Operation & Maintenance Manual

Original Instructions

UNIT DTK 500-1105 TRAILER MANUAL AND RADIO

003300	**3010 RADIO**
003304	**3010 MANUAL**

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Operation & Maintenance Manual for:

UNIT: DTK 500-1105 TRAILER:

003-300 3010 Manual

003-304 3010 Radio

ISSUE DATE: 12/05/2022

AMENDMENTS

Change	Changes	Date	Signature
1	INITIAL RELEASE	07/20	JHGS
2	SRV COMMENT ADDED	11/2020	JHGS
3	ADDED 003304 & REMOTE SECTION, UPDATED FRONT PAGES FORMAT	12/05/22	NJS

1. Contents & Introduction

1.1. Contents

1.2. Introduction

Please ensure that you read this Operation & Maintenance Manual in conjunction with the Health & Safety Manual before operation.

Within this manual the health and safety risks are highlighted with  and you are required to read the relevant section in the Health & Safety Manual.

Notices

Carefully read the notices of this manual because they give important information concerning safe installation, use and maintenance; familiarise yourself with the workings of the machine in order to rapidly switch it off and eliminate pressure.

This manual is an integral and essential part of the product; it must be consigned to the user in order to ensure the training/information for personnel.

The manufacturer does not assume responsibility for damage caused to persons, property or to the machine, in the case of improper use. Carefully preserve this manual for any further consultation.

Identify the model of your machine by reading the details on the identification plate. Upon delivery, inspect the machine / accessories for any damage, which may occur during transport.

IMPORTANT: Always follow the recommended operating procedures; do not misuse the equipment as this could result in injury or mechanical breakdown!

1.3. Scope of this Manual

This manual provides operation and maintenance instructions for the trailer. Where the unit has been fitted with proprietary components, details of these are also included in this manual.

This manual is compiled to match the Scope of Supply detailed in Section 2. All specifications, descriptions and parts lists refer only to the components in the version of the unit detailed in this scope of supply.

Maintenance instructions included in this manual include:

- Routine maintenance to be carried out at specific times.
- Maintenance of the high-pressure pump.

Repairs to the pump crankcase are not considered maintenance operations as these should be undertaken only by FLOWPLANT**,** their approved agents, or at least competent automotive engineers.

1.4. The Trailer

The Trailer is a highly versatile mobile high-pressure water jetting unit, which offers the benefits of proven power pack and pump performance with a comprehensive range of accessories.

It is plated at 1600 kgs and it has a maximum operational weight of 1500 kgs when filled with water to the maximum level allowed by the inlet float valve.

The options fitted to and the accessories supplied with this Trailer are detailed in Scope of Supply in Section 2

1.5. Composition of this Manual

This manual comprises the following further sections:

Section 2 Scope of Supply

This section defines the scope of supply of the equipment in compliance with the sales order.

Section 3 Technical Data

This section contains technical information about the unit.

Section 4 Operation

This section describes the recommended operating procedures for the unit.

Section 5 Routine Maintenance

This section details recommended routine maintenance requirements for the pump and unit.

Section 6 Fault Finding

Fault diagnosis tables for the pump, engine and ancillaries.

Section 7 Pump

Details of the pump and gearbox assembly.

Section 8 Circuit diagrams/Electrical Details

This section includes the Hydraulic, Water and Electrical circuits including engine controller & wiring loom.

Section 9 Diesel Engine

This section provides part details of the Kubota diesel engine.

Section 10 Parts list / Spares / Auxiliary components

How to identify and order spares / auxiliary components.

Section 11 Service Documents

Service logbook and checklist.

Section 12 Warranty & Certification

2. Scope of Supply

2.1. Scope of Supply

Unit:	DTK 500-1105 Trailer
Machine Build Code:	003-300 3010 MANUAL 003-304 3010 RADIO

2.2. Pump Assembly

The General Arrangement drawing No. 004-416 defines the components of the Trailer assembly as follows:

The pump is driven by an industrial diesel engine.

The engine drives the pump via a reduction gearbox which reduces the pump rpm down to the correct shaft speed.

Water is fed through the inlet hose reel from a mains supply into a plastic water storage tank; the tank supplies the pump with a positive head of pressure via a Hypro 80 mesh inline strainer that filters the water to approximately 177 microns.

(Do not fill the water tank directly, always use the inlet hose reel (in order to comply with Local Water Authority Regulations).

The **Speck** high-pressure plunger pump is driven by a **Kubota D1105-E4B-EU-X1 18.5kW Stage 5 C-TXT** industrial diesel engine through a Speck NP25 gearbox.

The water is directed by an electrically controlled Hydraulic diverter valve, to a hydraulically driven hose reel, or at low pressure ‘dumped’ back to tank.

The system is protected from over pressurisation by means of a Hawk safety relief Valve. The system pressure can be adjusted by means of a Speck UL221 Unloader Valve.

The pump’s selector can direct the water at high-pressure to a hydraulically driven hose reel or at low pressure ‘dumped’ back to tank.

The engine and system pressure can be monitored at the control panel situated at the rear of the trailer.

2.3. Detailed Drawings

Detailed drawings and parts lists for the above components are provided as follows:

The Pump is detailed in Section 7.

Details of other parts and assemblies are included at Section 10.

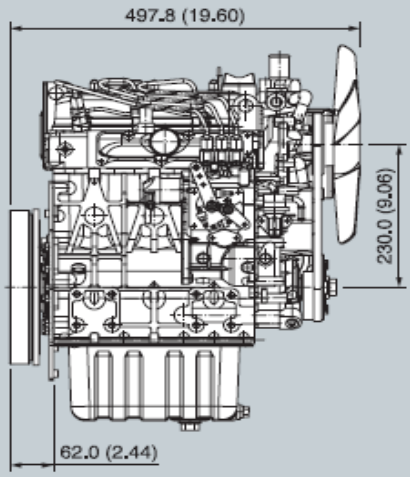
KUBOTA 05 SERIES D1105-E4B

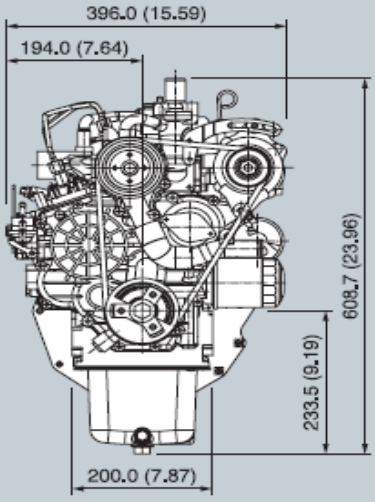
GENERAL SPECIFICATION

Model		D1105-E4B
Emission Regulation		Tier 4
Type		Vertical 4-cycle Liquid Cooled Diesel
Number of Cylinders		3
Bore	mm (in)	78.0 (3.07)
Stroke	mm (in)	78.4 (3.09)
Displacement	L (cu.in)	1.123 (68.53)
Combustion System		IDI
Intake System		Naturally Aspirated
Maximum Speed	rpm	3000
Output: Gross Intermittent	kW	18.5
	hp	24.8
	ps	25.2
Direction of Rotation		Counterclockwise Viewed on Flywheel
Oil Pan Capacity	L (gal)	5.1 (1.35)
Starter Capacity	V-kW	12-1.2
Alternator Capacity	V-A	12-40
Length	mm (in)	497.8 (19.60)
Width	mm (in)	396.0 (15.59)
Height (1)	mm (in)	608.7 (23.96)
Height (2)	mm (in)	233.5 (9.19)
Dry Weight	kg (lb)	93.0 (205.0)

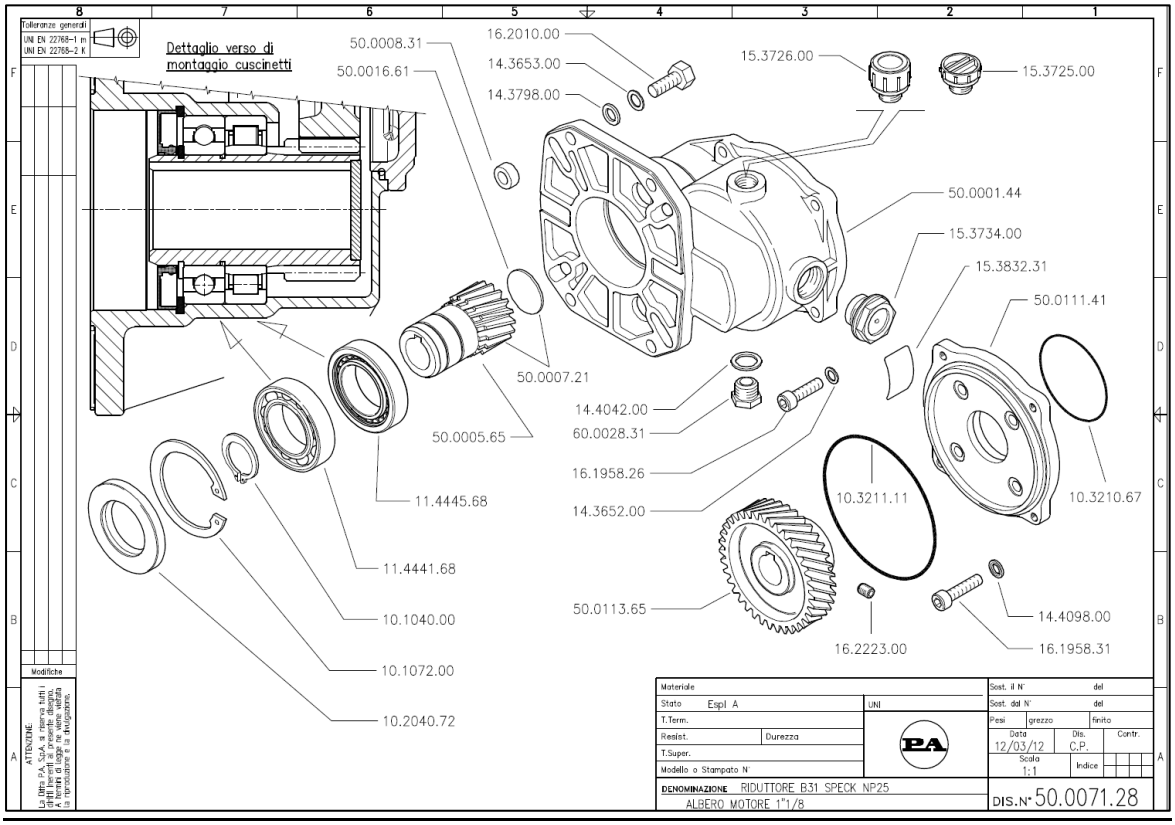
*Specification is subject to change without notice.
*Output: Gross Intermittent SAE J1995
*Dry weight is according to Kubota's standard specification. When specification varies, the weight will vary accordingly.

