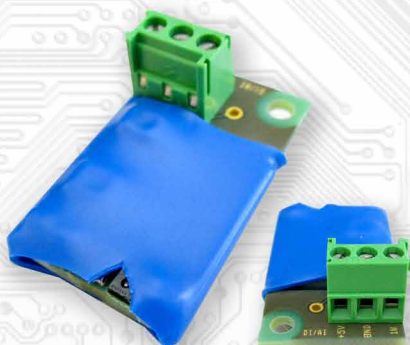




The modules are designed for measuring physical quantities with 1-wire bus communication.

Depending on the type, it is possible to measure temperature, relative air humidity, analog signal 0÷10V or use digital input.

Information about the measured values of quantities is transmitted using the DS2438 circuit on a 1-wire communication bus. Each module has its own unique address, which must be determined via the bus using a Master device - e.g. 1-wire extension from Loxone.

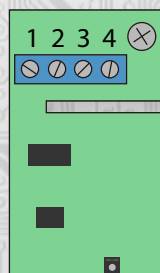
If a more accurate temperature measurement is required, a temperature sensor DS18B20/DS18S20 can be added to all types, in this case the device will communicate on two addresses.

The sensors must be protected from dirt, excessive dust or direct exposure to water!

Basic technical parameters

Supply voltage (Ucc)	5 VDC
Current consumption	max. 2 mA (except types with CO ₂ measurement)
Type of used temperature sensor	DS2438 / SHT31-ARP / DS18B20 / DS18S20
Accuracy of temperature measurement ¹	DS2438 ± 2°C / SHT31-ARP ± 0,5°C / DS18x20 ± 0,5°C
Type of used humidity sensor	SHT31-ARP
Measurement range of humidity	0 ÷ 100%
Humidity resolution	0,25%
Accuracy of RH (+25°C) ¹	± 3% (20 ÷ 80 %RH)
Measurement range of AI	0 ÷ 10 VDC
Resolution of AI measurement	0,009765625V
Accuracy of AI measurement	0,05V
DI (digital input)	Active - activated by connecting the terminals 2,4: terminals connected: rVsens = ≤5 [b] / Vsens = ≤0,00122 [V] not connected: rVsens = ≥1000 [b] / Vsens = ≥0,2441 [V] Passive - activated by voltage at the terminals 2,4: ≤1V: rVsens = ≤5 [b] / Vsens = ≤0,00122 [V] ≥2.5V (max.30V): rVsens = ≥1000 [b] / Vsens = ≥0,2441 [V]
Communication	1-wire
HW Communication interface	DS2438 (+DS18x20)
Galvanic separation input - output - 1wire	no
Range of working temperature and humidity ²	-10 ÷ 40°C / 0 ÷ 100 %RH without condensation
Range of recommended storage temp. / RH	10 ÷ 50 °C / 20 ÷ 60 %RH
Protection level	IP40 (EN 60529)
Type of terminal board	CPP (conductors max. 1 mm ²)

Wiring diagram (fig. 1)



Terminal 1..... 1-wire

Terminal 2..... common terminal (GND)

Terminal 3..... + 5V (Ucc)

Terminal 4.....Analog / Digital input (AI / DI)

Additional temperature sensor DS18B20/DS18S20 is connected to terminals 1-3

1 The accuracy of temperature and RH measurement depends on the stability of the supply voltage U_{cc} (+5V = terminal 3), since the SHT31-ARP sensor is directly powered from it, see: Formulas for calculating the value of measured quantities.

3 The devices are intended for use in residential interiors.

The sensor operates stably within the recommended measuring range, which is $5 \div 60$ °C and $20 \div 80$ %RH. Long-term exposure to high humidity, especially >80%RH, results in a gradually increasing deviation of the RH reading (+3%RH after 60 hours >80%RH). After returning to the normal range, the RH measurement slowly returns to the calibrated values. Long-term exposure to extreme conditions can accelerate the aging of the sensor. More detailed information on the conditions of long-term use of the sensor in conditions outside the normal range, especially at rel. humidity >80%RH, is provided directly on the manufacturer's website <http://www.sensirion.com>.

List of types: (in parentheses is the input signal source)

HT1WE	= T (DS2438 + SHT31) + RH (SHT31)
HTA1WE	= T (DS2438) + RH (SHT31) + AI (analog input 0÷10V)
HTD1WE	= T (DS2438) + RH (SHT31) + DI (digital input)
NTA1WE	= T (DS2438) + AI (analog input 0÷10V)
NTD1WE	= T (DS2438) + DI (digital input)

Types with temperature sensor DS18B20 (or DS18S20) = **xx1WE+DB (xx1WE+DS)**:

HT1WE+DB	= T (DS2438 + SHT31 + DS18B20) + RH (SHT31-ARP)
HTA1WE+DB	= T (DS2438 + DS18B20) + RH (SHT31) + AI (analog input 0÷10V)
HTD1WE+DB	= T (DS2438 + DS18B20) + RH (SHT31) + DI (digital input)
NTA1WE+DB	= T (DS2438 + DS18B20) + AI (analog input 0÷10V)
NTD1WE+DB	= T (DS2438 + DS18B20) + DI (digital input)

T = temperature; RH = relative humidity; AI = analog input 0÷10V; DI = digital input;
CO₂ = concentration CO₂

Description of measured quantities:

T (temperature):

All types have a temperature sensor, which is part of the DS2438 circuit.

In the HT1We type, an SHT31 temperature sensor is additionally available, mounted in a metal housing on the front side of the blanking plate for more accurate temperature measurement.

If more accurate temperature measurement is required, a DS18B20/DS18S20 temperature sensor can be added to all types (types xx1We+DB/ xx1We+DS). In this case, the device will communicate at two addresses.

RH (relative humidity):

To measure RH, an SHT31 sensor is used, mounted in a metal housing on the front side of the blanking plate, the output of which is processed by one of the A/D converters of the DS2438 circuit.

AI (analog input 0÷10V):

To measure AI, one of the A/D converters of the DS2438 circuit is used. The positive pole of the signal is connected to terminal 4, the negative pole to terminal 2 (GND).

DI (digital input):

The digital input can be connected as active, when the circuit responds to the resistance between terminals 4 and 2.

A normally open or normally closed contact is therefore connected to terminals 4, 2.

Or it can be connected as passive, when the circuit responds to the voltage between terminals 4 and 2. A DC voltage can therefore be applied to terminal 4 (+) versus 2 (GND), e.g. a normally open or normally closed contact connected to the power supply.

Formulas for calculating the value of measured quantities:

1. Calculation from bit values of registers:

rVDD = register value VDD (supply voltage to DS2438) [b]
 rVAD = register value VAD [b]
 rVsens = register value Vsens [b]

$T(SHT31) [^{\circ}C] = -66,875 + 218,75 * ((0,00390625 * rVsens) / (rVDD * 0,01))$
 $RH [\%] = -12,5 + 125 * ((rVAD * 0,01) / (rVDD * 0,01))$
 $AI [V] = 0,009765625 * rVsens$

2. Calculation from voltage values:

VDD = voltage value (supply voltage to DS2438) [V]
 VAD = voltage value [V]
 Vsens = voltage value [V]

$T(SHT31) [^{\circ}C] = -66,875 + 218,75 * (16 * Vsens / VDD)$
 $RH [\%] = -12,5 + 125 * (VAD / VDD)$
 $AI [V] = 40 * Vsens$