Driesen + Kern GmbH

User Manual

DKRF770 Series





FITTING PROBES

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1 Safety instructions

This manual describes the installation and operation of the **DKRF77x** device series. If you encounter problems with the operation or installation of the devices, please first try to resolve them with the help of this manual (see **Chapter 6**).

If you have questions that are not covered in this manual, or if you discover faults in your device, please refer to **Chapter 6.2** for information on how to contact Driesen + Kern for support.

Safety instructions for this manual:



Stop! Very important safety instructions, failure to comply with which may result in danger to your health and damage to the measuring device.



Caution! Warning about installation and configuration errors as well as incorrect operation, which could lead to data loss or malfunctions.



Information Notes on the optimal configuration and use of the measuring device as well as background information on avoiding measurement errors.

2 Introduction

The **DKRF77x** transmitter series consists of four models.



◄ DKRF771
Wall-mounted transmitter with rigid probe tube and sintered filter.



◄ DKRF772
Transmitter for duct mounting.



◄ DKRF773
For direct process integration up to +80 °C or even up to max. +120 °C. Several probe designs are available for this purpose.
See **Chapter 3.3** for more information.



◄ DKRF774
Pressure-resistant probe design.



◄ DKRF77x mit LCD
Version with integrated display (optional),
two-wire versions without background lighting

2.1 Areas of application and limitations

Note on humidity measurement:

When measuring humidity, and especially when calibrating humidity meters, it is essential that the temperature between the humidity sensor and the environment is balanced. Only when this balance is achieved will the sensor deliver maximum accuracy.

A small temperature difference of only ±1°C at ambient conditions of 20°C and 50 % RH can cause a measurement error of ±3 % RH. At an ambient humidity of 90 % RH, the error is as high as ±5.4 % RH.

Limitations of use:

A number of factors can make it difficult to measure relative humidity. The following information is intended to help extend the service life of the sensor and increase the accuracy of the measurement. If in doubt, please do not hesitate to contact us for further advice.

2.1.1 Chemicals

The transmitters operate on the basis of a capacitive humidity sensor using **CMOSens** technology. This technology, together with a number of other protective measures, makes the sensor highly resistant to contamination. Nevertheless, chemicals, **especially cleaning agents, solvents, and acids**, can influence the measurement or even **destroy the sensor**.

Please note that these may only occur at higher temperatures or may only reach an elevated and harmful concentration after a longer period of time due to outgassing. Whether and how measurements can be taken at such locations, possibly with the aid of filters or bypasses, must be examined on a case-by-case basis. For use in H2O2 environments, a transmitter from the **DKRF78x** series, for example, can be considered.

2.1.2 Humidity and temperature operating range

The sensor may generally be used in the **humidity range** 0...100 % RH, but not in the presence of condensation; for further information, see **Chapter 2.1.3**.



The **operating temperature range** is limited by the electronics, the sensor cable, the sensor itself, and the materials used; it is specified for each individual model and **must not be exceeded**. Integrated transmitters that are located in the same probe as the sensor usually have a temperature range of **-40 to +80°C**; transmitters with a **remote (external) sensor head** usually have a temperature range **of -40 to +120°C**.

2.1.3 High humidity



Under conditions with very high operating humidity, a temperature difference of just a few degrees Celsius can cause condensation to form on the sensor. Brief condensation is not a problem for the sensor. **However, the sensor must not be permanently or regularly exposed to condensation for hours on end, as this will lead to corrosion of the sensor and its conductor tracks**. If this happens accidentally, the sensor should be dried as quickly as possible in a heated and ventilated room; any filter that has been inserted should be temporarily removed for this purpose.

In the event of occasional brief condensation with pure water, the sensor will function properly again once the condensation has dried. **However, if the condensation is contaminated with pollutants (e.g., acidifiers, solvents), this may shorten the sensor's service life and lead to irreversible drift in the measured values, or even to the destruction described in Chapter 2.1.1.**

In very high humidity conditions, the use of a special high-humidity sensor (e.g., the DKRF676) is recommended, as it has a special sensor heater that prevents condensation from forming on the sensor head. It also ensures that the sensor dries more quickly after being wetted with water.

