Operation Manual (EN)

Original version of the operation manual

LP500 Series Laboratory Peristaltic Pumps

Models:

5501-01

5502-01

Americas

Gardner Denver Thomas Inc.

500 Bond St

Lincolnshire, IL 60069

USA

Phone: +1 (847) - 676 - 8800

E-mail: welch.na@irco.com

www.welchvacuum.com

EMEA

Gardner Denver Thomas GmbH

Am Vogelherd 20

98693 Ilmenau

Germany

Phone: +49 3677 6040

E-mail: welch.emea@irco.com

www.welchvacuum.de

Asia Pacific

Welch Vacuum Equipment (Shanghai) Co, Ltd.

Room 2206, 22nd Floor, Qiangsheng Mansion, No. 145 Pujian Road, Pudong New District

Shanghai, 200127

China

Phone: +86 21 51860238

E-mail: www.welch.as@irco.com

Revision	Description
A	Initial Release

Contents

Section 0: EU Declaration of Conformity

Original declaration (English)

Gardner Denver TCAT
1536 N 18th St
Sheboygan, WI 53081
USA

We hereby declare that we are responsible for the following product and due to its design and construction, and the documents which we have placed on the market, comply with the EU directives and standards listed below. In the event of a product modification to which we have not agreed, this declaration shall lose its validity.

Product description

Product Line:	LP 500 Series
Models / Article no.	5501-01 / LP500-L
	5502-01 / LP500-H

The product complies with the following directives and standards:

2006/42/EC	EN 61010-1:2010+AMD1:2016
2011/65/EU	EN IEC 63000:2018
2014/30/EU	EN 61326-1:2013
	EN IEC 61000-3-2:2019
	EN IEC 61000-3-3:2013+A1:2019

Person authorized to sign this declaration on behalf of the manufacturer:

Place, date: Ilmenau, 09.12.2025

Tobias Kraft
Plant manager

Person established in the European Union authorized to compile the technical file:

Gardner Denver Thomas GmbH
Am Vogelherd 20
98693 Ilmenau
Germany

+49 3677 604 0
+49 3677 604 131
welch.emea@irco.com
www.welchvacuum.com

Section 1: Introduction to Peristaltic Pumps

Peristaltic pumps are a safe and reliable fluid transmission pump. They contain no valves or seals that corrode. Fluids only make contact with the inner wall of the tubing, so there is no risk of contamination from the pump. Peristaltic pumps are a dry pump technology.

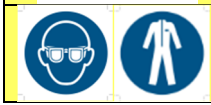
1.1 - How Peristaltic Pumps Work

Compressible tubing is squeezed between a roller and a track. This track is on the arc of a circle. A seal is created at the point of contact between the roller and the track. As the roller advances the tubing along, the seal advances too. After the roller has passed, the tubing returns to its original shape. This creates a small vacuum that is filled with fluid drawn in from the inlet port.

Before the roller reaches the end of the track, another roller compresses the tube at the start of the track. This isolates a pocket of fluid between the two compression points. As the first roller leaves the track, the next roller continues to advance. This expels the pocket of fluid through the pump's outlet port. A new vacuum pocket is formed by the second roller into which more fluid is drawn in. There is no backflow or siphoning. The pump effectively seals the tube when inactive. No valves are necessary.

Section 2: Safety Notes

Please read the manual carefully before operation

	**Warning: Keep fingers away from moving parts**
	**Warning: Use caution when operating**
	**Warning: Surfaces may be hot**
	**Warning: Electric shock hazard**
	**Warning: To prevent overheating and risk of fire, use only the supplied power cord or a power cord rated to this device's power requirements. Reference *Table 1.***
	**There is a replaceable fuse in the power receptacle. If replacing the fuse, please use the same specs as the original fuse. Reference *Table 1*.**
	**There are no user-serviceable parts inside the pump. Do not open the pump enclosure.**
	**Please recycle this product**
	**Warning: Please use personal protective equipment (PPE) when operating this product**

Danger

	**Please use a compatible power supply as outlined on the nameplate, otherwise equipment may be damaged.**
	**Do not disassemble the enclosure or modify the equipment, it may cause malfunctions or electric shocks.**
	**When installing and removing pump tubing, please turn off the power. Do not touch a rotating head/roller. Fingers and loose clothing may get caught in the rotating mechanism.**
	**When installing and removing external control devices, please turn off power to prevent electric shocks or damage to equipment.**
	**The grounding plug must be used at all times, otherwise there is a risk of electric shock, electromagnetic interference, or induced static electricity.**
	**If this pump is used to transfer dangerous liquids, special operating procedures must be developed. Precautions to prevent harm or injury must be taken. Wear PPE when operating this device.**
	**This product is not explosion-proof and should NOT be used in an explosive environment.**

Warnings

	**Before using, please confirm that the liquid being transferred will not chemically react with the tubing or pump head. Failure to do so may result in damaged tubing or pump head. If you are not sure, please contact us.**
	**The tube is a wearable component, please check it regularly. We are not responsible for loss or damage due to the leakage from tubing.**
	**Please read warranty carefully. If this product is damaged outside the scope of the normal warranty, we are not responsible for said damage.**
	**If the pump was running before a power outage or interruption, the pump will automatically turn back on when power is restored.**
	**Turn the pump off and unplug the unit before installing or uninstalling the pump head**
	**In the event the coin cell battery inside the unit fails, it should be replaced by a qualified technician.**

Veuillez lire attentivement le manuel avant d'utiliser l'appareil

	**Avertissement : Tenir les doigts à l'écart des pièces mobiles**
	**Avertissement : Faites preuve de prudence lors de l'utilisation**
	**Avertissement : Les surfaces peuvent être chaudes**
	**Avertissement : Risque de choc électrique**
	**Avertissement : pour éviter toute surchauffe et tout risque d'incendie, utilisez uniquement le cordon d'alimentation fourni ou un cordon d'alimentation adapté aux exigences d'alimentation de cet appareil. Reportez-vous au tableau 1.**
	**Il y a un fusible remplaçable dans la prise d'alimentation. Si vous remplacez le fusible, veuillez utiliser un fusible présentant les mêmes caractéristiques que le fusible d'origine. Reportez-vous au tableau 1.**
	**La pompe ne contient aucune pièce réparable par l'utilisateur. N'ouvrez pas le boîtier de la pompe.**
	**Veuillez recycler ce produit**
	**Avertissement : Veuillez utiliser un équipement de protection individuelle (EPI) lorsque vous utilisez ce produit**

