Basic soil moisture meters

Soil moisture content is one of the factors determining optimal plant growth and crop production. The soil moisture content also plays an important part in environmental research for acidification and pollution.

14.26 Thetaprobe soil moisture measuring system

The Thetaprobe soil moisture sensor measures the soil moisture volume percentage by applying the Frequency Domain technique. The Thetaprobe measures the soil moisture volume percentage by measuring the changes in the dielectric constant. The changes are converted into a millivolt signal proportional to the soil moisture content. The sensor consists of a sturdy, watertight synthetic housing which contains the electronics. The housing is fitted with 4 stainless steel measuring probes at one end that can simply be pushed into the soil (or other material).

The Thetaprobe is able to measure within a measuring range of 5 - 55 volumetric moisture content with an accuracy of 5% with standard calibration and only 2% with soil specific calibration. The sensor has an output signal of 0-1 Vdc. The sensor is supplied standard with a 5-metre cable and plug for connection to the soil moisture meter or with wire for connection to a datalogger.

The measurement values are shown on the display of the soil moisture meter and can be stored in the memory (including time and sensor location). These data can be read on a PC.

The meter comes with built-in conversion characteristics for mineral and organic soils. The software allows a further 5 soil specific calibrations to be introduced. If the moisture content is measured of other materials the meter will give an output signal in millivolts. If a series of soil moisture measurements is required the soil moisture sensors can be connected easily to a datalogger (art. no.: 14.26.04).

BENEFITS

14.26 Thetaprobe system

• Versatile instrument, measures and stores data
• Push probe, read and store
• Can be extended with profile probe
• Can be extended with conductivity sensor
• Two standard calibrations, three user curves
• A fair accuracy for a fair price
• Own soil data allow direct irrigation advice

Using the soil moisture meter the sensor is read-out. Data are stored in the meter’s memory.

Soil moisture meter with soil moisture sensor Thetaprobe
Advantages

- Easy to use.
- Accurate measurements.
- Direct readings of the volumetric soil moisture content in the field by using the soil moisture meter.
- Data stored in handheld meter and able to be read on a PC.
- Can be connected to a datalogger.
- Cheaper than TDR or neutron probe systems.
- Applicable in areas with soils with high salt concentrations.
- Fast response time.
- Maintenance free.
- The compact sensors can be placed under any angle.

The Thetaprobe is also available in the form of a profile probe for use in thin-walled tubes that are installed in the soil. The profile probe is fitted with several measuring elements (4 elements with a measuring range of 40 cm, 6 elements with a measuring range of 100 cm) so that the soil moisture content can be measured at different depths within a vertical soil profile.

The probe measures with an accuracy of ± 3% in a thin-walled tube and has a measuring volume of ± 1.5 litres at each profile depth. The profile probe can be used as a portable system by using the soil moisture meter or as a fixed system by using a profile probe in combination with a datalogger. The thin-walled tubes can be placed in the soil with the use of a special auger kit.

**Datalogger for Thetaprobe soil moisture sensors**

This datalogger with 6 analogue channels is a dedicated datalogger optimised for use with soil moisture sensors. It can be used with combinations of Thetaprobuses and also accepts rain gauge and soil temperature probe inputs. Up to 16000 readings can be stored in the memory.

- Ideal for Thetaprobuses
- Complete solution with IP67 weather-proof case and battery power
- Pocket PC interface for data collection and configuration
When it comes to accurate, affordable soil moisture measurement, the new soil moisture sensor SM200 is in a class of its own. Achieving +/- 3% accuracy (with soil specific calibration), this soil moisture sensor can handle both research and irrigation applications. Measuring range of the sensor is 0-50 %vol.

In the past, choosing a low cost soil moisture sensor meant sacrificing stability and accuracy. With the soil moisture sensor SM200 you can have excellent temperature stability, low salinity sensitivity and accurate volumetric water content data. This soil moisture sensor offers an excellent alternative when costs have to be kept down.

The soil moisture meter supplied with the Thetaprobe system can also be used for measurements with the SM200 sensor. The sensor can also be connected to a datalogger for continuous monitoring applications.

