User guide
1-Wire Multisensor
Flush-mounted living area sensor

- Temperature sensor
- Precise Humidity sensor
- Suitable for all 55mm switch ranges,
- e.g. Berker, Jung, Busch-Jaeger and many others
- Connection via screwless pressure clamps
- Simple power supply (5V)
- Integrated voltage monitoring
- Simple installation in 55mm flush-mounted boxes
- Orifices (central plates) in pure white matt and glossy available

- Application
- Heating control (individual room control)
- Ventilation system control

Note: Cover not part of base article

1 Introduction

Before you start installing and commissioning the Multisensor, read this manual carefully until the end, especially the section on safety instructions.
This Multisensor is a further development of the previous Multisensors 11132. The electronics of the integrated brightness sensor have been optimised.

2 Product description

With the flush-mounted 1-Wire Multisensor, simple monitoring of the room climate is possible. The Multisensor is installed in an attractive flush-mounted housing and blends harmoniously into modern living and business rooms. It can be used for all switch series with standard 50/55mm central plate. The cover (central plate) is available in pure white matt and glossy.
Thanks to the generous ventilation openings, the 1-Wire Multisensor very directly and quickly detects the climatic conditions in rooms.
For all types of radiator and heating controls, an accurate temperature sensor is an important actual value transmitter, which is included in the 1-Wire Multisensor. In combination with 1-Wire ESERA switching modules / binary outputs, a very effective and energy-saving heating control (individual room control) is possible. The 1-Wire Multisensor is intended for use in the interior of residential and business premises. A light sensor is integrated for brightness control. The measuring range is adapted to indoor areas.
A calibration of the 1-Wire Multisensor is not necessary. You can put the 1-Wire Multisensor into operation immediately without waiting.

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The 1-Wire Multisensor is integrated into a 1-Wire network using screwless pressure clamps.
The 1-Wire multi-sensor has a 1-Wire interface of type DS2438. Each 1-Wire multi-sensor has an individual serial number.
This 1-Wire Multisensor has an integrated measuring function for temperature, humidity, brightness and operating voltage.

3 Why measure humidity?

Room air always contains moisture in the form of water vapour. The relative humidity is decisive for a pleasant living climate. During the heating period, 35 to 45 % relative humidity can be regarded as optimal. Values above 45 to 55% may already lead to the formation of mould in a poor building envelope. For health reasons, values below 20 % should be avoided if possible.
The absolute humidity indicates how many grams of water vapour are dissolved in one cubic meter of air.
The warmer the air, the more water it can absorb. The relative humidity says, with how much percent the room-air is enriched with humidity.One speaks of air completely saturated with humidity when the relative humidity is 100 %. Beyond that the air cannot take up any further humidity. If even more moisture is added, the water vapour condenses and droplets form. In nature this phenomenon leads to fog formation, in heated rooms the water vapour from the room air precipitates on cold surfaces. There is a risk of mold growth here.

4 Software / Control

The 1-Wire Multisensor is read by 1-Wire command for DS2438 devices and is supported by many computer programs like Loxone SPS, WAGO SPS (via OWOS), OWFS, FHEM (Linux), IP-Symcon or microcontroller applications.

5 Technical data

1-Wire interface:	DS2438, Multisensor for temperature, humidity, brightness and operating voltage
Measuring range temp.:	-55°C to +60°C (sensor element: -55°C to +125°C)
Accuracy temperature:	+/- 0,5° in the range of -10°C - 85°C
Resolution:	9 Bit, 0.03125°C/Bit
Humidity sensor:	Capacitive sensor Honeywell
Measuring range humidity:	0-100% rel. humidity
Humidity accuracy:	+/-3.5 % (10-85% RH), +/-7% (<10% and >85% RH)
Brightness sensor:	Sensor adapted to the sensitivity of the human eye
Measuring range:	2 - 7000 Lux
Accuracy Lux:	+/-20% in the range up to approx. 200 Lux, +/-15% in the range up to 7000 Lux
Operating voltage:	5 V= (+/-10%)
Power consumption:	approx. 2 mA
Connection:	push-in terminal (screwless terminal)

6 Environmental conditions

Protection system: IP00
Protection class: III
Temperature operation of complete sensor: operation -25°C to 60°C
Humidity: 10 - 90% (non-condensing)
Dimensions (outside): 71 x 71 x 32mm (LxWxH)

7 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 Immunity, EN 61000-6-3 Interference, RoHS

8 Calculation

The following formula can be used to evaluate the humidity sensor.
VDD = operating voltage (5V), VAD = analog input DS2438, Xsense = brightness DS2438.

