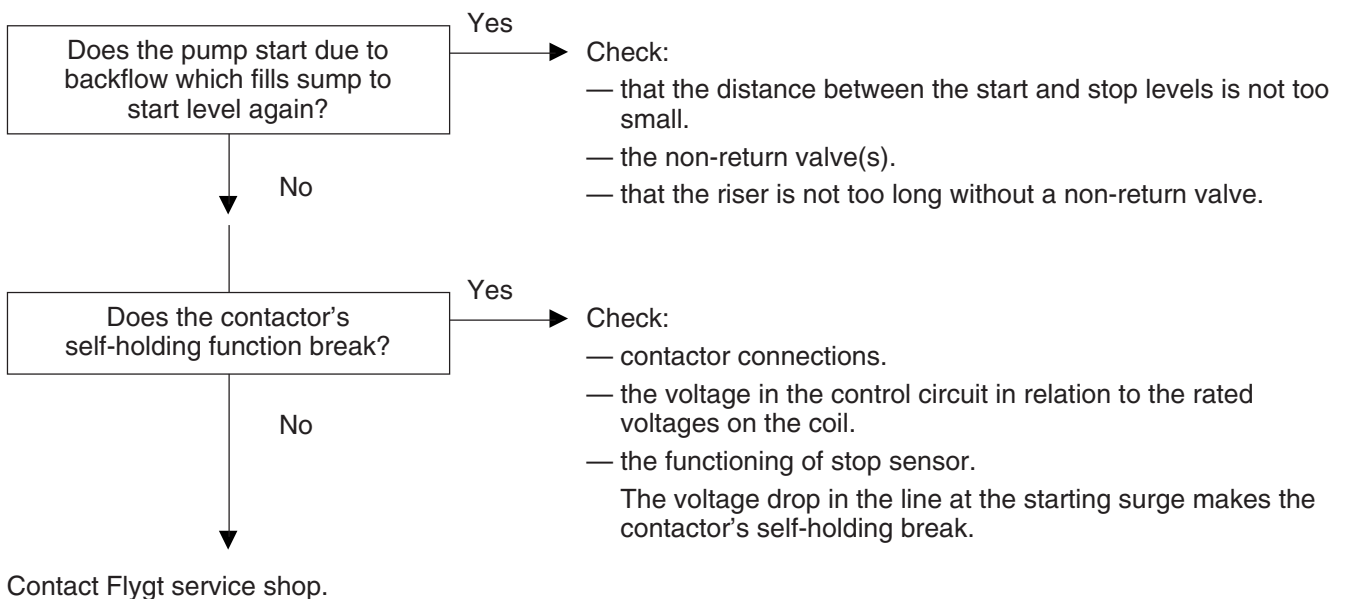
Contact Flygt service shop.



3. The pump does not stop



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



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/flange, suction bottom, diffuser disc, diffuser.

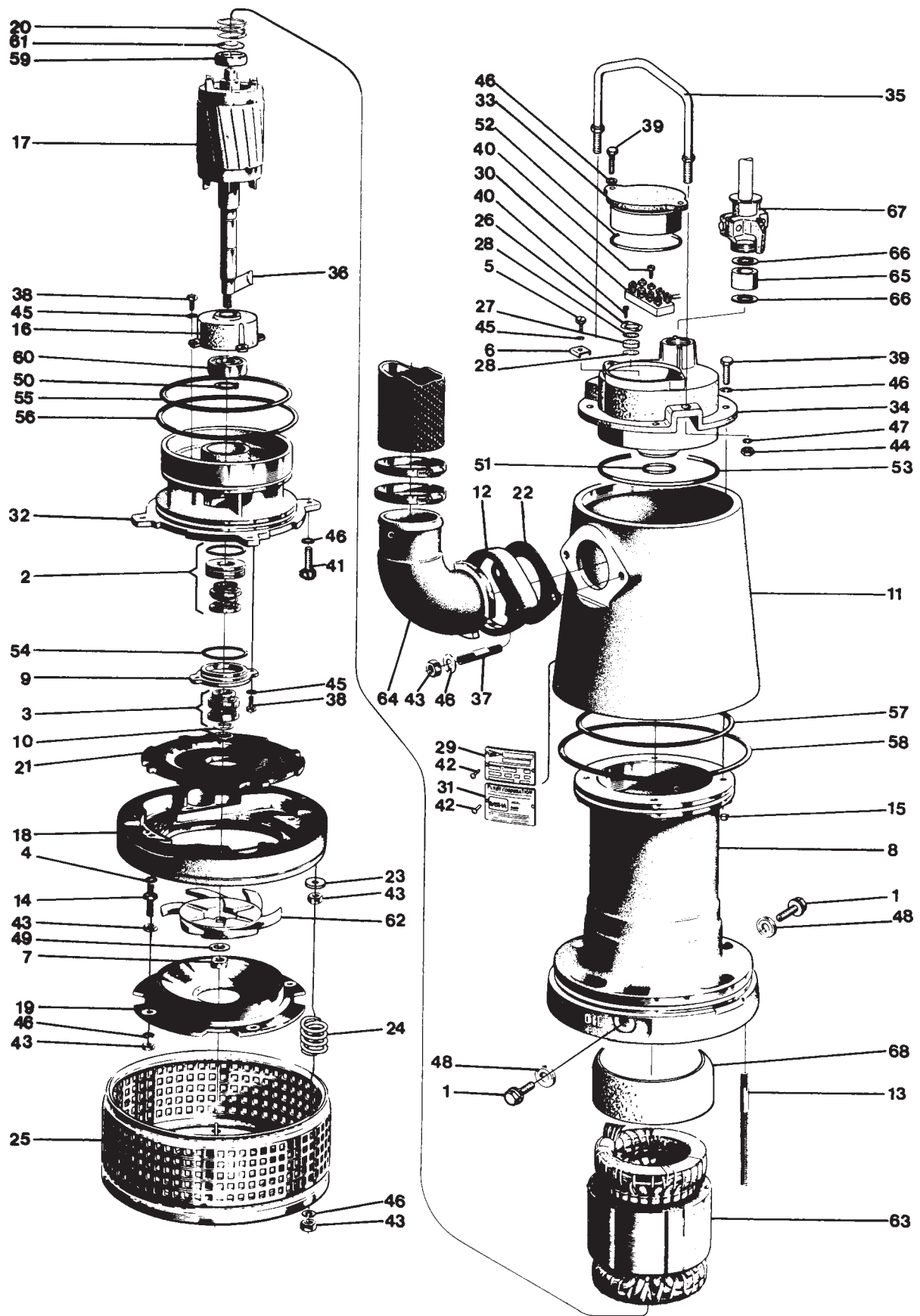
See also under “Inspection”.

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

SERVICE LOG

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

2075.050 and 2075.490





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