The gypsum blocks are permanently buried in the soil at the desired depth. Once buried there the blocks have a life of 3 to 5 years (depending on the type of soil). The meter is practical and is constructed in sturdy synthetic material. It has a measuring range of 0 - 100% for 3-100 kPa. The meter is applied in particular in places where a tensiometer cannot be used (dry soils). It is a system that provides an indication as to when irrigation is required. To achieve a series of soil moisture measurements the sensors can be connected to a datalogger.
SOIL MOISTURE METERS

14.27 Soil moisture measuring system Watermark

Soil moisture sensors that measure the moisture tension in the soil are read out with the soil moisture meter Watermark. The measuring principle is similar to that of the gypsum block system. The special sensors however do not dissolve in the soil and have a more consistent distribution of pores so that more accurate measurements are possible. The soil moisture sensors, which have a measuring range of 0-200 kPa (0 - 200 cbar), can be used individually or in combination with a PVC tube (in various lengths) for measuring the moisture tension. The condition for reliable measurements is the optimal contact between sensor and soil. Using the special auger the holes are pre-drilled so that the soil moisture sensors can be placed at various depths. The sensors are buried permanently and have an average life of 3-5 years.

By using a soil temperature meter the temperature measured can be set in the soil moisture meter allowing for temperature correction. The electrical resistance is converted by the soil moisture meter into moisture tension in kPa. The soil moisture sensors can be used as a replacement for tensiometers in most agricultural and landscape irrigation environments.

If a series of soil moisture measurements is required the soil moisture sensors can be connected easily to a datalogger.

14.27.5A Watermark monitor. Set for automatic soil moisture data logging

The Watermark Monitor is a battery operated data logger capable of automatically taking and storing readings from the Watermark sensors at a configurable interval. Readings can be viewed in the field, or collected data can be downloaded by a PC or handheld device and displayed graphically for analysis. Up to 7 sensors can be recorded, including optional temperature sensors and pressure ON / OFF switches for recording irrigation events. Reading intervals are configurable form once a minute to once every 24 hours. Complete set with 7 sensors, one temperature sensor and software.

The soil moisture meter Watermark shows the measuring result in kPa.
TDR soil moisture meters

The moisture content determines different characteristics of various materials (energy balance, condition, composition). The moisture present in the soil particular determines the transport and storage of solid and dissolved nutrients and pollutants.

Various techniques allow the determination of the moisture content:

- Drying and weighing of samples: very time consuming work and cost intensive and above all destructive.
- The neutron method: expensive equipment, severe restrictions imposed by radiation law.
- Conductivity method: results less reliable due to dependance on type of material and salinity.

A very accurate method that can be easily applied to determine the moisture content is the Time Domain Reflectometry (TDR). The TDR-method allows for accurate measuring results that are immediately available (non-destructive). The principle of the TDR-technique is based on measuring the propagation time of an electromagnetic pulse along measuring pins in the sample. The propagation time depends on the humidity content of the medium to be measured.

14.62 Trime FM-3 soil moisture measuring system

The Trime-system is a specially designed TDR-technique for measuring the moisture content in various materials.

The Trime FM-3 system consists of a read-out unit, various three-pin probes and a unique tube probe. The probes have a measuring range of 0 - 95 volume percentage moisture.

The compact, portable read-out unit is fitted in a robust IP65 housing with an LCD read-out screen. The display shows the measuring result, the TDR-level, the battery capacity and the status. The meter has a very low power consumption; using rechargeable batteries approximately 300 measurements can be executed.

The meter has been fitted with an analog output 0 - 1 V and a standard R232/V24 interface and therefore can be linked to a PC for programming, calibrating or reading and processing the measured values.
SOIL MOISTURE METERS

All probes have PVC coated rods to obtain best measuring results even in saline materials (bulk soil electrical conductivity up to 2 dS/m).

For very high salinities special high-conductivity-probes (C-version) are available.

The three-pin probes P3S and P3, length measuring pens respectively 110 and 160 mm, are intended for surface measurements.

For measurements in bore holes the P3Z three-pin probe is used. This probe is pushed into the bottom of the bore hole using an adapter.

The tube probe with a measuring range of 0 - 60 volume percent moisture is used for measurements in thin-walled tubes with a length of up to 2 meter.

After installation of the thin-walled tube with cutting shoe in the soil, the tube is sealed watertight using a rubber stopper. The probe is connected to the FM-3 meter and lowered into the tube. Measurements can be executed at any desired depth in the tube. It is possible to execute measurements on several locations and different depths with only one tube probe.

