Operation & maintenance manual.

Original Instruction

004-375
UNIT 4012 8 22 - YANMAR 4TNV88 Mk4 LIGHT VANPACK

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Operation & maintenance manual for:

UNIT : **004375** **UNIT 4012 8 22 – YANMAR 4TNV88**
Mk 4 LIGHT VANPACK.

ISSUE DATE : **11/14**

AMENDMENTS

Change Number	Page(s) Amended	Date	Signature
1	New Addition	05/2013	SAS
2	Section 12	07/2014	TWC

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SECTION 1 - Introduction

Read this manual before you operate, or carry out any maintenance on, the High Pressure Pumpset. Important safety information is highlighted as **WARNING** and ***CAUTION*** instructions. You must obey these instructions. The use of warnings and cautions is defined below:

WARNING

Warnings are given where failure to observe the instruction could result in injury or death to persons.

CAUTION

Cautions are given where a failure to observe the instruction could result in damage to the pump or to associated equipment.

NOTICE

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 will 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, things 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.

Follow the recommended operating procedures at all times, do not misuse the equipment as this could result in injury or mechanical breakdown.

1 INTRODUCTION

1.1 Scope of this manual

This manual provides operation and maintenance instructions for the Mk4 Light Vanpack.

Where the Vanpack 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 Vanpack detailed in this scope of supply. While a large proportion of the information is common to all versions, great care must be taken if this manual is used with versions not consistent with the scope of supply.

Maintenance instructions included in this manual include:

(1) Routine maintenance to be carried out at specific times.

(2) Maintenance of the high-pressure pump.

Repairs to the pump crankcase and gearbox components are not considered maintenance operations as these should be undertaken by **Flowplant Group Limited**, their approved agents or at least competent automotive engineers.

1.2 The Mk 4 Light Vanpack

The Mk4 Light 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 Vanpack has been meticulously designed for safe and efficient use.

One man remote operation ‘OMO’ is available to the customer if required.

The options fitted to and the accessories supplied with this Vanpack are detailed in

Section 2 – Scope of supply

1.3 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 **Health & Safety**

This section details health and safety considerations in general and specific to water jetting equipment.

Section 5 **Operation**

This section describes the recommended operating procedures for the unit.

Section 6 **Routine Maintenance**

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

Section 7 **Fault Finding**

Fault diagnosis tables for the pump, engine and ancilliaries.

Section 8 **'P' TYPE Pump**

(Refer to the Harben 'P' TYPE service manual 061-352) .

Section 9 **Circuit diagrams/Electrical Details**

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

Section 10 **Diesel Engine**

This section provides part details of the Yanmar 4TNV88 4cyl industrial diesel engine.

Section 11 **Parts list / Spares / Auxiliary components.**

How to identify and order spares / auxiliary components.

industrial diesel engine.

Section 12 **Service Documents**

Service logbook and checklist

Section 13 **Warranty & Certification**

SECTION 2 - Scope of Supply

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2 SCOPE OF SUPPLY

Unit: 4012 8 22 2.21:1 – YANMAR 4TNV88
Mk4 RADIO CONTROLLED LIGHT V/PACK

Machine Build Code: 004-375

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

1. UNIT Mk4 RADIO CONTROLLED LIGHT VANPACK:
   4012 'P' TYPE 8 22 2.21:1 - YANMAR 4TNV88.

2.1 Vanpack Assembly

The General Arrangement drawing: 004-375, defines the components of the Mk4 Light Vanpack mounted Pump Assembly as follows:

Water is fed from a mains supply 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 to approximately 80 microns.

The 'P' Type 8 22 radial piston high-pressure diaphragm pump is driven by a Yanmar 4TNV88 4cyl industrial diesel engine through a 2.21:1 reduction gearbox.

The water is directed by a divert valve, to a hydraulically driven hose reel c/w 300' of ½" hose, or at low pressure 'dumped' back to tank.

The system is protected from over pressurisation by a safety relief bursting disc.

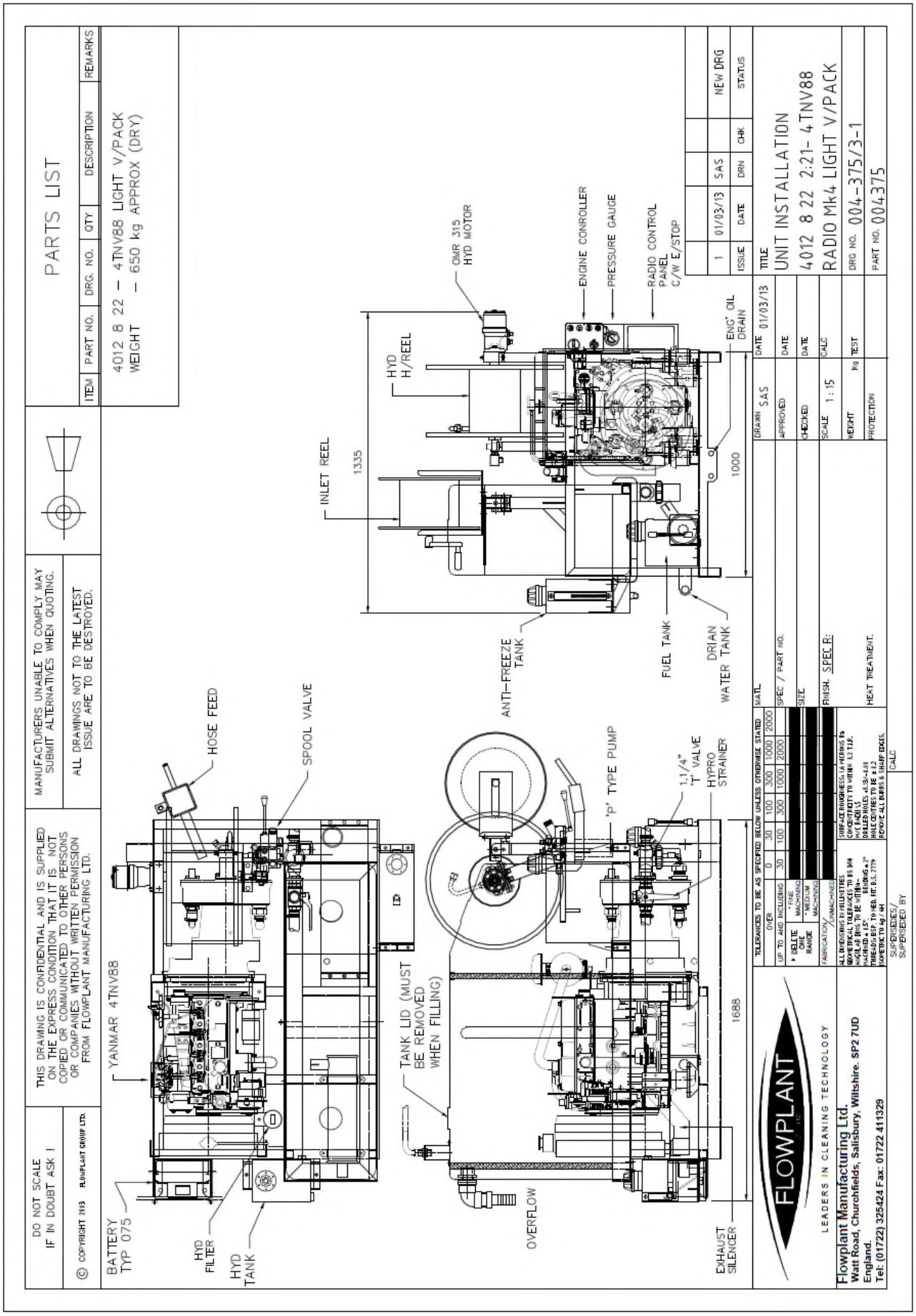
The engine and system pressure can be monitored at the control panel situated at the rear of the van.

2.2 Detailed Drawings

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

The 'P' Type 8 22 pump is detailed in Section 8.

Details of any additional assemblies will be included in Section 10.


PARTS LIST
ITEM | PART NO. | DRG. NO. | QTY | DESCRIPTION | REMARKS
4012 8 22 – 4TNV88 LIGHT V/PACK
WEIGHT – 650 kg APPROX (DRY)
MANUFACTURERS UNABLE TO COMPLY MAY SUBMIT ALTERNATIVES WHEN QUOTING.
ALL DRAWINGS NOT TO THE LATEST ISSUE ARE TO BE DESTROYED.
THIS DRAWING IS CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT COPIED OR COMMUNICATED TO OTHER PERSONS OR COMPANIES WITHOUT WRITTEN PERMISSION FROM FLOWPLANT MANUFACTURING LTD.
DO NOT SCALE IF IN DOUBT ASK !
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YANMAR 4TNV88
BATTERY TYP 075
HYD FILTER
HYD TANK
HOSE FEED
SPOOL VALVE
TANK LID (MUST BE REMOVED WHEN FILLING)
OVERFLOW
EXHAUST SILENCER
'P' TYPE PUMP
1.1/4" 'T' VALVE
HYPRO STRAINER
ANTI-FREEZE TANK
FUEL TANK
DRIAN WATER TANK
INLET REEL
1335
HYD H/REEL
OMR 315 HYD MOTOR
ENGINE CONROLLER
PRESSURE GAUGE
RADIO CONTROL PANEL C/W E/STOP
ENG' OIL DRAIN
1000
1688
1 | 01/03/13 | SAS | NEW DRG
ISSUE | DATE | DRN | CHK | STATUS
TITLE
UNIT INSTALLATION
4012 8 22 2:21- 4TNV88
RADIO Mk4 LIGHT V/PACK
DRAWN SAS DATE 01/03/13
APPROVED DATE
CHECKED DATE
SCALE 1:15 CALC
WEIGHT Kg TEST
PROTECTION
DRG NO. 004-375/3-1
PART NO. 004375
TOLERANCES TO BE AS SPECIFIED BELOW UNLESS OTHERWISE STATED
MATL
SPEC / PART NO.
SIZE
FINISH. SPEC'R:
HEAT TREATMENT.
FABRICATION/MACHINED
SUPERSEDES/ SUPERSEDED BY
CALC
FLOWPLANT
LEADERS IN CLEANING TECHNOLOGY
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Watt Road, Churchfields, Salisbury, Wiltshire. SP2 7UD England.
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SECTION 3 - Technical Data

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3 TECHNICAL DATA

3.1 4012 8 22 – 4TNV88 Mk4 Radio Controlled light V/pack specification.

Pump Type	'P' Type 8 22
Pump diameter	405 mm
Pump length	385 mm
Inlet	28.6 mm dia
Outlet	G1/2" (1/2" BSP)
Shaft dia	30mm
Shaft length	65mm
Number of cylinders	8
Power rating (nominal)	26 kW
Plunger diameter	22 mm
Shaft speed (Nominal)	1250 min^{-1}
Maximum pressure	275 bar (4000 psi)
Nominal Flow rate	55 lpm (<12.0 igpm)
Crankcase lubrication	Fully immersed.
Oil capacity (8 cyl)	5.0 litres
Weight (8 cyl)	80 kg
Max inlet pressure	0.5 bar (5.0 metre head)
Recommended crankcase oil	Shell Morlina 150 or Tellus 150 (Or alternative see section 6)
Max inlet temperature	25^{o}C *Note: Unless 70^{o}C hot water conv' kit is fitted 009-001.*

Prime Mover	YANMAR 4TNV88 (2190 cm^3 / 30.0 kW @ 2500 min^{-1})
Drive	012-242 Gearbox Harben reduction of 2.21:1
Ancillaries	
Water tank	Capacity 80 gals. (360 litres)
Supply Water Filter	N05105 Hypro line strainer / 80 micro mesh
Pressure Gauge	013-290 Gauge 700 bar
Safety relief	011-046 Burst Disc White 4,000 psi
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 Mk4 Light Vanpack are shown on dwg. 004-375, which are as follows:

1. A prime mover in the form of a Yanmar 4cyl water-cooled diesel engine which drives a Harben 'P' type 8 x 22 radial piston diaphragm high-pressure pump.
2. The 'P' type pump is capable of raising the water pressure up to 4000 psi (275 bar).
3. A Hydraulically driven hose reel c/w 91.44 m (300 ft) of 2 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 A200330, acting as a reservoir, ensures the water is settled and non turbulent, discharging a smooth lamina flow of uninterrupted air free supply, and a positive head of pressure to the pump inlet, 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. The 12VDC hydraulic diverter valve, allows water to be directed to either the high-pressure delivery hose or dumped back to the header tank.
6. A Hypro 80 micro 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)

3.2.2 Engine monitoring

Engine oil pressure and engine coolant temperature, together with alternator charge rate are continuously monitored. Activation of the engine pressure or temperature switches will cause an engine shutdown and the respective 'FAULT' lamp to illuminate.

Alternator failure will cause the red 'CHARGE' light to illuminate.

3.2.3 Delivery hose reel

The hose reel drum on which the delivery hose is wound is driven by a powerful OMR315 hydraulic motor directly coupled to the hose reel hub. Hydraulic power is obtained from a hydraulic gear pump driven from the engine P.T.O. *(See below)*

Note: 069-363 Hydraulic gear pump detail:-

(Ratio 1:1, Output 6.5 cm^3/r, SAE Flange mounting A, 16/32 Spline Pitch, 9 Teeth.)

The speed and direction of the reel is controlled by a manual lever controlled spool valve c/w safety relief and flow control, this is situated to the left of the hose reel.

3.3 Installation details

Installation Drawing No**.** 004-375 provides details of sizes, weight and fixings for the Mk4 Vanpack together with inlet and outlet water connections.

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4. Section 4 – Health & Safety

4.1. Introduction

This section should be read in conjunction with the WARNING and *CAUTION* notices contained throughout this manual or any safety notices on any items of the equipment supplied.

The use of WARNINGS and *CAUTIONS* is defined below:

WARNING

Warnings are given where failure to observe the instruction could result in injury or death to persons

CAUTION

Cautions are given where a failure observe the instruction could result in damage to the pump or to associated equipment

All procedures and recommendations in this manual must be strictly adhered to by operators of the unit, or by any person passing within close proximity.

All Company Safety Regulations applicable must be adhered to at all times.

The following notes, and safety notices throughout this manual, are intended to guide the operator in the safe use and maintenance of the equipment. Whilst every effort has been made for completeness, these notes and notices must be supplemented by the knowledge, training and experience of persons carrying out their tasks.

4.2. Safety notes

Please see a list of safety notes which should be read and understood before operating the machine.

- Operating procedures throughout this manual must be adhered to. In the case of conflicting or ambiguous instructions, reference must be made to a Site Management or Safety Officer.
- Any person operating, working with, or passing near, the unit must wear the necessary Personal Protective Equipment (PPE).
- The Site Management should make available to operators or persons working with the unit, or part thereof, the appropriate technical documentation and should ensure such persons read and understand the documentation prior to commencing their duties.
- Special tools should be used where recommended in this manual.
- Prior to any maintenance or repair work being carried out, the unit, or part thereof, must be shut down and equipment isolated.
- Any maintenance requirements in this manual should be adhered to as minimum maintenance requirements. Maintenance records should be up to date at all times.
- Guards which are located within the unit must be fitted and secured in accordance with the drawings and must not be loosened or removed whilst the unit or part thereof, is operational. Should it be necessary to remove any guard for access prior to start-up of the unit, it must be re-fitted and secured before start up.
- Oils, lubricants, greases and fluids used within the unit must be in accordance with the recommendations given in this manual.
- Fully competent personnel must carry out coupling and uncoupling of the unit.

4.3. Water Jetting Equipment or High Pressure Equipment

WARNING

High-pressure jetting can be extremely dangerous if it is not properly controlled by fully trained personnel.

Operators, and the employers of operators, of water jetting equipment should be trained in accordance with and be fully conversant with the;

- **'Code of practice for the use of high pressure water jetting equipment' (Code of Practice)** - ***Issued by The Water Jetting Association (WJA)***

Copies of the Code of Practice are available from Flowplant Group Ltd.

Supervisors and Operators should at all times adhere to recommendations and instructions contained within the Code of Practice

The following Water Jetting Safety Instructions are based on the Code of Practice.

4.4. Water Jetting Safety Instructions

4.4.1. Training

All persons using high-pressure jetting equipment should be fully conversant with relevant operating instructions, safety notes and Codes of Practice. If in doubt, contact Flowplant Group Ltd for advice on operator training.

4.4.2. Supervision

All high-pressure water jetting operations should be under the control of a fully trained supervisor, who will be aware of the potential hazards to operators and passers-by.

4.4.3. Jetting Area

Warning notices, "DANGER - HIGH PRESSURE JETTING" should be displayed at all possible access points to the jetting area. Notices are available from Flowplant Group Ltd.

4.4.4. Before Starting

Before starting the unit, 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 everyone knows how to stop the unit in case of an emergency.

Ensure that all the pre-operational checks have been completed, and that any necessary actions have been taken.

4.5. Personal Protective Equipment (PPE)

All persons using high-pressure water jetting equipment should use all necessary PPE suitable for the task being carried out. Please note PPE shown below can be supplied in various formats.

PPE for consideration: -

Please note, a site specific risk assessment must be complete to analyse which PPE must be worn.

A full range of PPE is available from Flowplant Group Ltd.

4.6. High Pressure Water Hoses

4.6.1. Standards

- BS EN 1829-2
- BS EN 853
- BS EN 854
- BS EN 855
- BS EN 856
- BS EN 857
- ISO 4413:2010

4.6.2. Hose checks

The following checks must be made at regular intervals during the unit's life span.