2.1.4 High humidity and high temperature

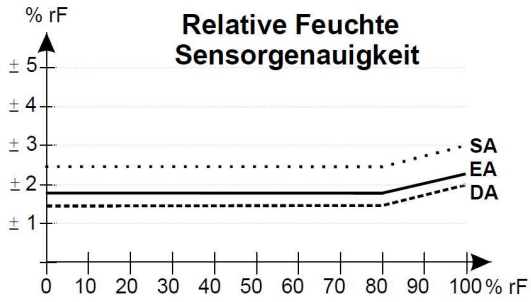
The sensor performs best within the recommended temperature and humidity range of 5°C to 60°C and 20% RH to 80% RH. Prolonged exposure outside the recommended normal range, especially at high relative humidity, can temporarily affect the RH signal (e.g., +3%

RH after 60 hours at >80% RH). After returning to the recommended temperature and humidity range, the sensor recovers automatically and meets the specifications. Prolonged use under extreme conditions can accelerate aging.

For use in high humidity and high temperature ranges, we strongly recommend using a suitable transmitter (e.g., the DKRF676). These are optimized for this purpose and offer mechanisms to suppress possible condensation.

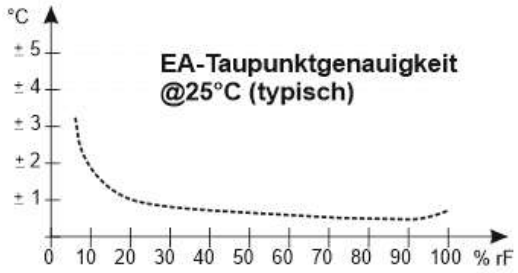
2.1.5 Low humidity

The measurement accuracy of the humidity sensor remains constant down to the lower humidity range.



However, this causes the relative error (relative to the actual measured value) to increase enormously at low measured values, which also reduces the accuracy of the dew point measurement.

Achievable dew point accuracies:



You measure at 50% RH. At this point, the sensor has an error of ±1.8% RH. This results in a relative error of 1.8/50 = 3.6%.

Now you measure at 5% RH. At this point, the sensor has an error of approx. ±2.5% RH. This results in a relative error of 50%.

This means that the dew point calculation becomes quite inaccurate at low humidity levels. If you want to measure very low values with a relative humidity sensor, you can measure in a bypass, for example.

2.1.6 Adjustments for critical environments

The following measures can improve the environmental conditions for the sensor:

1. If possible, mount the probe with the sensor head facing downwards so that any condensation that has penetrated can drip away from the sensor.
2. Install a bypass where conditions are more controllable; if necessary, convert to absolute humidity or dew point (separate temperature measurement may be required)!

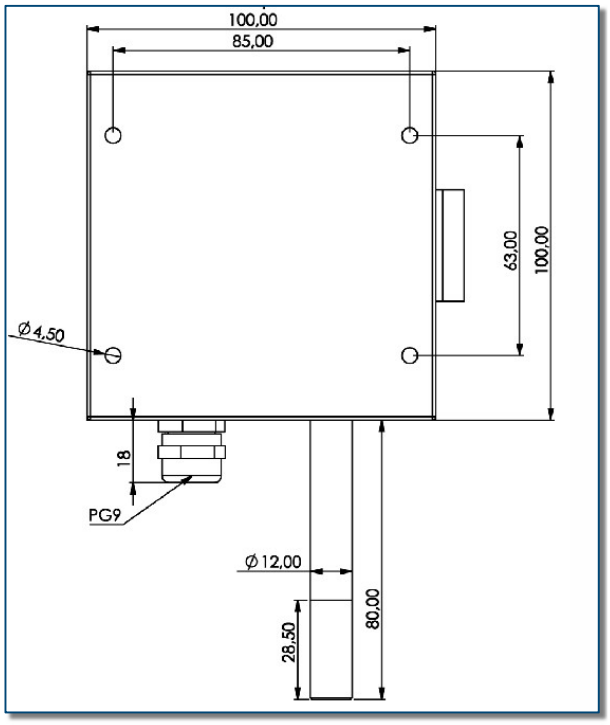
3. Install a baffle plate or immersion tube to prevent direct wetting of the sensor and to shield it from any pollutants present in the air flow!
4. If necessary, remove the sensor filter permanently so that the sensor can dry more quickly after brief condensation; please note that drying the sensor in unventilated measuring locations can take up to several hours under certain circumstances! Without the filter, the sensor is no longer protected from dust or droplets, so this option should only be used in relatively clean air.

