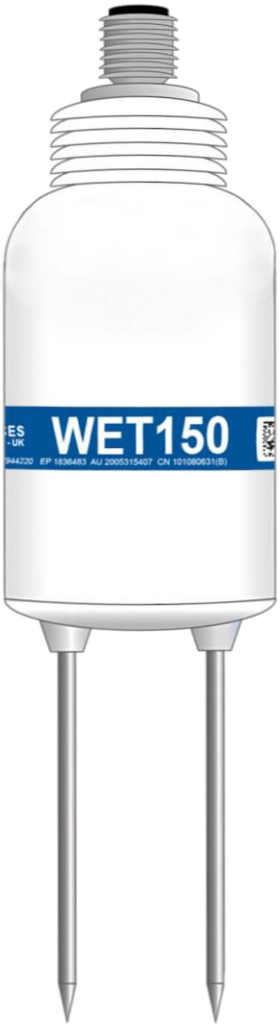
WET150 sensor

Quick Start Guide



Delta-T Devices

Version 3.0

Getting started

Thank you for purchasing the WET150, Delta-T's robust and accurate sensor for water content, electrical conductivity and temperature. To ensure you get the most out of your sensor, we recommend the following steps:

a) **Check you have all the equipment you need**
   For a list of accessories and additional equipment see section "System parts" (page 3).

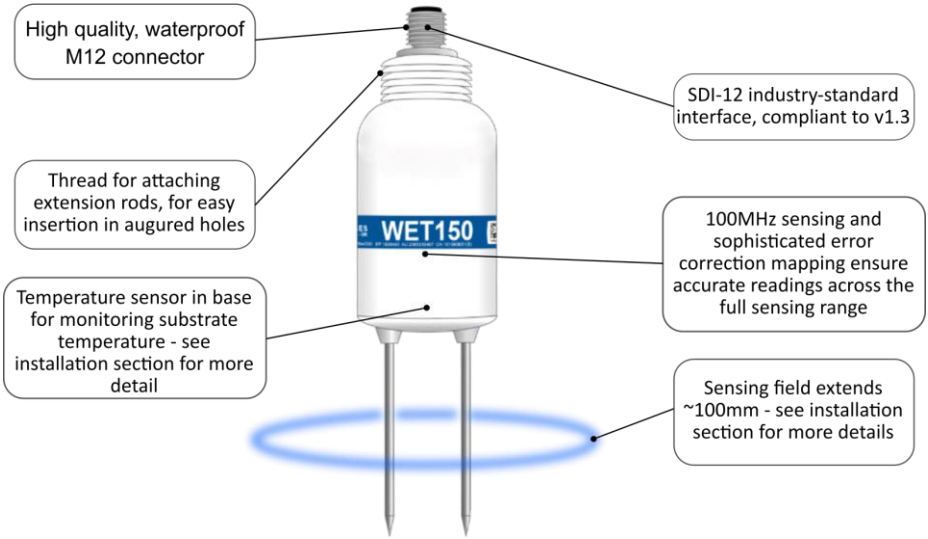
b) **Check how to connect your sensor**
   See section "Connecting your WET150" on page 4.

c) **Check your sensor is properly configured for your intended use**
   The WET150 is highly customisable to ensure maximum effectiveness in a wide variety of applications. See section "Configuring your WET150 for use" on page 5.

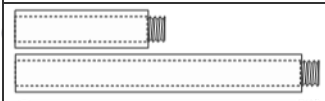
d) **Check the sensor can be correctly installed**
   See section "Installation" (page 6).

e) **Review the care and maintenance requirements of your sensor**
   See section "Care and Maintenance" (page 6).

