

TR - 3000 STORM WATER SAMPLER

MANUAL OF OPERATION



DURHAM GEO SLOPE INDICATOR

DESCRIPTION

The Durham Geo TR-3000 Storm Water Sampler is designed to monitor rainfall precipitation rate and allow automatic collection of a storm water runoff sample after a predetermined amount of precipitation has occurred. Specifically, the sampler has been designed to satisfy the sampling requirements of the Georgia DNR, Environmental Protection Division, Georgia Permit GAR100000, for construction site runoff monitoring regulation under the National Pollutant Discharge Elimination System, Storm Water Discharges Associated with Construction Activity.

The TR-3000 Storm Water Sampler is housed in a lockable, waterproof enclosure and is supplied with a 20 foot sample pick up tube with weighted stainless steel strainer, one liter sample bottle, self-emptying tipping rain gauge with 40 foot cable, water level sensor with 20 foot cable, rechargeable 5.0 ah gel cell battery and a 110 volt (ac) battery charger. An optional data logger is available and highly recommended to ensure permit compliance.



The microprocessor controller, LCD display and operator controls are mounted on a control panel with connectors marked for Rain Gauge, Water Level Sensor and Data Logger. A 12 volt, 5 ah gel cell rechargeable battery powers the system. A peristaltic pump is provided with a push fit inlet connector for a ¼ inch inlet tube to a quick connect fitting on the right side of the case. The pump is connected to the sample bottle cap along with a high water shut off sensor and an air vent, also terminated to the outside of the case. The sample bottle is a standard 1 liter polyethylene bottle. The cables from the rain gauge and water level sensor enter the case from the right, through a watertight cable fitting, to the Rain Gauge and Water Level Sensor connectors respectively.

System activation occurs after the controller has detected the preset rainfall limit (0.50, 1.00, 2.00 inches) in a 24-hour period. The pump delivers the sample to the sample bottle. The integral peristaltic pump is programmed to reverse and purge the sample line after the sample has been collected and reverts to stand-by mode. If the water level sensor is enabled, a sample will be taken only when both the rainfall limit has been reached and the water level sensor is in contact with the water source.

In use, it is anticipated that the system will remain on site for an extended period of time. The design assumes that the battery will be removed from the case for charging and replaced with a fully charged battery each month. A front panel mounted fuse electronically protects the system.

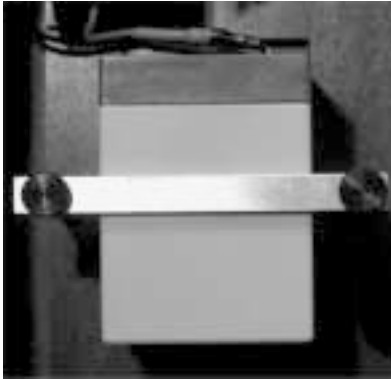
Designed and built to be easily upgraded for future features including telemetry and solar power battery recharging.



SET-UP

BATTERY

The supplied battery is a 12 volt, 5.0 ah gel cell rechargeable battery. To work correctly, the battery will need to be fully charged before use. Remove the battery from the case by first twisting the nut loose on the bar support and swinging the support bar out of the way. Disconnect from the control panel leads and remove the battery. Connect the battery lead cable to the battery charger lead cable and plug in the wall outlet for at least 8 hours. After charging, the battery should be disconnected from the charger and connected to the control panel leads in the unit.

**RAIN GAUGE**

The rain gauge is connected to the sampler using the connector marked Rain Gauge. The cable from the rain gauge enters the case from the right, through a watertight cable fitting, to the Rain Gauge connector. The rain gauge *must* be mounted on a level surface for rainfall to be measured accurately.



NOTE: Cut and remove the plastic tie, which holds the tipping mechanism in place during shipping, before operation.

WATER LEVEL SENSOR

The sampler is also capable of using a water level sensor to activate the sampling process. However, if the water level sensor is enabled, a sample will be taken only when both of the following parameters are reached: the rainfall limit has been reached and the water level sensor is in contact with the water source.





