

Operating Instructions for Sensors for Humidity and Temperature

Model: AFK-A/AFK-F/AFK-T/AFK-S



We don't accept warranty and liability claims neither upon this publication nor in case of improper treatment of the described products.

The document may contain technical inaccuracies and typographical errors. The content will be revised on a regular basis. These changes will be implemented in later versions. The described products can be improved and changed at any time without prior notice.

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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The instruction manuals on our website www.kobold.com are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC machinery directive.

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition. Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:

The standard delivery includes:

- Sensor for Humidity and Temperature model: AFK-A/AFK-F/AFK-T/AFK-S

4. Regulation Use

Any use of the device, which exceeds the manufacturer's specification, may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Operating Principle

The sensors of the AFK-A and AFK-F series measure humidity by means of a humidity-dependant condenser. The capacitive humidity measuring element, produced using thinfilm technology, consists of a base plate, on which the electrodes are housed and a hygroscopic polymer layer above it. The hygroscopic polymer layer absorbs water molecules from the medium to be measured (air) or releases them, thereby altering the capacity of the condenser.

The transmitters processor uses the values of the relative humidity and the temperature to calculate the dew point temperature, the enthalpy, the mixing ratio, the absolute humidity or the wet-bulb temperature, in accordance with the laws of physics¹⁾. The values are emitted at two analogue outputs with the standardised signals 0 ... 1 VDC or 0 ... 10 VDC or 4 ... 20 mA. Further measuring ranges on request.

The sensor parts and transmitters of the AFK-F series are firmly connected. In addition, the installation of a passive temperature element is possible (e.g. Pt100). All further technical features correspond to the ones of the AFK-A series.

The scope of delivery includes the sintered high-grade steel filter AFZ-GE13. If a better dynamics should be required, we recommend to use the filter type AFZ-GE04 together with a PTFE filter which protects the humidity sensing element directly. We recommend to do so in particular at low air speeds and also its increased service life, even under more challenging operating conditions (pollutant impact or permanent humidity > 95 %rh). The use of different filters is not possible. The sensors are designed for unpressurised systems (except the ...HD, 0D, ED... version), the measurement medium is non-aggressive air.

¹⁾ The accuracy of the calculated values depends on both the operating point in accordance with the hx diagram and on the primary values measured. The hx processor operates in the range $-30\text{ °C} < T < +70\text{ °C}$, $5\text{ \% rh} < F < 95\text{ \% rh}$. Values outside this range are not calculated, the last valid value is displayed. Normal atmospheric pressure of 1013.25 mbar is used when calculating the hx values.

6. Mechanical Connection

Position

The sensor has to be installed vertically with the measuring head downwards or horizontally. Do avoid positions where water ingress can occur.

Install the sensor at a place where characteristic levels of humidity occur. The sensor tube resp. measuring head should be exposed to the flow of air. Avoid installation next to heaters, doors or on outer walls. Avoid places exposed to the sun. We recommend that you lay the connection lines in a loop so that any water that may be present can run off.

Please note the maximum permissible ambient temperature for the sensor part and transmitter when installing it. The transmitters always have to be installed in such a way that the connection plugs are not exposed to a higher temperature either ($>85^{\circ}\text{C}$).

The sensor part AFK-SK0E... is mounted with an insulation length of at least 134 mm for use at 150°C (see dimension drawing).

Not reaching the given minimum air speed can lead to measurement errors.

The tightening torque when installing the pressure-resistant sensors (type AFK-SR(S)HD...) may not exceed 25 Nm.

In order to maintain interference immunity in accordance with EN 61326 when it is in use, we recommend to use a screened cable (e.g. type 8x AWG26 C UL) for connecting the sensors, and have this fitted into the sensor's EMC heavy-gauge conduit thread by a qualified electrician.

7. Electrical Connection

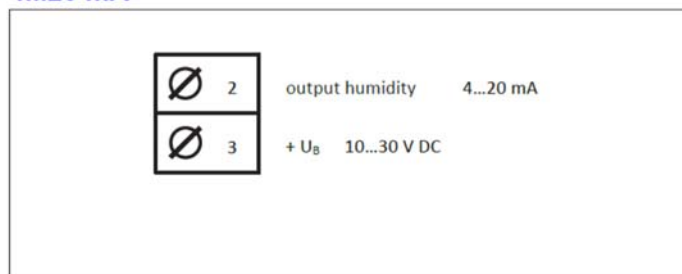
The electrical connection must be carried out by qualified personnel only.
The sensor contains sensitive electrical components. When opening the housing, make sure you comply with the electrostatic discharge precautions (ESD).
Pay attention to the load according to the operating voltage when using sensors with a current output.

