Dosistar VD series

Manual

This manual is for all devices of the Dosistar VD series:
Devices with wheel sensor: Dosistar VD, Dosistar VDN, Dosistar VDS, Dosistar VDSS
Devices with auxiliary output: Dosistar VDA

Hardware version min.:	v.61
Firmware version min.:	v.6005
Manual version:	v.1.1

Table of contents

1   Overview

The Dosistar VD series is a control unit for electrical pump systems. It is used for dosing and measuring fluids, especially in agriculture. It allows power control of electrical pumps while simultaneously showing the current flow and the total amount dosed on the display. The Dosistar VD series keeps the selected flow constant through optimised control algorithms.

The DOSISTAR VD allows:
- Controlling the power of electric engines up to 12A or linear electric valves from 12V to 24V DC.
- Switching of external relays to control AC electric drives with higher voltage.

Multiple control modes are available:
- Control of a desired flow
- Control of a desired quantity (charge dosing) with automatic stop
- Control of a desired flow per area with measurement of the vehicle speed
- Customer specific dosing modes (which are not part of this manual)

The Dosistar VD series is easy to operate and shows the important functions and messages in the backlit display.
The Dosistar VD series can be remote controlled by external sensors like a pick-up switch or a wheel switch.

1.1   Protection functions
- Short-circuit protection
- Overload protection adjustable from 2A to 12A
- Overheat protection
- Reverse battery protection
- Adjustable protection against running dry or dosing errors in case of missing liquid
- Soft start to reduce strain on pump, motor and battery

1.2   Main features:
- 4 memory locations each for different fluids or flowmeter calibration values (50 … 29999 Imp/L) and wheel sensors (15 … 29999 Imp/100m)
- Display of current flow up to 9999 litres per hour
- Complex control algorithms to keep the flow constant
- Quick adjustment of parameters through variable step sizes
- Different scales are available: L/h, L/min, ml/min and L/t
- Display of the daily volume
- Display of overall volume
- Variable scale accuracy (0,01L up to 10L / 0,1L up to 100L / 1L accuracy above), the device is therefore suitable for very small flow rates
- Different calibration options
- Pick-up switch allows remote controlled pause or standby function
- Remote controlled start off the charge dosing function with the pick-up switch (as an alternative to the pick-up pause function)
- Remote controlled pause or standby function through the wheel sensor (in case of normal flow dosing)

2 Device description

2.1 Control and display elements

Display
two-line LCD
display

Warning light
Blinks when an
error or a warning
occurs

Indicator light
Green light
whenever the
pump is running

Control knob
turning knob
with push
function

Display shows:
```
1 Dosierung  P: 45%
12,1L /h      7,83L
```

warning
motor
Dosistar

connector
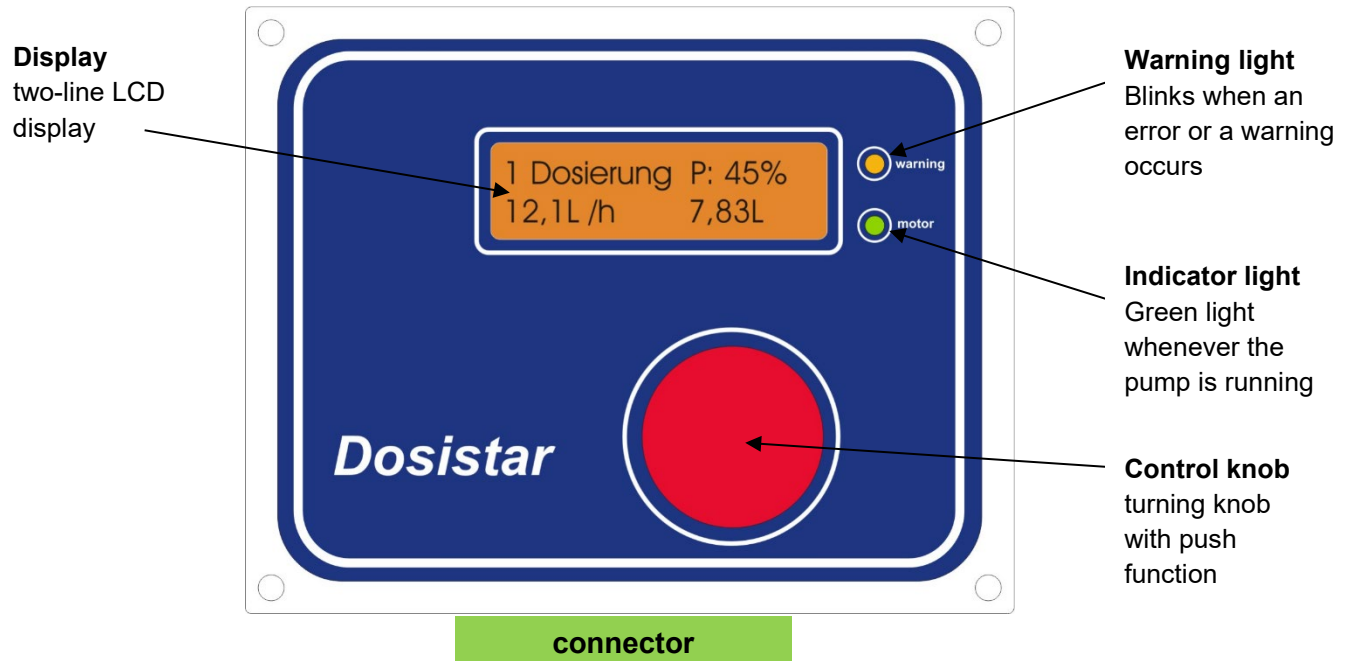
With the knob all user inputs of the device are carried out. In addition, it serves for turning on and off the device. The knob can be turned without limitation in both directions. The knob audibly clicks when turning. Every click corresponds to one step. Effected settings are confirmed with the push knob functionality.

2.2 Funktions

2.2.1 Switching the device on and off

Pressing the knob once turns the device on. In order to turn the device off press and hold the knob for 3 seconds. The device will show the message `switch off`.

2.2.2 Menu navigation

All settings and parameters can be adjusted through the menu. To keep the menu efficient, only the most important menu points are shown during normal operation. The menu point `advanced menu` can make the whole menu structure visible if needed.

Attention! Depending on your device type the order of menu points may vary. The visibility of some menu points can be dependent on the chosen dosing mode.

Use the turning knob until the desired menu point is visible in the display. The numbering will help with identifying the current position in the menu structure. Pressing the knob will enter the chosen menu point. Repeated button presses always lead back to the main menu without changing any settings.

