Product Catalog

Soil sensors
Data loggers
Connectivity / wireless
Accessories
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# Soil Sensors

**Summary**
- **GroPoint Profile**: Measure soil moisture at multiple depths with a single probe and cable. Installs quickly and easily without excavating.
- **GroPoint Lite**: Analog or digital soil moisture and temperature. Exceptional accuracy (±1%) and fully-potted electronics for long-term durability.
- **GroPoint Pro**: SDI-12 sensor measures moisture, EC and temperature. Exceptional accuracy (±1%) and fully-potted electronics for long-term durability.
- **GroPoint Classic**: Legendary ruggedness and dependability. Exceptional accuracy and large sphere of influence.

**Why choose this sensor?**
- **GroPoint Profile**: When you want to measure soil moisture and temperature with extreme accuracy at multiple depths to analyze water penetration through the soil.
- **GroPoint Lite**: When you need an extremely accurate and durable single-point soil sensor to measure moisture content and temperature.
- **GroPoint Pro**: When you need the accuracy and durability of GroPoint Lite, but also need to measure EC and would like a simple way to measure the wetting front.
- **GroPoint Classic**: When you need a 4-20mA analog solution and/or want a large area of influence surrounding the sensor.

## Technology

<table>
<thead>
<tr>
<th></th>
<th>GroPoint Profile</th>
<th>GroPoint Lite</th>
<th>GroPoint Pro</th>
<th>GroPoint Classic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology</strong></td>
<td>TDT&lt;sup&gt;5&lt;/sup&gt;</td>
<td>TDT&lt;sup&gt;5&lt;/sup&gt;</td>
<td>TDT&lt;sup&gt;5&lt;/sup&gt;</td>
<td>TDT</td>
</tr>
<tr>
<td>Analog 0-5mA</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Analog 4-20mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital SDI-12</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Digital RS-485</td>
<td></td>
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## Range

<table>
<thead>
<tr>
<th></th>
<th>Moisture</th>
<th>Temperature</th>
<th>EC</th>
<th>Moisture</th>
<th>Temperature</th>
<th>EC</th>
<th>Moisture</th>
<th>Temperature</th>
<th>EC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Moisture</strong></td>
<td>0% to 100% of VMC</td>
<td>-20°C to +70°C (-4°F to 158°F)</td>
<td>n/a</td>
<td>±1.0% **</td>
<td>±0.5°C</td>
<td>n/a</td>
<td>±0.5°C</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td></td>
<td>-20°C to +70°C (-4°F to 158°F)</td>
<td>n/a</td>
<td>±0.5°C*</td>
<td>±0.5°C</td>
<td>n/a</td>
<td>±3%</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td><strong>EC</strong></td>
<td></td>
<td>0 to 4 dS/m</td>
<td>n/a</td>
<td>±1.0% **</td>
<td>±1.0% **</td>
<td>n/a</td>
<td>±1.0% **</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>

## Precision

<table>
<thead>
<tr>
<th></th>
<th>Moisture</th>
<th>Temperature</th>
<th>EC</th>
<th>Moisture</th>
<th>Temperature</th>
<th>EC</th>
<th>Moisture</th>
<th>Temperature</th>
<th>EC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Moisture</strong></td>
<td>&lt; 0.2%</td>
<td>&lt; 0.2%</td>
<td>n/a</td>
<td>&lt; 0.2%</td>
<td>&lt; 0.2%</td>
<td>n/a</td>
<td>&lt; 0.2%</td>
<td>&lt; 0.2%</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Current Consumption

<table>
<thead>
<tr>
<th></th>
<th>Quiescent</th>
<th>Active</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quiescent</strong></td>
<td>&lt;0.5mA</td>
<td>&lt;0.1 mA *</td>
</tr>
<tr>
<td><strong>Active</strong></td>
<td>15-20 mA (depending on number of segments) for 100 mS</td>
<td>0-5 mA: 18 mA nominal, 25mA max 4-20 mA: 30mA (nominal), 50 mA (max) SDI-12/RS-485: 15-35 mA</td>
</tr>
<tr>
<td><strong>GroPoint Profile</strong></td>
<td>&lt;0.1 mA</td>
<td>15-35 mA</td>
</tr>
<tr>
<td><strong>GroPoint Lite</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GroPoint Pro</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GroPoint Classic</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* digital only  ** 8% to 42% VMC, in controlled laboratory conditions; factory calibrated for most agricultural soils. In field applications, accuracy may slightly decrease due to the inevitable heterogeneity of soil texture, soil compaction, moisture and fluctuation in soil temperature. The accuracy may also decrease in difficult soil conditions (higher clay and salinity content). In normal conditions, GroPoint sensors will maintain their accuracy from permanent wilting through field capacity in sandy loam through clay soils with less than 60% clay particles. Under moderately saline conditions, GroPoint sensors will maintain their accuracy up to 6 ds/m.
**GroPoint Profile**

