



**Peristaltic Pump**  
**TR-200**

**Operator's**  
**Manual**

Version 1.21

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RECORD THE FOLLOWING INFORMATION FOR FUTURE REFERENCE			
<b>Model / Type</b>	TR-200		
<b>Serial Number</b>		<b>Date Purchased</b>	

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## INTRODUCTION

*Thank you for purchasing a Durham Geo Slope Indicator pump. By following the setup, operating, and maintenance procedures, you can enjoy a lifetime of use.*

The Portable Peristaltic Sampling Pump is designed for environmental sampling in outdoor applications. It offers variable flow rates (up to 500 mL per minute @ 12 V) in two modes of operation: **sampling/ purging** (forward rotation) and **back flush** (reverse rotation).

The pump runs on 12 V (dc) power which is provided by the internal gel cell battery. Alternatively, it can run an external 12 V (dc) power source such as an automotive battery when using the Power Supply Kit provided with the unit.

**NOTE:**

The Power Supply Kit is not intended for recharging the battery. It is provided to power the motor directly from an outside 12 V source instead of running it from the internal battery.

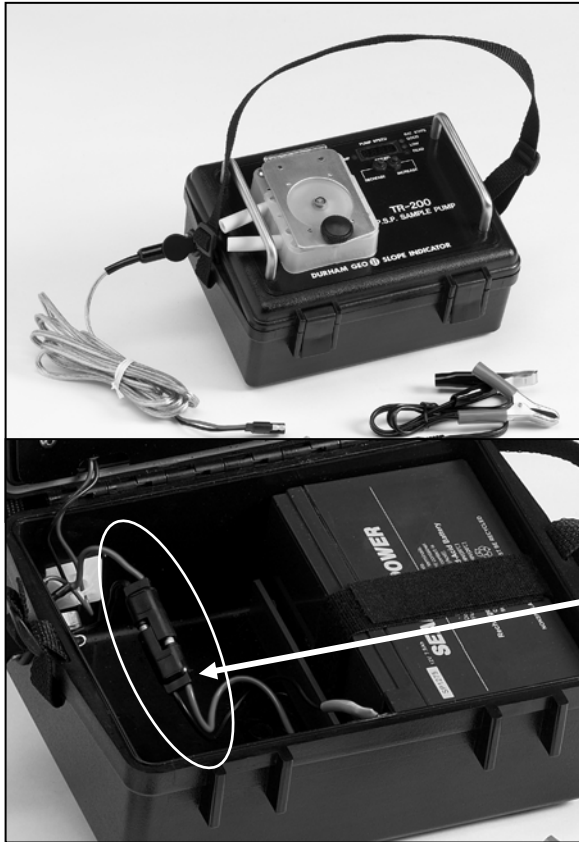
The battery charger is not included. It may be purchased separately (ref: Part Number TR-3013, Smart Battery Charger for AC power)

**CAUTION !**

**The TR-200 is NOT intrinsically safe.**

**DO NOT USE IN FLAMMABLE OR  
EXPLOSIVE ATMOSPHERES.**

## SET UP



Check for signs of shipping damage.

You should have received:

1. Model TR-200 pump with battery.
2. Bag containing the Power Supply Kit which includes a power cord for DC power (shown here plugged into the unit), a cigarette lighter adapter and alligator clips.
3. This Operator's Manual.

#### Connecting the Battery:

1. Open the cover and connect the battery (plug the battery terminal into the mating end). The battery should be fully charged from the factory but it is a good idea to check its charge level before use. The voltage should be 12.7 – 12.8 V for a fully charged battery. (see Battery Care and Maintenance, p 6)
2. Close the lid.

Note: After disconnecting the battery, use the connector cap to isolate the battery cable and prevent accidental short circuits.