- 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 and fittings may fail without warning and must 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. Stilsons 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 - see ISO 4413:2010 section 5.4.6.5.1 section A for details.

4.6.3. Hose Markings

- All hoses shall be marked at a maximum spacing of 500mm with following information clearly marked: -
    - Hose manufacturers identification
    - Maximum allowable working pressure (in bar)
    - Nominal bore (eg DN12)
    - Quarter and last two digits of assembly date (e.g. 4Q09)
- In addition, all hose assemblies shall be marked with the following: -
    - Manufacturer's identification or part number
    - Maximum allowable working pressure (in bar)
    - Quarter and last two digits of assembly date (e.g. 4Q09)
    - Standard BS EN 1829-2 or the relevant British Standard.

4.6.4. Hose Use Limitations

The hoses intended use is water jetting, any other uses are strictly prohibited they include:-

- Using the hose for applications above the maximum working pressure.
- Using the hose as a towing aid
- Using the hose as a lifting or restraining device.

4.7. Reaction Forces (where applicable)

It is a mandatory requirement to carry out a risk assessment for each new application before commencing work. This must include calculating the reaction force created by the jet, taking into account; pressure, flow, nozzle coefficient of discharge and pressure drop through the hoses fittings and gun.

Should the calculation reveal a reaction force greater than 250N, for a hand held application, additional support must be provided in the form of a gimbal or similar device, otherwise the engine speed, water flow and reaction force must be reduced.

WARNING

250N is the maximum recommended reaction force by the Code of Practice for unsupported hand held jetting guns and lances. If the equipment is capable of creating a reaction force in excess of 250N additional support must be used or the engine speed/pump flow must be reduced.

4.8. Frosty Conditions (where applicable)

If frost has occurred there may be frozen water in the hose or pump which will cause a dangerous blockage. Ice bullets could be ejected from the end of an open hose at dangerously high speed capable of causing serious injury or death.

WARNING

Do not start the pump until the complete high-pressure system has completely thawed out

4.9. Safety Gun (where applicable)

When operating a high-pressure water gun follow these steps and make note of important warnings.

- Never point a gun or lance at anyone, even if switched off.
- When using the Gun, the jet should be fitted correctly before starting the unit. All other hose connections must be checked before attempting to start the unit.
- Do not allow children the opportunity to play with the equipment!

WARNING

High-pressure water jet! Grip lance with both hands. Never direct jet of water towards people or animals.

WARNING

High-pressure water can be extremely dangerous do not leave plant unattended!

The use of jetting guns with oscillating or rotating heads tend to produce higher hand arm vibration levels than simple fixed head jets. Emissions of hand-arm vibration can be high enough to generate exposures above the exposure action value in the Control of Vibration at Work Regulations 2005. Exposures above the exposure limit value are unlikely. Guidance on the Regulations can be found in HSE publication L.140'Hand Arm Vibration – The Control of

Vibration at Work Regulations 2005', also available as a download from the HSE website: www.hse.gov.uk. (see section 4.10 for information on Jump jet kits).

4.10. During Operations

- If water appears from the hose, coupling or connector, often first sighted as a fine mist, then the hose is damaged and could burst or a joint is loose or defective. STOP THE UNIT IMMEDIATELY!
- No attempt should be made to adjust any hose, coupling or connector whilst that part of the system is under pressure.

4.11. During Maintenance

- A unit undergoing maintenance should be isolated from other plant or suitably identified to ensure that it is not used inadvertently.
- Maintenance must only be carried out by skilled personnel, who are conversant with the nature and dangers of high-pressure water, of jetting safety regulations and codes of practice.

4.12. Tools

- The correct tools of the right size for the job must always be used to avoid damaging the unit and possibly making it unsafe. Adjustable tools with serrated gripping jaws should not be used.

4.13. Replacement Parts

- Only replacement parts which have been obtained from or approved by Flowplant Group Ltd are to be used when undertaking maintenance. Using any other replacement parts will normally invalidate the warranty and could be dangerous.

4.14. Performance

- Never exceed the maximum rated pressure or engine speed.

Note: The maximum engine speed quoted refers to the “High Idle Speed” at no load condition i.e. at the lowest possible pressure.

4.15. Risk of Carbon Monoxide Poisoning (Trailer only)

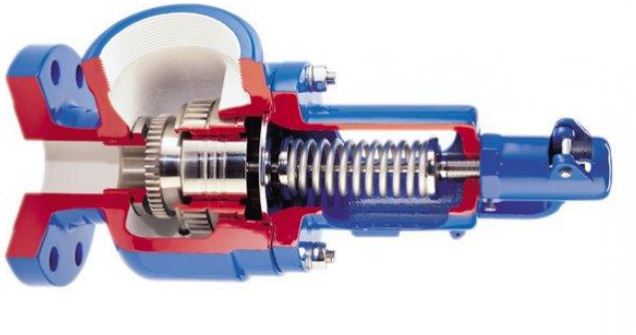
WARNING

The jetting unit uses a diesel engine that could cause build-up of carbon monoxide gases in the vehicles storage or cab area.

Ensure van cab is fully vented after using the jetting unit.

- The USER should have rear and side doors open when operating the machine.
- It is advisable to also carry a carbon monoxide monitor in the rear or the vehicle and the cab of the vehicle as an early warning of any potential risks.

4.16. Pressure Safety Device



- Pressure relief valves should be checked for functionality and certified by the manufacturer or their authorised representative at least every 6 months. Pressure discs should be replaced at least every 6 months to ensure continued safe operation and only manufacturer's original replacements should be used.

4.17. Exposure to Vibration

- Please see the following extract from "The Water Jetting Association Code of Practice for the Safe Working and Use of Water Jetting in Drains and Sewers"

New edition May 2013

"The use of 'Jump or Pulse Jets' in drain cleaning applications may expose the operator to vibration levels in excess of the exposure action value and exposure limit value if the jetting hose is handled. Water jetting hose should not be handled whilst the 'Jump or Pulse Jet' is in operation."

WARNING

Potential vibration level is 27m/s^2 RMS

Operators handling the jetting hose with the Jump Jet switched on for 4 minutes per day could reach the Exposure Action Valve (EAV). Further handling will reach the Exposure Limit Value (ELV) in approximately 16 minutes.

There are a number of recommendations that will reduce vibration levels and/or make operators less susceptible to HAV harm.

Do not touch the hose whilst the jump jet is in operation unless it is to avert a hazardous situation from arising.

Reducing the jetter engine speed from maximum to ½ or 2/3rd revs will decrease vibration levels.

Only use the jump jet as intended i.e. to facilitate blockage clearing or when extremely long pipe runs are encountered.

Maintain equipment in accordance with the manufacturers recommended maintenance schedule.

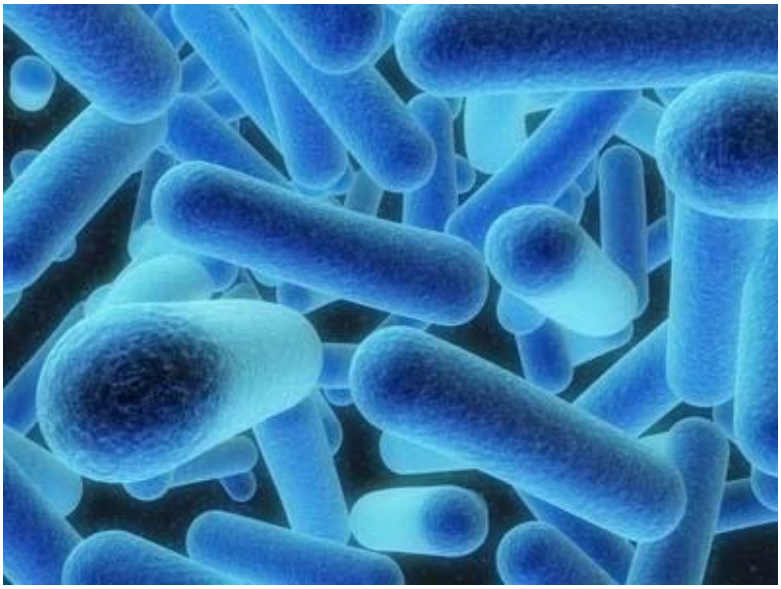
Always keep hands dry and warm at all times.

Consider wearing anti-vibration gloves in accordance with ISO 10819. (There is limited evidence that these gloves remove the harmful vibration at lower frequencies. Seek further advice from glove manufacturers)

Monitor the health of operators on a regular basis and maintain records of machine usage.

When employing any method for reducing vibration levels always conduct a risk assessment for your specific application.

4.18. Legionnaire's Disease



- The bacteria are common and are found naturally in water, usually in low numbers. The bacteria do not seem to multiply below 20°C and will not survive above 60°C; water temperatures between 20°C and 45°C being optimum for growth. The bacteria may remain dormant in water temperatures between 6°C and 20°C, multiplying when water temperatures reach a suitable level.
- The bacteria also require food to multiply such as algae, amoebae and other bacteria. The presence of scale, sediment, sludge and other material within the system may be important in creating favourable conditions for the growth of bacteria as are biofilms (a thin layer of micro-organisms which may form slime on the surfaces in contact with the water).
- As the tanks of the unit are required to be emptied after the completion of jetting operations, so that the daily checks required by the Operation & maintenance manual can be carried out, each jetting operation will be commenced with fresh water.
- In the event that the operations manual is ignored and the tanks not emptied, the risk of bacterial growth within the system would increase but the ambient temperature of the water in the tanks is likely to reach 20°C, and be maintained at that level, only in exceptional circumstances.
- To prevent a build-up of scale, sediment, sludge and other materials and reduce and associated hose and pipe work be thoroughly cleaned and flushed through at least every six months (preferably with hot water in excess of 70°C).

SECTION 5 - Operation

SAFETY AWARENESS SHEET 061-577

GENERAL H/P JETTING EQUIPMENT

FLOWPLANT GROUP

LEADERS IN CLEANING TECHNOLOGY

Warning this equipment may constitute a potential hazard

This equipment is designed for use in High Pressure Water Jetting and could cause serious injury or death if incorrectly used.

Before commencing the use of this equipment answer the following questions.

(a) Have you been fully trained by a qualified instructor ?
(b) Have you read the manual ?
(c) Do you understand the Water Jetting Association Code of Practice ?
(d) Have you been equipped with the correct Personal Protective Equipment ?
(e) Do you fully understand all of the equipment being used in connection with this item?
(f) Has a risk assessment for this task been carried out ?
(g) Is the equipment suitable for the task in hand ?
(h) Has the working area been isolated and warning signs erected ?

If you answer **NO** to any of the above, **or do not understand any question**, you may be in breach of Health and Safety Guidelines.
Do not proceed without consulting your Health and Safety Representative.

Flowplant Group Ltd. do not accept responsibility for any event arising from incorrect or mis-use of the equipment.

Technical information, warning signs, personal protective equipment and training by qualified instructors are available from:-

Flowplant Group Ltd., Gemini House, Brunel Rd., Churchfields, Salisbury Wilts. SP2 7PU. Tel. 01722 325424, Fax 01722 411329

5 OPERATION

5.1 Operating Conditions

Operators, and the employers of operators, of water jetting equipment should be fully conversant with the '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 supplied with each jetting machine.

Section 4 - Health & Safety in this manual includes a synopsis of the relevant parts of The Code of Practice, which pertain to this equipment and specifically to Single Person Operation.

5.2 Daily Checks

Carry out all daily checks.

All checks which should be carried out each day before operating the equipment are detailed in Section 6 - Routine Maintenance.

They are:
‘P’ PUMP OIL LEVEL
WATER FILTER CLEANLINESS
DIESEL ENGINE OIL LEVEL
DIESEL ENGINE COOLANT LEVEL
RESERVOIR TANK WATER LEVEL
RADIO HANDSET IS FULLY CHARGED.

Remember, if the Vanpack has previously been in operation for more than 100 hours, other routine maintenance checks may need to be carried out. Refer to Section 6**.**

5.3 Pre-start checks & procedures

1. Ensure the vehicle hand brake is applied.
2. To fill water tank connect to water supply, remove the water tank lid when connected to mains supply in order to comply with water authority byelaws. The water will fill the tank via the inlet hose reel when the tank is full it will flow out the overflow.
3. Feed the end of the high-pressure hose through the hose trace on the swinging arm in front of the hose reel. **Do not fit the nozzle or gun at this point!**
4. 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.
   IMPORTANT! Do not drop the hand held ‘radio control unit’ (RCU) down a manhole as this could cause it permanent damage, please use the carrying strap provided

5.4 Starting the engine and setting the operating pressure

The Vanpack is supplied with a Radio Control System allowing One-man operation 'OMO' (in accordance with the 'Single Person Operation as detailed in the Code of Practice, paragraph 7.2).

Starting procedures are provided for **'Local'** operation where water to the high-pressure hose is controlled by the operator using the Control box at the instrument panel, 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 has to be made at the pump set. Hence, even with the **'remote'** position selected, all initial pressure checks must be made

Either:

With a single operator and 'radio control unit' (RCU) 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 hand held 'radio control unit (RCU)

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, this will be indicated by a small red indicator light located on the instrument panel marked as 'low water'. It is preferable to have a full tank of water and provide the pump with a good positive head.

ATTENTION!

DO NOT ALLOW UN FILTERED WATER INTO THE PUMP.

EMERGENCY SHUTDOWN

At any time during the starting procedure, or during normal jetting operations, the system can be shutdown by depressing the **'RED'** emergency STOP button on the Control Panel and, when in 'remote', the 'STOP' button on the hand held radio control unit 'RCU'. Both will stop the engine. (See fig. 1)

Fig.1
(E-STOP at control panel, twist to release)

5.5 Normal 'Local' operation starting procedure

5.5.1 Starting the engine

Pre start checks

a) *Ensure the radio control panel is set to the 'local' operation position and the emergency stop button is in the 'out' position (Hold and turn Clockwise).*

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

Indirect Injection Diesel Engine Key Start Module-Operating Procedure.

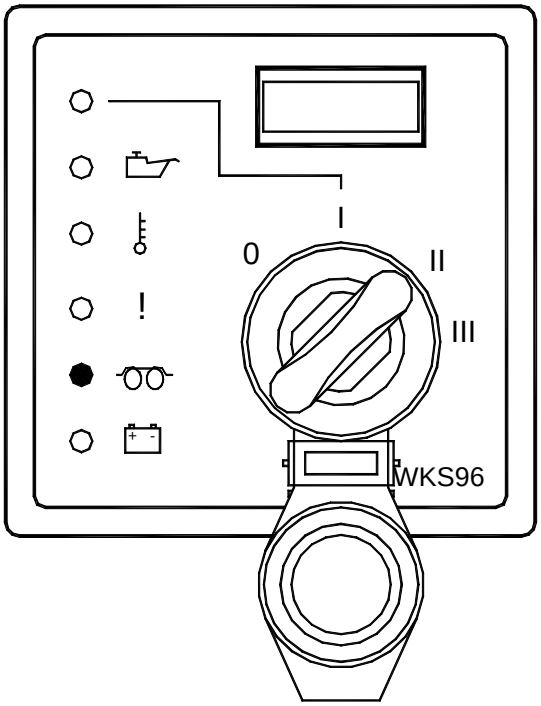


Fig.2
(YANMAR TNV Series WKS96 engine controller)

1. Key switch in stop position (0)

2. Key turned to position one (1) auxiliary circuits energized, LED illuminated.
   Note: **'GREEN'** LED is on (DC ON) , Hours Run meter counting.

3. When cold starting turn the key-switch to position (2) on the WKS96 engine controller, and hold for 20 seconds, pre-heat circuit energized, LED illuminated. (See fig. 2)
   Note: If the engine is already warm ignore this instruction.

4. Turn the Key to position (3) to crank the engine (starter motor actuation).

5. Release the key when the engine starts, it will return to position one (1) automatically.
   Note: the engine will always initially run in the idle position until instructed otherwise.

6. Failure to adequately pre-heat the engine prior to attempting to start may cause premature starter motor failure due to over cranking and a flat battery.
   Note: The system shutdowns are automatically overridden in the initial sequence to allow to engine oil pressure to stabilise.

7. When the engine has started the CHARGE light (Battery symbol) on the controller should go out indicating that the alternator charge output is satisfactory (+12V min).

8. Water will now be circulating through the pump and be diverted back to the header tank, allow the engine approximately 5 minutes to warm up.

9. To divert water to the high-pressure hose, press the green water 'on' button on the control panel. Select one of the 3 remaining speed setting buttons 2, 3 or 4 (max)
   Note: To return the engine speed to idle press the speed setting button 1.

10. To shut the system down, turn the key switch on the engine controller to the (0) position or in emergency situations press the emergency stop button on the radio control panel.

5.5.2 Checking the operating pressure with a nozzle fitted

1. Fit the correctly sized nozzle to the high-pressure hose. See section 11

2. Ensure the nozzle is secured in a safe position, preferably within sight of the operator at the control panel.

3. Press the water 'ON' button at the control panel. Select the required speed (and pressure) by pressing the appropriate speed selection button 2 – 4.

4. Observe the pressure gauge mounted on the control panel and note the pressure reading (See fig. 3). Press the water 'off' button and select idle, speed selection 1.

Note: If the pressure is significantly lower than expected, turn the unit off and replace the nozzle with a new one.

