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TO:	Bill Hester		
FROM:	Warner Robson		
SECTION:	Operations Engineering	DATE:	21st April 2010

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The following documents are new or revised issue and are issued herewith for you to file and use.

Document No.	Description	Copy No.	Revision No.	Stamped Date
O & M	Sections 1 & 2 for G11 Waterford Rd Gailes	3		05/04/09
O & M	Switchboard O & M for G11 Waterford Rd Gailes	3		05/04/09
O & M	Sections 4 & 5 for G11 Waterford Rd Gailes	3		05/04/09

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NAME: BILL HESTER
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DATE: 22/4/10
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Leighton Contractors
Operating and Maintenance Manual

SEWERAGE PUMPING STATION G11
IPSWICH LOGAN MOTORWAY INTERCHAGE UPGRADE

SEWERAGE PUMP STATION G11

IPSWICH LOGAN MOTORWAY INTERCHANGE UPGRADE

OPERATING AND MAINTENANCE MANUAL

Section 4 and 5

OCTOBER 2009

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1.2. Flygt Pump Parts List

1.3. Flygt Product Date – Medium Sized Waste water pumps

2.0. Construction Drawings- Civil Drawings As Constructed Drawings of Layout and Levels

**MANILLA
WHITE
DIVIDERS
10 TAB A4**



Ref No: 37400
Made in China
www.marbig.com

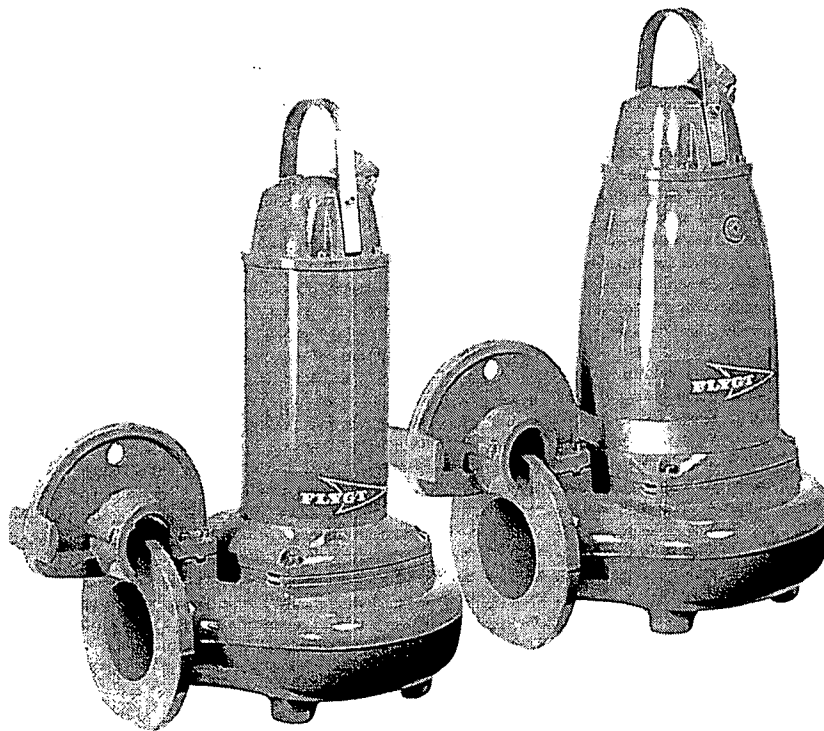


9 312311 374000



Installation, Care and Maintenance

3153



895381/08

Flygt



ITT Industries

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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 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 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 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. 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 the electric current and the chemical and physical characteristics of the gas and/or vapours present in hazardous areas.
- Flygt disclaims all responsibility for work done by untrained, unauthorized personnel.

GUARANTEE

ITT 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 faults are reported to Flygt or Flygt's representative during the guarantee period;
- that the product is used only under condition described in the Installation, Care and Maintenance manual and in applications for which it is intended;
- that the monitoring equipment incorporated in the product is correctly **connected** and **in use**;
- that all service and repair work is done by a work shop authorized by Flygt;
- that genuine Flygt parts are used.

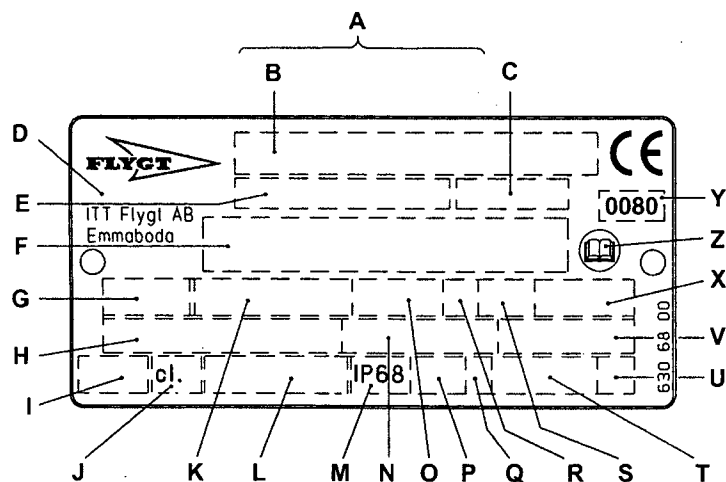
Hence, the guarantee does not cover faults caused by deficient maintenance, improper installation, incorrectly executed repair work or normal wear and tear.

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

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

DATA PLATE INTERPRETATION

General data plate

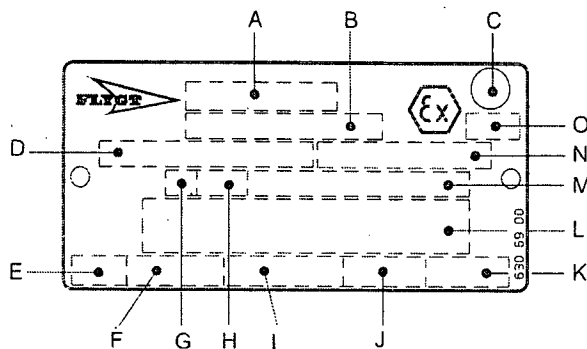


- A Serial number
- B Product code + Number
- C Curve code / Propeller code
- D Country of origin
- E Product number
- F Additional information
- G Phase; Type of current; Frequency
- H Rated voltage
- I Thermal protection
- J Thermal class
- K Rated shaft power
- L International standard
- M Degree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

Approval plates

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

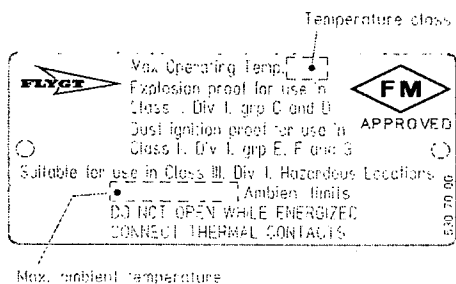
EN: European Norm
ATEX Directive
EN 50014, EN 50018, EN 1127-1
Ex II 2 G EEx dII B T3 for ambient temperatures $\leq 40^{\circ}\text{C}$



- 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

EN approval for the Cable entry

Certificate number: INERIS 03ATEX9008 U
Ex II 2 G or IM2 EEx d IIC or EEx d I



PRODUCT DESCRIPTION

Introduction

Thank you for buying a submersible ITT Flygt pump. In this Installation, Care and Maintenance manual you will find general information on how to install and service the 3153 pump to give it a long and reliable life.

Application

This Installation, Care and Maintenance manual applies to a submersible ITT Flygt pump.

If you have bought an Ex-approved pump (please see approval plate on your pump or Parts List) special handling instructions apply as described in this document.

The pump is intended to be used for;

- pumping of waste water
- pumping of raw or clean water
- pumping of sludge

Installation alternatives

P = semi permanent wet well arrangement with pump installed by means of twin guide bars with automatic connection to discharge.

S = transportable version with hose connection or flange for connection to discharge pipeline.

T = permanent dry well or in-line arrangement with flange connection to suction and discharge pipework; vertical mounting.

Z = permanent dry well or in-line arrangement with flange connection to suction and discharge pipework; horizontal mounting.

In **T**-, **Z**- and **S**-installations the pump must be equipped with cooling jacket.

For further information on applications, contact your nearest Flygt representative.

Pump versions

LT = low head execution

MT = medium head execution

HT = high head execution

SH = super high head execution

Liquid temperature: max. 40°C (104°F)

Also available in an execution for liquid temperature up to 70°C (158°F) only with cooling jacket.

Higher temperatures than 40° C (104° F) are not permitted for the Ex-approved pumps.

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

The pH of the pumped liquid: 5.5 —14.

Lowest liquid level: See illustration on page 8.

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

Recycling

Local and/or private laws and regulations regarding recycling must be followed. If there are no laws or regulations, or the product is not accepted by an authorized recycling company, the product or its parts can be returned to the nearest Flygt sales company or service workshop.

Weights

See Dimensional Drawings.

Motor data

50 Hz, 7.5 kW, 1460 r/min, 3- phase, 4-pole

Voltage V	Rated current A	Starting current A
230 D	29	168
380 D	17	96
400 D	16	91
400 Y	17	98
415 D	15	86
440 D	16	88
500 D	13	70
660 Y	9.9	56
690 Y	9.3	52

50 Hz, 9.0 kW, 1460 r/min, 3-phase, 4-pole

Voltage V	Rated current A	Starting current A
230 D	32	181
380 D	20	114
400 D	19	107
400 Y	19	105
415 D	18	105
440 D	19	107
500 D	15	86
660 Y	11	66
690 Y	11	62

50 Hz, 13.5 kW, 1455 r/min, 3-phase, 4-pole

Voltage V	Rated current A	Starting current A
230 D	47	250
380 D	28	150
400 D	28	150
400 Y	27	145
415 D	26	133
440 D	26	143
500 D	21	112
660 Y	16	87
690 Y	16	86

50 Hz, 9.0 kW, 955 r/min, 3-phase, 6-pole

Voltage V	Rated current A	Starting current A
230 D	36	151
380 D	22	95
400 D	21	90
400 Y	21	88
415 D	20	81
440 D	20	87
500 D	17	73
660 Y	13	55
690 Y	12	52

50 Hz, 15.0 kW, 2925 r/min, 3-phase, 2-pole

Voltage V	Rated current A	Starting current A
230 D	47	370
380 D	29	239
400 D	27	213
400 Y	27	216
415 D	27	222
440 D	28	238
500 D	22	187
660 Y	17	138
690 Y	16	123

Motor data

**60 Hz, 12 hp, (8.9 kW) 1755 r/min,
3-phase, 4-pole**

Voltage V	Rated current A	Starting current A
200 D	36	216
208 D	36	227
230 Y//	33	204
380 D	19	115
380 Y	20	124
440 D	17	101
460 D	16	95
460 Y ser	16	102
575 D	13	73
600 D	12	78

**60 Hz, 15 hp, (11.2 kW) 1755 r/min,
3-phase, 4-pole**

Voltage V	Rated current A	Starting current A
200 D	44	246
208 D	43	259
230 Y//	39	228
380 D	23	133
380 Y	23	139
440 D	20	121
460 D	19	112
460 Y ser	19	114
575 D	15	90
600 D	15	95

**60 Hz, 20 hp, (14.9 kW) 1755 r/min,
3-phase, 4-pole**

Voltage V	Rated current A	Starting current A
200 D	59	330
208 D	58	345
230 Y//	52	296
380 D	31	186
380 Y	31	180
440 D	26	158
460 D	26	157
460 Y ser	26	148
575 D	21	116
600 D	21	123

**60 Hz, 15 hp, (11.2 kW) 1150 r/min,
3-phase, 6-pole**

Voltage V	Rated current A	Starting current A
200 D	49	214
208 D	49	225
230 Y//	46	212
380 D	26	114
380 Y	26	109
440 D	23	100
460 D	21	95
460 Y ser	22	101
575 D	17	76
600 D	17	81

**60 Hz, 23 hp, (17.2 kW) 3525 r/min,
3-phase, 2-pole**

Voltage V	Rated current A	Starting current A
200 D	59	460
208 D	58	480
230 Y//	52	415
440 D	28	243
460 D	26	215
460 Y ser	26	207
575 D	21	189
600 D	21	198

DESIGN OF THE PUMP

Motor

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

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

The motor can be run continuously or intermittently with a maximum of 30 evenly spaced starts per hour. Flygt motors are tested in accordance with IEC 34-1.

The stator is insulated in accordance with class H (180°C, 360 F). The motor is designed to supply its rated output at $\pm 10\%$ variation of the rated voltage. Without overheating the motor, $\pm 10\%$ variation of the rated voltage can be accepted provided that the motor does not run continuously at full load.

Monitoring equipment

The stator incorporates three thermal contacts connected in series that activate an alarm at overtemperature.

The thermal contacts: open at 140°C (285°F). The sensors shall be connected to Flygt's monitoring unit MiniCAS II or equivalent unit.

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

The 3153 is supplied with inspection sensor FLS10 for sensing the presence of any liquid in the inspection chamber.

Cooling

The pump is cooled by the ambient liquid. For lowest liquid level, see illustration below.

Bearings

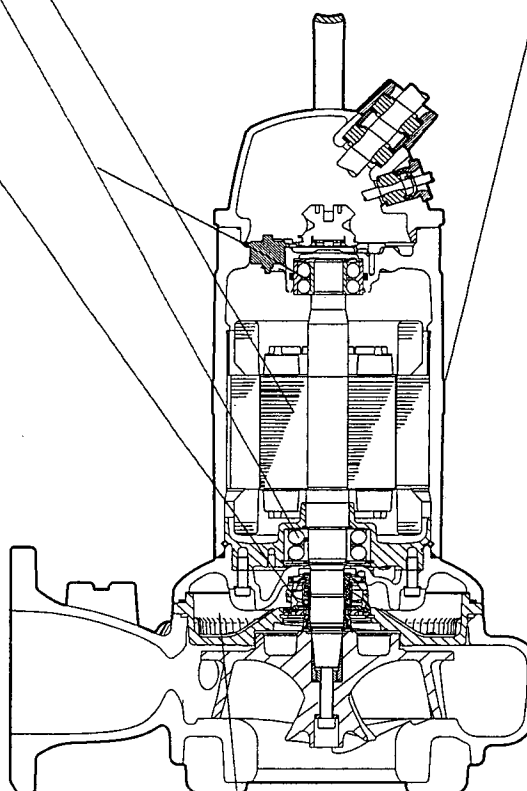
The support bearing of the shaft is a double row ball bearing. The main bearing of the shaft is a double row angular contact ball bearing.

Mechanical seal unit

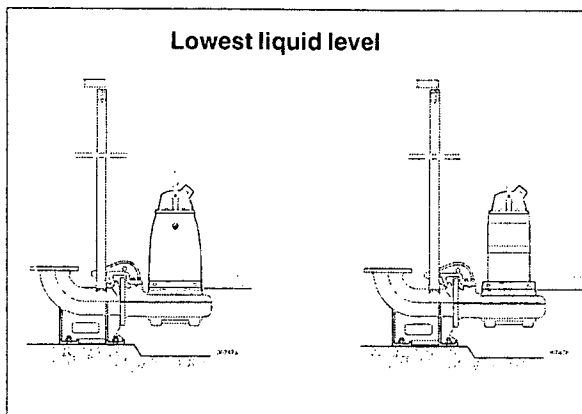
The pump has one shaft mechanical seal unit consisting of two independently operating seals:

- | | | |
|--------|-------------|---|
| Alt I | Inner seal: | Corrosion resistant cemented carbide WCCR/WCCR |
| | Outer seal: | Corrosion resistant cemented carbide WCCR/WCCR |
| Alt II | Inner seal: | Corrosion resistant cemented carbide/Aluminum Oxide WCCR/ Al_2O_3 |
| | Outer seal: | Silicon Carbide RSiC/RSiC |

Without cooling jacket



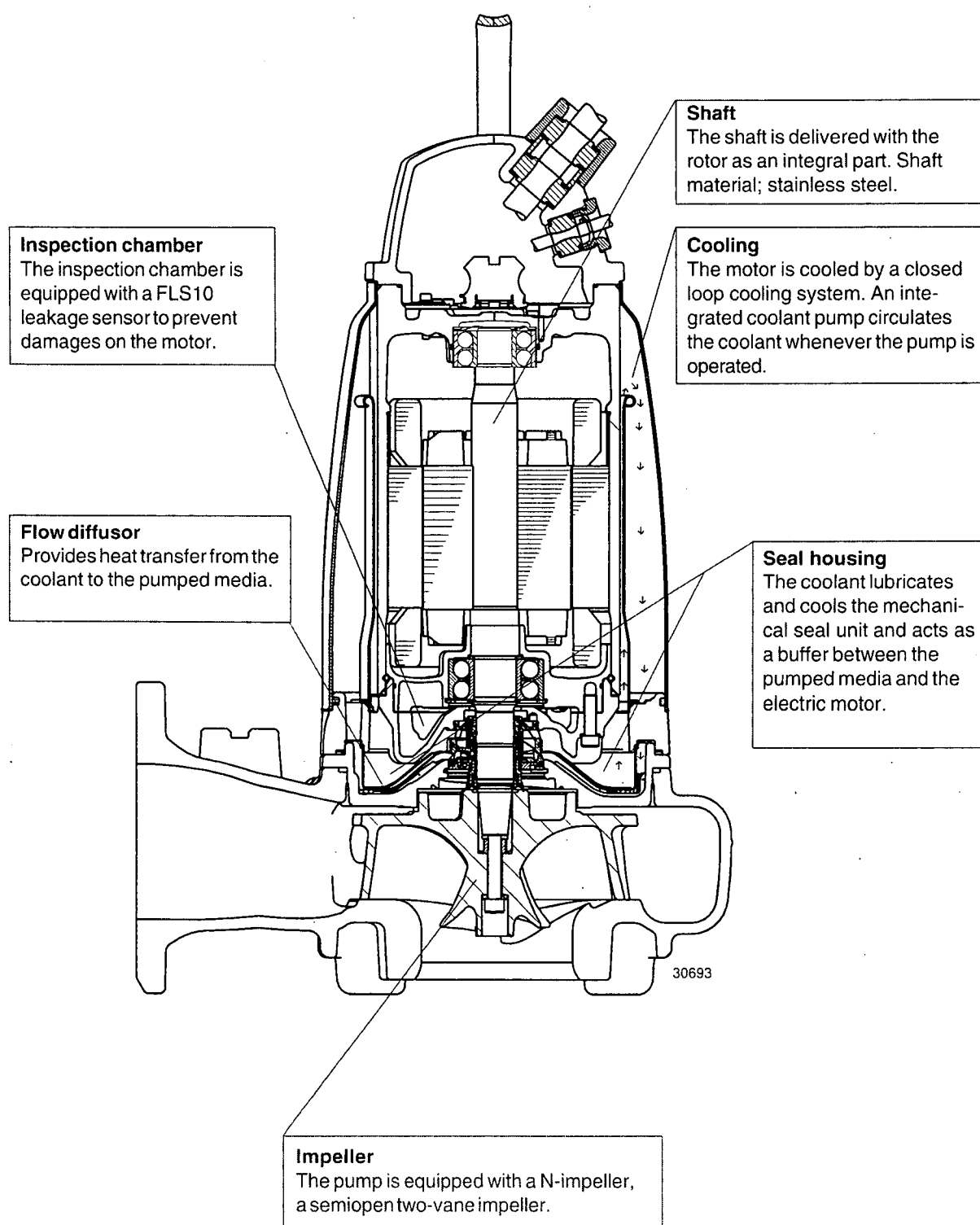
Lowest liquid level



Seal housing

A coolant fluid lubricates and cools the mechanical seal unit and acts as a buffer between the pumped media and the electric motor.

With cooling jacket



TRANSPORTATION AND STORAGE

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

WARNING!

Always lift the pump by its lifting handle.
 Never by the motor cable or the hose.

The pump is frostproof as long as it is operating or is immersed. If the pump is hoisted from the sump when the temperature is below the freezing point, the impeller and shaft seal may freeze.

A frozen impeller and shaft seal 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. The pump should run for a few seconds after being taken up in order to expel all remaining water from the hydraulic end.

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 seal rings 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 shaft seal and the cable entry.

Follow the instructions under the heading "Before starting".

INSTALLATION

Handling equipment

Always pay extra attention to safety aspects when working with lifting equipment.

Lifting equipment is required for handling the pump. The lifting chain and the shackle should be in stainless steel and inspected every year.



- Stay clear of suspended loads.
- Always lift the pump by its lifting handle – never by the motor cable or the hose.

The minimum height between the lifting hook and the floor shall be sufficient to lift the pump out of the sump.

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

Oversized lifting equipment could cause damage if the pump should stick when being lifted.

Make sure that the lifting equipment is securely anchored and in good condition.

Check that the lifting handle and chain are in good condition.

To ensure proper installation, please see the dimensions on the dimensional drawing.

WARNING! The end of the cable must not be submerged. It must be above flood level, as water could penetrate through the cable into the junction box or the motor.

For automatic operation of the pump (level control), it is recommended that the level regulators should be used at low voltage. The data sheet delivered with the regulators gives the permissible voltage. Local rules may specify otherwise.

Clean out all debris from the sump before the pump is lowered down and the station is started.



- NOTE for Ex version page 3.
- Minimum stop level should be according to the dimensional drawing.
- The pump must never run dry.

Safety precautions

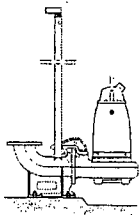
In order to minimize the risk of accidents in connection with service and installation work, the following rules should be followed:

1. Never work alone. Use a lifting harness, safety line and a respirator as required. Do not ignore the risk of drowning.
2. Make sure there are no dangerous gases within the work area.
3. Check the explosion risk before welding or using electric hand tools.
4. Before the pump is installed check that the cable and cable entry have not been damaged during the transportation.
5. Observe strict cleanliness. Do not ignore health hazards.
6. Bear in mind the risk of electrical accidents.
7. Make sure that the lifting equipment is in good condition and comply to local ordinances.
8. Provide a suitable barrier around the work area, e.g. a guard rail.
9. Make sure you have a clear path of retreat.
10. Use safety helmet, safety goggles and protective shoes.
11. All personnel who work with sewage systems must be vaccinated against diseases to which they may be exposed.
12. A first-aid kit must be close at hand.
13. Note that special rules apply to installation in explosive atmosphere.

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

Installation alternatives

P- installation



In the P- installation, the pump is installed on a stationary discharge connection and operates completely or partially submerged in the pumped liquid.

In addition to the pump the following items are required:

Guide bars consisting of two hot dip galvanized or stainless steel pipes.

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

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

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

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

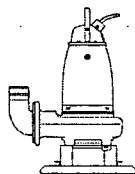
Discharge connection for connecting the pump to the discharge line. The discharge connection has a flange which fits the pump casing flange and a bracket for attaching the guide equipment.

Bushings for vibration damping between the guide bars and the discharge connection.

Instructions

- Provide a barrier around the pump pit, for example a guardrail.
- Arrange for a cable between the sump and the electric control box. Make sure that the cables are not sharply bent or pinched.
- 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 discharge connection in relation to the access frame.
- Place the discharge connection in position and tighten the nuts.
- Secure the guide bars in the bracket.
- Check that the guide bars are 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 level regulators.
- Protect bolts and nuts with corrosion preventive compound.
- Lower the pump along the guide bars.
- Fasten the lifting chain (stainless steel) 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.
- Run 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 bars for inspection without any connections having to be undone.

S- installation

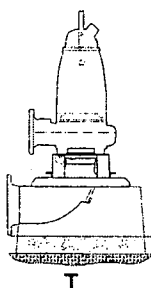


In the S- installation, the pump is transportable and intended to operate completely or partially submerged in the pumped liquid. The pump is equipped with a connection for hose or pipe, see "Parts list".

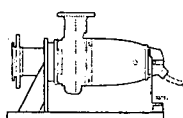
The pump stands on a base stand.

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

T/Z- installation



T



Z

In the T- installation, the pump is installed in a stationary position in a dry well next to the wet sump.

In the Z- installation the pump is installed in a horizontal position on a support stand and a bell-mouth is connected to the inlet pipe.

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

The pump is equipped with a cooling jacket.

In addition to the pump the following items are required:

Support stand for anchoring the pump to a base.

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

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

WARNING! The risk of freezing is particularly great at certain T or Z installations.

Instruction

Bolt the base stand to the concrete base by means of the anchor bolts. Bolt the pump to the base stand and the suction connection.

Connect the motor cable, suction line and discharge line.

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

ELECTRICAL CONNECTIONS



- Before starting work on the pump, make sure that the pump and the control panel are isolated from the power supply and cannot be energized. This applies to the control circuit as well.
- If the pump is equipped with automatic level control, there is a risk of sudden restart.
- If persons are likely to come into physical contact with the pump or pumped media (liquid), e.g on construction sites and farms, the earthed (grounded) socket must have an additional earth-(ground-) fault protection device (GFI) connected.

All electrical work shall be carried out under the supervision of an authorized electrician. Local codes and regulations shall be complied with.



NOTE for Ex version page 3.

- All electrical equipment must be earthed (grounded). 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 (ground) lead is correctly connected by testing it.

- Check the data plate to determine which voltage supply is valid for your pump.
- Check that the main voltage and frequency agree with the specifications on the pump data plate.
- If the pump can be connected to different voltages, the connected voltage is specified by a yellow sticker.
- Connect the motor cable to the starter equipment as illustrated in the wiring diagrams.
- When the pump is connected to the public mains it may cause flicker of incandescent lamps when starting. In this case the supply authority should be notified before installing the pump.

Leads that are not in use must be isolated.

The cable should be replaced if the outer sheath is damaged. Contact a Flygt service shop.
Make sure that the cable does not have any sharp bends and is not pinched.

Under no circumstances may the starter equipment be installed in the sump.

WARNING! For safety reasons, the earth (ground) lead should be approx. 100 mm (4.0") longer than the phase lead. If the motor cable is jerked loose by mistake, the earth (ground) lead should be the last lead to come loose from its terminal. This applies to both ends of the cable.

The motor is convertible between different voltages as stated on the data plate. This conversion is done on the terminal board or the contactor.

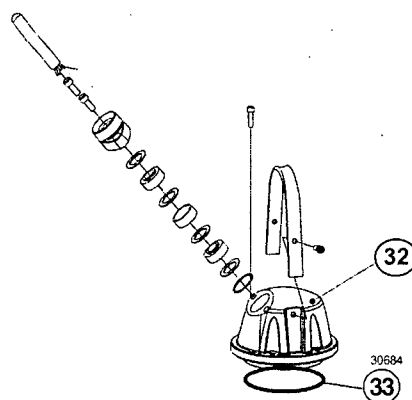


— Bear in mind the risk of electrical shock and the risk of explosion if the electrical connections are not correctly carried out.

When using a variable-frequency-drive (VFD) the shielded cable (type NSSHÖU.../3E+St) should be used in order to fulfil European CE requirements. Contact your Flygt representative and ask your VFD-supplier for electrical limitations. Also please see VFD-recommendation Flygt article no. 893472.

Connection of stator and motor leads

- Check on the data plate which connection, Y, D or YD, is valid for the voltage supply. Then, depending on voltage, arrange the connection on the terminal board in accordance with Y, D or YD. See figure.
- Connect the motor cable to the connection block, U1, V1, W1 and earth (ground). Connect the leads from the motor control circuit.
- If star-delta start is used, motor cables are connected as shown in the figure. Links (jumper strips) are not used with star-delta start.
- Make sure that the pump is correctly earthed (grounded).
- Install the O-ring (33) and connection cover (32).
- Tighten the screws and the gland nut so that the cable entry unit bottoms out.
- Connect the motor cable to the starter equipment.
- Check the direction of rotation, see "Before starting".
- If the direction of rotation is wrong, transpose two of the phase leads.
- Remember that the starting surge with the direct-on line start can be up to six times higher than the rated current. Make sure that the fuses and circuit breakers are of the proper amperage.
- The incorporated thermal contacts must be connected and in use. The pump must be connected to an over-load protection which must be set to rated power.



CABLE CHART

SUBCAB® 7GX

2 parallel cores connected together
 6-leads, Y

3153

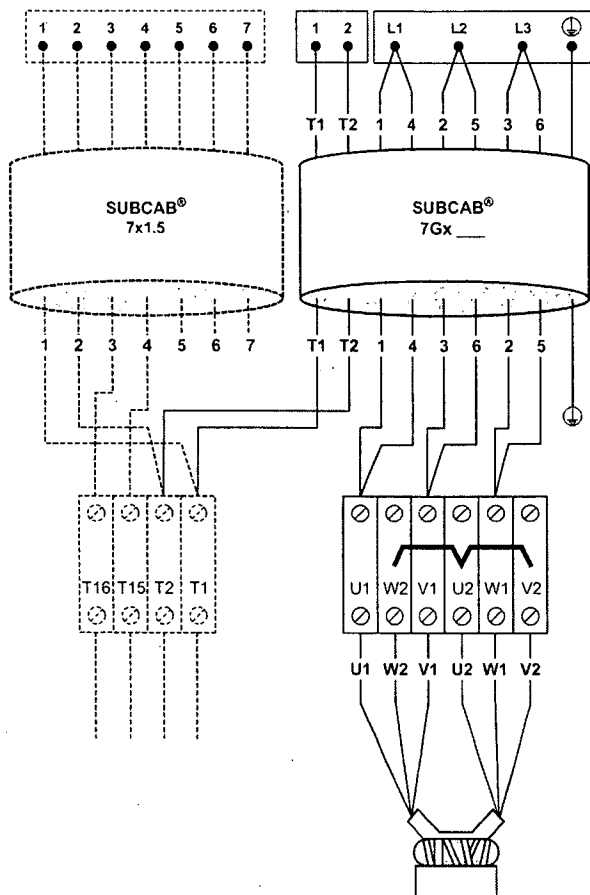


Bild 3

SUBCAB® 7GX

2 parallel cores connected together
 6-leads, D

3153

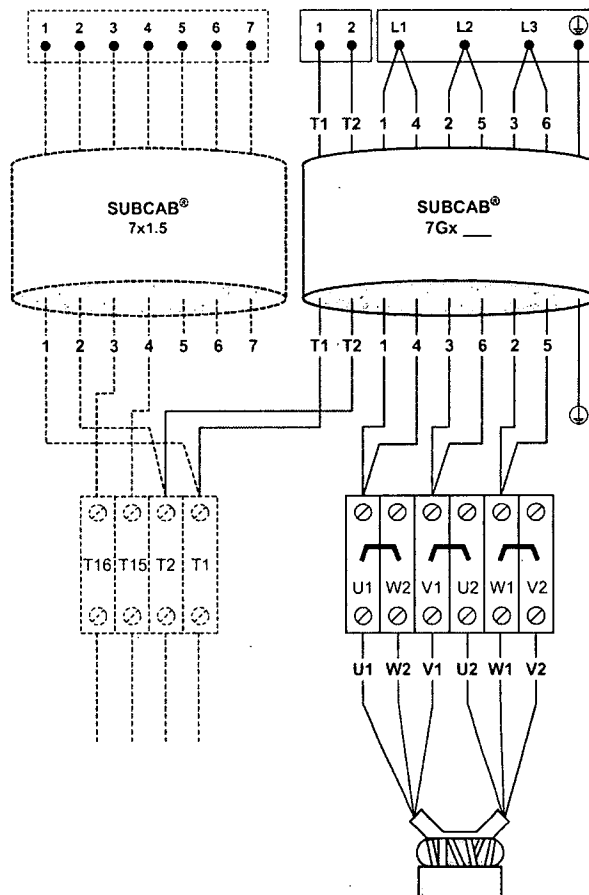


Bild 6

Mains	Lead	Terminal board
L1	1	U1
L1	4	U1
L2	2	W 1
L2	5	W 1
L3	3	V1
L3	6	V1
⊕	yellow/green	⊕
Control	Cable lead	Terminal board
T1	T1	T1
T2	T2	T2
Stator leads connection:		
Stator lead	Terminal board	
U1, red	U1	
W2, black	W 2	
V1, brown	V1	
U2, green	U2	
W1, yellow	W 1	
V2, blue	V2	

Mains	Lead	Terminal board
L1	1	U1
L1	4	U1
L2	2	W 1
L2	5	W 1
L3	3	V1
L3	6	V1
⊕	yellow/green	⊕
Control	Cable lead	Terminal board
T1	T1	T1
T2	T2	T2
Stator leads connection:		
Stator lead	Terminal board	
U1, red	U1	
W2, black	W 2	
V1, brown	V1	
U2, green	U2	
W1, yellow	W 1	
V2, blue	V2	

CABLE CHART

SUBCAB® 4GX/SUBCAB® AWG, 6-leads, Y

3153

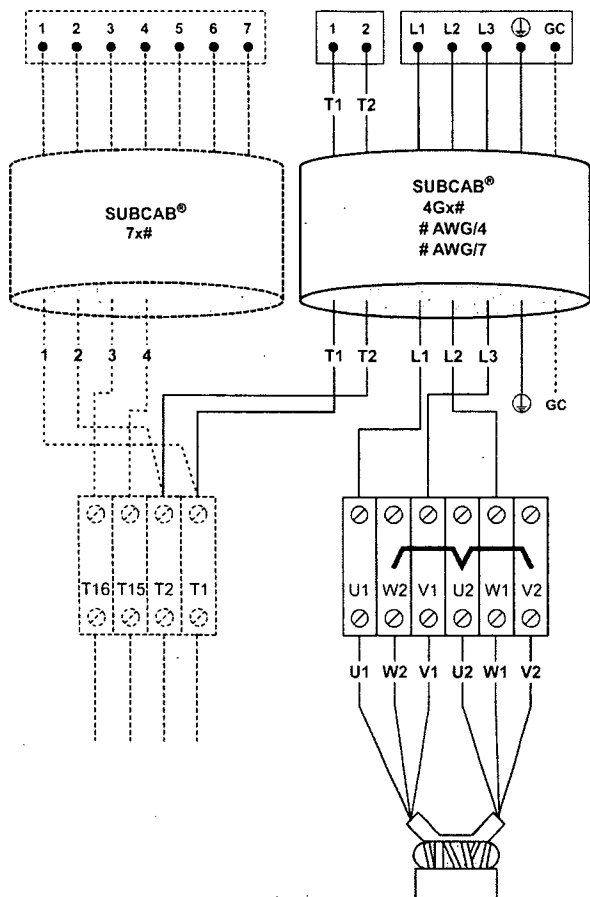


Bild 2

SUBCAB® 4GX/SUBCAB® AWG, 6-leads, D

3153

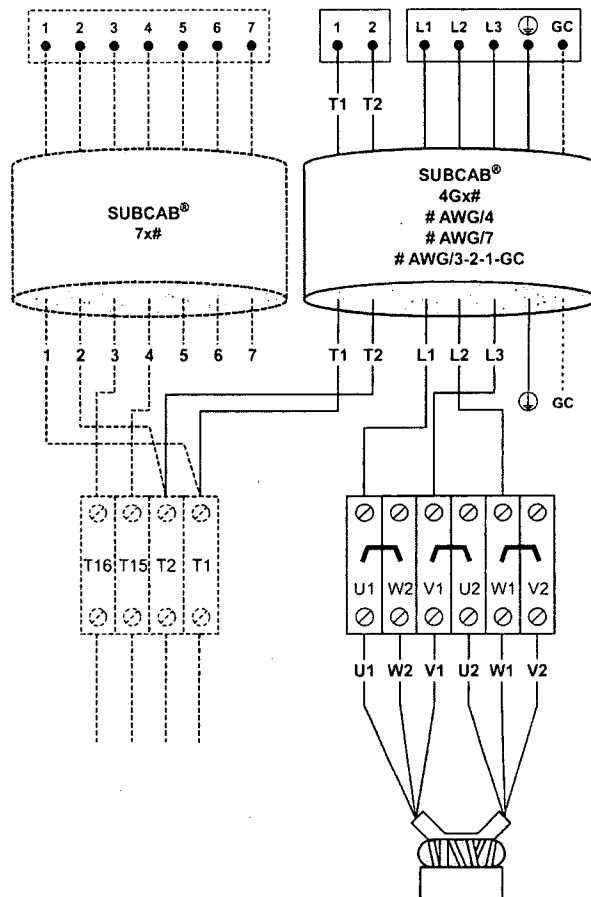


Bild 5

Mains:	SUBCAB® Lead	SUBCAB® AWG Lead	Terminal board
L1	brown	red	U1
L2	black	black	W 1
L3	grey	white	V1
⏚	yellow/green	yellow/green	⏚
Groundcheck GC		yellow	
Control:	SUBCAB® Cable lead	SUBCAB® AWG Cable lead	Terminal board
T1	T1	orange	T1
T2	T2	blue	T2
Stator leads connection:			
Stator lead	Terminal board		
U1, red	U1		
W2, black	W 2		
V1, brown	V1		
U2, green	U2		
W1, yellow	W 1		
V2, blue	V2		

Mains:	SUBCAB® Lead	SUBCAB® AWG Lead	Terminal board
L1	brown	red	U1
L2	black	black	W 1
L3	grey	white	V1
⏚	yellow/green	yellow/green	⏚
Groundcheck GC		yellow	
Control:	SUBCAB® Cable lead	SUBCAB® AWG Cable lead	Terminal board
T1	T1	orange	T1
T2	T2	blue	T2
Stator leads connection:			
Stator lead	Terminal board		
U1, red	U1		
W2, black	W 2		
V1, brown	V1		
U2, green	U2		
W1, yellow	W 1		
V2, blue	V2		

CABLE CHART

**SUBCAB® 4GX/SUBCAB® AWG,
 60 Hz only, 9-leads, 460 V, Y ser.**

3153

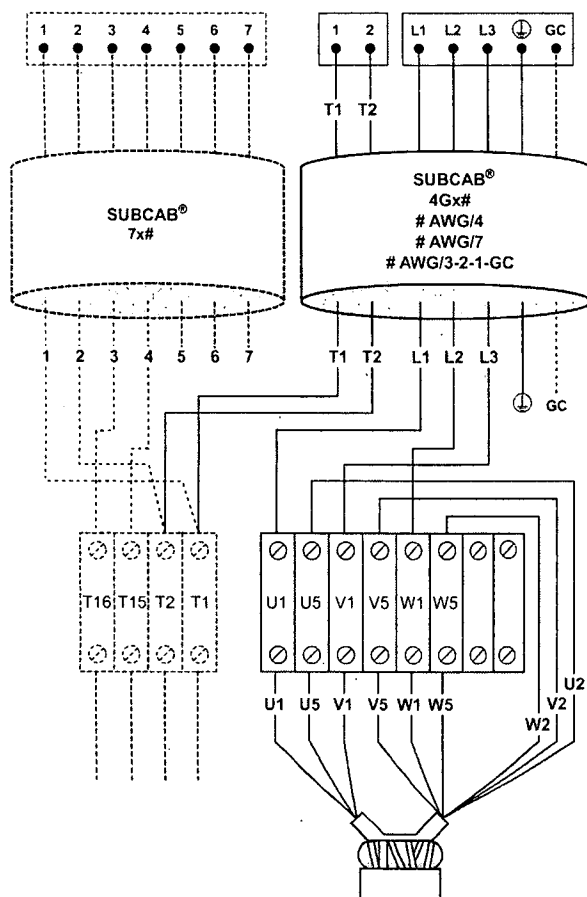


Bild 8

Mains	SUBCAB® Lead	SUBCAB® AWG Lead	Terminal board
L1	brown	red	U1
L2	black	black	W 1
L3	grey	white	V1
⊕	yellow/green	yellow/green	⊕
Groundcheck GC		yellow	
Control	SUBCAB® Cable lead	SUBCAB® AWG Cable lead	Terminal board
T1	T1	orange	T1
T2	T2	blue	T2
Stator leads connection:		Terminal board	
Stator lead			
U1, red		U1	
U5, red		U5	
U2, green		U5	
V1, brown		V1	
V5, brown		V5	
V2, blue		V5	
W1, yellow		W 1	
W5, yellow		W 5	
W2, black		W 5	

**SUBCAB® 4GX/SUBCAB® AWG,
 60 Hz only, 9-leads, 230 V, Y //**

3153

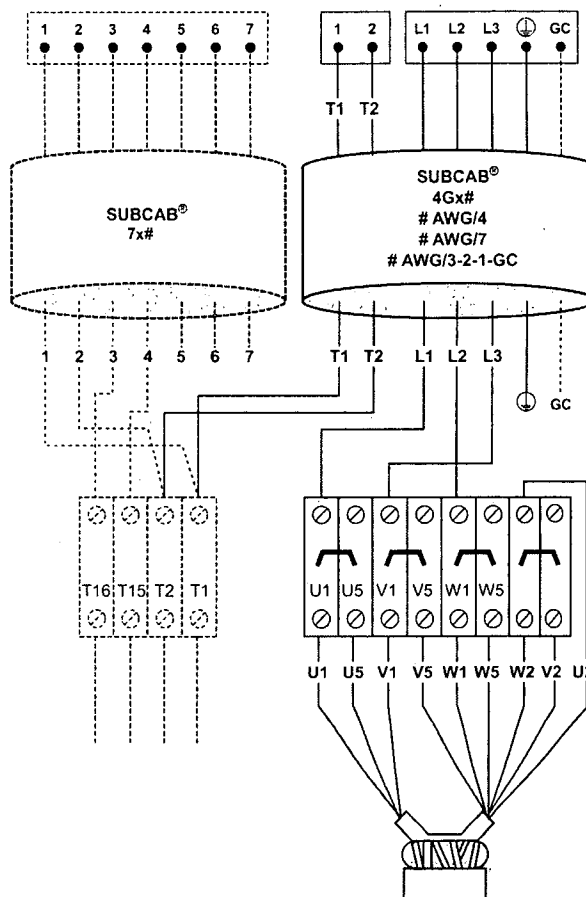


Bild 10

Mains	SUBCAB® Lead	SUBCAB® AWG Lead:	Terminal board
L1	brown	red	U1
L2	black	black	W 1
L3	grey	white	V1
Ⓢ	yellow/green	yellow/green	Ⓢ
Groundcheck GC		yellow	
Control	SUBCAB® Cable lead	SUBCAB® AWG Cable lead	Terminal board
T1	T1	orange	T1
T2	T2	blue	T2
Stator leads connection:			
Stator lead		Terminal board	
U1, red		U1	
U5, red		U5	
V1, brown		V1	
V5, brown		V5	
W1, yellow		W 1	
W5, yellow		W 5	
W2, black*			
V2, blue*			
U2, green*			
*Connected together at terminal			

CABLE CHART

SUBCAB® 7GX, 6-leads, Y/D

3153

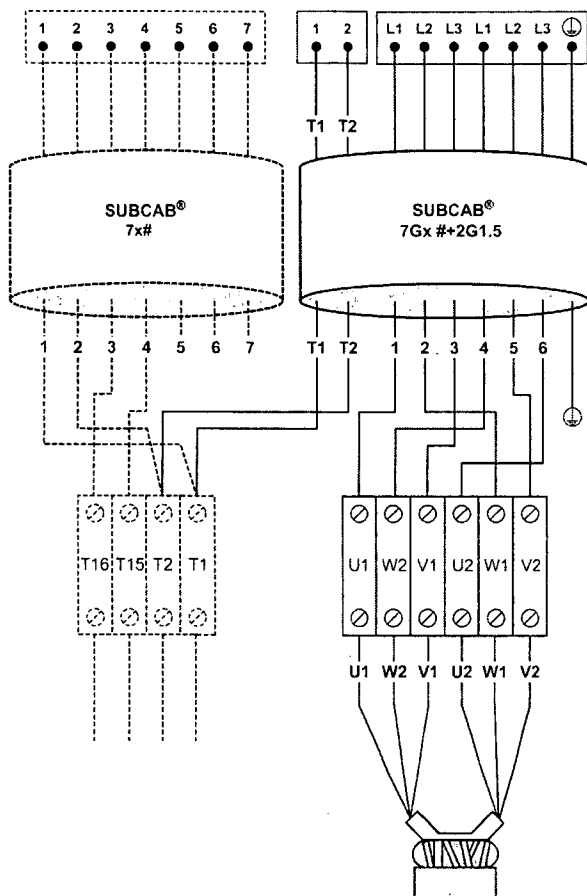


Bild 12

Mains	Lead	Lead
L1	1	U1
L2	2	W 1
L3	3	V1
L1	4	W 2
L2	5	V2
L3	6	U2
Ⓢ	yellow/green	Ⓢ
Control	Cable lead	Terminal board
T1	T1	T1
T2	T2	T2
Stator leads connection:		
Stator lead	Terminal board	
U1, red	U1	
W2, black	W 2	
V1, brown	V1	
U2, green	U2	
W1, yellow	W 1	
V2, blue	V2	

SUBCAB® Screened, 6-leads, Y

3153

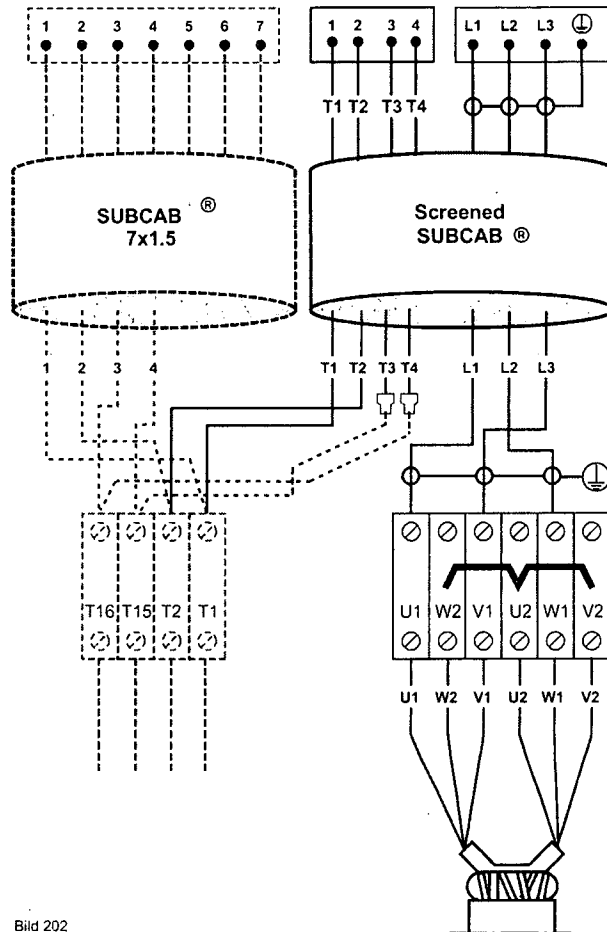


Bild 202

Mains	Lead	Lead
L1	Brown	U1
L2	Black	W 1
L3	Grey	V1
Ⓢ	Screen from leads	Ⓢ
Control	Cable lead	Terminal board
T1	White T1	T1
T2	White T2	T2
T3	White T3	T15
T4	White T4	T16
Stator leads connection:		
Stator lead	Terminal board	
U1, red	U1	
W2, black	W 2	
V1, brown	V1	
U2, green	U2	
W1, yellow	W 1	
V2, blue	V2	

CABLE CHART

SUBCAB® Screened, 6-leads, D

3153

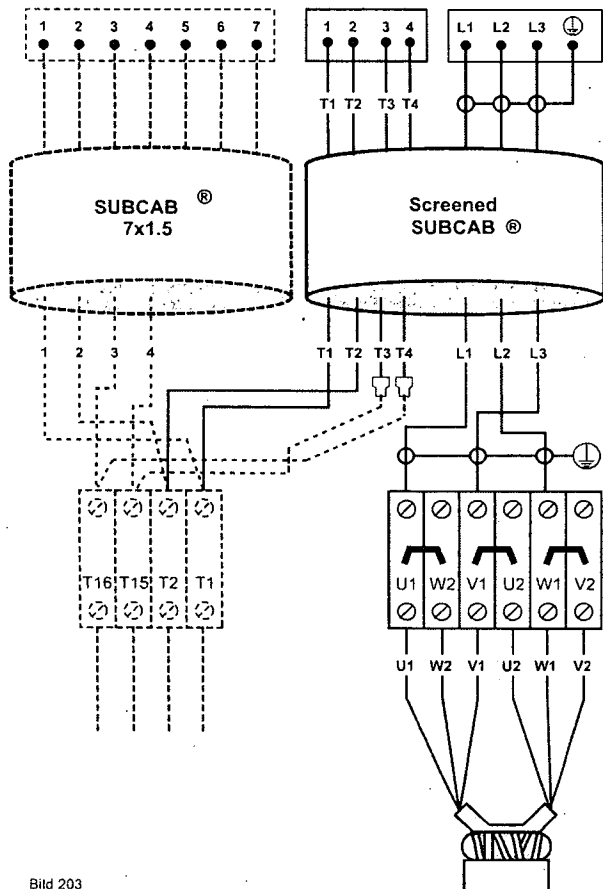


Bild 203

Mains	Lead	Lead
L1	Brown	U1
L2	Black	W 1
L3	Grey	V1
⊕	Screen from leads	⊕
Control	Cable lead	Terminal board
T1	White T1	T1
T2	White T2	T2
T3	White T3	T15
T4	White T4	T16
Stator leads connection:		
Stator lead	Terminal board	
U1, red	U1	
W2, black	W 2	
V1, brown	V1	
U2, green	U2	
W1, yellow	W 1	
V2, blue	V2	

NSSHÖU ../3E+st, Screened, 6-leads, Y

3153

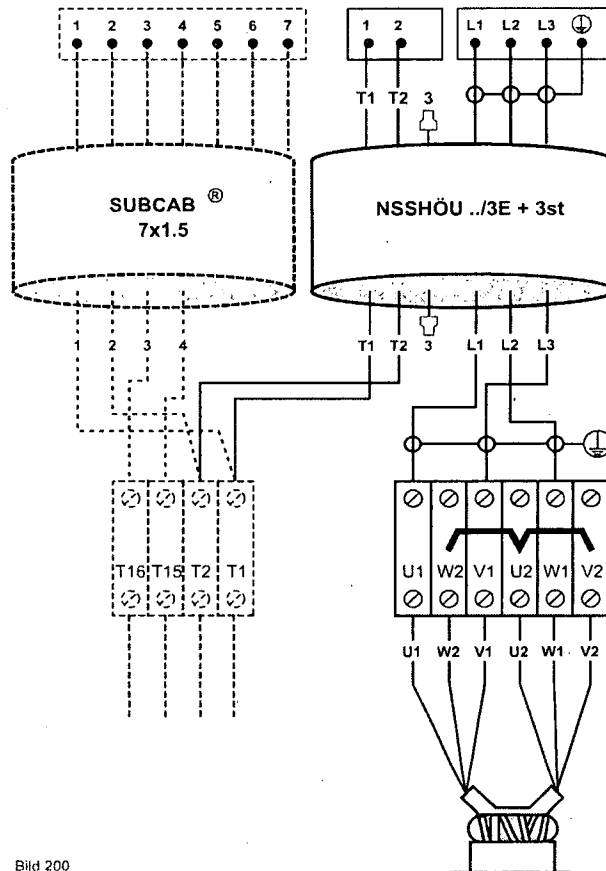


Bild 200

Mains	Lead	Lead
L1	Brown	U1
L2	Black	W 1
L3	Grey	V1
⊕	Screen from leads	⊕
Control	Cable lead	Terminal board
T1	Black T1	T1
T2	Brown T2	T2
T3	Grey	Unused
Stator leads connection:		
Stator lead	Terminal board	
U1, red	U1	
W2, black	W 2	
V1, brown	V1	
U2, green	U2	
W1, yellow	W 1	
V2, blue	V2	

CABLE CHART

NSSHÖU ../3E+st, Screened,
6-leads, D

3153

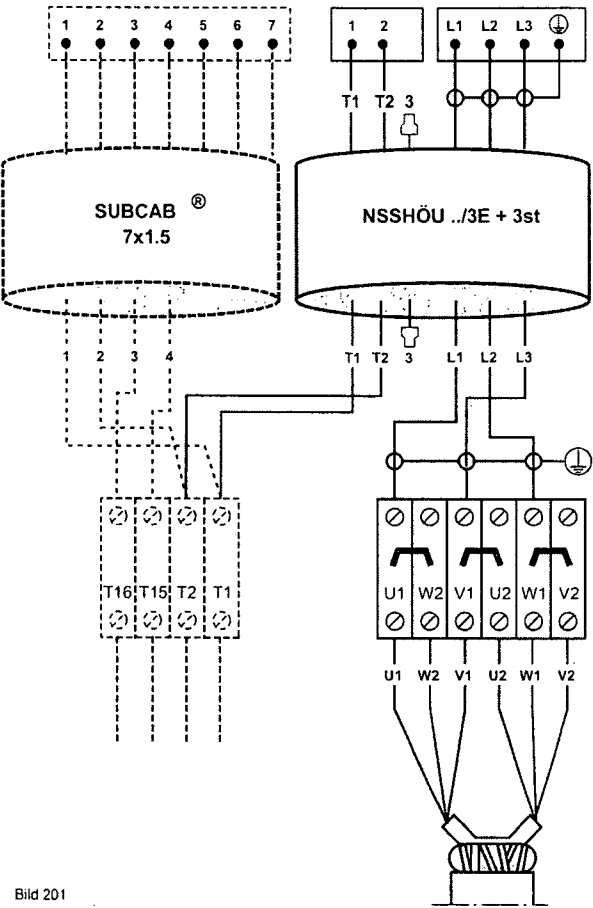




Bild 201

Mains	Lead	Lead
L1	Brown	U1
L2	Black	W 1
L3	Grey	V1
	Screen from leads	
Control	Cable lead	Terminal board
T1	Black T1	T1
T2	Brown T2	T2
T3	Grey	Unused
Stator leads connection:		Terminal board
Stator lead		
U1, red		U1
W2, black		W 2
V1, brown		V1
U2, green		U2
W1, yellow		W 1
V2, blue		V2

Sensor connections

Monitoring equipment

FLS10 is a small float switch and it is installed in the inspection chamber. FLS is connected to max 12 V.

Thermal switches are incorporated into the stator and are rated 250 V, 2.5 A ($\cos \varphi = 1$) / 1.6 A ($\cos \varphi = 0.6$).

