

# HUMIDITY

## ALMEMO® D6

### Digital temperature / humidity sensors FHAD 46x with ALMEMO® D6 plug



FHAD 46-1

#### Common technical features FHAD 46x

- ▶ Digital capacitive humidity sensor with integrated signal processor
- ▶ All sensor characteristics and adjustment data are stored in the humidity sensor element itself.
- ▶ Humidity sensor element, plug-in. Replacement elements are inexpensive. A replacement can be fitted quickly and easily on site by virtually anyone. It will be fully accurate and need no special adjustment.
- ▶ **new:** Humidity calculation on the basis of formulae as per Dr. Sonntag and enhancement factor as per W. Bögel (correction factor  $fw(t,p)$  for real mixed gas systems). This substantially widens the measuring range and improves the accuracy of humidity variable calculations.
- ▶ **new:** Humidity variable Absolute humidity in  $g/m^3$
- ▶ The humidity variables are calculated from the primary measuring channels (real measurable variables). (depending on sensor type) (see "Technical features")
- ▶ Freely selectable measurable variables  
Four measuring channels are programmed (at our factory). (depending on sensor type) (see "Technical features")  
Various humidity variables can be selected.  
Temperature ( $^{\circ}C$ ,  $T,t$ ), Relative humidity ( $\%H$ ,  $RH$ ,  $Uw$ ),  
Dew point ( $^{\circ}C$ ,  $DT$ ,  $td$ ), Mixture ( $g/kg$ ,  $MH$ ,  $r$ ), Absolute humidity ( $g/m^3$ ,  $AH$ ,  $dv$ ), Vapor pressure ( $mbar$ ,  $VP$ ,  $e$ ),  
Enthalpy ( $kJ/kg$ ,  $En$ ,  $h$ )  
This device can be configured on a PC using USB adapter cable ZA 1919 AKUV.  
(see "General accessories for ALMEMO® D6 sensors").

Other designs are available on request:

Sensor with PTFE filter cap FHAD 46-3  
Water-proof sensor  
Sensor plug connection IP67



### Digital temperature / humidity sensor FHAD 46-4AG in protective all-weather housing with integrated atmospheric pressure sensor in terminal box, cable length up to 100 meters with ALMEMO® D6 plug



#### Common technical data FHAD 46x :

Digital temperature / humidity sensor (including A/D converter)  
Operative range depending on sensor type

##### Humidity

Measuring range	0 to 100 % RH
Sensor	CMOSens® technology
Accuracy	$\pm 1.8$ % RH in the range 10 to 90 % RH at nominal temperature
Hysteresis	typical $\pm 1$ % RH
Nominal temperature	+25 $^{\circ}C$
Sensor operating press.	Atmospheric pressure
Response time T63	typical 8 seconds at 25 $^{\circ}C$ and 1 m/s (without filter)

##### Temperature

Sensor	CMOSens® technology
Accuracy	$\pm 0.3$ K at +25 $^{\circ}C$ $\pm 0.4$ K at +10 to +40 $^{\circ}C$ $\pm 1.3$ K at -20 to +80 $^{\circ}C$
Reproducibility	typical $\pm 0.1$ K
Response time T63	typical 20 seconds (without filter)

#### ALMEMO® connecting cable

PVC, For lengths, see variants with ALMEMO® D6 plug

#### ALMEMO® D6 plug

Refresh rate	2 seconds for all four channels
Supply voltage	6 to 13 VDC
Current consumption	12 mA

#### General features and accessories, ALMEMO® D6 sensors: see ALMEMO® D6 overview

## Digital temperature / humidity sensor FHAD 46-4x variant in stainless steel with filter cap with ALMEMO® D6 plug with integrated atmospheric pressure sensor, for automatic pressure compensation



### Technical features

- **new:** Automatic atmospheric pressure compensation is provided for pressure-dependent humidity variables by means of a digital atmospheric pressure sensor integrated in the ALMEMO® D6 plug itself.
- All relevant ambient parameters are measured with one sensor.
- The humidity variables are calculated from the three primary measuring channels (real measurable variables).  
Temperature, Relative humidity, Atmospheric pressure,
- Four measuring channels are programmed (at our factory).  
Temperature (°C, T, t), Relative humidity (%H, RH, Uw), Dew point (°C, DT, td), Atmospheric pressure (mbar, AP, p)

### Technical data

Operative range	-20 to +80 °C / 5 to 98 % RH
<b>Mechanical design</b>	
Sensor tube	Stainless steel, diameter 12 mm (for available lengths see variants)
Filter cap	Metal-mesh filter, SK7
Screw-fit cable gland	Splash-protected
<b>Digital atmospheric pressure sensor</b> (integrated in ALMEMO® D6 plug)	
Measuring range	700 to 1100 mbar
Accuracy	±2.5 mbar (at 0 to +65 °C)

General description and common technical data FHAD 46x  
see page 09.24

### Variants including manufacturer's test certificate:

Digital temperature / humidity sensor, with filter cap, stainless steel tube, fitted cable and ALMEMO® D6 plug, and integrated digital atmospheric pressure sensor.