DIMENSIONS

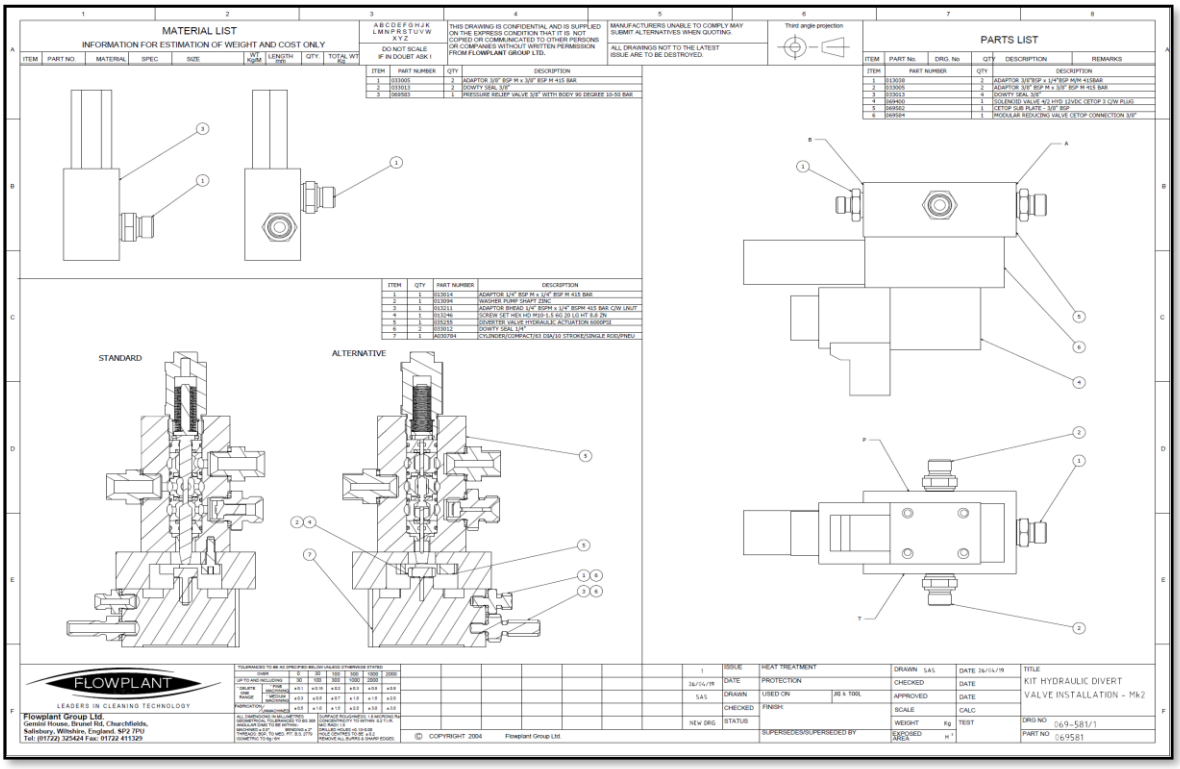




NP25 Gearbox Detail



Hydraulic Diverter Valve 069-581

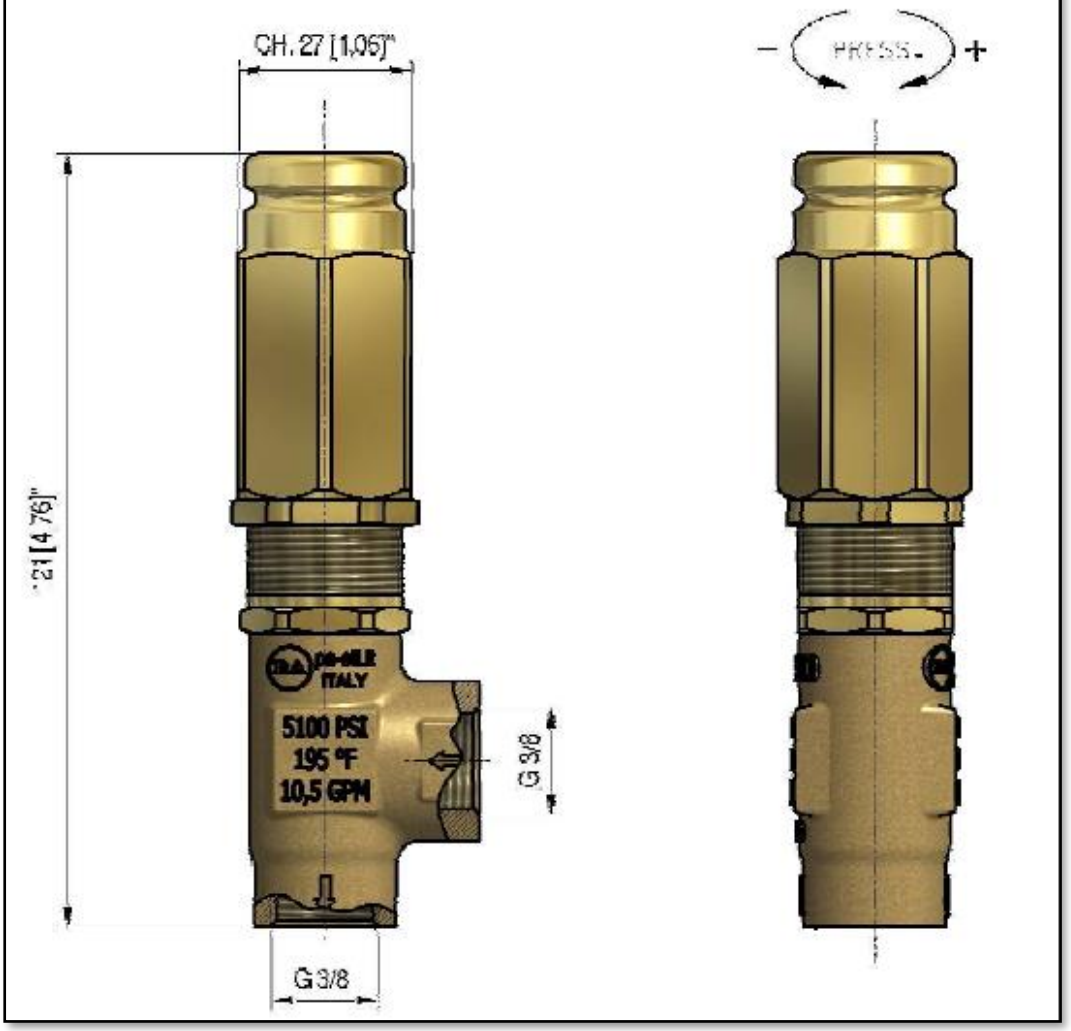


Hawk Safety Relief Valve 035-401

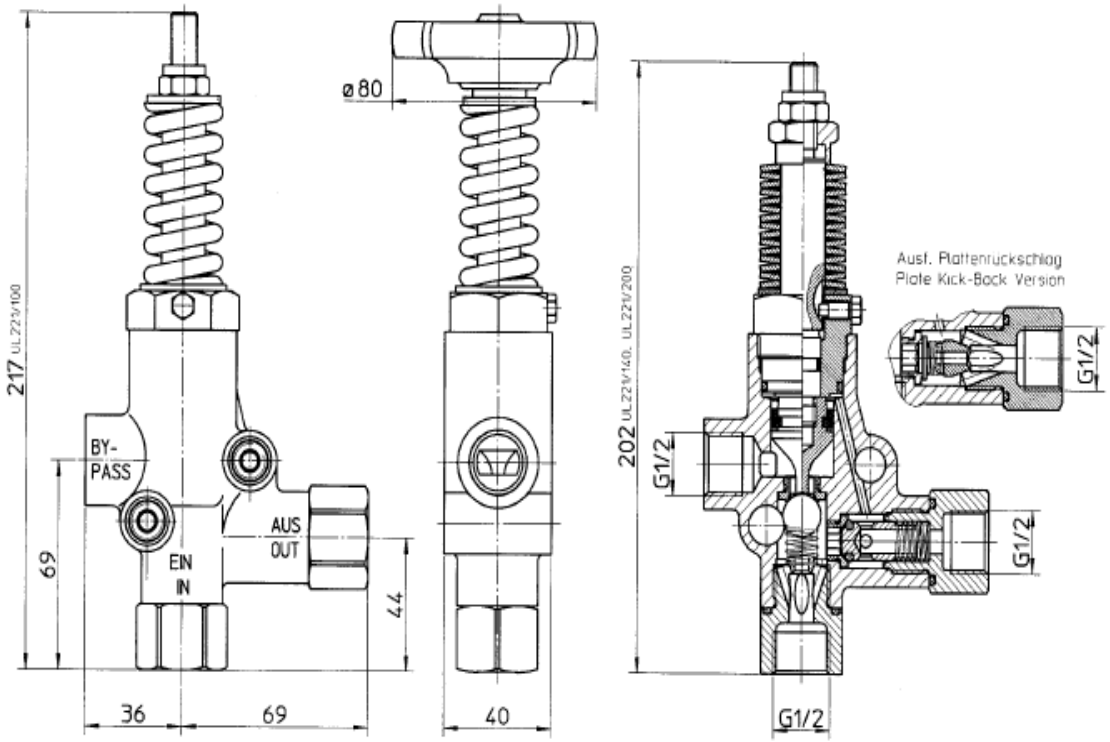
CARATTERISTICHE TECNICHE — TECHNICAL CHARATERISTICS

Codice Part No.	Pressione Max Max Pressure		Portata Flow rate		Temp. Max Max Temp.	Inlet Port Entrata	Outlet Port Uscita
	bar	PSI	l/min	GPM	°C		
1.099-493.0	310	4500	40	10.5	90	G3/8" F	G3/8" F

DIMENSIONI D'INGOMBRO — OVERALL DIMENSIONS



Speck Unloader Valve UL221 035-185



3. Technical Data

3.1. Technical data

3.1.1. Pump data

PUMP TYPE	Speck NP25/54-200 [positive displacement]
Number of cylinders	3
Power rating (nominal)	16.8 kW
Plunger diameter	25mm
Crankshaft speed	1450rpm
Maximum pressure	200
Normal operating pressure	200 bar [2900psi]
Flow rate	Up to 54 L/min
Crankcase lubrication	Splash / Gravity
Crankcase oil capacity	0.9 litres
Recommended crankcase oil	ISO VG 220 or SAE 90 Gear oil.
Valves	Identical suction & discharge.
NPSH	Input 10 bar max. Suction head -0.3 bar.

3.1.2. Main Components

00300

Engine	Kubota D1105-E4B-EU-X1 18.5kW Stage 5 C-TXT
Gearbox	Gearbox Speck NP25 Reduction box (2.176:1)

3.1.3. Ancillaries

Water tank	500 Litres Nominal Capacity
Supply filter	N05105 Hypro Line Strainer / 80 Micro Mesh
Monitoring & Control	Murphys MPC-20
Pressure Control and Safety	Hawk (Automatic SRV)

3.1.4. Services required

Mains water supply	Positive head capable of delivering greater than 60 lpm. *Note: Water pH value of 5 to 9 is recommended.*

3.2. Technical Description

3.2.1. Primary Components

The primary components of the trailer are as follows:

- A prime mover in the form of an industrial diesel engine which drives a high-pressure pump.
- The pump is capable of producing high-pressure water *Note: See above or section 7 for performance options*.
- A hydraulic driven hose reel with high-pressure hose with either a nozzle or gun attachment to deliver the high-pressure water to the work application.
- Plastic Polyethylene water tank, acting as a reservoir, also ensuring the water is settled and non-turbulent, discharging a smooth uninterrupted supply, with a positive head of pressure to the inlet, maximising the full potential of the pump.
- The selector valve either directs high pressure water to the hose (valve open) or diverts water back to the tank (dump).
- The front panel facia which includes the control panel, selector, jump jet valve, and the emergency stop button.
- A Hypro 80 micro mesh inline strainer is fitted to the suction line between the tanks and the pump inlet.
  Note: This is a critical component which ensures that no contaminants are drawn into the pump inlet. This filter must be inspected and cleaned daily, if it becomes blocked it could severely damage the pump

3.2.2. Engine Monitoring

Engine oil pressure and hours run are monitored on the control panel.

3.3. Installation details

Installation Drawing Nos**.** 004-416 provides overall dimensions.

4. Operation

4.1. Operating Conditions

Operators of water jetting equipment should be fully conversant with the 'WJA Code of Practice for the use of high-pressure water jetting equipment', hereafter referred to as 'The Code of Practice'. A copy of The Code of Practice is available upon request.

Please ensure that you read this Operation & Maintenance Manual in conjunction with the Health & Safety Manual before operation.

Within this manual the health and safety risks are highlighted with ⚠ and you are required to read the relevant section in the Health & Safety Manual.

⚠ SAFETY RELIEF VALVES MUST BE RECALIBRATED EVERY 6 MONTHS

4.2. Daily Checks

Refer to Section 5

4.3. Pre-start Checks & Procedures

1. In cold weather check that machine is not frozen before starting (see Antifreeze section). Only operate the machine in a well-ventilated area. ⚠
2. Ensure the towing vehicle and trailer hand brakes are applied.
3. Connect the water supply to the inlet hose reel (NOTE: in order to comply with water authority byelaws never fill the tank by putting a hose directly inside). The water will fill the tank via the float valve which ensures the correct tank level is maintained and the tanks are not overfilled.
   ⚠ Overfilling the tanks will overload the trailer axles and could make it dangerous.
4. Feed off the hose reel approximately 30 metres of high-pressure hose. **Do not fit the nozzle or gun at this point!**

At any time during the starting procedure, or during normal jetting operations, an emergency shutdown can be achieved by switching off the engine with the key or pressing the E/Stop button.

Fig. 4.1 Estop on control panel. Twist to release

4.4. Starting the Engine and Setting the Operating Pressure

With two people, one at the pump set and one in charge of the nozzle or gun.

Tank water level

Ensure you have an adequate water supply and that the water tank is filled to the ball valve shut off level.

NOTE: Do NOT allow unfiltered water into the pump

4.4.1. Operating Starting procedure

1. Ensure selector valve is in the dump ⚠ position.
2. Ensure the open ended, high pressure hose is in a safe position, preferable within sight of the operator at the control panel.
3. Using the rocker switch marked Power, energise the Control Panel.
4. Enter the 4 digit PIN using the ↑ & ↓ Arrows and ↵ buttons on the controller.
5. Momentarily press the Green Button on the Control Panel to start the Engine. The Engine will automatically start and hold at Idle Speed.
6. Water should now be circulating through the pump and be diverted back to the tank. Allow the engine 5 minutes to warm up.
7. ⚠ To divert water to the high-pressure hose, press Spray Button on the control panel. or by using the diverter valve.
8. Speed / Pressure can be adjusted using RPM+ and RPM-
9. To shut the system down, reduce the RPM to Idle and turn off the water. Switch the Engine off by momentarily pressing the Red button. The Engine will shut down safely. Use the rocker switch to de energise the control panel. The system is now safely off.
10. In Emergency Situations punch the emergency stop button.