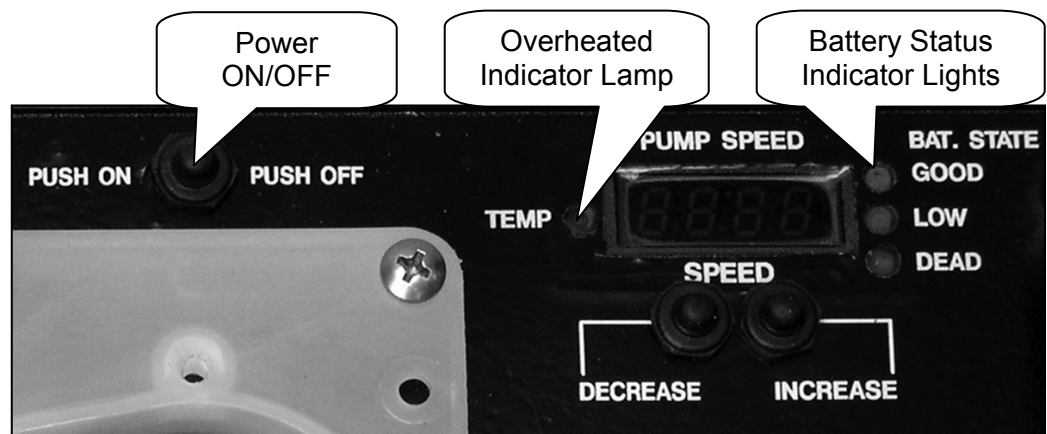
#### TUBE / SLEEVE ASSEMBLY:

Insert the suction tubing (TR-735 optional) to the pump tubing and secure the assembly with a tie fastener placed approximately 1/4" from the end of the pump tubing (the larger tubing). Be careful not to over tighten and collapse the inner tubing. Install the tubing with the tie fastener on the inlet side of the pump.

Note: make sure the fastener is on the outside of the pump housing and is not interfering with the roller assembly.

## OPERATION

## Controls

**START/STOP**

The PUSH ON / PUSH OFF button is used to start and stop the pump.

Whenever you press the button to stop the pump, the speed setting is changed to zero (0000).

**SPEED CONTROL**

There are two buttons to control speed: one to increase speed (pump/purge) and one to decrease (back flush) it.

The speed can only be adjusted by pressing the DECREASE or INCREASE buttons.

To reverse rotation:

- If the pump is stopped, press the DECREASE button and verify that the small dot on the display is on the bottom right (as indicated below)
- or
- If the pump is running in the pumping mode, decrease the speed past the zero point. The direction of rotation is indicated by a small red dot on the right the screen.



Small red dot...

- on top right of screen indicates forward rotation (SAMPLING mode)
- on bottom right of screen indicates reverse rotation (PURGING mode)

The value shown on the screen does not indicate an absolute speed. Rather, it indicates the **percentage (0% to 100%) of the maximum speed** available at the current battery level. The values displayed are useful reference settings when sampling or purging and allow you to repeat flow rates.

Note: depending on the pump head tubing and battery condition, it may take a level of some 55 to 60% to start pump rotation.

## BATTERY STATUS

One of the three Battery Status Indicator Lights is always lit. It gives you a quick sense of how well the battery is charged. When the amber light (LOW) comes on, the battery voltage is low and the battery should be recharged (or exchanged for a fully charged one) as soon as possible. You will have approximately 20 minutes of use at this indication at this point pumps speeds are considerably slower than they are at full charge and the speed settings you may have recorded at full voltage no longer apply.

## OVERHEATING PROTECTION

The TEMP indicator light comes on when the system overheated. An auto-reset feature turns the electric system off for protection. Allow the system to cool down. When the light goes off — which may take 10 minutes or more — you may restart the pump.

## External Power Supply

The pump may be powered directly from an external 12V (dc) power source — such as a vehicle battery—by connecting the Power Supply Kit as shown below .

Please note the Power Supply Kit cannot be used to recharge the internal battery. To recharge the internal battery, please use the optional TR3013 Smart Charger.



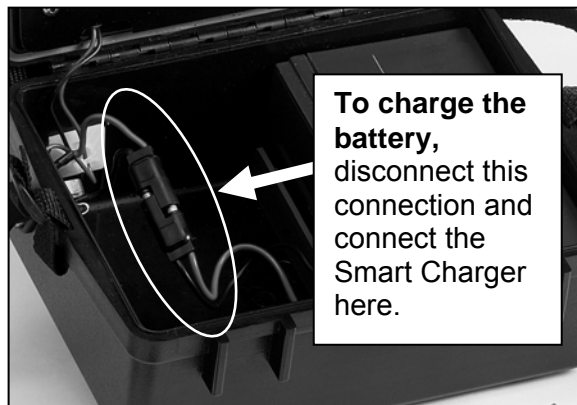
## CARE AND MAINTENANCE

### Battery Care

**NOTE →**

**Avoid mixed use of batteries. Different capacities, histories, or manufacturers of batteries may cause damage to the batteries or other equipments.**

High performance and long service life of batteries in the Durham Geo Slope Indicator Peristaltic pump depend upon correct charging. Improper charging modes or inadequate charging equipment result in decreased battery life and/or unsatisfactory performance. Any of the conventional charging techniques may be used, but to obtain maximum service life and capacity, along with acceptable recharge time, constant current/constant voltage charging is recommended. **We recommend using our TR-3013 Smart Charger which comes with appropriate fittings.** Connect the charger as shown on the image.