PICK UP TUBE with STAINLESS STEEL STRAINER

The sampler comes with a 20 foot by ¼” ID reinforced clear PVC pick up tube with a stainless steel strainer. This is attached to the case using a quick-connect connection and for strength against strong currents or debris.



DATA LOGGER

The sampler is capable of data logging with the use of an optional Onset HOBO Event Data Logger. A data logger may be attached to the inside of the sampler using Velcro patches and then connected to the control panel using the connector marked Data Logger. Downloading of data may be done directly into a laptop computer or via a HOBO Shuttle for transport to a computer. BoxCar Pro 4 Data Logging Software (CD) is also available.



Event Logger



Shuttle



Software

SAMPLE BOTTLE

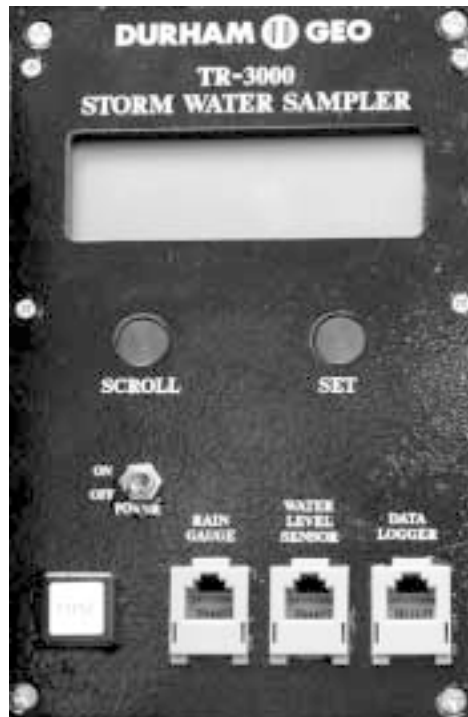
The sampler is provided with a single 1 liter sample bottle, the cap for which is permanently kept within the sampler as it has the fill inlet, air vent and high water shut off sensor permanently attached to it. The sample bottle is made from high-density polyethylene and has a 53mm wide mouth. In use, the cap from a new bottle will be used to seal the full sample bottle taken from the sampler.



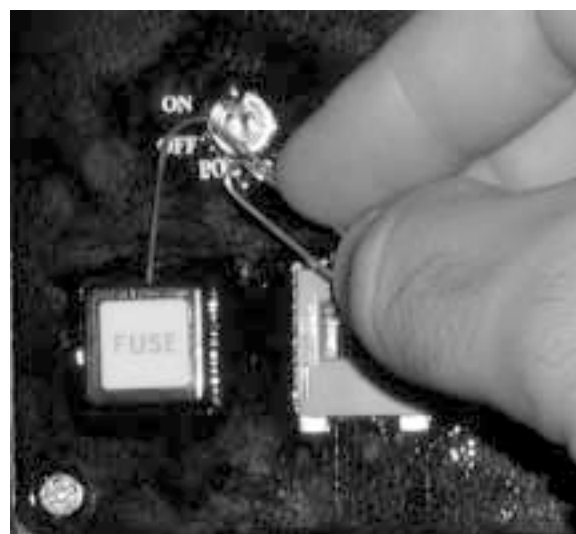
CONTROL PANEL

The control panel provides all the controls and connections to allow easy operation. The inputs on the panel are labeled for the Rain Gauge, Water Level Sensor and Data Logger.

The microprocessor controller is operated using the two surface mounted buttons “Scroll” and “Set”. The four-line LCD display provides information on the sampler settings and operational status relative to the sampling event. A full description on the operation of the sampler will be found in the next section.



Using a paper clip or similar device to depress a locking tab on the upper surface of the fuse housing will allow access to the fuse. When depressed, the fuse will be partially ejected, allowing for complete removal.



