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End of Disclaimer text.

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FLYGT

Installation, Care and Maintenance

H5570/6X5, H5570/7X5

Flygt

ITT Industries

894530/04

CONTENTS

SAFETY

This manual contains basic information on the installation, operating and maintenance and should be followed carefully. It is essential that these instructions are carefully read before installation or commissioning by both the installation crew as well as those responsible for operation or maintenance. The operating instructions should always be readily available at the location of the unit.

Identification of safety and warning symbols

General Danger:

Non-observance given to safety instructions in this manual, which could cause danger to life have been specifically highlighted with this general danger symbol.

High Voltage:

The presence of a dangerous voltage is identified with this safety symbol.

WARNING! Non-observance to this warning could damage the unit or affect its function

Qualifications of personnel

An authorized (certified) electrician and mechanic shall carry out all work.

Safety regulations for the owner/operator

All government regulations, local health and safety codes shall be complied with.

All dangers due to electricity must be avoided (for details consult the regulations of your local electricity supply company).

Unilateral modification and spare parts manufacturing.

Modifications or changes to the unit/installation should only be carried out after consulting with ITT Flygt.

Original spare parts and accessories authorized by the manufacturer are essential for compliance. The use of other parts can invalidate any claims for warranty or compensation.

Dismantling and re-assembly

If the pump has been used to pump hazardous media, care must be taken that, when draining the leakage, personnel and environment are not endangered.

All waste and emissions such as used coolant must be appropriately disposed of.

Coolant spills must be cleaned up and emissions to the environment must be reported.

The pumping station must be kept tidy and in good order at all times.

All government regulations shall be observed.

SAFETY

NOTES FOR EX-PRODUCTS

— **Only Ex-approved pumps may be used in an explosive or flammable environment.**

— **Do not open the pump when an explosive gas atmosphere may be present.**

— **Before starting work on the pump, make sure that the pump and the control panel are isolated from the power supply and can not be energized. This applies to the control circuit as well.**

— **All mechanical work on the explosion-proof motor section must be performed by personnel authorized by ITT Flygt.**

— **Electrical connection on the explosion-proof motor must be made by authorized personnel.**

— **Thermal contacts must be connected to protection circuit intended for that purpose according to the approval of the product.**

— **The pump may be used only in accordance with the approved motor data stated on the data plates.**

— **Intrinsically safe circuits are normally required (Ex i) for the automatic level control system by level regulator if mounted in zone 0.**

— **This equipment must be installed in conformity to prescriptions in international or national rules (IEC/EN 60079-14).**

— **The maintenance operation must be made in conformity to the international or national standards (IEC/EN 60079-17).**

— **The yield stress of fastener elements in the product must be in conformity with the value specified in the table for "Material of fastener" on the approval drawing or the parts specified in the part list for the product.**

— **According to the ATEX directive the Ex-pump must never run dry or snore at normal operation. Permitted minimum water level, see dimensional drawing for the pump.**
Dry running at service and inspection is only permitted outside the Ex area.

— **The user must know about the risks due to the electric current and the chemical and physical characteristics of the gas and/or vapours present in hazardous areas.**

— **ITT Flygt disclaims all responsibility for work done by untrained, unauthorized personnel.**

GUARANTEE

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

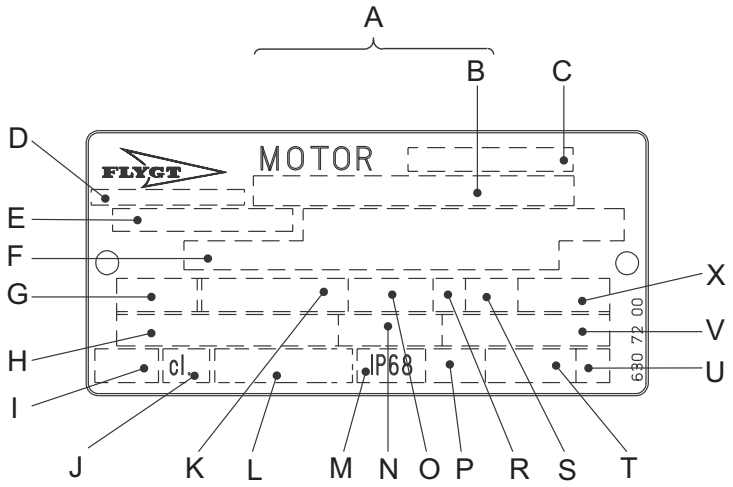
— that the fault is due to defects in design, materials or workmanship;
— that the fault is reported to Flygt or Flygt's representative during the guarantee period;
— that the product is used only under conditions described in the care and maintenance instructions and in applications for which it is intended;
— that the monitoring equipment incorporated in the product is used and correctly connected;
— that installation and start-up is done by Flygt authorized personnel;
— that the start-up form (Start-up report 85) is filled in and a copy sent to Quality Department;
— 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 20 years after the manufacture of this product has been discontinued.
The manufacturer reserves the right to alter performance, specification or design without notice.

DATA PLATES INTERPRETATION

DRIVE UNIT

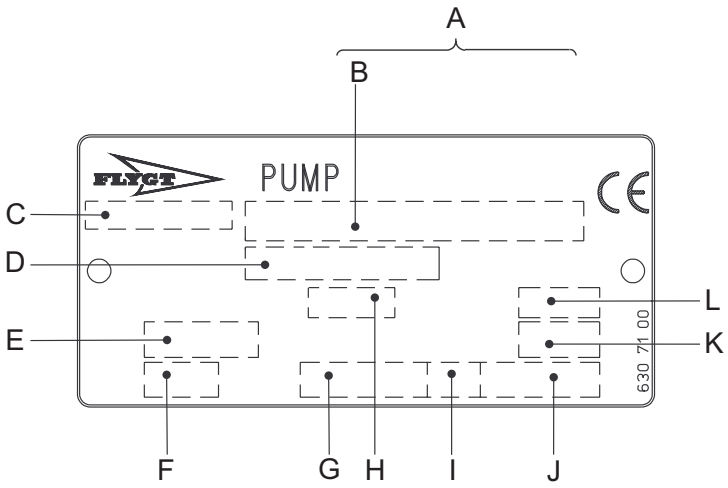
A Serial number
B Product code + Number
C Motor denomination
D Country of origin
E Product number
F Additional information
G Phase; Type of current; Frequency
H Rated voltage
I Thermal protection
J Thermal class
K Rated shaft power
L International standard
M Degree of protection
N Rated current
O Rated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



DATA PLATES INTERPRETATION

HYDRAULIC UNIT

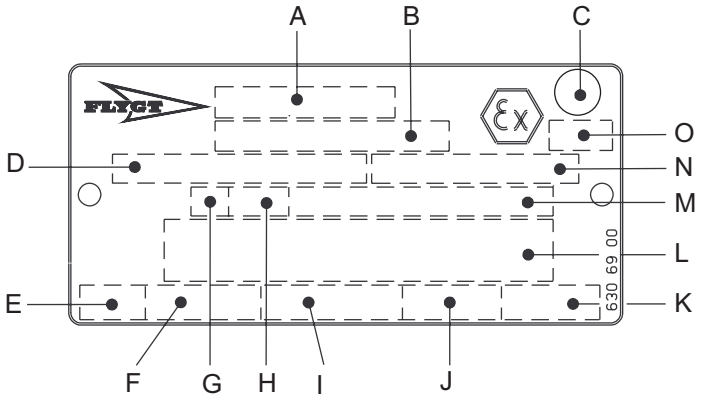
A Serial number
B Product code + Number
C Country of origin
D Product number
E Column dia./Inlet & outlet dia.
F Pressure class
G Rated speed
H Impeller/Propeller code
I Direction of rotation: L=left, R=right
J Product weight
K Propeller blade angle
L Impeller diameter



Approval plates

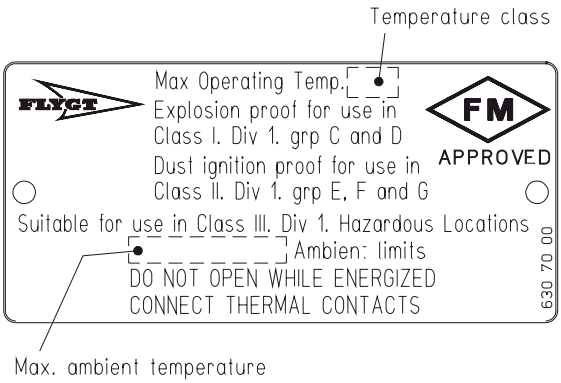
These approval plates apply to an explosion-proof submersible Flygt pump. The plates are used together with the general data plate on the pump.

EN: European Norm
ATEX Directive
EN 50014, EN 50018, EN 1127-1
II 2 G EEx dII T3 (6x5)
II 2 G EEx dII T3 (7x5)



A Approval
B Approval authority + Approval Number
C Approval for Class I
D Approved drive unit
E Stall time
F Starting current / Rated current
G Duty class
H Duty factor
I Input power
J Rated speed
K Controller
L Additional information
M Max. ambient temperature
N Serial number
O ATEX marking

FM: Factory Mutual
Class I Div. I Grp C and D
Class II and III Div. I Grp E, F and G



TRANSPORTATION AND STORAGE

The pump should be transported and stored in a horizontal position. Make sure that it is securely fastened and cannot roll or fall over.

The impeller shall be locked during transport.

Warning!
Always lift the pump by its lifting link and/or by the appropriate lifting eye brackets (service tools), never by the motor cable or other parts. Make sure that it cannot roll or fall over.

Remove the impeller locking device before installing the pump.

During storage, the pump must be protected against moisture and heat. The impeller should be rotated by hand every other month to prevent the seals from sticking together. If the pump is stored for more than 6 months, this rotation is mandatory.

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 and the cooling jacket may reeze.

When pumps with external cooling systems, are lifted out of the sump for service or storage, the cooling jacket must be drained manually by opening the air vent screw(s) at the top of the cooling jacket.

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

NOTE!
The pump may not run dry longer than 30 seconds.

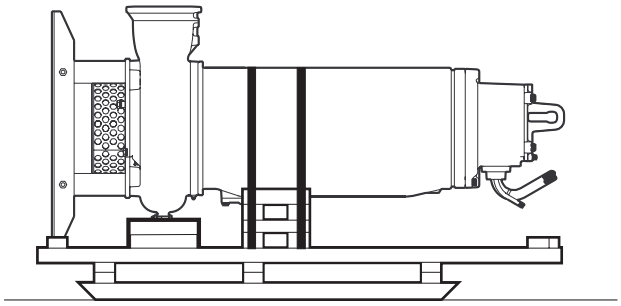
Note for Ex version page 3.

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 a naked flame to thaw the pump.

If the pump is kept where there is a risk of freezing temperatures, it is liable to be damaged if there is a great deal of water left in the hydraulic unit.

In order to avoid this, always position the hydraulic unit with the discharge facing down. In this way, most of the water will run out.

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.



INSTALLATION

Safety precautions

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

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

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

Handling equipment

Lifting equipment is required for handling the pump.

The lifting equipment shall be dimensioned to lift the pump with possible remaining slurries in it.

The lifting equipment shall be able to hoist the pump straight up and down in the sump, preferably without necessitating resetting the lifting hook.

The minimum height between the lifting hook and the access frame/cover/floor is individual for every installation. For further information, please contact your Flygt representative.

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

Make sure that the lifting equipment is securely anchored.

Two sets of lifting equipment are required to handle the pump for repair work.

The total weight of the pump is stated on the data plate of the hydraulic unit.

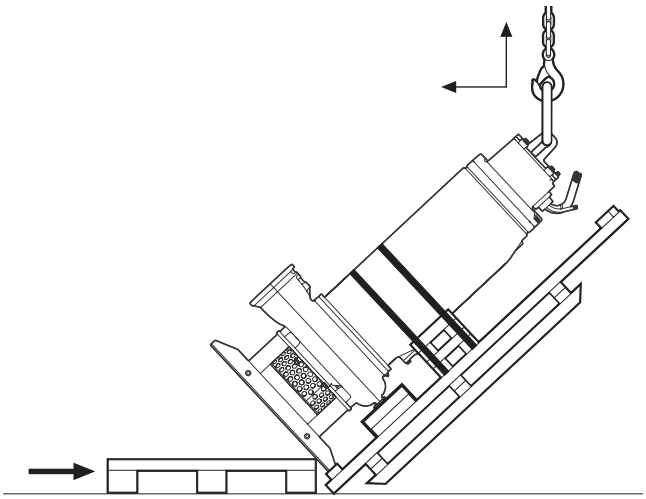
Removing the transport pallet

Raise the pump to its upright position while still attached to the transport pallet.