Danger

	**Veuillez utiliser une alimentation compatible conforme aux indications sur la plaque signalétique, sinon l'équipement risque d'être endommagé.**
	**Ne démontez pas le boîtier et ne modifiez pas l'équipement, cela pourrait entraîner des dysfonctionnements ou des chocs électriques.**
	**Lors de l'installation et du démontage des tubes de la pompe, veuillez éteindre l'appareil. Ne pas toucher une tête/un rouleau en rotation. Les doigts et les vêtements amples peuvent se coincer dans le mécanisme en rotation.**
	**Lors de l'installation et du démontage des dispositifs de contrôle externes, coupez l'alimentation électrique afin d'éviter les chocs électriques ou les dommages à l'équipement.**
	**La fiche de mise à la terre doit être utilisée en permanence, sinon il y a un risque de choc électrique, d'interférence électromagnétique ou d'électricité statique induite.**
	**Si cette pompe est utilisée pour transférer des liquides dangereux, des procédures d'exploitation spéciales doivent être mises au point. Des précautions doivent être prises pour éviter les dommages ou les blessures. Portez un EPI lorsque vous utilisez cet appareil.**
	**Ce produit ne résiste pas aux explosions et ne doit PAS être utilisé dans un environnement explosif.**

AVERTISSEMENT !

	**Avant de l'utiliser, veuillez vous assurer que le liquide transféré ne réagira pas chimiquement avec le tuyau ou la tête de pompe. Dans le cas contraire, le tube ou la tête de pompe risquent d'être endommagés. En cas de doute, veuillez nous contacter.**
	**Le tube est un composant qui s'use, veuillez le vérifier régulièrement. Nous ne sommes pas responsables des pertes ou des dommages dus à une fuite du tube.**
	**Veuillez lire attentivement la garantie. Si ce produit est endommagé en dehors du cadre de la garantie normale, nous ne sommes pas responsables de ces dommages.**
	**Si la pompe était en marche avant une panne ou une interruption de courant, elle se remettra automatiquement en marche dès que le courant sera rétabli.**
	**Veuillez consulter le manuel de la tête de pompe pour installer et utiliser la tête de pompe en toute sécurité**
	**En cas de défaillance de la pile bouton située à l'intérieur de l'appareil, celle-ci doit être remplacée par un technicien qualifié.**

2.1 – Appropriate Use

To properly operate the LP500 series peristaltic pumps, please ensure the following:

1. The operator has read the user's manual.
2. The pump head is checked to be securely fasted to the pump drive.
3. The pump is set up on a level and stable surface, 8" (20cm) clear from any obstacles.
4. Supported tubing is used in the pump.

2.2 – Use Contrary to Intended Purpose

The following shall be considered as use contrary to the intended purpose:

1. Applications that do not correspond to the intended use (see Chapter 2.1 Appropriate Use)
2. Use outside the specifications stated:
    a. in the technical data.
    b. on the nameplate.
    c. in the conditions set out in the delivery contract.
3. Operation in an unsound technical condition.
4. Outdoor operation.
5. Verify that the detachable MAINS power cord has adequate ratings for use with this equipment.

2.3 – Foreseeable Misuse

The following are potential forms of misuse. AVOID THESE RISKS WHEN OPERATING THE LP500 PERISTALTIC PUMPS:

1. Do not operate the pump before reading the user's manual.
2. Do not operate the pump on uneven or unstable surfaces.
3. Do not use unsupported tubing in the pump.
4. Do not pump liquids that are incompatible with the tubing being used.
5. Check your tubing for excessive wear or breaks before each use.

2.4– Target Groups

The Welch LP500 series peristaltic pumps are meant for laboratory use. See section 3.1 – Applications for possible target applications. Contact Welch for questions regarding your application.

2.5 – Qualification and Training of Personnel

The personnel operating the LP500 Series peristaltic pumps should read the user's manual and be trained before operating this device. Operators should always use proper personal protective equipment. Operators should be familiar with safety procedures of the lab they are operating in.

2.6 – Safe Operation, Electrical Safety, and Responsibilities

To operate your pump safely, set it up on a flat and level surface. Make sure to set it up at least 8" (20cm) from any obstacles on all sides to easily access the power switch and power cord in the event of an emergency. The operator should wear proper personal protective equipment based on their setting and the liquid being pumped.

The following are the responsibilities of the operator:

1. The operator should wear proper personal protective equipment based on their setting and the liquid being pumped.
2. Verify the voltage connected to the pump is within the parameters on the nameplate and in *Table 1.*

3. Do not open the pump drive, there is risk of electric shock.

4. Unplug the pump before doing pump maintenance, there is risk of electric shock.

5. Verify the tubing used is the correct size outlined in *Table 1.*
6. Verify the tubing is not excessively worn or broken.
7. Verify the tubing is compatible with the fluid being pumped.
8. The operator should educate themselves on the risks associated with the liquid being pumped.

Section 3: Product Description

The LP500 Series Variable Speed Peristaltic Pumps have a wide array of features while being very simple to operate. These pumps have basic start-stop functionality, pump speed control, maximum speed mode, and forward/reverse rotation. The LCD display provides an easy-to-use interface. The LP500 series supports numerous modes of control including various analog inputs, footswitch control, and manual control. These pumps support MODBUS protocol and RS485 communication, making them easy to integrate with other equipment and controllers. This series of speed variable peristaltic pumps includes a low flow LP500-L and a high flow LP500-H. Please refer to *Table 3* for specific performance metrics.

3.1 - Applications

The LP500 line of peristaltic pumps is ideal for handling most fluids, including viscous, corrosive, abrasive, and shear sensitive fluids. They are especially effective in applications where hygiene and cleanliness are mandatory. Possible applications for the LP500 series peristaltic pumps include but are not limited to:

- Medical Devices
  - IV Infusion
  - Dialysis
  - Blood Handling
- Laboratories
  - Sample transfer
  - Reagent dosing
  - Filtration
- Industrial Processes
  - Chemical metering
  - Wastewater treatment
  - Slurry handling
- Food and Beverage
  - Flavor dosing
  - Syrup transfer
  - Hygienic fluid movement
- Bacterial/Cell Culture
- Cardiac Perfusion in Animal Research
  - Simulate blood circulation
  - Cardiovascular research
  - Drug screening
- Chemical Synthesis Reactions
- Density Gradient Tube Filling
- General Media Dispensing

Contact your distributor or Welch customer service for assistance evaluating your application.

