

d.Drive Pump C30



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1 Scope of delivery

Product number:	900763
Scope of delivery:	2-syringe-pump d.Drive Pump C30 2x valve (3-2) PTFE/PCTFE, ¼-28-UNF (pre-assembled) 2x Y-junction PEEK, ¼-28-UNF (pre-assembled) 24 V/DC power supply
Additionally required:	2 syringes (have to be ordered separately)
(not included in delivery)	Set of connection tubings (has to be ordered separately) Fill & Dispense tubing (has to be ordered separately)

2 Technical Data

Technical specifications:

Power supply:	24 V/DC (external power supply)
Dimensions:	W180 x H250 x D130/180 mm
Weight:	approximately 3,9 kg
Syringe volume:	25 µl to 12.5 ml (wetted parts out of borosilicate glass/PTFE)
Valve:	3/2 way with ¼-28 UNF (wetted parts out of PTFE/PCTFE)
Step Resolution:	181.490
Flow range:	0,01µl/min – 75ml/min (depending on assembled syringes)
Max. Pressure:	6 bar (depending on syringe size)

2.1 Safety information

Stay away from parts of the pump in motion while the device is in operation. Never try to remove valves, syringes or tubes while syringe drive is in motion. Never move the pump while in operation.

In the event of accidental liquid spillage onto the device, turn off the pump and wipe it clean with sufficient disinfectant or chemical. Take characteristics of spilled liquid into account with all precautions necessary.

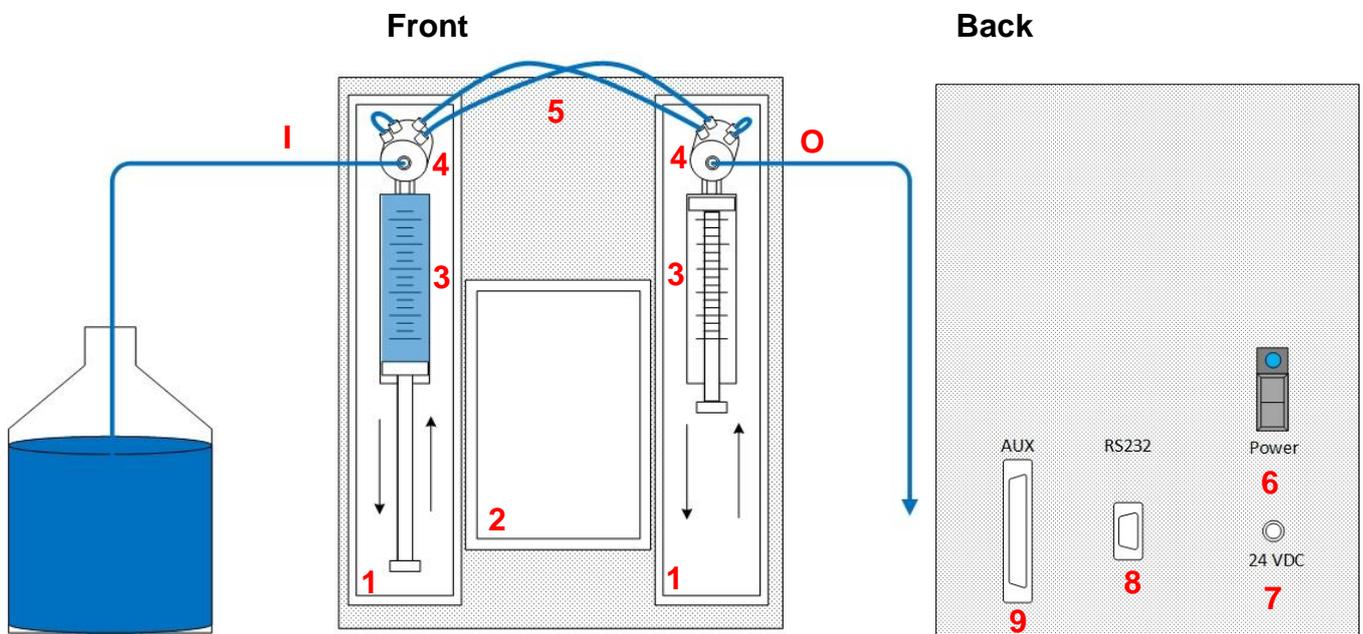
For control via touch panel only use fingers (also with gloves) or specially designed pens. Peaky or sharp objects can damage the touchscreen.

Do not use the system under direct sunlight, which reduces durability and function of the touchscreen.

