DOLPHIN
Self-powered IoT by EnOcean

ESO-H 200

Environmental Sensor Outdoor – Humidity Soil

TYPE	ORDERING CODE
ESO-H 200	**H6095-H200**

ESO-H 200 from EnOcean enables measurements of the soil humidity.
It is designed for use with the EMOS 200LH Transceiver Module.

ESO-H implements dedicated sensor functionality capable of measuring the volumetric water content (VWC) of the soil. Measure VWC from 0 to 100% (VWC of saturated soils is generally 40 to 60% depending on the soil type) and allows accurate measurement of all soils and soilless medias with a wide range of salinities.

ESO-H is connected to the EMOS 200LH via one of its Sensor Interfaces.

The ESO-H is based on an ultra-low power sensing unit. Measurement value are provided via analog voltage. EMOS measures and processes the value.

Features overview

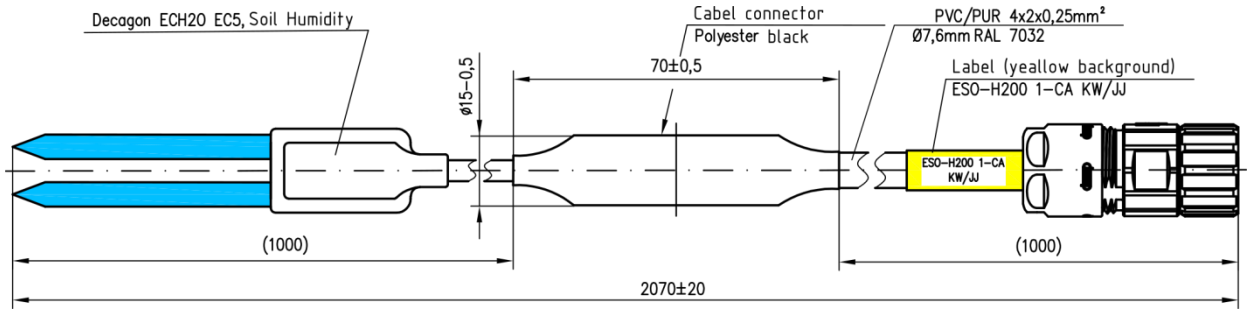
Used Sensor	EC-5 Decagon
Soil Moisture Measurement Range	0 % VWC ... 100 % VWC (NOTE 1)
Soil Moisture Measurement Resolution	0.1 % VWC
Temperature Measurement Accuracy	+- 5 % VWC (NOTE 1)
Maximum measured volume	240 ml
Sensor Data format	GSI with conversion to GP @ EMOS (NOTE 3)
GSI Sensor Type	Trigger Sensor (not powered constantly)
GP Data Channel Humidity	IDX:0 (8 bit, 0.4% step size)
Sensor Product ID (6 bytes)	E0: Manufacturer ID 0004: Product ID CCCCCC: Unique Sensor ID
Operating Temperature	-40 °C … +50 °C (NOTE 2)
Operating Humidity	0 % r.h … 100 % r.h.
Cable length	2000 mm +- 25 mm (with cable conector)
Protection class	IP 67

NOTE 1:
Calibration based on target soil required . Accuracy based on correct calibration for the specific soil type

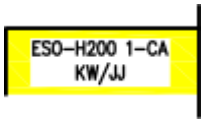
NOTE 2:
VWC measurement possible only above 0 °C (nonfreezing).

NOTE 3: For details see Generic Sensor Interface Specification.

Product Drawing:



Product Label:



Date Code "KW/JJ": e.g. 35/15
Step Code „**CA**": e.g. DA

Product Bag Label:

Date Code "04/18": CW/YY
Step Code „**DA**": YY
Order Code: H6095-H200

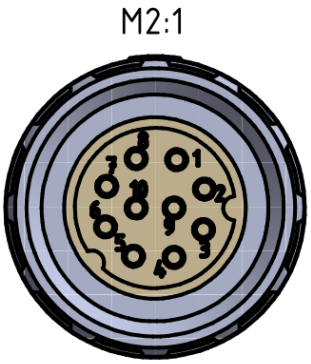
Date code on product refers to production date, date code on packaging refers to packaging date. There can be 1-3 days difference between these process steps.