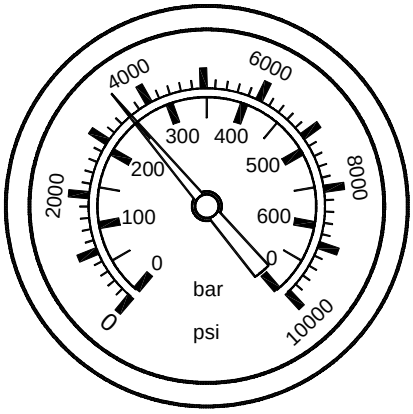


Fig. 3
(Pressure gauge dial)

WARNING! Do not exceed the maximum operating pressure of 4000 psi by fitting a smaller nozzle than is recommended, as this will cause the burst disc to rupture.
The maximum engine speed is 2750 rpm.

5.5.3 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. See section 5.5

5. Press the green ‘water on’ button to divert the water to the gun.

   Use the green ‘speed up’ button to control the engine speed.

6. Pull the gun trigger and observe the pressure gauge mounted on the instrument panel, note the pressure reading (See fig. 3). Press the red ‘speed down’ button until engine tick over speed is reached, then the red ‘water off’ button and return 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!

Fig 4. (Control Panel)

Warning

When using the RCU the operator is require to remove the key from the Local/Remote selection whenever the trailer/vanpack is unattended.

5.6 'Remote' operation starting procedure

5.6.1 Starting the engine

1. Turn the key to select the 'REMOTE' radio position on the control panel. See fig.4

2. When selected remove the key from the control panel *(This will enable the operator to leave the vanpack unattended during operation)*

3. On Engine Controller turn the Key to position one **(1)** auxiliary circuits energised, LED illuminated

On the RCU:

4. Pull out red button on the base of the RCU to switch the handset on.

5. Press and hold fully down both start buttons for 3 seconds until you hear a beep, the RCU and receiver have now 'paired'. See fig 5.

6. On the ignition controller, when the pre heat light on the ignition controller (see fig 2) goes out, the key should be turned further against spring pressure to position **(3),** to 'CRANK' the engine
(Note: starter motor actuation).

7. Release the key when the engine starts, it will return to position one (1) automatically. Note: the engine will always initially run in the idle position until instructed otherwise.

8. To direct water through the high pressure hose. Press the 'Water ON' button (number 3) on the RCU. 

9. To increase engine speed press the 'engine speed up' button, this is indicated by the symbol of a hare. See fig 5 

10. To decrease engine speed press the red engine 'speed down' button, this is indicated by the symbol of a tortoise. See fig 5 

11. Press the water OFF button (number 4) to divert the water back to tank. See fig 5 

12. To stop the engine, press the red STOP button (on the base) on the RCU. See fig 5

Note: If the operator wanders 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.

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

Fig. 5
Hand held
'Radio control unit' (RCU)

RCU Controls
Turning the remote control **ON**.

- Pull out the red button at the base of the RCU
- Press both start buttons together and hold for at least 3 seconds until a beep is heard and the red led lights stop flashing

The above sequence must be completed within 10 seconds.

Turning the remote control **OFF**.

- Turn the handset off by pressing the red STOP button.

Button 1.Tortoise ....Decrease Engine Speed.

Button 2. Rabbit. Increase Engine Speed

Button 3 Water Pressure ON

Button 4 Water Pressure OFF

The status LED indicates the operation mode.

2 x red led flashing at both start buttons...RCU not paired with receiver.

Green led light on ...handset on

No lights...RCU off.

Charging Details
(See handbook for charging instructions).

5.7 Rapid shutdown

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

REMOTE MODE

Using the hand held 'radio control unit' (RCU); press the water 'OFF' button to divert water back to tank,

Press the '**RED'** 'Stop' button to shut the engine down.

LOCAL MODE

At the control panel, press the red 'water off' button at the control panel to divert the water back to tank,

And / or in an emergency,

Depress the **'RED'** emergency STOP button to shut the engine down

Note: To reset the emergency stop on the control panel twist the button 'clockwise' to release. (See fig.1)

AUTOMATIC SHUTDOWN

The engine will shut down automatically if the monitoring and control system detects a malfunction.
Possible reasons for an automatic shutdown are detailed in Section 7 - Fault Finding.
Note: - When the engine has been stopped the RCU will turn itself off, to resume return to section 5.6 step 5.

5.8 Hose reel winding & 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.
(018-005 'Hydraulic Directional Control Valve' CV1185 c/w 110 bar relief and flow control)
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.

ATTENTION!

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 carrying 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.

The hose should NEVER be tightly wound onto the hose reel drum when the hose in 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.

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

5.9 Radio Remote Control System – Battery Charger Use and Information

See section 12 - User Manual Radio Remote Control System - Pages 15 and 16.

5.10 Frost Precautions

During periods when there is a risk of freezing the following precautions should be taken:

Before a frost

1. Prepare 30% anti-freeze solution.
2. Remove nozzle or gun attachments from the delivery hose.
3. Lower the water level in the tank.
4. Pour anti-freeze solution into the anti-freeze tank.
5. Restart the engine, move the ‘T’ valve in the suction line to the upwards position and pump the anti-freeze solution through the high-pressure hose and return line as required.

SO YOU FORGOT TO TAKE PRECAUTIONS!

IF THE PUMP IS FROZEN UP - IT SHOULD ON NO ACCOUNT BE STARTED

5.11 Additional Storage

ATTENTION!

When storing additional equipment take care not to overload the storage areas around the vanpack. Take care especially around the battery /electrical system, failure to do so may result in damage to the vanpack and is a potential fire risk to the vehicle.

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SECTION 6 - Routine Maintenance

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6 ROUTINE MAINTENANCE

6.1 Routine Maintenance Guide

Table 1 provides a basic guide to routine maintenance requirements for the various components of the unit.

6.2 Maintenance Procedures

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

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 (Ref Para 6.3) • Check engine oil level on dip stick (Ref section 10) • Check engine coolant level (Ref section 10) • Visual check for hose damage/water leaks & for any cracks in frame/chassis etc. • Check ignition and warning lamp operation • Check emergency stop button operation (Ref para 5.4)
Weekly or every 24 hours	• Visually inspect van pack for security checking for any loose, damaged or missing parts. • Check air filter cleanliness (Ref section 10) • Check engine fuel water trap for contamination (Ref section 10)
Three months/50 hrs	• First service contact Flowplant
Six Monthly / 150 hours	• Inspect tanks and fittings for leaks, thoroughly clean & flush through (with hot water in excess of 70 degrees C) • Tighten any loose joints • Grease the hydraulic hose reel bearing blocks • Check condition of 12volt start battery • Grease battery terminals for protection • Check alternator belt
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 • Check hydraulic filter gauge. If it reads in the red replace the filter and oil (Shell Tellus 22) • Carry out detailed inspection of pipes, hoses and fittings. • Dismantle, clean & lube the hydraulic diverter valve
Two Yearly / 600 hours	• Major service of engine, gearbox and pump required (Contact Flowplant) • Replace the pump inlet/delivery valves and diaphragms • Check wiring terminals/connections and continuity of electrical earth.

Table 1 Recommended Routine Maintenance

Note: For a detailed guide to pump maintenance and overhaul procedures refer to **Section 8**. *(Ref: 061-352 'P' Type service manual)*

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

6.3 Daily Maintenance

With unit switched off:

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

(Flowplant Part No. N05-105 See fig. 1)

Fig.1 (Hypro Strainer)

Note: unscrew the bowl to remove the mesh (N06021).Take precautions so as not to lose sealing ring (N05108).

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

WARNING

Water at high pressure jetting from a damaged hose or hose connector can cause serious injury. Do not attempt to repair or secure any hose while the high-pressure pump is running.

With pump running during jetting operation.

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

6.4 PUMP LUBRICATING CHART

Manufacturer	Type
ESSO	Nuto H150
GULF	LP 150
MOBIL	DTE Extra Heavy
ROC	Kiron 150
TEXACO	Rando HD 150
BP	Energol HLP 150
AGIP	OSO 105
SHELL	Tellus/Morlina 150
CENTURY OIL	PWLM
PETROFINA	Hydran 51
CASTROL	Hyspin AWS 150

Oil Capacity (litres)			
Number of Cylinders			
3-cyl	4-cyl	6-cyl	8-cyl
6.5	6.0	5.75	5.0

6.5 Burst Discs

When carrying out any maintenance/overhaul of the pump, always ensure the correct burst disc for its working pressure is fitted. The available burst discs are as follows:

Colour Code	Part Number	For Maximum Working Pressure
Yellow	011019	125 bar (1800 psi)
Blue	011020	140 bar (2000 psi)
Red	011021	175 bar (2500 psi)
Purple	011022	210 bar (3000 psi)
Green	011045	240 bar (3500 psi)
White	011046	275 bar (4000 psi)
Black	011047	345 bar (5000 psi)
Orange	011107	415 bar (6000 psi)

Fig. 2 (Burst disc holder showing “White” burst disc.)

6.6 PRESSURE SAFETY DEVICES

Pressure discs should be replaced at least every 6 months to ensure continued safe operation and only manufacturer's original replacements should be used.

If Pressure relief valves are fitted these should be checked for functionality and certified by the manufacturer or their authorised representative at least every 6 months

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SECTION 7 – Fault finding

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7 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 **7.3** overleaf for convenience.

Also covered at **7.3** overleaf is a diagnosis of **selector valve** problems.

7.1 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.1 as follows:

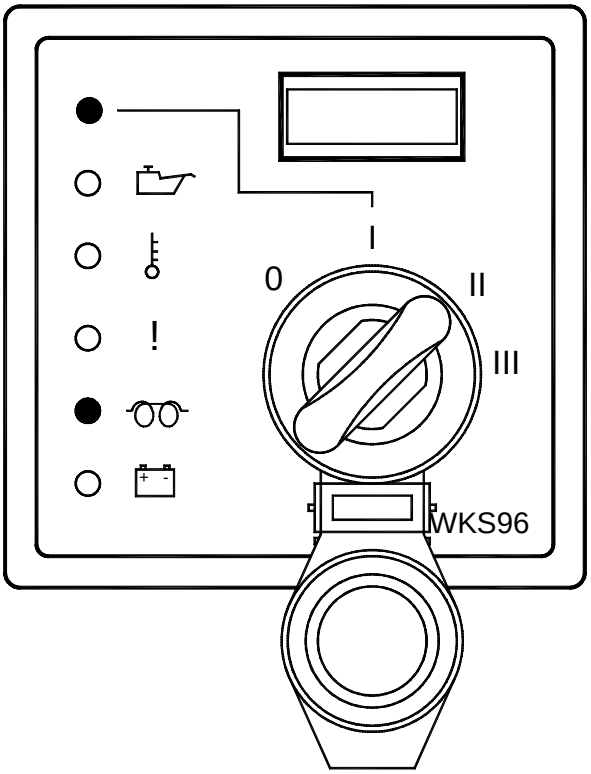
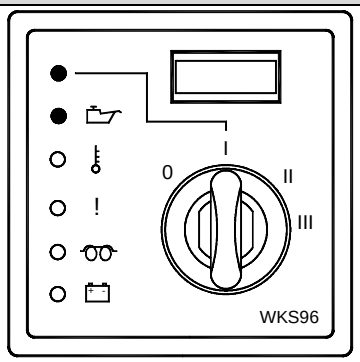
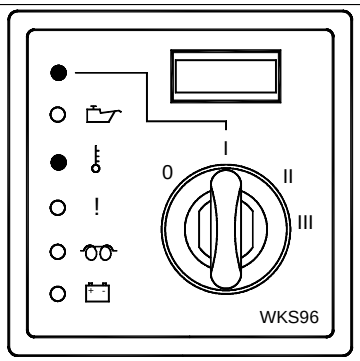
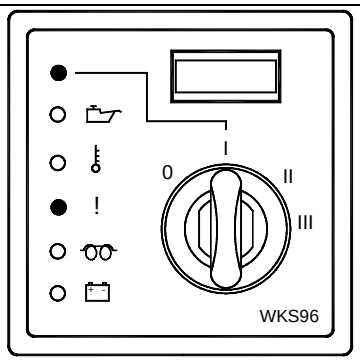
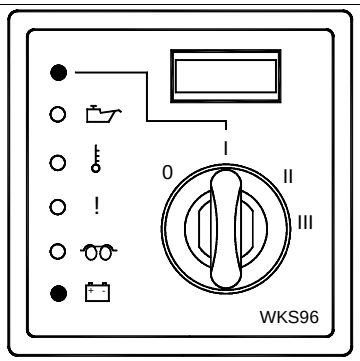


Fig. 1 [YANMAR TNV Series WKS96 engine controller]
Note: Preheat circuit shown energised.

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

Lamps	Condition	Solution
	Low oil pressure shutdown.	Check and replace switch if faulty. Check the oil pressure, if the pressure is low Refer to the handbook for further advice.
	Water/coolant temperature shutdown.	Check and replace switch if faulty. Check the water temp in the radiator, if the temp is very hot. Refer to the engine handbook for further advice.
	Emergency stop button in	Twist to release the button. *Note: The engine will not start in this condition, do not continue to crank the engine, as this will damage the starter due to over cranking!*
	Charge warning indication, normal when engine is not running.	Check the alternator 'V' belt tension, tighten the belt if it is slack and slipping. Check the connecting terminals to the alternator. Check the engine idle speed, reset if necessary. Refer to engine handbook for further advice.

7.2 Equipment Fault Finding.

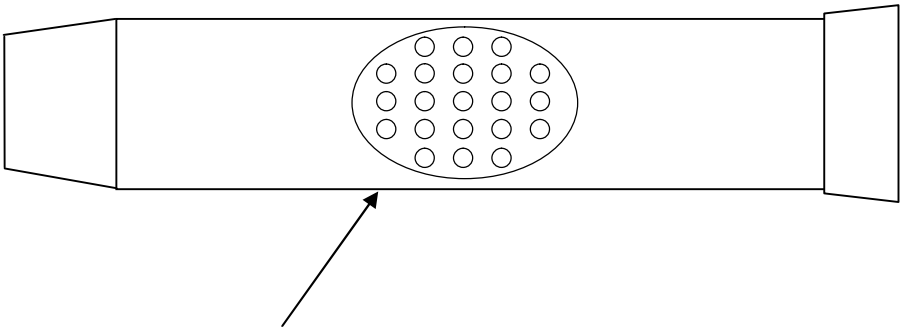
Problem	Possible Cause	Recommended Action
Low system pressure	1 Worn or incorrect size of cutting nozzle.	Replace the old jetting Nozzle with a new one.
	2 Engine speed slow.	Adjust to correct speed.
	3 Leaks from hose. Pipes and connections.	Check the connections for tightness, replace if needed
	4 Blocked inlet filter.	Clean or replace element.
	5 Inlet hose to long.	Shorten hose length.
	6 Loss of water through dump line of selector valve or gun when high-pressure selected.	Check seats and seals.
	7 Loss of water through dump line of remote control kit, if fitted.	Check seats and seals.
High System Pressure	1 Blocked nozzle, selector valve or gun.	Clean the items and flush out the delivery line.
	2 Incorrect nozzle size.	Replace the nozzle.
	3 Incorrect bore size.	Replace the hose.
	4 Engine speed high.	Adjust to correct speed.
	5 Crushed delivery hose.	Replace if necessary.
	6 Two gun choke left in gun when operating as single gun unit.	Replace with standard choke.
Low Water Level	1 Blocked or dirty pre-filters.	Clean or replace elements.
	2 Faulty ball valve assembly.	Replace if necessary.
	3 Wrong seat in ball valve assembly.	Replace the seat if necessary.
	4 Low inlet pressure.	Increase pressure.
Pump Not Running Evenly (also refer to pump faults).	1 Air in water.	Water bleed pump.
	2 Air in crankcase oil.	Oil bleed pump.
	3 Worn drive coupling.	Replace flexible elements and examine coupling.
	4 Faulty inlet or delivery valve.	Check valve condition.
	5 Valve nut over tightened.	Check tightness of inlet & delivery nut
Burst Disc failure or Safety Relief Valve Operating (also refer to high system pressure problem).	1 Incorrect burst disc.	Replace with correct disc.
	2 Incorrect valve setting.	Check certificate/setting.
	3 Faulty Valve.	Repair or replace if required.
	4 Faulty or fatigued burst disc.	Replace with new disc.

7.3 Pump Fault Finding.

Problem	Possible Cause	Recommended Action
1 Mixing of Oil and Water in crankcase 2 Loss of pressure 3 Pump not running evenly	1 Worn or damaged delivery valves. 2 Damaged filter element allowing debris to jam delivery valve.	1 Check all delivery valves – replace as necessary. 2 Check all diaphragms – replace as necessary. 3 Replace oil. 4 Check filters – replace as necessary.
1 Loss of crankcase oil through high pressure hose	1 Inlet restriction may have been caused through; a. Blocked filters b. Kinked inlet hose c. Worn or damaged inlet valves d. Excessive inlet hose length	1 Clear restriction.
2 Loss of pump pressure 3 Pump not running evenly	2 Pump has been frozen	2 Check inlet valves – replace as necessary. 3 Check diaphragms – replace as necessary. 4 Replenish oil.
1 Mixing of Oil and Water in Crankcase	1 Diaphragm failure (may have been through fatigue from excessive running hours).	1 Check all diaphragms – replace as necessary.

