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ENVIRONMENTAL PROTECTION AUTHORITY

AERATION OF WONNERUP INLET

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1.0 BACKGROUND

During the summer months with low or zero fluvial flow, water levels in the Wonnerup Inlet fall. With no flushing of the inlet from the sea and continued evaporation, oxygen levels decline causing fish death.

It is proposed to aerate the water along parts of the inlet to help ameliorate this condition.

Fluid Equipment Company have successfully utilised fountain nozzles for the aeration of a dam containing trout. It is proposed to use the same technique for the Wannarup Inlet.

For details of location and fountain arrangement, refer to the attached drawing.

2.0 DESIGN CONSTRAINTS

After discussions with Mr Kevin McAlpine of the Environmental Protection Authority, it was decided to concentrate aeration on two reaches of the Inlet, a 500m length to the SW of the Vasse Floodgates and a 250m length to the NW of the floodgates. These two lengths of channel or "the cut" have a uniform width of approximately 40m and a summer depth of 500mm or less.

The following criteria were to be aimed for in the design:

1. A theoretical turnover rate of the treated volume of water of about once in five days
2. 8 hour pumping periods at night
3. Fountains not to cause excessive spray over the Geographe Bay Road
4. A "modular" design consisting of a pump plus one or more nozzles that could be repeated along the length of the cut.

MODULAR PUMP/SPRAY SYSTEM

The proposed modular system is based on a single pump, two nozzle assembly as shown on the drawing.

The assembly would serve a 50m length of channel of total volume 800m³ at a mean depth of 400mm. At a pumping rate of 6 litres per second, 37 hours of continual pumping would theoretically turnover the entire volume, equivalent to approximately 4 nine hour pumping periods.

3.1 Pump Assembly

The proposed pump tank assembly would be based on Fluid Equipment Company's Packaged Fibreglass Pumping Station.

As shown on the drawing a 900mm diameter tank would be installed close to the bank with a 250mm diameter intake pipe. The intake would be fitted with a screen.

The tank would be equipped with a single Flygt submersible M3102 Grinder Pump. This type of pump is recommended since it will pulp any long fibres passing the intake screen and prevent clogging of the nozzles.

The pump will supply a pair of NCA aeration nozzles situated approximately 25m either side of the pump station and at the channel centre line.

Control of the pump would be by exterior mounted switchgear fitted with time switch only.

Brochures describing the tank and pump are included at the end of this report.

4.0 INSTALLATION

Installation of the tank would be relatively straight forward if performed at a time when water levels were reduced.

Then tank needs to be bedded on sand with a surround of compacted sand.

The intake pipe and nozzles would be supported on jarrah piles driven into the channel bed.

An 'O' ring connection between the tank and intake pipe would allow for some relative movement.

Supply to the nozzles would be by flexible 75mm diameter polyethylene pipe, again allowing relative movement of the whole assembly.

Hydrostatic uplift pressures on the tank would be non-existent since water levels inside and outside the tank would be equal.

5.0

OPERATION

The aeration nozzles need to be kept at a fixed position relative to the water surface. Since the water surface level will continually reduce during the summer months, the nozzles will have to be progressively lowered.

Adjustment would be possible by releasing the clamp holding the nozzle to the jarra pile, the flexible polyethylene supply pipe allowing the nozzle to be lowered.

5.1

Maintenance

The system will need to be maintained regularly during the summer time operation period. Maintenance would be limited to:

(a) lowering the nozzle at periods determined by the rate of evaporation

(b) clearing of the intake screen

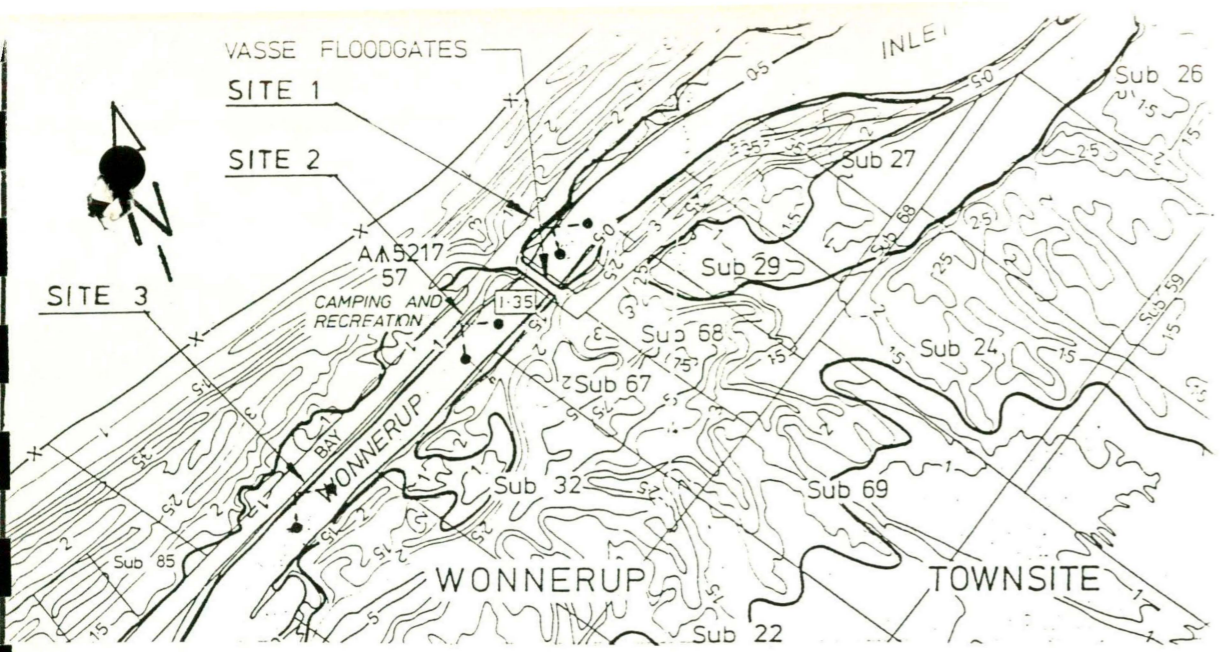
The pumps would also need servicing at six month intervals or after two seasons of use.

