

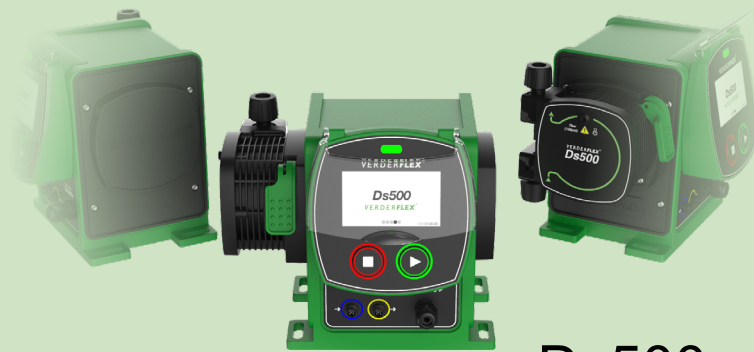
VERDERFLEX[®]

Peristaltic Pump

Operating Manual

Version 01

Original instructions (en)



Ds500
Ds500+



VERDER
passion for pumps



Version 01

Ds500
Ds500+



The information in this document is essential for the safe operation and maintenance of Verderflex[®] Ds500 & Ds500+ pumps. This document must be read and understood thoroughly prior to installation of unit, electrical connection and commissioning.



Table of Contents

1.	Declaration of Conformity	5
2.	About this Document.....	7
2.1	Target Groups	7
2.2	Warnings and symbols used in this manual.....	7
3.	Safety	9
3.1	Intended Use.....	9
3.2	General Safety Instructions.....	9
3.2.1	Product safety.....	9
3.2.2	Obligation of the operating company	9
3.3	Specific Hazards	9
3.3.1	Hazardous pumped liquids	9
4.	Transport, Unpacking and Storage	10
4.1	Transport.....	10
4.2	Unpacking.....	10
4.3	Lifting.....	10
4.4	Storage Conditions.....	10
4.5	Interim Storage Before Using the Pump	10
5.	Warranty.....	11
6.	Technical Specifications	12
6.1	Pump Specifications.....	12
6.2	Materials.....	12
6.2.1	Product contact (cartridge).....	12
6.2.2	Non-product contact (pump).....	12
6.3	Chemical Compatibility.....	12
6.4	Operating Conditions	12
6.4.1	Ambient.....	12
7.	Layout and Function.....	13
7.1	Design Details	13
7.2	Labelling.....	13
7.3	Layout	13
7.3.1	Front.....	13
7.3.2	Rear	14
8.	Installation and Connection.....	15
8.1	Electrical Installation	15
8.1.1	Checking the ambient conditions.....	15
8.1.2	Connecting to the mains supply.....	15
8.1.3	Protective earthing/ grounding	15
8.2	Electrical Isolation	15
8.3	External Control (Ds500+)	15
8.4	Fitting the Cartridge.....	16
8.5	Connections to the Cartridge	16
8.5.1	Removing the cartridge.....	16
9.	Operation	17
9.1	Pre-commissioning the Pump	17
9.2	Starting the Pump For the First Time	17
9.3	Stopping the Pump.....	17



10.	Navigating the Screens	18
10.1	First Time Power On	18
10.1.1	Touch calibration	18
10.1.2	Language select.....	18
10.2	Operating Screen (home).....	18
10.2.1	Manual mode (Ds500 default).....	18
10.2.2	4-20mA mode (Ds500+).....	19
10.2.3	Contact mode (Ds500+).....	19
10.3	Main Menu	19
10.3.1	Operational mode	19
10.3.2	Pump settings	21
10.3.3	Cartridge information	22
10.3.4	Fluid level monitor.....	22
10.3.5	Security settings.....	23
10.3.6	Pump information.....	23
10.3.7	I/O settings (Ds500+ only)	24
11.	Inspection, Maintenance and After Sales	25
11.1	Inspection.....	25
11.2	Maintenance.....	25
11.2.1	Recommended cleaning procedure	25
11.2.2	Maintenance schedule	26
11.3	After Sales.....	26
11.3.1	Returning the pump to the service centre	26
11.3.2	Ordering spare parts	26
12.	Troubleshooting	27
12.1	Pump Malfunctions.....	27
12.2	Error Codes	28
13.	Disposal	29
14.	Recycling	29
15.	List of Tables & Figures.....	30
16.	Ds500+ external connections	31
17.	Trademarks	32
18.	Document History	32



1. Declaration of Conformity (EC)

EC Declaration of Conformity according to Machinery Directive, Appendix II A


We,
VERDER Ltd., Unit 3 California Drive, Castleford
hereby declare that the following machine adheres to the relevant EC directives detailed below:

Designation
Ds500
Ds500+

EC directives:
Machinery Directive (2006/42/EC)
RoHS Directive (2011/65/EU) and Delegated Directive (2015/863/EU)
Radio Equipment Directive (2014/53/EU)

Applicable harmonized standards:
EN 61326-1:2013 - Electrical equipment for measurement, control and laboratory use. EMC requirements - General requirements
ETSI EN 301 489-1 V2.1.1 - ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements.
ETSI EN 301 489-17 V3.1.1 - ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems.

The pump, to which this declaration refers, may only be put into operation after it has been installed in the way prescribed by the manufacturer and, as the case may be, after the complete system of which this pump forms part, has been made to fulfil the requirements of Machinery Directive 2006/42/EC.

Manufacturer VERDER Ltd. Unit 3 California Drive Castleford WF10 5QH UK	Authorised Representative Established in EU (in accordance with Article 4, Regulation (EU) 2019/1020) Verder Liquids B.V Utrechtseweg 4a 3451 GG Utrecht Netherlands
Date: 02 / 09 / 2022	Company Stamp / Signature:  Anthony Beckwith Head of Engineering



Declaration of Conformity (UK)



In accordance with the UK Supply of Machinery (Safety) Regulations 2008, No 1597 ANNEX II, Part I, Section B


We,
VERDER Ltd., Unit 3 California Drive, Castleford
hereby declare that the following machine adheres to the relevant UK legislation detailed below:

Designation
Ds500
Ds500+

UK Legislation:
Supply of Machinery (Safety) Regulations 2008
UKSI 2012-3032 - The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
UKSI 2017-1206 - The Radio Equipment Regulations 2017

The following designated standard(s) has been applied:
BS EN 61326-1:2013 - Electrical equipment for measurement, control and laboratory use. EMC requirements - General requirements
ETSI EN 301 489-1 V2.1.1 - ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements.
ETSI EN 301 489-17 V3.1.1 - ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems.

The pump, to which this declaration refers, may only be put into operation after it has been installed in the way prescribed by the manufacturer and, as the case may be, after the complete system of which this pump forms part, has been made to fulfil the requirements of The Supply of Machinery (Safety) Regulations 2008.

Manufacturer	VERDER Ltd. Unit 3 California Drive Castleford WF10 5QH UK
Date: 02 / 09 / 2022	Company Stamp / Signature:  Anthony Beckwith Head of Engineering



2. About this Document

The Verderflex Ds500 is a peristaltic pump which has been developed using the latest technology and subject to continuous quality control. These operating instructions are intended to facilitate familiarisation with the pump and its intended use. This manual will act as a guide for operating the pump. You are advised to follow these guidelines to operate the pump correctly. These operating instructions do not take local regulations into account. The operator must ensure that such regulations are strictly observed by all, including the personnel responsible for installation.