3 Hardware

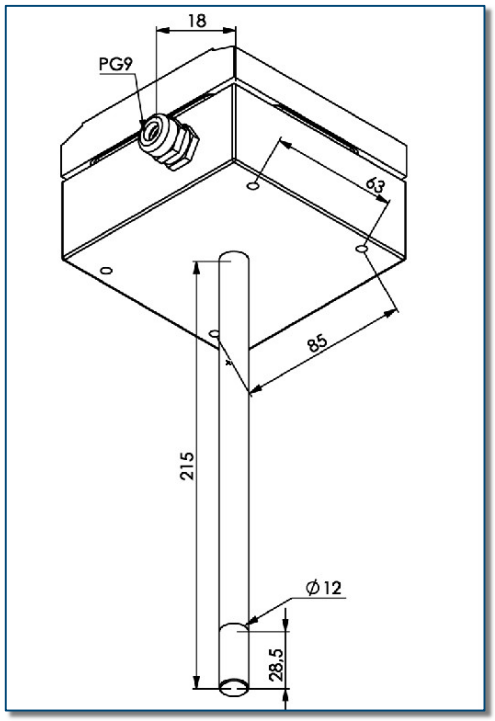
3.1 Installation

When installing the sensor, the installation location should be chosen with the utmost care. A continuous air flow promotes fast response times and the environment should be free of pollutants and dust. In addition, the possibility of condensation forming should be prevented. In any case, the sensors should always be mounted vertically with the possibility of dripping downwards or horizontally with a slight slope towards the sensor so that any condensation cannot collect on the sensor. Therefore, when installing a **DKRF77x**, also take the alignment of the sensor head into account.

3.2 Drilling pattern and dimensions



▲ **DKRF771**



DKRF772 ▲

3.3 Probe designs and connection

While the **DKRF771** and **DKRF772** models come with probes permanently attached to the transmitter housing, the **DKRF773** and **DKRF774** models have cable probes.

All probes available for the **DKRF773** model are listed below:



◄ DKRF773-300
Slim probe for direct process integration at -40 to +80 °C, 0 to 100% RH; pluggable probe cable up to 500 m, integrated dust filter



◄ DKRF773-300S
Probe and probe cable for high temperatures up to +120 °C; fixed probe cable up to 500 m, replaceable dust filter.



◄ DKRF773-300XXS
Miniaturized probe without dust filter (D = 0.4 in, L = 0.8 in), fixed probe cable available for temperatures up +80 °C or +120 °C



◄ DKRF773-312
Robust stainless-steel probe with sintered filter for operation at -40 to +120 °C and 0 to 100% RH, fixed probe cable up to 500 m



◄ DKRF773-317
Pressure-resistant screw-in probes up to 30 bar, without dust filter; thread G1/2“, G1/4” or M8; pluggable probe cable up to 500 m, up to +80 °C

The **DKRF774** model has a pressure-resistant cable probe:



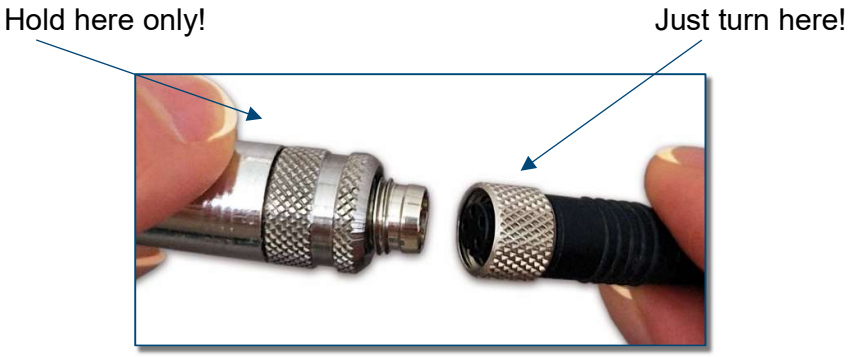
◄ DKRF774-316D
Pressure-resistant probe up to 100 bar, with G1/2" thread, sintered stainless steel filter, pluggable probe cable up to 500 m, up to +80 °C

The **DKRF773-300**, **DKRF773-312**, **DKRF773-317**, and **DKRF774-316D** measuring heads can be connected to the sensor using a plug-in connection cable. The connection cable has the matching female connector and is equipped with a safety screw connection.






First insert the probe, then screw the fitting into the thread of the probe.
Please hold the probe firmly while doing so!



