Delta-T Devices

NEW PRODUCT

PR2 SDI-12

Soil Moisture Profile Probe

PR2 Soil Moisture Profile Probe with SDI-12 Interface

The PR2 SDI-12 is a new digital alternative to the well-established analogue PR2 Profile Probe.

It shares the many strengths of the analogue PR2 soil moisture probe, but with the addition of SDI-12 compatibility - allowing integration into new and existing SDI-12 systems.

- **Multiple PR2 SDI-12s can be connected to a compatible data logger via a single cable**
- **Enables the creation of low cost highly flexible sensor networks**
- **Compatible with existing PR2 access tubes and auguring kits**
- **Conforms to industry standard SDI-12 (v1.3) spec**
- **Flexible integration with 3rd party SDI-12 hardware**
- **New low power design; ideal for remote sites**

GP2 SDI-12 Data Logger

The PR2 SDI-12 is fully compatible with the new SDI-12 enabled GP2 Data Logger and Controller - with simple point & click configuration.

Up to 50 SDI-12 Profile Probes can be connected to a single GP2 (subject to power requirements).

In addition to SDI-12 input, the GP2 can log 12 analogue channels.

Cost saving with SDI-12

- Lower cost cabling – uses standard Delta-T M12 x 5-way cable system
- Lower cost data logging for multi-probe installations
- Sensing depth 10,20,30,40,60,100 cms

PR2 SDI-12

Profile Probe

Overview

The PR2 SDI-12 Profile Probe builds on the reputation and field proven technology of the analogue PR2. By adopting the widely used SDI-12 interface (v1.3) the PR2 SDI-12 can be integrated with an even wider range of data loggers, sensors and equipment.

SDI-12 is an established communication standard adopted by many manufacturers of environmental monitoring and control equipment. It is popular because it allows large numbers of sensors (from many vendors) to be connected to a logger via a simple cable network, thereby reducing the cost and complexity of wiring large sensor installations.

Cables and connectors

The PR2 SDI-12 has a high quality, stainless steel IP67 rated connector (M12 x 5-way) – connecting to the standard Delta-T range of M12 x 5-way cables and accessories. The M12 x 5-way cables are also compatible with Delta-T's ML3, SM300, SM150 and EQ3 sensors.

(NB: The M12 x 8-way range of cables used for analogue PR2 connection is not compatible with the SDI-12 version of the PR2. Analogue and SDI-12 sensors cannot be mixed on the same cable system.)

GP2 Data Logger

The SDI-12 enabled GP2 Data Logger and DeltaLINK enable quick and easy creation of sensor networks - without need to resort to the often complex programming methods typically employed by other manufacturers.

The SDI-12 Profile Probe's electronics have been designed to improve power efficiency – reducing the overall power requirement. This is an important advantage for off-grid applications at remote sites.

HH2 Moisture Meter

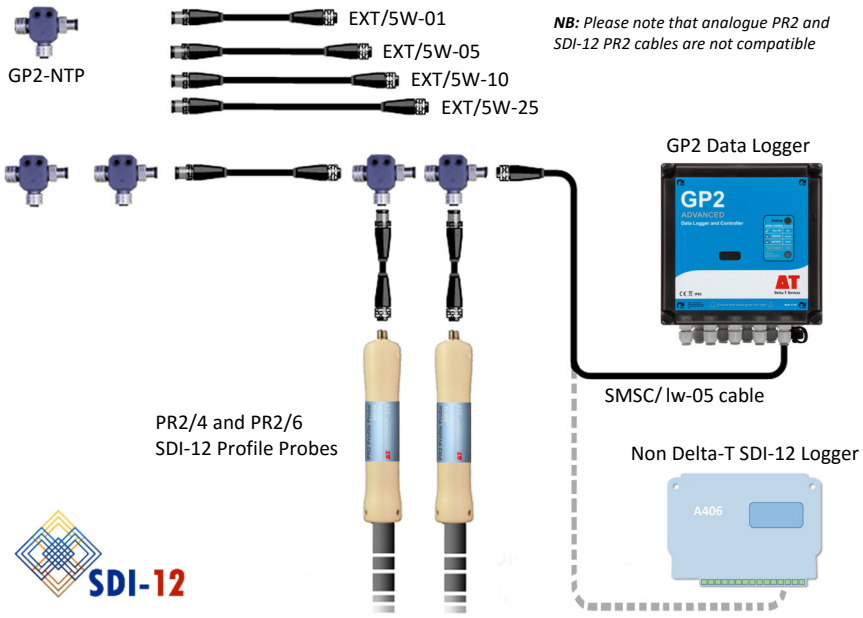
The HH2 Moisture Meter can display readings from the PR2 SDI-12 Profile Probe*. This is a great advantage for customers who value the freedom to use SDI-12 Profile Probes in both installed and portable applications. Pre-February 2017 HH2s can be upgraded at low cost (via firmware) to enable PR2 SDI-12 readout.