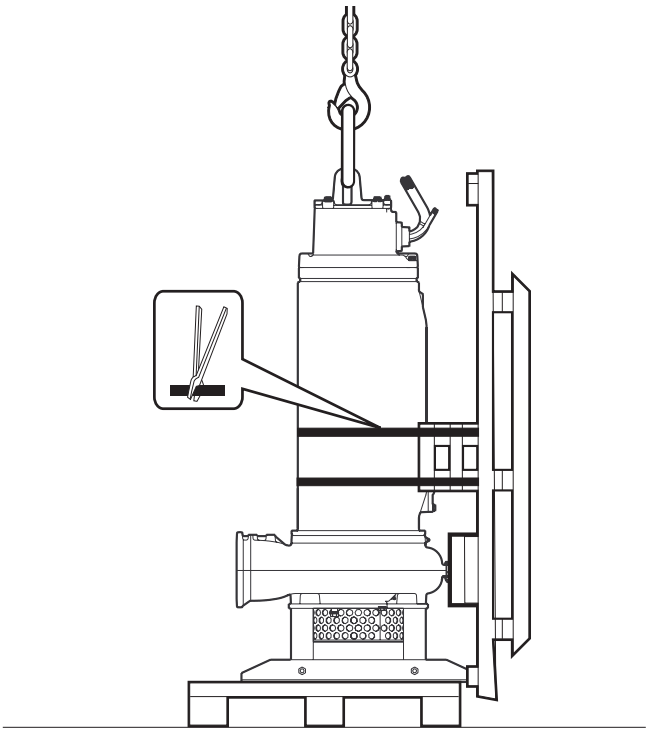
The pump will jolt and possibly sway slightly towards the end of the raising operation.

WARNING!
Watch out for agitator in rotation.

WARNING!
To avoid accidents stand at a safe distance, until this movement has been stopped.

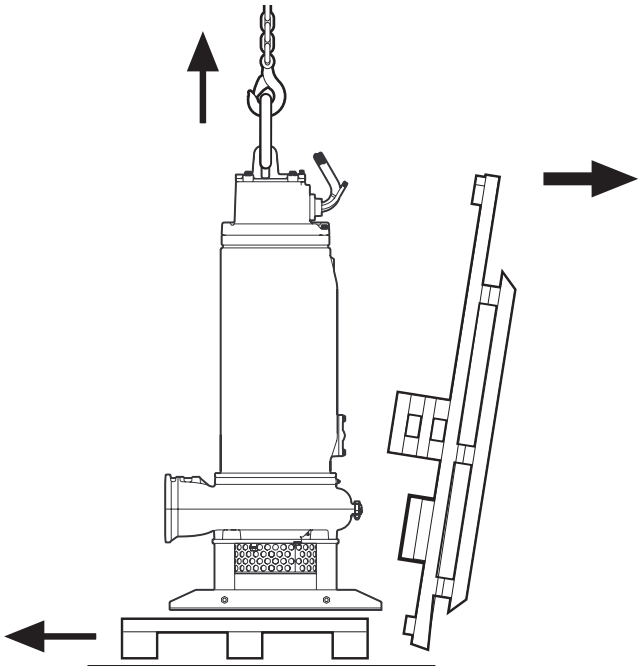


To minimize the jolt when raising the pump slide a pallet or similar object under the inlet section.



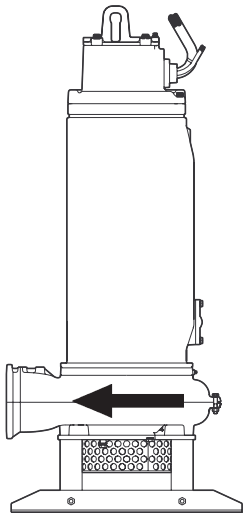
Remove the transport pallet after placing the pump in upright position.

WARNING!
Keep out from under suspended loads.



Lift up the pump and remove the support pallet.

NOTE!
Place the pump on a rigid horizontal surface and make sure that the pump cannot fall.



Direction of rotation

Installation

Consult your nearest Flygt representative regarding:

— sizing of sump, pumping station and access frame.

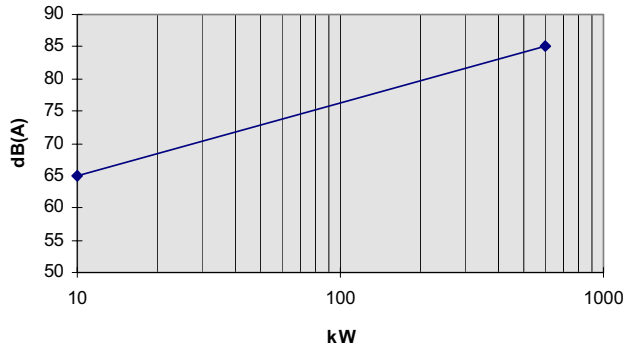
— choice of ancillary equipment.

— other aspects of installation.

Note (Sound Pressure Diagram)!
In certain installations and at certain operating points on the pump performance curve, the noise level of 70 dB can be exceeded.

Pumps with power output greater than 30kW, as shown in the diagram below, may have a noise level between 70dB and maximum 85dB at the best efficiency point.

Sound pressure



The pump should always be inspected before it is put into operation. Pay special attention to the seals and the cable entry. Rotate the propeller by hand with the pump isolated from power supply before final installation.

During a longer period out of operation, the pump shall be test-started every other month to prevent the mechanical seals from sticking together.

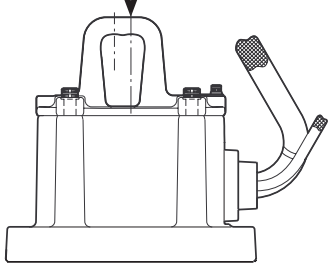
NOTE!
The pump may not run dry longer than 30 seconds.

Note for Ex version page 3.

Maximum permissible submersion depth is 20 m (65 ft).

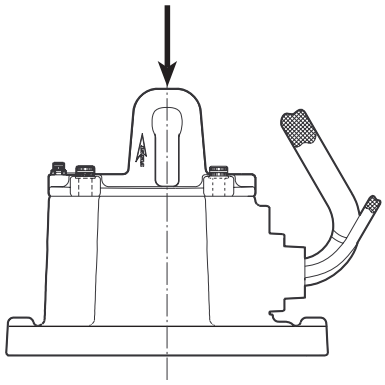
Pumps with drive units 605-675

Lifting of complete pump/drive unit



Pumps with drive units 705-775

Lifting of complete pump/drive unit



Referring to table below, make sure that the cables are not sharply bent or pinched.

SUBCAB® Cable	Min. bending radius in mm
12x1,5 mm²	85
24x1,5 mm²	145
4 G 16 mm²	140
4 G 25 mm²	175
4 G 35 mm²	195
4 G 50 mm²	225
4 G 70 mm²	245
4 G 95 mm²	290
4 G 120 mm²	300
4AWG/3-2-1-GC	175
1AWG/3-2-1-GC	215

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

Cooling system

The heat losses in the motor are removed by means of surrounding liquid. The coolant could be the pump medium itself or a coolant from external resource, depending on the application and installation type.

Without cooling jacket

The pump should always run completely submerged. At emptying the sump the lowest liquid level should not be lower than to the top of the pump housing. Please contact your Flygt representative for further information.

With cooling jacket

The pump is delivered with the cooling jacket adapted to external cooling (two versions):

a. External cooling only

Coolant from an external source is used to cool the motor. There are two threaded connections (ISO G 3/4) on the cooling jacket, the one in lower part for coolant inlet and the one in the upper part for coolant outlet.

b. External cooling and separate seal flushing

For more information regarding the a-, b-versions please contact your Flygt representative.

Draining the cooling jacket

Drainage of the cooling jacket for all installations can only be accomplished if the air vent screws "A" at the top of the cooling jacket are opened.

After draining the cooling jacket on HP-, HS - installed pumps with external cooling, the pump should be run dry for a short period of max 30 seconds to expel all water from the impeller area.

NOTE!

The pump may not run dry longer than 30 seconds.

Note for Ex version page 3.

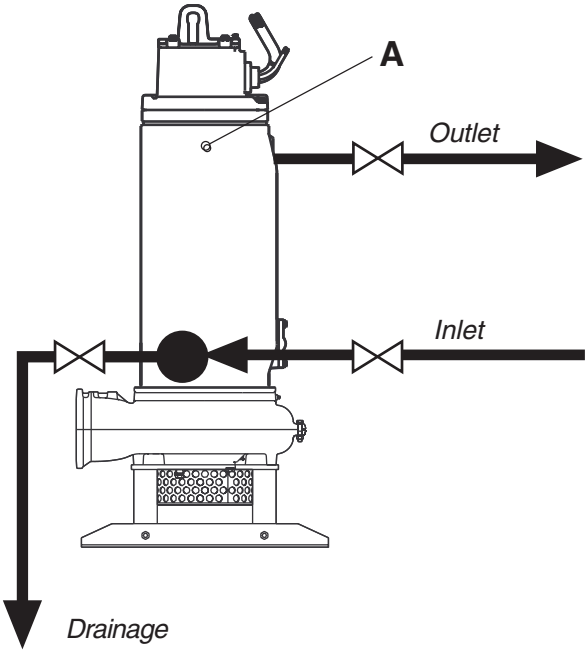
The cooling jacket used on HT- , HZ- installed pumps with external cooling, should, when the pump is installed, be fitted with a nipple, a stop-cock and a pipe or a hose leading to a suitable sump.

See pictures below.

The cooling jacket contains water which may be pressurized. Make sure therefore that the cooling jacket is drained before service work is started.

First depressurize the cooling system by opening the stop-cock, then drain the cooling jacket.

HP-, HS-, HT- and HZ-pumps with external cooling



WARNING!
Failure to drain the cooling jacket before service may cause injury.

NOTE!
Before starting service on the pump, make sure that the motor has cooled down sufficiently to carry out the service work.

Installation alternatives

HP version

In the HP version, the pump is installed on a stationary discharge connection and operates completely submerged in the pumped liquid.

In addition to the pump,the following items are required:

Guide bars.

Guide bracket for attaching the guide equipment to the access frame or to the upper part of the sump.

Level sensors or other control equipment for start, stop and alarm.

Cable holder for holding the cable and regulating the height of the level sensors.

Access frame (with covers) to which the upper guide bar bracket and cable holder can be attached.

Discharge connection for connecting the pump to the discharge line. The discharge connection has a flange which fits the pump casing flange and a bracket for attaching the guide equipment.

HP installation

The plugs between the drive unit and the hydraulic unit should be removed to reduce the seal pressure when the pump is running submerged. The cooling jacket version has eight plugs and the version without cooling jacket has seven plugs.

Provide a barrier around the pump pit, for example a guard rail.

Arrange for a cable between the sump and the electric control box. Make sure that the cables are not sharply bent or pinched. See also table for minimum bending radius.

Place the access frame in position.

Align the frame so that it is horizontal and then grout it in place.

Grout the anchor bolts in place. Be careful when aligning and positioning the dischrage connection in relation to the access frame.

Place the discharge connection in position and tighten it.

Secure the guide equipment in the brackets.

Check that the guide equipment is placed vertically by using a level or a plumb line.

Connect the discharge pipe to the discharge connection.

Bolt the cable holder to the access frame. Thread the level regulator cables through the holes in the cable holder and adjust the height of the sensors.

It is recommended that the level regulators be used with low voltage. The data sheet delivered with the regulators gives the permissible voltage. Local rules may specify otherwise.

Protect bolts and nuts with corrosion preventive compound.

Lower the pump along the guide rail.

On reaching its bottom position, the pump will automatically connect to the discharge connection.

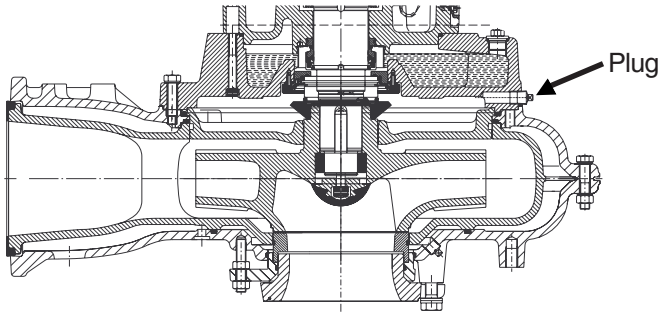
Fasten the lifting chain on the access frame and the cables on the cable holder. Make sure that the cables cannot be sucked into the inlet of the pump. Support straps are required for deep installations.

Rund the cables up to the electric control box.

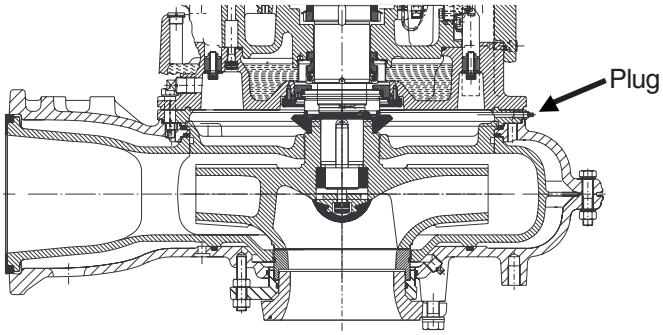
Clean out debris from the sump before starting up the station.