The method using the tube probe can be applied instead of the expensive neutron method. This method also is non-destructive, but suffers the disadvantages of high costs, severe restrictions imposed by radiation law and problems with the radiation released.

Using the special calibrating set the various probes can be calibrated with the meter. It is also possible to execute a special calibration for deviating materials or types of soil.

The different probes can, using modules, optionally be used in a network.
SOIL MOISTURE METERS

14.62.50 Trime Data Pilot system

For users wanting to exploit modern PC technology to the full, we can supply the optimum means for measurement data management on location, right at the point of measurement, using a Palm PC with Windows-CE.

The Trime FM meter with its RS 232/V24 interface provide the means for direct extraction of recorded moisture readings with the Trime Data Pilot and storing them in a file incorporating site specific data.

Verbal notes, too, can be recorded directly on location.

It is also possible to connect intelligent probes with its own RS 232/V24 interface directly to the Trime Data Pilot.

Using Windows-CE, the recorded data of course can be analysed on any PC with MS-Excel.

The USB is the standard interface for the transfer of data.

A protective case ensures that the Trime Data Pilot works reliable even in damp and wet surroundings.

BENEFITS

14.62.50 Trime Data Pilot system

• Attractive graphic user-interface
• Creation of up to 999 measurements locations files
• Date can be imported to Excel
• Connectable to Trime FM and stand-alone probes
SOIL MOISTURE METERS

14.63 Trase soil moisture measuring system

The Trase system is a complete (modular) measuring instrument for measuring and storing moisture data applying the TDR-technique. The open system allows for different cards to be built-in and makes the instrument suitable to meet future requirements. The instrument can be supplied in two different designs, with or without built-in multiplexer controller card. The meter features a measuring range of 0 - 100% volume percent moisture and is supplied inclusive wave guides, connector, battery and charging equipment.

The meter is housed in a strong, aluminium, waterproof housing and is tip-key controlled. On the large, high-resolution screen it is possible to not only show the measuring values, but also the graphic image of the wave-shape during the measurements. The wave-shape yields all kinds of information regarding the qualities of the material in which the measuring takes place. The instrument operates with various screens (setup, autolog, help, etc.) in order to offer user-friendly control.

The meter has a memory capacity for 200 graphs or 6300 measurements. The recharge-able battery is suitable for approx. 750 manual measurements or 1500 automatic measurements. The instrument is fitted with an RS232-gate for connection to a PC, printer or modem, a connection for recharging the battery or connection to an external power source, a multiplexer connection and a BNC-plug. For different applications different wave guides are available. The standard multiplexer-protection box offers weather-resistant housing, allowing several multiplexer cards to be built-in for the connection of several probes (a maximum of 76 channels; larger boxes are optional available). The multiplexer-cards are self-configuring which makes them easy to fit in the system.

Also available is a MiniTrase kit (14.63.SA), which retains all of the superior capabilities of the Trase system, but also features significantly reduced weight, size and cost.

Reading-out several probes connected in the multiplexer-box.

The MiniTrase can be easily transported in a backpack.

**BENEFITS**

14.63 Trase system

- Shown wave allows full interpretation of value
- Soil type can be derived from wave shape
- Many connection possibilities

www.eijkelkamp.com
Soil moisture meters (P1.64)

Depending on the aim and application of the soil moisture measurement a choice can be made out of the following systems:

- Measuring system with gypsum blocks. Indicative (0% to 100%), cheap, slow reaction. Measuring range 3 - 100 kPa
- Measuring system SM 200 Professional applied research market (3% accuracy)
- Measuring system Thetaprobe Professional, scientific market accurate (5% or 2% with soil specific calibration)
- Measuring system with granular matrix sensors. Professional market, large measuring range (1-200 kPa) (reading soil suction in kPa).

