The

Vertical Gravity Separator

(VGS*)

Fat, Oil and Grease

Separating Waste from Water

ACQUA International Group ["ACQUA"]

ACQUA are involved in the extraction of waste from water using proprietary technologies sold under the following brand names:

- *Vertical Gravity Separator (VGS*)*
- *Induced Cyclonic Separator (IC-SEP*)*
- *Cyclonic Falling Film Evaporator (CycloVap*)*
- *Inline Swirl Generator Hydrocyclone Head (ISG*)*
    - *Liquid/Liquid*
    - *Solid/Liquid*
- *Liquid Skimmer (Skimmer*)*

The ACQUA technologies are involved in the following market segments and applications:

- *Oil-water separation*
- *Fat, oil and grease recovery/removal*
- *Marine bilge water treatment and marina oil slicks clean-up*
- *Soil remediation*
- *Tertiary sewage treatment*
- *Recovery of backwash water*
- *Removal of suspended solids*
- *Treatment of wastewater from food and chemical manufacturing, pulp and fines recovery.*

* Indicates International Patents Pending

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CONTENTS

1 THE VERTICAL GRAVITY SEPARATOR (VGS*)

1.1 Fat, Oil and Grease (FOG) VGS*

The Fat, Oil and Grease (FOG) VGS* revolutionises on-site pre-treatment of greasy wastewater generated by the preparation of food.

This system has been developed to effectively remove fat, oil and grease in wastewater. It also removes most of the heavy and suspended solids. As a direct result, other wastewater quality indicators are improved, including Biological Oxygen Demand (BOD) Ammonia, pH, Phosphorous, Sulphate and Nitrogen.

Businesses that process or prepare food, generate large amounts of trade waste containing grease and oil, suspended solids and numerous other pollutants. This wastewater is known as 'Greasy Waste'.

Current Australian water authority policies require these organisations to install onsite pre-treatment equipment to improve the quality of the greasy wastewater prior to discharging into the sewer system.

Grease traps are the most common forms of pre-treatment, but as laws tighten they are becoming very costly to keep online.

Grease traps progressively become less efficient, as grease, oil and sludge accumulate. Regular cleaning of these pits along with frequent pump outs are required to prevent blockages, odour problems and health hazards.

The quality of wastewater discharged as trade waste, can be used by water authorities to charge food outlets for their trade waste output. Fees and charges are calculated by the quality of the wastewater leaving the premises. If the business does not meet with the authorities guidelines, then associated fees and charges can be very costly.

1.2 Typical Applications

Typical applications of the FOG VGS* are:

- Restaurants and Food Outlets
- Shopping Centres
- Clubs and Hotels
- Sporting Stadiums
- Resorts
- Schools and Colleges
- Mining Sites
- Hospitals and Nursing Homes
- Factory Canteens
- Processing Plants
- Abattoirs

1.3 Features and Benefits

FOG VGS* Features and Benefits	
Features	**Benefits**
Superior Design	Fully automatic system available. This is a unique system that continuously looks after itself.
Highly competitive price	Significantly improved quality of wastewater.
Simple to install	Reduced authority charges for wastewater quality and quantity.
Easy to use	Major reduction in the number of costly pit pump-outs. This can be reduced to 2 per annum in some installations.
Very low maintenance	Eliminates bacteria build-up such as the ever-common Bacterial Cellulose.
Quick to clean	Reduced drain blockages and therefore reduced plumbing costs due to the elimination of grease and removal of solids.
Portable	Treated water can be recycled to save costs.
	Available in a range of flow rates (up to 3000L/hr).
	Manufactured in Australia from high quality 316 stainless steel.

1.4 Why is the FOG VGS* so effective?

The FOG VGS* operates by ingenious control of both fluid velocity and pressure, which gently coaxes the impurities from the water. This allows high density contaminants to fall into a sludge retaining area at the bottom of the vessel, and for the free grease, oil and low density suspended solids to rise to the top section of the FOG VGS* where it flows into a grease retaining tank.

Testing has proven that the FOG VGS* system compared to existing grease traps, will greatly improve the quality of wastewater being discharged to sewer by conservatively 90% and better.

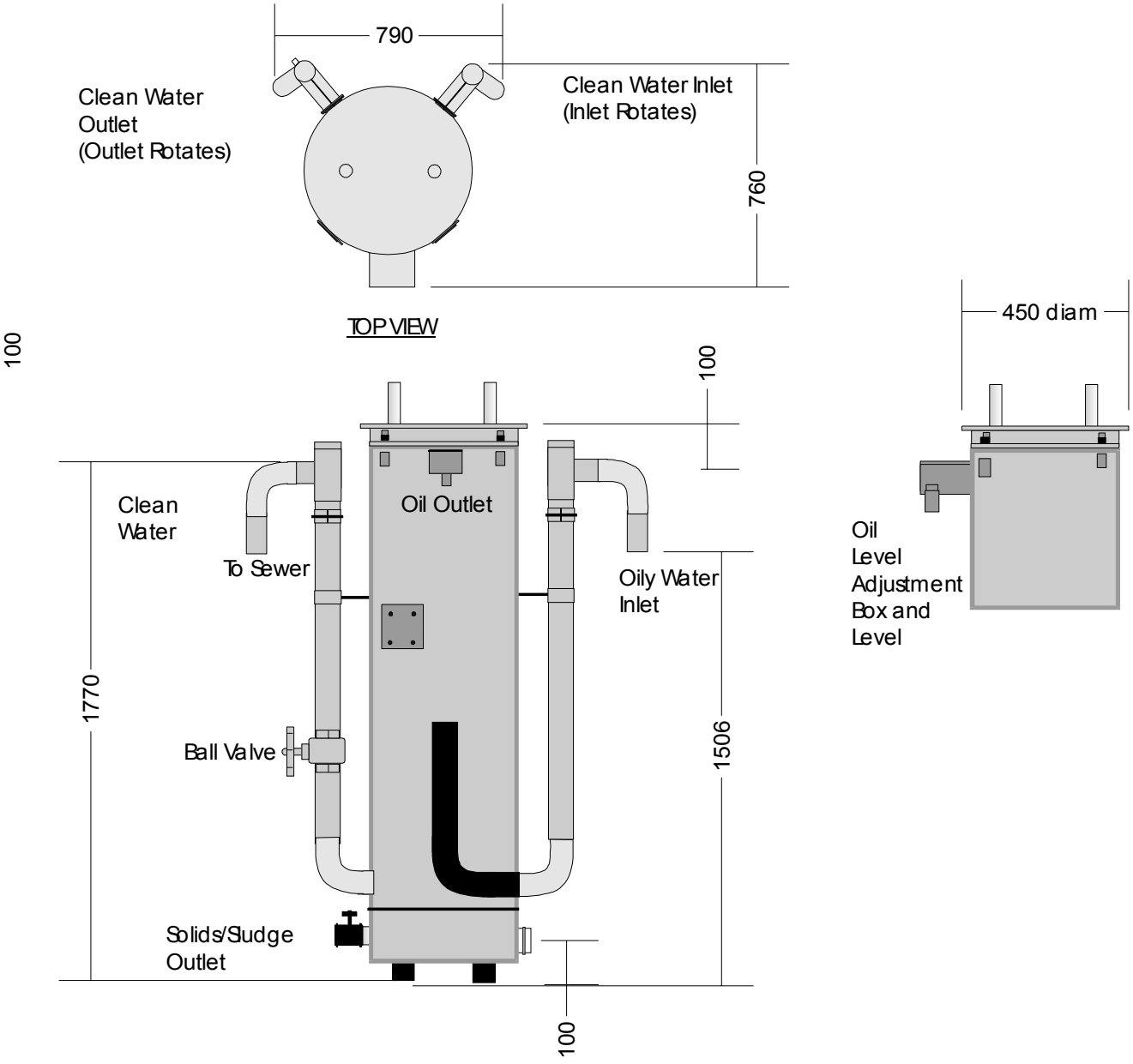
Optionally there is a fully automatic FOG VGS* that operates a cleaning cycle at pre-determined intervals. This system automatically cleans the internals of the FOG VGS* and returns any fats, oils, grease and sludge to the retention tank.