The pump can be hoisted up along the guide equipment for inspection without any connections having to be undone.

Drive unit without cooling jacket



Drive unit with cooling jacket



HS version

In the HS version, the pump is transportable and intended to operate completely submerged in the pumped liquid. The pump is equipped with a connection for hose or pipe, see “Parts list”.

The pump stands on a base stand.

HS installation

The plugs between the drive unit and the hydraulic unit should be removed to reduce the seal pressure when the pump is running submerged. The cooling jacket version has eight plugs and the version without cooling jacket has seven plugs.

Run the cables so that they have no sharp bends, are not pinched and cannot be sucked into the pump inlet. Connect the discharge line and the motor cable. See “Electrical connections”.

Lower the pump into the sump.

Place the pump on a base which prevents it from sinking into a soft sump bottom.

Alternatively, the pump can be suspended from above by its handle just above the bottom of the sump.

HT version

In the HT version, the pump is installed vertically in a stationary position in a dry well next to the wet sump.

The pump has a watertight motor and will therefore not be damaged in the event of flooding in the pump room.

Base stand/sled and anchor bolts for setting up the pump.

Elbows for connecting the suction and discharge lines.

Shut-off valves to permit the pump to be removed for repair.

Air vent on discharge side between the pump and the check valve.

Level sensors or other control equipment for start, stop and alarm.

HZ version

In the HZ version, the pump is installed horizontally in a stationary position in a dry well next to the wet sump.

The pump has a watertight motor and will therefore not be damaged in the event of flooding in the pump room.

Base stand/sled and anchor bolts for setting up the pump.

Elbows for connecting the suction and discharge lines.

Shut-off valves to permit the pump to be removed for repair.

Air vent on discharge side between the pump and the check valve.

Level sensors or other control equipment for start, stop and alarm.

HT/HZ installation

Check that the plugs between the drive unit and the hydraulic unit are assembled. The cooling jacket version has eight plugs and the version without cooling jacket has seven plugs.

The pump should be positioned low in the dry pit for effective drainage.

Bolt the base stand or plate to the concrete base by means of grouted-in anchor bolts.

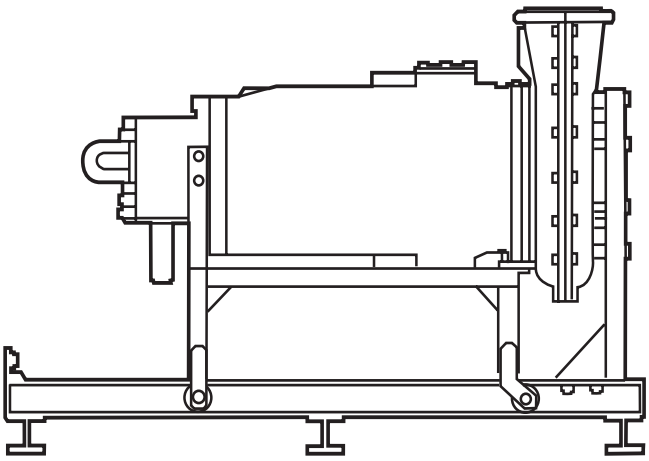
Bolt the pump to the stand/plate.

Check that the pump is vertical/horizontal.

Connect the motor cable, suction line and discharge line.

Make sure that the weight of the pump does not bear on the system piping.

NOTE!
The risk of freezing is particularly great at certain HT/HZ-installations.



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 main electrical equipment must be earthed. Failure to heed this warning may cause a lethal accident. Make sure that the earth lead is correctly connected by testing it.

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

Connection of auxiliary cable

MAS-connected

MAS is the standard existing monitoring system

The pump is delivered with the auxiliary cable mounted. Check on the drive unit data plate that it is marked with "MAS" in the field F. See chapter "Data plate interpretation".

Depending on which monitoring equipment the pump is equipped with, there are two types of auxiliary cable (SUBCAB®) available:

— 12 x 1,5 mm^2 (conductors numbered 1-12)

— 24 x 1,5 mm^2 (conductors numbered 1-24)

The number of conductors required to connect the sensors to the monitoring system is dependent on the number as well as the type of sensors being used.

Standard monitoring alternative, 12-lead auxiliary cable

Pumps equipped with a 12-lead cable will have the following monitoring components mounted as standard:

— Thermal switches for stator temperature monitoring (3 in series) or PTC-thermistors

— Leakage sensor in the stator housing

— Leakage sensor in the connection housing

— Analogue temperature sensor (Pt100) for main bearing temperature monitoring

— Analogue temperature sensor (Pt100) for stator winding temperature in one phase

— Pump memory

Optional monitoring alternative, 24-lead auxiliary cable

Additional monitoring functions require the use of a 24-lead cable. The following options are available with MAS:

— Vibration sensor VIS 10

— Analogue temperature sensor (Pt100) for stator winding temperature in phases 2 and 3

— Leakage sensor in the oil housing (CLS)

— Analogue temperature sensor (Pt100) for support bearing temperature monitoring

The different sensors (as applicable) are connected to the conductors as shown in the table below:

Sensors	**Pump terminal block**	**Conductor No.** 12-lead-cable	24-lead-cable
Float switch in the stator housing*)	1 2	1 2	1 2
Pt 100 in the main bearing arrangement*)	3 4	3 4	3 4
Thermal switches or thermistors in the stator	5 6	5 6	5 6
Pt 100 in the support bearing	37 38	— —	17 18
Float switch in the connection housing*)	9 2	7 —	7 —
CLS 30 water in oil housing +	33 34	— —	19 20
Pt 100 in the stator winding 1	19	8	8
*)	4	—	—
- winding 2	21	—	13
	22	—	14
- winding 3	23	—	15
	24	—	16
Pump memory RS-485 B	74	9	9
RS-485 A	75	10	10
Supply, ground	76	11	11
Supply, 12 V DC+	77	12	12
Vibration sensor VIS 10 +	78	—	21
—	79	—	22

*) Note! The leakage sensors in the stator housing and the connection housing use the common terminal 2 on the pump terminal block. The same is valid for the Pt100 sensors in the main bearing and stator winding 1, using terminal 4 as common.

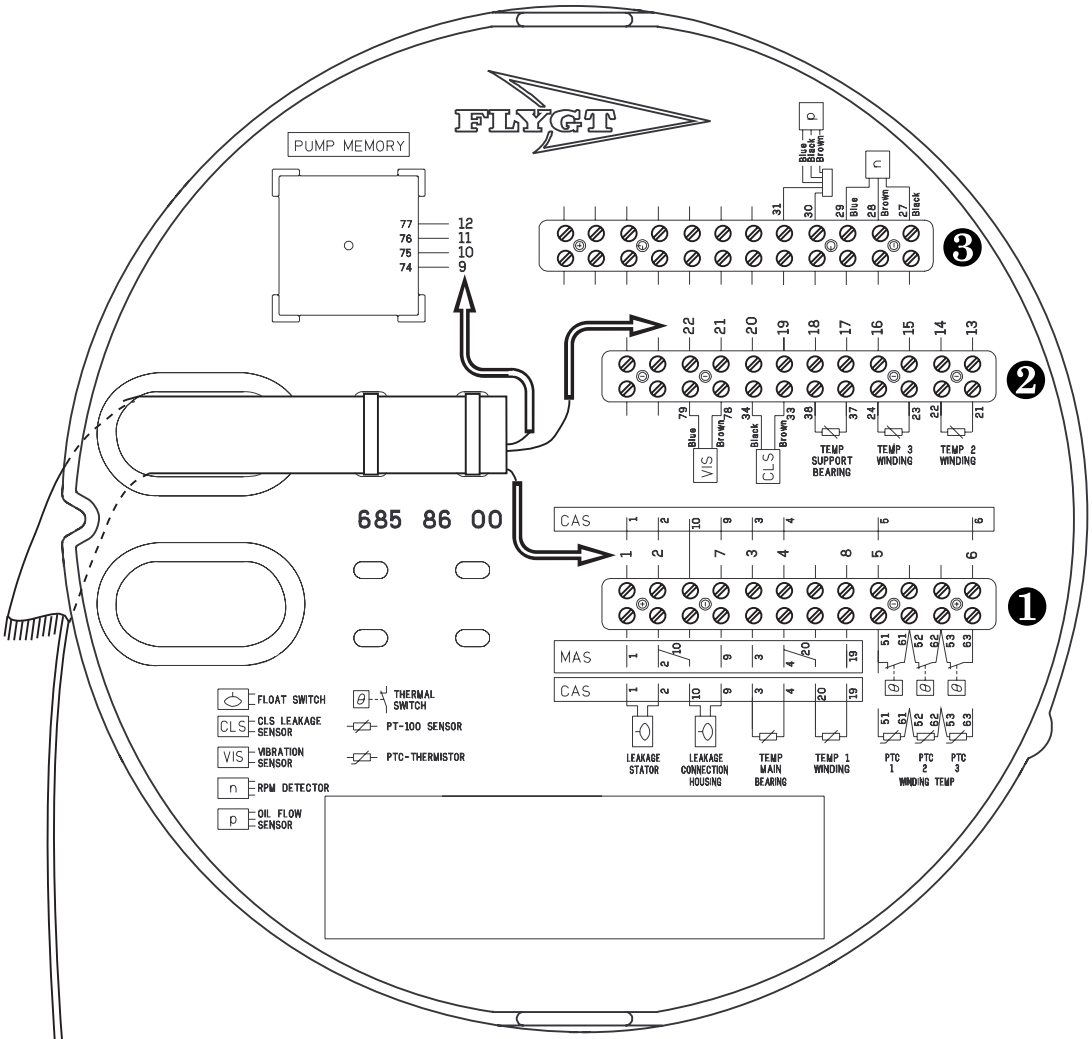
Note!
As the cable ends are sealed to eliminate moisture entrainment during transport and storage, the wire markings for the sensors at the outlet end of the cable will not be carried out at the factory. Marking must therefore be carried out during installation of the pump.

At first installation, the MAS base unit and the pump memory should be synchronized.

— Check that the communication between the pump and the MAS base unit is activated.

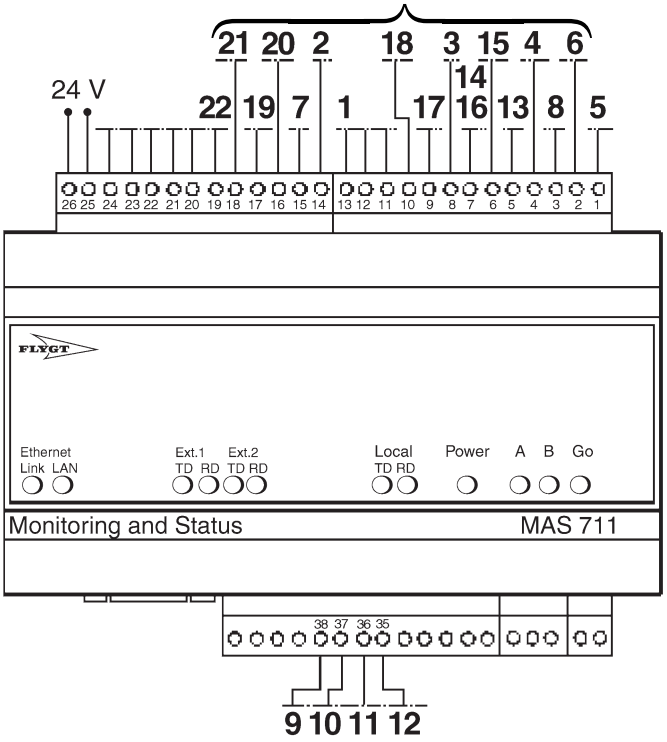
— Upload the factory settings of sensors and associated parameters by performing the operation **"Copy all from pump memory to MAS"** in the installation procedure for MAS. See also "Installation and User manual" for MAS 711 Monitoring system.

Connection of monitoring equipment

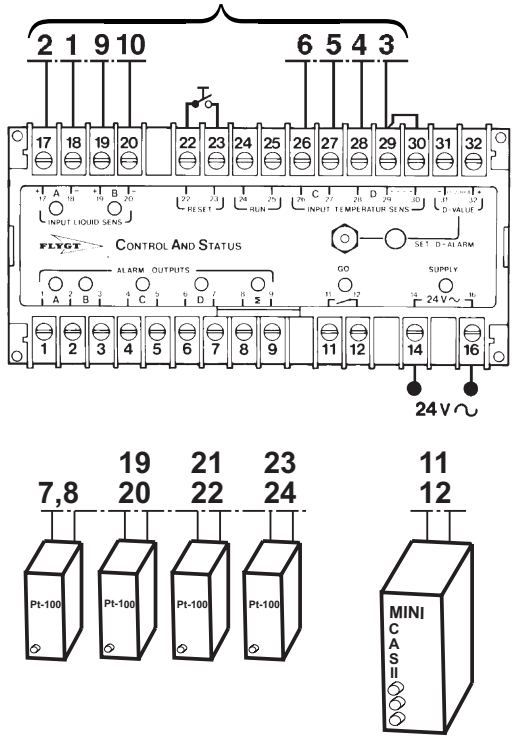


= SUBCAB cable lead number 1 — 12 alt 1 — 24

MAS-connected



CAS-connected



CAS-connected

For replacement pumps to stations equipped with CAS monitoring system.