Product Packaging:

ESO-H is delivered in a sealed plastic bag 240mm x 170mm. ESO-H is wrapped and fixed with elastics bands.

Pin Assignment

See Generic Sensor interface specification for details. Short overview listed below.



Pin configuration M16:
Pin 1 = VDD_Switched
Pin 2 = VDD_Permanent
Pin 3 = SCL
Pin 4 = GND
Pin 5 = Sensor TRQ
Pin 6 = GND
Pin 7 = SDA
Pin 8 = GND
Pin 9 / 10 = Shortcut in connector

Measurement reporting[1]:
The ESO-H is based on Decagon's sensor EC-5. The sensor determines volumetric water content (VWC) by measuring the dieletric constant of the media using capacitance and frequency domain technology. The 70 MHz frequency minimizes salinity and textural effects, making this sensor accurate in almost any soil or soilless media.

The two-prong design and higher measurement frequency allows the EC-5 to measure VWC from 0 to 100% (VWC of saturated soils is generally 40 to 60% depending on the soil type) and allows accurate measurement of all soils and soilless medias with a wide range of salinities.

ESO-H output sensing voltage is measured by EMOS. To convert RAW measurement to VWC an convert equation is applied. Equation is specific for soil types. Calibration for specific soil type is required. Please visit Decagon support page for details on calibration
(http://www.decagon.com/en/soils/volumetric-water-content-sensors/ec-5-lowest-cost-vwc/)

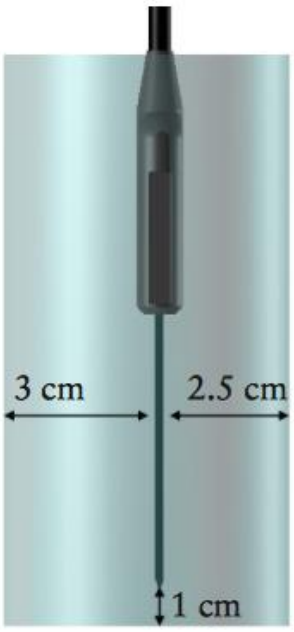
Inside EMOS a standard equation is applied, suitable for general purpose with +- 5 % accurany. The equation is as:

$$VWC\ (m^3/m^3) = 0.000992 * RAW - 0.45$$

VWC is the value transmited as % inside the EMOS telegram.
RAW is the value we measure on analog input of EMOS. In millivolts.
At receiver (EMOT) the RAW value can be computed and other conversion equation can be applied. Please refer to the Decagon user manuals for calibration equation for other types of soil (mineral soils, potting soils, rockwool, and perlite).

Installation recommendation[2]:
It is well known that the electric field distribution inside the measurement volume is strongly weighted toward the sensor surfaces. Care should still be taken to ensure good soil-sensor contact to avoid air gaps at the sensor surface where it is most sensitive. It is also likely that electromagnetic field lines propagate further through air than through higher dielectric material (i.e. soil), so the dimensions in Figure below the volume should be taken as the maximum possible for the sensor. Figure below should be good guideline for installing the sensor near the soil surface or near a foreign object in the soil.

[1] Source (01.07.2016): www.decagon.com:
http://manuals.decagon.com/Manuals/13876_EC-5_Web.pdf
[2] Source (01.07.2016): www.decagon.com
http://manuals.decagon.com/Application%20Notes/14955_VWC%20Sensor%20Measurement%20Volumes_Web.pdf



Orientation

The sensor can be oriented in any direction. However, orienting the flat side perpendicular to the surface of the soil will minimize effects on downward water movement.

To watch a video on proper installation of the sensor go to www.decagon.com/install.