Features of the WET150



System Parts

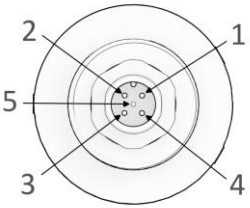
	**WET150 sensor**	Note: the WET150 and Meter are sold together as the WET150 kit with a dedicated Quick Start Guide* 
	**WET150 Meter**	
	**SMSC/lw-05m** 5m cable with 200mm flying leads	
	**EXT/5w-01** **EXT/5w-05** **EXT/5w-10** **EXT/5w-25**	1, 5, 10 and 25m extension cables
	**GP2-STP1** sensor Network T-piece	
	**ML/EX50** **ML/EX100**	extension tubes
	**SM-AUG-100** 45mm spiral auger	

* Available online via: https://delta-t.co.uk/product/wet150/#support

Connecting your WET150

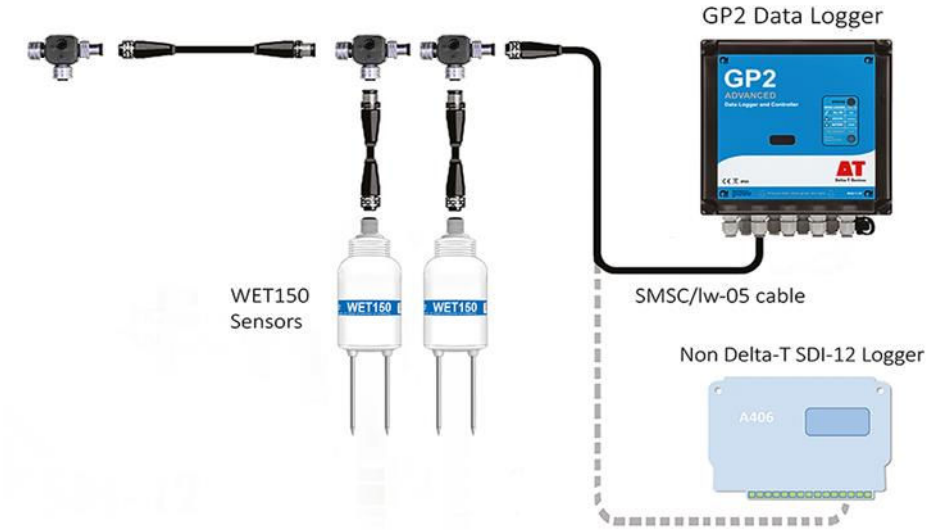
The WET150 complies with v1.3 of the SDI-12 Standard, published by the SDI-12 Support Group. As such it is compatible with a wide range of equipment. For details of how to connect it to your specific equipment, refer to your equipment's instructions on installing SDI-12 sensors.

Connections



WET150 pin	SMSC/lw-05m wire colour	Function
2	White	Power
3	Blue	Ground
4	Black	Data

IMPORTANT: before connecting the sensor to a network, the address must be set on the sensor. See section "Configuring your WET150 for use"



Cables can be joined via extension cables and T-connectors. Maximum cable lengths depend on configuration details. As an example, 200m with 10 WET150s each connected via a 5m extension cable works reliably with the GP2 Data Logger.

Configuring your WET150 for use

SDI-12 addresses (do this before network installation)

WET150s are supplied with the default address "0", but each SDI-12 sensor must be re-assigned a unique address before connecting it to a network – see instructions on how to set addresses in the SDI-12 for GP2 User Manual or the WET150 Kit QSG.

SDI12 commands used:

Command	Sensor reply	Notes
?!	0	The sensor responds with its address (0 in this example). Cannot be used if more than one sensor is connected.
0Aa!	a	Changes the address of sensor from 0 to a

Settings for ECp and water content measurement

For pore water conductivity (EC_p) and water content measurements, the WET150 contains user-configurable parameters. By default, the WET150 is shipped with generic parameters that match the generic parameters in Delta-T's WET2 sensor. **We strongly recommend you review these settings**. Best results will be obtained with parameters customised to your specific medium; Delta-T also supplies a list of generic parameters which give good performance for several common soils and substrates. See the WET150 User Manual for more details.