It is recommended that the electrical installation be carried out with the power disconnected if possible. In addition, the connection cable should (if possible) be removed from the transmitter by disconnecting the plug before connecting the wires, so that any electrical and mechanical interference that may occur during installation has no effect on the transmitter.

The connections on the **DKRF77x** probes are relatively robust. The input for the supply voltage is reverse polarity protected. All RS485 connections are also reverse polarity protected and short-circuit proof. However, it is strongly recommended **not to** connect the outputs to the supply voltage or to GND.

3.4 Installation with optional accessories

3.4.1 Installation with duct mounting kit

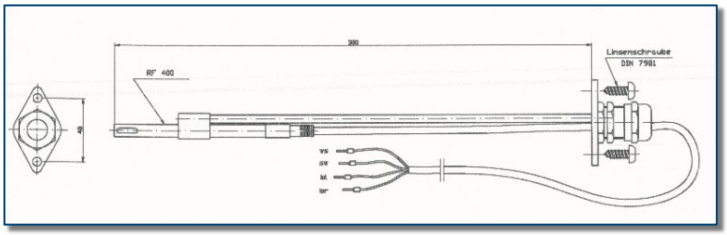
With the aid of an optional duct mounting kit, installation can also be carried out in a duct. The following models are suitable for this purpose: **DKRF773-300** and **DKRF773-312**.

▼ **Installation with duct mounting kit**

Insert the cable into the slotted insert



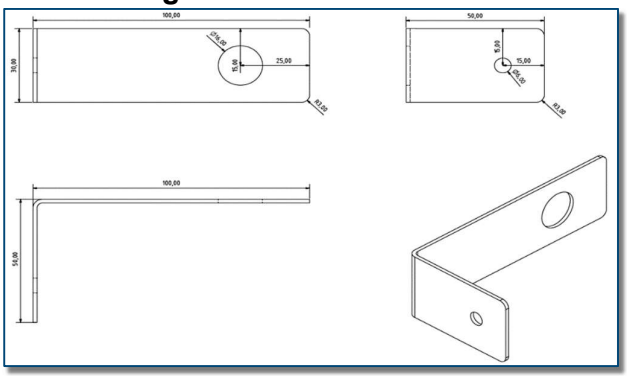
▼ D**uct mounting kit**, technical drawing



3.4.2 Installation with mounting bracket

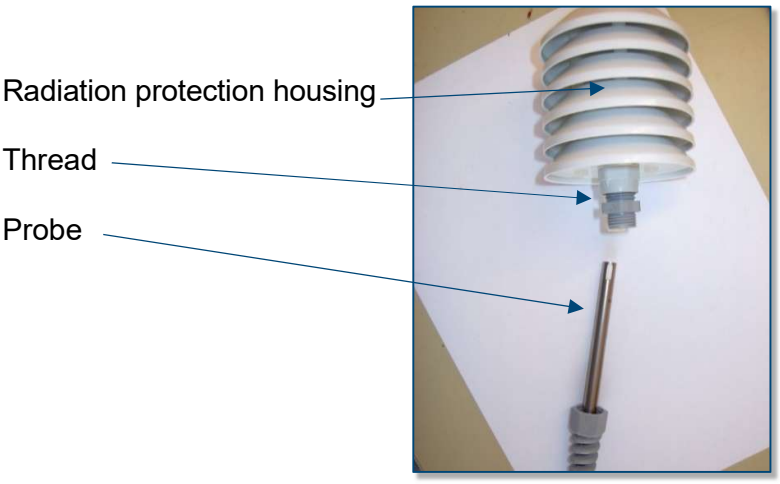
With the aid of an optional mounting bracket, the probe can be easily and accurately attached to a wall or surface for measurement purposes.

▼ **Mounting bracket**



3.4.3 Installation with radiation protection housing

Always use radiation protection when measuring outdoors! This protects the probe from sunlight and also provides some protection from precipitation (rain/snow).