3.2 – Mechanical, Electrical, and Environmental Specs

GERNERAL INFORMATION	
Pump Series	LP500
Pump Type	Variable Speed Peristaltic
Motor Type	Stepper Motor
Operating Methods	Membrane Keypad or Externally Controlled
Torque	0.8Nm at 400RPM
Drive IP Rating	IP31
Operating Temperature Range	32-104F (0-40C)
Operating Relative Humidity	<80%
Maximum Altitude	2000m (6560ft)
Dimensions	11.2” x 7.1” x 7.8” (28.4cm x 18.0cm x 19.7cm)
Weight	10.8lbs (4.9kg)
Display	132x32 Monochrome Graphic Dot Matrix LCD
Housing Material	ABS Plastic
Supply Voltage	100-240VAC, 50/60Hz, 1Ph
Fuse	250VAC, 1A, 5mm x 20mm Slow-Blow Fuse
External Control Voltage	5.0 – 24.0V
Maximum Power Consumption	<50W
Warranty	2 Years on pump drive, 1 Year on pump head
PERFORMANCE DATA	
Motor Speed Control Range	0.1 – 600rpm
Motor Speed Resolution	0.1rpm up to 100rpm, 1rpm beyond 100rpm
Minimum Flow Rate	.0025mL/min @ 0.1rpm
Maximum Flow Rate	1955ml/min @ 600rpm & 0.3bar rel.
Supported Pump Head	LP500 Low Flow, LP500 High Flow
Duty Cycle	Continuous up to 400RPM
TUBING INFORMATION	
Supported Tube Materials	Silicone
Supported Tube Sizes - 1.6mm (1/16”) Wall Thickness	3.2mm (1/8”) Inner Diameter
	4.8mm (3/16”) Inner Diameter
	6.2mm (1/4”) Inner Diameter
	8.0mm (3/8”) Inner Diameter

Table 1 – General Info, Performance Data, Tubing Info

3.2 – Functional Parameters

FUNCTIONAL PARAMETERS	
Operating Modes	Internal Control, External Control, Dispensing, Level 1 (Footswitch), Level 2 (Two external control signals)
Dispensing Time	0.1 – 999.9 sec/min/hr
Pause (Interval) Time	0.1 – 999.9 sec/min/hr
Cycles	0 – 999
Motor Direction	Clockwise (Forward) and Counterclockwise (Reverse)
Anti-Drip	0 – 720 Degrees
Anti-Drip Speed	0.1 – 600rpm
Keypad (Button) Tone	Yes
Keypad Lock	Yes
EXTERNAL INTERFACES	
Analog Control Modes	0-5V, 0-10V, 4-20mA
Digital Input Control Voltage	5V, 12V, 24V
Analog Output	0-5V
Output Status	Open Collector, used for motor direction and start/stop status
Supported Communication	RS485, MODBUS RTU

Table 2 – Functional parameters and supported external interfaces

Performance – Flow Rates and Tube Sizes					
Pump Configuration	Tubing Bore	Tubing Wall Thickness	Flow (mL/min) @ 0.3 bar rel.		
			100 rpm	300rpm	600rpm (Intermittent)
Silicone Tubing					
5501-01 (LP500-L)	3.2mm (1/8”)	1.6mm (1/16”)	100	290	600
	4.8mm (3/16”)	1.6mm (1/16”)	219	608	1170
5502-01 (LP500-H)	6.4mm (1/4”)	1.6mm (1/16”)	310	876	1569
	8.0mm (3/8”)	1.6mm (1/16”)	494	1188	1955

Table 3 – Supported tube sizes and corresponding flow rates

3.3 - Components and Interfaces

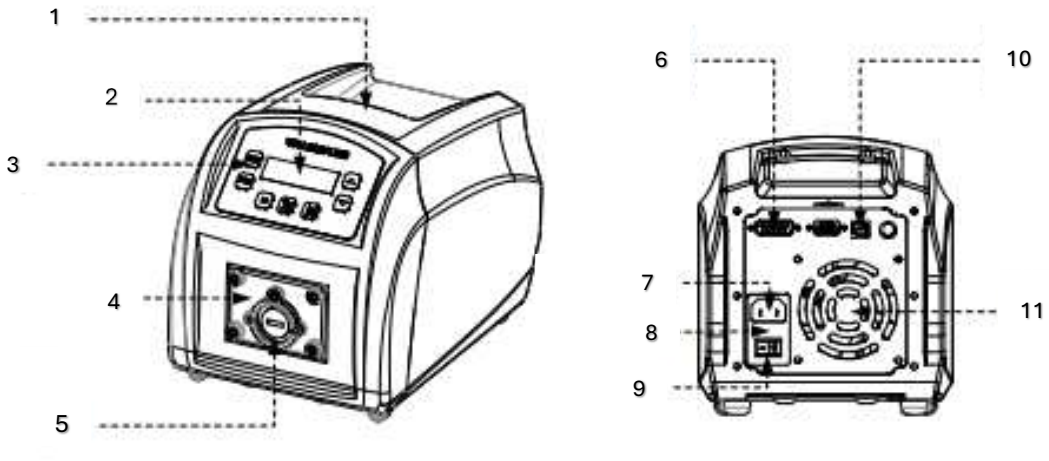


Figure 1 – Pump drive components and interfaces

Designation	Part
1	Handle
2	LCD Display
3	Buttons
4	Pump Head Support
5	Coupler
6	External Control Connector
7	Power Jack
8	Power Entry Module
9	Power Switch
10	Software Update Connector
11	Fan Cover