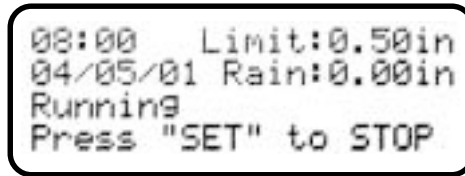
The TR-3000 must be in the upright position to operate.



OPERATION

FRONT PANEL DISPLAY

The four-line display provides information regarding the settings and operational status of the sampler. These are displayed as shown in the illustration below.



The push-button controls beneath the display are used to scroll through the menus, “Scroll” button and execute a function, “Set” button. The following describes the functions of each of the segments:

TIME

This field shows the time in Hours: Minutes. It will continuously advance at all times, unless both batteries are disconnected or the unit is turned off.

DATE

This field shows the date in Month/Day/Year. It will continuously advance at all times, unless both batteries are disconnected or the unit is turned off.

OPERATIONAL STATUS

This field shows the operational status performed. The available operational status commands include: *Running, Fill Bottle, Purging Hose, Sample Taken, Exit to Menu, Already Full, Waiting Water, Sample Abort, Pump Timeout, LD (level detector), EMR (end of month reset).*

COMMAND MENU

This field shows which command will be performed if the operator presses the “Set” button. The available commands include: *Set Rainfall Limit, Reset Rainfall Count, Run Pump Forward, Run Pump Backward, Ena/Dis Water Sensor, Ena/Dis EOM Reset, Adjust Time & Date, Show Captured Event, Clear Event.*

RAINFALL LIMIT

This field shows the selected rainfall limit that will trigger sample collection. This can be set at 0.50, 1.00 and 2.00 inches by executing the appropriate command.

RAINFALL ACCUMULATION

This field shows the actual rainfall that has been recorded within the past 24 hours. This is a rolling timeline, where each additional rainfall accumulation within the hour is added and the previous 24th hour is overwritten.

WATER LEVEL SENSOR

This field shows the Water Level Sensor status as enabled or disabled. If the Water Level Sensor is enabled, a sample will be taken only when both of the following parameters are reached: the rainfall limit has been reached and the Water Level Sensor is in contact with the water source.

SET PUSH-BUTTON

The operator must press this button in order to execute the selected command to actually take effect.

SCROLL PUSH-BUTTON

The operator can press this button to advance the unit through the command menu. The command menu will change to show which command is currently selected.





COMMAND REPERTOIRE

ON / OFF

This switch will turn the sampler on or off. This command conserves the battery during transport and/or storage.

SET RAINFALL LIMIT

This command is used to select the desired rainfall limit for triggering the water sampling process. Each time the “Set” button is pressed, a different Rainfall Limit will be displayed on the LCD display. The operator can press the button until the desired limit is displayed (0.50, 1.00, 2.00 inches).

RESET RAINFALL COUNT

The operator can reset the accumulated rainfall by selecting this command from the scrolling menu and pressing the “Set” button. Since this is a rolling 24-hour timeline, previous rainfall accumulation amounts will be cleared and a new 24-hour count started.

RUN PUMP FORWARD

The operator can activate the pump immediately for manual sampling or to verify the operation of the sampler by pressing the “Set” button. This will begin the sampling process and must be stopped by pressing the “Set” button.

RUN PUMP BACKWARD

This command will allow the operator to “back-flush” the unit whenever necessary. (Whether for clearing the sample pick up tube of any remaining water or for general maintenance cleaning of the sample pick up tube).

ENABLE / DISABLE WATER SENSOR

This command will allow the operator to enable or disable the Water Level Sensor. If the Water Level Sensor is enabled, a sample will be taken only when both of the following parameters are reached: the rainfall limit has been reached and the Water Level Sensor is in contact with the water source.

ENABLE / DISABLE EOM (end of month) RESET

This command will automatically reset the Rainfall Limit from 2.00 to 1.00 at the end of the month. If enabled, and the Rainfall Limit is set at 2.00, when the next month begins, the Rainfall Limit will automatically reset to 1.00.