4.4.2. Checking the Operating Pressure with a Nozzle Fitted

1. Fit the correctly sized nozzle to the high-pressure hose.
2. Ensure the nozzle is in a safe position placed inside the pipe to be cleaned and preferably within sight of the operator at the control panel.
3. Start engine.
4. ⚠ Move the selector valve to the high-pressure position.
5. Observe the pressure displayed on the control panel and note the pressure reading. Increase engine speed and pressure until the nozzle travels up the pipe
6. Clean short runs at a time.
7. When finished, reduce the speed of the engine.
8. Move the valve to the ‘dump’ position.
9. Switch the engine off.

NOTE: Operating the machine with the Jump Jet system turned off can increase the water pressure at the de-silter nozzle by up to 100%. Only do this when you know there is no risk of damage to in-situ

If the pressure is significantly lower than expected, turn the unit off and replace the nozzle with a new one as it may be worn.

4.5. Remote Operation (if applicable)

4.5.1. Starting the Engine

1. Switch on the Panel using the I/0 Rocker switch.
2. Enter the PIN using the ↑ & ↓ Arrows and ↵ buttons on the controller.
3. Press the remote function on the controller and press ↵ to enable remote. Display will show “Remote enabled” the unit is now ready for remote control.

On the RCU:

4. Pull out red button on the base of the RCU to switch the handset on.
5. Follow the on screen instructions - Press and hold fully down both buttons 5 + 6 for 3 seconds, a beeping noise will emit from the RCU. RCU & receiver have now ‘paired’. See fig 5.
6. Press button 2, the Start / Stop button on the RCU 

7. To increase engine speed, press the ‘engine speed up’ button, this is indicated by the symbol of a hare. See fig 5 
8. To decrease engine speed, press the red engine ‘speed down’ button, this is indicated by the symbol of a tortoise. See fig 5 
9. Press button 1, the water ON button, to divert the water to the nozzle or gun. See fig 5 
10. Press button 1 again, this will now divert the water back to tank See fig 5 
11. To stop the engine, reduce the Engine rpm press button 2 the start / stop button on the RCU. See fig 5 

12. **The Remote-control unit will remain connected unless the user disables remote control function at the main controller or system is powered down.

When the engine has be stopped the RCU will turn itself off. To resume return to step 5

If the operator goes out of radio receiving range the system will automatically turn the water OFF (divert back to tank). When the operator steps back into radio receiving range, the status is healthy, and jetting can be resumed.

Turning the unit ON

- Pull out the red button at the base of the RCU
- Press both buttons 5 & 6 together and hold for at least 3 seconds until a beep is heard. Once connected, the screen should display as per Fig. 5

Turning the remote control OFF

- Turn the handset off by pressing the red STOP button

Button 1 Water on / Water Off.

Button 2 Engine Start Stop

Button 3 HI RPM up

Button 4 LO RPM Down

No lights...RCU off.

Charging Details (See handbook for charging instructions).

4.6. Hose reel winding and unwinding

The high-pressure hose is manually unwound and hydraulically wound by an OMR315 hydraulic motor, which is driven by a gear pump from the engine P.T.O.

The motor is fitted to the hub of the hose reel. The motor speed and direction is controlled via a manually actuated spool valve.

The hose reel motor speed can be adjusted up and down by a flow control knob.

Pushing the lever inwards towards the pump set will wind the hose reel in.

The normal practice is to unwind the hose by hand, only drawing off the required length of hose to reach the work site and then to wind the hose back in using the hydraulic motor.

It should be remembered that the hose cannot be wound using the hydraulic motor unless the engine is running.

Therefore, when a jetting operation is finished, wind in the hose before shutting down the engine. Wind in the hose before you intend to empty the tank.

⚠ If the hose becomes stuck in the drain the hydraulic hose reel should NOT be used as a winch to try and free it and the towing vehicle should NEVER be driven away in an attempt to drag the hose clear. This will put severe strain on the reel framework which could lead to serious damage.

NOTE: Do not exceed the maximum operating pressure by fitting a smaller nozzle than is recommended. This will cause the burst disc to open. The maximum engine speed is 2500 rpm

Hoses that have become stuck can sometimes be pulsed free using the Jump Jet™ kit or alternatively they should be pulled free by hand.

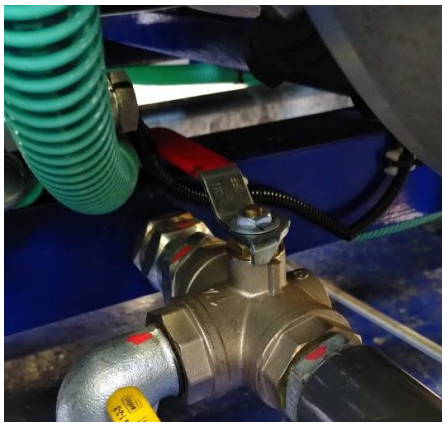
NOTE: The hose should NEVER be tightly wound onto the hose reel drum when the hose is not pressurised, as might occur when the hose has become trapped. A tightly wound hose can easily crush the hose reel when it is next pressurised. If you have reason to believe that the hose may have been tightly wound onto the reel when unpressurised it should be completely unwound and then rewound loosely before pressurising.

4.7. Frost Precautions

During cold periods there is a risk of freezing overnight or when travelling on the road. Damage caused by freezing is expensive to repair and IS NOT COVERED UNDER WARRANTY. Take the following precautions to avoid frost damage:

4.7.1. To Anti-Freeze the machine with an antifreeze tank:

1. The valves to control the antifreeze procedure are located to the front of the unit. (See picture below).



2. Put the Tank Drain valve (Red) into the DRAIN position and drain the water tanks. When the tanks have drained move the valve to the SHUT OFF position.

3. Put the jump jet valve into the “off” position, see below

4. Open the yellow valve from the tank marked ANTIFREEZE. This tank must be full of an antifreeze mixture with strength of no less than a 50/50 mix.

5. Remove the gun or any jetting nozzle from end of the hose and unreel 3m of hose.
6. Switch the selector from DUMP to HIGH PRESSURE
7. Hold the open-ended hose away from the body pointing it to the ground and away from any by-standers.
8. Start the engine and run at idle speed. Water will come from the end of the high-pressure hose. (It may be necessary to bleed the pump if water flow is very slow)
9. After a minute or two the blue antifreeze mixture will start to come out of the high-pressure hose. *IMMEDIATELY SWITCH OFF THE ENGINE.*
10. Place the end of the high-pressure hose into the antifreeze tank. If the hose is clean you may remove the strainer in the tank lid to make it easier.
11. Restart the engine and allow the antifreeze to circulate. Briefly (about 2 seconds) move the selector valve from HIGH PRESSURE to DUMP and back to HIGH PRESSURE. Briefly (about 4 seconds) put the 'jump jet' valve into the 'On' position and then return to the 'Off' position. See picture below.

12. Stop the engine by switching the ignition switch off. Leave the selector on HIGH PRESSURE.
13. Manually rewind the hose back on the reel and lock in position,

4.7.2. To De-Antifreeze the machine:

1. Shut off the 2-way antifreeze valve.
2. Place the 3-way valve into the RUN Position. See picture below.

3. Re-fill the water storage tank.
4. Put jump jet valve into the ‘off’ position, see below.

5. Place the high-pressure hose (NO NOZZLE ATTACHED!) into the antifreeze tank.
6. Start the engine with the selector on ‘HIGH PRESSURE’.
7. Pump out the antifreeze solution from the high-pressure hose back into the container.
8. As the antifreeze mix reaches the top of the tank turn engine off. (Regularly check the strength of the antifreeze mixture ensuring it is at least a 50/50 mix)
9. Place the jump jet valve in the on position.
10. The machine can now be used in the normal manner.

4.7.3. To antifreeze without an antifreeze tank:

1. Prepare 50/50 antifreeze solution.
2. Remove nozzle or gun attachments from the delivery hose.
3. Lower the water level in the tanks using the drain valve immediately to right of the o/s wheel.
4. Pour antifreeze solution into the water tanks.
5. Restart the engine and run at idle, pump antifreeze solution through the high-pressure line and return line as required.

4.7.4. To de-antifreeze:

DO NOT ATTEMPT TO JET ANY REMAINING ANTIFREEZE SOLUTION INTO A CONTAINER

Rather.

Consider the antifreeze solution as expendable and merely refill the tank for the next jetting operation. NEVER DISPOSE OF ANTIFREEZE INTO THE DRAINAGE NETWORK!

Or

With the engine switched off, drain the pump suction line into a container by unscrewing the inline strainer bowl to the bottom left side of the pump.

NOTE: If the pump is frozen up, on no account should the unit be started until it has been thoroughly thawed.

5. Routine Maintenance

Table 5.1 provides a basic guide to routine maintenance requirements for the various components of the trailer.

Warning: Maintenance should only be carried out with the engine turned off and when cold.

5.1. Maintenance Procedures

Table 1 indicates recommended routine maintenance tasks cross referenced to maintenance procedures.

Table 5.1 Recommended Routine Maintenance

	GENERAL
Prior to use / Daily / after 8 hours running	• In cold weather check machine is not frozen before starting • Check inlet water filter element (Ref Para 6.2) • Check engine oil level on dip stick (Ref section 10) • Check radiator water level • Visual check for hose damage/water leaks • Check emergency stop button operation • Check high-pressure hose condition • Check for any loose nuts and bolts or damaged items • Check tyre pressure
Weekly / 24 hours	• Visually inspect the machine for safety, checking for any loose, damaged or missing parts. • Check air filter cleanliness (Ref section 10) • Check fuel filter for contamination (Ref section 10)
Three monthly / 50 hours	• First service contact Flowplant • Replace Pump Oil (only required for first service only)
Six Monthly / 100 hours	• Inspect tanks and fittings for leaks • Tighten any loose joints • Check condition of 12 volt start battery • Grease battery terminals for protection • Grease the hydraulic hose reel bearing blocks
Yearly / 200 hours	• Intermediate service of engine, gearbox and pump required (Contact Flowplant) • Closely inspect the structural integrity of the framework for signs of stress and cracking • Carry out detailed inspection of pipes, hoses and fittings. • Check unloader valve operation.
Two Yearly / 400 hours	• Major service of engine, gearbox and pump required (Contact Flowplant) • Check wiring terminals/connections and continuity of electrical earth.

For a detailed guide to pump maintenance and overhaul procedures refer to Section 7.

For routing engine maintenance please refer to the engine handbook supplied with the unit.

5.2. Daily Maintenance

The following must be completed daily with the trailer switched **OFF**.

1. Check condition of inlet water filter & element. Clean or replace. (Flowplant part no. N05105)

   Unscrew the bowl to remove the mesh (Flowplant part no. N06021). Take precautions so as not to lose the sealing ring (Flowplant part no. N05108).

Fig. 6.1 - Inlet Filter

2. ⚠ Visually inspect all hoses for signs of chaffing or leaks. Report any damage immediately to supervisor or manager.

With the machine **running:**

3. Make further inspection for leaks. If a leak is observed, shut down immediately and report the leak to a supervisor or manager.

5.3. Gearbox Lubricating Oil

Manufacturer	Type	Oil Capacity (litres)	
		Output shaft Above Input	Input shaft Above Output
ESSO	Nuto H15	0.65	0.50
GULF			
MOBIL	DTE 11		
ROC			
TEXACO			
BP	Energol SHF LT15		
AGIP			
SHELL	Tellus T15		
CENTURY OIL	Nevis No5		
PETROFINA			
CASTROL	Hyspin AWH 15		

5.4. General Torque Settings

Fastener Nominal Dia (mm)	TORQUE SETTING (Nm)				
	Carbon Steel			Stainless Steel	
	Grade 8.8	Grade 10.9	Grade 12.9	Grade A2.5	Grade A2.7
5	6	8	10	4	6
6	11	14	16	7	10
8	27	33	40	17	23
10	53	66	79	33	46
12	92	115	138	58	81
16	229	286	344	143	200
20	447	559	670	279	391

The above Torque settings are for lightly oiled threads. IMPORTANT! DO NOT USE for DRY THREADS. ALL THREADS MUST BE LIGHTLY OILED, unless specified otherwise.

Where the nut material is softer than the bolt, this **must** be considered and a lower torque figure calculated. (Contact: Technical Dept).

The above Torque settings are to be used when no other specific torque is quoted. ALWAYS CHECK if a specific torque figure is available.

6. Fault Finding

Most of the problems experienced during jetting operations are likely to be caused by the pump or the associated hoses.

These types of problems are covered in the pump fault finding chart, which is repeated at 6.3 overleaf for convenience.

Also covered at 6.3 overleaf is a diagnosis of selector valve problems.

