



# PERISTALTIC PUMP 12 VDC COMPACT

## OPERATING INSTRUCTIONS



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**All it takes for environmental research**

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Agrisearch Equipment

a Royal Eijkelkamp Company

## On these operating instructions



If the text follows a mark (as shown on the left), this means that an important instruction follows.



If the text follows a mark (as shown on the left), this means that an important warning follows relating to danger to the user or damage to the apparatus.  
The user is always responsible for its own personal protection.

*Text*

**Italic indicated text indicates that the text concerned appears in writing on the instrument.**

### 1. Short description

This peristaltic pump suitable for use in the field is battery-powered and microprocessor controlled. The microprocessor ensures a constant yet adjustable rate of revolutions, protection against overload and a number of external control functions. A built-in maintenance-free 12 volt lead-acid battery makes possible continuous use of the pump for periods of between 2 and 5 hours (dependent on the load). The housing is splash-proof (IP64) and can be used safely and without problems out-of-doors. The apparatus may be used in all positions.

The pump has been designed for long term professional use under adverse conditions. High quality materials have been used in its manufacture.

The built-up pump is a simple but very durable peristaltic pump with three pressure rolls. The pump is mechanically very powerful.



**Never stick your fingers into a revolving pump!**

### 2. Using the pump for the first time

Peristaltic pumps which leave our factory are subjected to very strict final inspection. After delivery, check first that the pump and battery charger have not suffered damage during transport. Loose components in either the pump or the charger indicate damage. You can check on this by manipulating them gently from side to side; do not open them. In the case of damage you should contact your supplier.



**Do not use the pump until first reading these instructions.  
Keep these instructions in a place accessible to all users.**