2 DIMENSIONS

Dimensions

Export Crate Size and Weight

2.1 Dimensions Diagram



EXPORT CRATE DIMENSIONS
Length 211cm
Width 90cm
Height 63cm

Export Weight 120kg
Including crate and wrapping

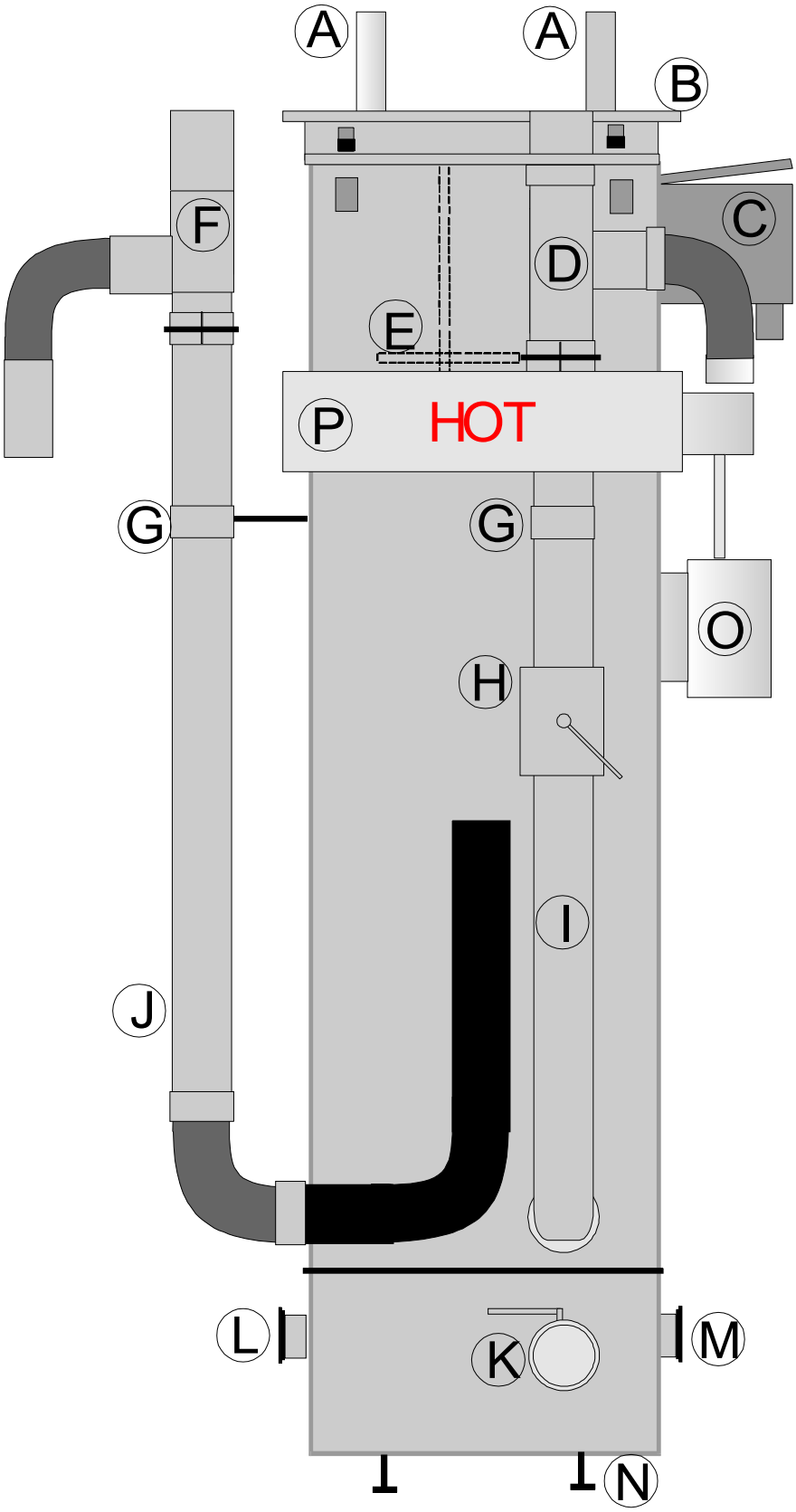
* All dimensions given are in millimetres (mm) unless otherwise specified

3 SPECIFICATIONS AND OPTIONS

Specifications

Options

3.1 FOG VGS* (Manual) Specifications



FOG VGS* (Manual) Specifications	
Model Number	BWTV 3000 FOG
Maximum Flow Rate (L/hr)	3000
Construction Material (Body)	1.6mm 304 grade Stainless Steel
Construction Material (SPAK)	20 x 1.55mm inert non-absorbing acrylic oleophilic cones

A SPAK rotation handles.

B FOG VGS* lid with seal and clamps.

C Waste Oil Outlet with hinged visual oil level and fat, oil & grease weir adjuster.

D Treated Water Outlet with 2" tri-clover union, 2 x 2" BSP sockets and odour valve.

E Deflection Plate.

F Wastewater Inlet with 2" tri-clover union, 2 x 2 BSP sockets and odour valve.

G Inlet and outlet pipe supports.

H Back Flush Valve (2" BSP Ball)

I Treated Waste Outlet with 2" tri-clover union.

J Wastewater Inlet with 2" tri-clover union and "u" tube wastewater SPAK inlet.

K Sludge Outlet Valve (2" BSP Ball).

L 2" tri-clover ferrule with blank.

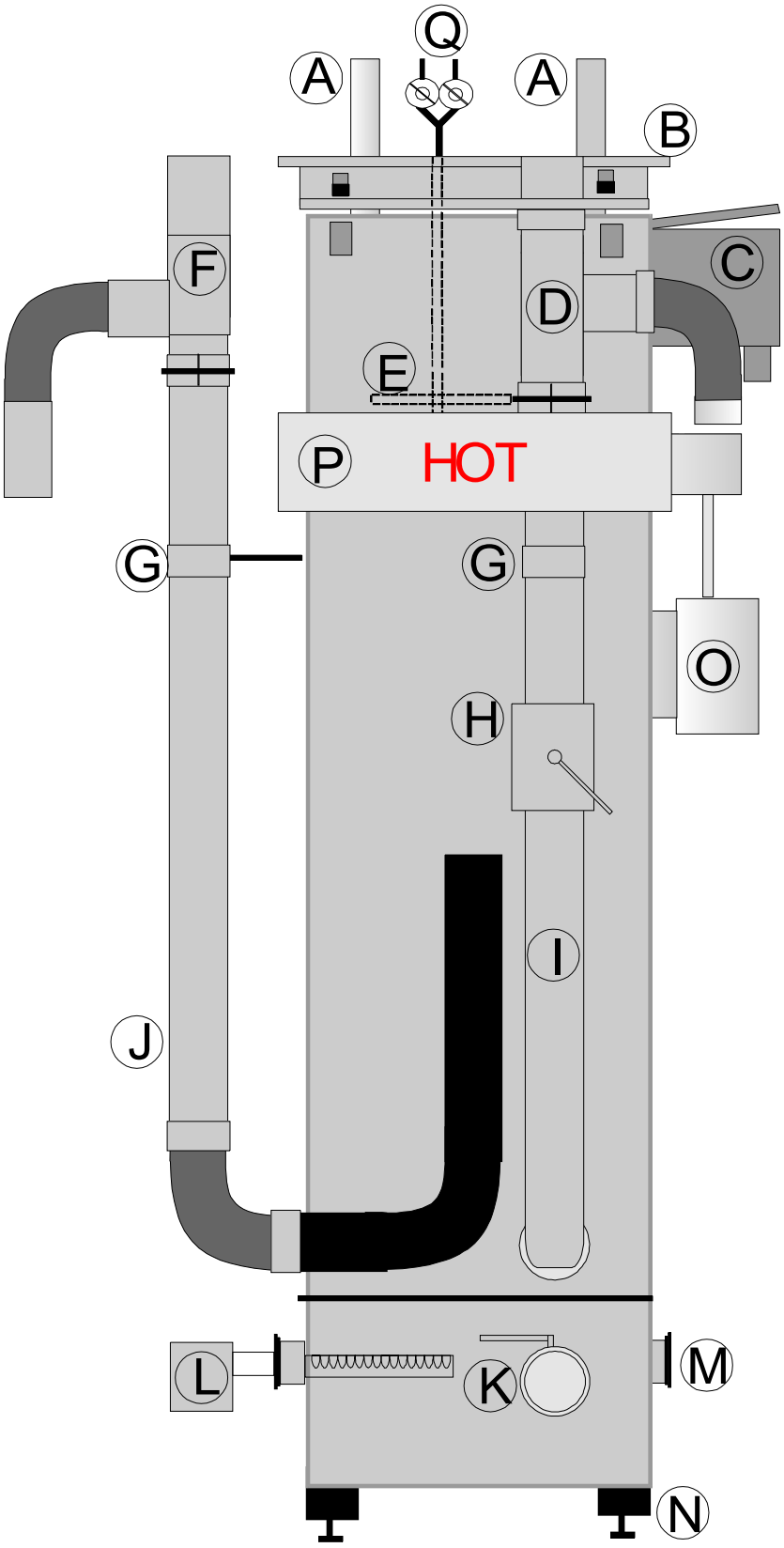
M 2" tri-clover ferrule with blank.

N Adjustable 40mm disc feet (8mm thread and locking nut).

O Thermostat control.

P Heater bands (2 x 1kw), insulation and stainless steel cover. These are controlled by the Thermostat control and are set to 30^{o}C, but can be altered through the use of the thermostat. The heaters are activated and deactivated as the pump operates.

3.2 FOG VGS* (Automatic) Specifications



FOG VGS* (Automatic) Specifications	
Model Number	BWTV 3000 FOGA
Maximum Flow Rate (L/hr)	3000
Construction Material (Body)	1.6mm 304 grade Stainless Steel
Construction Material (SPAK)	20 x 1.55mm inert non-absorbing acrylic oleophilic cones

A SPAK rotation handles.

B FOG VGS* lid with seal and clamps.

C Waste Oil Outlet with hinged visual oil level and fat, oil & grease weir adjuster.

D Treated Water Outlet with 2" tri-clover union, 2 x 2" BSP sockets and odour valve.

E Deflection Plate.

F Wastewater Inlet with 2" tri-clover union, 2 x 2 BSP sockets and odour valve.

G Inlet and outlet pipe supports.

H Back Flush Valve (2" BSP Ball).

I Treated Waste Outlet with 2" tri-clover union.

J Wastewater Inlet with 2" tri-clover union and "u" tube wastewater SPAK inlet.

K Automatic sludge valve and solenoid.

L Aeration system.

M Lower heater (1kw).

N Adjustable 40mm disc feet (8mm thread and locking nut).

O Thermostat control.

P Heater bands (2 x 1kw), insulation and stainless steel cover. These are controlled by the Thermostat control and are set to 30^{o}C, but can be altered through the use of the thermostat. The heaters are activated and deactivated as the pump operates.

Q Flushing Valve and Back Flush Solenoid (240V).

3.2.1 Aeration System

To maximise the separation process within the FOG VGS* a small air diaphragm pump is incorporated into the system. Air is pumped into the bottom of the FOG VGS* via a diffuser. Small air bubbles created by the diffuser travel up through the centre of the SPAK assembly and carry with it suspended oil particles to the surface. The constant flow of air bubbles enhances the convection current created by the flow of the incoming fluid.

3.2.2 Pumping System

The FOG VGS* (Fully Automatic) is designed to be self-cleaning to minimise maintenance time and to improve system performance and operational life.

3.2.2.1 Flushing System

At the end of a pump cycle an electrically operated solenoid valve is opened, allowing clean water to enter into the FOG VGS* through the greasy water inlet pipe and flush the SPAK. Two manual hot and cold water valves, prior to the flush solenoid valve, are utilised to control the flow and the temperature of this 5 minute process.

3.2.2.2 Sludge Dump System

At the start the cleaning cycle, the Sludge Valve is opened by a solenoid for a period of 2.5 minutes. This allows the sludge to exit the FOG VGS* and is automatically returned to the retention pit or grease trap.

3.3 Options

There are many options available with a FOG VGS*. It is important to discuss your exact needs with your ACQUA representative.