6.1. Shutdown Problems

Most problems which can cause the unit to shutdown will be indicated by one of the fault lamps on the engine controller See fig. 6.2 as follows:

6.2. Equipment Fault Finding

Problem	Possible Cause	Recommended Action
Low system pressure	1 Worn or incorrect size of cutting nozzle. 2 Engine speed slow. 3 Leaks from hose. Pipes and connections. 4 Blocked inlet filter. 5 Inlet hose to long. 6 Loss of water through dump line of selector valve or gun when high-pressure selected. 7 Loss of water through dump line of remote-control kit, if fitted.	Replace the old jetting Nozzle with a new one. Adjust to correct speed. Check the connections for tightness, replace if needed Clean or replace element. Shorten hose length. Check seats and seals. Check seats and seals.
High System Pressure	1 Blocked nozzle, selector valve or gun. 2 Incorrect nozzle size. 3 Incorrect bore size. 4 Engine speed high. 5 Crushed delivery hose. 6 Two gun choke left in gun when operating as single gun unit.	Clean the items and flush out the delivery line. Replace the nozzle. Replace the hose. Adjust to correct speed. Replace if necessary. Replace with standard choke.
Low Water Level	1 Blocked or dirty pre-filters. 2 Faulty ball valve assembly. 3 Wrong seat in ball valve assembly. 4 Low inlet pressure.	Clean or replace elements. Replace if necessary. Replace the seat if necessary. Increase pressure.
Pump Pulsing (with low pressure)	Broken valve spring. Leaking O-ring on valve cartridge. Worn pressure packings.	Replace spring. Renew O-rings. Renew packings.
Excessive Water Leakage from Pump	Worn pressure packings. Scored plungers.	Renew packings. Replace plungers.
Water in Crankcase	Filler/breather cap missing. High humidity.	Replace cap. Replace oil and reduce oil change interval.
Noisy Operation	Worn bearings.	Overhaul or replace pump.
Oil Leaks	Worn pressure packings. Worn oil seals.	Renew packings. Replace oil seals.

6.3. Selector Fault Finding (see section 8)

Selector problem	Cause	Action
Loss of pressure and flow is down.	Water leaking through the worn seat back to tank.	Replace the seats and the plug if also damaged.
If water leaks along spindle and past lever.	O-ring and back up ring failure along shaft.	Replace O-ring and back up ring 013-021 & 023-001.
Water leaking along the gland nut thread.	Leaking selector seal.	Replace seal 012-095.

7. Pump

Flowplant offer a detailed manual with the Speck NP25/54-200 Pump and this will be accompanied by this manual.

8. Circuit Diagrams

The following circuit diagrams are included in this section:

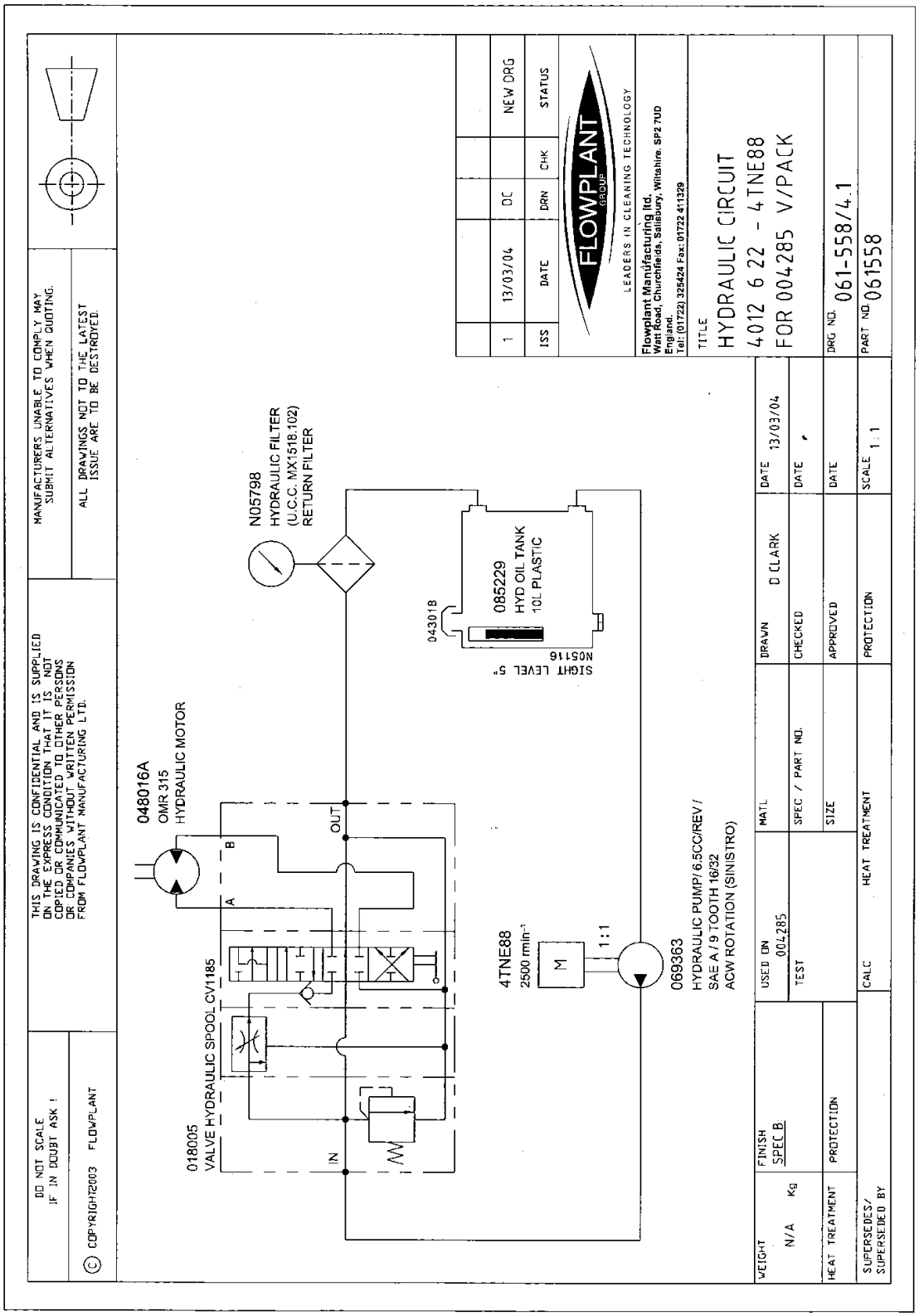
Hydraulic circuit

This provides details of the unit's hydraulic circuit, the function of which is to power a hydraulic motor driven hose reel, winding high-pressure hose in or out whilst carrying out drain cleaning or other high-pressure water jetting applications.

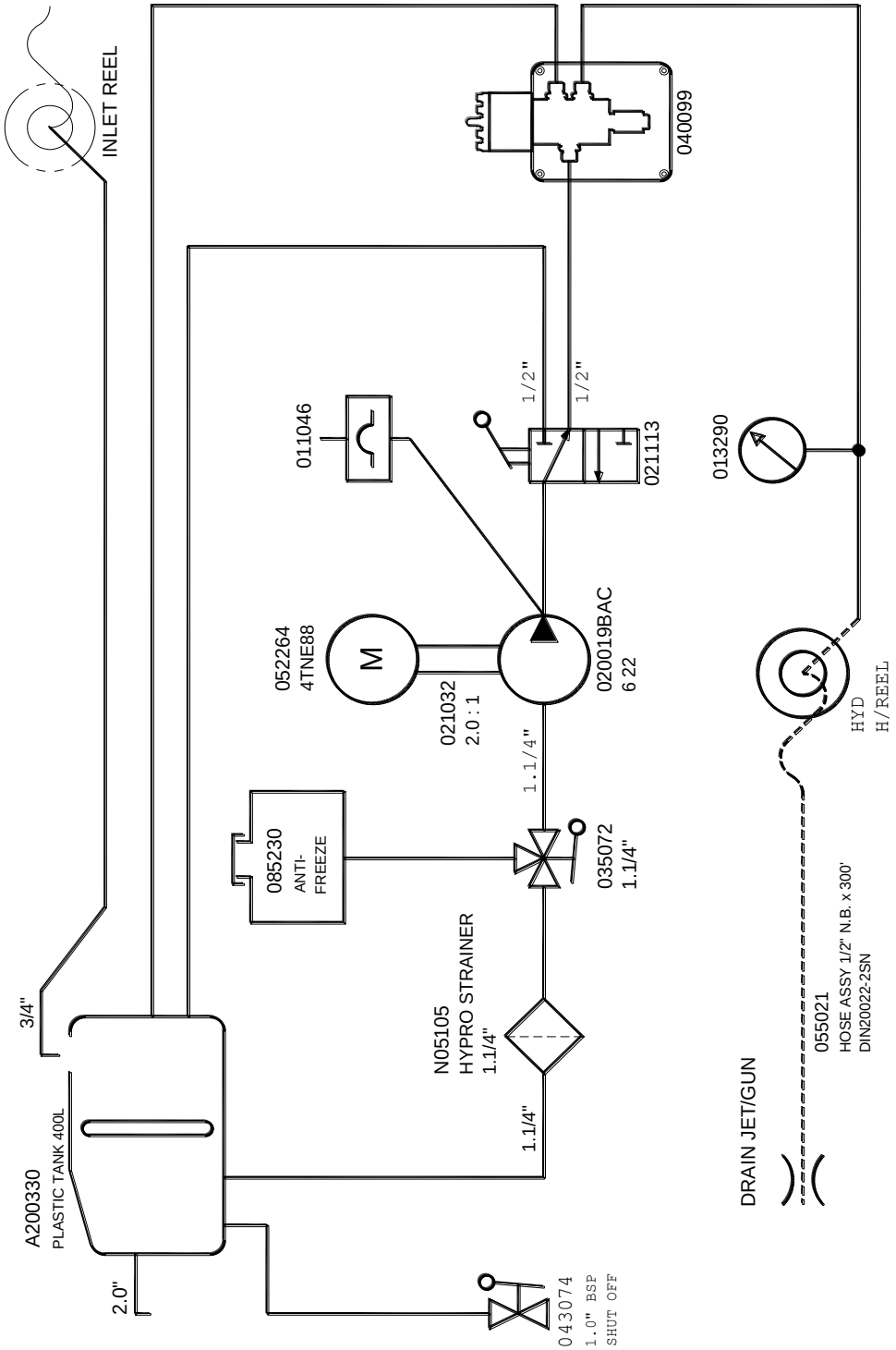
Water Circuit

This provides details of the water circuit, starting with the supply and ending with the delivery to the jetting application.

8.1. Hydraulic Circuit

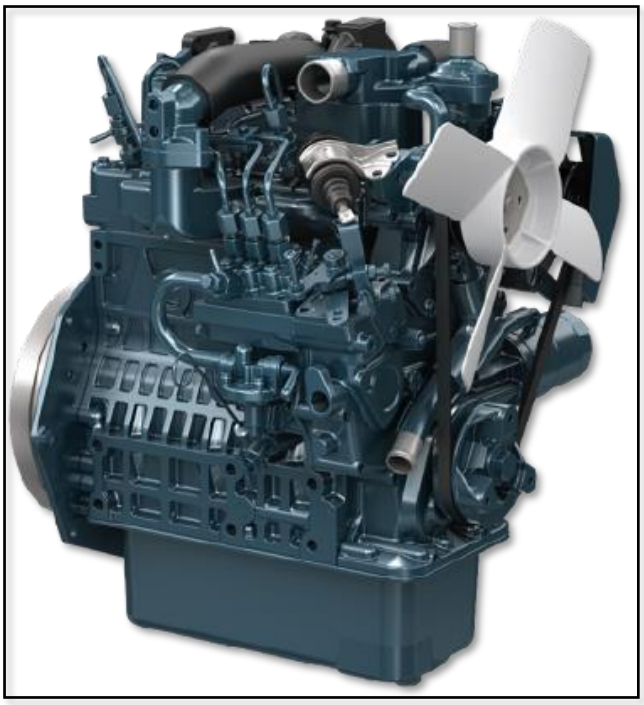


8.2. Water Circuit



9. Diesel Engine

Copies of the Diesel Engine Manufacturer's Operators Handbook is supplied with this equipment.



10. Parts Lists / Spares

10.1. Introduction

This section includes advice on obtaining spare parts.

To identify consumable items and service kits you require you should use the information in this section. To identify components for the pump or engine etc, refer to the relevant parts in this manual.

