

LAMBDA DOSER – Operating Instructions

1. Pre-treatment of solids

Solids have to be homogenous and free flowing. If this is not the case, they should be recrystallized, dried and sieved to remove the fines. The free flow of difficult solids can be achieved by the addition of AEROSIL 200 or 974 at a concentration of 0.1 to 2 %. AEROSIL is super finely dispersed pure SiO₂. Its particles cover the surface of the crystals and make it free flowing. AEROSIL is non-toxic, chemically inert and can be removed by filtration. It can be obtained at a low price from us or from DEGUSSA AG, Oberdorfstrasse 11, CH-6340 Baar.

2. How to put the LAMBDA DOSER together

The preparation of the DOSER for use is very easy:

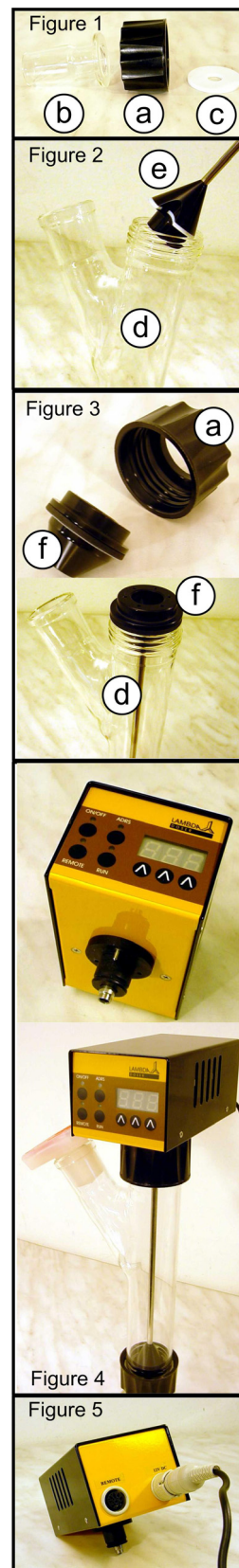
- The ground glass piece (b) is put through the threaded cap (a) (figure 1). The Teflon disc (c) is put inside the cap and placed on the ground surface of piece (b) and the cap is screwed to the glass tube (d). The distributor (e) is put inside the glass tube with its opening directed downwards so that it will not be damaged (figure 2).
- There is a silicon baffle on the lowest part of the tube. The distributor must be turned with its opening towards this baffle. The Teflon treated rubber seal is placed on the head (f) with the Teflon layer facing outside (towards the glass tube). Put the axis of the distributor through the centre of the head (figure 3) and tighten it with the threaded cap (a) to the glass tube.
- Press the axis of the motor unit completely inside the head so that the metal pin will fit into one of the six corresponding holes in the head (figure 4). This assures a perfect seal of the DOSER and a sufficient pressure of the distributor against the Teflon disc in the bottom of the DOSER tube.
- By loosening the upper threaded cap you can put the filling tube into the desired position then tighten the cap again.
- The solid is added through the filling arm of the tube. The filling arm can be closed with a ground glass or plastic stopper NS 29/32.
- The 12 V connector of the power supply is plugged into the 12 V DC socket of the motor unit (figure 5) and the power supply is connected to the mains.

3. Selection of the dosing speed

The speed of addition is selected by three decimal buttons for the speed control (▲ ▲ ▲). The digital selection allows good reproducibility of the selected flow.

Since specific densities of solid substance vary considerably it is important to calibrate the DOSER before starting work. The amount of substance delivered during a certain time period is measured. The speed of rotation of the distributor increases progressively with the speed control (▲ ▲ ▲) value; therefore it is possible to calculate the speed control adjustment corresponding to the desired flow rate of the substance.

The delivery of a solid is started by pressing the ON/OFF button. The light of the corresponding diode indicates that the dosing is in progress.