3.3.1 Alarm System

An alarm system can be supplied with the FOG VGS*. It is located in a prominent position and is a 240V red flashing light that when illuminated will indicate:

- A high level within the collection pit which has been activated by a high level on the float switch.
- A delivery pump failure that has been activated by the pump supply circuit breaker. In this case, the standby pump is automatically activated.
- A control panel failure

3.3.2 Float Switches

The FOG VGS* can be supplied with 3 different float switches:

- MAC 310 (10m of cable)
- MAC 315 (15m of cable)
- MAC 320 (20m of cable)

If a high level alarm is required, then 2 float switches will need to be fitted.

4 TYPICAL INSTALLATION

Diagrams

Location

Electrical Connections

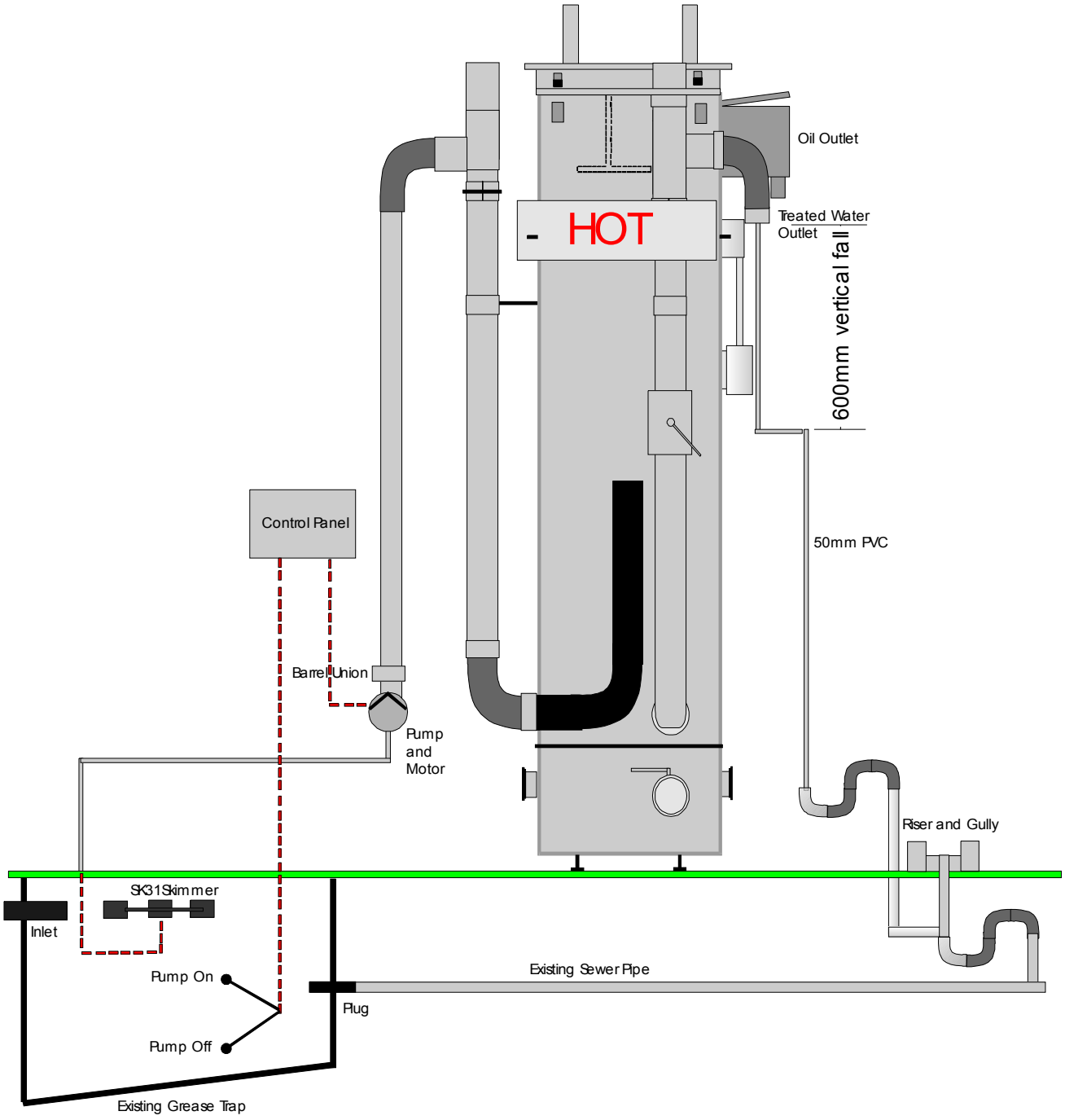
Installation and Assembly

Alarm System

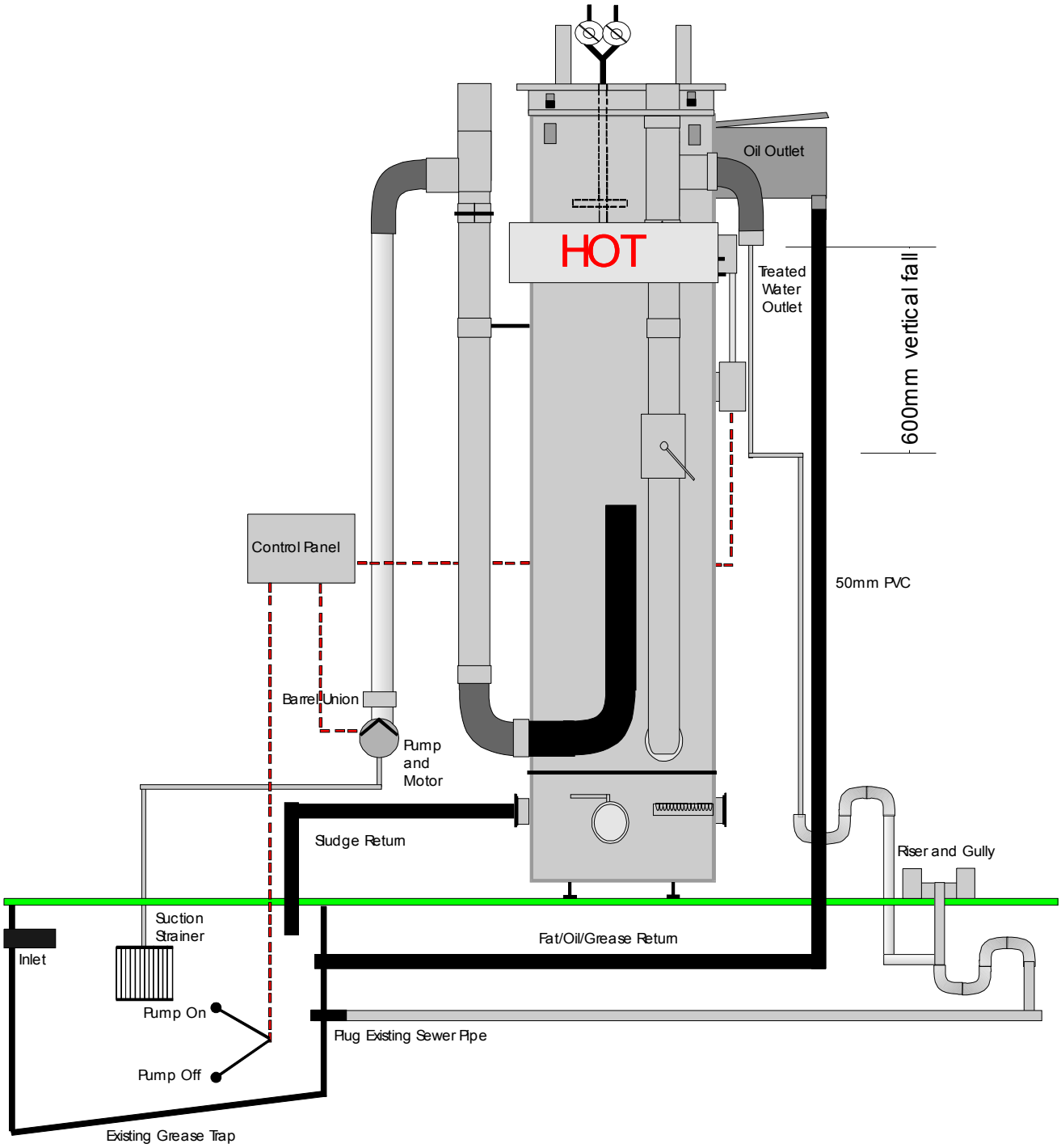
Commissioning

4.1 Diagrams

4.1.1 FOG VGS* (Manual) System Installation



4.1.2 FOG VGS* (Automatic) System Installation



4.2 Prior to Installation

Prior to commencing the installation of a FOG VGS* the following procedures need to be carried out:

- Notification of the relevant water authorities of the proposed installation.
- Initial site inspection by both the manufacturer/supplier and the client's representative.
- Preparation of detailed design drawings for the proposed installation.
- Notification or service change between the client and the pump out contractor.

4.3 Location

The FOG VGS* should be placed on a level and firm base. Failure to level the FOG VGS*, will result in the incorrect operation of the system.

4.4 Electrical Connections

If the wastewater being treated has Class 3 Flammable Liquids present, then the electrical system must be moved to pre-determined areas that are safe from flammables. Please refer to Government guidelines for installation and positioning.

4.5 FOG VGS* Installation and Assembly

FOG VGS* Installation and Assembly		
Control Panel	Mounting	The control panel should be mounted in an easily accessible position, which is in close proximity to the FOG VGS*.
Suction Point (Skimmer*)	Connection	The suction point should preferably be an ACQUA SK31 Skimmer*. The SK31 comes complete with a 1-metre long suction hose and a 1" BSP male connector. This is attached to the suction pipe in the feed pit.
Check Valve	Connection	A backflow device or check valve must be installed between the suction point and the pump. Preferably this should be installed in the feed pit.
Float Switch	Feed Pit	The float switch cable should be attached by cable ties to the suction piping from the feed pit. The cable should then pass through a suitable conduit to the control panel.
	Control Panel	The float switch is wired into the plug (supplied) and then connected to the control panel. Refer to the float switch manual for these instructions.
Pump	Pipe Connections	A 32mm (minimum) copper pipe should run from the feed pit, to the pump. It is preferable to install a barrel union on either side of the pump.
	Control Panel	The pump can then be plugged into the control panel.
Oily Water Inlet	Pump to FOG VGS*	Connect the piping from the pump to the marked Oily Water Inlet on the FOG VGS*. This is a 2" BSP socket, and a reducer should be fitted to the 32mm copper piping.
Waste Oil Outlet	FOG VGS* to FOG Collection	Install a suitable oil outlet, preferably a 50mm flexible hose, to a waste container.
	Oil Level Adjuster	The oil level adjuster is located in the oil outlet. This is a weir adjuster and is visually set to the type of oil being separated.
Clean Water Outlet	FOG VGS* to Sewer	Install a 50mm discharge pipe between the FOG VGS* and the sewer. This must have a minimum fall of 600mm and empty into a sewer tundish. Failure to install this correctly, will result in the incorrect operation of the FOG VGS*.
Thermostat	Connection	The thermostat can be connected to the control panel.