3 Device description d.Drive Pump C30

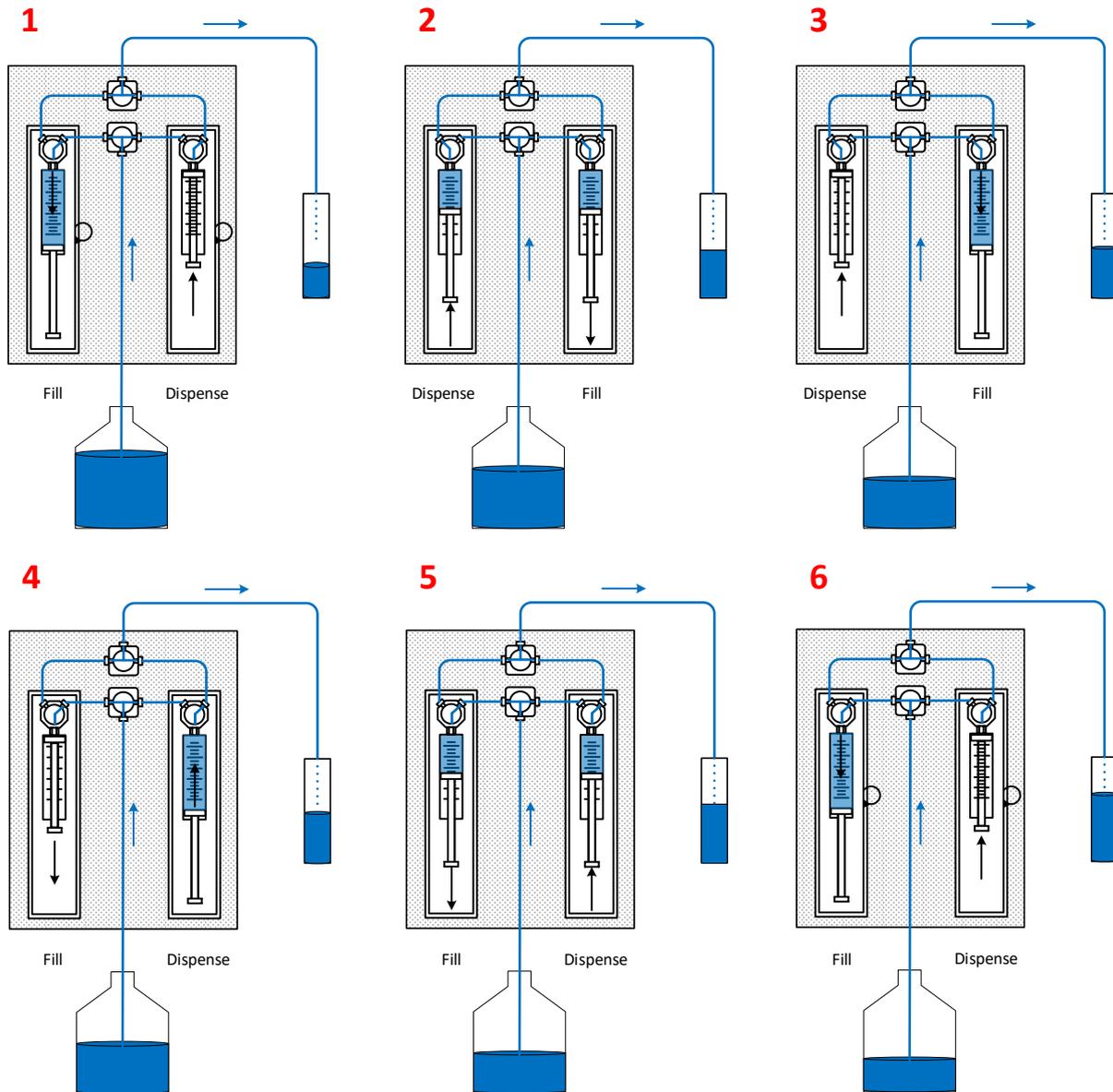
The d.Drive PUMP is a high-precision pump with low pulsation for laboratory, process engineering and industrial application for dosing in a range from nl/min to ml/min. The built-in materials enable the metal-free delivery of various media (aqueous, organic, aggressive, highly viscous, gaseous). Consequently, applications of this pump can be found in chemical industry, pharma, biotechnology, medical engineering, food industry and production industries. Operation and control of this pump can optionally be performed via a touch panel (manually), a windows software or via trigger signals using the I/O port.

3.1 General Setup



- | | |
|--|---|
| 1 Syringe module | 6 On/off switch |
| 2 Touch panel | 7 Power socket for 24 V/DC |
| 3 Syringe | 8 RS232 interface |
| 4 Active 2/3 way valve incl. Y-junction | 9 AUX port (I/O interface for SPS) |
| 5 Set of tubes | |
| I Input side | |
| O Output side | |

3.2 Theory of Operation



The d.Drive PUMP C30 is a 2-syringes-drive. While one syringe delivers the liquid, the other syringe is preparing for the subsequent stroke. The alternation of both syringe motions is performed by two contrary acceleration gradients in order to achieve a smooth transition. The flow is almost pulsation free. The valves are actively controlled and the pump is self-priming.