2.1 Target Groups

Target Groups	Duty
Operating Company	<ul style="list-style-type: none"> ▶ Keep this manual available at the operating site of the pump. ▶ Ensure that personnel read and follow the instructions in this manual and any other applicable documents, especially all safety instructions and warnings. ▶ Observe any additional rules and regulations referring to the system.
Qualified personnel, fitter	<ul style="list-style-type: none"> ▶ Read, observe and follow this manual and the other applicable documents, particularly all safety instructions and warnings.

Table 1. - Target groups

2.2 Warnings and symbols used in this manual







Warning	Risk Level	Consequences of disregard
	Immediate risk	Death, serious bodily harm
	Potential acute risk	Death, serious bodily harm
	Potential hazardous situation	Potential damage to the pump
Note	For information	Possible incorrect use/maintenance of pump

Table 2. - Warnings used in this manual

Symbol	Meaning
	Safety warning sign in accordance with DIN 4844 - W9 <ul style="list-style-type: none"> ▶ Take note of all information highlighted by the safety warning sign and follow the instructions to avoid injury or death.
	Warning of dangerous electrical voltage
	Protective earth (ground) / PAT test point
▶	Instruction
1., 2.,	Multiple-step instructions
☐	Checklist







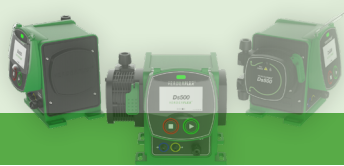
	Cross-reference
	Information
	Waste Electronic and Electrical Equipment (WEEE)
	USB


Table 3. - Symbols used in this manual



3. Safety



CAUTION

 The manufacturer does not accept any liability for damage resulting from disregard of this documentation.


3.1 Intended Use

- ▶ Only use the pump to handle fluids compatible with the fitted cartridge (→ 6.3 Chemical Compatibility).
- ▶ Adhere to the operating limits (→ 6. Technical Specifications).
- ▶ Consult the manufacturer regarding any other use of the pump.
- ▶ Note the operating limits of the pump with regard to temperature and pressure (→ 6. Technical Specifications).
- ▶ Do not operate the pump with any inlet/outlet valves closed
- ▶ Only install the pump as recommended in this manual.

Prevention of obvious misuse (examples)

- Running the pump with incompatible cartridge.
- Inserting items into any moving parts.
- Installation in the immediate vicinity of extreme hot or cold sources.
- Running pump in explosive atmosphere.

3.2 General Safety Instructions

 Observe the following regulations before carrying out any work.

3.2.1 Product safety

- These operating instructions contain fundamental information which must be complied with during installation, operation and maintenance of the unit. Therefore this operating manual must be read and understood both by the installing personnel and the responsible trained personnel / operators prior to installation and commissioning, and it must always be kept easily accessible within the operating area of the machine.
- Not only must the general safety instructions laid down in this chapter on “Safety” be complied with, but also the safety instructions outlined under specific headings.
- Operate the pump only if it and all associated systems are in good functional condition.
- Only use the pump as intended, be fully aware of safety and risk factors involved and the instructions in this manual.
- Keep a copy of this manual, and all other applicable documents complete, legible and accessible to personnel at all times.
- Refrain from any procedure or action that would pose a risk to personnel or third parties.
- In the event of any safety-relevant faults, shut down

the pump immediately and have the malfunction rectified by qualified personnel.

- The installation of the pump must comply with the requirements of installation given in this manual and any local, national or regional health and safety regulations.

3.2.2 Obligation of the operating company

Safety-conscious operation

- Ensure that the following safety aspects are observed and monitored:
 - Adherence to intended use
 - Statutory or other safety and accident-prevention regulations
 - Safety regulations governing the handling of hazardous substances if applicable
 - Applicable standards and guidelines in the country where the pump is operated
- Make personal protective equipment (PPE) available relevant to operation of the pump.

Qualified personnel

- Ensure that all personnel tasked with work on the pump have read and understood this manual and all other applicable documents, including the safety, maintenance and repair information, prior to use or installation of the pump.
- Organize responsibilities, areas of competence and the supervision of personnel.
- Have all work carried out by specialist technicians only.
- Ensure that trainee personnel are under the supervision of specialist technicians at all times when working with the pump.

3.3 Specific Hazards


3.3.1 Hazardous pumped liquids

- ▶ Follow the statutory safety regulations when handling hazardous pumped liquids (e.g. hot, flammable, poisonous or potentially harmful).
- ▶ Use appropriate PPE when carrying out any work on the pump.



4. Transport, Unpacking and Storage

4.1 Transport

 Always transport the unit in the upright orientation and ensure that the pump is securely packed in the box.

4.2 Unpacking

Contents of box:

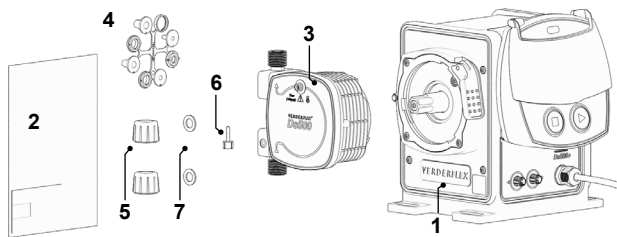


Figure 1. - Box contents

Item	Description	Item	Description
1	Pump	2	Leaflet with serial/USB
3	Cartridge	4	Tube connection kit x 2
5	Screw fittings (2pcs)	6	Hose tail fitting
7	O-rings (2pcs)		

Table 4. - Box contents

Report any missing items or transport damage to the manufacturer/ distributor immediately.
 Retain the packaging if returning any parts.
 Packaging (outer carton and foam) can be recycled - check local recycling guidelines and facilities.

4.3 Lifting



CAUTION

Risk of damage to pump by incorrect lifting

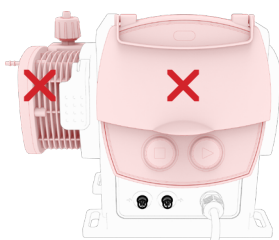


Figure 2. - Lifting

▶ Do not lift the pump by the screen module or cartridge

4.4 Storage Conditions

1. Make sure the storage location meets the following conditions:
 - Dry
 - Out of direct sunlight
 - Frost-free; temperature range -5° to +45°C
 - Vibration-free
 - Dust-free
2. The cartridge should be stored in the box it was supplied in for a maximum of 2 years.

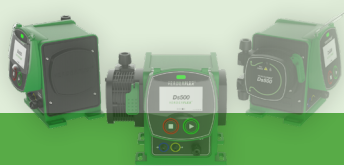
4.5 Interim Storage Before Using the Pump



CAUTION

Risk of pump damage if stored incorrectly

- ▶ Please observe the storage recommendations and use by dates which apply to the cartridge that you may wish to bring into service after storage.
- ▶ Allow the pump and cartridge to reach ambient temperature before use.



5. Warranty

The warranty is void if the customer fails to follow any Warning, Caution or general instruction provided in this document. Verder has made every effort to illustrate and describe the product in this document. Such illustrations and descriptions are, however, for the sole purpose of identification and do not express or imply a warranty that the products are merchantable or fit for a particular purpose, or that the products will necessarily conform to the illustration or descriptions.

Obtain the manufacturer's approval prior to carrying out any modifications, repairs or alterations during the warranty period. Only use genuine parts or parts that have been approved by the manufacturer.