DISTINGUISHING FEATURE OF FAILURE ON DIAPHRAGM

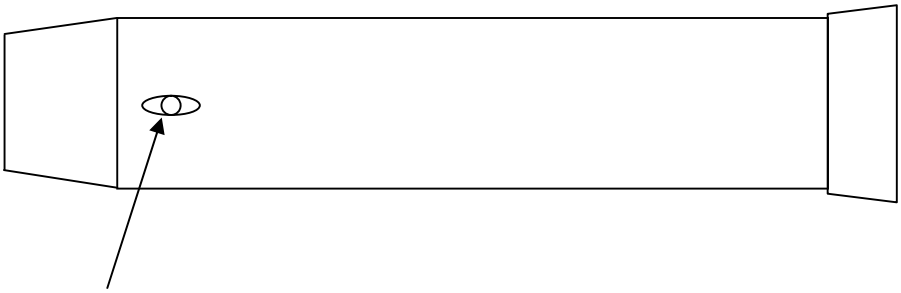
A



Impression of the baffle on diaphragm
Reason: It has been inflated

DISTINGUISHING FEATURE OF FAILURE ON DIAPHRAGM

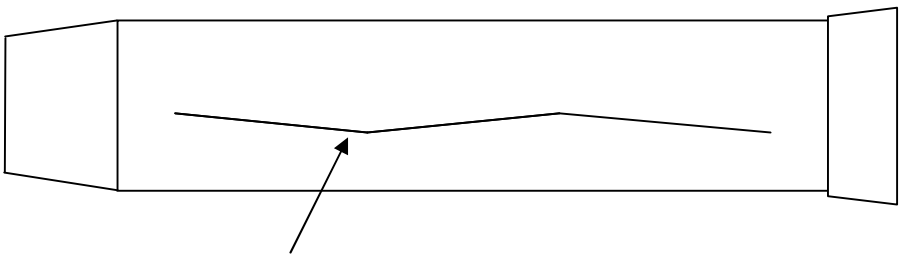
B



4 small impressions, cause more damage on the inside, than on the outside.
Reason: the diaphragm has pumped through mandrel delivery holes.

DISTINGUISHING FEATURE OF FAILURE ON DIAPHRAGM

C



SHEAR THROUGH WALL OF DIAPHRAGM

7.4 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.

SECTION 8 – 'P' TYPE PUMP

Refer to the 'P' Type Pump service Manual Pt No. 061-352
Included with the unit.
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Section 9 – Circuit Diagrams

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The following circuit diagrams are included in this section:

9.1 Hydraulic circuit – 061-558

This provides details of the units 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.

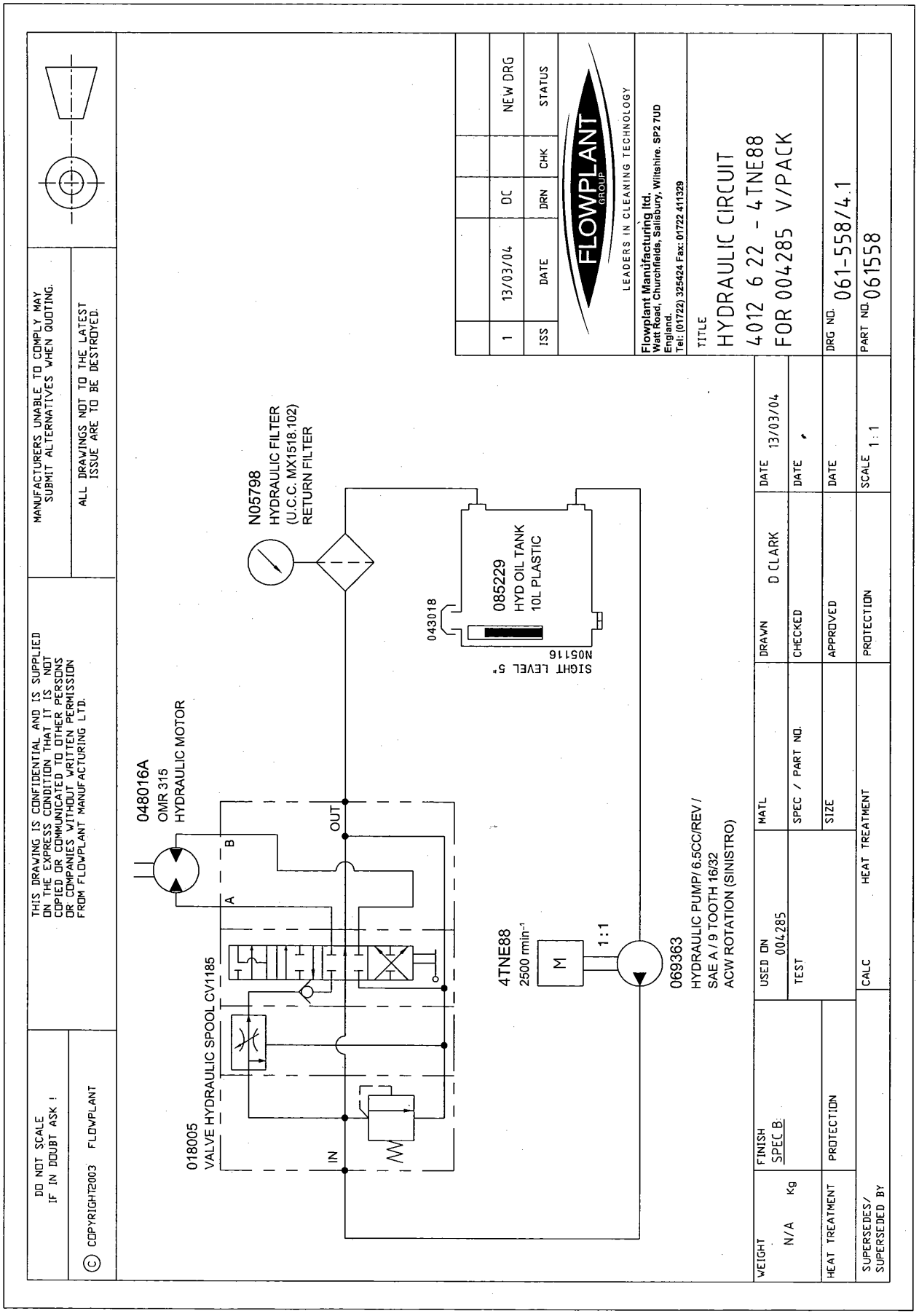
9.2 Water Circuit

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

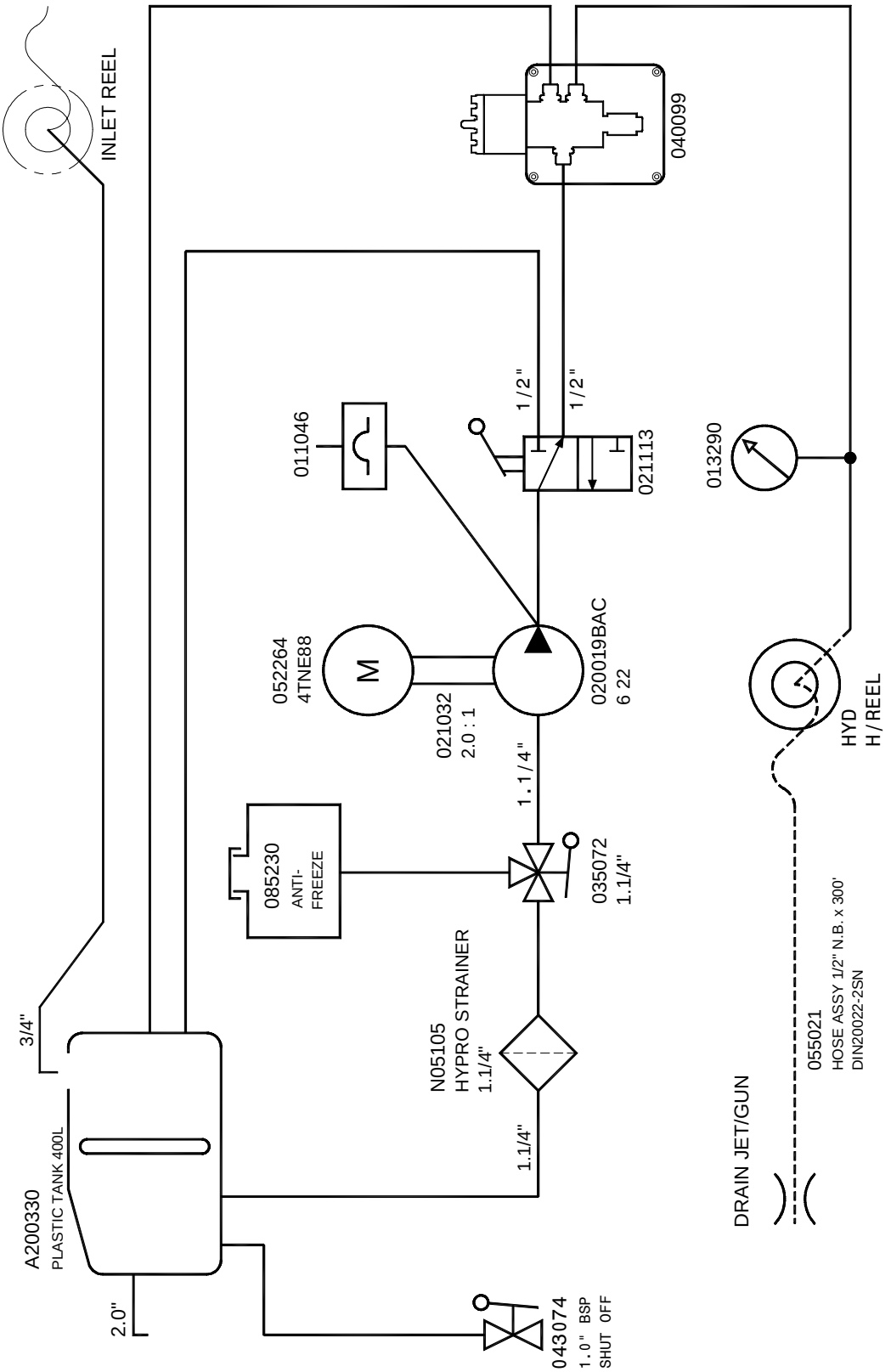
9.3 Wiring Diagram For Yanmar 4TNV88 Engine – RDG 6682

This provides details of the wiring for the Yanmar TNV series engine and WKS 96 engine controller.

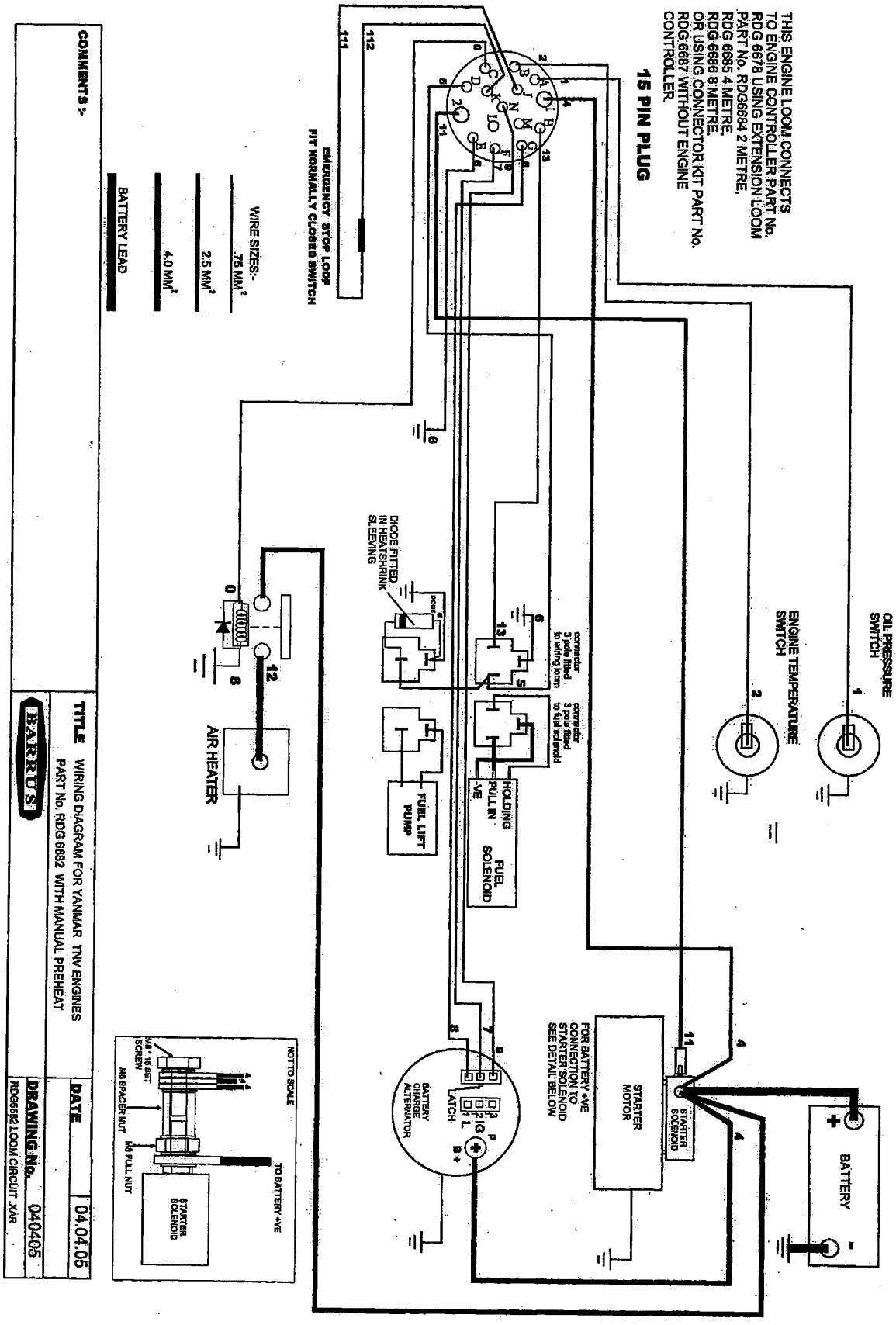
9.1 Hydraulic circuit – 061-558



9.2 Water Circuit



9.3 Wiring Diagram For Yanmar 4TNV88 Engine – RDG 6682.



Section 10 – Diesel Engine

A copy of the Diesel Engine Manufacturer's Operators Handbook is supplied with this equipment
The information contained within this section is only designed to complement the handbook and is for general use only.

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If you require any further help with service or parts information, please contact the relevant department. **See below**

It is recommended that the user records the engine serial number in the box below at the earliest opportunity.
This will provide assistance in identifying the correct spare or replacement parts for this specific engine.

Engine Serial no:	

YANMAR 4TNV88 - engine data only

Exhaust gas flow

min^{-1}	m^3/sec	kw
2600	0.125	31.3
2800	0.142	33.7

Industrial Output kW (hp)

2000	2200	2400	2600	2800	3000	3200	3400	3600
24.1	26.5	28.8	31.3	33.7	36.0	-	-	-
(32.3)	(35.5)	(38.6)	(42.0)	(45.2)	(48.3)			

Exhaust gas flow

min^{-1}	m^3/sec	kw
2600	0.125	31.3
2800	0.142	33.7

Basic engine noise levels

	1500	2000	3000
AT 1 METRE FULL LOAD db (A)	84	87	94
AT 7 METRE FULL LOAD db (A)	67		77

Replacement filters may be obtained from Flowplant.

Flowplant PART No.	**ITEM**
051818	AIR FILTER
051816	OIL FILTER
051817	FUEL FILTER

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Section 11
Parts lists / Spares

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11. SPARES ORDERING & RECOMMENDED SERVICE KITS

11.1 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.

11.2 Ordering spare parts

Order spare parts from:

Flowplant Group Ltd

Brunel Road,
Churchfields Industrial Estate,
Salisbury, Wiltshire, UK.
SP2 7PU.
Contact: Eric Moore (UK Spares)
Tel : 00 44 (0)1722 325424
Fax : 00 44 (0)1722 411329
Email : info@flowplant.com

Come visit our website:

HARBEN High Pressure Water Technology

AQUA hydraulics - the power of water

NEOLITH

When ordering, please state for each part required:

Assembly No. (See Front cover)
Part number and description of part required.
Drawing No. & parts list item number (If applicable)
Quantity required.

11.3 Routine Maintenance / Consumable items.

For routine maintenance the following will be required:

PUMP LUBRICATING OIL: SHELL TELLUS/MORLINA 150

Note: See section 8 for alternative manufacturers.