6.0

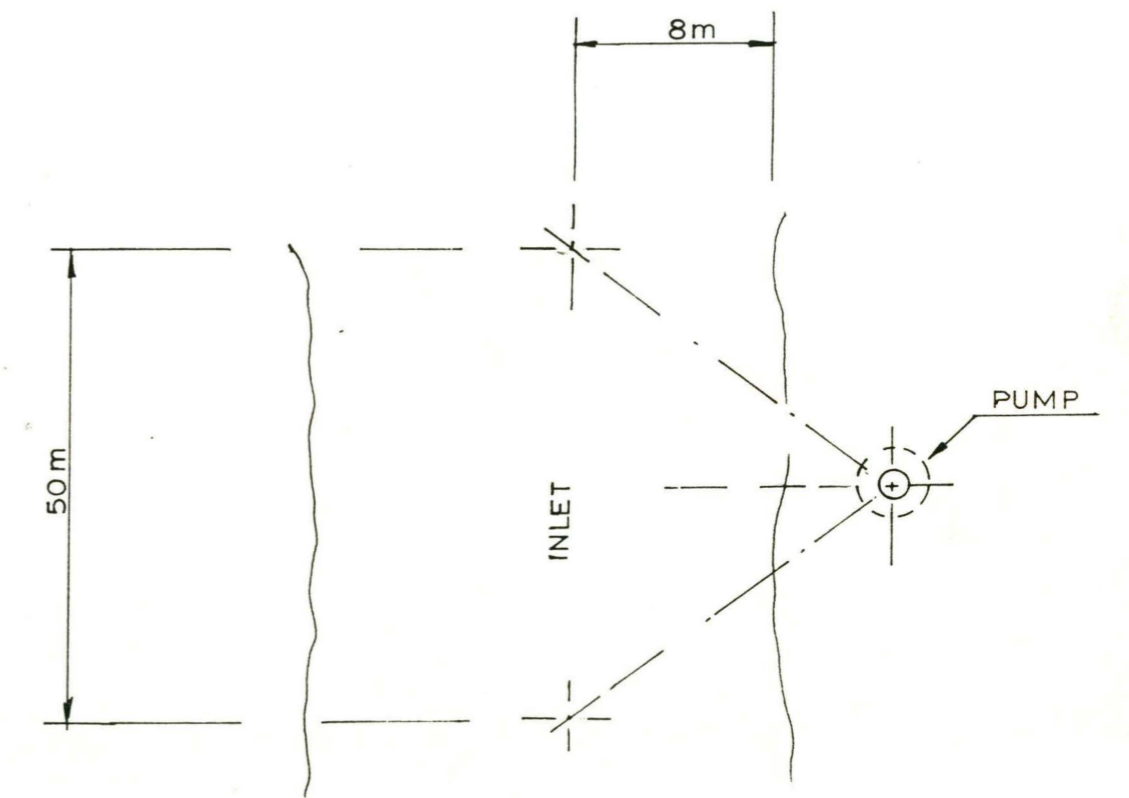
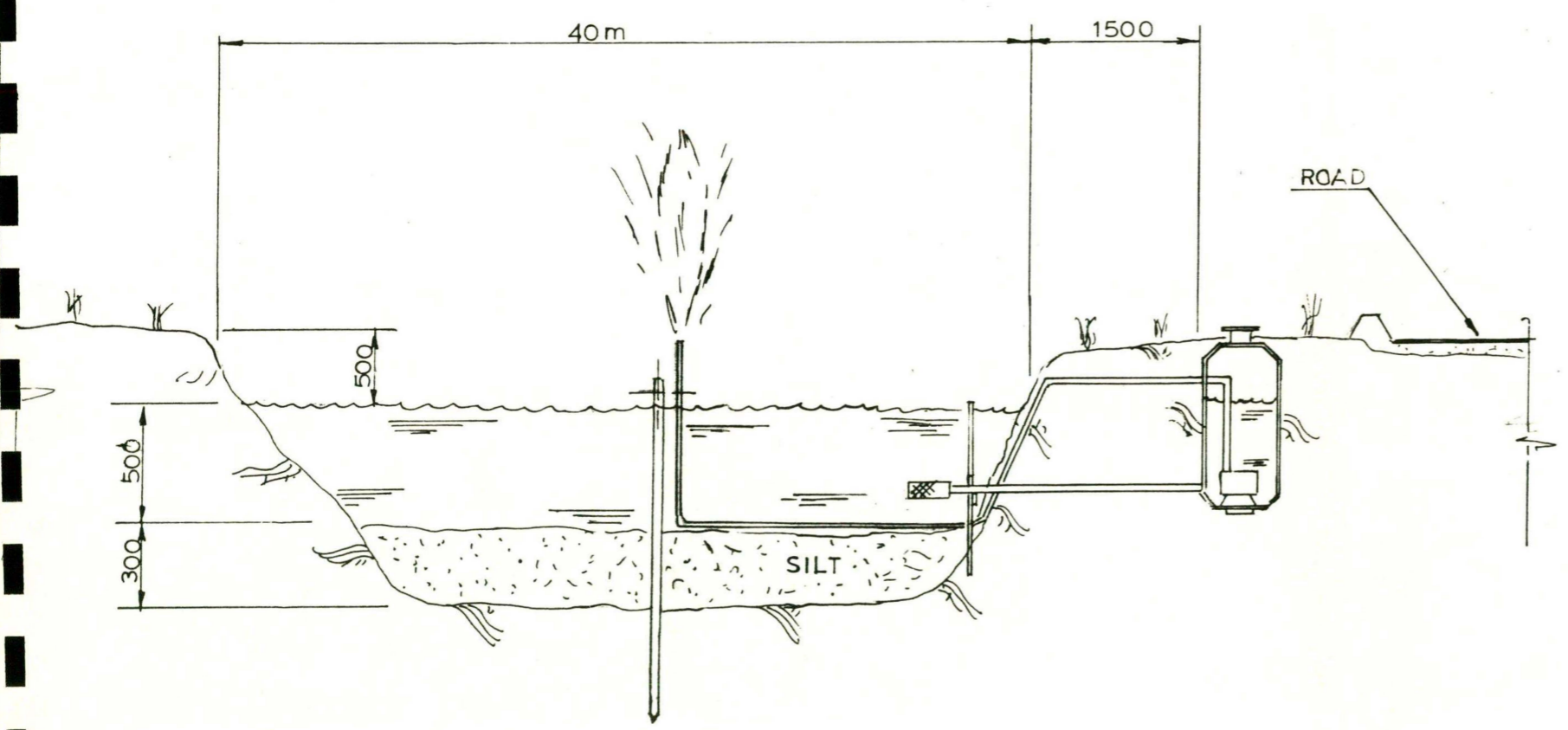
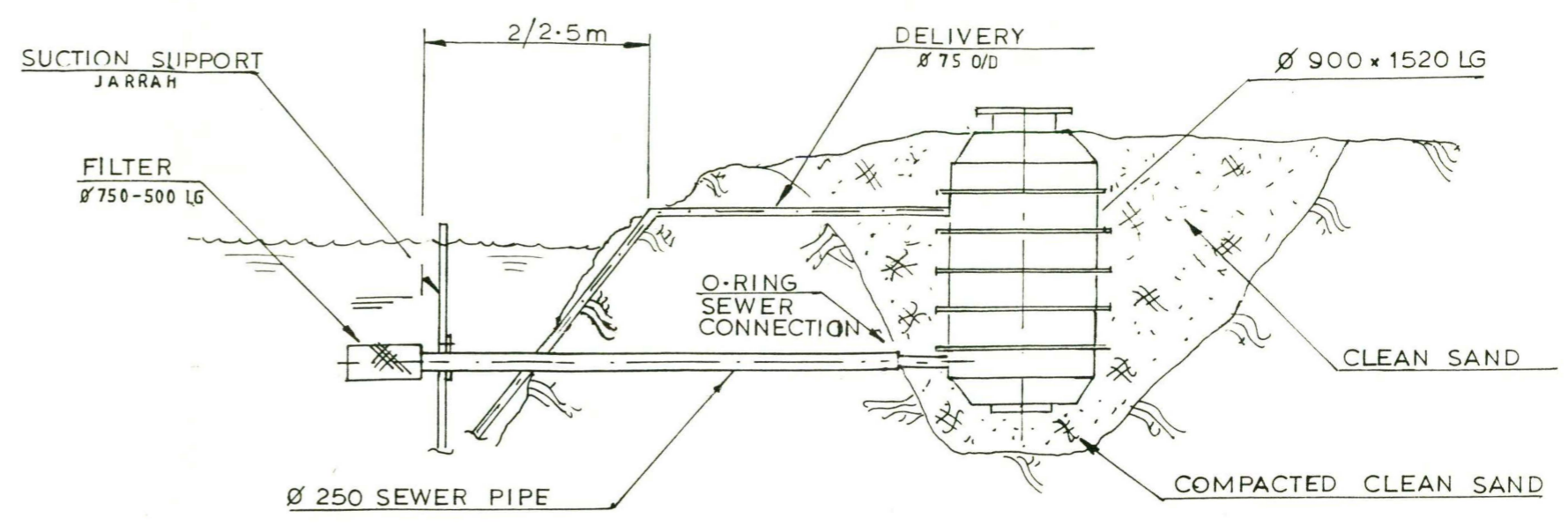
POSSIBLE INSTALLATIONS

The two nozzle module will theoretically aerate a 50m length of channel according to the criteria described in Section 1.

In terms of maintaining fish life during the summer months, aeration to a single 50m length may be sufficient. Alternatively, by placing the nozzles closer together, a local area of high aeration may be achieved which may be preferable.



SITE PLAN
N.T.S



Floquip

CLIENT		TITLE			
		WONNERUP INLET AERATION PROJECTION			
PROJEL	DRAWN	DATE	DRG NO.	REV	
	CHK D	1-2-55			
		SCALE	N.T.S		

FLUID EQUIPMENT COMPANY PTY. LTD.

FOUNTAINS AND WATER DISPLAYS

Fluid Equipment Company (FEC) specialises in the creative use of water for aesthetic and display purposes.

FEC can design, install and commission all sizes of water displays and fountains.

FEC are the State distributors of NCA Australia fountain equipment. NCA produce a wide variety of nozzles producing jets and sprays varying in height from a few centimetres to tens of metres, suitable for both inside and outside locations. Other equipment includes submersible lights, junction boxes, wind controllers to reduce fountain heights during windy conditions and water level controllers.

NCA equipment is manufactured in Australia from cast bronze with a design life of over fifty years. All submersible electrical components satisfy SEC design and operation standards.

FEC has a well equipped and staffed workshop where we manufacture all fountain equipment ancilliary to the bronze components. Typical equipment includes pump base plates, puddle flanges, fibreglass tanks and electrical control cubicles.

Two staff members are qualified divers whose skills are often employed for installations where existing lakes or pools cannot be drained.

Where appropriate, FEC recommend the use of Flgyt submersible pumps for water display installations. These high quality pumps are silent in operation and easily accessible for maintenance. The use of submersible pumps means that construction of a dry well pump sump is not necessary.

EXAMPLES OF PREVIOUS PROJECTS

SGIO ATRIUM

Two curtain waterfalls, both 600mm wide, one 8m high and the other 5m high. Water flows down a clear sheet of plastic in a smooth laminar fashion.

FEC involvement: design, supply, install and commission.

FOUNTAIN, CANNING SHIRE

Three 700 series aerating nozzles producing jets rising 8m, 10m and 12m. Each jet illuminated by two submersible lights. The fountain pipework was connected to existing pumps.

FEC involvement: design, supply, install and commission.

WOODVALE

Three series 700 aerating nozzles plus several Series 50 cascade nozzles positioned in a shallow lake 30m long. Jet heights varied from a few centimetres to 4m.

FEC involvement: design, supply, install and commission.

EGERTON STUD TROUT LAKE

Fountains were positioned in a trout lake to produce aeration and to assist maintenance of water quality. One Type 747 aerating nozzle produces a jet 12m high and five Type 55 nozzles produce jets 6m high. A Flygt submersible pump was installed directly into the lake.

FEC involvement: design, supply, install (including diving) and commission.

EGERTON STUD BIRD PARK

Five Type 53 cascade nozzles positioned in a shallow ornamental lake. Jet heights varied from 1m to 2m. A Flygt submersible pump was installed directly into the lake.

FEC involvement: design, supply, install and commission.

BURSWOOD ISLAND RESORT - PLAZA AREA WATER DISPLAYS

Two separate water displays: one a traditional fountain, the second a large pool with peripheral cascade. Contract price was in excess of \$250,000.00.

Fountain:

A 7.5m diameter pool containing fifteen Type 326 Calyx nozzles, seven Type 55 cascade nozzles and four Type 66 foam nozzles. Nozzles were mounted on copper ring mains and supplied by nine Flygt submersible pumps. Each jet was illuminated by a single submersible light.

Pool and Peripheral Cascade:

This is a 40m diameter pool with a peripheral cascade and central waterfall island. Eight Flygt submersible pumps provide 0.65 cubic metres of flow per second over the peripheral cascade.