6. Technical Specifications

6.1 Pump Specifications

Detail	Value
Mains supply voltage	100-240 V 50/60Hz AC
Mains supply voltage fluctuations	10% of rated voltage
Overvoltage category	II
Power consumption	250w
Dimensions (W x H x D)	216mm x 246mm x 210mm
Flow range	0.1 - 500ml/min*2
Max. discharge pressure	7 bar(g)
Max. suction pressure	2 bar (g)*1
Max. pump speed	65rpm
Max. temperature of pumped medium	70°C
Max. discharge speed adjustment range	5000:1
Indoor / outdoor use	Indoor - protect from prolonged UV exposure
Wet location, if applicable	N/A
Seal sealing / protects against system pressure / full occlusion	Yes (up to 60 PSI static, 100 PSI dynamic)
IP rating	IP66, NEMA Type 4X
Pollution degree of intended operating environment	PD2
Noise level	<70dB(A) @1m
Weight	8.25kg

Table 5. - Pump specifications

*1 Inlet pressure should not exceed 2 bar(g); increased inlet pressure will result in higher flow rate.

*2 Max flow rate becomes dynamic if flow calibration ratio is not default 1.000

6.2 Materials

6.2.1 Product contact (cartridge)

(in the event of cartridge / tube failure)

Detail	Value
Tube	Verderprene
Ports	PP (Polypropylene)
Connectors	PP
Seals	EPDM (Ethylene Propylene Diene Monomer)

Table 6. - Materials (product contact)


6.2.2 Non-product contact (pump)

Detail	Value
Pump housing	20% GF PPE/PS (Polyphenyl Ether + Polystyrene) Stanyl [®] (rear panel)
Drive shaft	P6 (nylon) (covering SS440C shaft)
Cartridge	20% GF PPE/PS + PA6 + Polypropylene
Screen enclosure	20% GF PPE/PS
Screen guard	Polycarbonate
Keypad	Polyester

Table 7. - Materials (non-product contact)

6.3 Chemical Compatibility

See https://www.verderliquids.com/fileadmin/user_upload/Website_documents_2016/Verderflex/Documents/Documents_EN/Brochures/Verderflex_Chemical_Compatibility_Guide.pdf

 Operation under any other conditions would require approval from the manufacturer, otherwise this may affect the warranty.

6.4 Operating Conditions

6.4.1 Ambient

Detail	Value
Operating temperature range	4-45°C
Humidity	5-95% RH (non-condensing)
Max. altitude	<2000m

Table 8. - Operating conditions


All units/calculations are based on operating conditions below ≤ 2000m. For use above this height please check with manufacturer or local representative for confirmation of performance.



7. Layout and Function

The Verderflex Ds500 is an industrial peristaltic, self-priming pump designed for metering, dosing and transfer (fluid/ chemical) with a focus on accuracy and minimum downtime, at pressures of up to 7 bar(g).

7.1 Design Details

 The medium to be pumped is contained within the tube and additional pipework and is totally contained within the cartridge. A rotor shoe passes along the length of the enclosed tube, compressing it. This motion forces the contents of the tube directly in front of the shoe to move forward along the length of the tube in a 'positive displacement' peristaltic movement. In the wake of the shoe's compressing action, the natural elasticity of the tube material causes the tube to recover and regain its round profile. This creates suction pressure which refills the tube.

7.2 Labelling

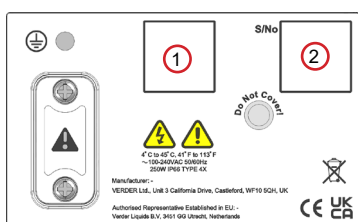


Figure 3. - Rear label

Item	Description
1	Product designation / year of manufacture
2	Serial number

Table 9. - Rear label details

When requesting spares or assistance the model and serial number should always be quoted.

7.3 Layout

7.3.1 Front

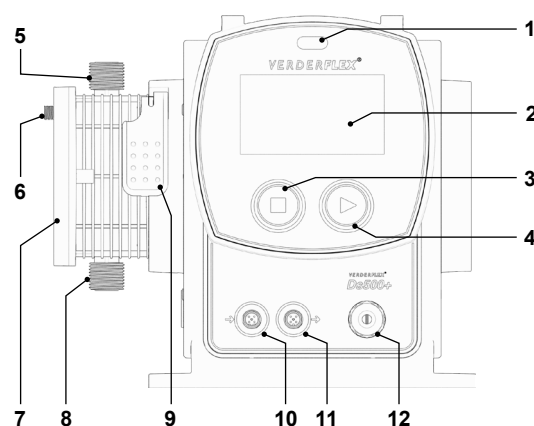


Figure 4. - Ds500+ front

(screen protector removed)

Item	Description	Item	Description
1	LED status indicator	2	HMI (Human Machine Interface)
3	Stop (red)	4	Start (green)
5	Discharge point (out)	6	Breather point
7	Cartridge	8	Suction point (in)
9	Cartridge lock	10	External control input (Ds500+ only)
11	External control output (Ds500+ only)	12	Mains input (pre-fitted)

Table 10. - Layout (front)

LED status indicator

- Red = Stopped
Red flashing = Error/ fault
- Green = Running with no errors
Green flashing = Pump running with Fluid Level Monitor warning threshold reached.
- Purple flashing = Running with active error/fault
- White flashing = Firmware update in progress

HMI

- Presents information to the user about the status of the pump.
- Allows the operator to make selections and adjustments.
- Can be operated by touch or suitable stylus.

Stop

- Press to stop the pump also
- Hold during boot to update firmware from USB device, see 10.3.6.2 Software.



Start

- Press to start the pump also
- Hold during boot to start touch calibration procedure, see 10.1.1 Touch calibration.

Discharge point (out)

- Fluid outlet, M24 threaded connector to be used with tube connection kit (supplied)

Breather point

- Pressure relief in the unlikely event of a hose burst - do not obstruct!
It is recommended that the hosed tail connection is fitted to aid with any fluid capture.

Cartridge

- Replaceable cartridge which facilitates non-contact fluid transfer.

Suction point (in)

- Fluid inlet, M24 threaded connector to be used with tube connection kit (supplied).

Cartridge lock

- Engages and locks the cartridge in position.

External control input

M12, 5 pin, B coded socket

- Digital control: Run/ stop, external contact
- 4-20mA speed control input

External control output

M12, 5 pin, A coded socket

- Digital control: Alarm, pump running conditions
- 4-20mA speed indication output

Mains input

- Pre-fitted mains cable with moulded plug (not user serviceable) for connection to a suitable mains supply 100-240 VAC.

7.3.2 Rear

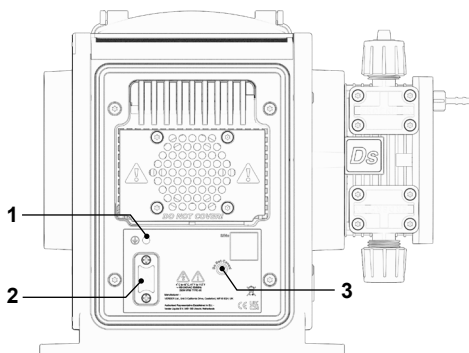


Figure 5. - Ds500 rear

Item	Description	Item	Description
1	PAT connection earth point (M4)	2	USB port
3	IP66 vent		

Table 11. - Layout (rear)



CAUTION

Portable Appliance Test (PAT) connection earth point

- Earth connection used only for testing.

USB port

- Covered USB port for firmware updates.
NOTE: in order to maintain IP integrity, the USB cover must be fitted when the port is not in use.

Vent

- Ensure there is unobstructed free space around the unit so as to maintain optimum air flow and heat dissipation. Ensure recommended ambient temperature is within Verder recommendations - see 6.4.1 Ambient.



8. Installation and Connection



CAUTION

Risk of damage to unit due to unauthorised modification of pump!

- ▶ Unauthorised modification will invalidate the warranty.

Under normal conditions, this pump is self-sealing and self-priming in action. Therefore, valves are not required on the suction or discharge lines.

