SWCSM-075 | SOIL MOISTURE SENSOR

Mounting and operating instructions

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SAFETY AND PRECAUTIONS

Read all the information, the datasheet, Modbus map, mounting and operating instructions and study the wiring and connection diagram before working with the product. For personal and equipment safety, and for optimum product performance, make sure you entirely understand the contents before installing, using, or maintaining this product.

For safety and licensing (CE) reasons, unauthorised conversion and / or modifications of the product are inadmissible.

The product should not be exposed to abnormal conditions, such as extreme temperatures, direct sunlight or vibrations. Long-term exposure to chemical vapours in high concentration can affect the product performance. Make sure the work environment is as dry as possible; avoid condensation.

All installations shall comply with local health and safety regulations and local electrical standards and approved codes. This product can only be installed by an engineer or a technician who has expert knowledge of the product and safety precautions.

Avoid contacts with energised electrical parts. Always disconnect the power supply before connecting, servicing or repairing the product.

Always verify that you apply appropriate power supply to the product and use appropriate wire size and characteristics. Make sure that all the screws and nuts are well tightened and fuses (if any) are fitted well.

Recycling of equipment and packaging should be taken into consideration and these should be disposed of in accordance with local and national legislation / regulations.

In case there are any questions that are not answered, please contact your technical support or consult a professional.

PRODUCT DESCRIPTION

SWCSM-075 is a soil water content sensor equipped with a digital temperature sensor. It is supplied with 24 VDC Power over Modbus. The measured values and all other parameters are accessible via Modbus RTU.

You need the ADPT-SWCSM adapter box to connect SWCSM-075 to a Sentera Modbus network.

ARTICLE CODE

Article code	Supply voltage	Imax
SWCSM-075	24 VDC (PoM)	10 mA
ADPT-SWCSM		1 mA

INTENDED AREA OF USE

- Environmental and irrigation monitoring and control
- Measuring the moisture content of a medium
- Smart farming

TECHNICAL DATA

- 24 VDC supply voltage, Power over Modbus (PoM)
- Sensing area: 103,35 x 18,75 mm
- Protection class: IP67
- Operating ambient conditions:
  - Temperature: -30—70 ºC
  - Rel. humidity: 0—100 % rH (non-condensing)

STANDARDS

- EMC directive 2014/30/EU: CE
  - EN 55022:2010: Information technology equipment – Radio disturbance characteristics - Limits and methods of measurement. Amendment AC:2011 to EN55022
  - EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use – EMC requirements - Part 1: General requirements
- WEEE 2012/19/EC
- RoHs Directive 2011/65/EC:
  - EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

WIRING AND CONNECTIONS

ADPT-SWCSM adapter box - RJ45 socket (Power over Modbus)		
Pin 1	24 VDC	Supply voltage
Pin 2		
Pin 3	A	Modbus RTU communication, signal A
Pin 4		
Pin 5	/B	Modbus RTU communication, signal /B
Pin 6		
Pin 7	GND	Ground, supply voltage
Pin 8		

MOUNTING INSTRUCTIONS IN STEPS

Before you start mounting the units, read carefully ***"Safety and Precautions"*** and follow these steps:

Soil sensor installation:

1. Choose the appropriate location for the sensor. When selecting a site for installation, bear in mind that the soil adjacent to the sensor surface has the strongest influence on the sensor readings and that the sensor measures the volumetric water content of the soil.

⚠ ATTENTION

For optimal performance, avoid any air gaps around the sensor. These can lead to inaccurate readings. Maximize contact between the sensor and soil. For most accurate results, the sensor should be inserted into undisturbed soil.

1.1 The sensors should be located in the effective root zone and at locations that can precisely follow up the moisture of the field. Areas planted with different crops or with significant differences in factors such topography or soil type should be considered unique soil moisture environments. Selecting a site which receives the least amount of water from the irrigation system will inform when the area becomes critically dry.