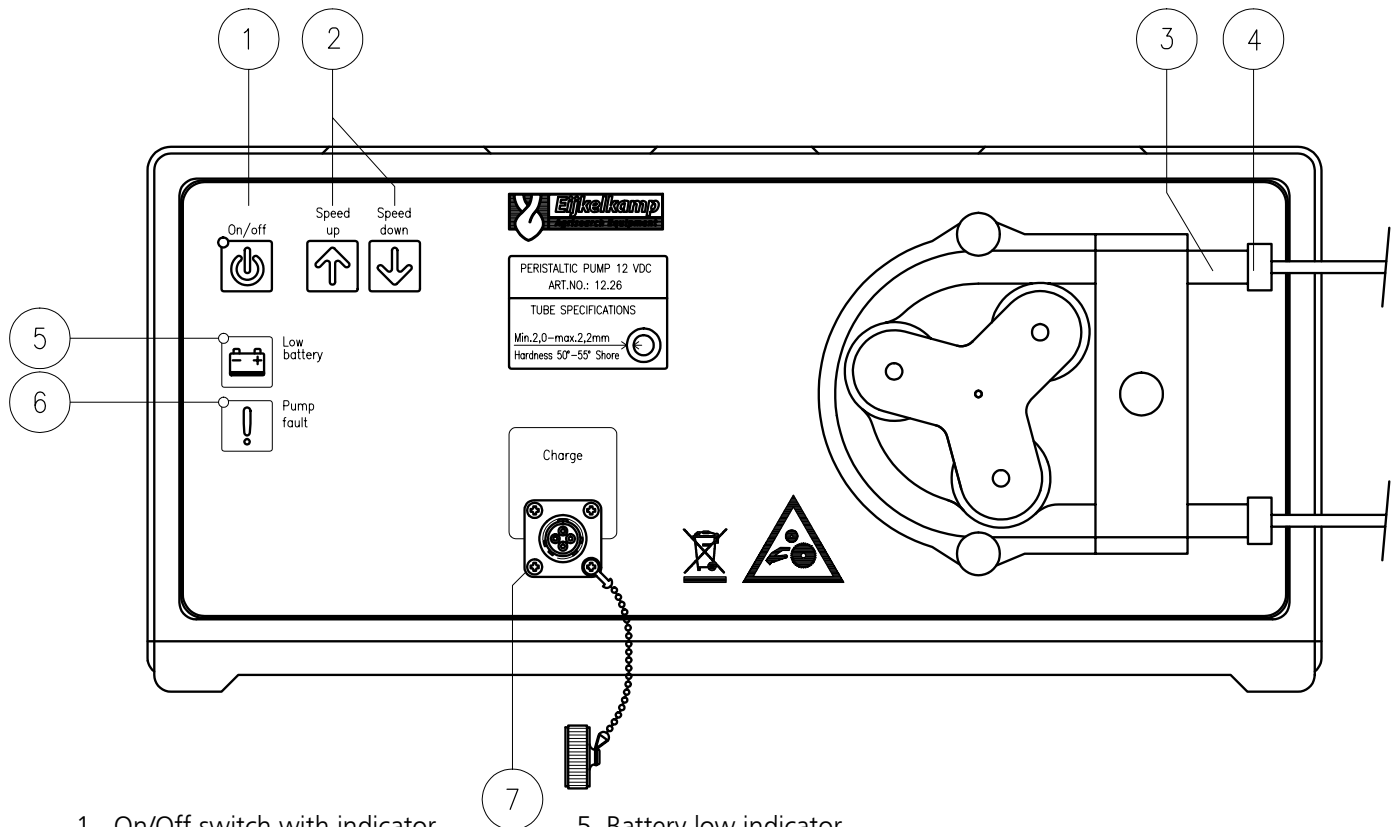


**Use of the pump in places where there is a danger of explosion is not permitted.**



**Charge the battery for the first time after delivery of the pump. This saves disappointment on the first working day!**

The battery is charged by connecting the accompanying charger to the *Charge* socket (7) on the front panel of the pump. The battery charger stops charging when the battery is full (normally after 24 hours) and then automatically changes over to so-called trickle charge. The pump is then ready for use.



- 1. On/Off switch with indicator
- 2. Speed control
- 3. Flexible tube
- 4. Clamp
- 5. Battery low indicator
- 6. Pump defect indicator/condensation indicator
- 7. Connection for battery charger & external sounding device with inversion switch

### 3. Using the peristaltic pump

The operation of the peristaltic pump takes place by means of the switches on the front panel. The switch panel is laid out clearly and the switches are provided both with text and logical markers. The control switches are so-called membrane key-pads which have a palpable instant of engagement. They only need to be pressed in order to perform the switch function.

#### 3.1 Switching on

Switching on the peristaltic pump takes place using the *On/off* switch (1). After switching on the green indicator will light up. The pump will not start up immediately after being switched on because of safety reasons.

#### 3.2 Rate of revolution

The rate of revolution can be speeded up using the *speed-up* switch (2). The pump will now begin to operate. Pressing the touch key once will have the effect of increasing the speed by ca. 10 revolutions per minute. If you keep the touch key depressed, the speed will reach maximum revolutions in approximately 5 seconds. Using the *speed down* key (2), the speed decreases in a similar manner. In case of problems, switch off the machine by using the *On/off* switch.

#### 3.3 Switching off

Switching off the pump takes place with the *On/off* switch. When the pump has not been used for an hour or more and the revolutions are at zero the pump will automatically switch off.

### 3.4 Charging the internal battery



**When charging the internal battery use only the accompanying battery charger. Other chargers, such as car-battery chargers can cause damage to the pump.**



**Charging the pump in places where there is a danger of explosion is not permitted.**

The pump is supplied tested but not charged. The battery can be recharged at any moment (does not need to be empty). The battery charger can remain connected even if the battery is full. Recharging the battery after every use of the pump lengthens the lifetime of the battery. Even if the pump is not used, the battery must be charged at least once every month.