- ▶ If pumping against a positive pressure, a non-return valve must be installed immediately after the pumps discharge outlet in order to prevent a reverse flow of fluid into the cartridge in the event of tube failure.

8.1 Electrical Installation



CAUTION

Failure to follow safe and proper electrical installation practices may result in pump malfunction or dangerous operation.

- ▶ Make sure the pump is installed correctly.
- ▶ The pump is supplied with a pre-fitted mains lead which may have a fuse fitted (country dependent); in the event of fuse failure, replace with the same fuse rating.
- ▶ Ensure that adequate air flow is maintained around the unit.
- ▶ Do not block the IP66 breather on the rear of the unit.

8.1.1 Checking the ambient conditions

1. Make sure that the operating conditions are as per pump specifications - see 6.4 Operating Conditions
2. Make sure the required ambient conditions are within limits - see 6.4.1 Ambient

8.1.2 Connecting to the mains supply



DANGER

Risk to health in case of electric shock!

Isolate mains supply from the pump before undertaking the installation.

This unit will operate from a mains voltage between 100-240V 50/60Hz AC and must be connected to a single phase, mains electric supply.

1. The pre-fitted (moulded) plug must not be removed.
2. The pump must not be used if there is visible damage to the mains cable or plug.
3. The pump must be positioned so that the isolation point is easily accessible.
4. The mains cable must be free from strain and the pump weight must not be supported by the mains cable.

5. Do not attempt to use the motor shaft or shaft screw for PAT / continuity testing as this may damage the unit.
6. Do not apply current to the motor shaft / shaft screw.

Note

It is recommended that a commercial grade mains voltage surge suppressor is used where there is an increased risk of excessive electrical noise entering the unit.

8.1.3 Protective earthing/ grounding

- ▶ The pump is designed to be permanently earthed and **MUST** be connected as such.
- ▶ By default, the earth connection is made through the earth pin on the mains lead.
- ▶ If the earth connection is removed / not used, EMC compliance cannot be guaranteed.
- ▶ The PAT connection earth point should not be used to permanently connect the pump to earth

Do not use the PAT connection earth point for anything other than PAT / continuity testing!

8.2 Electrical Isolation

1. The mains plug is the disconnection point for the pump and is used for isolation from the mains.
2. The mains plug should therefore be readily accessible in order to use as a disconnection point.
3. To isolate the pump, the mains plug is to be removed from the wall outlet.

8.3 External Control (Ds500+)

Recommended max. cable length between this unit and external connected equipment is 30 metres.



	Input	Output
1 Brown	Run/ stop 5-30VDC, referenced to GND	Digital Output 1 (open collector) User programmable output - see 10.3.7.
2 White	External contact 5-30VDC, referenced to GND. 40-1000ms pulse, 5-24VDC. Use with a normally open switch for manual dosing or a PLC output for automation.	Digital Output 2 (open collector) User programmable output - see 10.3.7.
3 Blue	4-20mA speed / flow control input 120Ω input impedance. Max current 40mA. Referenced to GND, polarity protected.	4-20mA speed / flow indication output Current source output referenced to GND. Requires a load resistance 100 to 330Ω for optimal results. Use a >100Ω resistor if using with a DVM.
4 Black	GND (0V)	GND (0V)
5 Grey	Reserved for future use. 5-30VDC, referenced to GND.	Supply Protected 5V output. Can supply up to 20mA. Can be used with a resistor to set Run/Stop or external contact inputs high or can supply low current loads connected to either digital output.

Table 12. - External control pinout

Colour refers to typical wire colour in readily available leads. Please confirm these colours before connection as there is no guarantee all manufacturers will follow this convention.



CAUTION

Do not connect multiple units in series; if pumps are to be *daisy chained* then use the 'Input Matched' function - see 10.3.7 I/O settings (Ds500+ only).

See Section 16. Ds500+ external connections for wiring example.

8.4 Fitting the Cartridge

NOTE: If the unit is already powered on - refer to 10.3.3 Cartridge information.

1. Lift the cartridge lock, as shown.
2. Insert the cartridge offset by 20°, as shown:

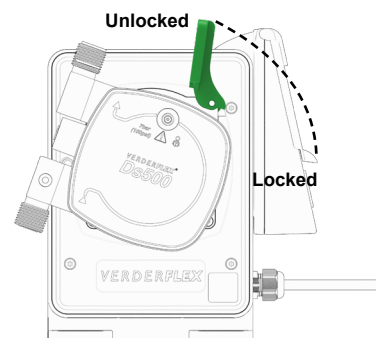


Figure 6. - Fitting a cartridge

3. Rotate the cartridge 20°CCW so that it 'snaps' into position.
4. Push the cartridge lever down to secure the cartridge.

8.5 Connections to the Cartridge

Ensure the tube to be connected is prepared with a square end. In the following order, place on to the tube:

1. Port sealing nut
2. Clamp ring (observe correct orientation)
3. Tube fitting
4. O-ring

NOTE: Max internal diameter of connecting tubes: 10mm.

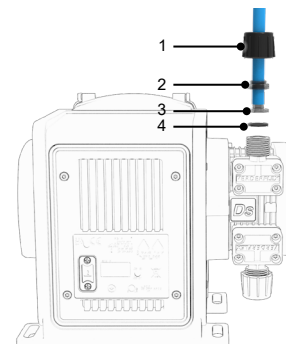
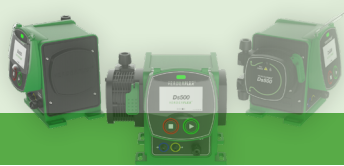


Figure 7. - Cartridge connections

8.5.1 Removing the cartridge

Refer to Section 10.3.3 for correct procedure and to retain cartridge data.



9. Operation

9.1 Pre-commissioning the Pump

Making the pump ready for use. Ensure the following:

- Installation and connection is complete (Section 8. Installation and Connection)
- Pipework is orientated correctly (discharge on top, inlet on bottom)
- Cartridge fitted and locked in place.
- Unit connected to mains outlet.

9.2 Starting the Pump For the First Time

When the pump is first installed, or after a factory reset, the unit will boot and request the user to:

1. Perform a screen calibration
2. Select a language

The pump will use the following (default) following parameters:

- Flow rate – 32 RPM
- Manual mode - On (Ds500+ only)
- Flow calibration offset ratio – 1.000
- Auto Restart – Off
- Fluid Level Monitor – Off
- Screen Lock - Disabled
- System PIN code - 1111 (also used for Factory Reset)
- Wi-Fi - Disabled

Press  to start the pump.

9.3 Stopping the Pump

Press  to stop the pump.

More information on screen calibration, language selection, parameter adjust, etc. can be found in Section 10. Navigating the Screens.



10. Navigating the Screens

10.1 First Time Power On

The unit has been factory reset before shipping. The following steps are required before normal usage can begin.

10.1.1 Touch calibration

In order for the screen to correctly respond to touch it requires calibration. If the unit is powered on for the first time, factory reset or manually initiated, the following screen will be displayed:

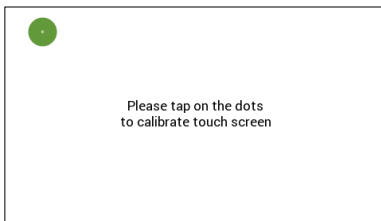


Figure 8. - Touch calibration

Touch the green dot when requested; the location of the dot will change.