4.5.1 Alarm System (If Installed)

The alarm system should be positioned in a prominent location. An alarm response procedure card is supplied with the system and is to be mounted local to the alarm light. Please refer to your supplier instruction manual for installation instructions.

4.6 Commissioning

The following procedure should be carried out when commissioning a FOG VGS*:

FOG VGS* Commissioning	
Waste Tank	Place a waste tank under the Waste Oil Outlet outlet, connected by a 50mm flexible hose.
Charge the FOG VGS*	Fill the main body of the FOG VGS* through the Waste Oil Outlet box by using a hose and clean tap water (where available).
Pump	Charge the pump by filling by the suction and discharge lines. Start the pump.

5 SKIMMER* SPECIFICATIONS

The SK31 Skimmer*

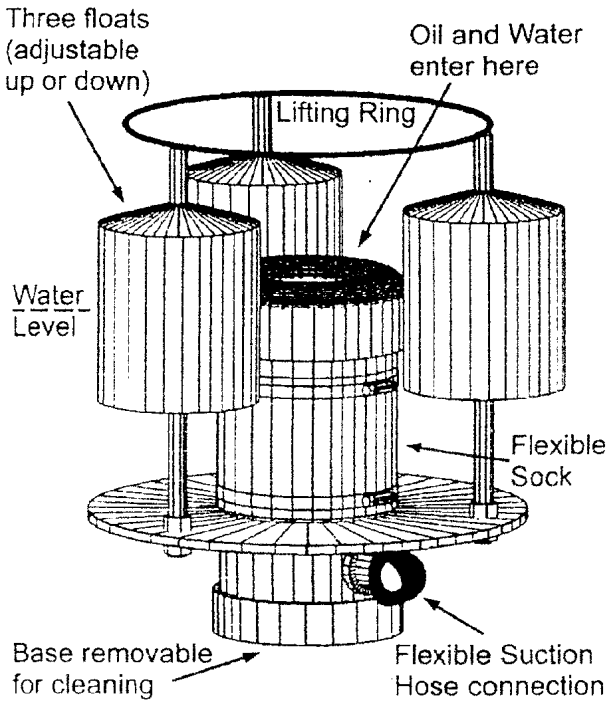
ACQUA Liquid Skimmers

5.1 THE SK31 SKIMMER*

The SK31 Skimmer is a compact oil/water skimmer with a small trash basket. It floats on the surface of the liquid, efficiently gathering free oil and water for delivery to the FOG VGS*.

5.1.1 Features

SK31 Skimmer* Features	
Skimmer	**Trash Basket**
• Lightweight and compact	• Backup for emergencies
• Extra suction hose (optional)	• Prevents blockage to the pump
• Small in diameter	

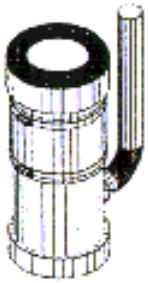


5.1.2 Specifications

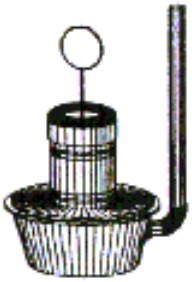
SK31 Skimmer* Specifications	
Flow Rate	600 - 3000 L/hr
Weight	4.6kg
Dimensions	360mm (diameter) x 350mm (height)
Minimal Operational Water Depth	300mm
Materials	Plastic and Steel
Flexible Suction Hose (as supplied)	1m x 1" BSP Female

5.2 ACQUA Liquid Skimmers

ACQUA Liquid Skimmers						
	SK20	**SK21**	**SK31**	**SK32**	**SK35**	**Combo**
Oil/Water	Yes	Yes	Yes	Yes	Yes	Yes
Grease/Water	No	Yes	No	No	Optional	No
Removable Trash Basket	No	Yes	No	Yes	Yes	Yes
Jumbo Trash Basket	No	Optional	No	Optional	Optional	Optional
Fluid Pre-screening	Yes	No	Yes	No	No	No
Body Diameter (mm)	140	300	360	450	520	450
Weight (kg)	1.0	5.0	4.6	7.0	10.0	10.0
Minimum Operational Water Depth (mm)	250	300	300	300	300	400
Maximum Flow Rate (L/hr)	3000	3000	3000	3000	3000	3000
Constant Level Interceptors	Fixed	Fixed	Floats	Floats	Floats	Floats
Floats at Oil/Water Interface	Fixed	Fixed	Yes	Yes	Yes	Yes
Submerged Intake Screen	No	No	No	No	No	Yes



SK20



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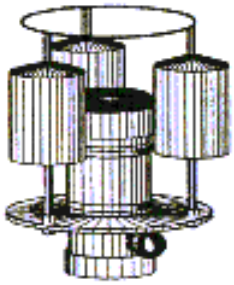
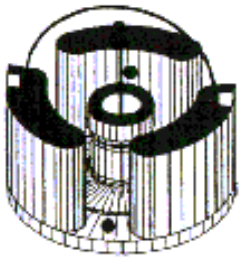
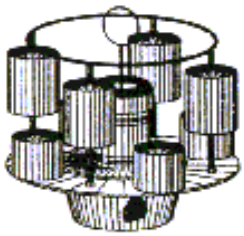


SK31



SK32



SK35

Combo

6 ROUTINE MAINTENANCE

FOG VGS* Maintenance

6.1 FOG VGS* Maintenance

The FOG VGS* must be maintained on a strict and regular basis to ensure continual, efficient and trouble free operation.

It is extremely important that a customer maintain the FOG VGS* to ACQUA service standards, and that the use of third party contractors for the cleaning of the retention pit and the disposal of solids, fats, oils and grease is adhered to.

6.1.1 Daily Maintenance

The FOG VGS* should have the following assessed daily:

FOG VGS* Daily Maintenance	
Alarm System	A test button for the Alarm System is located on the Control Panel. This should be pressed daily to ensure the illumination of the alarm.
Screening	It is imperative that all floor and sink screening systems within the premises are in place at all times. Report all missing or defective screens for immediate replacement.

6.1.2 Monthly Maintenance

The FOG VGS* must be serviced monthly at a minimum.

FOG VGS* Monthly Maintenance	
Visual Inspection	An overall visual inspection of the FOG VGS* and the surrounding areas.
Retention Pit Inspection	Inspect the retention pit for build-up and organise a pump and scrape out if necessary.
Back flush the FOG VGS*	Make sure that the FOG VGS* is operating. Close the Back Flush Valve and the unit will begin to overflow through the Waste Oil Outlet. When it is visually clear that water is being discharged, open the Back Flush Valve. Place a sludge container under the Sludge Outlet and open the valve. When the sludge empties and water is being discharged, close the Sludge Valve. Dispose of the sludge as necessary. Close the Back Flush Valve and repeat the initial step. This is not required for an Automatic FOG VGS*.
Flush and clean all lines	Flush and clean all lines with hot water. This is not required for an Automatic FOG VGS*.
Oil Level	Inspect and clean the level sensing equipment in the Waste Oil Outlet.
Suction Equipment	Inspect and if necessary replace the disposable portion of the suction strainer assembly.
Electrical Components	Check all electrical components.
Automatic Sequences	Test the automatic sequences from the Control Panel. This includes the Thermostat control, the Aeration System, the Flushing Solenoid and the Sludge Solenoid.

7 MONO CP SERIES PUMP RANGE MANUAL

Mono CP Series Pump Range

Operating and Maintenance Instructions

1 INTRODUCTION

Mono CP pumps

These pumps are designed for long, trouble-free service in many fields such as in light industrial, domestic and agriculture. Their application include wine and beverage, filling machines, weak acid and alkali transfer, sump duties, septic and sullage disposal, brine injection, spear point, domestic water supply, garden reticulation and the like.

The discharge port of the pump is nearest to the driving (motor) end on all models. The maximum temperature allowable is 80°C and should never be exceeded.

For fluids other than water consult your dealer or Mono Pumps (Australia) Pty Ltd to ensure the correct stator and mechanical seal materials are used.

2 INSTALLATION

2.1 Location of Unit

The pump should be bolted to a firm, flat base in a dry, well ventilated area. If mounted outside it is recommended that the motor be protected from the elements with a well ventilated cover. The pump should be accessible for inspection and repair.

2.2 Connecting the Pump Mechanically (Piping)

When connecting pipework to the pump it is preferable to USE THREAD TAPE. Great CARE SHOULD BE TAKEN NOT TO OVER-TIGHTEN connections to the pump, in particular when tapered thread fittings are used. PLASTIC FITTINGS are preferable.

Both the suction and discharge lines should be independently supported near the pump so that no strain will be thrown on the pump. The suction line should contain a minimum number of bends. Any bends necessary should have a large radii.

The suction line diameter shall be at least equal to the diameter of the suction port. For pumps operating with a suction lift, no valves should be placed in the suction line. For long suction lines a foot valve may be fitted. It is very important to have the suction line airtight. Arrange the suction pipework in such a way to ensure minimum operation without liquid.

Foot valves, when used, should have an open area of at least 1 1/2 times the area of the suction pipe. An efficient strainer should be provided to prevent foreign matter from being drawn into the pump and choking the foot valve. It is recommended that no foot valve or strainer be fitted for septic effluent duties.

The discharge line will preferably be the same or one size larger than the pump discharge branch size and it should be short and direct with the least number of bends and fittings, thus minimising the head lost by friction.

A non-return valve should be fitted on the discharge side to high head, long discharge lines and auto pressure system applications. The non-return valve is to protect the pump from excessive back pressure, and, where the pump is operating on a long suction line suitable valves should be fitted to ensure the pump does not run dry.