Multi-segment soil moisture and temperature profiling probe

GroPoint™ Profile provides cost-effective measurement of volumetric water content over multiple depths using a single probe, eliminating the cumbersome excavation required for multiple sensors placed at different depths. It can be deployed in irrigation-sensitive zones to enable full control of precision irrigation needs, providing an understanding of water movement through the soil.

The sleek, lightweight design installs quickly with minimal soil disruption using a pilot rod and slide hammer tool. Designed for vertical installation, the sensor takes measurements over multiple soil layers, with each measurement zone (segment) providing the average volumetric soil moisture content over a 15 cm range (approximately 6 inches).

- **✓** Eliminates need for multiple sensors and cabling systems.
- **✓** Installs quickly and easily without excavating.
- **✓** One SDI-12 address is used to read all segments, providing for simplified installations. Optional RS-485 output.
- **✓** Moisture readings can be user-calibrated with 3rd-order polynomials to meet custom requirements.
- **✓** Low power requirements—suitable for remote, autonomous applications.
- **✓** Patented TDT® technology for scientific-grade accuracy and excellent long-term stability of measurements.
- **✓** Factory-calibrated for most agricultural soils, but can be custom calibrated before shipping.

Choose the number of 15cm segments that are right for your application. You can configure it with no temperature sensors if you only require moisture measurement, or the standard configuration places temperature sensors every 1 or 2 segments. """" = temperature sensor placement.

This single GroPoint Profile probe installed without excavation is equivalent to 4 separate probes. It measures soil moisture at 4 different depths simultaneously.

Segment 1
Average volumetric soil moisture content measured over 15cm (5.9")

Segment 2

Segment 3

Segment 4
Each segment can be calibrated independently.
Growing innovation.

**TDT 5**

GroPoint’s patented technique for soil moisture measurement

Our proprietary TDT\textsuperscript{5} technology delivers an exceptional price:performance ratio, with performance as good (in most cases better) as sensors costing much more.

GroPoint™ sensors are based on the field-proven Time Domain Transmission (TDT) method of reliably measuring soil moisture, which is a refined version of Time Domain Reflectometry (TDR). TDT-based sensors do not need to be calibrated to each type of soil they will be buried in. Some of the best soil sensors utilize this method. TDT\textsuperscript{5} enhances TDT in 5 key ways:

1. **Extreme accuracy**
   - Our patented design weaves the antenna through the circuit board 20 times per centimetre, and much like a coiled spring, the effective length of the antenna is 5 times the physical length it consumes. It’s like having a 75cm long antenna in a single 15cm sensor. A larger antenna increases the resolution of each sample, allowing more noise to be filtered out, improving accuracy to ±1\% (between 8\% and 42\% VMC).

2. **Reduced manufacturing cost**
   - Unlike other moisture probes, GroPoint sensors do not have separate components for electronics and bulky metal antennas. By integrating the antenna and all electronics into the same circuit board (possible thanks to the patented antenna design), manufacturing costs are dramatically reduced.

3. **Repeatable accuracy**
   - Each time a measurement is taken, GroPoint sends 400,000 pulses through the sensing element to generate data for the measurement, then employs advanced filtering to eliminate outlying readings (noise) before averaging the data and sending the measurement as SDI-12 output. This ensures that the same extreme accuracy (±1\%) is obtained each and every time moisture is measured.

4. **Low power consumption**
   - Even with 400,000 pulses for each measurement, the total time to take the measurement is less than 100 ms. This means that power consumption is minimal, and that permits GroPoint sensors to be operated for many months with small 9V battery-powered data loggers.

5. **Maximum durability**
   - Unlike typical sensors, the antenna is not exposed to the soil, so there’s nothing to bend or break. The entire sensor circuit board (including antenna) is sealed in epoxy, then encased in a sealed polycarbonate housing.