The sensors are connected as standard to the Flygt monitoring relay MiniCAS II (see diagrams below).

In case optional sensors are used the more advanced monitoring relay MAS 711 can be used.

For a **PTC-thermistor** (PTC = Positive Temperature Coefficient), there is a significant increase in resistance at a certain temperature that can be utilized for monitoring the temperature.

PTC-thermistor

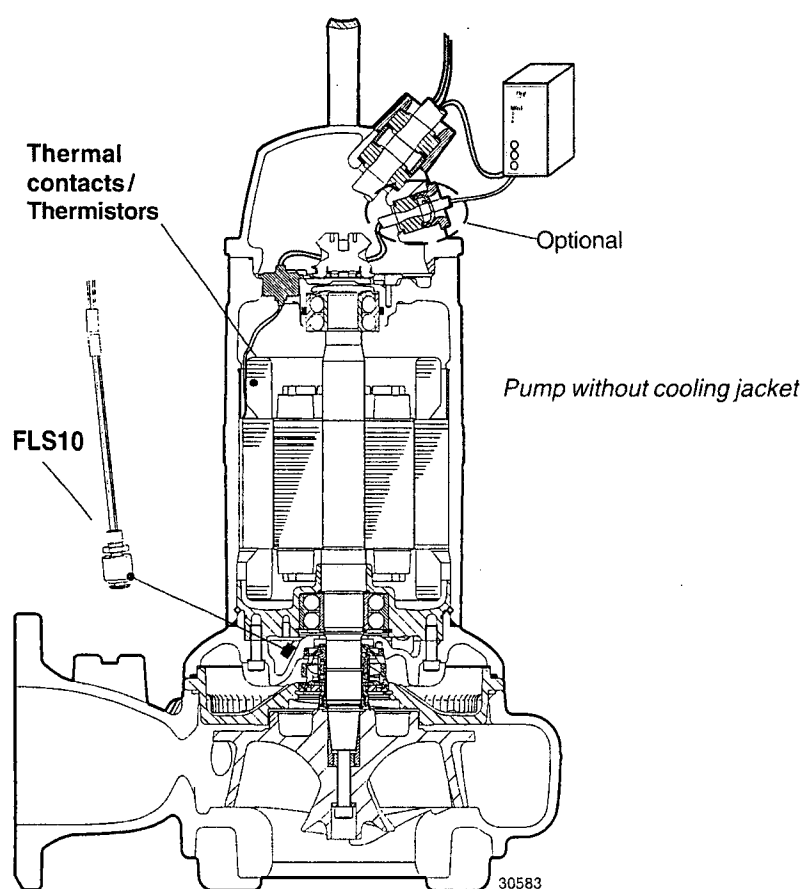
$T = 25\text{ }^{\circ}\text{C}$ $R \leq 100\text{ Ohm}$

$T = 135\text{ }^{\circ}\text{C}$ ($T_{\text{REF}} - 5\text{ }^{\circ}\text{C}$) $R \leq 550\text{ Ohm}$

$T = 145\text{ }^{\circ}\text{C}$ ($T_{\text{REF}} + 5\text{ }^{\circ}\text{C}$) $R \geq 1330\text{ Ohm}$

Three thermistors are connected in series and have a resistance of approx. 150-300 ohms at room temperature.

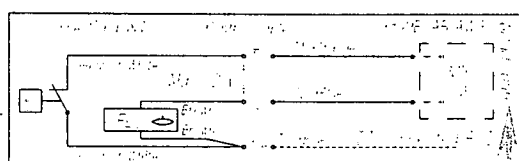
The label in the junction box shows if the pump is equipped with optional sensors.



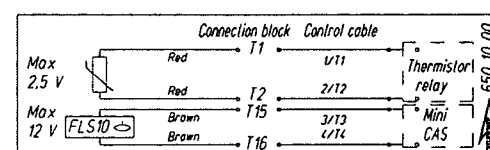
Sensor connection for standard configuration

In standard execution the pump is equipped with either thermal contacts or thermistors.

A) Thermal contacts



B) Thermistors



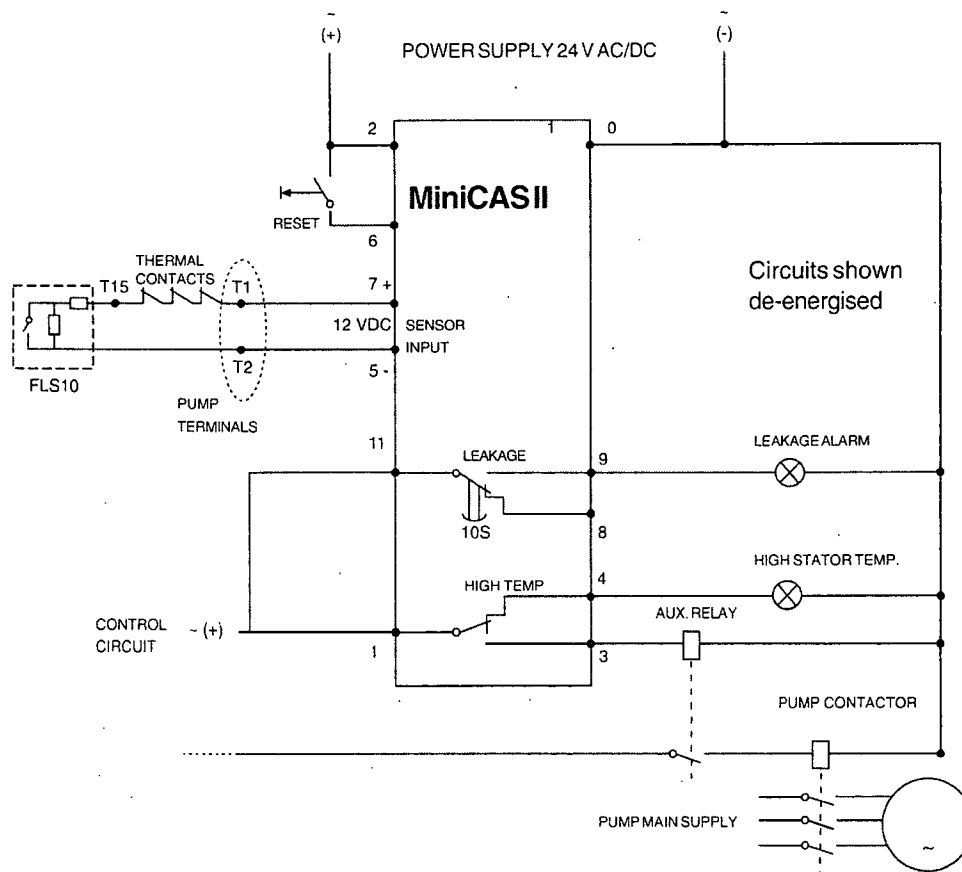
FLS10 + thermal contacts

0 mA = *Overtemperature*

10 mA = *OK*

28 mA = *Leakage*

Tolerance 10%



Sensor Connection Table

(For further information please contact Flygt representative.)

Sensor	Sensor lead	Thermal connection	Control cable	Connected to
Thermal contacts + FLS10	White Brown White+Brown	T1 T2 T15	T1/*Orange T2/*Blue = SubCab /* SubCabAWG	Mini CAS II Mini CAS II
Thermistors + FLS10	Red Red Brown Brown	T1 T2 T15 T16	1 2 3 4	Thermistor relay Thermistor relay Mini CAS II Mini CAS II

OPERATION

Before starting

- Check that the visible parts of the pump and installation are undamaged and in good condition.
- Remove the fuses or open the circuit breaker and check that the impeller can be rotated freely.
- Verify that the supply voltage matches the pump data plate voltage rating.
- Conduct insulation integrity check.
- Conduct phase to phase resistance check.
- Check that the monitoring equipment works.
- Check the direction of rotation. 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. See figure.
- In case of dry installation, check the direction of rotation through the inlet elbow access cover.
- Transpose two phase leads if the impeller rotates in the wrong direction (3-phase).

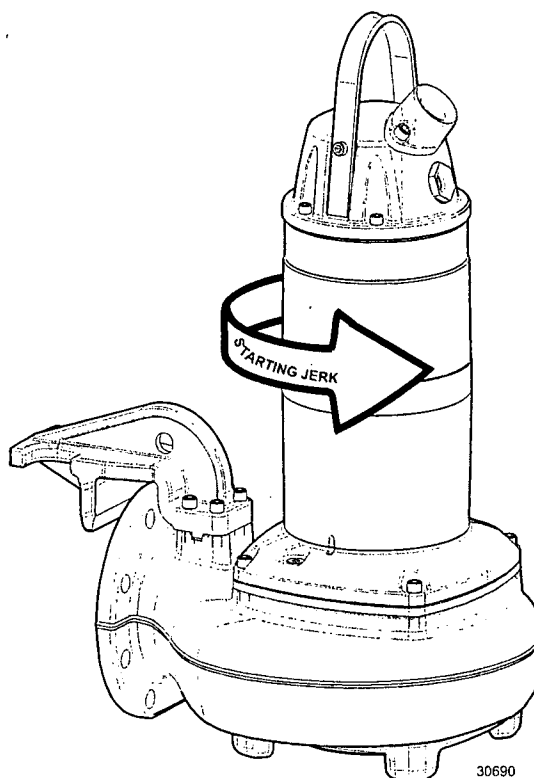


- Before starting work on the pump, make sure that the pump and the control panel are isolated from the power supply and can not be energized. This applies to the control circuit as well.

- NOTE for Ex version page 3.



- Make sure that the pump cannot roll or fall over and injure people or damage property.
- In some installations the pump surface and the surrounding liquid may be hot. Bear in mind the risk of burn injuries.
- In some installations and at certain operating points on the performance curve, the noise level of 70 dB or the noise level specified for the actual pump may be exceeded.



Watch the starting jerk which can be powerful.

CARE AND MAINTENANCE

Service/Inspection

ITT Flygt recommends a preventive maintenance program based on Intermediate and Major Services at regular intervals. For standard sewage applications where FLS 10 is correctly connected and in use and the temperature of the pumped liquid is 40°C (104°F) or less an *Intermediate Service* should be performed every 8000 hours or every 2 years, whichever occurs first.

The time between *Major Service* could vary considerably depending on operating conditions and the need for a Major Service will be determined during the regular Intermediate Services.

However, a minimum of 20 000 hours of operation could be anticipated.

For applications other than sewage water or for specific operating conditions, other service intervals may be recommended.

Pump	Intermediate Service running 8 000 h or 2 years
Junction box	Check that it is clean and dry.
Terminalboard	Check that the connections are properly tightened.
Insulation check	Check that the resistance between earth and phase lead is more than 5 M Ω . Conduct phase to phase resistance check.
Cable	Check that the rubber sheating (jacket) is undamaged.
Seal housing	Fill up with new coolant if necessary. Check freezing point (lower than -13°C, 9°F).
Inspection chamber	Drain all liquid if any. Check the resistance. Normal value approx. 1200 Ω , alarm approx. 430 Ω .
O-rings	Always replace the O-rings of the filling plugs and at the junction cover. Always grease new O-rings.
Thermal contacts	Check the resistance. Normally closed circuit; interval 0 – 1 Ω .
Thermistor	Check the resistance 20 – 250 Ω , (measuring voltage max 2 V DC).
Impeller	Check impeller clearance and adjust if necessary.

Lifting handle	Check the screws and the status of the lifting handle.
Rotation direction	Check the rotation of the impeller.
Lifting device	Check that local safety regulations are followed.
Voltage and amperage	Check running values.
Pump station	Intermediate Service running 8 000 h or 2 years
Electrical cabinets/panels	Check that they are clean and dry.
Connection to power	Check that the connections are properly tightened.
Overload and other protections	Check correct settings.
Personnel safety	Check guard rails, covers and other protections.
Level regulators	Check condition and function.
Pump	Major Service
Support and main bearing.	Replace with new bearings.
Mechanical seal unit.	Replace with new seal units.
Pumpstations same as Intermediate Service	

<p>If any indication of alarm between inspections, please see instructions below.</p>	<p>Actions</p>
<p>FLS10</p>	<p>Drain the fluid in the inspection chamber. Fill with new coolant if necessary. Check freezing point (lower than -13°C, 9°F). Check the inspection chamber again after one week of operation. If leakage has occurred, drain the fluid and change the mechanical seal unit and replace with new coolant.</p>
<p>Thermistor/Thermal-contact</p>	<p>Check coolant level. (pump with cooling jacket) Check start and stop levels.</p>
<p>Overload protection</p>	<p>Check that the impeller can rotate freely.</p>

- Make sure that the pump cannot roll or fall over and injure people or damage property.
- Check every year that the lifting equipment is in good condition.

- Make sure that the pump has been thoroughly cleaned.

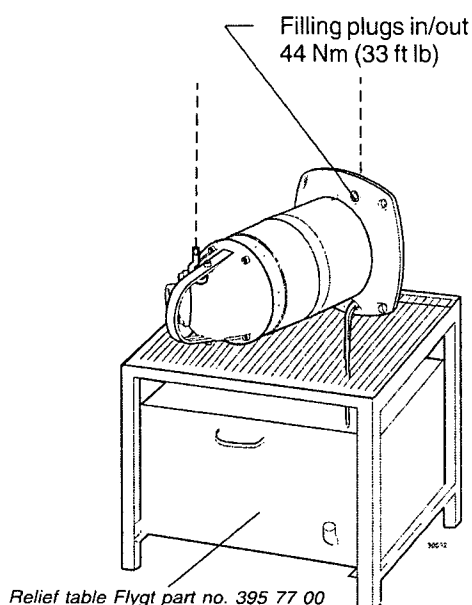
- Proceed as follows if fluids have splashed into your eyes:

- On your skin:

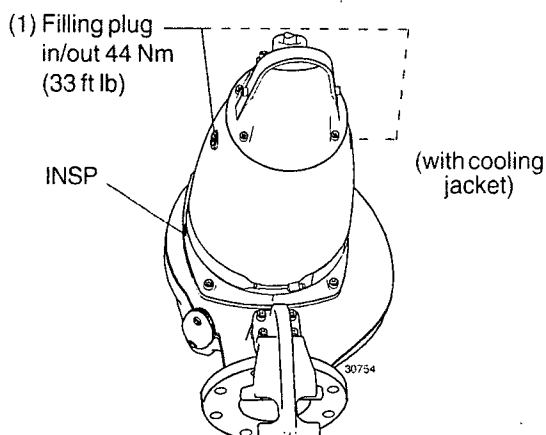
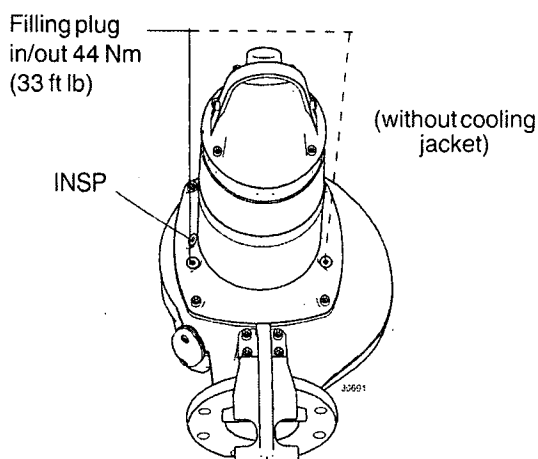
- Remove contaminated clothes.
- Wash your skin with soap and water.
- Seek medical attention, if required.

Changing the coolant

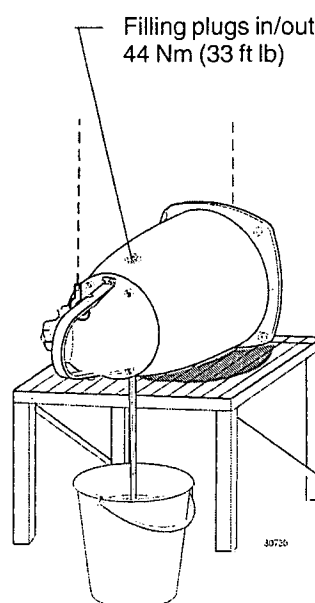
Emptying coolant (without cooling jacket)



Filling coolant



Emptying coolant (with cooling jacket)



1. Lift the pump horizontally with an overhead crane and place on relief table.

2. Turn the pump so that one of the filling plugs holes faces downwards.

WARNING! If the mechanical seal unit leaks, the seal housing may be under pressure. Hold a rag over the filling plug to prevent splatter.

3. Unscrew the filling plug. It is easier to drain the water-glycol if the other filling plug is also removed.

4. Pump **without** cooling jacket. Raise the pump to an upright position. Fill with coolant to the same level as the filling plugs; approx. 2,2 litres (2.3 US quarts). Pump **with** cooling jacket; approx. 10,5 litres (11.2 US quarts)

Coolant: a mix of water and stabilized monopropylene glycol in a mixture ratio of 70/30 % volume part.

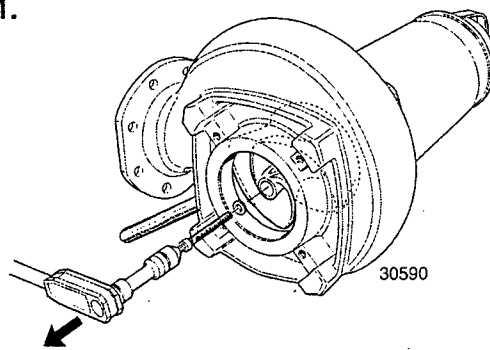
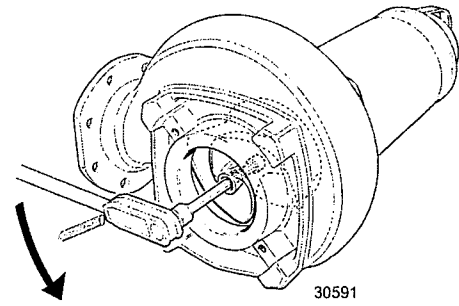
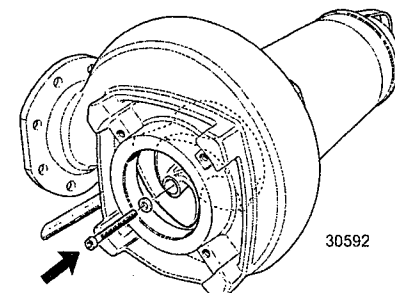
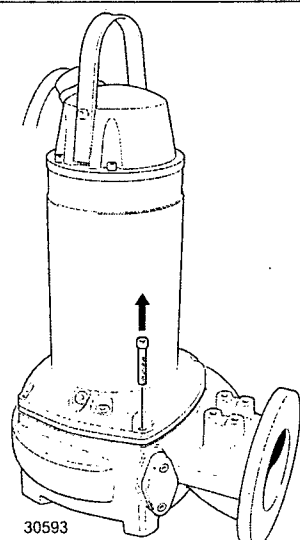
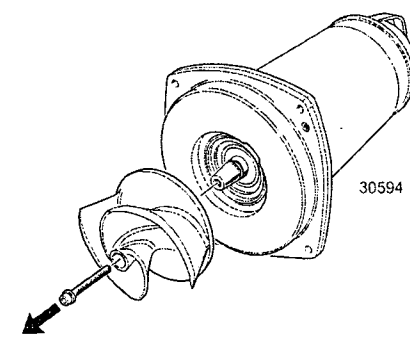

Known trade marks of monopropylene glycol are: Dowcal N (individual components are approved by FDA), Dowcal 20. These are non-poisonous, heat-and-cold resistant and inhibiting of corrosion.

Use of other type of glycol jeopardize the function of the pump.

If there is no risk of freeezing even clean water with anti-corrosive is acceptable as coolant.

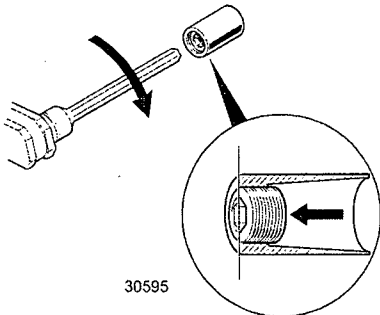
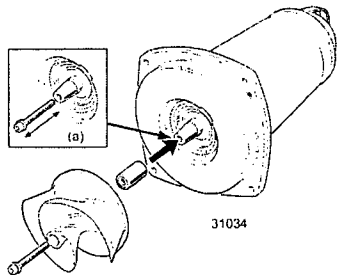
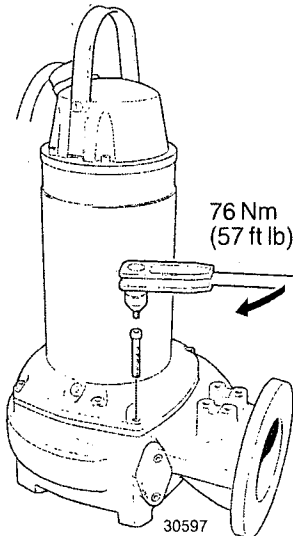
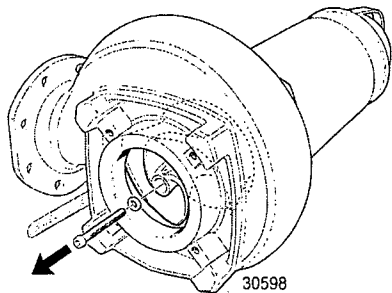
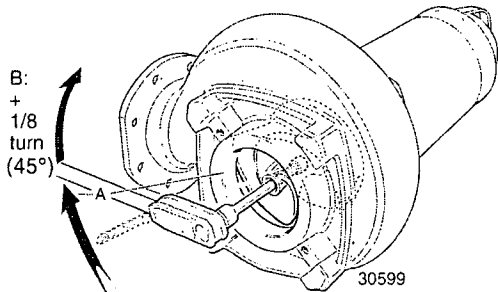
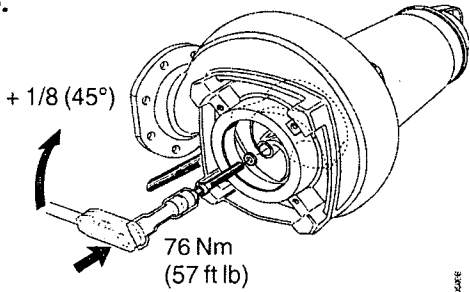
5. Always replace the O-rings of the filling plugs. Put the plugs back and tighten them.

Removing the impeller

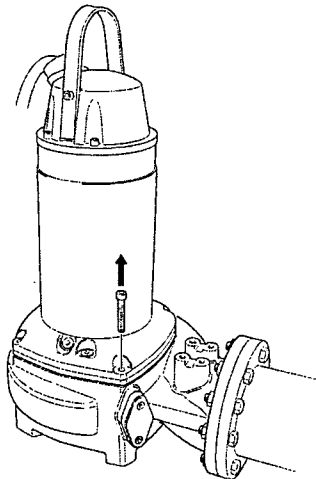
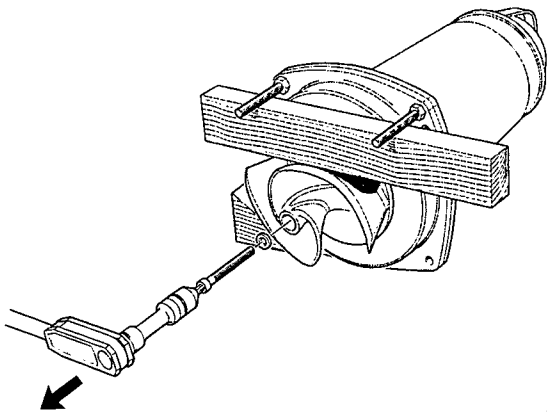
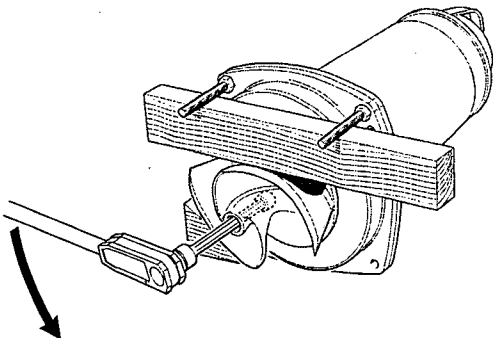

<p>1.</p>  <p>Place the pump horizontally. Remove the guide pin (if mounted). Remove the flush valve cover and its O-ring. Insert a rod (wood or plastic) through the hole and lock the impeller in place. Remove the impeller screw.</p>	<p>2.</p>  <p>Using a 12 mm hexagon bit adaptor (allen socket) with a 100 mm (4") extension (minimum length) turn the gland screw counter clockwise until the impeller breaks free from the shaft.</p>
<p>3.</p>  <p>Install the impeller screw. Tighten lightly by hand, just to prevent the impeller from falling off.</p>	<p>4.</p>  <p>Remove the rod and raise the pump. Remove the pump housing screws. Using a crane, lift the drive unit off the pump housing.</p>
<p>5.</p>  <p>Place the drive unit horizontally. Remove the impeller screw.</p>	<div data-bbox="768 1433 893 1568">  </div> <p>Worn impellers can have very sharp edges. Use protective gloves!</p> <p>WARNING! When laying the pump on its side do not allow the weight of the pump to rest on any portion of the impeller. The impeller must not be allowed to make contact with the concrete floor or other hard and rough surfaces.</p>

Installing and setting clearance

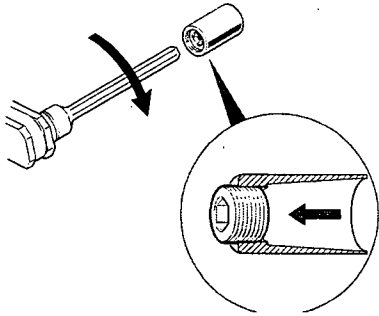
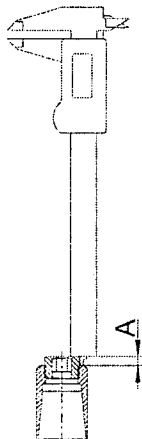
(If you fail with the impeller installation, you **must** start again from step 1)

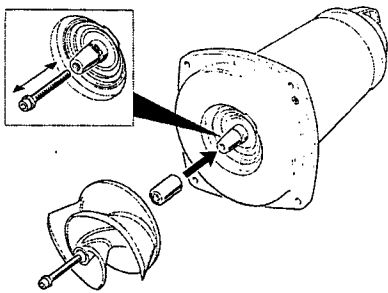
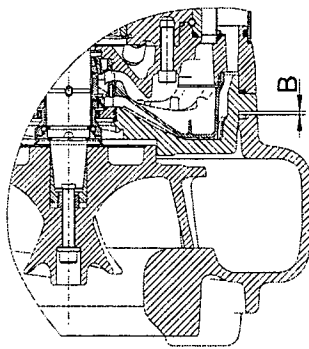
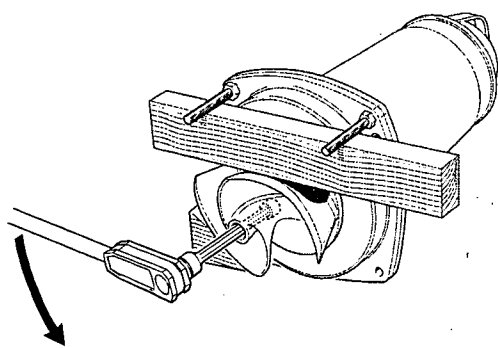
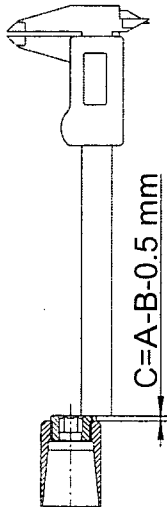
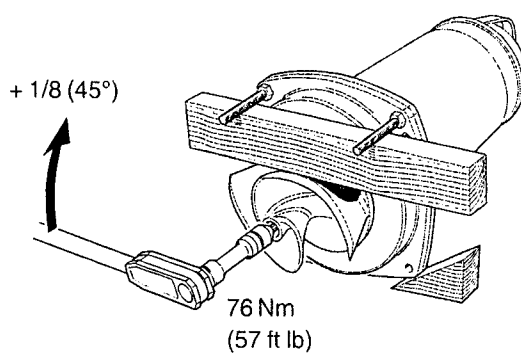
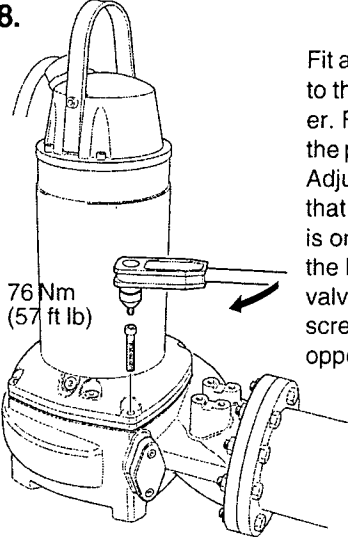
<p>1.</p>  <p>30595</p> <p>Make sure that the end of the shaft is clean and free from burrs. Polish off any flaws with fine emery cloth. Grease end of shaft, conical sleeve and the threads of the gland screw and the impeller screw. Align the edge of the gland screw with the edge of the conical sleeve so that they are flush.</p>	<p>2.</p>  <p>31034</p> <p>Before assembling, check that the impeller screw is clean and easy to screw into the shaft end (a). This to prevent the shaft to rotate with the impeller screw. Assemble the conical sleeve and the impeller onto the shaft. Fit the impeller screw onto the shaft. Tighten the impeller screw lightly by hand, just to prevent the impeller from falling off.</p>
<p>3.</p>  <p>30597</p> <p>Fit the drive unit to the pump housing. Adjust its position so that the inspection hole is on the same side as the hole for the flush valve. Tighten the screws in diagonally opposite pairs.</p> <p>76 Nm (57 ft lb)</p>	<p>4.</p>  <p>30598</p> <p>Place the pump horizontally. Remove the flush valve cover and it's O-ring. Insert a rod (wood or plastic) through the hole and lock the impeller in place. Remove the impeller screw.</p>
<p>5.</p>  <p>30599</p> <p>Turn the gland screw clockwise until the impeller makes contact with the pump housing. Tighten it a further 1/8 turn, 45°. This will insure the correct clearance between the impeller and the bottom of the pump housing in the next step.</p> <p>B: + 1/8 turn (45°)</p> <p>A</p>	<p>6.</p>  <p>30599</p> <p>Fit the greased washer and the greased impeller screw and tighten, torque to 76 Nm (57 ft lb) + 45°. Remove the rod used to lock the impeller. Fit the O-ring, flush valve cover and secure with screws, torque to 44 Nm (33 ft lb). SH-version - if applicable: Fit the guide pin and adjust the clearance to 0,2 - 0,8 mm (0,008-0,032") bet-ween the guide pin and the impeller.</p> <p>+ 1/8 (45°)</p> <p>76 Nm (57 ft lb)</p>

Removing the impeller - dry installation version, NT

<p>1.</p>  <p>Remove the drive unit from the pump housing.</p>	<p>2.</p>  <p>Place the drive unit horizontally. Lock the impeller in place and remove the impeller screw.</p>
<p>3.</p>  <p>Using a 12 mm hexagon bit adaptor (allen socket) with a 100 mm (4") extension (minimum length) turn the gland screw counter clockwise until the impeller breaks free from the shaft. Remove the impeller.</p>	<p>WARNING! When laying the pump on its side do not allow the weight of the pump to rest on any portion of the impeller. The impeller must not be allowed to make contact with the concrete floor or other hard and rough surfaces.</p>  <p>Worn impellers can have very sharp edges. Use protective gloves!</p>

Installing and setting clearance

<p>1.</p>  <p>Make sure that the end of the shaft is clean and free from burrs. Polish off any flaws with fine emery cloth. Grease end of shaft, conical sleeve and the threads of the gland screw and the impeller screw. Unscrew the gland screw approximately 5 mm.</p>	<p>2.</p>  <p>Measure and note the distance A.</p>
---	--

<p>3.</p>  <p>Before assembling, check that the impeller screw is clean and easy to screw into the shaft end (a). This to prevent the shaft to rotate with the impeller screw. Assemble the conical sleeve and the impeller onto the shaft. Fit the impeller screw with washer onto the shaft and tighten to 76 Nm (57 ft lb).</p>	<p>4.</p>  <p>Make sure that the O-ring is removed from the seal housing cover. Place the drive unit in the pump housing. Check the distance between the seal housing cover and the pump housing with a feeler gauge. Check diametrically at four points. Note the <u>largest</u> measured distance, B. See fig.</p>
<p>5.</p>  <p>Lift the drive unit out of the pump housing and remove the impeller and conical sleeve.</p>	<p>6.</p>  <p>Calculate the measure C according to formula: C = A - B - 0,5mm Unscrew the gland screw until C is reached.</p>
<p>7.</p>  <p>Fit the greased conical sleeve, impeller and greased impeller screw with greased washer and tighten to 76 Nm (57 ft lb) + 45°.</p>	<p>8.</p>  <p>Fit a new greased O-ring to the seal housing cover. Fit the drive unit to the pump housing. Adjust its position so that the inspection hole is on the same side as the hole for the flush valve. Tighten the screws in diagonally opposite pairs.</p>

FAULT TRACING (TROUBLESHOOTING)

A universal instrument multimeter (VOM), a test lamp (continuity tester) and 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

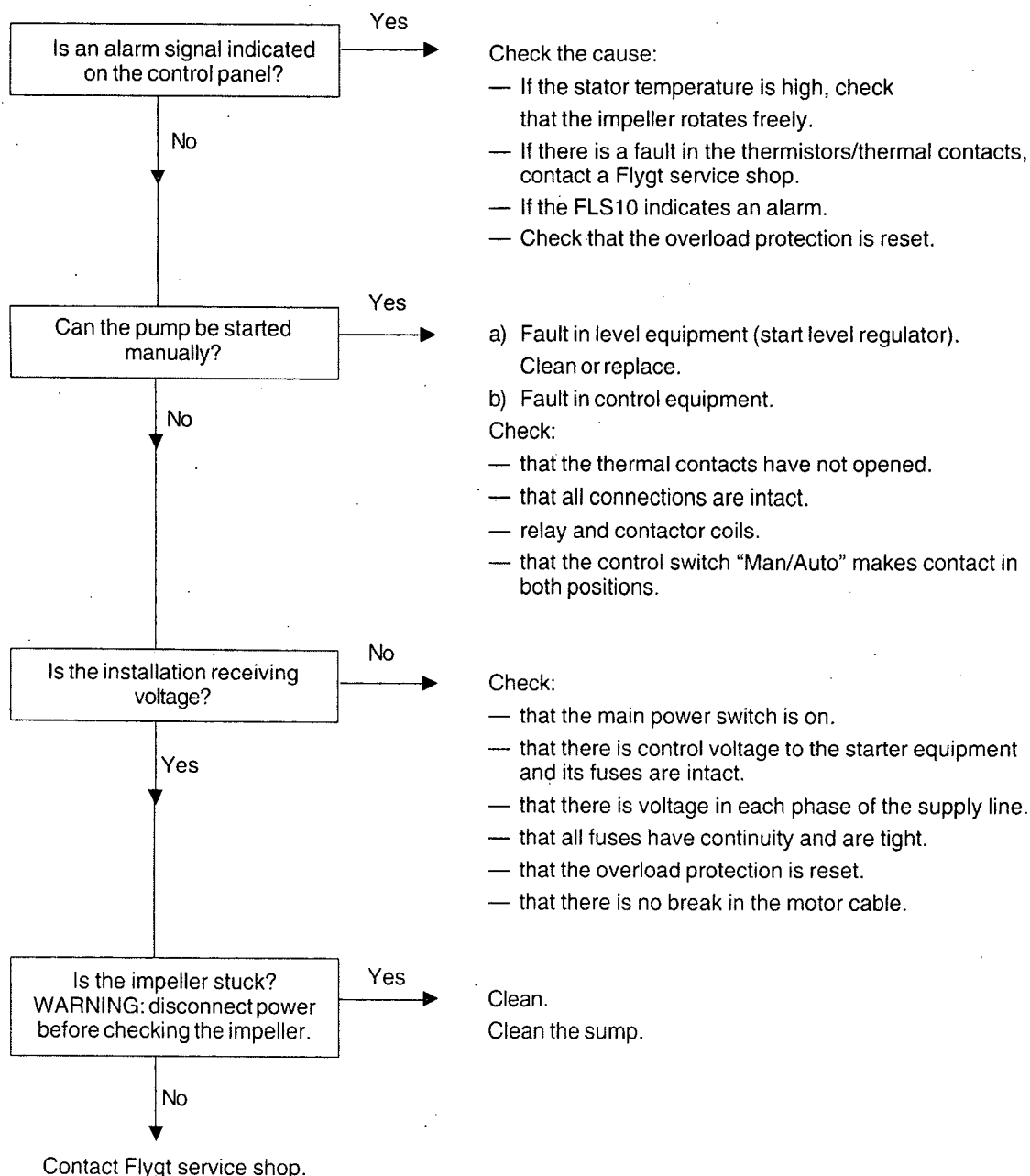
when the power supply is turned on.

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

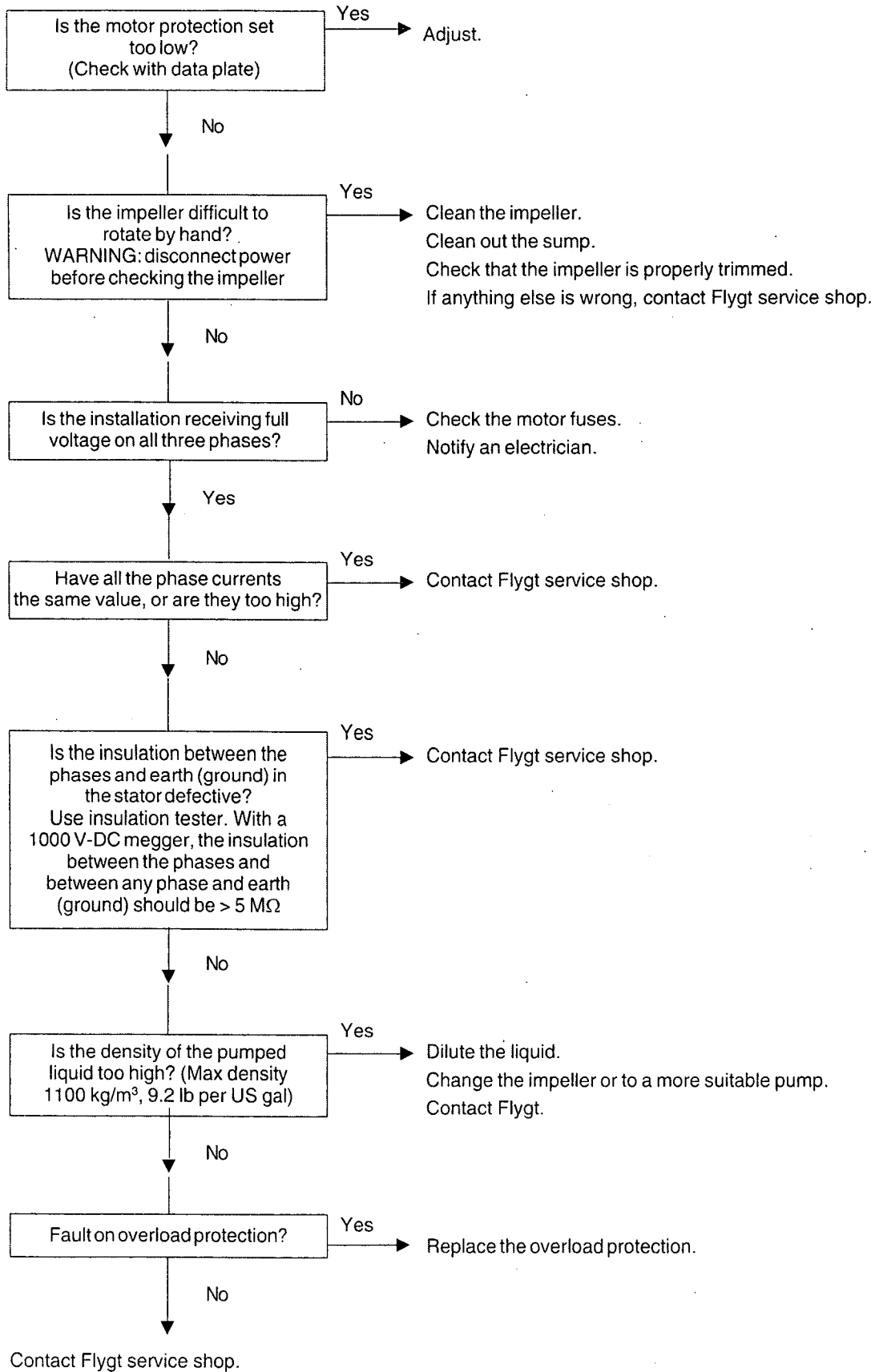
Electrical work shall be performed by an authorized electrician.

Follow local safety regulations and observe recommended safety precautions.

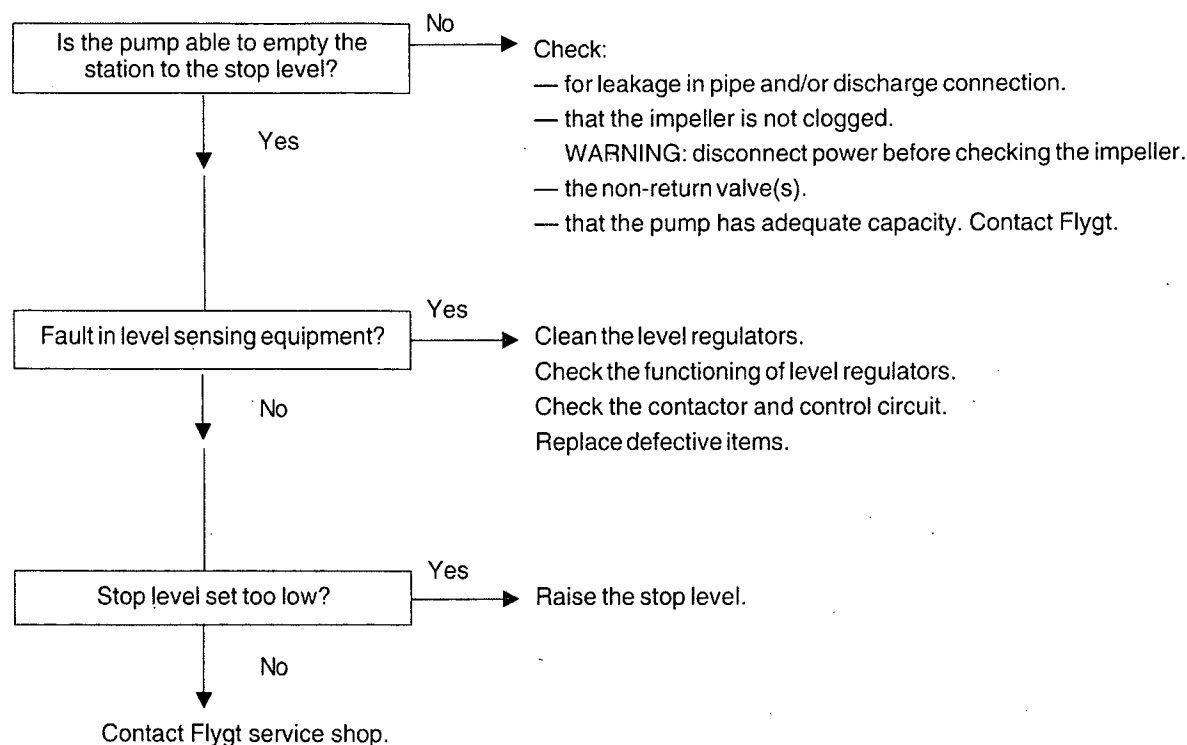
1. Pump fails to start



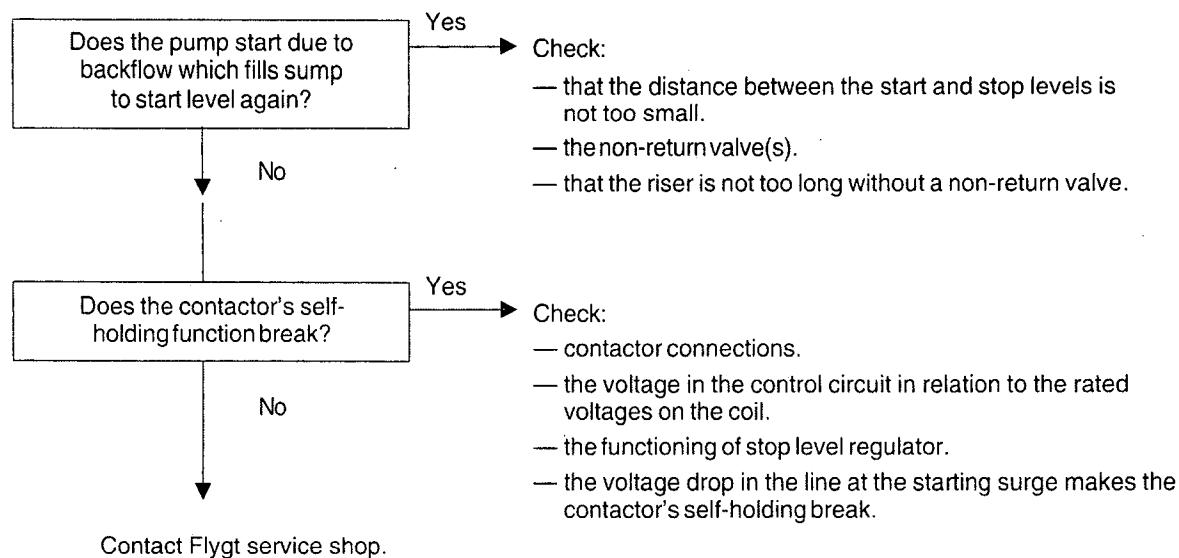
2. Pump starts but motor protection trips



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



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





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895381

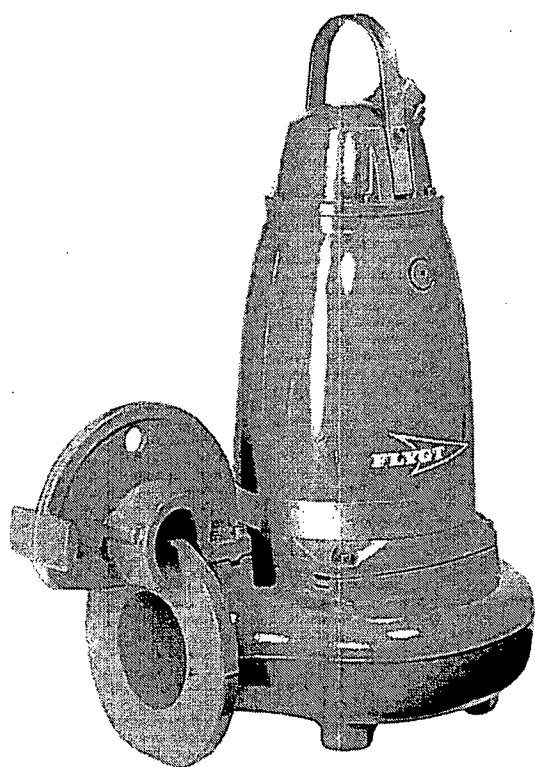
3153.08.En.05.07.PDF © ITT FLYGT AB

1.1



Technical Specification

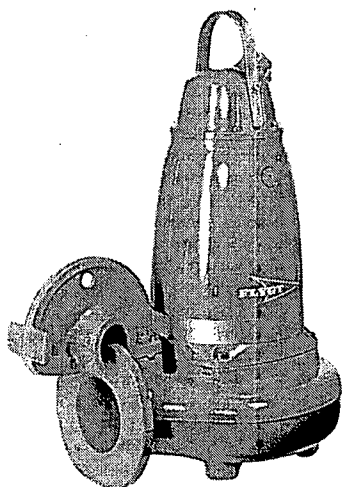
Submersible Pump N 3153, 50 Hz



Flygt



ITT Industries

FLYGT**N 3153**

N 3153

Product

Submersible pump for pumping clean water, surface water and waste water containing solids or long-fibred material.

Denomination

Product code	3153.181
	(high chromium) 3153.185
Installation	P, S, T, Z
Impeller characteristics	LT, MT, HT, SH

Process data

Liquid temperature	max +40 °C
Depth of immersion	max 20 m
The pH of the pumped liquid	pH 5,5-14
Liquid density	max. 1100 kg/m ³

Motor data

Frequency	50 Hz
Insulation class	H (+180 °C)
Voltage variation	
- continuously running	max ± 5%
- intermittent running	max ± 10%
Voltage imbalance between phases	max 2%
No. of starts/hour	max 30

Cable

Direct-on-line start
SUBCAB®

4G2,5+2x1,5 mm ²
4G4+2x1,5 mm ²
4G6+2x1,5 mm ²
4G10+2x1,5 mm ²

Y/D start

SUBCAB®

7G2,5+2x1,5 mm²

7G4+2x1,5 mm²

7G6+2x1,5 mm²

Monitoring equipment

Thermal contacts opening temp.	140 °C
Leakage sensor in inspection chamber	FLS

Material

Impeller (.181)	Cast iron
Impeller (.185)	High chromium cast iron
Pump housing	Cast iron
Stator housing	Cast iron
Shaft	Stainless steel

O-rings

Alternative	Material
1	Nitrile rubber
2	Fluorinated rubber

Mechanical face seals

Alternative	Inner seal	Outer seal
1	Corrosion resistant tungsten carbide/Corrosion resistant tungsten carbide	Corrosion resistant tungsten carbide/Corrosion resistant tungsten carbide
2	Corrosion resistant tungsten carbide/Corrosion resistant tungsten carbide	Silicon carbide/Silicon carbide

Surface Treatment

All cast parts are primed with a water-borne primer. The finishing coat is a high-solid two pack paint.

Weight

See dimensional drawing.

Option

3153.091	Ex. proof design
3153.095	(high chromium) Ex. proof design
Warm liquid version on request	
Surface treatment	Epoxy treatment
Other cables	
Zinc anodes	

Accessories

Discharge connections, adapters, hose connections and other mechanical accessories.

Electrical accessories such as pump controller, control panels, starters, monitoring relays, cables.

See separate booklet or www.flygt.com, for further information.

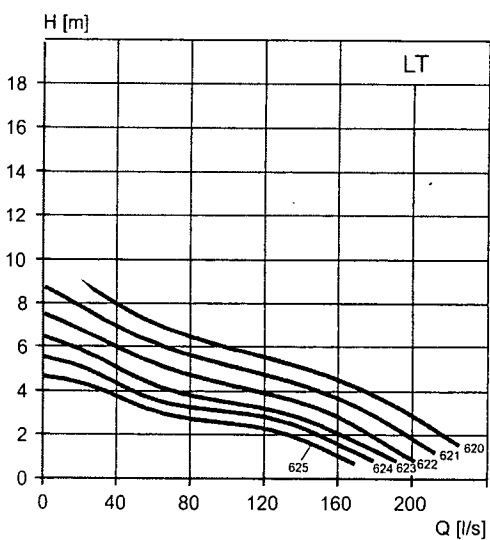
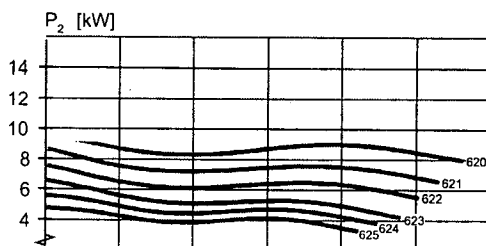
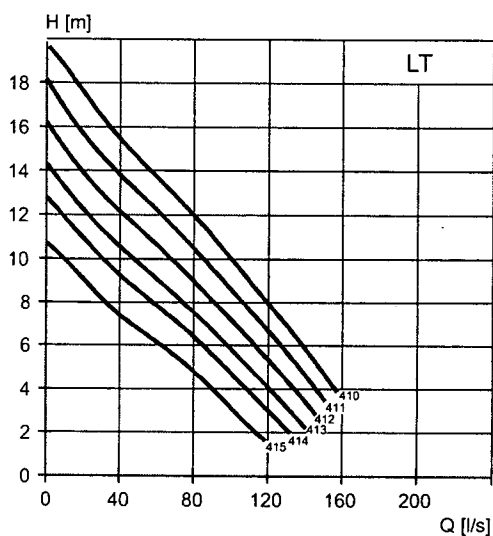
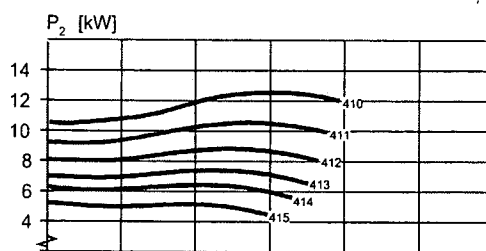


N 3153

LT-Motor rating and performance curve

Curve/Impeller No	Rated power, kW	Rated current, A	Starting current, A	Power factor cos ϕ	Ex proof version available	Installation			
						P	S	T	Z
400 V, 50 Hz, 3 ~, 1465 r/min									
413	7,5	16	107	0,76	•	•	•	•	•
414 ¹	7,5	16	107	0,76	•	•	•	•	•
415 ¹	7,5	16	107	0,76	•	•	•	•	•
400 V, 50 Hz, 3 ~, 1460 r/min									
412 ¹	9,0	19	107	0,80	•	•	•	•	•
413	9,0	19	107	0,80	•	•	•	•	•
414 ¹	9,0	19	107	0,80	•	•	•	•	•
415	9,0	19	107	0,80	•	•	•	•	•
400 V, 50 Hz, 3 ~, 955 r/min									
620	9,0	21	90	0,72	•	•	•	•	•
621 ¹	9,0	21	90	0,72	•	•	•	•	•
622	9,0	21	90	0,72	•	•	•	•	•
623 ¹	9,0	21	90	0,72	•	•	•	•	•
624	9,0	21	90	0,72	•	•	•	•	•
625 ¹	9,0	21	90	0,72	•	•	•	•	•
400 V, 50 Hz, 3 ~, 1455 r/min									
410	13,5	28	150	0,82	•	•	•	•	•
411 ¹	13,5	28	150	0,82	•	•	•	•	•
412 ¹	13,5	28	150	0,82	•	•	•	•	•
413	13,5	28	150	0,82	•	•	•	•	•
414 ¹	13,5	28	150	0,82	•	•	•	•	•
415	13,5	28	150	0,82	•	•	•	•	•

Y/D starting current is approximately 1/3 of D starting current.