FEC involvement:

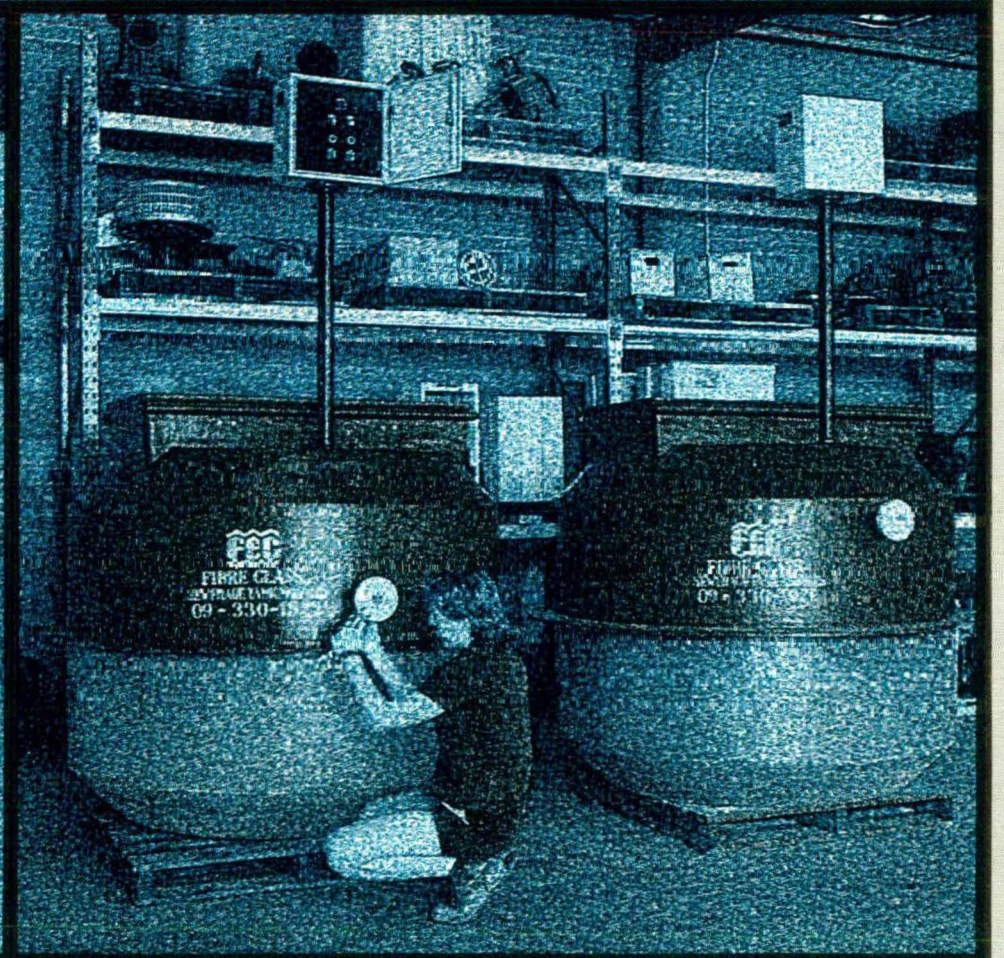
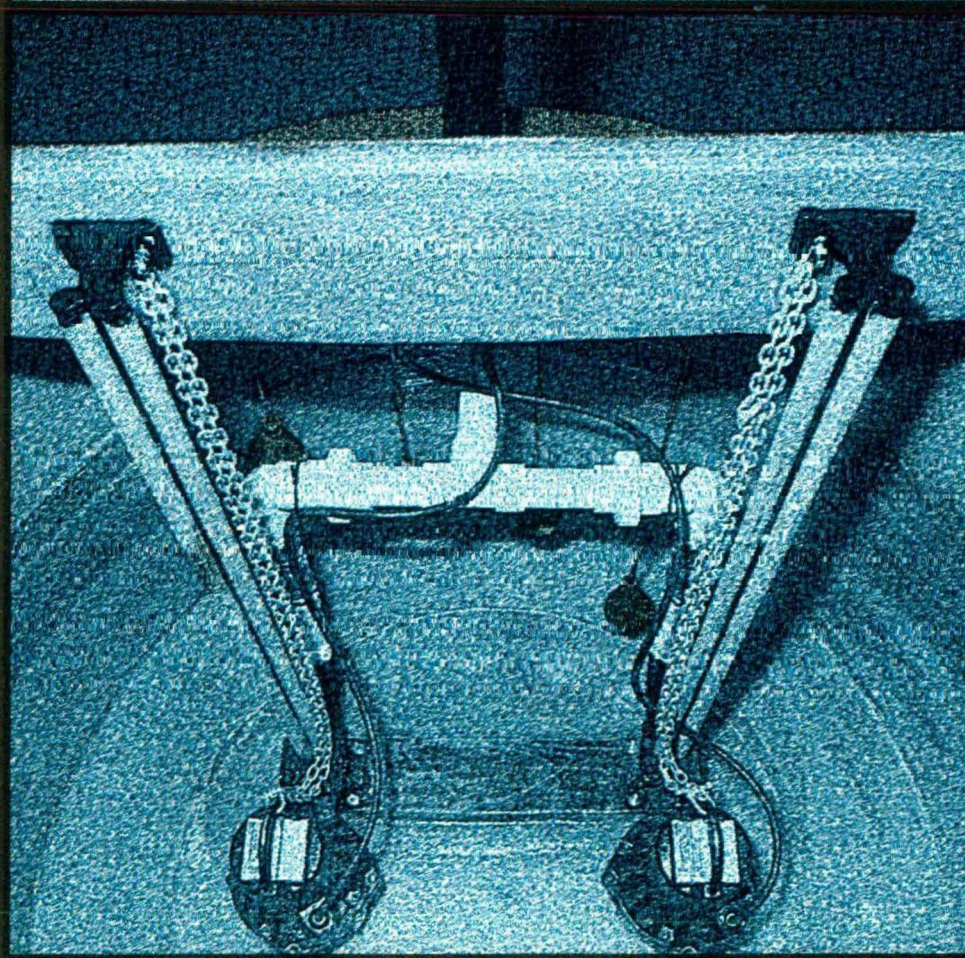
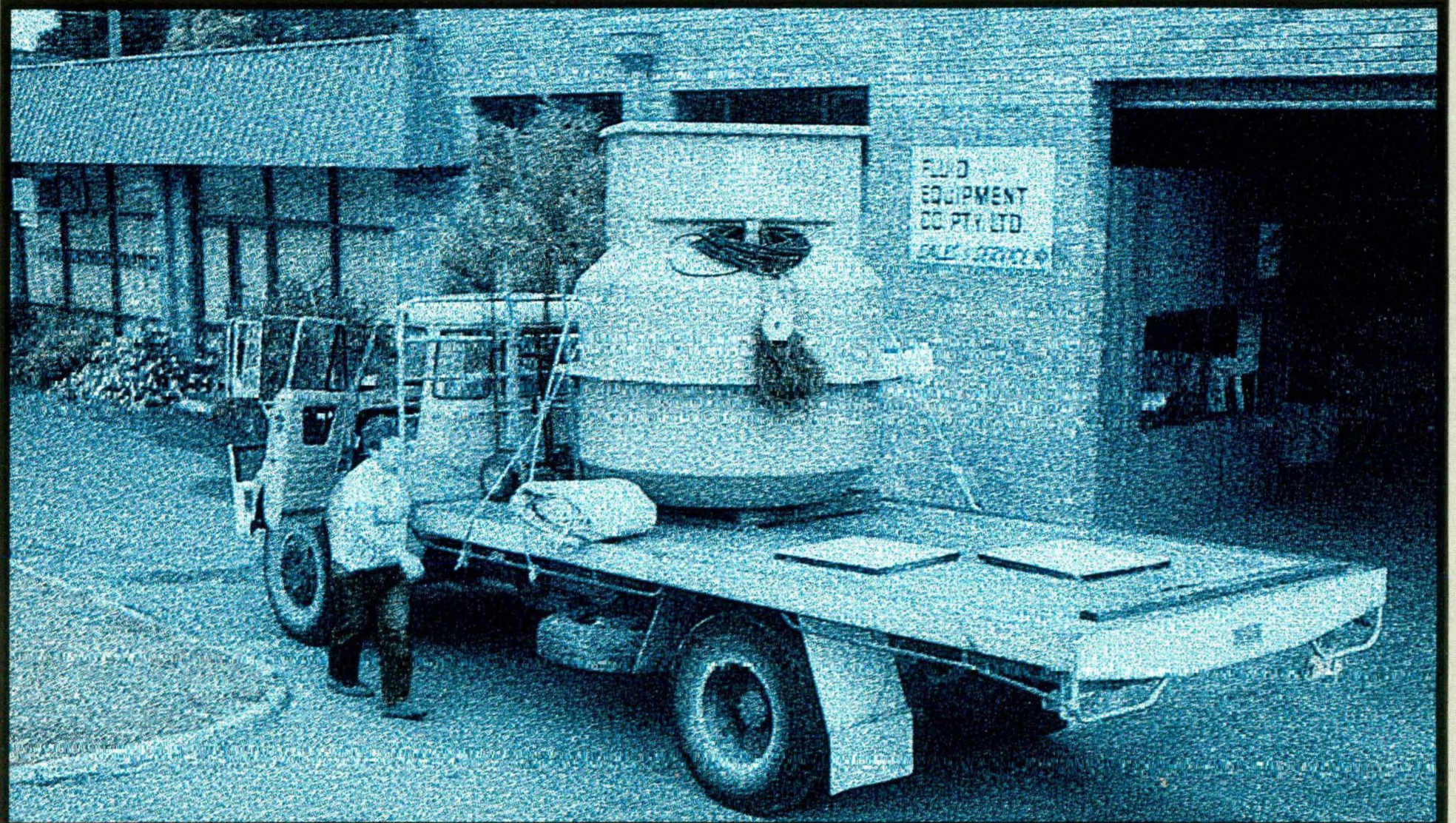
Hydraulic design based on Architects requirement including pump selection, water top-up and rainwater discharge facilities. A model test of the cascade was conducted in order to produce the best possible effect.

Supply of all equipment including nozzles, lights, electrical control cubicles, air controlled valves, top-up tanks etc.