### ART. NO. DESCRIPTION Qty. in set

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.22 Soil moisture measuring system with gypsum blocks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.22.05 Soil moisture block, gypsum, cable length 3.5 m, set of 5 pieces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01.02.02.07.B Edelman auger, bottom part, comb.type, bay., Ø 7 cm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01.10.01.B Handle, normal, 60 cm, bay. (incl. coupling sleeve)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01.10.07.B Extension rod, 100 cm (incl. coupling sleeve) bay.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.01.09 Container synthetic sand, particle size about 73 micron, contents 12.5 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.24 Soil moisture measuring system with SM 200 sensor.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.24.06 Thetaprobe soil moisture sensor, soil moisture meter and operating instructions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.24.10.16 Connecting cable between soil moisture sensor SM200 and data logger. Cable length 5 m (without connector).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.24.06.90 Synthetic protection case for Thetaprobe soil moisture sensor, soil moisture meter and operating instructions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.26 Soil moisture measuring system with Thetaprobe sensor.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.26.02 Soil moisture meter to read out the Thetaprobe, the W.E.T. sensor, the profile probe and the SM200 soil moisture sensor. With 25-way D socket. Incl. operating instructions, PC software and RS 232 cable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.26.06.90 Synthetic protection case for Thetaprobe soil moisture sensor, soil moisture meter and operating instructions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.26.06 Sensors. Thetaprobos with connector (for connection to hand read-out unit) or with wire end (for connection to</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Soil Moisture Sensors

14.26.06.01 **Soil moisture sensor Theta-probe with 25-way D connector.**
- Measuring range 5-55% vol.
- Accuracy: +/- 5% with standard calibration, +/- 2% with soil specific calibration.
- With 4 pins, length 60 mm, Ø 3.2 mm. Output signal 0-1 Vdc. Cable length 5 m

14.26.06.02 **Soil moisture sensor Theta-probe without connector.**
- Measuring range 5-55% vol. Accuracy: +/- 5% with standard calibration, +/- 2% with soil specific calibration.
- With 4 pins, length 60 mm, Ø 3.2 mm. Output signal 0-1 Vdc. Cable length 5 m

14.26.06.03 **Soil moisture sensor Theta-probe with dividable cable (for use with extension tube).**
- Measuring range 5-55% vol. Accuracy +/-5% with standard calibr., +/-2% with soil spec. calibr. With 4 pins, length 60 mm, Ø 3.2 mm. Output signal 0-1 Vdc. Cable length 5 m

### Accessories for Thetaprobe

14.26.05.01 **Spare measuring pin for soil moisture sensor (Thetaprobe).**
- Set of 12 pieces

14.26.05.03 **Thetaprobe hand-operated adjusting block for installation in hard soils.**
- Complete with 6 metal pins

14.26.11.01 **Extension tube for soil moisture sensor Thetaprobe, length 50 cm**

14.26.11.02 **Extension tube for soil moisture sensor Thetaprobe, length 100 cm**

**Soil auger to install the Thetaprobe at greater depths:**

- **01.02.07.B** Edelman auger, bottom part, comb.type, bay., Ø 7 cm
- **01.10.01.B** Handle, normal, 60 cm, bay. (incl. coupling sleeve)
- **01.10.07.B** Extension rod, 100 cm (incl. coupling sleeve) bay.

**The Thetaprobe is also supplied as a profile probe to be used in thin-walled fibreglass access tubes that are installed in the soil.**

14.26.82.04 **Soil moisture profile probe with 4 sensor rings.**
- Full measuring range 0-100 vol. % soil moisture.
- Accuracy (within 0-40 vol.%) 6% with standard calibration and 4% with soil specific calibration.
- Output 0-1.0 Vdc. Max. measuring depth 100 cm. Excl. cable.

14.26.82.06 **Soil moisture profile probe with 6 sensor rings.**
- Full measuring range 0-100 vol. % soil moisture.
- Accuracy (within 0-40 vol.%) 6% with standard calibration and 4% with soil specific calibration.
- Output 0-1.0 Vdc. Max. measuring depth 100 cm. Excl. cable.

### Dataloggers

14.26.82.14 **Connecting cable between profile probe and hand meter.**
- IP 68 M12 connector to 25-way D connector. Cable length 1.5 m

14.26.82.16 **Connecting cable between profile probe and data logger.**
- IP 68 M12 connector to bare wire (without connector). Cable length 5 m.