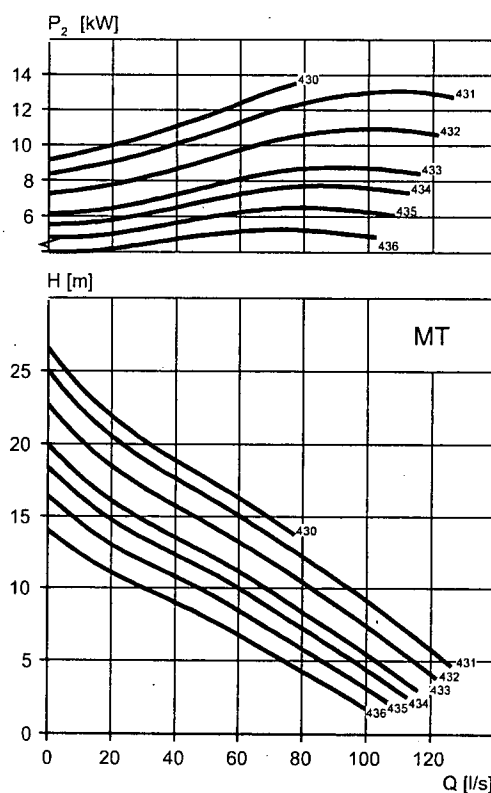
¹Only 3153.181

**N 3153**

MT-Motor rating and performance curve

Curve/Impeller No	Rated power, kW	Rated current, A	Starting current, A	Power factor cos φ	Ex proof version available	Installation				
						P	S	T	Z	
400 V, 50 Hz, 3 ~, 1460 r/min										
434	7,5	16	91	0,79	•	•	•	•	•	
435 ¹	7,5	16	91	0,79	•	•	•	•	•	
436	7,5	16	91	0,79	•	•	•	•	•	
400 V, 50 Hz, 3 ~, 1460 r/min										
433 ¹	9,0	19	107	0,80	•	•	•	•	•	
434	9,0	19	107	0,80	•	•	•	•	•	
435 ¹	9,0	19	107	0,80	•	•	•	•	•	
436	9,0	19	107	0,80	•	•	•	•	•	
400 V, 50 Hz, 3 ~, 1455 r/min										
430 ¹	13,5	28	150	0,82	•	•	•	•	•	
431	13,5	28	150	0,82	•	•	•	•	•	
432 ¹	13,5	28	150	0,82	•	•	•	•	•	
433 ¹	13,5	28	150	0,82	•	•	•	•	•	
434	13,5	28	150	0,82	•	•	•	•	•	
435 ¹	13,5	28	150	0,82	•	•	•	•	•	
436	13,5	28	150	0,82	•	•	•	•	•	

Y/D starting current is approximately 1/3 of D starting current.

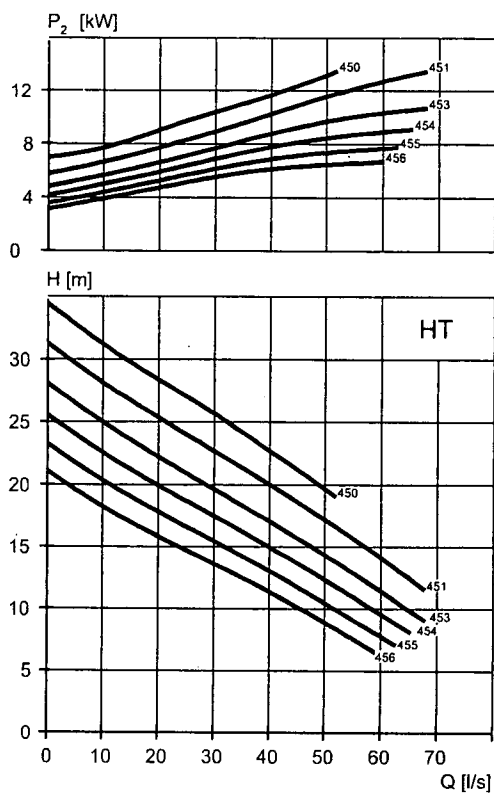
¹ Only 3153.181

**N 3153**

HT-Motor rating and performance curve

Curve/Impeller No	Rated power, kW	Rated current, A	Starting current, A	Power factor cos ϕ	Ex proof version available	Installation				
						P	S	T	Z	
400 V, 50 Hz, 3 ~, 1460 r/min										
451	7,5	16	91	0,79	•	•	•	•	•	
453 ¹	7,5	16	91	0,79	•	•	•	•	•	
454	7,5	16	91	0,79	•	•	•	•	•	
455 ¹	7,5	16	91	0,79	•	•	•	•	•	
456 ¹	7,5	16	91	0,79	•	•	•	•	•	
400 V, 50 Hz, 3 ~, 1460 r/min										
450	9,0	19	107	0,80	•	•	•	•	•	
451	9,0	19	107	0,80	•	•	•	•	•	
453 ¹	9,0	19	107	0,80	•	•	•	•	•	
454	9,0	19	107	0,80	•	•	•	•	•	
455 ¹	9,0	19	107	0,80	•	•	•	•	•	
456 ¹	9,0	19	107	0,80	•	•	•	•	•	
400 V, 50 Hz, 3 ~, 1455 r/min										
450 ¹	13,5	28	150	0,82	•	•	•	•	•	
451	13,5	28	150	0,82	•	•	•	•	•	
453 ¹	13,5	28	150	0,82	•	•	•	•	•	
454	13,5	28	150	0,82	•	•	•	•	•	
455 ¹	13,5	28	150	0,82	•	•	•	•	•	
456 ¹	13,5	28	150	0,82	•	•	•	•	•	

Y/D starting current is approximately 1/3 of D starting current.

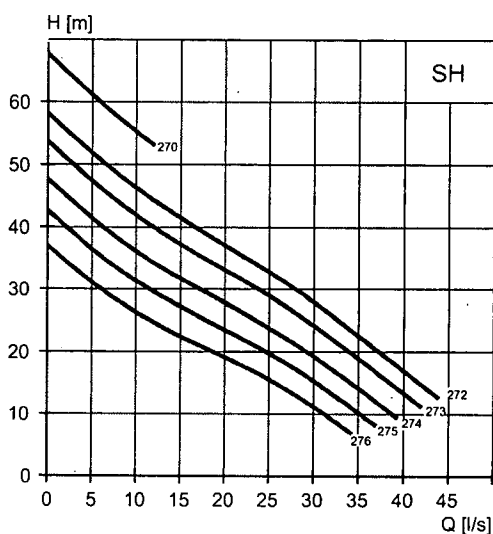
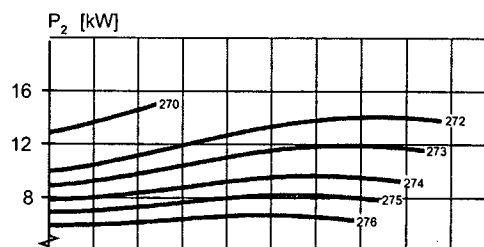
¹ Only 3153, 181

**N 3153**

SH-Motor rating and performance curve

Curve/Impeller No	Rated power, kW	Rated current, A	Starting current, A	Power factor cos ϕ	Ex proof version available	Installation				
						P	S	T	Z	
400 V, 50 Hz, 3 ~, 2905 r/min										
273 ¹	11	19	139	0,94	•	•	•	•	•	•
274	11	19	139	0,94	•	•	•	•	•	•
275 ¹	11	19	139	0,94	•	•	•	•	•	•
276	11	19	139	0,94	•	•	•	•	•	•
400 V, 50 Hz, 3 ~, 2910 r/min										
270 ¹	15	27	213	0,89	•	•	•	•	•	•
272	15	27	213	0,89	•	•	•	•	•	•
273 ¹	15	27	213	0,89	•	•	•	•	•	•
274	15	27	213	0,89	•	•	•	•	•	•
275 ¹	15	27	213	0,89	•	•	•	•	•	•
276	15	27	213	0,89	•	•	•	•	•	•

Y/D starting current is approximately 1/3 of D starting current.

¹ Only 3153.181

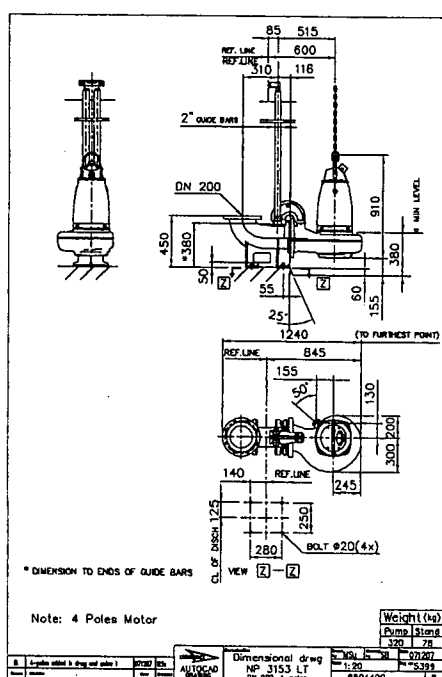
N 3153

Dimensional drawing

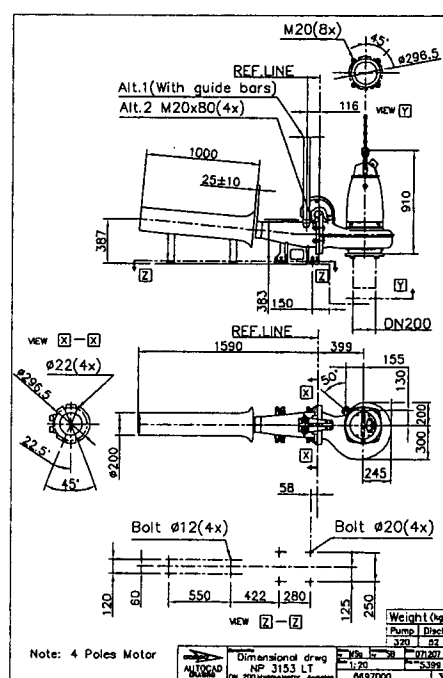
All drawings are available as Acrobat documents (.pdf) and AutoCad drawings (.dwg). Download the drawings from www.flygt.com or contact your ITT Flygt representative for more information.

All dimensions are in mm.

LT, P-installation



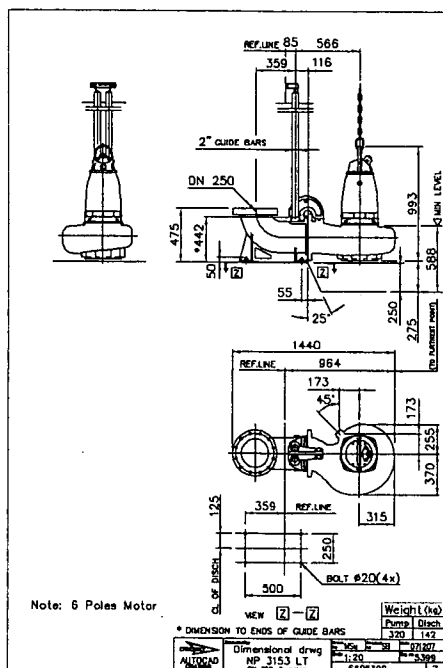
LT, P-installation



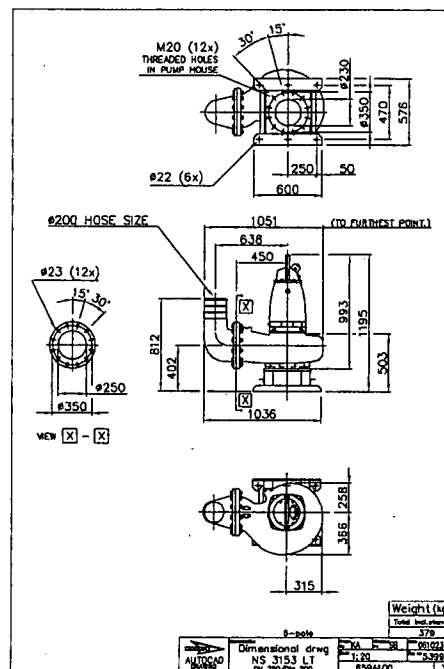


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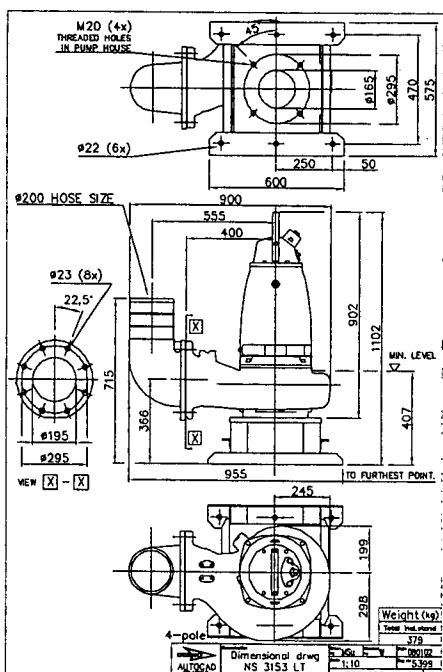
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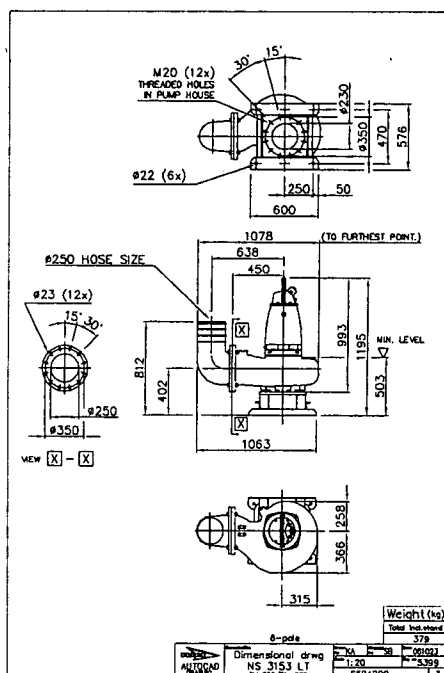
LT, S-installation



LT, S-installation



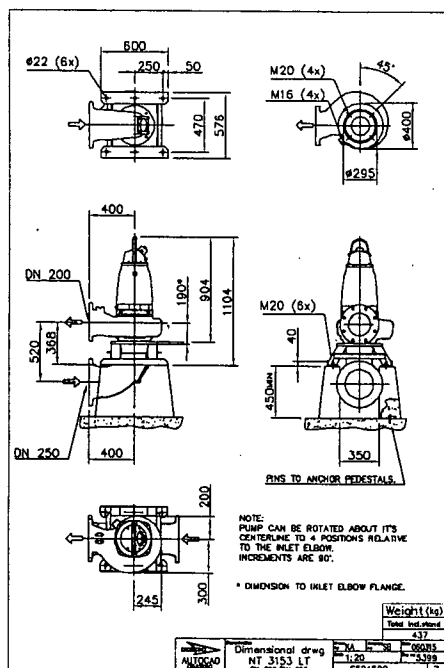
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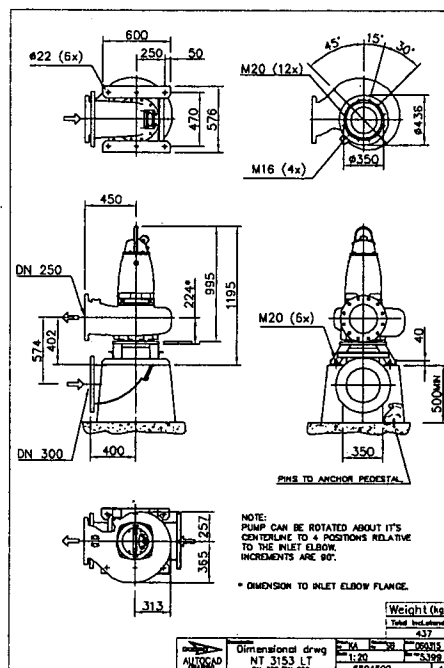


N 3153

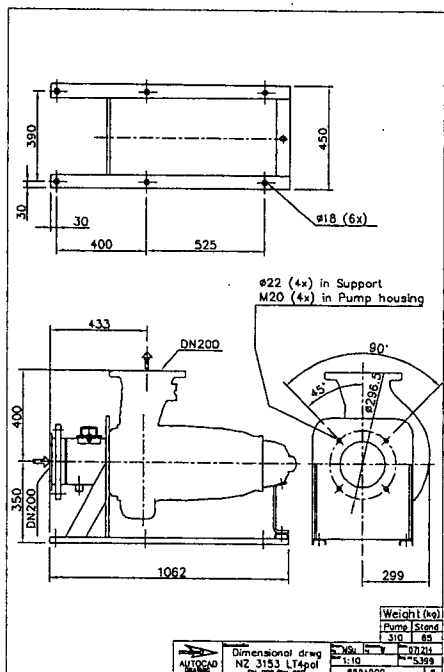
LT, T-installation



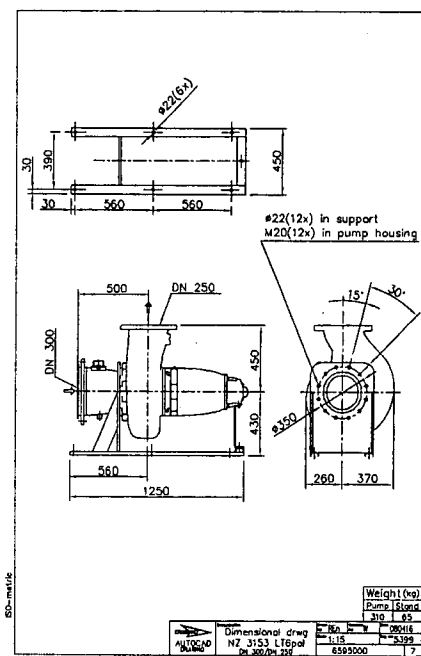
LT, T-installation

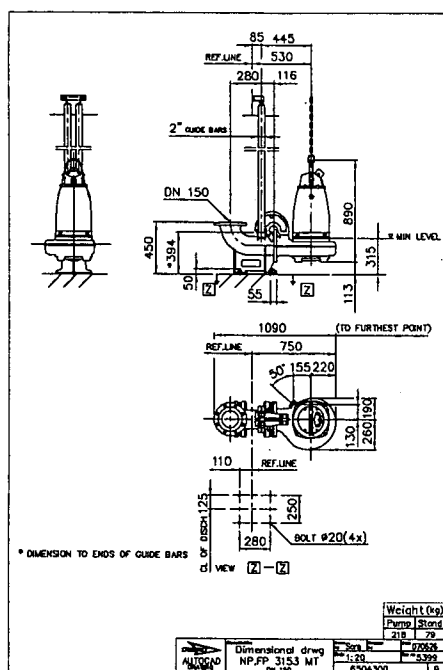


LT, Z-installation



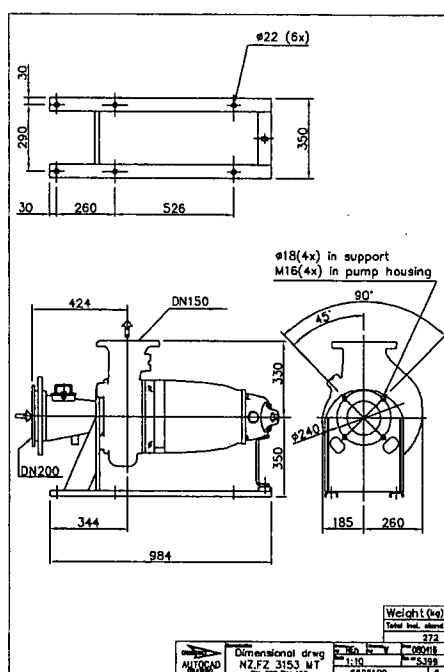
LT, Z-installation



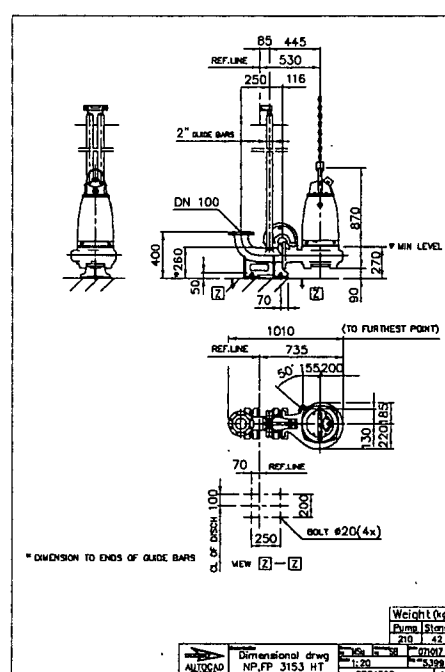
FLYGT**N 3153****MT, P-installation**

N 3153

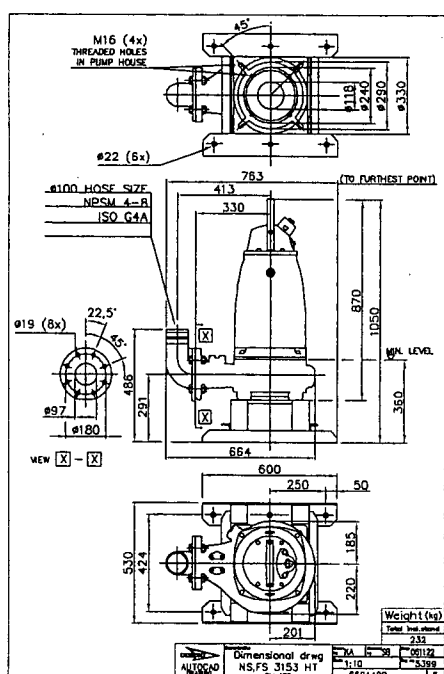
MT, Z-installation



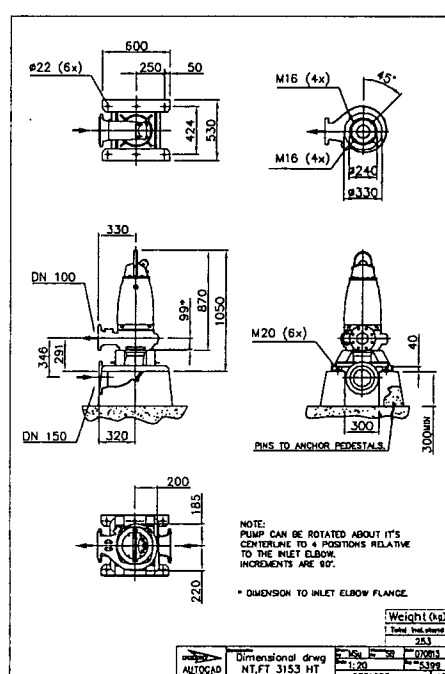
HT, P-installation

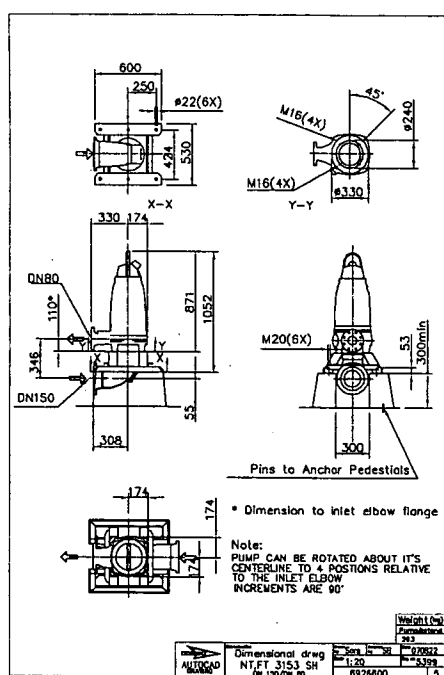
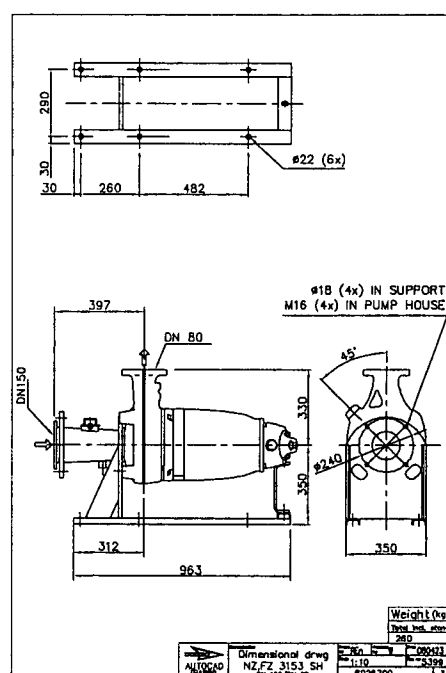


HT, S-installation



HT, T-installation




N 3153
SH, T-installation

SH, Z-installation




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1.2

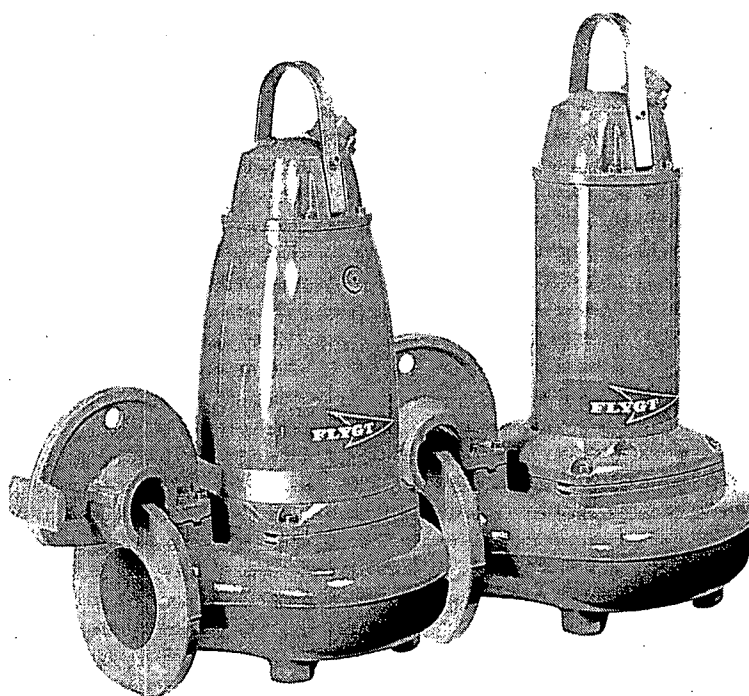


ITT

Water & Wastewater

Parts List

Flygt 3153.091/095/181/185



Engineered for life

Parts List

Flygt 3153.091/095/181/185

Overview

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Preface

Purpose	<p>The purpose of this manual is to give the reader information about available spare parts and accessories for the product.</p> <hr/>
Recipient	<p>The manual is principally intended for ITT</p> <ul style="list-style-type: none">• customers• service personnel <i>and</i>• sales personnel. <hr/>
Contact	<p>Please contact ITT if any information in this publication is</p> <ul style="list-style-type: none">• incorrect• missing• difficult to find <i>or</i>• irrelevant. <hr/>
Reference	<p>More information about the product is available in the following documents:</p> <ul style="list-style-type: none">• Installation• Service and Maintenance• Accessories. Please see Mechanical Accessories at ITT intranet, GPI for list of Stationary Discharge Connections. <hr/>

Practical Information

Overview

Table of Contents

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Approval Plate – EN approved version.....	7
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Data Plate Interpretation

Introduction

The ITT product is always provided with data plates:

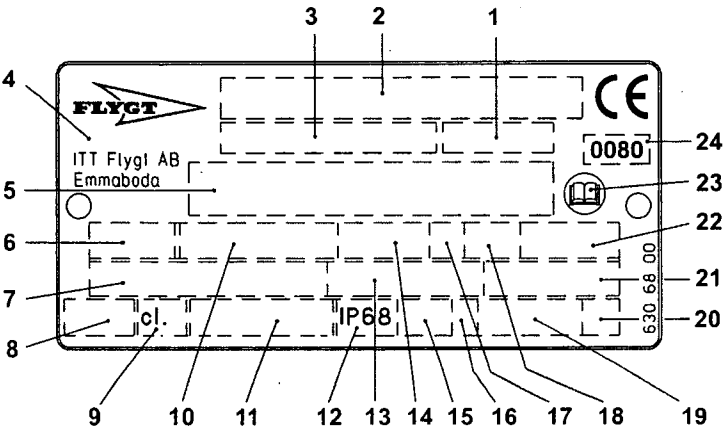
- The general data plate is used on all products.
- The approval plate is added to all explosion proof products.

Data Plate

The product may only be operated within the parameters stated on the data plate.

Illustration

This is an illustration of a general data plate.



Field description

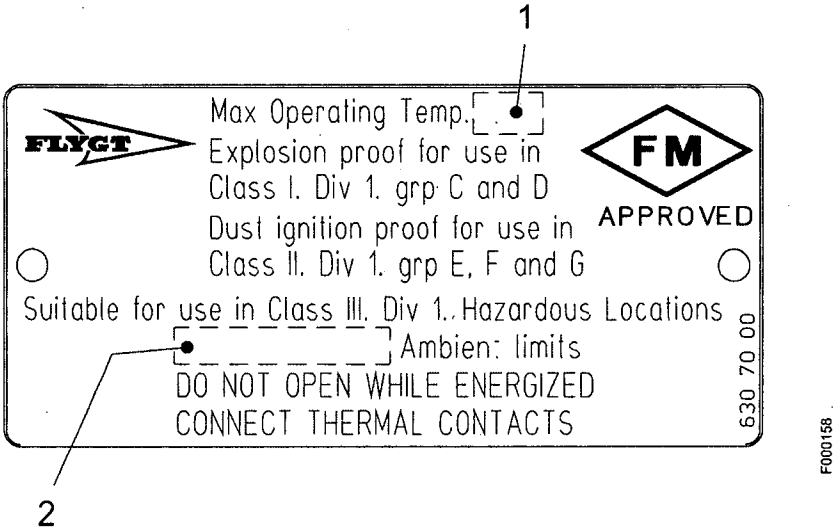
This table shows the fields on the general data plate, and which information each field contains.

Field	Description	Field	Description
1	Curve code/Propeller code	13	Rated current
2	Serial number	14	Rated speed
3	Product number	15	Maximal submersion
4	Country of origin	16	Direction of rotation: <ul style="list-style-type: none">• L = Left• R = Right
5	Additional information	17	Duty class
6	Phase; type of current, frequency	18	Duty factor
7	Rated voltage	19	Product weight
8	Thermal protection	20	Locked rotor code letter
9	Thermal class	21	Power factor
10	Rated shaft power	22	Maximal ambient temperature

Field	Description	Field	Description
11	International standard	23	Read Installation Manual
12	Degree of protection	24	Notified body (only for EN-approved Ex-products)

Approval Plate – FM approved version

Illustration This is an illustration of an approval plate for the FM approved product version.

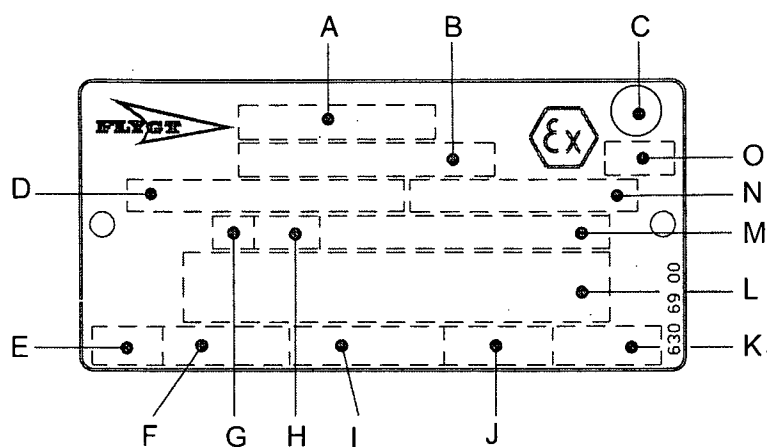


Field description This table shows the fields on the approval plate, and which information each field contains.

Field	Description
1	Temperature class
2	Maximum ambient temperature

Approval Plate – EN approved version

Illustration This is an illustration of an approval plate for the EN approved product version.








Field description

This table shows the fields on the approval plate.

Field	Description	Field	Description
A	Approval	I	Input power
B	Approval authority + Approval Number	J	Rated speed
C	Approval for Class 1	K	Controller
D	Approved drive unit	L	Additional information
E	Stall time	M	Max. ambient temperature
F	Starting current / Rated current	N	Serial number
G	Duty class	O	ATEX marking
H	Duty factor	—	—


Approval

The approval for the European version according to ATEX Directive 94/9/EC is shown on the Approval Plate with one of the following information:

-  IM2 EEx de I
-  IM2 EEx dl
-  II2G EEx de IIB T3
-  II2G EEx d IIB T3
-  II2G EEx d IIB T4

Cable entry: The approval for the cable entry has the following certificate number:

INERIS 02ATEX 9008 U

-  II 2 G or IM2 EEx dIIC or EEx dl

Product Identity

Sales denomination

The product's identity is built up of the Sales Code (four digit) and two letters indicating hydraulic end and type of installation.

This is an example of a sales denomination.

NP 3085
 1 2 3

Table: This table explains what the letters and the numbers in the sales code stand for.

Code Position	Gives information about the...
1	hydraulic part
2	installation mode
3	sales code

Product code

In each range the product's identity, Product Code, is made up of seven digits.

This is an example of a product code.

NP 3085.183
 1 2

Table: This table explains what the product code is made up of:

Code position	Gives information about the ...
1	sales denomination
2	version

Serial number The serial number is used for identification of an individual pump/mixer.
This is an example of a serial number.

NP 3085.183 - 951 0163

|
1

|
2

|
3

|
4

Table: This table explains what the serial number is made up of:

Product code position	Gives information about the ...
1	product code
2	production year
3	production cycle
4	running number

Order parts

Order	When ordering spare parts, state serial number of the product, spare part number and quantity.
Requirements	Genuine ITT parts must always be used for repairs if the product is to fulfill requirements and obtain official approval.
Qualification of personnel	Only ITT or ITT-authorized service personnel may undertake repair work on Ex-approved products.

Motor Parts

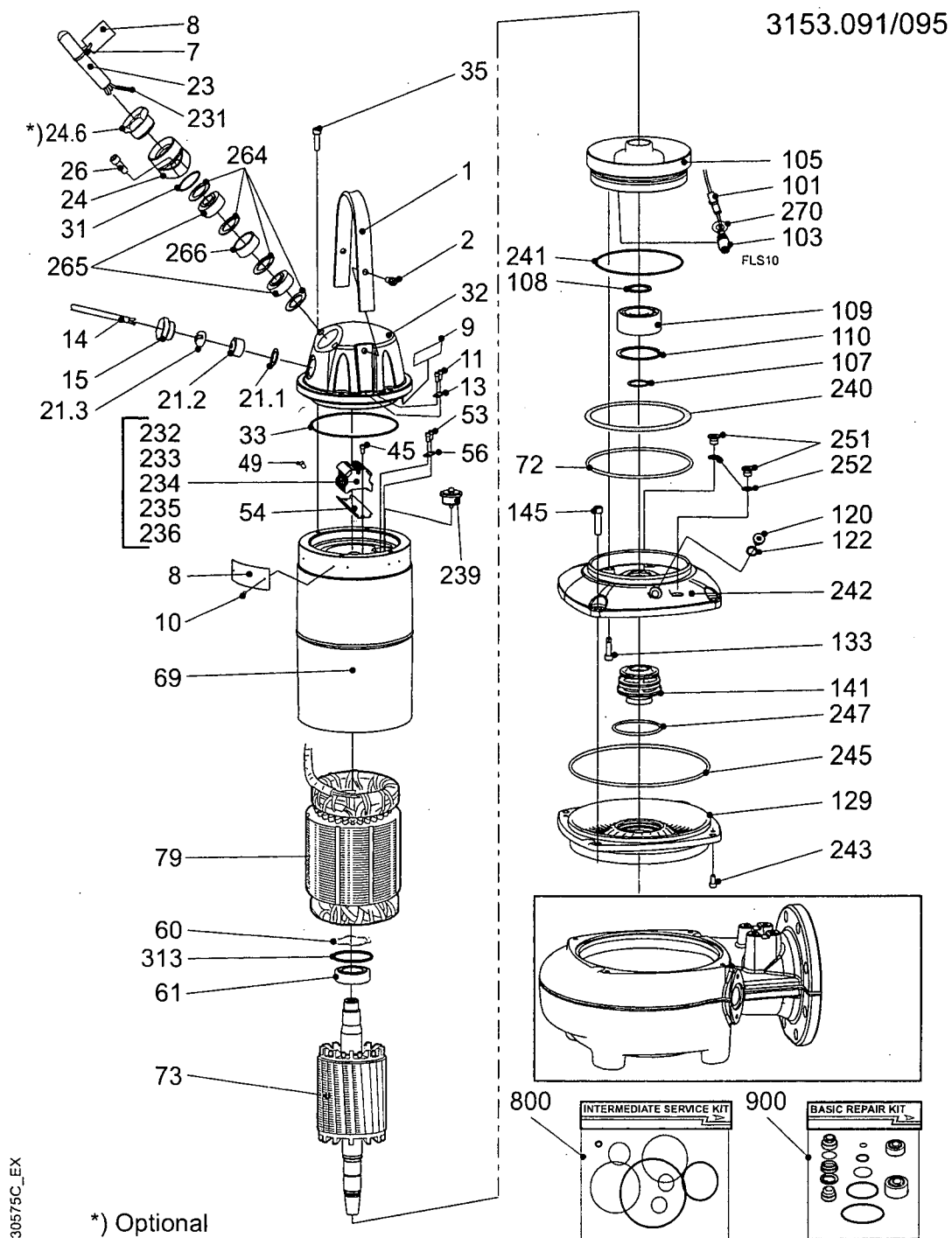
Overview

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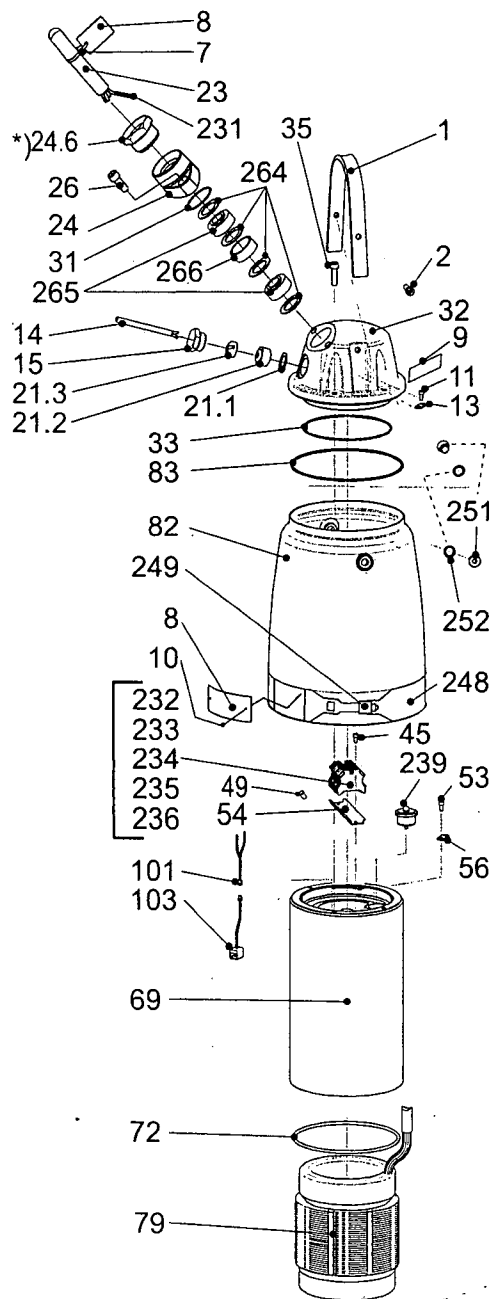
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Exploded view: Motor Parts, Standard version without Cooling jacket.....	15
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Exploded view: Motor Parts, Explosion proof version without Cooling jacket



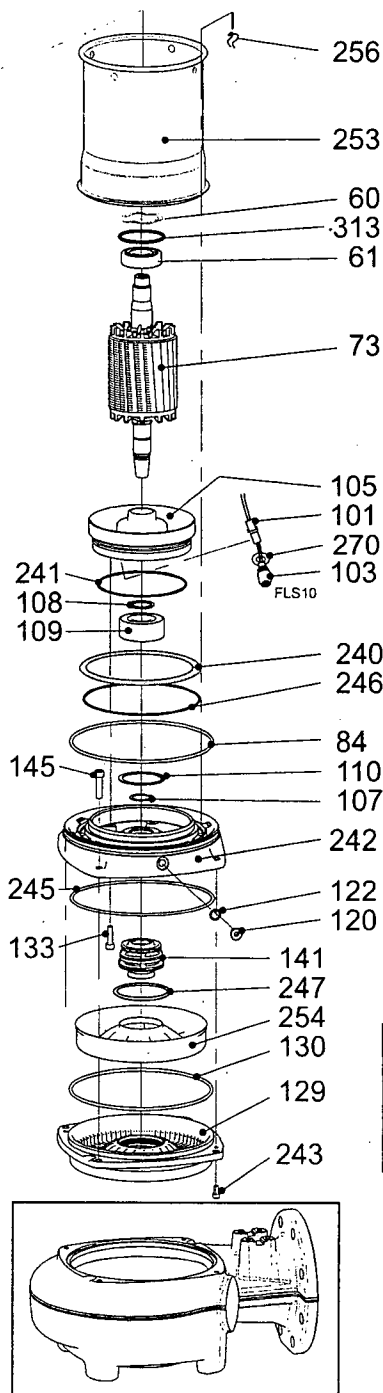
Exploded view: Motor Parts, Explosion proof version with Cooling jacket

3153.091/095

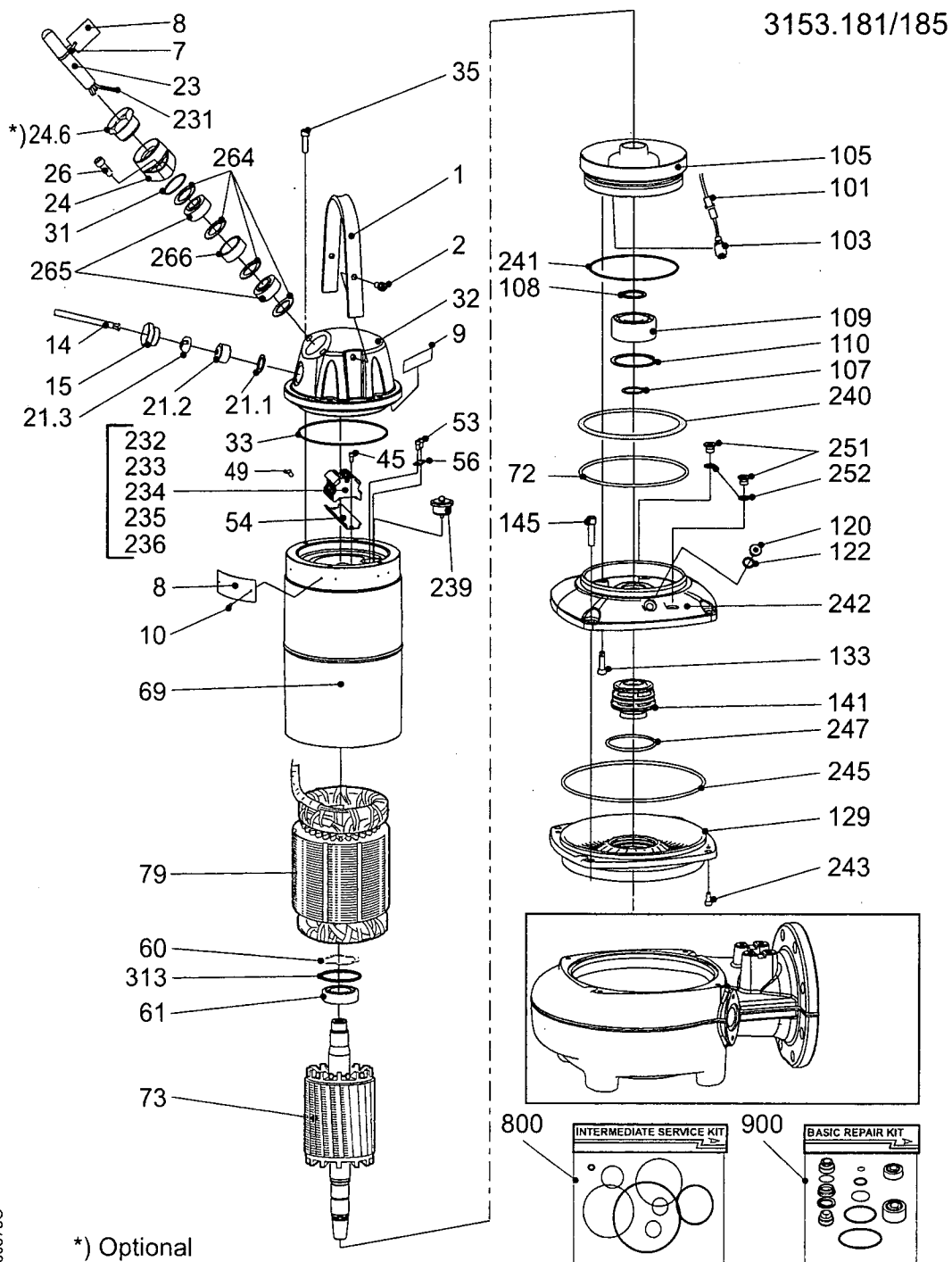


30699D_EX

*) Optional

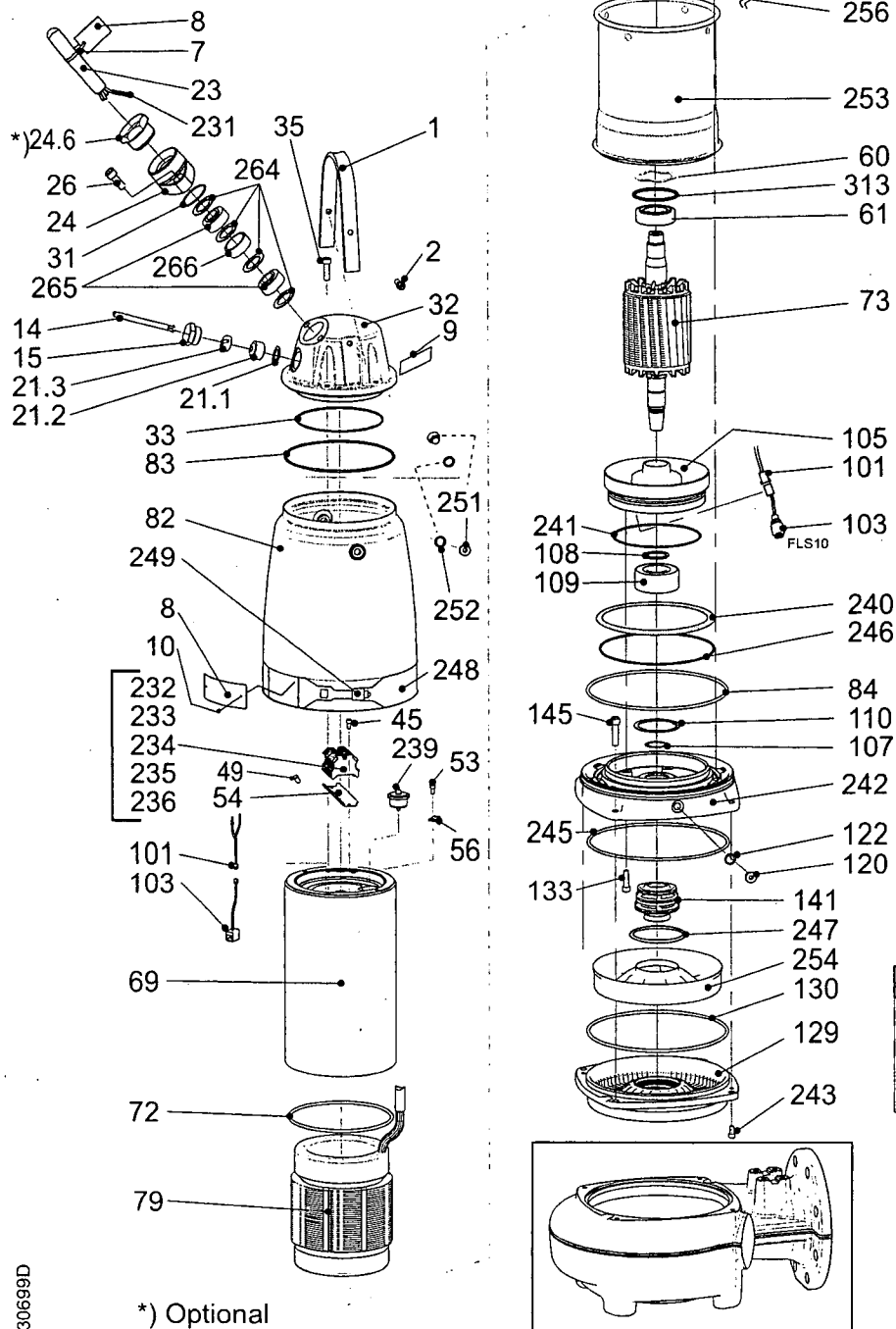


Exploded view: Motor Parts, Standard version without Cooling jacket



Exploded view: Motor Parts, Standard version with Cooling jacket

3153.181/185



30699D

*) Optional

List of Motor Parts

Pos. No	Part. No	Denomination	Qty/Version				
			091	095	181	185	
1	642 15 00	Lifting handle	1	1	1	1	
2	83 04 56	Hex.socket hd screw M10X35-A4-80	2	2	2	2	
7	83 45 52	Cable tie 292X3,5;NYLON;+125 C	1	1	1	1	
7	83 45 59	Cable tie 200X2,4 PA 6/6 -55+105	1	1	1	1	
8	630 68 00	Data plate USE 6306801 AS SPARE PART	2	2	2	2	
8	630 69 00	Certificate plate EX	1	1			
8	630 70 00	Certificate plate FM APPROVED	1	1			
8	630 76 00	Plate HOT WATER PRODUCT			1	1	
9	83 93 50	Marking strip 5-GW(T1;T2;T15;T16)	1	1	1	1	
9	83 93 51	Marking strip W5;V5;U5;V2;W1;U2;V1;W2;U	1	1	1	1	
9	650 09 00	Connection plate	1	1	1	1	
9	650 10 00	Connection plate			1	1	
9	657 79 00	Connection plate	1	1	1	1	
9	681 58 00	Plate	1	1	1	1	
9	698 94 00	Connection plate	1	1	1	1	
9	698 95 00	Connection plate	1	1	1	1	
10	82 20 88	Drive screw 4X5-A2-70	6	6	4	4	
13	642 16 00	Earthing plate	1	1			
14	94 19 22	Control cable SUBCAB 7X1,5 MM2 OD=15-17	*	*	*	*	
14	94 19 30	Control cable 25X1.5	25x1,5 mm2	1	1	1	
15	397 81 00	Gland screw	1	1	1	1	
21.1	82 40 61	Plain washer (10)-22MM	1	1	1	1	
21.2	84 17 90	Seal sleeve (10)-12MM	1	1	1	1	
21.2	84 17 92	Seal sleeve (14)-16MM	1	1	1	1	
21.3	678 58 12	Cable clip (10)-12MM	1	1	1	1	
21.3	678 58 16	Cable clip (14)-16MM	1	1	1	1	
23	94 17 81	Motor cable SUBCAB S3X2,5+3X2,5	SUBCAB S3X2,5+3X2,5/3+4X1,5, Max 70°C (158°F)(18,7) -20 mm. Screened	*	*	*	*
23	94 17 82	Motor cable SUBCAB S3X6+3X6/3+4X1,5	Max 70°C (158°F)(20) -23 mm. Screened	*	*	*	*
23	94 17 84	Motor cable SUBCAB S3X16+3X16/3+4X1,5	Max 70°C (158°F)(29) -32 mm. Screened	*	*	*	*
23	94 20 56	Motor cable SUBC 4G6+2X1.5MM2 23-25	Max 70°C (158°F)(23) -25 mm	*	*	*	*

Pos. No	Part. No	Denomination	Qty/Version				
			091	095	181	185	
23	94 20 57	Motor cable SUBC 4G10+2X1,5MM2 26-28	Max 70°C (158°F)(26) -28 mm	*	*	*	*
23	94 20 59	Motor cable SUBC 4G2,5+2X1,5 MM2	Max 70°C (158°F)(17) -18 mm	*	*	*	*
23	94 20 60	Motor cable SUBC 4G4+2X1.5MM2 20-22	Max 70°C (158°F)(17) -18 mm	*	*	*	*
23	94 20 80	Motor cable SUBC 7G4+2X1.5MM2 22-26	Max 70°C (158°F)(22) -26 mm	*	*	*	*
23	94 20 81	Motor cable SUBC 7G6+2X1,5MM2 24-28	Max 70°C (158°F)(24,3) -28,3 mm	*	*	*	*
23	94 20 82	Motor cable SUBC 7G2,5+2X1,5MM2 20-23	Max 70°C (158°F)(20) -23 mm	*	*	*	*
23	94 21 02	Motor cable	Max 70°C (158°F)(17)(18) -20 mm	*	*	*	*
23	94 21 04	Motor cable	Max 70°C (158°F)(19,5) -21,5 mm	*	*	*	*
23	94 21 06	Motor cable	Max 70°C (158°F)(20,3) -22,3 mm	*	*	*	*
23	94 21 08	Motor cable SUBC 8AWG/3-2-1-GC 27-29	Max 70°C (158°F)(27,2) -29,2 mm	*	*	*	*
23	94 21 09	Motor cable SUBC 6AWG/3-2-1-GC 30-32	Max 70°C (158°F)(30) -32 mm	*	*	*	*
23	94 21 10	Motor cable SUBC 4AWG/3-2-1-GC 33-35	Max 70°C (158°F)(33) -35 mm	*	*	*	*
24	597 87 01	Entrance flange SS		1	1	1	1
24	597 87 04	Entrance flange ISO 228/1-G2		1	1	1	1
24	597 87 08	Entrance flange 2-11.5 NPT		1	1	1	1
24	597 87 11	Entrance flange 1 1/2-11,5 NPT		1	1	1	1
24	642 17 01	Entrance flange	SS	1	1	1	1
24.6	633 11 01	Gland screw 1 1/4" ISO.FOR METALHOSE		1	1	1	1
24.6	633 11 04	Gland screw 1 1/2" NPT.FOR METALHOSE		1	1	1	1
25	84 41 09	Plate		1	1	1	1
26	83 04 53	Hex.socket. hd screw M12X45-A4-80		2	2	2	2
30	429 24 00	Metal hose ISO 7/1 RP 1 1/4"	ISO 7/1 Rp 1 1/4, ISO 7/1 R1 1/4	1	1	1	1
30	517 38 00	Metal hose ISO 7/1 RP 2"	ISO 7/1 Rp 2, ISO 7/1 R2	1	1	1	1
31	82 74 63	O-ring 49,5X3,0 NBR		1	1	1	1
31	82 81 03	O-ring 49,5X3,0 FPM		1	1	1	1
32	642 14 00	Entrance cover	Intended for only motorcable			1	1
32	642 14 01	Entrance cover	Intended for only motorcable	1	1		
32	642 14 04	Entrance cover	Intended for motorcable and aux.cable			1	1
32	642 14 05	Entrance cover	Intended for motorcable and aux.cable	1	1		
33	82 71 33	O-ring 175,0X3,0 FPM		1	1	1	1

Pos. No	Part. No	Denomination	Qty/Version			
			091	095	181	185
33	82 78 35	O-ring 175,0X3,0 NBR	1	1	1	1
35	83 04 56	Hex.socket hd screw M10X35-A4-80	4	4	4	4
45	82 00 11	Hex.socket hd screw EXT. GROUND SCREW M6X12	2	2	2	2
49	83 42 48	End sleeve H16/24	3	3	3	3
49	83 42 49	End sleeve H25/30	3	3	3	3
53	82 00 11	Hex.socket hd screw EXT. GROUND SCREW M6X12	6	6	4	4
54	642 08 00	Rail	1	1	1	1
56	642 16 00	Earthing plate	2	2	2	2
60	82 56 25	Spring washer 71,5X59,0X6,5	1	1	1	1
61	83 30 16	Ball bearing 3306A-2Z/C3VT113	1	1	1	1
69	642 09 00	Stator housing			1	1
69	642 09 01	Stator housing	1	1		
72	82 74 94	O-ring 209,3X5,7 NBR	1	1	1	1
72	82 80 83	O-ring 209,3X5,7 FPM	1	1	1	1
73	641 91 03	Shaft unit	1	1	1	1
73	641 98 05	Shaft unit	1	1	1	1
73	641 98 06	Shaft unit	1	1	1	1
73	648 61 01	Shaft unit	1		1	1
79	641 93 01	Stator 21-18-4a	1	1	1	1
		3-phase, 50 Hz, 400V D/690V Y. Thermal contact 140 DC. 3-phase, 60 Hz, 460V D. Thermal contact 140 DC.				
79	641 93 02	Stator 21-18-4a	1	1	1	1
		3-phase, 50 Hz, 400V Y/230V D. Thermal contact 140 DC.				
79	641 93 03	Stator 21-18-4a	1	1	1	1
		3-phase, 50 Hz, 415 - 440V D. Thermal contact 140 DC.				
79	641 93 04	Stator 21-18-4a	1	1	1	1
		3-phase, 60 Hz, 200 - 208V D. Thermal contact 140 DC.				
79	641 93 05	Stator 21-18-4a	1	1	1	1
		3-phase, 60 Hz, 460VY SER/230VY //. Thermal contact 140 DC.				
79	641 93 06	Stator 21-18-4a	1	1	1	1
		3-phase, 60 Hz, 380V D. Thermal contact 140 DC.				
79	641 93 07	Stator 21-18-4a	1	1	1	1
		3-phase, 60 Hz, 380V Y. Thermal contact 140 DC.				
79	641 93 08	Stator 21-18-4a	1	1	1	1
		3-phase, 50 Hz, 500V D, thermal contact 140 DC. 3-phase, 60 Hz, 575 - 600V D, thermal contact 140 DC.				