In order to guarantee the lifetime of the 12 volt battery (art. no. 12.25.02) this has been protected against being entirely discharged. Where the battery voltage falls below 10.5 volts the pump switches off and the *battery low* indicator lights up. The battery should now be charged (with battery charger 12.25.24). Connect the plug of the battery charger to the *Charge* socket. The battery charger stops charging when the battery is full (normally after 24 hours) and then automatically changes over to so-called trickle charge. The charger can remain connected to the pump without danger of over-charging of the battery.

For safety reasons the battery is built into a separate gas-tight space which has its own ventilation to the outside air so that battery gases cannot accumulate in the housing. Where the peristaltic pump is in intensive use and the battery needs to be charged daily, it is advisable to have the battery charger adapted for this purpose by Eijkelpomp. This adaptation consists of raising the charge voltage supplied by the battery charger. This prevents an undesirable shortening of the life of the battery where there is intensive use. The adaptation of the battery charger has the consequence that the battery may no longer be kept connected to the battery charger for an unlimited time.

### 3.5 External sounding device with inversion switch

The start-stop system can only be used in combination with an electronic sounding device with inversion switch (art. no. 11.03.30 and 11.03.32).

Pump with this special sounding device and connection cable allow to (micro-)purge a well in an extremely efficient and accurate way. This allows to collect samples with a low turbidity and minimal aeration.

The start-stop system of this pump is applied in the following way:

- Measure the water level with the water level sounder with the switch in position "Water".  
(Example -2.75 m)
- Lower the sample tubing.  
(According the Dutch NEN 5744:2011 standard half way the screened part of the well)
- Connect the sounding device with the pump by means of connection cable 12.25.26.01.
- Lower the level sensor to the depth of the maximum drawdown.  
(Acc. to NEN5744:2011 this is max. 50 cm lower then the undisturbed water level; in the example so -3.25 m)
- Now put the switch on the sounding device in the function "Air+SW".  
(The constant beeping will stop and only a short beep every second will be heard noting that the sensor is still sensing water. Only when the sensor gets dry, a constant beep will start to sound)
- Switch the peristaltic pump ON and adjust to the allowed speed.  
(According to NEN 5744:2011 500 ml/minute or lower (minimum 100 ml/min))
- The pump stops pumping when the water is drawn below the level of the sensor.  
(In the example at -3.25 m)
- The pump then is pre-programmed to wait 30 seconds before restarting. This sequence of pumping until sensor dry, restarting after 30 seconds, stopping and restarting will continue until the purging is stopped by the user.
- When the pump runs very shortly when restarting, you are confronted with a slowly recovering well. Then you may lower the flow of the pump from 500 ml/min to for instance 100 ml/min. This will make the start-stopping process less nervous.

- ❑ Use this system to easily limit the maximum permitted drawdown without many hand measurements and speed adjustments. Drawdown is 50 cm for NEN5744:2011 and 10 cm for the American EPA 540-S95-504 Low flow sampling guideline. The International ISO 5667-22 standard does not define a maximum drawdown; however mentions micro-purging as well). In all cases aeration of the screened part of the well should be avoided so even when not using these standards you may use this system to avoid loss of volatiles and trace metals by aeration.
- ❑ This system allows to leave a pump unmanned while purging a well. This allows a number of pumps purging wells on one single site with little guidance.
- ❑ Clean tape and sensor with isopropylalcohol or in another way according to type of pollution.

## 4. Using the peristaltic pump

A peristaltic pump is both a gas and liquid pump. The pump is self-priming. Even when the pump is not turning, the tube is compressed entirely by one of the rollers. Fluid or gas can therefore never flow back. Flexible tubes having different diameters and chemical properties can be used in the pump. The rollers roll the gas or fluid out of the tube so that they are expelled from the pump tube. Behind the roller the tube then springs up once more and sucks new gas or fluid inside.