The pump is delivered with the auxiliary cable mounted. Check on the drive unit data plate that it is marked with "CAS" in the field F. See chapter "Data plate interpretation".

Depending on which monitoring equipment the pump is equipped with, there are two types of auxiliary cable (SUBCAB®) available:

— 12 x 1,5 mm^2 (conductors numbered 1-12)

— 24 x 1,5 mm^2 (conductors numbered 1-24)

The number of conductors required to connect the sensors to the monitoring system is dependent on the number as well as the type of sensors being used.

Standard monitoring alternative

Pumps equipped with a 12-lead cable will have the following monitoring components mounted as standard:

— Thermal switches for stator temperature monitoring (3 in series) or PTC-thermistors.

— Leakage sensor in the stator housing.

— Leakage sensor in the connection housing.

— Analogue temperature sensor (Pt100) for main bearing temperature monitoring.

Optional monitoring alternative, 12-lead auxiliary cable

Additional monitoring functions with a 12-lead cable. The following options are available in systems with CAS and requires separate relays:

— Leakage sensor in the oil housing (CLS).

— Analogue temperature sensor (Pt100) for support bearing temperature monitoring.

Optional monitoring alternative, 24-lead auxiliary cable

Additional monitoring functions with a 24-lead cable. The same options as for 12-lead cable and the following:

— Analogue temperature sensor (Pt100) for stator winding temperature in 3 phases.

The different sensors (as applicable) are connected to the conductors as shown in the table below:

Sensors		**Pump terminal block**	**Conductor No.** 12-lead-cable	24-lead-cable
Float switch in the stator housing		1 2	1 2	1 2
Pt 100 in the main bearing arrangement		3 4	3 4	3 4
Thermal switches or thermistors in the stator		5 6	5 6	5 6
Pt 100 in the support bearing		37 38	7 8	7 8
Float switch in the connection housing		9 10	9 10	9 10
CLS 30 water in oil housing	+ —	33 34	11 12	11 12
Pt 100 in the stator winding 1		19 20	— —	19 20
	- winding 2	21 22	— —	21 22
	- winding 3	23 24	— —	23 24

Note!
As the cable ends are sealed to eliminate moisture entrainment during transport and storage, the wire markings for the sensors at the outlet end of the cable will not be carried out at the factory. Marking must therefore be carried out during installation of the pump.

Connection of motor leads

The pump is delivered with the power cable(s) mounted.

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

Depending on which drive unit the pump is equipped with, there are different types of cable entrance arrangements. All types consist of seal sleeves and washers mounted around the cable and into an entrance flange.

Install the power cable and the auxiliary cable where necessary as illustrated in the figure.

To avoid leakage into the pump, check:

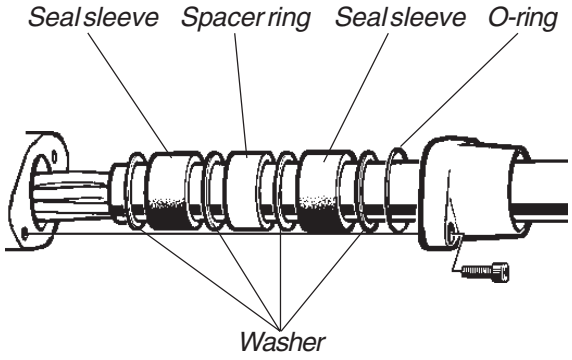
— that the cable entry seal sleeves and washers conform to the outside diameter of the cable. See the parts list. Always measure the cable before installing it.

— that the outer jacket on the cable is not damaged. When refitting a cable which has been used before, always peel off a short piece of the cable so that the cable entry seal sleeves does not close around the cable at the same points again.

— that the cable sheathing does not have indentations or is embossed (with markings etc.) at the cable entry.

— that the minimum bending radiuses for the cables do not underpass the values acc. to the table in page 9.

Drive units 605-765



NOTE!

For safety reasons, the earth lead should be connected in such a way that if the power 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 D, is valid for the voltage supply. Then, depending on voltage, arrange the connection on the terminal board in accordance with Y or D, see figure.

Connect the power cable to the terminal board connections U1, U2, V1, V2, W1, W2 and earth according to the “Terminal board connection”.

SUBCAB® 4Gx

Conductors	Connection starter
brown	L1
blue alt. grey[1)]	L2
black	L3
yellow/green	earth

[1)] Coluor changed to grey from March 2005

SUBCAB® xAWG/4
(For Canada/USA)

red	L1
white	L2
black	L3
yellow	GC[2)]
yelllow/green	earth

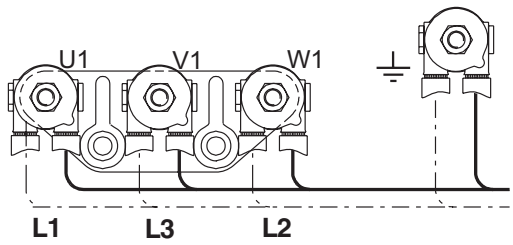
[2)] GC = Ground Check

SUBCAB is a registered trademark of ITT Flygt AB for electric cables.

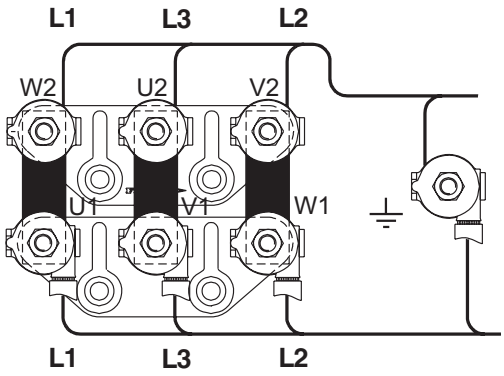
Terminal board connection

Drive units 605 - 775

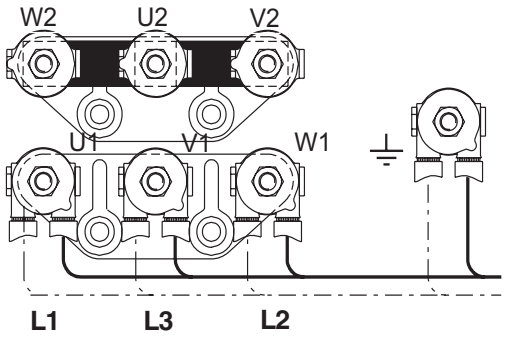
D-connection, 1 or 2 cables, 6-lead stator



D-connection, 1 or 2 cables

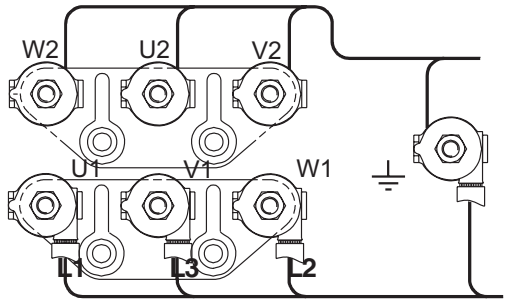


Y-connection, 1 or 2 cables



L1 L3 L2

Y/D-connection



Starter equipment connection

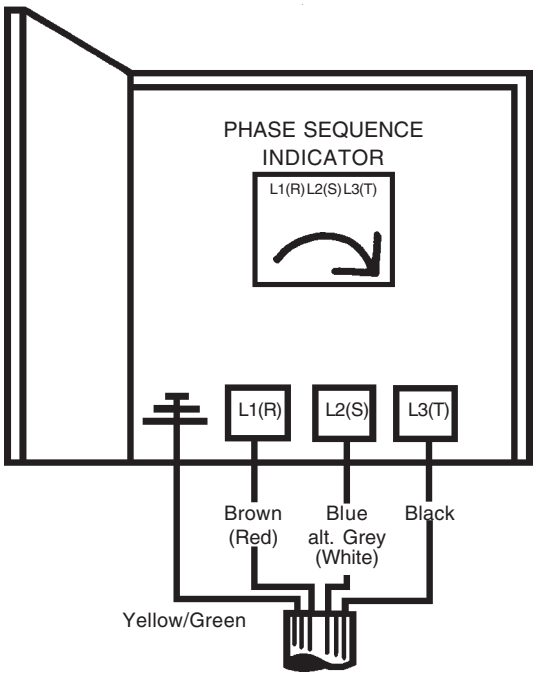
Make sure that the pump is correctly earthed (grounded).

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

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.

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

Connect the motor cable and the auxiliary cable to the starter equipment. Check the direction of rotation, see "Installation and start-up".



CARE AND MAINTENANCE

Service/Inspection

ITT Flygt recommends a preventive maintenance program based on Intermediate and Major Services at regular intervals. For pumping applications where the temperature of the pumped liquid is 40°C or less an *Intermediate Service* should be performed every 5000 hours or once a year, whichever occurs first. A *Major Service* should be performed after 25000 working hours or every 5 years.

It should be observed, however, that these are general recommendations based on experience from the most frequent applications for these pumps. For specific applications or operating conditions other service intervals may be recommended. For example a storm water pump that works mainly during a part of the year an Intermediate Service should be performed before and after this main working period.

Service contract

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

Standard Intermediate and Major Services includes the following items:

Pump	**Intermediate Service 5 000 working hours/Once a year**
Junction box	Check that it is clean and dry. If wet, check cable entry. Replace O-rings. Fitting of new O-rings should be made to all O-ring seals joints opened during the inspection.
Terminal board	Check that the electrical connections are properly tightened.
Isolation check	Check that the resistance between earth and phase lead is more than 5 M Ω
Cable	Check that the rubber sheathing (jacket) is undamaged.
Oil housing	Check the oil quality. - If there is water in the oil, drain the oil and replace with new. After one week of operation check the oil quality again. If again there is water in the oil, change the seals. - If the oil is free from water, fill to correct oil level if necessary. Replace the filling plug O-rings.
Stator housing	Check that it is clean and dry. - If there is oil in the stator housing, drain and clean. After one week of operation check again. If again there is oil in the stator housing, change seals. - If there is water in the stator housing and there was water in the oil, change seals immediately. - If there is water in the stator housing but there was no water in the oil, check all other connections. Replace the O-rings.
Sensors	Check stator temperature, bearing temperature and FLS sensors. For details, see "Service instructions"
Hydraulic wear parts	Check wear parts status. Change if necessary.
Zinc anodes	Check and change if necessary.
Screw joints	Check all externally accessible screw joints and tighten if necessary to correct torque. See torque table and parts list.
Lifting handle	Check its condition and replace if necessary.
Rotation direction	Check impeller/propeller rotation direction.
Pump station	**Intermediate Service 5 000 working hours/Once a year**
Lifting device	Check that local safety regulations are followed.
Electrical cabinets/panels	Check that they are clean and dry.
Connection to power	Check the cable connections. Tighten if necessary.
Overload and other protections	Check settings.
Personnel safety	Check guard rails, covers and other protections.
Level regulators	Check condition and function.

Pump	Major Service 25 000 working hours/Every 5 year
Isolation check	Check that the resistance between earth and phase lead is more than 5 MOhm.
Cable	Check that the rubber sheathing (jacket) is undamaged. Change if necessary.
Oil housing	Drain the oil.
Dismantling and cleaning	Total dismantling of the pump. Cleaning of all parts.
Bearings	Replace.
O-rings and other rubber sealing parts	Replace.
Reassembly	Reassemble the pump.
Seals	Replace.
Sensors	Check stator temperature, bearing temperature and FLS/CLS sensors. For details, see "Service instructions".
Oil	Fill new oil.
Impeller/Propeller	Check general impeller/propeller and wear ring status. Change if necessary.
Zinc anodes	Check and change if necessary.
Screw joints	Check all externally accessible screw joints and tighten if necessary to correct torque. See torque table and parts list.
Lifting handle	Check its condition and replace if necessary.
Painting	Touch up painting if necessary.
Rotation direction	Check impeller/propeller rotation direction.
Voltage and amperage	Check running values.

Pump station	Major Service 25 000 working hours/Every 5 year
Lifting device	Check that local safety regulations are followed.
Electrical cabinets/panels	Check that they are clean and dry.
Connection to power	Check the cable connections. Tighten if necessary.
Overload and other protections	Check settings.
Personnel safety	Check guard rails, covers and other protections.
Level regulators	Check condition and function.