3 Menu points

The chapter titles are identical to the menu titles in the device itself. The order of menu points can vary depending on device type.
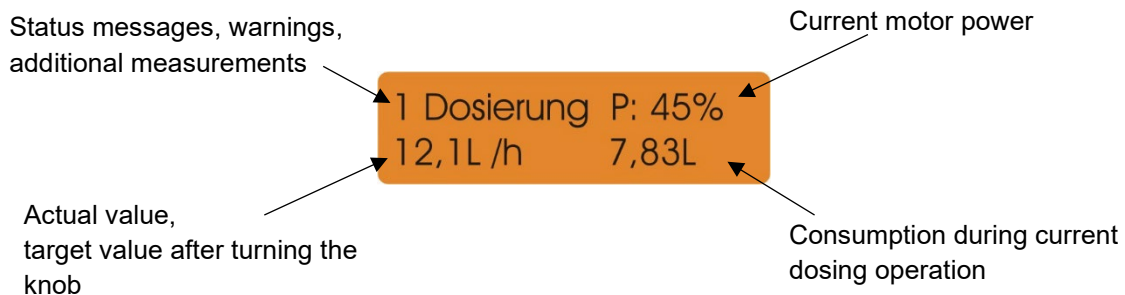
3.1 Advanced menu

Here the extended menu can be made visible. By default, it is turned off when switching on the device. Only when turned on all menu points can be reached. Many points of the menu are never used during daily operation and are often only used once during initial device setup. By deliberately hiding menu points the device remains clear and easy to use.

3.2 Dosing

During normal use, this is the only required menu point. You are automatically in this menu point after switching the device on. This menu has a fixed position and is always in first place.

A button press starts the dosing. The basic placement of elements in the display is always the same, although there can be slight variations depending on the chosen dosing mode.

Status messages, warnings, additional measurements

Current motor power

1 Dosierung P: 45%
12,1L /h   7,83L

Actual value,
target value after turning the knob

Consumption during current dosing operation

By turning the knob, the desired flow can be adjusted. The target flow will be shown for 5 seconds after turning the knob, afterwards the actual flow will be shown. During active control the motor power is adjusted so that a constant target flow is achieved. The user has to make sure that the desired flow is actually achievable with the given combination of pump, nozzle and dosed liquid.

If the device is used to switch a relay, no flow control is possible.

The display shows the current motor power or the relay state, the current flow and the already dosed amount.

Pressing the button again will stop the motor. You are now back in the main menu. Repeated button presses allow a repetition of the dosing process. The target flow value is automatically saved when ending the current dosing process, and remains available even after switching the device off and back on again.

3.2.1 Dosing functions

The behaviour and the appearance of the dosing menu is dependant on the chosen dosing function. Here, a list of possible dosing functions gives a rough overview. A detailed description of the available settings can be found in the corresponding chapters. Customer specific dosing modes, that are not present in all devices, are not part of this manual.

3.2.1.1 Measure flow

This dosing mode controls the pumps power so that a constant flow is achieved. The dosing runs until the user stops it by pressing the knob.

Target value	flow [volume/time]
Measurements	Actual flow value [volume/time], dosing amount [volume]
Stop condition	User input
Remote control pick-up	Active pick-up pauses the dosing process dosing resumes if pick-up is deactivated
Remote control wheel sensor (if available/ activated)	No speed measurement, only differentiates between vehicle standing/ moving dosing pauses when vehicle stops
Relay use	Possible
Pulsating pump	Possible

3.2.1.2 Pump fixed charge

During charge dosing a predefined amount will be dosed. After reaching the set amount the pump will automatically stop. The flow rate is not controlled, instead the motor power is set directly.

Target value	Motor power in %
Measurements	Actual flow value [volume/time], remaining amount of current charge [volume]
Stop condition	Remaining amount = 0L or user input (aborting the current charge dosing)
Remote control pick-up	Active pick-up pauses the dosing process dosing resumes if pick-up is deactivated
Remote control wheel sensor (if available/ activated)	No speed measurement, only differentiates between vehicle standing/ moving dosing pauses when vehicle stops
Relay use	Possible
Pulsating pump	Possible

3.2.1.3   Area dependant dosing

Through vehicle speed and adjustable working width, the area per time can be calculated. The control algorithms then adjust the pump so that a constant amount per area is dosed. Changes in vehicle speed are automatically accounted for.

Target value	Dosing amount [volume/area]
Measurements	Actual dosing amount [volume/area], dosing amount [volume] speed [km/h]
Stop condition	User input
Remote control pick-up	Active pick-up pauses the dosing process dosing resumes if pick-up is deactivated
Remote control wheel sensor (if available/ activated)	Always on as part of the control loop, (the pause function for stopped vehicles that can be activated separately will be ignored)
Relay use	No
Pulsating pump	No

Since the use of a wheel sensor is mandatory for area dependant dosing, the use of this dosing function on devices with auxiliary output (instead of a wheel sensor input) is not possible.

3.2.1.4   Driving simulation

As a sub-function of the area dependant dosing mode the driving simulation can be used. In that mode the vehicle speed is not measured but instead simulated through an adjustable value. This allows a test of the dosing function with standing vehicles, and emergency function with broken or missing wheel sensor.

Target value	Simulated vehicle speed [km/h]
Measurements	Actual dosing amount [volume/area], dosing amount [volume]
Stop condition	User input
Remote control pick-up	Active pick-up pauses the dosing process dosing resumes if pick-up is deactivated
Remote control wheel sensor (if available/ activated)	inactive
Relay use	No
Pulsating pump	No

3.3   Adjust charge
This menu point is only visible if _Pump fixed charge_ has been chosen as dosing function.

Here it is possible to enter a predetermined amount to dose. Choose the amount to dose (between 0 and 9999.9 liters) by turning the knob. The value is entered one digit at a time.

3.4   Working width
This menu point is only visible if _Area dependant dosing_ has been chosen as dosing function.

For the correct calculation of the area from the vehicle speed, the current working width of the machine is essential. Here the working width can be adjusted between `0.1 m` ... `99 m` by turning the knob.

3.5   Driving simulation
This menu point is only visible if _Area dependant dosing_ has been chosen as dosing function.

In this menu the vehicle speed and the dosing amount can be pre-configured. The vehicle speed can be switched between two different modes:
- `Off`: there is no driving simulation, speed will be measured through the wheel sensor
- `0…99 km/h`: the wheel sensor will be ignored, the control loop will use the simulated value instead (a speed of 0 km/h does NOT deactivate the driving simulation, it is a valid value for the simulation)

The speed can be adjusted by turning the knob. To fully deactivate the driving simulation, lower the speed below zero (the setting will read `off`). You can save your current setting by pressing the knob.