For more information on upgrading firmware please contact our Tech Support department: *tech.support@delta-t.co.uk*

*Please note that the HH2 only reads SDI-12 digital data from the PR2 SDI-12 Probe – it is not a general purpose SDI-12 meter.

Cabling System

Use of PR2 SDI-12 Sensors with Data Logger



Specification
The PR2 Profile Probe **SDI-12** shares its general specification with the analogue version of the probe, whose specs can be found online at www.delta-t.co.uk and on page 13 of the *Soil Moisture Measurement Catalogue.*
Logger Compatibility:
SDI-12 protocol version 1.3 (www.sdi-12.org)
Power consumption <60 mA at 12 V DC
Sleep current <2 mA at 12 V DC

Ordering Information	
PR2/4-SDI-12	Profile Probe 40 cm SDI-12 interface
PR2/6-SDI-12	Profile Probe 100 cm SDI-12 interface

Cables must be ordered separately - see page 2 of the *Soil Moisture Measurement Catalogue* for cable options (SMSC/lw-05 and EXT/5W range of extension cables).

All Profile Probe accessories, such as augering kits and access tubes, are compatible with the SDI-12 version. Cables are an exception: the analogue PR2 and SDI-12 PR2 cables are not compatible.

See page 10 of the *Soil Moisture Measurement Catalogue* for details of PR2 accessories.

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Delta-T Devices

Augering and Extraction Kits

❑ Augering kits for optimal access tube installation

Delta-T augering kits help you achieve the best possible access tube installation in virtually any soil. Profile Probes are used in access tubes inserted into carefully pre-augered holes in the soil. Correct access tube installation is absolutely vital for accurate measurement of soil moisture profiles.

To get the best performance from Profile Probes, the augered holes should be straight, smooth sided and the correct diameter. The goal is to produce optimal contact between the soil and the wall of the access tube. However, if substantial stoniness or compaction, or the presence of voids, foreign bodies, or soil instability are features of a particular site, it may not always be possible to install an access tube successfully.

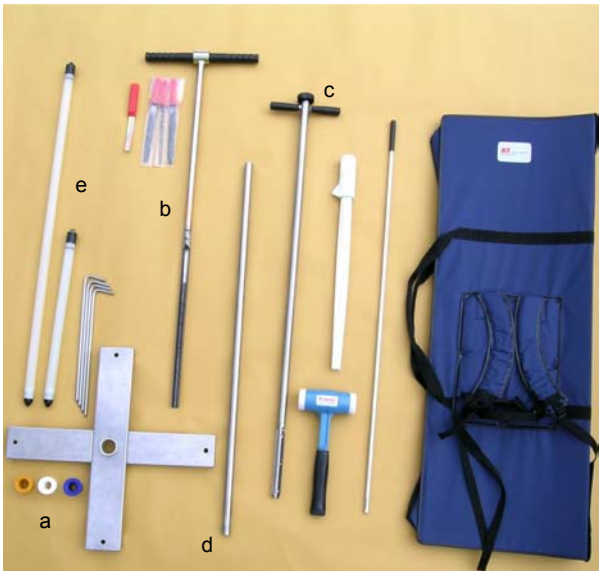
Three types of kit are available (but please note that for dry sandy soils a PR2-AUG2 25mm spiral auger should be ordered in addition to the selected kit).

PR-ASK1-S, Augering Starter Kit (short) Only recommended for installing short access tubes (type ATS1, for PR2/4) in soft soil, or if backfilling is acceptable. (For example, in an irrigation monitoring application, where accuracy is not a key concern, an oversized hole could be partially dug out with a small spade and the soil replaced by hand. Only the lower portion of the hole would be augered). Comprises 24mm pilot auger, stabilisation plate, access tube insertion rod and user manual.

PR-ASK1-L, Augering Starter Kit (long) For installing both short and long access tubes (types ATS1 and ATL1, for PR2/4 and PR2/6) in most soil types. Based on the PR-ASK1-S (short) kit, plus a finishing auger and a dead-blow mallet.

PR-AKC1, Complete Augering Kit For installing both short and long access tubes in most soil types. Based on the PR-ASK1-L (long) kit, with the addition of a carrying bag, cleaning rod and flexicanes.

Cutting head of Finishing Auger



Complete Augering Kit, PR-AKC1. Shows (a) Stabilisation plate (b) Pilot auger (c) Finishing auger (d) Insertion rod (e) Short and long access tubes (not part of PR-AKC1)

PR-EXK1, Access Tube Extraction Kit
Heavy duty system for removing installed tubes.

Upgrades Customers with older augering systems, such as the PR-AK1, may be able to reuse some of the components. Please enquire for further details.