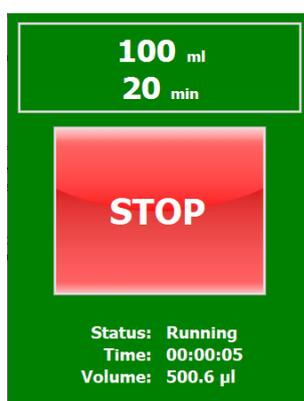
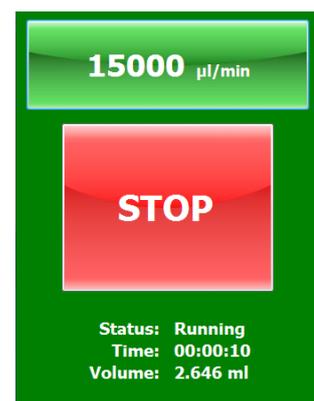
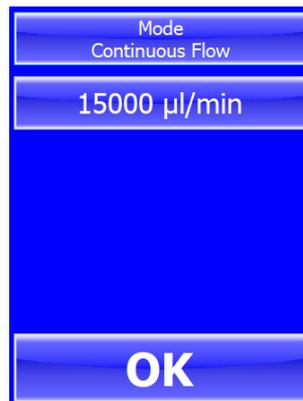
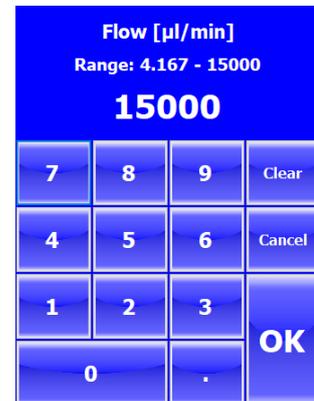
The flow rates cover – depending on assembled syringe - a range from 0.04µl/min to 75ml/min. Besides continuous lifts also finite dosing is realizable. Control and monitoring of the pump can be ensured by RS232, Bluetooth as well as by analogue or TLL-signals. Additional to the function as a pump every syringe drive can be controlled separately which enables various applications of liquid handling in fields like research, development, production and process engineering.

3.3 Functions, parameters, settings

Function	Description	Touch panel	Software	IO Port
Continuous Pumping [Continuous Flow]	Indefinite pumping function with currently set flow rate	x	x	x
Finite Dosing [Total Time & Volume]	Dose volume and time are set and after dose volume or time is achieved the pump is stopped automatically.	x	x	
Start Pump [START]	Continuous pumping resp. finite dosing is started. For this purpose, a syringe is lifted completely and then pumping starts. For pumping directly after start, the step "PREPARE" has to be performed beforehand.	x	x	x
Stop Pump [STOP]	Continuous pumping resp. finite dosing is stopped. Is the pump started again afterwards, first a syringe is lifted completely and then pumping starts again.	x	x	x
Reverse Flow Direction [Reverse Flow]	In „Reverse Flow“ mode the pump picks up liquid under the set flow rate in µl/min instead of pumping.	x	x	
Set Syringe Size [Syringe Volume]	Different syringe sizes can be set.	x	x	
Change Flow Rate on the Fly	While pump process is running (only continuous flow) the flow rate can be adjusted. This flow rate is active for the next possible point in time.	x	x	x
Initialize [INIT]	Valves are set to defined position („Init Direction“). Afterwards, the syringes drive to the top with defined speed ("Init Prime Speed").	x	x	x
Change Initialization Direction [Init Direction]	Set valve direction for initialization. Input (left) or output port (right) can be chosen.	x	x	
Service Position [Move Syringes Down]	Syringes move down for easy disassembly and assembly.	x	x	
Rinse [PRIME]	Device is rinsed with defined speed [0-9].	x	x	x
Prepare [PREPARE]	Syringe fills medium in order to deliver immediately with given flow rate right after start.	x	x	
Display Time Period & Volume	Display time period and dosed volume since last reset resp. restart of the pump.	x	x	
Reset Time Period and Volume [Reset Counters]	Reset display of time period and volume.	x	x	
Chose Units	Chose units for flow rate, dosing rate, dose volume and dosing time from a list.		x	

3.4 Touch panel

With the touch panel in the front all functions of the device can be executed. It enables an easy, intuitive and direct control of the pump. All relevant parameters can be adjusted and read up.



3.5 RS232 Interface & Software

Windows Software:

In principle, windows software enables the same control like the touch panel. An additional function is the selection of units for flow rate, dose volume and dosing time.

The user interface of the software is equal to the display of the touch panel.

Linking between control computer and pump is performed by RS232 interface using a RS232/USB cable or RS232/Bluetooth adapter.

RS232 Protocol:

Technically versed users can control the pump directly using the RS232 command protocol and without DURATEC software.

3.6 I/O Interface

It is possible to control the device via a process control combined with an I/O port. Beforehand, pump and flow parameters are saved into the memory of the pump via RS232 interface or selected via the touch panel. Then, functions like: Init, Start, Stop, Prime, can be executed by a trigger signal. The flow rate is set by an analog signal and can be adapted during a running pumping process. For status check output signals for busy and error are provided.

PIN Configuration I/O Port:

PIN	Function	Description
1	Init	Input, active low
2	Start	Input, active low
3	Stop	Input, active low
4	Prime	Input, active low
5	Error	Output, active low
6	Busy	Output, active low
7	n/a	Not used
8	Boot	For service only
9	5VDC	auxiliary voltage, 500mA max
10	GND	Ground
11	GND	Ground
12	GND	Ground
13	GND	Ground
14	GND	Ground
15	Flow	Analog signal, 0 to 5V = 0 to maximum flow (10bit)