The second adjustable value is the target value for the dosing amount in L/ha. Adjust the value by turning the knob. The step size will automatically adjust relative to the current value, and can be saved by pressing the knob. While actively running the driving simulation this value cannot be adjusted.

The dosing amount (with deactivated driving simulation) or the speed (with driving simulation active) can also be adjusted during the dosing process. The device will automatically save the last used values independent of the menu in which they were set.

3.6 Choose dosing function

The devices of the Dosistar VD series are very flexible. For different use cases there are three main dosing functions.

1. **`Measure flow`**
   A Pump is controlled to achieve a constant flow rate and simultaneously current flow rate and dosed amount are shown.

2. **`Pump fixed charge`**
   This dosing function doses a pre-defined amount, and then stops automatically. The current flow and the remaining amount to be dosed are shown. The size of the charge is adjusted beforehand in the separate menu *Adjust charge*.

3. **`Dosing L/ha`**
   this mode enables area or speed dependant dosing. In addition to the flow rate the vehicle speed must also be measured (see also menu *Driving simulation*) and the working width must be set (menu *Working width*).

Depending on the device type additional special dosing functions can be available.

3.7 Daily quantity

Here the total amount dosed since the last reset of daily quantity or total quantity is displayed. Clearing the daily quantity has no effect on the total quantity. When entering the menu, you can use the knob to choose either **`clear? yes`** or **`clear? no`** to reset the counter to zero or to return to the main menu.

3.8 Gesamtmenge

Here the total amount dosed since the last reset of the total quantity counter is displayed. Clearing the total quantity also clears the daily quantity. The method is the same as with the *Daily quantity*.

3.9 Select cali value

The calibration value is the number of pulses generated by the flowmeter if 1 litre flows through the flowmeter. It depends of the flowmeter and the viscosity of the liquid to measure. This menu selects the special calibration value for your process. By selecting this menu, the actual calibration value and its memory place is displayed. Choose the memory place to select by turning the knob.

The calibration values can be changed in menu *Adjust cali value* and *Flow meter calibration*.

3.10 Adjust cali value

This menu organises the memory places for calibration. You can assign a name to each memory place consisting of a word with a maximum length of 8 letters or numbers. This assigned name should have a connection to the name of the liquid that is stored at this memory place.

First select the memory place to edit by rotating the knob. Then press the knob to start editing. The stored name is shown on the display and the first letter is blinking. You can now change the letter by turning the knob. After pushing the knob, the letter is stored and the next letter can be changed.

Afterwards the calibration value can be entered in the same way, digit by digit. Possible values are between **50** and **29999**.

Below are the calibration values shown for DIGMESA Flowmeters and water at 20°C:

Flowmeter type	Pulses per litres
1,0 mm	2223
2,5 mm	764
4,0 mm	382
5,6 mm	256
7,0 mm	165

The input of name and calibration value can be aborted by switching off the device.

3.11 Flow meter calibration

The most precise way to obtain the right calibration value is to calibrate the device with the liquid you want to dose. This is done by dosing a known amount of said liquid while simultaneously counting the impulses generated by the flowmeter. Due to the nature of the calibration process the more accurate results require larger amounts to be dosed. Calibration with only one litre is only recommended for very small flow rates to keep the calibration time within reasonable bounds.

For the calibration process a container with known volume is required. Large measuring beakers are recommended.
- Fill the whole system with the liquid (pipes, pump, flowmeter...). For this use the menu *Work without flow meter*.
- Select menu flow meter calibration
- Select flowmeter memory place
- Select the quantity for calibration `1L` … `10L`, depending on your measuring container.
- Dose the desired quantity into the measuring container and stop when quantity is reached. To do so the pumps power can be adjusted manually with the knob. Reduce the flow rate towards the end of the calibration for an optimal timing when switching the pump off.
- On display the number of pulses from the flowmeter is shown.
- If the procedure was successful the new calibration value can be stored in memory by selecting `save? yes`.

Make sure you always pump into and not out of the measuring container.

3.12 Work without flow meter

This menu allows to work without flow meter and pick-up sensors. It can be used with defect flow meter or during filling in processes.

Attention! *The dry running protection function is not active.*

The rotary knob can be used to change the pumps power or to switch the relay respectively. The display shows the current power in % and, depending on device type, additional information like current consumption or counted flow meter pulses (display only, no control function).

The internal current measurement has a limited accuracy (typically around ±1A). If an exact measurement is required, the use of an externally connected true RMS ampere meter is mandatory.

3.13 Language

The device can use multiple different languages for its menu. Available languages are: **German**, **Englisch**, **Estonian**, **Dutch**, **Finnish**, **Danish** and **French**.

Additional languages can be added on demand. Contact us for more information.

3.14 Unit

Depending on the use case the dosed volume can vary greatly. It is therefore possible to display the flow in different units. Available are:

- **L/h**   litres per hour
- **mL/min**   Millilitres per minute
- **t/h**   tons per hour (see also *Adjust amount litre per tonne*)
- **L/min**   Litres per minute

Only the currently chosen unit is displayed and can be changed with the knob.

3.15 Adjust amount litre per tonne

If t/h (tons per hour) has been chosen as display unit in the menu *Unit* a scaling factor is needed to convert between mass/time and volume/time. This menu is used to enter said conversion factor in the unit litre/ton.

3.16 Choose the type of pump

Dosistar VD devices use different methods of calculating the current flow. Peristaltic pumps for instance can dose in a very irregular manner due to their working principle. This can lead to massive fluctuations in the display (in the range of seconds). In such a case choose **pulsing flow** in this menu. The flow rate updates much slower but is also more accurately displaying the average flow. If your pump delivers a constant flow choose **steady flow** instead.

Consumption measurement is not influenced by this setting.

Attention! *The choice of pump type also influences the control algorithms. Not all dosing functions are available when using pulsing pumps.*

In case of doubt test both options. In most cases **steady flow** is the preferred setting.

3.17 Choose output function

The Dosistar VD devices have a power output. Typically connected is the motor of a pump whose output power is regulated by the device. To use other loads connected to different voltage levels, it is possible to connect a relay to the output. If `switch relay` is chosen, the output will only switch between on and off. Alternatively `motor control` can be chosen.

The dosing function *Area dependant dosing* cannot be used when `switch relay` has been chosen.