Table 4 – Pump drive components and interfaces

3.4 - Display Panel and Operating Keypad

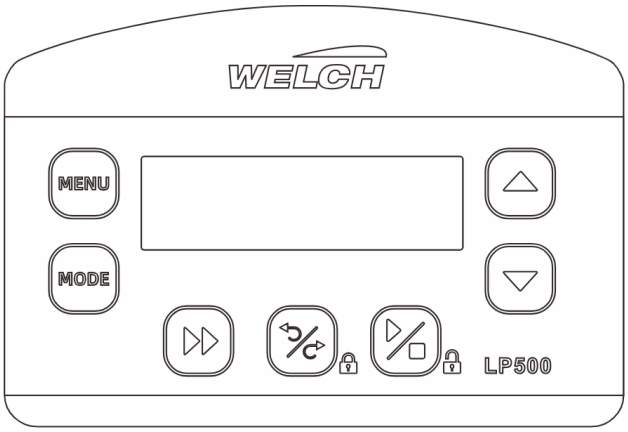


Figure 2 - Display Panel and Operation Keys

3.4.1 - Keypad Button Descriptions

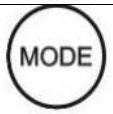
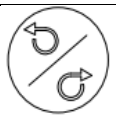
	**Up Key**	Value increase key – press key once and the lowest digit will increase by 1, long pressing key will increase the value rapidly
	**Down Key**	Value decrease key – press once and the lowest digit will be reduced by 1, long pressing the key will decrease the value rapidly
	**Menu Key**	In the main interface, press this key to enter the menu. When not on the main interface screen, long press this key to return to the main interface; invalid when running
	**Mode Key**	In the main interface screen, short press this key to switch the control mode between Internal, External, Timing, Level 1, and Level 2
	**Full Speed Key**	Press this key to switch between the highest speed and the original state
	**Direction Key**	Control the direction the motor spins; switch between clockwise (forward) and counterclockwise (reverse)
	**Start/Stop Key**	Starts and stops the pump, press this in the menu screen to enter a submenu

Table 5 - Description keypad button functions on the front panel

3.4.2 – Icon Description

Icon	Function	Icon	Function
	Running		Stopped
	Paused	>>>>>>	Maximum Speed
	Clockwise		Counterclockwise
	Tone On		Tone Off
	Locked		Unlocked
#1	Shows pump number in calibration		Communication Disconnected

Table 6 - Description of icons on the display

3.4.3 - LCD Display

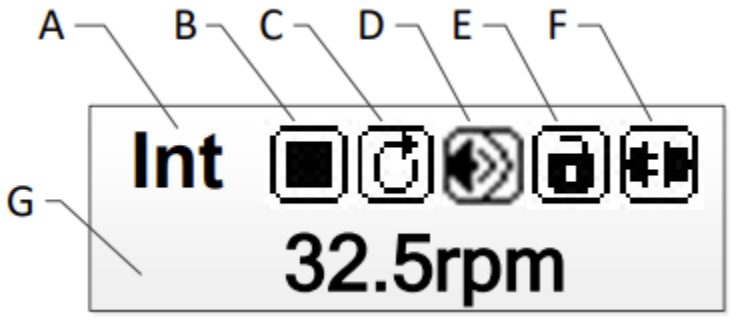


Figure 3 – LCD Display Layout

A. **Control State:** Displays the current control mode, press to switch modes. Available modes are: Internal Control, External Control, Dispensing, Level 1, and Level 2.
    a. **Internal Control Mode:** Uses the keypad on the panel to control. May us an external pulse signal to control the start and stop.
    b. **External Control Mode:** The speed of the pump is controlled by an external analog signal. The start/stop function and direction of rotation are controlled by an external digital high/low signal.
    c. **Dispensing Mode:** Configure the run time, interval time, and number of cycles to dispense fluid.

   d. **Level 1 (Foot Switch Mode):** The start/stop function is controlled by an external digital high/low signal such as a footswitch. The speed and direction of rotation are adjusted by the control panel.
   e. **Level 2 (Level Mode):** The start/stop function and direction of rotation are controlled by an external digital high/low signal. The speed is adjusted on the control panel.

B. **Running State:** Displays whether the pump is running, stopped, or paused. The possible icons displayed here are:
   a. Stopped state
   b. Running state
   c. Paused state

C. Direction of Rotation: Shows the direction in which the pump is rotating. The possible directions are:
   a. Forward clockwise
   b. Reverse counterclockwise

D. **Tone:** Displays whether the button tone is on or off.

E. **Lock State:** Displays whether the pump is currently in a locked state. In the locked state, only the start and stop keys work. All other keys are invalid when locked. In the main interface screen, press and hold the direction key to enter the locked state. To unlock the pump, long press the start/stop key.

F. **Communication State:** Displays whether the pump is currently communicating.

G. **Speed Display:** Displays the current rotational speed in rpm. When ">>>>>>" is displayed, the pump is running at full speed.

Section 4 – Getting Started

4.1 - Before Operation

- Please refer to the packing list to ensure all accessories are included and undamaged. Please contact Welch Vacuum if you find any issues with your pump or accessories.

Included Items	Description
LP500 Peristaltic Pump	Assembled Pump
Power Cords	US and EU Power Cords included
Manual	User's Manual in English, Spanish, French, and German

- Read the operation manual carefully. Keep the manual on hand while operating the pump.
- Place the pump on a level table with back of the pump at least 8" (20cm) from obstacles.

Section 5 – Operating Instructions

5.1 – First Run Settings

Parameter	Default Setting
Run Time Unit	Seconds
Dispense Time	1.0 Seconds
Pause Time Unit	Seconds
Pause Time	1.0 Seconds
Number of Cycles	1
Reverse Angle	0 Degrees
Max Speed	600RPM
Pump ID	#1
Button Tone	On
Language	English
Contrast	8
Tube Warning	Off
RS485 Baud Rate	9600
Stop Bit	1
Parity	Even
Pulse Trigger	Falling Edge
Level Trigger	High
External Control Mode	Analog Input 0-5.0V
ADD Time	0.6 Seconds
DEC Time	0.6 Seconds
Step Production	Disabled

Table 7 – This table contains the default (factory) settings of the LP500 series pumps

5.2 - Settings Menu

To navigate to the settings menu from the main interface screen, press the “Menu” Key. In the settings menu screen, use the “Up” and “Down” keys to navigate between parameters. To enter a submenu, use the “Start/Stop” key. Use the arrow keys to adjust the parameter. To return to the main screen, press and hold the “Menu” key, or press the “Menu” key repeatedly until you return to the main screen. Refer to *Figure 4* for the Menu’s flow chart.

