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Operating manual Peristaltic pump Mini

BT103S



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1 Safety instructions

⚠ **Important information: Read the operating instructions carefully before operating the pump.**

Symbol	Meaning
	Warning: Keep fingers away from moving parts.
	Warning: Caution.
	Warning: Caution, hot surface.
	Warning: Caution, electric shock hazard.
	Note: Recycle this product.
	Warning: Wear personal protective equipment.

Table 1 Safety symbols

1.1 Danger

⚠ Use the power supply specified on the device nameplate. Otherwise, the device may be damaged.

⚠ Do not dismantle the housing or modify the inside of the device yourself. This may cause malfunctions or electric shock.

Switch off the power before inserting or removing the pump tubing. Keep clear of the rotating rollers to prevent fingers or clothing from becoming caught in the mechanism.

⚠ Switch off the power before connecting or disconnecting external control devices to prevent electric shock or equipment damage.

⚠ The protective earth contact of the mains plug must always be properly grounded. Otherwise, there is a risk of electric shock, electromagnetic interference or induced electrostatic charge.

Special operating procedures must be established for each hazardous liquid being pumped. Personnel must be protected against injury during use.

⚠ This product is not suitable for potentially explosive atmospheres and must not be used in them.

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1.2 Warning

Before use, check that the pumped liquid does not react chemically with the tubing or pump head. Otherwise, the tubing or pump head may be damaged. If in doubt, contact Labmaterial GmbH.

The tubing is a wear part and must be checked regularly. To the extent permitted by law, Leadfluid and Labmaterial GmbH accept no responsibility for losses resulting from tubing damage, particularly leaks of toxic, harmful or valuable liquids.

If actual operating conditions exceed the technical specifications, for example temperature, humidity or supply voltage, and this damages the equipment, the damage is not covered by the normal manufacturer's warranty. The manufacturer offers paid repairs in such cases.

Protection against injury from moving pump parts is primarily provided by the pump head safety device. Safety devices differ between pump head models. Refer to the section for the relevant pump head.

If the pump was running before a power failure, it restarts automatically when power is restored. Protect the system against unintended restarting.

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2 Introduction to the peristaltic pump

The Mini peristaltic pump, model BT103S, has an LCD display and keypad. Speed, direction, running time, pause time and repetitions can be set. The speed range is 0.1–100rpm. The flow range depends on the pump head and tubing; technical combinations are listed in Chapter 14.

Operating principle: The tubing lies between the rollers and the pressure bed. Compression seals it at the contact point. The rotating rollers move this point forward. Behind a roller, the tubing returns to its original shape; the resulting vacuum draws in liquid. Before the first roller leaves the pressure bed, the next roller is already compressing the tubing. The liquid between the contact points is conveyed to the outlet. Only the inside wall of the tubing contacts the liquid. The compressed tubing acts as a valve; no separate valve is required for this pumping principle.

2.1 Applications

- The pump body does not come into contact with the liquid.
- No valve blockages; smooth tubing inner surface that is easy to clean.
- According to the manufacturer, the suction lift can reach 8m of water column.
- Low shear forces; suitable for transferring emulsions and liquids containing foam, cells and similar constituents.
- Suitable for liquids containing gas, magnetic beads or small suspended particles.
- Suitable for dispensing and continuous transfer. Select tubing diameter and filling capacity to suit the application.
- Suitable for transferring liquids with a certain viscosity.
- With suitable food-grade or medical-grade tubing, the pump can be used for transfer and filling in corresponding applications. This product is not medically certified. If incorporated into a medical device, the medical device itself must hold the appropriate certification.
- Tubing made from special materials can be used for abrasive liquids.

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2.2 Functions and features

- LCD display in Chinese or English; operation using keys.
- Forward and reverse rotation, start and stop, speed control and full speed.
- Adjustable running time, pause time and number of dispensing cycles.
- Speed resolution 0.1rpm; speed error less than ±0.2%.
- Analogue speed control via 0–5V, 0–10V or 4–20mA; selected in the system menu.
- Optically isolated external signals for start/stop and direction; digital input range 5–24V.
- RS485 communication with MODBUS protocol and adjustable communication parameters.
- Optional Wi-Fi equipment for the functions described in Chapter 9.
- Protective coating on the circuit board against dust and moisture; high interference immunity.
- Plastic housing, easy to clean.

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3 Components and interfaces

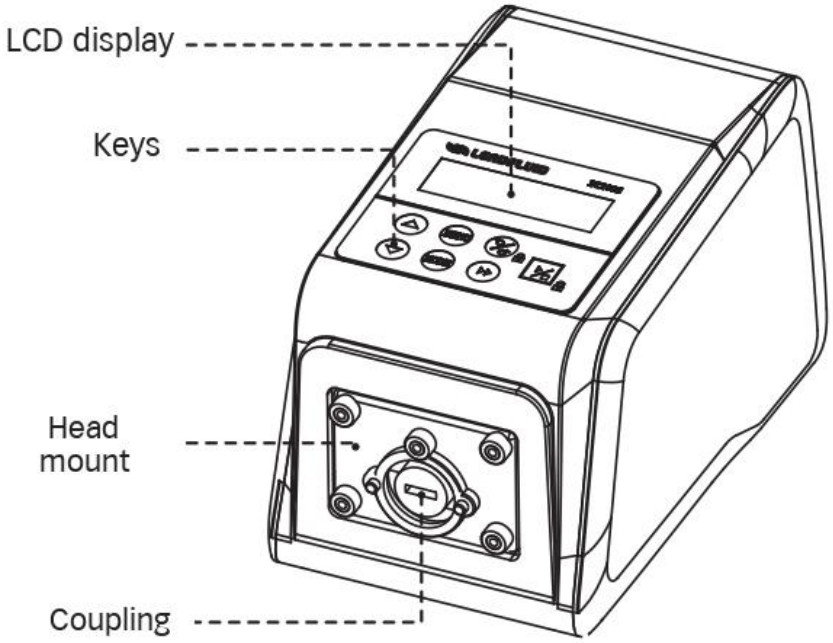


Figure 1 Front view and drive coupling

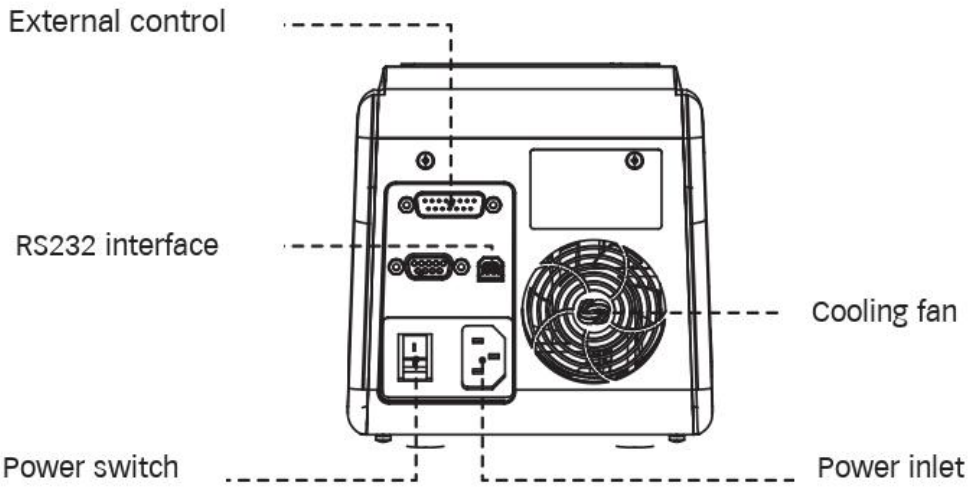


Figure 2 Rear view and connections

The DB15 connector is used for external control and RS485 communication. The DB9 connector is the RS232 interface. Numbering and pin assignments are described in Chapter 5. Keep the rear cooling fan unobstructed.

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4 Display and operating keys

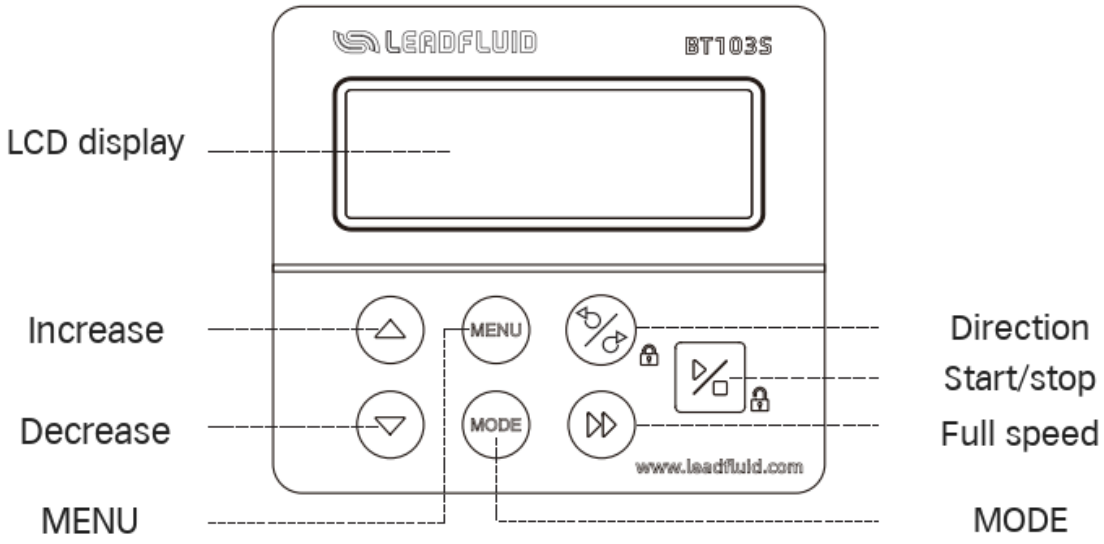


Figure 3 LCD display and keypad

4.1 Operating keys

Up arrow – increase: Press once to increase the last digit by one. Hold to increase the value more quickly.