3.18 Current limit adjust

To protect the pump from overload the current is electronically limited inside the device. The current limit can be set in this menu and prevents damage to blocked or overloaded motors. The maximum current limit should be 30% above the typical current of the pump.
If the pump needs more than the adjusted value a yellow warning light is blinking and the current will be limited. The display will show `Overload!` or just `load!`

An estimate of the typical motor current can be gained in the menu *Work without flow meter*.

3.19 Adjust alarm level

The Dosistar VD series possesses a two-stage dosing alarm system:
- `Underdose` the red warning lamp flashes but the dosing process will continue
- `Dry run` the red warning lamp flashes and the pump is stopped

For both alarms limits can be set below which the alarms will trigger. The limit is given as a percentage of the target flow value. Additionally, both alarms have an adjustable time delay. The flow must be below the warning limit for that many seconds before the alarm will actually trigger.

If the device is fitted with an optional acoustic buzzer, it can be switched on and off in the final setting of this menu. Warnings (pump keeps running: underdose and overload) will trigger one short beep once a second. Alarms (emergency stop: dry run, temperature, short circuit) will trigger continuous noise.

3.19.1 Other alarms

Parallel to the adjustable alarm limits for motor current and dosing limits, the device has always on self-protection functionality.

In case of a hard short circuit across the motor the device immediately switches the motor off and displays `! short cut !` In such a case thoroughly check all wires and the motor itself before turning the device back on.

If the device overheats the motor will be stopped and the message `! temperature !` will be shown. Once the device has cooled down you can turn the motor back on. Additional information can be found under *Technical data*.

3.20 Regulation

The control algorithms of the Dosistar VD series of devices make sure that the target value is quickly reached and that disturbances are quickly eliminated. The control algorithms parameters have been fine tuned in many experiments in the field. However, in special cases it might be necessary to adjust these parameters. Available parameters are:

- `Maximum flow` The flow rate at full power (default 600L/h)
- `Start value pump` as percentage of the maximum motor power (default 30%)
- `Parameter Kp` the proportional part of the PI-controller (default 1800)
- `Parameter I` the integral part of the PI-controller (default 600)

The values can be changed one by one. The settings will be saved when pressing the knob. If possible, try to avoid changing the settings of proportional and integral part.

The maximum flow is the flow that can be achieved in the system at full motor power. This includes resistance from tubes and nozzles.

The start value of the pump is the value from which the control algorithm starts regulating the motor power. It allows adjusting the behaviour during initial motor start up.This parameter is only active immediately after switching the device on. If a dosing process has been started once, the control algorithms will always resume from the last operating point. This guarantees the fastest possible control of the pump speed, if the dosing has been temporarily disrupted, for example after standby due to an activated pick-up switch.

The Dosistar VD is a switching regulator that controls the pump voltage. Like all switching regulators, the Dosistar VD can generate a whistling noise depending on its operating point, which some users find unpleasant. Activating the `low noise` option shifts this tone from 2.5 kHz to 20 kHz (just outside the human audible range) by changing the switching frequency.

However, this increase in switching frequency also causes higher switching losses! The self-heating of the device increases, and the maximum available power decreases. If the Dosistar shuts down due to a temperature error message, the low-noise option cannot be used. Thoroughly test whether your system can handle the increased self-heating over an extended period!

3.21 Sensor functions

A running dosing process can be interrupted with the pick-up switch. The pick-up sensor can, for example, be linked to the lifting mechanism of the mower. An optional wheel sensor can check for vehicle movement and is able to interrupt the dosing process if the vehicle stops. As pick-up switch, both opening and closing switches can be used. Instead of using a switch, the pick-up function can also be driven by an external voltage. Refer to chapter *Connection* for more information.

This menu allows choosing the pick-up polarity. Use the knob to choose between:
- `Closing switch`   (NO – normally open)
- `Opening switch`   (NC – normally closed)
- `OFF`   Pick-up input deactivated

Without connected sensor `Closing switch` and `OFF` behave identically.
The option OFF allows ignoring a sensor in case of an error without interfering with the cables and disconnecting the sensor.

Afterwards the wheel sensor can be turned on and off. Simply choose between `Wheel sensor NO` and `wheel sensor YES`.

In the dosing functions *Measure flow* and *Pump fixed charge* the wheel sensor input only differentiates between standstill (no impulses detected) and movement (impulses detected). Vehicle speed is not actively measured. Therefore, a wheel sensor calibration is not necessary when using these dosing functions.

In the dosing function *Area dependant dosing* this menu's wheel sensor setting will be ignored. The wheel sensor is always active, and has to be calibrated before use.

Tip: *If you are working with neither pick-up switch nor wheel sensor choose the options* `Closing switch/OFF` *and* `wheel sensor NO`*.*

3.22 Choose pick-up type

The standard use of the pick-up input is that of a pause/standby-switch. If activated the dosing stops until the input gets deactivated again.

For charge dosing (see *Pump fixed charge*) this menu allows to change the function of the pick-up into a remote-controlled start signal. Once the input is activated the device will start dosing a single charge.

The polarity of the pick-up input can be changed in the menu *Sensor functions*

3.23 Select wheel sensor

The calibration value of the wheel sensor is the number of impulses generated when driving 100m. In this menu a calibration value can be chosen and be loaded from memory. When entering the menu, the currently selected memory location is shown with calibration value and wheel sensor name. use the knob to choose a memory location. Entering values or calibrating the wheel sensor can be done in the menus *Adjust wheel sensor* and *Calibrate wheel sensor*.

3.24 Calibrate wheel sensor

For the correct calculation of the vehicle speed, needed by the *Area dependant dosing* function (option Dosing L/ha in *Choose dosing function*), the number of impulses generated while driving 100m must be known.

During calibration the impulses generated will be counted while driving a known distance of 100m in a straight line and without swerving.

Before calibration use the knob to choose one of the memory locations. Pressing the knob selects the currently shown memory location and starts the calibration process. The display then reads `drive 100m`. Start driving now. The bottom line shows the number of counted impulses. At the end of the calibration distance press the knob once more. Save the new calibration value if everything is in order.

If the number of impulses is too small `too few impulses` will be shown in the display, and the new calibration value is automatically dismissed.

3.25 Adjust wheel sensor

For the correct calculation of the vehicle speed, needed by the _Area dependant dosing_ function (option Dosing L/ha in _Choose dosing function_), the number of impulses generated while driving 100m must be known.

In this menu a known calibration value can be entered directly. Additionally, a unique name can be entered for every memory location.

