

INTEGRATOR

OPERATIONAL MANUAL

The PUMP-FLOW INTEGRATOR is an auxiliary piece of equipment for the PRECIFLOW PUMP or LAMBDA DOSER. The operating instructions for the integrator are identical for both.

1. CONNECTION OF THE INTEGRATOR TO THE PUMP

Insert the 5 pole plug of the integrator marked 'input' into the corresponding socket (A) of the PRECIFLOW pump (figure 1).

2. CONNECTION TO A REGULATOR (PH-STAT, PO2-STAT, THERMOSTAT ETC.)

Plug the 5 copper wire remote control cable (Cat. No. 4802 or 4810) into the socket 'remote control' on the rear side of integrator and lock it by screwing the security ring into the socket.

2.1 Regulators with a voltage free contact output:

The two plugs of the remote control cable (cat.no. 4802) are connected to the output contacts of the regulator. If necessary remove both plugs and use wires directly or exchange both plugs for those compatible with your regulator. The polarity isn't important in this case.

If you prefer to use the 5-wire remote control cable (cat no. 4810) connect the white and brown wire to the regulator (see fig. 3).



2.2 Regulators with 230 V ~ outputs:

Frequently (by relays outputs) the 230 V wire can be disconnected then the regulator can be connected as in the case 2.1.

In other cases (eg. with a thyristor output) it is necessary to connect another relay between the regulator and integrator. We supply relays for 230 V ~ (cat. no. 4804). Please contact us if you have any questions.

2.3 Regulators with 12 V DC outputs:

Connect the + 12 V contact of your regulator with the white wire of the remote control cable (cat.no. 4810) and the 0 V contact to the green wire of the same cable.

2.4 Remote control of the pump speed

The socket 'remote control' of the integrator can be used to control the speed of the pump over the whole range by using an external signal (0–1 V).

- Connect the positive pole of the regulator with the brown wire of the remote control cable (cat. no. 4810).
- Connect the 0 V pole to the yellow wire of the same cable.

Note:

- *The 5-pole socket 'remote control' of the integrator corresponds to the same socket of the PRECIFLOW pump (or of LAMBDA DOSER).*
- *The pole No. 2 of the remote control socket on the rear of the integrator supplies the step frequency of the motor. This can be used for further applications.*

3. CONNECTION TO A RECORDER

- Connect your recorder using sockets 0/+ 'recorder' on the rear of the integrator.
- Select the output voltage corresponding to your recorder with switch (0.1, 1 or 5 V).

4. ADJUSTMENT OF THE INTEGRATION SENSITIVITY

The sensitivity of integration can be varied in the range of 1 to 512 by division of the step frequency of the motor. The sensitivity is adjusted by a decimal switch 'sensitivity'. If you increase the number by one, the frequency of the step frequency is halved. The full scale of your recorder will indicate a two times larger volume of liquid. If you select a lower number the effect will be the opposite.

Example: Using the silicon tubing with an internal diameter of 4 mm and the sensitivity '0' the full scale of recorder will correspond to 8 ml of liquid. With 'sensitivity' 1, 2, 3... this maximum will correspond to 16, 32, 64... ml of liquid respectively.

Volumes corresponding to the maximum of the recorder scale for tubing of different internal diameters (ml)

Internal diameter of tubing (mm)	sensitivity 0 ... 9 ml
0.5	0.12 ... 60
1	0.5 ... 250
2	2.0 ... 1000
3	4.5 ... 2250
4	8.0 ... 4000

5. CALIBRATION OF THE TUBING

The diameter of the tubing has a major effect on the flow of the liquid through the pump. The diameter of the tubing changes slightly during its production, therefore it is necessary to calibrate each lot of tubing. The easiest way is to measure the volume of liquid being pumped between the two automatic resets of the integrator. This gives you the volume of the full scale of your integrator for the specific tubing and sensitivity.

6. RESET

- You can reset your integrator anytime by pressing the red reset button.
- When you connect the pump to the mains, the integrator is automatically set to zero.
- If the full scale of the recorder is reached, the integrator is automatically reset to zero and the integration continues. This allows the measurement of unlimited amounts of liquid. This is important during continuous processes such as fermentations.

7. SPECIFICATIONS:

Dimensions:	4 × 10.5 × 9.5 cm (H × W × D)
Weight:	250 g
Operating temperature:	0–40 °C
Operating humidity:	0–90 %
Power supply:	12 V DC (delivered by PRECIFLOW pump or LAMBDA DOSER)
Remote control:	0–1 V, 0 and 12 V

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

8. ACCESSORIES:

8.1 Delivered with the integrator:

- Recorder cable
- Remote control cable (cat. no. 4810)

8.2 Optional accessories:

- Adapter-relays for regulators with a 230 V ~ output
- Remote control cable ON/OFF (two wires) (cat.no. 4802)

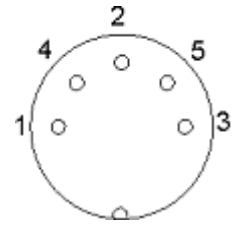


Figure 3

9. CLEANING

The integrator does not require any special service or adjustment. It can be cleaned using damp paper or cloth or if necessary with a mild detergent or water diluted ethanol or in exceptional cases with isopropanol.

Lambda
Dr.Pavel Lehky
Postfach 93
CH-3932 Visperterminen
Tel./Fax 0041 279 46 60 74

e-mail: lambda@rhone.ch
Web pages: www.rhone.ch/lambda

Lambda CZ s.r.o.
Lozibky 1
CZ-614 00 Brno
Czech Republic
Tel./Fax 00420 545 578 643
Mobil phone: 00420 603 274 677

lambda@sky.cz
www.sky.cz/lambda