Upon successful touch calibration the following screen is displayed:

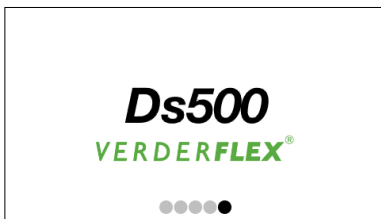


Figure 9. - Boot screen

During this time the unit will perform background system checks. Identified errors will be displayed on the main screen along with the current firmware version. For a list of error codes and their causes, see 12.2 Error Codes.

Once initial setup is complete, this will be the loading screen for the next time the unit is power cycled.

NOTE: Touch calibration can be performed at any time by holding the Start button and power cycling the unit.

10.1.2 Language select

Select the correct language for your country of operation:



Figure 10. - Language select

Confirm the selection:



Figure 11. - Language confirm

Once initial setup is complete, the *Operating screen* becomes available:

10.2 Operating Screen (home)

10.2.1 Manual mode (Ds500 default)

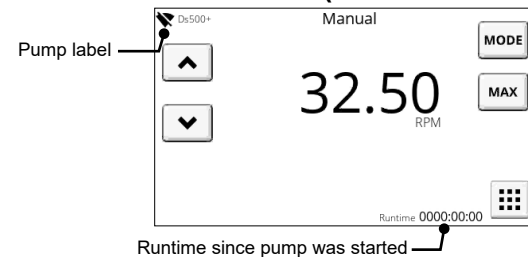


Figure 12. - Operating screen (Manual)







Symbol	Description
	Increase/ decrease UoM (Unit of Measurement) (hold to increase adjustment speed). For large adjustments, press the numerical value to be adjusted; a keypad will appear for numeric entry. Clear the current entry (C) and enter required value.
	Wifi connection status and pump name (currently showing as wifi disabled).
	Screen lock (status, lock, unlocked). Only available if enabled in Security Settings.
	Press to toggle between Manual, 4-20mA, Contact mode.
	Press and hold to operate pump at maximum flow rate - useful for priming. Note: Duration of flow can be set from 0-90s - see 10.3.2 Pump settings.
	Press to access main menu.
Pump label	Name of this unit to distinguish it from others (see 10.3.6 Pump information to change).

Table 13. - Operating screen symbols



10.2.2 4-20mA mode (Ds500+)

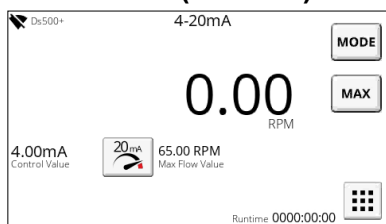


Figure 13. - Operating screen (4-20mA)

This screen provides an overview of the unit when in 4-20mA mode.

Control value indicates the realtime current being detected on the external control input (front panel).

To set the parameters for this mode, see 10.3.1.1 4-20mA Calibration.

Symbol	Description
	Press to toggle between Manual, 4-20mA, Contact mode.
	Press to set the maximum flow rate when 20mA is present on the external control input.
	Press and hold to operate pump at maximum flow rate - useful for priming. Note: Duration of flow can be set from 0-90s - see 10.3.2 Pump settings.

10.2.3 Contact mode (Ds500+)

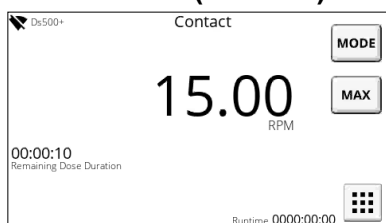


Figure 14. - Operating screen (Contact mode)

This screen provides an overview of the unit when in Contact mode.

Remaining Dose Duration indicates the remaining dose duration since the last contact pulse was received.

NOTE: It is normal to see this value increase when a control signal is received by the unit.

To set the parameters for this mode, see 10.3.1.2 Contact.

Symbol	Description
	Press to toggle between Manual, 4-20mA, Contact mode.
	Press and hold to operate pump at maximum flow rate - useful for priming. Note: Duration of flow can be set from 0-90s - see 10.3.2 Pump settings.

10.3 Main Menu

From this screen the operator can access other sub-menus:

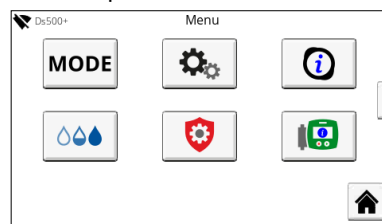


Figure 15. - Main menu

Symbol	Description
	Operational mode
	Pump settings
	Cartridge information
	Fluid level monitor
	Security settings
	Pump information
	Press to return to the home screen at any time
	Next page (swipe right to left) (Ds500+ model only)
	I/O settings (Ds500+ model only)
	Go to previous screen

Table 14. - Main menu symbols

10.3.1 Operational mode

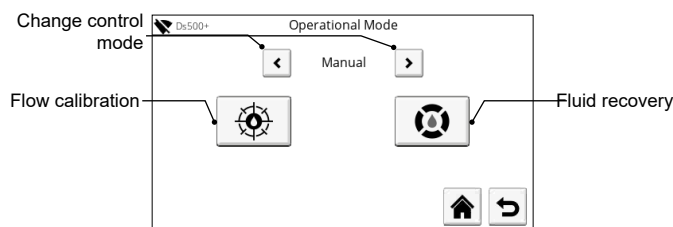
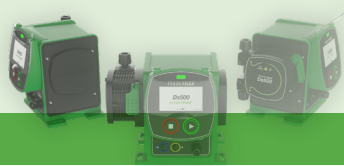


Figure 16. - Operational mode

Available control modes:

- Manual (default mode)
- 4-20mA (Ds500+ only)
- Contact (Ds500+ only)

NOTE: The pump will not start when in 4-20mA or contact mode if there is a cartridge issue. This is to prevent unintentional



operation when remotely controlled. Manual operation is still possible with a confirmation dialogue.

10.3.1.1 4-20mA Calibration

External control signals can be used to control the flow of the unit. To do so, calibration must be performed:

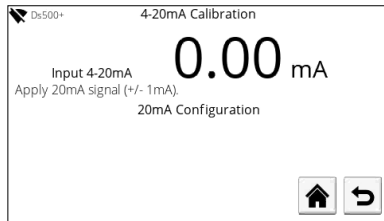


Figure 17. - 4-20mA Calibration (1)

The above screen is awaiting a 20mA input signal (± 1 mA). Once 20mA is reached, confirmation is required:

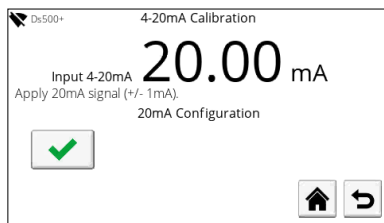


Figure 18. - 4-20mA Calibration (2)

At this point, 20mA can be set to suit the application, e.g., 20mA = 65 rpm:

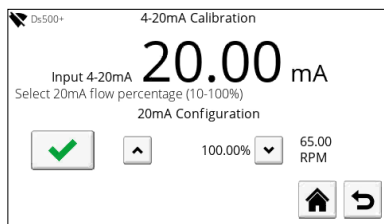


Figure 19. - 4-20mA Calibration (3)

The same procedure needs applying to the 4mA input signal:

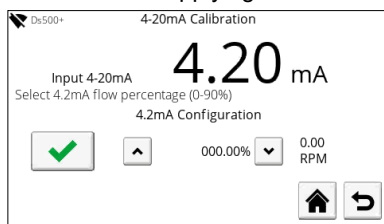


Figure 20. - 4-20mA Calibration (4)

At this point, 4mA can be set to suit the application, e.g., 4mA = 0 rpm.

Once calibration is complete, the speed can be set proportionally by the external control signal.