Lines to and from the sensor must not be installed parallel to strong electromagnetically fields.

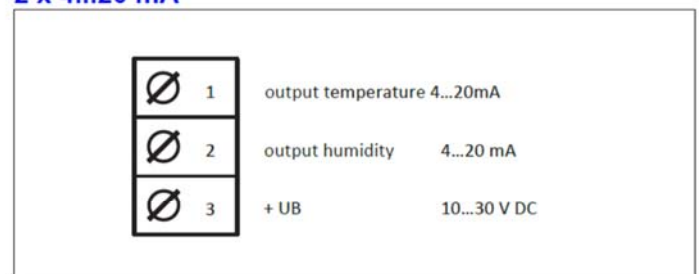
If there is any chance of an electrical surge, please install surge protection devices.

Connection diagrams

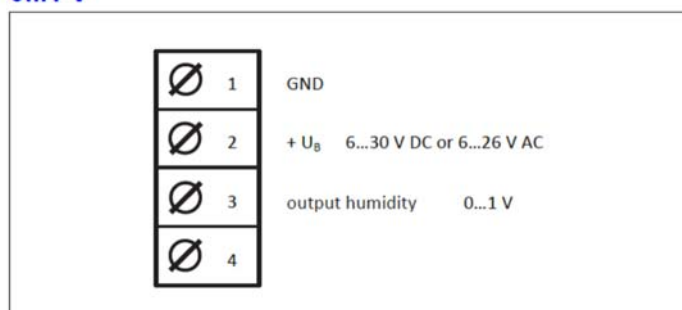
4...20 mA



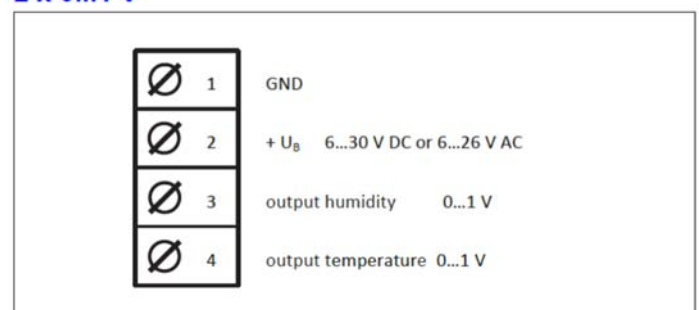
2 x 4...20 mA



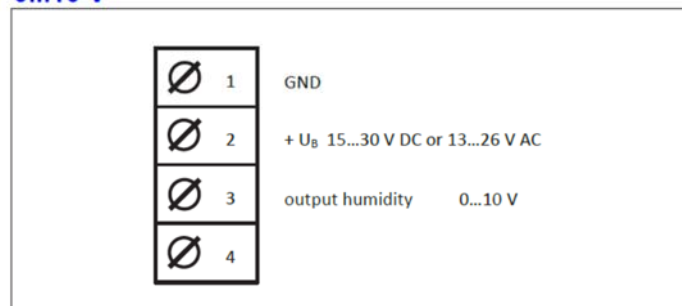
0...1 V



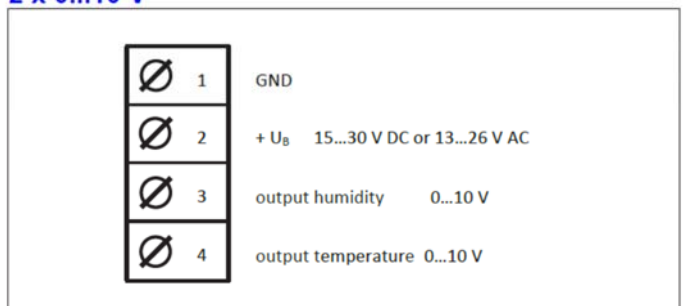
2 x 0...1 V



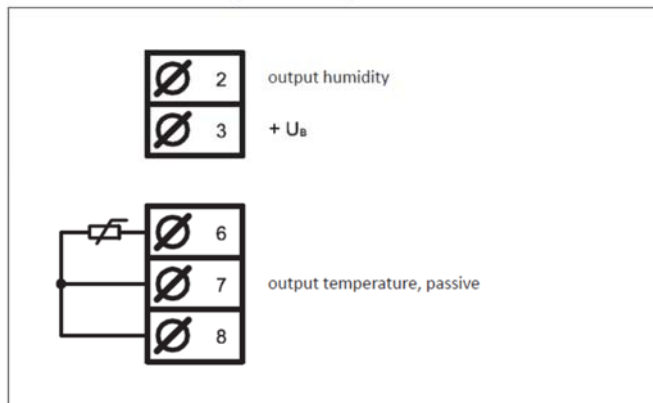
0...10 V



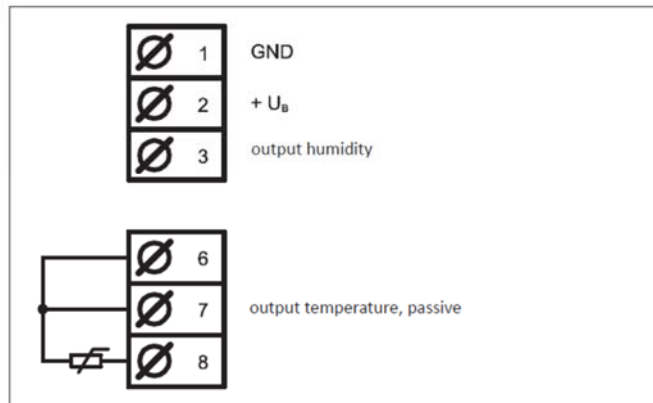
2 x 0...10 V



4...20 mA and temperature passive

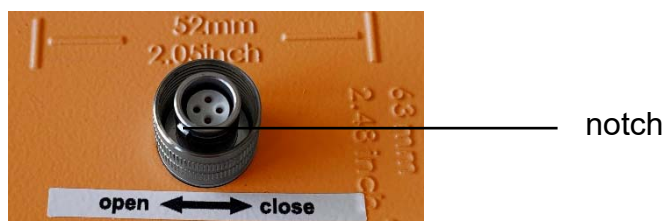


0...10(1) V and temperature passive



Electrical connection for exchangeable transmitters/sensors

Socket AFK-T



Plug connection AFK-S



Due to the notch, incorrect connection between transmitter and sensor is impossible.

8. User instructions for in situ alignment via internal keypad and LED

Humidity adjustment	1-point-adjustment (Offset)	<p>Selection of calibration mode press button DOWN for at least 3 sec. LED lights up 1 time</p> <p>1-Point-adjustment humidity mode is reached Confirmation: press button DOWN for at least 3 sec. LED lights up permanently</p> <p>For modifying of adjustment value press buttons UP / DOWN: + / - 0.1 %rh</p> <p>Confirmation: press button DOWN for at least 3 sec. The adjustment value is saved.</p> <p>Termination of adjustment mode at any time: press button UP for at least 3 sec.</p>