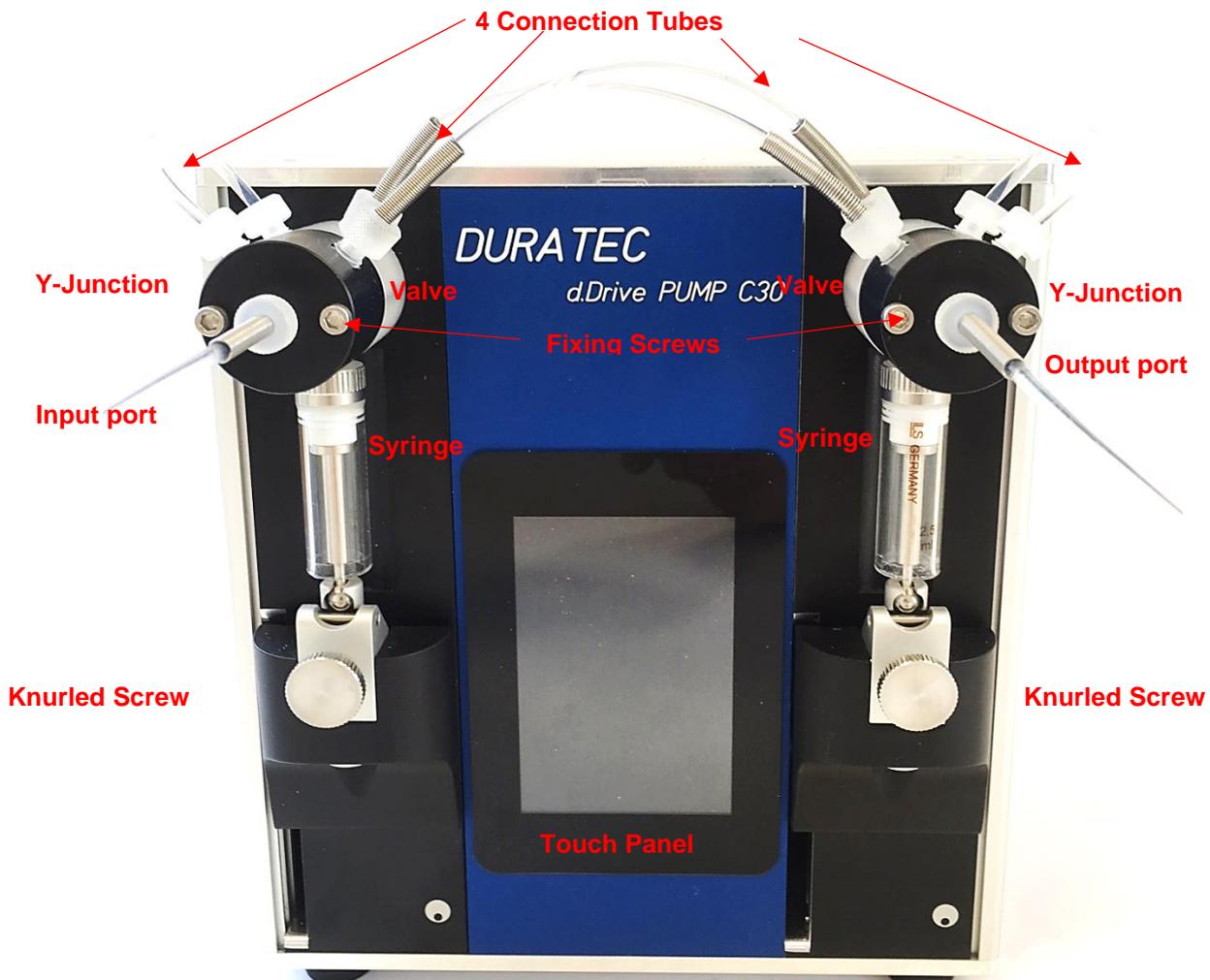
4 Putting into Operation

4.1 Selection of the right environment

Choose a clean, dry and flat area for the pump where it will not come into contact with hazardous chemicals, radiation and/or biohazardous substances. Leave enough space around the device to ensure adequate ventilation. Make sure there is an outlet nearby to connect the power cord.

4.2 Construction of the device

If you have ordered the required syringes and connecting tubes with the device, they are already pre-assembled on the device.



1. Connect the power adapter to the power supply.
2. Mount the inlet tubing at the input and outlet tubing at the output (tubings are not included in the scope of delivery).
3. Switch the device on using the toggle switch on the back of the device [On / Off switch]

5 Control

The device can be operated / controlled in 3 different ways:

- Touch panel (front)
- RS232 interface (rear connection - SUB D 9-pin)
- I / O port (rear connection - SUB D 15-pin)

5.1 General Operation

The user interface of the touch panel and the software have the same structure. Control via the software also offers the option of selecting the unit for the flow rate, the dosing volume and the dosing time.

5.2 General Workflow / Function

By pressing the according key buttons, the actions are carried out directly or the selection and setting windows for parameterizing the device open.

1. Turn on device
2. **[INIT]** Initialize device
3. **[Setup]** Set device parameters
4. **[PRIME]** Fill/rinse fluidic path
5. **[Continuous Flow]** or **[Total Time & Volume]**
[Flow] Flowrate respectively
[Total Volume] Volume & **[Total Time]** time adjustment
6. **[PREPARE]** Prepare
7. **[START]** Start pumping/dosing
8. **[STOP]** Stop pumping/dosing
9. **[STATUS]** Control via status display
10. **[Reset Counters]** If required, reset counter before next start



5.2.1 Start Screen



[FLOW DISPLAY]: Selection menu for the operating mode

[START]: Starts the pumping or dosing process. If no [PREPARE] has been carried out before, first one of the two syringes is fully filled and then the dispensing process will start.

[INIT]: Valves move to the defined position ("Init Direction"). The syringe then moves up at the defined speed ("Init Prime Speed").

[PREPARE]: The syringe is moved down so that the pumping / dosing process begins immediately right after the start.

