

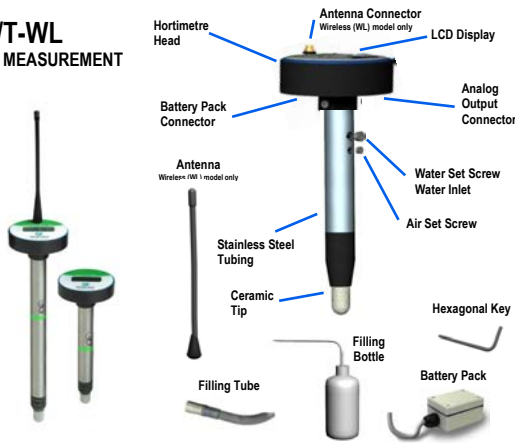
USER MANUAL

HORTIMETRE T/T-WL

SOIL AND SUBSTRATE TENSION MEASUREMENT

HORTIMETRE T/T-WL probes are derived from a classical tensiometer technology that allows readings of soil and substrate tension for optimized plant growing, experiment monitoring and environmental follow-up.

FOR SERVICE PLEASE CALL
1-888-5-HORTAU



4 FEATURES

LCD Display
The tension measurement is displayed on the LCD Display. The LCD Display is always ON when the device is powered. If the device is equipped with a temperature sensor (optional for T-35 and T-35-WL Models), both tension and temperature measurements are displayed alternatively.

Low Battery Indicator
When the battery level is getting low, an arrow is displayed next to the Low Battery pictogram.

Units
The HORTIMETRE T/T-WL displays soil or substrate tension in kilopascal (kPa) or centibar (cbar), two equivalent measurement units. The temperature (optional for T-35 and T-35-WL Models) is displayed in °C (Fahrenheit in USA).

Analog Output Connector
The HORTIMETRE T/T-WL is equipped with an Analog Output Connector. This feature enables connection with most analog data loggers and control systems.

Dust Cap
The Analog Output Connector and Battery Pack Connector are equipped with Dust Caps to protect against dust and debris accumulation. Leave them in place when connectors are not in use.

6 OPERATION - TIPS

The plants (growth stage, size, species, etc.) and the ambient conditions, as well as the characteristics of the soil or substrate, are variable parameters. Hence, soil water tension (moisture) varies from one location to the next. Here is how to choose a location for the HORTIMETRE T/T-WL and determine the number of HORTIMETRE T/T-WL needed in a given situation.

DEFINING IRRIGATION ZONES

If your irrigation system is installed, this exercise must have been completed during the design stage of the system. Normally, an irrigation valve controls the watering for a specific zone. Watering in this zone is relatively uniform; hence the plants it contains must normally have similar water needs. If you water manually, define the zones where plants have similar water needs. Install at least one (1) HORTIMETRE T/T-WL per irrigation zone. Ideally, five (5) HORTIMETRE T/T-WL are needed to manage irrigation and obtain an average representation of the water needs of plants within a given irrigation zone. However, three (3) HORTIMETRE T/T-WL are often enough to ensure proper management within a zone.

7 COMMUNICATION

Autonomous Mode
The tension measurement can be read directly on the LCD Display. The display is refreshed on a random average of five (5) minutes.

Analog Mode
The HORTIMETRE T/T-WL can be connected to an irrigation control system or a data logging system by a wire linked to the Analog Connector. It is necessary to supply power to the HORTIMETRE T/T-WL through the analog connector to get a voltage output. To transform the output voltage into tension, use the following equations where "y" is tension in kPa or cbar and "x" is voltage in Volt:
T-35 and T-35-WL : (y) = 11,9750 (x) - 1,1032
T-80 and T-80-WL : (y) = 27,4170 (x) - 2,6514

Wireless Mode
Only the wireless (WL) models can be operated in wireless mode. The tension and temperature (optional) measurements, as well as the battery level and the wireless signal quality, are transmitted to the Iricom WR (Hortau's wireless receiver, P/N 6010). The Iricom WR translates the wireless signal into a RS-232 signal that can be used by your PC computer using the Iricom Light Software by Hortau (P/N 5001). For installation and use, please refer to the User Guide of the Iricom WR provided with it.

1 HORTIMETRE T

2 WARNING

3 IMPORTANT NOTICE

IMPORTANT
Before using or preparing your HORTIMETRE T/T-WL, check that you have all parts at hand and in good working order.

