Operation & Maintenance Manual

Original Instructions

ECO 3000 VANPACK JETTER RADIO / MANUAL (003-330, 003-331)

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Operation & Maintenance Manual for:

UNIT: ECO 3000 VANPACK JETTER RADIO / MANUAL

ISSUE DATE: 04/2025

AMENDMENTS

Change	Changes	Date	Signature
1	First Release	04/25	LK

1. Contents & Introduction

1.1. Contents

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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 unit. 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 ECO 3000Series Vanpack

The ECO 3000 Series Vanpack 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.

Developed for a wide range of water jetting applications, the Unit has been meticulously designed for safe and efficient use.

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 Engine

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

Section 9 Ancillaries

Section 10 Parts list / Spares

How to identify and order spares

Section 11 Service Documents

Service logbook and checklist.

Section 12 Warranty & Certification

2. Scope of Supply

2.1. Scope of Supply

Unit:	UNIT ECO 3000 VANPACK RADIO / MANUAL
Machine Build Code:	003330, 003331

The Scope of Supply in compliance with the above order compromises the following items:

1. UNIT ECO 3000 VANPACK SERIES (200 BAR 41 LPM)

2.2. Vanpack Assembly

The General Arrangement drawing: 003-330, defines the components of the ECO 3000 Series Vanpack mounted Pump Assembly as follows:

Water is fed from a “mains” supply through a manual low-pressure inlet hose reel into a plastic water storage tank. The tank supplies the pump with a positive head of pressure via an inline Hypro strainer that filters the water.

The **Interpump** high-pressure plunger pump is driven by a **Loncin 24Hp** industrial petrol engine through **Interpump** gearbox.

The water is directed by Shut of Valve and electrically controlled Solenoid Valve (Radio unit only), to a Manual hose reel with 60m of 3/8” hose, or at low pressure ‘dumped’ back to tank.

The system is protected from over pressurisation by safety relief Valve.
System pressure can be adjusted with Unloader Valve.

System pressure can be monitored at the control panel on the pressure gauge.

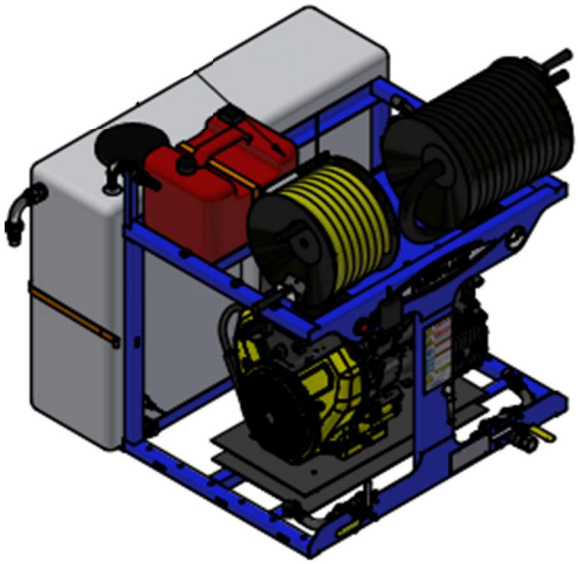
2.3. Detailed Drawings

Detailed drawings for the above components are provided as follows:

The Pump is detailed in Section 7.

ECO 3000 Series Van Pack

- Compact Design to Suit Smaller Vans
- Lightweight Safety Enclosure
- Manual or Radio Remote Control Operated
- Automatic SRV (Safety Relief Valve)
- Optional Service / Location Tracking



Model	ECO 3000 Series Van Pack
Pressure & Flow	200 Bar @ 41L/pm
Pump	InterPump
Fuel Tank	Fuel tank capacity 12l
Engine	ENGINE Loncin Petrol 24 Hp
Water Tank	White / Transparent 250l Breathable plastic tank
Frame	Lightweight covers / lightweight steel frame, shot blasted and powder coated
Hose Reel	Manual Hose Reel 60m Capacity
Weight	**Dry Weight from 240kg (with hoses)**
Build Options	Remote Service Monitoring & Location Tracking (UK Only) Lightweight Tough Skin Hose

3. Technical Data

3.1. Technical data

3.1.1. Pump data

PUMP TYPE	Interpump W2141
Number of cylinders	3
Power rating (nominal)	16.2 kW
Crankshaft speed	1450rpm
Maximum pressure	210
Unit operating pressure	200 bar (3000psi)
Flow rate	Up to 41 L/min
Crankcase lubrication	Splash / Gravity
Crankcase oil capacity	1 L
Recommended crankcase oil	SAE30 (SAE 15W/40 pump oil)

Prime Mover Petrol Engine Loncin 24Hp

Drive Gearbox Interpump

Water Tank Capacity 250 litres

Pressure Display Pressure Gauge

Safety Relief Automatic SRV

Mains Water Supply Positive head.

Note: Water pH value of 5 to 9 is recommended.

3.2. Technical Description

3.2.1. Primary Components

The primary components of the ECO 3000 Series Vanpack are as follows:

1. A prime mover in the form of an Engine Loncin V-TWIN which drives a Interpump W2141 type high-pressure pump.
2. The pump can raise the water pressure up to 3000psi (200 bar).
3. A manual hose reel 60 m (200 ft) of single wire braid high-pressure hose with either a nozzle or gun attachment to deliver the high-pressure water to the selected working site.
4. A plastic water tank, acting as a reservoir, ensures the water is settled and non-turbulent, discharging a smooth lamina flow of uninterrupted air free supply, a positive head of pressure to the pump inlet and maximising the pumps full potential. The tank can be filled via the inlet reel by connecting to a mains inlet water supply