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.

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

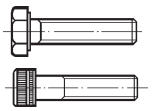
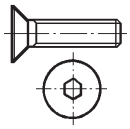
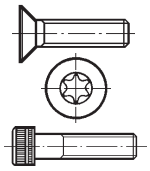
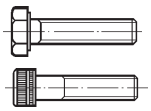
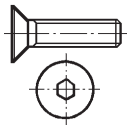
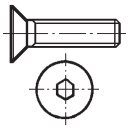
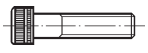
NOTE!
Before starting service on the pump, make sure that the motor has cooled down sufficiently to carry out the service work.

Tightening torques

The torque values in the table below should be used unless otherwise stated. Refer also to cross-sectional drawing in the parts list for torque values.

RECOMMENDED TIGHTENING TORQUE FOR FLYGT'S STANDARD SCREWS IN Nm AND ft-lb

Chart valid only for lubricated screws. Mineral oils for non stainless screws. Use oils such as 90 18 00 for stainless screws.

Material / Thread	Stainless (A2, A4)						Non stainless							
	Property class						Property class							
					80		8.8		8.8		10.9		12.9	
	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb
M5	4,1	3	2,0	1,5	5,4	4	5,7	4,2	4,6	3,4	6,5	4,8	9,7	7,2
M6	7	5,2	4,1	3	9,3	6,9	9,8	7,2	7,8	5,8	11	8	17	12,5
M8	17	12,5	7	5,2	22	16	24	18	19	14	26	19	40	30
M10	33	24,3	17	12,5	44	32	47	35	38	28	52	38	79	58
M12	57	42	33	24,3	76	56	81	60	65	48	91	67	136	100
M16	140	103	57	42	187	138	197	145	158	116	222	164	333	245
M20	273	201	100	74	364	268	385	285	308	228	433	320	649	480
M24	472	348	140	103	629	464	665	490	532	392	748	552	1120	825
Type of screw														

Service instructions

Intermediate service

DRIVE UNIT

— Check the whole pump and the cables for external mechanical damage.

— Open all inspection covers (for the junction box and the sensors).

CAUTION! Inside may be pressurized! Make sure that the cooling jacket is drained before service work is started. See "Installation, Cooling system".

The cooling jacket has two inspection covers.

They are to be used for cleaning of the cooling jacket and to give access to the inspection cover(s) on the stator housing and the sensors behind these.

For 705-series drive units the sensors are accessible behind the inspection cover marked “SENSORS”.

Note! These drive units have only one inspection cover on the stator housing.

— Check that the inside is dry and clean. No moisture or oil should be present.

— Check the insulation resistance from phase to earth and phase to phase.

NOTE! ONLY POWER CABLES.

Use a 1000 V-DC megger. The insulation between the phases and between any phase and earth (ground) should be above 50 MΩ, and in any case not lower than 5MΩ. Keep a record of the results.

— Check that the leads are correctly connected to the terminals and that these are tightened to the correct torque.

— Check that the cable entry screws are tightened to the correct torque.

— Check all sensors (as applicable). See "Connection of monitoring equipment".

NOTE!
Never insert measuring probes into the sensor contacts or sockets during measuring or checking as these may be deformed and cause a “loose” contact when the ordinary plug is connected.

— Reassemble all inspection covers after checking the drive unit (see following section).

NOTE! Always fit new O-rings.

— Check the zinc anodes (if applicable) to make sure they are large enough and intact. Replace after approx. 75% consumption.

— Check that all screws are tightened to the correct torque according to specifications in parts list.

Drive units 605, 665, 705, 735, 765 and 775

1. Stator winding temperature

A basic function for monitoring of stator winding temperature is that the motor should be shut off at high temperature. For this the pumps are always equipped with thermal switches or PTC-thermistors. As standard, there is also one Pt 100 sensor incorporated in one of the windings for measuring and logging of temperature. By using an analoge sensor two adjustable alarm limits can be used, one for warning (B-alarm) and one for pump stop (A-alarm).

Available as option, the temperature can be measured with Pt 100 in all three phases.

Totally with the MAS system, there are four alternative methods for monitoring the stator winding temperature where alternative "A" and “B” are standard. The other alternatives are available on request. For the high voltage drive units 950 and 985, only alternative "D" is available.

A. The coil ends of the stator winding incorporate three thermal switches connected in series and one Pt 100 sensor incorporated in one of the windings. The switches are normally closed and open at 140°C (285°F).

B. The coil ends of the stator windings incorporate three thermistors connected in series and one Pt 100 platinum transducer incorporated in one of the windings.

T*Ref*=140°C (285°F).

C. The coil ends of the stator winding incorporate three thermal switches connected in series and three Pt 100 sensors, one for each phase, incorporated in the windings. The switches are normally closed and open at 140°C (285°F).

D. The coil ends of the stator windings incorporate three thermistors connected in series and three Pt 100 sensors, one for each phase, incorporated in the windings.

T*Ref*=140°C (285°F).

T*Ref*=155°C (310°F) for high voltage drive units.

The thermal switches and the thermistors are connected to terminals 51-61, 52-62, 53-63 on terminal block 1.

The Pt 100 sensors, one for each phase, are connected individually to terminals 19-20 on terminal block 1 and terminals 21-22, 23-24 on terminal block 2.

Check of temperature sensors
Thermal switches, PTC thermistors and Pt100

Use a multimeter for measuring ohms.

Note!
Do not use a megger or other device applying a higher voltage than 2,5 V.

Disconnect the sensor wires and measure resistance to check the status of the sensor and wiring. Also measure between each sensor lead to ground to establish that the resistance is infinite (or at least several Mohms).

Thermal switches

The thermal switches are normally closed contacts, thus the resistance measured is in the wiring, typically 0-3 ohms unless the wires are very long.

An infinite value - open circuit - indicates either high temperature or a fault (a wire is broken or there is a bad contact in a connector).

PTC-thermistors

The PTC-thermistor is a semiconductor device with a resistance at normal temperature of 50-100 ohms (three in series 150-300 ohms). Above the tripping point, Tref, the resistance increases dramatically to several kohms.

An infinite value - open circuit - indicates a fault (broken wire or bad contact in a connector).

A value close to zero indicates a short circuit in the wiring.

Pt100 sensors

The Pt100 sensor is a resistor changing value almost linearly with temperature. It is 100 ohms at 0°C (32 °F) and 138,5 ohms at 100°C (212 °F). Refer to table on page 27.

An infinite value - open circuit - indicates a fault (broken wire or bad contact in a connector).

A value close to zero indicates a short circuit in the wiring.

2. Stator housing leakage

A float switch in the lower part of the stator housing reacts if liquid enters the stator housing.

Resistance: normal 1530 ohms
at alarm 330 ohms

Connected to terminals 1 and 2 on terminal block 1.

Measure ohms by using a multimeter to establish either of conditions (or both if the sensor is accessible).

3. Main bearing temperature

A Pt 100 sensor at the main bearing measure the bearing temperature.
The temperature limits are stored in the pump memory for downloading to the MAS base unit.

Resistance according to table, page 27.

Connected to terminals 3 and 4 on terminal block 1.

NOTE! The Pt 100 sensor may not be connected to a higher voltage than 2.5 V.

4. Connection housing leakage

A float switch in the connection housing reacts if leakage occurs in the connection housing.

Connected to terminals 9 and 10 on terminal block 1.

5. Support bearing temperature

A Pt 100 sensor at the support bearing measure the bearing temperature.
The temperature limits are stored in the pump memory for downloading to the MAS base unit.

Resistance according to table, page 27.

Connected to terminals 37 and 38 on terminal block 2.

6. Oil housing leakage

A capacitive leakage sensor (CLS) in the oil housing issues an alarm if the water content reaches a concentration of approx. 30%.

Connected to terminals 33 and 34 on terminal block 2.

CLS can only be checked when it is connected to a 12V DC supply. To enable the sensor to be checked it must have the correct polarity. It will not however be damaged if plus and minus are switched.

Use the multimeter as an ammeter and connect it in series with the sensor.

Method: If the sensor is accessible the alarm function can be checked by gripping the sensor in your hand. Skin tissue and blood contain a high content of water.

Result	
0 mA	Can indicate one of the following conditions: 1: Sensor has the wrong polarity: check by changing over plus and minus. 2: Breakage in the cable / lead.
4.0 - 8.0 mA 27 to 33 mA	OK condition Alarm current

NOTE!
CLS has a 5 second delay before the alarm current, signalling leakage, is initiated.

7. Pump memory

Inside the pump there is a pump memory, which is connected to the MAS base unit. The memory brings factory preloaded data which is uploaded at first start-up:

— The pump's actual set of pump sensors and Flygt's recommended alarm settings.
— Data plate info.

The pump memory also contains operational data and data to support service:

— Histograms of temperature, vibration and pump cycle length.
— Start and stop registrations.
— Service log comprising a max of 200 lines of text.
— Conditions to prompt for service (based on running time, no of starts or a specific date).

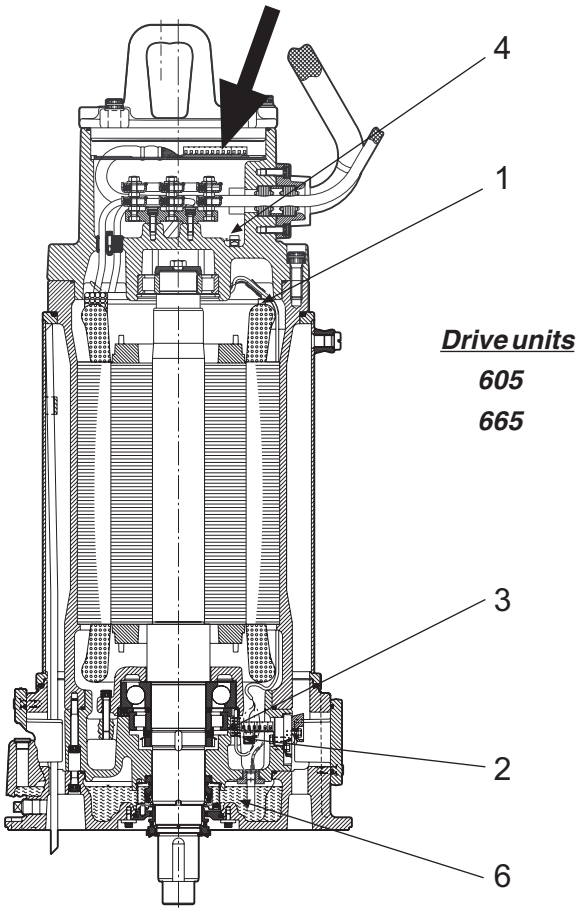
See also "Installation and User manual" for MAS 711 Monitoring system.

8. Vibration sensor

The pump can be equipped with a vibration sensor as an optional monitoring function. The sensor is mounted into the pump connection housing and measures the vibration in one direction. The output is a 4 - 20 mA signal proportional to the vibration level. It is suitable for connection to the MAS system.

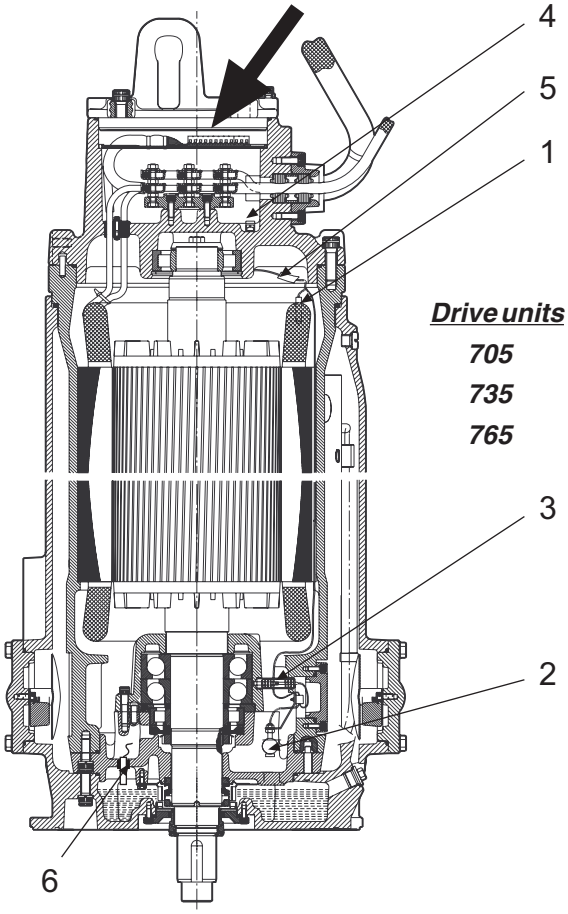
Connected to terminals 78 and 79 on terminal block 2.