Pos. No	Part. No	Denomination	Qty/Version				
			091	095	181	185	
79	641 93 09	Stator 21-18-4a	3-phase, 50 Hz, 660V Y/380V D, thermal contact 140 DC. 3-phase, 60 Hz, 440V D, thermal contact 140 DC.	1	1	1	1
79	641 94 01	Stator 21-15-4a	3-phase, 50 Hz, 690V Y/400V D, thermal contact 140 DC. 3-phase, 60 Hz, 460V D, thermal contact 140 DC.	1	1	1	1
79	641 94 02	Stator 21-15-4a	3-phase, 50 Hz, 400V Y/230V D, thermal contact 140 DC.	1	1	1	1
79	641 94 03	Stator 21-15-4a	3-phase, 50 Hz, 415 - 440V D, thermal contact 140 DC.	1	1	1	1
79	641 94 04	Stator 21-15-4a	3-phase, 60 Hz, 200 - 208V D. Thermal contact 140 DC.	1	1	1	1
79	641 94 05	Stator 21-15-4a	3-phase, 60 Hz, 460VY SER/230VY //. Thermal contact 140 DC.	1	1	1	1
79	641 94 06	Stator 21-15-4a	3-phase, 60 Hz, 380V D. Thermal contact 140 DC.	1	1	1	1
79	641 94 07	Stator 21-15-4a	3-phase, 60 Hz, 380V Y. Thermal contact 140 DC.	1	1	1	1
79	641 94 08	Stator 21-15-4a	3-phase, 50 Hz, 500V D, thermal contact 140 DC. 3-phase, 60 Hz, 575 - 600V D, thermal contact 140 DC.	1	1	1	1
79	641 94 09	Stator 21-15-4a	3-phase, 50 Hz, 380V D/660V Y, thermal contact 140 DC. 3-phase, 60 Hz, 440V D, thermal contact 140 DC.	1	1	1	1
79	647 27 01	Stator 21-18-6	3-phase, 50 Hz, 690V Y/400V D, thermal contact 140 DC. 3-phase, 60 Hz, 460V D, thermal contact 140 DC.	1		1	1
79	647 27 02	Stator 21-18-6	3-phase, 50 Hz, 400V Y - 230V D. Thermal contact 140 DC.	1		1	1
79	647 27 03	Stator 21-18-6	3-phase, 50 Hz, 415- 440V D. Thermal contact 140 DC.	1		1	1
79	647 27 04	Stator 21-18-6	3-phase, 60 Hz, 200 - 208V D. Thermal contact 140 DC.	1		1	1
79	647 27 05	Stator 21-18-6	3-phase, 60 Hz, 460VY SER/230VY //. Thermal contact 140 DC.	1		1	1
79	647 27 06	Stator 21-18-6	3-phase, 60 Hz, 380V D. Thermal contact 140 DC.	1		1	1
79	647 27 07	Stator 21-18-6	3-phase, 60 Hz, 380V Y. Thermal contact 140 DC.	1		1	1

Pos. No	Part. No	Denomination	Qty/Version				
			091	095	181	185	
79	647 27 08	Stator 21-18-6	3-phase, 50 Hz, 500V D. Thermal contact 140 DC. 3-phase, 60 Hz, 575 - 600V D. Thermal contact 140 DC.	1		1	1
79	647 27 09	Stator 21-18-6	3-phase, 50 Hz, 660V Y/380V D, thermal contact 140 DC. 3-phase, 60 Hz, 440V D, thermal contact 140 DC.	1		1	1
79	654 95 03	Stator 21-18-4a	3-phase, 50 Hz, 415 - 440V D (Incl. thermistors).			1	1
79	654 96 03	Stator 21-15-4a	3-phase, 50 Hz, 415 - 440V D (Incl. thermistor).			1	1
79	659 48 03	Stator 21-18-6	3-phase, 50 Hz, 415 - 440V D (Incl. thermistor).			1	1
79	661 39 01	Stator 21-18-2b	3-phase, 50 Hz, 400 - 440V D, thermal contact 140 DC. 3-phase, 60 Hz, 460V D, thermal contact 140 DC.	1	1	1	1
79	661 39 02	Stator 21-18-2b	3-phase, 50 Hz, 400V Y/230V D, thermal contact 140 DC.	1	1	1	1
79	661 39 03	Stator 21-18-2b	3-phase, 50 Hz, 500V D, thermal contact 140 DC. 3-phase, 60 Hz, 575 - 600V D, thermal contact 140 DC.	1	1	1	1
79	661 39 04	Stator 21-18-2b	3-phase, 60 Hz, 440 - 460VY SER/220 - 230VY //, thermal contact 140 DC.	1	1	1	1
79	661 39 07	Stator 21-18-2b	3-phase, 50 Hz, 660V Y/380V D, thermal contact 140 DC. 3-phase, 60 Hz, 440V D, thermal contact 140 DC.	1	1	1	1
79	661 39 08	Stator 21-18-2b	3-phase, 60 Hz, 200 - 208V D, thermal contact 140 DC.	1	1	1	1
79	689 07 01	Stator 21-18-2b	3-phase, 50 Hz, 400 - 440V D/690V Y (Incl. thermistor).			1	1
79	702 44 01	Stator 21-18-2f	3-phase, 50 Hz, 660 - 690V Y / 380 - 400V D, thermal contact 140 DC. 3-phase, 60 Hz, 440 - 460V D, thermal contact 140 DC.	1	1	1	1
79	702 44 02	Stator 21-18-2f	3-phase, 50 Hz, 440V Y/230V D, thermal contact 140 DC.	1	1	1	1
79	702 44 03	Stator 21-18-2f	3-phase, 50 Hz, 500V D, thermal contact 140 DC. 3-phase, 60 Hz, 575 - 600V D, thermal contact 140 DC.	1	1	1	1
79	702 44 04	Stator 21-18-2f	3-phase, 60 Hz, 440 - 460VY SER/220 - 230VY //, thermal contact 140 DC.	1	1	1	1

Pos. No	Part. No	Denomination	Qty/Version				
			091	095	181	185	
79	702 44 07	Stator 21-18-2f	3-phase, 50 Hz, 415 - 440V D, thermal contact 140 DC.	1	1	1	1
79	702 44 08	Stator 21-18-2f	3-phase, 60 Hz, 200 - 208V D, thermal contact 140 DC.	1	1	1	1
79	702 45 07	Stator 21-18-2f	3-phase, 50 Hz, 415 - 440V D (Incl thermistor).			1	1
82	608 12 00	Cooling jacket OUTER	Standard	1	1	1	1
82	608 12 01	Cooling jacket OUTER	Stainless Steel	1	1	1	1
83	82 71 70	O-ring 221,84X3,53 FPM		1	1	1	1
83	82 78 49	O-ring 221,84X3,53 NBR		1	1	1	1
84	82 75 01	O-ring 279,3X5,7 NBR		1	1	1	1
84	82 75 22	O-ring 279,3X5,7 FPM		1	1	1	1
101	650 51 00	Cable unit FLS10	Intended for FLS 10	1	1	1	1
103	663 04 00	Level sensor FLS10	FLS 10	1	1	1	1
105	642 10 00	Bearing holder				1	1
105	642 10 01	Bearing holder		1	1		
107	82 59 06	Retaining ring SGA 40		1	1	1	1
108	82 44 15	Supporting washer 40X50X2,5-SPRING STEEL		1	1	1	1
109	83 30 18	Ball bearing 3308A-2Z/C3VT113	Lower bearing	1	1	1	1
110	83 07 62	Retaining ring JB 90		1	1	1	1
120	642 13 00	Inspection screw		1	1	1	1
122	82 76 85	O-ring 17,0X3,0 NBR		1	1	1	1
122	82 79 15	O-ring 17,0X3,0 FPM		1	1	1	1
129	642 12 00	Seal housing cover		1	1	1	1
130	82 78 39	O-ring 230,0X3,0 NBR		1	1	1	1
133	83 04 56	Hex.socket hd screw M10X35-A4-80		6	6	6	6
141	641 50 00	Mechanical seal DIAM.35	WCCR/WCCR	1	1	1	1
141	641 50 01	Mechanical seal DIAM.35	WCCR/RSiC	1	1	1	1
145	83 04 53	Hex.socket hd screw M12X45-A4-80		4	4	4	4
228	663 85 00	Connection plate		1	1	1	1
229	667 40 01	Sticker		2	2	2	2
231	93 00 77	Shrink hose ID 6,4		*	*	*	*
231	93 00 78	Shrink hose ID 9,5		*	*	*	*
232	83 53 58	Terminal clamp WEIDMÜLLER WDU6/10		3	3	4	4
233	83 53 17	Terminal clamp WDU35/IK/ZA		6	6	6	6
233	83 53 61	Terminal clamp WDU16,1000V		8	8	8	8
234	83 53 49	Cross connection WQW35/2		3	3	3	3

Pos. No	Part. No	Denomination	Qty/Version			
			091	095	181	185
234	83 53 67	Cross connection WQV 16/2 WEIDMÜLLER WQV 16/2	4	4	4	4
234	650 20 02	Cross connection WQV 16	1	1	1	1
234	650 20 03	Cross connection WQV 35	1	1	1	1
235	83 53 54	End support WEW 35/2	2	2	2	2
236	83 53 50	Partition	1	1	1	1
239	441 46 00	El lead through unit	1	1	1	1
239	443 69 00	El-lead through	1	1	1	1
240	607 48 00	Spring	1	1	1	1
241	82 71 33	O-ring 175,0X3,0 FPM	1	1	1	1
241	82 78 35	O-ring 175,0X3,0 NBR	1	1	1	1
242	608 22 10	adapter			1	1
242	608 22 11	adapter	1	1		
242	642 11 00	adapter Execution without cooling jacket			1	1
242	642 11 01	adapter Execution without cooling jacket	1	1		
243	83 02 97	Hex.socket hd screw M8X16-A4-70	2	2	2	2
245	82 75 01	O-ring 279,3X5,7 NBR	1	1	1	1
245	82 75 22	O-ring 279,3X5,7 FPM	1	1	1	1
246	82 78 39	O-ring 230,0X3,0 NBR	1	1	1	1
247	82 95 69	O-ring 84,4X4,0 FPM	1	1	1	1
248	608 27 00	Strip	1	1	1	1
249	82 32 50	Clip	1	1	1	1
251	642 13 00	Inspection screw	2	2	2	2
252	82 76 85	O-ring 17,0X3,0 NBR	2	2	2	2
252	82 79 15	O-ring 17,0X3,0 FPM	2	2	2	2
253	608 13 00	Cooling jacket INNER Inner	1	1	1	1
254	608 14 00	Flow diffusor	1	1	1	1
256	608 42 00	Wire bow	4	4	4	4
264	82 40 69	Plain washer 35.5X52X2 (33)-35 MM	4	4	4	4
264	82 40 81	Plain washer (14)-20 MM	4	4	4	4
264	82 40 82	Plain washer (20)-32 MM	4	4	4	4
265	84 18 01	Seal sleeve (17)-20 MM	2	2	2	2
265	84 18 02	Seal sleeve (20)-23 MM	2	2	2	2
265	84 18 03	Seal sleeve (23)-26 MM	2	2	2	2
265	84 18 04	Seal sleeve (26)-29 MM	2	2	2	2
265	84 18 05	Seal sleeve (29)-32 MM	2	2	2	2
265	84 18 06	Seal sleeve (32)-35 MM	2	2	2	2
266	597 98 02	Ring	1	1	1	1
270	608 31 00	Lock washer	1	1		

Pos. No	Part. No	Denomination	Qty/Version			
			091	095	181	185
313	82 71 72	O-ring 71,2X3,0 FPM	1	1	1	1
912	82 76 85	O-ring 17,0X3,0 NBR Extra O-rings for Inspection screws	3	3	3	3
912	82 79 15	O-ring 17,0X3,0 FPM Extra O-rings for Inspection screws	3	3	3	3

Hydraulic Parts

Overview

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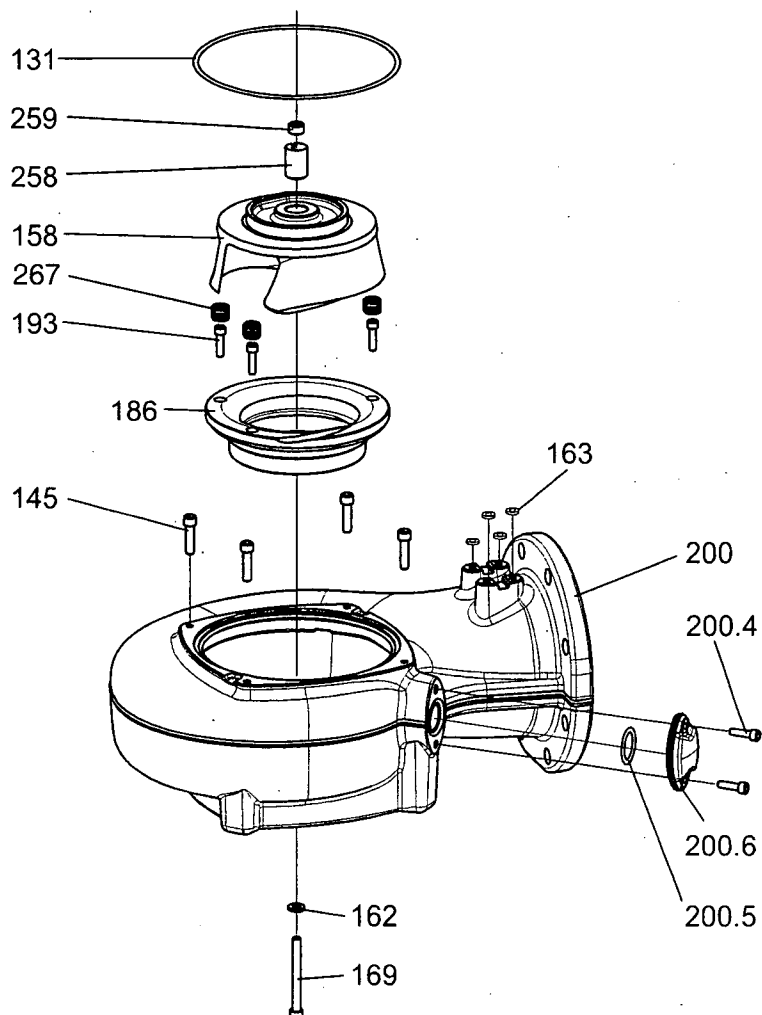
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Exploded view: Hydraulic Parts N; MT	28
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Exploded view: Hydraulic Parts N; LT, 4-Pole

"LT" Low Head. Curve: 410-416

N_ 3153 LT

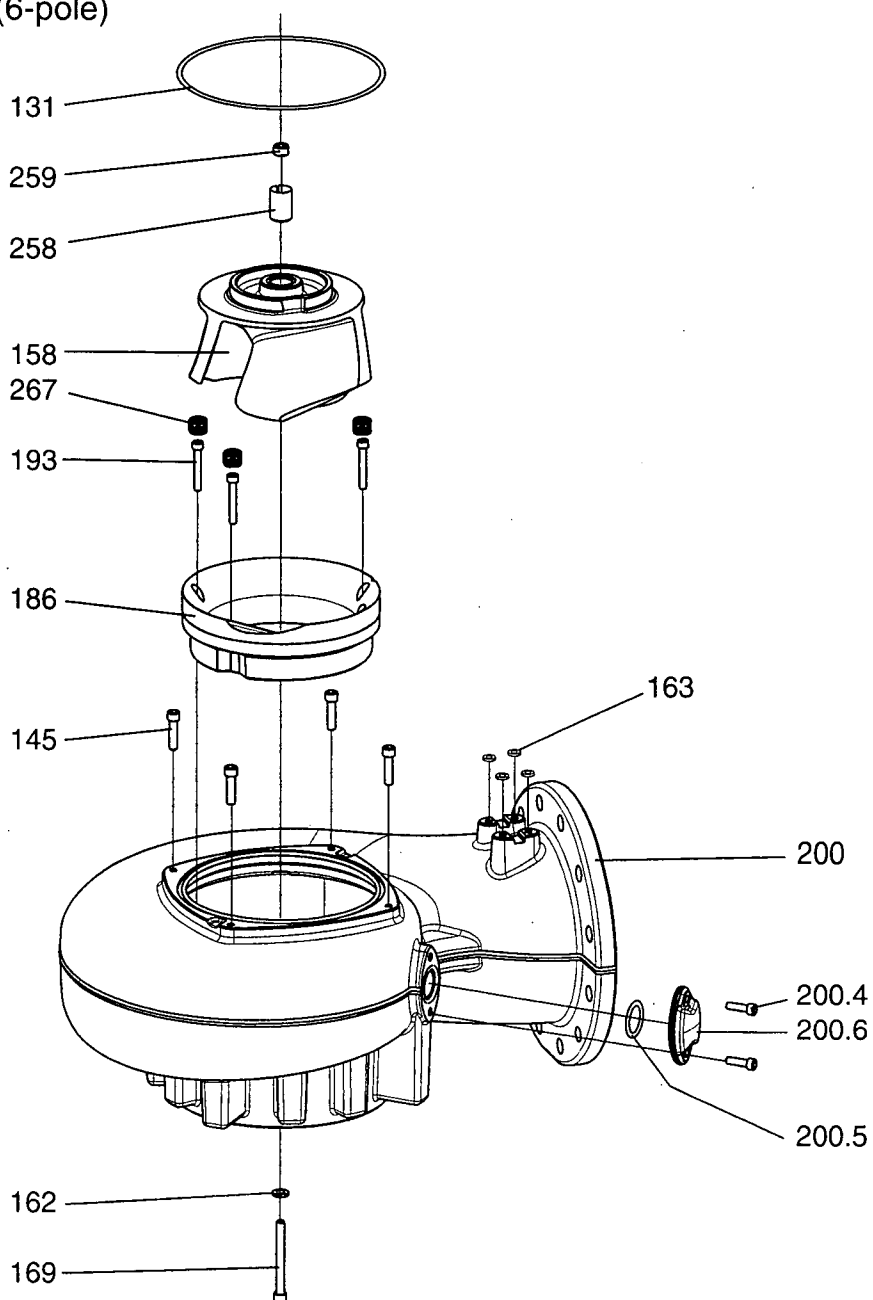


31261

Exploded view: Hydraulic Parts N; LT, 6-Pole

"LT" Low head Curve: 620, 621, 622, 623, 624, 625

N_ 3153 LT (6-pole)

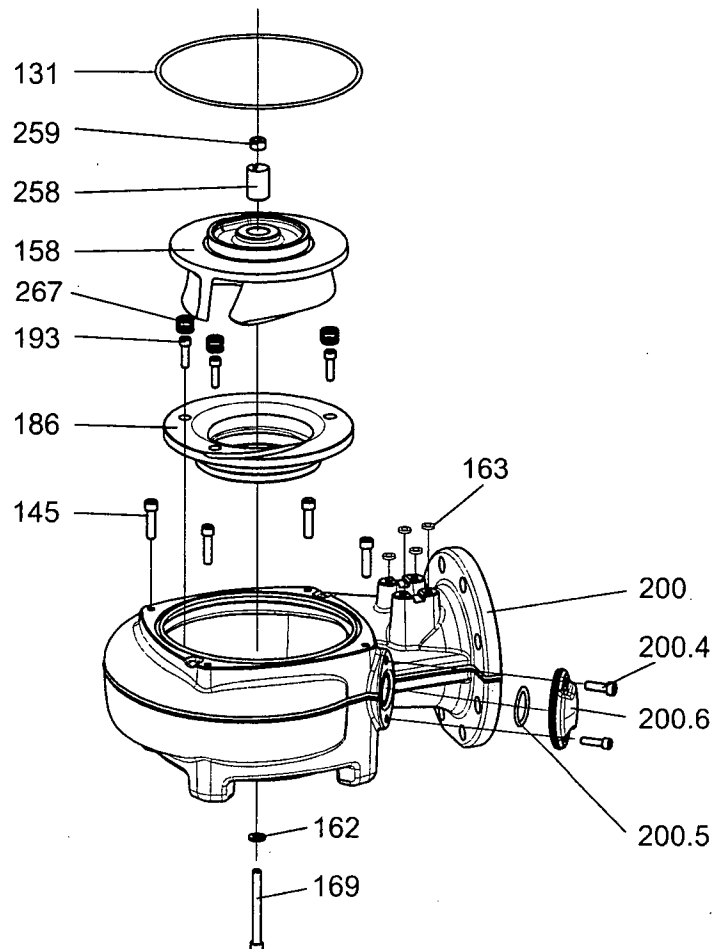


31364

Exploded view: Hydraulic Parts N; MT

"MT" Medium head, Curve: 430-437

N_ 3153 MT

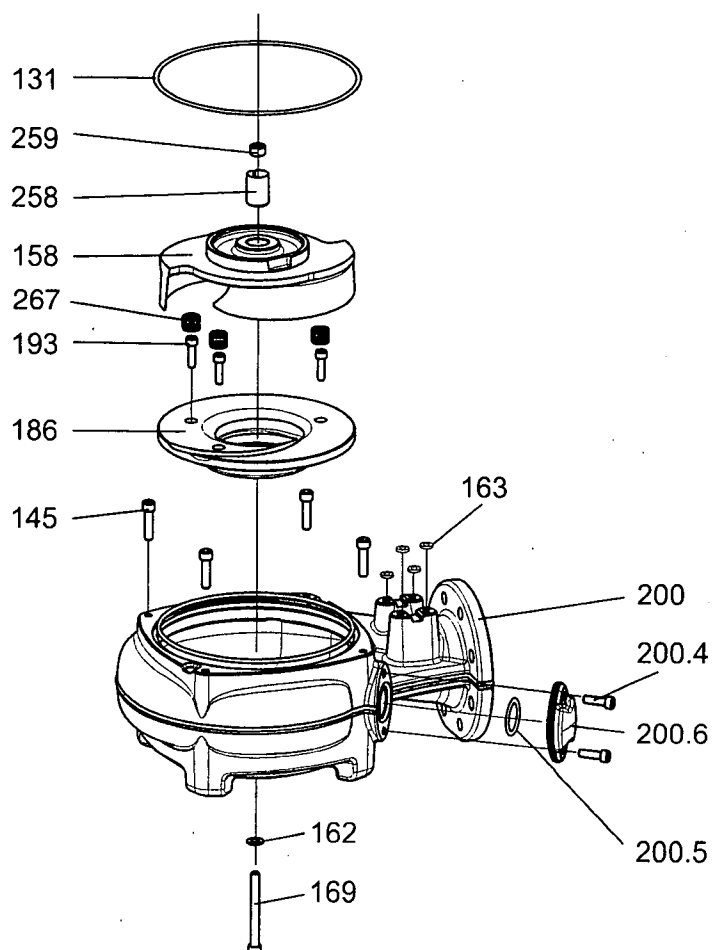


31260

Exploded view: Hydraulic Parts N; HT

"HT" High head Curve: 450-457,461-466

N_ 3153 HT



31259

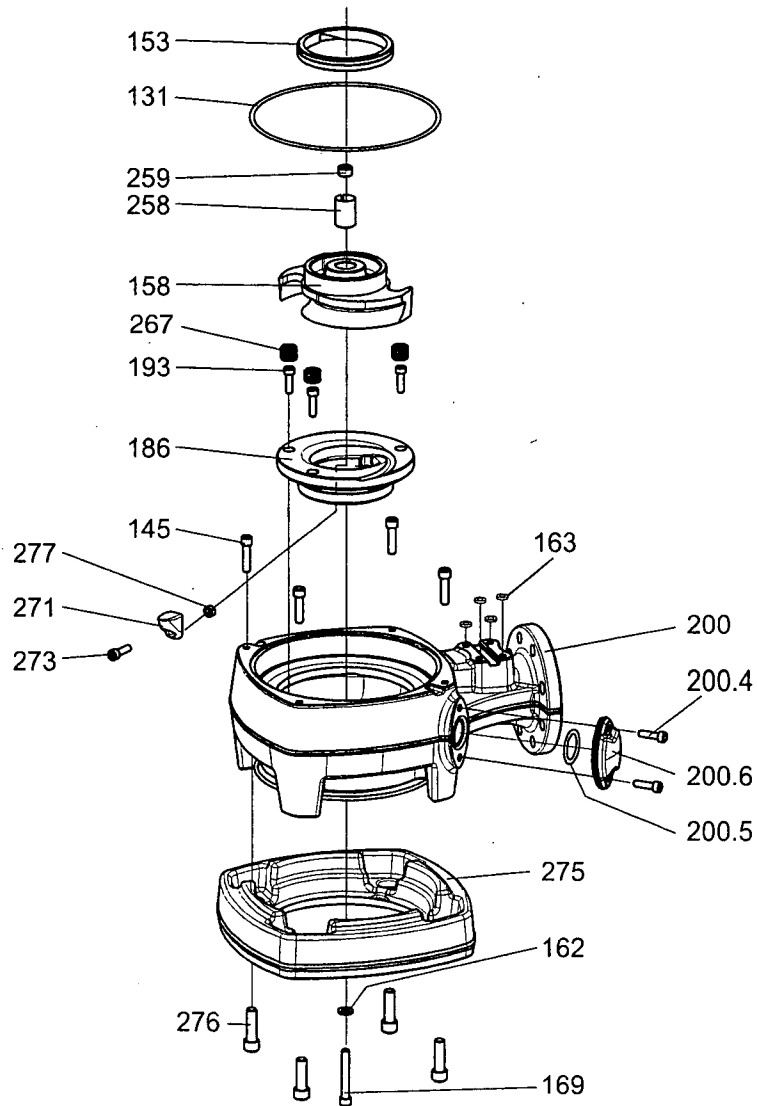
Parts List, Flygt 3153.091/095/181/185

29

Exploded view: Hydraulic Parts N; SH

"SH" Super high head Curve: 270, 272-276

N_ 3153 SH



31258

List of Hydraulic Parts

Pos. No	Part. No	Denomination	Qty/Version			
			091	095	181	185
131	82 75 01	O-ring 279,3X5,7 NBR	1	1	1	1
131	82 75 22	O-ring 279,3X5,7 FPM	1	1	1	1
153	681 28 00	Insert ring	1	1	1	1
158	605 94 00	Impeller "HT" High head. Curve no: 461, 60 Hz, 3-phase	1		1	
158	605 94 09	Impeller "HT" High head. Curve: 462, 60 Hz, 3-phase	1		1	
158	605 94 22	Impeller "HT" High head. Curve no: 463, 60 Hz, 3-phase	1		1	
158	605 94 32	Impeller "HT" High head. Curve no: 464, 60 Hz, 3-phase	1		1	
158	605 94 46	Impeller "HT" High head. Curve no: 465, 60 Hz, 3-phase	1		1	
158	605 94 55	Impeller "HT" High head. Curve no: 466, 60 Hz, 3-phase	1		1	
158	654 77 00	Impeller "LT" Low head. Curve no: 620, 50 Hz, 3-phase	1		1	
158	654 77 15	Impeller "LT" Low head. Curve no: 621, 50 Hz, 3-phase	1		1	
158	654 77 30	Impeller "LT" Low head. Curve no: 622, 50/60 Hz, 3-phase	1		1	
158	654 77 45	Impeller "LT" Low head. Curve no: 623, 50/60 Hz, 3-phase	1		1	
158	654 77 62	Impeller "LT" Low head. Curve no: 624, 50/60 Hz, 3-phase	1		1	
158	654 77 81	Impeller "LT" Low head. Curve no: 625, 50/60 Hz, 3-phase	1		1	
158	685 15 00	Impeller "SH" Super high head. Curve no: 270, 50 Hz, 3-phase	1		1	
158	685 15 18	Impeller "SH" Super high head. Curve no: 272, 50 Hz, 3-phase	1		1	
158	685 15 27	Impeller "SH" Super high head. Curve no: 273, 50/60 Hz, 3-phase	1		1	
158	685 15 39	Impeller "SH" Super high head. Curve no: 274, 50/60 Hz, 3-phase	1		1	
158	685 15 48	Impeller "SH" Super high head. Curve: 275, 50/60 Hz, 3-phase	1		1	
158	685 15 57	Impeller "SH" Super high head. Curve: 276, 50/60 Hz, 3-phase	1		1	
158	696 48 00	Impeller "HT" High head. Curve no: 450, 50 Hz, 3-phase	1		1	
158	696 48 14	Impeller "HT" High head. Curve no: 451, 50 Hz, 3-phase	1		1	

Pos. No	Part. No	Denomination	Qty/Version			
			091	095	181	185
158	696 48 28	Impeller	"HT" High head. Curve no: 453, 50/60 Hz, 3-phase.	1		1
158	696 48 39	Impeller	"HT" High head. Curve no: 454, 50 Hz, 3-phase.	1		1
158	696 48 50	Impeller	"HT" High head. Curve no: 455, 50 Hz, 3-phase.	1		1
158	696 48 60	Impeller	"HT" High head. Curve no: 456, 50 Hz, 3-phase.	1		1
158	696 49 00	Impeller	"MT" Medium head. Curve no: 430, 50 Hz, 3-phase	1		1
158	696 49 08	Impeller	"MT" Medium head. Curve no: 431, 50 Hz, 3-phase	1		1
158	696 49 20	Impeller	"MT" Medium head. Curve no: 432, 50 Hz, 3-phase	1		1
158	696 49 32	Impeller	"MT" Medium head. Curve no: 433, 50/60 Hz, 3-phase	1		1
158	696 49 42	Impeller	"MT" Medium head. Curve no: 434, 50/60 Hz, 3-phase	1		1
158	696 49 52	Impeller	"MT" Medium head. Curve no: 435, 50/60 Hz, 3-phase	1		1
158	696 49 65	Impeller	"MT" Medium head. Curve no: 436, 50/60 Hz, 3-phase	1		1
158	696 49 75	Impeller	"MT" Medium head. Curve no: 437, 60 Hz, 3-phase	1		1
158	696 50 00	Impeller	"LT" Low head. Curve 410, 50 Hz, 3-phase	1		1
158	696 50 10	Impeller	"LT" Low head. Curve 411, 50 Hz, 3-phase	1		1
158	696 50 22	Impeller	"LT" Low head. Curve 412, 50 Hz, 3-phase	1		1
158	696 50 33	Impeller	"LT" Low head. Curve 413, 50/60 Hz, 3-phase	1		1
158	696 50 43	Impeller	"LT" Low head. Curve 414, 50/60 Hz, 3-phase	1		1
158	696 50 57	Impeller	"LT" Low head. Curve 415, 50/60 Hz, 3-phase	1		1
158	696 50 63	Impeller	"LT" Low head. Curve 416, 60 Hz, 3-phase	1		1
158	698 71 14	Impeller	"HT" High head. Curve 451, 50 Hz, 3-phase		1	1
158	698 71 39	Impeller	"HT" High head. Curve 454, 50 Hz, 3-phase		1	1
158	698 72 08	Impeller	"MT" Medium head. Curve: 431, 50 Hz, 3-phase		1	1
158	698 72 42	Impeller	"MT" Medium head. Curve: 434, 50/60 Hz, 3-phase		1	1

Pos. No	Part. No	Denomination	Qty/Version			
			091	095	181	185
158	698 72 65	Impeller		1		1
158	698 73 00	Impeller		1		1
158	698 73 33	Impeller		1		1
158	698 73 57	Impeller		1		1
158	699 26 18	Impeller		1		1
158	699 26 39	Impeller		1		1
158	699 26 57	Impeller		1		1
158	703 20 09	Impeller		1		1
158	703 20 32	Impeller		1		1
158	704 36 00	Impeller		1		1
158	704 36 30	Impeller		1		1
158	704 36 62	Impeller		1		1
162	82 38 00	Plain washer STAINLESS STEEL A4	1	1	1	1
163	82 69 40	Protective plug	4	4	4	4
169	83 04 55	Hex.socket hd screw M12X110-A4 80	1	1	1	1
169	83 04 66	Hex.socket hd screw M12X80-A4 80	1	1	1	1
186	702 28 00	Insert ring	1		1	
186	702 29 00	Insert ring		1		1
186	702 82 00	Insert ring	1		1	
186	702 83 00	Insert ring		1		1
186	702 85 00	Insert ring	1		1	
186	702 85 01	Insert ring	1		1	
186	702 86 00	Insert ring		1		1
186	702 86 01	Insert ring		1		1
186	702 88 00	Insert ring	1		1	
186	702 89 00	Insert ring		1		1
186	704 66 00	Insert ring	1		1	

Pos. No	Part. No	Denomination	Qty/Version			
			091	095	181	185
186	704 67 00	Insert ring		1		1
193	82 00 60	Hex.socket hd screw M10X70-A2-70	3	3	3	3
193	83 04 56	Hex.socket hd screw M10X35-A4-80	3	3	3	3
200	702 27 00	Pump housing	1	1	1	1
200	702 27 03	Pump housing	1	1	1	1
200	702 27 06	Pump housing	1	1	1	1
200	702 81 00	Pump housing	1	1	1	1
200	702 81 01	Pump housing	1	1	1	1
200	702 81 03	Pump housing	1	1	1	1
200	702 81 05	Pump housing	1	1	1	1
200	702 84 00	Pump housing	1	1	1	1
200	702 84 01	Pump housing	1	1	1	1
200	702 84 03	Pump housing	1	1	1	1
200	702 84 05	Pump housing	1	1	1	1
200	702 84 10	Pump housing	1	1	1	1
200	702 84 13	Pump housing	1	1	1	1

Pos. No	Part. No	Denomination	Qty/Version				
			091	095	181	185	
200	702 84 20	Pump housing	"SH" Super high head DN 100. With outlet sealing. With or without guide pin. Prep. for Flush valve.	1	1	1	1
200	702 84 23	Pump housing	"SH" Super high head DN 100. Dr. inlet. With outlet sealing. With or without guide pin. Prep for f. valve and z. anodes.	1	1	1	1
200	702 87 00	Pump housing	"LT" Low head DN 200. Undrilled inlet. Prepared for Flush valve.	1	1	1	1
200	702 87 03	Pump housing	"LT" Low head DN 200. Drilled inlet. Prepared for zinc anodes (only for P and S installation). Prepared for Flush valve	1	1	1	1
200	702 87 06	Pump housing	"LT" Low head DN 200. Drilled to: EN 1092-2 tab.8, ANSI B16.1-89; tab.5. Prepared for Flush valve.	1	1	1	1
200	702 87 07	Pump housing	"LT" Low head DN 200. Drilled to: EN 1092-2 tab.9. Prepared for Flush valve.	1	1	1	1
200	704 65 00	Pump housing	"LT" Low head DN 250. Undrilled. Prepared for flush valve.	1	1	1	1
200	704 65 01	Pump housing	"LT" Low head DN 250. Drilled to EN 1092-2 tab.8. Prepared for flush valve.	1		1	1
200	704 65 03	Pump housing	"LT" Low head DN 250. Drilled for S, T, Z and zinc anodes. Prepared for flush valve.	1	1	1	1
200	704 65 05	Pump housing	"LT" Low head DN 250. Drilled to ANSI B16.1-89; tab.5. Prepared for flush valve.	1	1	1	1
200	704 65 07	Pump housing	"LT" Low head DN 250. Drilled to EN 1092-2 tab.9. Prepared for flush valve.	1	1	1	1
200.3	84 90 93	Seal ring	Intended for pumphousing 7028410, 7028413	1	1	1	1
200.3	84 90 94	Seal ring	Intended for pumphousing 7028420, 7028423	1	1	1	1
200.4	83 04 56	Hex.socket hd screw M10X35-A4-80		2	2	2	2
200.5	82 81 93	O-ring 44,2X5,7 FPM		1	1	1	1
200.6	648 00 00	Cover		1	1	1	1
258	720 14 00	Sleeve unit		1	1	1	1
267	725 06 00	Plug		3	3	3	3
271	703 22 00	Lip		1	1	1	1
273	83 04 56	Hex.socket hd screw M10X35-A4-80		1	1	1	1
275	679 01 01	Counter weight		1	1	1	1

Pos. No	Part. No	Denomination	Qty/Version			
			091	095	181	185
276	82 01 07	Hex.socket hd screw M16X50-A2-70	4	4	4	4
277	82 23 33	Hexagon nut M10-A4-70	1	1	1	1

Sump Components

Overview

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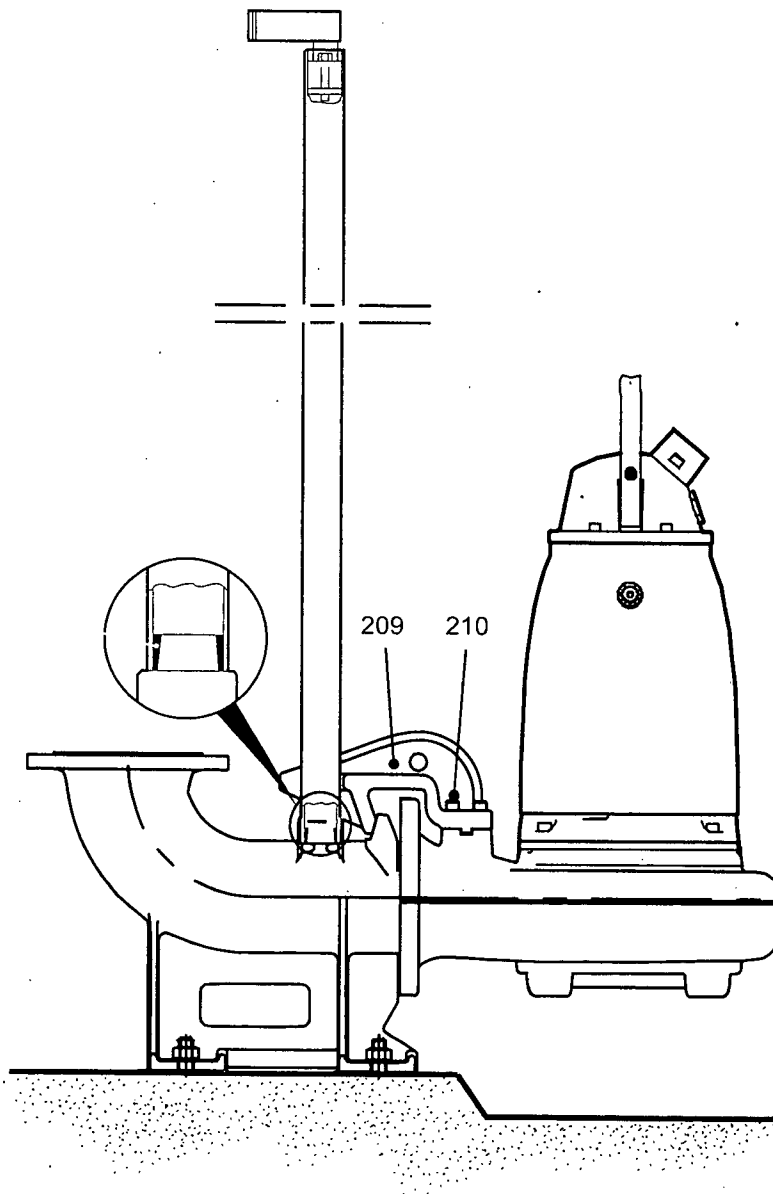
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View: Sump Components NP

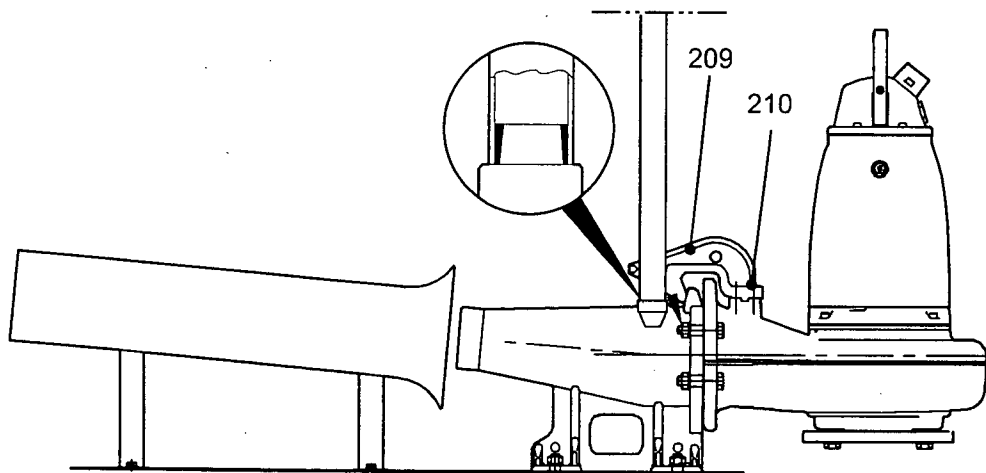
NP 3153



30582

View: Sump Components NP; Hydroejector

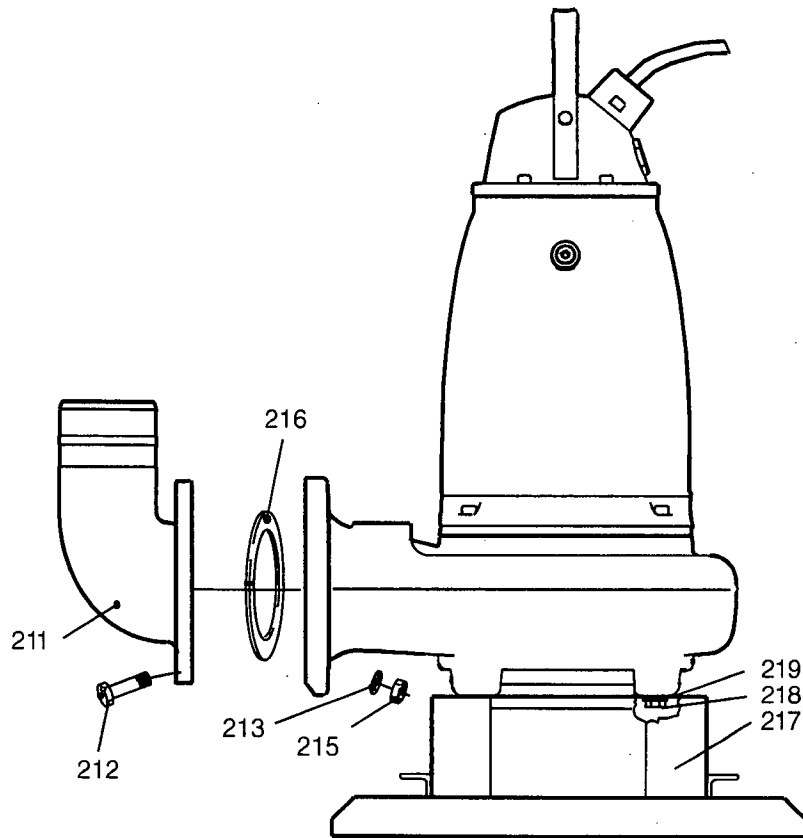
NP 3153 Hydroejector



31114

View: Sump Components NS

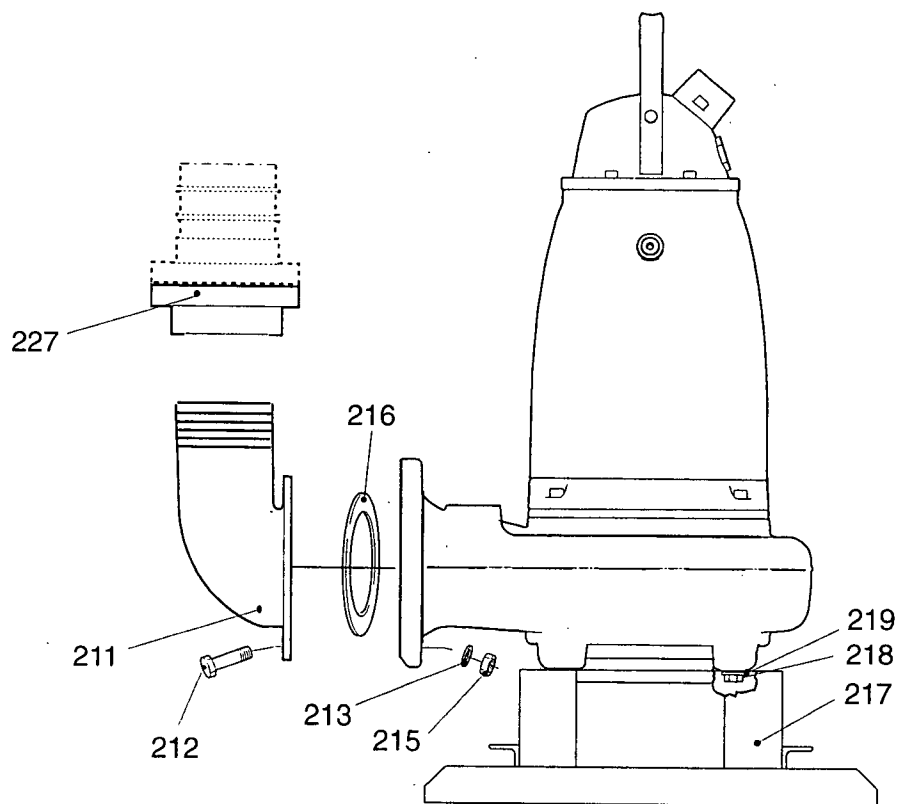
NS 3153



30783

View: Sump Components NS with Quick coupling

NS 3153



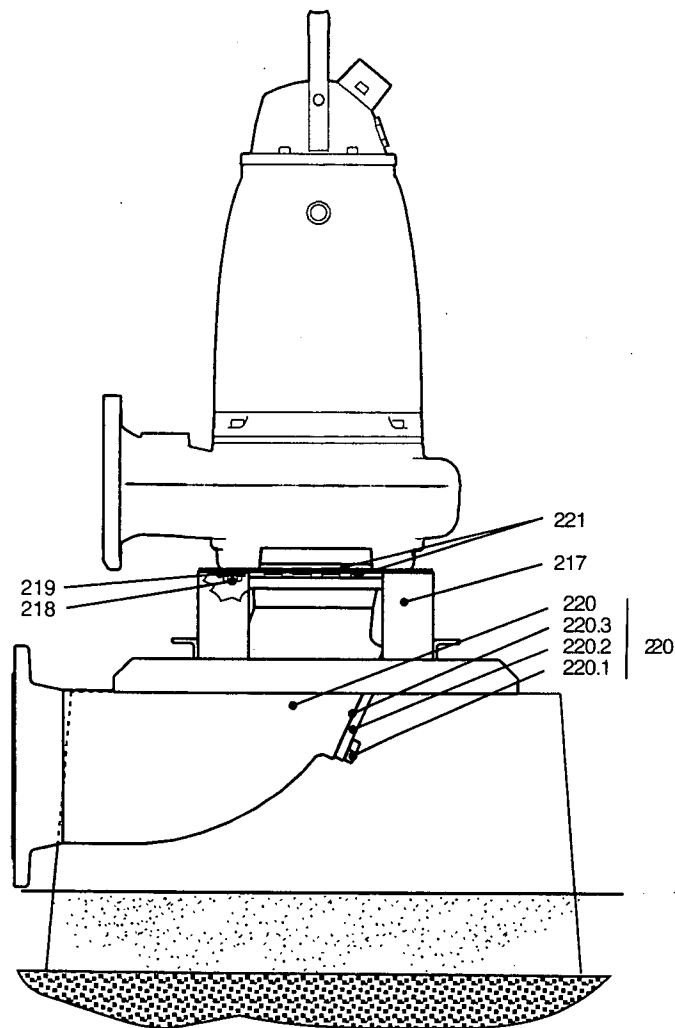
30792

Parts List, Flygt 3153.091/095/181/185

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View: Sump Components NT; LT