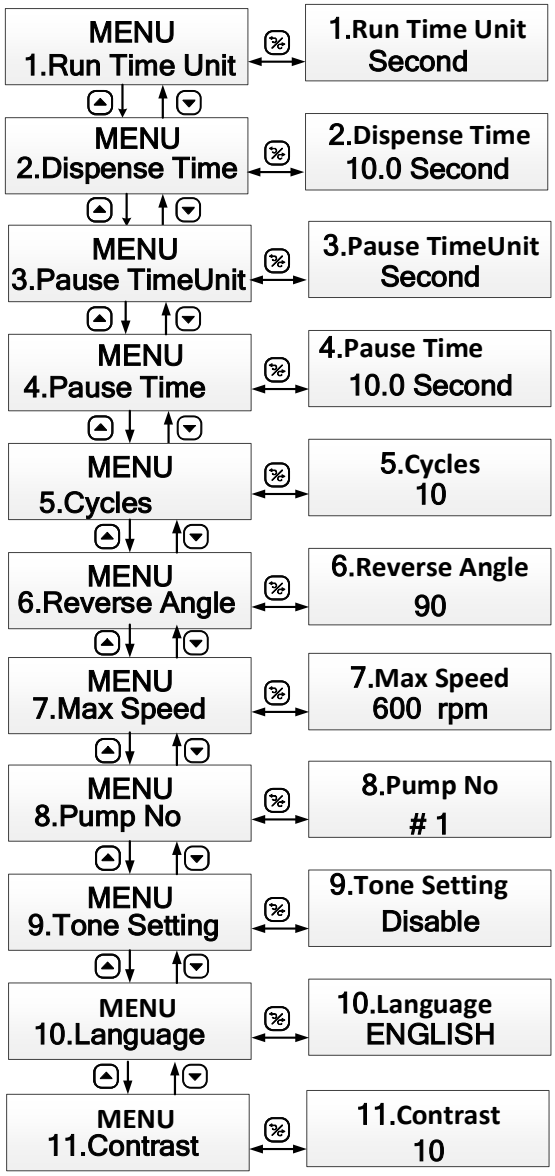


Figure 4 – This figure shows the flow chart of the menu screen

5.3 – Description of Parameters

1. **Run Time Unit:** In the dispensing mode, set the run time unit. This can be set in days, hours, minutes, and seconds.
2. **Dispense Time:** In dispensing mode, set the run time. The range of acceptable values is 0.1-999 seconds/minutes/hours/days.
3. **Pause Time Unit:** In dispensing mode, set the interval time unit. This can be set in days, hours, minutes, and seconds.
4. **Pause Time:** In the dispensing mode, when the number of cycles is >1, sets the pause time between each dispensing cycle. The range of acceptable values is 0.1-999 seconds/minutes/hours/days.
5. **Cycles:** In dispensing mode, set the number of repeated operations between 0-999. When the value is 0, the cycle will repeat infinitely until the Start/Stop button is pressed. When the cycles are set to a number greater than 1, the operations will be stopped automatically after completing the set number of cycles.
6. **Reverse Angle:** In order to prevent the liquid in the tubing from dripping when the pump stops, the motor of the pump rotates in the opposite direction for the configured rotation angle. The acceptable range of values is 0-720 degrees. When the angle is set to 0, this function is disabled.
7. **Max Speed:** In the external control mode, set the upper speed limit of the analog control range.
8. **Pump No.:** When using external communications, this configures the address of the pump.
9. **Tone Setting:** Sets whether the button press tone is on or off.
10. **Language:** Set the pump's display language; English is the only available language.
11. **Contrast:** Sets the contrast of the LCD.

Section 6 – External Control Interfaces

DB15 Pin	Pin Assignment	Descriptions
1	ADC_W	Positive input of external analog signal
2	B	B-pole of RS485 Interface
3	A	A-pole of RS485 Interface
4	+12V_W	External 12V power input
5	NOT USED	N/A
6	CW_W	External input to control direction
7	PWM	PWM Output
8	COM	External common/ground
9	AGND	Negative input of external analog signal
10	+12V	Internal +12V power output
11	GND	Ground of internal power output
12	CW	Internal direction output
13	RS_W	External input to control start/stop
14	NOT USED	
15	NOT USED	

Table 8 – Pin assignments for external control pins

6.1 – Analog Input Control Modes

The motor speed can be controlled by an external analog signal. The LP500 series pumps are compatible with 0-5V, 0-10V, and 4-20mA control. When the LP500 is configured for external analog control, the keys on the control panel will not function. The start/stop function is controlled by an external digital low/high signal.

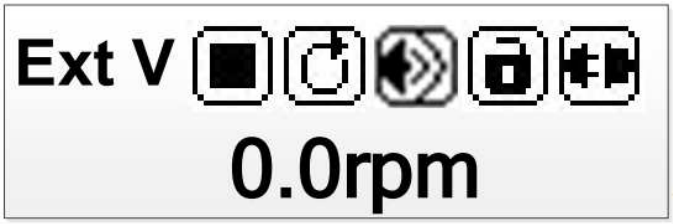


Figure 5 – Shows the control panel when configured in 0-5V/0-10V mode.

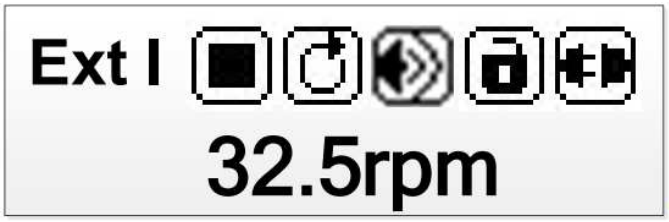


Figure 6 – Shows the control panel when configured in 4-20mA mode.

To configure the LP500 in 0-5V/0-10V or 4-20mA mode, follow these steps:

1. Turn off the power.
2. Connect the DB15 interface on the back of the pump to match the wiring diagram below if using an external power supply.