Down arrow – decrease: Press once to decrease the last digit by one. Hold to decrease the value more quickly.

MENU – menu: Open the settings menu from the main screen; return to the main screen from the menu. This key has no effect while the motor is running.

MODE – operating mode: On the main screen, cycle through Int, Ext, Disp, Lev1 and Lev2. On Wi-Fi-equipped devices, hold for approximately ten seconds to start network setup. Changing operating mode is disabled while the motor is running.

Double arrow – full speed: Switch between maximum speed and the previous operating state, for example to fill or empty the tubing.

Circular arrows – direction: Switch between clockwise and counterclockwise rotation. On the main screen, hold the key to lock the keypad.

Start/stop – triangle and square: Start or stop the pump. Open a submenu from the menu. Hold to unlock the keypad.

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4.2 Screen icons

Symbol	Meaning	Symbol	Meaning
	Pump running		Pump stopped
	Pause		Full speed
	Clockwise		Counterclockwise
	Key sound on		Key sound off
	Strong Wi-Fi signal		Medium Wi-Fi signal
	Weak Wi-Fi signal		Wi-Fi disconnected
	Keys locked		Keys unlocked
	Pump address during communication		Communication disconnected

Table 2 Meaning of display symbols

4.3 Main screen

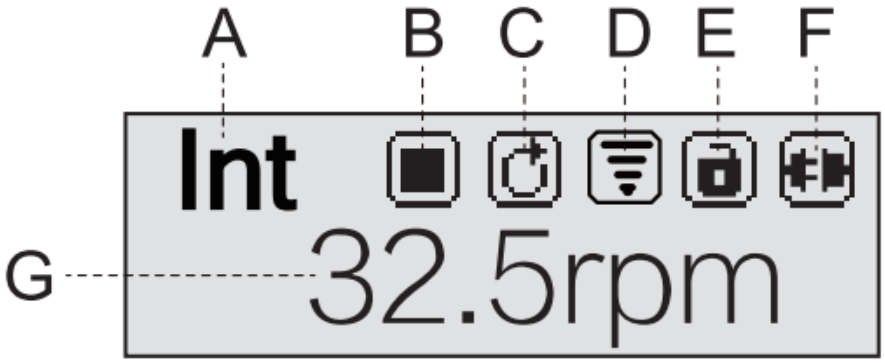


Figure 4 Main screen with labels A to G

A Operating mode: MODE switches between the following modes:

- Int: Keypad operation; an external pulse signal can trigger start/stop.
- Ext: Analogue signal for speed, external level signals for start/stop and direction.
- Disp: Timed dispensing with running time, pause time and number of repetitions.
- Lev1: External level signal for start/stop; speed and direction set on the keypad.
- Lev2: External level signals for start/stop and direction; speed set on the keypad.

B Operating status: ■ Stopped, ▶ Running or ⏸ Paused.

C Direction: ↻ Clockwise or ↺ Counterclockwise.

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D Wi-Fi signal strength, optional: strong, medium, weak or disconnected. When Wi-Fi is disabled, the key sound status is displayed here.

E Keypad lock: locked or unlocked. Start/stop remains available when locked; the other keys are disabled. Hold direction to lock; hold start/stop to unlock.

F Communication: disconnected; when communication is established, the pump address is displayed, for example #1.

G Speed: Display in rpm. The >>>>>> display indicates full speed.

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5 External control connections

5.1 DB15 connector

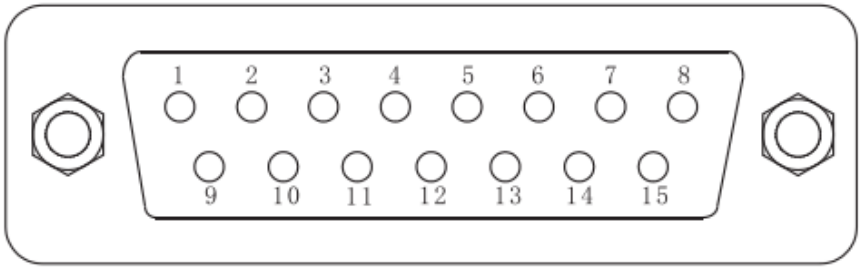


Figure 5 DB15 connector numbering

Pin	Signal	Description
1	ADC_W	Positive external analogue signal input
2	B	RS485, line B
3	A	RS485, line A
4	VCC_W	External DC supply for the control circuit
5	—	—
6	CW_W	External direction input
7	PWM	Pulse signal output
8	COM	Common reference for external control
9	AGND	Negative external analogue signal input
10	+12V	Internal +12V auxiliary output
11	GND	Internal supply ground
12	CW	Internal direction output
13	RS_W	External start/stop input
14	PWM_W	External pulse signal input
15	RS	Internal start/stop output

Table 3 DB15 pin assignments

5.2 DB9/RS232 connector

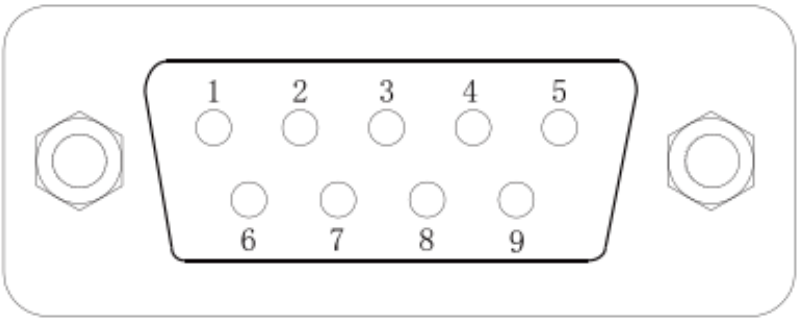


Figure 6 DB9 connector numbering

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Pin	Signal	Description
1	—	—
2	RXD	Receive data
3	TXD	Transmit data
4	—	—
5	GND	Signal ground
6	—	—
7	—	—
8	—	—
9	—	—

Table 4 RS232 pin assignments

⚠ **Note:** Do not connect mains voltage to the external control connector. Apply only the signals shown in the connection diagrams to the corresponding pins. Do not exceed the permitted signal ranges or apply supply voltage to other pins. Otherwise, permanent damage not covered by the manufacturer's warranty may occur.

⚠ **Note:** Low-voltage signals must be separated from the mains supply. Use a separate shielded ground wire.

⚠ **Note:** Use suitable ferrules on the ends of stranded wires. Otherwise, equipment damage may occur.

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6 Installation and commissioning

6.1 Before operation

- When unpacking, check against the packing list that all accessories are complete, correct and undamaged. Contact Labmaterial GmbH immediately if anything is wrong.
- Read the operating manual carefully and keep it available for later reference.
- Place the pump on a level surface. Leave at least 20cm clearance behind the equipment.
- Keep ventilation openings clear. Disconnect the pump from the mains before installation, dismantling or tubing changes.

6.2 Installing the pump head and tubing

YZ15/YZ25 head: Align the flat of the head shaft with the flat groove in the drive coupling. Fit the head and secure it with the two screws. Open the lever, insert the correct tubing properly into the pressure bed and close the lever again.

DG head: Align the flat shaft and coupling, bring the locating pin and hole together and secure the head with the two socket head screws. Insert the tubing straight into the cassette without twisting and secure the tubing clamps at both ends in the retaining grooves. First engage the left cassette end in the round guide, then the other end in the rectangular guide.

Follow the corresponding pump head instructions for the supplied configuration. The overview of other heads in Chapter 15 does not replace their installation instructions.

6.3 Connecting the mains supply

Connect the power cable at the rear and operate the power switch. The main screen appears after the welcome screen.

⚠ The mains voltage must match the nameplate. Use a properly earthed mains connection. Keep the mains plug and power switch accessible.

⚠ **Note:** All supply cables must be rated for the equipment’s power consumption.

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6.4 Factory settings

Parameter	Setting
Running time unit / running time	Seconds / 1.0s
Pause time unit / pause time	Seconds / 1.0s
Cycles	1
Reverse angle	0°
Maximum speed	100rpm
Pump address	#1
Key tone	Enable, on
Language	Chinese
Contrast	8
Tubing warning	Disable, off
Baud rate / stop bits / parity	9'600 / 1 / Even, even parity
Pulse / level triggering	Falling Edge / High Level
External analogue control	0–5V
Step loss protection / Wi-Fi	Disable, off; equipment-dependent

Table 5 Factory settings

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7 Settings

7.1 Using the settings menu

On the main screen, press MENU MENU. Use Increase and Decrease to select a menu item. Start/stop opens the submenu. Change the value using the arrow keys; MENU returns to the main screen.