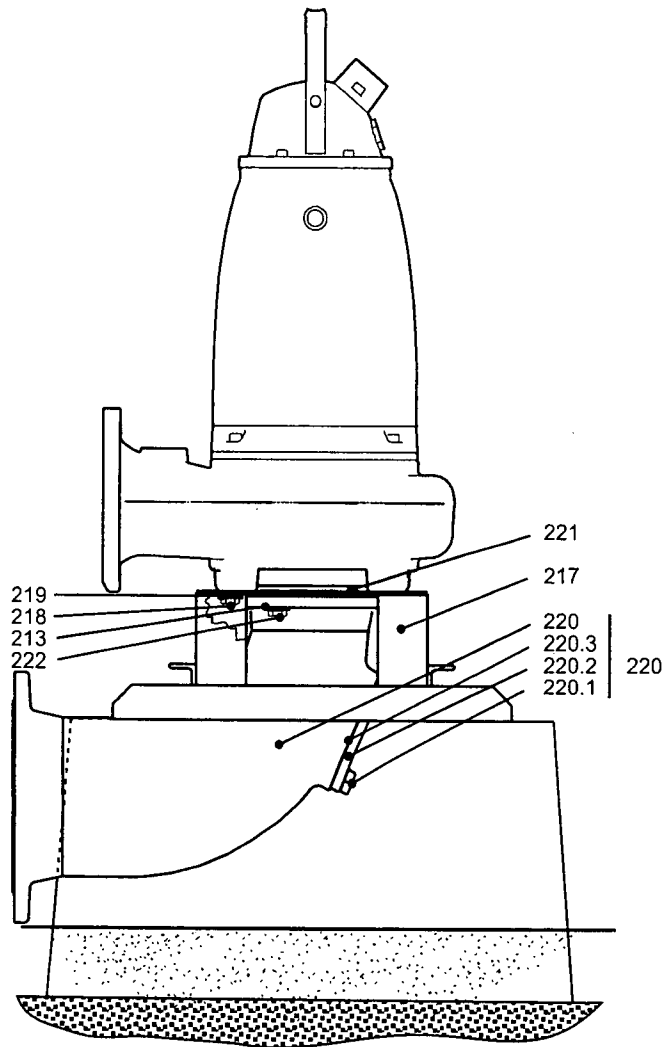
NT 3153



30793

View: Sump Components NT; MT/HT/SH

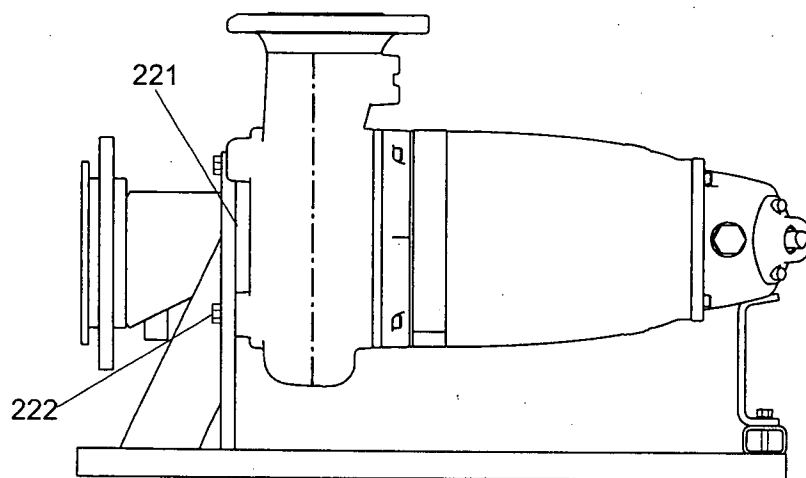
NT 3153



30784

View: Sump Components NZ

NZ 3153



30785

List of Sump Components

Pos. No	Part. No	Denomination	Qty/Version			
			091	095	181	185
209	651 07 01	Sliding bracket	1	1	1	1
210	83 04 53	Hex.socket hd screw M12X45-A4-80	4	4	4	4
211	259 82 04	Discharge connection	"HT/SH" Super/High head version DN 100 (4")	1	1	1
211	259 84 05	Discharge connection	"HT/SH" Super/High head version DN 100 (4") Threaded 4-8 NPSM Outer	1	1	1
211	259 84 06	Discharge connection	"HT" High head version DN 100 (4"), Thread : ISO G4A Outer	1	1	1
211	281 79 00	Discharge connection	"LT" Low head version DN 200 (8")	1	1	1
211	295 57 00	Discharge connection	"MT" Medium head version DN 150 (6")	1	1	1
211	309 31 00	Discharge connection	"MT" Medium head version DN 150 (6") Threaded 6-8 NPSM Outer	1	1	1
211	309 31 01	Discharge connection	"MT" Medium head version DN 150 (R6") Thread : ISO G6A Outer. Quick coupling: Storz	1	1	1
211	310 03 01	Discharge connection	"SH" Super high head version DN 75	1	1	1
211	379 32 00	Discharge connection	"LT" Low head version DN 200 (8")	1		1
211	385 52 03	Discharge connection 3-8 NPSM	"SH" Super high head version DN 75 Threaded:3-8 NPSM Outer	1	1	1
211	385 52 04	Discharge connection	"SH" Super high head version DN 75 Threaded:ISO G3 Outer	1	1	1
211	479 26 00	Discharge connection	"LT" Low head version DN 250 (10")	1		1
212	81 49 36	Hexagon head screw M16X65-A4-70	4	4	4	4
212	84 34 07	Hexagon head screw M16X60-A2-70	Intended for, S -version "HT"	4	4	4
212	84 34 32	Hexagon head screw M20X70-A2-70	S-version "MT"	8	8	8
212	84 34 34	Hexagon head screw M20X80-A2-70	S-version "LT"	12	8	12
213	82 35 23	Plain washer 16-A2-A 140	8	8	4	4
213	82 35 26	Plain washer 20-A2-A 140	8	8	8	8
215	82 23 61	Hexagon nut M16-A2-70	4	4	4	4
215	82 23 62	Hexagon nut M20-A2-70	12	8	12	12
216	259 83 00	Gasket 4"	1	1	1	1
216	283 19 00	Gasket 8"	1	1	1	1
216	295 64 00	Gasket 6"	1	1	1	1

Pos. No	Part. No	Denomination	Qty/Version				
			091	095	181	185	
216	310.05 00	Gasket	Intended for "SH"	1	1	1	1
216	384 45 00	Gasket 8"		1		1	1
217	380 92 01	Stand compl.	S/T-installation LT, DN 250	1	1	1	1
217	380 92 02	Stand compl.	S-installation LT DN, 200/250, T-installation LT DN 300	1		1	1
217	396 11 00	Stand compl.	S-installation MT, DN 150, HT/SH, DN 100, SH, DN 75. T-installation MT, DN 200, HT/SH, DN 150	1	1	1	1
217	608 23 02	Stand		1		1	1
218	81 43 73	Hexagon head screw M20X100-A2-70	T-version "LT"	12		12	12
218	84 34 03	Hexagon head screw M16X40-A2-70	T-version "MT", "HT", "SH", S-version "MT", "HT", "SH"	4	4	4	4
218	84 34 28	Hexagon head screw M20X50-A2-70 (ONLY TRSP)	T/S-version "LT"	4	4	4	4
218	84 34 34	Hexagon head screw M20X80-A2-70	T/S-version "LT"	4	4	4	4
219	82 35 23	Plain washer 16-A2-A 140			4		4
219	82 35 26	Plain washer 20-A2-A 140		12	8	12	12
219	82 38 01	Plain washer STAINLESS STEEL A4		4	4	4	4
220	272 82 20	Suction pipe unit	"MT" Medium head version DN 200 (8"). Undrilled	1	1	1	1
220	272 82 26	Suction pipe unit	"MT" Medium head versionDN 200 (8"). Drilled to EN 1092-2 tab. 8, ANSI B16.1-89;tab.5	1	1	1	1
220	272 82 27	Suction pipe unit	"MT" Medium head versionDN 200 (8"). Drilled to EN 1092-2 tab. 9	1	1	1	1
220	295 60 20	Suction pipe unit	"HT/SH" Super High head version DN 150 (6"). Undrilled	1	1	1	1
220	295 60 26	Suction pipe unit	"HT/SH" Super/ High head version DN 150 (6"). Drilled to EN 1092-2 tab.9, ANSI B16.1-89; tab.5	1	1	1	1
220	381 77 30	Suction connect.unit	"LT" Low head version DN 250 (10"). Undrilled	1	1	1	1
220	381 77 31	Suction pipe unit	"LT" Low head version DN 250 (10"). Drilled to EN 1092-2 tab. 8	1	1	1	1
220	381 77 35	Suction pipe unit	"LT" Low head version DN 250 (10"). Drilled to ANSI B16.1-89; tab.5	1	1	1	1
220	381 77 37	Suction pipe unit	"LT" Low head version DN 250 (10"). Drilled to EN 1092-2 tab. 9	1	1	1	1
220	384 74 00	Suction connect.unit	"LT" Low head versionDN 300 (12"). Undrilled	1		1	1
220	384 74 01	Suction pipe unit	"LT" Low head versionDN 300 (12"). Drilled to EN 1092-2 tab. 8	1		1	1

Pos. No	Part. No	Denomination	Qty/Version			
			091	095	181	185
220	384 74 05	Suction pipe unit "LT" Low head version DN 300 (12"). Drilled to ANSI B16.1-89; tab.5	1		1	1
220	384 74 07	Suction pipe unit "LT" Low head version DN 300 (12"). Drilled to EN 1092-2 tab. 9	1		1	1
220.1	81 41 56	Hexagon head screw M12X35-A2-70 (LT) DN 250/300	4	4	4	4
220.1	81 52 17	Hexagon head screw 1/2 UNCX32-A2-70 (SH, HT) DN 150	4	4	4	4
220.1	81 52 49	Hexagon head screw (MT) DN 200	4	4	4	4
220.2	274 45 00	Cleaning door (MT) DN 200	1	1	1	1
220.2	274 45 01	Cleaning door (LT) DN 250/300	1	1	1	1
220.2	295 53 00	Cleaning door (SH, HT) DN 150	1	1	1	1
220.3	274 48 00	Gasket (MT, LT) DN 200/250/300	1	1	1	1
220.3	295 54 00	Gasket (SH, HT) DN 150	1	1	1	1
221	84 65 82	Gasket 250 PN 10	2		2	2
221	84 65 87	Gasket 150 PN10	1	1	1	1
221	84 65 88	Gasket 200 PN10	2	2	2	2
221	84 65 93	Gasket 125 PN10	1	1	1	1
222	81 41 81	Hexagon head screw M16X40-A4-70	4	4	4	4
222	81 55 40	Hexagon head screw M16X50 A4-70	4	4	4	4
222	84 34 05	Hexagon head screw M16X50-A2-70	4	4	4	4
222	84 34 07	Hexagon head screw M16X60-A2-70	4	4	4	4
222	84 34 32	Hexagon head screw M20X70-A2-70	12	4	12	12
227	83 19 34	Coupling part DN 110 INNER THREAD G4	1	1	1	1
227	83 19 36	Coupling part DN 150 INNER THREAD G6	1	1	1	1

Parts for Service

Pos. No	Part. No	Denomination	Qty/Version				
			091	095	181	185	
800	84 15 47	O-ring kit INTERMEDIATE SERVICE KIT	NBR O-rings < = 70 DEGR.C	1	1	1	1
800	84 15 48	O-ring kit INTERMEDIATE SERVICE KIT	FPM O-rings , Industry	1	1	1	1
900	657 17 08	Basic repair kit	NBR O-rings < = 70 DEGR.C DEGR.C. Standard. Incl. Mechanical Seal WCCR/WCCR	1	1	1	1
900	657 17 09	Basic repair kit	Warm water. Incl. 641 50 00 Mechanical Seal WCCR/WCCR	1	1	1	1
900	657 17 10	Basic repair kit	NBR O-rings < = 70 DEGR.C. Incl. Mechanical Seal WCCR/RSiC	1	1	1	1
900	657 17 11	Basic repair kit	FPM O-rings Industry. Incl. Mechanical Seal WCCR/RSiC	1	1	1	1
901	90 37 08	Monopropylene glycol "DOWCAL N"		*	*	*	*



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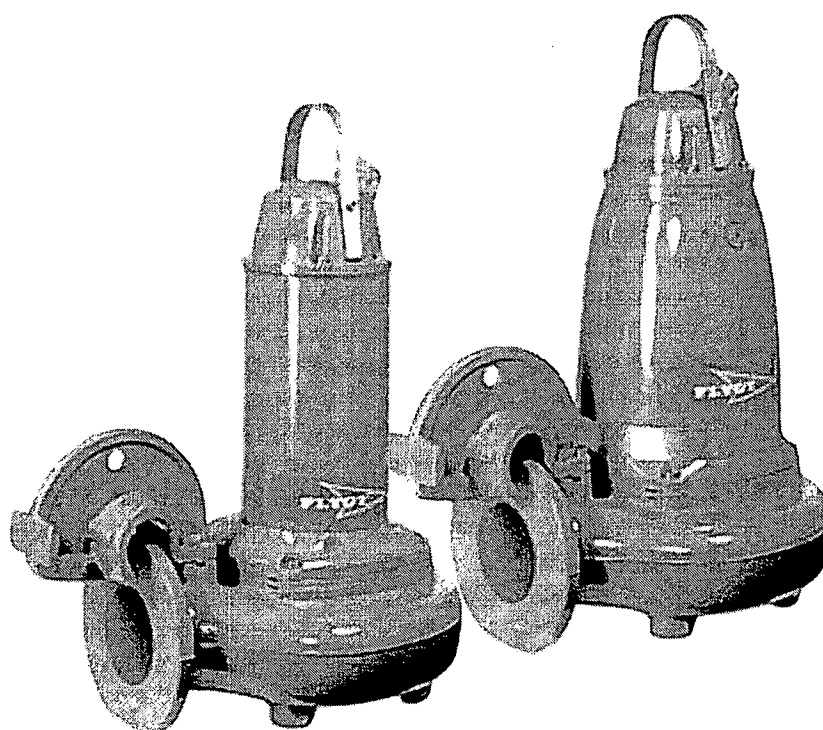
1.3

FLYGT

PRODUCT DATA

MEDIUM-SIZED WASTE WATER PUMPS

3153.181 AND 3153.091



Flygt



ITT Industries

FLYGT**PRODUCT DATA****3153.181****3153.091**

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1. GENERAL (8)	6.3 Pump housing
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5.4 Junction box	9.2 Emptying and filling coolant
5.4.1 Electrical connections	9.3 Coolant
5.5 Monitoring equipment	9.4 Inspection and Storage
5.5.1 Float switch (FLS 10)	9.5 Major Service
5.5.2 Thermal sensors	9.6 Tools
5.5.3 Receiving units	9.6.1 Special Tools
5.6 Shaft unit	9.7 Removing, installing and trimming the impeller
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5.8 Mechanical Face Seal	10. 50 HZ DATA (5)
5.9 Cooling	10.1 Power cables
5.9.1 General	10.2 Electrical Data
5.9.2 Methods of cooling	10.3 Performance Curves
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	11. 60 HZ DATA (5)
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0. ADDENDUM**0.1 Document Status**

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0	1	2	5	20	2
0	2	2	5	21	2
			5	22	2
1	1	2	5	23	2
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1	4	2	6	1	2
1	5	2	6	2	2
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1	7	2	6	4	2
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			7	1	2
3	1	2	7	2	2
3	2	2			
3	3	2	8	1	2
			8	2	2
4	1	2	8	3	2
			8	4	2
5	1	2	8	5	2
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5	3	2			
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5	8	2			
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5	10	2	10	2	2
5	11	2	10	3	2
5	12	2	10	4	2
5	13	2	10	5	2
5	14	2			
5	15	2	11	1	2
5	15	2	11	2	2
5	16	2	11	3	2
5	17	2	11	4	2
5	18	2	11	5	2
5	19	2			

The sections and pages listed above are approved by: *Sarka Brydniek* Date: 2005-09-19

Sarka Brydniek, Dept KW

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0.2 Enclosures

1.	Cross Sectional Drawing Drive Unit without cooling jacket	642 01 00
2.	Cross Sectional Drawing Drive Unit with cooling jacket	642 02 00
3.	Cross Sectional Drawing Hydraulic Units (LT 4-pole, LT 6-pole, MT, HT, SH)	689 83 00
7.	Assembly Drawing, Accessories	655 78 00
8.	Motor Charts 50Hz and 60Hz	
9.	Performance Curves 50Hz and 60Hz	
10.	Dimensional Drawings:	
	NP 3153 LT DN 200/DN 200	650 44 00
	NP 3153 LT DN 200/Hydroejector	669 70 00
	NP 3153 LT DN 250/DN 250	660 53 00
	NP 3153 MT DN 150/DN 150	650 43 00
	NP 3153 HT DN 100/DN 100	650 45 00
	NP 3153 SH DN 100/DN 100	692 62 00
	NP 3153 SH DN 80/DN 80	692 63 00
	NS 3153 LT DN 200/dia 200	659 40 00
	NS 3153 LT DN 250/dia 200	659 41 00
	NS 3153 LT DN 250/dia 250	659 42 00
	NS 3153 MT DN 150/dia 150	659 43 00
	NS 3153 HT DN 150/dia 100	659 44 00
	NS 3153 SH DN 150/dia 80	692 64 00
	NT 3153 LT DN 250/DN 200, 4-pole	659 45 00
	NT 3153 LT DN 300/DN 250, 6-pole	659 46 00
	NT 3153 MT DN 200/DN 150	655 17 00
	NT 3153 HT DN 150/DN 100	655 16 00
	NT 3153 SH DN 150/DN 80	692 66 00
	NZ 3153 LT DN 200/DN 200	659 49 00
	NZ 3153 LT DN 300/DN 250	659 50 00
	NZ 3153 MT DN 150/DN 200	659 51 00
	NZ 3153 HT DN 150/DN 100	659 52 00
	NZ 3153 SH DN 150/DN 80	692 67 00
11.	Dimensional Drawing, Flush Valve Installation	570 81 00
12.	Tooling Instruction Sheet	608 32 00



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1. GENERAL

1.1 Description

The **3153.181** (standard version) and **3153.091** (explosion-proof version) are pumps in the series of medium-sized submersible waste water pumps.

They are designed to work entirely or partly submerged in the pumped liquid, but can also be used in a permanent installation in dry sump applications.

The pump is comprised of a drive unit (a watertight encapsulated electric motor) and a hydraulic unit designed according to the N-pump concept. The hydraulic unit is available in four different capacity ranges, i.e. LT-, MT-, HT- and SH-version.

Build-up

The drive unit of the pump is normally cooled by the surrounding water but for certain applications the drive is equipped with a cooling jacket.

See further under "1.2 Applications".

The drive unit is comprised of stator, stator housing, shaft unit, bearings, bearing housing, mechanical seal, leakage sensor, entrance cover, cable entry and cable.

Depending on whether the drive unit is equipped with a cooling jacket or not, the following parts are also a part of the drive unit:

Without cooling jacket

adaptor and seal housing cover

With cooling jacket

adaptor, flow diffuser, seal housing cover, inner and outer cooling jacket

For further information, see cross-sectional drawings on the following pages.

Materials

All major cast parts are made of cast iron.

The lifting handle is made of stainless steel.

See also section "3. Materials" for further details.

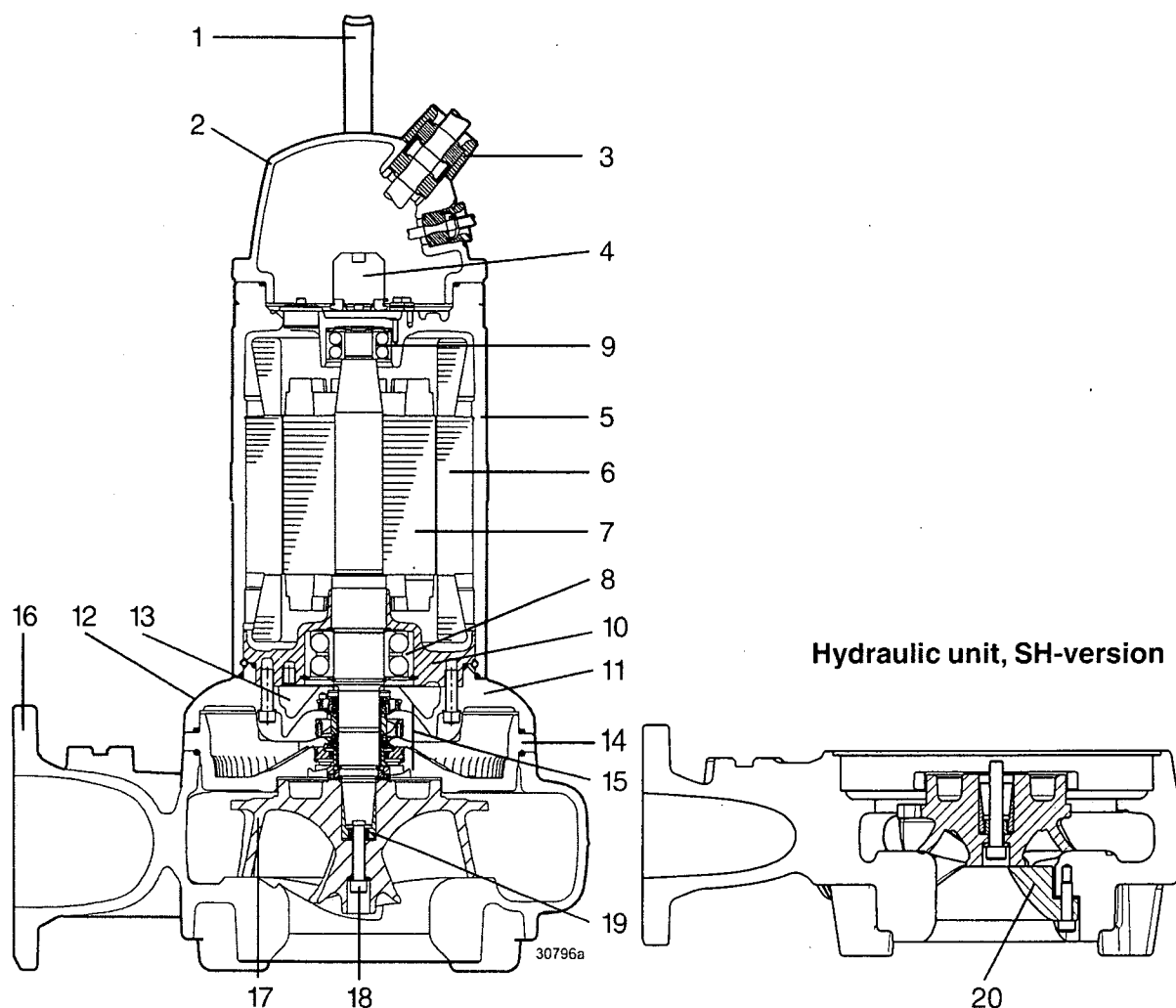


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Without cooling jacket

- | | | |
|-----------------------------|-------------------------|---------------------|
| 1. Lifting handle | 2. Entrance cover | 3. Cable entry |
| 4. Terminal block | 5. Stator housing | 6. Stator |
| 7. Shaft unit | 8. Main bearing | 9. Support bearing |
| 10. Bearing housing | 11. Adaptor | 12. Plug |
| 13. Inspection chamber | 14. Seal housing cover | 15. Mechanical seal |
| 16. Pump housing | 17. Impeller | 18. Impeller screw |
| 19. Impeller trimming screw | 20. Guide pin (only SH) | |

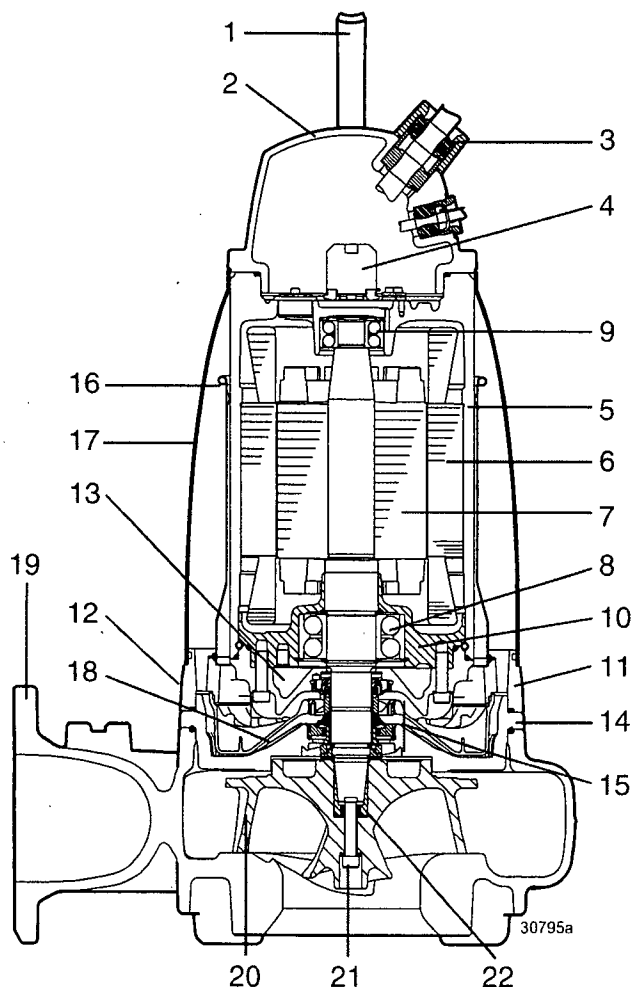


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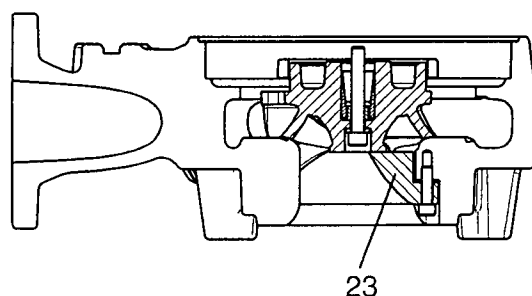
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Hydraulic unit, SH-version



With cooling jacket

- | | | |
|-----------------------------|---------------------------|---------------------|
| 1. Lifting handle | 2. Entrance cover | 3. Cable entry |
| 4. Terminal block | 5. Stator housing | 6. Stator |
| 7. Shaft unit | 8. Main bearing | 9. Support bearing |
| 10. Bearing housing | 11. Adaptor | 12. Plug |
| 13. Inspection chamber | 14. Seal housing cover | 15. Mechanical seal |
| 16. Cooling jacket, inner | 17. Cooling jacket, outer | 18. Flow diffusor |
| 19. Pump housing | 20. Impeller | 21. Impeller screw |
| 22. Impeller trimming screw | 23. Guide pin (only SH) | |



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Motors

Ambient /liquid temperature $\leq 40^{\circ}\text{C}$

50Hz	Motor	Poles	Rated power [kW]		Remarks (curve no.)
	21-18-2BB	2	15		SH 270, 272, 273, 274, 275, 276
	21-13-4AA	4	7,5		LT 413, 414, 415 MT 434, 435, 436 HT 451, 453, 454, 455, 456
	21-15-4AA	4	9,0		LT 412, 413, 414, 415 MT 433, 434, 435, 436 HT 451, 453, 454, 455, 456
	21-18-4AA	4	13,5		LT 410, 411, 412, 413, 414, 415 MT 430, 431, 432, 433, 434, 435, 436 HT 450, 451, 453, 454, 455, 456
	21-18-6AA	6	9,0		LT 620, 621, 622, 623, 624, 625

Ambient /liquid temperature $\leq 40^{\circ}\text{C}$

60Hz	Motor	Poles	Rated power [hp] [kW]		Remarks (curve no.)
	21-18-2BB	2	23	17,2	SH 273, 274, 275, 276
	21-13-4AA	4	12	8,9	LT 415, 416 MT 436, 437 HT 454, 455, 456, 457
	21-15-4AA	4	15	11,2	LT 414, 415, 416 MT 435, 436, 437 HT 452, 453, 454, 455, 456, 457
	21-18-4AA	4	20	14,9	LT 413, 414, 415, 416 MT 433, 434, 435, 436, 437 HT 452, 453, 454, 455, 456, 457
	21-18-6AA	6	15	11,2	LT 622, 623, 624, 625



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1.2 Applications

The 3153 pump is fully submersible, compact and easy to install.

It is available in four versions, LT, MT, HT and SH (i.e. low head, medium head, high head and super high head characteristics).

These can be installed in four different ways, i.e. the P-, S-, T- and Z-installation forms.

The pump is intended for pumping of the following media:

- Municipal waste water
- Industrial waste water
- Return sludge
- Raw, ground or clean water

1.2.1 Installations

NP 3153

This system consisting of guide bars, sliding bracket and a discharge connection permits automatic connection of the pump to the discharge. The pump is lowered into position via the guide bars and hooks onto the discharge connection flange by means of the sliding bracket arrangement.

The pump is designed to press onto the discharge connection flange and is kept in place by its own weight, without hanging on or straining the guide-bars.

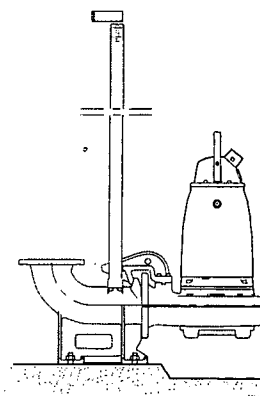
The upper outlet flange on the discharge connection is available with different drilling standards.

The pump is working completely or partly submerged in the pumped liquid and its drive unit is cooled by the surrounding liquid. For warm liquid applications, the drive unit is equipped with a cooling jacket. An integrated circulation pump circulates a coolant in a closed loop system as soon as the pump is running.

As well as being lifted into operating position the pump can also be lifted up for inspection or service without anyone having to climb down into the sump.

See also section "8. Accessories".

See also dimensional drawings for further details.





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NS 3153

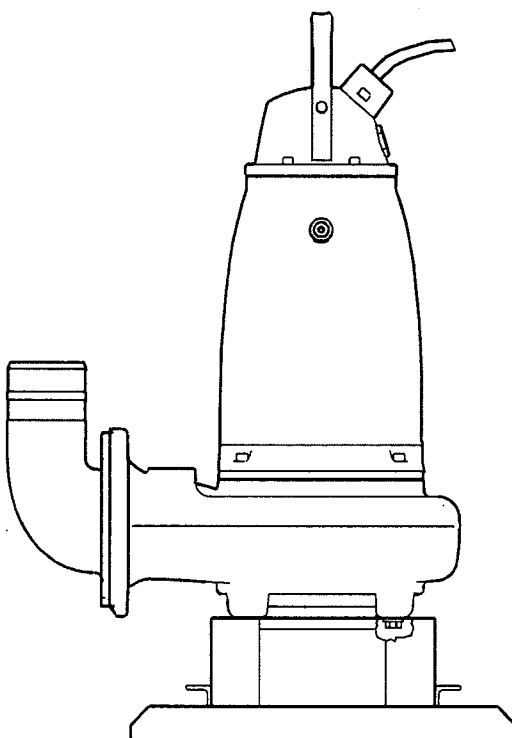
In this application the pump is portable and operates fully or partially submersed in the pumped liquid. Since the possibilities of monitoring the water level in these applications often are poor, the drive unit of the pump is always cooled by a cooling jacket. An integrated circulation pump circulates a coolant in a closed loop system as soon as the pump is running.

The pump is equipped with a stand, bolted onto the pump housing.

There are a number of different hose connections dimensioned to accomodate a hose for the different pump versions.

Please see dimensional drawings for further details.

See also section "8. Accessories".





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NT 3153

In this application the pump is normally installed dry on a concrete base via a base stand.

In this application the drive unit of the pump is always cooled by means of a cooling jacket. An integrated circulation pump circulates a coolant in a closed-loop system as soon as the pump is running.

The submersible design of the pump prevents damage in the event of flooding.

The suction-end of the pump is connected to the inlet supply pipe via an inlet elbow.

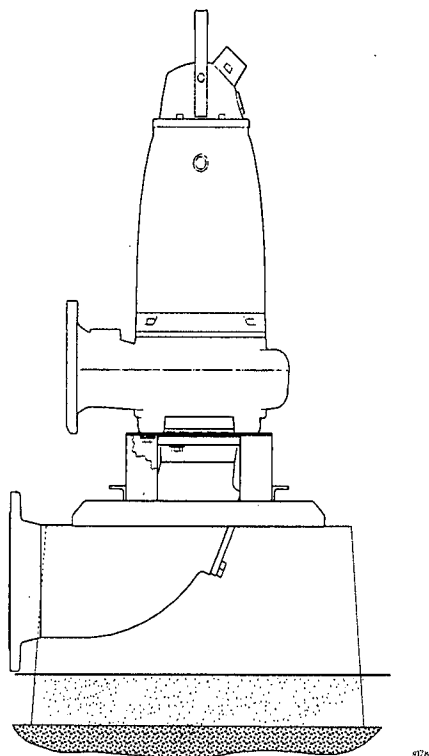
The upper flange of the inlet elbow is drilled to a fixed standard.

The upper flange of the inlet elbow is bolted to the underside of the pump housing with a gasket between the surfaces.

The flange on the supply end of the inlet elbow is available with different drilling standards to accommodate a variety of pipes.

See also section "8. Accessories".

See also dimensional drawings for further details.





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NZ 3153

In this installation form the pump is mounted in a stand which allows it to be installed dry and with the pump arranged in a horizontal position.

This could be of importance on a retrofit market where conventional pumps are replaced by Flygt submersibles. With this installation type there are no elbows before or after the pump creating extra pipe losses, all flow is straight-lined. The stands also allow installation in locations where the ceiling height is limited.

A stand is composed of three rectangular structural hollow sections (two in parallel and one transversal), a plate, two supporting webs and an inlet pipe section.

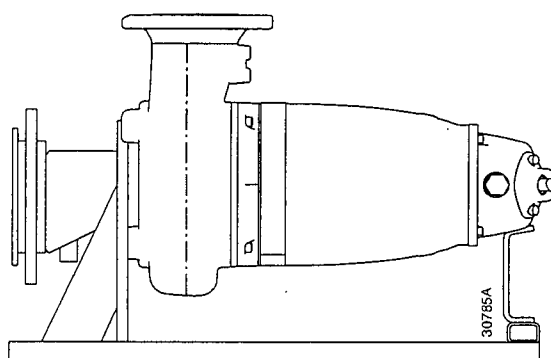
The stands are also equipped with a support for the pump top.

The plate is welded across the parallel beams in an upright position. The supporting webs are welded between the sides of the plate and each of the parallel beams.

An inlet pipe, which is a flanged pipe with loose back flange, is welded to the plate and is thus an integral part of the stand.

In this application the pumps drive unit is always cooled by means of a cooling jacket. An integrated circulation pump circulates a coolant in a closed loop system as soon as the pump is running.

The submersible design of the pump prevents damage in the event of flooding.





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2. STANDARDS AND APPROVALS

The pump is designed, dimensioned and manufactured to comply with different standards and approvals

2.1 Standards

The motor is designed according to IEC 60034-1 1969.

Motor encapsulation according to IEC 529:1989, IP68, submersible to 20m

The 3153 hydraulic units are designed and built according to pressure class PN10 (Nominal Pressure).

2.2 Approvals

Explosive environments

The **3153.091** version is approved

by Ineris according to

ATEX Directive

European standards EN 50 014 and EN 50 018 as

EEx d IIB T3 for ambient temperatures $\leq 40^{\circ}\text{C}$

EEx d IIB T4 for ambient temperatures $\leq 25^{\circ}\text{C}$

and

FM according to standard 3615 as:

- Explosion proof for use in Class I, Div. 1. grp C and D
- Dust ignition proof for use in Class II, Div 1. grp E, F and G
- Suitable for use in Class III, Div. 1. Hazardous Locations

Temperature class: T3C for ambient temperatures $\leq 40^{\circ}\text{C}$

The **3153.181** standard pump shall **not** be used in explosive or flammable environments or with flammable liquids.

CSA-approval

The **3153.181** version is approved by CSA.



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3. MATERIALS

Denomination	Material	Flygt No	EN	AISI/ASTM
Major castings	Cast iron	0314. 0125.00	EN 1561-GLJ-250	A48 No35 B
Impeller	Cast iron (partially induction hardened)	0314. 0125.00	EN 1561-GLJ-250	A48 No35 B
Lifting handle	Stainless steel	0344. 2343.05	EN 10 088-2- X2CrNiMo17-12-3	316L
Shaft	Stainless steel	0344. 2321.03	EN 10 088-3- X17CrNi16-2 QT800	431
Flow diffuser	Stainless steel	0344. 2333.02	EN 10 088-2- X5CrNi18-10	304
Cooling jacket, inner	Aluminium	0401. 4007.14	---	B 209; AA 1050A
Cooling jacket, outer	Steel	0323. 1312.00	EN 10025 S235JRG2	A36, 284 Grade D A36, 573 Grade 65
	alt. Stainless steel	0344. 2343.02	EN 10088-2: X2CrNiMo 17-12-2	316 L
Studs, screws and nuts	Stainless steel	0344. 2343.05 (A4)	EN 10 088-2- X2CrNiMo17-12-3	316L
O-rings *)	Nitrile rubber (NBR) 70° IRH	0516. 2637.04	---	---
	alt. Fluorinated rubber (FPM) 70° IRH	0516. 2637.04	---	---

*) Please see separate specifications for the available mechanical seals overleaf.



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Denomination	Material	Flygt No	EN	AISI/ASTM
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Mechanical seals

Alt. 1

Inner seal, stationary and rotating seal ring	Corrosion resistant cemented carbide (WCCR)	0490.8640	---	---
Outer seal, stationary and rotating seal rings	Corrosion resistant cemented carbide (WCCR)	0490.8640	---	---
O-rings	Fluorinated rubber (FPM) 70° IRH	0516. 2637.04	---	---

Alt. 2

Inner seal, stationary and rotating seal ring	Corrosion resistant cemented carbide (WCCR)	0490.8640	---	---
Outer seal, stationary and rotating seal ring	Reaction bonded silicon carbide (RSiC)	0292.0010	---	---
O-rings	Fluorinated rubber (FPM) 70° IRH	0516. 2637.04	---	---



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3.1 Surface treatment

Priming: Painted with a Water or Alkyd-based primer,
see Flygt standard M 0700.00.0002

Note The impeller is not primed. Only treated with a corrosion inhibitor at the
hardening process.

Finish: Navy gray NCS 5804-B07G two-component high-solid top coating,
see Flygt standard M 0700.00.0004 for standard painting
and M 0700.00.0005 for special painting.



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4. DIMENSIONS AND WEIGHTS

For dimensions, see enclosed dimensional drawings.

Without cooling jacket

Pump version	NP (kg)	NS (kg)	NT (kg)	NZ (kg)
3153 LT 4-pole	270	---	---	---
3153 LT 6-pole	307	---	---	---
3153 MT	198	---	---	---
3153 HT	184	---	---	---
3153 SH DN 80	202	---	---	---
3153 SH DN 100	234	---	---	---

With cooling jacket

Pump version	NP (kg)	NS (kg)	NT (kg)	NZ (kg)
3153 LT 4-pole	283	342	400	273
3153 LT 6-pole	320	379	437	310
3153 MT	211	245	289	201
3153 HT	197	219	240	187
3153 SH DN 80	215	237	258	205
3153 SH DN 100	247	---	---	---



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5. DRIVE UNIT DATA

5.1 Motor

The motors are squirrel cage induction motors. The stators are insulated in accordance with class H, IEC 85, which means that the insulation of the stator winding can resist a temperature of 180°C (355°F).

The stator is trickle impregnated with class H resin, see Flygt standard A 3422.04.

The output ends from the stators are either six in number or nine (for 460 V YSER and 230 V Y// connections).

The rotor bars and short-circuit rings are made of aluminium.

5.2 Cable Entry

There are two entrance covers available. One is designed to accomodate one power cable for direct start or star-delta start. Cables of different sizes, which all include two pilot cables can be mounted. The other entrance cover allows the same power cables **and** one 7-conductor pilot cable to be mounted. This pilot cable is needed if the stator is equipped with thermistors, since these must be monitored on a circuit separated from the FLS 10. See further below.

Cable entries for power cables are available for cable diameters **17 - 35 mm**.

The cables are sealed off and tension relieved by double compressible rubber bushings. The dimensions of these rubber bushings should be selected, according to the cable dimensions, to reach the optimum clamping and sealing function.

5.3 Power Cable Qualities

The cables are either of type SUBCAB[®], SUBCAB[®] AWG or of type NSSHöu.

The SUBCAB[®] cables fulfill the requirements in IEC 245 (66); CENELEC H22 sect. 2; VDE 0282 part 810; CSA C22.2 No 49-1992 where applicable.

The cables feature a number of excellent characteristics which not only fulfill but also well exceed the requirements in the norms above:

- * Ambient temperature up to + 70°C.
- * Oil resistant according to VDE 0282, part 810, tab. 3.
- * High mechanical properties, high tensile strength; high wear resistance with preserved high flexibility.
- * Oil and weather resistant chloroprene rubber sheathing.



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The SUBCAB[®] AWG cables fulfill the requirements in IEC 245 (66);
CAN / CSA-C 22.2-2 No 49-92; ICEA S-68-516; CAN 3-C 68.4 - M 86.

The cables feature a number of excellent characteristics which not only fulfill but also well exceed the requirements in the norms above:

- * Ambient temperature up to + 70°C.
- * Oil resistant according to IEC 811-1-1 clause 9 and IEC 811-2-1 clause 10.
- * High mechanical properties, high tensile strength; high wear resistance with preserved high flexibility.
- * Oil and weather resistant chloroprene rubber sheathing.

The SUBCAB[®] and the NSSHöu cables are delivered in lengths of 10m or 20 m.

The SUBCAB[®] AWG cables are delivered in lengths of 13 m and 16 m.

During transport and storage the cable end is sealed off by means of a protective cap to eliminate moisture penetration.

See Flygt standard (41) M 3018.951.

5.3.1 Power Cable Data

Available power cable sizes are:

SUBCAB[®], maximum voltage 750 V

Cable sizes (mm²): 4 G 2,5+ 2x1,5
4 G 4 + 2x1,5
4 G 6 + 2x1,5
4 G 10 + 2x1,5

7 G 2,5+ 2x1,5
7 G 4 + 2x1,5
7 G 6 + 2x1,5

4-conductor cables

The power cable has four unnumbered conductors in different colours, brown, blue alt. grey, black and green/yellow (PE core). Two pilot cables marked T1 and T2 are included in the cables.



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7-conductor cables

The power cable has six numbered conductors (white colour on black bottom) and one green/yellow (PE core). Two pilot cables marked T1 and T2 are included in the cables.

Maximum rated voltage 750 V

See also Flygt standard M 1997.045.

SUBCAB® AWG, maximum voltage 600 V

Cable sizes:

- 14 AWG / 7
- 12 AWG / 7
- 10 AWG / 3 - 2 - 1 - GC
- 8 AWG / 3 - 2 - 1 - GC
- 6 AWG / 3 - 2 - 1 - GC
- 4 AWG / 3 - 2 - 1 - GC

AWG - cable

The power cable has five unnumbered conductors in different colours, white, red, black, green/yellow (PE core) and yellow (ground check). Two pilot cables (blue and orange) are also included.

Maximum rated voltage 600 V acc. to CSA.

Amperage according to local regulations.

See also Flygt standard M 1997.048.

Cable type NSSHöu.../3E, maximum voltage 1000V

Cable sizes (mm²)

- 3x2,5 + 3x2,5/3E + 3x1,5
- 3x6 + 3x6/3E + 3x1,5
- 3x16 + 3x16/3E + 3x2,5

The power cable has three unnumbered conductors in different colours, brown, blue alt. grey, black. Each conductor is surrounded by a screen of copper wire which shall be connected to the ground connection as it also serves as protective earth. This cable is mainly intended for VFD applications, where the screen prevents the spreading of electromagnetic noise to the surroundings. The cables also contain three pilot cables in different colours, black (T1), brown (T2) and blue.

See also Flygt standard M 1997.01



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5.3.2 Pilot Cable

Depending on the customers requirements the stator can be equipped with two different types of thermal sensors, i.e. thermal contacts or thermistors (please see the Product Specification). Since the thermistors must be connected to a thermistor relay, they cannot be connected in series with the FLS 10, which shall be connected to the MiniCAS II. Consequently they must be connected in a separate circuit. Any other sensors (special order) would also require a pilot cable with more conductors.

A **7 x 1,5 mm²** SUBCAB[®] pilot cable is therefore available.

The cable has 7 conductors numbered 1-7 (white figures on black bottom).

See also Flygt standard M 1997.06.

Note!

When handling the pump and the cable, make sure that the cable is not excessively bent, as this will result in creasing of the cable sheathing and possible formation of cracks in it with subsequent risk for leakage into the junction box.

See table below for minimum bending radius.

Cable size	Min. bending radius in mm
4 G 2,5 + 2x1,5	180 mm
4 G 4 + 2x1,5	220 mm
4 G 6 + 2x1,5	250 mm
4 G 10 + 2x1,5	280 mm
7 G 2,5+ 2x1,5	230 mm
7 G 4 + 2x1,5	260 mm
7 G 6 + 2x1,5	285 mm
14 AWG / 7	200 mm
12 AWG / 7	220 mm
10 AWG / 3 - 2 - 1 - GC	225 mm
8 AWG / 3 - 2 - 1 - GC	295 mm
6 AWG / 3 - 2 - 1 - GC	320 mm
4 AWG / 3 - 2 - 1 - GC	350 mm
3x2,5 + 3x2,5/3E + 3x1,5	230 mm
3x6 + 3x6/3E + 3x1,5	240 mm
3x16 + 3x16/3E + 3x2,5	300 mm
7x1,5	170 mm



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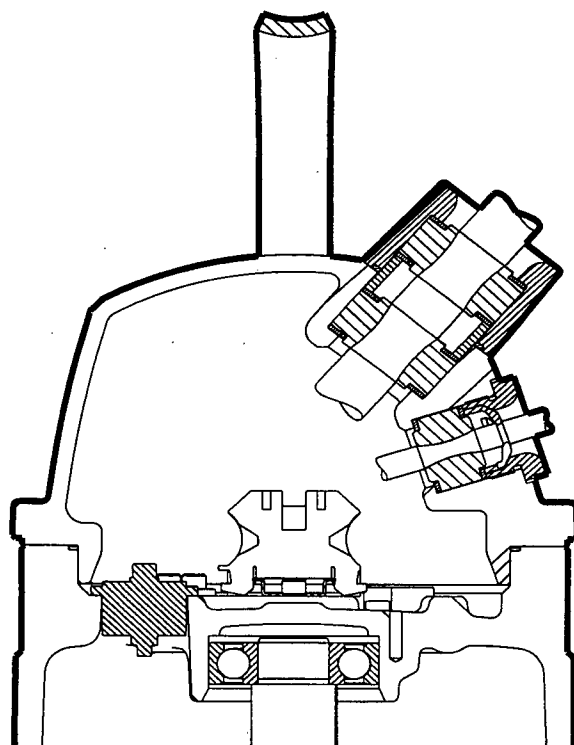
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5.4 Junction Box

For the connection of the stator leads, power cable and the pilot cable the drive unit is provided with a terminal block. It becomes accessible by lifting off the entrance cover. See picture below.



The terminal block is a standard electric component which is made up of several individual segments that are lined up on bar and clamped in place. The connections for the pilot cables are placed to one side of the terminal block.

The stator leads are brought to the terminal block through a hole in the top of the stator housing. This hole is sealed off with a compressible rubber bushing, i.e. the stator leads are brought through holes in the bushing which is then compressed around the leads and against the walls of the hole.



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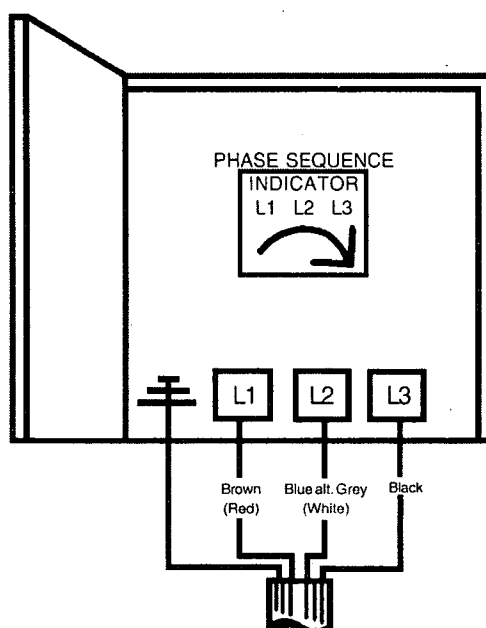
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5.4.1 Electrical connections

The power cables should always be connected to the starting equipment as shown in the picture below.





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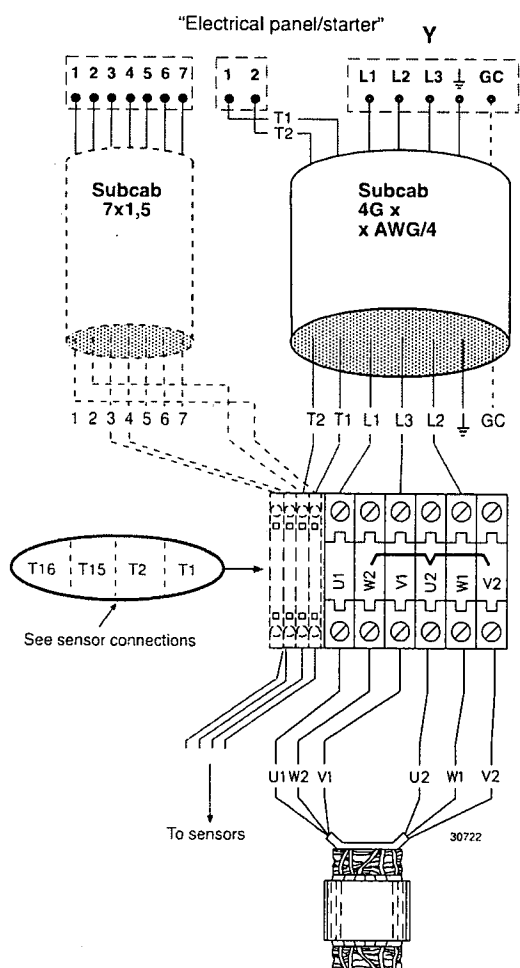
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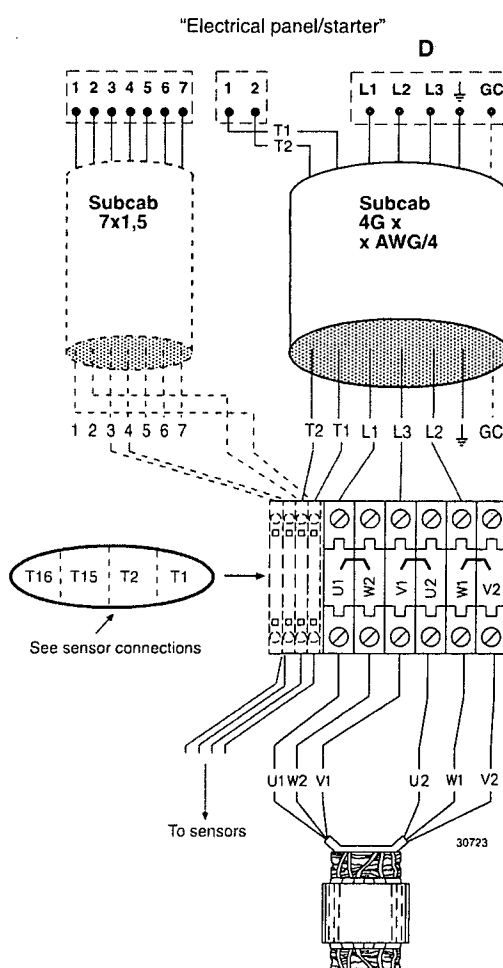
5.4.1.1 The stator leads, the power cables and the pilot cables shall be connected to the terminal block as shown in the pictures below.

SUBCAB® / SUBCAB® AWG

Y - Connection

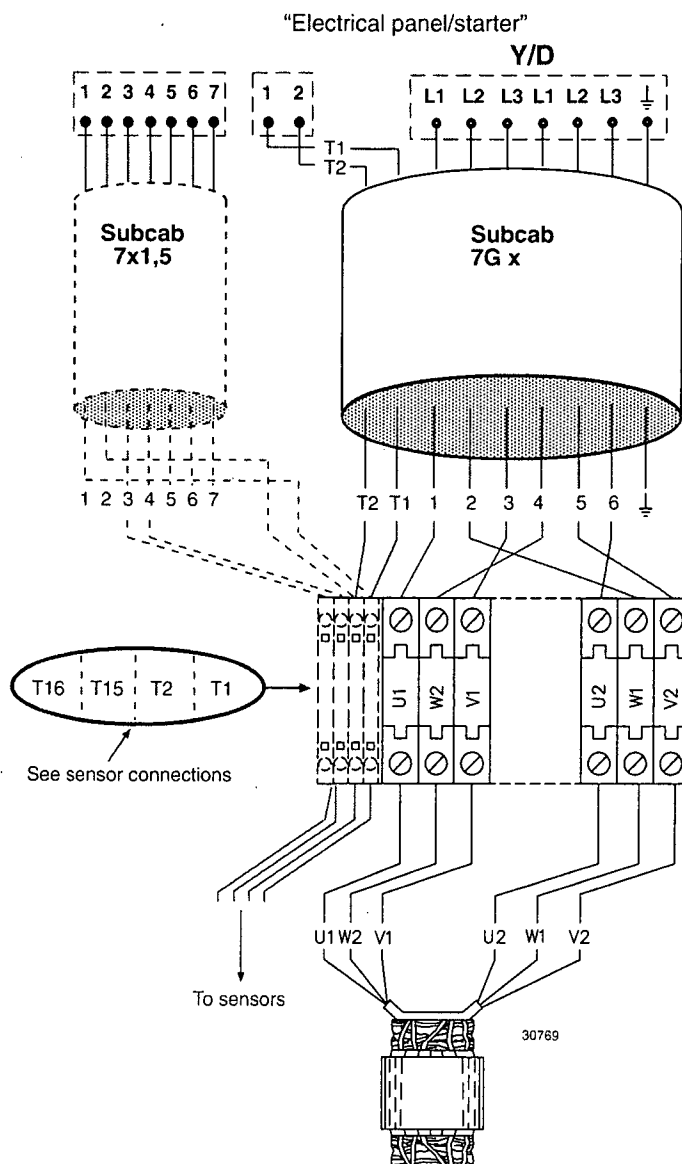


D - Connection



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SUBCAB®**Y / D - Connection**



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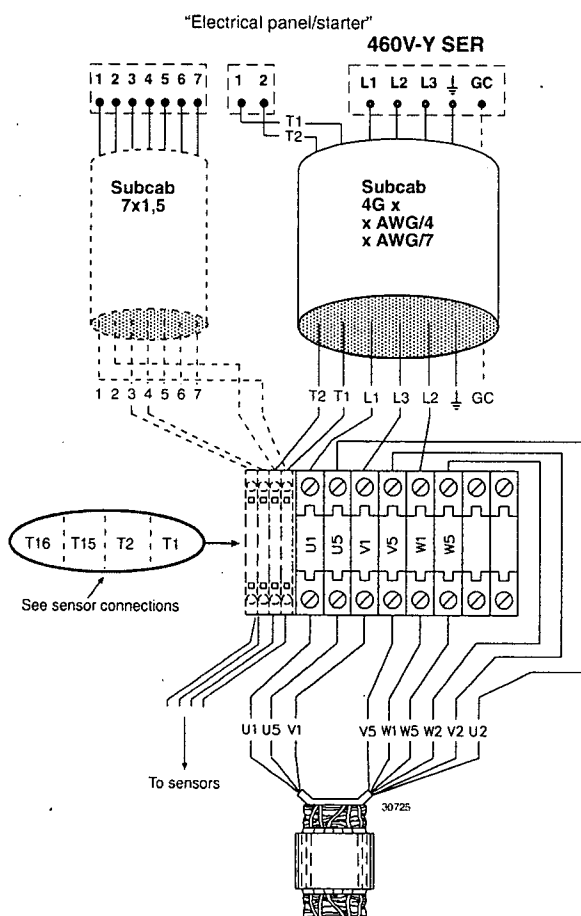
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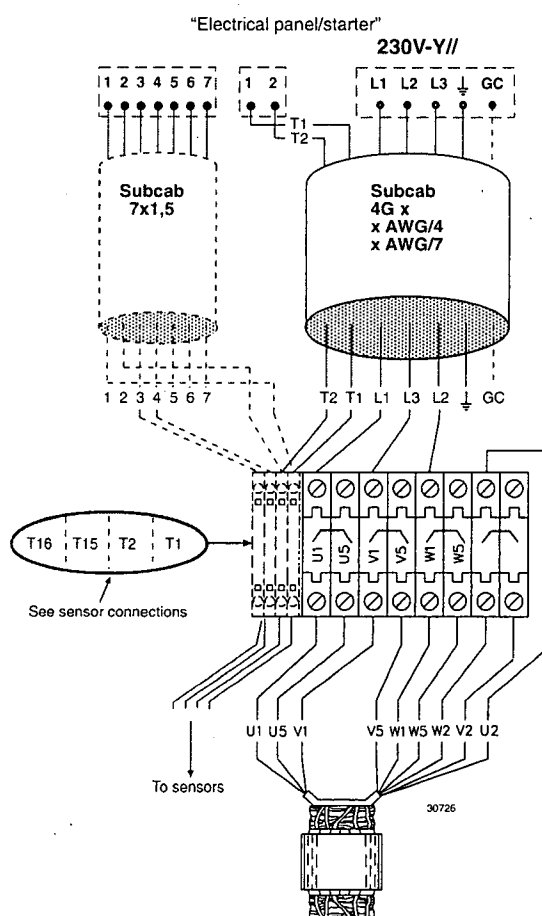
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SUBCAB® / SUBCAB® AWG

460 V YSER



230 V Y//





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5.5 Monitoring Equipment

The drive unit is equipped with sensors at two places in the machine monitoring the following functions:

- * Leakage into the inspection chamber
- * Stator temperature.