14.26.85.01 **Thin-wall fibre-glass access tube for profile probe.**
- Length 554 mm, Ø 28 mm, incl. cap. Suitable for 4 rings probe

14.26.85.02 **Thin-wall fibre-glass access tube for profile probe.**
- Length 1154 mm, Ø 28 mm, incl. cap. Suitable for 6 rings probe

14.26.90 **Auger kit for the installation of the thin-wall fibre-glass access tubes for the Thetaprobe profile probe.**
- Drilling depth 125 cm.

**14.01.01** Single gouge auger with detachable handle, Ø 24 mm total length 130 cm, operational length 50 cm

**14.26.90.01** Spiral auger, single, length 125 cm, Ø 25 mm.
- With special auger point with Ø 22 mm. With detachable grip

**04.05.01.16** Bent spatula, breadth 16 mm

**01.10.15** Push-/pull handle, Ø 25.4 mm

**14.26.90.03** Brush with rod, Ø 30 mm, length 120 cm

**14.26.90.05** Beating head for access tube for Thetaprobe profile probe

**14.26.90.07** Hammer with synthetic heads, Ø 50 mm

**00.14** Carrying bag for field equipment, with two shoulder straps (backpack model), (inside) Ø 17x150 cm,

**Datalogger (max. 6 probes)**

14.26.04 **Datalogger (Delta-T DL6) suitable for soil moisture sensors (Thetaprobe, profile probe and SM200 sensor).**
- 6 Analogue channels plus temperature and counter inputs. Complete with data transmission cable and software.

### Soil Moisture Measuring System with Watermark Sensor

14.27 **Soil moisture measuring system with Watermark sensor**

**Hand read-out unit:**

14.27.01 **Soil moisture meter to read out Watermark soil moisture sensor.**
- With temperature correction.
- Digital read-out in kPa.

**Sensor (Watermark) with cable or pvc tube for installation**
on greater depths

14.27.05 Soil moisture sensor, granular matrix (Watermark), to measure soil moisture tension. Measuring range 0-200 kPa (=0-200 cbar). Length sensor 80 mm, Ø 22.4 mm. Cable length 1.5 m.

14.27.07 Soil moisture sensor, granular matrix (Watermark), to measure soil moisture tension. Measuring range 0-200 kPa (= 0-200 cbar). Length sensor 80 mm, Ø 22.4 mm. With PVC tube, length 75 cm. Cable length 1.5 m.

14.27.09 Soil moisture sensor, granular matrix (Watermark), to measure soil moisture tension. Measuring range 0-200 kPa (= 0-200 cbar). Length sensor 80 mm, Ø 22.4 mm. With PVC tube, length 120 cm. Cable length 1.5 m.

Soil auger to install the sensor in the soil

14.27.17 Spiral auger, single, length 125 cm, Ø 25 mm. With special auger point with Ø 22 mm to install soil moisture sensors (Watermark)

14.27.15 Common soil temperature meter for soil moisture measurement system (Watermark). Temperature can be adjusted on soil moisture meter Datalogger with accessories (complete set). For automatic soil moisture data logging we supply a datalogger with sensors and accessories

14.27.SA Watermark monitor. Complete set for automatic logging of soil moisture data, consisting of datalogger, 7 Watermark sensor (5x with 6 m cable and 2x with 10 m cable), temperature sensor, software and RS232 communication cable. Incl. quick connectors and PVC installation pipe.

In our product range two soil moisture measurement systems are included according to the TDR method:
- TRIME FM-3 system
- TRASE system

14.62 TRIME FM-3 soil moisture measuring system:

Hand read-out unit

14.62.01 Trime FM-3 soil moisture meter for tube probe and three-pin probes P3 and P3Z, aluminium housing IP65, LC display, rechargeable batteries, battery charger and case. Supplied with analog output 0-1 V and standard RS232/V24 interface, with cables (excl. probes)

14.60.16 CD-rom with WinMonitor software for Trime FM-2 and FM-3 soil moisture meters. To process and display measurements with an IBM compatible PC. Suitable for Windows 95/98/NT/ME/2000 and XP.