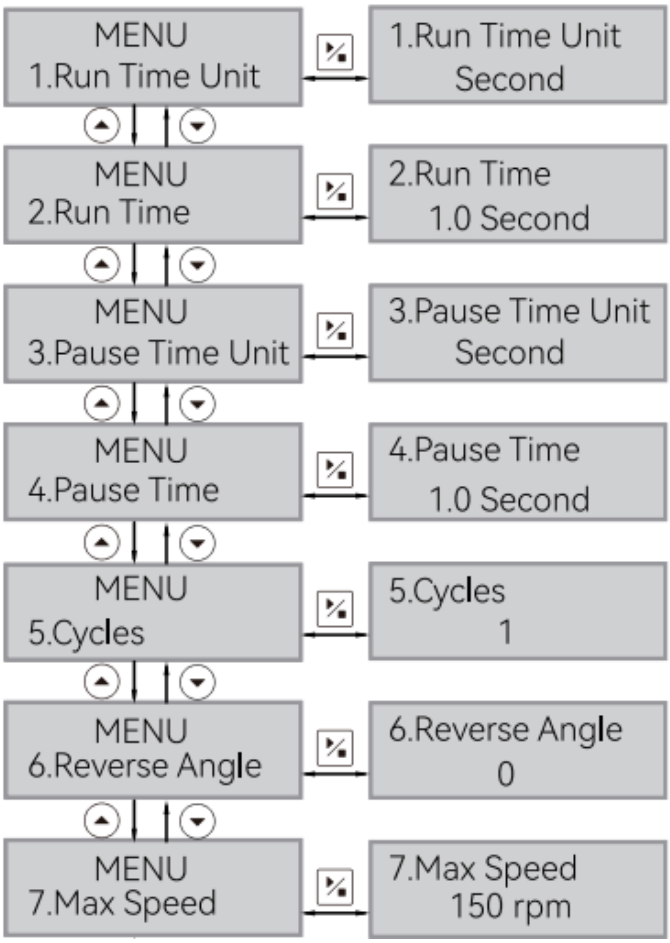


Figure 7 Settings menu, items 1 to 7

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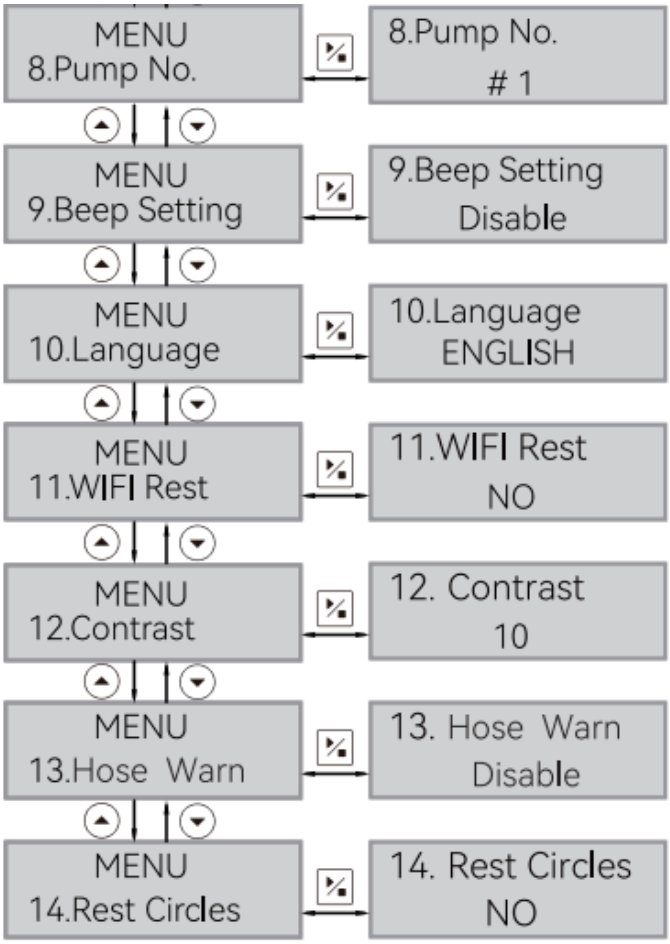


Figure 8 Settings menu, items 8 to 14

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The screens show example values. The BT103S maximum is 100rpm.

Display	Meaning and operation
1 Run Time Unit	Select the running time unit for timed dispensing. The operating screen offers days, hours, minutes and seconds.
2 Run Time	Set the dispensing running time. For seconds, minutes and hours, the specified range is 0.1–999.9 in the selected unit.
3 Pause Time Unit	Select the pause time unit.
4 Pause Time	Set the pause between doses when Cycles is not 1; the time range is the same as Run Time.
5 Cycles	0–999 repetitions. At 0, the pump repeats indefinitely until start/stop is pressed. At a positive number, the sequence ends after the set count.
6 Reverse Angle	Reverse angle 0–750°. After stopping, the motor reverses to reduce dripping. At 0, the function is disabled.
7 Max Speed	Upper speed limit for analogue speed control; no more than 100rpm.
8 Pump No.	Set the pump communication address. Restart the drive after changing it.
9 Beep Setting	Switch the key sound on or off.
10 Language	Select Chinese or English.
11 WIFI Reset	Reset the Wi-Fi connection and set it up again; Wi-Fi-equipped versions only.
12 Contrast	Set the LCD contrast.
13 Hose Warn	Enable the tubing warning. When the calculated tubing life expires, the cloud app requests replacement; requires the corresponding Wi-Fi equipment. Disabled by default.
14 Rest Circles	Reset the calculated tubing life after replacement; suitably equipped versions only.

Table 6 Settings menu and meaning

⚠ **Note:** Wi-Fi and tubing monitoring functions require the corresponding equipment. These options have no effect on the standard version. A calculated warning does not replace regular visual inspection of the tubing.

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7.2 Setting system parameters

On the main screen, press MENU and Increase simultaneously. Select a parameter with the arrow keys; Start/stop opens the submenu. Change it with the arrow keys. Start/stop returns to the previous menu, MENU to the main screen.

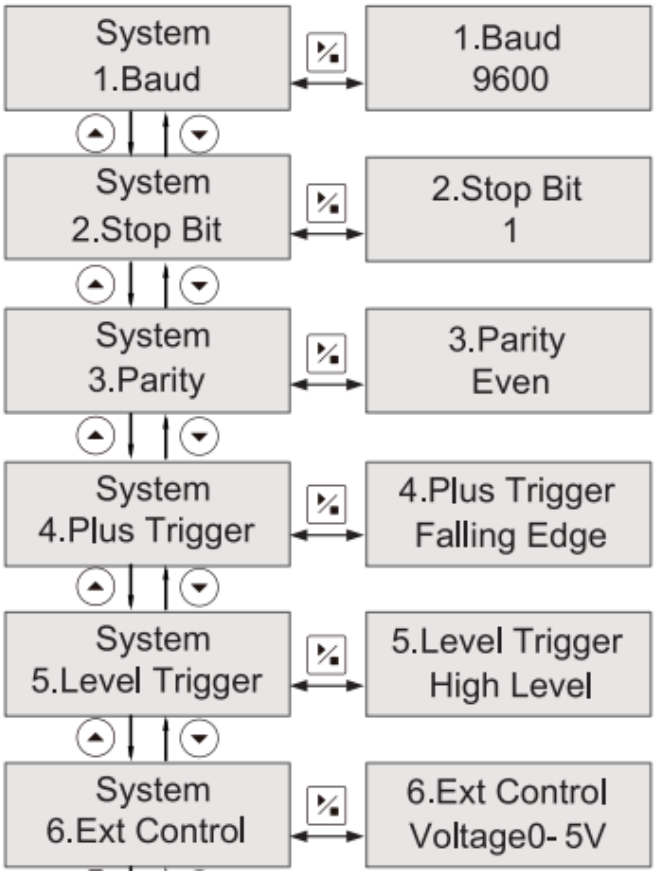


Figure 9 System parameters, items 1 to 6

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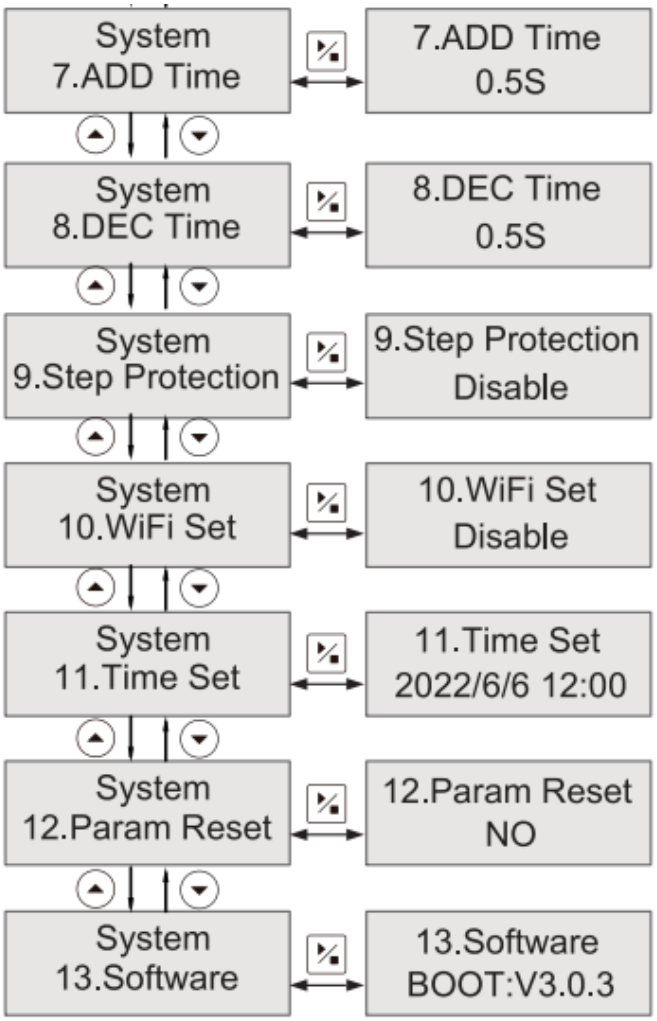