4. How to program the DOSER

Up to 30 pairs of time and flow rate may be programmed in a simple way. Access to the program is opened by simultaneously pressing buttons REMOTE and RUN until an indication **PGM** appears on display.

(If you repeat this simultaneous pressing, the memory will be cleared and the indication **cLE** will appear on the display. For programming press both buttons again until **PGM** appears again).

- Press the ON/OFF button. The indication F01 will shortly appear on the display indicating that you can select the first flow rate value.
- Set the desired flow rate value (0 to 999 representing 0 to 100% speed of rotation) by pressing the buttons under the display. Press the ON/OFF button again. The indication t01 will appear for a second on the display indicating that you can program the time period of the first step in minutes. Select the desired time period for the first program step.
- Press the ON/OFF button again. The indication F02 will briefly appear on the display. You can now enter the second desired flow rate. After this press the ON/OFF button again. The symbol t02 will briefly appear on the display. You can now set the time of the second step.
- In a similar way up to 30 steps can be programmed.
- After having entered the time of the last step press REMOTE and RUN buttons simultaneously until an indication **End** appears on the display.
- **After the last program step the DOSER will continue the rotation with the speed setting of the last step until it is switched off manually. If you wish to switch the dosing off after the last step you must program another step with the rotation speed zero and the time step of minimum 1 minute. Only then press the REMOTE and RUN buttons to end the programming.**

**(It is not possible to end the program after programming the time data).*

To start the program press the RUN button.

To end the running program definitively press again the RUN button.

It is possible to stop the pump (button ON/OFF). This facilitates the reaction in emergency situations. *(Do not forget to switch the pump on (with ON/OFF button) after you have finished your intervention).*

The time basis in the microprocessor is **not stopped** meanwhile so that the total time of the step and of the program will not be affected by this modification. When the step time is elapsed, the pump will automatically go on to the next step. The program is not therefore modified by this emergency intervention.

5. Use of the DOSER during reflux or under controlled atmosphere

Vapours of boiling solvents can penetrate into the lower part of the DOSER and condense. The condensation disturbs the flow of the solid. This can be prevented by blowing a light stream of air or another convenient gas through the DOSER tube. The vapours are displaced and cannot disturb the dosing.

The gas is introduced by a special stopper fitted with tubing. For this purpose we deliver a polyethylene stopper. However any fitting compatible with NS 29/32 ground fittings (e.g. SVL threaded fittings which can be adapted to several tubing diameters are excellent). The slight stream of gas passes through the hollow axis of the distributor and the lower part of the DOSER tube. The stream and pressure of the gas must be carefully controlled to prevent compression of the solid substance during dosing.

Since the DOSER is airtight, it can also be utilised for work under controlled atmosphere (nitrogen, argon etc). The DOSER withstands a pressure of ± 0.05 MPa. The airtight DOSER is especially useful during work with oxygen sensitive or hygroscopic substances. In this case manual dosing is particularly difficult.

6. Remote control

6.1 Remote control on/off

By interlinking the contacts No.4 and 5 of the socket on the rear of the pump (see fig. 5 and 6) the motor will be blocked. The same effect will be obtained if you apply 12 V to the contact No.5 (0 V line is connected to contact No.3) (fig. 5 and 6). The remote control cable (cat. no. 4810) is used for transmission of remote control signals.

6.2 Remote control of the speed.

The speed of rotation can be controlled over the whole range by an external signal (0 - 10 V/DC) when applied to the contact No.1 of the socket „remote control“ on the rear of the motor unit (fig.5 and 6). The 0 V line is connected to the contact no. 1. Press the „REMOTE“ button to activate the remote signal port.

! Caution: for safety reasons the voltage of the external signal must not exceed 48 V to earth.

Note: When the DOSER is switched off by remote control, the light of the ON/OFF diode goes out.

6.3 PC control

The address of the DOSER is set by pressing the button „ADRS“ and selection of an appropriate address number from 00 to 99. Press the ON/OFF button to enter the new address. During address setting the ADRS yellow LED turns off.