10.3.1.2 Contact

Contact mode is used to deliver a predefined dose based on a received pulse (required pulse width 40ms - 1000ms with >1 second gap between pulse):

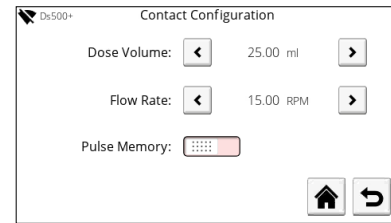


Figure 21. - Contact Configuration

Dose Volume: Adjust range 000.01 - 999.99ml

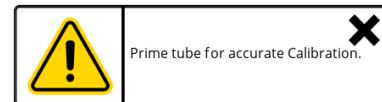
Flow Rate: Adjustable range 000.01 - 65rpm

Pulse Memory: Enable to queue doses; if the unit is dosing whilst a pulse is received, another dose will be added to the queue.

10.3.1.3 Flow calibration

Calibration is essential in order to ensure accurate and consistent flow rate delivery.

Upon entering the flow calibration screen a popup will appear:



This is advice only so that the benefits of calibration are realised.

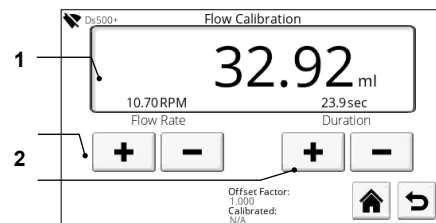


Figure 22. - Flow Calibration

1. Enter the volume to be delivered in order for calibration to be performed.
2. Set the flow rate OR the duration for which the above specified volume will be delivered.
3. Press the Start button; the specified volume will be delivered and the following screen will be displayed:

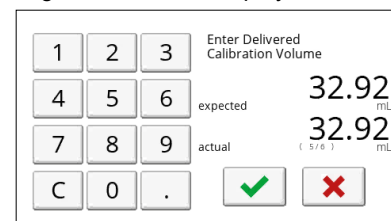


Figure 23. - Calibration delivery volume

4. Enter the actual delivered volume so that the offset ratio can be calculated. The offset ratio will be displayed on screen:

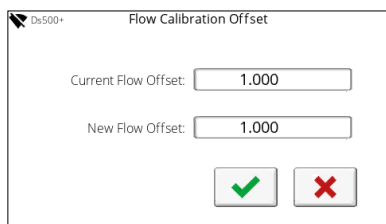


Figure 24. - Flow Calibration Offset

The user can confirm or reject this new flow offset; if the offset is rejected, the previous offset will be retained. Offset range: 0.1 to 10.0

NOTE: Accuracy is further improved by increasing the calibration volume.

10.3.1.4 Fluid recovery



CAUTION

Ensure the system, to which the unit is connected, is compatible with reverse flow!

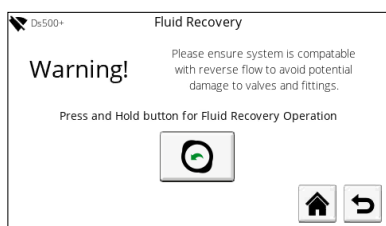


Figure 25. - Fluid recovery

This allows the user to recover fluid by operating the pump in reverse for as long as the button is pressed.

10.3.2 Pump settings

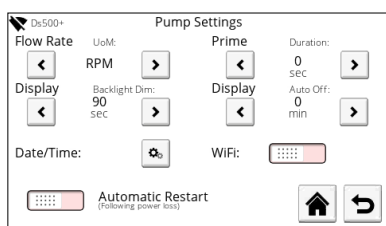


Figure 26. - Pump Settings

From this screen the following parameters can be adjusted:

- **Flow rate**
Choose the Unit of Measurement (ml/min, ml/hr, ltr/min, ltr/hr, ltr/day, USG/h, USG/d, oz/min, RPM, %)
- **Prime duration**
Duration adjust for Max (prime) function (value of 0 = disabled, max. 90 seconds).
- **Display**
Backlight dim - Adjust the time before the backlight dims.
Display auto off - Adjust the time before the display

switches off.

- **Date/Time**
Adjust the date and time.
- **Wifi**
Once enabled, press to go to wifi settings screen.
- **Automatic restart**
Unit will automatically restart if the motor was running at the time of power loss.

10.3.2.1 Date/Time



From this screen the date and time can be adjusted:

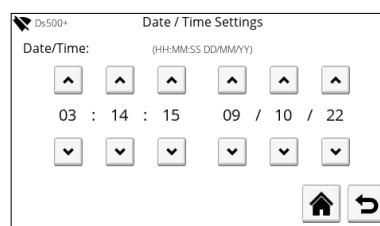


Figure 27. - Date / Time Settings

Internal battery backup ensures that minimal date and time adjustments are required.

10.3.2.2 Wifi



This screen allows the operator to connect to a wifi access point:

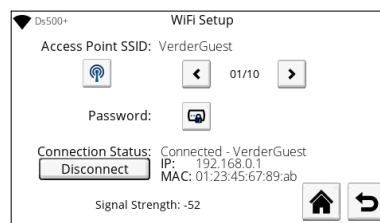


Figure 28. - Wifi Setup

Note: wifi needs to be enabled from the pump settings screen.

Symbol	Description
	Press to start scanning for available wireless networks
	Wireless SSID selection buttons
	Press to enter the password to connect to the selected SSID.
	Press to connect to the selected SSID.

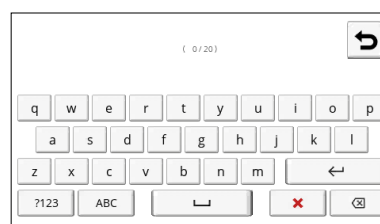


Figure 29. - Popup keyboard for wifi password entry



10.3.2.3 Unable to connect / signal strength

Under normal conditions (no connection issues) the screen will report the *signal strength*; the greater the value, the stronger the signal will be (-50 will be stronger than -100). If there is an issue with the connection, *unable to connect* will be shown in place of signal strength.

Press to confirm that a new cartridge has been fitted; the Cartridge Information counters will be reset while a pop-up informs of cartridge initialisation.



or

Press to decline so that the counters are not reset.



10.3.3 Cartridge information

This screen provides information about the cartridge and facilitates replacement:

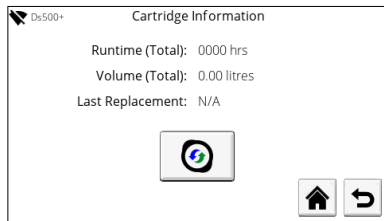


Figure 30. - Cartridge Information

10.3.4 Fluid level monitor

This screen allows the operator to set the fluid level monitor parameters:

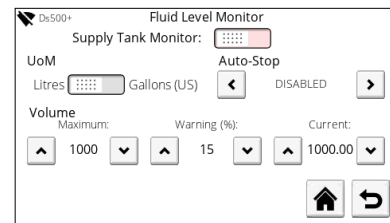
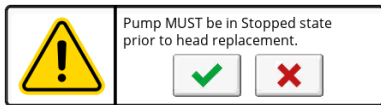


Figure 31. - Fluid Level Monitor

Press to stop the unit so that the cartridge can be replaced.



A popup will appear to warn the operator that the pump must be in a stopped state. Press accept to stop the pump:



With the pump stopped, the motor is disengaged and the cartridge can now be removed:

10.3.4.1 Supply tank monitor

Use the toggle switch to enable/ disable the data reported on the main screen.

10.3.4.2 UoM

Press to toggle between Litres and Gallons(US).

10.3.4.3 Auto-Stop

Change the triggers which cause the unit to automatically stop; Disabled, On warning, On empty.