Probes and accessories for surface measurements

Three-pin hand probe P3S for Trime FM-3 meter or ES-3-module, cable length 1.5 m. With waterproof plug IP 67, length of pins 110 mm, Ø of pins 3.5 mm, distance between pins 20 mm

Three-pin hand probe P3 for Trime FM-3 meter or ES-3-module, cable length 1.5 m. With waterproof plug IP 67, length of pins 160 mm, Ø of pins 8 mm, distance between pins 35 mm

Probes and accessories for deeper measurements (to be used in synthetic tubes which are installed in the soil):

Three-pin hand probe P3Z, borehole design, for Trime FM-3 meter or ES-3-module, cable length 2.5 m, with waterproof plug IP 67, length of pins 160 mm, Ø of pins 8 mm, distance between pins 40 mm

Adapter for connection of borehole probe (14.60.23 and 14.62.23) to extension rods, conical screwthread

Extension rod, 100 cm, c.sc.

Handle, normal, 60 cm, c.sc.

Spanner 20x22 mm

Probe and accessories for deeper measurements to be used in synthetic tubes which are installed in the soil:

Tube probe for Trime FM-3 meter, for measurements in thin wall tubes up to 2 m length, cable length 2.5 m, measuring range 0 - 60 % of volumetric soil moisture. Suitable for measuring in materials with an electrical conductivity up to 4 mS
PARTS LIST

<table>
<thead>
<tr>
<th>Art.no.</th>
<th>Description</th>
<th>Qty. in set</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.62.33</td>
<td>Thin-wall tube for Trime tube probe (14.62.26), polycarbonate, design with cutting shoe and rubber closing stopper, Ø 44 x 42 mm, length 100 cm (with rubber bottom stopper)</td>
<td></td>
</tr>
<tr>
<td>14.62.34</td>
<td>Thin-wall tube for Trime tube probe (14.62.26), polycarbonate, design with cutting shoe and rubber closing stopper, Ø 44x42 mm, length 200 cm (with rubber bottom stopper)</td>
<td></td>
</tr>
<tr>
<td>14.62.35.C</td>
<td>Adaptor for securing the rubber stopper at the bottom of the tube (to make a water proof closing), conical screw thread connection</td>
<td></td>
</tr>
<tr>
<td>01.02.02.45.C</td>
<td>Edelman auger, bottom part, comb. type, c.sc., Ø 45 mm</td>
<td></td>
</tr>
<tr>
<td>01.10.10.01.C</td>
<td>Extension rod, 100 cm, c.s.c.</td>
<td></td>
</tr>
<tr>
<td>01.10.12.C</td>
<td>Extension rod, 100 cm, c.s.c.</td>
<td></td>
</tr>
<tr>
<td>99.50.22</td>
<td>Spanner 20x22 mm</td>
<td></td>
</tr>
</tbody>
</table>

Calibration of TRIME soil moisture meter:

14.60.40 | Calibration set for basic calibrations of Trime soil moisture meters. Complete standard set, incl. 2 calibration containers, glass beads, calibration plug and software |             |
**14.60.40.01 | Calibration container, pvc, volume 8.5 liter, with lid, incl. adapter for calibration of tube probes, suitable for polycarbonate tube | 2 |
**14.60.40.03 | Glass beads for calibration container, Ø approx. 0.5 mm, bag at 22 kg | 2 |
**14.60.40.04 | Calibration plug for Trime FM soil moisture meters | 1 |
**14.60.40.06 | CD-rom with calibration software for Trime soil moisture meters, incl. operating instructions. Suitable for Windows 95/98/NT/ME/2000 and XP. | 1 |

Optional software for calibration set:

14.60.40.05 | Calibration software SM-CAL for Trime soil moisture meters, incl. operating instructions. |             |

For users who want to use modern PC technology we supply the TRIME Data Pilot with palm PC under Window - CE.

It can be used as an extension of the FM meter, or with stand-alone sensors


Accessories for connection to TRIME FM meter.

14.62.51 | Connection cable between Data Pilot and Trime FM meter. |             |

Stand-alone sensors for surface measurements and measurements in bottoms of bore holes (Ø min. 7 cm)

14.62.53 | Two pin intelligent sensor EZ for Data Pilot. Cable length 1.5 m, length of pins 160 mm, distance between pins 40 mm, ith RS232/V24 interface. For soils with bulk electrical conductivity of up to 2 dS/m. |             |
14.62.54 | Two pin intelligent sensor EZC for Data Pilot. Cable length 1.5 m, length of pins 160 mm, distance between pins 40 mm, with RS232/V24 interface. For soils with bulk electrical conductivity of up to 8 dS/m. |             |