ADJUST TIME & DATE

This command allows the operator to set the time and date on the unit. Each time the “Set” push-button is pressed, the cell with the cursor increases one value. Each time the “Scroll” push-button is pressed, the cursor advances to the next cell. Once the time and date has been set-up, press the “Set” button to lock in the correct information and “*Exit the Menu*”.

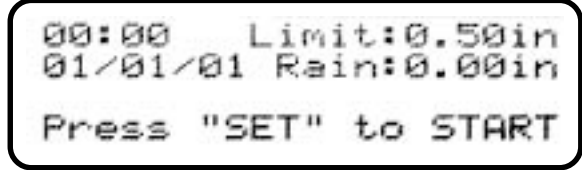




STEP-BY-STEP OPERATION

The following will take you through the programming and operation of the sampler:

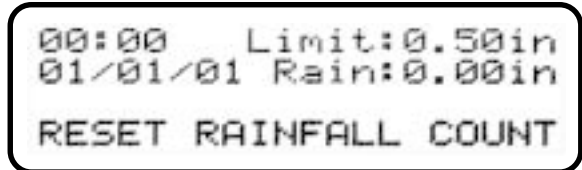
When the power is turned on, the LCD screen will appear as shown.



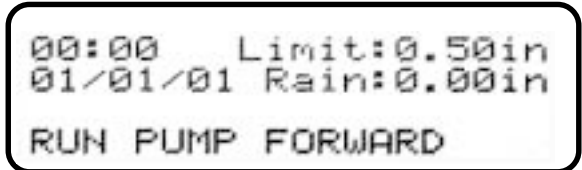
Press “Scroll” once, the “Set Rainfall Limit” screen will appear (.50 inch is the default limit). Press “Set” once for 1.00 inch, twice for 2.00 inches.



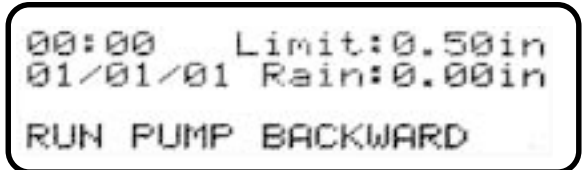
Press “Scroll” once, the “Reset Rainfall Count” screen will appear. Press “Set” to reset the Rainfall Count to 0.00 inches.



Press “Scroll” once, the “Run Pump Forward” screen will appear. Press “Set” to run pump forward, then press “Set” again to stop pump.



Press “Scroll” once, the “Run Pump Backward” screen will appear. Press “Set” to run pump backward, then press “Set” again to stop pump.



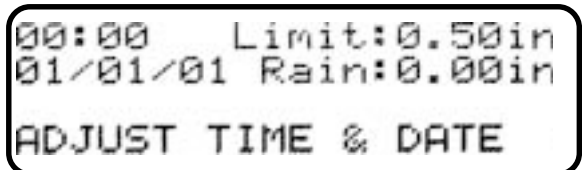
Press “Scroll” once, the “Enable / Disable Water Sensor” screen will appear. Press “Set” to enable or disable the Water Level Sensor.



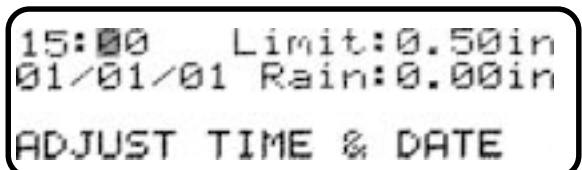
Press “Scroll” once, the “Enable/Disable EOM Reset” screen will appear. Press “Set” to enable or disable the “end of month” reset of the Rainfall Limit from 2.00 to 1.00.



Press “Scroll” once, the “Adjust Time & Date” screen will appear.



Press “Set” to increase the value of the cursor one value. Press “Scroll” to advance the cursor to the next cell and repeat until the correct time and date are entered.