1.2 Typically, one or two sensors should be installed in the root zone. A single sensor should be placed in the middle of the root zone. When two sensors are installed at a single site, it is recommended to place one sensor at the top of the root zone and a second at the bottom. An advantage of installing multiple sensors is that this allows you to see how well irrigation and rainwater is moving through the soil. The SWCSM-075 is most sensitive to the soil adjacent to the sensor. Therefore, good contact between the soil and sensor is important. Stones and air gaps next to the sensor will affect the accuracy of the readings.

⚠ ATTENTION

Do not install the sensors adjacent to large metal objects such as metal poles or stakes. This can attenuate the sensor electromagnetic field and adversely affect readings.

2. Insert the sensor directly into loose soil. In case the soil is hard and too compact you may:

2.1 Moisten the soil.

2.2 Dig a hole a few centimetres deeper than the depth at which the sensor is to be installed. Do not use metal hardware or other tools in order to insert the sensor into the soil by force!

3. Put the sensor in place and cover it with soil as indicated in the figures below. It can be very useful to install at least two sensors at different depths. Thus the penetration of water can be monitored and the irrigation process can be optimised.

⚠ ATTENTION

The perfect orientation of the sensor is horizontal. It is important to turn the sensor vertically, so that no water can be accumulated on the surface of the green measurement area. If the sensor is not entirely covered with soil, this may lead to wrong temperature measurements.

The sensor cable is strong enough to be buried in any type of soil, however, to protect it from animal bites, you can use a cable protection sleeve.

Fig. 1 Mounting dimensions

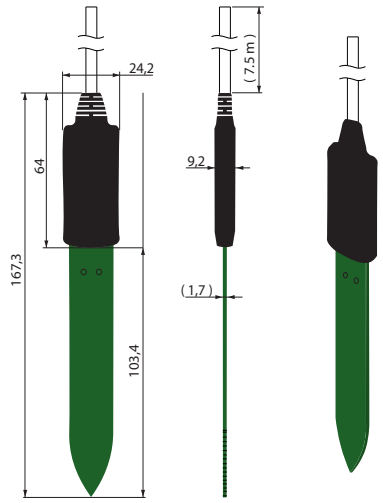
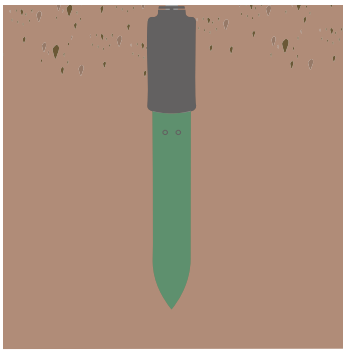
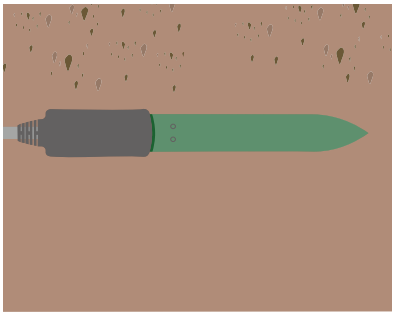


Fig. 2 Mounting position

Vertical



Horizontal



Adapter box installation:

1. Choose a smooth surface for mounting location, preferably not directly exposed to the sun (e.g. the wall of a building facing north or north-west) and follow the steps:
2. Unscrew the front cover of the enclosure to remove it.
3. Fix the enclosure onto the surface by means of suitable fasteners while adhering to the mounting dimensions shown in **Fig. 3** *Mounting dimensions* and the correct mounting position shown in **Fig. 4** *Mounting position*.