**If you use the pump in rainy weather, you should take care to completely protect the peristaltic pump from the rain. A slippery flexible tube will cause pumping problems. You should at least place the pump face down in rainy weather, supported by the carrying strap. Water will not then be able to accumulate on the front panel. Make sure that water cannot penetrate the battery compartment through the ventilation opening.**



**The transparent cover plate must always be on the pump to prevent damage of the bearings by dirt and moisture. Think about safety: the pump is very powerfull. The cover plate prevents shifting of the tube (loss of pressure and suction power).**



**Never stick your fingers into a revolving pump!**

### 4.1 Type of tube

The pump is designed for use with elastic pump tubes where the total (= double) wall thickness is 4.0 to 4.4 mm thick. The rigidity of the flexible tube must be between 50 and 55 degrees Shore. The stronger the flexibility, the stronger the suction. Therefore the thinnest pump tube has the greatest suction (full vacuum). Normally speaking only the relatively expensive flexible silicone rubber is used in the pump.

As transport tube polyethylene or sometimes the very expensive but inert teflon is used as tube material. Where the tube must be able to resist a high pressure (for example during in-line filtration) the pump tube needs to be protected against coming loose by using a tube clamp. This is not necessary on the suction side.

The thinnest tube for use in the pump has a diameter of 4 x 8 mm, with a suction power equivalent to a Meter Water Column (mwc) of 8 - 9.5 meter . The pressure exerted reaches 25-30 mwc and the flow rate is maximal 1 l/min at 400 rpm.

The normal tube has a diameter of 6 x 10 mm, suction of 6 - 9 mwc a pressure of 25-30 mwc and a flow rate of 2.4 l/min (maximal, without discharge head and suction height).

The indicated values may vary because of tolerances in thickness and rigidity of the tube. They apply only as indication values for the silicone tube.



**The much used 6 x 10 mm silicone tube should preferably be used in combination with the 6 x 8 mm PE tube.**

The PE or teflon tube in the 8 x 10 mm size may also be fitted inside this silicone tube.

The PE or teflon tube in size 10 x 12 mm may if necessary be fitted over this silicone tube. The 4 x 8 mm silicone tube can if necessary be used with the same 6 x 8 mm PE tube.

The 2 x 4 mm PE or teflon tube is a little easier to work with. This fits inside the silicone tube but has a very high through-put resistance to water. (limited flow rate and high pressure in long flow lines). The 2 x 4 mm PE (or teflon) tube is more suitable for pumping gas. The 4 x 6 mm PE tube can be used either with the 6 x 8 mm silicone tube as well as with the 4 x 8 mm silicone tube. In combination with the latter silicone tube the 4 x 6 mm PE tube can very well be used to pump up water from wells where the water level may reach 9.5 m.

| Art. No. | Material           | Size                 | Length                 |
|----------|--------------------|----------------------|------------------------|
| 12.20.02 | Polyethylene tube, | diameter 2 x 4 mm,   | roll of 100 m          |
| 12.20.03 | Polyethylene tube, | diameter 4 x 6 mm,   | roll of 100 m          |
| 12.20.04 | Polyethylene tube  | diameter 6 x 8 mm,   | roll of 100 m          |
| 12.20.05 | Polyethylene tube, | diameter 6 x 8 mm,   | roll of 200 m          |
| 12.20.07 | Polyethylene tube, | diameter 6 x 8 mm,   | roll of 200 m, 30 pcs. |
| 12.20.08 | Polyethylene tube, | diameter 8 x 10 mm,  | roll of 100 m          |
| 12.20.09 | Polyethylene tube, | diameter 8 x 10 mm,  | roll of 200 m          |
| 12.20.13 | Polyethylene tube, | diameter 10 x 12mm,  | roll of 75 m           |
| 12.20.22 | Teflon tube,       | diameter 2 x 4 mm,   | roll of 10 m           |
| 12.20.28 | Teflon tube,       | diameter 8 x 10 mm,  | roll of 10 m           |
| 12.20.32 | Teflon tube,       | diameter 10 x 12 mm, | roll of 10 m           |
| 12.20.46 | Silicone tube,     | diameter 4 x 8 mm,   | roll of 5 m            |
| 12.20.48 | Silicone tube,     | diameter 6 x 10 mm,  | roll of 5 m            |

Sampling for the purposes of analysis on micro-parameters should be carried out changing both the pump tube and the polyethylene transport tube before each sampling operation in order to avoid risks of cross contamination. An exception can be made in the case of the teflon tube. This expensive but chemically stable tube can usually be used again after a thorough cleaning.