Humidity adjustment	2-point-adjustment (lower point, 33 %rh) with humidity standard solution 33% rh at 25 °C	<p>Selection of calibration mode press button DOWN for at least 3 sec. LED lights up 1 time press button DOWN 1 time shortly LED lights up 2 times</p> <p>2-point-adjustment 33% humidity mode is reached Confirmation: press button DOWN for at least 3 sec. LED lights up permanently</p> <p>For modifying of adjustment value press buttons UP / DOWN: + / - 0.1 %rh</p> <p>Confirmation: press button DOWN for at least 3 sec. The adjustment value is saved.</p> <p>Termination of adjustment mode at any time: press button UP for at least 3 sec.</p>
Humidity adjustment	2-point-adjustment (upper point, 75 %rh) with humidity standard solution 75% rh at 25 °C	<p>Selection of calibration mode press button DOWN for at least 3 sec. LED lights up 1 time press button DOWN 2 times shortly LED lights up 3 times</p> <p>2-point-adjustment 75% humidity mode is reached Confirmation: press button DOWN for at least 3 sec. LED lights up permanently</p> <p>For modifying of adjustment value press buttons UP / DOWN: + / - 0.1 %rh</p> <p>Confirmation: press button DOWN for at least 3 sec. The adjustment value is saved.</p> <p>Termination of adjustment mode at any time: press button UP for at least 3 sec.</p>