The following parameters are used to calculate remaining fluid.

10.3.4.4 Maximum

Use the up/down buttons to set the maximum capacity of the tank you are drawing from.

10.3.4.5 Warning

Set the value(%) at which the main screen warning should appear.

NOTE: The pump will not stop automatically when 0% is reached.

10.3.4.6 Current

Set the value of what is currently in the tank.



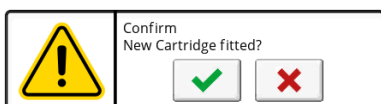
Always use PPE (eye protection and clothing) if hazardous fluids have been pumped.

1. Drain the system.
2. Safely release any pressure in the pipework.
3. Release the port sealing nuts and remove the tubes whilst ensuring that fluid does not spill out.
4. Release the cartridge lock.
5. Rotate the cartridge 20° CW and remove.
6. Safely and responsibly dispose of the cartridge. Check your local disposal guidelines, particularly when hazardous fluids have been used.

Press to confirm that the cartridge has been replaced



A popup will appear to confirm that a new cartridge has been fitted:





10.3.5 Security settings

This screen allows for a screen lock to be enabled/ disabled, adjustment of time before the screen lock activates and whether a PIN code should be entered to unlock the screen:

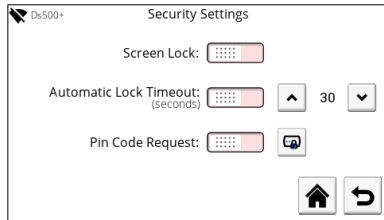


Figure 32. - Security Settings

- **Screen lock**
If enabled, the Operating screen can be manually locked / unlocked.
- **Automatic lock timeout:**
Adjust delay before the screen automatically locks.
- **Pin Code Request:**
Enable/ disable pin entry to unlock screen.

Change system PIN code



Press to change the pin code; a popup numeric keypad will be displayed where the operator will be required to enter the current PIN code (default 1111):

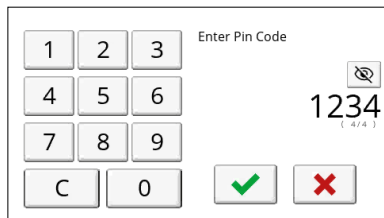


Figure 33. - PIN code entry

Now a new PIN code can be entered.
Re-enter the PIN code then accept to continue.

10.3.6 Pump information

This screen displays information about the pump and allows configuration of Pump Label and Language along with access to the Diagnostics, Software and Factory Reset screens:

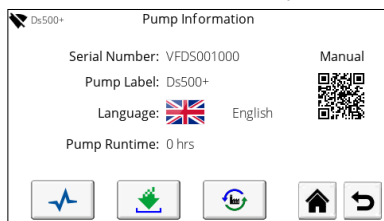


Figure 34. - Pump Information

10.3.6.1 Diagnostics

This screen shows a log of all errors and warnings since the last factory reset:

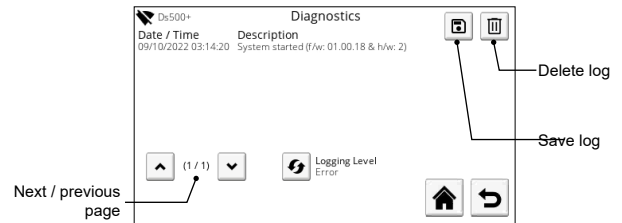



Figure 35. - Diagnostics

The information can be filtered by type; *Errors* - Errors, Warnings - *Errors, Warnings Info* by pressing the  button.

This log can also be transferred to a connected USB storage device as a CSV file.

The log can be deleted to aid on-screen viewing (log is retained in memory).

10.3.6.2 Software

Use this screen to update the software/firmware of the pump by following the on-screen instructions:

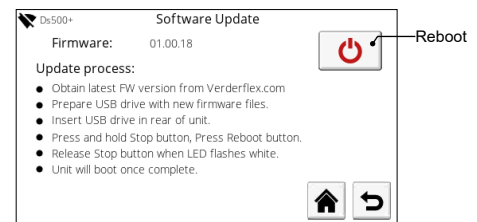


Figure 36. - Software Update

NOTE: The firmware files must be stored in the root directory of a FAT32 format USB removable device.

10.3.6.3 Factory Reset

Use this screen to perform a factory reset of the unit:

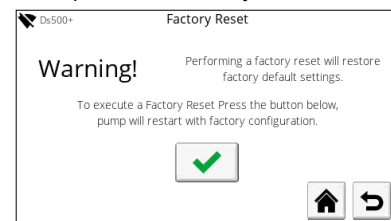
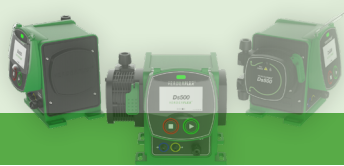


Figure 37. - Factory Reset

PIN entry required to confirm factory reset (default 1111).
Warning - ALL settings will be deleted and the defaults will be restored.



10.3.7 I/O settings (Ds500+ only)

This screen provides the options for configuring the external control Input / Output signals:

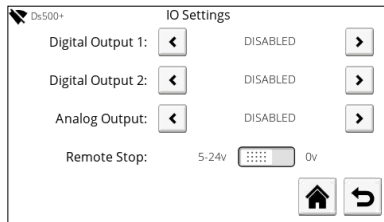


Figure 38. - I/O Settings

10.3.7.1 Digital Output 1

Disabled, Run Status, General Alarm, Fluid Level Low Alarm, Cartridge Issue

10.3.7.2 Digital Output 2

As above

10.3.7.3 Analog Output

Input Matched

Current present on the input pin will also be present on the output pin, e.g., 4mA input = 4mA output.

Can be used for *daisy chaining* units.

Full Scale

4-20mA output derived from current motor speed, e.g.,

0 rpm motor speed = 4mA output

65rpm motor speed = 20mA output

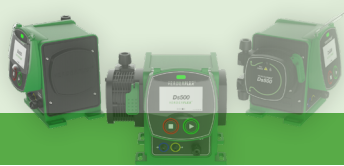
10.3.7.4 Remote Stop

Used to set the voltage on the Remote Stop input which triggers a *stop*.

The 'Supply' output can be used with this pin or an external voltage (e.g., 5-24V from a PLC) can be used.

If 5-24V is selected, the pump will run when the run/stop input is connected to the GND/0V and stop when connected to the positive voltage.

If 0V is selected, connect the run/stop to GND/0V to stop the pump. To start the pump it should be connected to a positive voltage.



11. Inspection, Maintenance and After Sales



DANGER

Risk of injury if pump is running or parts are hot!

- ▶ Do not carry out any repair/maintenance work when the pump is running.
- ▶ Follow the safety procedures applicable to the product being pumped. If the tube has failed the cartridge may be contaminated and/or be pressurized.
- ▶ Appropriate measures must be taken to relieve any pressure build up.
- ▶ Decontaminate before handling as per local safety regulations.

11.1 Inspection



The inspection intervals depend on the usage of the pump.

1. Check at appropriate intervals:
 - Normal operating conditions are unchanged
2. For trouble-free operation, always check the following:
 - No leaks
 - No unusual running noises or vibrations

11.2 Maintenance



These pumps are generally maintenance free and any work should normally be limited to periodic visual inspections and cleaning; these may be more frequent in dusty and/or hot conditions.

Establish a suitable cartridge replacement schedule to prevent unscheduled downtime.

The Ds500 contains no user serviceable parts and factory sealed for integrity. The warranty will be invalidated if the seal is broken.

