USER INSTRUCTION

HUMIDITY TRANSDUCER
AR250

Thank you for choosing our product.
This instruction is intended to facilitate correct operation,
safe use, and taking full advantage of the device's functionalities.
Before you start the device, please read and understand this instruction.
In the event of any additional questions, please contact our technical adviser.

CONTENTS

⚠ Please pay particular attention to the text marked with this sign.

The manufacturer reserves the right to make changes to the design and the programming of the device without any deterioration of the technical parameters (some functions may not be available in older versions).

1. SAFETY PRINCIPLES ⚠

- before you start to use the device, become familiar with the present instructions;
- in order to avoid electrocution or damage to the device, its mechanical and electrical installation must be performed by qualified workers;
- before switching on the power supply, make sure that all cables and wires are properly connected;
- before making any modifications to the wire and cable connections, switch off the voltage supplied to the device;
- ensure proper operating conditions compliant with the technical specification of the device (chapter 5, power supply voltage, humidity, temperature).

2. INSTALLATION GUIDELINES ⚠

The device is designed so as to ensure an appropriate level of immunity to most interferences that may occur in industrial and household environments. In environments of unknown level of interferences, it is recommended to implement the following measures so as to prevent potential interference with the operation of the device:

a) do not supply the device from the same lines as high-power equipment without using appropriate power line filters;

b) use shielded supply, sensor, and signal cables, whereby the earthing of the shield should be single-point and located as close to the device as possible;

c) avoid running measurement (signal) cables in the direct vicinity of and parallel to power and supply cables;

d) it is recommended to twist the signal wires in pairs or to use a finished twisted-pair cable;

e) avoid proximity of remotely controlled devices, electromagnetic meters, high power loads, loads with phase or group power control, and other devices that cause high impulse disturbances;

f) ground or zero metal rails on which rail-mounted devices are installed.

3. GENERAL CHARACTERISTICS OF THE TRANSDUCER

- a high class digital relative humidity sensor with a protective filter (ABS material as a standard, slot width 1 mm, and steel wire mesh with mesh size of 0.15 mm)
- a probe integrated with the enclosure, external or on a stainless steel pipe
- a current output, 4÷20 mA (2-wire, with power supply from the current loop), a voltage output 0÷10 V (3-wire)
- temperature compensation of humidity measurement, high measurement stability
- programmable processing ranges for humidity
- configuration of parameters through the PRG port (programmer AR956 or AR955) and free ARsoft-CFG software that enables quick setting and copying of all configuration parameters
- protection rating IP65 provided by the enclosure which improves reliability of operation thanks to high resistance to penetration of water and dust and surface condensation of steam inside of the device an IP40 probe

NOTE: ⚠

* periodic calibration of the device in accordance with the requirements in force at the installation site or once every 12 months is recommended

NOTE: ⚠️

- before you start working with the device, become familiar with this user instruction and make sure the
  electrical and mechanical systems have been made properly and the correct parameters have been set;
- if the parameters of the transducer have been set using the AR956 programmer, the ARsoft-CFG software
  must be configured properly.

4. CONTENTS OF THE SET

- ■ the transducer;
- ■ a user instruction;
- ■ a warranty card.

5. TECHNICAL DATA

Measurement range for the probe		0÷100 %RH, **do not pour water on measuring probe**
The sensor's sheath (ABS sheath and internal stainless steel wire mesh)		mesh size: 0.15 mm; ABS sheath slot width: 1 mm; sheath diameter: 15 mm; sheath length: 40 mm
Measurement accuracy (same as Sensirion SHT31 sensor)		typically ±2 %RH in the entire measurement range of transducer
Additional errors	hysteresis	±0.8 %RH at the temperature of 25 °C
	long-term stability	<0.25 %RH/year **(1)**
Response time (τ 63%) to step change of the measured value		8 s (for air flow >3.6 km/h)
Measurement period		1 s
Analog outputs (without galvanic separation from power supply)	current 4÷20 mA	maximum resolution approx. 14.5 µA; load capacity R_o < (Usup-12) / 22 mA
	voltage 0÷10 V	max. resolution ~ 9.1 mV, load capacity Io<4.5 mA (Ro>2.5 kΩ)
	output error	basic < 0.1%; additional ±0.01%/°C of the output range
Communication interfaces	PRG programming connection, standard	- speed 2.4 kb/s - character format 8N1 (8 data bits, 1 stop bit, no parity bit) - MODBUS-RTU protocol (SLAVE) - without galvanic separation from power supply
Power supply	version 4÷20 mA	12÷36 VDC (supply from the current loop)
	version 0÷10 V	18÷30 VDC, current consumption without load on outputs: approx. 7 mA
Rated operating conditions		-30 to 80 °C (no condensation, do not pour water on the probe)
Operating environment		air and neutral gases
Enclosure protection rating and mounting		IP65 (electronic components), IP40 (sensor), wall mounted
Operating position		any (or the sensor sheath to the ground when the transducer is exposed to the risk of contact with water or water splashes)
Weight		approx. 120 g (with integrated probe)
Electromagnetic compatibility (EMC)		immunity: according to the PN-EN 61000-6-2 standard
		emission: according to the PN-EN 61000-6-4 standard