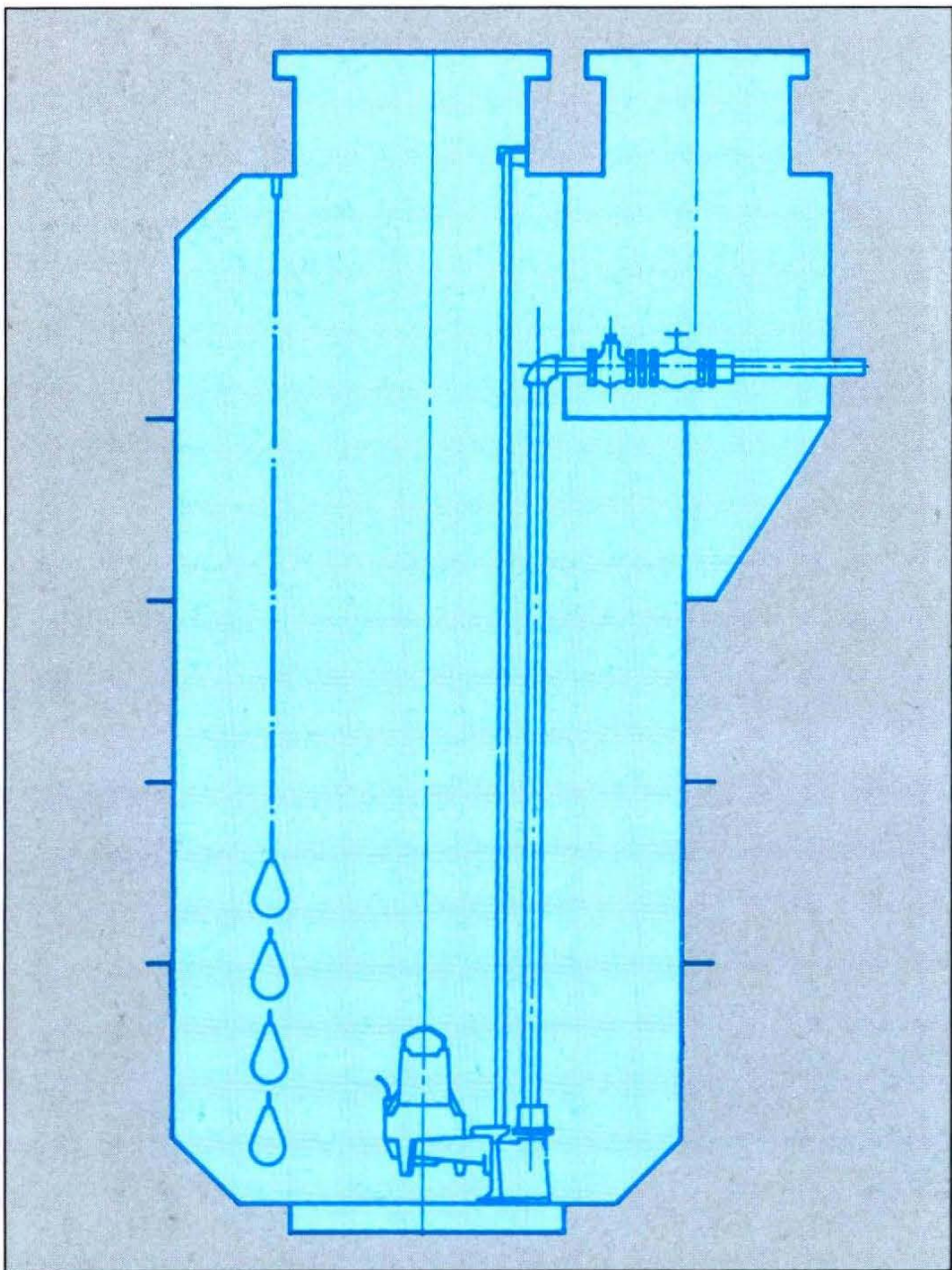
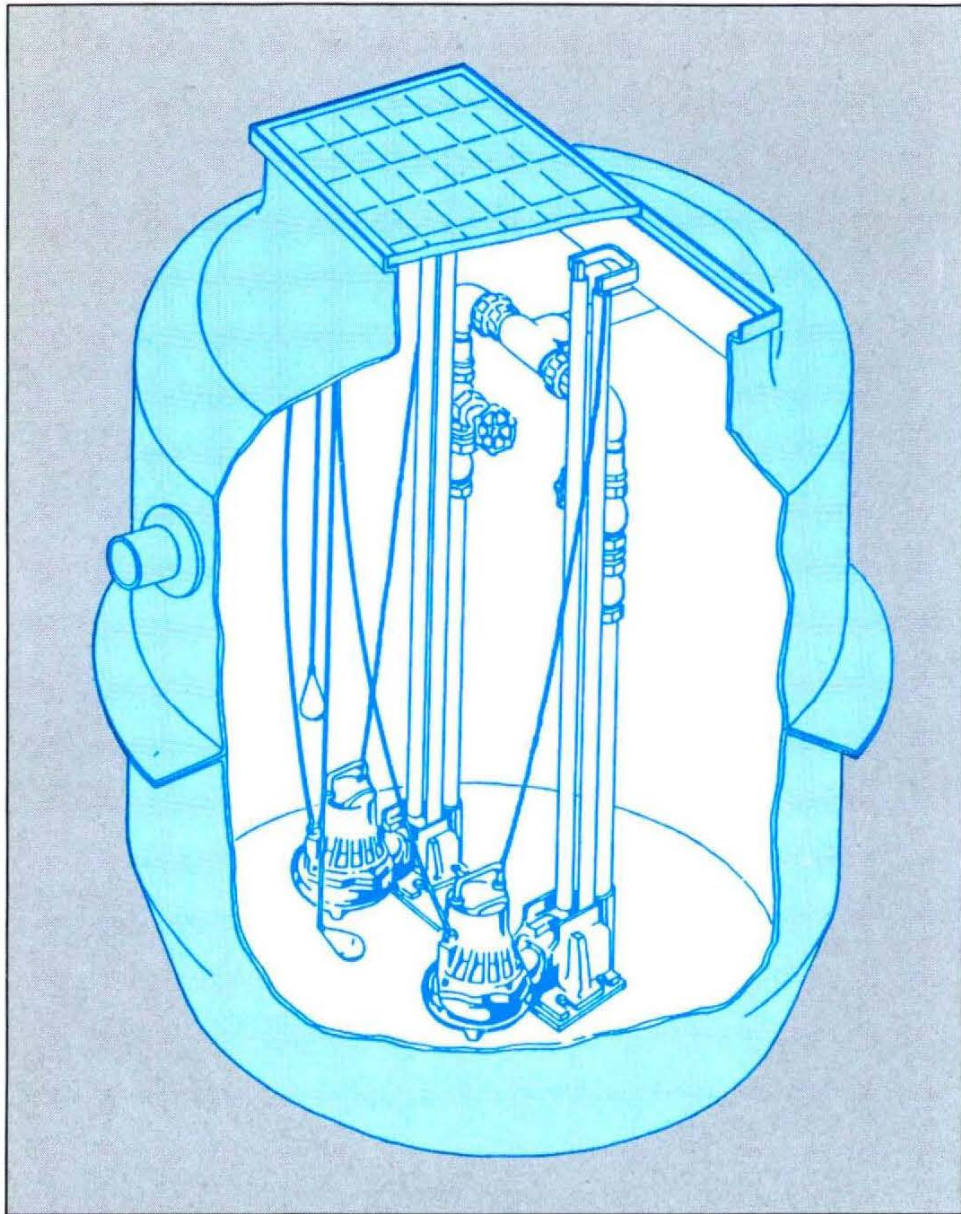
Supervision of installation.

Commissioning.

Packaged fibreglass pumping stations



save both time and money.....



Design Features

The Floquip range of prepackaged pump stations is available in both single and dual pump configurations, and can be supplied to suit varying depths and storage capacities. (Most applications require a twin pump installation as recommended by the Water Authority of W.A.).

The standard Floquip MK2 dual pump station has an overall diameter of 1.7m and a minimum depth of 1.6m with an optional valve chamber for easy access (see bottom left). In each case the modular glass fibre structure incorporates a steel access frame with concrete filled manhole covers.

This pre-packaged concept offers many advantages:

- Simple installation — sand backfill.
- Reduces on-site costs to a minimum.
- Easily transported to site.
- Quick installation for remote locations.
- As used by the Water Authority of W.A.

Applications

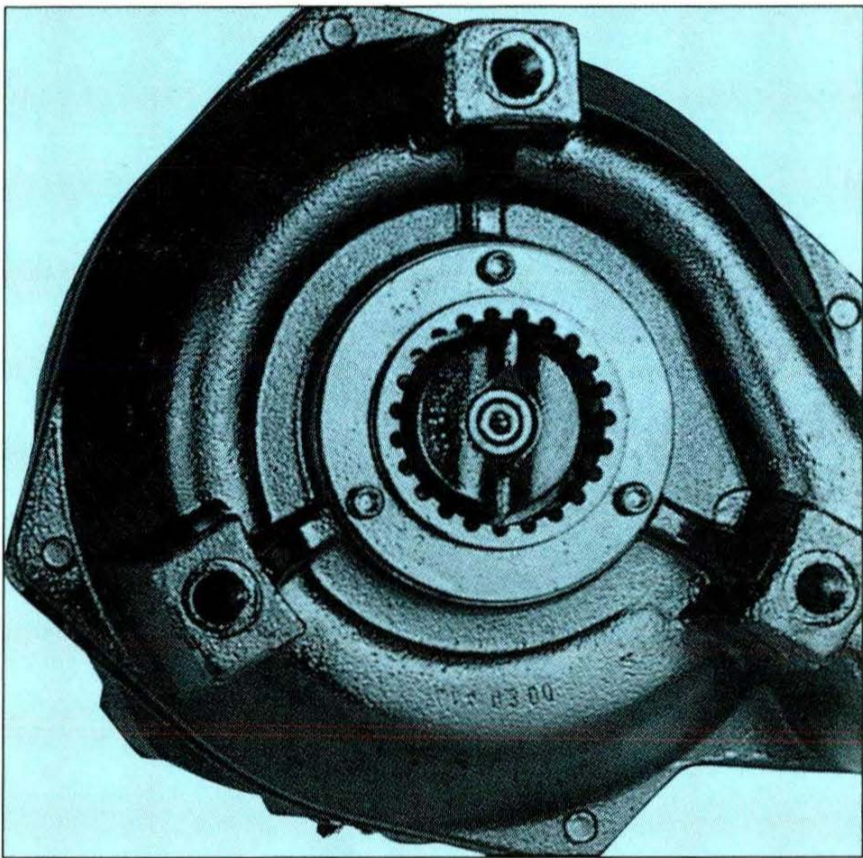
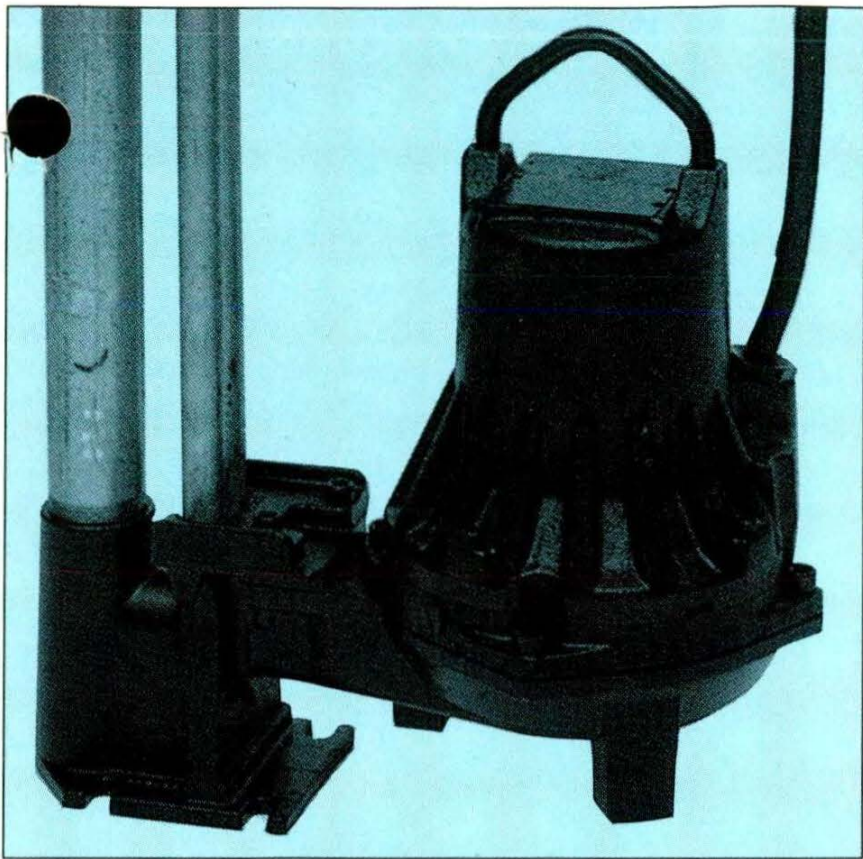
Pre-packaged sewage pump stations are the ideal solution for industrial, commercial and government projects where installation costs and on-site convenience are major considerations:

- Mine sites and construction camps
- Caravan parks, motels and hotels
- Schools and residential developments
- Commercial and industrial complexes
- Shopping centres and sporting facilities

Installation

Site installation is limited to excavation and connections to power and pipework, followed by sand backfill. (If required a concrete pad can be cast around the raised inspection frame to provide a flush finish with the tank's integral access covers).

Fluid Equipment Company can provide detailed plans and specifications to assist with Shire approvals although we recommend that a Consulting Engineer be engaged to assess ground conditions and to supervise the final installation.



MODEL OPTIONS

Floquip pump stations are supplied with 80mm diameter pipework to suit an 80/100mm rising main, or with a 50mm discharge when fitted with Flygt grinder pumps (shown left)

Pump station models can be identified as follows:

Example — Floquip Model **MP-3041-MK2V**

MP = Flygt grinder pumps

CP = Flygt nevaclog pumps

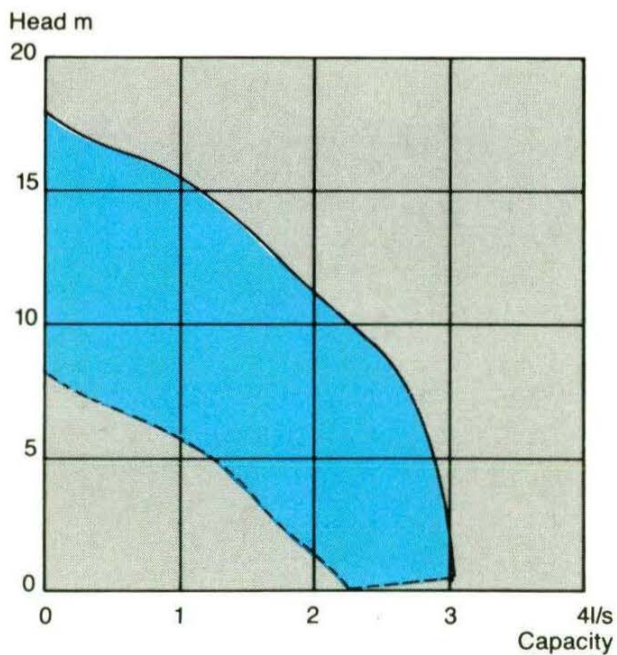
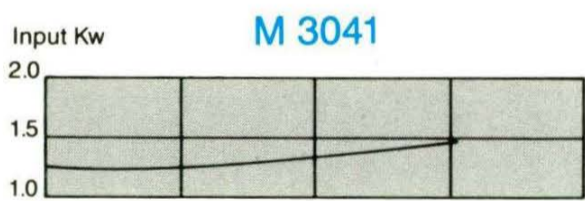
3041 = Flygt pump model

MK2 = Dual pump station

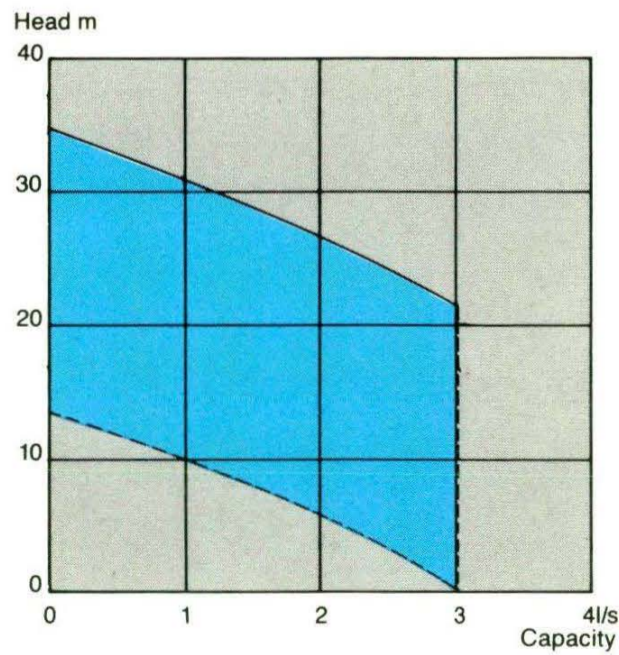
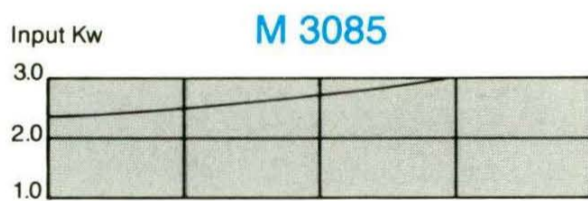
MK2V = Dual pump with separate valve chamber

PUMP STATION SPECIFICATIONS

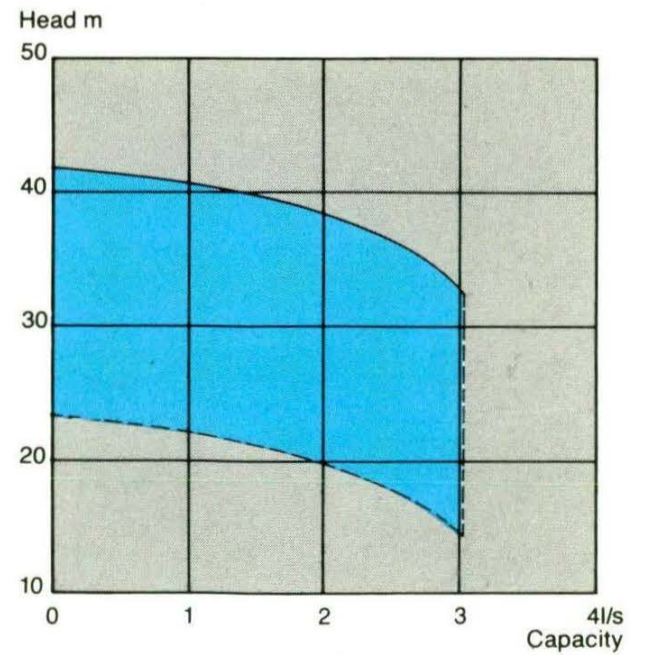
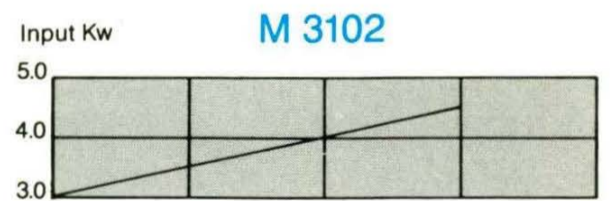
- Overall depth — Standard range 2m-4.4m
- Tank diameter — Nominal 1.7m (MK2)
- Storage capacity — 1000-7000 litres
- Tank construction — Modular GRP in 600mm segments
- Manhole access — 1200 x 750mm concrete covers
- Valve chamber — 900mm diam x 1200mm depth
- Valve access — 600mm diam concrete covers
- Valves — Cast iron bronze trim, WAWA approved
- Pumps — Flygt submersible, guide rail mounted
- Level control — Flygt level regulators ENH/10
- Switchgear — Floquip automatic with electronic alarm
- Performance — Typical performance curves shown below (50mm)



Pump type	Rated power		Rated current	
	kW	rpm	415v	240v
M3041 3-phase	1.2	2815	2.5A	
M3041 1-phase	1.0	2890		6.2A



Pump type	Rated power		Rated current	
	kW	rpm	415v	240v
M3085 3-phase	2.4	2800	5.0A	
M3085 1-phase	1.9	2900		11.0A



Pump type	Rated power		Rated current	
	kW	rpm	415v	240v
M3102 3-phase	4.4	2850	8.5A	

Floquip MK2 PUMP CONTROL SYSTEM

DESIGN FEATURES

The Floquip MK2 control cabinet is designed for use with dual Flygt pumps and Flygt level regulators to provide a fully automatic control system.

All controls are enclosed in a lockable weatherproof cabinet (380 x 380 x 210mm depth) to suit external wall mounting, with built-in electronic alarm and panel warning light.

The automatic control system ensures that the two pumps work in an alternating duty sequence with the provision for two pump operation during peak period.

CONTROLS

Pump operating controls are situated on a hinged panel behind the door:

- main isolating switch
- manual-off-automatic lockable selector switch for each pump
- motor "running" indicator lamps
- motor overload "reset" pushbuttons
- alarm isolation switch
- optional extras: hour run counters, alarm light etc

STARTING AND CONTROL EQUIPMENT

- motor H.R.C. fuses to suit motor rating
- motor overload protection relays
- motor contactors
- audible electronic alarm and panel lamp
- stepping relay
- control circuit transformer 415-24V
- control circuit fuses
- terminals

OPERATION

When liquid level rises to pump "start" level, the duty pump starts and runs until the level is reduced to the "stop" low level switch. Should the liquid rise above the "start" level to the standby pump "start" switch, the standby pump will start and the alarm will sound. Both pumps will run until the level is reduced to the "stop" low level switch.