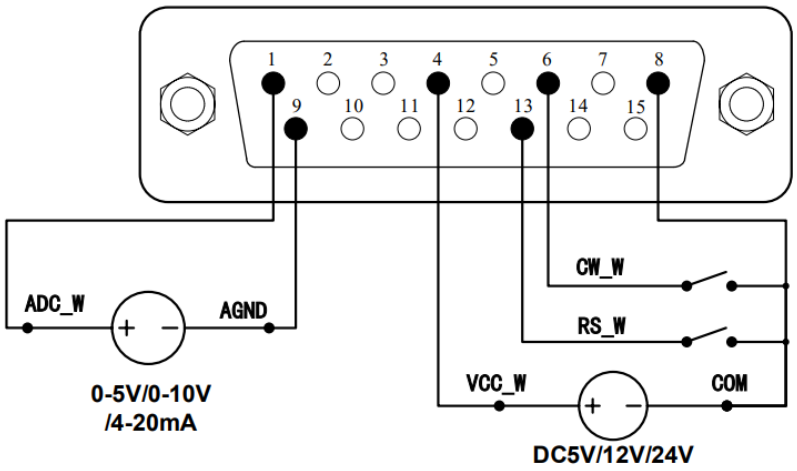


Figure 7 – Shows the wiring diagram for 0-5V, 0-10V, and 4-20mA external analog control with an external power supply.

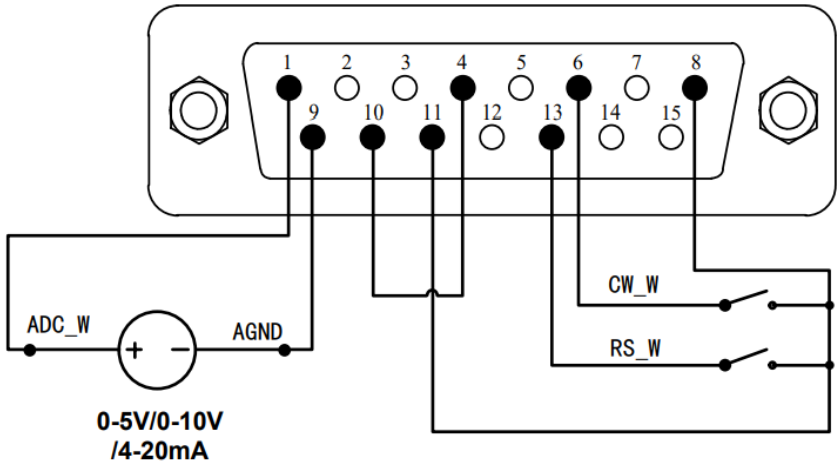


Figure 8 – Shows the wiring diagram for 0-5V, 0-10V, and 4-20mA external analog control using the internal power supply.

	**WARNING: Follow the wiring diagram to connect the inputs and outputs correctly. Do not exceed the specified voltage/current range on each of the pins, otherwise permanent damage can occur not covered by the warranty.**
	**WARNING: Low voltage signals must be isolated from mains power. Use a separate shielded wire for sensitive analog signals.**
	**WARNING: Use a protective wire sleeve at the end of multi-strand cables. Failure to do so increases the risk of equipment damage or short circuits.**

6.2 – Level 1 (Footswitch) Control Mode

The LP500 can be controlled by an external digital high/low signal such as a footswitch.

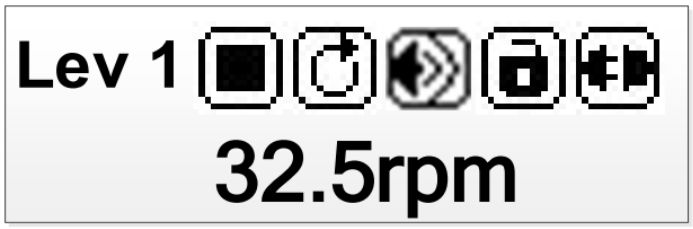


Figure 9 – Shows the LCD panel when configured in Level 1 Mode

To configure the pump in Level 1 Mode, follow these steps:

1. Turn off the pump
2. Connect the DB15 connector according to *Figure 10* if using an external power supply, and according to *Figure 11* if using the internal power supply

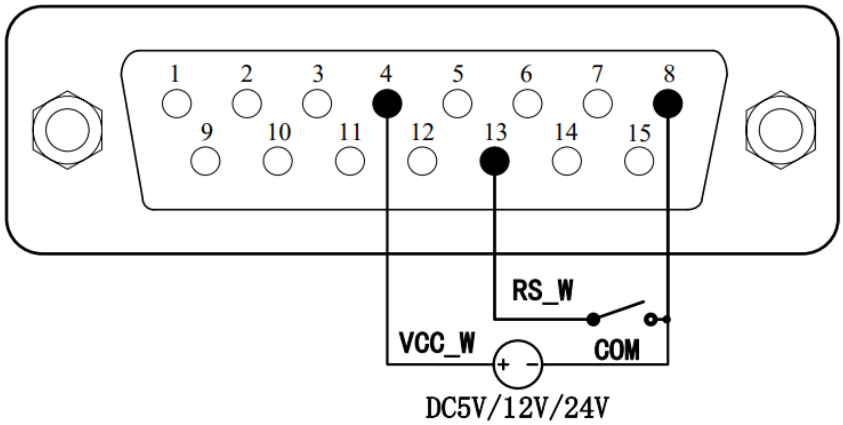


Figure 10 – Shows the wiring diagram to hook up an external footswitch using an external power supply.

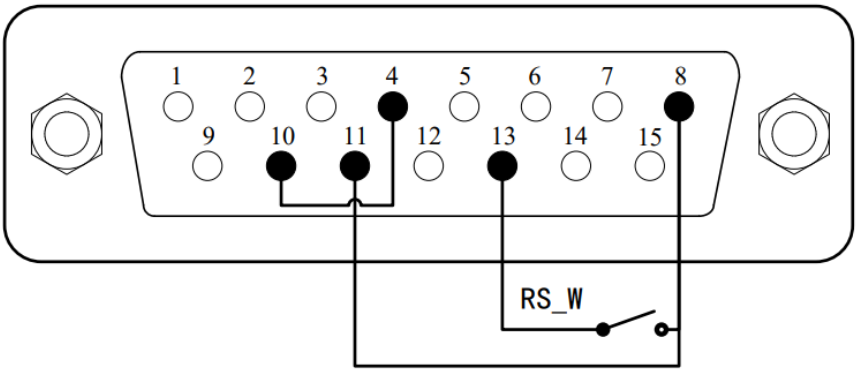
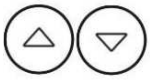


Figure 11 – Shows the wiring diagram to hook up an external footswitch using the internal power supply.

