D Series
Sensors for
Humidity and Temperature Measurement
With calibrated dModul

Type DW
Industrial version for wall mounting
Optional display

- **dynamic MELA® humidity sensing element**
- **output of all hx values**
- **calibrated dModul for humidity and temperature measurement**
- **in situ alignment**
- **easy to install**
- **operating temperatures up to 80°C**

The core part of the D Series is the digital calibrated dModul, which processes the measurement values of relative humidity and temperature individually. The values are compared to the calibration values stored in the dModul and communicated digitally to the transmitter electronics, where they are processed to standardised current and voltage signals.

The housings of the industrial versions provide protection in accordance with IP 65. Only a single screw is required to close it securely.

Technical data

Humidity

measuring range	0...100 %RH
measuring element	capacitive FE09
measuring accuracy	
10...90 %RH at 10...40°C	±2 %RH
< 10 %RH or > 90 %RH at 10...40°C	±2,5 %RH
influence of temperature <10°C or >40°C	±0,05 %RH/K

Temperature

measuring element	Pt1000 1/3 DIN
measuring ranges (ouputs)	0...+50°C
	-30...+70°C
	0...+100°C
	further ranges
	on request
measuring accuracy	
Sensors with active temperature signal	
Sensors with voltage output at 10...40°C	±0,2 K
Sensors with current output at 10...40°C	±0,3 K
influence of temperature <10°C or >40°C	±0,01 K/K

Electrical data

outputs	0...1 V DC
	0...10 V DC
	4...20 mA
	passive temperature
	outputs on request
voltage supply	see type survey
consumption of electronics (voltage output)	typ. 7 mA
Load R_L (current output)	$R_L(\Omega) = \dfrac{\text{voltage supply - 10 V}}{0{,}02\,A} \pm 50\ \Omega$
min. load resistance (voltage output)	≥10 kΩ
electromagnetic compatibility	ref. EN 61326-1 and EN 61326-2-3

General data

|	
measuring medium	air, pressureless, non-aggressive

max. air speed
    protective cage w. membrane
    (basic equipment)
	10 m/s

min. air speed	≥ 0,5 m/s
operating temperatures	-30...+80°C
storage temperatures	-40...+85°C

connection
    wire diameter per connector
    total diameter cable
	connecting terminals
	max. 1,5 mm²
	4-8 mm

degree of protection / measuring head
    protective cage w. membrane
    (basic equipment)
    PTFE sinterd filter (optional)
	
	IP 30
	
	IP 54

degree of protection / housing	IP 65
material of housing	PC

Options

display	2 lines 3 digits + 1 decimal place display approx. 21 x 40 mm² digit height approx. 8 mm

hx Values, selectable for two outputs

relative humidity	0...100 %RH
temperature	-30...+70°C 0...100°C 0...50°C further ranges on request
dew point temperature	-20...70°C
enthalpy	0...80 kJ/kg
mixing ratio	0...100 g vapour /kg dry air
absolute humidity	0...20 g/m³ or 0...100 g/m³
wet-bulb temperature	-10...50°C

Load at current output
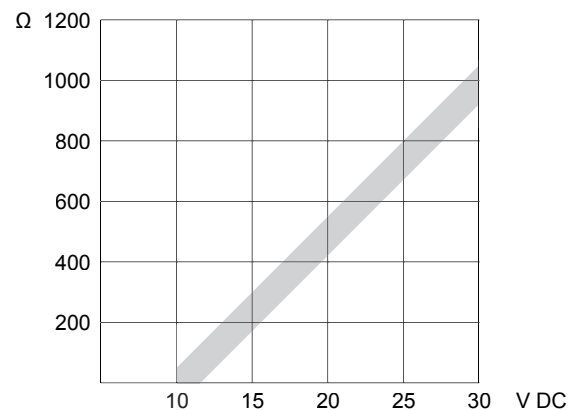
Type survey DWF
Humidity sensor

| Type	Housing for wall mounting	hx Value	Measuring range	Electrical outputs	Voltage supply U_B
DWF	optional display	relative humidity	0…100 %RH	0…1 V DC	6…30 V DC 6...26 V AC
				0...10 V DC	15…30 V DC 13...26 V AC
				4...20 mA	10…30 V DC