First select the memory place to edit by rotating the knob. Then press the knob to start editing. The stored name is shown on the display and the first letter is blinking. You can now change the letter by turning the knob. After pushing the knob, the letter is stored and the next letter can be changed.

Afterwards the calibration value can be entered in the same way, digit by digit. Possible values are between `15` and `29999`.

3.26 Sensor test

This menu allows quick testing of all connected sensors, in order to test the wiring and to find errors in the system.

The top line shows the current pick-up state. The display shows 1 if the pick-up is active (corresponds with dosing paused) and 0 if the pick-up is inactive (corresponds to dosing process is running). The displayed state already acknowledges the pick-up's polarity. It therefore does not necessarily correspond to the electrical state of the signal line. The current setting is also displayed:
- `Pick-up NO` – closing switch
- `Pick-up NC` – opening switch

The bottom line shows the counted impulses for both wheel sensor and flow meter.

It can be difficult to generate flow meter impulses for testing purposes if the flow meter has already been installed (blowing through the flow meter is then no longer possible). In such a case you can alternatively use either the _Work without flow meter_ or the _Flow meter calibration_ menu. In these menus you can manually adjust the pumps power while simultaneously counting flow meter impulses.

3.27 Administrator

The Administrator's menu contains useful information for service and maintenance purposes.

`Total quantity` and **`Operating hours`** are non-resettable counters. They document the dosed amount (depending on calibration) and the total runtime of the pump (independent of dosing mode or actual motor power) over the entire service life of the device. These values can be used to assess and plan the timing for service and maintenance intervals.

The **`Factory reset`** reverts the device back into its configuration during delivery. It resets all settings and calibration values to its defaults. All calibrations will be lost. In some device types this function is password protected. In such a case contact your distributor.

The **`Master-password`** is exclusively for the service personnel of the IML Electronic GmbH. Repeatedly pressing the knob lets you skip the password entry so you can return to the main menu.

If a **`Factory reset`** has been accepted with **`YES`**, the device will switch off automatically when leaving the menu. During the next start up the device's memory will be reinitialized. This might take a few seconds longer than normal.

4 Connection

The Dosistar VD has a central 10pin connector. This connector is used for all electrical connections. Pay special attention to proper wiring. Use the connection diagrams for orientation. The connector should be mounted with housing strain relief and cable kink protection. Use the connectors lock screws to guarantee a tight connection with the device.

4.1 Recommended cable cross sections

Supply voltage: $>= 2{,}5mm^2$
Motor connection: $>= 2{,}5mm^2$
All sensor connections: $>= 0{,}34mm^2$

Larger cross sections do no harm, smaller cross sections lead to increased losses and can produce faults.

4.2 Connections

Connections vary between devices with wheel sensor compared to those with auxiliary relay

Die Anschlussbelegung unterscheidet sich bei Geräten mit Radsensor gegenüber den Geräten mit Transportrelaisausgang.

Pin Nbr.	Function with wheel sensor	Alternative function auxiliary relay
1	Flow meter plus	
2	Flow meter signal	
3	Flow meter minus	
4	Wheel sensor	Auxiliary relay/ solenoid valve (switched supply voltage)
5	Pick-up sensor	
6	Supply voltage pick-up and wheel sensor	
7	Motor minus	
8	Motor plus	
9	Supply voltage minus	
10	Supply voltage plus	

Attention! The connector is placed upside down in the device (screw heads pointing down/ to the back)
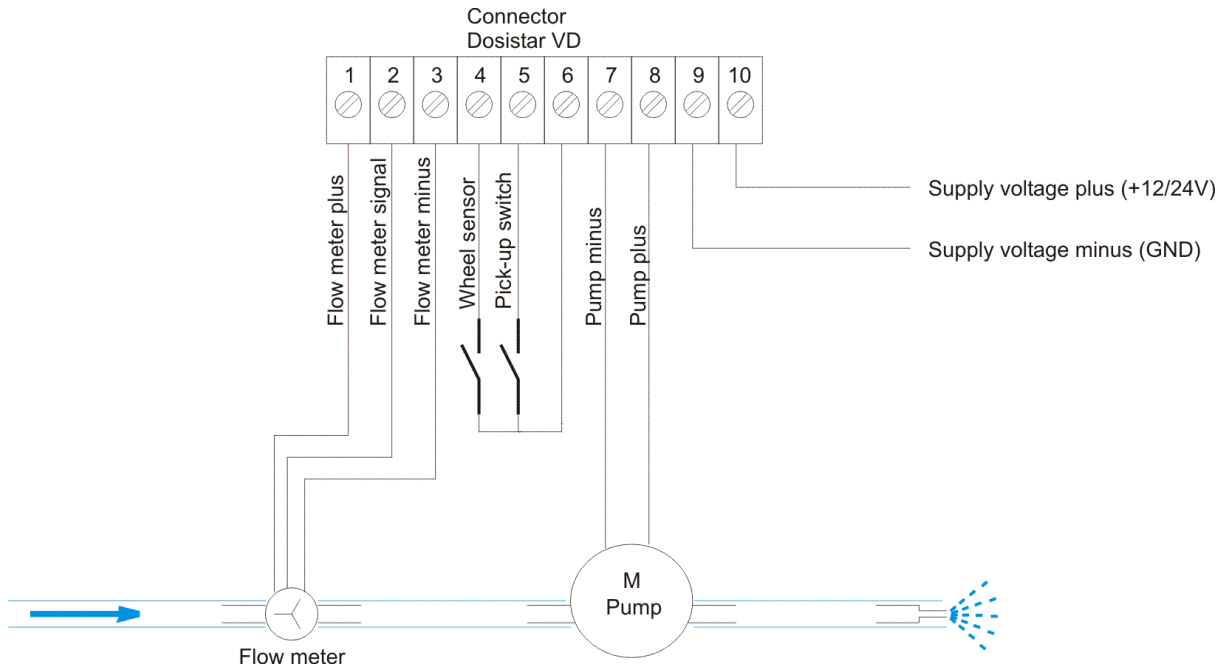

1   2   3   4   5   6   7   8   9   10

Connector Dosistar VD

1	2	3	4	5	6	7	8	9	10

- Flow meter plus
- Flow meter signal
- Flow meter minus
- Wheel sensor
- Pick-up switch
- Pump minus
- Pump plus

Supply voltage plus (+12/24V)

Supply voltage minus (GND)

M Pump

Flow meter

Figure 1: connection scheme A (applies to devices with wheel sensor)

Connector Dosistar VDA

1	2	3	4	5	6	7	8	9	10

- Flow meter plus
- Flow meter signal
- Flow meter minus
- Solenoid valve +12V
- Pickup-switch
- Pump minus
- Pump plus