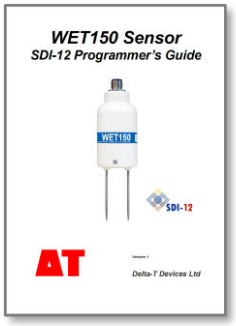
For example, here is the SDI-12 command sequence to modify the "mineral soil" ECp soil parameter:

Command	Sensor reply	Notes
aXU1D?!	a -8.9	Command queries what the current ECp soil parameter is for measurement set M1 ("Mineral soil"); the sensor replies it is -8.9
aXU1B=Z!	a OK	Command tells the sensor that measurement set M1 is to be configurable.
aXU1D=2.72!	a 2.72	Command then sets the ECp soil parameter for measurement set M1 to 2.72
aM1!	a<values>	Command requests a measurement using M1 (now using the custom soil parameter).

Settings configuration can be done before or after connection to the network.

More SDI-12 commands

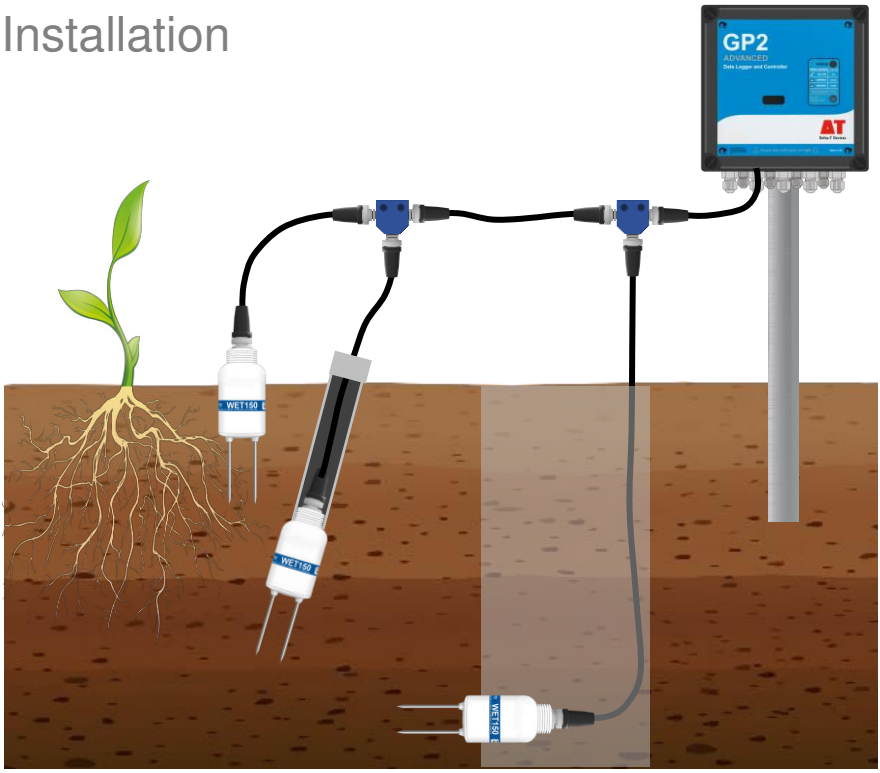
The WET150 supports a comprehensive set of SDI-12 commands for configuring the sensor. The WET150 SDI-12 Programmer's Guide contains full details.



Care and maintenance

- Do not touch the WET150 rods or expose them to other sources of static damage, particularly when powered up.
- Ensure that connectors are clean, undamaged and properly aligned *before* pushing the parts together. Screw together firmly for a water-tight seal. We do not recommend tightening with a spanner or other tool as this can lead to overtightening and damaging the o-ring seal.
- Do not pull the sensor out of the soil by its cable.

Installation



Surface installation and spot measurements

Consistent technique is critical for repeatable results. Varying how hard the sensor is inserted can alter the bulk density of the soil/substrate and cause readings to diverge.

1. Clear away any stones. Pre-form holes in very hard soils before insertion.
2. Push the WET150 into the soil, fully inserting the rods.
3. If you feel strong resistance when inserting the WET150, you have probably hit a stone. Stop, and re-insert at a new location.