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1 833 GROPOINT / 1 250 412 6642
**GroPoint Lite**

Accurate and reliable analog or digital soil moisture probe

The GroPoint™ Lite soil sensor is robust, reliable and highly accurate, providing cost effective soil moisture and temperature measurements. The sleek, light-weight design installs quickly with minimal soil disruption. When installed vertically, the sensor averages volumetric moisture content over a soil layer of about 6" (15cm). When installed horizontally, the sensor can be used to measure moisture at a specific soil depth.

- Soil moisture (and temperature with digital versions) sensor
- Flexible interface options (SDI-12, RS-485, 0-5mA and 4-20ma) simplify integration into a broad range of applications, ancillary equipment and data loggers.
- Moisture readings can be user-calibrated with 3rd-order polynomials to meet custom requirements.
- Low power requirements—suitable for remote, autonomous applications.
- Patented TDT5 technology for scientific-grade accuracy and excellent long-term stability of measurements.
- Fully potted electronics for excellent durability.

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**GroPoint Pro**

Moisture, salinity, temperature and wetting front in a single SDI-12 sensor

The GroPoint™ Pro soil sensor is robust, reliable and highly accurate, providing cost-effective measurement of soil moisture, soil temperature, salinity (electrical conductivity or EC).

This SDI-12 sensor also functions as a wetting front detector, providing a separate output for the wetting front measurement. By placing the tip of the sensor just above the bottom of your crop’s root zone, the wetting front measurement will indicate when water has reached the bottom of the probe during irrigation, allowing you to have your irrigation stop at precisely the optimal time to ensure only the water needed is applied.

- Provides SDI-12 output of moisture, temperature and salinity (electrical conductivity).
- Detects when wetting front has reached bottom of probe.
- Moisture readings can be user-calibrated with 3rd-order polynomials to meet custom requirements.
- Low power requirements—suitable for remote, autonomous applications.
- Patented TDT5 technology for scientific-grade accuracy and excellent long-term stability of measurements.
- Fully potted electronics for excellent durability.
GroPoint Classic

The original analog GroPoint moisture sensor, with legendary ruggedness and accuracy.

GroPoint™ Classic is our original analog soil sensor, with a rugged design that has been proven over decades of use. The sensing element is manufactured from a solid 6.4mm (0.25”) stainless steel rod, and all electronics are sealed in water-proof epoxy.

The 4-20mA output integrates easily with common irrigation control and management systems, and it’s also available with 0-5mA output. The standard 5m cable can be extended to up to 150m (500’) and terminates in a rugged IP66/68 environmental connector or bare wires.

The sensor can be calibrated specifically for sandy soil, most soils or high salinity and clay soils—specify when ordering. It also features a larger area of influence than our other sensors—about 10cm (4”) surrounding the sensing element.

The GroPoint Classic responds immediately and accurately to changes in soil moisture. It’s extremely rugged, easy to install and requires virtually no maintenance. It will provide years of reliable service.

- Fully potted electronics for excellent durability and consistency of operations.
- Stainless steel sensing element provides years of maintenance free, reliable sensing.
- 4-20 mA interface options provide easy and simple integration into common irrigation management and control systems.
- Low power consumption—suitable for remote applications.
- Large area of influence.
**Data Loggers**

**GP-DL4**

Simple, effective and reliable automatic recording of sensor data.

GroPoint™ dataloggers provide an inexpensive and simple-to-use method of automatically recording and storing measurements from GroPoint soil sensors. The analog version connects up to 4 sensors simultaneously, and the SDI-12 version can connect up to 10 sensors (using the 4-port SDI-12 Expansion Bar connected to 2 of the ports).

Measurements are recorded at a time interval selected by the user, from once per minute to every twelve hours. Data is stored in non-volatile memory and is maintained even if the battery fails. The memory can hold up to 32,520 measurements.

Configuring the data logger is done via the included Logger Config (SDI-12 version) or GroGraph (analog version) Windows software. Plug the included USB cable into the USB port on the data logger and a USB port on your computer, then run the software to set up the logging interval, SDI-12 sensor address, etc.

The water resistant enclosure and rugged IP66/IP68 environmental connectors permit outdoor placement of this data logger. The enclosure can be easily opened using a standard Philips size 0 screwdriver to replace the batteries (a 3.0V lithium CR2032 coin cell powers the logger, while a 9V alkaline powers the sensors). Both batteries are included and pre-installed upon delivery. Batteries will generally last about a year under normal operation.