[PRIME]: The device is rinsed with the set speed level [0-9] from the input to the output side.

[STATUS]: Open status menu

[SETUP]: Open setup menu

5.2.2 Settings (Setup)



[Syringe]: Information on the syringe size / volume used in µl

[Reverse Flow]: In "Reverse Flow" mode, the pump draws the liquid at the set flow rate instead of pumping it. In this mode, the input and output ports are swapped.

[Reverse Init]: Selection of the valve position during initialization. You can choose between the reservoir (left) and the delivery side (right).

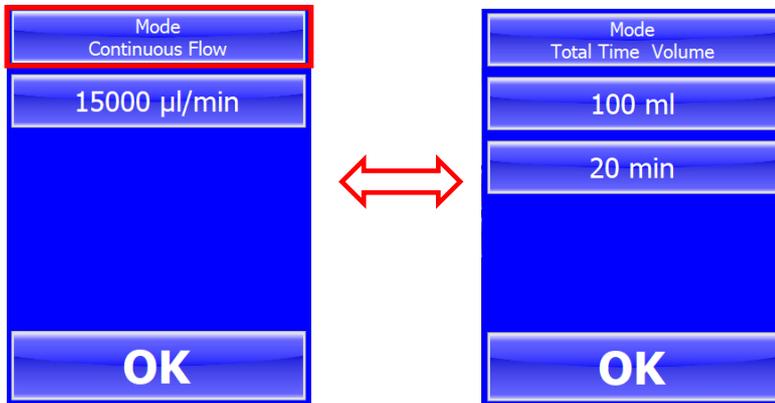
[Move Syringes Down]: Syringes are lowered for easy disassembly & assembly.

[Init Prime Speed]: Setting the speed level 0-9 for initialization and rinsing (0 = slow & 9 = fast)

[OK]: Confirms the entry and returns to the start menu

5.2.3 Selection of Operation Mode

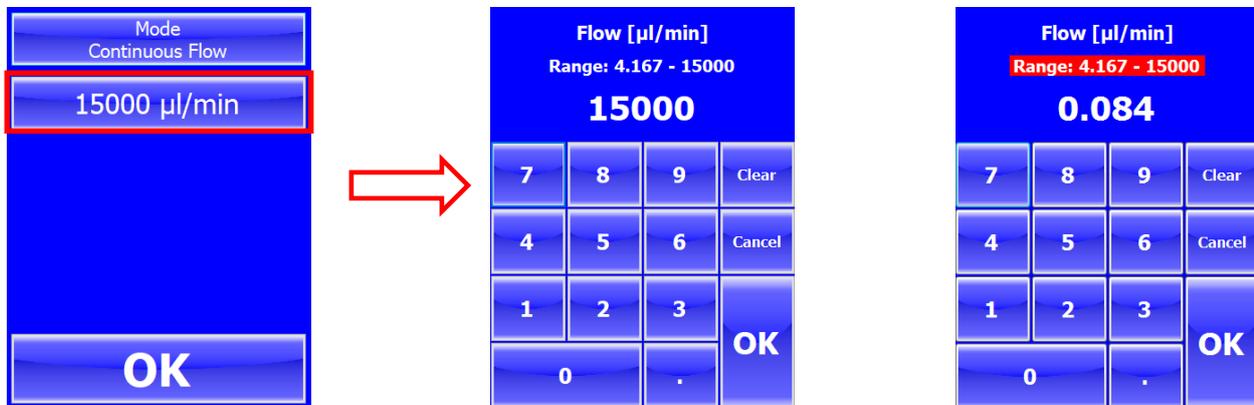
By pressing the "Mode" button, you can switch between the two operating modes.



5.2.4 Setting Flowrate [Continuous Flow]

Pressing the flow rate field opens the input dialog for the flow rate.

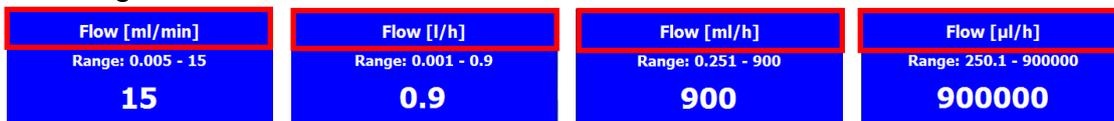
Entries are limited to max. 6 characters. The possible input range (Range) is displayed.