7. Cleaning the DOSER

After use, the motor unit is pulled out of the DOSER head until both separate. (Do not be afraid to pull hard, as the blocking mechanism requires it). Loosen both threaded caps and separate all components inside the tube. The parts can now be washed by common laboratory methods (for example with ethanol, acetone, diluted acids or bases). It is however not recommended to expose parts to these reagents for long periods of time.

The motor and control unit can be cleaned only with a piece of cloth soaked in water containing a mild detergent, diluted ethanol or with more care iso-propanol. Use of other solvents could damage the surface of the unit.

8. Accessories and spare parts

LAMBDA DOSER consists of three parts: the dosing tube, motor unit and power supply.

8.1 INTEGRATOR (Cat. No. 4803)

The LAMBDA DOSER is the only instrument on the market, which allows a simple but precise integration of solid delivered as a function of time.

The electrical impulses, which move the stepping motor, are registered and transformed into a direct current. The voltage can be measured or recorded by common recorders or voltmeters.

In processes where the pump is controlled e.g. by a pH-stat during a fermentation so as to keep the pH of the medium constant, it is frequently important to know when and how much acid or base (in solid form) was added. This data yields important information about the process, its kinetics, time of completion, etc. The INTEGRATOR is connected to the DOSER by a cable to the 8-pole socket on the rear of the motor unit.

8.2 Adapter-relays for 230 V output

This adapter allows a remote control of the LAMBDA DOSER by control instruments having 230 V ~ output.

8.3 Remote control cable ON/OFF (Cat. No. 4810)

8.4 Spare parts:

	Cat. No.
Ground output glass tube	5801
Threaded cap	5802
Teflon disc	5803
Distributor (standard)	5804
Distributor for very fluid substances	5805
Rubber seal	5806
Head	5807
Stopper for gas introduction	5808
Power supply 12 V DC 5 W	5809
Glass tube	5810
Motor unit	5811
LAMBDA DOSER complete	5812

9. Specifications

Dimensions:	tube :	30 (H) x 12 (W) x 5 (D) cm
	motor unit:	6 (H) x 7 (W) x 13 (D) cm
Weight:		950 g
Power supply:		12 V DC, 5 W
Operating temperature:		0-40 °C
Operating Rel. Humidity:		0-90 %
Remote control:		0-10 V/DC, 12 V *

*** ! For safety reasons the voltage of the remote control signal to earth must not exceed 48 V DC**

INPUTS/OUTPUTS (REMOTE):

Contact number and cable colour code

1	+ input remote speed control 0-10V (yellow)*
2	step signal from stepping motor (0 and 12V) (grey)
3	earth, 0 V (green)
4	12 V + (brown)
5	+ input remote ON/OFF (white) 0 V = ON, 3-12 V = OFF
6	earth (pink)
7	RS 485 B - (red)
8	RS 485 A + (blue)

*(zero line connected to the contact no. 3)

INPUTS (12 VDC):

1	not connected
2	0 V
3	+ 12 V DC

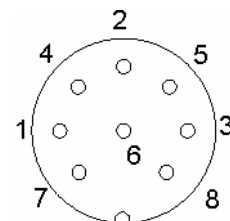


Figure 6

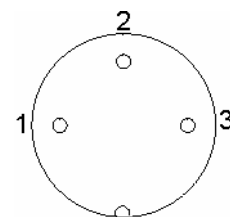


Figure 7

10. Guarantee

LAMBDA gives a three-year guarantee for work and components when the instrument has been used according to our operating instructions.

Conditions of guarantee:

- The instrument must be returned with a complete description of the defect or problem.
- The customer pays the cost of sending the instrument to our service office.
- Damage or loss during transport of items will not be compensated by LAMBDA
- Failure to fulfil these requirements will disqualify the customer from compensation.

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