11.2.1 Recommended cleaning procedure

Gently wipe the screen and pump housing with 70% IPA (Isopropanol / Propan-2-ol) solution applied on a clean, lint free cloth and allow to evaporate in a well ventilated area. Accumulated dirt may require more than one application to remove.



11.2.2 Maintenance schedule

Task	Frequency	Action
Check pump and cartridge for leaks and damage	<ul style="list-style-type: none"> – Before pump start up – Daily visual inspection – Scheduled intervals during operation 	<ul style="list-style-type: none"> ▶ Check cartridge connections for any leaks ▶ Clean up any spillage.
Check pump for unusual temperatures or noise in operation	<ul style="list-style-type: none"> – Daily visual inspection – Scheduled intervals during operation 	<ul style="list-style-type: none"> ▶ Check pump for damage. ▶ Replace cartridge if required.

Table 15. - Maintenance schedule

11.3 After Sales

There are no user serviceable parts inside the pump. Repairs can only be carried out by the manufacturer or authorised service centre.

11.3.1 Returning the pump to the service centre

Obtain prior authorisation and returns advice number (for tracking purposes) before return of the pump.


For returns, please contact customer.services@verderflex.com.
Verder Ltd. are not liable for the cost of transportation.

All Ds500 cartridges are excluded.

Ensure that:

- Pump has cooled down
- Cartridge removed
- Pump is decontaminated

11.3.2 Ordering spare parts

 For trouble-free replacement in the event of a fault, it is recommended to keep a stock of spare parts. For a current list of spare parts, please contact: sales@verder.co.uk.

The following information is mandatory when ordering spare parts:

- Pump model
- Year of manufacture
- Part number and description of required part
- Serial number
- Quantity



12. Troubleshooting

12.1 Pump Malfunctions

If malfunctions occur which are not specified in the following table or cannot be traced back to the specified causes, please consult the manufacturer.

Possible malfunctions are identified and respective cause and remedy are listed in the table.

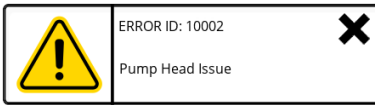
Problem	Cause	Solution
Low flow / low discharge pressure	Excessive back pressure.	Reduce discharge pressure to within working parameters. Increase external pipework diameter.
	Blockage in the line.	Check for blockage and remove.
	Pump not calibrated to specific application.	Perform the calibration procedure.
Premature cartridge failure	Excessive back pressure causing backflow.	Reduce discharge pressure to within working parameters. Increase external pipework diameter.
	Excessive temperature of pumped medium.	Reduce temperature of medium.
Flow rate inaccurate	Pump not calibrated to specific application	Perform the calibration procedure.
Excessive noise	Pulsation due to excessive discharge pressure.	Reduce discharge pressure to within working parameters. Increase external pipework diameter.
		Check pipework dimensions. Eliminate small radius bends.
Pump won't start	Pump head issue when in 4-20mA or contact mode (remote control).	Address pump head issue. Enable alarm output to show fault status.

Table 16. - Troubleshooting



12.2 Error Codes

On screen error codes provide useful information in the event of an error:



Error ID	Message	Solution
10002	Pump Head Issue	<ul style="list-style-type: none"> • Make sure cartridge is properly and securely fixed. • Replace the cartridge if burst has been identified.
11500	Internal Memory Error	<ul style="list-style-type: none"> • Power cycle the unit
11501	External Memory Error	<ul style="list-style-type: none"> • Power cycle the unit
12008	Motor Failure	<ul style="list-style-type: none"> • Power cycle the unit - if problem persists, contact Verder for technical support.
12016	Motor Failure	<ul style="list-style-type: none"> • Power cycle the unit. • Remove the cartridge (see 10.3.3 Cartridge information) and confirm if the pump resumes normal operation. If yes - install the same cartridge to see if normal operation resumes. If no - fit a new cartridge and re-check if normal operation resumes. • If unit has been running for a prolonged period, stop the motor before re-energising it.
12702	Fluid Low	<ul style="list-style-type: none"> • Check fluid level or re-adjust the warning% - see 10.3.4 Fluid level monitor.

Table 17. - Error codes



13. Disposal

With prolonged use, parts of the pump may become contaminated by hazardous pumped liquids to such an extent that cleaning may be insufficient.



WARNING

Risk of poisoning and environmental damage due to surface contaminants!

Prior to disposal of the pump:

- Collect and dispose of any leaking pumped liquid in accordance with local regulations.
- Neutralise residues of pumped liquid in the pump.
- Dispose of the pump and associated parts in accordance with local regulations.

14. Recycling

Before disposing of any parts, please adhere to your local WEEE regulations and guidelines. More information can be obtained by contacting your Verder distributor or by emailing: customer.services@verderflex.com.



15. List of Tables & Figures

List of tables

Table 1. - Target groups	7
Table 2. - Warnings used in this manual	7
Table 3. - Symbols used in this manual	8
Table 4. - Box contents	10
Table 5. - Pump specifications	12
Table 6. - Materials (product contact)	12
Table 7. - Materials (non-product contact)	12
Table 8. - Operating conditions	12
Table 9. - Rear label details	13
Table 10. - Layout (front)	13
Table 11. - Layout (rear)	14
Table 12. - External control pinout	16
Table 13. - Operating screen symbols	18
Table 14. - Main menu symbols	19
Table 15. - Maintenance schedule	26
Table 16. - Troubleshooting	27
Table 17. - Error codes	28
Table 18. - Document history	32

List of figures

Figure 1. - Box contents	10	Figure 20. - 4-20mA Calibration (4)	20
Figure 2. - Lifting	10	Figure 21. - Contact Configuration	20
Figure 3. - Rear label	13	Figure 22. - Flow Calibration	20
Figure 4. - Ds500+ front	13	Figure 23. - Calibration delivery volume	20
Figure 5. - Ds500 rear	14	Figure 24. - Flow Calibration Offset	21
Figure 6. - Fitting a cartridge	16	Figure 25. - Fluid recovery	21
Figure 7. - Cartridge connections	16	Figure 26. - Pump Settings	21
Figure 8. - Touch calibration	18	Figure 27. - Date / Time Settings	21
Figure 9. - Boot screen	18	Figure 28. - Wifi Setup	21
Figure 10. - Language select	18	Figure 29. - Popup keyboard for wifi password entry	21
Figure 11. - Language confirm	18	Figure 30. - Cartridge Information	22
Figure 12. - Operating screen (Manual)	18	Figure 31. - Fluid Level Monitor	22
Figure 13. - Operating screen (4-20mA)	19	Figure 32. - Security Settings	23
Figure 14. - Operating screen (Contact mode)	19	Figure 33. - PIN code entry	23
Figure 15. - Main menu	19	Figure 34. - Pump Information	23
Figure 16. - Operational mode	19	Figure 35. - Diagnostics	23
Figure 17. - 4-20mA Calibration (1)	20	Figure 36. - Software Update	23
Figure 18. - 4-20mA Calibration (2)	20	Figure 37. - Factory Reset	23
Figure 19. - 4-20mA Calibration (3)	20	Figure 38. - I/O Settings	24



17. Trademarks

VERDERFLEX® is a registered trademark of Verder Liquids B.V. No permission is granted to use any Verder trademarks or trade names included in this document without the prior written agreement of Verder Liquids B.V.

Tri-clamp® is a registered trademark of Alfa Laval Corporate AB.

Hypalon® is a registered trademark of RSCC Wire & Cable LLC.

18. Document History

Version	Description	Date	Approved
00	INITIAL RELEASE	13/10/22	CT
01	Updated inline with FW 01.00.18	19/07/23	CT

Table 18. - Document history