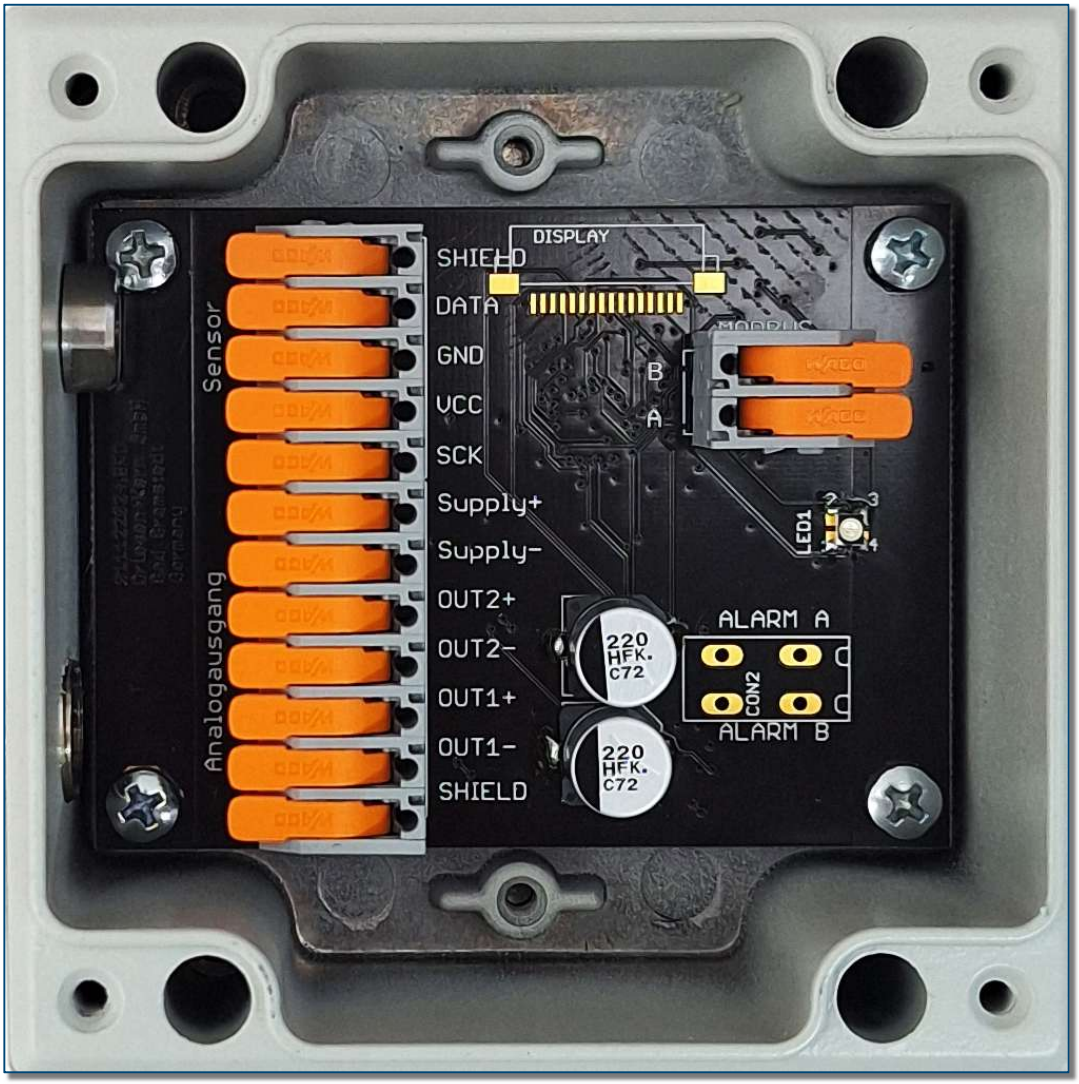


◄ radiation protection

The radiation protection housing is also available with mounting brackets for wall and roof mounting.
It is generally advisable to install the radiation protection housing first and then insert the probe into it.

3.5 Electrical installation

▼ Assignment of **outputs for three-wire connection (voltage or current)**
(active output signals for two measured variables, e.g., temperature and humidity)



▼ **Wire assignment of the probe cable for internal measurement data transmission:**

Assignment	Standard version for plug-in probes	120°C cable for fixed probes	Cable length >10 m for for plug-in probes
Shield		**Yellow/Green**	
DATA	**Blue**	**Green**	**Brown**
GND	**Black**	**Yellow**	**Black**
VCC	White	**Brown**	**Red**
SCK	**Brown**	White	**Orange**

Power supply voltage:

6…24 V AC or 6…36 V DC for **voltage output** 0…1 V or 0…5 V

12…24 V AC or 12…36 V DC for **voltage output** 0…10 V

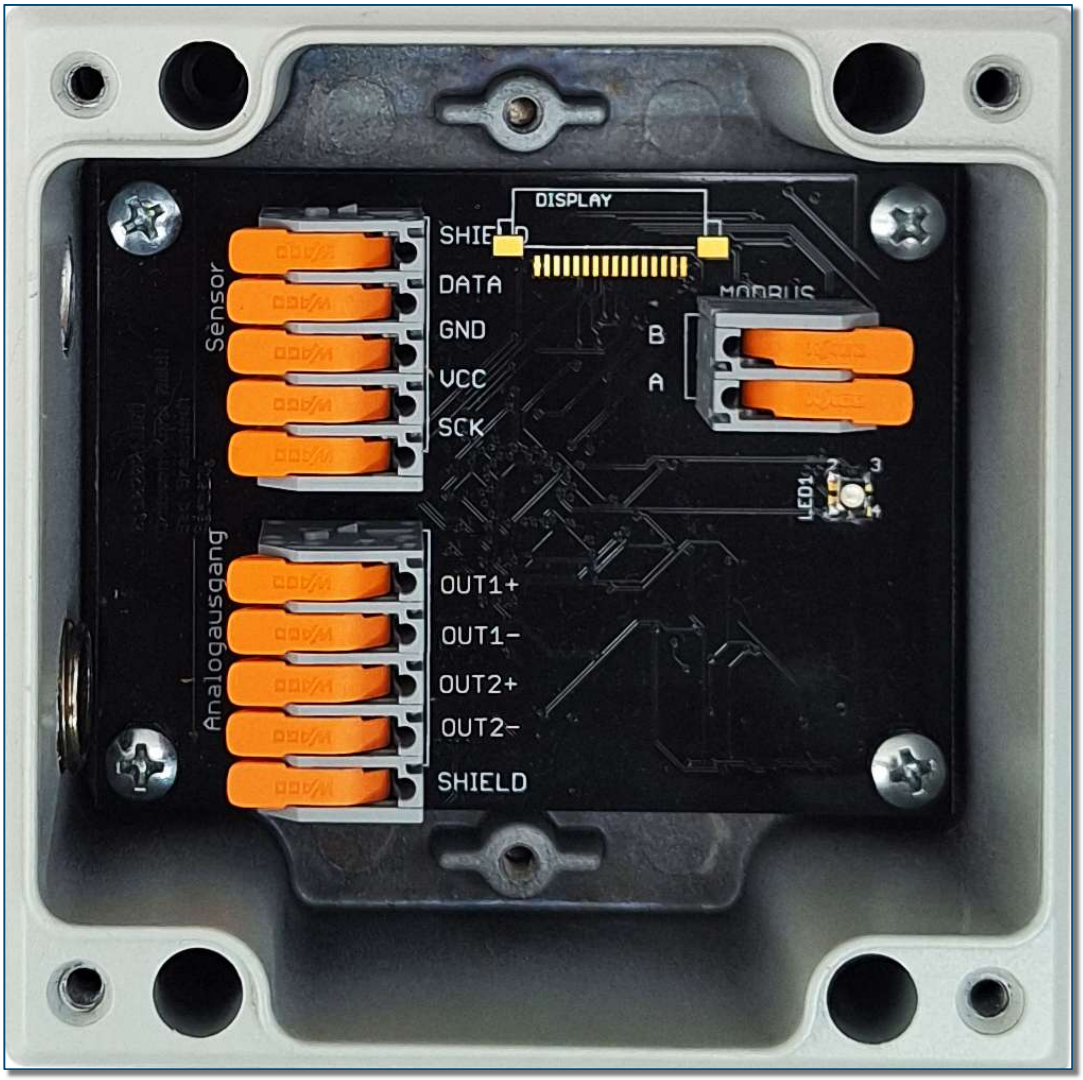
12…24 V AC or 12…36 V DC for **active current output** 0…20 mA or 4…20 mA

Relay switch:

The optional relay switch (not possible with two-wire current loops) for alarm signaling or system control is designed for low voltages up to a maximum of 60 V DC and can conduct a direct current of up to 1 A.

The positive pole of the switching voltage must be connected to the “ALARM A” contact, and the negative pole to “ALARM B”.

▼ Assignment of **current loops for two-wire connection**
(two current loops for two measured variables, e.g., temperature and humidity)



The wire assignment of the probe cable for internal measurement data transmission is completely identical to the three-wire version (see above).

Power is supplied directly via each individual current loop:

12…36 V DC (under no circumstances AC voltage) separately for each 4…20 mA current loop.