10.2. Ordering Spare Parts

Order spare parts from:

Flowplant Group Ltd
Gemini House, Brunel Road, Churchfields Industrial Estate
Salisbury, Wiltshire, UK, SP2 7PU
Tel. +44 (0)1722 325424 – Fax. +44 (0)1722 411329
sales@flowplant.com
www.flowplant.com

10.3. Parts List

Component	Description	Qty.
013014	ADAPTOR 1/4" BSP M x 1/4" BSP M 415 BAR	1
013039	ADAPTOR 1/2" BSP M x 1/2" BSP M 415 BAR C-TXT	3
013046	ADAPTOR 3/4" BSP M x 1/2" BSP M 345 BAR	1
013224	ADAPTOR BHEAD 1/2" BSPM x1/2"BSPM 415BAR C/W LNUT	2
013266	SEAL DOWTY 1 1/4"BSP SELF CENTERING	25
013349	CLIP "R"	6
013375	LOCKNUT 1 1/4"BSP UPVC	4
013813	SCREW THREAD CUTTING PAN HEAD TORX DRIVE 6.0 mm x 16 mm ZINC PLATED	4
013853	SCREW SET HEX HD M12-1.75 100 LG ZINC PLATED	2
014153	REFLECTOR SIDE MARKER(EEC APPROVED)SCREW ON TYPE	4
014298	PANEL HOLE PLUG DIA. 50mm - DTB 500 ESSENTRA 466866	1
016245	KEY 1/4" X 1/4" X 60MM LONG	1
016401	FLYWHEEL HOUSING MACHINED CENTRE BORED - TO SUIT KUBOTA D1105 - 052369	1
018005	VALVE SPOOL HYD FLOW CONTROL	1
021059	SELECTOR ASSEMBLY INLINE 1/2"BSP	1
021090	ADAPTOR 3/4" BSPM x 3/8" BSPM 415 BAR	2
023011	ANGLE SWIVEL JOINT 90 DEG 1/2" BSP M/M 415BAR	1
023025	INSERT FOR HOSE SWAGED 1/2"BSP FEM	1
023030	INSERT FOR HOSE SWAGED 3/4"BSP FEM	1
023041	O CLIP 3/4"	4
023047	HOSE CLIP DIA 30-40 JCS HI-GRIP S/S	12
023082	INSERT HOSE 3/8" BSP 90 DEG FEMALE	2
0231046	CROSS 1 1/4" BSP F/F/F/F LOW PRESSURE GALVANISED	1
023148	INSERT FOR HOSE SWAGED 1/2"BSP 90 DEG FEM	2
023203	INSERT FOR HOSE 1"BSP FEM SWAGED TYPE	1
023261	ADAPTOR 1/2"BSPM x 1/2"BSPF SWIVEL 415 BAR ZINC	2
023262	ADAPTOR 1/2"BSP FEMALE FIXED TEE 415 BAR	2
023362	ADAPTOR 1/2"BSP M x 7/8"-14 JIC M 415BAR	1
023363	ADAPTOR 3/4"BSP M x 7/8"-14JIC M 345 BAR	1
023379	ADAPTOR BHEAD 1 1/4" BSPM x 1 1/4" BSPM 210 BAR C/W NUT	1
023391	PLUG BLANKING 1/2" BSP ST/ST 550 BAR	1
023569	PIN CANOPY RETAINER	6
023847	ADAPTOR 1.1/4" BSP M/F SWIV 2B/20 210 BAR	1
028004	FRAME HYD HOSE REEL DTW (POWDER COAT)	1
028032	CLAMP BATTERY DTW (POWDER COAT)	1
028037	GUIDE HOSE FEED ASSY DTB	1
031330	HANDWHEEL PLASTIC TAPPED M12 (GUN HOLDER, HOVERVAC)	2
031340	TEE 3/8"BSP MALE/FEMALE RUN MALE BRANCH ZINC	1
031431	ROTARY JOINT GUARD (POWDER COAT)	1
032088	CLAMP FORWARD HANDLE MARK 2 GUN MACHINED	4
032194	ADAPTOR 3/4"BSP M x 1/2"BSP F FIXED 900BAR S/S	1
032278	SPACER 25MM 3/8 SCHD S.S	1
033005	ADAPTOR 3/8" BSP M x 3/8" BSP M 415 BAR	4

033006	ADAPTOR 1/2" BSP M x 3/8" BSP M 415 BAR ZN	6
033010	SEAL BONDED 1/2" BSP 400-825-4490-41 448 BAR SELF CENTRALISING	17
033013	SEAL BONDED 3/8" BSP 400-823-4490-41 492 BAR SELF CENTRALISING	4
033014	SEAL BONDED 3/4" BSP 400-827-4490-41 420 BAR SELF CENTRALISING REPLACES A041271	5
033058	HOSE ASSY 1/2" 00.81m STR/ELB 1/2"BSPF EN 853 2SN	2
035072	VALVE 1 1/4"BSP T PORT 375 PSI FIG 2000 S/R TYPE 98 ALBION	1
035077A	POLY FLOAT 6" X 5/16"	1
035185	UNLOADER VALVE UL221/200H G1/2" 50LPM 210BAR WITH HANDLE WHEEL	1
035210	VALVE BALL FLOAT VALVE 3/4" HP 300 PSI (WITH BRASS LOCK NUTS)	1
035401	VALVE SAFETY RELIEF (SRV) VS 310 HAWK 310 BAR @ 40LPM	1
041029	GROMMET 25.4M/M BLACK PVC BLANK	4
041031	GROMMET CABLE RB3466TPR CTEXT	4
041034	STUDDING M10 ZINC PLATED [PER 1.5 METRE] c-txt	1
0421805	SUPPORT HOSEREEL O/S DTB II (POWDER COAT)	1
0421806	SUPPORT HOSEREEL N/S DTB II (POWDER COAT)	1
0421807	PANEL INNER WING DTB II (POWDER COAT)	2
0421812	FRONT SUPPORT ARM (0/S) TANK DTB 500 (POWDER COAT)	1
0421813	FRONT SUPPORT ARM (N/S) TANK DTB 500 (POWDER COAT)	1
0421823	MOUNT BALLCOCK DTB 500 (POWDER COAT)	1
0421892	LABEL BRACKET DTB500 (POWDER COAT)	1
0422487	BRACKET DTB500 NUMBER PLATE (POWDER COAT)	1
0422547	BRACKET FRONT LIGHT DTB500 (POWDER COAT)	2
0422633	LIGHT MOUNTING BRACKET - OFFSIDE - DTB500 (POWDER COAT)	1
0422634	LIGHT MOUNTING BRACKET - NEARSIDE - DTB500 (POWDER COAT)	1
0422658	REAR TRIANGLE - DTB500 (POWDER COAT)	2
0422659	REAR TRIANGLE SPACER (POWDER COAT)	2
0422692	SPACER 28MM PIPE CLAMP STAUFF 10MM THK TO SUIT 061278	1
0422875	VALANCE DTB500 MK2 PLATE TYPE	2
0423184	BRACKET RAIN FLAP DTB500 2018	2
0423337	320 cooler plate	1
0423347	320 UNIT PERFORATED GUARD	1
0423362	INSTRUMENT SUPPORT PANEL DTK500 KUBOTA 1803	1
0423363	FRONT SUPPORT WATER TANKS DTK KUBOTA 1803	1
0423370	DTB500 D1803 MPC-20 COVER	1
0423412	ENGINE FOOT KUBOTA D1105 inc RELAY HOLE	1
0423185	BRACKET THROTTLE ACTUATOR KUBOTA D1105 315 SERIES MK3	1
0423463	DTK500 1105 PUMP SUPPORT BRACKET	1
043018	CAP HYD/FUEL TANK	2
043061	HOSE CLIP DIA 9.5-12 JCS HI-GRIP S/S	8
043139	GROMMET BLACK RIBBED 80 x 40	2
043196	ELBOW 90 DEG. THREADED 1 1/4" BSPF UPVC	4
043222	INSERT HOSE 1 1/4"BSPM X 32 MM DIA HOSETAIL UPVC	12
043235	ADAPTOR FLANGED 1 1/4"BSPM X 1 1/4" BSPM UPVC	5
044548	DTK 500 2019 FRAME	1
048005	BEARING HOSE REEL HYD P TYPE (POWDER COAT)	1
048016A	MOTOR HYDRAULIC DANFOSS OMR 315 (POWDER CAT)	1

048103	TUBE WATER OUTLET FOR HYDRAULIC HOSE REEL N15-142 AND 048-110	1
048110	HOSEREEL DRUM P TYPE BOLTED FLANGE (POWDER COAT)	1
050295	OUTER CASING PER METRE CABLE-TEC	1
050296	WIRE 1.9MM PER METRE CABLE-TEC	1
050317	HEAT EXCHANGE - ENGINE COOLING VAN PACK - HIGH FLOW, CAST ENDS	1
050324	PTO HYDRAULIC PUMP KUBOTA D1105	1
050325	THERMOSTAT OUTLET 1105D COOLER	1
0511009	CABLE END - CHOKE - HONDA GX690 CABLE HOLDER	1
0511066	KUBOTA D1105 EXHAUST GASKET	1
051557	THROTTLE CABLE/TWIST LOCK/6 FT/RDB/ BPP 1004/6'0"	1
052369	ENGINE KUBOTA D1105-E4B-EU-X1 1J90600000	1
053175	HOSE FUEL 8MM ID SAE J30R	3
055024	HOSE 1/2" P.V.C. CLEAR BRAIDED [PER METRE] HDPVC12	2
055063	HOSE 1 1/4" HELIFLEX [PER METRE]	8
055175	HOSE ASSY 3/8" 00.38M STR/ELB 3/8"BSPF EN 853 2SN	2
0551801	1" RED HOSE Autosiliconehoses.com	1
0551802	1" BLUE HOSE Autosiliconehoses.com	1
0551817	1" BLUE U BEND 180DEG HOSE	1
055182	HOSE ASSY 3/8" 02.07M STR/ELB 3/8"BSPF EN 853 2SN	2
0551845	HOSE ASSY 1/2" 415 BAR @ 1500MM CL STR/ELB	1
055207	HOSE ASSY 1/2" 2.6M STR/ELB 1/2" BSPF EN 853 2SN	1
055287	HOSE ASSY 3/8" 0.47m ELB/ELB 3/8" BSPF EN 853 2SN 180 DEG	1
055288	HOSE ASSY 3/8" 0.60m ELB/ELB 3/8" BSPF EN 853 2SN	1
055295	HOSE ASSY 3/8" 1.50M ELB/ELB 3/8" BSPF EN 853 2SN (ANGLE SET 180 DEG)	1
055431	RUBBER-FUEL-LINE DIA 6MM	2.6
058298	PIPEWORK HOSE JOINER 1" x 1" x 3/8" STEEL PLATED	1
058301	320 COOLANT RADIUS' 25MM DIA @ 100MM CLR	1
059116	WATER TANK 250LTR DTB 2019 BLUE RAL 5002	2
061033	SPACER PACKING D.T.T.	6
061067	WASHER SEATING FOR 1/4"BSP GAUGE	1
061352	MANUAL P-PUMP/ HI LIFT	1
061088	SCREW SELF TAPPING 1/2" x 8 STEEL PAN HEAD	8
061434	LABEL "E-STOP" SELF ADHESIVE	1
061278	CLAMP DIA28 STAUFF TYPE (SUP. CODE 428 PP)	1
061577	SAFETY AWARENESS SHEET FOR GENERAL H/P JETTING EQUIPMENT	1
061663	LABEL OPERATING PROCEDURE DRAIN ASSY DTB500	1
061829	STATUTORY LABEL PLATE TRAILER	1
061880	PEEL AWAY SAFETY STICKER	1
061886	USB MANUALS	1
061970	LABEL - READ MANUAL AND HEALTH AND SAFETY MANUAL	1
067853	GEARBOX 2.176:1 SPECK NP25	1
071001	BATTERY 12V HEAVY DUTY TYPE 644	1
071008	REFLECTOR TRIANGLE	2
0711021	13 PIN PLUG ADAPTOR, 13 PIN TRAILER 7 PIN CAR 0-695-69	1
0711024	8MM SADDLE TYPE CABLE TIE MOUNT RS PT NO. 666-739	8
0711029	LIGHT REAR COMBINATION INDICATOR/TAIL/STOP 151BAR	2
0711031	LIGHT REGISTRATION LED 12V BRITAX L868.00LDV	2