- [Clear]: Delete entry
- [Cancel]: Back to overview
- [OK]: Confirm entry

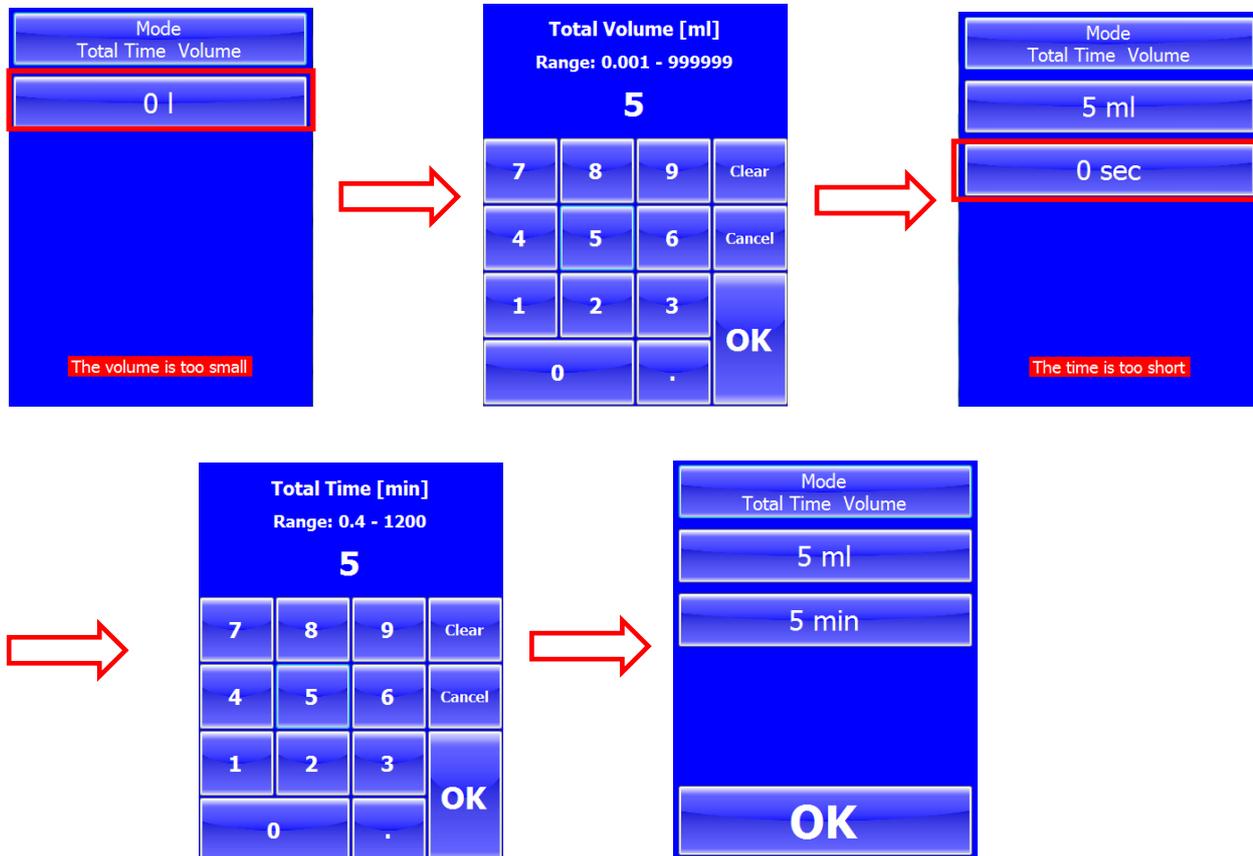
Chose Unit Flowrate – only for Windows Software

Pressing „Flow“ enables the selection of flowrate units



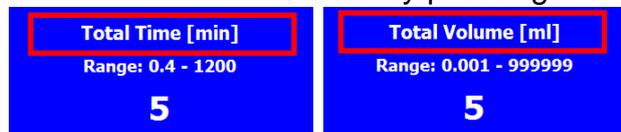
5.2.5 Setting volume and time for finite dosing: [Total Time & Volume]

Pressing the volume field opens the input mask for the flow rate. The possible input range (Range) is displayed. By pressing OK the time field appears. Now the dosing time can be entered.



Select unit dosing volume & dosing time - only possible with Windows software

The units can be selected by pressing "Total Time" or "Total Volume"



Total Volume [µl; ml; l]
Total Time [sec; min; h]

5.2.6 Status-Display

Overview Run-Time, Dosing Volume & Firmware Versions



[Status]: Displays current pump status

[Time]: Displays total dosing time

[Volume]: Displays total dosing volume

[Reset Counter]: Display run-time and volume are reset to 0.

Firmware version

[OK]: Confirm entry and get to start menu

5.3 Operation via RS232 interface / software "d.Drive Pump"

In addition to the touch panel, the pump can also be controlled via the RS232 interface (RS232 command set on request) or via the special "d.Drive Pump" Windows software (P/N 900760-001).

5.3.1 RS232 Interface Parameters

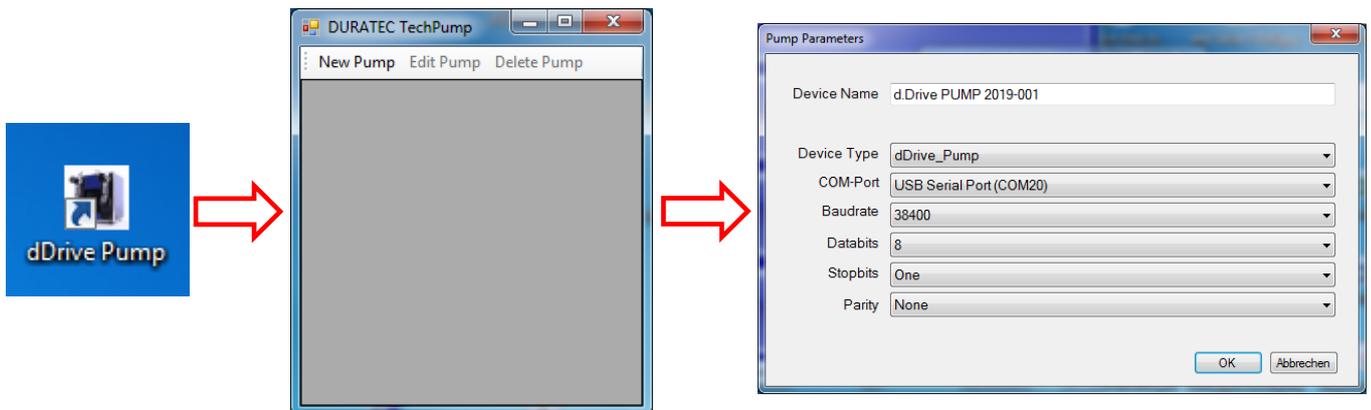
Baudrate: 38400
Databits: 8
Stopbits: One
Parity: None