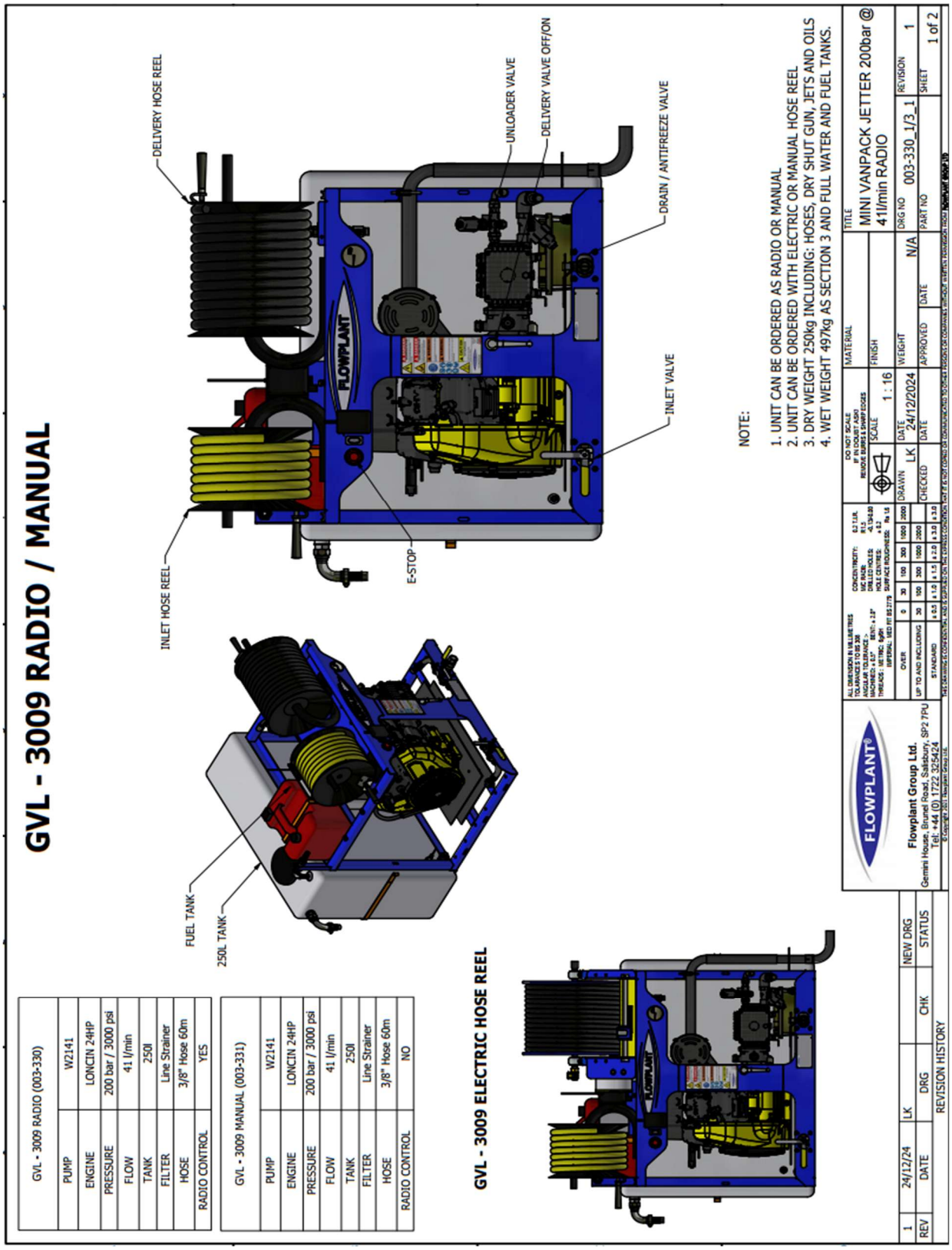
   Note: Turbulent water will cause the pump to run unevenly and cause excessive wear due to cavitation.

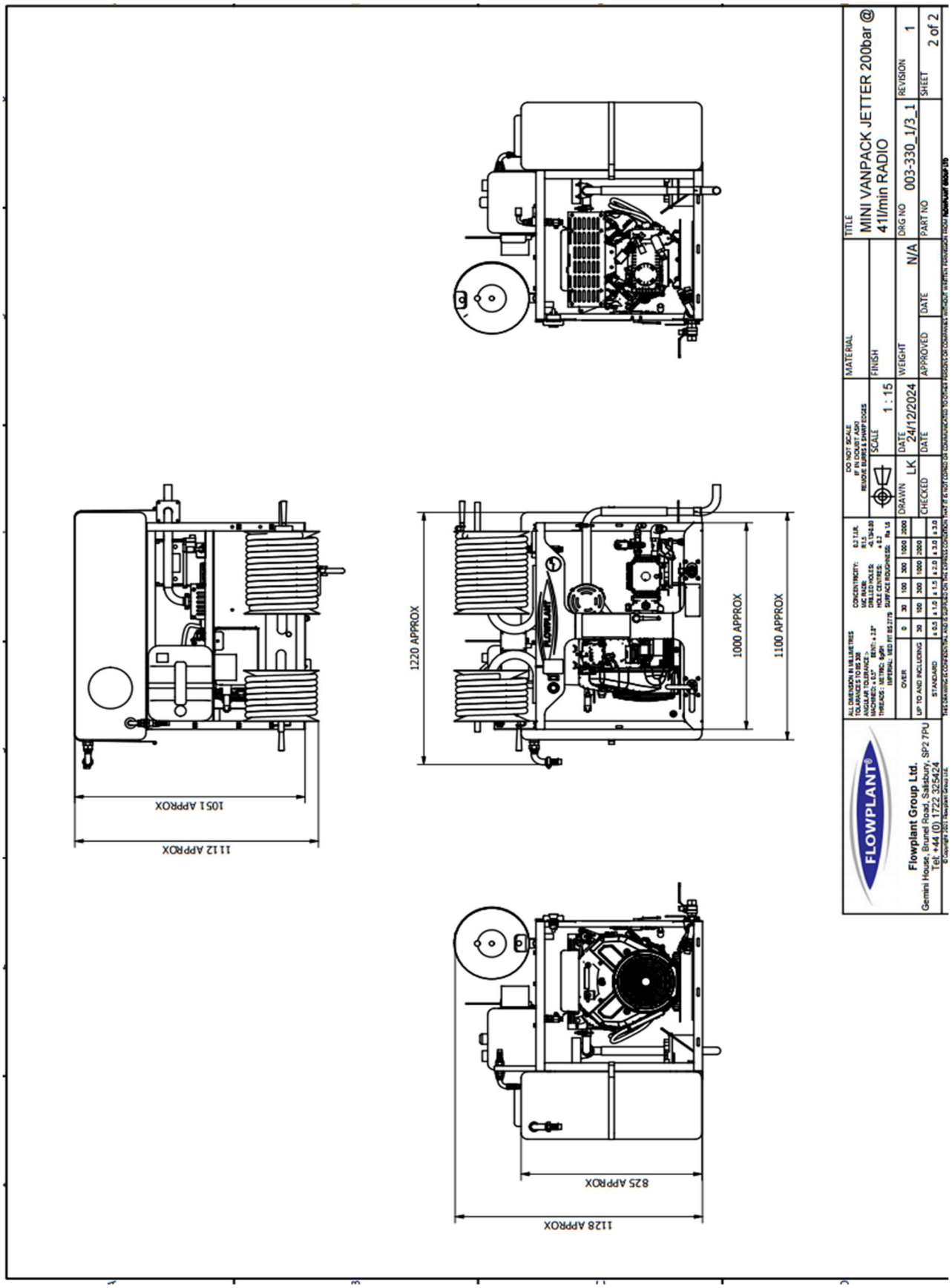
5. Water is delivered to the hose reel by using a 12VDC solenoid valve (only on radio version) and manual shut off valve.
6. A mesh inline strainer is fitted to the suction line between the tank and the pump inlet.