Should the duty pump trip on overload the standby pump is automatically started and the alarm sounds. This may be silenced by the alarm isolating switch.

A stepping relay is incorporated to alternate the "duty" pump after each operation to assure even pump usage. Either pump may be run manually by selecting "manual" on the pump's selector switch.

CONTROL VOLTAGE

The control voltage used is 24V A.C. and is designed for use with "Flygt" level regulators Model ENH10.

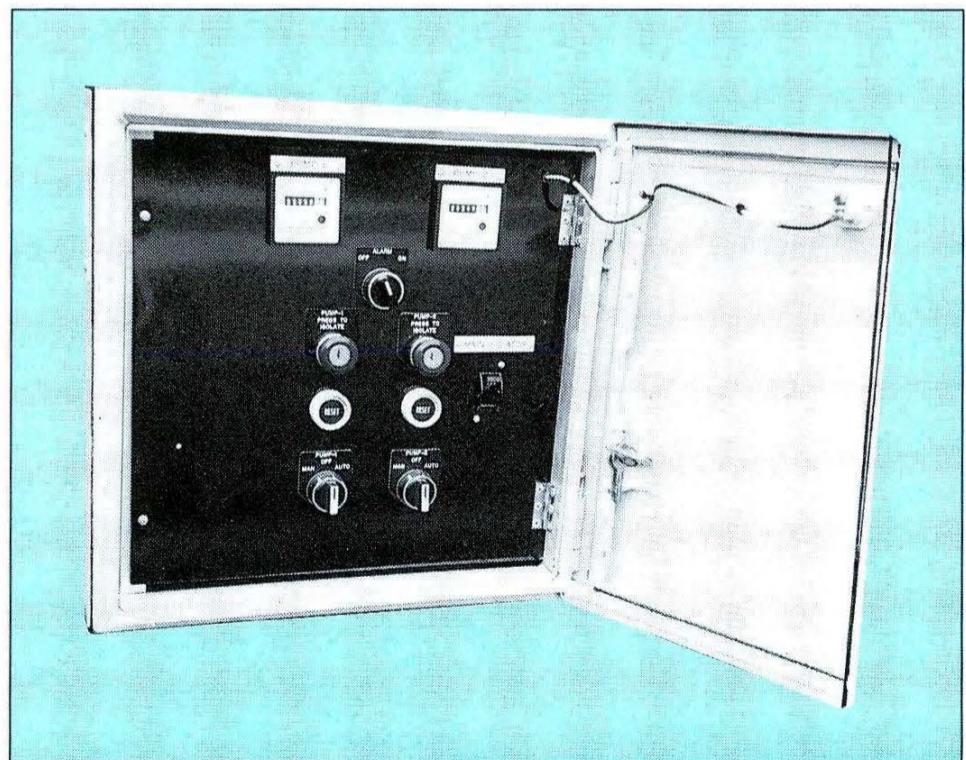
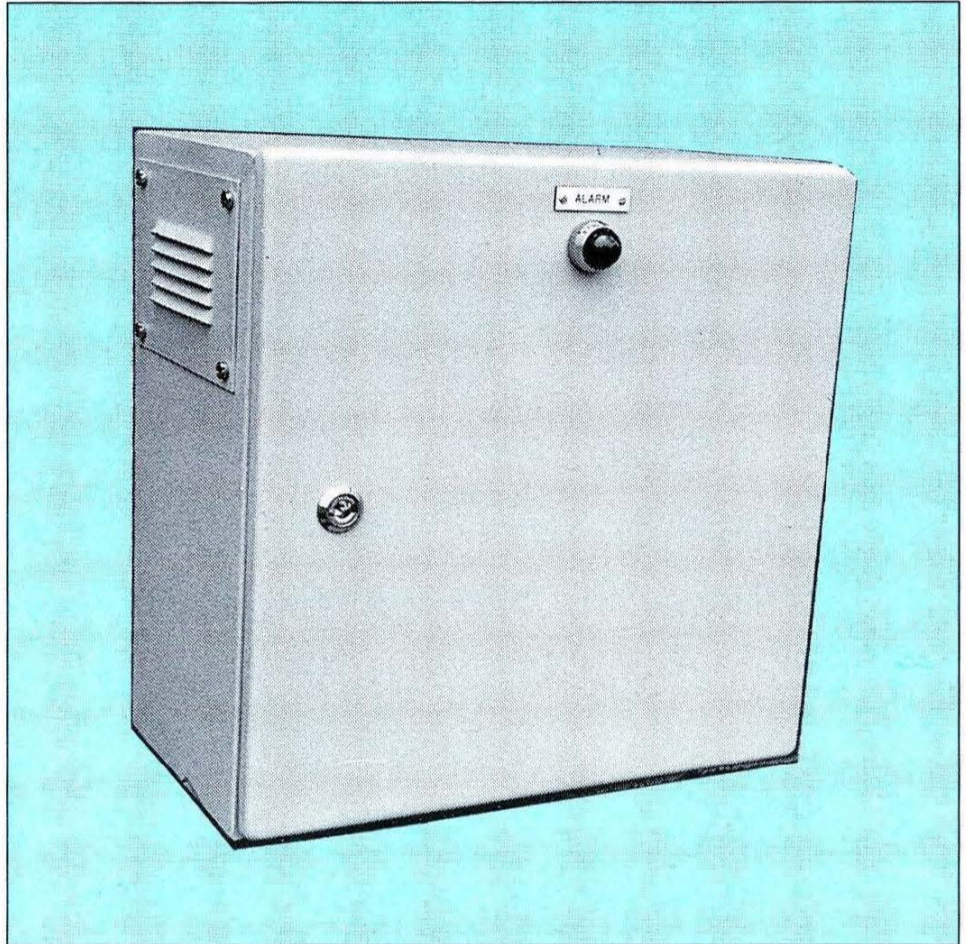
(Supply voltage is 415V, 50 Hz, A.C. 3 phase).

CONTROL CIRCUITS

A control circuit diagram is supplied and numbered terminals facilitate ease of site connection with supply, motors and float switches.

3 OR 4 LEVEL CONTROLS

The Floquip MK2 control cabinet can be used with either three or four level regulators as required. For storm water applications where occasional high inflow requires two pumps to operate together the four level system should be used — in this case no alarm sounds during peak flow conditions unless the inflow exceeds the capacity of both pumps.



FLUID EQUIPMENT CO PTY LTD

OFFICE AND FACTORY:

60 NORMA ROAD, BOORAGOON WA 6154

PO BOX 71, APPECROSS WA 6153

TELEX: AA94906, FAX 330 7076

TEL (09) 330 1922 (8 lines)

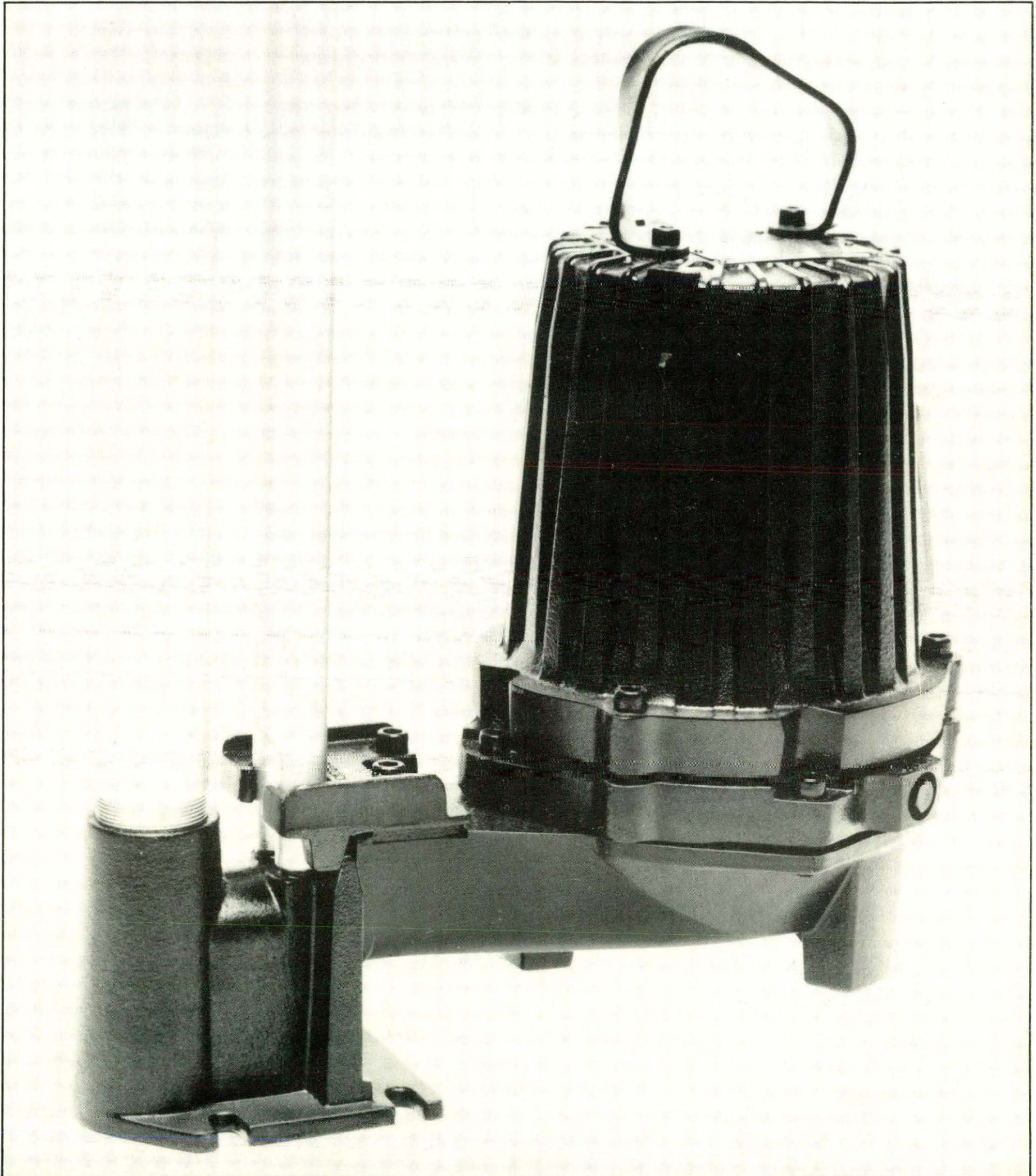
(Incorporated in W.A. Trustee for Fluid Equipment Unit Trust)

M 3102.170

Grinder pump



Technical specification



Technical specification 3102.170

3102.170 is a submersible grinder pump intended to be used for pumping waste water containing solids. The grinder assembly at the inlet of this pump reduces the solids to a fine slurry so that the pump can be used with small bore discharge pipe system.