Notes: (1) - periodic calibration of the device in accordance with the requirements in force at the installation site or once every
12 months is recommended

## 6. ENCLOSURE DIMENSIONS AND INSTALLATION DATA

a) general data and dimensions of the standard version (integrated probe)

| Enclosure type	industrial IP65
Material	polycarbonate
Enclosure dimensions	58 x 94 x 35 mm
Fixing methods	2 x Φ9 mm holes, distance between the holes 80 mm, narrower part of the hook holder with max. diameter of 5 mm
Conductor cross-sections	1.5 mm^2
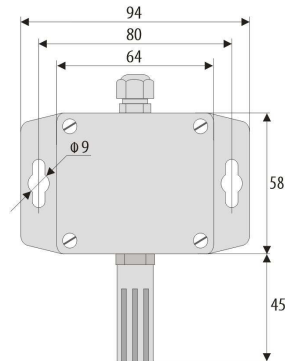
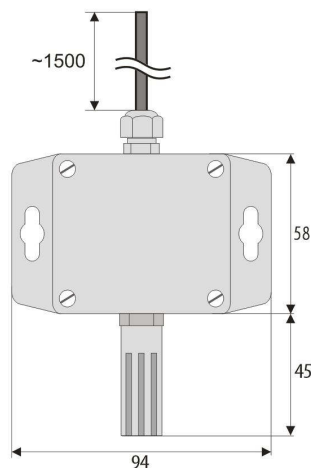**b)** dimensions for external probes in different designs
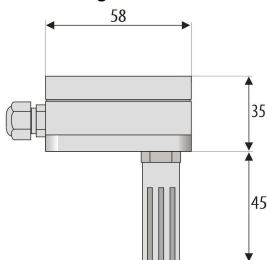
b.1) An external probe with a wire
AR250/2
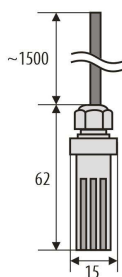
b.2.) A probe on a stainless steel pipe
AR250/L150 or AR250/L250
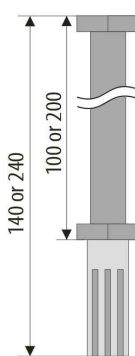
b.3) An external probe
in an enclosure with a wire
AR250/3

b.4) A probe integrated with
the enclosure in the back
(channel) design AR250/T

c) installation of cabling

– **cut off the power supply before making any changes to the cabling**
– remove the 4 screws in the front cover and take it off the device
– terminals to connect power supply cables, outputs cables, and signal cables become accessible – see chapter 7
– the electric cables must be inserted into the enclosure through cable glands
– in order to achieve the IP65 rating, the nuts of the cable glands and the enclosure cover must be tightened precisely

CAUTION: ⚠️
In order to avoid any mechanical and electrostatic damage, one must be very careful when handling the circuit board.

7. DESCRIPTION OF TERMINAL STRIPS AND ELECTRICAL CONNECTIONS

Table 7.1. Numbering and description of terminal strips - the version with the current output

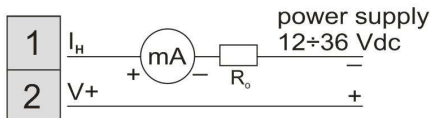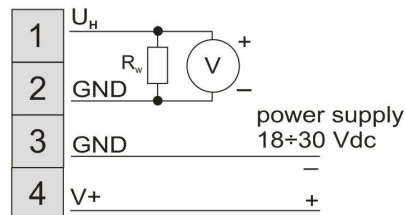| Terminals	Description
1	current output (I_H =4÷20 mA) for the measured humidity
2	supply input V+

Table 7.2. Numbering and description of terminal strips - the version with the voltage output

Terminals	Description
1	voltage output (U_H =0÷10 V) for the measured humidity
2, 3	common earth (minus for the output and the power supply)
4	supply input V+

V+ - power supply voltage
(mA) - measuring device (miliammeter)
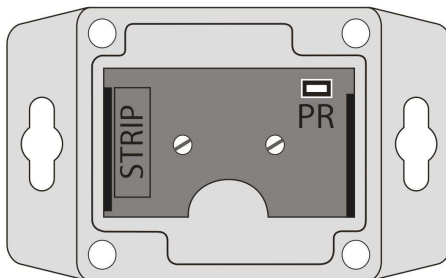(v) - measuring device (volt meter)

Fig. 7. Location of the terminal strip and the programming socket **PR**

8. SETTING OF THE CONFIGURATION PARAMETERS

All the configuration parameters of the device are stored in the non-volatile internal memory.
Configuration methods:

1. Use the AR956 programmer and the ARSOFT-CFG software to:
– connect the device to a computer port and to start and configure the ARSOFT-CFG application
– after the connection has been established, the current measured values and are displayed in the software's window
– setting and viewing of the device parameters is possible in the parameter edition window
– new parameter values must be approved with the **Approve changes** button
– the current configuration can be saved in a file or set using values read from a file

NOTE: ⚠️
– before disconnecting the device from a computer, press the **Disconnect device** button (ARSOFT-CFG)
– in the event of no response:
• in the **Program options** check the configuration of the port and the **MODBUS address of the device** (transmission speed 2400 bit/s, address MODBUS=1)
• make sure that the serial port drivers in the computer have been properly installed for the AR956 prog.

- disconnect for a few seconds and then reconnect the AR956 programmer
- restart the computer
- if the AR955 programmer is used instead of the AR956 programmer, connect the power supply voltage to the transducer

If a difference is found between the indications and the actual measured values, it is possible to tune the zero and the sensitivity for the specific sensor: parameters **coH** (calibration of the zero point) and **cGH** (calibration of the inclination).

<u>In order to restore the default settings</u>, use the file with the default configuration in the ARSOFT-CFG software.

NOTE: ⚠️
The transmission parameters for the AR956 programmer in the ARSOFT-CFG software are the following: 2400 bit/s, address MODBUS = 1

Table 9.1. Configuration parameters for the version with the 4÷20 mA current output or the 0÷10 V voltage output

Parameter	Range of variability of the parameter and description		Default settings
1: **HiLo** the lower value of the measurement range of the output I_H or U_H (chapter 7)	**-50.0 ÷ 150.0**	humidity value for 4mA or 0V	**0.0** [%RH]
2: **HiHi** the upper value of the measurement range of the output I_H or U_H	**-50.0 ÷ 150.0**	humidity value for 20mA or 10V	**100.0** [%RH]
3: **coH** calibration of the zero point for humidity [%RH]	**-20.0 ÷ 20.0**	zero point offset	**0.0** [%RH]
4: **cGH** calibration of the inclination for humidity [%RH]	**-15.0 ÷ 15.0**	sensitivity (gain)	**0.0** [%]

## 9. CONNECTING THE CONTROLLER TO A COMPUTER AND AVAILABLE SOFTWARE

It may be useful (or necessary) to connect the transducer to a computer in order to configure parameters, which also enables copying the setting to other transducers of the same type.
As a standard, the transducers are equipped with a **PR** port which enables connection to a computer using an AR956 programmer using the MODBUS-RTU communication protocol and the following transmission parameters: speed = 2400 bit/s, MODBUS address = 1.
The following application is available (on a CD supplied with the AR956 programmer or to be downloaded from the Internet at **www.apar.pl**, *"Download"* section, for operating systems Windows Vista/7/8/10):

Name	Software description
ARsoft-CFG (free)	- display of current measurement data from the connected device - setting configuration parameters, such as the measurement signal, the indication range, the options, the display, etc. - creation on the disk of a "cfg" file with the current configuration of the parameters for future use (copying of configuration) - the software requires communication with the device via the **PR** port (AR956 or AR955)

A detailed description of the aforementioned application can be found in the installation folder.
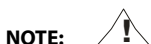
NOTE: ⚠️
Before a connection is established, make sure that the MODBUS address and the transmission speed in the options of the ARsoft software are set properly. Moreover, in the options of the ARsoft software, set the number of the COM serial port in use (in the case of the AR956/AR955 programmer it is the number assigned by the operating system during installation of the drivers).

SENSIRION
THE SENSOR COMPANY

Calibration Certification

Name and address of the manufacturer: **Sensirion AG**
Laubisruetistrasse 50
CH-8712 Switzerland

Description: Digital Humidity- and Temperature Sensors

- SHT1x
- SHT3x
- SHTC1
- STS21

- SHT2x
- SHT7x
- SHTW1
- STSC1

The above mentioned products are calibrated to meet the specifications according to the corresponding Sensirion data sheet. Each device is individually tested after its calibration.

Sensirion uses transfer standards for the calibration. These transfer standards are themselves subject to a scheduled calibration procedure. The calibration of the reference itself used for the calibration of the transfer standards is performed by an ISO/IEC 17025 accredited laboratory.

The accreditation body is full member of the International Laboratory Accreditation Cooperation (www.ilac.org). Calibration certificates issued by facilities accredited by a signatory to the ILAC Mutual Recognition Arrangement (MRA) are accepted by all signatories to the ILAC MRA.

This provides traceability of measurement to recognized national standards and to units of measurement realized at the "National Physical Laboratory" (NPL) or other recognized national standards laboratories like "Physikalisch-Technische Bundesanstalt" (PTB) or "National Institute of Standards and Technology" (NIST).

Staefa, November 2015

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