Art. No. 11165

User Guide

MSP 120

1-Wire Multisensor Pro II

Professional in-wall Room Sensor for Temperature, Air Humidity and Air Quality (VOC)

- Professional in-wall mounted Multisensor for
  - Temperature
  - Air Humidity
  - Air Quality (VOC)
- For commercial and residential applications, smart building, smart home, schools, public buildings and companies
- High accuracy Sensors with 12bit resolution
- Air Quality Sensor (VOC) with short warm-up time and fine resolution at low power consumption
- Universal in-wall mounting
- Shapely and high quality sensor housing
- Simple 5VDC power supply

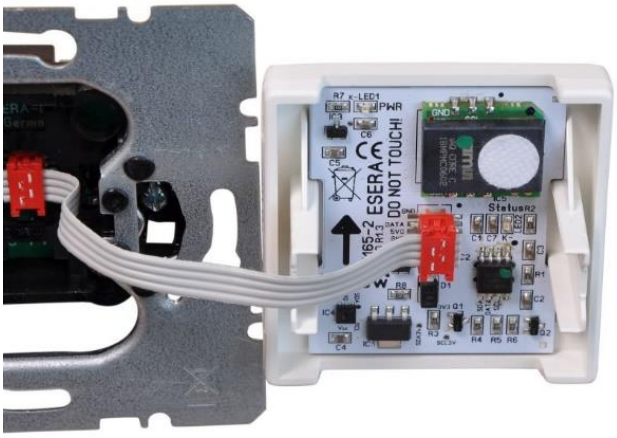
Application

- Multisensor for heating control (single room control)
- Air Humidity Sensor for mold prevention
- Air Quality Sensor for control of ventilation systems
- Indoor air quality warning and monitoring with bad air prevention

Note
Before you start assembling the device and put the product into operation, please read these operating instructions carefully to the end, especially the section of the safety instructions.

1 Product description

With the ESERA 1-Wire Multisensor Pro II you have acquired a professional and highly accurate Multisensor. Due to the new technology of the ESERA 1-Wire Multisensor PRO sensors, the accuracy of the humidity readings is on average 200 - 300% higher compared to most sensors on the market.
Due to the use of high quality internal sensors with 12Bit resolution, the 1-Wire Multisensor Pro II provides very accurate values for temperature, relative humidity and air quality. In addition, the evaluation of the delivered measured values is enormously simplified.
The 1-Wire Multisensor Pro II enables simple climate monitoring of rooms and buildings.
The Multisensor is installed in a shapely surface-mounted housing and fits harmoniously into modern furnished living and business rooms.



Inside view sensor

Due to the generous ventilation openings, the 1-Wire Multisensor Pro II detects the climate conditions in rooms very directly and quickly.

For all types of radiator and heating controls, an accurate temperature sensor such as the one installed in the Multisensor is an important actual value transmitter.

The Air Humidity Sensor provides information about the humidity conditions in the living space and can be used to prevent mold growth.
With the help of the Air Quality Sensor a good statement about the current air quality and hint for ventilation can be given. It is also the optimal sensor for controlling a ventilation system.

In combination with 1-Wire ESERA Switching modules / binary outputs a very effective and energy-saving heating control (single room control) is possible.
The 1-Wire Multisensor Pro II is intended for use in normal living spaces. For outdoor use and in damp rooms, such as sauna, steam bath or winter garden, a suitable sensor is available via the ESERA website.
The 1-Wire Multisensor Pro II has a short warm-up time of a few minutes for the air quality value.
The electrical connection to the 1-Wire Bus system of the 1-Wire Multisensor Pro II is made with screw terminals and can be operated in standard mode (3 cables for ground, data and 5V).
Each 1-Wire Multisensor Pro II has an individual serial number.

Note
Basics and tips for the 1-Wire bus system can be found in the ESERA Online Shop at
https://www.esera.de/1-wire-grundlagen/
or please refer to our eBook in the shop under Training/Documentation

2 Auto-E-Connect Support

The Multisensor Pro with production date as of 06/2021 supports Auto-E-Connect Level I, II and III.