2.3 Electrical Connection

Single -phase pump units are supplied complete with a plug and lead. This can be plugged into any single-phase power outlet. Single-phase pump units are supplied fitted with a thermal overload. In the event of the motor overheating, the overload will activiate and the motor will stop. Once the cause of the overheating has been identified and removed, the red button on the back of the capacitor box will reset the overload and the motor can be restarted.

Three-phase motors should be connected to the electrical supply as shown in the terminal box. Only a registered electrical contractor should carry this out.

Three-phase motors should be protected through the installation of a thermal cut out of the non-self resetting type.

When a three-phase power supply is available, the motor should be connected in star configuration.

When a single-phase frequency controller is being used, the motor should be connected in delta to the three-phase power that is being created by the frequency controller. Three-phase frequency controllers should not be used.

If a frequency controller is to be used, the motor speed

for continuous applications should fall within the range 800rpm to 1500 rpm. Outside this speed range the motor is likely to overheat due to higher currents or reduced cooling effec from the fan.

All three-phase motors on Mono pumps should be wired for direct on line starting. Do not use star-delta starting.

3. OPERATION

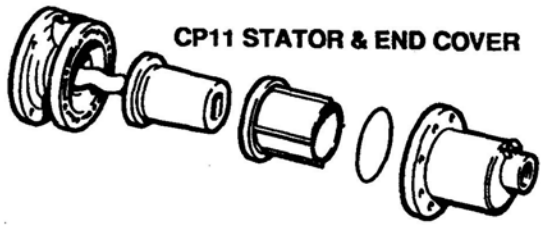
FILL THE PUMP WITH LIQUID BEFORE STARTING - NEVER RUN THE PUMP DRY

3.1 Starting

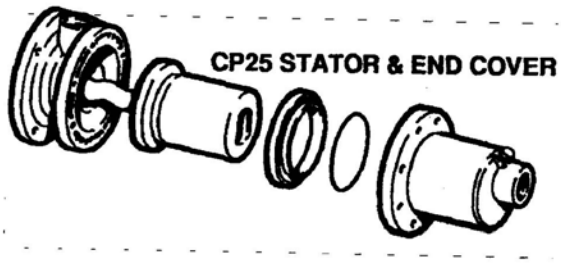
The plug (3) on the end cover (1) immediately adjacent to the suction port, should be removed before starting the pump for the first time and the pump filled with liquid.

This is not to prime the pump, but is required for lubrication to prevent damage to the stator (2) on starting

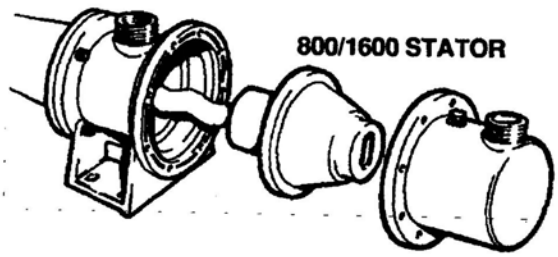
The pump should be mounted with the suction port horizontal on the CP11 & CP25 and vertical on the CP800 & CP1600.



CP11 STATOR & END COVER



CP25 STATOR & END COVER



800/1600 STATOR

When the pump is stopped sufficient liquid will be retained to provide start-up lubrication. If the pump has been standing for some time or has been drained by removal of the end cover (1) the pump must again be filled with liquid to lubricate the stator.

3.2 Maintenance

Disassembly

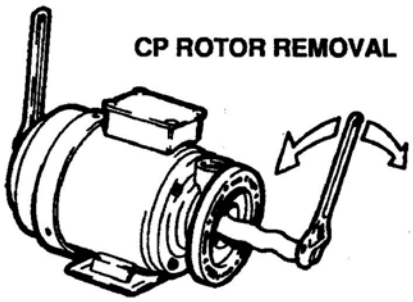
(a) Stator (2). Undo the eight nuts (12) and remove bolts to release end cover (1). NOTE: CP800 and CP1600. The lower four bolts that pass through the aluminium support foot (40) are longer than the upper four.

Remove end cover (1).

CP11 and CP25 - remove stator support (41) with O'rings (37).

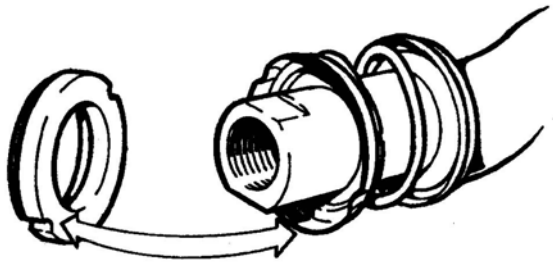
(b) Rotor (4). Holding the end of the motor shaft with a spanner, place a second spanner on the flats of the rotor (4). By rotating clockwise for the CP11 and anti-clockwise for the CP25, CP800 and CP1600, the rotor (4) may be removed, taking care that the mechanical seal (6) is not damaged. With the CP11 and CP25, if fitted with a stub shaft (38) should this come away with the rotor (4) they may be separated by turning in the opposite direction, holding the stub shaft (38) with a spanner on the flats provided. With the CP1600, the rotor (4) will be removed complete with the universal joint assembly

(c) Mechanical seal (6). This component is entirely self adjusting and needs no maintenance. Removal of the rotor (4) will release the mechanical seal (6) which may then be slid off its shaft. If it is intended to re-use the mechanical seal (6), care should be taken not to damage the sealing faces.



CP ROTOR REMOVAL

To remove the static seat of the mechanical seal, undo

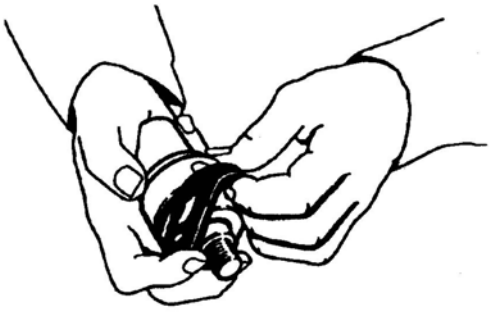


MECHANICAL SEAL SEAT

the four nuts (20) or set screws (17) at the motor/ bearing housing/body flange and remove bolts. (Note: The lower two bolts that pass through the aluminium support foot (40) are longer than the upper two on the bareshaft CP800 and CP1600). The body (5) and support foot (40) may then be removed from the motor/ bearing housing. Care should be taken to ensure the static seat does not touch the shaft or that the face is damaged. (Note: The O-ring (37) on the CP800 and CP1600 can now be removed).

(d) Universal Joint (CP1600). After removal of mechanical seal the universal joint can be disassembled by first removing the rubber boot (44) from drive head coupling (42). The drive pin (45) may then be pushed out allowing rotor (4) with coupling ball (43) to be removed from drive head coupling (42) with a slight twisting motion.

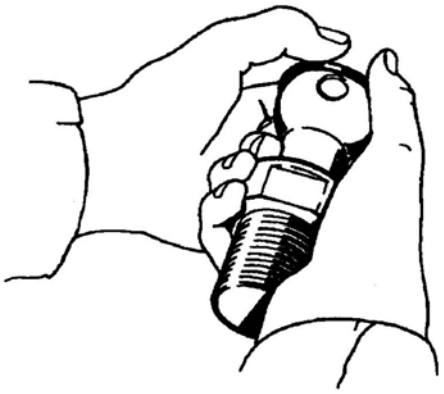
If necessary the seal rings (46) may be removed by gently pushing them by hand over the coupling ball



CP1600 RUBBER BOOT

(43). It is recommended that to prevent seal ring damage no tools are used to lever seal rings on or off the coupling ball. Unless replacing either rotor (4) or coupling ball (43) it is not necessary to separate these two components.

(e) Bearing Housing (24). Bareshaft pumps. Using circlip pliers, remove circlip (35). The main shaft

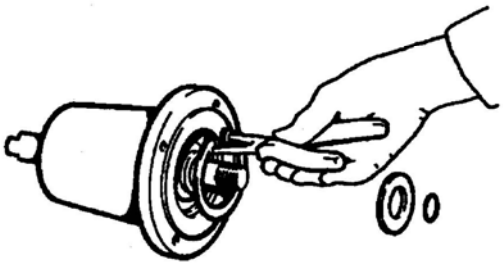


CP1600 UNIVERSAL JOINT 'O' SEAL

(39) with bearings may now be removed from the bearing housing (24). Removal of the circlip (36) will allow bearings (26 & 25) to be removed from main shaft (39).

Re-assembly

(a) Bearing housing (24). Press bearings (25 & 26) on main shaft (39). Place circlip (36) in position



CIRCLIP BEARING HOUSING ASSEMBLY

(CP800, CP1600). The shaft and bearing assembly can now be assembled as a unit into bearing housing (24). Fit circlip (35) and ensure shaft turns freely.

NOTE: Bearings are sealed for life and as such cannot be repacked with grease. If replacing bearings, double sealed type must be used in assembly.

After installing the thrower (8) onto shaft (39) replace shaft O-ring (37) into position (CP800 and CP1600) taking care not to damage it on the thread.

Carefully press the static face of the mechanical seal (6) into the body (5) ensuring that the face is not marked or damaged and is exposed.

Pass body (5) over the shaft and engage body flange on motor/bearing housing flange spigot with delivery port vertical.

Insert support foot (40) (CP800 and CP1600) between body flanges and align all bolt holes. Enter bolts (longer ones through support foot) or set screws ensuring flat washer is under head of bolt and between body and spring washer under nut. Tighten evenly.

(b) Rotor/universal joint assembly (CP1600). The seal rings (46) can be drawn over coupling ball (43) by supporting rotor with ball end pointing away from oneself and using the ends of the fingers of both hands pull each seal ring over ball end onto the seating collar.

In order to obtain the maximum life from the universal joint, it is important to ensure that the joint is liberally packed with special Mono Pump non-emulsifying grease.

After filling the drive head coupling (42) with grease push ball end in and rotate to align drive pin holes.