5.3.2 Installation Windows Software

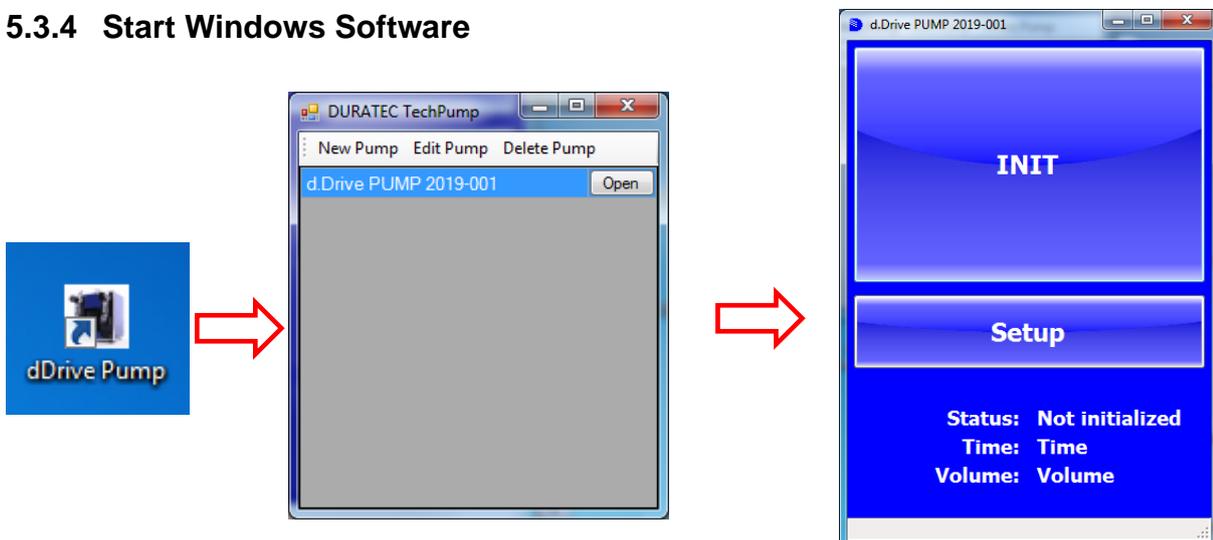
To install the Windows software, run the setup file and follow the instructions.



5.3.3 Create, edit & delete pumps



5.3.4 Start Windows Software



6 Maintenance and Care

To ensure that the pump always functions optimally, the system should be serviced and maintained regularly. The type, scope and frequency depend strongly on the field of application, number of cycles as well as dosing and environmental conditions.

6.1 Cleaning the Fluid Path

When the pump needs to be cleaned depends on how the device was used, i.e. what is the time in operation and what types of chemicals were pumped.

We recommend cleaning the device daily. The tubing and syringes should be rinsed and primed at the end of each experiment and / or shift. Rinse the pump for cleaning with deionized water, ethanol or with 10% chlorine bleach in deionized water. Do not use alkaline or acidic cleaning solutions.

Important! If the device is not used for a long time, syringes and tubing should remain filled with deionized water. This is especially important when using buffers or other salt solutions that could accumulate or crystallize in the system. If buffers or other salt solutions remain in the liquid path overnight, crystals can form and damage the seal of the syringe plunger or the valve.

6.2 Cleaning Surfaces

The housing of the device is moderately resistant to chemicals. However, some chemicals can discolor the surface of the device.

If spilled liquid gets on the outside of the instrument, wipe it off immediately. Clean the area in question with a damp cloth and water and soap. Then dry the area. Make sure that the liquid does not get inside the device.

6.3 Periodic Maintenance

Syringes and valves are the most stressed parts. These should be replaced at the latest when there are visible leaks or dosing inaccuracies.

6.4 Syringe Exchange

Please empty the system completely before replacing.