- ⚠ Handle the HORTIMETRE T/T-WL with care at all times.
- ⚠ The Ceramic Tip MUST be in contact with soil or substrate in order to generate an accurate reading.
- ⚠ Do NOT put the Ceramic Tip in contact with oil, fats or any contaminant that could affect its wettability.
- ⚠ Never totally immerse the HORTIMETRE T/T-WL.
- ⚠ The HORTIMETRE T/T-WL is sealed and cannot be opened except for the Water Inlet and the Ceramic Tip which can be replaced if broken.
- ⚠ Protect the Ceramic Tip at all times against shocks.
- ⚠ The HORTIMETRE T/T-WL should be protected at all times against frost. Under no circumstances should the storage temperature be below 5 °C (40 Fahrenheit).
- ⚠ Avoid exposure to magnetic fields.
- ⚠ Do not expose to extreme temperatures.

The user manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication. This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at its own expense. This device has been designed to operate with an antenna having a maximum gain of 2.2 dB. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

5 GETTING STARTED

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INSERTING AND CHANGING BATTERIES



Note: The HORTIMETRE T/T-WL package includes a Battery Pack (PIN 7030) containing two (2) AA batteries.

1. Unscrew the four (4) screws from the Battery Pack.
2. Separate the cover from the housing of the Battery Pack.
3. Remove the used batteries (if any)
4. Insert two (2) new AA batteries.
5. Verify that the gasket is well positioned.
6. Put together the cover and the housing.
7. Screw back the four (4) screws.
8. Connect the Battery Pack wire to the Battery Pack Connector located under the Hortimetre Head.

When powered-on, the HORTIMETRE T/T-WL goes through an initialization routine :

1. Battery voltage displayed.
2. Tension displayed (the HORTIMETRE T/T-WL is now ready).

INSTALLING THE ANTENNA (WIRELESS (WL) MODELS ONLY)

1. Make sure the gasket is inserted around the Antenna Connector. If not, insert it.
2. Screw the Antenna on the Antenna Connector. Make sure the Antenna is tightly screwed. This will ensure good transmission.

FILLING THE HORTIMETRE T/T-WL

1. Unscrew the cap of the Filling Bottle
2. Pour drinking water in the Filling Bottle and screw the cap back.
3. Using the Hexagonal Key, remove completely the Water Set Screw.
4. Screw completely the threaded tip of the Filling Tube in the Water Inlet of the HORTIMETRE T/T-WL then; unscrew it slightly (half a turn) to make filling easier.

6 OPERATION - TIPS

SOIL TENSION IS A VARIABLE PARAMETER BASED ON, AMONG OTHERS, CLIMATIC CONDITIONS, AND SOIL CHARACTERISTICS. THE HORTIMETRE T/T-WL PERFORMS A MEASUREMENT FROM THE LOCATION WHERE IT HAS BEEN INSTALLED. THIS IN NO WAY GUARANTEES THAT THE TENSION READING WOULD BE THE SAME AT ANOTHER LOCATION, EVEN IF IT WERE CLOSE TO THE INSTRUMENT. THE HORTIMETRE T/T-WL CANNOT IN ANY CASE REPLACE PERSONAL JUDGEMENT.

THE NUMBER OF HORTIMETRE T/T-WL PER IRRIGATION ZONE IS GIVEN FOR INDICATION ONLY. EVERY SITUATION INVOLVES PARTICULAR CIRCUMSTANCES THAT CANNOT BE ESTABLISHED IN THIS MANUAL. THESE INDICATIONS CANNOT IN ANY WAY REPLACE PERSONAL JUDGEMENT.

INSERTING THE HORTIMETRE T/T-WL INTO THE SOIL OR SUBSTRATE

1. **Determine depth of penetration**
For plants growing in a pot or in a grow bag, the penetration depth must be equal to half the height of the pot or bag. As for field-grown plants, the penetration depth must be equal to the average rooting depth of the plants.

6 OPERATION - TIPS

2. **Preparing the insertion hole**
Using a 25 mm (1 in.) diameter rod, make an insertion hole in the soil or substrate where the HORTIMETRE T/T-WL will be installed. Once inserted in the soil, the entire surface of the Ceramic Tip must remain in contact with the soil. Therefore, do not insert the rod at a depth exceeding the penetration depth of the HORTIMETRE T/T-WL to allow the Ceramic Tip to remain in contact with the soil at the bottom of the insertion hole. For deep insertion it might be difficult to insert a rod in the soil. To make the insertion easier, pour water at the surface prior making the hole, and pour some more water in the hole as you go deeper. This will make the soil easier to dig. A 25 mm (1 in.) power-driven drill will make deep installation faster and easier. The blue line on the metal tube of the HORTIMETRE T/T-WL indicates the maximum insertion depth, this in order to leave the Air Set Screw above soil.