11.4 Consumable Components

Pt No.	Description
N06021	MESH FOR LINE STRAINER N05105 80 MICRON
011-046	PRESSURE DISC WHITE 4000 PSI

11.5 Accessories

Ancillary Equipment

Pt No.	Description
055-021	HOSE ASSY 1/2" 91.44M STR/STR 1/2"BSPF DIN 20022 2SN

Guns/Lance

Pt No.	Description
031-040	GUN MARK 2 SAFETY 6000 PSI (OPTIONAL)

Jet Inserts

Pt No.	Description
056-026	JET HIGH VELOCITY 2.1MM
056-180	JET FAN 15 DEGREE 15125 1/4 NPT S/S

General Accessories

Pt No.	Description
056-097	JET DRAIN 1/2"BSP 3 x 1.0MM @ 30 DEGREES
056-413	JET DRAIN 1/2"BSP 3Rx1FWD DIAMETER 1.0 at 30 DEG
056-584	JET DRAIN 1/2" BSPM 6R X 0.8MM @ 30DEG HARBEN
013-290	PRESSURE GAUGE 10,000 PSI
055-093	HOSE ASSY LEADER 1/2"BSPM 1/2"BSPF 3.05M SAE100R8
023-227	MINI JET KIT 20'COMPLETE MAX. W.P. 6000 PSI
060-133	JET DRAIN H/E 6 x 0.8MM REAR
056-671	JET HE 1/2" 3 REAR x 0.8, 0.9 FWD
057-041	KIT JUMP JET 6 & 8 CYL PUMPS `P'TYPE VANPACKS
055-027	HOSE 3/4" P.V.C. CLEAR BRAIDED [PER METRE]

11.6 Parts List / 4012 Mk4 LIGHT VANPACK

004-375 UNIT 4012 8 22 – 4TNV88 Mk4 LIGHT VANPACK

Component	Description	Qty
N05105	LINE STRAINER 1 1/4" (HYPRO)	1
A060574	FITTING TEE 1 1/4" BSP FEMALE UPVC	1
023400	ADAPTOR 1 1/4"BSP M x 1" BSP M 210BAR ZN	1
020020AAB	PUMP BARE SHAFT P 8 X 22 EN57 4000PSI	1
012242	GEARBOX HARBEN 2.21:1	1
048112	INLET HOSEREEL TYPE RWM-1340	1
031040	GUN MARK 2 SAFETY 6000 PSI	1
026111	KIT HYDRAULIC DIVERT VALVE INSTALLATION	1
071026	LEAD BATTERY 1070mm POSITIVE 12v	1
071141	LEAD BATTERY 610mm NEGATIVE 12v	1
011156	ELBOW INLET MANIFOLD (1 1/4" INLET)	1
011157	TUBE SUPPORT 1 1/4" INLET HOSE P PUMP	1
012184	ADAPTOR PLATE SAE4-SAE5 HATZ, YANMAR, ISUZU	1
0422081	MOUNTING BRACKET INLET HOSEREEL MK4 LIGHT VP	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
013173	WASHER HOVERCLEAN PLATED	2
013203	ADAPTOR BHEAD 3/8" BSPM x 3/8" BSPM 415 BAR C/W LNUT	1
013224	ADAPTOR BHEAD 1/2" BSPM x1/2"BSPM 415BAR C/W LNUT	4
013266	SEAL DOWTY 1 1/4"BSP	9
013290	GAUGE PRESSURE 10000 PSI C/W RESTRICTOR	1
013349	CLIP "R"	2
014013	HOSE CLIP DIA 20-30 JCS HI-GRIP S/S	2
014041	CHAIN JACK PER METRE	0.3
018005	VALVE SPOOL HYD FLOW CONTROL CV1185 (SEE NOTES)	1
021020	BELL HOUSING PERKINS MACHINED	1
021090	ADAPTOR 3/4" BSPM x 3/8" BSPM	2
023011	ANGLE SWIVEL JOINT 90 DEG 1/2" BSP M/M	1
023025	INSERT FOR HOSE SWAGED 1/2"BSP FEM	1
023041	O CLIP 3/4"	4
023082	INSERT HOSE 3/8" BSP 90 DEG FEMALE	2
023203	INSERT FOR HOSE 1"BSP FEM SWAGED TYPE	1
023204	INSERT FOR HOSE SWAGED 1"BSP 90DEG FEM	1
023362	ADAPTOR 1/2"BSP M x 7/8"-14 JIC M 415BAR	2
023379	ADAPTOR BHEAD 1 1/4" BSPM x 1 1/4" BSPM 210 BAR C/W NUT	1
032459	SPACER SHAFT HYDRAULIC H/REEL MINI VANPACK	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	24

033013	SEAL BONDED 3/8" BSP 400-823-4490-41 492 BAR	6
033014	SEAL BONDED 3/4" BSP 400-827-4490-41 420 BAR	4
033015	SEAL BONDED 1.0" BSP 400-830-4490-41 312 BAR	2
033058	HOSE ASSY 1/2" 00.81m STR/ELB 1/2"BSPF EN 853 2SN	2
033068	ADAPTOR BHEAD 1" BSPM x 1" BSPM 210 BAR C/W LOCNUT	1
035072	VALVE 1 1/4"BSP T PORT 500PSI FIG 2000 S/R TYPE 98 ALBION	1
037010	NIPPLE GREASE 1/8"BSP	1
0421025	BRACKET VANPACK HYDRAULIC FILTER	1
0421104	HOSE REEL TRACE SWING ARM V/PACK	1
0421653	STRAP ASSY FOR SILENCER ON 004285, 004287 (2 PER UNIT REQ'D	2
0421654	HEAT SHIELD FOR TANK ON 004285, 004287	1
0421666	BRACKET LONG FLOOR RESTRAINT VANPACKS	4
042431	SUMP ADAPTOR M22 X 1.5 X 1/2"BSP M/M 415 BAR	1
042510	PIN LOCKING SWIVEL KIT INLET HOSE REEL	1
079154	EXHAUST ELBOW / FLOOR FLANGE YANMAR MK4 LIGHT V/P	1
043018	CAP HYD/FUEL TANK	3
043074	VALVE 1"BSP SHUT OFF 200PSI TYPE 750 R751T	1
043075	VALVE 1/2"BSP SHUT OFF 250PSI TYPE 750 R751T	1
043133	LABEL UNIT SPECIFICATION	1
043177	ADAPTOR [PLASTIC] 2"BSPM X 2"O/D	1
043186	ADAPTOR 1"BSPT-30MM UPVC	1
043222	INSERT HOSE 1 1/4"BSPM X 32 MM DIA HOSETAIL UPVC	2
043243	NUT FLANGED 2"BSP UPVC	1
044298	FRAME Mk4 LIGHT VANPACK 4TNV88-DSA	1
048103	TUBE WATER OUTLET FOR HYDRAULIC HOSE REEL N15-142 AND 048-110	1
048016A	MOTOR HYDRAULIC DANFOSS OMR 315	1
052312	ENGINE YANMAR 4TNV88-DSA	1
053002	EXHAUST CLAMP 1 7/8"	3
053005	SILENCER	1
053155	EXHAUST TAILPIPE	1
053175	HOSE FUEL 8MM ID	3
055024	HOSE 1/2" P.V.C. CLEAR BRAIDED [PER METRE] HDPVC12	5
055027	HOSE 3/4" P.V.C. CLEAR BRAIDED [PER METRE] HDPVC34	1.8
055029	HOSE 1" HELIFLEX [PER METRE]	1.3
055037	HOSE 2" HELIFLEX [PER METRE]	1.2
055063	HOSE 1 1/4" HELIFLEX [PER METRE]	1.5
0551031	Elbow 2" Rubber Formed (Soft)	1
055335	HOSE ASSY 3/8" 1.75M ELB/ELB 3/8"BSPF EN 853 2SN	2
055666	TUBE FLEXIBLE 1 3/4" ID ZINC PLATED	1
055985	HOSE ASSY DN10 3/8" 1.05M STR/ELB EN 853 2SN	3
056097	STANDARD DRAIN JET - 3 REAR C-TXT	1
056413	STANDARD DRAIN JET - 3 REAR 1 FORWARD C-TXT	1
056584	STANDARD DRAIN JET - 6 REAR C-TXT	1
061067	WASHER SEATING FOR 1/4"BSP GAUGE	1

061352	MANUAL P-PUMP/ HI LIFT	1
069363	HYDRAULIC PUMP/ 6.5CC/REV /SAE A/ 9 TOOTH 16/32	1
071575	BATTERY 12V HEAVY DUTY TYPE 075	1
014201	P CLIP 25mm ZINC PLATED	1
078321	PIN RESTRICTING SWING ARM H/REEL VANPACK	1
085229	TANK HYD PLASTIC FOR 004-285, 004-287 Mk4 LIGHT V/PACK	1
085231	TANK FUEL 30L PLASTIC - MK4 VANPACK	1
088042	EXHAUST LAGGING GW304 FORTAGLAS WEBBING 76 X 3MM 35050.76 ARCO REF	8
104482	WATER TRAY HOSE REEL LISTER VANPACK	1
A024219	SCREW SELF TAPPING(PAN HEAD) NO.6 X 0.5IN LONG	16
A030376	LID, SCREW INSPECTION COVER(6)BLACK.	2
A180430	ROD STRAP RETAINER WATER TANK	4
A190821	STRAP ASSEMBLY RATCHET TYPE. 25MM WIDE NYLON	2
A200330	TANK WATER 390 LITRES RIGID C/W BAFFLE POLYPROPYLENE WHITE	1
N01280	ELBOW 1" BSP MXF MALLEABLE GALV	1
N01282	ELBOW 1 1/4 BSP MXF MALLEABLE GALV	1
N01518	INSERT 1/2"BSP F 90 DEG COMPACT (PUSH IN) ZINC 415 BAR	3
N01794	BEARING PLUMMER BLOCK HOUSING 1" C/W GREASE NIPPLE	1
N01799	BEARING NEEDLE BUSH	1
N05085	HANDLE GRIP PLASTIC	1
N05105	LINE STRAINER 1 1/4" (HYPRO)	1
N05114	SIGHT GLASS 10"	1
N05116	SIGHT LEVEL GAUGE 5116/7	2
016266	AV MOUNT CAPTIVE TRANSIT CTM633512/2 FRONT (RADIATOR END)	2
016267	AV MOUNT CAPTIVE TRANSIT CTM633512/6 REAR (FLYWHEEL END)	2
N05798	HYDRAULIC FILTER (U.C.C. MX1518.102) RETURN FILTER	1
N05819	LINK HOSE "U"	1
N10001	BATTERY RETAINING BRACKET	1
N15142	HYD HOSEREEL	1
N20836A	BEARING HOUSING HYD HOSE REEL	1
N20838	HOSE REEL SHAFT (FLUID END)	1
N20839	HOSE REEL SHAFT ZINC PLATED	1
N20843	TRACE ROLLER	4
0421810	ENGINE FOOT REAR YANMAR 4TNV88	2
048010	SPACER 30MM LG HOSE FEED GUIDE HYD REEL P TYPE	1
043061	HOSE CLIP DIA 9.5-12 JCS HI-GRIP S/S	8
015010	SEAL BONDED 2.0" BSP 400-836-4490-41 288 BAR C-TXT	1
0421746	EXHAUST OUTLET BEND YANMAR 4TNV88	1
013316	HOSE CLIP DIA 44-64 JCS HI-TORQUE S/S	3
N08502	HV JET 2.5MM	1
056011	JET FAN 15 DEGREE 1515 1/4 NPT S/S	1
0551068	HOSE ASSY 3/4" TRICOFLEX 25 METRES LONG	1
0421984	MOUNTING BRACKET HYDRAULIC DIVERT VALVE	1
023261	ADAPTOR 1/2"BSPM x 1/2"BSPF SWIVEL 415 BAR ZINC	1

023262	ADAPTOR 1/2"BSP FEMALE FIXED TEE 415 BAR	1
023391	PLUG BLANKING 1/2" BSP ST/ST 550 BAR	1
0422319	SUPPORT TANK FILL POINT VANPACKS	1
023273	ADAPTOR BULKHEAD 3/4"BSP X 3/4"BSP MALE C/W LOCKNUT 210 BAR	1
0231060	1/2"BSP X 1 1/4BSPT MALE/MALE 215 BAR	1
023847	ADAPTOR 1.1/4" BSP M/F SWIV 2B/20	2
0231061	1/2" X 1/2" X 1/4"BSP M/F/M TEE 415 BAR	1
0231063	1/2"BSP MALE X 1/2" HOSE INSERT	1
047050	WASHER SNUBBING A/V MTG 16.5MM BORE REQUIRED	4
0551088	HOSE ASSY 1/2" BSP ELB/ELB @ 90 DEG 1.300m LG EN 853 2SN	1
0551089	HOSE ASSY 1/2" BSP ELB/ELB @ 180 DEG 0.600m LG EN 853 2SN	1
0551092	HOSE ASSY 1/4" BSP COMP ELB/COMP ELB DIN 20022 2SN 0.900m LG	2
023028	TEE 3/8"BSP M 415BAR	2
N01472	ELBOW 90DEG COMPACT 3/8 BSPF x 3/8 BSPF ZN	2
011046	PRESSURE DISC WHITE 4000 PSI	11
A024220	SCREW SELF TAPPING(PAN HEAD) NO.10 X 1IN LONG ZINC	4
055093	SAFETY LEADER HOSE 1/2"BSPM 1/2"BSPF 3.05M BLUE	1
055367	TUBE DIA 2" O/D 16 SWG ST/ST 316. BRIGHT POLISHED	0.1
A0300352	FASTENER EXHAUST CLAMP 2.1/8	2
061635	LABEL WARNING! MACHINE OPERATION	1
055021	HOSE ASSY 1/2" 91.44M STR/STR 1/2"BSPF EN 853 2SN	1
047004	STEM OUTLET (INLET HOSE REEL)	1
N01492	ADAPTOR 1/2" BSPM x 1/2" BSPTM ZINC	1
085230	TANK ANTI-FREEZE B PLASTIC FOR 004-287 Mk 4 LIGHT V/PACK	1
021087	ADAPTOR 1/4" PRESSURE GAUGE STAINLESS STEEL 700 BAR	1
023265	ADAPTOR 1/4"BSP M x 1/4"BSP F SWIVEL 415 BAR	1
055288	HOSE ASSY 3/8" 0.60m ELB/ELB 3/8" BSPF EN 853 2SN	1
0421873	FUEL PUMP/RELAY SUPPORT DTB 500	1
013064	HOSE CLIP DIA 17-25 (OX) JCS HI-GRIP S/S	3
013813	SCREW THREAD CUTTING PAN HEAD TORX DRIVE 6.0 mm x 16 mm ZINC PLATED	4
013053	HOSE CLIP DIA 25-35 JCS HI-GRIP S/S	5
013054	HOSE CLIP DIA 30-50 JCS HI-TORQUE S/S	1
061488	LABEL SOUND POWER LEVEL 114 DBA	1
012061	PLUG BRASS FLANGED 1/2" BSP	3
055780	HOSE ASSY 3/8" 0.18M ELB/ELB 3/8"BSPF EN 853 2SN	1
078417	EXTENDED HEX NUT M8	1
032055	HOSE ASSY 3/8" 00.61M STR/ELB 3/8"BSPF EN 853 2SN	1
N15190	ADJUSTING SPACER CONVEX	2
023347	INSERT FOR HOSE SWAGED 3/4"BSP 90DEG FEM	1
023047	HOSE CLIP DIA 30-40 JCS HI-GRIP S/S	1
023215	ADAPTOR 3/8"BSP Mx 3/8"BSP F SWIVEL 415BAR	1
061703	LABEL 'MANUFACTURED BY FLOWPLANT GROUP LTD'	1
055295	HOSE ASSY 3/8" 1.50M ELB/ELB 3/8" BSPF EN 853 2SN (ANGLE SET 180 DEG)	1

048011	SPACER 10MM LG HOSE FEED GUIDE HYD REEL P TYPE	4
061781	LABEL WARNING DAMAGE CAUSED BY FREEZING	1
021063	ADAPTOR 1 1/4"BSP M x 1 1/4"BSP M 210BAR	2
021065	SOCKET 1 1/4" BSP PARALLEL GALVANISED	1
021045	LOCKNUT 1 1/4"BSP	1
016136	COUPLING E140 PT10 YANMAR 3TNE78/4TNE78 7.5" SAE	1
023093	COUPLING PART 4 B140 BORE 30MM KEY 8MM MACHINED	2
023088	COUPLING Pt1 B140 O'SIZE FLEX BORE 30 KEY 8	1
0422216	FLANGE TUBE 1 1/4" MK LIGHT VP	2
0422217	FLANGE TUBE 1" MK LIGHT VP	1
0422215	FLANGE TUBE 2" MK LIGHT VP	1
061088	SCREW SELF TAPPING 1/2" x 8 STEEL PAN HEAD	16
023023	INSERT FOR HOSE SWAGED 3/8"BSP FEM	1
0421938	SUPPORT FOOT ENGINE FRONT YANMAR 4TNV ENGINE MK2	2
023030	INSERT FOR HOSE SWAGED 3/4"BSP FEM	1
079200	EXHAUST FLANGE 1 1/2" BSPT RDG5805 YANMAR 4TNV	1
013030	NUT NYLOC M10-1.5 6H HT 8.0 ZN	2
013094	WASHER S/COIL SQR.SECTION M10 SPRING STEEL ZN	2
071901	ELECTRICAL PISTON TYPE PE40-35GV12	1
071902	ELECTRICAL UNIT CONTROL TYPE S.FCESY7V12	1
071903	RADIO CONTROL "TIGER GENERATION II" SYSTEM	1
071937	STANDARD ENGINE CONTROLLER & LOOM ASSEMBLY YANMAR 4TNV88 MK4 LIGHT VANPACK CAPRICORN	1
0422462	MOUNTING PANEL CONTROL PANEL MK4 LIGHT VP	1
078393	CABLE GRIP HOLDER TO CLEVIS/THROTTLE	1
0422385	BRACKET THROTTLE VANPACK	1
0422390	BRACKET REMOTE CONTROL VAN PACK	1

11.7 HYDRAULIC DIVERTER VALVE ASSY

RECOMMENDED TOOLS

Part Number	Description
054041	GREASE ESA 100
069186	LUBRICATING METAL PASTE
054003	OIL SHELL TELLUS 150
033275	DRIFT VALVE SPINDLE

SERVICE KITS

024047 KIT SEAL CENTURY TRIGGER ASSY

Part Number	Description	Quantity
013345	O RING BS019/90	4
015062	GLYD RING SEAL	2
015063	STEPSEAL	2

033279 OVERHAUL KIT CENTURY TRIGGER ASSY

Part Number	Description	Quantity
013345	O RING BS019/90	4
015062	GLYD RING SEAL	2
015063	STEPSEAL	2
033293	CENTRE COLLAR	1
033264	SCRAPER	1
033294	END COLLAR	2
033295	GLAND	2
033296	SPINDLE	1
033275	DRIFT VALVE SPINDLE	1

IMPORTANT! Before attempting to overhaul the diverter valve, the machine must be switched off and all hoses and adaptors to the selector disconnected.