Note: The Power Supply Kit provides power directly to the motor and by-passes the battery. Therefore the Power Supply Kit cannot be used to recharge the internal battery.

A charge quantity of 105-120% of the previous discharged quantity is needed for fully charging the battery. The charging voltage of battery decreases with increasing temperature and increases with decreasing temperature. At a temperature below 5°C (41°F) or above 35°C (95°F), temperature compensation for charging voltage is necessary. At ambient temperature the compensation will not be necessary.

Overcharging should be avoided: As a result of too high a charge voltage, excessive current will flow after reaching full charge, causing decomposition of water in the electrolyte and, hence, premature aging.

Undercharging should also be avoided: If too low a charge voltage is applied, the charger current output will essentially stop before the battery is fully charged. This allows some of the lead sulphate to remain on the plates, which will eventually reduce capacity.

STORAGE TEMPERATURE	RECHARGE INTERVAL AND METHOD
Below 20°C (68°F)	9 months, charge for 16 hrs at 14.4 V
20°C - 30°C (68°F - 86°F)	6 months, charge for 16 hrs at 14.4 V
above 30°C (86°F) (avoid this storage condition)	3 months, charge for 16 hrs at 14.4 V

### CHECKING BATTERY CHARGE IN THE FIELD

Using a voltmeter, check the voltage across the battery terminals.

READING	BATTERY CONDITION
12.7 – 12.8 V	Battery is fully charged.
12.4 V	Battery has about 65% of its charge and needs to be recharged.
10.5 V	Battery is discharged to the point where it must not be used on the sampler or Cyber Rain Gauge. It needs a full recharge cycle.
5 V or less	Battery is totally discharged to the point where it may be damaged or may not be able to be recharged fully.

### HANDLING INSTRUCTIONS

- Do not short the terminals.
- Do not reverse polarity.

## CARE AND MAINTENANCE

- Do not let the battery be discharged totally or it will damage it.
- Do not store gel cell batteries in an uncharged condition.
- Do not place the battery near or in fires.
- Do not use the battery in a container or bag without proper ventilation.
- Operate at a temperature between 5°C to 35°C (40°F to 90°F) for cycle use.
- To properly store the battery, remove battery from equipment or charger and store in a dry and cool place. Immediately recharge after discharging. If sulfuric acid from the battery is spilled on skin or clothing, wash anywhere the acid came in contact with water. If acid comes in contact with eyes, flush with large amounts of water and immediately see a doctor.

## Peristaltic Pump Care

### OPERATING TIPS:

#### FOR OPTIMUM TUBING LIFE

Periodically move the tubing so that a different segment is in the pump head, or change the tubing link. This will avoid excessive tubing wear at any specific point. Always move the worn tubing to the suction side of the pump.

#### RUN DRY

The pump can run dry without damaging the motor or drive unit. However, the tubing life will be reduced.

#### PRIMING

The peristaltic pump is self priming and will hold vacuum when turned off.

### TUBING REPLACEMENT

**Change the pump tubing as soon as any signs of cracking, wear, swelling or stiffness are seen.** Replacing worn tubing before it leaks will help avoid spillage, and possible costly repairs.



**Turn the pump OFF.** Disconnect the battery — or the external power cord if it is being used — before removing or installing tubing. Fingers or loose clothing could be caught in the pump mechanism.



**Always wear safety glasses** and use appropriate measures to protect operator and equipment.



Make sure the pump tubing is drained to avoid spills.