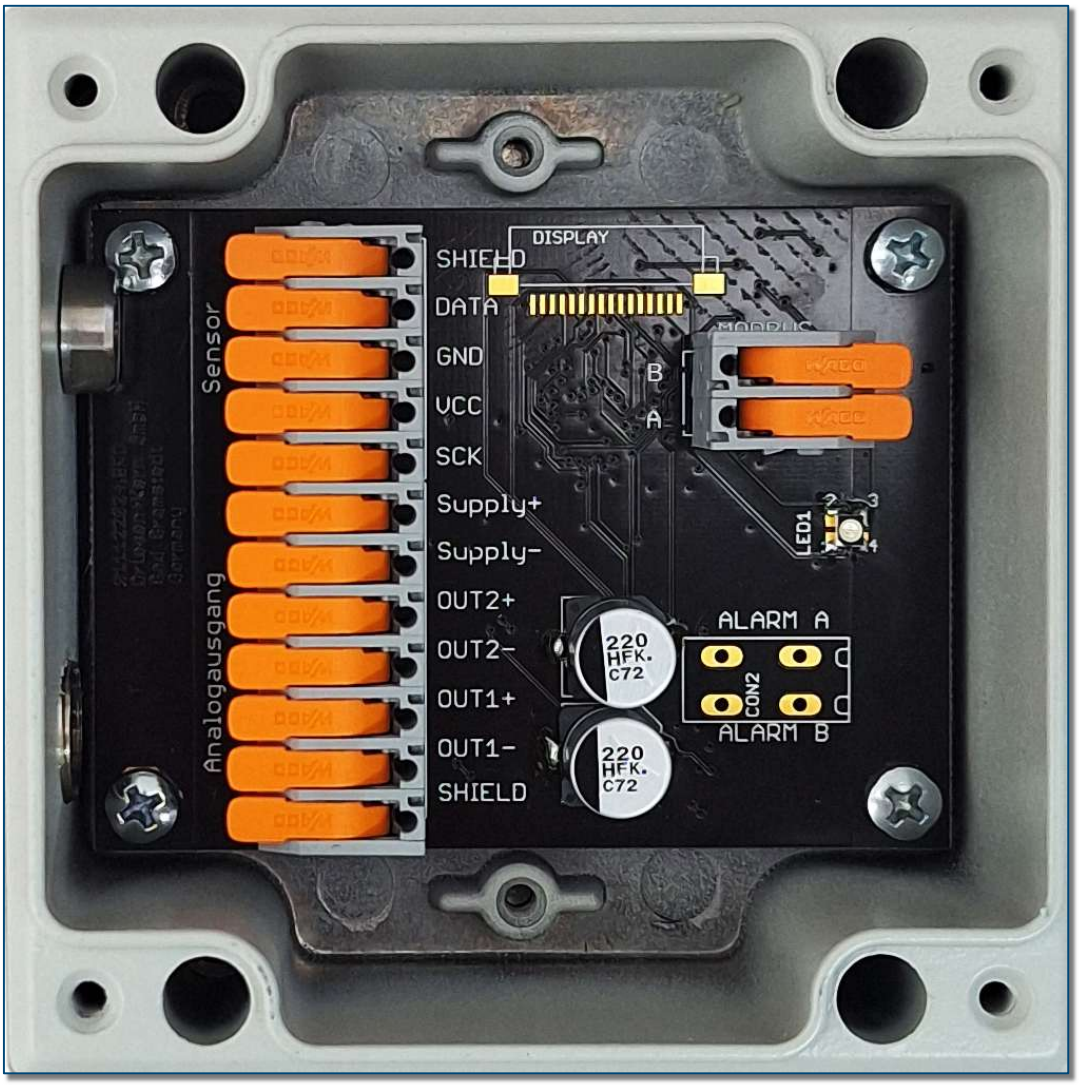
If only the second current loop (channel 2) is required (e.g. for humidity), the first current loop (channel 1) must still be supplied with voltage (12...36 V DC, no AC voltage!).

3.6 Digital Interfaces

3.6.1 Connection via RS485 interface

DKRF77x transmitters are equipped with an RS485 interface as standard. This can be operated with ASCII or Modbus protocol (depending on the current setting).