5.5.1 Float Switch (FLS 10)

The sensor consists of a conventional reed-contact inside a brass pipe, the activating magnet is placed inside a float body made of closed cell rigid foam nitrile rubber (Nitrophyl).

Apart from the contact, two resistances are built in to enable signal separation.
See picture overleaf.

Contact function: Normally open

Rated voltage: 12 V DC

Built-in resistors: 430 Ohm/0.5 W
770 Ohm/0.25 W

Resistance values:

Normal operation: $R = 1.2 \text{ kOhm} - 10 \text{ mA (12 V)}$

Alarm values: $R \approx 0 \text{ Ohm} - \text{short circuit}$
 $R = 430 \text{ Ohm} - \text{leakage} - 28 \text{ mA (12 V)}$
 $R \approx \infty \text{ Ohm} - \text{broken circuit}$

The float switch is mounted in the inspection chamber.

The brown leads from the float switch in the inspection chamber are brought through the stator housing on the outside of the stator and connected to terminals T2 and T15 on the terminal block, thus connected in series with the thermal contacts. If the thermal protection of the stator is made up of thermistors the float switch is connected separately to terminals T15 and T16 of the terminal block.

Note!

The float switch is mounted in the same way (position) for vertically respectively horizontally installed machines. When the pump is mounted in horizontal position the float switch will be oriented downwards in order to function properly.



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As a consequence of this the amount of fluid that can leak into the inspection chamber before the float switch reacts is considerably less, about 50% of that in a vertical installation.

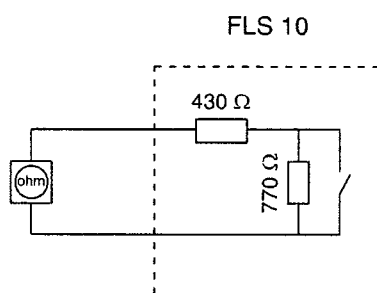
That a pump in horizontal installation can be expected to be in operation about half the duty time between alarm from the float switch compared to a vertically installed pump is thus fully natural and should not be interpreted as a seal failure.

Function test:

Method 1: Use a multimeter and measure the resistance of the sensor (see picture below).

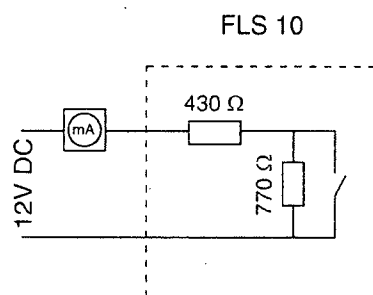
Result: No-alarm status: 1140 to 1260 ohms.

Alarm status: 410 to 450 ohms.



Method 2: Connect the sensor to a 12V DC power source and the multimeter (set as a mA meter) in series with the sensor.

Result: 0 mA Breakage in the cable/lead
 9.5 to 10.5 mA Normal No-alarm current
 26.5 to 29.5 mA Normal Alarm current





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5.5.2 Thermal Sensors (Stator).

The stator is equipped with three sensors, one in each phase.

These are embedded in the upper coil ends of the stator.

There are two alternatives for monitoring the stator temperature - A and B.

- A. This alternative is a 140° C thermal contact.
This can be considered as the "standard" thermal sensor.
See further under "5.5.2.1 Thermal Contacts".
- B. This alternative is a 140° C thermistor.
It is only available for four stators, i.e. one of each motor size and for voltage variant 03 (415 - 440 V).
See further under "5.5.2.2 Thermistor".

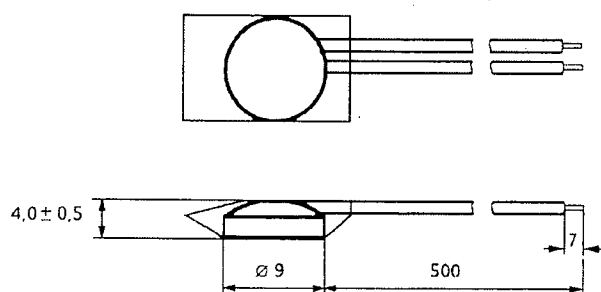
5.5.2.1 Thermal contacts

A thermal contact works with a bi-metal function which at a given temperature triggers a contact or breaks a circuit.

The switching function is used to give an alarm or to stop an electric motor for example. When the temperature decreases below the activation point with a certain amount the contact regains its normal status.

The contacts can be of either "normally open" or "normally closed" type.

Thermal contacts are more robust than thermistors and the "on-off" signal is easier to handle at the receiving end.





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Normally closed type.

This makes it possible to check that the monitoring circuit is not broken.

The thermal contact

Opens at **140° ± 5° C.**

Resets at min. **95° C**

Rated voltage **250 V** (Note! Output voltage to thermal contacts from MiniCAS II is only 12V DC)

Rated current: **1.6A at cos phi = 0.6**
2.5A at cos phi = 1.0

Max. breaking current: **5A**

Reference is made to IEC 34-11.7.4 .

See also Flygt standard M 4315.01 .

The thermal contacts are connected three in series and the yellow output ends are connected to terminals T1 and T15 of the terminal block. With this connection the thermal contacts and the float switch are connected in series.

5.5.2.2 Thermistor

General

A thermistor is a resistor having a very large and non-linear variation of resistance with temperature.

For a PTC-thermistor (PTC = Positive Temperature Coefficient), there is a significant increase in resistance at a certain temperature, that can be utilized for monitoring the temperature.

The main advantage with thermistors, compared with thermal contacts, is that they are very small and respond rapidly to temperature rise. A thermistor has always a resistance, low or high. Thus it is possible to determine if the circuit is intact. i.e. neither broken nor short-circuited.



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PTC-thermistor rated voltage **max 30 V**

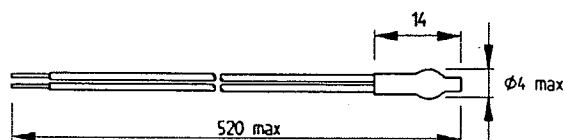
T=25 °C R ≤100 Ohm

T=135 °C (T_{REF}-5 °C) R ≤550 Ohm

T=145 °C (T_{REF}+5 °C) R ≥ 1330 Ohm

Reference is made to standard IEC 738-1.

See also Flygt standard M 4315.10



The thermistors are connected three in series and the red output ends are connected to terminals T1 and T2 of the terminal block. In this case the thermistors and the FLS10 are connected in two separate circuits, the thermistors to a thermistor relay and the FLS 10 to the MiniCAS II.

Function test

Three PTC-thermistors connected in series have a resistance of approximately 150-300 ohms at room temperature.

Check the resistance by using a multimeter set for measuring ohms.

If broken circuit condition is established, always check the contacts and the leads first.



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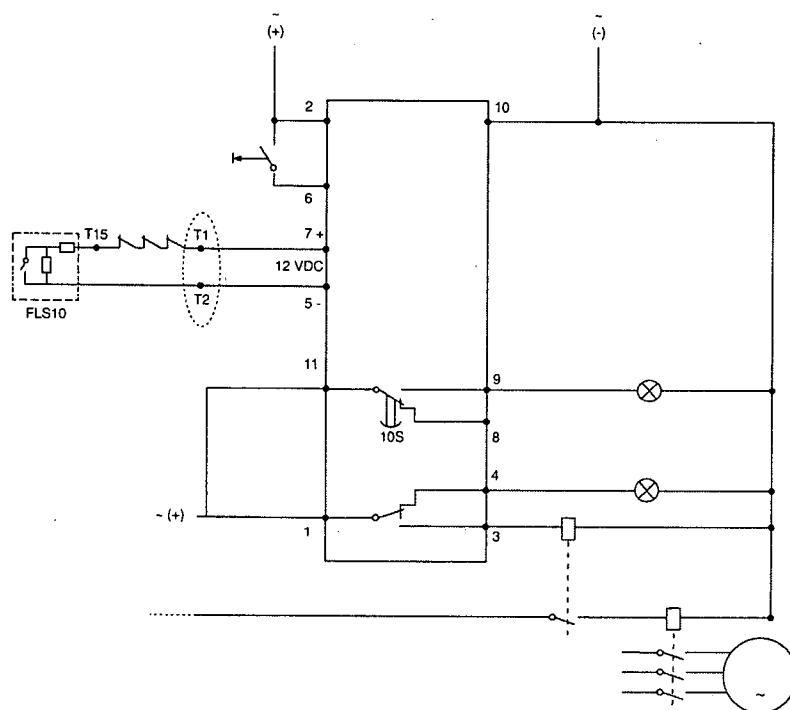
5.5.3 Receiving Units

For a proper function of the sensors they must be connected to suitable receiving units.

Available from Flygt is MiniCAS II

Other types of units should be acquired locally.

Depending on how the monitoring system of the actual machine has been specified, there are two ways of how the sensors are to be connected to the receiving units. The one below shows how FLS10 in series with the thermal contacts should be connected to the MiniCAS II. In case of thermal protection with thermistors, these should be connected to a separate thermistor relay and only the FLS10 be connected to the MiniCAS II as shown below.



In case of an alarm from the sensors, the connection of the monitoring equipment as shown in the picture will have the following results:

- A tripped thermal contact will stop the pump and a lamp for "high stator temperature" will be lit.
- Alarm from the FLS10 will **not** stop the pump but only a lamp indicating "leakage alarm" will be lit.

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5.6 Shaft Unit

The short-circuit rings and the rotor bars are made of aluminium.

The die-cast aluminium rotor is shrink-fitted onto the shaft.

The rotor and the shaft are delivered as one unit.

The shaft units are balanced in accordance with ISO standard 1940 , Quality Grade G6.3, meaning that the velocity of the center of gravity error may be maximum 6.3 mm/s.

The torque is transmitted from the shaft to the hydraulic parts via a tapered shaft end and a tapered clamping sleeve.

See cross-sectional drawing in chapter "1. Description"

The shaft rotates in one support bearing and a main bearing arrangement.

Design criteria

The shaft is designed to adequately withstand the torque and the forces acting on the shaft during the starting phase and during operation. This includes both the magnetic forces from the rotor/stator as well as radial and axial forces produced by the hydraulic end.

5.7 Bearings

5.7.1 Support bearing

The support bearing is a double row angular contact ball bearing. The bearing is sealed with two metal shields (bearing designation with suffix "2Z") and is delivered ready greased from the bearing supplier. The grease is of quality Esso Unirex EQ 3 (SKF - GHQ 3).

5.7.2 Main bearing

The main bearing is a double row angular contact ball bearing. The bearing is sealed with two metal shields (bearing designation with suffix "2Z") and is delivered ready greased from the bearing supplier. The grease is of quality Esso Unirex EQ 3 (SKF - GHQ 3).

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5.7.3 Bearing life

The bearing life has been calculated as $L_{10\text{aah}}$.

The index "10" represents the difference between the requisite reliability and 100%. Consequently it means, that in this case 90% of the bearings will exceed or attain the calculated bearing life.

In the calculation the influence of lubrication, cleanliness, materials etc, are considered apart from the load.

The bearing life is at least **50 000 hours**, provided that the pump is operating in the flow range $0.5Q_n \leq Q \leq 1.25Q_n$, where Q_n is the flow at the nominal point (= best efficiency point). If the pump is operating near Q_n the bearing life can be multiplied by a factor of 2.

Note!

The bearing life has been calculated for the largest motor and for vertical installation, which gives the most unfavourable combination of the load parameters.

The smaller motors are used in combinations where the radial and axial forces produced by the hydraulic ends are smaller and thus the bearing life longer.

Further aspects

The calculated bearing life is the span before the first signs of fatigue can be seen in a bearing. Most bearings do not fail because of fatigue damages though, the service life of a bearing is normally determined by other factors such as corrosion, wear, contaminated lubricants etc.

See also further under section "9.5 Major Service".



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5.8 Mechanical Face Seal

The mechanical face seal arrangement is devised to isolate the bearings and electrical parts of the drive unit from the pumped media in the hydraulic unit.

Principle of operation

The ITT Flygt seal system is based on a double seal arrangement with an intermediate buffer cavity (seal housing filled with a coolant) in between. The seal system consists of an outer seal and an inner seal unit, both of which have a stationary seal ring and a rotating seal ring.

Controlled leakage

The seal unit is designed to work on controlled leakage principle where a minimal amount of coolant/air or coolant/media is allowed to enter the space between the seal-rings. This creates a hydrostatic film which acts both as a sealing media and a lubricant.

Leakage through the outer seal will enter the seal housing where it is mixed with the coolant.

Any leakage through the inner seal will be directed to a separate pocket, the so called inspection chamber, located below the stator housing and the main bearing. Since this leakage is the one that poses a threat to the functioning of the drive unit, the FLS10 float switch is mounted in the inspection chamber where it is monitoring the fluid level in the chamber. The alarm level is set so that there is still ample margin on the fluid level before it reaches the main bearing.

The inspection chamber shall be emptied at the at the scheduled Intermediate Services. By keeping a record of the amount of registered leakage as well as if any alarms occur between the scheduled service occasions, it is possible to assess when the seal is no longer in good working order and should be replaced.

See further under "9.4 Inspection and Storage".

Mechanical seal build-up

The outer and inner mechanical seals are mounted together in a seal holder/housing which make them form a mechanical seal unit, or more precisely a cartridge type shaft seal. Integrated with the seal holder/housing is a small propeller. When the drive unit is equipped with a cooling jacket this propeller will circulate the coolant within the cooling jacket.

See further under chapter "5.9 Cooling".

This 35 mm seal unit is one of those who will be appear in marketing material as ITT Flygts new series of mechanical shaft seals, the "Plug-in seal".

Please see also illustration overleaf.

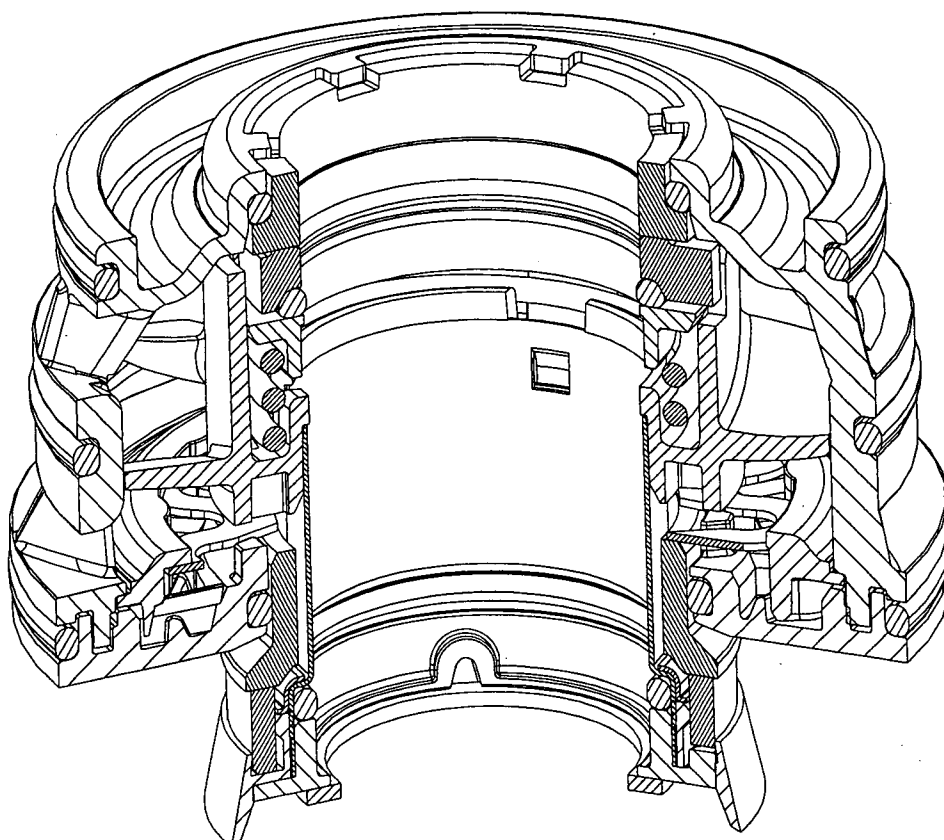


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35 mm mechanical shaft seal of cartridge type, i.e. the new "Plug-in seal" type.



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5.9 Cooling

5.9.1 General

Heat losses in a motor

All motors have one common feature, they transform electrical energy to mechanical energy and this transformation cannot occur without losses. The difference between input (P1) and output (P2) power equals the losses. The ratio between P2 and P1 gives the efficiency of the motor.

The losses in the machine can be divided into five groups:

- * Stator winding losses
- * Rotor losses
- * Stray load losses
- * Iron losses
- * Friction losses

Among several factors that affect the heat generation in the machine are for example pole number, voltage and frequency. ITT Flygt uses a sophisticated computer program to calculate the characteristics of the machine. This of course includes the determination of the losses mentioned above. All calculations are verified by extensive laboratory tests. The heat generation in the motor is therefore well known. Most of the energy losses are transferred to the surrounding media through the stator housing (pump with no cooling jacket) or the seal housing cover (pump with cooling jacket).

5.9.2 Methods of cooling

The drive unit can either be configured for convection cooling only (no cooling jacket) or for forced convection cooling (with cooling jacket and an internal, closed loop circulation system). See further below.

Convection cooling only (no cooling jacket)

The drive unit of the pump is cooled by the liquid surrounding and flowing past the stator housing, i.e. pure convection cooling.

Convection cooling (no cooling jacket) is suitable for installations where the stator housing is fully submersed. Intermittent running enables condition of semi-submergence for shorter periods. Convection cooling is commonly used for P-installations.

The seal housing cover and the adapter are held together by screws and form the seal

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housing. This contains the coolant which in this case is only used to cool and lubricate the seals.

The adaptor is connected to the bearing housing by means of screws. These parts are locked together with the stator housing by means of a coil spring lock system which is placed in a square-shaped groove. This design solution eliminates a screw joint for the stator housing and allows for an outer "clean design" which as far as possible prevents deposition of dirt on the exterior of the pump. See also cross-sectional drawing in chapter "1.1 Description".

In cases where the pumped liquid temperature exceeds 40 °C the motor power is down rated according to product specification.

Internal cooling system with closed loop circulation

The drive unit of the pump is equipped with an internal cooling system with closed loop circulation.

The internal cooling system is required for the following:

- Dry-installations, ie T- and-Z-installation
- Installations where the stator housing for long periods is not fully submersed, i.e. S- installations and some P-installations.
- Installations in media that creates build-up on stator surface.

The drive unit is fitted with another type of adaptor which allows an inner, as well as an outer cooling jacket to be mounted. The stator is cooled by the coolant which is forced to flow between the stator housing and the inner cooling jacket by an internal pump placed in the shaft seal unit. The flow passes between the inner and the outer cooling jackets and is directed down to the narrow slot between the flow diffuser, which is mounted in the seal housing, and the seal housing cover, then back to the propeller in the mechanical seal. The seal housing cover works as a heat exchanger and the coolant in the cooling system is cooled by the pumped liquid. The purpose of the coolant is to cool and lubricate the seals **and** to cool the motor. Please also see picture in 5.9.3.

The capacity of the cooling system is such that, the pump can be equipped with a full size impeller, i.e. full load at full speed, and be run from full speed through the whole range down to the minimum speed without any risk of overheating the motor.

In cases where the pumped liquid temperature exceeds 40 °C the motor power is down rated according to product specification.



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External aided cooling

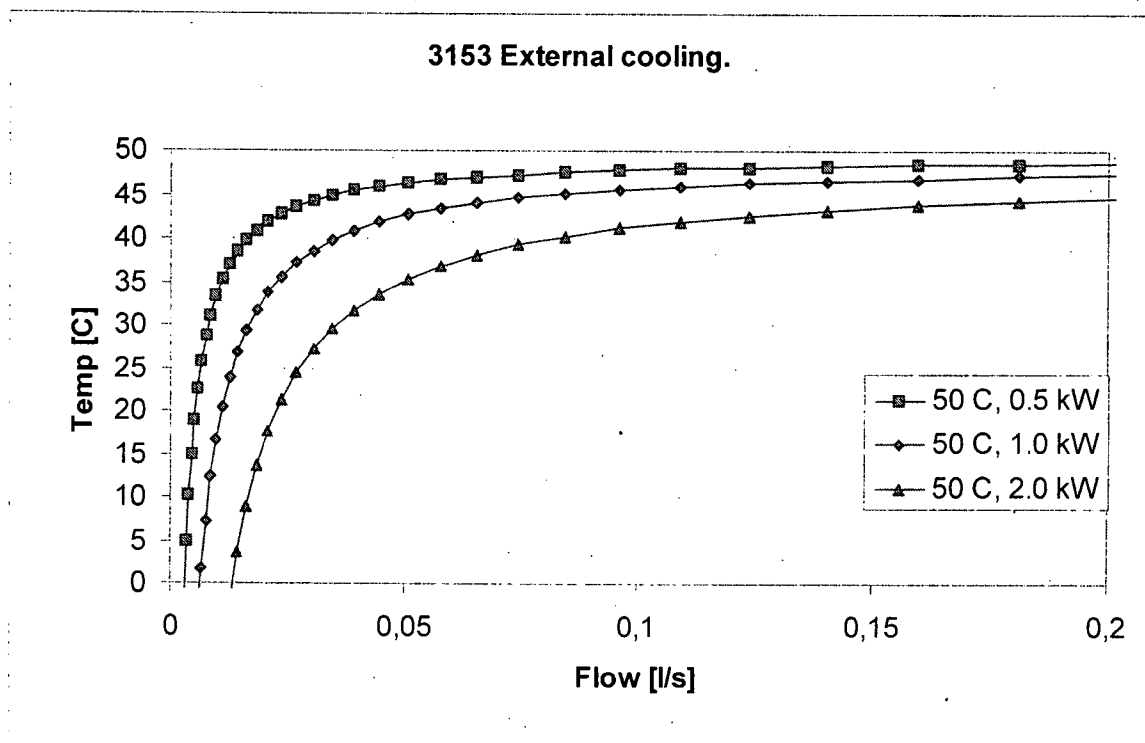
External aided cooling can be applied for pumps where the drive unit of the pump is equipped with an internal cooling system with closed loop circulation. The filling plugs (used for filling and emptying coolant) are replaced with inlet and outlet pipes for the external cooling (see picture in 5.9.3). No other modifications of the pump are required. External aided cooling enables nominal power output for the pump, i.e. avoiding down rating, when pump media has temperature $> 40\text{ }^{\circ}\text{C}$. Note that external cooling also cools the pumped media to a certain extent.

The relation between the flow and temperature of the external aided cooling liquid (here water), pumped media temperature and heat loss in the motor can be found in the diagrams below.

Each diagram is plotted for a specific temperature of the pumped media.

Each curve in the diagram is plotted for a specific heat loss in the motor ($= P_{in} - P_{out}$).

Minor deviations from showed curves may occur depending on different motor speeds i.e. pole number.





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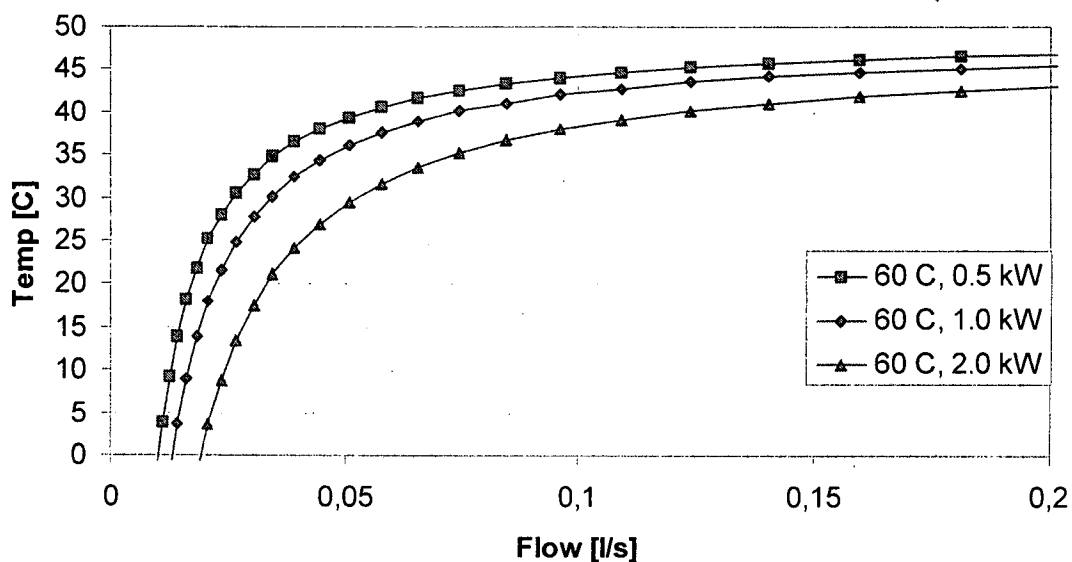
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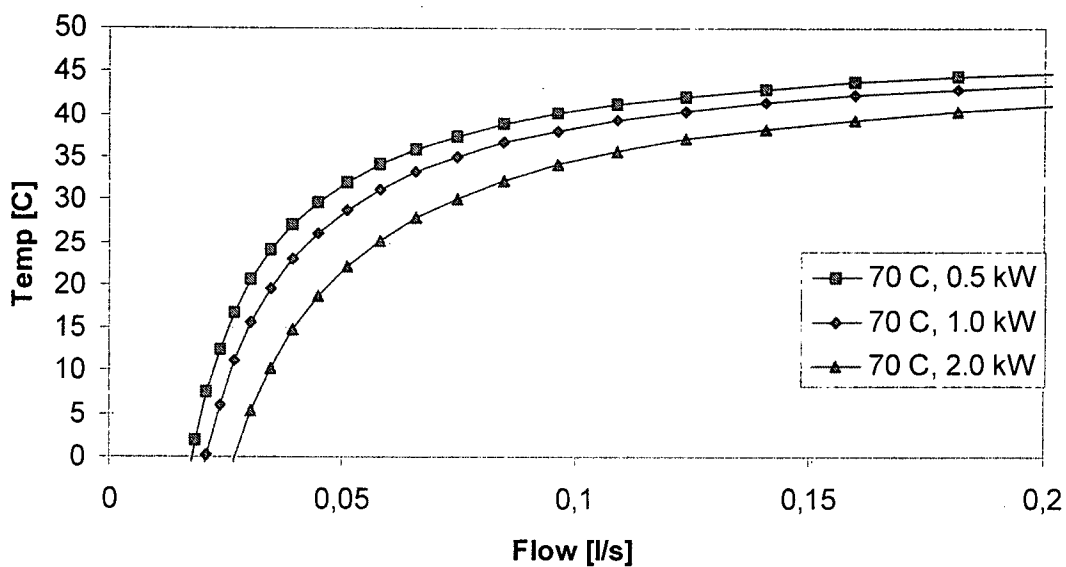
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3153 External cooling.





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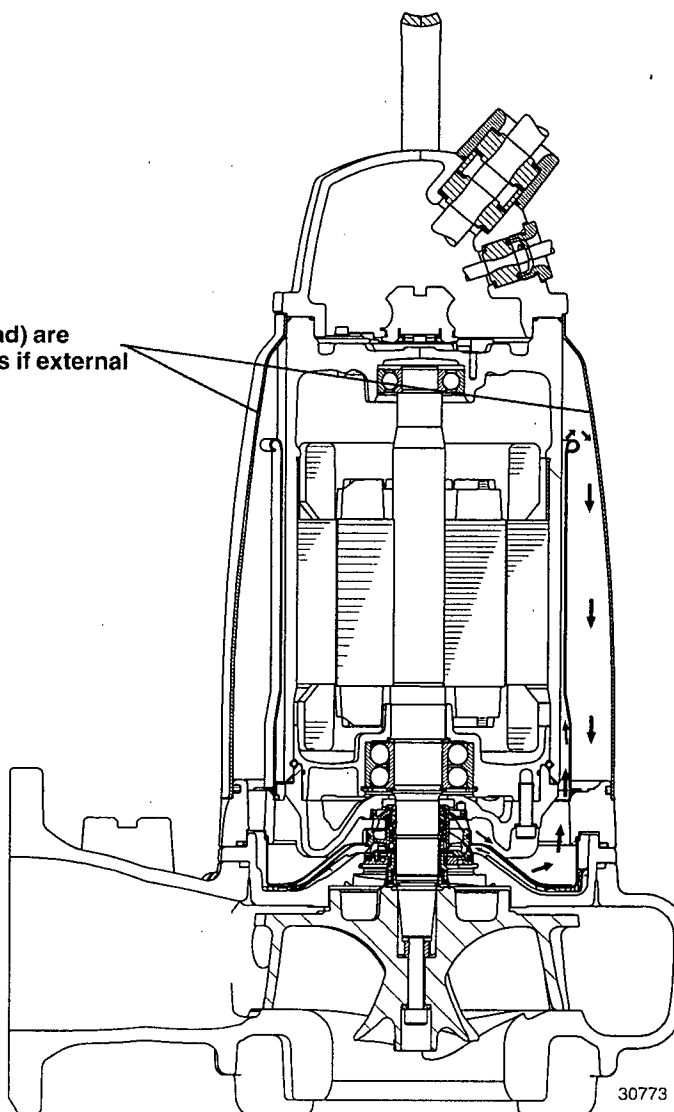
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5.9.3 Draining and filling the seal housing / cooling system

Please see further under chapter "9. Inspection and Service", as well as the "Care and Maintenance Manual".

Filling plugs 642 13 00 (M16 thread) are replaced by inlet and outlet pipes if external cooling is used



Pump with integrated, closed loop cooling system.
The arrows in the picture indicate the circulation within the cooling system



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6. HYDRAULIC UNIT DATA

6.1 General

The waste water pumps available on the market today all have hydraulic units of traditional designs that have one thing in common:

They are all, although in a greater or less degree, sensitive to clogging. This is normally a process where pieces of stringy material, plastic strips, rags etc. gradually build up on the leading edge(s) of the impeller. The effect of this is of course a reduced capacity and in the end it can lead to a complete choking of the pump. Clogging can also take place in slots around the impeller and thereby increase friction losses.

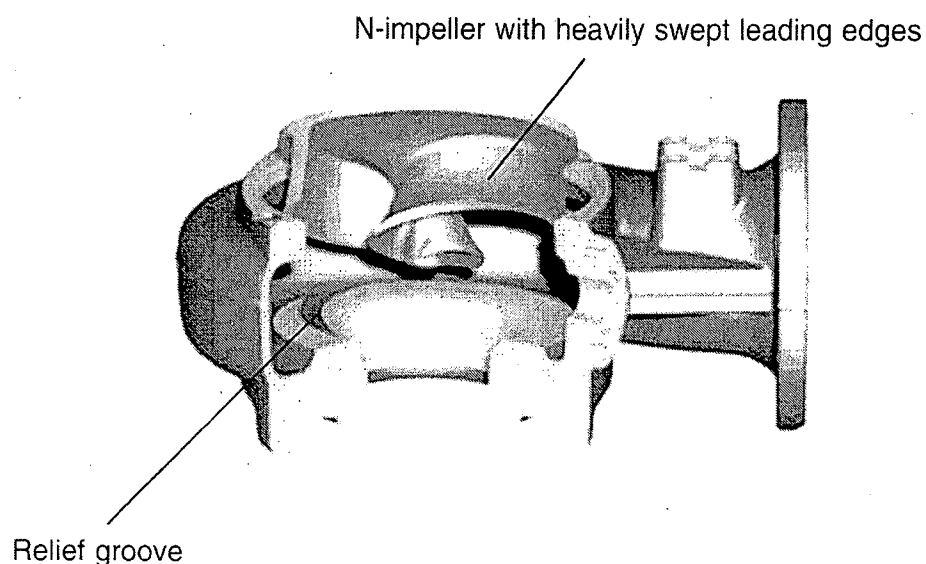
The tendency to clog has an influence on the performance of the pump in two ways:

- Reduced capacity resulting in longer running time
- Lower efficiency due to higher losses resulting in a higher energy consumption.

The hydraulic units for the 3153 pump are all designed according to the N-pump concept.

Extensive field test have shown that this design solution has resulted in a product that in normal waste water applications in practice is clog free and in addition to this has the unique quality of maintaining a high efficiency over time.

A cut-away view of the MT hydraulic unit can be seen below.





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6.2 Impeller

It is natural that most of the good performance of the N-pump is related to the design of the impeller. The design of the impeller makes it self-cleaning and in addition to this it can also be regarded as an high-efficiency impeller.

The key factors to the N-impeller performance can be summarized in the following points:

- The leading edge is heavily swept back with a specified angle distribution. Tests show that these specifications must be followed in detail in order to reach the unique self-cleaning performance.
- The inversely swept relief groove together with the special impeller blades transport rags, plastics, fibers, etc. through the pump. The special design of the relief groove facilitates this transport.
- Tests have shown that the specially designed relief groove also works as a labyrinth seal which reduces the leakage in the gap between the impeller and the pump housing.
- Since the impeller is semi-open there is no risk, as is the case with closed impellers, for clogging at the impeller neck.
- In order to eliminate the risk for clogging in the clearance between the impeller and the seal housing cover, the impeller and the seal housing cover are equipped with a groove which works in the same way as the relief groove in the pump housing.

The hydraulic units for 3153 are all equipped with two-vane semi-open impellers made of cast iron. The edges of the impeller vanes that fit against the bottom of the pump housing are induction hardened to avoid wear.

The impellers have a ball throughlet of 57 mm for the 4-pole LT-, 54 mm for the 6-pole LT-, 50 mm for the MT-, 41 mm for the HT- and 31 mm for the SH-version. These throughlets are only relevant if one talks about real solid objects like stones, pieces of wood etc. and their possibilities to pass through the pump. But the good results from the extensive field test have shown that these types of solids in normal waste water is not so very common and therefore one can say that the rather small throughlets of the impellers can be disregarded.

The impellers are turned down in steps from the max. diameter and a few of these have been chosen as "standard" and can be found in the impeller modules in the Product Specification.

Performance Curves for 50 and 60 Hz and data regarding impeller part numbers and moment of inertia, see section 10 and 11 respectively.

Compilations of the Performance Curves can be found in the respective Technical Specifications for 50 Hz and 60 Hz.

The impellers are statically balanced to a quality grade of G 6.3.

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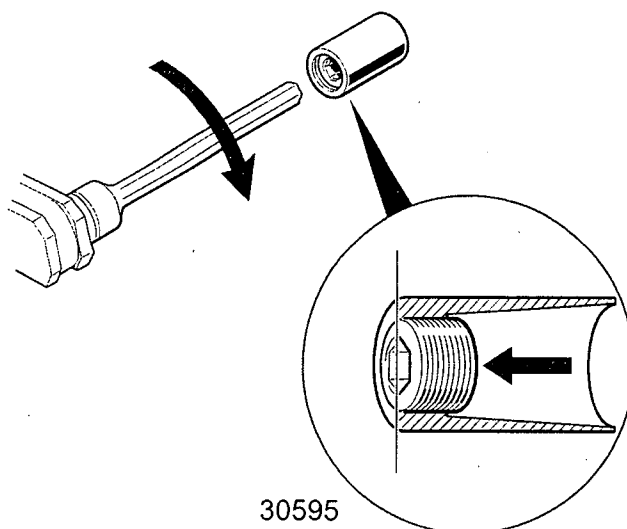
6.2.1 Impeller fastening and trimming

The shaft torque is transmitted to the impeller via a tapered shaft end and a tapered clamping sleeve. The sleeve is combined with an impeller trimming screw which is threaded into the outer end of the sleeve. The trimming screw has a left-hand thread on its outside. When installing the impeller, the trimming screw shall be mounted flush with outer end of the sleeve. Please see picture below.

After mounting the sleeve with the trimming screw and the impeller on the shaft, the drive unit shall be mounted on the pump housing. When the trimming screw is turned clockwise, as in the picture below, the impeller is pushed outwards by the trimming screw until it makes contact with the bottom of the pump housing. The trimming screw shall then be turned another 1/8 of a turn.

When the impeller fastening screw is then mounted and tightened to the correct torque (76 Nm) the impeller will be installed with a correct clearance between the impeller vanes and the bottom of the pump housing.

Please see the "Care and Maintenance" manual or the "Workshop Manual" for complete descriptions of these working operations.



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6.3 Pump Housing

There is one size of pump housing for each version of the hydraulic units.
They are available with undrilled outlet flanges or with flanges drilled according to different standards which are listed below.

LT 4 pole

The pump housing outlet flange is a 200 mm flange. The pump housing is available in the following drilling variants:

Variant Available standards

-00	Undrilled flange, undrilled inlet
-03	Undrilled flange, drilled inlet
-06	EN 1092-2 Table 8 and ASME/ANSI B16.1-1989 Table 5
-07	EN 1092-2 Table 9

LT 6 pole

The pump housing outlet flange is a 250 mm flange. The pump housing is available in the following drilling variants:

Variant Available standards

-00	Undrilled flange, undrilled inlet
-01	EN 1092-2 Table 8
-03	Undrilled flange, drilled inlet
-05	ASME/ANSI B16.1-1989 Table 5
-07	EN 1092-2 Table 9

MT

The pump housing outlet flange is a 150 mm flange. Actual outlet dimension is 140 mm so that the pump housing in retrofit applications will fit on old discharge connections. The pump housing is available in the following drilling variants:

Variant Available standards

-00	Undrilled flange, undrilled inlet
-03	Undrilled flange, drilled inlet
-06	EN 1092-2 Table 9 and ASME/ANSI B16.1-1989 Table 5

HT

The pump housing outlet flange is a 100 mm flange. The pump housing is available in the following drilling variants:

Variant Available standards

-00	Undrilled flange, undrilled inlet
-01	EN 1092-2 Table 9
-03	Undrilled flange, drilled inlet
-05	ASME/ANSI B16.1-1989 Table 5



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SH

The pump housing outlet flange is a 80 mm flange. The pump housing is available in the following drilling variants:

Variant Available standards

- 00 Undrilled flange, undrilled inlet
- 01 EN 1092-2 Table 9
- 03 Undrilled flange, drilled inlet
- 05 ASME/ANSI B16.1-1989 Table 5
- 10 Undrilled flange, undrilled inlet, with outlet sealing
- 13 Undrilled flange, drilled inlet, with outlet sealing

Adjusted to 100 mm flange with outlet sealing Note! Only for P-installation!

- 20 Undrilled flange, undrilled inlet
- 23 Undrilled flange, drilled inlet

6.4 Flush Valve

Pumps in NP-installations can be equipped with flush valve **4901**.

All pump housings are equipped with a small cover which is mounted close to the outlet. By removing this the flush valve can mounted onto the pump housing.

For more information on the flush valve, please see the Product Data in the "Accessories" binder no. 2a, chapter 3.10.

For mounting dimensions, please see the enclosed drawing 570 81 00.



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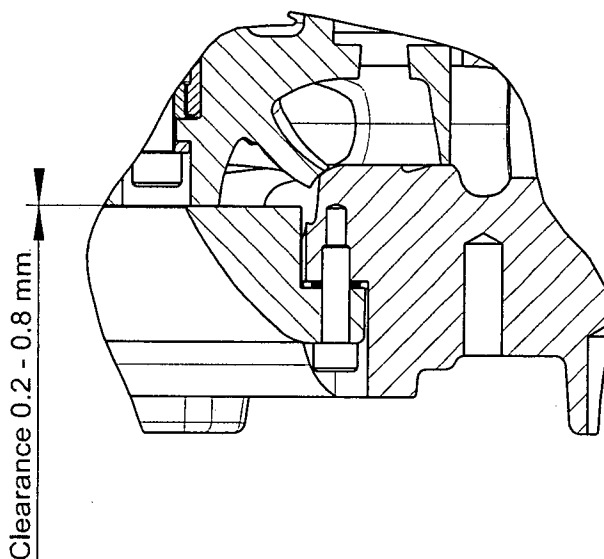
6.5 Guide Pin (for SH-pumps)

The guide pin is an option used together with the N-impellers. It is used to obtain a superior hydraulic unit for sewage installations with extremely high contents of solids. It improves the function of the N-technique by even further enhancing the transport of objects away from the impeller leading edges to the relief groove.

The pin itself is essentially a specifically designed metal bar, with a particular size and shape, mounted in the pump inlet, aligned with the machined leading edge of the impeller.

The clearance between the guide pin and the impeller leading edges should be equal to the clearance between the impeller vanes and the volute. Tests have proven that a clearance up to 1.5 mm does not have an adverse effect on the clogging resistance. Little wear has been noticed on the guide pin, which keeps the clearance unaffected, even when pumping abrasive media.

The guide pin has no or only a minor effect on clean water performance. No separate performance curves are needed.





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7. LIMITATIONS

- The standard version of the pump (3153.181) must not be used in explosive or flammable environments or with flammable liquids.
- Maximum permissible temperature of the pumped liquid is 40°C for the "standard" version of 3153.181 and 70°C for the "warm liquid version".
- Maximum permissible temperature of the pumped liquid is 40°C for the explosion proof version, i.e. 3153.091.
- Maximum permissible submersion depth 20 m.
- For the explosion proof version of the pump (3153.091), the ATEX Directive requires that the minimum water level (stop level) should be according to the dimensional drawing. The pump must never run dry or on snore.
- All electrical data of the motor and the performance of the pump are related to operation at the rated voltage. The product is designed for operation at the rated voltage $\pm 5\%$. Greater voltage deviations up to a maximum of $\pm 10\%$ are acceptable but do affect performance and may affect the working life of the motor, if operated continuously under full load conditions.
The motor is designed to operate with an voltage imbalance of up to 2% between the phases.
- The maximum voltage tolerance allowed for guarantee performance values is 5% of data plate value measured at the pump terminal board under full load conditions.
- Maximum 30 evenly spaced starts per hour.
- Rated voltage for sensors:
FLS 10: 12 V DC
Thermal contacts, if not connected in series with FLS10: max 250 V, otherwise 12 V DC
Thermistors: max 30 V
- The pH of the pumped liquid must be between 5.5 - 14.
- Maximum density of the pumped liquid is 1100 kg/m³.
- The NPSH_{re} value is dependent on the operating point (see the Performance Curves).
- The drive unit is designed for working pressures of up to 1.0 MPa.
The hydraulic units are designed for working pressures of 1.5 of HDP.
- The pumped liquid may contain solid particles up to a size of approximately 57 mm (4-pole LT), 54 mm for the 6-pole LT, 50 mm (MT), 41 mm (HT) and 31 mm (SH), which are the respective impeller ball throughlet diameters.



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- Selection of mechanical face seals:
The type of seal to be used in these pumps is determined by the type of media in which the product operates.

NOTE

This product is designed and dimensioned to operate only in circumstances described in this product data.

Should the product be used in other environments contrary to intended areas of use, please check that the materials described in chapter "3. Materials" are compatible.



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8. ACCESSORIES

8.1 Electric Starters

Starting equipment which can be delivered from the factory is listed in the leaflet "Automatic Controls for Pumps" Auto 02.05.

The MiniCAS II should be connected to the starter equipment as shown in picture on page 15, chapter "5.5.3 Receiving Units".

When an alarm signal for high stator temperature is given the interlocking contact opens, whereby the pump is stopped.

The contact remains open until the alarm signal ceases and the manual reset of the MiniCAS II - unit has been carried out.

For further information see the MiniCAS II "Installation & Application" manual.

8.2 Level Control

Start and stop of the pump may be arranged manually or automatically. If automatic start and stop is required, Flygt ENM-10, FMC or IPC Level Regulators can be used. See separate leaflets.

8.3 Zinc Anodes

When pumping corrosive liquids e.g sea water, the hydraulic unit should be equipped with zinc anodes.

To determine the initial anode consumption speed the anodes should be inspected one, three and six months after installation.

The zinc anodes should be replaced when 75% of their volume is consumed.

Variant	Anode	For use in	Assembly drawing
671 56 00	84 55 71	3153 drive unit	671 57 00
	495 80 00		
671 56 01	666 59 00	3153 LT 6-pole pump housing	671 57 00
671 56 02	666 58 00	3153 LT 4-pole pump housing	671 57 00
671 56 03	666 56 00	3153 MT	671 57 00
671 56 03	666 56 00	3153 HT/SH	671 57 00



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8.4 Pump Lift™ Lifting Device

Flygt can offer a lifting arrangement which is specially suitable for retrieving pumps that are totally submerged or installed in deep sumps.

The Pump Lift consists of a chain sling unit and a grip eye. The chain sling unit is a short piece of chain with a fastening device and a 10m nylon cord. The grip eye with the lifting chain is allowed to slide down the nylon cord. The grip eye grabs hold of the chain sling and the pump can be lifted up.

Note

The lifting device can be moved around to service similar pumps in the customers station or be a part of a service crews special tools equipment.

The lifting device available for this pump size has a 540 kg lifting capacity.

Pictures showing the use of the lifting device can be seen on the following pages.



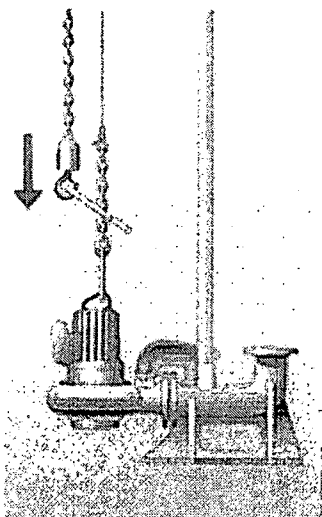
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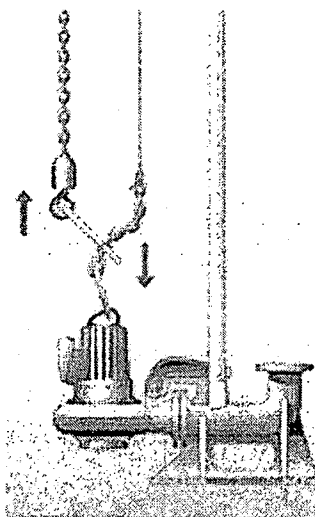
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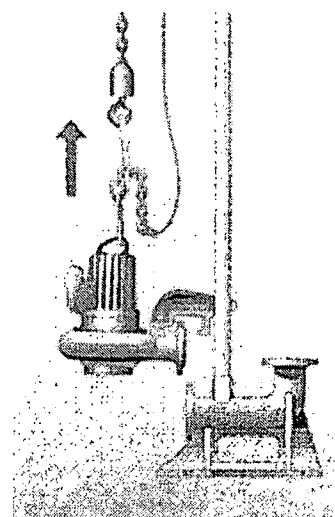
Retrieval and Lifting



1. The nylon cord is untied and the grip eye, attached to the lifting chain and hook, is allowed to slide down the taut cord to the pump chain.



2. Slackening the nylon cord allows the tooth on the grip eye to snag into a link on the pump chain.



3. Now the pump is properly attached and can be lifted.



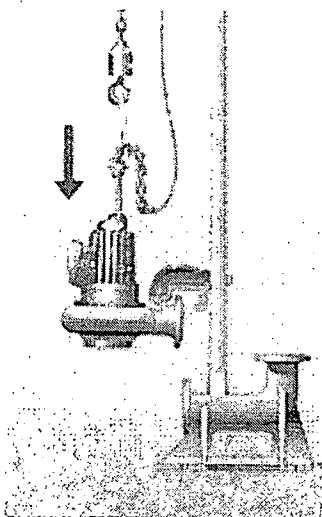
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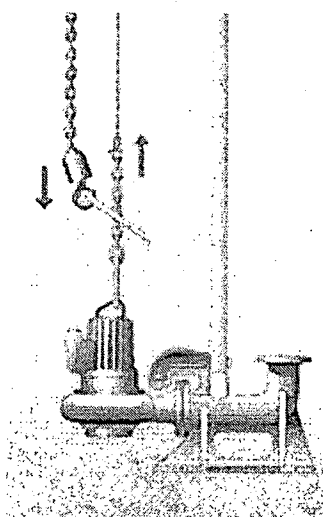
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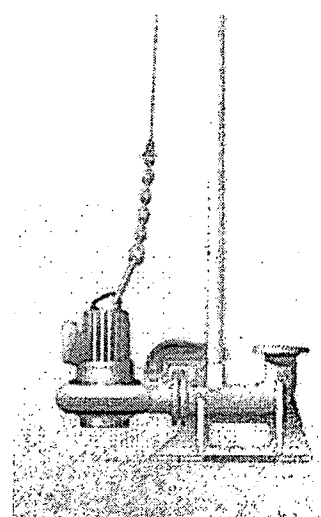
Reinstalling pump



4. The pump is lowered into position.



5. When the nylon cord is taut, the tension on the lifting chain is slackened, the grip eye loses its grip and it can be raised.



6. The nylon cord is tied off until it is next needed.

For more information, please refer to the Pump Lift brochure or the Technical Specification for the Pump Lift system.



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8.5 Connections

NP Discharge Connection

Nominal flange size mm	Available standards	Weight
80	Undrilled	35 kg
80	EN 1092-2 Table 9	35 kg
80	ASME/ANSI B16.1-1989 Table 5	35 kg
100	Undrilled	42 kg
100	EN 1092-2 Table 9	42 kg
100	ASME/ANSI B16.1-1989 Table 5	42 kg
150	Undrilled	79 kg
150	EN 1092-2 Table 9 and ASME/ANSI B16.1-1989 Table 5	79 kg
200	Undrilled	78 kg
200	EN 1092-2 Table 8 and ASME/ANSI B16.1-1989 Table 5	78 kg
200	EN 1092-2 Table 9	78 kg
250	Undrilled	142 kg
250	EN 1092-2 Table 8 and ASME/ANSI B16.1-1989 Table 5	142 kg
250	EN 1092-2 Table 9	142 kg

Discharge connections for TOP - station installation

100	Undrilled	32 kg
150	Undrilled	46 kg



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NS Discharge Connection

Nominal flange size mm	Available standards	Weight
80	3" Hose	6 kg
80	Threaded 3 - 8 NPSM	7 kg
100	4" Hose	6 kg
100	Threaded R4	6 kg
100	Threaded 4 - 8 NPSM	6 kg
150	6" Hose	15 kg
150	Threaded R6	17 kg
150	Threaded 6 - 8 NPSM	17 kg
200	8" Hose	31 kg
250	8" Hose	42 kg
250	10" Hose	40 kg

NT Inlet Elbow

Nominal flange size mm	Available standards	Weight
150	Undrilled, EN 1092-2 Table 9 and ASME/ANSI B16.1-1989 Table 5	32 kg
200	Undrilled, EN 1092-2 Table 8 and ASME/ANSI B16.1-1989 Table 5	53 kg
200	BS-EN 1092-2 Table 9	53 kg
250	Undrilled, EN 8, EN 9, ANSI	69 kg
300	Undrilled, EN 8, EN 9, ANSI	100 kg

8.6 Other Installation Accessories

NP Access Frame Unit (including Guide Holder) 75 kg

Warning! DO NOT place the pump on the frame unit

NS Stand	For MT-, HT- and SH-versions	21 kg
	For LT version	24 kg
	For LT 6-pole version	24 kg



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9 INSPECTION AND SERVICE

9.1 Mechanical Face Seal, Inspection Chamber

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

Leakage alarm

In case of an alarm signal from the FLS 10 the MiniCAS II will not stop the pump but only a warning light will be lit, signalling "leakage alarm". This does not give any information about the actual condition of the mechanical seal, only that the fluid in the inspection chamber has reached a certain level. It is therefore of utmost importance in this situation **that the pump is taken out of operation for inspection and service within 48 hours.**

On N 3153 the inspection chamber can be checked by opening the inspection plug which is mounted in a slanted position (marked INSP) on the adaptor. Hold a rag over the plug to avoid splatter in case the inspection chamber is pressurized.

9.2 Emptying and filling coolant

Draining the seal housing

The seal housing contains coolant that may be pressurized. Therefore it has to be drained manually before the pump can be dismantled. It is recommended that the pump has cooled down to room temperature before draining the seal housing.

Unscrew one of the filling plugs which are unmarked and vertically mounted in the adaptor. Hold a rag over the filling plug to avoid splatter. Unscrew the other plug and remove the coolant with a handpump or lay the pump on its side and let the coolant pour out by itself.

Filling the seal housing

The seal housing shall be filled with the pump standing on a horizontal plane in an upright position. Unscrew both filling plugs which are unmarked and vertically mounted in the adaptor. Fill with coolant up to the thread of the filling plugs (approximately 2.2 litres). The level of coolant is now at the right level. Put both filling plugs back.