0711032	LIGHT FOG LED 12/24VDC 81FM	1
0711033	LIGHT REVERSE LED 12/24VDC 81WM	1
0711036	LIGHT/REFLECTOR FRONT LED 12/24VDC 44WME	2
0711040	PVC CABLE GROMMET 9MM MAX. CABLE, 15MM HOLE DIAM.	4
071130	LEAD BATTERY 1600mm POSITIVE 12V	1
0711340	12V CIGARETTE LIGHTER OUTLET PIXNOR UNIVERSAL WATERPROOF WITH CAP PANEL MOUNT	1
0711382	CONTROL PANEL MURPHY MPC-20 CUSTOM FRONT	1
0711383	WIRING LOOM CONTROL PANEL MPC-20 SINGLE 21 PIN CONNECTOR	1
0711387	SIREN / SOUNDER 8-35V DC	1
0711390	GASKET FOR MPC-20 CONTROLLER	1
0711392	MAGNETIC PICK UP 68MP0060 M16x1.5	1
0711395	WIRING HARNESS 320 TELERADIO	1
0711408	ROCKER SWITCH ON/OFF BLACK 21A @ 14V SPST IP56 LATCHING	1
071141	LEAD BATTERY 610mm NEGATIVE 12v	1
0711454	PRESSURE TRANSMITTER 0-600 BAR 4-20mA 1/2" NPTM	1
0711460	DTK 500 KLAXON / SIREN	1
0711461	PRESSURE TRANSMITTER 0-600 BAR 4-20mA 1/2" BSP	1
071261	SHRINK SLEEVING BORE 19.0 TO 9.5 SHRINK	1
071367	E STOP TWIST TO RELEASE including NC ACTUATOR 78-3724 78-3732	1
071786	RELAY 12V 120AMP RP/120-12	1
071790	BLADE FUSE HOLDER C/W SPLASH PROOF COVER/FLYING LEADS (30 AMP MAX)	2
071886	FLOAT SWITCH HORIZONTAL POLYPROPYLENE 1/2" NPT 397-0564 (HOTSHOT 200 FUEL TANK)	1
071901	ELECTRICAL PISTON TYPE PE40-35GV12	1.3
071902	ELECTRICAL UNIT CONTROL TYPE S.FCESY7V12	1.52
071988	PLUG 13 PIN TRAILER P13PN	1
071989	CABLE TRAILER 13 CORE GTW131 (50m ROLL MINIMUM ORDER)	6
071992	CABLE TRAILER 2 CORE BROWN AND WHITE TTW1.0BRW 2 X 1MM SQ	8
073069	HEAT SHRINKABLE SLEEVING 9.5MM BORE (RS398-177)	1
073069	HEAT SHRINKABLE SLEEVING 9.5MM BORE (RS398-177)	0.2
0781010	MODIFICATION TO FLUID HEAD NP25 SPECK FOR JUMP JET - 54-200	1
0781130	DRIVE SHAFT 1 1/8" KEYED FOR KUBOTA 1105D 315 SERIES MK3	1
0781170	MPC COVER BOLTS	4
078417	EXTENDED HEX NUT M8	1
078417	EXTENDED HEX NUT M8	1
078773	OUTER FLANGE HOSE REEL (POWDER COAT)	1
079245	FLANGE ADAPTOR EXHAUST DTB500	1
079260	EXHAUST OUTLET FLANGED 'U' BEND - KUBOTA D1105	1
081159	COUPLING KFG20 KNOTT 2000KG	1
081217	BRAKE CABLE 830/1040MM	2
081218	STANDARD SINGLE BALANCE BAR KIT	1
081221	WHEEL AND TYRE 18570R13 TO SUIT DTB500/DTK500	2
081222	AXLE DTB500 1800KG BRAKE 250/40	1
082133	RAINFLAP DTB500	2
082137	JOCKEY WHEEL TO SUIT KFG20 DTB 500	1
082143	NUMBER PLATE MOUNTING BRACKET	1

082160	CANOPY PLASTIC DTK TRAILER 500 2019	1
082160	CANOPY PLASTIC DTK TRAILER 500 2019	1
082161	LOOSE WHEEL NUT INDICATORS 27MM (PACK 100)	8
085263	HYDRAULIC TANK DTB500	1
085341	TANK FUEL PLASTIC DTB500 MK2 40L	1
085396	EXPANSION TANK 320 COOLING SYSTEM	1
094103	Elbow 45 deg Male Female 1" BSPT x malleable iron galvanised	1
105204	BRACKET FOR HYD SELECTOR HV39 (POWDER COAT)	1
A030376	LID, SCREW INSPECTION COVER(6)BLACK.	1
A041024	SCREW CAPSCREW M10 X 50MM LONG SOCKET HD	2
A060574	FITTING TEE 1 1/4" BSP FEMALE UPVC	1
A140909	PLAIN DOWEL PIN M8 X 20	1
N00864	M10x10 GRUB SCREW	2
N01280	ELBOW 1" BSP MXF MALLEABLE GALV	1
N01280	ELBOW 1" BSP MXF MALLEABLE GALV	1
N01282	ELBOW 1 1/4 BSP MXF MALLEABLE GALV	1
N01282	ELBOW 1 1/4 BSP MXF MALLEABLE GALV	1
N01496	ELBOW 1/2-1/2 BSP MxF 90 COMPACT FORGED 415BAR	1
N01518	INSERT 1/2"BSP F 90 DEG COMPACT (PUSH IN) ZINC 415 BAR	1
N01965	1/4 BSPF S/STEEL CHECK VALVE C25P/9K	1
N05105	LINE STRAINER 1 1/4" (HYPRO)	1
N05114	SIGHT GLASS 10"	2
N05116	SIGHT LEVEL GAUGE 5116/7	1
N05386	LINK HOSE E 1/4" R2AT X 8 1/2" COMPACT ELB/ELB	1
N05798	HYDRAULIC FILTER (U.C.C. MX1518.102) RETURN FILTER	1
N10001	BATTERY RETAINING BRACKET	1
0423463	DTK500 1105 PUMP SUPPORT BRACKET	1
0423464	DTK500 1105 ENGINE FEET	4
0423465	DTK500 1105 COOLER MOUNT	1
016420	AV MOUNT CAPTIVE M10 CTM833510-40CT	1
016421	AV MOUNT CAPTIVE M10 CTM833510-60CT	1

11. Service Documents

11.1. Service Checklist

SERVICE CHECK LIST

FLOWPLANT

Serial Number -

Unit Number - *Sht 1 of 2*

Date - Engineer -

Hours Run - ESR -

I - Intermediate service **Y - Yearly service** **R - Customer request**

	Engine	I	Y	R
1	Check oil level			
2	Change oil			
3	Change oil filter			
4	Clean air filter			
5	Change air filter			
6	Change fuel filter			
7	Clean water trap			
8	Check coolant level & A/F mix			
9	Inspect radiator			
10	Inspect hoses			
11	Check fan belt			
12	Check engine mounts			
13	Check exhaust			
14	Check throttle cable			
15	Check for leaks			
	Gearbox			
		I	Y	R
16	Check oil level			
17	Change oil			
18	Check for leaks			
	Pump			
		I	Y	R
20	Check valves (Inlet/delivery)			
21	Replace valves (Inlet/delivery)			
22	Check diaphragms			
23	Replace diaphragms			
24	Change oil			
25	Check hoses/fittings			
26	Check working pressure			
27	Check working temp			
28	Check smooth running			
29	Change Burst Disc (Must be changed every 6 months)			
30	Set Safety Relief Valve (Must be set by manufacturer/authorised agent and reset/certificated every six months)			
30	Check main pressure gauge			
31	Check burst disc fitted			
32	Check jump jet operational			
33	Pressure gauge reading correctly			

	Hydraulics	I	Y	R
34	Check oil level			
35	Change oil			
36	Change filter			
37	Inspect hoses			
38	Inspect reel			
39	Grease reel bearings			
40	Check reel mountings			
41	Check operation			
42	Check for leaks			
	Electrics/Controls			
		I	Y	R
43	Check battery			
44	Check/grease terminals			
45	Check charge system			
46	Check wiring connections			
47	Test/check operations			
48	Test remote control unit			
	Vanpack frame			
		I	Y	R
49	Check for cracks/damage			
50	Check fixing bolts & brackets			
51	Check safety straps			
	Trailer			
		I	Y	R
52	Check for cracks/damage			
53	Check wheels/tyres/pressure			
54	Check brake operation			
55	Check lights/reflectors			
56	Check tow hitch/lubricate			
57	Check safety cable			
58	Check jockey wheel condition			
	Gun & Lance			
		I	Y	R
59	Check for leaks on pressure			
60	Check for damage			
61	Check operation			
62	Check jets are correct			

	Water tank	I	Y	R
63	Clean water filter			
64	Change water filter			
65	Check hoses & fittings			
66	Check tank security			
67	Check tank integrity			
68	Check A/Freeze			
69	Check inlet ball valve			
	OMO Foot pedal			
		I	Y	R
70	Check cable & plugs			
71	Test operation			
72	Check safety button			
	Pressure Hose			
		I	Y	R
73	Check for wear / damage			
74	cuts / tears			
75	Braiding showing			
76	Any joins in single length			
77	Fittings in good order			
78	Leader hose satisfactory			
	Hot Wash			
		I	Y	R
79	Check fuel pump pressure			
80	Clean fuel filter			
81	Check swirl plate adjustment			
82	Check electrode gap			
83	Check air flow			
84	Check thermostat operation			
85	Check low water level switch			
86	Check unloader valve			
87	Check burner is running clean			
	Remote Control			
		I	Y	R
88	Check handset operation			
89	Check Antenna			
	Other			
		I	Y	R
90	Test emergency stop button			
91	Check safety decals visible			
92	Check ID plate condition			
93	Clean & tidy appearance			

I	Intermediate Service
Y	Yearly Service
R	At Request of Customer

NA - Not applicable, A - Adjusted, √ - Satisfactory, R - Repair required, O - Observation

Note - If 'Adjusted' or 'Repair required' please describe issue on sht 2

FLOW 0321 Iss 3

11.2. Service Logbook

Flowplant Unit Log Book	FLOWPLANT
Serial Number -	
Unit Number -	
Date of Manufacture -	*Sht 1 of 2*

Date .... Official Flowplant Stamp and Signature
Engineer ....
Type of Service .... Please state if other Service provider used ....

Date .... Official Flowplant Stamp and Signature
Engineer ....
Type of Service .... Please state if other Service provider used ....

Date .... Official Flowplant Stamp and Signature
Engineer ....
Type of Service .... Please state if other Service provider used ....

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Date .... Official Flowplant Stamp and Signature
Engineer ....
Type of Service .... Please state if other Service provider used ....

Date .... Official Flowplant Stamp and Signature
Engineer ....
Type of Service .... Please state if other Service provider used ....

Type of service - Itermediate, Yearly	*FLOW 0322 Iss 1*

Flowplant Unit Log Book

Serial Number -	
Unit Number -	
Date of Manufacture -	*Sht 2 of 2*

Date .... Official Flowplant Stamp and Signature

Engineer ....

Type of Service .... Please state if other Service provider used ....

Date .... Official Flowplant Stamp and Signature

Engineer ....

Type of Service .... Please state if other Service provider used ....

Date .... Official Flowplant Stamp and Signature

Engineer ....

Type of Service .... Please state if other Service provider used ....

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Date .... Official Flowplant Stamp and Signature

Engineer ....

Type of Service .... Please state if other Service provider used ....

Date .... Official Flowplant Stamp and Signature

Engineer ....

Type of Service .... Please state if other Service provider used ....

Type of service - Itermediate, Yearly	*FLOW 0322 Iss 1*

12. Warranty and Certification:

12.1. Warranty of new products:

Equipment manufactured and supplied by Flowplant is warranted to be free from defects in materials and workmanship.
The warranty includes both parts and labour necessary to correct any such defects.
The warranty period for new products is twelve months from date of despatch from our factory.
We shall repair or, at our discretion, replace free of charge any product, part(s) or component(s) manufactured by Flowplant which fail due to faulty manufacture or material within the warranty period.

12.2. Warranty of spare parts:

The warranty for new spare parts is six months from date of despatch on materials and workmanship.
The warranty for reconditioned spare parts is 90 days from date of despatch on materials and workmanship.
Provided always that:

- They are returned to Flowplant for inspection (carriage paid), along with a copy of the original part(s) sale invoice (where necessary); and
- All terms agreed by Flowplant for payment of such goods have been complied with; and
- If a defect/failure is discovered before the expiration of the warranty, notification must be given to the Flowplant service department immediately
- Any claim hereunder is made within 30 days of the date of discovery of the defect/failure.

Provision of this warranty shall not apply to any Flowplant product which has been:

- Used for a purpose for which it is not designed for; or
- Applied to a use which has not been approved by Flowplant; or
- Subject to misuse, negligence, lack of maintenance or accident; or
- Repaired or altered in any way so as, in the judgement of Flowplant, to adversely affect its performance and reliability

12.3. Limitations of warranty:

The new product and spare parts warranty is limited to defects in material or workmanship of the product. It does not cover loss of time, inconvenience, property damage or any consequential damages. Repair or replacement of the product is your exclusive remedy.
Our liability under this clause shall be in lieu and to this exclusion of any warranty or conditions implied or expressed by law as to the quality or fitness for purpose of any goods supplied hereunder PROVIDED THAT nothing in this clause shall operate so as to exclude liability for death or personal injury arising from the negligence of the company or its employees.
Our obligations as aforesaid shall constitute the full extent of our liability in respect of any loss or damage sustained by the purchaser whether caused by any breach of this contract or by our negligence or otherwise and we shall not be liable to make good or pay for loss of use of the goods, loss of revenue, loss of profit or goodwill or any direct or consequential losses howsoever caused and the purchaser undertakes to indemnify us against any such claims against us by third parties.
In order to comply with the provision of the Health and Safety at work etc. Act 1974 in respect of articles manufactured, supplied or installed for use at work we test all our products before they leave our factory and supply them with adequate instructions for their proper use. Further copies of these instructions are available from us upon request.

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12.4. Declaration of Conformity

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13. Health and Safety Manual – 061956

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HEALTH AND SAFETY MANUAL – Issue 1

Read before operating equipment

Flowplant high pressure jetters and systems have been designed to the highest standards so that they will work safely and reliably for many years. It is important that you take time to read the safety information provided here so that you understand how to make the most of the equipment and how to use it safely. Flowplant jetters are powerful pieces of industrial equipment and should only be operated by competent users who understand that serious injury or death can occur through misuse.