Type survey DWK
Humidity and temperature sensor

Type	Housing for wall mounting	hx Values selectable for 2 outputs	Measuring range (standard)	Electrical outputs	Voltage supply U_B
DWK	optional display	relative humidity	0…100 %RH	0…1 V DC	6…30 V DC 6...26 V AC
		temperature	-30…+70°C 0…+100°C 0…+50°C		
		dew point temperature	-20…70°C	0...10 V DC	15…30 V DC 13...26 V AC
		enthalpy	0…80 kJ/kg		
		mixing ratio	0…100 g vapour /kg dry air		
		absolute humidity	0…20 g/m³ 0…100 g/m³	4...20 mA	10…30 V DC
		wet-bulb temperature	-10…+50°C		

Accessories

| Product n°	Description
ZE05	sintered filter made of fine-pored PTFE, IP 54
ZE 31/1-12 ZE 31/1-75	humidity standard to check the accuracy of the sensor at 12 %RH humidity standard to check the accuracy of the sensor at 75 %RH
ZE 31/1-33 ZE 31/1-84	humidity standard to check the accuracy of the sensor at 33 %RH humidity standard to check the accuracy of the sensor at 84 %RH
0400989	testing adapter for sensor tubes Ø 12 mm

Dimensions

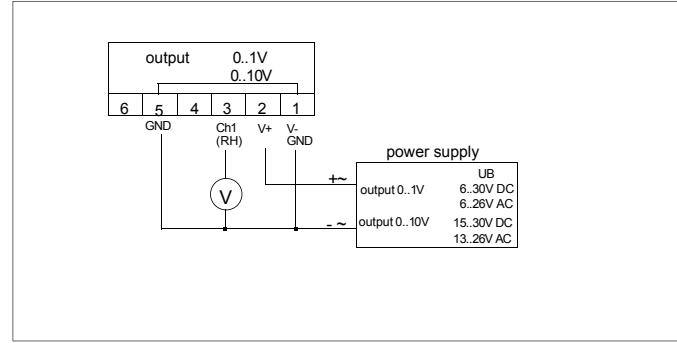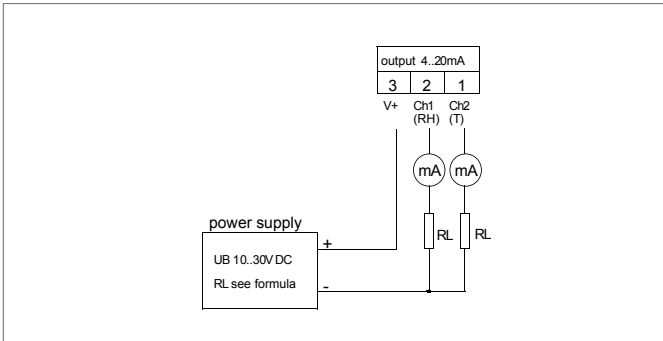The hole pattern of the sensor is located on the packaging.
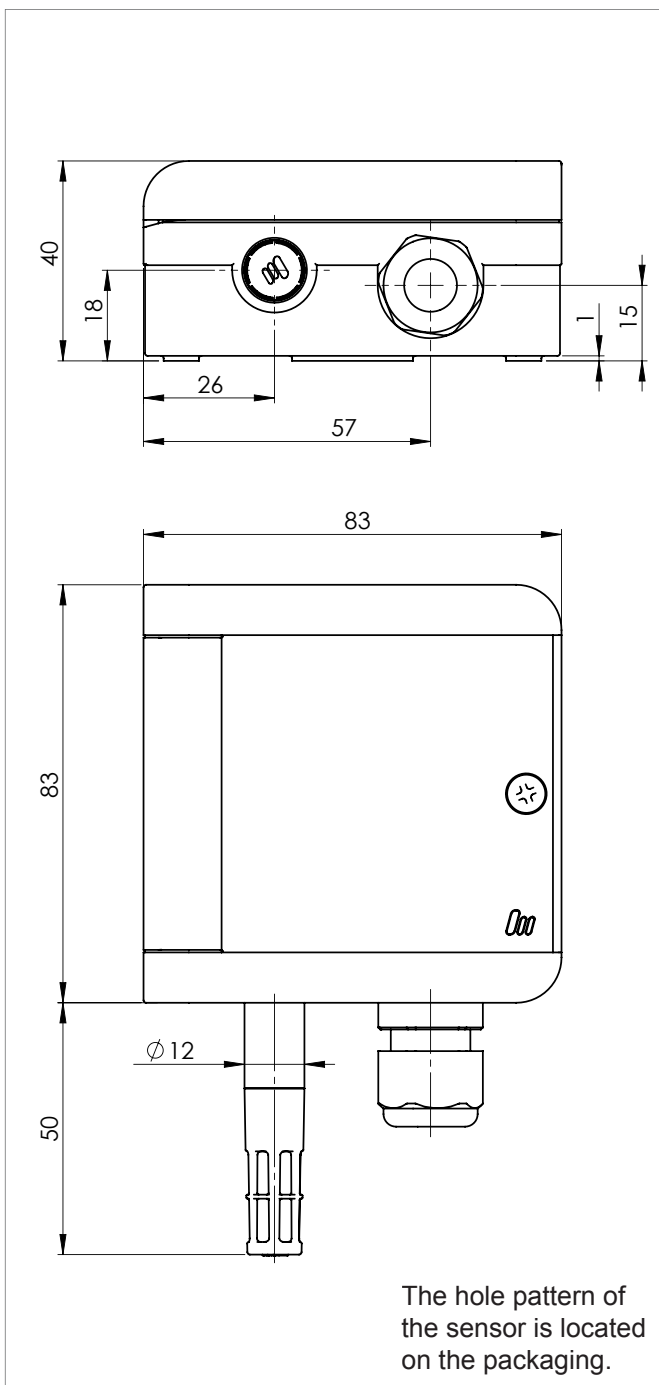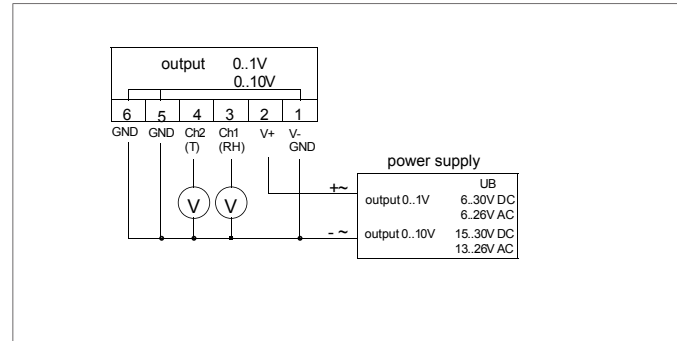
Connection diagrams