## 4.2 Inserting the tube



**Switch off the pump before inserting the tube.**

After removing 28 to 30 cm of pump tube this may be inserted in the pump by carefully removing the pump's cover plate and unfastening the pressure clasp. By evenly turning the pressure rollers with the fingers, the tube may be laid in place.



**Never stick your fingers into a revolving pump!**

There is also an alternative method. Turn on the pump and allow it to run. Loosen the pressure clasp and take out the old pump tube. (following the direction of the pump). The new piece of tube is then inserted in the same way. The tube must be well gripped by the pressure clasp. Otherwise the tube will be slowly pulled inwards by the pump. This can block the motor and stop the operation of the pump.

Pump housing, rollers and tubes should be always dry and maintained in a dry condition during operation of the pump. This prevents the tube being pushed aside by the rollers during pumping. When this happens only a small fraction of the original suction and pressure power remains.

## 5. Defects and maintenance

### 5.1 Defects

Since only high quality components are used in the manufacture of the pump, in ordinary proper use you will only have problems very exceptionally. Safety protections have been fitted to the pump in order to prevent damage through overloading, short circuit or faulty use. The overview below has been drawn up to provide quick help in case of any problems.

#### ❑ **The pump is switched on but the *On/off* indicator fails to light up**

- The battery is completely empty. From the practical point of view this can only happen where the battery has an internal closed circuit or the pump has been stored for a very long time without being recharged. The battery should be charged or replaced.
- As a result of overloading the internal self reset protection is activated. Overloading of the battery can occur by connecting it with the wrong kind of battery charger or by short circuiting the *Charge* connection. In this case the internal self reset protection is activated. First locate and deal with the cause! The pump may be switched on again after 1 minute.

#### ❑ **Battery low indicator flashes**

- The battery is almost empty, charge the battery.

#### ❑ **The pump has stopped, *battery low* indicator is on**

- The battery is empty; charge the battery followed by turning off the pump using the *On/off* switch and then turn it on again.

#### ❑ **After being charged, the battery quickly becomes empty**

- Connect the battery charger to the mains and to the *Charge* connection. The indicator on the battery charger should light up. If the indicator goes out after a short time the problems should be sought in the battery.
- The battery is worn or faulty and needs to be replaced.

#### ❑ **The pump suction and pressure are insufficient**

- The housing and rollers are wet. Dry the pump housing, rollers and pump tube. Prevent the pump from becoming wet again (Cover up the pump).
- The tube has shifted position in the pump housing and therefore is running alongside the rollers (it is especially the 4 x 8 tube which is liable to this). Remove the tension from the tube by releasing the tension clasp and tightening it again.
- Make sure you are using the proper sort of pump tube. Check the wall thickness of the pump tube.
- Pump housing is deformed. Check the distance of the inside of the pump housing till the centre of the black synthetic rollers (= round synthetic plate with hole on the end of the main drive shaft). The distance must be the same everywhere (+/- 0.15 mm). Use a caliper gauge.
- The transparent cover plate must always be on the pump to prevent damage of the bearings by dirt and moisture. Think about safety: the pump is very powerfull. The cover plate prevents shifting of the tube (loss of pressure and suction power).

❑ **The pump turns itself off after a short while, the *Pump fault* indicator is on and the *On/off* indicator is flashing**

- The motor is too heavily loaded or is congested. The protection turns off the pump. Make sure no sand has been sucked into the pump tube or that the pump is not blocked in some other way. First remove the cause of the overload. The protection can be reset by switching the pump on and off with the *On/off* switch.