14.62.58.01 | Extension tube for EZ/EZC sensor, length 50 cm. |             |
14.62.58.02 | Extension tube for EZ/EZC sensor, length 100 cm. |             |

Spares and accessories

14.62.59 | Extension cable for EZ/EZC sensor, length 150 cm. |             |
14.62.53 | Spare pin for EZ sensor | 146.53 |
14.62.54 | Spare pin for EZC sensor | 146.54 |

Stand alone sensor for measurements in synthetic tubes which are installed in the soil:

14.62.56 | Intelligent tube probe IPH for Data Pilot. For measurements in thin wall tubes up to 2 m length. With RS232/V24 interface. Cable length 2.5 m. |             |
14.62.33 | Thin-wall tube for Trime tube probe (14.62.26), polycarbonate, design with cutting shoe and rubber closing stopper, Ø 44x42 mm, length 100 cm (with rubber bottom stopper) |             |
14.62.34 | Thin-wall tube for Trime tube probe (14.62.26), polycarbonate, design with cutting shoe and rubber closing stopper, Ø 44x42 mm, length 200 cm (with rubber bottom stopper) |             |
14.62.35.C | Adaptor for securing the rubber stopper at the bottom of the tube (to make a water proof closing), conical screw thread connection |             |
01.02.02.45.C | Edelman auger, bottom part, comb. type, c.s.c., Ø 45 mm |             |
01.10.12.C | Extension rod, 100 cm, c.s.c. |             |
01.10.10.01.C | Handle, normal, 60 cm, c.s.c. |             |
99.50.22 | Spanner 20 x 22 mm |             |
<table>
<thead>
<tr>
<th>Art.no.</th>
<th>Description</th>
<th>Qty. in set</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.63</td>
<td>TRASE soil moisture measuring system</td>
<td></td>
</tr>
<tr>
<td>14.63.01</td>
<td>Trase time domain reflectometer for soil moisture measurements, range 0-100%, accuracy 2%, supplied inclusive wave guides (length 15 cm), connector for guides, battery 6 AH and battery charger 220V-50Hz</td>
<td></td>
</tr>
<tr>
<td>14.63.02</td>
<td>Trase time domain reflectometer for soil moisture measurements with built-in multiplexer control card, range 0-100%, accuracy 2%, supplied inclusive wave guides (length 15 cm), connector for guides, battery 6 AH and battery charger 220V-50Hz</td>
<td></td>
</tr>
<tr>
<td>14.63.05</td>
<td>Enclosure for 5 multiplexer cards, for maximal 76 channels</td>
<td></td>
</tr>
<tr>
<td>14.63.07</td>
<td>Multiplexer card (16 channels)</td>
<td></td>
</tr>
<tr>
<td>14.63.11</td>
<td>Büriable waveguide, length of waveguides 20 cm, cable length 2 m</td>
<td></td>
</tr>
<tr>
<td>14.63.15</td>
<td>Büriable waveguide, length of waveguides 20 cm, cable length 2 m. Coated design for soils with high electrical conductivity &gt; 3.5 mS</td>
<td></td>
</tr>
<tr>
<td>14.63.20</td>
<td>Extension cable for connection between Trase waveguides and Trase soil moisture meter or multiplexer, cable length 10 m</td>
<td></td>
</tr>
<tr>
<td>14.63.22</td>
<td>Extension cable for connection between Trase waveguides and Trase soil moisture meter or multiplexer, cable length 20 m</td>
<td></td>
</tr>
<tr>
<td>14.63.24</td>
<td>Extension cable for connection between Trase waveguides and Trase soil moisture meter or multiplexer, cable length 30 m</td>
<td></td>
</tr>
<tr>
<td>14.63.26</td>
<td>Extension cable for connection between Trase waveguides and Trase soil moisture meter or multiplexer, cable length 40 m</td>
<td></td>
</tr>
<tr>
<td>14.63.5A</td>
<td>Minitrase TDR soil moisture meter, range 0-100%, accuracy 2%. Compl. kit incl. meter with multiplexer card, standard ave guide connector, Palm IIIC terminal, backpack, battery, cables, chargers and software to use and download data to a PC</td>
<td></td>
</tr>
</tbody>
</table>