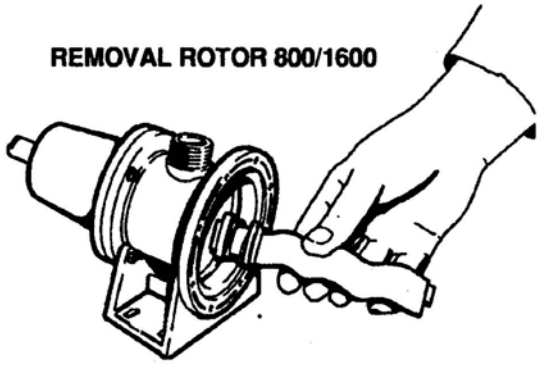
Insert drive pin (45) and re-fit rubber boot (44). To fit boot correctly it is necessary to first turn boot inside out. Then locate bead of boot in outer groove of drive head (groove nearest rotor) and fold over drive head into other groove.

(c) Rotor. Pass dynamic half of mechanical seal (6) over stub shaft/rotor head/drive head coupling ensuring that spring is seated in retaining washer.

Apply a small quantity of anti-seize compound on thread of shaft and screw on rotor/rotor assembly. Tighten until firm but do not over tighten. Ensure that the spring locating washer (CP11 & CP25) is not caught between the rotor (4) and stub shaft (38).

(d) Stator. Wet stator (2) with water and push over rotor (4) and locate flange to grooved recess in body. Place stator support ring (41) over stator and place O-ring (37) in position (CP11 & CP25).

REMOVAL ROTOR 800/1600



Place end cover (1) over stator (2) ensuring that small locating dowel is to the bottom and lined up with mating hole.

NOTE: The suction inlet should be in the uppermost position.

Insert bolts (longer ones through support foot (4) in CP800 & CP1600) with flat washers beneath head and screw on nuts with flat and lock washer. Tighten evenly and securely in position.

NOTE: DO NOT FORGET TO REMOVE FILLING PLUG (3) AND FILL PUMP WITH LIQUID FOR LUBRICATION PRIOR TO START-UP

ON LONG SUCTION LINES FILL THE SUCTION PIPE WITH LIQUID.

	Operating & Maintenance Manual	
Trouble Shooting Guide	**CP Range**	

	PROBLEM		CAUSE
1.	Motor will not run	-	Overload tripped out
		-	Blown fuse/power failure
		-	Defects in motor
		-	Faulty pressure switch (pressure system)
2.	No liquid delivered (Pump will not prime)	-	Pump not filled before starting
		-	Air leak on suction
		-	Discharge head too high (above rating)
		-	Suction lift too high
		-	Inlet pipe not submerged enough
		-	Non return valve too close to pump
		-	Insufficient net inlet head
		-	Damaged/worn stator/rotor
3.	Not enough liquid delivered	-	Air leak on suction
		-	Discharge head too high (above rating)
		-	Suction lift too high
		-	Inlet pipe not submerged enough
		-	Viscosity of liquid greater than rating
4.	Loss of liquid after starting	-	Air or gas in liquid
		-	Air leak on suction
		-	Suction lift too high
		-	Inlet pipe not submerged enough
		-	Insufficient net inlet head
		-	Blocked inlet
5.	Pump is noisy (cavitation)	-	Air or gas in liquid
		-	Blocked foot valve/strainer
		-	Restriction in line
		-	Too great total suction lift
6.	Pump vibrates	-	As for No. 5 above
		-	Pump not bolted down firmly
7.	Pump will not give rated pressure	-	Worn Stator/rotor or both rotor and stator
8.	Motor runs hot	-	Viscosity of liquid greater than rating
		-	Voltage/frequency differ to rating
		-	Overloads set too low (three phase)
		-	Defects in motor
		-	Pump overloaded (current too high)
			NOTE: Motor normally runs too hot to hold.
9.	Overload tripped out	-	Low voltage
		-	Too frequent starting (single phase)
		-	Overload set too low (three phase)
		-	Pump overloaded (current too high)
		-	Motor not protected from sun
10.	Pump starts too often (pressure system)	-	Incorrect pressure switch setting
		-	Leaking non return valve
		-	Lead in system pipework
		-	Pressure/diaphragm tank too small
		-	Pressure diaphragm tank air pre-charge too low
		-	Air bag in pressure tank damaged.
11.	Pump runs continuously	-	Pressure switch set incorrectly

Published information other than that marked CERTIFIED is to be used as a guide only.

Performance characteristics

NOTE: All pumps continuously rated to 28m head (40 psi)

CP11 and 4 Pole Motor	1" BSP	1430	6 m	Lph	715	670	630	570	540	490
				kW	0.2	0.2	0.2	0.2	0.2	0.2
			20ft	l Gph	157	147	139	125	119	108
				Hp	0.25	0.25	0.25	0.25	0.25	0.25
CP25 and 4 Pole Motor	1" BSP	1430	6 m	Lph	1620	1520	1410	1300	1210	1120
				kW	0.37	0.37	0.37	0.37	0.37	0.37
			20ft	l Gph	356	334	310	286	266	246
				Hp	0.5	0.5	0.5	0.5	0.5	0.5

CP800 and 4 Pole Motor	1 1/2" BSP	1450	6 m	Lph	3960	3860	3750	3600	3520	3400
				kW	0.55	0.55	0.55	0.55	0.55	0.55
			20ft	l Gph	870	849	825	792	774	748
				Hp	0.75	0.75	0.75	0.75	0.75	0.75
CP1600 and 4 Pole Motor	1 1/2" BSP	1450	6 m	Lph	7600	7500	7320	7140	6930	6700
				kW	0.95	0.95	0.95	0.95	0.95	0.95
			20ft	l Gph	1670	1650	1610	1570	1525	1470
				Hp	1.25	1.25	1.25	1.25	1.25	1.25

CP800 and 6 Pole Motor	1 1/2" BSP	960	6 m	Lph	2550	2470	2390	2310	2260	2190
				kW	0.75	0.75	0.75	0.75	0.75	0.75
			20ft	l Gph	561	543	526	508	497	482
				Hp	1.00	1.00	1.00	1.00	1.00	1.00
CP1600 and 6 Pole Motor	1 1/2" BSP	960	6 m	Lph	5060	4930	4770	4590	4420	4180
				kW	0.75	0.75	0.75	0.75	0.75	0.75
			20ft	l Gph	1113	1085	1049	1010	972	920
				Hp	1.00	1.00	1.00	1.00	1.00	1.00

NB: 0.75 kw 1o 6Ø pole motor is 25mm longer than the standard 4 pole motor.

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Effective from July 1998 the following Design Improvement applies to Pump Models CP11B, CP25B (bareshaft).

The stubshaft (item 38) is no longer a separate item. It is now integral with the main shaft (item 39). Shaft material has been upgraded to Stainless Steel for all models.

SF main shafts are interchangeable with existing Pumps in Service and can be used to upgrade models prior to July 1998.

	DESCRIPTION	CP11		CP25	
		CP11B	CP11	CP25B	CP25
1.	End Cover	AC CP11 2400	AC CP11 2400	AC CP11 2400	AC CP11 2400
2.	Stator SR - synthetic rubber	RR CP11 2200	RR CP11 2200	RR CP25 2200	RR CP25 2200
3.	Plug	OO CP00 0430	OO CP00 0430	OO CP00 0430	OO CP00 0430
4.	Rotor	SF CP11 2500	SF CP11 2500	SF CP25 2500	SF CP25 2500
5.	Body	AC CP11 0100	AC CP11 0100	AC CP11 0100	AC CP11 0100
6.	Mechanical Seal - kit ceramic	MPK-SK011	MPK-SK011	MPK-SK011	MPK-SK011
	Mechanical Seal - Stainless steel	ST CP11 1050	ST CP11 1050	ST CP11 1050	ST CP11 1050
	Mechanical Seal	ZU CP11 1050	ZU CP11 1050	ZU CP11 1050	ZU CP11 1050
8.	Thrower	RR CP11 4200	RR CP11 4200	RR CP11 4200	RR CP11 4200
9.	End Cover bolt	K112240F	K112240F	K112240F	K112240F
10.	End Cover flat washer	W112051F	W112051F	W112051F	W112051F
11.	End Cover Lock Washer	W112251F	W112251F	W112251F	W112251F
12.	End Cover Nut	N112100F	N112100F	N112100F	N112100F
17.	Motor Bolt		K113220F		K113220F
18.	MotorFlat Washer		W113051F		W113051F
19.	Motor Spring Washer		W113251F		W113251F
24.	Bearing Housing	AL CP11 0110		AL CP11 0110	
25.	Bearing Large	A170202B		A170202B	
26.	Bearing Small	OO CP11 3400		OO CP11 3400	
27.	Bearing Housing Bolt	K113260F		K113260F	
28.	Bearing Housing Flat Washer	W113051F		W113051F	
29.	Bearing Housing Lockwasher	W113251F		W113251F	
30.	Bearing Housing Nut	N113100F		N113100F	
35.	Circlip	MG CP11 5500		MG CP11 5500	
37.	O-ring	RR CP11 2010	RR CP11 2010	RR CP11 2010	RR CP11 2010
38.	Stub Shaft (obsolete)	SF CP11 3210	SF CP11 3210	SF CP25 3210	SF CP25 3210
39.	Main Shaft	SF CP11 3212		SF CP25 3212	
41.	Stator Support Ring	AC CP11 4700	AC CP114700	AC CP25 4700	AC CP25 4700
47.	Motor 415v. 1/4 hp 3 phase		CPE0253TFM		
48.	Motor 240v 1/4 hp single phase		CPE0251CSTFM		
49.	Motor 415v 1/2 hp 3 phase				CPE0503TFM
50.	Motor 240v 1/2 hp single phase				CPE0501CSTFM
55.	Motor thermal overload		CMG-1025		CMG-1025
OPTIONS:					
	Mechanical Seal	RV CP11 1050	RV CP11 1050	RV CP11 1050	RV CP11 1050
	Mechanical Seal	TU CP11 1050	TU CP11 1050	TU CP11 1050	TU CP11 1050
	Mechanical Seal - Stainless steel	ST CP11 1050	ST CP11 1050	ST CP11 1050	ST CP11 1050
	Mechanical Seal	ZU CP11 1050	ZU CP11 1050	ZU CP11 1050	ZU CP11 1050
	O-Ring	RV CP11 2010	RV CP11 2010	RV CP11 2010	RV CP11 2010
	Stator	RA CP11 2200	RA CP11 2200	RA CP25 2200	RA CP25 2200
	Stator	RJ CP11 2200	RJ CP11 2200	RJ CP25 2200	RJ CP25 2200
	Stator	RH CP11 2200	RH CP11 2200	RH CP25 2200	RH CP25 2200
	Stator	RV CP11 2200	RV CP11 2200	RV CP25 2200	RV CP25 2200
	Stator RB - natural rubber			RB CP25 2200	RB CP25 2200