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 will cause the pump to cavitate.

3.3. Installation details

Installation Drawing No. 003-330 provides details of sizes for the 3009 Series Vanpack together with inlet and outlet water connections.




1220 APPROX
1000 APPROX
1100 APPROX
1051 APPROX
1112 APPROX
825 APPROX
1128 APPROX
MINI VANPACK JETTER 200bar @ 41l/min RADIO
003-330_1/3_1
Flowplant Group Ltd.
Gemini House, Brunel Road, Salisbury, SP2 7PU
Tel: +44 (0) 1722 325424

4. Operation

4.1. Operating Conditions

Operators of water jetting equipment should be fully conversant with the Water Jetting Association ‘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 ⚠ symbol and you are required to read the relevant section in the Health & Safety Manual.

4.2. Daily Checks

Carry out all daily checks. Full maintenance checks are detailed in Section 5 - Routine Maintenance.

They are:

- Pump oil level
- Gearbox oil level
- Water filter cleanliness
- Engine oil level
- Tank water level & Cleanliness
- Fuel level
- Radio Remote fully charged
- Check for leaks

If the unit has previously been in operation for more than 100 hours, other routine maintenance checks may need to be carried out. Refer to section 7 and 8.

⚠

SAFETY RELIEF VALVES MUST BE RECALIBRATED EVERY 12 MONTHS

4.3. Pre-start checks & bleed procedure

- In cold weather check that machine is not frozen before starting (see Antifreeze section). Only operate the machine in a well-ventilated area. ⚠
- Park next to suitable clean water supply on a level ground.
- Ensure vehicle handbrake is applied.
- To fill the water tank, connect water supply to inlet hose reel. The water will fill the tank via the inlet hose reel, when the tank is full it will flow out of the overflow.
- In order to avoid an interruption to the jetting operation please ensure that the hand held 'radio control unit' is fully charged, this is to ensure the radio signal is at full strength and not compromised while the unit is being operated in 'remote' mode.

Do not drop the handheld "radio control unit" (Transmitter) down a manhole as this could cause it permanent damage. Please use the lanyard.

4.4. Starting the engine & setting the operating pressure

The Vanpack can be supplied with the Radio Control System allowing One-man operation 'OMO' (in accordance with the 'Single Person Operation as detailed in the Code of Practice.

⚠ Starting procedures are provided for 'Local' operation where water to the high-pressure hose is controlled by the operator using the Control unit at the machine, and for 'remote' operation where water to the high-pressure hose is controlled by the hand-held radio control unit 'RCU'.

While the remote-control facility is provided for single person jetting operation, it should be noted that initial pressure check **must** be made at the pump set. Hence, even with the 'remote' enabled, all initial pressure checks must be made

Either:

With a single operator and 'radio control unit' (Transmitter) adjacent to the pump set and with the nozzle secure in a drain or pipe or the gun firmly held in the hand.

Or:

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

Once the required operating pressure has been set, remote operation can be safely conducted by one person using the handheld 'radio control unit (Transmitter)

Tank water level

Ensure you have an adequate water supply and that the water tank is at least ½ full. The machine **WILL NOT RUN** if the water tank is empty. It is preferable to have a full tank of water and provide the pump with a good positive head.

NOTE: Do Not allow unfiltered water into the pump

Emergency Shutdown

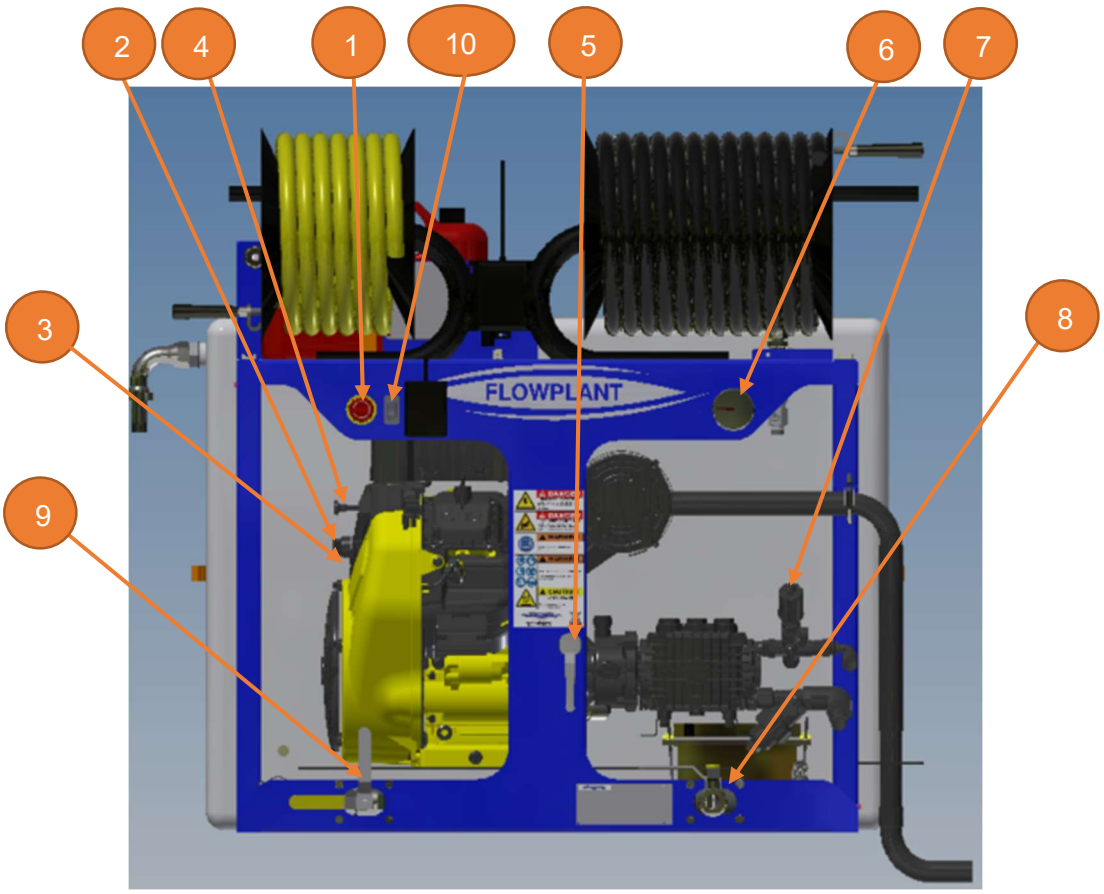
At any time during the starting procedure, or during normal jetting operations, an emergency shutdown can be achieved by switching off the engine with the key or pressing the E/Stop