Augering Kit Features

The key components are:

Stabilisation plate to keep the auger vertical. A major contribution to readings errors arises from conical enlargement of the hole (funnelling) during the augering process, especially in the top 30cm. This results in poor contact between the outside surface of the access tube and the surrounding soil. The stabilisation plate minimises this effect. *NB All new augering kits include a stabilisation plate.*

Insertion rod to drive the access tube into an augered hole by applying force to the bottom of the tube (normally by hammering). This new technique reduces the flexing that can produce air gaps around the access tube and minimises soil displacement.

Finishing auger To expand augered pilot holes to the exact diameter required for an access tube, a new type of auger has been designed. This adjustable finishing auger produces straight, smooth-sided holes in most soil types (see image, left).

Soil type and depth	PR-ASK1-S Starter Kit (short)	PR-ASK1-L Starter Kit (long)	PR-AKC1 Complete Kit
Normal soils, up to 40cm depth	✓	✓✓	✓✓✓
Normal soils, up to 100cm depth	×	✓✓	✓✓✓

- For dry, sandy soils the PR2-AUG2 25mm spiral auger should be ordered in addition to the selected augering kit.
- Only the complete kit includes a carrying bag (all augering items can be ordered individually).

Key: ✓ = Meets basic need ✓✓= Well suited ✓✓✓ = Well suited & includes items for extra convenience × = Unsuitable

PR2 Profile Probe Soil Moisture System

PR2-SDI-12 Profile Probe Specifications

Model types	PR2/4 and PR2/6	
Sensing depths	PR2/6: 10, 20, 30, 40, 60, 100 cm PR2/4: 10, 20, 30, 40 cm (nominal)	
Measurement	Volumetric soil moisture content θ_V ($m^3.m^{-3}$ or % vol)	
Range	Accuracy figures apply from 0 to 0.4 $m^3.m^{-3}$ Full range is from 0.0 to 1.0 $m^3.m^{-3}$	
Accuracy 0.0 to 0.4 $m^3.m^{-3}$	± 0.04 $m^3.m^{-3}$, 0 to 40°C	Typical, after calibration to a specificsoil type
0.0 to 0.4 $m^3.m^{-3}$	± 0.06 $m^3.m^{-3}$, 0 to 40°C	Typical, using the generalised soil calibr-ations in 'normal' soils
Salinity errors	Included in above accuracy figures (50 to 400 $mS.m^{-1}$, 0.5 to 4 $dS.m^{-1}$, pore water conductivity).	
Soil sampling volume	Vertically: ~95% sensitivity within ± 50mm of upper ring of each pair. Horizontally: ~95% sensitivity within acylinder of radius 100mm.	
Environment	0 to 40°C for full accuracy specification, –20 to +70°C full operating range. IP67 rated when installed in access tube.	
Response time	Full accuracy achieved within 1 second [2]	
Power requirement	Minimum: 5.5V DC with 2m cable, 7.5V with 100m. Maximum: 15V DC. PR2/4 consumption: < 80 mA PR2/6 consumption: < 120 mA	
Outputs	4 (PR2/4) or 6 (PR2/6) SDI-12 output	
Cable	Standard and extension cables – see Ordering Information.	
Construction	25.4mm polycarbonate with pairs of stainless steel rings.	
Size / weight	PR2/4 length: 750mm Weight: 0.6kg PR2/6 length: 1350mm Weight: 0.9kg	

HH2 -Handheld Meter Specifications

Range	Zero to saturation (soil water Content)
Accuracy	± 0.13% of mV reading ± 1 mV
Resolution	1 mV Reading
Storage	Typically 500 to 1500
Connection	1 x male 25-pin D-connector used for sensor and RS232 communications
Battery type, life	9 V alkaline 6LR61 (PP3), ~ 5,000 readings
Size, weight	125 x 80 x 40 mm, 450 g
Access Tubes	ATL1: 1154 mm x 28 mm ATS1: 554 mm x 28 mm

PRC/w-05 5m cable, IP68 M12 connector to bare wire.Cable connects PR2 to DL2e and other data loggers.

Access tubes and Profile Probe accessories: **ATS1** Access tube – short, 554mm x 28mm diameter.Includes cap, bung and collar. For use with PR2/4.
ATL1 Access tube – long, 1154mm x 28mm diameter.Includes cap, bung and collar. For use with PR2/6.
PR2-SP PR2 Profile Probe spares kit
PR-CB2 Protective carrying bag suitable for Profile Probe and HH2 Moisture Meter or Pocket PC. Includes space for access tube cleaning rod.

Dual purpose

The unique PR2 Profile Probe can be installed for continuous data logging and can also be used for multi-site, portable measurements with an HH2 hand-held readout unit. The PR2 uses patented* sensing technology, making it possible to measure soil moisture content in a range of soil types and across a wide range of nutrient levels, including saline soil conditions.

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