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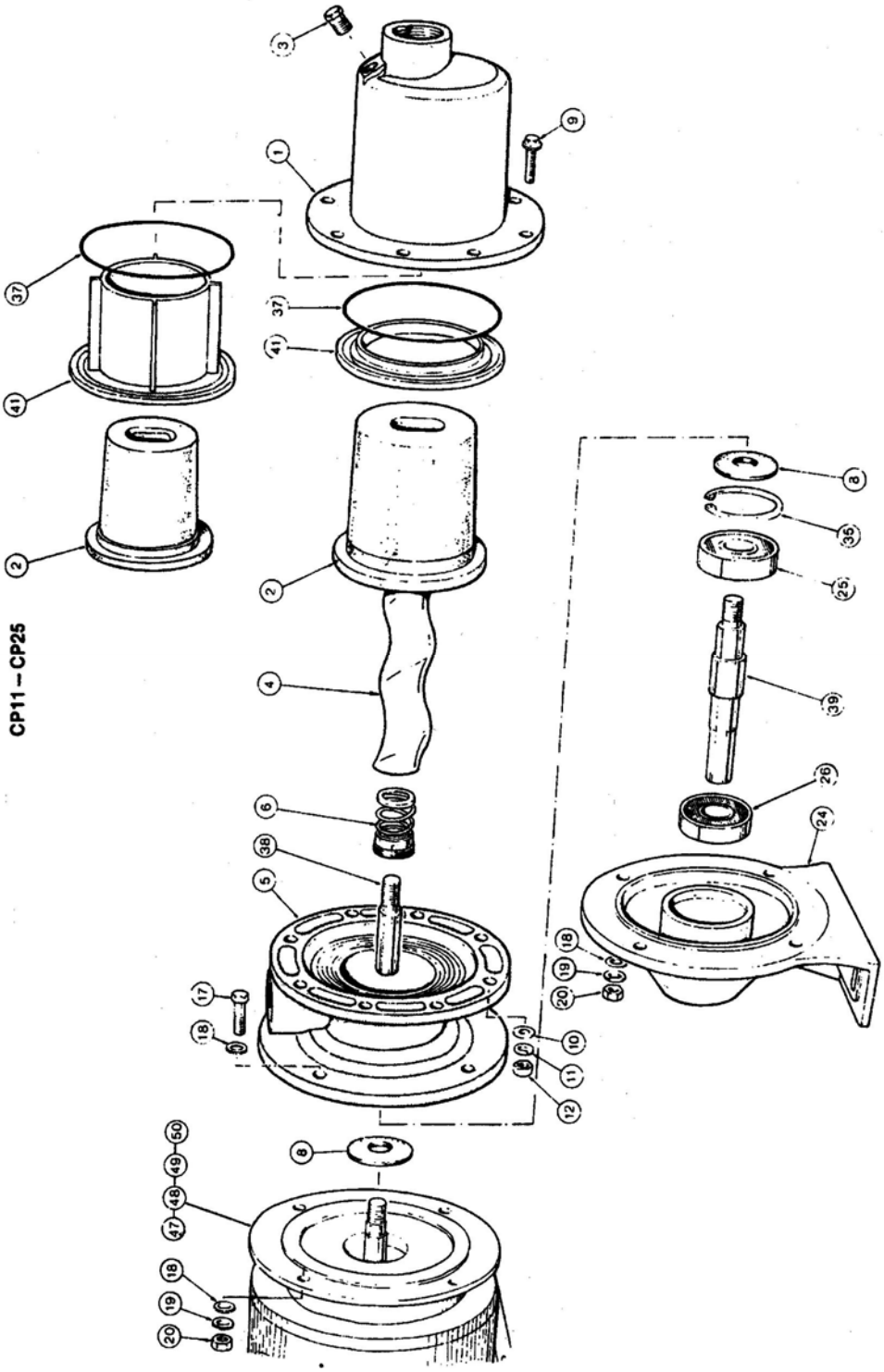

Published information other than that marked CERTIFIED is to be used as a guide only.

		CP800		CP1600	
		CP800B	CP800	CP1600B	CP1600
1.	End Cover	AC CP800 2400	AC CP800 2400	AC CP800 2400	AC CP800 2400
2.	Stator SR - synthetic rubber	RR CP800 2200	RR CP800 2200	RR CP1600 2200	RR CP1600 2200
3.	Plug	OO CP00 0430	OO CP00 0430	OO CP00 0430	OO CP00 0430
4.	Rotor	SB CP800 2500	SB CP800 2500	SB CP1600 2500	SB CP1600 2500
5.	Body	AC CP800 0100	AC CP800 0100	AC CP1600 0100	AC CP1600 0100
6.	Mechanical Seal - kit	OO SWP800 1050	OO SWP800 1050	OO SWP800 1050	OO SWP800 1050
8.	Thrower	RR CP800 4200	RR CP800 4200	RR CP800 4200	RR CP800 4200
9.	End Cover bolt	K113280F	K113280F	K113280F	K113280F
10.	End Cover flat washer	W113051F	W113051F	W113051F	W113051F
11.	End Cover Lock Washer	W113251F	W113251F	W113251F	W113251F
12.	End Cover Nut	N113100F	N113100F	N113100F	N113100F
13.	End Cover, Support Foot bolt	K113290F	K113290F	K113290F	K113290F
14.	End Cover, Support Foot F/washer	W113051F	W113051F	W113051F	W113051F
17.	Motor Bolt		K113220F		K113220F
18.	MotorFlat Washer		W113051F		W113051F
19.	Motor Spring Washer		W113251F		W113251F
21.	Motor, Support Foot bolt		K113260F		K113260F
22.	Motor, Support Foot Flatwasher		W113051F		W113051F
23.	Motor, Support Foot Lockwasher		W113251F		W113251F
24.	Bearing Housing	AL CP800 0110		AL CP800 0110	
25.	Bearing Large	A170402B		A170402B	
26.	Bearing Small	A170302B		A170302B	
27.	Bearing Housing Bolt	K113260F		K113260F	
28.	Bearing Housing Flat Washer	W113051F		W113051F	
29.	Bearing Housing Lockwasher	W113251F		W113251F	
31.	Bearing Housing, Supp.Foot Bolt	K113290F		K113290F	
32.	Bearing Housing, Support Foot F/washer	W113051F		W113051F	
33.	Bearing Housing, Support Foot L/washer	W113251F		W113251F	
34.	Bearing Housing, Supp. Foot Nut	N113100F		N113100F	
35.	Circlip	MG CP800 5500		MG CP800 5500	
36.	Circlip	MG CP800 5510		MG CP800 5510	
37.	O-ring	RR CP800 3110	RR CP800 3110	RR CP800 3110	RR CP800 3110
39.	Main Shaft	MM CP800 3200		MM CP800 3200	
40.	Support Foot	AL CP800 6200	AL CP800 6200	AL CP1600 6200	AL CP1600 6200
42.	Drivehead			SB CP1600 3210	SB CP1600 3210
43.	Coupling Ball			SB CP1600 2600	SB CP1600 2600
44.	Rubber Boot			RR CP1600 7500	RR CP1600 7500
45.	Drive Pin			SB D60 2900	SB D60 2900
46.	Seal Ring			RR D60 2800	RR D60 2800
50.	Motor 240v 1/2 hp single phase		CPE0753M		
52.	Motor 240v 3/4 hp single phase		CPE0751CSTFM		
53.	Motor 415v 1 1/4 hp 3 phase				CPE1253M
54.	Motor 240v 1 1/4 hp single phase				CPE1251CSM
55.	Motor thermal overload		CMG-1027		CMG-1029
OPTIONS:					
	Key	K100830P		K100830P	
	Stator RB - natural rubber	RB CP800 2200	RB CP800 2200	RB CP1600 2200	RB CP1600 2200
	Stator	RA CP800 2200	RA CP800 2200	RA CP1600 2200	RA CP1600 2200
	Stator	RJ CP800 2200	RJ CP800 2200	RJ CP1600 2200	RJ CP1600 2200
	Rotor	SF CP800 2500	SF CP800 2500	SF CP1600 2500	SF CP1600 2500
	Rotor	SB CP800 2520	SB CP800 2520	SB CP1600 2520	SB CP1600 2520
	Rotor	SF CP800 2520	SF CP800 2520	SF CP1600 2520	SF CP1600 2520