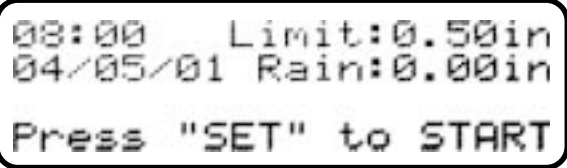




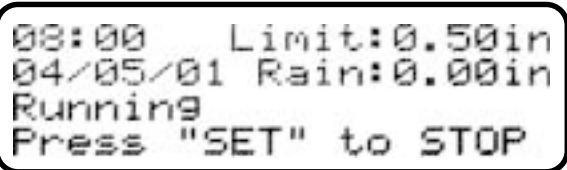
Press “Set” to “Exit to Menu” once the correct time and date have been entered.



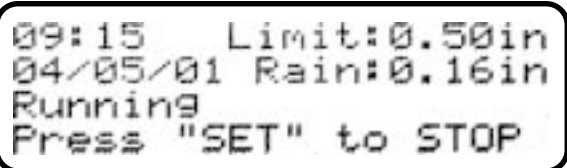
Press “Scroll” once, the “Press Set to Start” screen will appear.



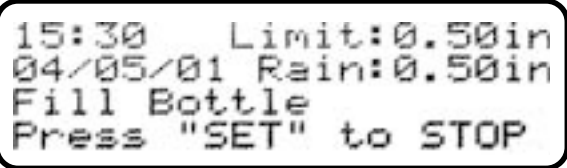
Press “Set” once, the “Press Set to Stop” screen will appear. *Running* will appear in the Operational Status field, the unit is now fully functional of all preset commands and the rain gauge will begin to count rainfall amounts.



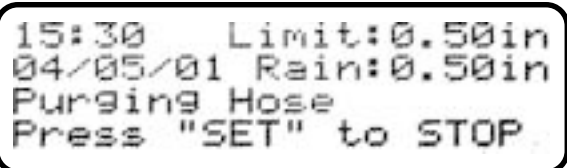
The following screens appear as the automatic sampler operates.



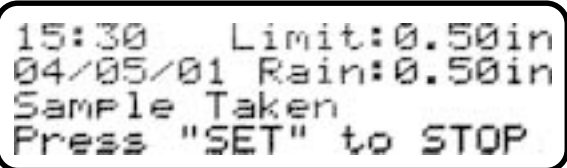
When the predetermined rainfall limit is reached within the present time frame, the sampling sequence is activated.



When the high water shut off float within the bottle is activated, the pump stops then reverses to purge the sample intake line of water. The time required is calculated by the controller, based on the bottle fill time.



The controller stops the pump, but continues to log rainfall accumulation and maintain the time and date.



This completes the operating program used by the sampler. It is assumed that the controller will be reset when the sample is removed from the unit.

To assure that the sampler is reset, the commands will lead the operator through the reset process before the sample should be taken from the unit and the sample event time captured is recorded. To reset the controller, simply following the commands on the LCD display.

Press “Set” once, to stop the unit and the “set rainfall limit” screen will appear. Press “Set” until the new desired limit is shown (0.50, 1.00, 2.00 inches).

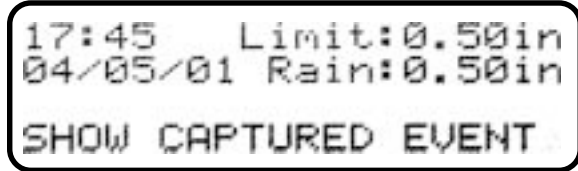




Press “Scroll” once, the “*Reset Rainfall Count*” screen will appear. Press “Set” to reset the Rainfall Count to 0.00 inches.

If desired press “Scroll” to “*Run Pump Forward*”, “*Run Pump Backward*”, “*Enable / Disable Water Sensor*”, “*Enable/Disable EOM Reset*” or “*Adjust Time & Date*”.

Press “Scroll” once, the “*Show Captured Event*” screen will appear. Press “Set” to reveal the time and date stamp of when the sample was taken. Record this data.



Press “Scroll” once, the “*Clear Event*” screen will appear. Press “Set” to clear the time and date stamp and reset for the next sampling event.