Fig. 4.1 Estop on control panel. Twist to release

4.5. Pre-start Checks & Procedures

4.5.1. Controls

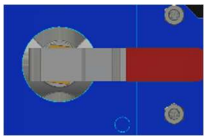
1. E-Stop
2. Ignition key switch
3. Engine speed up / down (Manual unit only)
4. Engine Choke
5. Water Shut off valve
6. Pressure gauge
7. Unloader valve
8. Drain / anti-freeze inlet valve
9. Inlet valve
10. Rocker switch (OFF / ON)



4.5.2. Starting the engine - Manual version unit only

Ensure the open-ended high-pressure hose is in a safe position, preferably within sight of the operator at the control panel. ⚠

1. Both ON / OFF rocker switch and push button (E-Stop) are in OFF (0) position.
2. Twist to release push button (E-Stop) to position ON (1) and press rocker switch to ON position. Now auxiliary circuits will be energized.
3. Ensure that Inlet valve is in **run position.** ⚠



4. Make sure that water shut off valve is in **off position.**
5. Turn the ignition switch and start the engine. Pulling the choke might be needed if engine is cold. ⚠

   Engine will start and idle at a pre-determined engine rpm. **Water will now be circulating through the pump and be diverted back to the water tank. Push choke back. **Note: If choke is not pushed back, engine won't reach correct RPM.**
6. To deliver water to the High-Pressure hoses, open manual shut off valve.

   Speed / Pressure can be adjusted by using speed up and speed down lever.
7. Use speed up lever to raise the RPM.
8. Use unloader valve to adjust the pressure (do not exceed 200bar). ⚠
9. To shut the system down, reduce the pressure on unloader valve and reduce RPM to idle speed and turn off the water by using water shut off valve. Switch the engine off by using key switch. The engine will shut down safely. Press the rocker switch to OFF position and press E-STOP button to OFF (0) position. The system is now safely off.

NOTE: If you don`t press OFF button on the rocker switch, battery will get empty over time, and unit might not start!

⚠ **10. ** or in emergency situations press the E-STOP button on the main control panel or stop button on the radio transmitter.**

4.5.3. Checking the operating pressure with a nozzle fitted

1. Fit the correctly sized nozzle to the high-pressure to the safety leader hose. This should then be safely positioned within a pipe or drain.
2. Ensure the nozzle is secured in a safe position, preferably within sight of the operator at the control panel. ⚠
3. Open shut off valve (or if using the radio the press the water 'ON' button on the transmitter). Select the required speed.
4. Observe the pressure displayed on the pressure gauge and note the pressure reading. Close shut off valve (or if using the radio press the water 'OFF' button) and adjust speed to idle. Note: If the pressure is significantly lower than expected, turn the unit off and replace the nozzle with the new one.

Do not exceed the maximum operating pressure of 200Bar by fitting a smaller nozzle than is recommended, as this will cause the Pressure relief valve & or Safety relief valve to dump the excess pressure. The maximum engine speed is restricted to 3100 rpm.

4.5.4. Checking the operating pressure with a gun fitted

1. Fit the gun (with the appropriately sized H.V. (pencil) or Fan Jet), to the high-pressure hose.
2. Ensure the gun is held firmly in the hand.
3. Start the engine.
4. Open the shut off valve (or if using the radio press the Water 'ON' button) to divert the water to the gun. Use the speed up button to raise the engine speed.
5. ⚠ Pull the gun trigger and observe the pressure gauge mounted on the instrument panel, note the pressure reading. Release the gun trigger, then close shut off valve (or if using the radio press the water 'OFF' button) and return the unit to the idle position.

   Note: If the pressure is significantly lower than expected, turn the unit off and replace the worn nozzle in the gun with a new one! Once engine has been stopped, press the gun trigger to release any trapped pressure before attempting to disconnect the gun from the high-pressure hose.

4.5.5. Starting the engine - Radio version unit only

1. Battery LED
2. Signal LED
3. Water ON / OFF
4. Speed UP
5. Remote ON / OFF
6. Speed Down
7. STOP (5 sec reset)

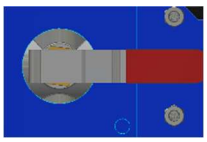
Fig 4. Operating with the Radio Remote

4.5.6. Starting the Engine

1. Both ON / OFF rocker switch and push button (E-Stop) are in OFF (0) position.

2. Twist to release push button (E-Stop) to position ON (1) and press rocker switch to ON position. Now auxiliary circuits will be energized.

2. Ensure that Inlet valve is in **run position.** ⚠



a. On the transmitter:

3. Press remote ON button (Button 5) remote will power on

4. Press and hold stop button for at least 5 seconds (until signal LED turns ON).

   Transmitter & receiver have now 'paired'.

   Note: If unit is stopped by using stop button, reset must be done otherwise engine can't be started again. For reset: Press and hold stop button for at least 5 seconds (until signal LED turns ON).

5. Start the engine by using ignition key switch on the control panel. Pulling the choke might be needed if engine is cold.

   Engine will start and idle at a pre-determined engine rpm. **Water will now be circulating through the pump and be diverted back to the water tank. Push choke back.

Note: If choke is not pushed back, engine won't reach correct RPM.

6. To increase engine speed, press the 'engine speed up' button, this is indicated by the symbol of a hare.
7. To decrease engine speed, press the engine 'speed down' button, this is indicated by the symbol of a tortoise.
8. Press water ON / OFF button to ON position, to divert the water to the nozzle or gun, this is indicated by the symbol of a
9. Press water ON / OFF button to OFF position, to divert water back to tank.
10. To stop the engine, reduce the Engine rpm and turn the key switch on the engine from on to off position.
12. Turn off the remote-control transmitter by pressing ON / OFF button to OFF position.
13. Press the rocker switch to OFF position and press E-STOP button to OFF (0) position. The system is now safely off.

    Note: If the operator goes out of radio receiving range, engine will shut off and water will be turned off. For reset: Press and hold stop button for 5 seconds (until signal LED turns ON). Engine can be turned ON again.

4.5.6.1. Charging Details:

Place the transmitter on the charging pad.

The top battery LED will flash red to indicate charging.

When charged the signal green LED will be ON.

4.6. Rapid Shutdown

⚠ Should any unforeseen circumstances arise, including any signs of a leak, the jetting operation should be terminated immediately, the equipment shut down and the relevant managers informed.

4.7. Automatic Shutdown

The engine will shut down automatically if the unit runs out of water or if Radio control loses connection.