Supply voltage plus (+12/24V)

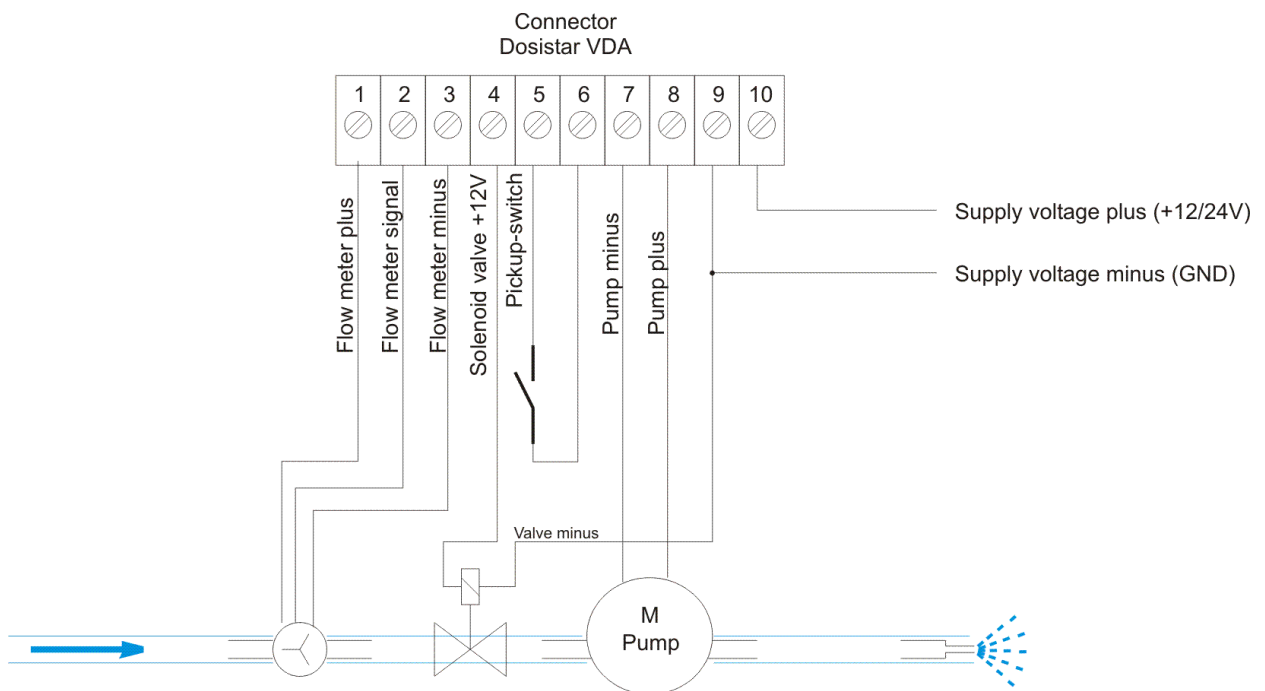Supply voltage minus (GND)

Valve minus

M Pump

Figure 2: connection scheme B (applies to devices with auxiliary relay)

Attention! All following alternative configurations only show changed single components. All omitted components are to be connected according to above default connection schemes A and B. A combination of multiple alternative connection schemes is possible.
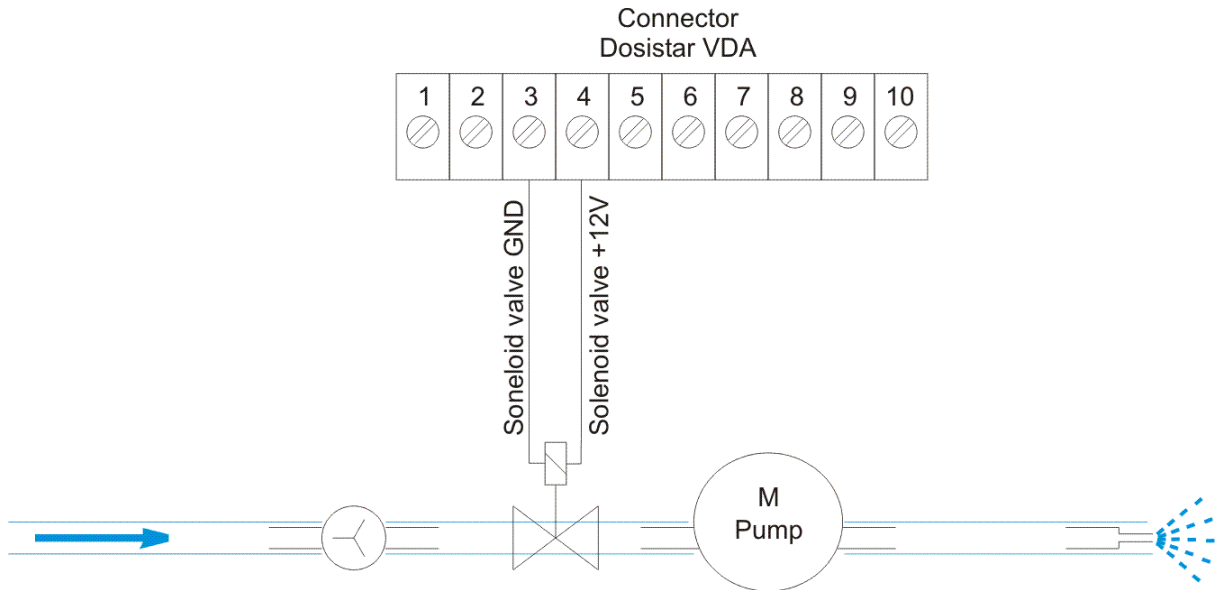
Connector Dosistar VDA

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Soneloid valve GND

Solenoid valve +12V

M Pump

Figure 3: connection scheme B1 – solenoid valve ground connected to flow meter ground (only applies to devices with auxiliary relay)

Connector Dosistar VD

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Pickup-signal from on-board electronics +12V...24V