AFK-A/AFK-F/AFK-T/AFK-S

Temperature adjustment	1-point-adjustment	<p>A very good thermal coupling between the reference device and the measuring head are the precondition when doing temperature compensation.</p> <p>Selection of calibration mode press button DOWN for at least 3 sec. LED lights up 1 time press button DOWN 3 times shortly LED lights up 4 times</p> <p>Temperature 1-point-adjustment mode is reached Confirmation: press button DOWN for at least 3 sec. LED lights up permanently</p> <p>For modifying of adjustment value press buttons UP / DOWN: + / - 0.1°C</p> <p>Confirmation: press button DOWN for at least 3 sec. The adjustment value is saved.</p> <p>Termination of adjustment mode at any time: press button UP for at least 3 sec.</p>
Restore factory settings		<p>press buttons UP and DOWN simultaneously for more than 10 sec. All user adjustments will be reset.</p>

9. User Instructions

Dew formation

Dew formation and splashes do not damage the sensor, although measurement readings are corrupted until all moisture on and around the sensing element has dried up completely.

Cleaning of filters and protective baskets

If necessary, soiled filters and protective baskets can be screwed off and rinsed carefully. Bear in mind the sensors will not measure accurately until filters are completely dry. Please do not touch the highly sensitive sensing element.

Sensors with integrated PTFE filter can be completely and carefully cleaned with distilled water. It is not possible to exchange the PTFE filter on the humidity sensor element.

Cleaning of capacitive sensing element

Loose dust can be carefully cleaned off the humidity sensing element using distilled water or by blowing the dust carefully off. Please do not touch the highly sensitive humidity sensing element in the process.

Damaging influences

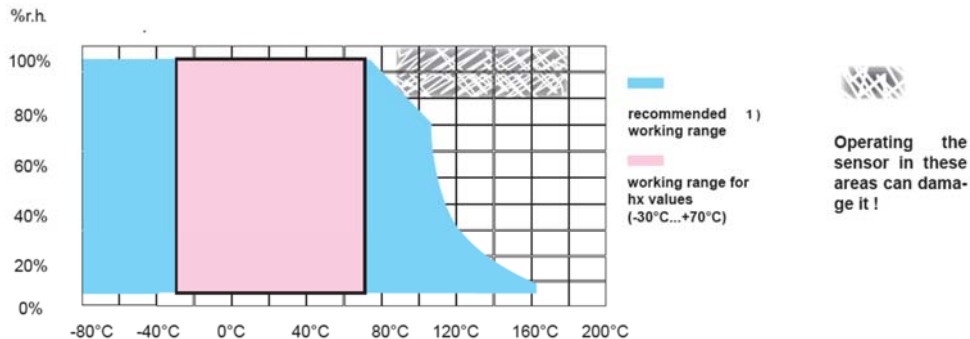
Depending on their type and concentration, aggressive media containing solvents can cause incorrect readings or cause the sensor to fail.

Substances deposited on the sensor element (e. g. resin aerosols, paint aerosols, smoke deposits etc.) are harmful as they eventually form a water-repellent film.

In order to check functioning in the place of installation, we recommend that you use **humidity standard...** (accessories).

To ensure the given accuracy of the sensors, we recommend a calibration cycle of 6-12 months.

10. Working range for humidity and temperature



11. Technical Information

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

12. Order Codes

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

13. Dimensions

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

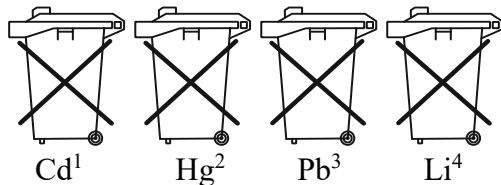
14. Disposal

Note!

- Avoid environmental damage caused by media-contaminated parts
- Dispose of the device and packaging in an environmentally friendly manner
- Comply with applicable national and international disposal regulations and environmental regulations.

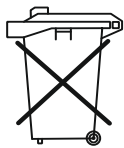
Batteries

Batteries containing pollutants are marked with a sign consisting of a crossed-out garbage can and the chemical symbol (Cd, Hg, Li or Pb) of the heavy metal that is decisive for the classification as containing pollutants:



1. „Cd" stands for cadmium
2. „Hg" stands for mercury
3. „Pb" stands for lead
4. „Li" stands for lithium

Electrical and electronic equipment



15. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Sensor for Humidity and Temperature model: AFK-A/AFK-F/AFK-T/AFK-S

to which this declaration relates is in conformity with the standards noted below:

EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

EN 61326-2-3:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning

EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also, the following EC guidelines are fulfilled:

2014/30/EU
2011/65/EU
2015/863/EU

EMC Directive
RoHS (category 9)
Delegated Directive (RoHS III)

Hofheim, 26 May 2023



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