4.8. Hose reel winding and unwinding

The high-pressure hose is manually unwound or wound to the hose reel.

via a manually actuated spool valve.

⚠ **If the hose becomes stuck in the drain the hose reel <u>should NOT</u> be used as a winch to try and free it and the vehicle <u>should NEVER</u> be driven away to drag the hose clear. This will put severe strain on the reel framework which could lead to serious damage**. Hoses that have become stuck should be pulled free by hand.

4.9. Frost Precautions

General Antifreeze Information

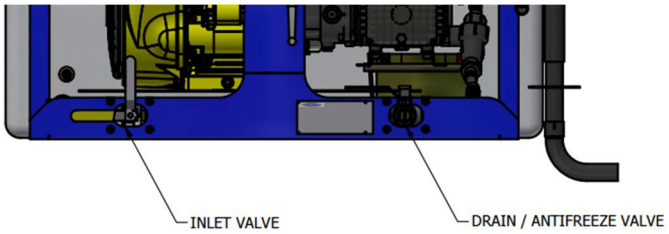
- Antifreeze procedures throughout this manual must be adhered to. In the case of conflicting or ambiguous instructions contact your Site Manager or Safety Manager before commencing work.
- ⚠ If the pump is frozen up – it should on no account be started. Operating the machine frozen will damage the pump and damages caused by misuse will not be covered under warranty.
- 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.
- Any person operating, working with, or passing near the jetter must wear the appropriate Personal Protective Equipment (PPE).
- The jetting supervisor should make this antifreeze 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.

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:

4.10. To Anti-Freeze the machine:

1. Prepare 50/50 antifreeze solution.
2. **Remove nozzle or gun attachments** from the delivery hose.
3. Lower the water in the tank. Open the antifreeze / drain valve and inlet valve.

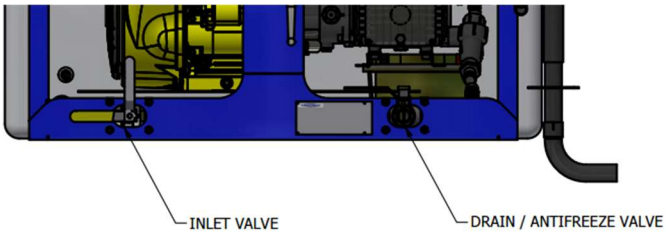


4. Shut off the inlet valve, and attach antifreeze suction hose to the antifreeze / drain valve (antifreeze valve must stay open).
5. Insert antifreeze suction hose into antifreeze container.
6. Hold the open-ended hose away from the body pointing it to the ground and away from any by-standers **(WITH NO NOZZLE ATTACHED!).**

   Start the engine and immediately open shut off valve or if using the radio press water ON button. Water will come from the end of the high-pressure hose. **Pump must never run on dry. If you run out of antifreeze immediately turn off the unit and fill the antifreeze container.**
7. The blue antifreeze mixture will start to come out of the high-pressure hose. Immediately insert delivery hose into the antifreeze container. Water should recirculate for 30 seconds.
8. Unwind the pressure regulator to protect return line and shut down the engine.
9. Shut off antifreeze / drain valve.
10. Isolate the unit.

4.11. To De-Antifreeze the machine:

1. Re-fill the water storage tank.
2. Open the Inlet valve.



3. Place the high-pressure hose **(WITH NO NOZZLE ATTACHED!)** into the antifreeze container.
4. Start the engine and immediately press water ON button. Pump out the antifreeze solution from the high-pressure hose back into the container.
5. As the antifreeze mix reaches the top of the container turn engine off. (Regularly check the strength of the antifreeze mixture ensuring it is at least a 50/50 mix)
6. The machine can now be used in the normal manner.

5. Routine Maintenance

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

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.

	GENERAL
Prior to use / Daily / after 8 hours running	• Check inlet water filter element (Clean if necessary) • Check engine oil level on dip stick • Visual check for hose damage/water leaks & for any cracks in frame/chassis etc. • Check Power and remote control • Check emergency stop button operation
Weekly / 24 hours	• Visually inspect van pack for security checking for any loose, damaged or missing parts. • Check for any leakage • Check air filter cleanliness • Check engine fuel filter
Three monthly / 50 hours	• First service contact Flowplant Service
Six Monthly / 100 hours	• Inspect tanks and fittings for leaks, thoroughly clean & flush through • Tighten any loose joints • Check condition of 12volt start battery • Grease battery terminals for protection
Yearly / 300 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 (Specifically welded joints) • Carry out detailed inspection of pipes, hoses and fittings. (Specifically looking for perished rubber and damage)
Two Yearly / 400 hours	• Major service of engine, gearbox and pump required (Contact Flowplant) • Check wiring terminals/connections and continuity of electrical earth.

Two Yearly / 600 hours	• Major service of engine, gearbox and pump required (Contact Flowplant) • Replace pump inlet/delivery valves • Check wiring terminals/connections and continuity of electrical earth.

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

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

5.2. Engine Maintenance Schedule

For a detailed guide to engine maintenance and overhaul procedures refer to Section 8.

Periodic Maintenance Schedule		Time of Use	20 H or the first Month of Initial Use	50 H or Every 3 Months	100 H or Every 6 Months	300 H or Every Year
Engine oil	Check the oil level	○				
	Replacement		○		○	
Secondary oil filter	Replacement					○**(2)** 200 h
Air filter	Check	○				
	Clear			○(1)		
	Replacement					○(3)
Fuel filter	Replacement					○(1)
Position of battery electrolyte	Check	○				
Spark plug	Check and adjust the clearance				○(2)	
	Replacement					○
Valve clearance	Check and adjust the clearance					○(2)
Oil pipe	Replacement	Every 2 years (2)				

5.3. Gearbox Lubricating Chart – Interpump Gearbox

Always us the sight glass in the side of the gearbox as the level indicator

Manufacturer	Type	Oil Capacity (litres)
Shell	ISO VG 220 DIN	0.28L

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.

5.5. Daily Maintenance

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

1. Check condition of inlet water filter & element. Clean or replace

   Unscrew the bowl to remove the mesh. Take precautions so as not to lose the sealing ring.

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.

6. Fault Finding

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

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

Also covered overleaf is a diagnosis of selector valve problems.

The table below indicates potential problems and suggests an appropriate course of action.