Draining the cooling system

The internal cooling system contains coolant that may be pressurized. Therefore it has to be drained manually before the pump can be dismantled. It is recommended that the pump has cooled down to room temperature before draining the internal cooling system.

Unscrew one of the filling plugs at the top of the cooling jacket. Hold a rag over the filling plug to avoid splatter. Unscrew the other plug and remove the coolant with a handpump or lay the pump on its side and let the coolant pour out by itself.



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Filling the cooling system

The cooling system shall be filled with the pump standing on a horizontal plane in an upright position. Remove both filling plugs at the top of the cooling jacket. Fill until the system overflows (approximately 10.5 litres). The level of cooling liquid is now at the right level. Put both filling plugs back.

Please see also the "Care and Maintenance Manual" where these procedures above are explained with pictures.

NOTE !

When filling coolant into the seal housing or the cooling system the pump must be standing upright to avoid overfilling.

Overfilling the coolant may cause the pressure regulating effect of enclosed air to cease. This can lead to the lower seal being pressed apart causing loss of coolant and/or abnormal fluid leakage into the seal housing.

The lower seal can still remain intact, despite coolant over-fill, due to the fluid pressure in the pump housing. In such a case over-pressure will be directed upwards applying abnormal pressure to the upper seal thus causing excess leakage or surface wear.

9.3 Coolant

The coolant shall be a mixture of water and *stabilized* monopropyleneglycol in a 70% / 30 % ratio by volume.

Suitable glycol qualities are for example : Dowcal N or Dowcal 20.

These glycols are non-poisonous and also corrosion-inhibiting

The pumps are delivered from the factory with monopropyleneglycol of Dowcal N quality. The individual components of this glycol quality are approved by the FDA.

If it is not possible to find a suitable glycol quality locally and if the pump is never exposed to temperatures at or below the freezing point, then the water/glycol mixture can be substituted by pure water.

9.4 Inspection and Storage

ITT Flygt recommends a preventive maintenance program based on Intermediate and Major Services at regular intervals. For standard sewage applications where the temperature of the pumped liquid is 40°C or less an *Intermediate Service* should be performed every 8000 hours or every 2 years; whichever occurs first.

Please see the "Care and Maintenance Manual" for detailed recommendations.



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Storage (Important)

For longer periods of 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.

Before final installation, or if the pump is stored for more than 6 months, *this rotation procedure is mandatory.*

9.5 Major Service

The time between *Major Service* could vary considerably depending on operating conditions and the need for a Major Service shall be determined during the regular Intermediate Services. However, a minimum of 20 000 hours of operation could be anticipated.

For other applications than sewage water or for specific operating conditions, other service intervals may be recommended.

Complete instructions for Major Service working operations can be found in the "Workshop Manual".

9.6 Tools

Most of the tools needed for servicing of the pump are tools normally included in every servicemans tool kit. However, there are some special tools exclusively for this pump type without which servicing of the pump will be difficult and the pump can very easily be damaged.

9.6.1 Special Tools

Part No	Denomination	Remarks
332 91 00	Spring puller	Spring removal
608 20 00	Mounting/Dismounting tool	Main bearing
608 23 01	Stand	Pump fixation
398 31 00	Mounting sleeve	Mechanical seal unit
689 54 04	Mounting/Dismounting tool	Stator

See instructions for use on the Tooling Instruction Sheet (enclosure) or the "Workshop Manual".

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9.7 Removing, installing and trimming the impeller

Complete instructions for these working operations can be found in the "Care and Maintenance Manual" as well as the "Workshop Manual".



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10. 50 HZ DATA

10.1 Power Cables

SUBCAB[®], maximum voltage 750 V

Cable sizes (mm²): 4 G 2,5 + 2x1,5
4 G 4 + 2x1,5
4 G 6 + 2x1,5
4 G 10 + 2x1,5

7 G 2,5 + 2x1,5
7 G 4 + 2x1,5
7 G 6 + 2x1,5

Cable type NSSHöu.../3E, maximum voltage 1000V

Cable sizes (mm²) 3x2,5 + 3x2,5/3E + 3x1,5
3x6 + 3x6/3E + 3x1,5
3x16 + 3x16/3E + 3x1,5

10.2 Electrical Data 50 Hz

Motor 21-18-2BB

3-PHASE, 2-POLE, RATED OUTPUT POWER 15 kW

Voltage [V]	Stator No	Starting Current [A]	Winding Resistance [Ohm/phase]
400 D	661 39 01	213	0,657
440 D	01	238	0,657
690 Y	01	123	0,657
230 D	02	370	0,217
400 Y	02	216	0,217
500 D	03	187	0,934
380 D	07	239	0,592
660 Y	07	138	0,592

The starting current is stated with a tolerance of +20%.
For more information on electrical data, see Motor Ratings.



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Motor 21-13-4AA

3-PHASE, 4-POLE, RATED OUTPUT POWER 7.5 kW

Voltage [V]	Stator No	Starting Current [A]	Winding Resistance [Ohm/phase]
400 D	641 95 01	91	2,253
690 Y	01	52	2,253
230 D	02	168	0,696
400 Y	02	98	0,696
415 D	03	86	2,473
440 D	03	88	2,473
500 D	08	70	3,702
380 D	09	96	1,999

Motor 21-15-4AA

3-PHASE, 4-POLE, RATED OUTPUT POWER 9.0 kW

Voltage [V]	Stator No	Starting Current [A]	Winding Resistance [Ohm/phase]
400 D	641 94 01	107	1,794
690 Y	01	62	1,794
230 D	02	181	0,607
400 Y	02	105	0,607
415 D	03	105	1,949
440 D	03	107	1,949
500 D	08	86	2,759
380 D	09	114	1,608

The starting current is stated with a tolerance of +20%.
For more information on electrical data, see Motor Ratings.



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Motor 21-18-4AA

3-PHASE, 4-POLE, RATED OUTPUT POWER 13,5 kW

Voltage [V]	Stator No	Starting Current [A]	Winding Resistance [Ohm/phase]
400 D	641 93 01	150	1,274
690 Y	01	86	1,274
230 D	02	250	0,437
400 Y	02	145	0,437
415 D	03	133	1,506
440 D	03	143	1,506
500 D	08	112	2,130
380 D	09	150	1,205
660 Y	09	87	1,205

Motor 21-18-6AA

3-PHASE, 6-POLE, RATED OUTPUT POWER 9.0 kW

Voltage [V]	Stator No	Starting Current [A]	Winding Resistance [Ohm/phase]
400 D	659 48 01	90	1,544
690 Y	01	52	1,544
230 D	02	151	0,512
400 Y	02	88	0,512
415 D	03	81	1,745
440 D	03	87	1,745
500 D	08	73	2,393
380 D	09	55	1,3865

The starting current is stated with a tolerance of +20%.
For more information on electrical data, see Motor Ratings.



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10.3 Performance Curves

	Curve No.	Impeller Part No.	Impeller moment of inertia [kgm ²]	Total moment of inertia (Imp+shaft unit) [kgm ²]
LT	53-410-00-6010	642 36 00	0,046	0,099
	53-411-00-6010	642 36 10	0,043	0,096
	53-412-00-4510	642 36 22	0,037	0,081
	53-412-00-6010	642 36 22	0,037	0,090
	53-413-00-3010	642 36 33	0,031	0,069
	53-413-00-4510	642 36 33	0,031	0,075
	53-413-00-6010	642 36 33	0,031	0,084
	53-414-00-3010	642 36 43	0,027	0,065
	53-414-00-4510	642 36 43	0,027	0,071
	53-415-00-3010	642 36 57	0,017	0,061
	53-620-00-7520	654 77 00	0,121	0,174
	53-621-00-7520	654 77 15	0,105	0,158
	53-622-00-7520	654 77 30	0,092	0,145
	53-623-00-7520	654 77 45	0,085	0,138
	53-624-00-7520	654 77 62	0,079	0,132
	53-625-00-7520	654 77 81	0,073	0,126
MT	53-430-00-6030	642 34 00	0,057	0,110
	53-431-00-6030	642 34 08	0,053	0,105
	53-432-00-6030	642 34 20	0,045	0,098
	53-433-00-4530	642 34 34	0,037	0,081
	53-433-00-6030	642 34 34	0,037	0,090
	53-434-00-3030	642 34 42	0,033	0,071
	53-434-00-4530	642 34 42	0,033	0,077
	53-434-00-6030	642 34 42	0,033	0,086
	53-435-00-3030	642 34 52	0,028	0,066
	53-435-00-4530	642 34 52	0,028	0,072
	53-436-00-3030	642 34 65	0,023	0,061

FLYGT**PRODUCT DATA****3153.181****3153.091**

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11. 60 HZ DATA**11.1 Power Cables**

SUBCAB® AWG, maximum voltage 600 V

Cable sizes:

- 14 AWG / 7
- 12 AWG / 7
- 10 AWG / 3 - 2 - 1 - GC
- 8 AWG / 3 - 2 - 1 - GC
- 6 AWG / 3 - 2 - 1 - GC
- 4 AWG / 3 - 2 - 1 - GC

11.2 Electrical Data 60 Hz*Motor 21-18-2BB*

3-PHASE, 2-POLE, RATED OUTPUT POWER 23,0 hp, 17,2 kW.

Voltage [V]	Stator No	Starting Current [A]	Winding Resistance [Ohm/phase]
460 D	661 39 01	95	2,253
575 D	03	216	0,421
600 D	03	227	0,421
230 Y//	04	204	0,174
460 YSER	04	102	0,696
440 D	07	124	0,469
200 D	08	73	3,702
208 D	08	78	3,70

The starting current is stated with a tolerance of +20%.
For more information on electrical data, see Motor Ratings.



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10.3 Performance Curves

	Curve No.	Impeller Part No.	Impeller moment of inertia [kgm ²]	Total moment of inertia (Imp+shaft unit) [kgm ²]
HT	53-450-00-4550	642 32 00	0,047	0,091
	53-450-00-6050	642 32 00	0,047	0,099
	53-451-00-3050	642 32 14	0,042	0,085
	53-451-00-4550	642 32 14	0,042	0,091
	53-451-00-6050	642 32 14	0,042	0,10
	53-453-00-3050	642 32 28	0,037	0,075
	53-453-00-4550	642 32 28	0,037	0,081
	53-453-00-6050	642 32 28	0,037	0,090
	53-454-00-3050	642 32 39	0,036	0,074
	53-454-00-4550	642 32 39	0,036	0,080
	53-454-00-6050	642 32 39	0,036	0,089
	53-455-00-3050	642 32 50	0,033	0,071
	53-455-00-4550	642 32 50	0,033	0,077
	53-455-00-6050	642 32 50	0,033	0,086
	53 456-00-3050	642 32 60	0,031	0,069
	53 456-00-4550	642 32 60	0,031	0,075
	53 456-00-6050	642 32 60	0,031	0,084
SH	53-270-00-1070	685 15 00	0,018	0,037
	53-270-00-1078	685 15 00	0,018	0,037
	53-272-00-1070	685 15 18	0,016	0,035
	53-272-00-1078	685 15 18	0,016	0,035
	53-273-00-1070	685 15 27	0,015	0,034
	53-273-00-1078	685 15 27	0,015	0,034
	53-274-00-1070	685 15 39	0,013	0,032
	53-274-00-1078	685 15 39	0,013	0,032
	53-275-00-1070	685 15 49	0,012	0,031
	53-275-00-1078	685 15 49	0,012	0,031
	53 276-00-1070	685 15 60	0,011	0,030
	53 276-00-1078	685 15 60	0,011	0,030



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Motor 21-13-4AA

3-PHASE, 4-POLE, RATED OUTPUT POWER 12,0 hp, 8,9 kW.

Voltage [V]	Stator No	Starting Current [A]	Winding Resistance [Ohm/phase]
460 D	641 95 01	95	2,253
200 D	04	216	0,421
208 D	04	227	0,421
230 Y//	05	204	0,174
460 YSER	05	102	0,696
380 D	06	115	1,509
380 Y	07	124	0,469
575 D	08	73	3,702
600 D	08	78	3,70
440 D	09	101	1,999

Motor 21-15-4AA

3-PHASE, 4-POLE, RATED OUTPUT POWER 15,0 hp, 11,2 kW.

Voltage [V]	Stator No	Starting Current [A]	Winding Resistance [Ohm/phase]
460 D	641 94 01	112	1,794
200 D	04	246	0,350
208 D	04	259	0,350
230 Y//	05	228	0,152
460 YSER	05	114	0,606
380 D	06	133	1,279
380 Y	07	139	0,400
575 D	08	90	2,759
600 D	08	95	2,759
440 D	09	121	1,608

The starting current is stated with a tolerance of +20%.
For more information on electrical data, see Motor Ratings.



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Motor 21-18-4AA

3-PHASE, 4-POLE, RATED OUTPUT POWER 20,0 hp, 14,9 kW.

Voltage [V]	Stator No	Starting Current [A]	Winding Resistance [Ohm/phase]
460 D	641 93 01	157	1,274
200 D	04	330	0,255
208 D	04	345	0,255
230 Y//	05	296	0,218
460 YSER	05	148	0,218
380 D	06	186	0,887
380 Y	07	180	0,289
575 D	08	116	2,130
600 D	08	123	2,130
440 D	09	158	1,205

Motor 21-18-6AA

3-PHASE, 6-POLE, RATED OUTPUT POWER 15,0 hp, 11,2 kW.

Voltage [V]	Stator No	Starting Current [A]	Winding Resistance [Ohm/phase]
460 D	659 48 01	95	1.274
200 D	04	214	0.255
208 D	04	225	0.255
230 Y//	05	212	0.109
460 YSER	05	101	0.436
380 D	06	114	0.887
380 Y	07	109	0.289
575 D	08	76	2.130
600 D	08	81	2.130
440 D	09	100	1.205

The starting current is stated with a tolerance of +20%.

For more information on electrical data, see Motor Ratings.



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11.3 Performance Curves

Curve No.	Impeller Part No.	Impeller moment of inertia [kgm ²]	Total moment of inertia (Imp+shaft) [kgm ²]
unit) [kgm ²]			
LT	63-413-00-6010	642 36 33	0,031
	63-414-00-4510	642 36 43	0,027
	63-414-00-6010	642 36 43	0,027
	63-415-00-3010	642 36 57	0,017
	63-415-00-4510	642 36 57	0,017
	63-416-00-3010	642 36 63	0,023
	63-622-00-7520	654 77 30	0,092
	63-623-00-7520	654 77 45	0,085
	63-624-00-7520	654 77 62	0,079
	63-625-00-7520	654 77 81	0,073
MT	63-433-00-6030	642 34 34	0,037
	63-434-00-6030	642 34 42	0,033
	63-435-00-4530	642 34 52	0,028
	63-435-00-6030	642 34 52	0,028
	63-436-00-3030	642 34 65	0,023
	63-436-00-4530	642 34 65	0,023
	63-437-00-3030	642 34 75	0,019
HT	63-452-00-4550	642 32 19	0,041
	63-452-00-6050	642 32 19	0,041
	63-453-00-4550	642 32 28	0,037
	63-453-00-6050	642 32 28	0,037
	63-454-00-3050	642 32 39	0,036
	63-454-00-4550	642 32 39	0,036
	63-454-00-6050	642 32 39	0,036
	63-455-00-3050	642 32 50	0,033
	63-455-00-4550	642 32 50	0,033
	63-455-00-6050	642 32 50	0,033
	63-456-00-3050	642 32 60	0,031
	63-456-00-4550	642 32 60	0,031
	63-456-00-6050	642 32 60	0,031
	63-457-00-3050	642 32 71	0,027
	63-457-00-4550	642 32 71	0,027
	63-457-00-6050	642 32 71	0,027



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11.3 Performance Curves

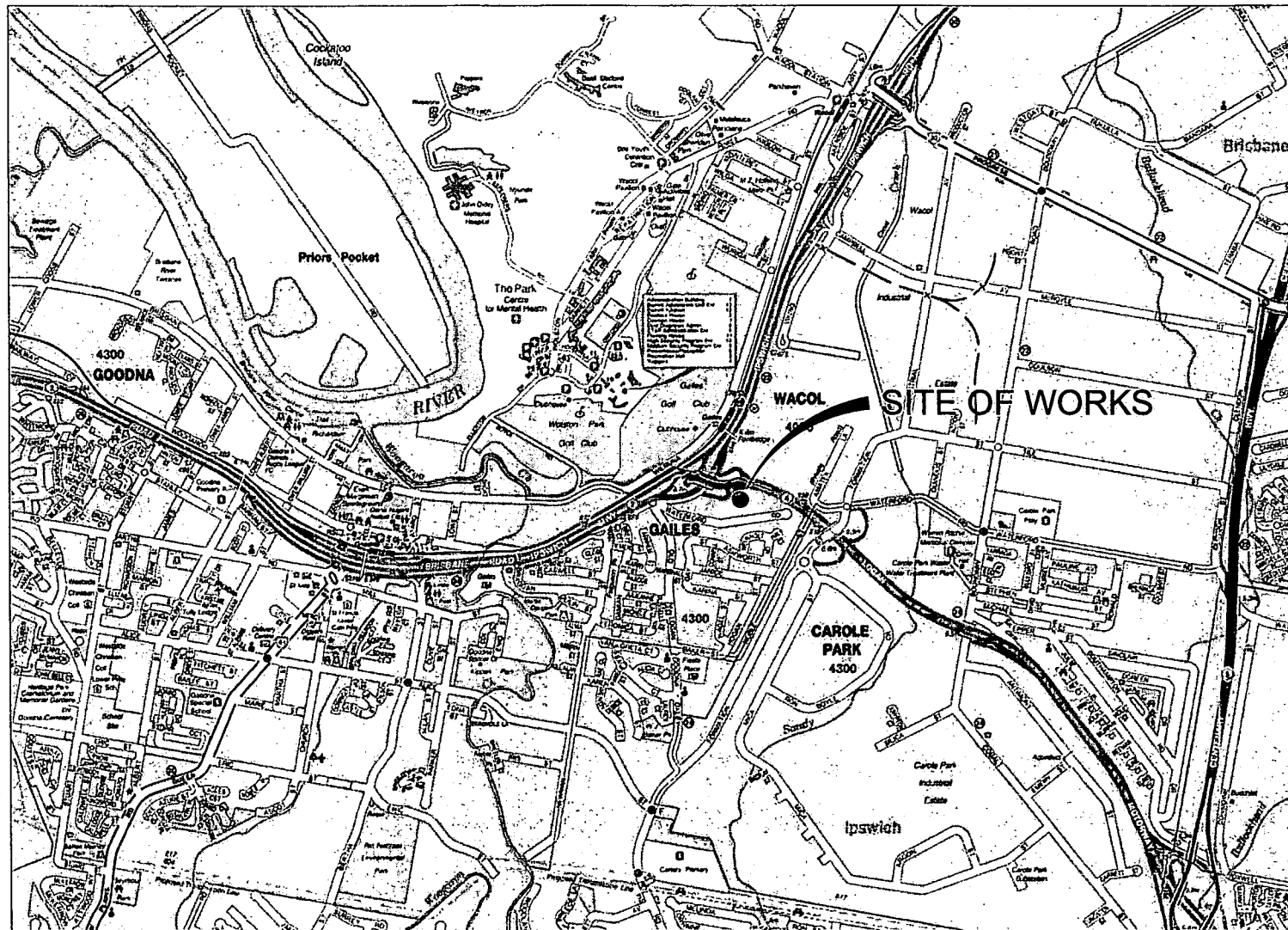
Curve No.	Impeller Part No.	Impeller moment of inertia [kgm ²]	Total moment of inertia (Imp+shaft unit) [kgm ²]
SH 63-273-00-1070	685 15 27	0,015	0,034
63-273-00-1078	685 15 27	0,015	0,034
63-274-00-1070	685 15 39	0,013	0,032
63-274-00-1078	685 15 39	0,013	0,032
63-275-00-1070	685 15 49	0,012	0,031
63-275-00-1078	685 15 49	0,012	0,031
63 276-00-1070	685 15 60	0,011	0,030
63 276-00-1078	685 15 60	0,011	0,030

60 Hz

2.0

IPSWICH / LOGAN INTERCHANGE

SEWAGE PUMP STATION



LOCALITY PLAN
NOT TO SCALE

DRAWING INDEX

2138310A-WAT-0001	COVER SHEET, LOCALITY PLAN AND DRAWING INDEX
2138310A-WAT-0002	NOTES
2138310A-WAT-0003	GENERAL ARRANGEMENT
2138310A-WAT-0004	SITE LAYOUT
2138310A-WAT-0005	PUMP WELL, VALVE PIT & OVERFLOW - PLAN
2138310A-WAT-0006	PUMP WELL & VALVE PIT - SECTIONS
2138310A-WAT-0007	PUMP WELL & OVERFLOW - SECTIONS 1 OF 2
2138310A-WAT-0008	PUMP WELL & OVERFLOW - SECTIONS 2 OF 2
2138310A-WAT-0009	VALVE PIT - SECTIONS

STRUCTURAL DRAWINGS

2138310A-STR-0051	PUMP WELL, VALVE PIT & OVERFLOW - REINFORCEMENT
2138310A-STR-0052	PUMP WELL & VALVE PIT - REINFORCEMENT
2138310A-STR-0053	PUMP WELL & OVERFLOW - REINFORCEMENT

IPSWICH WATER STANDARD DRAWINGS

SS04	SEWER CONSTRUCTION PIPELINE CONSTRUCTION TYPES
SS12	SUBMERSIBLE SEWERAGE PUMPING STATION 7.2m VENT POLE
	TERRAIN CAT 2 AND 3
SS18	PUMP STATION OVERFLOW

IPSWICH MOTORWAY UPGRADE DRAWINGS

Q1215/PU04/40411	GRAVITY SEWER MISCELLANEOUS DETAILS 1 OF 1 *
Q1215/PU04/40451	GRAVITY SEWER TO PUMP STATION SHEET 1 OF 2 *
Q1215/PU04/40452	GRAVITY SEWER TO PUMP STATION SHEET 2 OF 2 *
Q1215/PU04/40453	RISING MAIN FROM PUMP STATION SHEET 1 OF 2 *
Q1215/PU04/40454	RISING MAIN FROM PUMP STATION SHEET 2 OF 2 *

* CONTRACTOR SHALL REFER TO LATEST ISSUED REVISION.

2

AS CONSTRUCTED

REV	DATE	DESCRIPTION	DRAWN	CHECK	DESIGN	VERIFY
3	17.11.09	AS CONSTRUCTED				
2	20.08.08	ISSUE FOR CONSTRUCTION	MN	AD	AD	DRK
C	27.06.08	PRELIMINARY ISSUE - PUMP STN MOVED	MN	AD	AD	
1	3.06.08	ISSUE FOR CONSTRUCTION	MN	AD	AD	

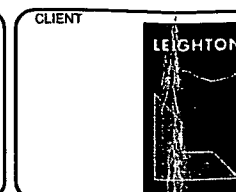
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NCSI certified Quality System to ISO 9001

SCALES

NOT TO SCALE

A1 ORIGINAL
DO NOT SCALE THIS DRAWING - USE FIGURED DIMENSIONS ONLY
VERIFY ALL DIMENSIONS ON SITE
APPROVED FOR AND ON BEHALF OF
PARSONS BRINCKERHOFF AUSTRALIA PTY LIMITED
MR K. WATTS
SIGNED
18/11/09
DATE
6850
RPEQ No.

PARSONS BRINCKERHOFF
100 YEARS
Adelaide, Bendigo, Brisbane, Melbourne, Newcastle, Perth, Singleton, Sunshine Coast and Sydney
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PROJECT	DISCIPLINE	NUMBER	REV.
IPSWICH / LOGAN INTERCHANGE SEWAGE PUMP STATION LOCALITY PLAN AND DRAWING INDEX	- WAT -	0001	3
PROJECT No. 2138405A			

GENERAL NOTES

- G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ANY OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE DESIGNER REPRESENTATIVE BEFORE PROCEEDING WITH THE WORK.
- G2. UNLESS NOTED OTHERWISE:
- ALL CHAINAGES AND RL'S ARE SHOWN IN METRES
 - ALL CO-ORDINATES ARE TO THE LOCAL GRID
 - ALL LEVELS ARE TO AUSTRALIAN HEIGHT DATUM (AHD)
- G3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE CONTRACTOR ON SITE. DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
- G4. THE CONTRACTOR SHALL SATISFY HIMSELF AS TO THE PREVAILING GROUND CONDITIONS.
- G5. THE CONTRACTOR SHALL PERFORM GEOTECHNICAL INVESTIGATIONS INCLUDING AN ASSESSMENT OF ACID-SULPHATE SOILS WHICH MAY BE PRESENT WITHIN THE SITE.
- G6. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT AUSTRALIAN STANDARDS.
- G7. THE CONTRACTOR SHALL ENSURE THAT DURING CONSTRUCTION ALL TRENCHES SHALL BE MAINTAINED IN A STABLE CONDITION AT ALL TIMES AND TEMPORARY SHORING IS PROVIDED FOR ALL TRENCHES GREATER THAN 1.5M DEEP.
- G8. THE CONTRACTOR IS LIABLE FOR THE COST OF REPAIR TO ANY DAMAGED SERVICES.
- G9. THE CONTRACTOR SHALL NOTE THE PRESENCE OF EXISTING SERVICES ASSOCIATED WITH THE WORKS. SPECIAL CARE SHALL BE TAKEN BY THE CONTRACTOR.
- G10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR STABILITY OF THE PUMP STATION DURING CONSTRUCTION UNTIL BACKFILLING IS COMPLETE.

EARTHWORKS

- E1. ALL VEGETATION AND ALL SOIL CONTAINING ORGANIC MATTER SHALL BE REMOVED FROM AREAS TO BE COVERED BY SLAB ON GROUND AND FOOTINGS.
- E2. TRIM/FILL PLATFORM AS NECESSARY FOR CONSTRUCTION OF SUB-BASE.
- E3. WHERE THE PUMPING STATION IS CONSTRUCTED IN PART OR WHOLLY IN OPEN CUT EXCAVATION, BACKFILL UNDER THE VALVE PIT SECTION AND AROUND THE WET WELL SHALL BE APPROVED MATERIAL. GRANULAR MATERIAL SHALL BE COMPACTED TO 75 DENSITY INDEX AND NON-GRANULAR TO 98% MAXIMUM DRY DENSITY AS DETERMINED BY AS 1289-E1.1.
- E4. 4% CEMENT STABILISED SAND MAY BE USED AS APPROVED FILL FOR DEEP EXCAVATION WHERE COMPACTION IS DIFFICULT.
- E5. EARTHWORKS AND FILLING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 3798 WITH LEVEL 1 INSPECTION AND TESTING. FREQUENCY OF TESTING SHALL BE TYPE 3 TO TABLE 8.1 OF AS 3798-2007.

PIPEWORK NOTES

- P1. PROVIDE UNIFORM GRADES IN PIPES BETWEEN LEVELS SHOWN ON THE DRAWINGS.
- P2. OFFSET DIMENSIONS ARE TO THE PIPELINE CENTRELINES UNO.
- P3. THE TEST PRESSURE FOR THE PIPELINE SHALL BE 1,000kPa.
- P4. ALL PIPE FITTINGS SHALL BE OF (AS 2280) AND PAINT FINISHED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, UNLESS NOTED OTHERWISE.
- P5. ALL BURIED DUCT PIPE EXTERNAL TO THE WET WELL AND PITS SHALL BE POLYTHENE WRAPPED (AS 3680).
- P6. EXCAVATIONS 1.5M OR MORE DEEP SHALL BE SUPPORTED TO THE REQUIREMENTS OF THE WORKPLACE HEALTH AND SAFETY ACT.
- P7. THE CONTRACTOR SHALL PLACE BACKFILL IN A MANNER THAT AVOIDS LOADING ON THE PIPES IN EXCESS OF THE STRUCTURAL CAPACITY FOR THE LOADING CONDITION.
- P8. PIPES SHALL BE LAID SO THAT THE BARRELS BEAR FIRMLY AND EVENLY ON THE BEDDING MATERIAL. PIPE SOCKETS SHALL BE ENTIRELY FREE FROM BEARING UNTIL AFTER THE PIPELINE HAS BEEN JOINTED. BEFORE BACKFILLING, OPEN SPACES UNDER JOINTS SHALL BE FILLED WITH MATERIAL AS ORDERED FOR PIPELINE BEDDING AND ALL BEDDING SHALL BE COMPACTED TO ENSURE UNIFORM SUPPORT OVER THE WHOLE LENGTH OF THE PIPELINE.
- P9. FLANGES SHALL BE IN ACCORDANCE WITH AS 4087 FIG B5.
- P10. STAINLESS STEEL BOLTS GRADE 316 AND NUTS GRADE 304.
- P11. GASKETS TO BE IN ACCORDANCE WITH WSA 109.

CONCRETE NOTES

- C1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE PROJECT SPECIFICATION AND THE CURRENT EDITION OF A.S. 3600 AND A.S. 3735. ANY MATTER OF DOUBT MUST BE REFERRED TO THE SUPERINTENDENT.
- C2. CONCRETE QUALITY:-
- | ELEMENTS | STRENGTH | MAX | SUMP | TYPE OF CONTROL |
|--------------------------|----------|-----------|------|-----------------|
| | GRADE | AGG. SIZE | | TESTING |
| PAD/STRIP FOOTINGS | N40 | 20 | 80 | PROJECT |
| MISC. CONCRETE | N40 | 20 | 80 | PROJECT |
| GROUND SLABS (INC. PITS) | N40 | 20 | 80 | PROJECT |
| SLAB INTHS | N40 | 20 | 80 | PROJECT |
| SUSPENDED SLABS | N40 | 20 | 80 | PROJECT |
| BORED PIERS | N40 | 20 | 80 | PROJECT |
| PIER CAPS (UNO) | N40 | 20 | 80 | PROJECT |
| WALLS | N40 | 20 | 80 | PROJECT |
- C3. THE USE OF BLENDED CEMENTS, AND/OR CHEMICAL ADMIXTURES, UNLESS NOTED OTHERWISE, WILL NOT BE PERMITTED WITHOUT THE APPROVAL OF THE SUPERINTENDENT. SUBJECT TO THE APPROVAL OF THE SUPERINTENDENT, FLY-ASH MAY BE INCORPORATED IN THE CONCRETE.
- C4. GRADE 15MPa BLINDING CONCRETE (50mm THICK) SHALL BE PLACED BELOW ALL CONCRETE TO BE CAST IN THE GROUND.
- C5. NO HOLES OR CHASES OTHER THAN THOSE SHOWN, SHALL BE MADE WITHOUT THE APPROVAL OF THE SUPERINTENDENT.
- C6. FORMED EXPOSED SURFACES SHALL BE FINISHED SMOOTH USING A STEEL TROWEL.
- C7. ALL FORMED EXPOSED EDGES AND RE-ENTRANT CORNERS SHALL BE CHAMFERED OR FILLETED $\geq 20\text{mm}$.
- C8. CLEAR CONCRETE COVER TO ALL REINFORCEMENT SHALL BE AS FOLLOWS, UNLESS NOTED OTHERWISE:
- | | |
|-------------------------------------|------|
| WET WELL STRUCTURE (EACH FACE 75mm) | 75mm |
| SURFACES AGAINST GROUND | 50mm |
| ALL OTHER SURFACES | 50mm |
- C9. MINIMUM LAP LENGTHS FOR REINFORCEMENT SHALL BE AS NOTED ON THE DRAWINGS, WHERE NOT SHOWN, THE FOLLOWING LAPS SHALL APPLY (LAP LENGTHS SHALL BE STAGGERED):
- | GRADE 500N | N12 - 500mm |
|------------|--------------|
| | N16 - 600mm |
| | N20 - 700mm |
| | N24 - 900mm |
| | N28 - 1000mm |
| | N32 - 1250mm |
| | N36 - 1500mm |
- FABRIC 2 CROSS WIRES \times 25mm
- C10. POSITIONS AND DIMENSIONS OF REINFORCEMENT LAPS AND SPLICES UNLESS SHOWN, SHALL BE IN ACCORDANCE WITH A.S. 3600 AND SHALL BE TO THE APPROVAL OF THE SUPERINTENDENT.
- C11. ALL REINFORCEMENT BARS SHALL COMPLY WITH A.S./N.Z.S. 4671.
- REINFORCEMENT SYMBOLS:-**
- R - STRUCTURAL ROUND BAR GRADE 250N
- N - DEFORMED BAR GRADE 500N
- SL for RL - HARD DRAWN WIRE FABRIC GRADE 500N
- THE NUMBER IMMEDIATELY FOLLOWING THESE SYMBOLS IS THE NOMINAL BAR DIAMETER IN MILLIMETRES.
- C12. REINFORCEMENT POSITION SYMBOLS UNO:
- | | |
|-----------------|-------------------|
| TF - TOP FACE | FF - FAR FACE |
| NF - NEAR FACE | EW - EACH WAY |
| B - BOTTOM FACE | IF - INSIDE FACE |
| EF - EACH FACE | OF - OUTSIDE FACE |
- C13. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON PLASTIC OR GRADE 40 CONCRETE CHAIRS AT NOT GREATER THAN 900mm CENTRES BOTH WAYS. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.

LOADING NOTES

- L1. ROOF LIVE LOAD = 5kPa
- L2. BUOYANCY = WATER TABLE AT R.L. 22.15
- L3. BACKFILL DENSITY = 19kN/m³
- L4. ACTIVE PRESSURE COEFFICIENT Ka = 0.33
- L5. SOIL ALLOWABLE BEARING PRESSURE = 100kPa
- L6. FULL HEIGHT LOADING HAS BEEN ASSUMED ON ALL STRUCTURES.

TRAFFIC MANAGEMENT NOTES

- TM1. ALL WORKS ARE TO BE IN ACCORDANCE WITH THE CONTRACTOR'S TRAFFIC MANAGEMENT PLAN.
- TM2. THE CONTRACTOR SHALL MINIMISE ALL OBSTRUCTIONS TO TRAFFIC.
- TM3. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY APPROVALS FROM COUNCILS AND OTHER AUTHORITIES FOR TEMPORARY TRAFFIC ARRANGEMENTS. ALL ADVERTISING AND COMMUNITY ENGAGEMENT WILL BE CARRIED OUT BY THE CONTRACTOR.
- TM4. TWO WEEKS BEFORE UNDERTAKING WORK THAT WOULD OBSTRUCT TRAFFIC, THE CONTRACTOR SHALL SUBMIT A TRAFFIC GUIDANCE SCHEME FOR THE SUPERINTENDANT'S APPROVAL.

PUMP STATION NOTES

- PS1. ALL INTERNAL SURFACES OF THE PUMP WELL AND VALVE PITS SHALL BE COATED WITH PEERLESS EMULSION "EPIGEN 1311" OR WATTYL "SIGMAGUARD CSF75" (WHITE OR OFF-WHITE). THE CONCRETE SURFACE SHALL BE SMOOTH AND FREE FROM HOLES AND LIGHTLY SANDBLASTED OR ACID-ETCHED BEFORE PAINTING. THE CONCRETE SURFACE SHALL HAVE CURED FOR NOT LESS THAN 28 DAYS. THE PAINT SHALL BE APPLIED IN THREE COATS WITH A TOTAL DRY FILM THICKNESS OF NOT LESS THAN 600 MICRONS.
- PS2. THE ISOLATING VALVE ON THE INLET SEWER SHALL BE A FULLY GRADE AS 2837/316 STAINLESS STEEL LUGGED KNIFE GATE VALVE INCLUDING STAINLESS STEEL SUPERSTRUCTURE AND NON-RISING SPINDLE ADAPTOR WITH STAINLESS STEEL METAL TO METAL SEAT.
- PS3. REFLUX VALVES SHALL BE COATED INTERNALLY AND EXTERNALLY WITH A FUSION BONDED EPOXY.

FOOTINGS

- F1. THE CONTRACTOR SHALL BE FAMILIAR WITH COFFEY GEOTECHNICS REPORT ENTITLED "IPSWICH LOGAN MOTORWAY INTERCHANGE UPGRADE PROJECT, NOV 2007". FOOTING AND GROUND SLABS HAVE BEEN DESIGNED BASED UPON THIS DESIGN INFORMATION AND SHALL BE CONFIRMED BY A GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTION.
- F2. THE BASE OF FOOTING/TRENCH/PIT EXCAVATIONS SHALL BE THOROUGHLY HAND CLEANED TO REMOVE ALL LOOSE AND/OR SOFT MATERIAL. THIS IS TO BE INSPECTED BY THE SUPERINTENDENT.
- F3. DEEP EXCAVATIONS SHALL BE SHORED IN ACCORDANCE WITH THE REQUIREMENTS OF WORKPLACE HEALTH AND SAFETY ACT.
- F4. OVER-EXCAVATION OF FOOTINGS SHALL BE FILLED WITH MASS CONCRETE.
- F5. THE CONTRACTOR IS TO ENSURE THAT FOOTINGS ARE NOT UNDERMINED BY ADJACENT EXCAVATION.

SURVEY NOTES

- S1. THE ACCURACY AND COMPLETENESS OF EXISTING SERVICES SHOWN ON THE DRAWINGS IS NOT TO BE GUARANTEED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE LOCATION OF ALL SERVICES AND INFRASTRUCTURE (INCLUDING LIGHTING, POWER POLES AND SIGNAGE) WITH ALL RELEVANT AUTHORITIES PRIOR TO CONSTRUCTION AND ADVISE THE SUPERINTENDENT ON ANY DIFFERENCE FROM THE DRAWINGS. ALL MEASURES AS NECESSARY SHALL BE TAKEN TO PREVENT DAMAGE TO EXISTING SERVICES AND INFRASTRUCTURE. THE DESIGNER AND PRINCIPAL TAKE NO RESPONSIBILITY FOR THE ACCURACY AND COMPLETENESS OF THIS INFORMATION AND ALL SERVICES SHOWN ARE APPROXIMATE ONLY.
- S2. PROPERTY BOUNDARIES AND DIMENSIONS SHOWN ON THESE DRAWINGS MUST NOT BE RELIED UPON WHEN DESIGNING SERVICES THAT WILL BE CONSTRUCTED IN CLOSE PROXIMITY TO THEM.
- S3. THE SHAPES DEPICTING SERVICES ARE SYMBOLIC REPRESENTATIONS, AND WHILST THEY ARE ACCURATELY POSITIONED, THEY ARE NOT TO SCALE.

ELECTRICAL AND CONTROL

- EL1. ALL ELECTRICAL AND CONTROL WORKS ASSOCIATED WITH THE PUMP STATION SHALL BE UNDERTAKEN IN ACCORDANCE WITH IPSWICH WATER REQUIREMENTS.

AS CONSTRUCTED

REV	DATE	DESCRIPTION	DRAWN	CHECK	DESIGN	VERIFY
4	17.11.09	AS CONSTRUCTED				
2	20.08.08	ISSUE FOR CONSTRUCTION	MN	AD	AD	DRK
C	27.06.08	PRELIMINARY ISSUE - PUMP STN MOVED	MN	AD	AD	
1	3.06.08	ISSUE FOR CONSTRUCTION	MN	AD	AD	

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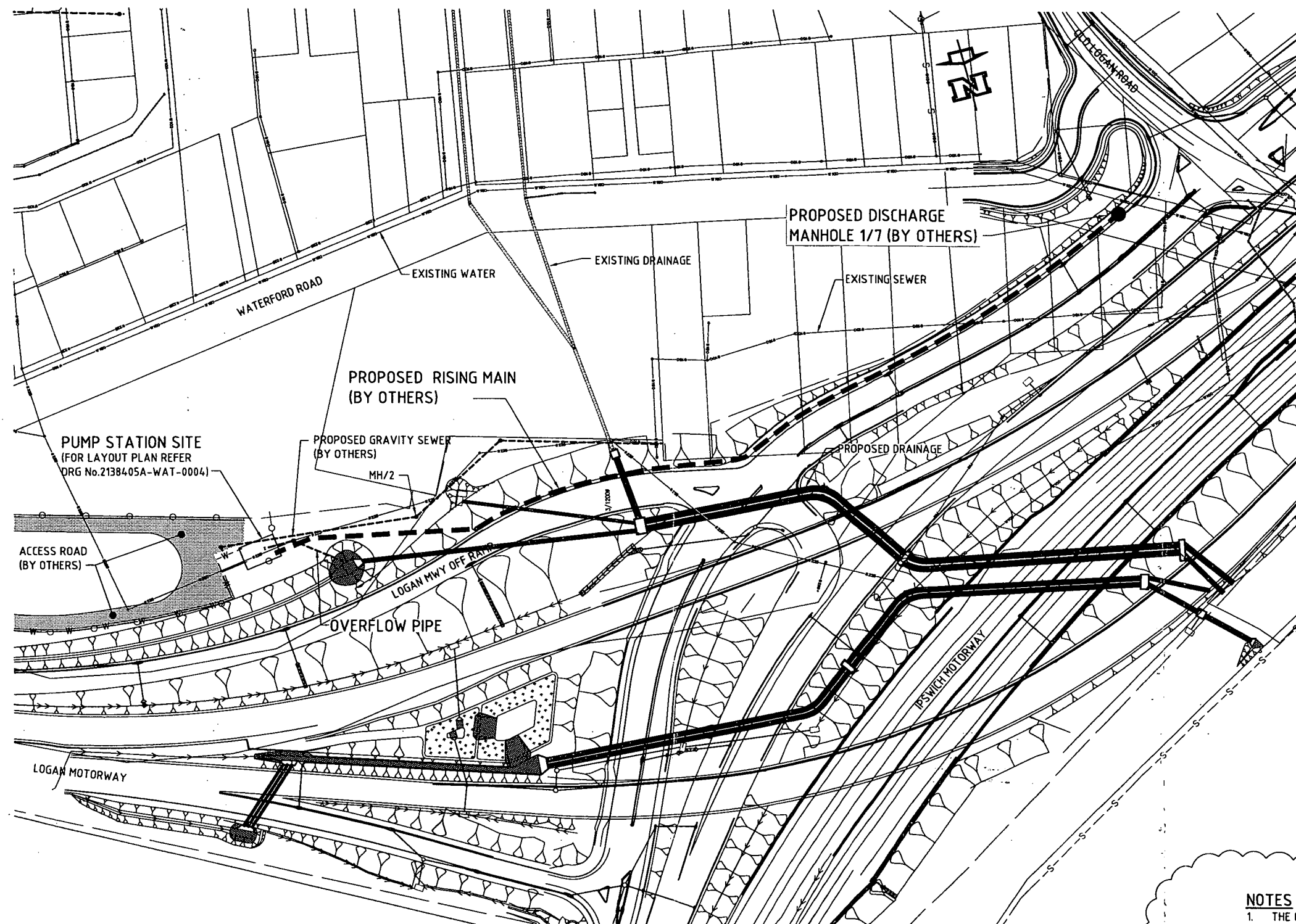
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CLIENT**PROJECT**

IPSWICH / LOGAN INTERCHANGE
SEWAGE PUMP STATION
NOTES

PROJECT No. 2138405A DISCIPLINE - WAT NUMBER 0002 REV. 3

2138405A-WAT-0003



PLAN
SCALE 1:1000

NOTES

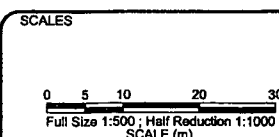
1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFIRMING THE FINAL LOCATION AND ALIGNMENTS OF ALL PROPOSED GRAVITY SEWERS AND RISING MAINS WITH THE SUPERINTENDENT PRIOR TO COMMENCEMENT OF WORKS.

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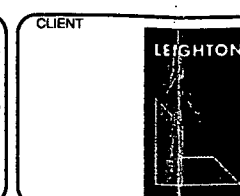
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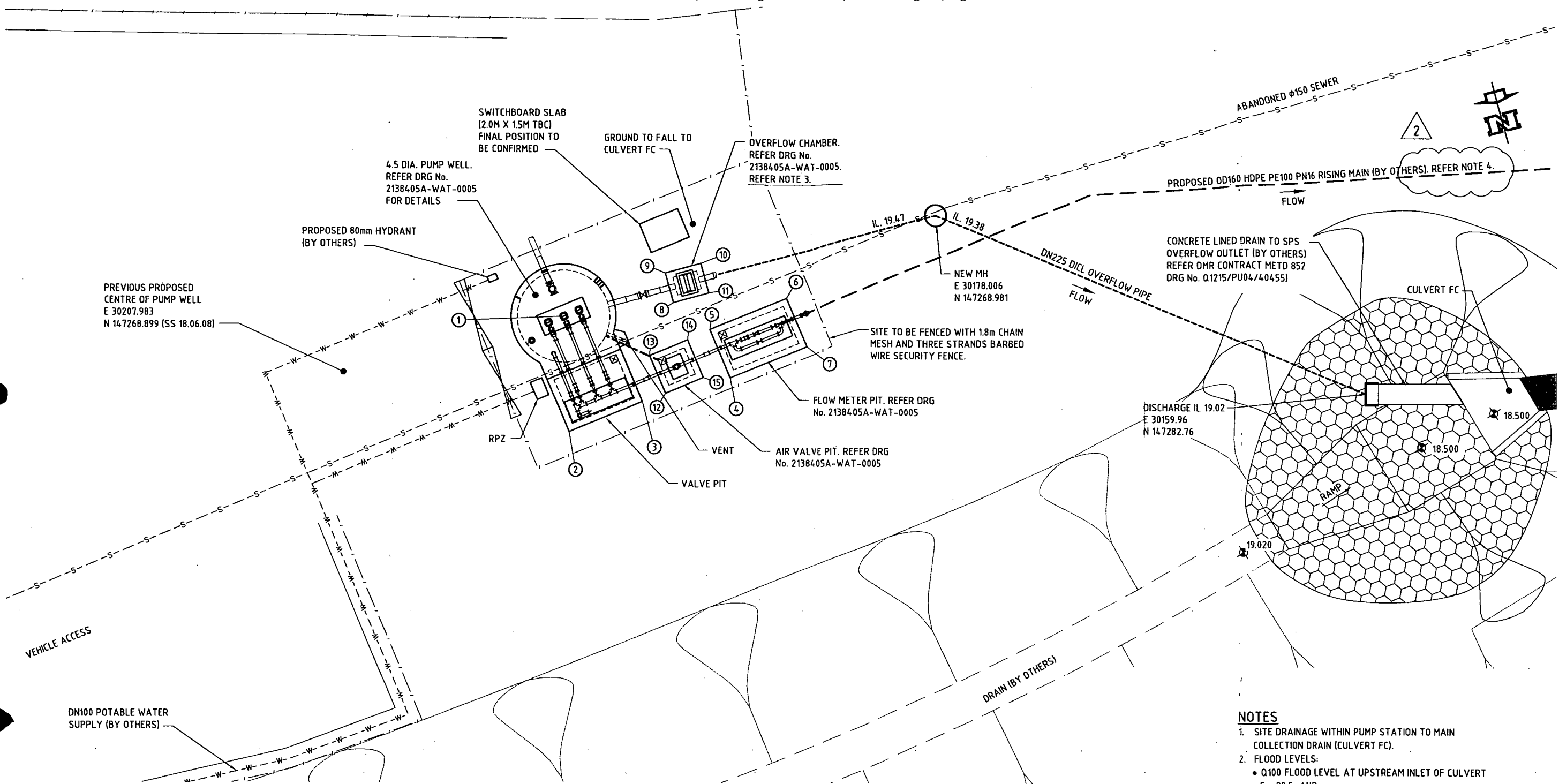
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PROJECT			
IPSWICH / LOGAN INTERCHANGE			
SEWAGE PUMP STATION GENERAL ARRANGEMENT			
PROJECT No. 2138405A	DISCIPLINE - WAT -	NUMBER 0003	REV. 3

2138405A-WAT-0004



SETOUT TABLE

IDENTIFIER	EASTINGS	NORTHINGS	RL	DESCRIPTION
1	30195.318	147270.590	22.19	CENTRE OF WET WELL
2	30196.561	147276.084	22.19	CORNER VALVE PIT
3	30192.717	147275.569	22.19	CORNER VALVE PIT
4	30188.274	147275.590	22.18	CORNER FLOW METER PIT
5	30188.618	147273.034	22.18	CORNER FLOW METER PIT
6	30184.610	147272.495	22.18	CORNER FLOW METER PIT
7	30184.267	147275.052	22.18	CORNER FLOW METER PIT
8	30189.994	147271.288	22.17	CORNER OVERFLOW CHAMBER
9	30189.960	147269.786	22.17	CORNER OVERFLOW CHAMBER
10	30188.161	147269.797	22.17	CORNER OVERFLOW CHAMBER
11	30188.199	147271.278	22.17	CORNER OVERFLOW CHAMBER
12	30191.547	147275.476	22.18	CORNER AIR VALVE PIT
13	30191.810	147273.498	22.18	CORNER AIR VALVE PIT
14	30189.817	147273.217	22.18	CORNER AIR VALVE PIT
15	30189.549	147275.206	22.18	CORNER AIR VALVE PIT

NOTES

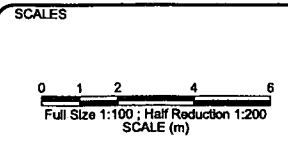
- SITE DRAINAGE WITHIN PUMP STATION TO MAIN COLLECTION DRAIN (CULVERT FC).
- FLOOD LEVELS:
 - Q100 FLOOD LEVEL AT UPSTREAM INLET OF CULVERT F = 20.5m AHD.
 - Q50 FLOOD LEVEL = 19.5m AHD.
- OVERFLOW CHAMBER HAS MOVED DUE TO CHANGE IN PUMP STATION LOCATION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFIRMING THE FINAL LOCATION AND ALIGNMENTS OF ALL PROPOSED GRAVITY SEWERS AND RISING MAINS WITH THE SUPERINTENDENT PRIOR TO COMMENCEMENT OF WORKS.

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C	27.06.08	PRELIMINARY ISSUE - PUMP STN MOVED	MN	AD	AD	
1	3.06.08	ISSUE FOR CONSTRUCTION	MN	AD	AD	

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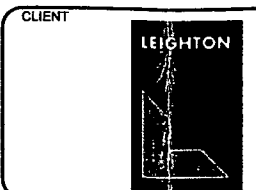
MR K. WAITS
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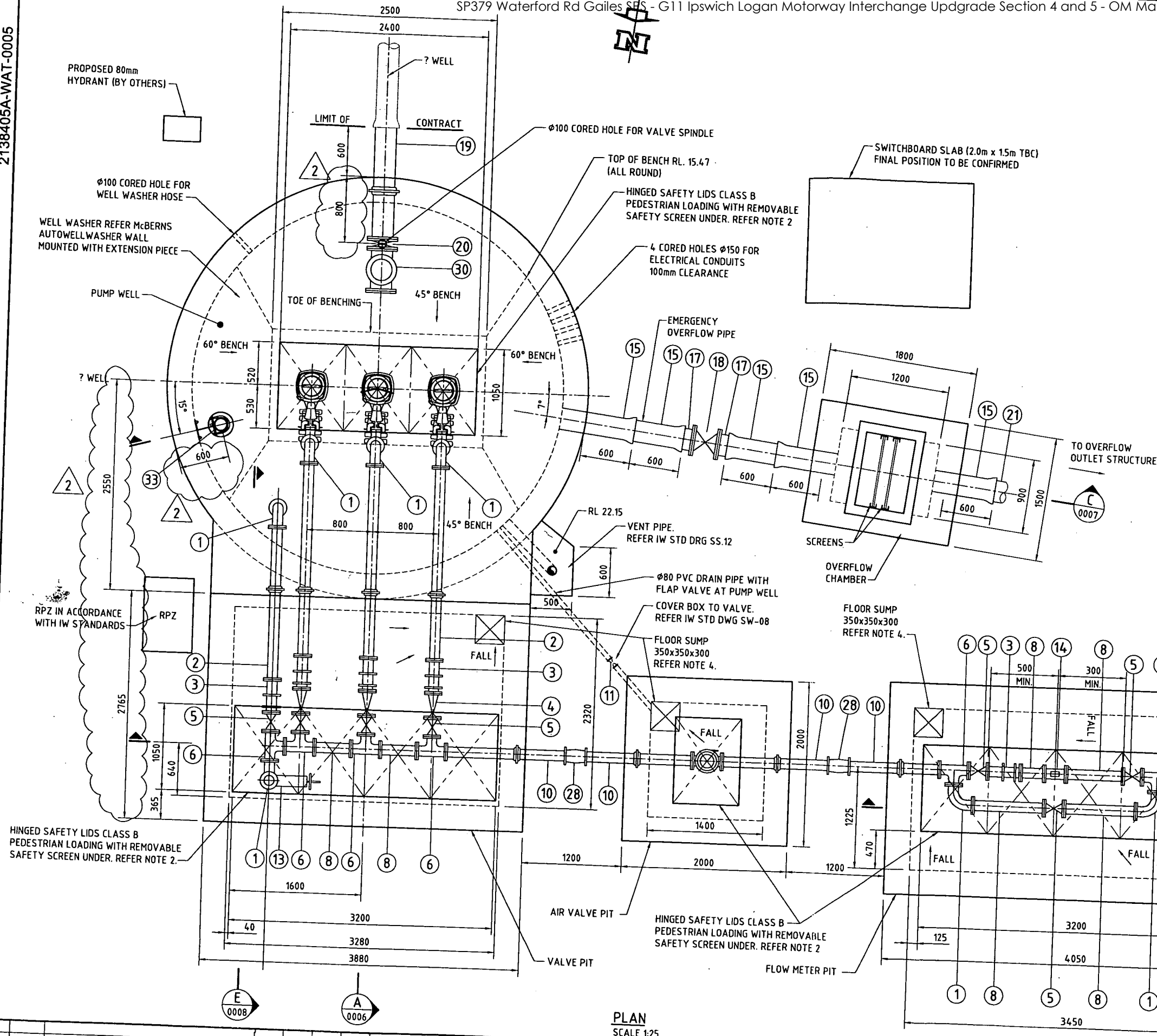
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PROJECT			
IPSWICH / LOGAN INTERCHANGE			
SEWAGE PUMP STATION SITE LAYOUT			
PROJECT No.	DISCIPLINE	NUMBER	REV.
2138405A	- WAT	0004	3

ITEM	QTY	DESCRIPTION
1	7	DN100 FL-FL 90° BEND DCL
2	5	DN100 FL-FL PIPE DCL WITH PUDDLE FLANGE
3	5	DN100 DISMANTLING JOINT
4	4	DN100 CHECK VALVE
5	7	DN100 SLUICE VALVE RESILIENT SEATED FL - FL
6	7	DN100 FL-FL TEE DCL
7	1	DN150 BAUER COUPLING MALE WITH FLANGE AND FEMALE PLUG
8	9	DN100 FL-FL PIPE DCL CUT TO SUIT
9	1	VENT-O-MAT AIR VALVE MODEL 050RGXv-1611
10	4	DN100 FL-SP PIPE DCL WITH PUDDLE FLANGE
11	1	DN80 SLUICE VALVE RESILIENT SEATED SP - SP
12	-	-
13	1	DN100 STAINLESS STEEL KNIFE GATE VALVE
14	1	DN100 ELECTROMAGNETIC FLOWMETER - ALIAMAG MODEL AMF900 SERIES OR ABB MAGMASTER, OR APPROVED EQUIVALENT
15	5	DN225 SC-SP PIPE DCL
16	2	DN225 HARDIE-KING FLAP VALVE OR APPROVED EQUIVALENT
17	2	DN225 FL-SP CONNECTOR DCL
18	1	DN225 SLUICE VALVE RESILIENT SEATED FL-FL
19	1	DN225 FL-SP PIPE DCL WITH PUDDLE FLANGE
20	1	DN225 STAINLESS STEEL KNIFE GATE VALVE FL-FL
21	35m (APPROX)	DN225 SC-SP PIPE DCL
22	1	DN100 BLANK FL
23	1	DN100 FL-SP PIPE DCL
24	1	DN100 SS316 FLANGE SPECIAL WITH 50mm BSP MALE CONNECTION
25	3	FLYGT SUBMERSIBLE PUMP NP3153.181 SH 11kW. 169mm Dia IMPELLER
26	3	DUCKFOOT BEND
27	1	DN100-DN150 TAPER CONCENTRIC DCL
28	2	DN100 VARI-GIB COUPLING
29	1	50mm BALL VALVE BSP FEMALE ENDS
30	1	DN225 FL CROSS DCL
31	1	DN225 BLANK FLANGE
32	1	DN225 FL-SP PIPE DCL
33	1	DN160 PE100 PN16 HDPE PIPE



1. WATER TABLE LEVEL TO BE DETERMINED
2. REFER MCBERNS SAFETY LID WITH SAFETY GRATE OR APPROVED EQUIVALENT
3. LEVEL INSTRUMENTATION CABLE AND ATTACHMENTS NOT SHOWN
4. SUMP DIMENSIONS BASED ON GRUNDFOS AP50 2" SUBMERSIBLE PUMP.
5. DN225 PIPEWORK SHALL BE D1CL PN35 RRJ.