Figure 10 System parameters, items 7 to 13

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Display	Meaning and operation
1 Baud	4'800, 9'600, 19'200 or 38'400 baud; factory setting 9'600.
2 Stop Bit	One or two stop bits; factory setting 1.
3 Parity	Odd, Even or None: odd, even or no parity; factory setting Even.
4 Plus Trigger	Triggering by a rising or falling pulse edge in Int and Disp; factory setting Falling Edge.
5 Level Trigger	High or low trigger level in Ext, Lev1 and Lev2; factory setting High Level.
6 Ext Control	Select analogue signal 0–5V, 0–10V or 4–20mA. The speed changes linearly with the signal.
7 ADD Time / 8 DEC Time	Time parameters shown in the system display.
9 Step Protection	Step loss protection; equipment-dependent Wi-Fi version, disabled by default.
10 WiFi Set	Enable or disable Wi-Fi; requires a Wi-Fi module, disabled by default.
11 Time Set	Set date and time. Use full speed to change the field, arrow keys to change the value and start/stop to save.
12 Param Reset	Restore factory settings. Select YES with Increase; return to the main screen with MENU to execute the reset.
13 Software	Display software version information.

Table 7 System parameters

To reset, use Param Reset in the illustrated system menu.

⚠ **Note:** Do not change the Wi-Fi settings on equipment without Wi-Fi. Record required parameters before resetting and afterwards check especially the control method, direction and communication parameters.

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8 Operating modes and operation

8.1 Changing operating mode

The main screen appears after switching on. With the motor stopped, press MODE to select the next mode: Int, Ext, Disp, Lev1, Lev2 and back to Int.

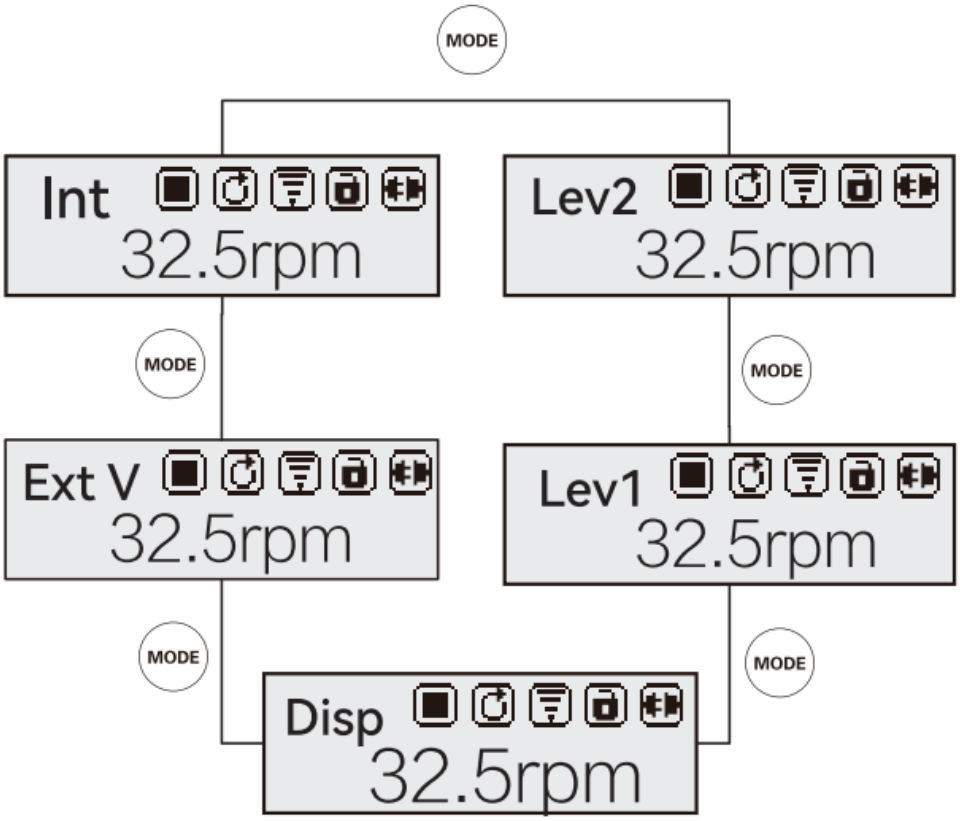


Figure 11 Switching between the five operating modes

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8.2 Internal control Int

Operation uses the keypad.

1. Switch on the equipment and select Int using MODE MODE.
2. Set the speed using Increase and Decrease.
3. Select the pumping direction using Direction.
4. Start or stop using Start/stop.
5. Full speed switches to maximum speed. Press again to restore the previous state.

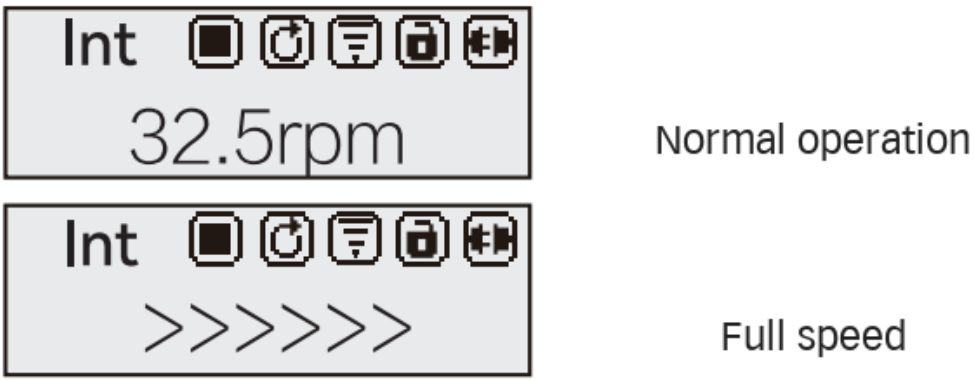


Figure 12 Internal control: normal operation and full speed

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8.3 External analogue control Ext

The analogue signal determines speed. External level signals control start/stop and direction. The normal operating keys have no effect in this control method.

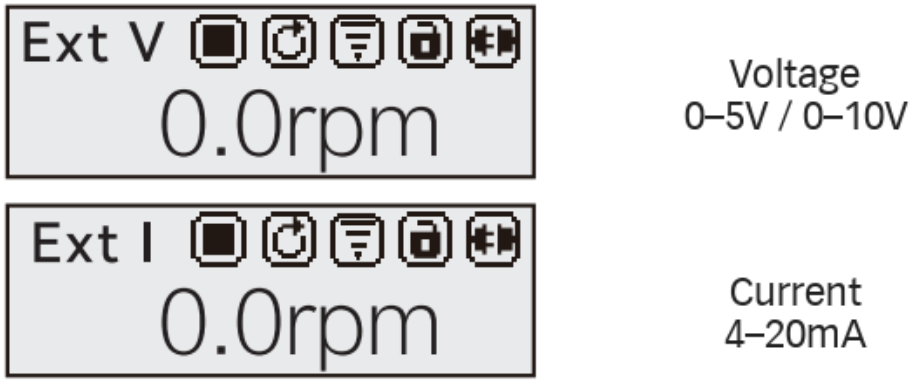


Figure 13 External control with voltage or current signal

Wire according to Figure 14 or Figure 15 with the equipment switched off and disconnected from the mains. Only then connect the DB15 plug to the equipment.