3 Auto-E-Connect® System

With the launch of the ECO Controller, the ESERA Auto-E-Connect® 1-Wire Plug and Play system for the 1-Wire bus is now introduced and supported.
This now enables fully automatic configurations of 1-Wire devices (sensors and actuators) on the 1-Wire bus. It is optimized for commercial and industrial applications and enables significant added value beyond sensor and chip data.

The Auto-E-Connect function is built up in three levels. Currently there are Level I, Level II and Level III available.
Please refer to the "Technical data" to find out which Auto-E-Connect functionality this sensor supports.
With Auto-E-Connect Level III, fully automatic configurations of the 1-Wire devices on the 1-Wire Bus are possible. It is optimized for industrial and IoT applications and enables significant added value beyond sensor and chip data.

With the Auto-E-Connect function, ESERA devices are detected fully automatically, suitable libraries are started and ready-formatted data is output.
The Auto-E-Connect functionality will be available for the ECO Controller and ESERA-Station 200 Pro from 2021.

Auto-E-Connect Level I
OWD Detect: Detection of new sensors and actuators and automatic start of adapted libraries.

Auto-E-Connect Level II
Visualize Product data: Readout and visualization of Auto-E-Connect and manufacturer data of sensors and actuators, such as article number, date of manufacture, firmware and hardware version.

Auto-E-Connect Level III
Extended Plug and Play System for 1-Wire Bus

- **Pre Configuration: The OWD number for the next installation can be written to the 1-Wire device.**
- **Automatic Positioning**: The device logs on to each ECO controller with Auto-E-Connect III with the new desired OWD number. This automatic login works up to the maximum possible OWD number of the ECO controller.
- **Sensorfinder Function**: The ECO controller can activate a status LED within the ESERA 1-Wire Pro sensors. The status LED flashes or lights up permanently for a certain time. This makes the detection of a device in a 1-Wire network much easier. A faster detection saves a lot of time and therefore money when searching for a 1-Wire device.
- **Classes Assignment:** ESERA 1-Wire devices are assigned to OWD classes with the same properties. This assignment enables fully automatic visualization and data evaluation in control systems. A class list is available from ESERA**.**

For further information about the ESERA Auto-E-Connect system please refer to the ESERA website and the ESERA Config Tool 3.
Auto-E-Connect is registered as German and European Patent by ESERA GmbH.

4 Technical data

Function	professional Multisensor for indoor use in buildings for the acquisition of temperature, rel. humidity and air quality (VOC). for professional applications in commercial and private residential sector. the integrated VOC –Sensor requires only a very short warm-up time after commissioning and has a fine resolution with low power consumption. monitoring of the operating voltage
Auto-E-Connect Feature	**Pre Configuration:** desired OWD Storage **Automatic Positioning:** OWD advanced Plug And Play **Sensorfinder Function:** LED display for sensor detection **Classes Assignment:** OWD class via ECO Controller the Sensor supports Auto-E-Connect Level I and II
Temperature Sensor	high-precision digital temperature sensor with 12-bit measured value resolution
Measuring range Temperature	-40°C to + 85°C (sensor element: -40°C to +85°C)
Accuracy Temperature	0,2° in the range of 5°C to 60°C (better than DS18B20 sensor)
Resolution	12 Bit, 0,06°C/Bit depending on selected resolution
Air Humidity Sensor	capacitive digital humidity sensor with high accuracy
Measuring range humidity	0-100% rel. humidity
Accuracy Humidity	2 % in the range of 20-80% relative humidity at 25°C
Data output	0-10V corresponds to 0-100% relative humidity, 0,1V = 1% rF

Air Quality Sensor (VOC)	mixed gas sensor (VOC)
Measuring range	400 - 1800 ppm (CO2 equivalent)
Accuracy	+/- 10%, depending on air composition
Data output	30-250mV corresponds to 400-2900ppm, 1mV output voltage corresponds to 11,6ppm. Smallest output value: 30,51mV corresponds to 405ppm.
Interface	3 - conductor connection (Data, Ground and 5V, Parasitic operation not supported).
Connection	Push-In terminals for cable solid 0.2 to 2.5qmm or fine stranded 0,2 to 1,5qmm. For the connection we recommend slotted screwdriver size 2,5x75
1-Wire interface	based on DS2438 command set
Operating voltage	5 V= (+10%/-20%)
Current consumption	ca. 20mA