❑ **The internal motor is running, but not the pump**

- The coupling between the motor and the pump may be loose. Refasten this using a small screwdriver. The base plate of the housing needs to be removed to perform this operation.

❑ ***Pump fault* indicator flashes, but the pump is functioning in a normal way**

- There is condensation in the pump housing; the pump must be checked as soon as possible, to prevent damage of the electronics.

## 5.2 Maintenance

This equipment has been designed to make sampling possible under field conditions. These samples may be used for the purpose of very exact and extremely sensitive analyses. A clean piece of equipment stimulates the proper ways of working during sampling. A well maintained machine looks better and lasts longer.

Regularly clean the peristaltic pump, the cover plate, rollers and pressure clasp using a damp cloth. The front panel and the housing can be cleaned using a soft damp cloth and a non-abrasive cleaning agent where necessary.



**Never use abrasive cleaning agents or solvents when cleaning the pump!**



**It is recommended that where the pump is being used almost daily, it should be given a service each year by the supplier.**

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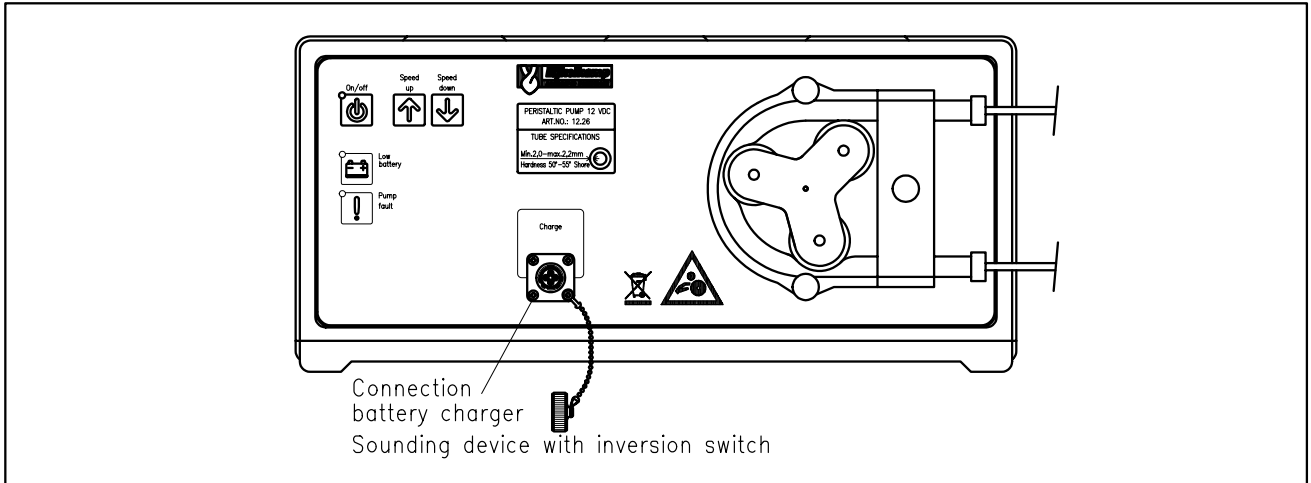
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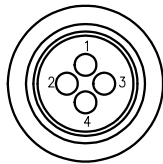


# Appendix: Connection battery charger / sounding device with inversion switch



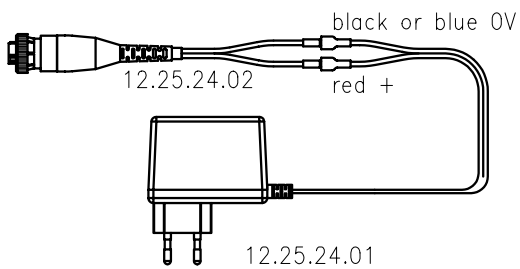
## Battery charger

- 1 do not connect
- 2 red, charge + max. 1 Amp.
- 3 black, charge -
- 4 do not connect