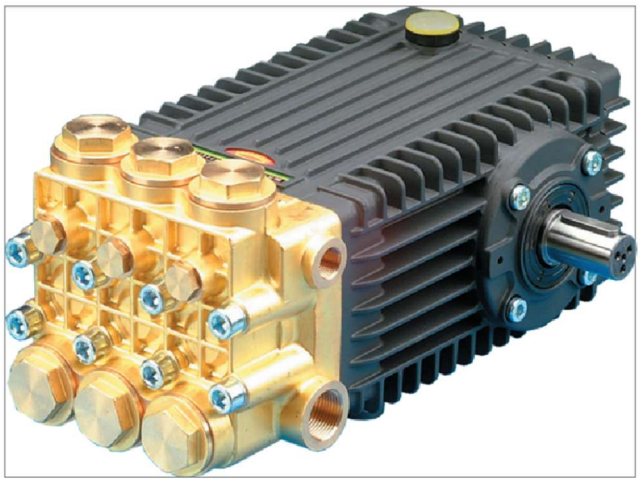
Fault	Condition	Solution
Engine does not start	**Low Water level tank**	**Fill the tank or replace float switch if necessary.**
	E-Stop button pressed	**Twist to release or replace if necessary.**
	Engine problem	**Refer to the engine handbook for further advice.**
	Faulty relay	**Replace if necessary.**
Radio control doesn't work	**Empty battery on transmitter**	**Recharge the battery.**
	Malfunction of the radio	**Refer to the radio handbook for further advice.**

6.1. Equipment Fault Finding

Problem	Possible Cause	Recommended Action
Low system pressure	Worn or incorrectly sized nozzle. Blocked water filter. Blocked suction hose. Damaged suction hose. Leaks in delivery hoses/couplings. Unloader valve leaking. Worn pressure packings. Worn suction or delivery valves.	Replace nozzle. Clean filter element. Remove obstruction. Repair or replace. Check all joints for tightness. Replace any worn hoses. Repair or replace. Replace worn parts. Replace seals or renew valves.
Low pressure and pump pulsing	Broken valve spring. Leaking O-ring on valve cartridge. Worn pressure packings.	Replace spring. Renew O-rings. Renew packings.
No water delivery	Water solenoid valve malfunction Unloader valve malfunction Manual water shut off valve malfunction	Repair or replace. Repair or replace. Repair or replace.
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.

7. Pump

Flowplant offer a detailed manual with the **Interpump W2141** Pump and this will be accompanied by this manual.



7.1. Safety Relief Valve ⚠

⚠ The unit is fitted with a safety relief valve which will lift at 10% working pressure. This will protect the machine and will lift before the rated pressure of any component on the unit.

Unit pressure	SRV set pressure
200 bar	**220 bar**

Pressure relief valves should be checked for functionality and certified by the manufacturer or their authorised representative at least every 12 months.

NOTE: The relief valve is on the unit to protect the machine. The relief valve is not set up to protect to the duct of any item within.