Connector Dosistar VD

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Pickup PNP-Sensor GND
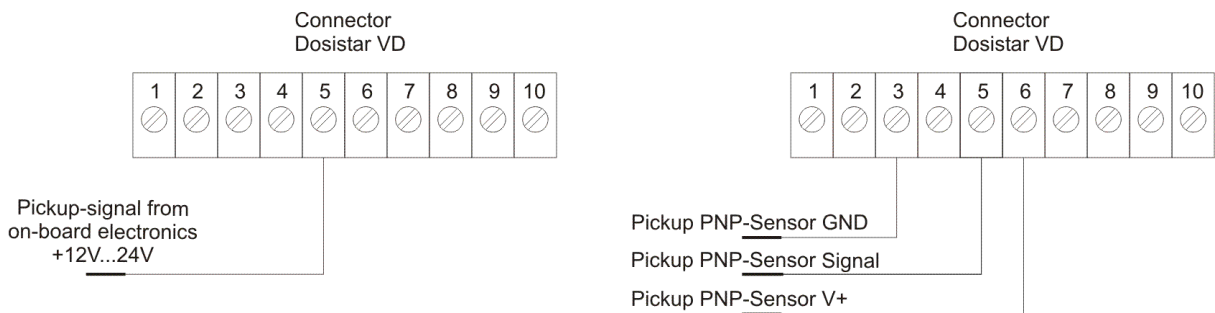
Pickup PNP-Sensor Signal

Pickup PNP-Sensor V+

Figure 4: connection scheme C1(left) – Pick-up supplied externally instead of through pin 6
(referenced to supply/ vehicle ground)
connection scheme C2(right) – use of a PNP-sensor as pick-up
A wheel sensor (if available) can be can be used in a similar fashion on pin4 instead of pin 5

Connector Dosistar VD

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Relais -

Relais +

Supply voltage plus (+12/24V)

Supply voltage minus (GND)

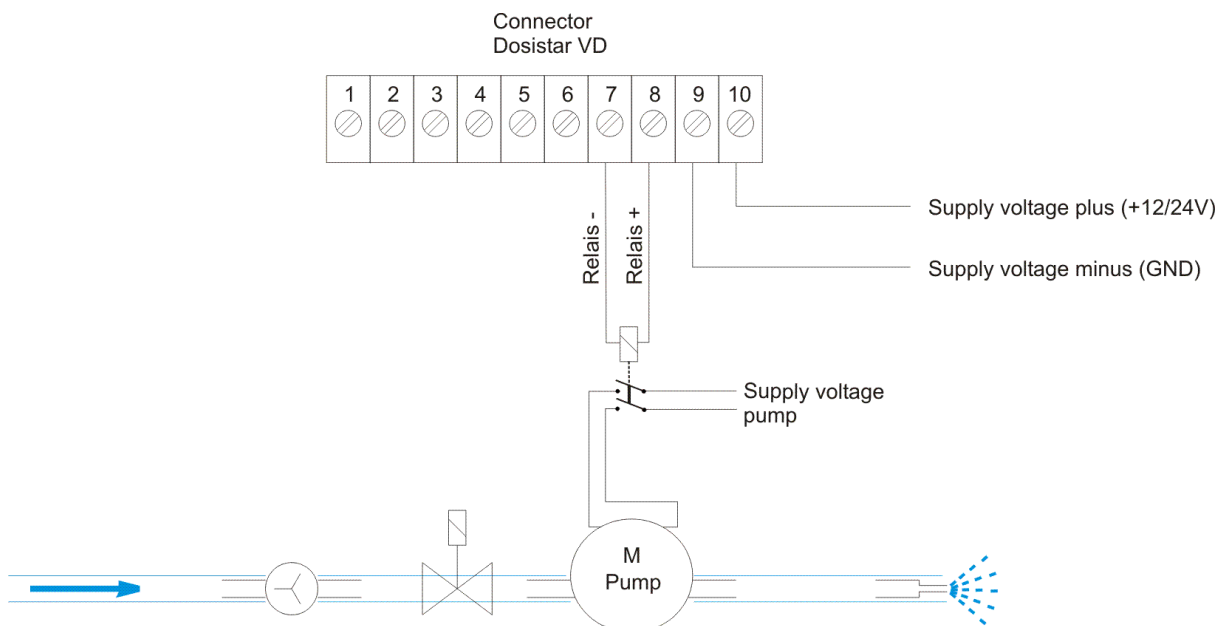Supply voltage pump

M Pump

Figure 5: connection scheme D – control of a rela instead of a motor

4.3   Flow meter connection

Please use a shielded cable for the connection to the flowmeter. The Dosistar VD is for use of flowmeters with open collector NPN outputs. Cables to the flowmeter should not run parallel to the cables for the pump and the supply of the device. Take care of the right polarity. Wrong polarity will destroy the flow meter.

4.4   Pick-up and wheel sensor connection

The connections 4 and 5 are voltage inputs. For active state connect a voltage between 10V and 24V. There are 2 possibilities to achieve this:

1.   Use the voltage from contact 6 to contact 4 or 5. Connect these pins with a switch or a reed-contact See connection scheme A.

2.   The voltage is supplied by the vehicles on board electronics. Use external voltage. See connection scheme C1.

3.   Use a sensor with pnp-output (see connection scheme C2):
     Sensor plus   pin 6 (12V sensor supply)
     Sensor minus   pin 3 (sensor ground from flowmeter)
     Sensor signal   pin 5 (pick-up) or pin 4 (wheel-sensor)
     Current consumption of the sensors must not exceed 100mA

4.   Use a sensor with npn-output (**not recommended**)
     The Dosistar VD series is not designed for the use with npn-sensors. However, if no other sensor is available, it is possible to use an npn-sensor in the described way:
     Sensor plus   pin 6 (12V sensor supply)
     Sensor minus   pin 3 (sensor ground from flowmeter)
     Sensor signal   pin 5 (pick-up) or pin 4 (wheel-sensor)
     additionally: add a resistor (1kΩ) between pins 5 and 6
                            make sure all wires are properly isolated

4.5   Motor connection

The contacts 7 and 8 are for the electrical load. This can be an electrical engine in a pump, an electrical relay, an analog electrical valve or a switching valve. Be sure that the cable cross section is thick enough for the load and keep the cables as short as possible.

4.6   Supply connection

The connector's pins 9 and 10 are used for the voltage supply of Dosistar and load alike. Cable cross sections should be at least identical with the motor cables. The supply line, coming from the vehicle's battery, should be protected with a properly dimensioned fuse. Keep the cable length as short as possible.

The Dosistar can also be supplied by a power adapter. If the device is used to control a relay in most cases a 12V 300mA power adapter is sufficient.

4.7   Auxiliary relay connection

On devices with auxiliary output, a transport relay or a solenoid valve can be connected to the Dosistars pin 4. If the pump is activated, the auxiliary output is always on too. The output voltage on pin 4 is equal to the supply voltage. Therefore auxiliary loads have to be chosen compatible to the supply voltage.