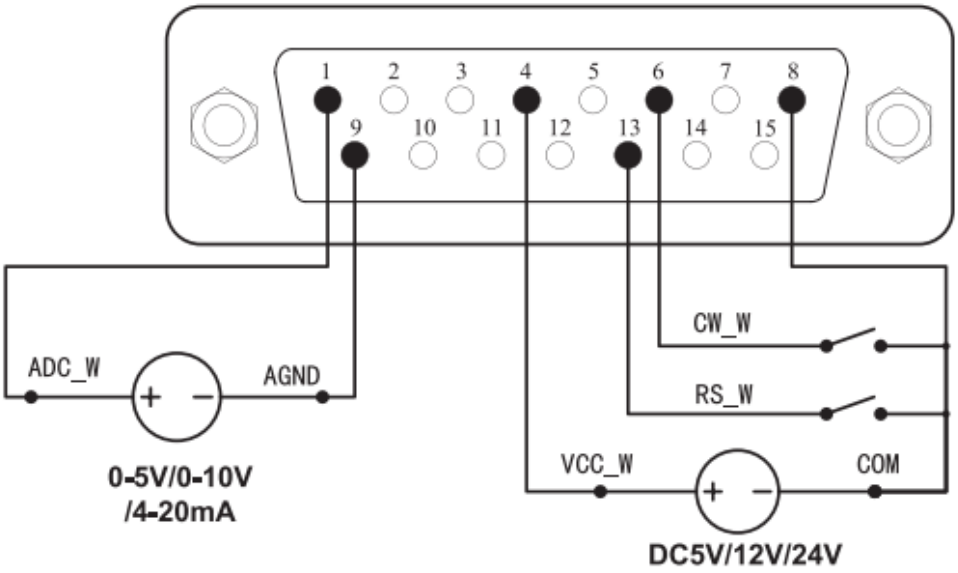


Figure 14 External analogue control with an external control power supply

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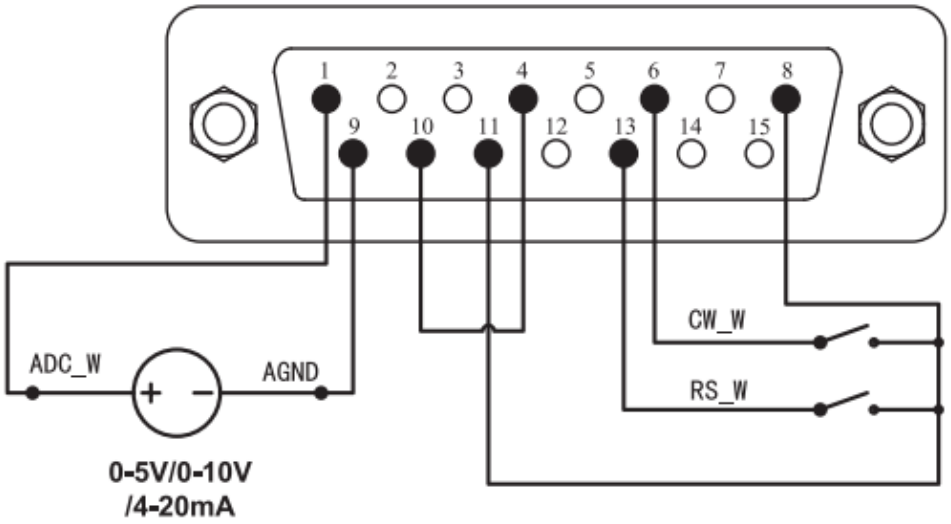


Figure 15 External analogue control with internal auxiliary supply

⚠ **Note:** Do not connect mains voltage to the external control connector. Apply only the signals shown in the connection diagrams to the corresponding pins. Do not exceed the permitted signal ranges or apply supply voltage to other pins. Otherwise, permanent damage not covered by the manufacturer's warranty may occur.

⚠ **Note:** Low-voltage signals must be separated from the mains supply. Use a separate shielded ground wire.

⚠ **Note:** Use suitable ferrules on the ends of stranded wires. Otherwise, equipment damage may occur.

1. Switch on and select Ext using MODE.
2. Set the appropriate analogue range in the system menu: 0–5V, 0–10V or 4–20mA.
3. Close RS_W and apply the analogue signal. The pump runs and follows the analogue speed setting. Opening RS_W stops the motor.
4. With CW_W open, the pump rotates clockwise; with CW_W closed, counterclockwise. These statements assume the illustrated wiring; observe the selected level triggering.

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8.4 Timed dispensing Disp

Liquid delivery is controlled by speed and running time. Pause time and cycle count determine repetitions.

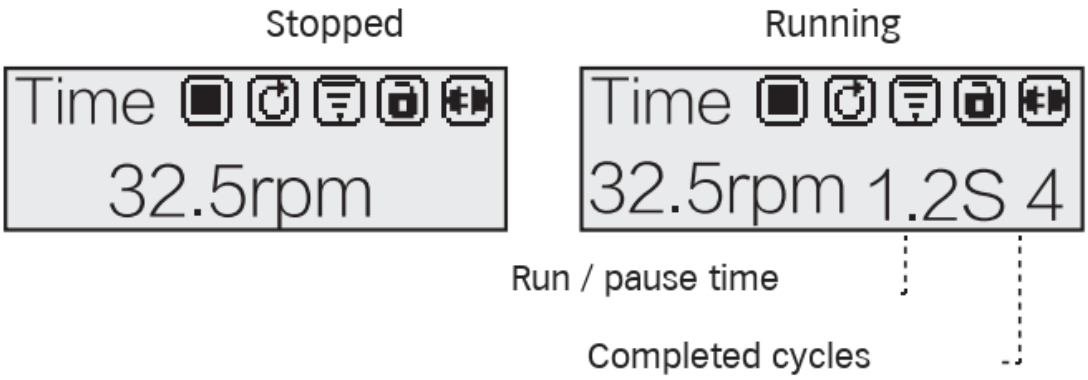


Figure 16 Timed dispensing: stopped, running, time and completed cycles

Setting parameters:

1. Switch on and select Disp using MODE MODE.
2. Open the settings menu using MENU MENU.
3. Set running time unit, running time, pause unit, pause time and cycle count; then return to the main screen.
4. Set speed with the arrow keys and direction with Direction.

Running dispensing:

5. Start/stop starts the set dispensing sequence. Running or pause time and completed cycles are displayed during operation.
6. Press start/stop again to stop the sequence. A suitable external pulse trigger, for example via the optional foot pedal, can also trigger dispensing.

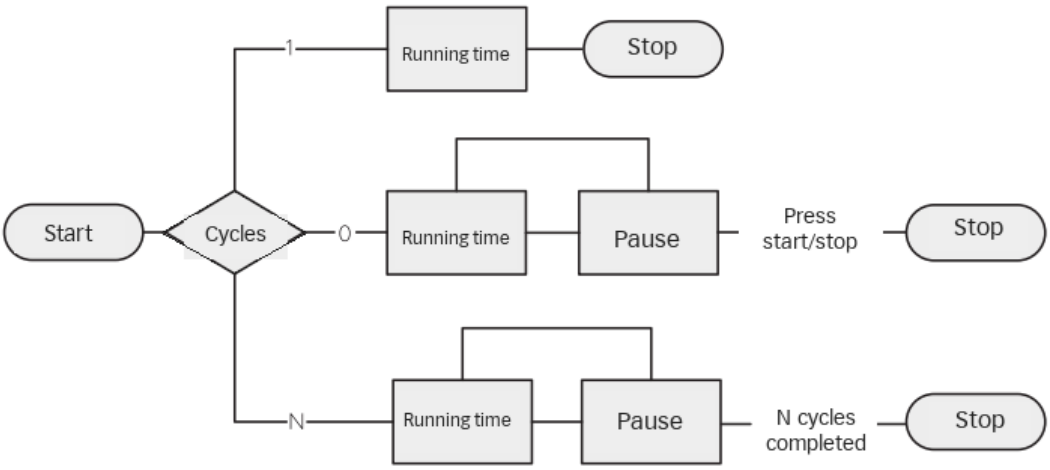


Figure 17 Timed dispensing sequence with one, unlimited or multiple cycles

At Cycles = 1, a single dose is delivered. At Cycles = 0, running and pause repeat until stopped. At Cycles = N, dispensing ends after N cycles.

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8.5 Level control Lev1

In Lev1, an external level signal controls start/stop. Speed and direction are set on the keypad. This mode can be used, for example, with a suitable foot switch or filling controller.

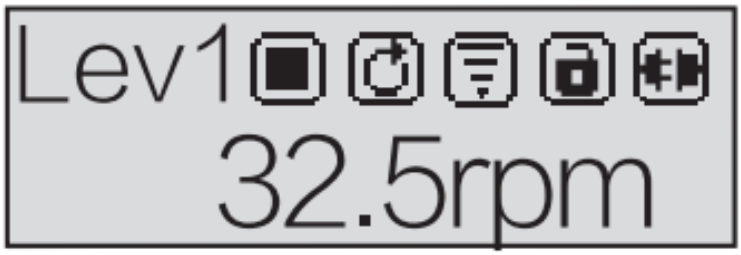


Figure 18 Main screen in level control Lev1

Connect the control circuit according to Figure 19 or Figure 20 with the equipment switched off and disconnected from the mains.

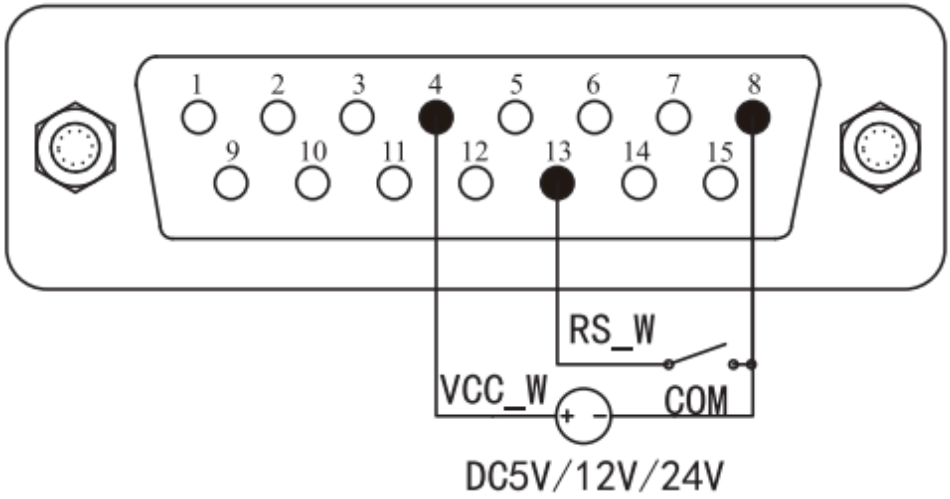


Figure 19 Lev1 with external control power supply

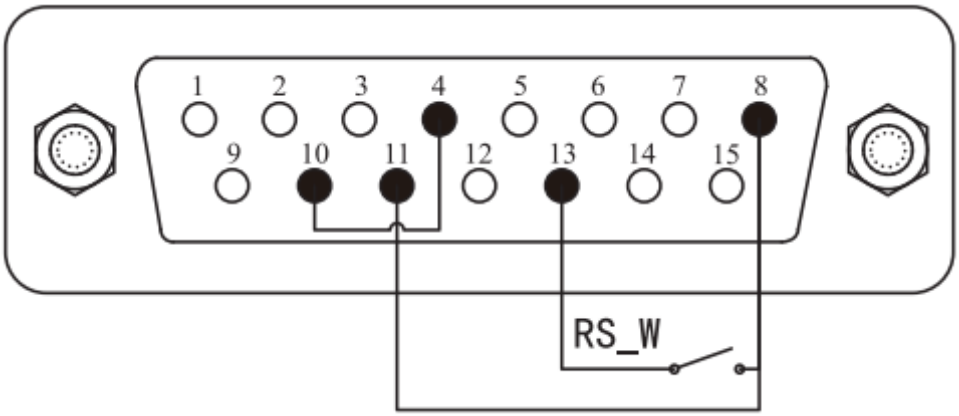


Figure 20 Lev1 with internal auxiliary supply

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⚠ **Note:** Do not connect mains voltage to the external control connector. Apply only the signals shown in the connection diagrams to the corresponding pins. Do not exceed the permitted signal ranges or apply supply voltage to other pins. Otherwise, permanent damage not covered by the manufacturer’s warranty may occur.