The jetters described here are intended to be used for high pressure jetting and pumping applications.

Additional accessories can be purchased from Flowplant, such as: floor cleaners, jetting guns and jet pumps which extend the range of work that can be carried out with the jetter. Safety information relating to individual accessories is provided later in this section.

Throughout this manual there are various warnings marked with this icon. Where shown, failure to follow the instruction can result in serious injury or even death.

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Change	Changes	Date	Signatu
1	NEW ADDITION	09/19	SAS
2	GENERAL EDIT	01/20	DMM

Contents

1. General Safety Information

- Safety procedures throughout this manual must be adhered to. In the case of conflicting or ambiguous instructions contact your Site Manager or Safety Manager before commencing work.
- Any person operating, working with, or passing near the jetter must wear the appropriate Personal Protective Equipment (PPE).
- The jetting supervisor should make this safety manual available to operators or persons working with the jetter and should ensure they read and understand it prior to operating the jetter.
- Prior to any adjustments being carried out the jetter must be shut down, de-pressurised and equipment isolated.
- All maintenance requirements in this manual should be adhered to as minimum maintenance requirements. Maintenance records should be kept up to date at all times. Maintenance should be carried out by competent persons only
- Guards which are located within the jetter must be fitted and must not be loosened or removed whilst the jetter is operational. Should it be necessary to remove any guard for access, it must be re-fitted and secured before start-up.

2. General use of High Pressure Jetters

- All persons using high pressure jetting equipment must be fully conversant with relevant operating instructions, safety notes and codes of practice.
- Operators must be competent in all aspects of jetter use.
- Erect suitable cordons at least 10m from the jetting operation to restrict all unauthorised access.
- All high-pressure water jetting operations should be under the control of a fully trained supervisor, who is aware of the potential hazards to operators and passers-by.
- Check the makeup of the jetting team complies with the relevant WJA Code of practice.
- Warning notices, 'DANGER - HIGH PRESSURE JETTING' should be displayed at all possible access points to the jetting area.
- Before starting the jetter, ensure that you, and anyone else who may be in control at any time, are fully aware of its controls and their function.
- ⚠ It is especially important that operators know how to stop the jetter in case of an emergency.
- Ensure that all the pre-operational checks have been completed.
- Do not operate the jetter near any persons or animals
- ⚠ Before starting the machine perform a safety training session at the machine and refer to all safety aspects.
- Legionnaire's Disease – leaving warm water in jetter tanks to stagnate for long periods could create conditions for Legionnaire bacteria to multiply. Clean jetter tanks out at least every 6 months with water above 70c (160F) to prevent algae and bacteria forming.

3. Hazards Associated with the misuse of High-Pressure equipment

- Never use a jetter that isn't regularly serviced according to the manufacturer's recommendations.
- When a jetter is used to clean drains & sewers that are contaminated with a hazardous substance it is possible these may be entrained in the resulting aerosol and inhaled by operators. Consider using respiratory protection.
- ⚠ Do not spray flammable liquids – there is a risk of explosion.
- ⚠ Ensure the correct fuel is used on all occasions or there is a risk of explosion.
- Never start the jetter when it may be frozen. Operating a jetter whilst frozen could cause high speed ice bullets to be ejected from the jetter hose on machine start up.
- Never start jetting a drain, sewer or pipe unless the jet nozzle is safely inside the drain and pointing in the direction that you intend it to travel.
- When drain jetting a drain, sewer or pipe whose inside diameter is not small enough to prevent the hose from turning back on itself, a drain jet extension (a piece of straight rigid tube equivalent to the pipe diameter) should be fitted between the end of the hose and the nozzle.
- Always use a safety leader hose at the beginning of the main jetting hose to alert operators when the jet nozzle is nearing the manhole entrance.
- Always consider the use of a tiger tail hose feed guide to protect the jetting hose from abrasion and prevent premature failure.
- Be aware that high pressure hoses can generate static electricity which may need to be controlled when working in hazardous areas.
- ⚠ Never direct a high-pressure water jet at electric power lines or electrical equipment as serious injury or death from electrocution could occur.
- When jetting drains or pipes if there is a danger to the general public from hoses laying across public walkways, they must be covered in such a way as to protect against injury from hose failure and tripping hazards.
- Before starting work, check and ensure the drain jets have no blocked holes or nozzles as this may cause the pumping system to over pressurise which could result in burst disc failure or bursting the jetting hose.
- ⚠ Never attempt to unblock a fully choked drain or pipe before considering the consequence of releasing the blockage (e.g. flooding, explosive ejection, drain nozzle ejection) and having a plan to safely deal with it.

- Never attempt to clean drains or pipes in one pass because this could lead to debris build up behind the jet nozzle causing a pressure build up in the drainage system. Be aware that a pressure build-up in the drain or pipe could cause the jet nozzle to be unexpectedly ejected back towards the operator.
- ⚠ Never enter the manhole to either place the jet nozzle into or extract it from the drain entrance unless the required confined space regulations have been met.
- ⚠ Never work in a manhole where explosive gases may be present with a radio remote control transmitter that is not designed for use in hazardous areas.
- Never use the hydraulic hose reel facility as a winch to retract a jetting hose that has become stuck in the drain or pipe. Damage to the hose could be caused that will make subsequent hose failure more likely.
- Never operate the hydraulic hose reel with the trailer disconnected from the towing vehicle.
- ⚠ Never allow jetting hoses to become kinked and always remove from service any jetting hose with an outer cover that has worn through to the reinforcing braid.
- Never use the high-pressure jetting hose for any purpose other than sewer, drain or pipe cleaning, e.g. winching vehicles or other plant.
- Only use jetting nozzles and/or accessories that have been calibrated for the jetting machine pump performance or else unexpected system over pressurisation could occur.
- Never attempt to clean a drain or pipe with a nozzle that has more forward force than rear force. It will be ejected back toward the operator and could cause injury.
- Never attempt to clean a drain or pipe with a chain flail type jet that has unequal chain lengths as this could lead to severe vibration and high-pressure hose failure.
- When using a venturi jet pump never place your fingers into the pump inlet as they could be trapped by the vacuum and cause injury. Always secure the free end of the pump hose securely and ensure adequate drainage is in place to deal with high volumes of pumped water.
- Never use a dry shut type jetting gun or foot control valve on a jetter that does not have a pressure unloader valve as this could result in burst disc failure or bursting the jetting hose.
- When using a dry shut type system be aware that high pressure can be retained in the jetting hose even after the machine has been shut down. Always discharge pressure in a safe manner after machine shut down.
- ⚠ Never point the gun at anyone as injury from high pressure water will occur if the jet stream comes into contact with body parts.
- Never work on a slippery surface because the reaction force of the jetting gun could cause you to become unstable and lose your footing.

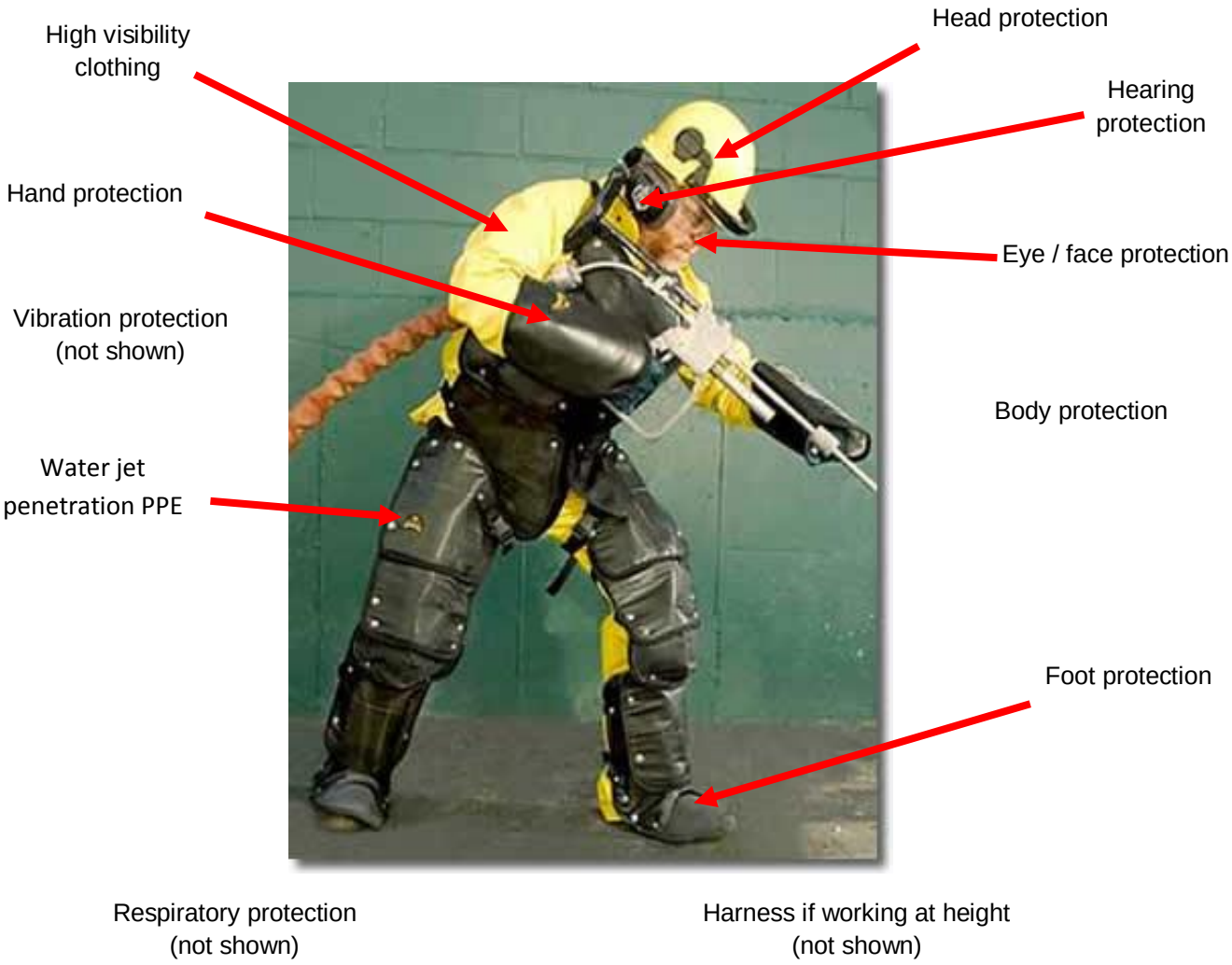
- Never work from a ladder as the reaction force of the jetting gun could cause the ladder to fall backwards from the working area causing possible injury.
- Never work from scaffolding unless it is designed, erected and managed by competent persons and it is adequately secured to prevent it being pushed over by jetting gun reaction forces.
- When using the jetting gun to clean hard surfaces be aware that splash back could contain hard debris travelling at high speed.
- When using the jetting gun to clean contaminated surfaces be aware that splash back could contain dangerous contaminants.
- Never use the jetting gun to clean a surface that could be damaged by the water jet.
- Always ensure that an adequate area is cordoned off around the working zone so that flying debris and contamination cannot injure passers-by.
- Be aware that water jetting guns fitted with oscillating or rotating jet heads can produce higher hand arm vibration levels than simple fixed head jets. Monitoring these levels may be required under national health and safety regulations.
- When using a jetting gun or nozzle to clean at floor level wear suitable protective footwear.
- ⚠ Never use a high-pressure jetting gun to clean down PPE whilst you or others are still wearing it as serious injury and death could result.
- ⚠ Never use a high-pressure jetting gun to wash or cool down livestock as serious injury and death could result.
- Drainage systems may carry bacteria which can cause severe illness or death. Avoid exposing eyes, nose, mouth, ears, hands, cuts or abrasions to wastewater or faecal matter during drain cleaning operations. After working around drainage systems help protect yourself by always washing hands, arms and other areas of the body with hot, soapy water and, if necessary, flush mucous membranes with clean water. Disinfect soiled equipment by washing surfaces with a hot soapy wash using a strong detergent.

4. Personal Protective Equipment

Before operating jetting equipment all persons must carry out a risk assessment to determine the type and level of PPE required by each member of the jetting team. This could include:

- Ear protection – noise levels can be high
- Head and eye protection – a helmet with chin guard and visor is recommended
- Waterproof hand protection
- Waterproof clothing
- Waterproof safety boots with toe protection

> A risk assessment must be completed to analyse which PPE must be worn. Specialist PPE is available which offers enhanced protection against water jet injuries.



5. Pressure Safety Devices

- Pressure relief valves should be checked for functionality and certified by the manufacturer or their authorised representative at least every 6 months.
- Pressure discs (burst discs) should be replaced at least every 6 months to ensure continued safe operation and only manufacturer's original replacements should be used.
- Under no circumstance should a fake part be used in place of a manufacturer's pressure disc (burst disc).