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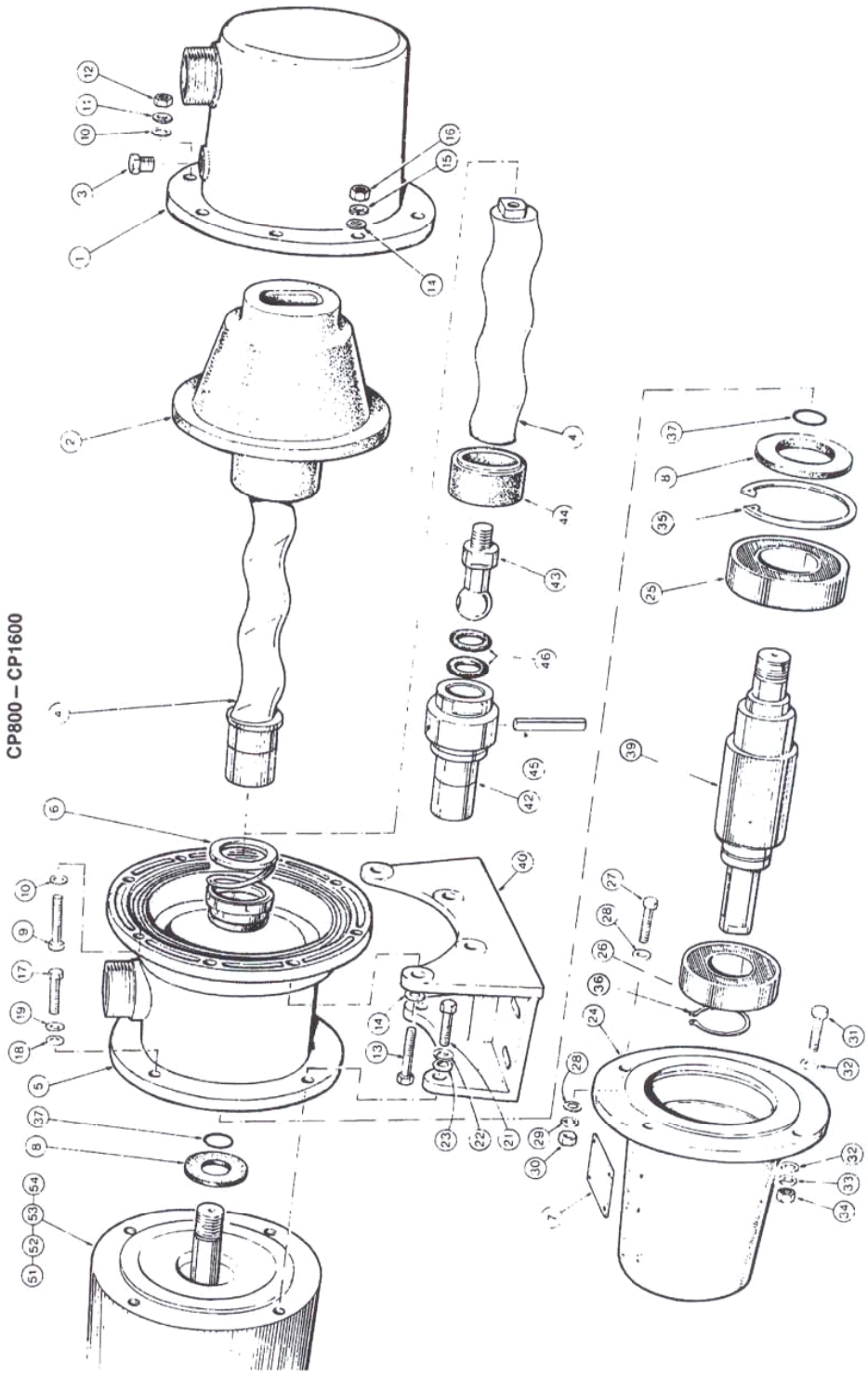


Published information other than that marked CERTIFIED is to be used as a guide only.

1. Pumps manufactured by Mono Pumps are covered by warranty for a period of twelve months from installation.

2. Mono Pumps will make good by repair, or at their option, the replacement of faulty parts under warranty, providing always that:

- The equipment was correctly installed and properly used in accordance with Mono Pumps Installation and Operating instructions and accepted codes of good engineering practice.
- Any claim under warranty arises solely from faulty design, material or workmanship.
- Repairs are carried out with the written approval of Mono Pumps (Aust) Pty Ltd who may choose to carry out the repair themselves or at their option nominate an approved repairer for the purpose.
- All costs other than the direct repair costs are borne by the purchaser.

3. Auxilliary equipment not of Mono Pumps manufacture but supplied by Mono as part of a package will be protected by the original manufacturers warranty. Mono Pumps warranty is limited to that extent.

4. Mono Pumps warranty does not cover any of the following:

- Claims for third party liability for damage caused by the failure of any of the company's products.
- Damage caused by abnormal operating conditions, war, violence, storm cataclysm or any other force.
- Damage caused by the equipment being used for an application for which the product is not recommended.

5. The decision of Mono Pumps in relation to any claims or disputes over warranty is final.

6. The warranty is in lieu of all other warranties and conditions expressed or implied, written or oral, statutory or otherwise, which are hereby negated and excluded.

7. This express warranty does not exclude any conditions or warranty implied by the Trade Practices Act 1974 or separate State laws and is in addition to any other right that the original purchasers or any subsequent purchaser may have at law.

In case of claim please contact your Authorised Mono Dealer or contact Mono Pumps (Australia) Pty. Ltd. direct with details as completed in Delivery Record.

8 FLOAT SWITCHES TECHNICAL SPECIFICATIONS

Float Switch Installation

Float Switch Diagrams

8.1 Float Switch Installation

The regulators are homologated in compliance with CEI EN 60730 standards and thereby comply with the fundamental requisites of Directive 93/68/EEC.

The appliance combined with the pump connected by a flexible cable, permits the regulation of the level of the liquid in which it is immersed.

The regulator in fact features a float with a totally waterproof casing, inside which there is a micro-switch connected to the cable.

The float position depends on the liquid level and determines the commutation of the microswitch that in turns control the pump operation.

INSTALLATION

To ensure the efficient function of the appliance it is necessary to fix the electric cable inside the tank or well as illustrated. The length of the cable section between the fixture point of the same and the regulator body, determines the total extension of the float and the consequent distances between the pump stopping and starting level. It is also necessary to check that the float is not obstructed during its run.
During installation joins to the level regulator cable must not be made under any circumstances.
An eventual cable join section must never be immersed in water.

COUNTERWEIGHT INSTALLATION IF PRESENT IN THE RETAIL PACKAGE

For correct counterweight installation refer to the following procedure as illustrated.

1. Insert the cable into the counterweight, from the conic part, turning it. This will result in the detachment of the plastic ring inserted in the mouth (if necessary aid detachment by using a screwdriver). Place the ring at the point of the cable where the counterweight is to be fixed.

2. Fix the counterweight on the ring using moderate pressure and turning it. The counterweight is only provided on request.

ELECTRICAL CONNECTIONS

The regulator may be used for filling or emptying according to the connections made between the terminals of the microswitch and the cable.
For correct product installation refer to wiring diagrams.

NOTE

When making the connections described above ensure that the maximum motor power does no exceed the values indicated on the level regulator.
The power supply cable is an integral part of the appliance. Should the cable be found to be damaged the appliance is to be replaced. Repairs to the cable itself are not possible.
The earth wire of yellow/green colour must be connected to a suitable earth terminal and the section dimension must not be less than $1mm^2$. The eventual terminal used must be effectively protected against accidental slackening.

ELECTRICAL FEATURES

MAXIMUM OPERATIONAL TEMPERATURE	50^oC
PROTECTION GRADE	IP68 (tested bu IMQ at a depth of 1m for a period of 7 days at water temp 50^oC
MAC3 RELIABILITY TEST	The appliances must pass an immersion test at depth of 10m, at a temperature of 50^oC for a period of 7 days
POLLUTION GRADE	NORMAL
FEATURES OF AUTOMATIC ACTION	1B (micro-disconnections in operation)

8.2 Float Switch Diagrams

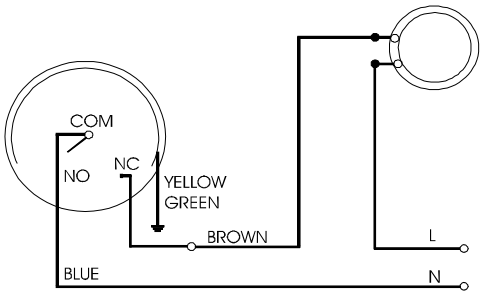


FIG 1

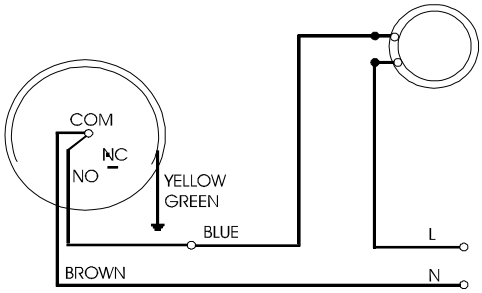


FIG 2

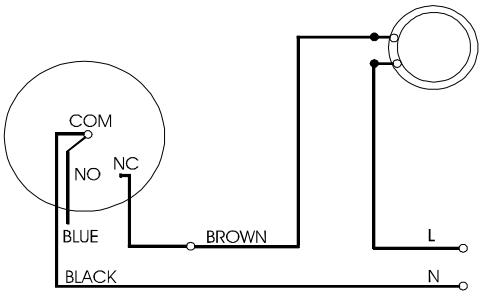


FIG 3

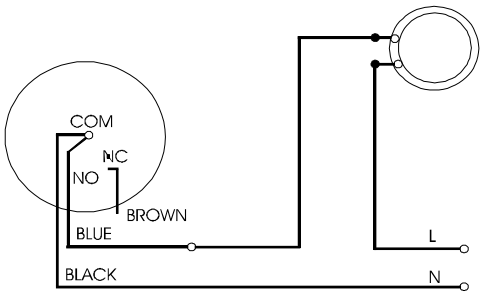
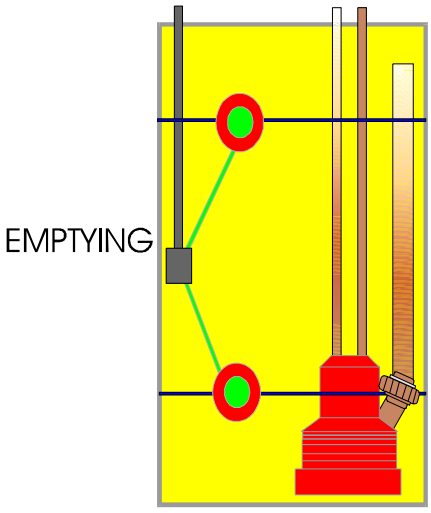
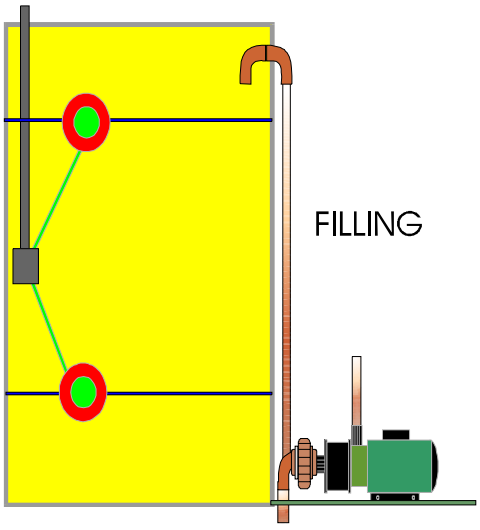


FIG 4

The wire that is not used must be correctly insulated





9 INDUSTRY INTEGRATION FLOWCHART

This industry integration flowchart illustrates the applications for the FOG VGS* and other ACQUA proprietary technologies.

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