5 Ambient conditions

Protection system	IP20
Protection class	III
Temperature,Operation	-25°C to 50°C, (Limitation of max. temperature to 50°C by air quality sensor and sensor housing)
Air Quality Sensor	operating range 0 bis 50°C
Air Humidity	5 to 95% (non condensing)
Storage temperature	-25°C to 50°C
Dimensions (outside)	71 x 71 x 32mm (LxWxH)

6 Conformity

EN 50090-2-2
EN 61000-4-2, ESD
EN 61000-4-3, HF
EN 61000-4-4, Burst
EN 61000-4-5, Surge
EN 61000-6-1, interference immunity
EN 61000-6-3, interference radiation
RoHS/REACH

7 Software / control

The 1-Wire Multisensor Pro II is read out via 1-Wire command for DS2438 devices. The Multisensor is supported in many controllers, such as ESERA-Station, Loxone, IP-Symcon, OWFS, FHEM, (Linux) or microcontroller applications.
For ESERA 1-Wire Multisensor of the Pro Series no complex formulas are necessary anymore.
A sensor controller within the Multisensor takes over the preprocessing of all measured values and thus simplifies the integration into 1-Wire systems enormously. Complex formulas are no longer necessary.
Also, the measured values are no longer dependent on the operating voltage of the 1-Wire Multisensor.

The sensor measurement values are assigned to the standard DS2438 device values (according to the data sheet) as follows:
VDD = operating voltage (5V), VAD = humidity, Xsens = air quality.

Calculations:
Temperature:
Standard output according to DS2438 module

Operating voltage:
Standard output according to DS2438 module

Air Humidity:
To obtain the rel. humidity in percent, multiply the output value (Vas) by a factor of 10.
0.1V corresponds to 1% relative humidity

Air quality:
The air quality is output in accordance (equivalent) to CO2 sensors.
After start-up, the sensor outputs 0V for a few minutes. This means that the air quality sensor is in the start-up phase.

In normal operation, the lowest output value is 30.5mV, which is 405 ppm equivalent CO2.
The increase in output voltage is in the ratio of **1mV per 11.6ppm** CO2.
As an example, an output voltage of 60.2mV corresponds to 698.3ppm CO2.

8 Data output 1-Wire Controller / 1-Wire Gateway

For the 1-Wire Multisensor Pro II, the following measured values are output via the 1-Wire controller/1-Wire gateway.

Data output:

1_EVT|12:27:40
1_OWD1_1|2008 => Controller No._module No._Data set|temperature (°C) example: 20,08 °C
1_OWD1_2|511 => Controller No._module No._Data set|voltage VCC (V)
1_OWD1_3|850 => Controller No._module No._Data set|humidity (rF) example: 85,0%
1_OWD1_4|1200 => Controller No._module No._Data set|dew point (°C) example: 12,00 °C
1_OWD1_5|80000 => Controller No._module No._Data set| air quality(ppm CO2) ex.: 800,00 ppm

Further information on the options and commands can be found in the current 1-Wire Controller/ 1-Wire Gateway documentation.

9 Integration in IP-Symcon / ESERA-Station

Via our website we provide ESERA IP-Symcon software modules for reading the 1-Wire Multisensor into IP-Symcon via 1-Wire Controller/1-Wire Gateway. So no scripts are necessary.
Details can be found on the ESERA website at „Kompatible Steuerungen/Zentralen/IP-Symcon-Integration"
https://www.esera.de/kompatible-steuerungen-zentralen/ip-symcon-integration/

For the conventional connection via 1-Wire Bus Coupler the sensor values have to be calculated according to the given formulas.

10 Integration in Loxone

Via the shop we provide a sample project for reading in the 1-Wire Multisensor via 1-Wire controller 1/1-Wire gateway, among other things. For details see here:
https://www.esera.de/kompatible-steuerungen-zentralen/loxone-integration/demo-1-wire-controller-1-loxone-integration/

11 Integration in FHEM

For the integration into the open source automation software FHEM we provide a software module for reading the 1-Wire Multisensor via 1-Wire controller/1-Wire gateway. This means that evaluation scripts are no longer necessary.
Details can be found on the ESERA website at „Kompatible Steuerungen - Zentralen / FHEM-Integration"
https://www.esera.de/kompatible-steuerungen-zentralen/fhem-integration/

12 Commissioning and Warm-up

The Air Quality Sensor integrated in the 1-Wire Multisensor requires a short warm-up time of approx. 7 minutes. During this time, 0% air quality is constantly output via the 1-Wire interface. After the warm-up time, the Air Quality Sensor automatically switches to normal operation.