<table>
<thead>
<tr>
<th>Output</th>
<th>CSV text file via USB cable (included)</th>
</tr>
</thead>
</table>
| Maximum number of sensors | SDI-12 version: 10 (via multiple 4-Port SDI-12 Expansion Bars)  
Analog version: 4 |
| Storage         | 1 MB, non-volatile Flash storage  
This is the equivalent of:  
> 50K GroPoint Lite measurements  
> 20K moisture and temperature measurements from a GroPoint Profile 4-segment sensor |
| Measurement interval | Configurable by user  
Range: 1 minute to 12 hours |
| Power           | 3.0V lithium coin cell powers the memory (included)  
9V industrial alkaline battery powers the sensors (included) |

- Operates with standard household batteries (CR2032 for logger, and 9V to power the sensors).
- Sensors connect with GroPoint EN3 harsh environmental connectors.
- Water-resistant enclosure.
- Battery life of up to a year is typical.
- Data is retained even with no battery.
- Logger data is downloaded in universal CSV format, allowing you to archive and graph data in your favourite software, like Microsoft Excel.
Connectivity/Wireless

GP-DU Handheld Sensor Reader

Instant readings of current conditions measured by your in-situ sensors.

The GP-DU handheld reader gives immediate readings of current measurement conditions from GroPoint sensors. It also allows testing of individual sensors to troubleshoot when the sensors are part of a larger system. It features a large display window in a robust weather resistant casing with a 3 pin EN3 connector.

The GP-DU reads data from analog sensors and displays the volumetric moisture content as a percentage.

The GP-DU SDI-12 is capable of reading all GroPoint SDI-12 sensors. Alternatively, it can be used to read data directly from a GP-DL4 SDI-12 data logger.

- Battery operated
- Push button command
- Instant display
- Compact
- Self-calibrated
- Reads SDI-12 soil moisture sensing devices
- Requires a 9V battery

Bluetooth Sensor Pod

Retrieve data wirelessly to your smartphone.

The Bluetooth Sensor Pod is both a data logger and a wireless access point to retrieve data through your smartphone. It can be left in the field connected to your sensors, allowing you to access the data when convenient.

The Bluetooth Sensor Pod connects to up to 10 SDI-12 GroPoint sensors (with the 4-Port SDI-12 Expansion Bar). Sensors must terminate in an EN3 connector.

Data is stored in non-volatile memory and is retained even if the battery fails. The memory can hold up to 32,520 measurements.

- Retrieve sensor data wirelessly to your smartphone with a quick visit to the site.
- Stay connected up to 60m (200 ft) away.
- Operates with AA alkaline household batteries.
- Batteries will last up to 6 months with typical use.
- Water-resistant, IP57-rated enclosure.
- Data is retained even with no battery.
- Connects up to 10 SDI-12 sensors (via multiple 4-Port SDI-12 Expansion Bars).
- Free GP Reader app available for Android devices.
The free GP Reader app (available for Android devices only) is used to check current conditions, download data and set up the sensor sampling interval (from one minute to 12 hours). With the app open on your smartphone, simply push the button on the Bluetooth Sensor Pod to wake it up and automatically establish a wireless connection. Tap the Download button in the app to download all logged data. You can also check the current battery level of the Sensor Pod.

<table>
<thead>
<tr>
<th>Wireless protocol</th>
<th>Bluetooth 4.0 LE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum number of sensors</td>
<td>10 (via multiple 4-Port SDI-12 Expansion Bars)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 MB This is the equivalent of:</td>
</tr>
<tr>
<td></td>
<td>&gt; 50K GroPoint Lite measurements</td>
</tr>
<tr>
<td></td>
<td>&gt; 20K moisture and temperature measurements from a GroPoint Profile 4-segment sensor</td>
</tr>
<tr>
<td>Measurement interval</td>
<td>Configurable by user Range: 1 minute to 12 hours</td>
</tr>
<tr>
<td>Power</td>
<td>2x AA alkaline batteries</td>
</tr>
<tr>
<td>Battery life</td>
<td>Up to 6 months, depending on measurement interval</td>
</tr>
</tbody>
</table>

CloudConnect
Soil Sensor Cellular Transport + Cloud Interface

GroPoint™ CloudConnect is a power-efficient, 2-way cellular (GSM or CDMA) modem that eliminates the need for a data logger by automatically capturing data from connected SDI-12 sensors and uploading it to a cloud-based data repository. Data can be downloaded to work with it locally, or use our web-based GroPoint CloudInsight software to analyze and visualize your data, set up alerts, forward data to another destination, or configure your remote CloudConnect devices and SDI-12 sensors.