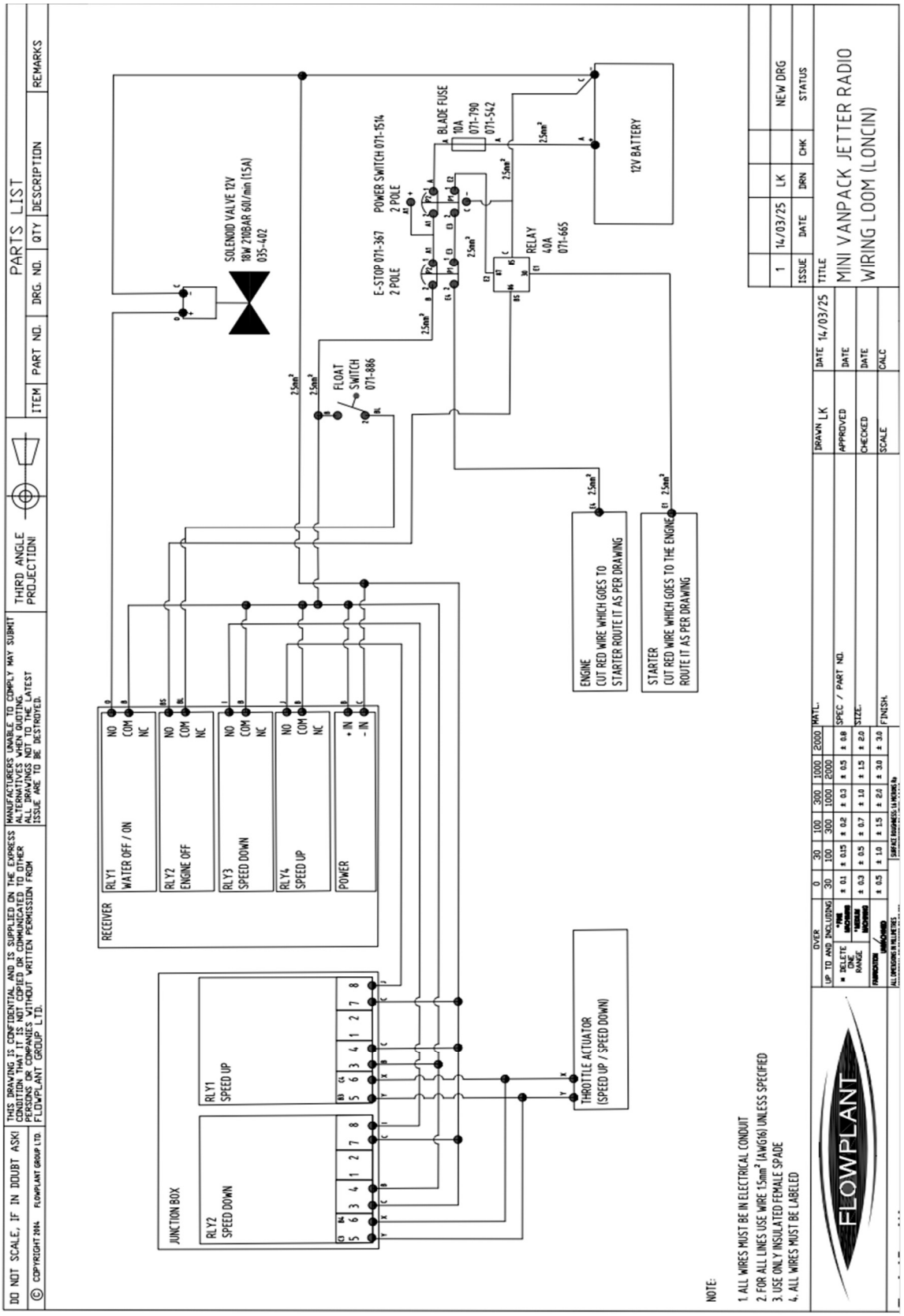
8. Engine

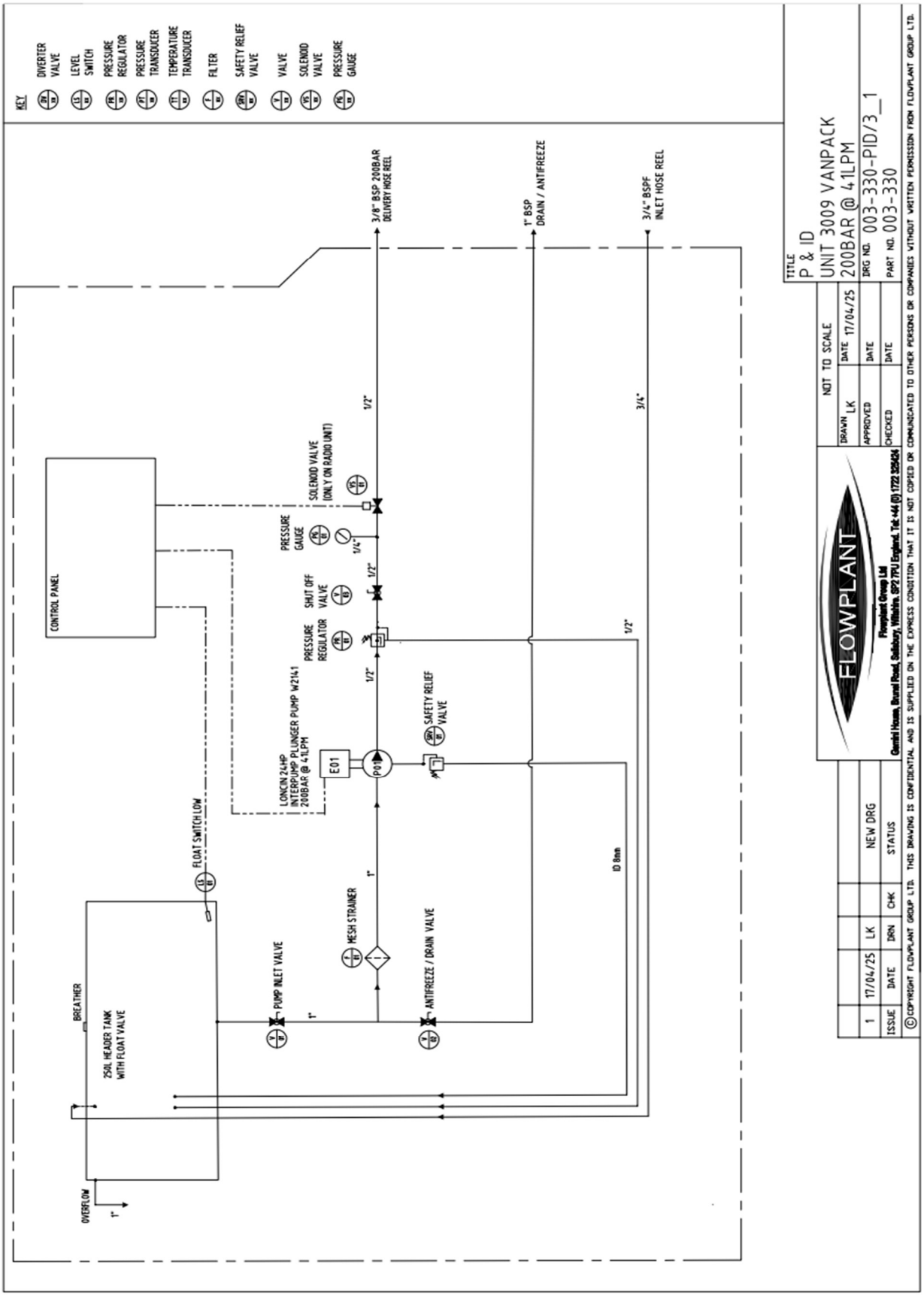
Loncin offer a detailed manual with the **LONCIN (LCV80FD)** petrol engine and this will be accompanied by this manual.

Replacement filters may be obtained from Flowplant

Flowplant PART No.	ITEM
700-2659	LONCIN (LCV80FD) SERVICE KIT
051-1183	LONCIN (LCV80FD) SPARK PLUG
054-123	ENGINE OIL
051-1184	LONCIN (LCV80FD) FUEL FILTER
051-1185	LONCIN (LCV80FD) AIR FILTER
051-1186	LONCIN (LCV80FD) OIL FILTER

9. Circuit and Wiring Diagrams




KEY
DIVERTER VALVE
LEVEL SWITCH
PRESSURE REGULATOR
PRESSURE TRANSDUCER
TEMPERATURE TRANSDUCER
FILTER
SAFETY RELIEF VALVE
VALVE
SOLENOID VALVE
PRESSURE GAUGE
3/8" BSP 200BAR DELIVERY HOSE REEL
1" BSP DRAIN / ANTIFREEZE
3/4" BSPF INLET HOSE REEL
CONTROL PANEL
SOLENOID VALVE (ONLY ON RADIO UNIT)
PRESSURE GAUGE
SHUT OFF VALVE
PRESSURE REGULATOR
LONCIN 24HP INTERPUMP PLUNGER PUMP W2141 200BAR @ 41LPM
E01
P01
SAFETY RELIEF VALVE
FLOAT SWITCH LOW
MESH STRAINER
PUMP INLET VALVE
ANTIFREEZE / DRAIN VALVE
BREATHER
250L HEADER TANK WITH FLOAT VALVE
OVERFLOW
1/2"
3/4"
1"
ID 8mm
TITLE
P & ID
UNIT 3009 VANPACK
200BAR @ 41LPM
DRG NO. 003-330-PID/3_1
PART NO. 003-330
NOT TO SCALE
DRAWN LK DATE 17/04/25
APPROVED DATE
CHECKED DATE
1 17/04/25 LK NEW DRG
ISSUE DATE DRN CHK STATUS
Flowplant Group Ltd
Gemini House, Brunel Road, Salisbury, Wiltshire, SP2 7PU England. Tel: +44 (0) 1722 325424
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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

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	
Serial Number -	
Unit Number -	
Date of Manufacture -	*Sht 1 of 2*
Date .... Engineer .... Type of Service	Official Flowplant Stamp and Signature Please state if other Service provider used ....
Date .... Engineer .... Type of Service	Official Flowplant Stamp and Signature Please state if other Service provider used ....
Date .... Engineer .... Type of Service	Official Flowplant Stamp and Signature Please state if other Service provider used ....
Date .... Engineer .... Type of Service	Official Flowplant Stamp and Signature Please state if other Service provider used ....
Date .... Engineer .... Type of Service	Official Flowplant Stamp and Signature Please state if other Service provider used ....
Date .... Engineer .... Type of Service	Official Flowplant Stamp and Signature Please state if other Service provider used ....
Date .... Engineer .... Type of Service	Official Flowplant Stamp and Signature Please state if other Service provider used ....
Type of service - Itermediate, Yearly	*FLOW 0322 Iss 1*

Flowplant Unit Log Book	FLOWPLANT
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	....