Sensor length 160 mm, Connecting cable Length 2 meters  
Sensor length 160 mm, Connecting cable Length 5 meters  
Sensor length 160 mm, Connecting cable Length 10 meters  
Sensor length 270 mm, Connecting cable Length 2 meters  
Sensor length 270 mm, Connecting cable Length 5 meters  
Sensor length 270 mm, Connecting cable Length 10 meters  
Sensor length 530 mm, Connecting cable Length 2 meters  
Sensor length 530 mm, Connecting cable Length 5 meters  
Sensor length 530 mm, Connecting cable Length 10 meters  
Replacement sensor element, digital, adjusted, plug-in

**Order no. FHAD4641**  
**Order no. FHAD4641L05**  
**Order no. FHAD4641L10**  
**Order no. FHAD4642**  
**Order no. FHAD4642L05**  
**Order no. FHAD4642L10**  
**Order no. FHAD4643**  
**Order no. FHAD4643L05**  
**Order no. FHAD4643L10**  
**Order no. FH0D46**

### Filter caps

Dimensions  
Diameter 12 mm  
Length approx. 33 mm



SK7



SK6

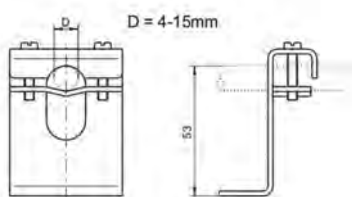


SK8

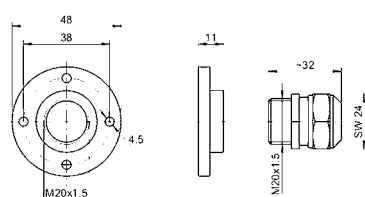
	Designation	Pore-size	Max. temp.	Typical Application	Order no.
SK7	Metal-mesh filter in PC-housing	100 µm	120°C	Universal, for medium, contamination, also high humidity	<b>ZB9600SK7</b>
SK6	PTFE-Sinterfilter	50 µm	180°C	High chemical resistance	<b>ZB9600SK6</b>
SK8	Stainless steel sinter filter	10 µm	180°C	For severe mechanical stress, heavy contamination, strong air flow	<b>ZB9600SK8</b>

\* Sensor Application Note

### Accessories



Brackets for wall mounting,  
distance from wall approx. 40 mm  
Order no. : ZB9600W



Movable brass screw connection with plastic sealing ring for  
sensor tube Ø 12 mm  
Connecting flange for screw connection, pitch circle  
diameter 38 mm  
Order no. ZB9600KV20  
Order no. ZB9600F20

03/2012 We reserve the right to make technical changes.

# HUMIDITY

## ALMEMO® D6

### Digital temperature / humidity sensor FHAD 46-2 Version in plastic, with slotted sensor cap, with ALMEMO® D6 plug



FHAD462

Sensor element enclosed in slotted sensor cover, compact design, short response time



FHAD462 Option with plug-in extension tube



FHAD462L00

#### Technical features

- The humidity variables are calculated from the two primary measuring channels (real measurable variables).  
Temperature, Relative humidity
- Four measuring channels are programmed (at our factory).  
Temperature (°C, T,t), Relative humidity (%H, RH, Uw),  
Dew point (°C, DT, td), Mixture (g/kg, MH, r).

Other designs are available on request:

Sensor with terminal box FHD 462 KL

Terminal box with plug-in digital temperature / humidity sensor, cable lengths up to 100 meters

#### Technical data

Operative range -20 to +60 °C / 5 to 98 % RH

#### Mechanical design

Sensor cap Ø 8 mm, length 36 mm  
Plug connection Ø approx. 9 mm, IP40  
Extension tube Ø 8 mm, length 97 mm

General description and common technical data FHAD 46x  
see page 09.24

#### Variants including manufacturer's test certificate:

Digital temperature / humidity sensor, in slotted sensor cap, plug-in, including ALMEMO® connecting cable with coupling and ALMEMO® D6 plug.

Connecting cable, length 2 meters **Order no. FHAD462**

Connecting cable, length 5 meters **Order no. FHAD462L05**

Connecting cable, length 10 meters **Order no. FHAD462L10**

Cable stub, length (including sensor cap) approx. 80 mm **Order no. FHAD462L00**

Replacement sensor, digital, in slotted sensor cap, adjusted **Order no. FH0D462**

Extension tube, Ø 8 mm, length 97 mm, plug-in, for FHAD462 **Order no. ZB0D462VR**



### Digital temperature / humidity sensor FHAD 46-0 uncovered sensor element with ALMEMO® D6 plug.



FHAD460

Uncovered sensor element: smallest design, short response time



FHAD460 with option W Sensor terminals protected against damp

#### Technical features

- The humidity variables are calculated from the two primary measuring channels (real measurable variables).  
Temperature, Relative humidity
- Four measuring channels are programmed (at our factory).  
Temperature (°C, T,t), Relative humidity (%H, RH, Uw),  
Dew point (°C, DT, td), Mixture (g/kg, MH, r).