TO DISMANTLE

1. Unscrew the four M8 bolts (4) and remove cylinder (3) (DRG 026-111).
2. Unscrew the three M8 caphead screws (17) (DRG 035-255) and remove the adaptor (2) (DRG 026-111) from the water valve body (18) (DRG 035-255)
3. Remove the spring cap (8) from water valve body (18) (DRG 035-255)
   TO DISMANTLE THE SPRING PACK
   Using a vice fitted with soft jaws and small dia bar, approx 5mm, compress the spring mount (6) and disc springs (1) into the cap (8) and remove circlip (2) (DRG 035-255)

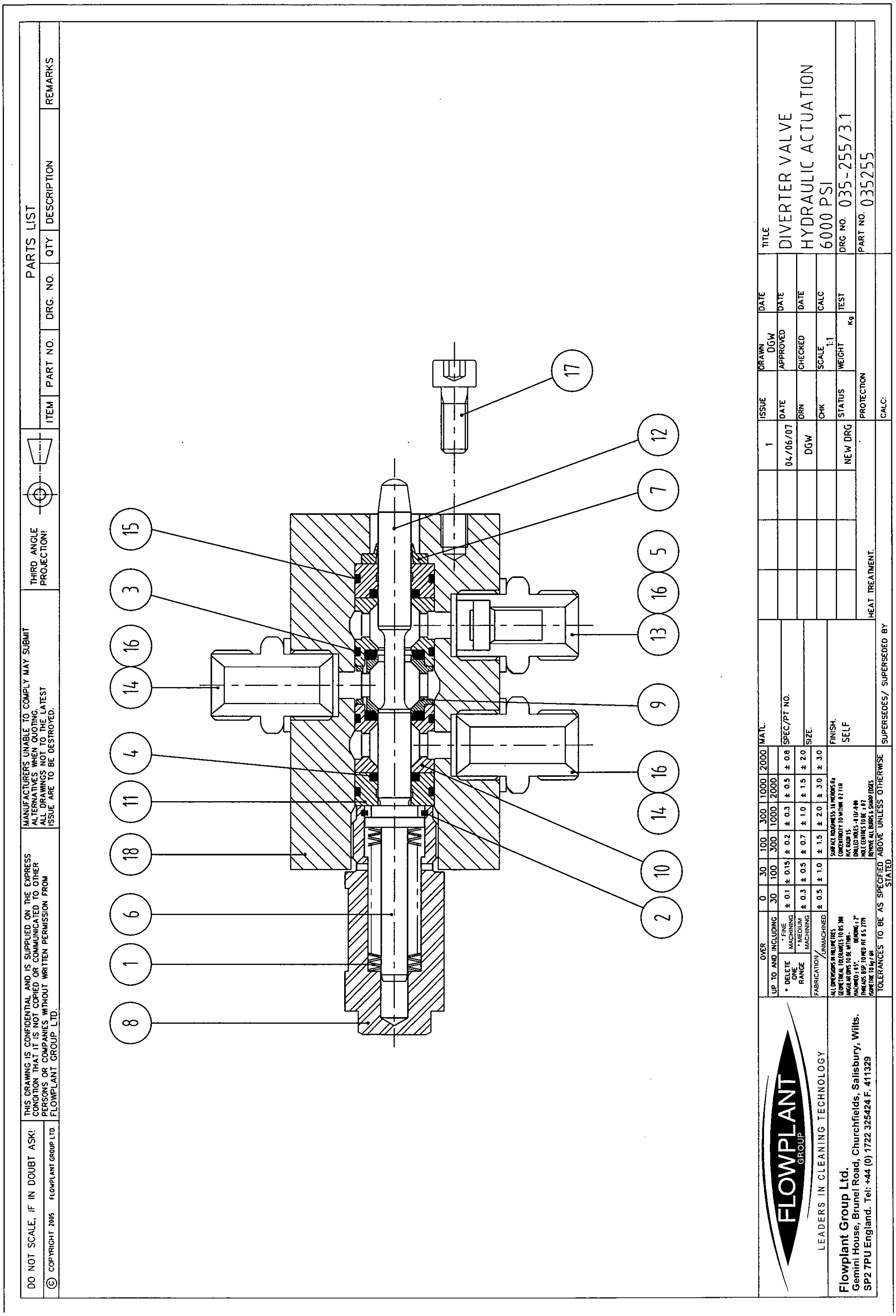
4. Place drift 033275 over spindle (12), tap end of drift gently and remove internal water valve parts. Keeping all parts in order, separate out the spindle stack and remove seals (4), (3) & (15) and scraper (7) (DRG 035-255).

TO ASSEMBLE

1. Check all parts for burrs, swarf, and damage, then clean thoroughly and lay components out on a clean area.
2. Gently ease both stepseals (4) into glands (11) making sure step of inner seal faces pressure (DRG 035-255)
3. Gently ease both Glyd rings (3) into end collars (10) making sure stepped side of inner seal is visible when fitted (DRG 035-255)
4. Fit centre collar (9) between the two end collars (10). This may be a slide, or a light press fit into the collars (DRG 035-255)
5. Holding glands (11) against end collars (10) with step seals facing end collar, gently push lightly oil spindle (12) right the way through internal bore of stack until spindle (12) stops up against face of gland (11) (DRG 035-255)
6. Fit four o-rings (15) to items (10) and (11) (DRG 035-255)
7. Slide scraper (7) over end of spindle (12) (DRG 035-255)
8. Lightly grease o-rings (15), and gently push the complete spindle stack into the water valve body (18). It may be necessary using a delrin rod to gently tap, evenly and squarely, the spindle stack into the body (18) (DRG 035-255)
9. Stack disc springs (1) onto the spring mount (6) as shown on the (dwg 035-255) and grease the complete stack.
10. Fit the greased spring stack into cap (8) and using a vice fitted with soft jaws and a small diameter bar, approx. 5mm, compress the spring mount (6) and disc springs (1) into the cap (8) bore enough to enable the circlip (2) to be fitted in groove on the wall of cap (8). Then pressure can be gently released and spring mount (6) will stop against circlip (2)(DRG 035-255)
11. Apply metal paste to threads of cap (8) and screw into body (18) and torque to 41Nm (DRG 035-255)
12. Locate the adaptor cylinder (2) (DRG 026-111) onto the water valve body (18) DRG 035-255/3 and secure with the three M8 socket button head set screws (17) (DRG 035-255)
13. Replace screw set & washer (5&6) (DRG 026-111)
14. Replace cylinder (3) and the four M8 cap screws (4) (DRG 026-111)

DIVERTER VALVE HYDRAULIC ACTUATION – 035255

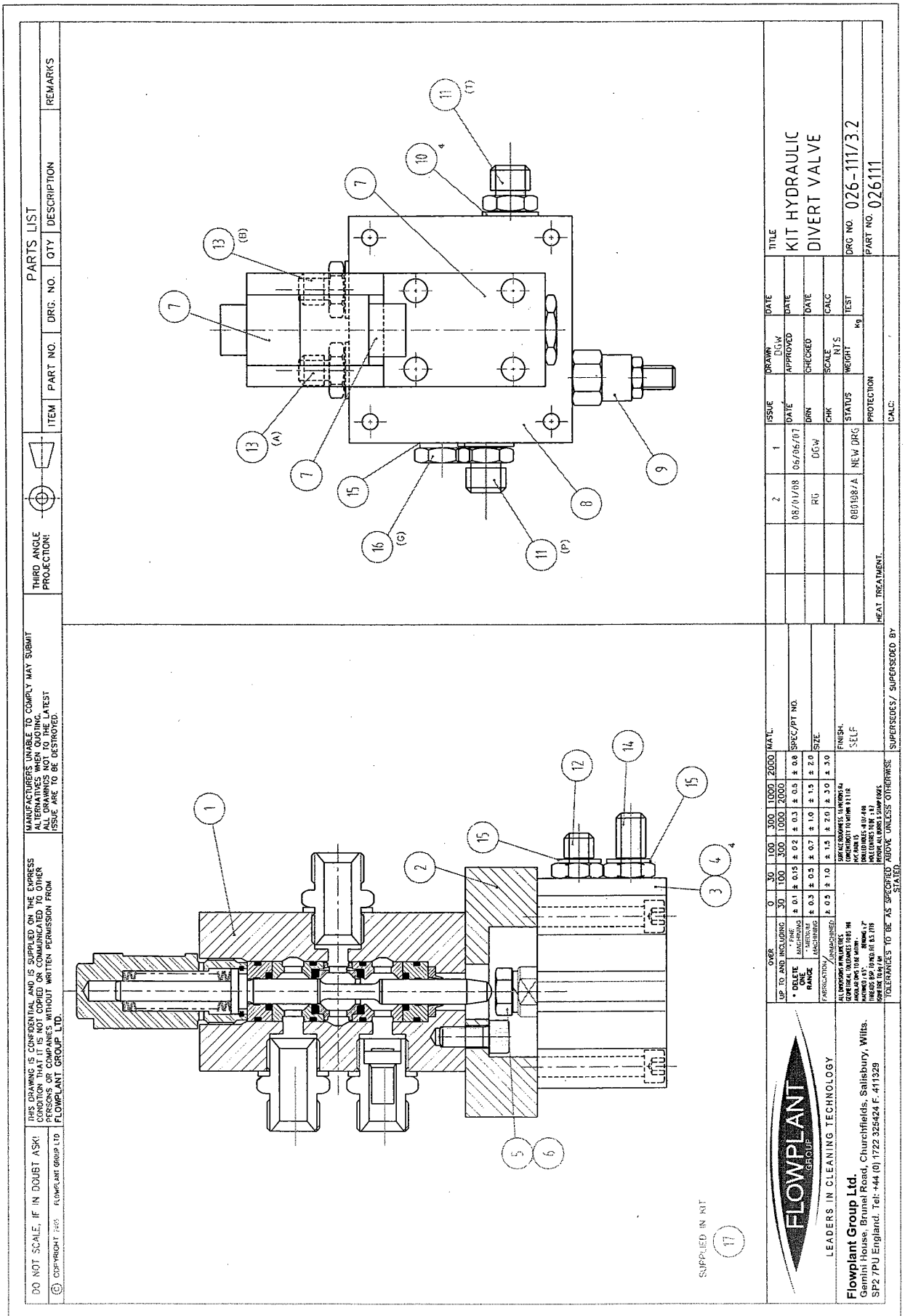
Item	Part No	Description	Qty
1	014076	DISC SPRING S168206 Stainless Steel	45
2	014106	CIRCLIP 1700 METRIC X 18 ANDERTON	1
3	015062	GLYD RING SEAL SHAMBAN S-50992-5907-010	2
4	015063	STEPSEAL (SHAMBAN) (S-55015-0100-80)	2
5	032472	CHOKE MKII SOLINOID VALVE	1
6	033263	SPRING MOUNT BODY ASSY CENTURY GUN	1
7	033264	SCRAPER BODY ASSY CENTURY GUN	1
8	033268	CAP BODY CENTURY GUN	1
9	033293	CENTRE COLLAR BODY ASSY CENTURY GUN MODIFIED	1
10	033294	END COLLAR BODY ASSY CENTURY GUN MODIFIED	2
11	033295	GLAND BODY ASSY CENTURY GUN MODIFIED	2
12	033296	SPINDLE CENTURY GUN MODIFIED	1
13	033306	HOLDER FOR CHOKE	1
14	013039	ADAPTOR 1/2" BSP M x 1/2" BSP M 415 BAR	2
15	013345	O RING BS019/90	4
16	033010	SEAL BONDED 1/2" BSP 400-825-4490-41 448 BAR	3
17	A040814	SCREW CAPSCREW M8 X 20MM LONG SOCKET HD	3
18	078200	BODY WATER DIVERTER VALVE AIR OPERATED	1



PARTS LIST / SPARES

KIT HYDRAULIC DIVERT VALVE INSTALLATION– 026111

Item	Part No	Description	Qty
1	035255	DIVERTER VALVE HYDRAULIC ACTUATION 6000PSI	1
2	078718	ADAPTOR CYLINDER TO BODY UNLOADER VALVE	1
3	A030784	CYLINDER/COMPACT/63 DIA/10 STROKE/SINGLE ROD/PNEU	1
4	013500	BOLT SOCKET CAP HD M8-1.25 6G 60mm LG 8.8 Zn	4
5	013246	SCREW SET HEX HD M10-1.5 6G 20 LG HT 8.8 ZN	1
6	013094	WASHER S/COIL SQR.SECTION M10 SPRING STEEL ZN	1
7	069400	SOLENOID VALVE 4/2 HYD 12VDC CETOP 3 C/W PLUG	1
8	069458	SUB PLATE SIDE PORTED ISO 03 3/8" BSP ESU	1
9	069459	VALVE HYDRAULIC PRESSURE REDUCING/RELIEVING	1
10	033013	SEAL BONDED 3/8" BSP 400-823-4490-41 492 BAR	4
11	033005	ADAPTOR 3/8" BSP M x 3/8" BSP M 415 BAR	2
12	013014	ADAPTOR 1/4" BSP M x 1/4" BSP M 415 BAR	1
13	013038	ADAPTOR 3/8"BSP x 1/4"BSP M/M 415BAR	2
14	013211	ADAPTOR BHEAD 1/4" BSPM x 1/4" BSPM 415 BAR C/W LNUT	1
15	033012	SEAL BONDED 1/4" BSP 400-821-4490-41 616 BAR	3
16	013140	PLUG BLANKING 1/4"BSP	1
17	0231069	SPECIAL ADAPTOR ASSY 3/8" BSP M/M 3.5 DIA HOLE	1


PARTS LIST
ITEM
PART NO.
DRG. NO.
QTY
DESCRIPTION
REMARKS
THIRD ANGLE PROJECTION
DO NOT SCALE, IF IN DOUBT ASK!
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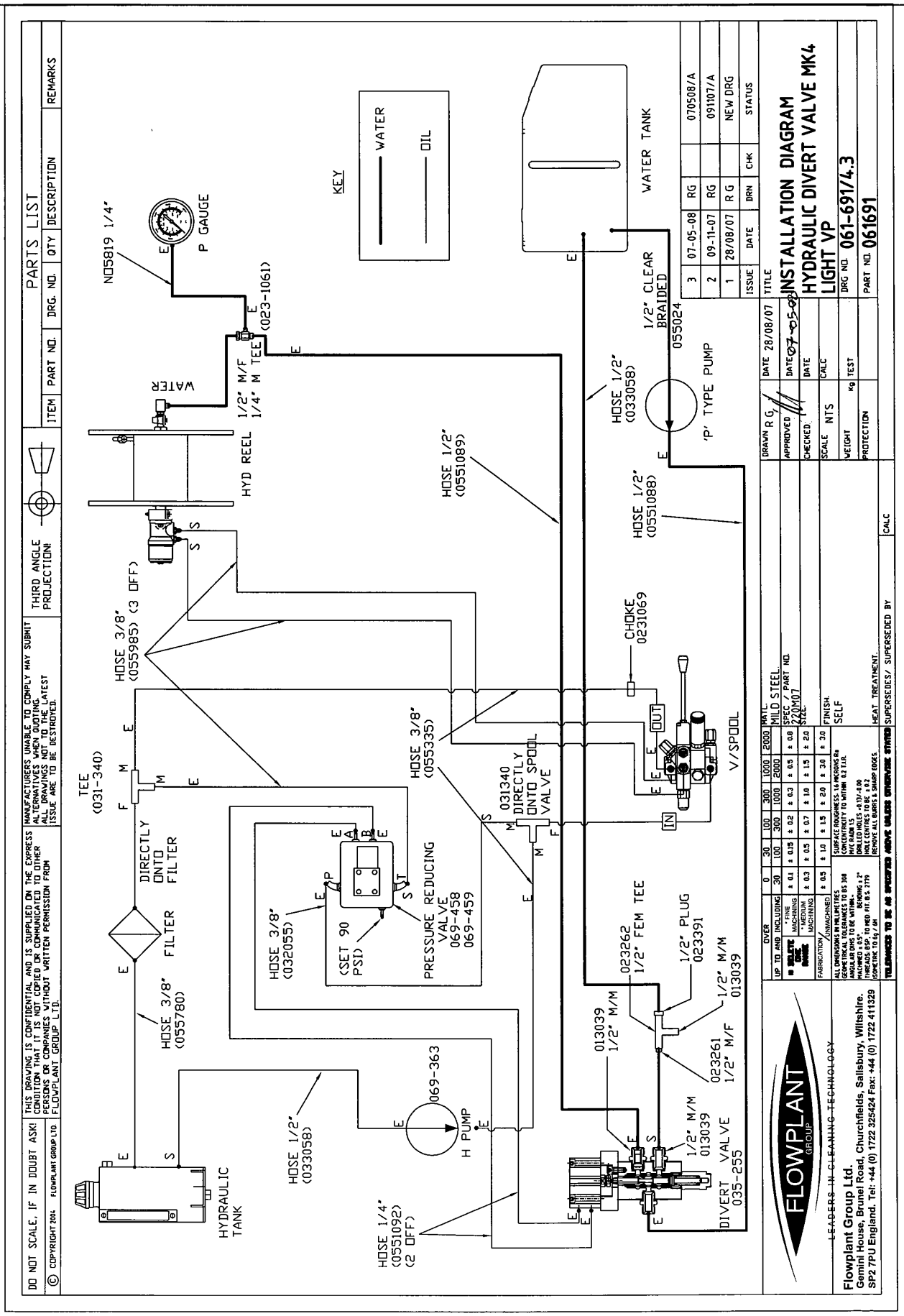
MANUFACTURERS UNABLE TO COMPLY MAY SUBMIT ALTERNATIVES WHEN QUOTING. ALL DRAWINGS NOT TO THE LATEST ISSUE ARE TO BE DESTROYED.
SUPPLIED IN KIT
TITLE
KIT HYDRAULIC DIVERT VALVE
DRG NO. 026-111/3.2
PART NO. 026111
FLOWPLANT GROUP
LEADERS IN CLEANING TECHNOLOGY
Flowplant Group Ltd.
Gemini House, Brunel Road, Churchfields, Salisbury, Wilts. SP2 7PU England. Tel: +44 (0) 1722 326424 F. 411329