View A, see page 14



Drive units
605
665

View A, see page 14



Drive units
705
735
765

EX-Drive units 615, 675, 715, 745 and 775

1. Stator winding temperature

A basic function for monitoring of stator winding temperature is that the motor should be shut off at high temperature. For this the pumps are always equipped with thermal switches or PTC-thermistors. As standard, there is also one Pt 100 sensor incorporated in one of the windings for measuring and logging of temperature. By using an analoge sensor two adjustable alarm limits can be used, one for warning (B-alarm) and one for pump stop (A-alarm).

Available as option, the temperature can be measured with Pt 100 in all three phases.

Totally with the MAS system, there are four alternative methods for monitoring the stator winding temperature where alternative "A" and “B” are standard. The other alternatives are available on request.

A. The coil ends of the stator winding incorporate three thermal switches connected in series and one Pt 100 sensor incorporated in one of the windings. The switches are normally closed and open at 140°C (285°F).

B. The coil ends of the stator windings incorporate three thermistors connected in series and one Pt 100 sensor incorporated in one of the windings.

T*Ref*=140°C (285°F).

C. The coil ends of the stator winding incorporate three thermal switches connected in series and three Pt 100 sensors, one for each phase, incorporated in the windings. The switches are normally closed and open at 140°C (285°F).

D. The coil ends of the stator windings incorporate three thermistors connected in series and three Pt 100 sensors, one for each phase, incorporated in the windings.

T*Ref*=140°C (285°F).

The thermal switches and the thermistors are connected to terminals 51-61, 52-62, 53-63 on terminal block 1.

The Pt 100 sensors, one for each phase, are connected individually to terminals 19-20 on terminal block 1 and terminals 21-22, 23-24 on terminal block 2.

Checking of sensors should be performed in the same way as for the standard drive units, see page 24.

2. Stator housing leakage

A float switch in the lower part of the stator housing reacts if liquid enters the stator housing.

Resistance: normal 1530 ohms
at alarm 330 ohms

Connected to terminals 1 and 2 on terminal block 1.

Measure ohms by using a multimeter to establish either of conditions (or both if the sensor is accessible).

3. Main bearing temperature

A Pt 100 sensor at the main bearing measure the bearing temperature.
The temperature limits are stored in the pump memory for downloading to the MAS base unit.

Resistance according to table, page 27.

Connected to terminals 3 and 4 on terminal block 1.

NOTE! The Pt 100 sensor may not be connected to a higher voltage than 2.5 V.

4. Connection housing leakage

A float switch in the connection housing reacts if leakage occurs in the connection housing.

Connected to terminals 9 and 10 on terminal block 1.

5. Support bearing temperature

A Pt 100 sensor at the support bearing measure the bearing temperature.
The temperature limits are stored in the pump memory for downloading to the MAS base unit.

Resistance according to table, page 27.

Connected to terminals 37 and 38 on terminal block 2.

6. Pump memory

Inside the pump there is a pump memory, which is connected to the MAS base unit. The memory brings factory preloaded data which is uploaded at first start-up:

— The pump’s actual set of pump sensors and Flygt’s recommended alarm settings.
— Data plate info.

The pump memory also contains operational data and data to support service:

— Histograms of temperature, vibration and pump cycle length.
— Start and stop registrations.
— Service log comprising a max of 200 lines of text.
— Conditions to prompt for service (based on running time, no of starts or a specific date).

See also “Installation and User manual” for MAS 711 Monitoring system.

7. Vibration sensor

The pump can be equipped with a vibration sensor as an optional monitoring function. The sensor is mounted into the pump connection housing and measures the vibration in one direction. The output is a 4 - 20 mA signal proportional to the vibration level. It is suitable for connection to the MAS system.

Connected to terminals 78 and 79 on terminal block 2.

— Reassemble all inspection covers.

NOTE! Always fit new O-rings.

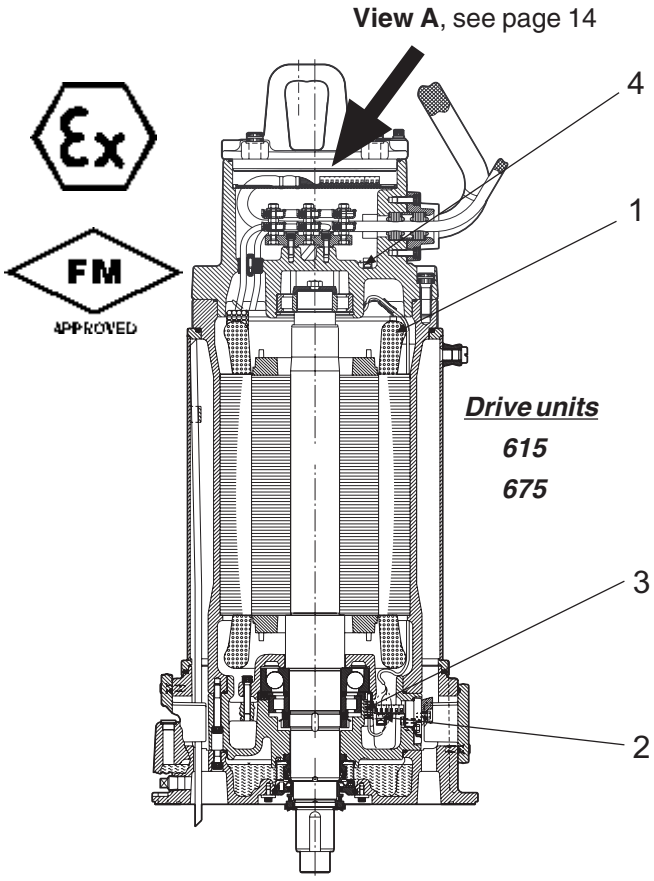
— Check the zinc anodes (if applicable) to make sure they are large enough and intact. Replace after approx. 75% consumption.

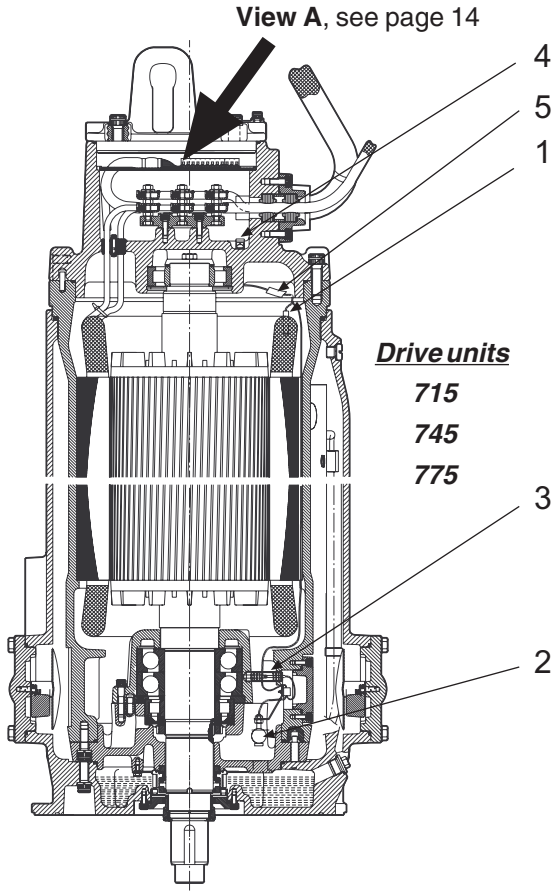
— Check that all screws are tightened to the correct torque according to specifications in parts list.

Pt 100, Temperature/resistance relationship

R (0) = 100,00 Ω α = 0,003 850

°C EIPT-68	0	1	2	3	4	5	6	7	8	9	10	°C EIPT-68
0	100,00	100,39	100,78	101,17	101,56	101,95	102,34	102,73	103,12	103,51	103,90	0
10	103,90	104,29	104,68	105,07	105,46	105,85	106,24	106,63	107,02	107,40	107,79	10
20	107,79	108,18	108,57	108,96	109,35	109,73	110,12	110,51	110,90	111,28	111,67	20
30	111,67	112,06	112,45	112,83	113,22	113,61	113,99	114,38	114,77	115,15	115,54	30
40	115,54	115,93	116,31	116,70	117,08	117,47	117,85	118,24	118,62	119,01	119,40	40
50	119.40	119.78	120.16	120.55	120.93	121.32	121.70	122.09	122.47	122.86	123.24	50
60	123.24	123.62	124.01	124.39	124.77	125.16	125.54	125.92	126.31	126.69	127.07	60
70	127.07	127.45	127.84	128.22	128.60	128.98	129.37	129.75	130.13	130.51	130.89	70
80	130.89	131.27	131.66	132.04	132.42	132.80	133.18	133.56	133.94	134.32	134.70	80
90	134.70	135.08	135.46	135.84	136.22	136.60	136.98	137.36	137.74	138.12	138.50	90
100	138.50	138.88	139.26	139.64	140.02	140.39	140.77	141.15	141.53	141.91	142.29	100
110	142.29	142.66	143.04	143.42	143.80	144.17	144.55	144.93	145.31	145.68	146.06	110
120	146.06	146.44	146.81	147.19	147.57	147.94	148.32	148.70	149.07	149.45	149.82	120
130	149.82	150.20	150.57	150.95	151.33	151.70	152.08	152.45	152.83	153.20	153.58	130
140	153.58	153.95	154.32	154.70	155.07	155.45	155.82	156.19	156.57	156.94	157.31	140
150	157.31	157.69	158.06	158.43	158.81	159.18	159.55	159.93	160.30	160.67	161.04	150





Changing the oil

WARNING.
The oil housing may be pressurized. Hold a rag over the oil plug to prevent oil spraying out.

Unscrew the oil housing plugs. Pump out the oil using oil drainage pump 83 95 42 or the equivalent. Make sure that the plastic tube goes all the way to the bottom of the oil housing.

Fill up with new oil. The oil housing contains the following amounts of oil (volume values in litres (US quarts):

— 6x5 series drive units 4.5 litres (4.7 US quarts)

— 7x5 series drive units 5.5 litres (5.8 US quarts)

The pumps are delivered from the factory with a tasteless and odourless paraffin oil suitable for raw- or clean-water applications. This oil is authorized according to FDA 172.878.

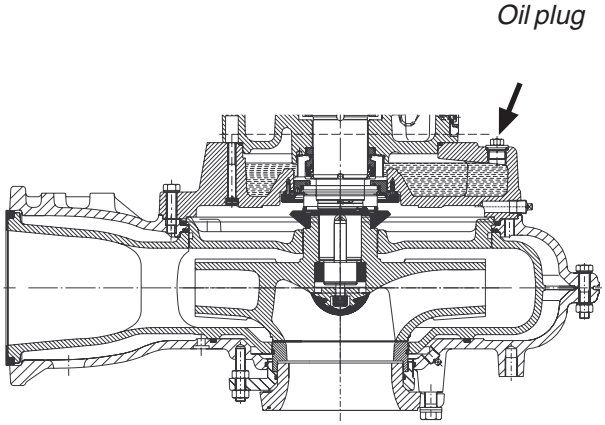
Oil type Mobil Whiterex or Shell Ondina etc. with viscosity class ISO VG 15 to 32 can be used.

Check that the oil reaches up to the oil holes. The pump should be standing vertically.

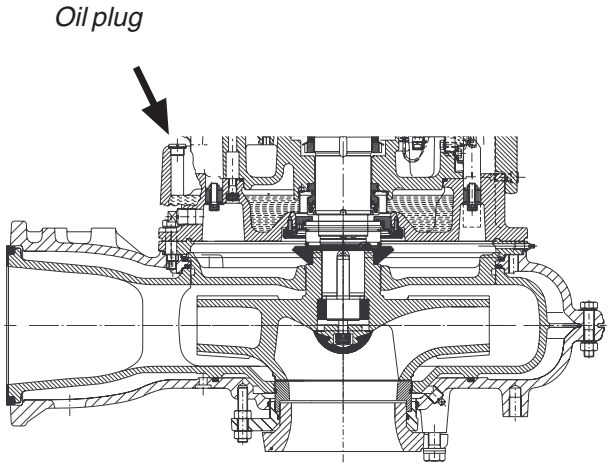
Always replace the O-rings of the oil plugs. Put the plugs back and tighten them. Tightening torque 80 Nm (60 ft lb).

— Check the paint; if damaged, repaint.