#### Technical data

Operative range -20 to +80 °C / 5 to 98 % RH

#### Mechanical design

Sensor element (dimensions over all) approx. 6 x 14 x 3 mm  
Plug connection Width approx. 7 mm  
New Option W Each sensor connection is protected against damp by means of silicone and a shrink-fit sleeve. (Sensor element no longer pluggable)  
Width approx. 8 mm.

General description and common technical data FHAD 46x  
see page 09.24

#### Variants including manufacturer's test certificate:

Digital temperature / humidity sensor element, uncovered, plug-in, including ALMEMO® connecting cable with coupling and ALMEMO® D6 plug.

Connecting cable, length 2 meters **Order no. FHAD460**

Connecting cable, length 5 meters **Order no. FHAD460L05**

Connecting cable, length 10 meters **Order no. FHAD460L10**

Replacement sensor element, digital, adjusted, plug-in **Order no. FH0D460**

**new:** option W: Each sensor connection is protected against damp (sensor element no longer pluggable) **Order no. 0AD9460W**

### ALMEMO® D6 overview

#### ALMEMO® D6 sensor - with outstanding features

- ▶ This digital ALMEMO® D6 sensor can be connected to any ALMEMO® measuring instrument without in any way affecting its measuring accuracy. The measuring accuracy of the whole system is determined exclusively by the A/D converter incorporated in the ALMEMO® D6 sensor.
- ▶ This digital ALMEMO® D6 sensor is calibrated without involving the ALMEMO® measuring instrument (DKD / factory) and can be replaced or exchanged as and when convenient.
- ▶ The connecting cable for this digital ALMEMO® D6 sensor can be extended using pluggable extension cables quickly and easily and without any line losses. (see "General accessories for ALMEMO® D6 sensors") These digital extension cables have no effect on measuring accuracy and offer high transmission reliability.
- ▶ The digital ALMEMO® D6 sensor can - via USB - be connected directly to a PC or - via Ethernet - incorporated in an ALMEMO® network. Measured values can be processed directly using the WinControl software package.
- ▶ These digital ALMEMO® D6 sensors can be configured (e.g. measuring range selection) directly on the PC using USB adapter cable ZA1919AKUV. (see "General accessories for ALMEMO® D6 sensors")

#### General accessories

ALMEMO® extension cable, length 2 meters

Order no. ZA9060VK2

ALMEMO® extension cable, length 4 meters

Order no. ZA9060VK4

ALMEMO® extension cable, length 10 meters (For other lengths up to 100 meters, see page XREF)

Order no. ZA9090VKC10

ALMEMO® USB adapter cable, length 1.5 meters

For connecting an ALMEMO® D6 sensor directly to the USB port on a PC (power supply via USB)

Order no. ZA1919AKUV

ALMEMO® Ethernet adapter cable, total length 3 meters

For connecting an ALMEMO® D6 sensor directly to an Ethernet PC network, including mains unit

Order no. ZA5045AKFBV

#### Digital temperature / atmospheric humidity sensor

FHAD 46-0 and FHAD 46-2, with ALMEMO® D6 plug



Measuring ranges: Temperature, relative humidity, dew point, absolute humidity, mixture, enthalpy, vapor pressure

#### Digital thermoanemometer

FVAD 35 THx with ALMEMO® D6 plug,

**new:** With integrated atmospheric pressure sensor, for automatic pressure compensation



Measuring ranges: Temperature, air flow, atmospheric pressure

#### High-precision digital temperature / atmospheric humidity sensor

FHAD 36 Rx, with ALMEMO® D6 plug,

**new:** With integrated atmospheric pressure sensor, for automatic pressure compensation



Measuring ranges: Temperature, relative humidity, atmospheric pressure, dew point, absolute humidity, mixture, enthalpy, vapor pressure

#### Digital atmospheric pressure sensor

FDAD 12 SA, for barometric pressure with ALMEMO® D6 plug



Measuring ranges: Barometric pressure

#### Digital psychrometer

FNAD 46-3 with ALMEMO® D6 plug,

**new:** With integrated atmospheric pressure sensor, for automatic pressure compensation



Measuring ranges: Dry temperature, humid temperature, relative humidity, atmospheric pressure, dew point, absolute humidity, mixture, enthalpy, vapor pressure

#### Digital heat flow plate

FQADx, with ALMEMO® D6 plug

**new:** With integrated temperature sensor for automatically correcting the heat flow plate's temperature coefficient



Measuring ranges: Plate's mean temperature, heat flow