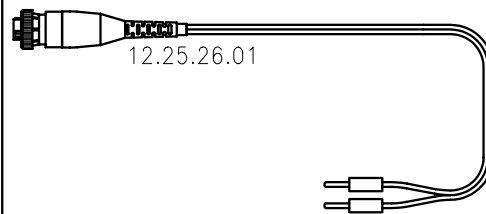


View of mounting side connector

## Charging internal battery



## Connection sounding device with inversion switch



AUTEURSRECHTEN VOORBEH. VLGS. DE WET



BENAMING: Connection battery charger

TEKENINGNR. 1226DOC-004

GETEKEND: EK 22.08.2006

GECONTR.: YJD 10.10.2011

C00018543.SZA



## EC-declaration of conformity for machinery

(Directive 98/37/EG, Annex II, sub A)

### Manufacturer:

Eijkelkamp Agrisearch Equipment  
Nijverheidsstraat 30  
6987 EM Giesbeek  
Netherlands

herewith declares that:

### Machine : Peristaltic pump COMPACT

Art. no.: 12.26

### is in compliance with:

- Machinery Directive 98/37/EG
  - EMC Directive 89/336/EG
- Applied to European standards (generic):
- EN 50081-1 Emission test, light industrial
  - EN 50082-1 Immunity test, light industrial

**Place** : Giesbeek

**Date** : 16-07-2013

**Name** : F. Tillmann

**Signature** :

A handwritten signature in blue ink, appearing to be 'F. Tillmann', written over a horizontal line.



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## Short manual peristaltic pump 12 VDC COMPACT (to be used in addition to the extended manual)

### Charging the battery

- The peristaltic pump is supplied tested but not charged.
- A fully charged battery provides 2-5 hours of power for the pump.
- Charging the battery takes approx. 24 hours.
- The battery requires no maintenance.
- The battery charger can remain connected even if the battery is full.
- The battery can be recharged at any moment (does not need to be empty).
- The instrument is protected against discharging of the battery beyond a critical point when the pump is used.
- Recharge the battery after every use of the pump. Longer life time of the battery.
- ... the pump is not used, the battery must be charged at least once every month.



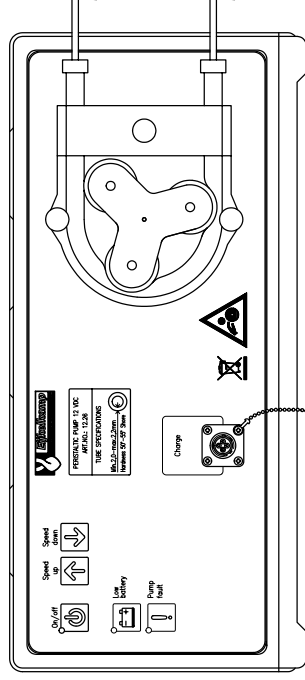
**During use, always use the pump's cover plate.**

### Tube

- The pump housing itself must be fitted with a  $\pm$  30 cm silicon rubber tube (art. no. 12.20.48) with a hardness/elasticity of 50 - 55° Shore and a total (= double) wall thickness between 4.0 and 4.4 mm.
- The tube must be dry on the outside.
- During operation of the pump the pump housing must be and remain dry. Suction- and delivery capacity otherwise is lost completely (in the rain the pump must be covered).
- In rainy weather the pump must not be placed standing up but it must be laid down on the brace (or cover the pump).
- For protection against sand, dirt or water on the bearings, always use the pump's cover plate.
- The rubber tube can be extended with a PE or Teflon tube.
- The pump is self-priming. With a silicon rubber tube 6 x 10 mm up to a water column of 6-9 meter (sea level). With a 4 x 8 mm tube up to a water column of 8-9.5 m.