13 Calibration / Adjustment

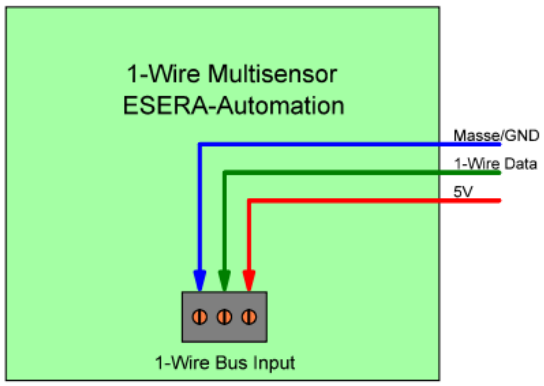
The 1-Wire Multisensor Pro II is pre-calibrated. Calibration is not necessary and is possible.

14 Measuring accuracy

The sensor elements within the 1-Wire Multisensor Pro II are pre-calibrated. Please note that the measuring accuracy may possibly be reduced towards the measuring range limits and at very high and low operating temperatures.

15 Terminal assignment

The 1-Wire Multisensor Pro II is connected via Push-In terminals.
The connection terminal is intended for solid cables with a cross-section of 0.2 to 2.5qmm or fine-stranded cables with a cross-section of 0.2 to 1.5qmm. For connection we recommend slotted screwdriver size of 2,5x75.
The pin assignment is printed on the printed circuit board.
It is necessary to pay attention to the correct polarity when connecting.
The Multisensor is to be connected with three cables (Ground, 1-Wire Data and 5V). The parasitic mode is not supported.

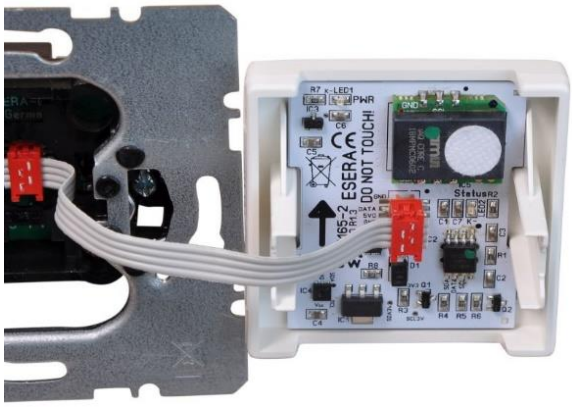


Note
The module may only be operated at the voltages and under the ambient conditions intended for it. The operating position of the device is arbitrary.
The modules may only be commissioned by a qualified electrician.

For further information on the operating conditions, see the following instructions under "Operating conditions".

16 Assembly

The installation location must be protected from direct moisture (e.g. dripping water) and drafts. The device may only be used in dry indoor rooms and in protected outdoor areas.
A location free of drafts must be selected for installation.
The device is intended for installation as a stationary device. The 1-Wire Multisensor can be ideally mounted on a flush-mounted box thanks to clever housing cutouts.



Note
The sensor module and the carrier frame are connected with a narrow ribbon cable. Avoid mechanically stressing the red connector plugs or pulling on the ribbon cable.
Overloading may cause irreparable damage.

17 1-Wire Network Cabling

The special feature of the 1-Wire system is the "BUS technology". All devices (sensors and actuators) are operated in parallel on a three-wire line, which is used for both power supply and data communication. The 1-Wire bus system joins the list of other successful bus systems such as CAN or Modbus RTU. All of the installation principles recommended for these are also applicable and appropriate to 1-Wire.
The maximum size of a 1-Wire Network is determined by various factors. These are mainly:

- Total cable length and cable type
- Number of 1-Wire devices
- Type of cable installation (topology)
- Number and design of cable connectors (unnecessary connection transitions should be avoided)

All factors in total are summarised and referred to as 1-Wire Bus load. Each increase of a factor increases the total 1-Wire Bus load for the 1-Wire controller and thus reduces the maximum network size.