INSTALLATION DIAGRAM
HYDRAULIC DIVERT VALVE MK4
LIGHT VP
DRG NO. 061-691/4.3
PART NO. 061691
WATER TANK
HYD REEL
P GAUGE
'P' TYPE PUMP
H PUMP
HYDRAULIC TANK
DIVERT VALVE 035-255
V/SPOOL
PRESSURE REDUCING VALVE 069-458 069-459
CHOKE 0231069
HOSE 3/8" (055985) (3 OFF)
HOSE 3/8" (055780)
HOSE 3/8" (032055)
HOSE 3/8" (055335)
HOSE 1/2" (033058)
HOSE 1/2" (0551089)
HOSE 1/2" (0551088)
HOSE 1/2" (033058)
HOSE 1/4" (0551092) (2 OFF)
1/2" CLEAR BRAIDED 055024
TEE (031-340)
DIRECTLY ONTO FILTER
FILTER
(SET 90 PSI)
031340 DIRECTLY ONTO SPOOL VALVE
023262 1/2" FEM TEE
1/2" PLUG 023391
1/2" M/M 013039
1/2" M/F 013039
023261 1/2" M/F
069-363
1/2" M/F 1/4" M TEE (023-1061)
N05819 1/4"
WATER
KEY
WATER
OIL
PARTS LIST
ITEM | PART NO. | DRG. NO. | QTY | DESCRIPTION | REMARKS
ISSUE | DATE | DRN | CHK | STATUS
3 | 07-05-08 | RG | | 070508/A
2 | 09-11-07 | RG | | 091107/A
1 | 28/08/07 | R.G | | NEW DRG
DRAWN R.G. DATE 28/08/07
APPROVED DATE 07-05-08
CHECKED DATE
SCALE NTS CALC
WEIGHT Kg TEST
PROTECTION
MATL. MILD STEEL
SPEC / PART NO. 220M07
SIZE.
FINISH. SELF
HEAT TREATMENT.
SUPERSEDES/ SUPERSEDED BY
CALC
TITLE
THIRD ANGLE PROJECTION
DO NOT SCALE, IF IN DOUBT ASK!
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Flowplant Group Ltd.
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SP2 7PU England. Tel: +44 (0) 1722 325424 Fax: +44 (0) 1722 411329

MK2 SAFETY GUN

The Flowplant Mk2 Safety gun is suitable for most types of cleaning tasks and benefits from:

- A well balanced design
- Fail safe characteristics
- Low trigger loads
- Multi-gun operation capability
- Ease of maintenance
- Proven reliability
- Shoulder stock available

MK2 SAFETY GUN - Part No. 031-040

Max working pressure - 420 bar (6000 psi)

Max Flow - 60 lpm (13 igpm)

Weight (approx) - 3.9 kg (exc. shoulder stock)

Max Water Temp - 45° C

Note this temperature can be increased to 70°C with the addition of a special hot water conversion kit: 024-012. Always wear suitable protective clothing when handling hot surfaces.

Safe Working Reference Chart

The chart on page 2 highlights the safe working pressures of typical jet sizes in relation to working pressure and flow.

For applications where the reaction force of the gun is greater than 150N, as indicated by the shaded area on the graph, a shoulder stock kit (033-096) is recommended and can be supplied with the gun, or separately to be retro-fitted.

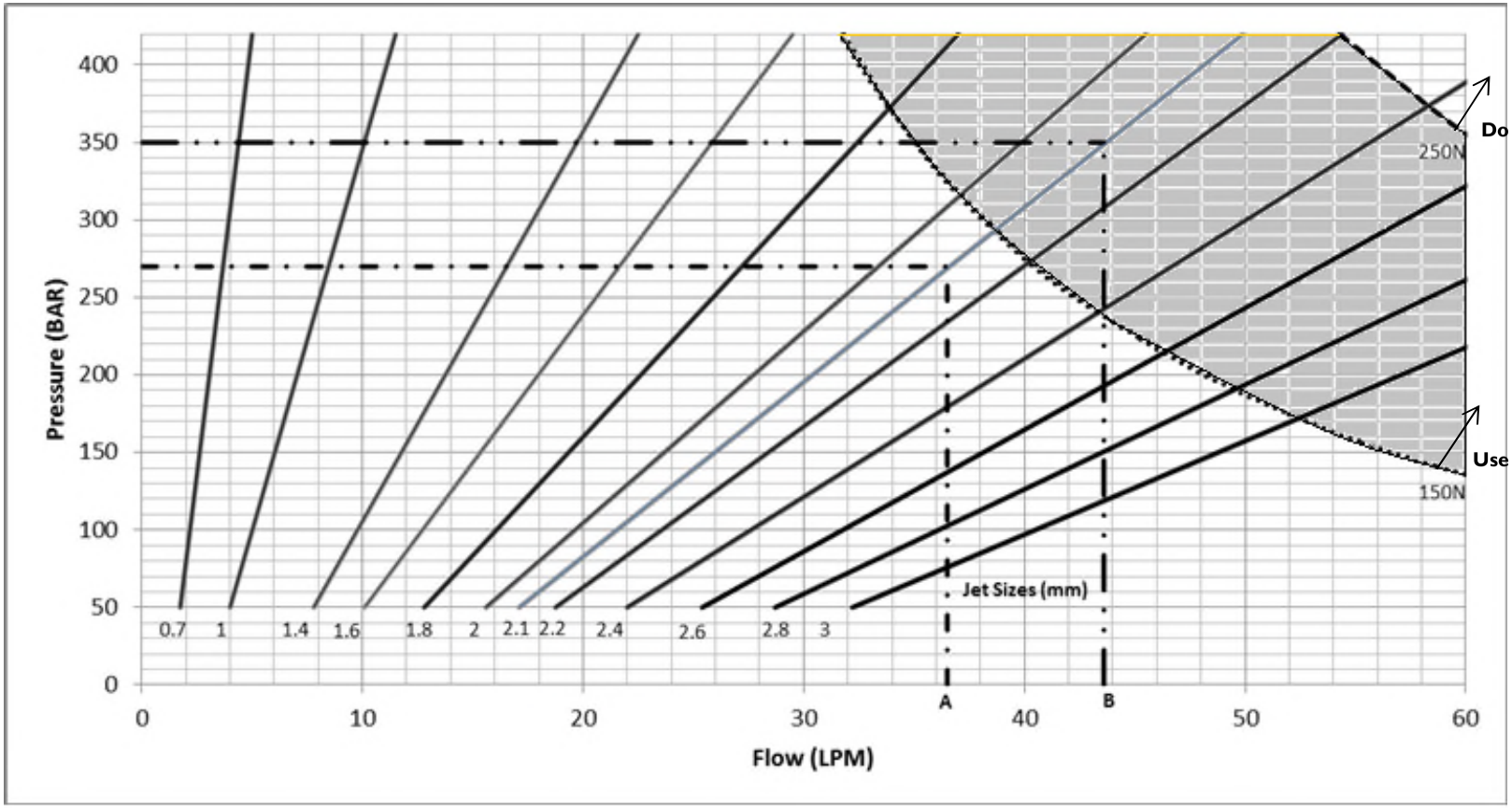
For applications where the reaction force of the gun is greater than 250N, as indicated on the graph, the gun must not be used.

IMPORTANT: This chart is to be used as a guide. If you have any queries or are unsure of the performance of your unit please contact Flowplant on the details below.

IMPORTANT! Before using this equipment; please ensure that you have undertaken the proper training and are fully conversant in the use of high-pressure water jetting equipment. You must follow the 'SAFETY CODE OF PRACTICE' at all times, failure to do so could result in injury or death to persons. You must also read and adhere to the safety awareness sheet 061-577 supplied with this equipment Copies of the code of practice and specialist training are available from:

Flowplant Group Ltd, Brunel Rd., Churchfields, Salisbury, Wilts. SP2 7PU
Tel: (0) 1722 325 424

Safe Working Reference Chart



Examples

A – Running a 2.1mm jet @270 BAR gives a reaction force less than 150N and uses 36 l/min

B – Running a 2.1 mm jet @ 350 bar gives a reaction force greater than 150N and uses 44 l/min

Using the gun

- It is strongly recommended that a Flowplant hose safety shroud (part no. 7001679) is permanently connected to the gun inlet. See end of data sheet for details. The jetting unit main hose can then be connected to the hose safety shroud via the ½" BSP male connector provided.
- If an alternative hose shroud is being used make sure that it covers the hose ferrule and doesn't interfere with the gun trigger assembly.
- Select PPE as required by your risk assessment and WJA code of practice.
- Clean all connections and make sure that no grit or debris has entered the gun inlet tube/hose shroud inlet as this may cause the gun to malfunction and the trigger to jam. Check that the gun trigger assembly operates freely and that the trigger guard has not been bent or damaged. Check that both barrels are straight and free from faults.
- Make sure that all connections are tightened sufficiently using the correct sized spanner. Never use serrated jaw wrenches as these can seriously damage the ferrule nut which can lead to premature failure.
- Check that the correct nozzles are connected to the gun high pressure & dump barrels and use the safe working reference chart to determine if a shoulder stock is recommended.
- Start the jetting machine and operate the gun at low pressure checking that the gun trigger assembly is working correctly and the gun cycles correctly between dump and high pressure. If the gun jams it will be necessary for it to be serviced by a competent person before it can be used.
- Increase the operating pressure gradually checking that no leaks occur at the connection points. If a leak appears stop the jetting machine and switch it off. When all system pressure has been released retighten the leaking connections and repeat the start-up process.
- When working pressure has been reached check that the gun operator is comfortable with the level of reaction force and that it can be safely controlled.

DO NOT EXCEED THE MAXIMUM WORKING PRESSURE

UNDER NO CIRCUMSTANCES SHOULD THIS SAFETY GUN BE MODIFIED. HIGH PRESSURE BARRELS MUST BE A MINIMUM OF 1.1M LONG AS DEFINED IN THE WATER JETTING ASSOCIATION CODE OF PRACTICE. WHERE FITTED AS PART OF THE ORIGINAL DESIGN HANDLES MUST BE USED AT ALL TIMES

SHOULDER STOCK TO BE USED WHERE APPLICABLE

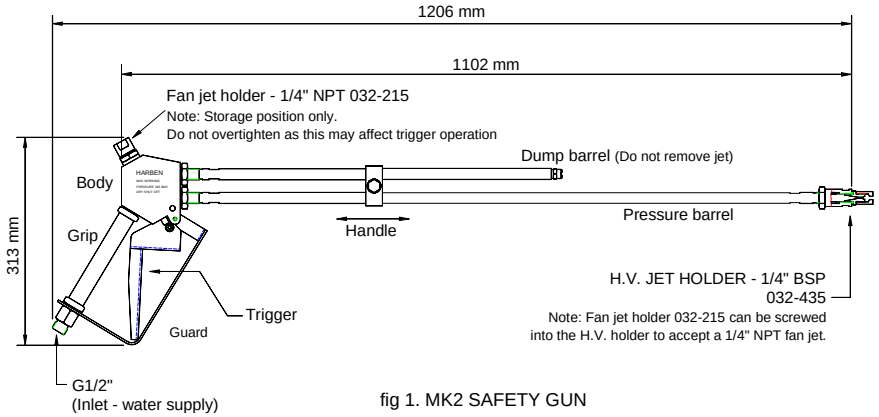


fig 1. MK2 SAFETY GUN

Maintanance Manual

See Drg. No. 031-040/3-4 (2shts)

1. Dismantling

i. Remove one of the 6mm bolts (35) which holds the pressure bar (46) in position. Remove the pressure bar from the trigger (40) by pulling from the opposite side.
ii. Unscrew and remove nut (28)
iii. Turn gun over so that the end of the spindle (31) is visible through hole in guard (39)
iv. Using a hollow plastic rod or tube pass over spindle and tap lightly to remove all of the gun's internal parts. DO NOT TAP SPINDLE as this may result in damage.

2. Inspection

i. Examine all parts and replace metal and plastic parts if there is the slightest sign of damage, pay particular attention to the seats (26 & 32) and spindle, replace all seals

3. Reassembly

i. Holding spindle upright (with chamfer at bottom) put delrin seat (26) with chamfer facing down on to spindle chamfer.
ii. Place one of the collars (27) on top of seat (6), followed by seal support (25)
iii. Press energizer (24) and seal (23) into gland (29) then push gland over spindle with the energizer and seal facing the seal support.
iv. Locate "O" rings (30) around seat (26) and gland.
v. Push assembly into body (5) making sure gland is facing down nearest to the bottom of the hole.
vi. Tap spindle gently with a plastic rod until gland bottoms on shoulder.
vii. Insert second collar until it contacts seat.
viii. Locate "O" ring around bronze seat (32) and insert into body with the chamfer facing down towards spindle.
ix. Locate "O" ring around nut (28) then screw nut into body
x. DO NOT OVER TIGHTEN as this may affect the operation of the trigger.
xi. Replace pressure bar, 6mm bolt and then tighten.

4. Fault finding

- If water leaks from thread of nut (29) replace "O" ring (30)
- If water leaks from around gland (29) replace "O" ring (30)
- If water leaks from around spindle (4) replace energizer and seal (24 & 23)
  Note: To carry out 2 and 3 above; all internal components must be removed.
- If after re assembly the trigger is slow to return to dump; slacken nut (28)
- If water is leaking from dump barrel when the trigger is fully depressed; check bronze seat (32) and spindle (31) for wear, damage or debris lodged between them.

Note: For multi gun operation nut (28) must be replaced by a choke, sized to suit the application.

MATERIAL LIST

INFORMATION FOR ESTIMATION OF WEIGHT AND COST ONLY

ITEM	PART NO.	MATERIAL	SPEC	SIZE	WT Kg/M	LENGTH mm	QTY.	TOTAL WT Kg

A B C D E F G H J K L M N P R S T U V W X Y Z

DO NOT SCALE
IF IN DOUBT ASK !

MANUFACTURERS UNABLE TO COMPLY MAY SUBMIT ALTERNATIVES WHEN QUOTING.

ALL DRAWINGS NOT TO THE LATEST ISSUE ARE TO BE DESTROYED.

