

DOSER

OPERATIONAL MANUAL

1. PRETREATMENT 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. It's particles cover the surface of the crystals and make it free flowing. AEROSIL is nontoxic, chemically inert and can be removed by filtration.

Can be obtained at a low price from us or from DEGUSSA AG, Oberdorfstrasse 11, CH-6340 Baar.

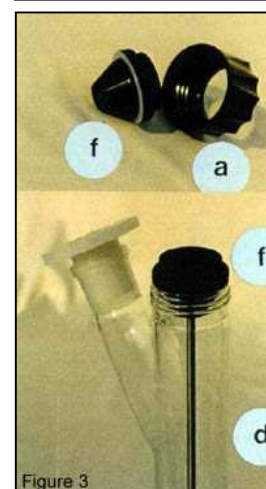
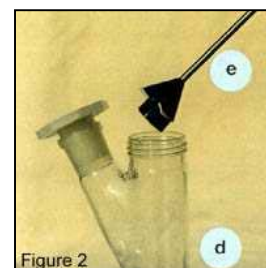
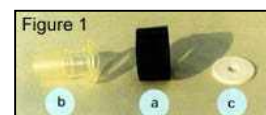
2. HOW TO PUT THE LAMBDA DOSER TOGETHER

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 center 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 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 an addition is selected by three decimal switches '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 starts by switching the rocker switch to position 'I'. The green light of the diode indicates that the dosing is in progress.

4. USE OF DOSER DURING REFLUX OR UNDER CONTROLLED ATMOSPHERE

- Vapors of boiling solvents can penetrate into the lower part of the doser and condense. This 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 vapors are displaced and cannot disturb the dosing.
- The gas is introduced by a special stopper fitted with a tubing. For this purpose we deliver a polyethylene stopper. However any fitting compatible with NS 29/32 ground fittings (eg. 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 air-tight doser is especially useful during work with oxygen sensitive or hygroscopic substances. In this case manual dosing is particularly difficult.

5. REMOTE CONTROL

5.1 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 cables (cat. no. 4804 or 4810) are used for transmission of remote control signals.
- Sometimes a reversed logic for the remote control is required. This can be obtained through switches S2 and S3 on the circuit board (see section 7).

5.2 Remote control of the speed.

- The speed of rotation can be controlled over the whole range by an external signal (0–1 V) when applied to the contact No.4 of the socket „remote controle“ on the rear of the motor unit (fig. 5 and fig. 6). The 'speed control' switches must be switched to '000'.

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

5.3 Control by line voltage

- The doser can be controlled by switching the mains on and off *.
- This type of control can be used with control instruments (eg. pH, temperature, etc.) with outputs of 230 V. In this case there will be a certain inertia of the doser when switching on and off. This can be completely eliminated by using our adaptor (Cat.No. 4804) which simultaneously allows the connection to our Pump-Flow Integrator (Cat. No. 4803).

** This does not damage the doser.*

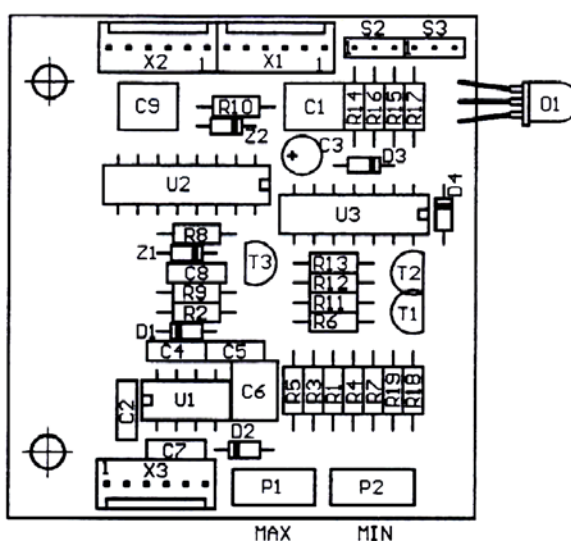
Note: When the doser is switched off by remote control, the green light of the diode changes to yellow.

6. 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 isopropanol. Use of other solvents could damage the surface of the unit.

7. LOGIC-TABLE FOR REMOTE CONTROL OF THE DOSER



Input 5	S2	S3	Pump	Comment
LOG 0	2	1	OFF	
LOG 1	2	1	ON	only with remote control
LOG 0	1	1	OFF	
LOG 1 or no signal	1	1	ON	
LOG 0 or no signal	2	2	ON	
LOG 1	2	2	OFF	
LOG 0	1	2	ON	only with remote control
LOG 1	1	2	OFF	

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 eg. 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 5-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. 4802)

8.4 Cable for remote speed control 0–1 V (Cat.No. 4802)

8.5 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) × 12 (W) × 5 (D) cm
	motor unit	6 (H) × 7 (W) × 13 (D) cm
Weight:		950 g
Power supply:		12 V DC, 5 W
Operating temperature:		0–40 °C
Operating Humidity:		0–90 %
Remote control:		0–1 V, 12 V *

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

INPUTS/OUTPUTS:

Contact No. and cable (Cat.No. 4810) color code: (Fig. 5, 6)

- 1 - Input remote speed control 0–1 V (yellow)
- 2 - Output step signal from stepping motor 0, 12 V (grey)
- 3 - 0 V (green)
- 4 - 12 V + (brown)
- 5 - Input of remote ON/OFF control (white)
0 V ... ON, 12 V ... OFF

The logic of this remote control can be inverted see section 7.

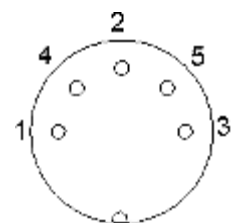


Figure 6

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 fulfill these requirements will disqualify the customer from compensation.

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