The electric motor and the pump comprise a compact and robust unit which requires little space and is easy to handle.

APPLICATIONS

3102.170 is intended to be used for pumping waste water where the solids need to be reduced to a slurry prior to pumping.

Examples of applications are:

- for one or a group of one-family-houses located at a level too low to be directly hooked up to a already existing or planned gravity system.
- in remote summer and winter recreation areas.
- in combination with small, local, packaged sewage treatment plants.

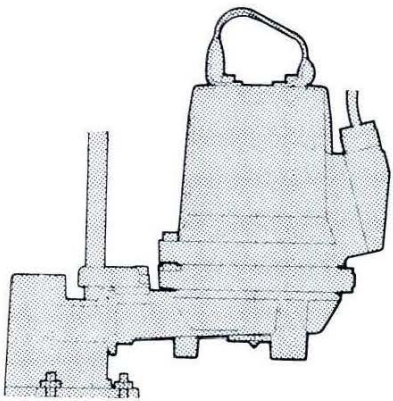
If the grinder pump will be used for other applications please contact your local Flygt representative for information.

The pump features:

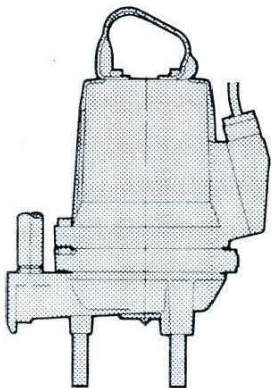
- compact low-built design for effective cooling and lowcost installation in small tanks.
- dependable, non-clogging due to its effective long-life grinder assembly.
- motor insulated to Class F.
- easy maintenance.

INSTALLATION ALTERNATIVES

3102.170 is available in two versions, depending on the method of installation.



MP
This discharge connection is fixed to the sump floor. When the pump is lowered down the guide bars it engages automatically with the discharge connection — and automatically released when it is raised.



MF
This installation has no permanently mounted discharge connection. The pump stands freely on legs in the pump well. It can be equipped with either pipe or hose connection.

Weights

Without motor cable

- MP: 79 kg (pump unit with sliding bracket)
MF: 75 kg (pump unit with legs)

TECHNICAL DATA

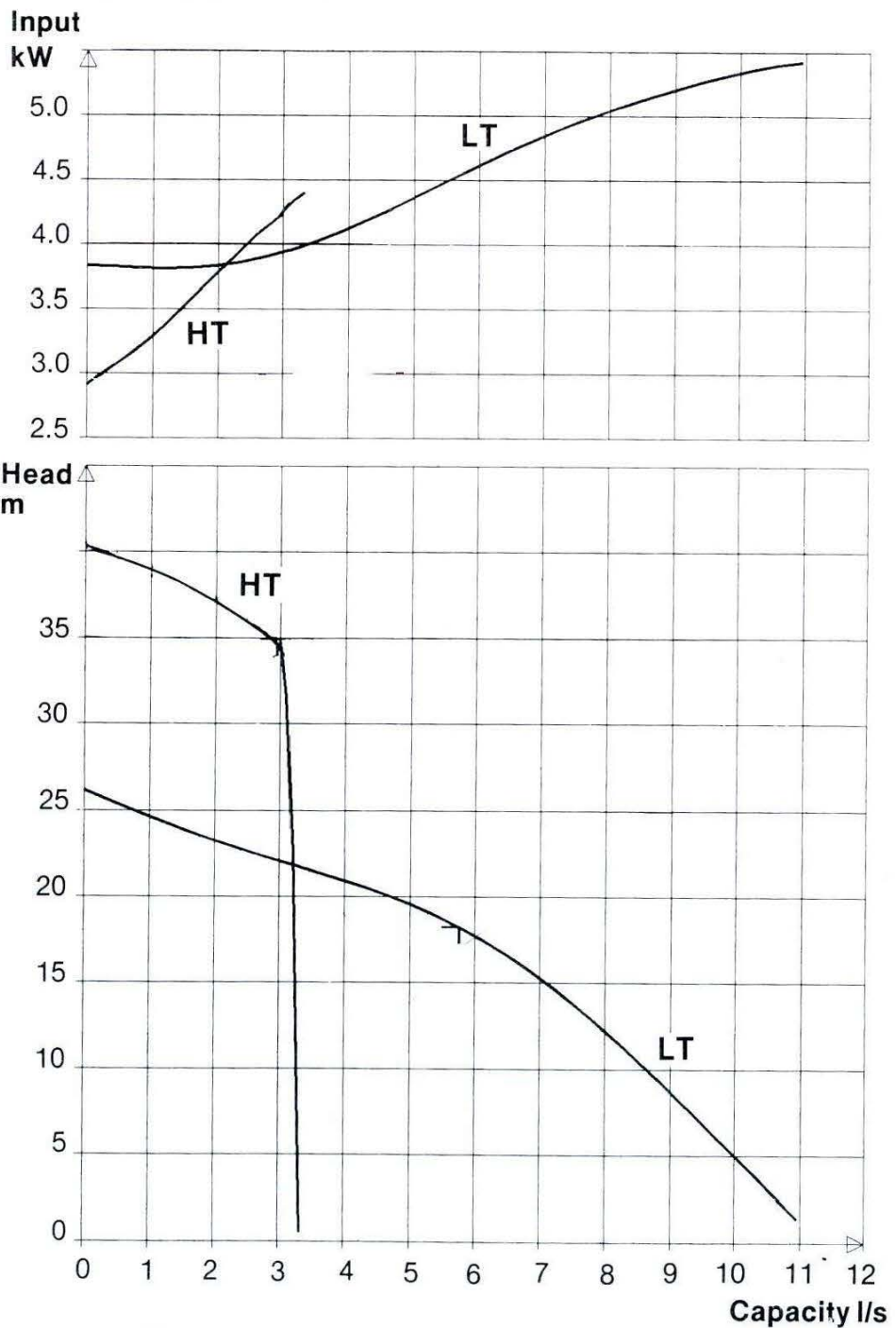
Motor data

Squirrel-cage 3 phase AC motor Insulation Class F, 50 Hz				
Rated output kW (hp)	rpm	Rated current		
		380 V	415 V	500 V
4.4 (6)	2850	9.3A	8.5A	7A

The pump is also available in 60 Hz.

Power cable: Your local Flygt representative will provide details on cables required to comply with local regulations.

Performance curves



Limitations

Liquid temperature: max 30°C (86°F).

Liquid density: max 1 100 kg/m³.

The pH of the pumped liquid: 6—11.

Lowest liquid level: the pump casing must be covered.

Depth of immersion: max 20 m.

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

DESIGN

1. Junction box

The junction box is completely sealed off from the surrounding liquid.

2. Cooling

The stator is cooled by the liquid or air surrounding the stator casing.

3. Motor

Motor insulation to Class F means a maximum working temperature of 155°C (310°F) and permits a temperature rise of 100°C (212°F).

The temperature rise in Flygt motors does not normally exceed 80°C (175°F). The insulation material is chosen with the greatest care, and most materials are classified as Class H 180°C (355°F) materials or very close to Class H. This means an expected service life far beyond what is required for Class F.

4. Oil casing

The oil lubricates and cools the seals and acts as a buffer between the pumped liquid and the electric motor.

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

5. Bearings

The upper bearing consists of a single-row ball bearing the lower bearing is a double-row angular contact ball bearing.

6. Shaft seals

The pump has two mechanical seals. The seals work independently of each other and seal off the motor from the pump section.

7. Pump casing

The pump casing for MP version has a horizontal outlet to fit a stationary discharge connection and for the MF version a vertical threaded outlet.

8. Impellers and grinder assembly

The pump is equipped with impeller and cutter.

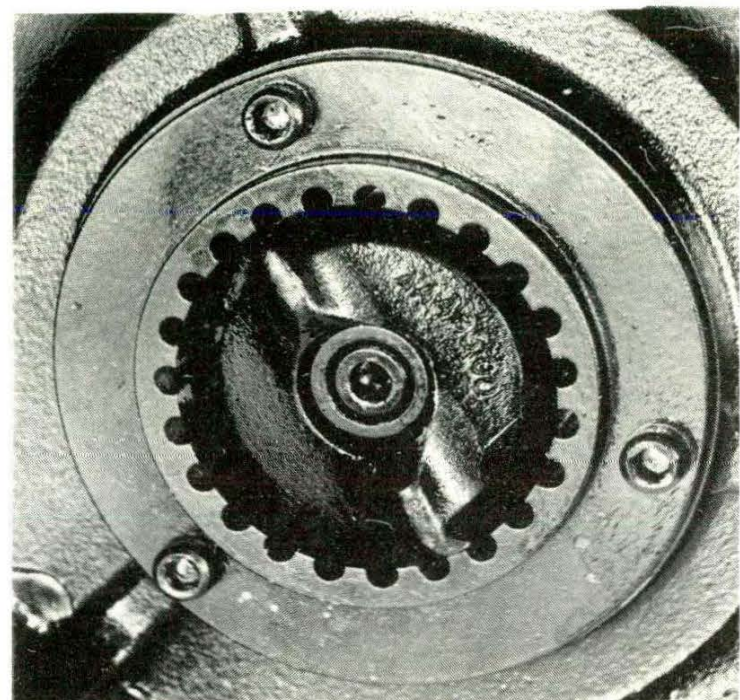
The impeller is pressed on to the cutter wheel.