According to our many years of experience and a lot of feedback from customers, the following conservative recommendation can be made:

- Maximum cable length 50 -120m
- Number of 1-Wire devices no more than 20 -22 pieces
- As linear a topology as possible without T-junctions

The topology in particular plays a major role. If possible, linear topology should be used. The linear topology can be compared like pearls on a pearl necklace. The data line should be laid from one device to the next without T-joints.
Furthermore, the type of cable used can also be mentioned here. We recommend for the cabling CAT5 or CAT6 network cable. It is also possible to use J-Y(St)Y telephone cables and KNX cables. Longer cable runs are possible with CAT5 versus CAT7 cables.

With twisted pair cables, a longer connection length can be achieved in an undisturbed environment, as the capacitive bus load is lower. A total length of 50 m and more can be easily achieved without additional measures. In disturbed, commercial and industrial environments, the cable should always be shielded in order to increase the "robustness" or interference sensitivity of the system

Note
The above statements about 1-Wire are hints and tips and do not describe any product property or represent any warranted product property of the product and the 1-Wire Controller.

18 Operating conditions

The Multisensor is intended for temperature and humidity measurement of air and gases in indoor areas such as living rooms, offices, factory halls or public facilities. The measured values specified under technical data are limit data for the entire 1-Wire Multisensor and must not be exceeded or fallen short of, otherwise the Multisensor may be damaged.

19 Disposal note

Do not dispose of device in household waste! Electronic devices must be disposed of in accordance the directive on waste electrical and electronic equipment via the local collection local collection points for electronic waste!

20 Safety instructions

When handling products that come into contact with electrical voltage, the applicable VDE regulations must be observed, in particular VDE 0100, VDE 0550/0551, VDE 0700, VDE 0711 and VDE 0860.

- All final or wiring work must be carried out with the power turned off.
- Before opening the device, always unplug or make sure that the unit is disconnected from the mains.
- Components, modules or devices may only be put into service if they are mounted in a contact proof housing. During installation they must not have power applied.
- Tools may only be used on devices, components or assemblies when it is certain that the devices are disconnected from the power supply and electrical charges stored in the components inside the device have been discharged.
- Live cables or wires to which the device or an assembly is connected, must always be tested for insulation faults or breaks.
- If an error is detected in the supply line, the device must be immediately taken out of operation until the faulty cable has been replaced.
- When using components or modules it is absolutely necessary to comply with the requirements set out in the accompanying description specifications for electrical quantities.
- If the available description is not clear to the non-commercial end-user what the applicable electrical characteristics for a part or assembly are, how to connect an external circuit, which external components or additional devices can be connected or which values these external components may have, a qualified electrician must be consulted.
- It must be examined generally before the commissioning of a device, whether this device or module is basically suitable for the application in which it is to be used.
- In case of doubt, consultation with experts or the manufacturer of the components used is absolutely necessary.
- For operational and connection errors outside of our control, we assume no liability of any kind for any resulting damage.

- Kits should be returned without their housing when not functional with an exact error description and the accompanying instructions. Without an error description it is not possible to repair. For time-consuming assembly or disassembly of cases charges will be invoiced.
- During installation and handling of components which later have mains potential on their parts, the relevant VDE regulations must be observed.
- Devices that are to be operated at a voltage greater than 35 VDC / 12mA, may only be connected by a qualified electrician and put into operation.
- Commissioning may only be realized if the circuit is built into a contact proof housing.
- If measurements with an open housing are unavoidable, for safety reasons an isolating transformer must be installed upstream or a suitable power supply can be used.
- After installing the required tests according to DGUV / regulation 3 (German statutory accident insurance, https://en.wikipedia.org/wiki/German_Statutory_Accident_Insurance) must be carried out.

21 Warranty

ESERA GmbH guarantees that the goods sold at the time of transfer of risk to be free from material and workmanship defects and have the contractually assured characteristics. The statutory warranty period of two years begins from date of invoice. The warranty does not extend to the normal operational wear and normal wear and tear. Customer claims for damages, for example, for non-performance, fault in contracting, breach of secondary contractual obligations, consequential damages, damages resulting from unauthorized usage and other legal grounds are excluded.
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