⚠ **Note:** Low-voltage signals must be separated from the mains supply. Use a separate shielded ground wire.

⚠ **Note:** Use suitable ferrules on the ends of stranded wires. Otherwise, equipment damage may occur.

1. Switch on and press MODE until Lev1 is selected.
2. Set direction using the direction key and speed using the arrow keys.
3. Closing the contact starts the pump; opening it stops the pump. Observe the configured level triggering.

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8.6 Level control Lev2

In Lev2, external level signals control start/stop and direction. Speed is set on the keypad.



Figure 21 Main screen in level control Lev2

Connect according to Figure 22 or Figure 23 with the equipment switched off and disconnected from the mains.

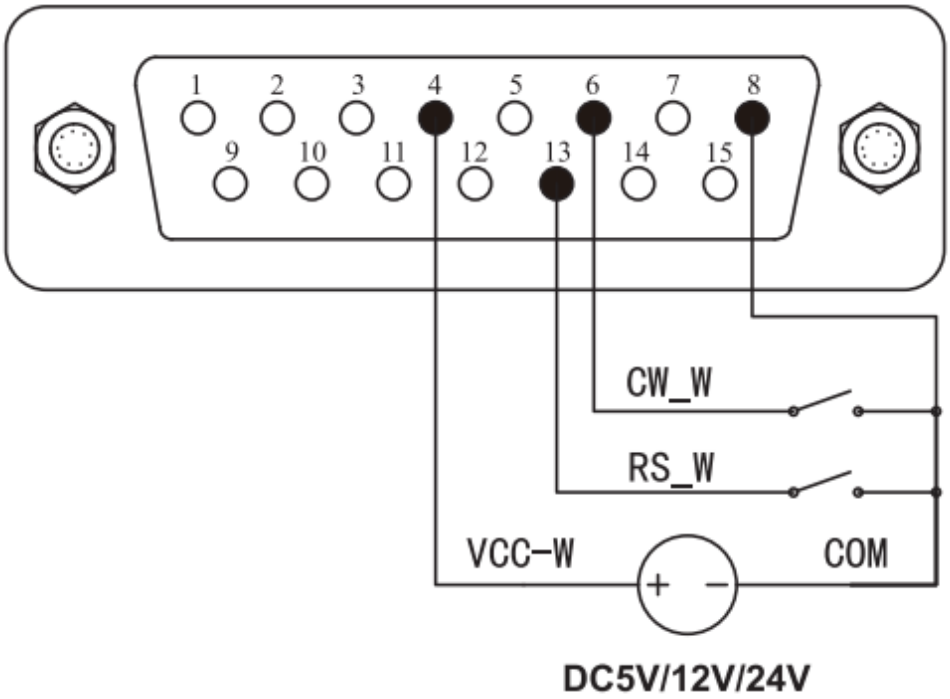


Figure 22 Lev2 with external control power supply

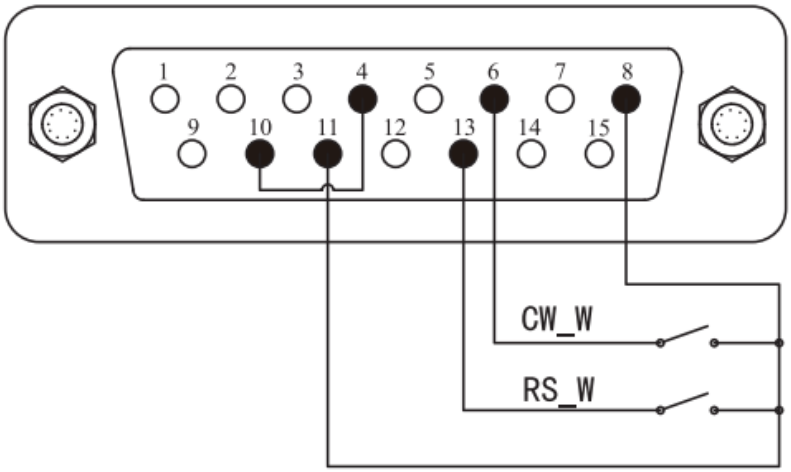


Figure 23 Lev2 with internal auxiliary supply

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⚠ **Note:** Do not connect mains voltage to the external control connector. Apply only the signals shown in the connection diagrams to the corresponding pins. Do not exceed the permitted signal ranges or apply supply voltage to other pins. Otherwise, permanent damage not covered by the manufacturer's warranty may occur.

⚠ **Note:** Low-voltage signals must be separated from the mains supply. Use a separate shielded ground wire.

⚠ **Note:** Use suitable ferrules on the ends of stranded wires. Otherwise, equipment damage may occur.

1. Switch on and select Lev2 using MODE.
2. Set the speed using the arrow keys.
3. Closing RS_W starts the pump; opening it stops the pump. CW_W open selects clockwise, CW_W closed counterclockwise. These statements assume the illustrated wiring; observe the selected level triggering.

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8.7 Communication via RS485/MODBUS

RS485 supports the MODBUS protocol for external pump control. The registers, commands and addressing are given in the corresponding English S-series MODBUS communication protocol.

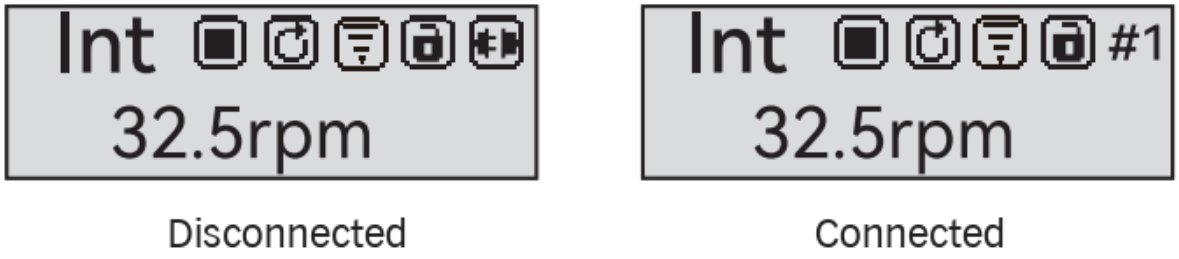


Figure 24 Communication display without and with a connection

Wire according to Figure 25 or Figure 26 and connect the DB15 plug with the equipment switched off and disconnected from the mains.