DO NOT ROTATE THE HORTIMETRE T/T-WL IN ORDER TO WIDEN THE INSERTION HOLE. THIS WILL REDUCE THE CONTACT SURFACE BETWEEN THE CERAMIC TIP AND THE SOIL AND CAUSE THE INSTRUMENT TO DISPLAY FALSE MEASUREMENTS. THIS MIGHT ALSO CAUSE THE CERAMIC TIP TO BREAK.

6 OPERATION - TIPS

3. **Inserting the HORTIMETRE T/T-WL**
Insert the HORTIMETRE T/T-WL, the Ceramic Tip first, by pushing lightly on the Hortimetre Head. Do not exert undue pressure on the Hortimetre Head. If it does not glide in easily, widen the insertion hole by using a 30 mm (1 1/4 in.) diameter metal rod. Try once more. If it is still not possible to push the HORTIMETRE T/T-WL into the insertion hole, dig another hole at a different place. While inserting the HORTIMETRE T/T-WL, be careful not to unscrew the Ceramic Tip by rotating the HORTIMETRE T/T-WL counter clockwise. Once the installation is done, replace soil or substrate around the Stainless Steel Tubing to avoid water infiltration along the tube.

4. **Setting the soil**
Once installed, it is recommended to pour water at the soil or substrate surface, around the HORTIMETRE T/T-WL, to ensure adequate contact between the Ceramic Tip and the soil or substrate.

5. **Operation / Maintenance**
The HORTIMETRE T/T-WL is designed to reduce the maintenance to a minimum. However, if the soil tension gets too high or after long use periods, the HORTIMETRE T/T-WL might need to be refilled. In such cases, the HORTIMETRE T/T-WL will display the value H2O. This display indicates that a refilling is required.

8 STORAGE

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When not in use, the HORTIMETRE T/T-WL should be stored properly. This will prevent some damage and extend the shelf life of the device.

STORING THE HORTIMETRE T/T-WL

1. Remove the device from the soil or substrate by pulling gently on the Hortimetre Head.
2. Wash the Stainless Steel Tubing and the Ceramic Tip with water.
3. Unplug the Battery Pack from the Battery Pack Connector located under the Hortimetre Head.
4. Remove the batteries from the Battery Pack following the INSERTING AND CHANGING THE BATTERIES instructions of section 5 - GETTING STARTED of this manual.
5. Release the pressure from the Stainless Steel Tubing by removing the Water Set Screw using the Hexagonal Key.
6. Store the HORTIMETRE T/T-WL in a dry place. Storage temperature must stay between 5 and 30 °C (40 and 85 Fahrenheit)

THE HORTIMETRE T/T-WL SHOULD BE PROTECTED AGAINST FROST AT ALL TIMES. UNDER NO CIRCUMSTANCES SHOULD THE STORAGE TEMPERATURE BE BELOW 5 °C (40 FAHRENHEIT).

9 TROUBLESHOOTING

Displaying H2O while the Ceramic Tip is in the water

1. Normal while the Ceramic Tip is in the water for a long time.
2. Insert the Ceramic Tip into the soil and wait 15 minutes.

No Display

1. Verify that the batteries are not dead by replacing them with new ones.

Worn or broken Ceramic Tip

1. The material used for the end piece is brittle. Minute splinters and scratches may appear at its surface with extended use. These do not hinder the good operation of the instrument.
2. If the end piece is broken, order a replacement from your local distributor

Displaying H2O constantly

1. The HORTIMETRE T/T-WL is empty and needs to be refilled in order to work properly. Just refill it with water following the FILLING THE HORTIMETRE T/T-WL instructions of section 5 - GETTING STARTED of this manual
2. The HORTIMETRE T/T-WL is in contact with the water table. Wait for the soil to dry.

10 SPECIFICATIONS

Power Supply	2.2 to 3.3 Volt DC
RF Frequency	418 mHz (WL models only)
Available	15 cm (6 in.); 30 cm (12 in.); 45 cm (18 in.) and 60 cm (24 in.)
Insertion Depth	
Tension Range	0.0 – 35.0 kPa (cbar): Models T-35 and T-35-WL 0.0 – 80.0 kPa (cbar): Models T-80 and T-80-WL
Analog Data Output	0.0 – 3.3 Volt DC
Analog wires color code	Red wire: Supply (+) Black wire (twisted with red wire): Ground (-) White wire: Signal (+) Black wire (twisted with white wire): Signal (-)



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