Humidity calculation (simplified formula)
Offset = 0.847847 (Zero Offset V), slope = 29.404604 (Slope: mV/%RH)
Srh = (VAD_neu - offset) / (slope / 1000)
rFH = (Srh + 2)/ ((1.0305 + (0.000044 * temperature) - (0.0000011 * temperature x 10^2)))))))

For Loxone control:
I1 = VAD value, I3 = temperature
(((((5/I2*I1)-0.847847)/(29.404604/1000))+2)/((1.0305+(0.000044*I3)-(0.0000011*I3^2))))

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brightness calculation
Xsense in Volt, factor = 25600
Correction for operating voltage fluctuations: Xsense = (5 / VDD) * Xsense
Brightness (LUX) = (0,223V - Xsense) * Factor

Note on light sensor
the light sensor within the 1-Wire multi-sensor is suitable for detecting brightness or darkness, e.g. whether light is on or off in a room, due to the installation position in the wall, flush-mounted in relation to the living area lighting (ceiling). This behaviour is due to the installation position in the wall (flush-mounted). This sensor can only be used to a limited extent to implement good brightness-dependent lighting control.

Sample program (PHP script for IP-Symcon)
Humidity values, dew point, brightness and operating voltage are calculated per script. For details see example script in the shop.

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

For the 1-Wire Multisensor, the following measured values are calculated and output via the 1-Wire Controller / 1-Wire Gateway. The dew point calculation is a function of the 1-Wire Controller / 1-Wire Gateway.
Important: Please assign article number 11133 to the 1-Wire Multisensor via Config Tool 3. This is the only way to activate the correct library for this Multisensor generation.
Why assign article number 11133? The electronics of the 1-Wire Multisensor has been adapted to the Multisensors with the article numbers 11134 and 11135. In order to ensure a distinction from the previous 1-Wire Multisensors (11132 before 2019), article number 11133 has been assigned to the new library.

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|4300	=> Controller No_ Module no. _Data set|Air humidity (rH) Example 43,0%
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|Brightness (Lux) Example: 800.00 Lux

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

10 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. Thus no scripts are necessary. Details can be found on the ESERA website under "Compatible Controls/Centrals/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 must be calculated according to the specified formulas.

11 Integration in Loxone

Via the shop we provide an example project for reading the 1-Wire multisensor via 1-Wire Controller 1. Details see here:
https://www.esera.de/kompatible-steuerungen-zentralen/loxone-integration/demo-1-wire-controller-1-loxone-integration/

12 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 eliminates the need for evaluation scripts. Details can be found on the ESERA website under "Compatible Controls - Central Units / FHEM Integration".
https://www.esera.de/kompatible-steuerungen-zentralen/fhem-integration/

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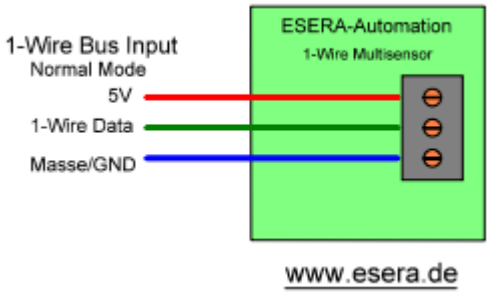
13 pin assignment

The 1-Wire Multisensor is connected via screwless pressure clamps. The terminal pin assignment is printed on the printed circuit board.
The terminals are intended for solid cables with a cross-section of 0.2 to 2.5qmm or flexible cables with a cross-section of 0.2 to 1.5qmm. The correct polarity of the connection must be observed. The 1-Wire Multisensor must be supplied with three cables (ground, 1-Wire Data and 5V). The parasitic mode is not supported.



Note: Basics and tips for the 1-Wire bus system can be found on the ESERA website at
https://www.esera.de/1-wire-grundlagen/

14 Assembly

The installation site must be protected from moisture. The device is intended for installation inside a building as a stationary device. Draughts through cable conduits can falsify the measured values. An airtight closure of the cable conduits avoids this effect.
The 1-Wire Multisensor must be mounted so that the ventilation openings of the central plate are open upwards and downwards.

15 Operating conditions

The module may only be operated at the specified voltages and ambient conditions. The device is intended for use in dry areas.
If condensation forms inside the multisensor, wait at least 2 hours before acclimatizing. Do not operate the module in an environment in which flammable gases, vapours or dusts are present or may be present.

16 Disposal instructions

Do not dispose of the device in domestic waste! Electronic devices are to be disposed of according to the Directive on waste electrical and electronic equipment (WEEE) on local authorities and collection points for waste electronic equipment!

17 Safety Instructions

When using products that come into contact with electrical voltage, the valid VDE regulations must be observed, especially 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.

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- 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.

18 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. Excepting to this, ESERA GmbH accepts liability for the absence of a guaranteed quality resulting from intent or gross negligence. Claims made under the Product Liability Act are not affected.
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