### Control of the peristaltic pump

- Switch the pump on and off using the ON/OFF-key.
- Push the SPEED UP key 10 times.
- Take a piece of silicon rubber tube of the right thickness/diameter and with a length of at least 30 cm.
- Push the tube into the lower opening under the press-on brace and guide it into the pump until it protrudes from the top side again (some turning and twisting of the tube may be required).
- Press/screw the brace tight again.
- Extend the silicon rubber tube on the suction- as well as on the delivery side using a PE or Teflon tube.
- It's also possible to insert tube while the pump is not running. Insert the tube by carefully removing the pump's cover plate (remove millet nut A and B) and unfastening the pressure clasp.
- If pressure builds on the delivery side (for instance for pressure filtration) then the tube connection from rubber to plastic must be fitted with a clamp in order to avoid detachment.



is used.



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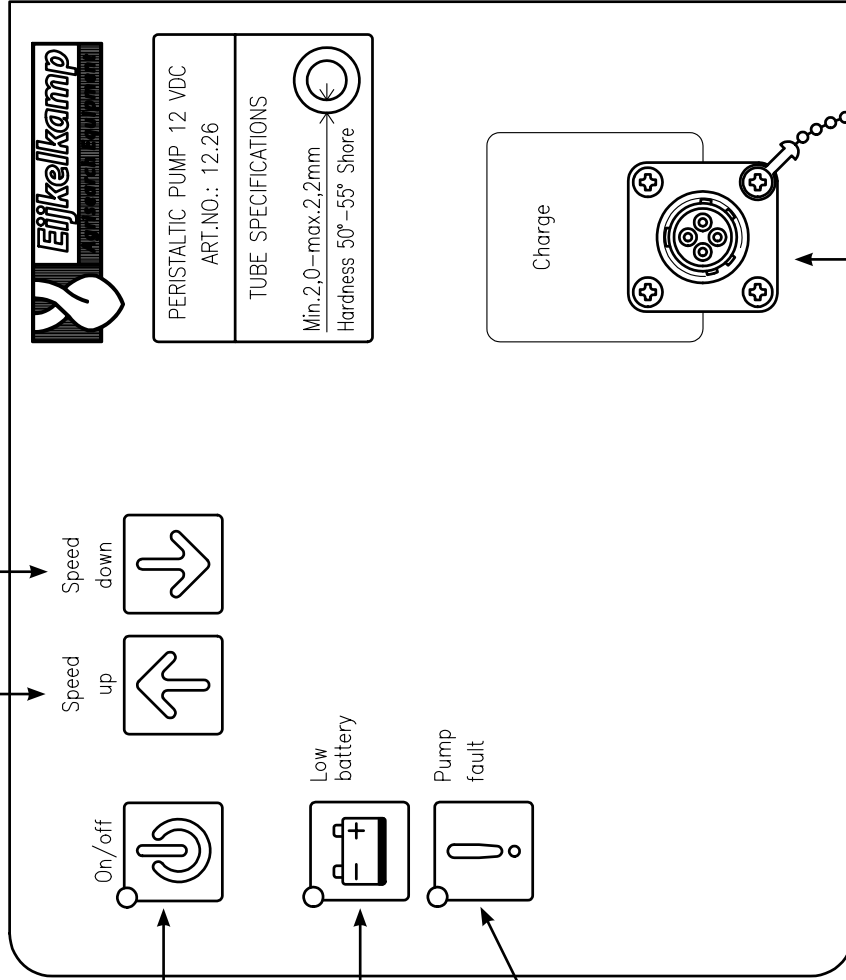
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**Operation membrane key-pad**

Per click the speed of the peristaltic pump is increased or decreased with 10 rotations per minute.



On/Off/Reset\*-key  
\* Push reset key if the pump was blocked.

Battery voltage low. The pump will stop soon. Recharge the battery.

Warning for overload, for instance if the pump is blocked. Release and reset using the On/Off-key.  
Warning for condensation in pump housing. Check: Electronics can get damaged!

Connection battery charger / sounding apparatus with inversion switch