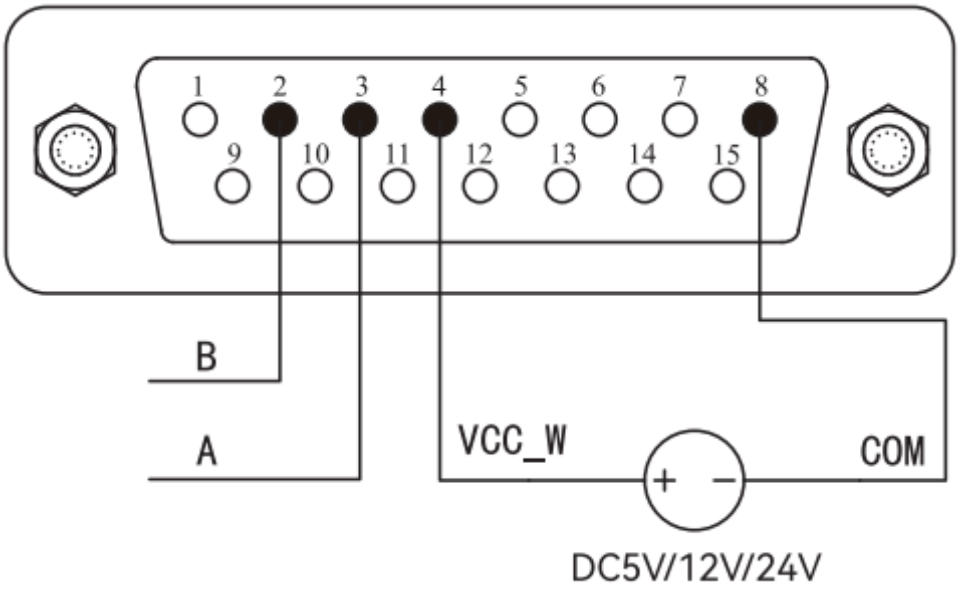


Figure 25 RS485 communication with an external control power supply

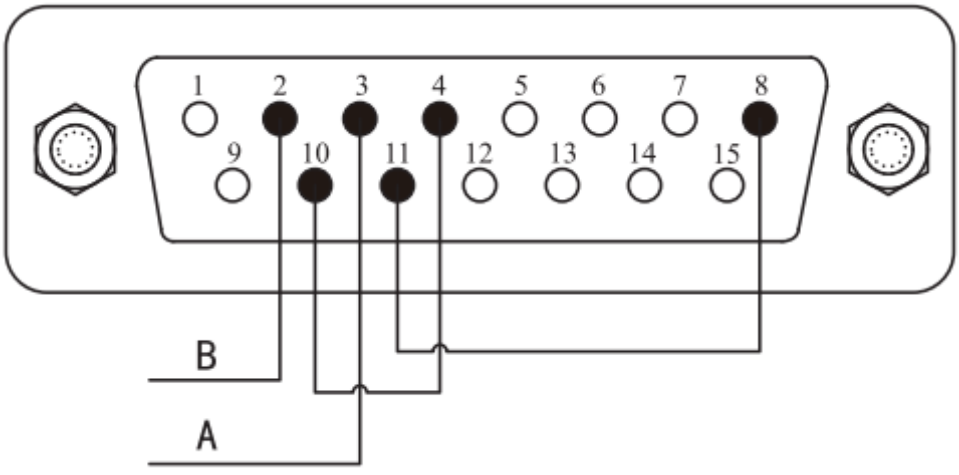


Figure 26 RS485 communication with internal auxiliary supply

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⚠ **Note:** Do not connect mains voltage to the external control connector. Apply only the signals shown in the connection diagrams to the corresponding pins. Do not exceed the permitted signal ranges or apply supply voltage to other pins. Otherwise, permanent damage not covered by the manufacturer's warranty may occur.

⚠ **Note:** Low-voltage signals must be separated from the mains supply. Use a separate shielded ground wire.

⚠ **Note:** Use suitable ferrules on the ends of stranded wires. Otherwise, equipment damage may occur.

1. Switch on. Select Int or Disp using MODE.
2. Set the pump address, baud rate, stop bits and parity to match the control system. Restart after changing the pump address.
3. Control pump functions using communication commands. Start/stop can stop the pump.

The communication connectors are D-sub connectors. They do not provide a direct Ethernet/RJ45 interface.

8.8 Setting the speed

Resolution is 0.1rpm. Increase and Decrease change the last digit with each press; hold to change the value faster.

Hold Full speed and additionally press Increase to set the highest speed directly. Hold Full speed and press Decrease to set the lowest speed directly.

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9 Wi-Fi setup, optional equipment

These functions apply only to equipment with the corresponding Wi-Fi module. Setup has no effect on equipment without a module.

1. Switch on. The corresponding symbol appears when Wi-Fi is disconnected. If only the key sound is displayed, press MENU and Increase simultaneously, select WiFi Set in the system menu and open it with start/stop. Select ON and return to the main screen with MENU.

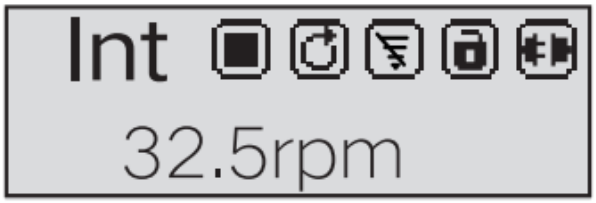


Figure 27 Wi-Fi disconnected

2. On the main screen, hold MODE for approximately ten seconds. Alternatively, open MENU, select WIFI Reset, open with start/stop, choose YES with the arrow keys and return with MENU. A beep sounds, the Wi-Fi symbol flashes and the pump is ready for network setup.



Figure 28 WIFI Reset for new network setup

3. Connect the phone to the intended Wi-Fi network and sign in to the Lead Fluid Cloud Control App.
4. On the app home screen, select + at the top right and add a Wi-Fi device. Check the detected Wi-Fi network, enter the password and select Connect. The added device should appear after approximately 20 seconds.



Figure 29 Display with a Wi-Fi connection

⚠ **Note:** A Wi-Fi menu shown in an illustration does not mean that every device has Wi-Fi. The tubing warning also requires the corresponding equipment and app.

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10 Troubleshooting and maintenance

10.1 Manufacturer's warranty and customer service

The manufacturer provides a three-year warranty for the complete drive. Pump head, tubing and other wear parts are excluded. The period starts on the purchase date shown on the valid proof of purchase. For quality issues within the warranty period, the manufacturer provides free repair or replacement.

For damage caused by human action, for example water ingress, dropping or improper use, the manufacturer describes repairs without labour charges but with material costs charged. Contact Labmaterial GmbH for clarification and handling.

Check the version of tubing and consumables before use. Unpacked and used consumables cannot be returned or exchanged except in case of quality defects; mandatory statutory rights remain unaffected.

10.2 Drive spare parts

Spare part	Specification
Fuse	1A
Power cable	250V, 10A

Table 8 Spare parts and specifications

Contact Labmaterial GmbH regarding spare parts and repairs. Do not open the equipment housing yourself.

10.3 Daily maintenance

- Check the tubing regularly for breakage, damage and loss of elasticity.
- Do not cover the rear cooling fan; heat dissipation must be ensured.
- Do not spray the pump with water. If tubing breaks, immediately remove spilled liquid from the head and dry the affected parts.
- Do not use chemical solvents to clean the pump and pump head surfaces.

⚠ **Note:** Always unplug the mains supply before opening the head cover, changing tubing or carrying out installation, dismantling or maintenance.

10.4 Maintenance schedule

Check	Frequency	Action if abnormal
Leaks and damage	Before every start; daily visual inspection; repeatedly during operation	Repair leaks and damage before resuming operation, replace defective parts and remove spilled liquid.
Unusual temperature or noise	Daily and repeatedly during operation	Check the cause and have worn parts replaced.
Tubing condition	At least every three days; more frequently if the application requires	Replace the tubing if flow drops below 75% of the initial value, if it has burst or is badly worn, or when the specified replacement interval is reached.
Pump head and rotor	Check roller movement weekly; inspect when changing tubing; perform a full annual wear check	Damaged or worn surfaces can cause premature tubing failure. Have worn parts replaced promptly; check bearings and bearing play.

Table 9 Regular checks and actions

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10.5 Troubleshooting

Fault	Checks and remedies
No display	Check the power cable and supply. If the fuse has blown, contact Labmaterial GmbH for replacement.
Motor does not rotate	Check the speed setting. At very low speeds, for example 0.1rpm, movement is only slowly apparent.
Drive vibrates	Check that the head fixing screws and lever are secure.
Motor rotates in one direction only	Check the direction key and external direction signal.
Keys do not respond	Check whether the keypad is locked. Hold start/stop to unlock it. Observe the selected external operating mode.
Loud operating noise	Motor resonance around 70rpm may increase noise. Check the head fixing screws and lever.
Communication does not work	First check the operating mode, pump address and duplicate bus addresses. Then check the wiring and power supply of the external control circuit.
External control does not work	First check the external operating mode, then the wiring and power supply of the external control circuit.

Table 10 Fault causes and remedies

If faults persist after checking settings and external connections, contact Labmaterial GmbH and do not repair the equipment yourself.

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11 Dimensions and ordering information