6.4.1 Disassembly of the Syringe

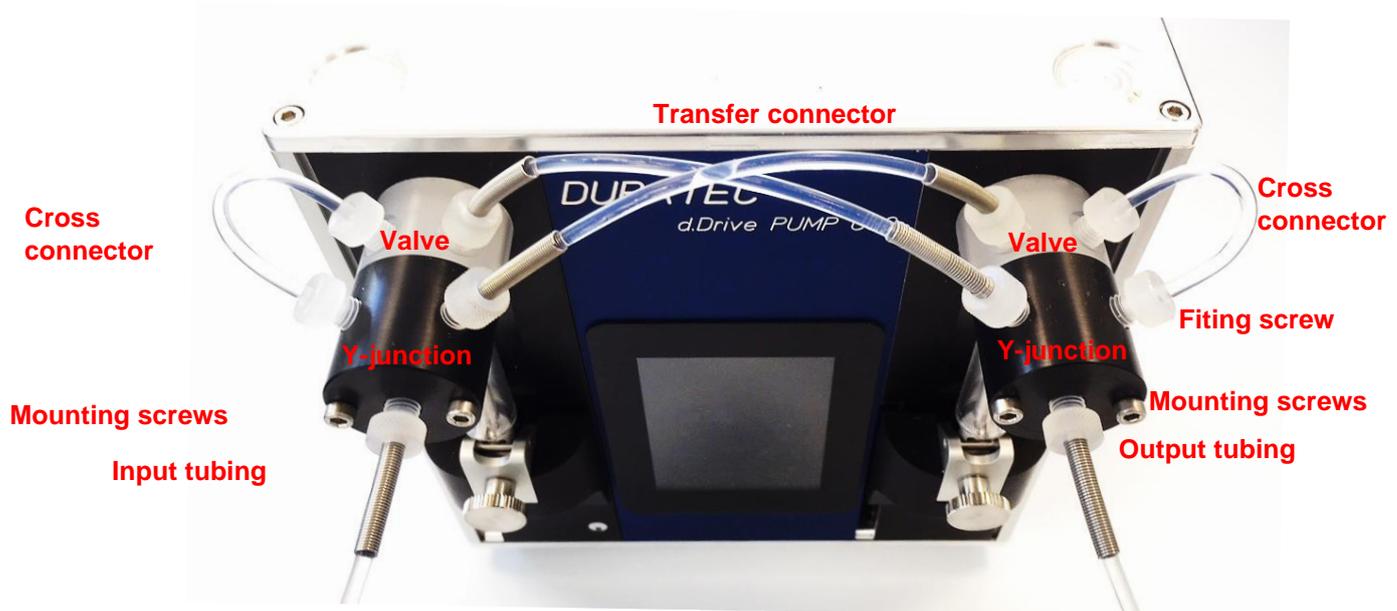
1. Unscrew the knurled syringe fixing screw completely
2. Unscrew the syringe from the valve
3. Remove the ball end of the syringe from the capture mechanism



6.4.2 Assembly of the syringe

1. Carefully insert the ball end of the syringe into the capture mechanism
2. Slightly lift the capture mechanism and the syringe barrel and screw the syringe into the valve
3. Tighten the syringe fixing screw, making sure that the syringe ball end is fully secured in the capture mechanism





6.5 Change of Valves resp. Y-Junctions

Please empty the system completely before replacing.

1. First remove the syringes and tubing.
2. Loosen the fastening screws of the valve / Y-junction using a 2.5mm Allen key and pull out both.
3. Install the new valve / Y-junction on the dosing module. Make sure that the pin of the drive shaft is seated in the notch of the valve and that the drill holes of the valve are above the threaded holes on the front plate. The two connection bores of the Y-junction must point upwards. Fasten the valve and Y distributor with both screws.
4. Reassemble the syringes and hoses.

6.6 Change of Tubes

Please empty the system completely before replacing.

The tubings can be easily replaced by turning the fitting screw. Please do not use any tools for this - just turn it hand-tight.

The connections of the valve and the Y-junction are ¼-28 UNF threads - only use fittings of this thread type.

7 Error Reporting and Troubleshooting

If the pump malfunctions, a red warning window appears and a warning signal sounds. By pressing the "Buzzer off" button this goes out. Check and correct the cause of the error and then press Init.



8 Appendix

8.1 Accessories & Spare Parts

Description	P/N
Windows Software	900760-001
RS232/Bluetooth Adapter	900760-002
RS232/USB Control Cable	900760-003
PEEK Y-Junction (Threads for ¼-28 UNF connectors)	900760-004
Valve (3-2) PTFE/PCTFE (Threads for ¼-28 UNF connectors)	900760-005
Tubing set FEP for <1ml syringes (ID = 1mm) 2x Cross connector (2x ¼-28 Flanged Fitting) 1x Transfer connector 135mm length (2x ¼-28 Flanged Fitting incl. bend protection) 1x Transfer connector 140mm length (2x ¼-28 Flanged Fitting incl. bend protection)	900763-001
Tubing set FEP für > 1ml syringes (ID = 2mm) 2x Cross connector (2x ¼-28 Flanged Fitting) 1x Transfer connector 135mm length (2x ¼-28 Flanged Fitting incl. bend protection) 1x Transfer connector 140mm length (2x ¼-28 Flanged Fitting incl. bend protection)	900763-002
25µl Syringe (PTFE piston seal)	900760-C30-25
50µl Syringe (PTFE piston seal)	900760-C30-50
100µl Syringe (PTFE piston seal)	900760-C30-100
250µl Syringe (PTFE piston seal)	900760-C30-250
500µl Syringe (PTFE piston seal)	900760-C30-500
1.000µl Syringe (PTFE piston seal)	900760-C30-1000
2.500µl Syringe (PTFE piston seal)	900760-C30-2500
5.000µl Syringe (PTFE piston seal)	900760-C30-5000
12.500 µl Syringe (PTFE piston seal)	900760-C30-12500
More spare parts on request	

Contact

DURATEC Analysentechnik GmbH

Rheinauer Strasse 4

D-68766 Hockenheim (Germany)

Tel. +49(0) 6205 / 9450-0

Fax +49(0) 6205 / 9450-33

Email info@duratec.de

Website www.duratec.de / www.duratec.com