- No data logger required. All data uploaded directly to the cloud.
- All data also backup up locally on removable SD card.
- Approximately 20X typical improvement in power consumption vs. typical cellular telemetry.
- Intelligent data management, data buffering, and network verification to ensure successful transmission of critical data.

Customize your dashboard display with drag-and-drop data widgets
Easily chart trends of any parameter

Sensor interface module. Connect SDI-12 sensors via bare wires.
SD card slot for local backup storage.
Growing innovation.

- **Cloud-based management:** Sensor configuration, data storage, custom algebraic equations, custom data formats and forwarding, control, analysis, alarm notifications (email, SMS), reporting and actions all done in the cloud.

- **Easy configuration:** Configure with any device connected to the Internet via the web-based GroPoint CloudInsight. No custom programming or scripts required.

- **Automated updates:** Updates to firmware and cloud-based application are automatic.

- **Reliable connection:** CloudConnect verifies connection with cell network and server connection before data is sent. If no connection is available or if data reception is not confirmed, data is saved and sent the next scheduled transmission.

### SENSOR INPUT

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog input</td>
<td>4 analog channels, single-ended</td>
</tr>
<tr>
<td>Input type</td>
<td>2 wire, 0 – 2.5 V or 4 - 20 mA current loop</td>
</tr>
<tr>
<td>Sensor power</td>
<td>24 VDC switched (under firmware control)</td>
</tr>
<tr>
<td>Analog to digital</td>
<td>(0-2.5 VDC): 21-bit resolution</td>
</tr>
<tr>
<td>Pulse input</td>
<td>4 pulse channels</td>
</tr>
<tr>
<td>Continuity or TTL</td>
<td>0 V to 2.2 V - 5 V</td>
</tr>
<tr>
<td>Maximum rate</td>
<td>10 pulses per second</td>
</tr>
<tr>
<td>SDI-12 input</td>
<td>Number of sensors: up to 62 sensors (up to 9 parameters per sensor)</td>
</tr>
<tr>
<td>Sensor power</td>
<td>12 VDC switched, during measurement</td>
</tr>
</tbody>
</table>

### CURRENT CONSUMPTION

<table>
<thead>
<tr>
<th>Activity</th>
<th>Current Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listen/trigger mode/idle</td>
<td>&lt;2 mA</td>
</tr>
<tr>
<td>Logging</td>
<td>35 mA</td>
</tr>
<tr>
<td>Data receive/store/prepare for transmission</td>
<td>150 mA</td>
</tr>
<tr>
<td>Data transmit</td>
<td>250 mA</td>
</tr>
</tbody>
</table>

### Accessories

- **Slide Hammer for GroPoint Profile**
  Makes installing GroPoint Profile quick and easy without excavating.

- **Pilot Rod for GroPoint Profile**
  Attaches to slide hammer, makes a hole the exact size of the GroPoint Profile probe being installed.

- **Additional cable for GroPoint sensors**
  Add to your sensor order (which includes a standard 5m cable) for a custom cable length.

- **GroPoint 4-Port SDI-12 Expansion Bar**
  Connects to any open channel of a GroPoint data logger and provides connectors for up to four more sensors. Adds 3 additional ports (you lose 1, you gain 4).

- **SDI-12 Alligator Clip Adaptor**
  Lets you use your GP-DU Handheld SDI-12 Sensor Reader with non-GroPoint SDI-12 sensors.
GroPoint Products are manufactured in Canada by RioT Technology Corp.

In 2016, RioT Technology Corp. acquired the GroPoint™ brand, and rights to manufacture GroPoint sensors from ESI (Environmental Sensors Inc.)

We also hired several longstanding employees of ESI who had manufactured and designed the original MoisturePoint and GroPoint products. As such, we have the historical expertise for all GroPoint products in-house and available to assist former clients of ESI, and new clients interested in leveraging over 12 years of soil monitoring expertise.