Note: Partial or full burial of the WET150 will improve temperature accuracy, and reduce effects of air temperature and radiant heat.

Installing at depth

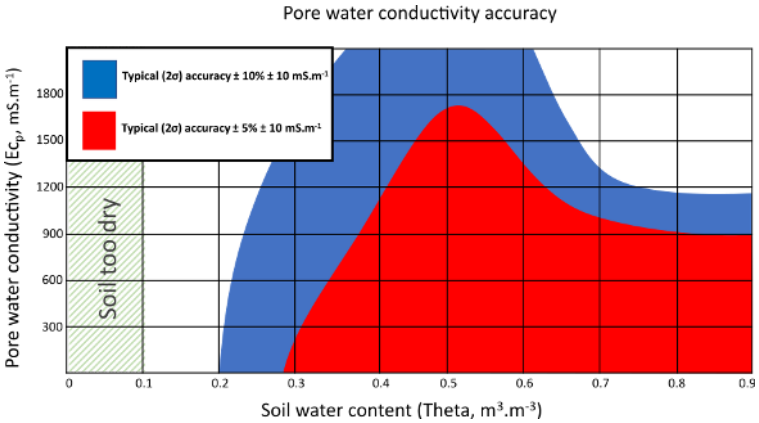
1. Auger a 45mm diameter hole, using the SM-AUG-100 (see "System Parts" section). ~10° to vertical is recommended.
2. Fit an extension tube to the WET150 – remember to fit the connector and pass the cable through the extension tube first.
3. Push the WET150 into the soil, fully inserting the rods.

Alternatively

- Dig a trench and install horizontally into the wall of the trench.
- Backfill carefully to avoid disturbing the sensor

Pore Water EC (EC_p) accuracy

The following graph indicates the range of pore water conductivity (ECp) that can be most accurately measured by the WET150 at different soil moisture levels:



Notes:

[1] The WET150 has been carefully optimised to provide accurate readings in soils and substrates - readings taken in water or air may not meet the full specification.

[2] The ECp contour map is based on measurements from 30 sensors at 20°C in NPL* traceable media. Calculated ECp readings are derived from the Hilhorst equation, using the generalised "mineral" soil calibration and the default soil parameter = 4.1

* NPL is the UK's National Metrology Institute, developing and maintaining the national primary measurement standards.

Outline specifications

Volumetric Water Content		
Accuracy	**± 3%** (with a calibration matching the soil / substrate)	
Range	Accurate range: **5 to 100%vol**, EC_b 0 to 500mS.m^{-1} Full range: 0 to 100%vol	
Permittivity (ε')		
Accuracy	**± (3%** of reading **+ 0.8 ε')** **1 → 40** for ECp ≤ 800mS.m^{-1} **± 5%** of reading **40 → 80** for ECp ≤ 500mS.m^{-1}	
Range	Accurate range: **1 to 80**, full range: 1 to 90	
EC_b (bulk conductivity)		
Accuracy	± (**6% + 10mS.m^{-1}**)	
Range	Accurate range: **0 to 1200mS.m^{-1}** Full range: 0 to 2000mS.m^{-1}	
Temperature *(the WET150 must be buried to accurately measure soil temperature)*		
Accuracy	**± 0.5 °C**	± 0.7 °C
Range	Accurate range: **0 to +40 °C**	Full range: -20 to +60 °C
Operating specifications		
Power requirement	6 to 20V, ~22mA x 12ms (with short 45mA peak)	
Maximum cable length	>100m (see User Manual for tested configurations)	
Interface	SDI-12 version 1.3	
Operating range	-20 to +60°C	
Environmental	IP68	
Sample volume	55 x 70 mm diameter	
Dimensions, weight	143 x 40 mm diameter, 77g	

Please refer to the WET150 User Manual and WET150 SDI-12 Programmer's Guide for further details and important notes.

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