Fig. 3 Mounting dimensions

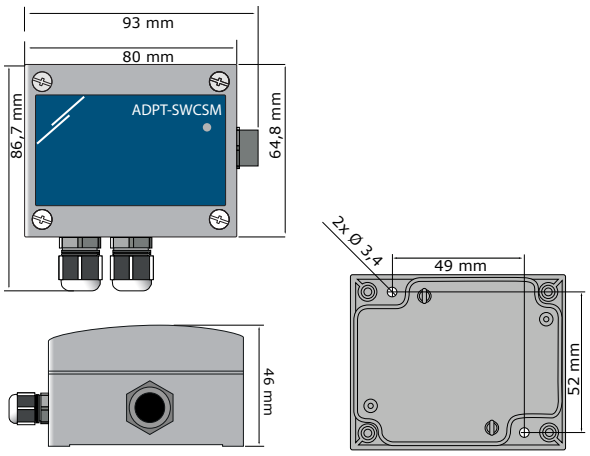
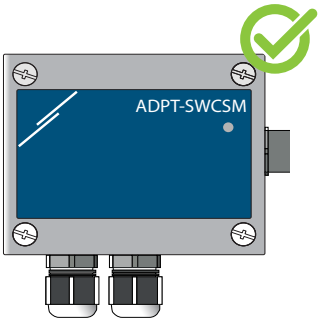
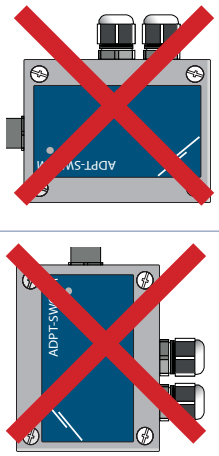


Fig. 4 Mounting position

Correct

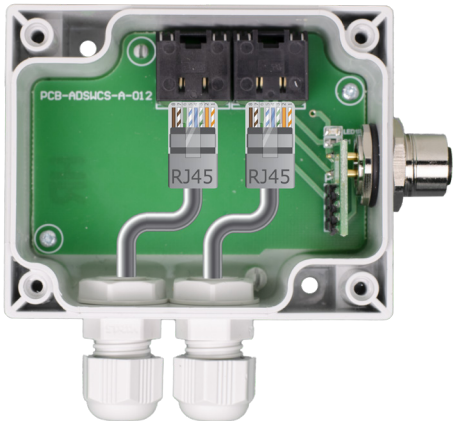


Incorrect



4. Insert the cable(s) through the cable gland(s), then crimp the cable(s) and plug into the RJ45 socket(s) as shown in **Fig. 5** below and the ***Wiring and connections*** section above.

Fig. 5 Connection



6. Put back the cover and secure it with the screws.

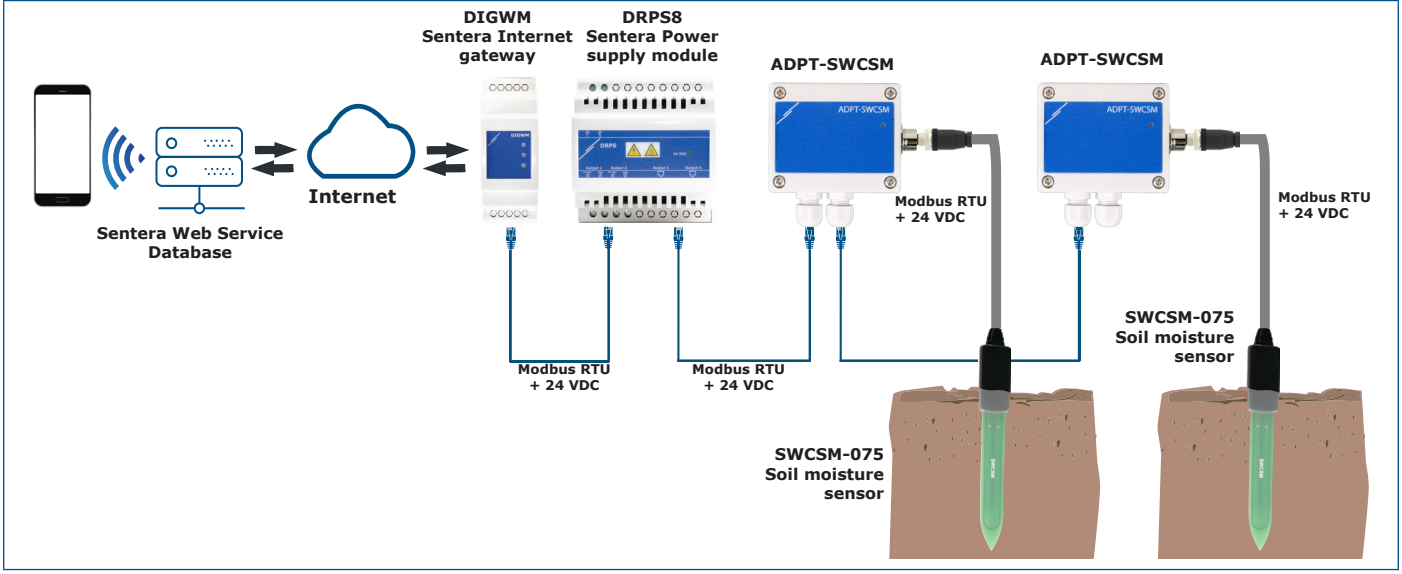
Connecting the sensor to the adapter box:

1. Connect the sensor(s) to the adapter box(es) as indicated in **Fig. 6**

NOTE

The adapter box is Power over Modbus supplied (24 VDC). The boxes need to be interconnected to create a Modbus network.

Fig. 6 Connecting the sensor to the adapter box



Having connected the sensor to the adapter box:

1. Switch on the mains supply.
2. Customise the factory settings to the desired ones via the 3SModbus software or the Sensistant configurator. For the default factory settings, see Modbus register maps.

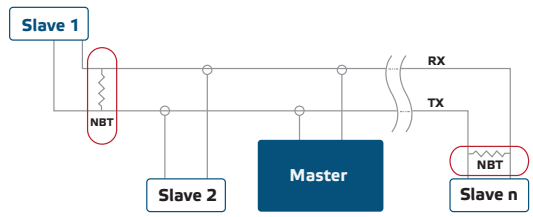
NOTE

For the complete Modbus register data, refer to the product Modbus Register Map, which is a separate document attached to the article code on the website and contains the registers list. Products with earlier firmware versions may not be compatible with this list.

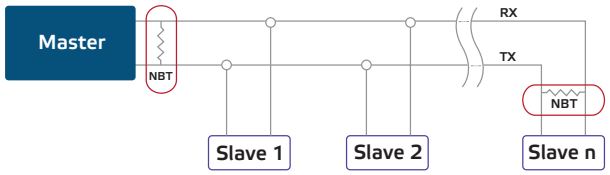
Optional settings:

To assure correct communication, the NBT needs to be activated in only two devices on the Modbus RTU network. If necessary, enable the NBT resistor via 3SModbus or Sensistant (Holding register 9).

Example 1



Example 2



NOTE

On a Modbus RTU network, two bus terminators (NBTs) need to be activated.

Firmware update

New functionalities and bug fixes are made available via a firmware update. In case your device does not have the latest firmware installed, it can be updated. SenteraWeb is the easiest way to update the unit firmware. In case you do not have an internet gateway available, the firmware can be updated via the 3SM boot application (part of the Sentera 3SMcenter software suite).

NOTE

Make sure the power supply does not get interrupted during "bootload" procedure.

VERIFICATION OF INSTALLATION INSTRUCTIONS

After powering up the sensor, the green LED on the ADPT-SWCSM lights up to indicate Modbus communication (**Fig. 7**).

Fig. 7 LED indication

TRANSPORT AND STORAGE

Avoid shocks and extreme conditions; stock in original packing.

WARRANTY AND RESTRICTIONS

Two years from the delivery date against defects in manufacturing. Any modifications or alterations to the product after the date of publication relieve the manufacturer of any responsibilities. The manufacturer bears no responsibility for any misprints or mistakes in this data.

MAINTENANCE

In normal conditions this product is maintenance-free. If soiled, clean with a dry or damp cloth. In case of heavy pollution, clean with a non-aggressive product. In these circumstances the unit should be disconnected from the supply. Pay attention that no fluids enter the unit. Only reconnect it to the supply when it is completely dry.