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	....

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. Back to Base Warranty

12.1. Warranty of new products:

Equipment manufactured and supplied by Flowplant is warranted to be free from defects in materials and workmanship.
The Back to Base 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.

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
- Failures resulting from neglecting scheduled service or maintenance intervals as specified in the product manual or user guide.

12.2. Back to Base terms:

Under this warranty, the customer is responsible for:

- Returning the faulty product to Flowplant Group Limited at their own cost.
- Ensuring the product is packaged safely to avoid further damage in transit.
- Collecting or arranging return shipping of the repaired or replaced item.

Flowplant Group Limited is not liable for any damage or loss incurred during shipping to our service location.

12.3. 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.

12.4. 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.

12.5. Declaration of Conformity

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13. Health and Safety Manual – 061956

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HEALTH AND SAFTEY MANUAL – Issue 3

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.

Change	Changes	Date	Signatu
1	NEW ADDITION	09/19	SAS
2	GENERAL EDIT	01/20	DM
3	TRAILER TOWING ADDITION	06/23	TNG

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.
- Trailer units must be road worthy condition and legal for towing.

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.

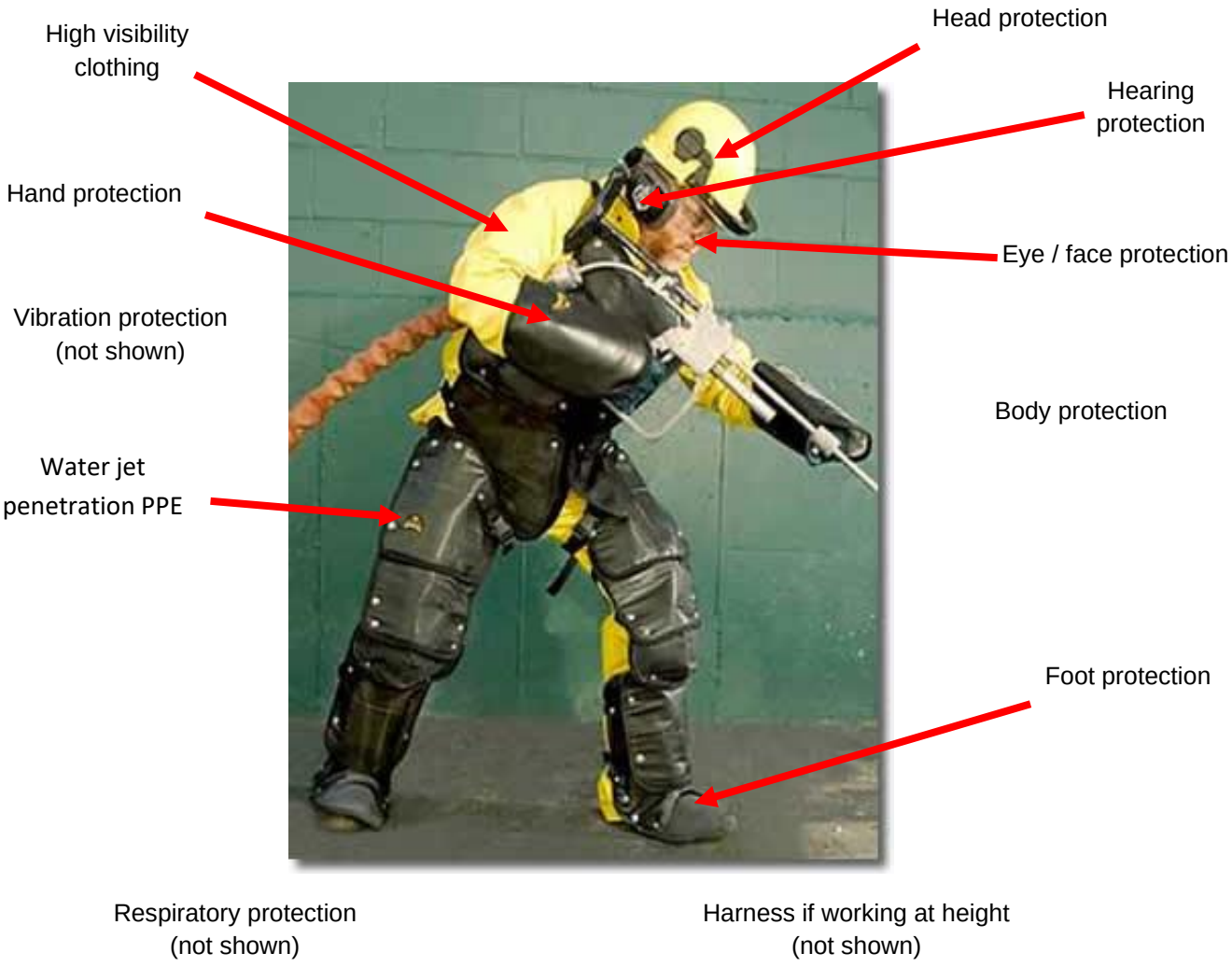
- Never work from scaffolding unless it is designed, erected and managed by competent persons and it is adequately secured to prevent it being pushed over by jetting gun reaction forces.
- When using the jetting gun to clean hard surfaces be aware that splash back could contain hard debris travelling 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.
- Check the exhaust system is not damaged and exhaust gases are correctly directed through the exit of the tailpipe.
- 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 wastewater 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
- Trailer is in a road worthy condition
- Tyres are not worn
- Tyre pressure is correct
- Towing hitch is not worn
- Trailer lights are functioning correctly
- 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

During Jetting operations

- 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.

Towing

Check that:

- The combined weight of the vehicle, trailer, payload and passengers does not exceed ‘weight 2’ of the vehicle manufactures plate.
- the trailer is correctly coupled to the towball or pin - follow the manufacturer’s advice
- the coupling height is correct
- the 7 or 13 core cable and plug is not damaged
- there’s no damage to the lights, and that they’re all working correctly
- the trailer is not overloaded
    - **do not** add additional equipment to the trailer ⚠
- that all items are secure

Breakaway cable, check that:

- cable is not worn or damaged
- cable has enough slack in the cable so that it does not accidentally apply the brakes
- the cable will not drag on the ground whilst driving

Wheels and Tyres, check that:

- do not have any cuts or bulges
- are inflated to the manufacturer’s specification for the load being carried
- each tyre has a tread depth of at least 1.6mm:
    - across the central three-quarters of the breadth of the tread
    - around the entire circumference of the tyre

Additional towing information can be found at the following resources:

https://www.gov.uk/guidance/tow-a-trailer-with-a-car-safety-checks

https://www.ntta.co.uk/law

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 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.