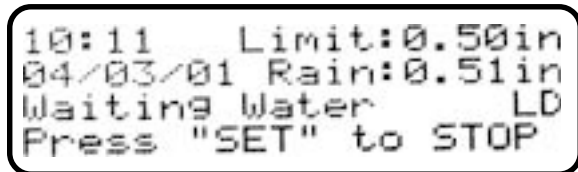
Now the operator can remove the sample bottle, label the bottle and replace the bottle with a new clean bottle.

Press “Scroll” once, the “*Press Set to Start*” screen will appear.

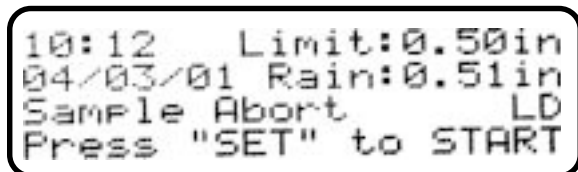
Press “Set” once, the “*Press Set to Stop*” screen will appear. *Running* will appear in the Operational Status field, the unit is now fully functional of all new preset commands and the rain gauge will begin to count rainfall amounts again.

Additional operational status fields that may appear include the following:

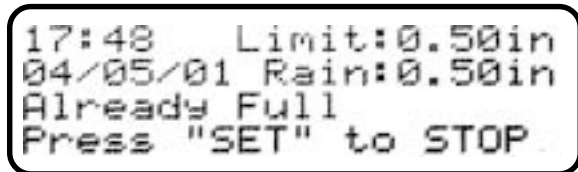
“*Waiting Water*”: When the Water Level Sensor is enabled and the rainfall limit has been reached, but the Water Level Sensor is not in contact with the water, the “*Waiting Water*” screen is displayed.



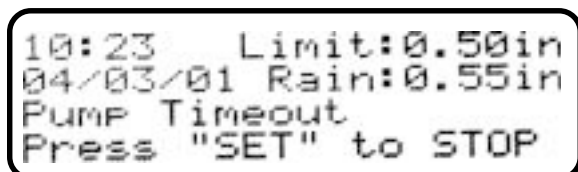
“*Sample Abort*”: When the sampling process is stopped by pressing “Set”, the “*Sample Abort*” screen is displayed.



“*Already Full*”: When the sample bottle is full, meaning the high water shut off float is activated, and another sampling event is triggered, the controller will not allow the sample to be taken and display the “*Already Full*” screen.



“*Pump Timeout*”: If the high water shut off float is not activated in 4 minutes, the unit will automatically stop the pump, saving the battery and pump from excess use, and display the “*Pump Timeout*” screen.



DURHAM GEO SLOPE INDICATOR

SPECIFICATIONS

PUMP	Peristaltic, 12 volt, reversible.
SAMPLE BOTTLE	Round, high-density polyethylene, 3.5” diameter x 8.0” high, 53mm mouth, capacity 1 liter (32 oz).
SAMPLE PICK UP TUBE	20’ x 0.25” ID reinforced clear PVC tubing with stainless steel strainer.
SAMPLE CASE	ABS plastic, waterproof enclosure. Size: 6.7” x 11.4” x 17.4”
BATTERY	12 Volt, 5.0 amp hour gel cell, rechargeable.
BATTERY CHARGER	110 Volt (ac) input with 12 Volt (dc) output.
CONTROLLER	Programmable, microprocessor controlled with a 4 x 20 LCD display. Two push button operation. Input for Rain Gauge, Water Level Sensor & Data Logger. Fuse.
RAIN GAUGE	Self-emptying tipping bucket rain gauge with 40 foot cable.
WATER LEVEL SENSOR	Sensor with 20 foot cable for use in ponds, streams or rivers.
WEIGHT	16 lbs.
OPERATING TEMPERATURE	32° F - 140° F

The TR-3000 must be in the upright position to operate.

WARRANTY

The Durham Geo TR-3000 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 which 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.

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