	**WARNING: Follow the wiring diagram to connect the inputs and outputs correctly. Do not exceed the specified voltage/current range on each of the pins, otherwise permanent damage can occur not covered by the warranty.**
	**WARNING: Low voltage signals must be isolated from mains power. Use a separate shielded wire for sensitive analog signals.**
	**WARNING: Use a protective wire sleeve at the end of multi-strand cables. Failure to do so increases the risk of equipment damage or short circuits.**

3. Press the “Mode” button to switch to Level 1 Mode 

4. Press the “Direction” button to adjust the desired direction 
5. Use the “Up” and “Down” arrow keys to set the speed of the motor 
6. When the footswitch is connected, the pump will run at the configured speed. When the footswitch is disconnected, the pump will stop.

6.2 – Level 2 Control Mode

The LP500 Pumps can be controlled using more two external control signals. These can be configured to control the start/stop functionality and to control the direction of rotation.

Figure 12 – Shows the main interface when configured in Level 2 Control Mode

1. Turn off the pump
2. Connect the DB15 connector according to *Figure 13* if using an external power supply, and according to *Figure 14* if using the internal power supply

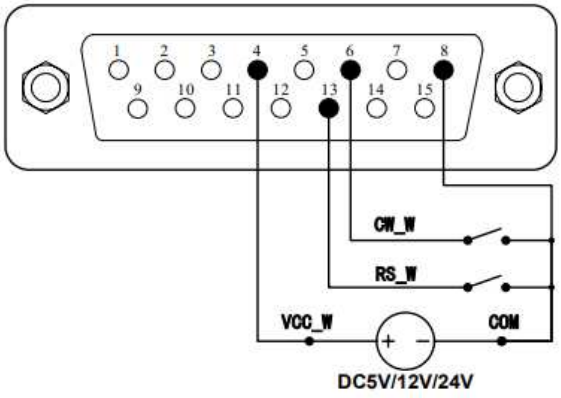


Figure 13 – Shows the wiring diagram for the Level 2 Control Mode using an external power supply.

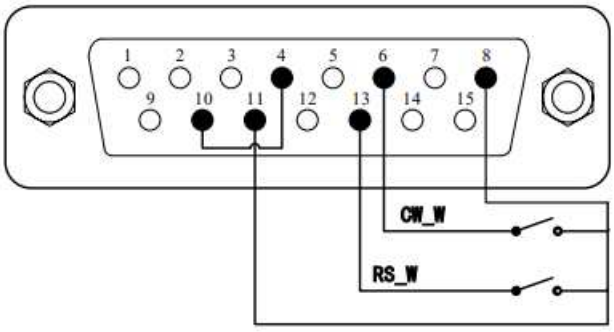
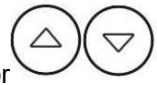


Figure 14 – Shows the wiring diagram for the Level 2 Control Mode using the internal power supply

	**WARNING: Follow the wiring diagram to connect the inputs and outputs correctly. Do not exceed the specified voltage/current range on each of the pins, otherwise permanent damage can occur not covered by the warranty.**
	**WARNING: Low voltage signals must be isolated from mains power. Use a separate shielded wire for sensitive analog signals.**
	**WARNING: Use a protective wire sleeve at the end of multi-strand cables. Failure to do so increases the risk of equipment damage or short circuits.**

3. Press the “Mode” button to switch to Level 1 Mode 

4. Press the “Direction” button to adjust the desired direction 
5. Use the “Up” and “Down” arrow keys to set the speed of the motor 
6. RS_W will now run the pump when connected, and stop the pump when disconnected. CW_W will now turn the pump counter-clockwise when connected, and clockwise when disconnected.

6.3 – RS485 Communication Mode

The LP500 pump can communicate with external controllers via RS485. This pump is compatible with the MODBUS RTU communication protocol. Please reference the LP500 MODBUS Messaging Specification for more specific information.

Figure 15 – Shows the main interface when communication is disconnected

Figure 16 – Shows the main interface when the pump is communicating, the Device Number is displayed

1. Turn off the pump
2. Connect the DB15 connector according to *Figure 17* if using an external power supply, and according to *Figure 18* if using the internal power supply

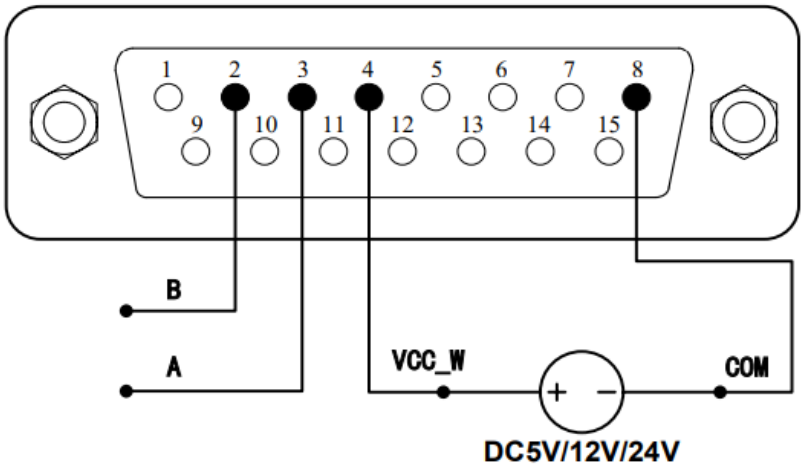


Figure 17 – shows the wiring diagram to connect RS485 when using an external power supply