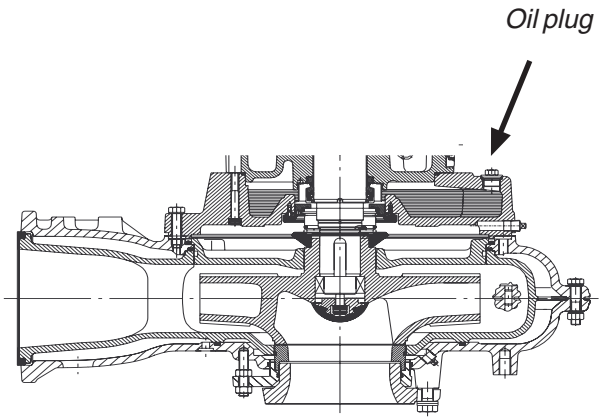
Drive units 6xx without cooling jacket



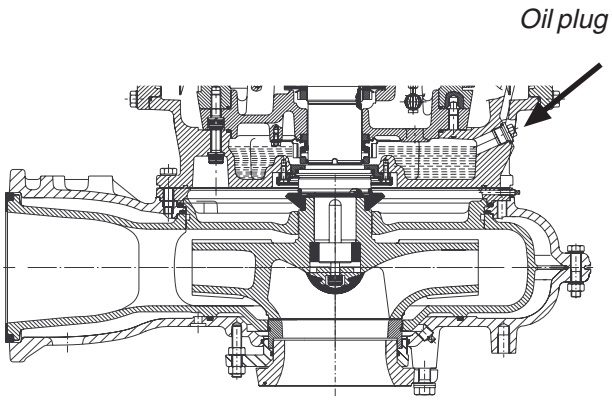
Drive units 6xx with cooling jacket



Drive units 7xx without cooling jacket



Drive units 7xx with cooling jacket



HYDRAULIC UNIT

Replacing the impeller

When fitting the new wear parts, a clearance must be provided between the impeller (160) and the wear ring (170) of at least 0.2—0.3 mm.

Check after installation that the impeller rotates freely.

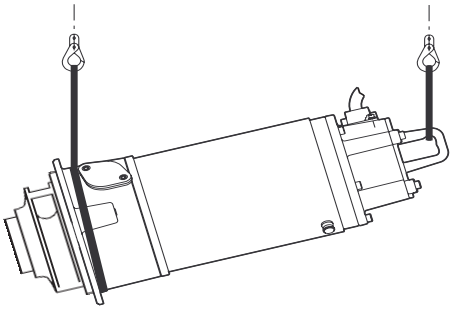
Removing the impeller

Two sets of lifting equipment are required to handle the pump for repair work.

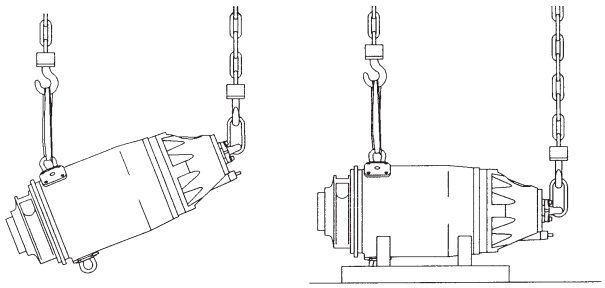
Disconnect and lift off the drive unit from the pump housing. Lay the drive unit on its side. Make sure it cannot roll.

WARNING!
For personal safety reasons and to avoid damage to the impeller, seals or bearings the drive unit must never be placed on the shaft end or the impeller.

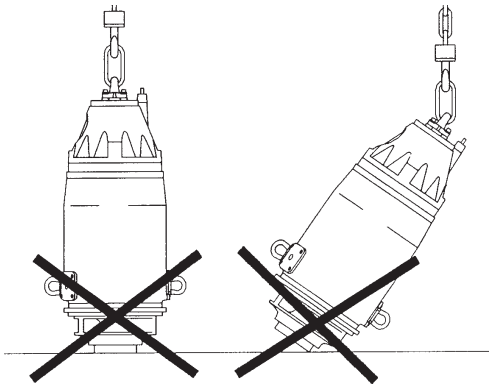
Use the lifting method below.



Drive units 605 — 775



Drive units 705 — 775



WARNING! Worn impellers and agitators often have very sharp edges.

Remove the wear protection (153).

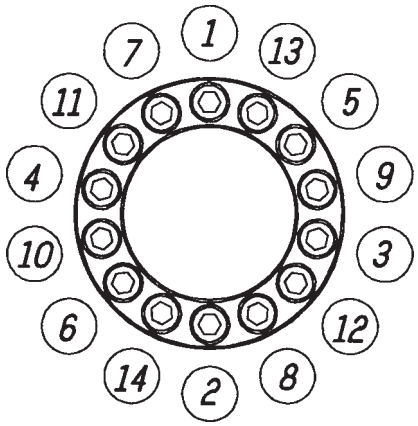
Remove the protective plastic plug (155).

Hold the impeller firmly with a crow bar and remove the impeller screw (152), washer and ring.

Insert a protective seal plug so that the end of the shaft won't be damaged.

Remove the locking assembly (177).

Loosen the screws on the locking assembly evenly in a diagonal pattern and in sequence according to the picture below



Use a puller to remove the impeller.

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 O-ring (173) is undamaged.
Replace if necessary.

— that the key is seated in the keyway on the shaft.

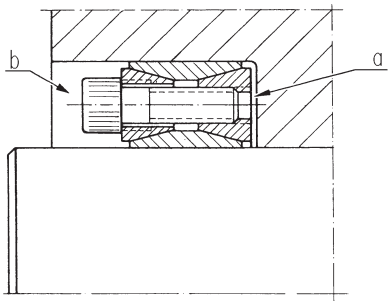
Apply anti-seize oil to the shaft end and the inside of the impeller hub.

Check the wear on the expeller (167). Replace if necessary.

Check the clearance between the wear cover (165) and the impeller hub. The clearance should not exceed 5 mm (1.5 in). If it does, the wear cover should be replaced.

Press the impeller on to the shaft.

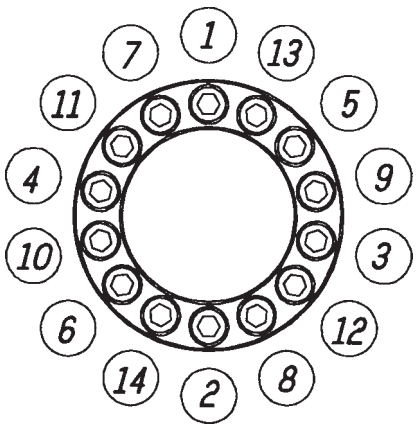
Installing the locking assembly (177).



Fit the locking assembly (well oiled) in the impeller hub without tightening any screws.

Oil containing Molybdenum disulphide (MoS_2) should not be used.

Tighten the screws manually in sequence all around until the locking assembly keeps the impeller/impeller hub in place.



Put the ring, washer and impeller screw (152) in place.

Tighten the impeller screw (152) with a torque of 140 Nm (105 ft lb).

Check that the impeller can easily be rotated by hand.

Fit the plastic plug (155) and wear protection (153).

Fit the drive unit to the pump housing and tighten the screws.

Before tightening the drive unit, check that the impeller can rotate freely, without friction from the wear ring (170).

Trim clearance 0.2 mm.

Replacing the wear lining

Removing the wear parts

Disconnect and lift off the drive unit from the pump housing. Lay the drive unit on its side. Make sure it cannot roll.

Remove the impeller (160).

Use crowbars to help lift off the wear ring cover (165) and remove the expeller (167).

Check the wear ring cover and the expeller. Replace if necessary.

Turn the volute upside down and unscrew the suction cover (164). Use two crowbars if it's difficult to remove the cover.

Remove the O-ring (157) and then the trimming flange (172).

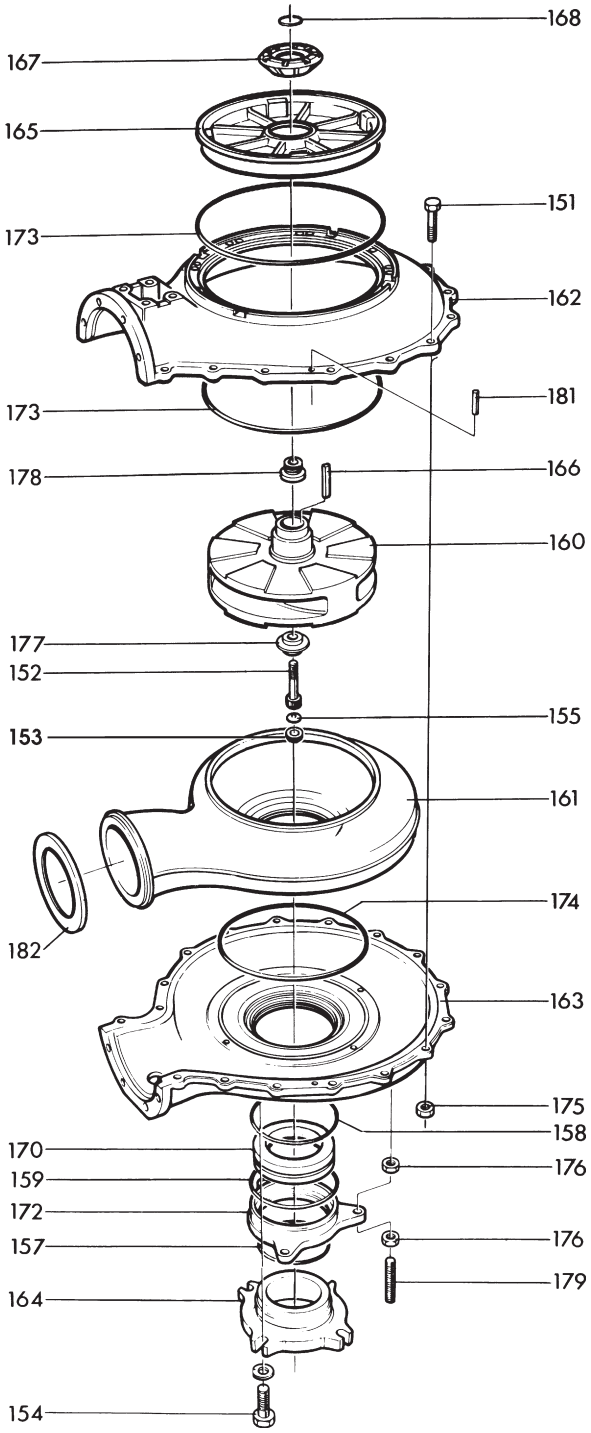
Remove the O-rings (158) and (159).

Unscrew the screws (151) and nuts (175) that keep the volute halfes together (162, 163).

Use two crowbars to separate them.

Remove the O-rings (174) and (173) and the rubber gasket (182).

Lift off the lining (161) from the volute.



Reassembling the wear parts

Make sure that the parts are cleaned and free of burrs.

Polish off any flaws with fine emery cloth.

Replace all O-rings with new ones.

Put back the expeller (167) and the wear cover (165). Knock the wear cover in place with a plastic mallet.

Grease the O-ring (173) and put it in place.

Mount the impeller, see “Installing the impeller”.

Place the lower volute half (163) on the floor.

Grease the O-ring (174) and put it in place.

Fit the wear lining (161).

Put on the upper half of the volute.

Press the O-ring (173) between the lining and the upper half of the volute. If the O-ring does not fit, use a screwdriver to lift the volute. This makes it’s easier to fit the O-ring.

Tighten the screws (151) and nuts (175) that hold the volute halves together.

Mount the rubber gasket (182) at the outlet.

Make sure the gasket is firmly in position.

Lower the drive unit into the volute and tighten the screws.

Lay the pump on it’s side.

Clean the groove for the O-ring (158) in the bottom of the volute. Grease the O-ring and insert it.

Check the wear ring (170) and the O-rings (157) and 159).

Replace if necessary and put the O-rings in place.

Insert the trimming flange (172) and tighten the nut.

With your hand, make sure that the impeller can rotate freely, without friction from the trimming flange. Clearance 0.2—0.3 mm.

Tighten the inner nuts.

Fit the O-ring (157).

Mount the suction cover (164), and tighten screws.

Installing the agitator propeller

Assembly the agitator propeller unit

Remove the strainer if installed.

Lock the impeller with a rod (wood or plastic) through the inlet and remove the wear protection, plastic plug and impeller screw.

Fit the barrel nut (2).

Fit the new impeller screw (1) and tighten it to a torque of 140 Nm (105 ft lb).

Apply some grease on the contact surfaces between the shaft (3) and the barrel nut (2).

Fit the shaft (3) into the barrel nut (2) and tighten it to a torque of 630 Nm (464 ft lb) using the key handle on the shaft.

Fit the strainer.

Apply a little grease into the tapered hole in the agitator propeller (4).

Fit the propeller to the shaft end.

Fit the retainer ring (6) washer (5) and screw (7) into the place and tighten to 100 Nm (74 ft lb).

Fit the protective plug (8) into the propeller.

Check that the propeller can rotate freely by rotating the agitator by hand.

Removing the propeller

Remove the wear protection plug (8).