6. High Pressure Hoses

Hose assemblies require careful handling to provide long service life and to guard against potentially dangerous failure. Serious injury and death can result from the failure of a hose assembly that is damaged, worn out, wrongly assembled or installed incorrectly.

- Do not kink the hose
- Do not pull on loops
- Do not excessively stretch the hose
- Do not squash the hose
- Do not twist the hose
- Do not cut the hose
- Use a hose feed guide
- Do not kink the hose at the hose fitting

The following checks must be made before use:

- ⚠ High pressure jetting hoses must be checked along their entire length at the start of each shift to ensure that they are free from external damage. Hoses with exposed or broken reinforcing braid or damaged couplings may fail without warning and should be replaced immediately.
- Before use check end fittings and couplings for damage to threads, sealing faces and rounding of connection nuts. Only use the correct size spanner to tighten the hose fitting. Pipe wrenches or adjustable spanner type tools with serrated teeth must not be used.
- Hoses that have been used must not be re-ended under any circumstances. (Check national regulations which may vary)
- ⚠ Water appearing from the hose, coupling or connector, often first sighted as a fine mist, indicates the hose is damaged and could burst or a joint is loose or defective. Stop the jetter immediately. No attempt should be made to adjust any hose, coupling or connector whilst that part of the system is under pressure.

7. Pump Bleed Screws

- Never open pump bleed screws when pump is running on high pressure. High pressure fluid will jet from the bleed screw hole and it could cause injury.

8. Exhaust Gases & Fire Prevention

Our jetters use diesel or petrol (gas) powered engines

- ⚠ Engine exhaust fumes can be very harmful if allowed to accumulate in enclosed areas. Only run the engine in a well-ventilated location.
- The exhaust gas from the muffler is very hot. To prevent a fire do not expose dry grass, mowed grass, oil of any other combustible materials to exhaust gas. Always keep the engine and muffler clean.
- To avoid a fire be alert for leaks of flammable substances from hoses and lines. Be sure to check for leaks from hoses or pipes, such as fuel and hydraulic fluid by following the maintenance check list.
- To avoid a fire, do not short across power cables and wires. Check to see that all power cables and wirings are in good condition. Keep all electrical connections clean. Bare wire or frayed insulation can cause a dangerous electrical shock and personal injury.
- When running van pack jetters always ensure that the rear of the van is well ventilated and that the side and rear doors are always open.
- ⚠ Ensure the correct fuel is used on all occasions or there is a risk of explosion.

9. Freezing Conditions

- If the equipment has been frozen, it is essential that the whole system is first thoroughly thawed, then cautiously flushed without any nozzle or other restriction attached to the high-pressure hose.
- ⚠ Ice Bullets – ice may be trapped in the system. No attempt should be made to force the ice out by starting the engine. Ice can be ejected from the hose at high speed as the pump is started. Ice “bullets” can be ejected from the hose at speed with possible lethal consequences.

10. Adequate Drainage (Wastewater)

- Ensure that there is adequate drainage of the jetted water. Large puddles should never be allowed to accumulate, particularly on suspended floors.
- The weight of accumulated waste water can create a hazard.

  1,000 litres of water weighs 1,000 kgs

  300 gallons (US) of water weighs 2,500 lbs

11. Daily Checks

To ensure the equipment is safe to use carry out all daily checks before you operate the jetter. These can include the following:

- Water filter cleanliness
- Fuel level
- All jets are clean and free from debris
- All jetting hoses are free from damage and abrasion
- Wheel nuts are tight
- Loose parts are secured
- Tyres are not worn
- Tyre pressure is correct
- Towing hitch is not worn
- Pump oil level
- Gearbox oil level
- Engine oil level

Please refer to the Operation & Maintenance Manual for specific details

12. Explosive Atmospheres

⚠ Water jetting within enclosed areas that have not been gas-freed or inerted may create a risk of ignition of flammable vapour by an electrostatic charge generated by the action of the water jet.

- Equipment used in explosive atmospheres must be certified to the correct ATEX level. Check before commencing work.
- Check earthing (grounding) requirements for machines & hoses before use.

13. Trailer Jetters

- Always park the trailer on level ground
- Always put the handbrake on or chock the wheels before removing from the towing vehicle
- Never operate the hydraulic hose reel unless the trailer is hitched to the towing vehicle
- If the trailer is fitted with prop stands, always deploy and secure stands before use.

14. Jetting Applications and Accessories

All our jetting accessories are designed to be safe in operation, but operators must be aware that misuse could cause serious injury. In the following sections we have noted hazards specific to the misuse or those arising from general use of various accessories.

15. Drain & Pipe Cleaning

- When a jetter is used to clean drains & sewers that are contaminated with a hazardous substance it is possible these may be entrained in the resulting aerosol an inhaled by operators. Consider using respiratory protection.
- Never start jetting a drain, sewer or pipe unless the jet nozzle is safely inside the drain and pointing in the direction that you intend to travel.
- When drain jetting a drain, sewer or pipe with an inside diameter that is not small enough to prevent the hose from turning back on itself, a drain jet extension (a piece of straight rigid tube equivalent to the pipe diameter) should be fitted between the end of the hose and the nozzle.
- Always use a safety leader hose at the beginning of the main jetting hose to alert operators when the jet nozzle is mearing the manhole entrance.
- Always consider the use of a tiger tail hose feed guide to protect the jetting hose from abrasion and prevent premature failure.
- Be aware the high-pressure hoses can generate static electricity which may need to be controlled when working in hazardous areas.
- When jetting drains or sewers if there is a danger to the general public from hoses laying across public walkways, they must be covered in such a way as to protect against injury from hose failure and tripping hazards.
- Before starting work, check and ensure the drain jets have no blocked holes or nozzles as this may cause the pumping system to over pressurise which could result in burst disc failure or bursting the jetting hose.
- ⚠ Never attempt to unblock a fully choked drain or pipe before considering the consequence of releasing the blockage (e.g. flooding, explosive ejection, drain nozzle ejection) and having a plan to safely deal with it.
- Never attempt to clean drains or pipes in one pass because this could lead to debris build up behind the jet nozzle causing a pressure build up in the drainage system. Be aware that a pressure build up in the drain or pipe could cause the jet nozzle to be ejected at speed back towards the operator.
- ⚠ Never enter the manhole at either place the jet nozzle into or extract it from the drain entrance unless the required confined space regulations have been met.

- ⚠ Never work in a manhole where explosive gases may be present with a radio remote control transmitter that is not designed for use in hazardous areas.
- Never use the hydraulic hose reel facility as a winch to retract a jetting hose that has become stuck in the drain or pipe. Damage to the hose could be caused that will make subsequent hose failure more likely.
- ⚠ Never allow jetting hoses to become kinked and always remove from service any jetting hose with and outer cover that has worn through to the reinforcing braid.
- Never use the high-pressure jetting hose for any purpose other than sewer, drain or pipe cleaning e.g. winching vehicles other plant.
- Only use jetting nozzles and / or accessories that have been calibrated for the jetting machine pump performance or else unexpected system over pressurisation could occur.
- Never operate the hydraulic hose reel with the trailer disconnected from the towing vehicle.
- Never start the jetter when it may be frozen. Operating a jetter whilst frozen could cause high speed ice bullets to be ejected from the jetter hose on machine start up.
- Never attempt to clean a drain or pipe with a nozzle that has more forward force than rear force. It will be ejected back toward the operator and could cause injury.
- Never attempt to clean or pipe with a chain flail type jet that has unequal chain lengths as this could lead to severe vibration and high-pressure hose failure.
- Drainage systems may carry bacteria which can cause severe illness or death. Avoid exposing eyes, nose, mouth, ears, hands, cuts or abrasions to wastewater or faecal matter during drain cleaning operations. After working around drainage systems help protect yourself by always washing hands, arms and other areas of the body with hot, soapy water and, if necessary, flush mucous membranes with clean water. Disinfect soiled equipment by washing surfaces with a hot soapy wash using a strong detergent.
- One-man operations should only be attempted when the jetter is fitted with a suitable remote-control system that allows the operator to control the machine & the water jet stream.
- The use of “jump or pulse jets” in drain cleaning applications may expose the operator to vibration levels in excess of the exposure limits action value if the jetting hose is handled. Water jetting hose should not be handled whilst the “jump or pulse jet” is in operation for more than 25 minutes per 8-hour day.

16. Jetting Guns

- Never exceed the recommended maximum for reaction force (250N with shoulder stock & 150N without shoulder stock). Other national standards may apply.

  Current guidance in the USA is that reaction forces should not exceed 1/3rd of the operator's bodyweight for extended periods of time.

- Never shorten the barrels of the jetting gun below 1-1m from the nozzle tip to centre of the trigger assembly.
- Never lock the safety trigger in the ON position
- Never point the gun at anyone as injury from high pressure water will occur if the jet stream comes into contact with body parts.
- Never work on a slippery surface because the reaction force of the jetting gun could cause you to become unstable and you could lose your footing.
- Never work from a ladder as the reaction force of the jetting gun could cause the ladder to fall backwards from the working area causing possible injury.
- Never work from scaffolding unless it is designed, erected and managed by competent persons and it is adequately secured to prevent it being pushed over by jetting gun reaction force.
- When using the jetting gun to clean hard surfaces be aware that splash back could contain hard debris travelling at high speed.
- When using the jetting gun to clean contaminated surfaces be aware that splash back could contain dangerous contaminates.

- Never use the jetting gun to clean a surface that could be damaged by the water jet.
- Always ensure that an adequate area is cordoned off around the working zone so that flying debris and contamination cannot injure passers-by.
- Be aware that the use of water jetting guns fitted with oscillating or rotating jet heads can to produce higher hand arm vibration levels than simple fixed head jets. Monitoring these levels may be required under national health and safety regulations.
- Never work on a slippery surface.
- When using a jetting gun or nozzle to clean at floor level wear suitable protective footwear.
- ⚠ Never use a high-pressure jetting gun to clean down PPE whilst you or others are still wearing it as serious injury and death could result.
- ⚠ Never use a high-pressure jetting gun to wash or cool down livestock as serious injury and death could result.
- ⚠ Never direct a high-pressure water jet at electric power lines or electrical equipment as serious injury or death from electrocution could occur.
- ⚠ Do not spray flammable liquids – there is risk of explosion.

17. Tube Cleaning

- Manual tube cleaning is not recommended by Flowplant.
- If our jetting units are used to power automatic & semi-automatic tube cleaning equipment specific safety instructions must be obtained from the tube cleaning equipment manufacturer prior to use.

18. Floor Cleaners

- Never adjust the operating pressure when the unit is running.
- Never use the floor cleaner over uneven or damaged surfaces.
- ⚠ Never raise the floor cleaner from the floor when under pressure.
- ⚠ Over pressurising the floor cleaner could lead to it becoming dangerously unstable.

19. Jet Pumps

- When using a Venturi jet pump never place your fingers into the pump inlet as they could be trapped by the vacuum and cause injury. Always secure the free end of the pump hose securely and ensure adequate drainage is in place to deal with high volumes of pumped water.

20. Dry Shut Guns & Foot Valves (Additional to Jetting Guns Info)

- ⚠ When using a dry shut type system, be aware that high pressure can be retained in the jetting hose even after the machine has been shut down. Always discharge pressure in a safe manner after machine shut down.
- Never use a dry shut type foot control valve on a jetter that does not have a pressure unloader valve as this could result in burst disc failure or bursting the jetting hose

21. Electric Machines

- Flowplant electric machines operate at voltages of up to 690 volt and 200amps. Only trained, competent electricians should install units and carry out any maintenance works.
- If working on any maintenance schedules related to the electrical installation, the electrical supply must be isolated. Lock and tag if necessary.
- ⚠ Do not get water within the electrical cabinet. If water may have entered the electrical cabinet, the power should be isolated immediately and an investigation carried out via a trained operator.
- Care should be taken when working around any electrical cables. If any of the cables are damaged, the power should be isolated immediately and an investigation carried out via a trained operator.

22. Hot Water Machines

- Only trained, competent operators to use Flowplant hot water machines.
- ⚠ Flowplant hot water machines will operate at temperatures over 90 degrees centigrade. Care must be taken to not come into contact with any of the operating fluids.
- ⚠ Components that come into contact with the heated water will hold excess temperatures (hoses, metallic fittings, pressure gun). Care must be taken not to come into contact with these hot surfaces.
- ⚠ Boiler surfaces will reach temperatures in excess of 50 degrees centigrade. Care should be taken not to come in the contact with these surfaces.
- ⚠ Within the boiler, a naked flame powered by the diesel tank will heat water to the required temperatures. Only trained operatives should access the boiler for any required maintenance.
- As a by product of the boiler combustion, carbon dioxide is produced from the boiler flue. The unit must be operated in a well ventilated area.
- Exhaust gases will exit boiler flue at temperatures of up to 220 degrees centigrade. Care must be taken not to come into contact with these gases.