**Procedure for replacing the pump head tubing:**

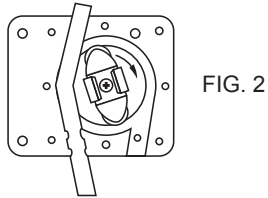


FIG. 2

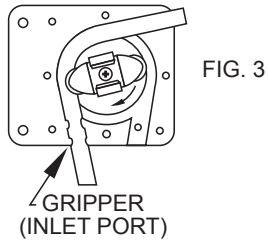


FIG. 3

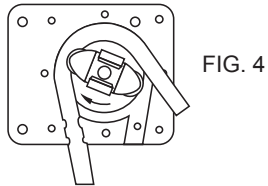


FIG. 4

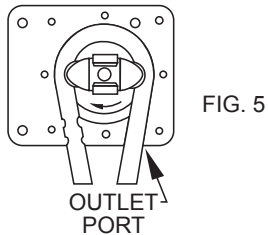


FIG. 5

1. Disconnect power to the pump.
2. Disconnect the suction and discharge tubing from the pump tubing.
3. Remove (flip open) the pump cover (Fig. 1).
4. Pull out the old pump tubing and discard.
5. Clean the roller race, removing any particles that could damage the tubing.
6. Make sure the power is still disconnected. Rotate the roller bracket assembly until it is in the position shown in Fig. 2.
7. Push the new tubing into the inlet port, anchoring the tubing in grippers (see Fig. 3). If using a 9" piece of tube, 1½" should extend outside of the inlet port.
8. Continue to rotate the roller bracket assembly while pushing the tubing into the roller race (Fig. 4).
9. Insert the tubing in the outer port (Fig. 5) and secure the cover.
10. Reconnect the suction and discharge tubing and use tie fasteners approximately ¼" from the end. Be sure the fastener is on the outside of the pump housing and is not interfering with the roller assembly.



Fig. 1: To replace the pump tubing, flip the pump cover open to gain access to the roller.

**Tubing Assembly:**

Insert the suction tubing to the pump tubing and secure the assembly with a tie fastener placed approximately ¼" from the end of the pump tubing (the larger tubing). Be careful to not over tighten and collapse the inner tubing. Install the tubing with the tie fastener on the inlet side of the pump.

Note: make sure the fastener is on the outside of the pump housing and is not interfering with the roller assembly.

## SPECIFICATIONS

Pumping Rate	100 to 500 ml/min (with 25 ft of 1/4 " OD suction hose and 0 ft head, and full battery charge).
Back Flush Rate	Same as pumping rate
Suction Lift (Max.)	25 ft (7.6 m)
Current Consumption	2.5 A (typical)
Overcurrent Protection	Auto-reset with indicator light
Operating Voltage	12 V (dc)
Operating Temperature	35 to 160°F (2 to 70°C)
Pump Head Tubing	3/8" OD x 3-1/6" ID unreinforced silicone tubing.
Suction and Discharge Hoses	Optional
Power	12 V, 7.5 A-h gell cell battery. Rechargeable
Enclosure	Water resistant. ABS plastic construction.
Dimensions	9.5 x 7.5 x 6 in (241 x 190 x 152 mm)
Shipping Weight	10 lb (4.5 kg) with battery.

**CAUTION !**

**The TR-200 is NOT intrinsically safe.**

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EXPLOSIVE ATMOSPHERES.**

## Troubleshooting

*This is used as a guide to aid the user in defining problems. If this does not help resolve the issue, please feel free to contact Durham Geo Slope Indicator.*

### **PROBLEM: Suction is poor or non-existent**

1. Battery voltage is low. Charge battery if below 11.5 V.
2. Suction tubing not properly tied to the pump head tubing (pump is sucking air). Tie the tubing as indicated in the Care and Maintenance chapter.
3. Suction tubing or pump head tubing is pierced or cracked. Replace tubing.

### **PROBLEM: Indicator lights do not illuminate**

1. Battery is not properly connected. Check connections for corrosion.
2. Battery is not charged. Check battery voltage.

### **PROBLEM: Pump does not start**

1. Battery is not properly connected. Check connection and voltage.
2. The overcurrent protection tripped (the warning light should be on it may be out of order). Wait 10-15 min for the unit to cool down naturally and try restarting it.

## Limited Warranty

The Durham Geo Slope Indicator TR-2000 is guaranteed against defective materials and workmanship for a period of one year from the date of shipment. We will repair or replace such items as may prove defective at our option. Under no condition will we allow labor charges or other expenses to repair defective merchandise without our approval. Durham Geo makes no other warranties of any kind or nature and all implied warranties or merchantability or fitness for a particular purpose that exceeds the previously stated obligation are expressly excluded. We accept no responsibility for damage or abuse to apparatus due to improper installation or operation. We accept no responsibility for and will not pay for any lost profits incidental, consequential or special damages.

For a complete warranty disclosure, please refer to the printed statement on the back of any Durham Geo Slope Indicator original invoice,

→ call **1-800-837-0864** (toll free) or +1 (770) 465-7557

→ e-mail **info@durhamgeo.com**