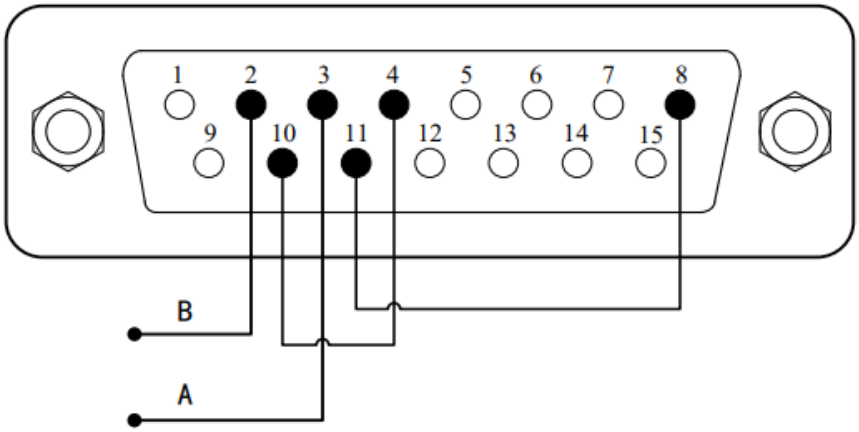
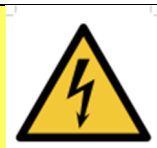


Figure 18 – shows the wiring diagram to connect RS485 when using the internal power supply

	**WARNING: Follow the wiring diagram to connect the inputs and outputs correctly. Do not exceed the specified voltage/current range on each of the pins, otherwise permanent damage can occur not covered by the warranty.**
	**WARNING: Low voltage signals must be isolated from mains power. Use a separate shielded wire for sensitive analog signals.**
	**WARNING: Use a protective wire sleeve at the end of multi-strand cables. Failure to do so increases the risk of equipment damage or short circuits.**

Section 7 - Tube Installation

The LP500 Peristaltic Pump supports the use of tubing with a wall thickness of 1.6mm. Please reference the “Tubing Information” section of the manual for all supported sizes of tubing.

1. Power off and unplug the pump.
2. To install the tubing properly, flip up the plastic latch of the head as shown in *Figure 19.*

Figure 19 – shows the pump head with the tubing positioned properly before the pump head is closed.

3. To secure the tubing, close the latch on the head. Make sure the tubing is properly seated in the middle of the triangular guides on the sides of the head.

Figure 20 – shows the pump head after it is closed with the tubing installed.

Section 8 - LP500 Pump Heads

The ETL-500 pump head comes in a Low-Flow configuration and a High-Flow configuration. The low-flow configuration supports flow rates from 0.0025-1170 mL/min and the high-flow configuration supports flow rates from 0.005-1955mL/min. See *Table 3* for pump performance based on tube size and head configurations.

Figure 21 – LP500 peristaltic pump head

Figure 22 – LP500-L low-flow peristaltic pump head

Figure 23 – LP500-H high-flow peristaltic pump head

Section 9 - Troubleshooting

If the display remains blank after plugged in and switched on:

- Check that mains power is operational and at the proper voltage.
- Check that the fuse is intact and not blown.
- Check the mains power switch in the rear of the pump.

If the pump runs but there is little to no flow:

- Check that fluid is supplied to the pump.
- Check for any kinks or blockages in the tubing.
- Check that any valves installed in the line are open.
- Check that the tubing is installed properly in the pump rotor.
- Check that the tubing is not split or broken.
- Check that the correct wall thickness of the tubing is being used.
- Check the direction of the rotor.
- Check that the rotor is not slipping on the drive shaft.

If the pump turns on, but will not run:

- Check the auto-run function and configuration.
- Check the mode the pump is set to, are you in manual mode? If so, check your wiring against the wiring diagrams in this manual.
- Try running the pump in manual mode to verify the rotor turns when it is supposed to.

If your issues persist, please contact your distributor or Welch customer service.

Section 10 - Disposal and Recycling

Dispose of packaging materials safely and in accordance with regulations in your area. If anything is missing or damaged from your box, contact your distributor immediately. Please refer to the packing list in the original box or in this manual.

Recycle this product under the terms of the EU Waste Electrical and Electronic Equipment (WEEE) Directive if in Europe, or in accordance with local regulations.

Section 11 – Storage and Transportation

This product has a long shelf life. However, care should be taken after storage to verify all parts function properly. Please check the ideal storage conditions for this device within this manual. Please observe the use-by dates that apply to the tubing you may wish to install in this product. The recommended storage conditions for this pump are 65-85F (18-30C) and less than 60% humidity.

The LP500 weighs 10.8lbs/4.9kg and has dimensions of 11.2” x 7.1” x 7.8” (28.4cm x 18.0cm x 19.7cm). This pump is safe for one user to move from place to place. Secure the pump in way that prevents it from falling or tipping over when using a cart or vehicle to transport it.

Section 12 – Ordering Information

Welch Part Number	Description
5501-01	LP500 Laboratory Peristaltic Pump Low Flow Configuration
5502-01	LP500 Laboratory Peristaltic Pump High Flow Configuration

Service Parts & Accessories	Description
5501K-01	LP500 Low Flow Head
5502K-01	LP500 High Flow Head
5500K-01	LP500 Pump Drive
5500K-02	Pump Head Adapter Plate
5500K-03	Shaft Adapter
5500KT-03	Silicone Tubing 3.2mm ID x 1.6mm Wall Thickness
5500KT-04	Silicone Tubing 4.8mm ID x 1.6mm Wall Thickness
5500KT-06	Silicone Tubing 6.2mm ID x 1.6mm Wall Thickness
5500KT-08	Silicone Tubing 8.0mm ID x 1.6mm Wall Thickness

Table 9 – Ordering information, service part numbers, and accessory part numbers

Section 13 – Disclaimers

DISCLAIMER OF WARRANTY

SELLER DOES NOT WARRANT THE MERCHANTABILITY OF ITS PRODUCTS AND DOES NOT WARRANT THE FITNESS OF THE PRODUCTS FOR A PARTICULAR PURPOSE. SELLER DOES NOT MAKE, AND HEREBY DISCLAIMS AND EXCLUDES, ANY WARRANTY, EXPRESS OR IMPLIED, OTHER THAN THE WARRANTY CONTAINED HEREIN. THERE ARE NO WARRANTIES EXPRESS OR IMPLIED BEYOND THAT WHICH IS DESCRIBED BELOW.

PURCHASER IS SOLELY RESPNSIBLE FOR DETERMINING THE SUITABILITY OF THE PRODUCTS FOR THE PURCHASER'S USE OR RESALE, OR FOR INCORPORATING SUCH PRODUCTS INTO OBJECTS OR FOR APPLICATIONS WHICH THE PURCHASER DESIGNS, ASSEMBLES, CONSTRUCTS OR MANUFACTURES.

Please contact your distributor or Welch customer service for warranty claims.