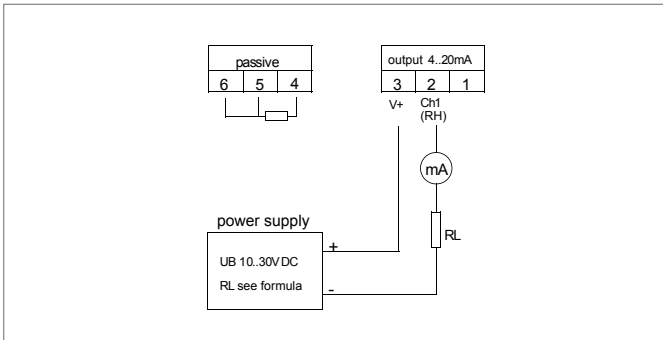## DWF 4...20 mA
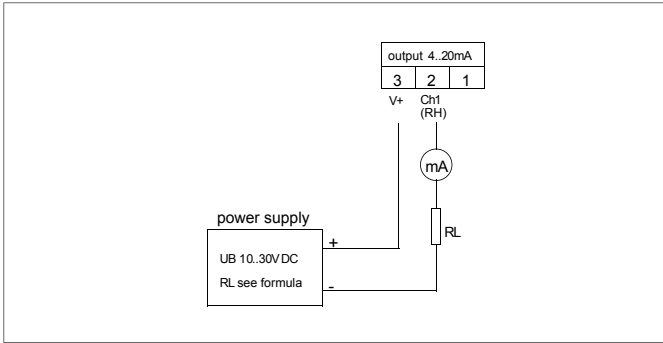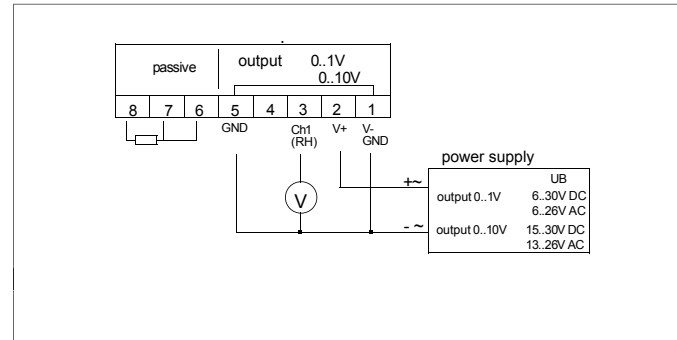

DWF 0...1 V DC or 0...10 V DC

DWK 2 x 4...20 mA

DWK 2 x 0...1 V DC or 0...10 V DC

DWC humidity: 4...20mA
temperature: passive

DWC humidity: 0...1 V DC or 0...10 V DC
temperature: passive

ESD protection advice

The sensors of the D Series contain components, which can be damaged by the effects of electrical fields or by charge equa-listion when touched.
The following protective measures must be taken when the housing of the sensor is to be opened for connection or in situ alignment:

- Before opening the housing of the sensor, ensure electrical potential equalisation between you and your environment.
- Pay particular attention to ensure that this potential equalisation is maintained while you are working with the opened housing.