The maximum allowed load on the auxiliary output is 1A.
The auxiliary load's ground should ideally be connected directly to supply groung.

Alternatively, in can be connected to the flow meters ground connection.
Attention! *Depending on flow meter type, this connection scheme can cause interference on the flow meter input. Test carefully!*

5   Mechanical assembly

The Dosistar VD series is fitted with a strong permanent magnet. It allows mounting the device on many metallic surfaces. If no magnetic surfaces are available, use the included retaining plate, which can be screwed to any appropriate surface.

To remove the Dosistar, grab it with both hands and tilt the upper corner forwards.

6   Step by step commissioning

This part gives a simplified overview of the necessary configuration

1. *Choose dosing function*
   Decide which mode you want to use: `measure flow`, `pump fixed charge` or area dependant dosing (`Dosing L/ha`)

2. *Choose output function*
   Is a motor directly connected to the device or do you control a relay? Choose your output type.

3. Choose a flow meter value in the menu *Select cali value* or enter a known value in the menu *Adjust cali value*. The best option however would be to directly calibrate the sensor in the menu *Flow meter calibration*.

4. *Choose the type of pump*. In most cases the option `steady flow` is preferable.

5. Configure additional inputs in the menu *Sensor functions*. If you are working with neither pick-up switch nor wheel sensor, choose `closing switch` and `wheel sensor NO`

6. Set the maximum allowed motor current in the menu Current limit adjust. You can generally find the nominal motor current on the motors type label. Set the motor current approx. 30% above the nominal current.

7. Choose a *Unit* fitting for your application. If you want to use the unit `L/t` adjust the conversion factor in *Adjust amount litre per tonne*

8. Under *Regulation* set the `maximum flow` expected in your system.

9. Adjust additional parameters applicable to your chosen dosing function:
   9.1. Charge dosing: *Adjust charge* to set the amount to dose in litres
   9.2. Area dependant dosing: set your *Working width* and activate the *Driving simulation* if needed

10. Start the dosing process in menu 1 Dosing (the actual menu name may vary depending on the chosen dosing function)

7 Technical data

Supply voltage range:	10V… 28V DC
Current consumption Dosistar VD	150mA
Load current [1][2]:	9A constant, 12A peak (motor startup)
Auxiliary output [3]:	switched supply voltage
Max. current auxiliary output [3]:	1A
Input frequency flow meter/wheel sensor:	2Hz ... 2000Hz (2...2000 Impulse / Sekunde)
Calibration value flow meter:	50…29999 Impulses/Litre
Calibration value wheel sensor [4]:	15…29999 Impulses/100m
Dimensions:	120mm x 95mm x 65mm
Operating temperature range [1][2]:	-20°C bis 45°C
Weight:	0,45kg
Protection level:	IP54

[1] Tested at 20°C ambient temperature with 12V supply over 3 hours.
   Always test your specific setup.
   For accuracy, current measurement should be done externally with a true RMS current meter, since the internal measurement of the Dosistar is merely an estimate.
   Continuous maximum power output can be reduced under certain conditions:
   - Reduced cooling due to insufficient airflow around the case or because of increased ambient temperatures
   - Additional power losses in the system (corroded connectors, insufficient cable diameters, motor not running smooth)
   - Different supply voltages or specific system setups
   - Customer specific modifications not reflected by this manual

[2] maximum power output is limited by 2 independent alarm circuits:
   - Current limiting (adjustable through the _Current limit adjust_ menu, default set to 12A), gives the `! Load !` warning, does not stop the motor but limits maximum current, can be used to limit overall power output although this might reduce maximum flowrate
   - Temperature (not adjustable, measured internally), this is for self-protection of the Dosistar, gives the `! Overheat !` alarm and shuts the motor down
   - Output power is only valid with deactivated low noise option (see _Regulation_)

[3] The auxiliary output is not available in all device types.
   The maximum load current is reduced by the current of the auxiliary output. At a maximum auxiliary load of 1A the permissible constant motor current drops from 9A to 8A.

[4] The wheel sensor input is not available in all device types.

8 Troubleshooting

Switch on is not possible	Check the power-supply: voltage and polarity
When starting a dosing process the messages **Pick-up** or **Standstill** are displayed despite no sensors being installed	Check the settings of the _Sensor functions_ menu
Device turns off during motor start-up	Low voltage through high start-up current check menu _Choose output function_ (**motor control**) Power-supply may not be strong enough or cables are too thin.
Device shows **short cut**.	Check all connections. Loose connections can cause high start-up currents. Do not add an additional switch into the motor cable.
Device shows **dry run** error despite liquid being present	No signals from flowmeter. Motor power set too low? Check for blocked tubes. Check flowmeter and cables.
Device stops with **temperature** error	Device becomes too hot. Insufficient ventilation (cooling happens over the casing) Pump may not run smoothly. Check pins in the connector for dirt or corrosion (increased contact resistance)
Discrepancy between dosed and measured amount	Flow meter calibration is wrong or flow meter is dirty. Possible interference on the cables. Pump may be defect. Liquid may move back and forth.
Control is very slow or swings	Check **maximum flow** in the menu _Regulation_.
Motor starts very slow or not at all, motor power shows very small value.	Check **maximum flow** and **Start value pump** in the menu _Regulation_.
Knob sits directly on the casing, pressing the knob not possible	Knob slipped on its axis. Remove the snap in plastic cover on the knob. Loosen the nut and slightly move the knob up.
Device not reacting to pressing or turning the knob	Knob defect, send device in for repairs

9 General handling information

- Do not use voltages above maximum ratings!
- Do not use battery chargers as power-supply! Open circuit voltage can be in excess of 50V!
- Look out for correct polarities and secure connections!
- Look into the security manuals of the liquids you want to dose!
- The housing of the Dosistar is used for heat transfer! Make sure there is proper ventilation around the Dosistar
- Make sure that there is no moisture at the electrical contacts!
- Do not use high-pressure cleaning equipment to clean the Dosistar VD! Use a wet rag instead
- Be carefully with the foil above the display, do not use pointy things on it!
- The turning knob is sensitive to rough handling. Prevent sideway forces to avoid permanently bending the axis.
- Avoid vertical forces on the knob that go far beyond what is necessary for the push function. Do not place heavy things on top when the device is in storage.

10 Additional options

We offer you a wide range of accessories:

- Flow meters for different liquids and flow ranges
- switches, pick-up sensors
- magnet sensors for use as wheel sensors
- power-supplies for small and medium power
- additional translations on request

You have special wishes or ideas? Contact us! We are willing to help you with your individual dosing needs.

11 Manufacturer:

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