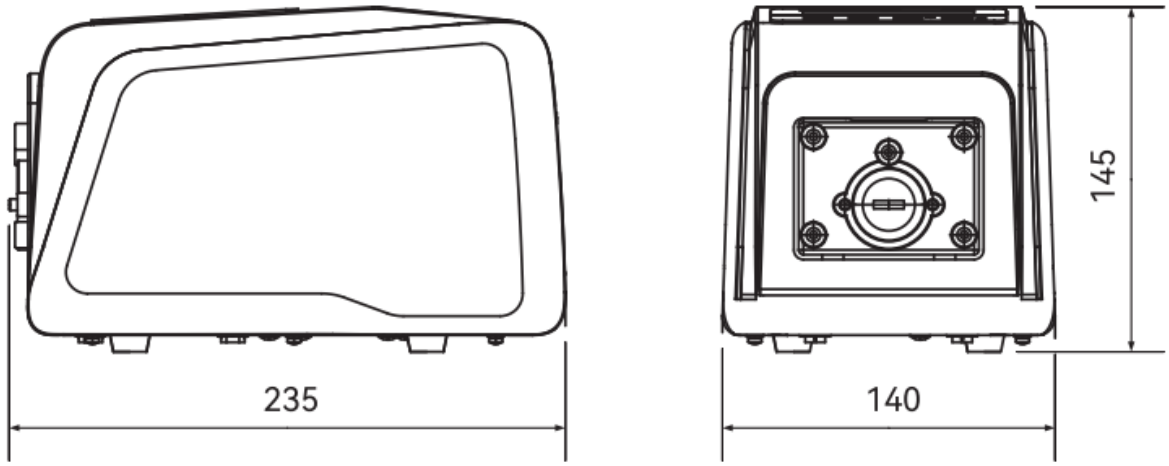


Figure 30 Dimensions of the BT103S drive in mm

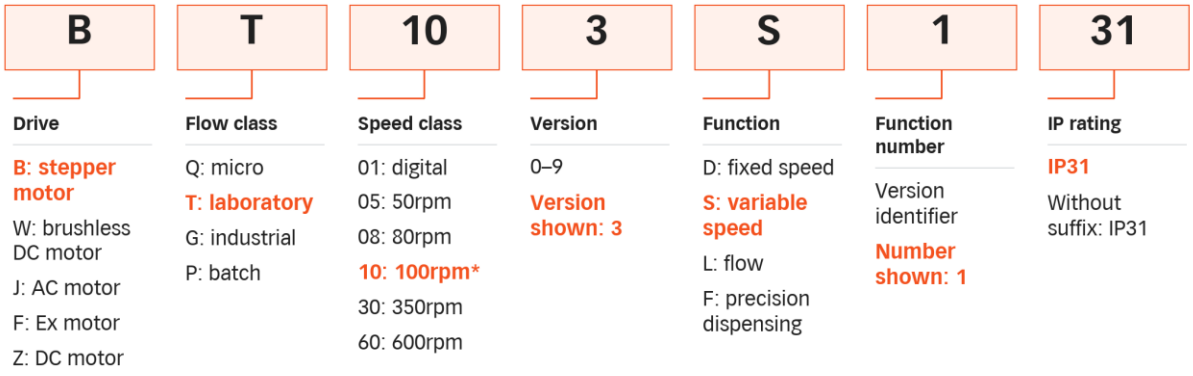
Labmaterial product code	Description	Configuration
1704_5	Peristaltic pump – Mini – 1 channel	BT103S + YT15
1704_6	Peristaltic pump – Mini – 2 channels	BT103S + DG10-2
1704_7	Peristaltic pump – Mini – 4 channels	BT103S + DG10-4
P1701_1	Foot pedal	Accessory for external triggering

Table 11 Our products and accessories

The scope of delivery depends on the ordered configuration. Other heads and tubing in the technical reference tables are not automatically included.

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12 Model designation



* BT103S: maximum 100rpm; speed class depends on model.

Figure 31 Model designation breakdown for BT103S

The designation comprises drive, flow class, speed class, version, function, version number and protection rating. The nameplate and technical data in Chapter 13 apply to the specific equipment.

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13 Technical data

Property	BT103S
Flow range	0.00011–500mL/min, depending on pump head and tubing
Speed	0.1–100rpm
Speed resolution / speed error	0.1rpm / less than ±0.2%
Timed dispensing	Running and pause time 0.1–999.9s/min/h; cycles 1–999; 0 for unlimited repetition
Operation	LCD display and keys; Chinese/English menus
Mains supply	230V, 50/60Hz
Power consumption	<30W
Environment	0–40°C; relative humidity <80%
Drive dimensions (L × W × H)	235 × 140 × 145mm
Drive weight	2.8kg
Housing	Plastic, ABS
Protection rating	IP31
Control	Digital inputs 5–24V; analogue setting 0–5V, 0–10V or 4–20mA; RS485/MODBUS
WLAN	Optional equipment

Table 12 BT103S drive technical data

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14 Pump flow table

Pump head	Channels	Compatible tubing	Flow per channel mL/min
DG/DS, 6 rollers	1, 2, 4	Wall 0.8–1mm; ID ≤3.17mm	0.00016–49
DG/DS, 10 rollers	1, 2, 4	Wall 0.8–1mm; ID ≤3.17mm	0.00011–32
YZ15 / YZ15T	1	#13, #14, #19, #16, #25, #17, #18	0.005–427
YT25	1	#114, #116, #15, #24, #35, #36	0.024–500

Table 13 BT103S technical head and tubing combinations

Pump head	Channels	Compatible tubing	Flow per channel mL/min
DT10-18	1	#13, #14; wall 0.8–1mm; ID ≤3.17mm	0.00023–64
DT10-28	2	#13, #14; wall 0.8–1mm; ID ≤3.17mm	0.00023–64
YZ25	1	#15, #24	0.17–300
YT15	1	#13, #14, #16, #19, #25, #17, #18	0.006–450

Table 14 Further technical head combinations

With DG10 and tubing with a 2.4mm bore, the reference flow at 100rpm is approximately 21mL/min per channel. The maximum of 32mL/min requires other tubing dimensions.

⚠ **Note:** The listed pump heads, channel counts and flow values per channel were determined with purified water and tubing at normal laboratory temperature and pressure. The values are for reference. Pressure, temperature, pumped medium properties, tubing material and other operating conditions affect actual flow performance. Contact Labmaterial GmbH for the specific application.

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15 Suitable pump heads



Figure 32 Overview of pump heads

Follow the corresponding head instructions and ordered configuration. Technical references do not guarantee the scope of delivery or a particular flow rate in the application.

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16 Electrical data for control inputs and outputs

16.1 Digital inputs

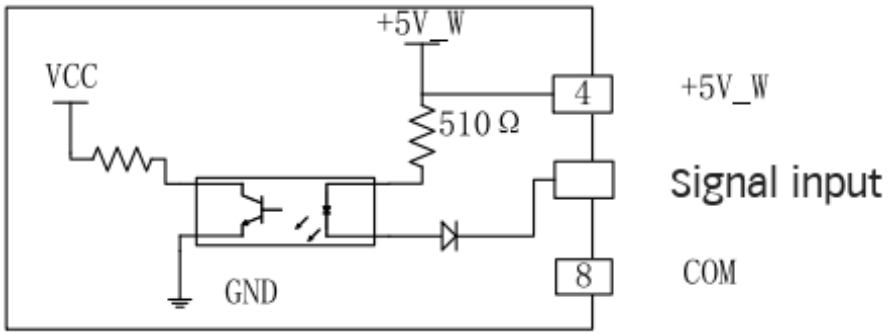


Figure 33 Optically isolated input circuit principle

Property	Parameter
Signal type	Open/closed contact or open-collector NPN transistor
External digital control voltage	5–24V
Isolation	Optoelectronic

Table 15 Electrical data of digital inputs

16.2 Digital outputs

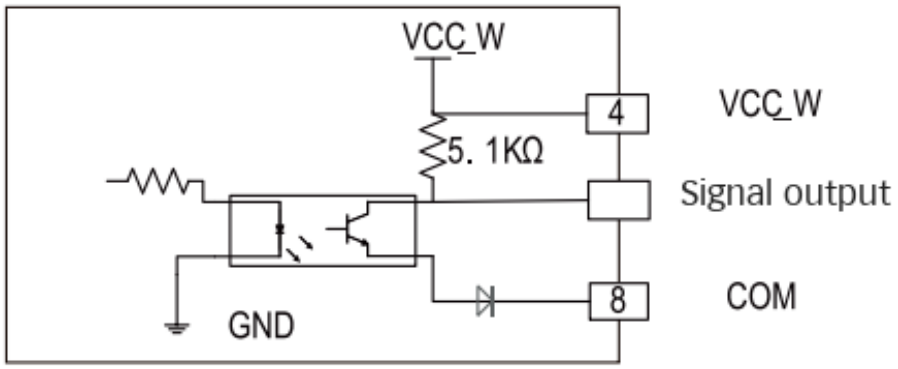


Figure 34 Optically isolated output circuit principle

Property	Parameter
Output type	Open-collector NPN transistor with internal pull-up
Isolation	Optoelectronic

Table 16 Electrical data of digital outputs

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16.3 Analogue inputs

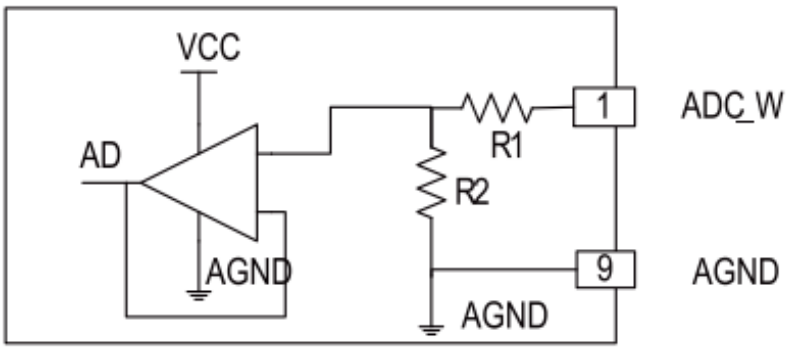


Figure 35 Analogue input circuit principle

Signal range	Input impedance below 100Hz	Permitted error	Resolution
0–5V or 0–10V	R1 = 2.1kΩ; R2 = 1kΩ	±1%	2.5mV
4–20mA	R1 = 91Ω; R2 = 160Ω	±1%	4µA

Table 17 Electrical data of analogue inputs

16.4 Internal auxiliary supply

Property	Parameter
Output voltage	12V DC ±1V
Permitted output current	<130mA

Table 18 Internal auxiliary supply

16.5 External control circuit supply

Property	Parameter
Permitted input voltage	5–25V DC
Required available current	>350mA

Table 19 External control circuit supply

The external control supply does not replace the pump's mains supply. The supply range of 5–25V does not permit applying more than 24V to the digital inputs. Only use the designated pins.

Disclaimer

The suitability of the pump, pump head and tubing for the intended application must be checked before use. To the extent permitted by law, Labmaterial GmbH accepts no liability for damage caused by improper use, failure to follow these instructions, unauthorised modifications or the use of unsuitable media and tubing. Liability for intent and gross negligence and mandatory statutory product liability remain unaffected.