AS CONSTRUCTED

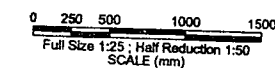
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PLAN
SCALE 1:25

SCALES



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CLIENT



LEIGHTON

PROJECT

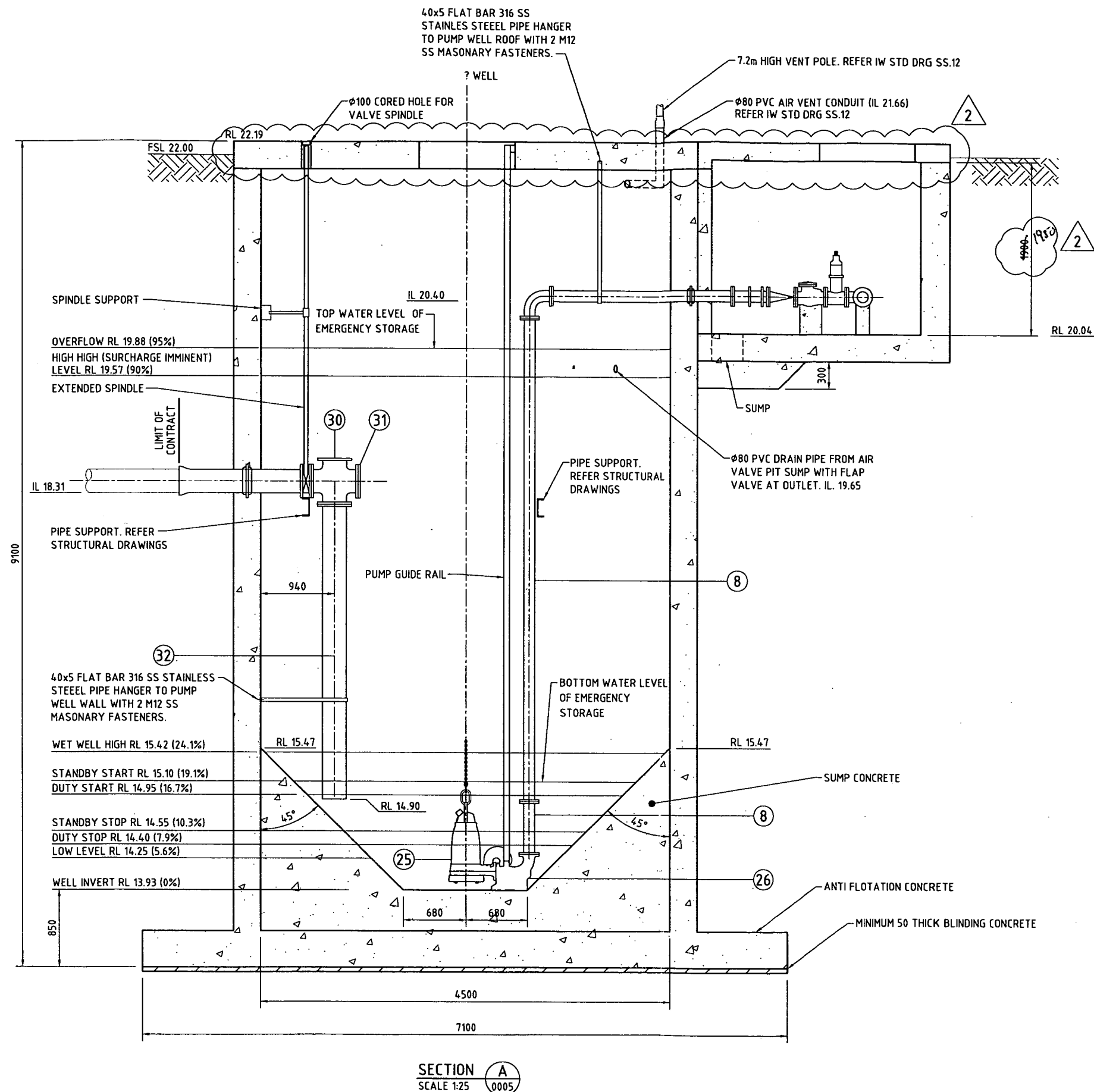
IPSWICH / LOGAN INTERCHANGE

SEWAGE PUMP STATION

PUMP WELL VALVE PIT & OVERFLOW

PROJECT No. 2138405A DISCIPLINE IAWAT Page 180 of 182

EV.
3



NOTES

1. ALL LEVELS TO mAHD.
2. FOR ITEM SCHEDULE REFER DRG No. 2138405A-WAT-0005.

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REV	DATE	DESCRIPTION	DRAWN	CHECK	DESIGN	VERIFY
2	20.08.08	ISSUE FOR CONSTRUCTION	MN	AD	AD	DRK
E	03.07.08	PRELIMINARY ISSUE - PUMP STN MOVED	AC	AD	AD	
D	03.07.08	PRELIMINARY ISSUE - PUMP STN MOVED	AC	AD	AD	
C	27.06.08	PRELIMINARY ISSUE - PUMP STN MOVED	MN	AD	AD	DRK
2	11.06.08	ISSUE FOR CONSTRUCTION - LEVEL ADDED	MN	AD	AD	
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SCALES

0 250 500 1000 1500
Full Size 1:25; Half Reduction 1:50
SCALE (mm)

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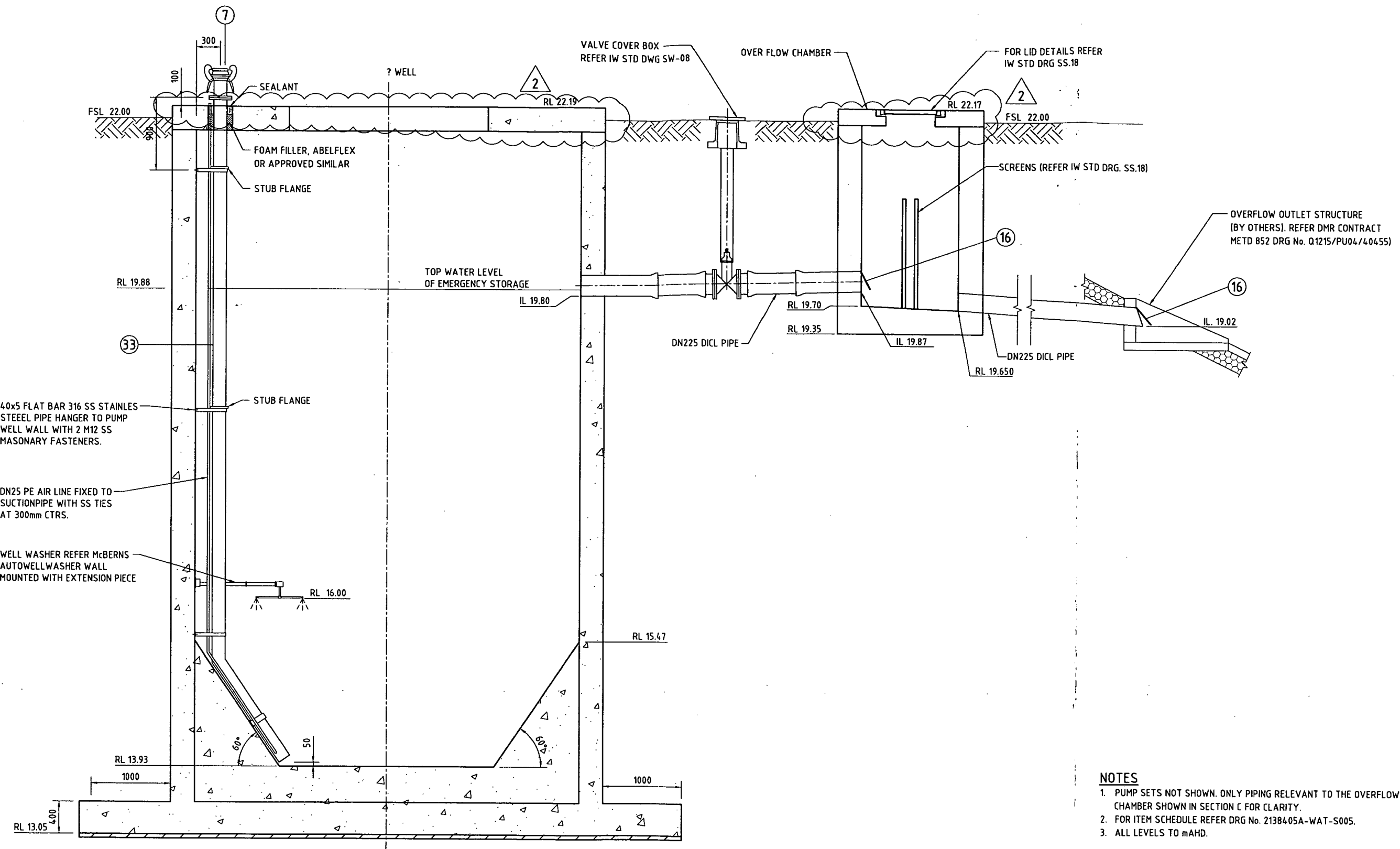
PROJECT

IPSWICH / LOGAN INTERCHANGE

SEWAGE PUMP STATION
PUMP WELL & VALVE PIT
SECTIONSPROJECT No.
2138405ADISCIPLINE
- WAT -NUMBER
0006REV.
3

2138405A-WAT-0007

100mm AT FULL SIZE



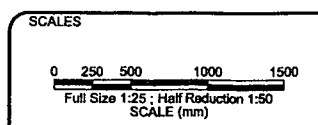
SECTION C
SCALE 1:25

- NOTES**
1. PUMP SETS NOT SHOWN. ONLY PIPING RELEVANT TO THE OVERFLOW CHAMBER SHOWN IN SECTION C FOR CLARITY.
 2. FOR ITEM SCHEDULE REFER DRG No. 2138405A-WAT-S005.
 3. ALL LEVELS TO mAHd.

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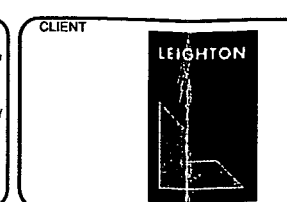
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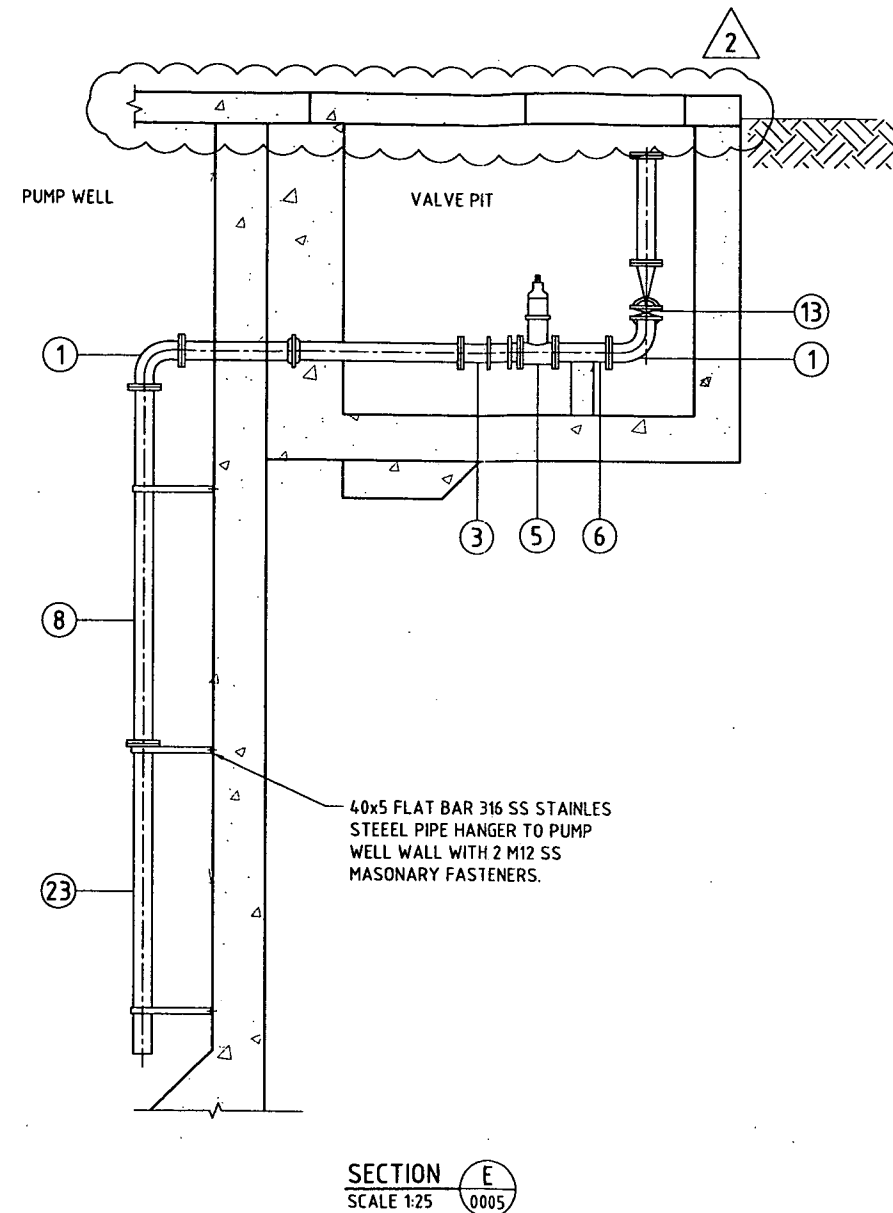
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PROJECT			
IPSWICH / LOGAN INTERCHANGE			
SEWAGE PUMP STATION PUMP WELL & OVERFLOW SECTIONS			
SHEET 1 OF 2			
PROJECT No.	DISCIPLINE	NUMBER	REV.
2138405A	- WAT	0007	3

2138405A-WAT-0008



NOTES

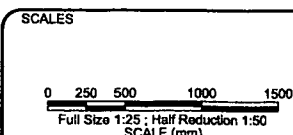
1. ALL LEVELS TO mAHD
2. FOR ITEM SCHEDULE REFER DRG No. 2138405A-WAT-S005.

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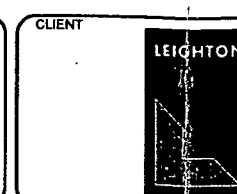
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SIGNED **MR K. WATTS**
DATE **18/11/09**
RPEQ No. **6850**

PARSONS BRINCKERHOFF

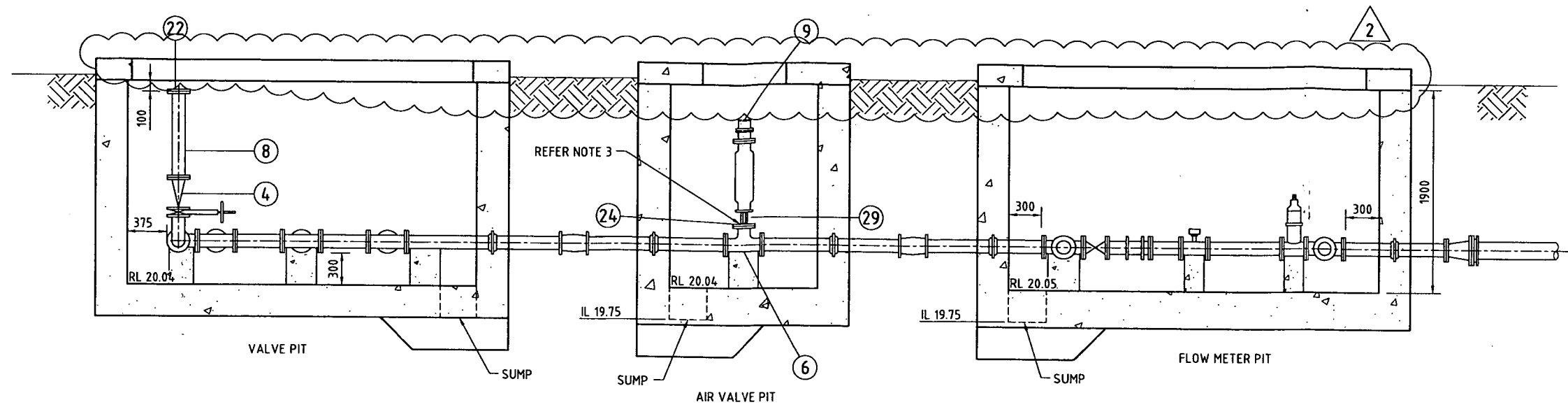
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Brisbane QLD 4001
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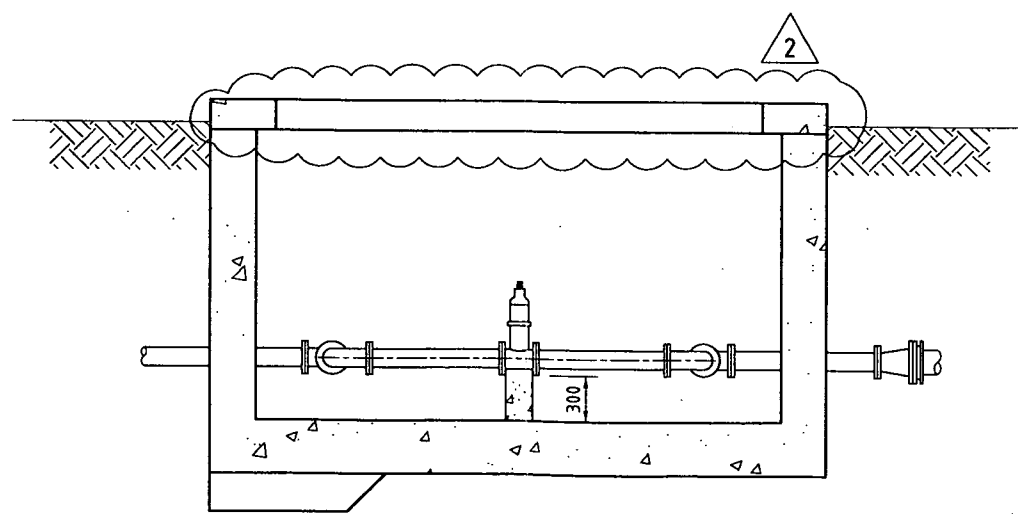


PROJECT			
IPSWICH / LOGAN INTERCHANGE			
SEWAGE PUMP STATION PUMP WELL & OVERFLOW SECTIONS			
SHEET 2 OF 2			
PROJECT No.	DISCIPLINE	NUMBER	REV.
2138405A	- WAT	0008	3

2138405A-WAT-0009



SECTION B
SCALE 1:25
0005



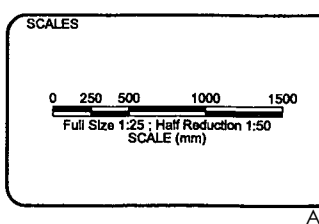
SECTION D
SCALE 1:25
0005

- NOTES**
1. ALL LEVELS TO mAHd.
 2. FOR ITEM SCHEDULE REFER DRG No. 2138405A-WAT-S005.
 3. REFER WSA STANDARD DRAWING WAT-1313 FOR DETAILS OF INSULATED FLANGE JOINTS

AS CONSTRUCTED

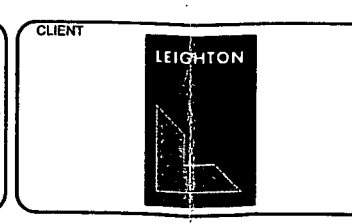
REV	DATE	DESCRIPTION	DRAWN	CHECK	DESIGN	VERIFY
3	17.11.09	AS CONSTRUCTED				
2	20.08.08	ISSUE FOR CONSTRUCTION	MN	AD	AD	DRK
A	27.06.08	PRELIMINARY ISSUE - PUMP STN MOVED	MN	AD	AD	

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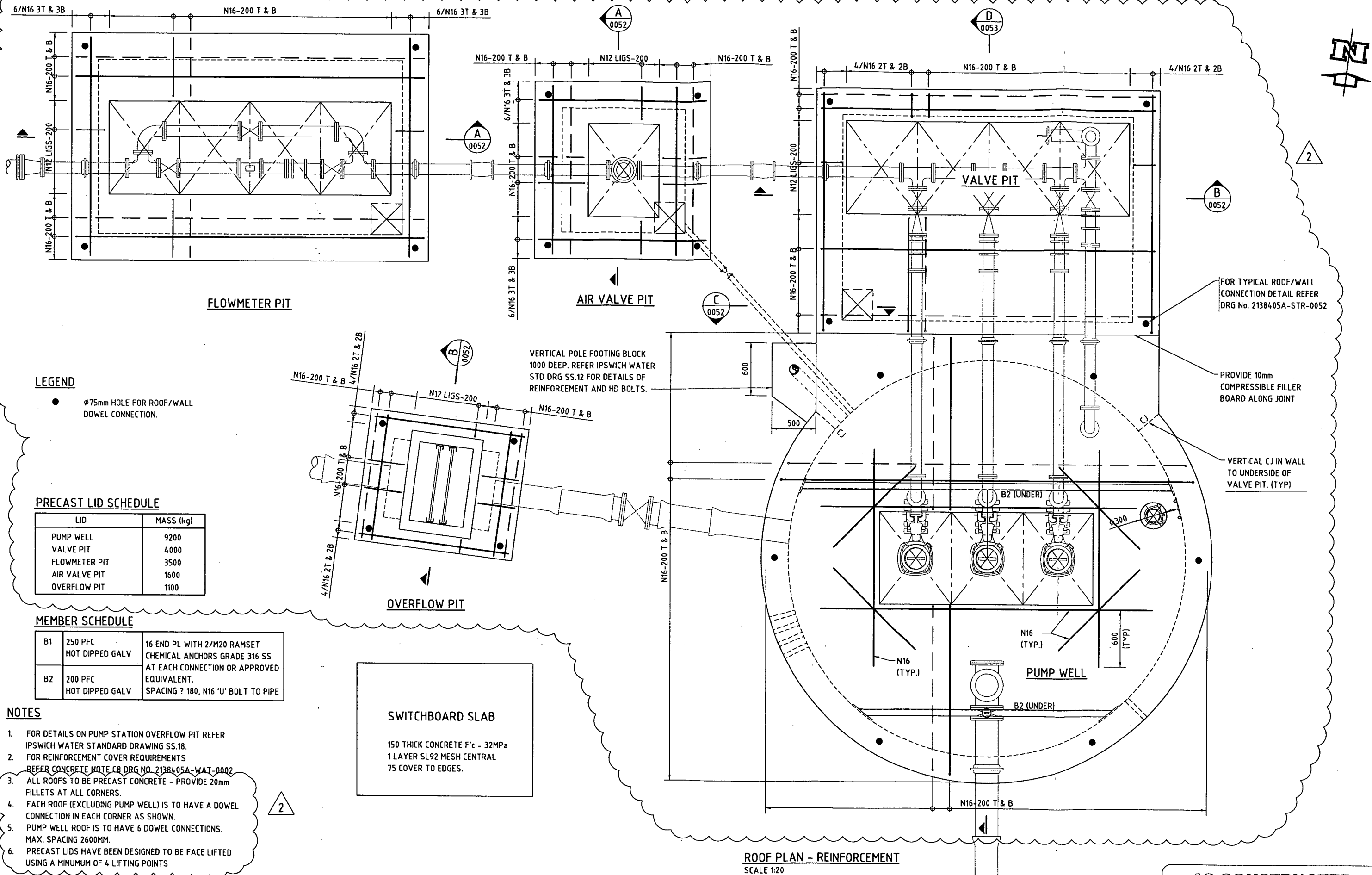


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SIGNED *MR K. WATTS*
18/11/09
DATE

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PROJECT			
IPSWICH / LOGAN INTERCHANGE			
SEWAGE PUMP STATION			
VALVE PIT			
SECTIONS			
PROJECT No.	DISCIPLINE	NUMBER	REV.
2138405A	- WAT	0009	3

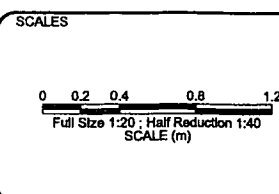


100mm AT FULL SIZE

REV	DATE	DESCRIPTION	DRAWN	CHECK	DESIGN	VERIFY
3	17.11.09	AS CONSTRUCTED				
2	20.08.08	ISSUE FOR CONSTRUCTION	MN	AA	AA	MS
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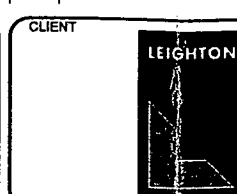
SIGNER: **MR K. J. JAMES**
DATE: **18/11/09**
RPEQ No. **6850**

PARSONS BRINCKERHOFF

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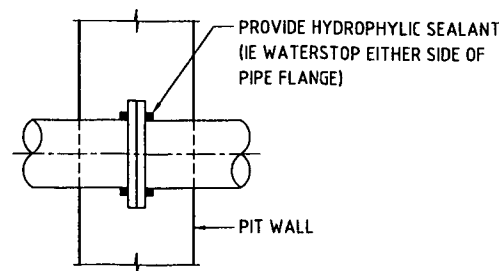


PROJECT			
IPSWICH / LOGAN INTERCHANGE			
SEWAGE PUMP STATION PUMP WELL, FLOWMETER AND VALVE PIT ROOF REINFORCEMENT			
PROJECT No. 2138405A	DISCIPLINE - STR	NUMBER 0051	REV. 3



SECTION A
SCALE 1:10 0051


SECTION B
SCALE 1:10 0051



TYPICAL ROOF/WALL
CONNECTION DETAIL
SCALE 1:10

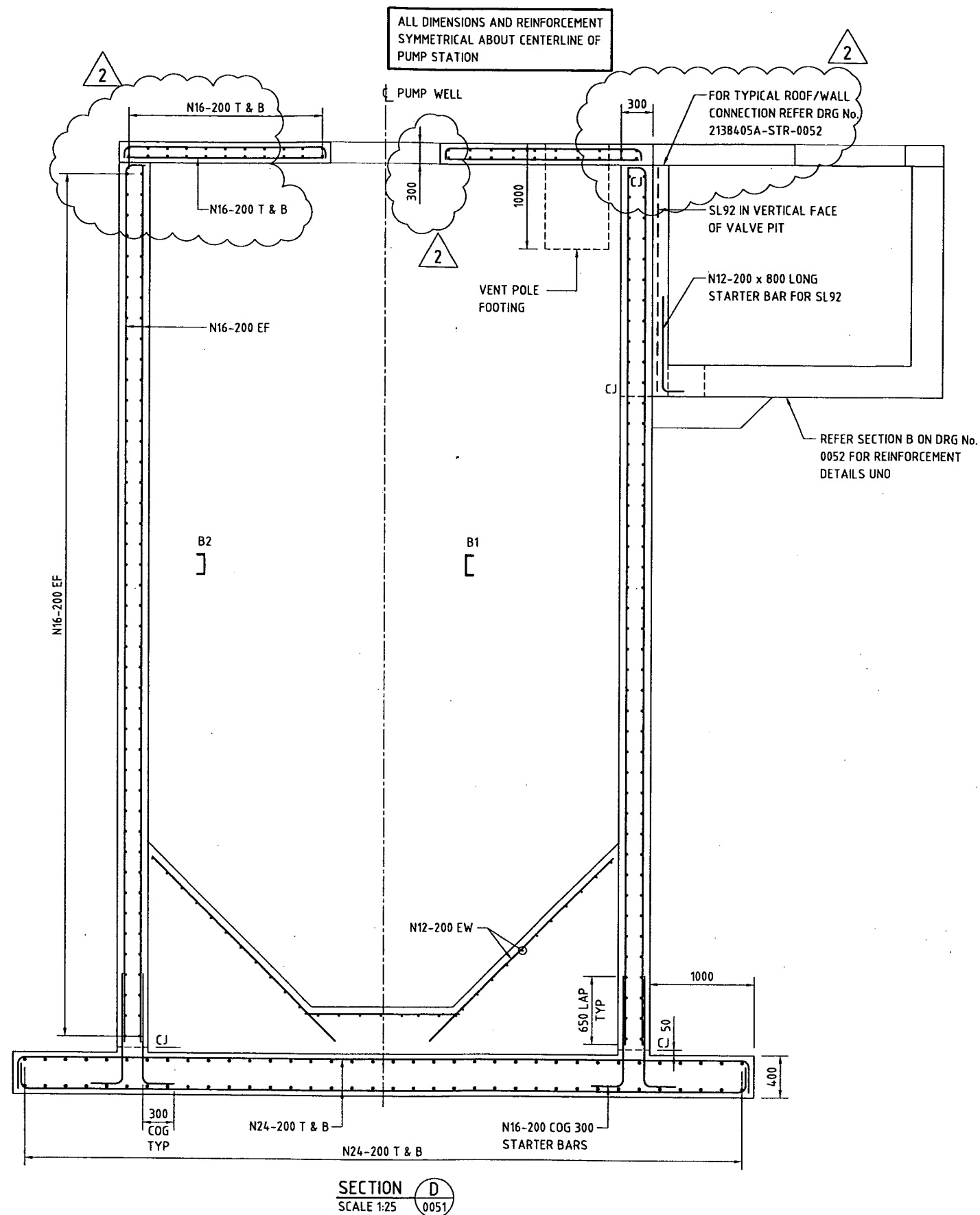
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REFER CONCRETE NOTE C8 DRG No. 2138405A-WAT-0002

SECTION C
SCALE 1:10 0051

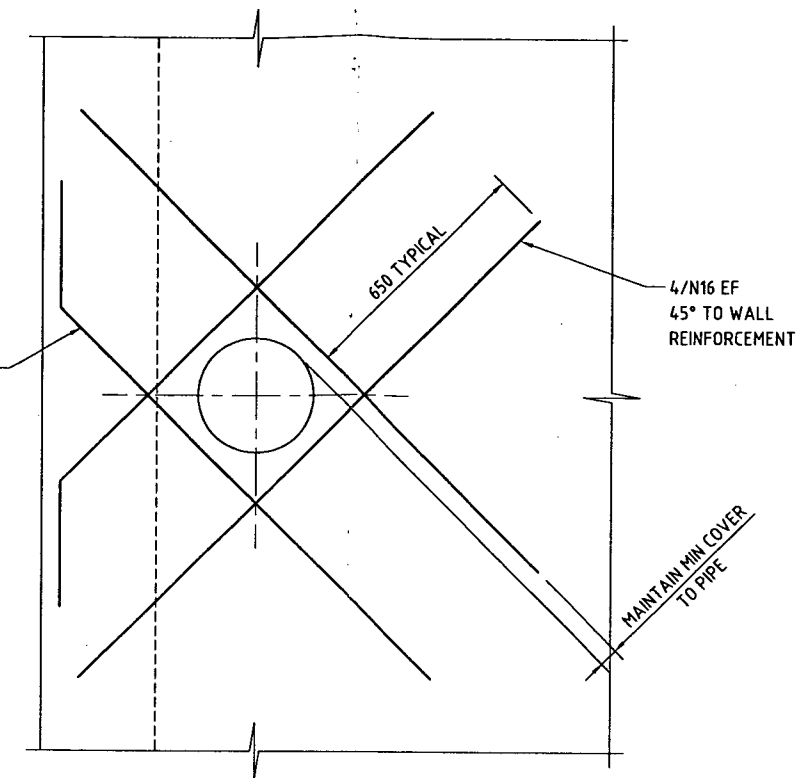
CLIENT		PROJECT	IPSWICH / LOGAN INTERCHANGE		
		SEWAGE PUMP STATION FLOWMETER PIT, VALVE PIT AND SUMP REINFORCEMENT DETAILS			
		PROJECT No.	DISCIPLINE	NUMBER	REV.
		2138405A	- STR -	0052	3

AS CONSTRUCTED

2138405A-STR-0053



BEND REINFORCEMENT AS REQUIRED AT WALL JUNCTION



TYPICAL WALL PENETRATION DETAIL
ROOF PENETRATION SIMILAR
SCALE 1:10

NOTES:

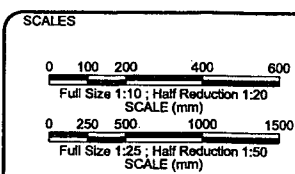
- FOR REINFORCEMENT REQUIREMENTS
REFER CONCRETE NOTE C8 DRG No. 2138405A-WAT-0002

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REV	DATE	DESCRIPTION	DRAWN	CHECK	DESIGN	VERIFY
3	17.11.09	AS CONSTRUCTED				
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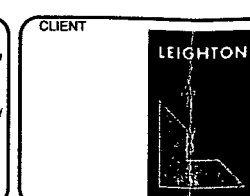
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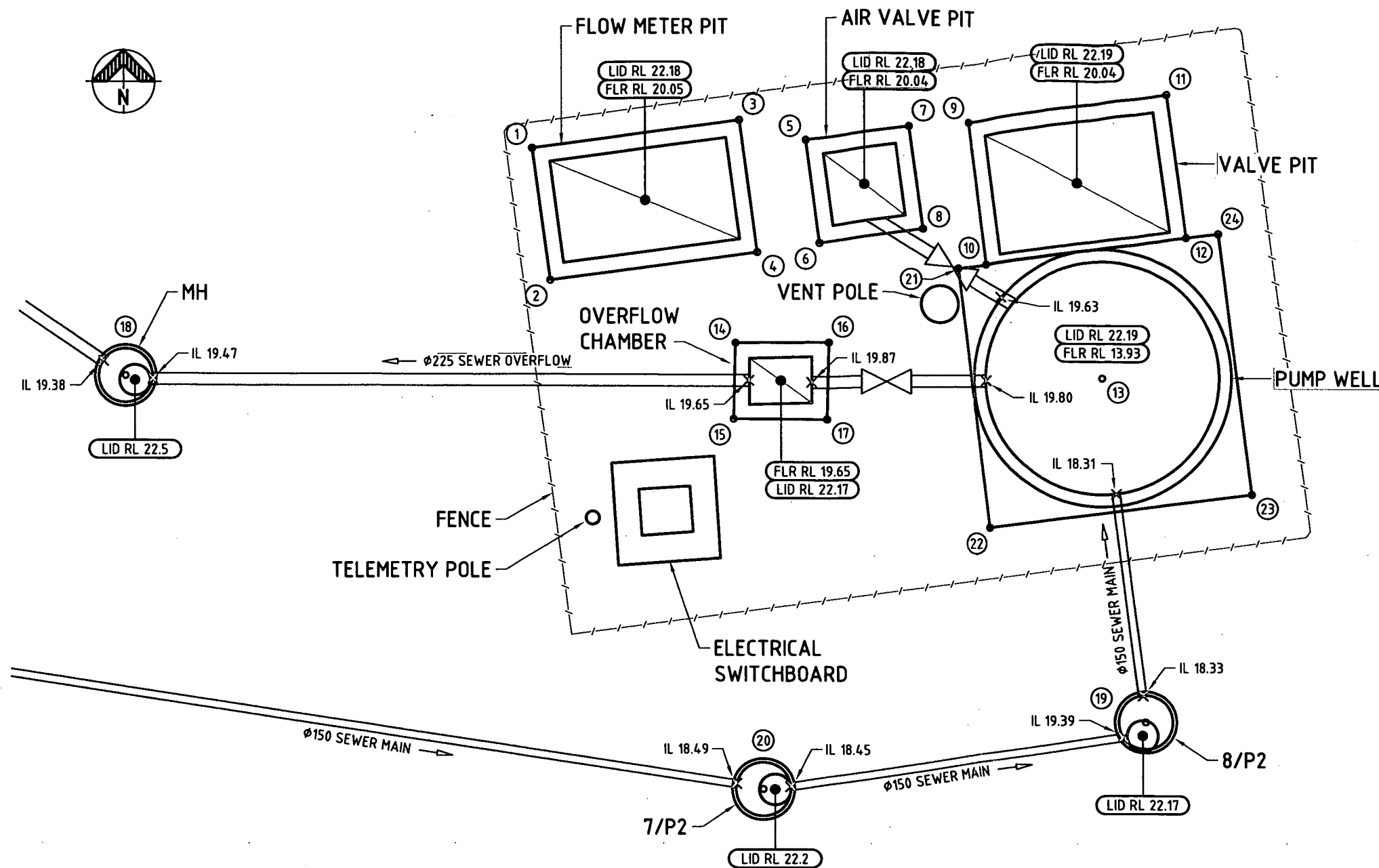
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PROJECT	DISCIPLINE	NUMBER	REV.
IPSWICH / LOGAN INTERCHANGE	STR	0053	3
SEWAGE PUMP STATION PUMP WELL REINFORCEMENT DETAILS			
PROJECT No. 2138405A			



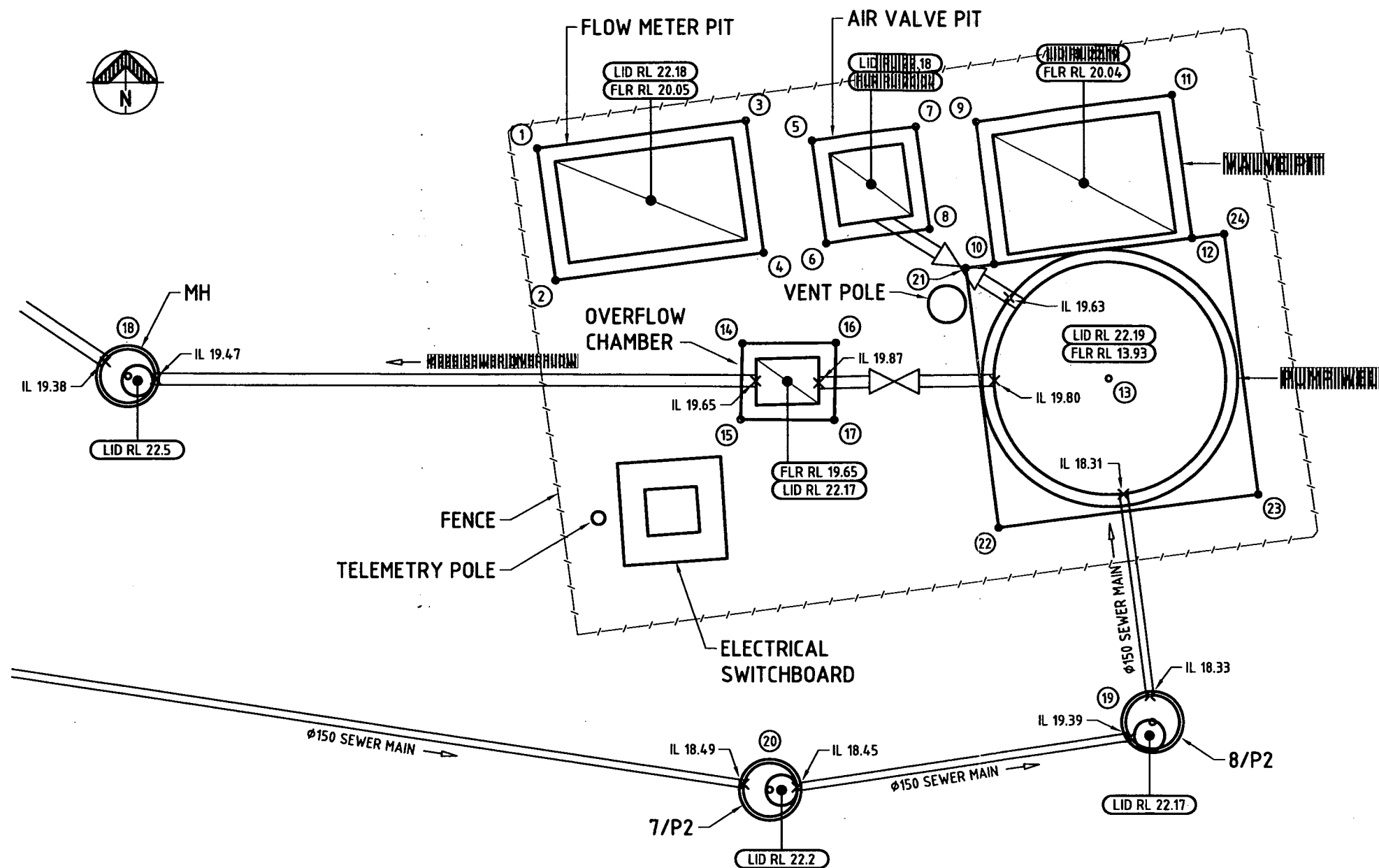
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1	30184.267	147275.052	CNR OF FLOW PIT
2	30184.610	147272.495	CNR OF FLOW PIT
3	30188.274	147275.590	CNR OF FLOW PIT
4	30188.618	147273.034	CNR OF FLOW PIT
5	30189.549	147275.206	CNR OF AIR VALVE PIT
6	30189.817	147273.217	CNR OF AIR VALVE PIT
7	30191.547	147275.476	CNR OF AIR VALVE PIT
8	30191.810	147273.498	CNR OF AIR VALVE PIT
9	30192.717	147275.569	CNR OF VALVE PIT
10	30193.072	147272.819	CNR OF VALVE PIT
11	30196.561	147276.084	CNR OF VALVE PIT
12	30196.936	147273.310	CNR OF VALVE PIT
13	30195.318	147270.590	CEN OF PUMP WELL
14	30188.199	147271.278	CNR OF OVER FLOW PIT
15	30188.161	147269.797	CNR OF OVER FLOW PIT
16	30189.994	147271.288	CNR OF OVER FLOW PIT
17	30189.960	147269.786	CNR OF OVER FLOW PIT
18	30176.358	147270.634	CEN OF MANHOLE
19	30196.145	147263.913	CEN OF MANHOLE
20	30188.723	147262.597	CEN OF MANHOLE
21	30192.502	147272.738	PUMP WELL LID
22	30193.146	147267.689	PUMP WELL LID
23	30198.205	147268.334	PUMP WELL LID
24	30197.561	147273.388	PUMP WELL LID

NOTE: DATUM VERTICAL - AHD
DATUM HORIZONTAL - MAIN ROADS IPSWICH MWY

LAYOUT PLAN
SCALE 1:100

0 0.5 1.0 1.5 2.0 2.5m
Scale 1:100 - A3

A FOR GENERAL USE REVISIONS DRAWN DATE	LEIGHTON 	LEIGHTON CONTRACTORS P/L LEVEL 3, 143 CORONATION DR MILTON QLD 4064 www.leightoncontractors.com.au	PROJECT IPSWICH / LOGAN MOTORWAYS INTERCHANGE UPGRADE	JOB SEWER PUMP STATION AS CONSTRUCTED LAYOUT & LEVELS TITLE LAYOUT PLAN	Drawn: LL	Drawing No. 1053-C1	A
					Checked: AC	Date 24/7/09	




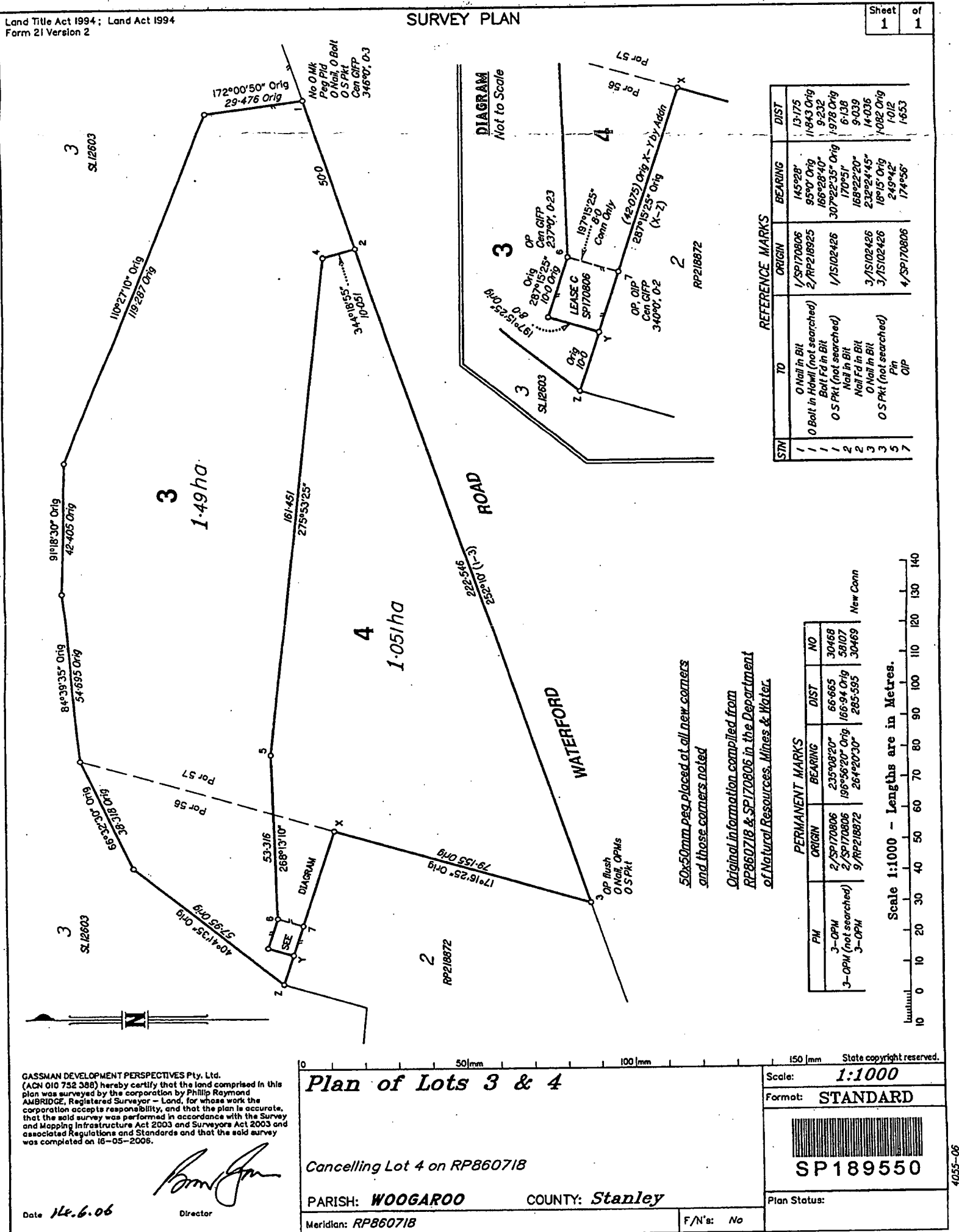
PUMP STATION AS-CON SURVEY			
POINT	EASTING	NORTHING	LOCATION
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2	30184.610	147272.495	CNR OF FLOW PIT
3	30188.274	147275.590	CNR OF FLOW PIT
4	30188.618	147273.034	CNR OF FLOW PIT
5	30189.549	147275.206	CNR OF AIR VALVE PIT
6	30189.817	147273.217	CNR OF AIR VALVE PIT
7	30191.547	147275.476	CNR OF AIR VALVE PIT
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23	30198.205	147268.334	PUMP WELL LID
24	30197.561	147273.388	PUMP WELL LID

NOTE: DATUM VERTICAL - AHD
DATUM HORIZONTAL - MAIN ROADS IPSWICH MWY

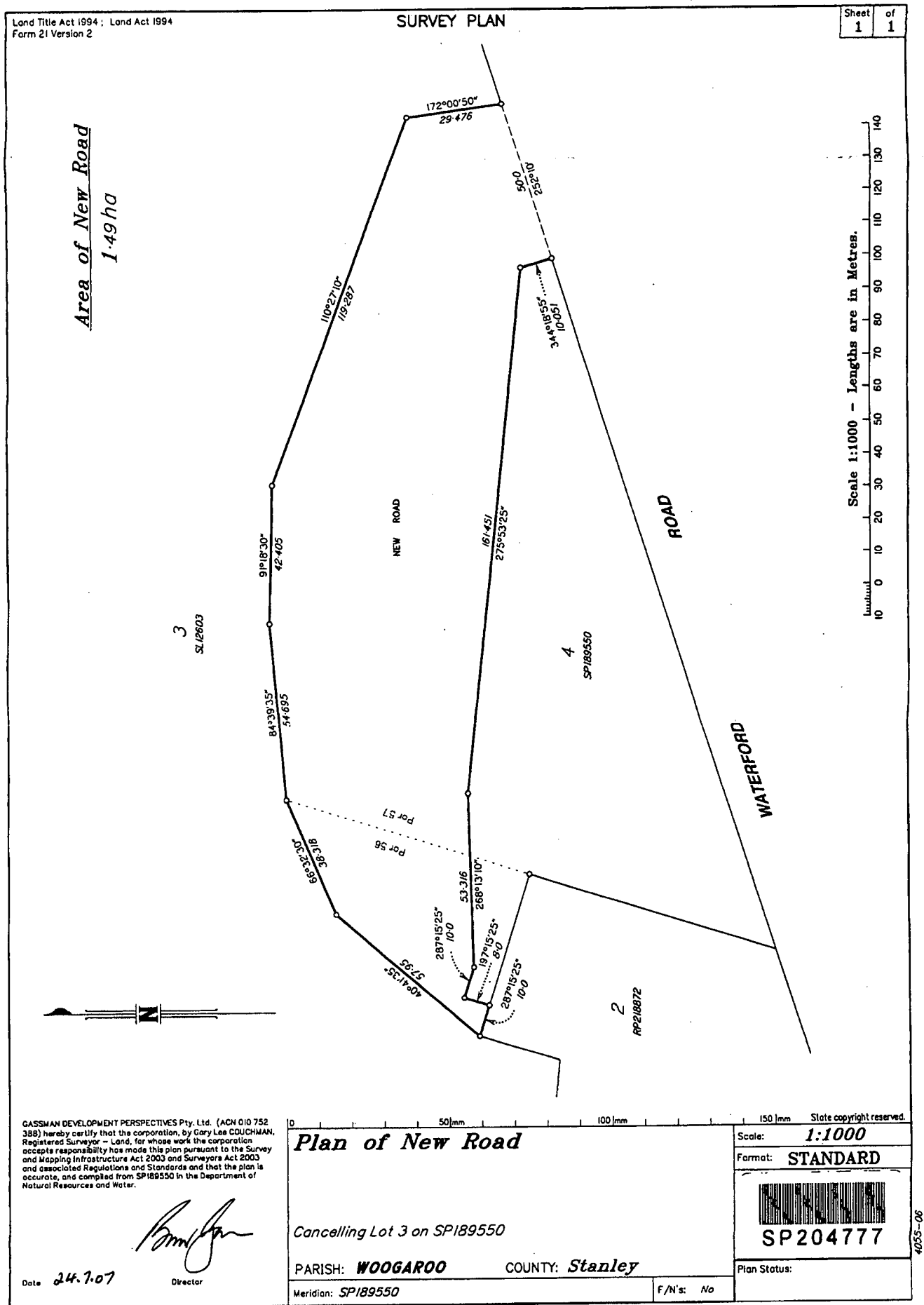
LAYOUT PLAN
SCALE 1:100

0 0.5 1.0 1.5 2.0 2.5m
Scale 1:100 - A3

					LEIGHTON CONTRACTORS P/L LEVEL 3, 143 CORONATION DR MILTON QLD 4064 www.leightoncontractors.com.au	PROJECT IPSWICH / LOGAN MOTORWAYS INTERCHANGE UPGRADE	JOB SEWER PUMP STATION AS CONSTRUCTED LAYOUT & LEVELS	Drawn: LL	Drawing No. 1053-C1	Revision A
								Checked: AC	Date 24/7/09	
A FOR GENERAL USE REVISIONS								LL DRAWN	24/7/09 DATE	



SP204777 V0 Page 1 of 2 Not To Scale



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