In situ alignment

During the in situ alignment the sensor does not necessarily have to be taken out of the control circuit.

We offer humidity standards for alignment of the sensors (page 3: accessories).
Before calibrating the sensor, standards should remain at least 2 hours on the sensors.
The temperature must remain constant during this time. For the correct temperature according to the humidity standard used, please refer to data sheet F5.2 Humidity Standards.
During calibration temperature and humidity must remain constant.

During calibration, especially during storage of data, uninterrupted power supply of the sensor must be provided.

During calibration the following measurement ranges are shown on the display/ are used for calibration:

CH 1:   all sensors   always: relative humidity, measuring range 0...100 % RH

CH 2:   sensors
                  with relative humidity RH output (CH1)
                  and temperature °C output (CH2)
                                                              the programmed temperature range, unaltered
                  sensors
                  with other hx-values outputs
                                                              the standard temperature measuring range of -40...85°C

The accuracies shown in the technical data of this data sheet refer exclusively to works calibration.

Command		Operation	Transmitter / LED
default attention: all user adjustments will be reset.	possible only when adjustment mode is off. (LED must not be lit.)	press buttons UP and DOWN simultaneously for at least 8 sec.	until LED lights up for 1 sec.
calibration mode		press button DOWN for at least 3 sec.	until LED blinks 1 time per second
selection of **type of calibration**	humidity 1-point-adjustment (offset)	no further command necessary	LED blinks 1 time per second.
	humidity 2-point-adjustment lower point at 12 %RH and 20...30°C humdity standard ZE31/1-12	press button DOWN 1 time shortly	LED blinks twice per second.
	humidity 2-point-adjustment upper point at 75 %RH and 20...30°C humdity standard ZE31/1-75	press button DOWN twice shortly	LED blinks 3 times per second.
	temperature 1-point-adjustment	press button DOWN 3 times shortly	LED blinks 4 times per second.
adjustment		buttons UP / DOWN: (press shortly) +/- 0,1 %RH respectively +/- 0,1°C per keystroke	
saving		press button DOWN for at least 3 sec.	until LED is off
program termination **(at any time)**		press button UP for at least 3 sec.	until LED blinks 6 times and then switches off.

Mounting instructions

Position	Install the sensor at a place where characteristic levels of humidity occur. The measuring chamber should be located in streaming air. Avoid installation next to heaters, doors or on outer walls. Avoid places exposed to the sun.
	Do not position the sensor where ingress of water could occur.
	To close the housing securely turn screw until dead stop.
	We recommend that you lay the connection lines in a loop so that any water that may be present can run off.
	Not reaching the given minimum air speed can lead to measurement errors.
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).
	Please pay attention to the ohmic resistance according to the operating voltage (see diagram on page 2) when using sensors with a current output. Else measurement errors may occur.
	Lines to and from the sensor must not be installed parallel to strong electromagnetical fields.
	If there is any chance of an electrical surge, please install surge protection devices.

User instruction

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 can be screwed off and rinsed carefully. Bear in mind the sensors wil not measure accurately until filters are completely dry. Please do not touch the highly sensitive humidity sensing element. Please ensure that the temperature sensing element does not touch the sensitive surface of the humidity sensing element.
Cleaning of the capacitive humidity 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. Please ensure that the temperature sensing element does not touch the sensitive surface of the humidity sensing element.
Damaging influences	Depending on type and concentration, agents that are corrosive and contain solvents, can result in faulty measurements and can cause the sensor to break down. Substances deposited on the sensor (e. g. resin aerosols, lacuer aerosols, smoke deposits etc.) are damaging as they eventually form a water-repellent film.

This information is based on current knowledge and is intended to provide details of our products and their possible applications. It does not, therefore, act as a guarantee of specific properties of the products described or of their suitability for a particular application. It is our experience that the equipment may be used across a broad spectrum of applications under the most varied conditions and loads. We cannot appraise every individual case. Purchasers and/or users are responsible for checking the equipment for suitability for any particular application. Any existing industrial rights of protection must be observed. The quality of our products is guaranteed under our General Conditions of Sale. Data sheet DW_EN. Issue: April 2011. Subject to modifications.

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