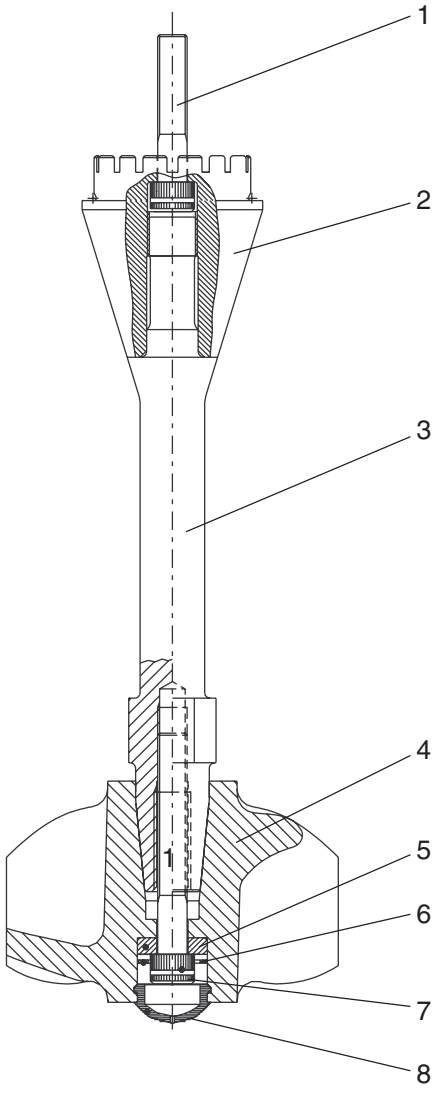
Untighten and remove the screw (7).

Remove the retaining ring (6) and washer (5).

Put back the screw (7).

Place the washer (5) on top of the screw and insert the retaining ring (6) into the groove in the propeller.

Unscrew the screw. Puller operation is obtained by the head of the screw pressing the propeller outwards.



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 should be performed by an authorized electrician.

Follow local safety regulations and observe recommended safety precautions.

1. Pump fails to start

Is an alarm signal indicated ont the control panel?

Yes →

Check the cause:

— At high bearing temperature, wait until the machine has cooled. If the bearing temperature is still high, contact a Flygt service shop.

— If the stator temperature is high, check that the cooling system is working and that the impeller rotates easily.

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

Check that the overload protection is reset.

No ↓

Can the pump be started manually?

Yes →

a) Fault in level equipment (start sensors).
Clean or replace.

b) Fault in control equipment.

Check:

— that all connections are intact.

— relay and contactor coils.

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

No ↓

Is the installation receiving voltage?

No →

Check:

— that the main power switch is on.

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

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

— that all fuses have continuity and are tight.

— that the overload protection is reset.

— that there is no break in the motor cable.

Yes ↓

Is the impeller stuck?
WARNING: disconnect power before checking the impeller.

Yes →

Clean.

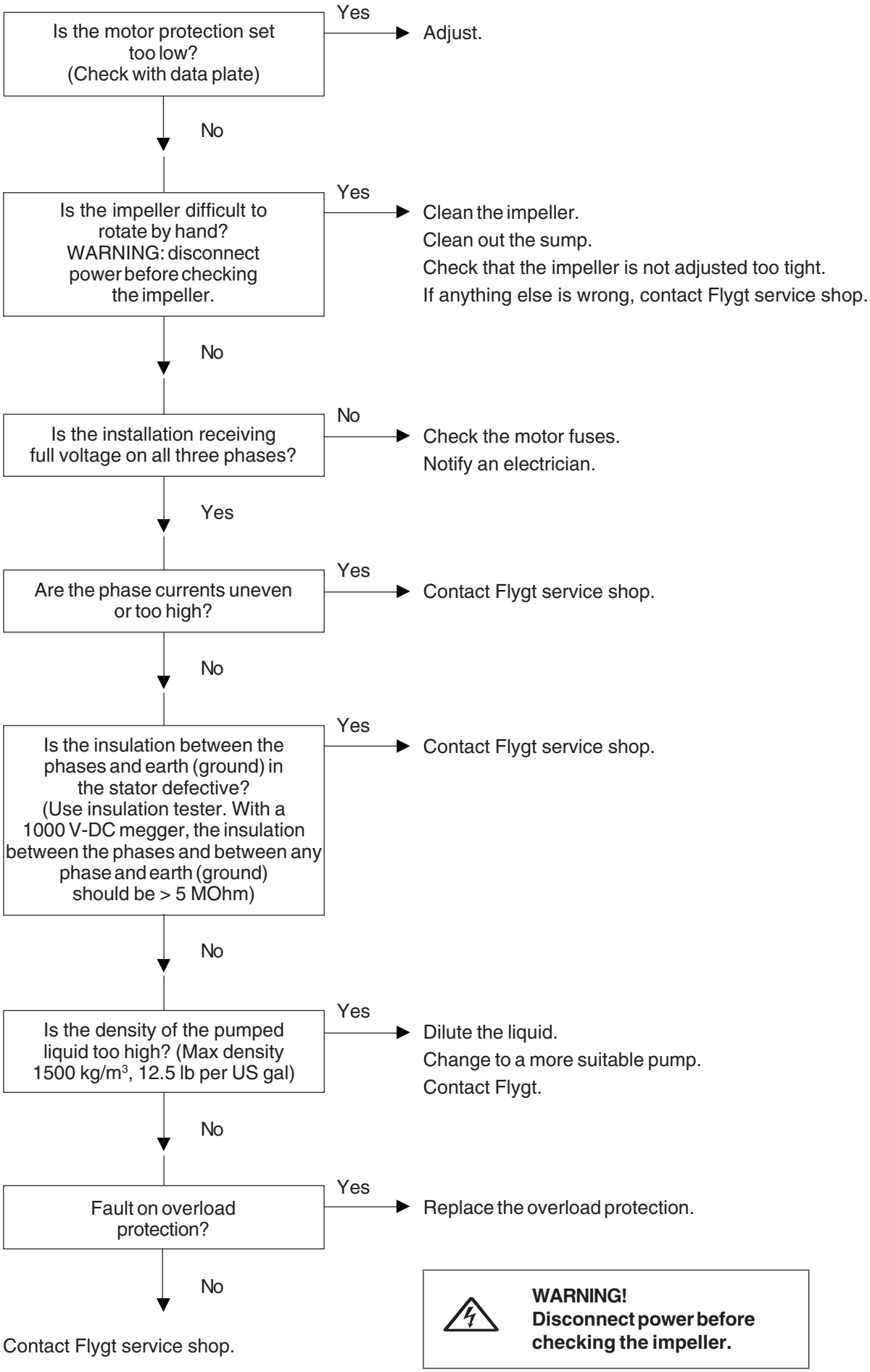
Clean the sump.

WARNING!
Disconnect power before checking the impeller.

No ↓

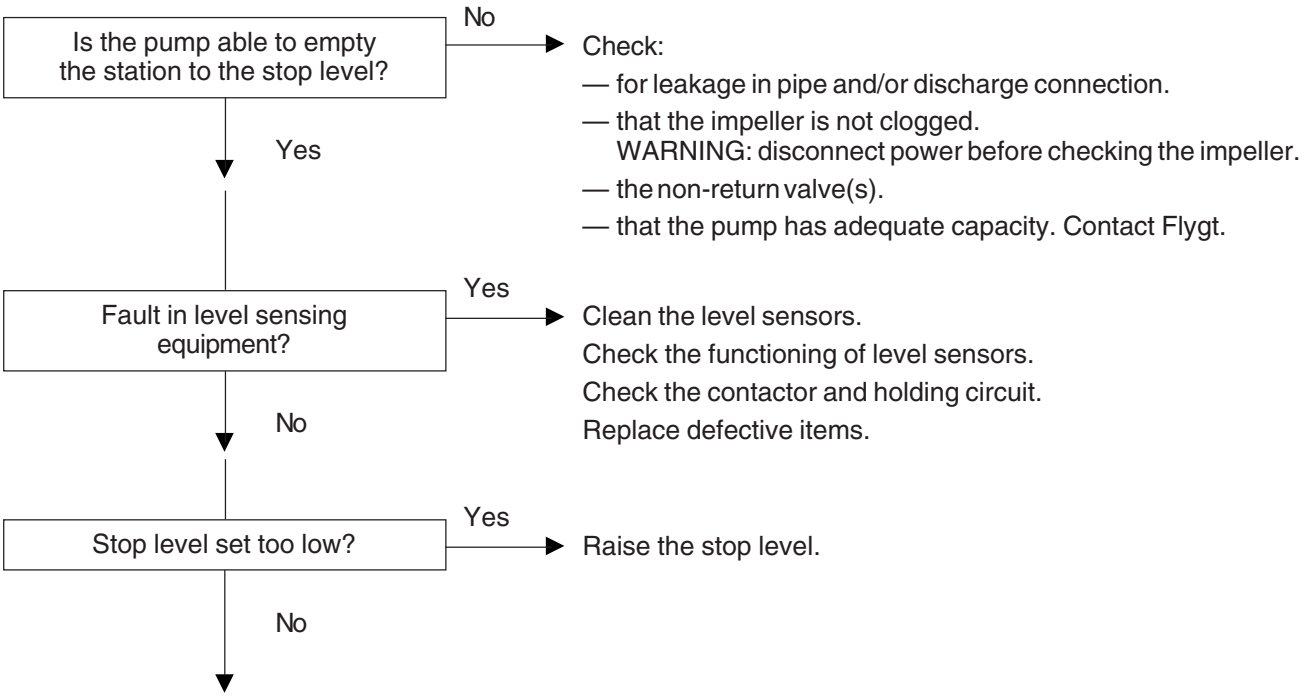
Contact Flygt service shop.

2. Pump starts but motor protection trips

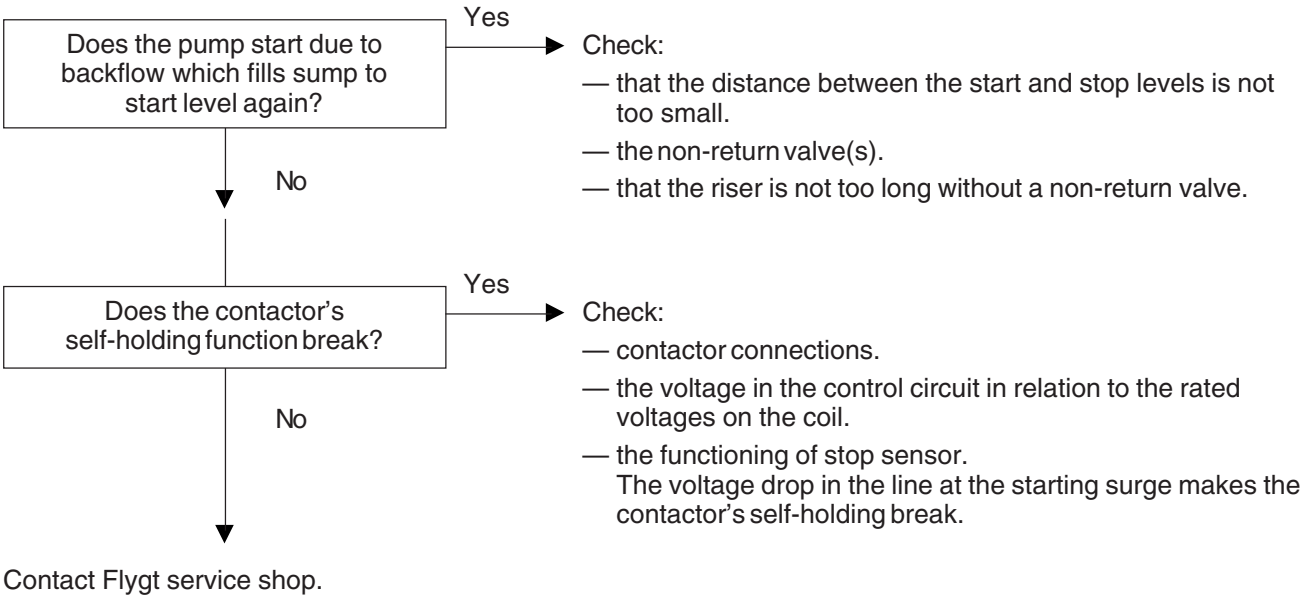


WARNING!
Disconnect power before checking the impeller.

3. The pump does not stop (when level control is used)



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



WARNING!
Disconnect power before checking the impeller.

5. Pump runs but delivers too little or no water

Check:

— direction of rotation of the pump.

— 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 housing/flange.

See also under “Inspection”.

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

ACCESSORIES AND TOOLS

Zinc anode set

5570/6XX 614 31 00, 614 32 00, (for the drive unit)
441 20 00 (for the hydraulic unit)

5570/7XX: 566 55 00, 614 31 00, 94 66 73 (for the drive unit)
441 20 00 (for the hydraulic unit)

Level sensor

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

Tools

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

Order No.	Description
84 15 66	Torque wrench 0—137 Nm

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

SERVICE LOG

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

H5570. 01.04 Eng. 08.05 © ITT FLYGT AB 894530

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