Third angle projection

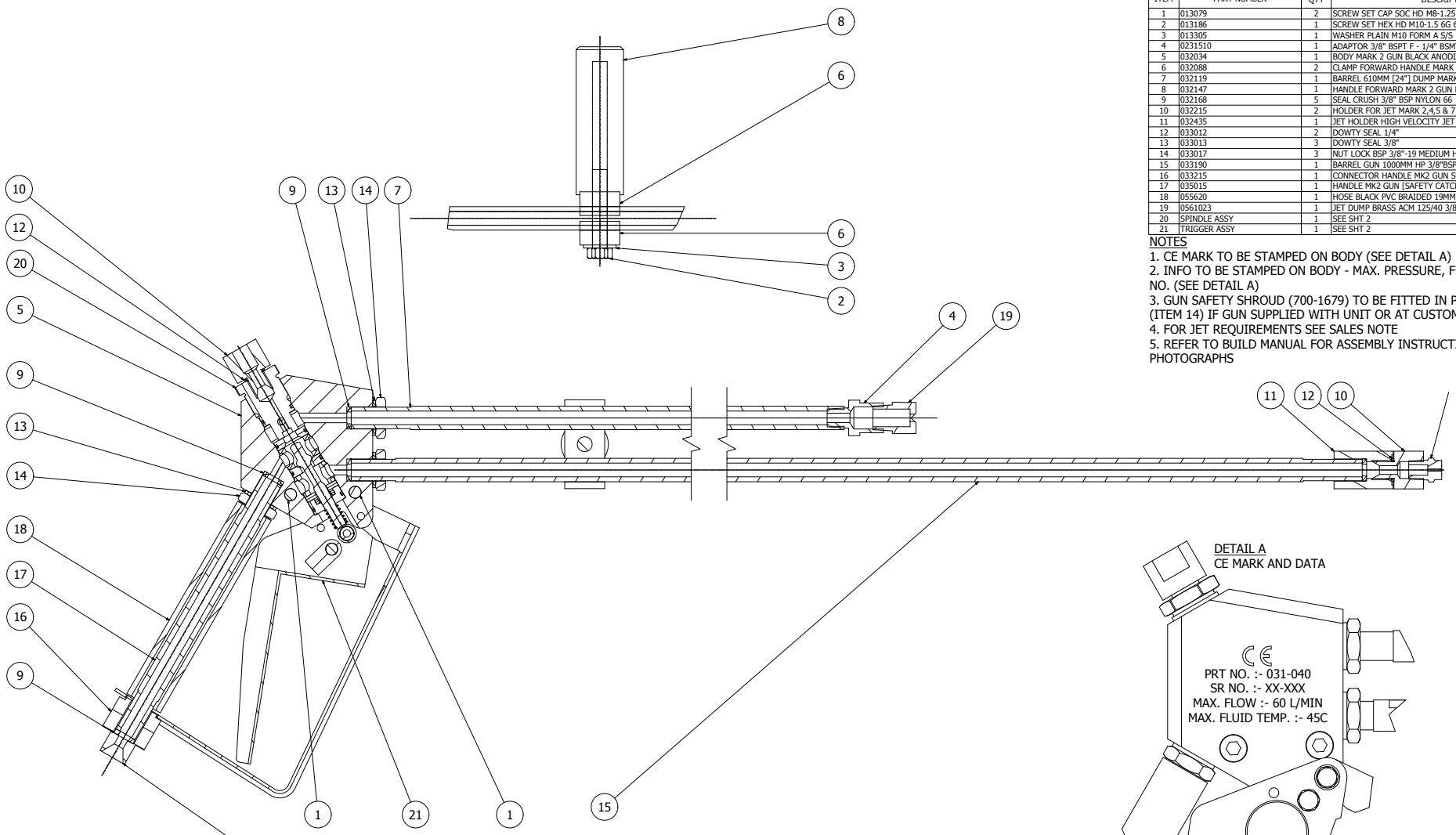
PARTS LIST

ITEM	PART No.	DRG. No	QTY	DESCRIPTION	REMARKS

PARTS LIST

ITEM	PART NUMBER	QTY	DESCRIPTION
1	013079	2	SCREW SET CAP SOC HD M8-1.25 6G 30 LG HT 8.8 ZN
2	013186	1	SCREW SET HEX HD M10-1.5 6G 60 LG S/S A2
3	013305	1	WASHER PLAIN M10 FORM A S/S
4	0231510	1	ADAPTOR 3/8" BSPT F - 1/4" BSMT M FIXED
5	032034	1	BODY MARK 2 GUN BLACK ANODIZED
6	032088	2	CLAMP FORWARD HANDLE MARK 2 GUN MACHINED
7	032119	1	BARREL 610MM [24"] DUMP MARK 2 GUN
8	032147	1	HANDLE FORWARD MARK 2 GUN NYLON
9	032168	5	SEAL CRUSH 3/8" BSP NYLON 66
10	032215	2	HOLDER FOR JET MARK 2,4,5 & 7 GUNS [TAPER FAN JET]
11	032435	1	JET HOLDER HIGH VELOCITY JET
12	033012	2	DOWTY SEAL 1/4"
13	033013	3	DOWTY SEAL 3/8"
14	033017	3	NUT LOCK BSP 3/8"-19 MEDIUM HT 8.0 ZINC PLATED
15	033190	1	BARREL GUN 1000MM HP 3/8"BSP THRD ROLLED MK2
16	033215	1	CONNECTOR HANDLE MK2 GUN SELF
17	035015	1	HANDLE MK2 GUN [SAFETY CATCH MODEL]
18	055620	1	HOSE BLACK PVC BRAIDED 19MM ID X 26MM OD 41022
19	0561023	1	JET DUMP BRASS ACM 125/40 3/8"BSPT
20	SPINDLE ASSY	1	SEE SHT 2
21	TRIGGER ASSY	1	SEE SHT 2

NOTES
1. CE MARK TO BE STAMPED ON BODY (SEE DETAIL A)
2. INFO TO BE STAMPED ON BODY - MAX. PRESSURE, FLOW, TEMP, PART NO. (SEE DETAIL A)
3. GUN SAFETY SHROUD (700-1679) TO BE FITTED IN PLACE OF 033-215 (ITEM 14) IF GUN SUPPLIED WITH UNIT OR AT CUSTOMER REQUEST
4. FOR JET REQUIREMENTS SEE SALES NOTE
5. REFER TO BUILD MANUAL FOR ASSEMBLY INSTRUCTIONS AND PHOTOGRAPHS



DETAIL A
CE MARK AND DATA

LEADERS IN CLEANING TECHNOLOGY

Flowplant Group Ltd.
Gemini House, Brunel Rd, Churchfields,
Salisbury, Wiltshire, England. SP2 7PU
Tel: (01722) 325424 Fax: 01722 411329

TOLERANCES TO BE AS SPECIFIED BELOW UNLESS OTHERWISE STATED							
OVER		0	30	100	300	1000	2000
UP TO AND INCLUDING		30	100	300	1000	2000	
* DELETE ONE RANGE	* FINE MACHINING	± 0.1	± 0.15	± 0.2	± 0.3	± 0.5	± 0.8
	* MEDIUM MACHINING	± 0.3	± 0.5	± 0.7	± 1.0	± 1.5	± 2.0
FABRICATION / UNMACHINED		± 0.5	± 1.0	± 1.5	± 2.0	± 3.0	± 3.0

ALL DIMENSIONS IN MILLIMETRES
GEOMETRICAL TOLERANCES TO BS 308
ANGULAR DIMS TO BE WITHIN:- MACHINED ± 0.5°, BENDING ± 2°
THREADS: BSP, TO MED. FIT. B.S. 2779
ISOMETRIC TO 6g / 6H

SURFACE ROUGHNESS: 1.6 MICRONS Ra
CONCENTRICITY TO WITHIN 0.2 T.I.R.
M/C RADII 1.5
DRILLED HOLES +0.13/-0.00
HOLE CENTRES TO BE ± 0.2
REMOVE ALL BURRS & SHARP EDGES.

	4	3	2	1
ISSUE				
DATE	15/07/14	28/07/10	22/01/07	01/05/05
DRAWN	TWC	DGW	PJ	DC
CHECKED				
STATUS	150714/A	280710/A	22/01/07/B	NEW DRG

HEAT TREATMENT
PROTECTION
USED ON JIG & TOOL
FINISH:
SUPERSEDES/SUPERSEDED BY

DRAWN DC DATE 01/05/05
CHECKED DATE
APPROVED DATE
SCALE CALC
WEIGHT Kg TEST
EXPOSED AREA M²

TITLE
Mk II GUN
SHT 1 OF 2
DRG NO 031-040/3-4
PART NO 031040

MATERIAL LIST

INFORMATION FOR ESTIMATION OF WEIGHT AND COST ONLY

ITEM	PART NO.	MATERIAL	SPEC	SIZE	WT Kg/M	LENGTH mm	QTY.	TOTAL WT Kg

A B C D E F G H J K L M N P R S T U V W X Y Z

DO NOT SCALE
IF IN DOUBT ASK !

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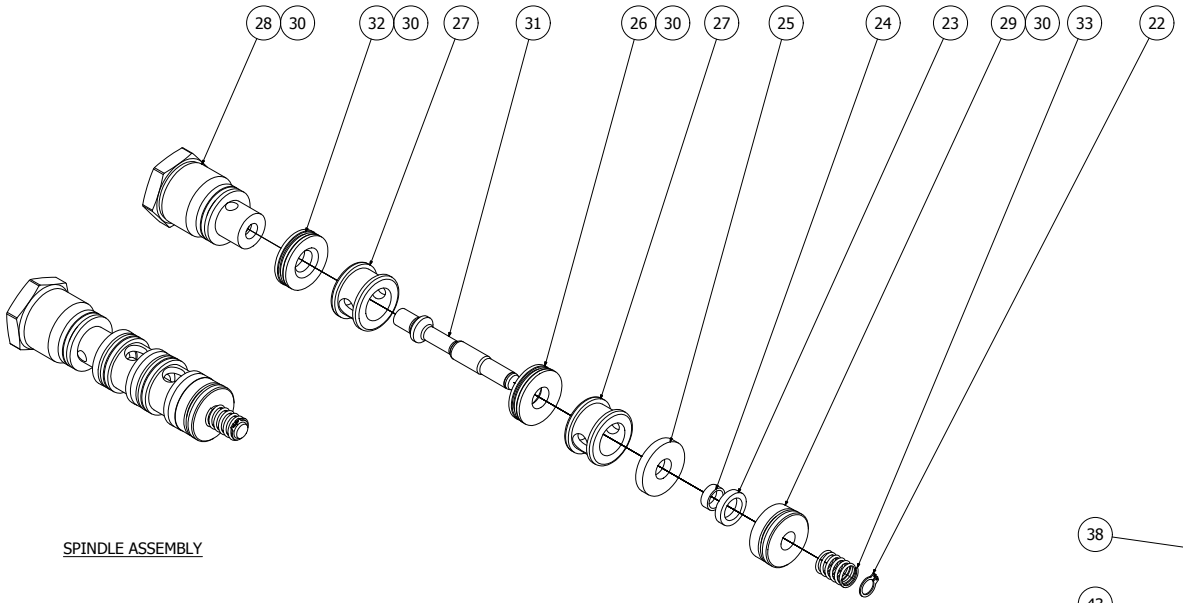
ALL DRAWINGS NOT TO THE LATEST ISSUE ARE TO BE DESTROYED.

Third angle projection

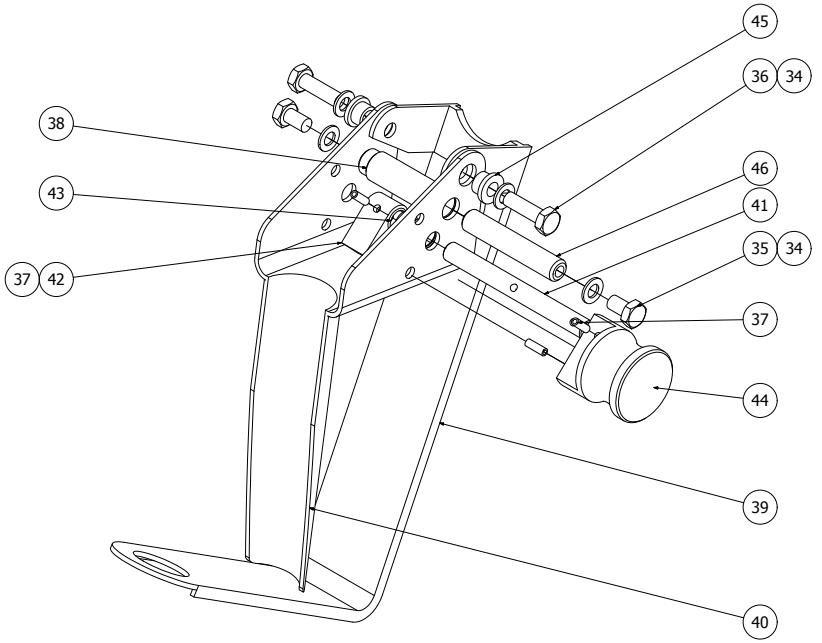
PARTS LIST

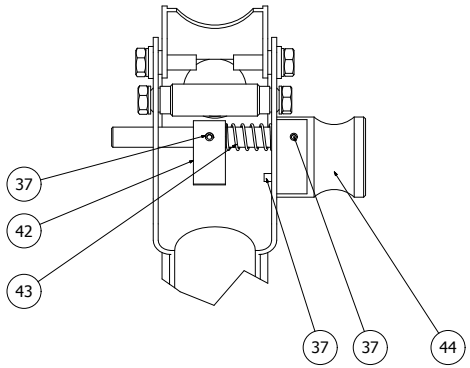
ITEM	PART No.	DRG. No	QTY	DESCRIPTION	REMARKS
ITEM	PART NUMBER		QTY	DESCRIPTION	
22	014216		1	CIRCLIP D1400-0070	
23	032005		1	SEAL	
24	032005		2	ENERGISER	
25	032022		1	SEAL SUPPORT MARK 2 GUN DELRIN	
26	032023		1	SEAT DELRIN MARK 2 GUN	
27	032025		2	COLLAR MARK 2 GUN	
28	032026		1	NUT MARK 2 GUN	
29	032027		1	GLAND MARK 2 GUN	
30	033044		4	O RING BS019/70	
31	033184		1	SPINDLE MK2 GUN (LOW TRIGGER LOAD)	
32	033185		1	SEAT MK2 GUN (LOW TRIGGER LOAD)	
33	037119		1	SPRING COMPRESSION LC-047EF-5M	
ITEM	PART NUMBER		QTY	DESCRIPTION	
34	013071		4	WASHER PLAIN M6 FORM A S/S	
35	013078		2	SCREW SET HEX HD M6-1.0 6G 10 LG S/S A2	
36	013175		2	SCREW SET HEX HD M6-1.0 6G 20 LG S/S A2	
37	033018		3	PIN ROLL TYPE 1/8" DIA X 3/8" LG STAINLESS STEEL	
38	033173		1	SPACER TUBE MK2 GUN PRESSURE BAR	
39	035005		1	GUARD TRIGGER MARK 2 GUN COATED [BLACK]	
40	035006		1	TRIGGER MARK 2 GUN	
41	035008		1	SHAFT SAFETY CATCH MARK 2 GUN	
42	035009		1	BAR LOCK MARK 2 GUN SAFETY CATCH	
43	035010		1	SPRING SAFETY CATCH MARK 2 GUN	
44	035011		1	KNOB SAFETY CATCH MARK 2 GUN	
45	035016		2	BUSH MARK 2 GUN	
46	035017		1	PRESSURE BAR MARK 2 GUN	



SPINDLE ASSEMBLY

TRIGGER ASSEMBLY





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Tel: (01722) 325424 Fax: 01722 411329

TOLERANCES TO BE AS SPECIFIED BELOW UNLESS OTHERWISE STATED							
OVER		0	30	100	300	1000	2000
UP TO AND INCLUDING		30	100	300	1000	2000	
* DELETE ONE RANGE	* FINE MACHINING	± 0.1	± 0.15	± 0.2	± 0.3	± 0.5	± 0.8
	* MEDIUM MACHINING	± 0.3	± 0.5	± 0.7	± 1.0	± 1.5	± 2.0
FABRICATION / UNMACHINED		± 0.5	± 1.0	± 1.5	± 2.0	± 3.0	± 3.0

ALL DIMENSIONS IN MILLIMETRES
GEOMETRICAL TOLERANCES TO BS 308
ANGULAR DIMS TO BE WITHIN:-
MACHINED ± 0.5°, BENDING ± 2°
THREADS: BSP, TO MED. FIT. B.S. 2779
ISOMETRIC TO 6g / 6H

SURFACE ROUGHNESS: 1.6 MICRONS Ra
CONCENTRICITY TO WITHIN 0.2 T.I.R.
M/C RADII 1.5
DRILLED HOLES +0.13/-0.00
HOLE CENTRES TO BE ± 0.2
REMOVE ALL BURRS & SHARP EDGES.

	4	3	2	1
ISSUE				
DATE	15/07/14	28/07/10	22/01/07	01/05/05
DRAWN	TWC	DGW	PJ	DC
CHECKED				
STATUS	150714/A	280710/A	22/01/07/B	NEW DRG

HEAT TREATMENT
PROTECTION
USED ON JIG & TOOL
FINISH:
SUPERSEDES/SUPERSEDED BY

DRAWN DC DATE 01/05/05
CHECKED DATE
APPROVED DATE
SCALE CALC
WEIGHT Kg TEST
EXPOSED AREA M²

TITLE
Mk II GUN

SHT 2 OF 2

DRG NO 031-040/3-4
PART NO 031040

INSTRUCTION / DATA SHEET 061780

GUN SAFETY SHROUD

The Flowplant gun safety shroud connects to Flowplant MkII guns and offers enhanced protection from pinhole occurrences near the operator. It provides a cost effective solution in a neatly engineered package.

- Highly burst resistant
- Highly abrasion resistant
- Highly chemical resistant
- Connects permanently to gun
- Adaptors can be provided to suit alternative gun designs
- Enhanced safety

GUN SAFETY SHROUD	**- Part No. 700-1679**	
Max working pressure (refers to hose assy)	- 420 bar	(6000 psi)
Max Flow	- 60 lpm	(13 igpm)
Weight (approx)	- 2.8 kg	
Length	- 3m	
Inlet connection	- $^1/_2$" BSPM	
Gun connection	- 3/8" BSPF crush seal	

FUNCTION & FITTING

The gun safety shroud can be retro-fitted to all Flowplant MkII guns (part no. 031-040). It is manufactured from twin sleeve super de-aerated Polyamide 6. The sleeve material has been tested and approved to international standards and has been found to be very effective in reducing the concentrated stream of pinhole leaks.

When retrofitting it will be necessary to remove the original $^1/_2$" BSPM inlet water supply boss from the gun inlet tube and replace it with the complete gun safety shroud. This should be tightened until the crush seal seats firmly onto the gun inlet tube.

IMPORTANT! Before commencing please ensure that you have undertaken the proper training and are fully conversant in the use of high-pressure water jetting equipment. You must follow the Water Jetting Association 'SAFETY CODE OF PRACTICE' at all times, failure to do so could result in injury or death to persons. Copies of the code of practice and specialist training are available from:

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SECTION 12 – Service Documents

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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

Flowplant Unit Log Book

Serial Number -

Unit Number -

Date of Manufacture -

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

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Flowplant Unit Log Book

Serial Number -

Unit Number -

Date of Manufacture -

Date ……

Engineer ……

Type of Service ……

Official Flowplant Stamp and Signature

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Official Flowplant Stamp and Signature

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Date ……

Engineer ……

Type of Service ……

Official Flowplant Stamp and Signature

Please state if other Service provider used ……

SECTION 13 – Warranty and Certification

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Warranty

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 option, 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.

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

1. They are returned to Flowplant for inspection (carriage paid), along with a copy of the original part(s) sale invoice (where necessary); and
2. All terms agreed by Flowplant for payment of such goods have been complied with; and
3. If a defect/failure is discovered before the expiration of the warranty, notification must be given to the Flowplant service department immediately
4. 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:

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

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.

On 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.