The grinder assembly consist mainly of a fixed cutting ring and a rotating cutter wheel.

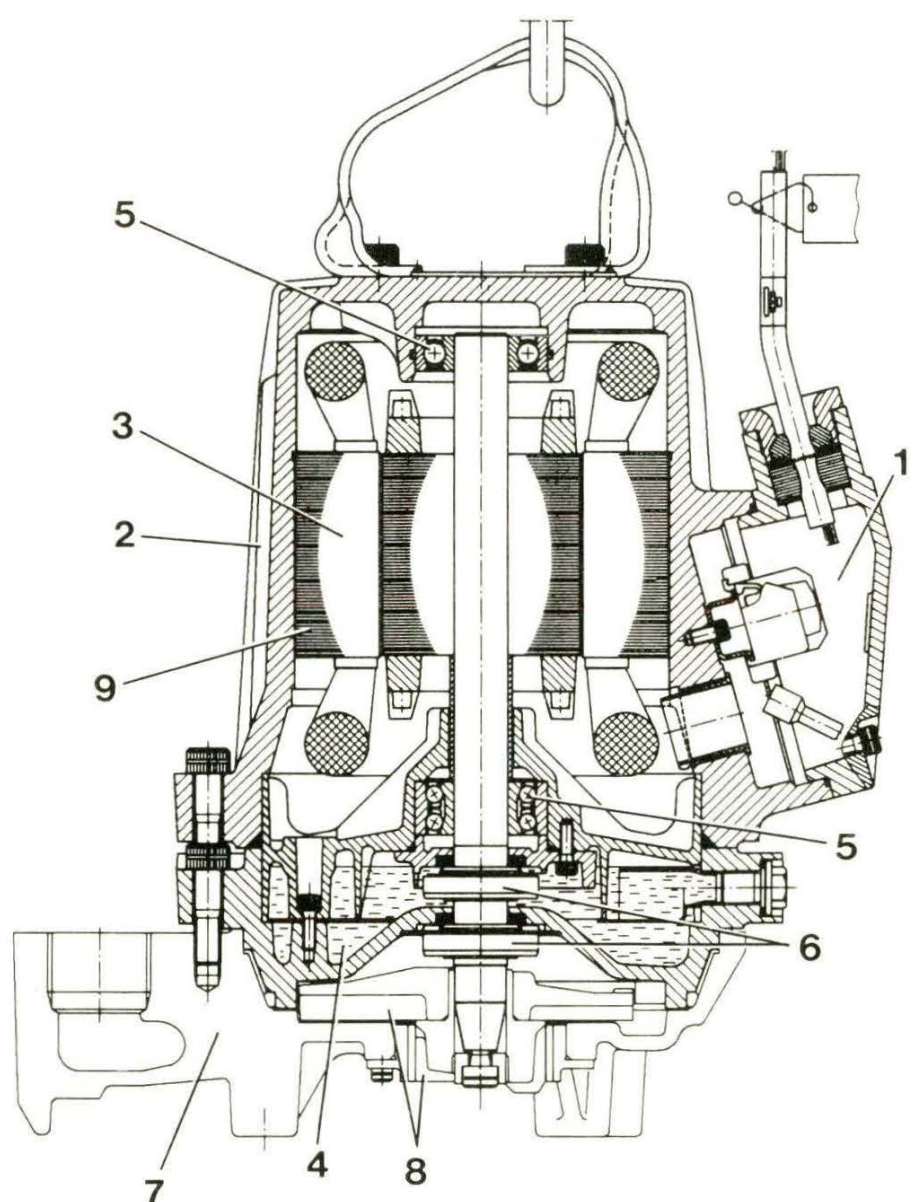
9. Monitoring equipment

The stator incorporates two thermal switches connected in series.

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



Grinder assembly



MATERIALS

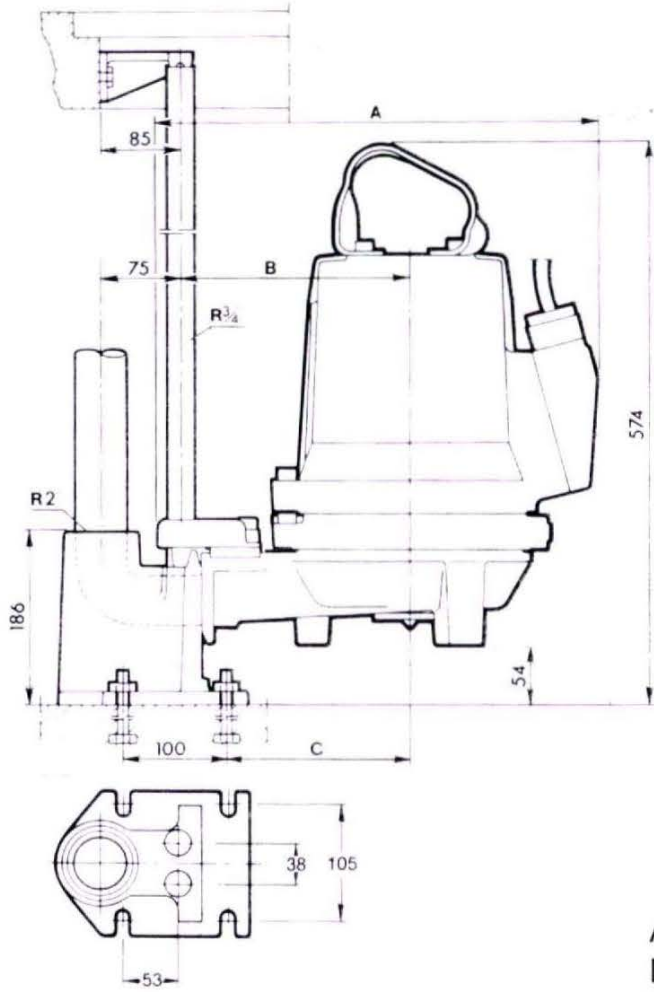
		BS	DIN
Cast parts:	Cast iron	1452:1977 Grade 220	1691 GG 20
Shaft:	Stainless steel	970:4 430S37	17440 X20Cr13
Fasteners:	Stainless steel	EN 58A	X5CrNi 18/9
Lifting handle:	Galv. steel	—	—
O-rings:	Nitrile rubber 70° IRH	Grade 704	—
Impeller:	Cast iron	1452:1977 Grade 220	1691 GG 20

		BS	DIN
Grinder assy:			
— stationary cutting ring	Hardened stainless steel	—	1.4535
— rot. cutting wheel	Alloyed white cast iron L 102	—	—
Mechanical face seals:			
— inner:	Carbon/tungsten carbide or Carbon/ceramic		
— outer:	Tungsten carbide/tungsten carbide or Carbon/ceramic		
Surface treatment			
Impellers:	Sprayed with primer		
Pump exterior:	Primer: PVC Epoxy Finish: Black synthetic enamel		

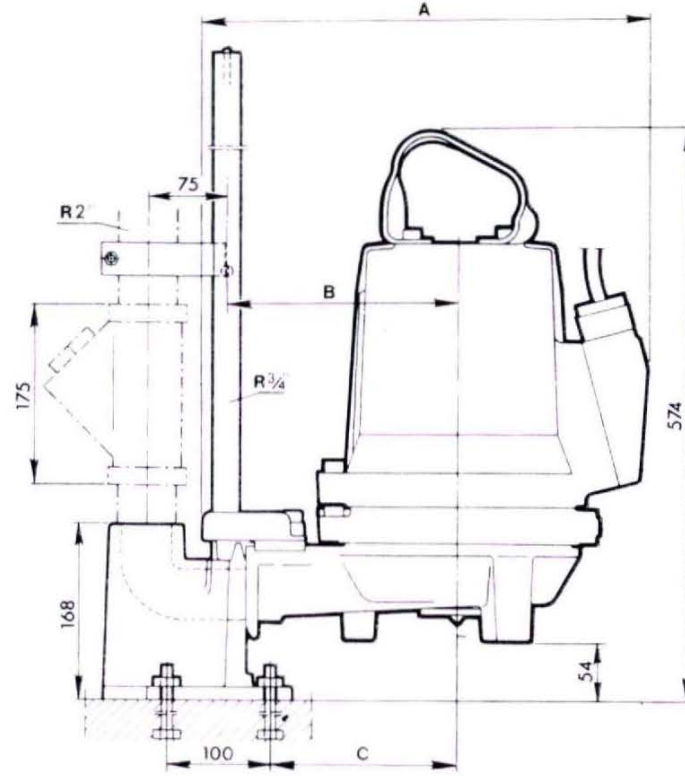
INSTALLATION DIMENSIONS

Dimensions in mm.

MP Alternative 1

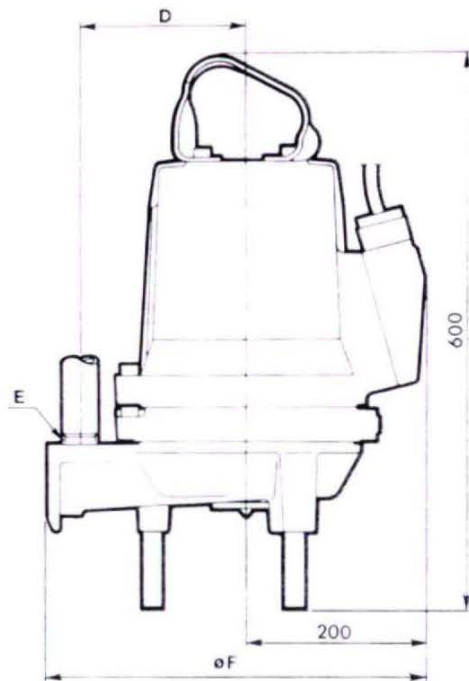


MP Alternative 2



	LT	HT
A	469	459
B	245	235
C	198	188

MF



	LT	HT
D	188	178
E	R2"	R1 1/2"
F	Ø460	Ø450

Discharge connection

- MP = Vertical stool with R2" female thread
- MF = Vertical pipe connection with R1 1/2" (HT) and R2" (LT) female thread

Accessory

- Stationary discharge connection R2" for version MP (LT, HT)
- Sliding bracket for version MP (LT, HT)
- Hose connection 2" for version MF (LT)
- Hose connection 1 1/2" for version MF (HT)

The manufacturers reserve the right to alter performance, specification or design without notice.