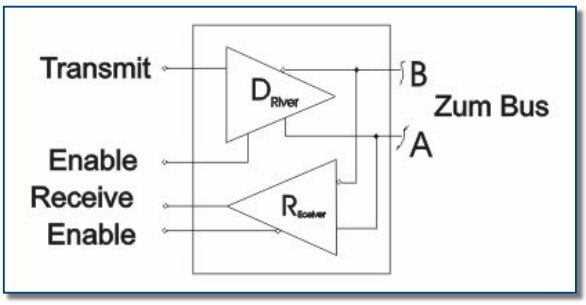
▼ Pin assignment of the **RS485 interface**



Power supply voltage:

6…24 V AC or 6…36 V DC only for the RS485 interface

▼ **Typical structure of the RS485 interface**



Bus specification:
Standard RS485, two-wire technology, half-duplex,
-7 V to +10 V common-mode input voltage range
Baud rate: 9600
Data bits: 8
Parity: none
Stop bits: 1
Encoding: ASCII or Modbus (depending on setting)
Probe echo: off

3.6.2 Connection via USB interface

A **DKRF77x** sensor with RS485 interface can also be connected to all standard computers using a USB adapter cable. The sensor is powered via a separate cable.
However, operating system drivers must be installed.
These can be downloaded from our website at:

www.driesen-kern.com ► Support ► Software & Updates

Please always install the USB driver before connecting the device to your computer's USB port. You communicate with the probe via a virtual COM port, which is automatically assigned by the operating system after the probe is detected.

In the Windows operating system, after connecting the USB adapter cable, you will find the entry Silicon Labs CP210x USB to UART Bridge (COMx) under **Start\Settings\Bluetooth and other devices**.

COMx is your COM port, which you can access using the appropriate terminal program.

4 Operation

Provided that the sensor has been correctly installed at the measuring point and is connected to the downstream evaluation electronics via the connection cable, it can be put into operation by applying the supply voltage.

When measuring humidity, and especially when calibrating humidity measuring devices, the temperature equilibrium between the humidity sensor and the environment is of fundamental importance. Even a small temperature difference of only ±1°C at ambient conditions of +20°C and 50% RH can cause a measurement error of ±3% RH. At an ambient humidity of 90% RH, the error is as high as ±5.4% RH.

Please wait until the humidity value has stabilized accordingly after significant temperature fluctuations!

It is possible to operate the probes in Modbus and ASCII mode and ASCII-addressed. The probe has an RS485 interface as standard.

Analog outputs are also available in parallel to digital operation.

4.1 Modbus protocol

In the now widely used Modbus RTU protocol, the measurement data is transmitted in binary form. If you are not yet using software that supports the Modbus protocol, we recommend Modbus Poll. A free trial version is available on the Internet.

If you are using an RS485 or USB adapter, you may need to select the (virtual) COM port in the software and set the transmission parameters. These settings are often already taken over by the software itself.

The exact transmission specifications are listed in **Chapter 3.6.1** (Connection of the RS485 interface) (**9600/8/N/2**).

Supported functions:

Code

03 (0x03) Read register

06 (0x06) Write to individual register

The default Modbus address (upon delivery) is 240 dec or 0xF0 in hex.

Please refer to the following table for the assignment of the individual registers!

4.1.1 Register assignment

Reg No. Dec	Register Address Hex	Register Description	Data Format	Register Type	Notes
1	0x0000	Temperature [°C]	32 Bit float LSW	Read Only	32 Bit float
2	0x0001		32 Bit float MSW	Read Only	
3	0x0002	Rel. Humidity [%]	32 Bit float LSW	Read Only	32 Bit float
4	0x0003		32 Bit float MSW	Read Only	
5	0x0004	Abs. Humidity [g/m3]	32 Bit float LSW	Read Only	32 Bit float
6	0x0005		32 Bit float MSW	Read Only	
7	0x0006	Dew Point [°C]	32 Bit float LSW	Read Only	32 Bit float

8	0x0007		32 Bit float MSW	Read Only	
9	0x0008	Mixing Ratio [g/kg]	32 Bit float LSW	Read Only	32 Bit float
10	0x0009		32 Bit float MSW	Read Only	
11	0x000A	Wet Bulp Temperature [°C]	32 Bit float LSW	Read Only	32 Bit float
12	0x000B		32 Bit float MSW	Read Only	
13	0x000C	Abs. Humidity [ppm]	32 Bit float LSW	Read Only	32 Bit float
14	0x000D		32 Bit float MSW	Read Only	
15	0x000E	Specific Enthalpy [J/kg]	32 Bit float LSW	Read Only	32 Bit float
16	0x000F		32 Bit float MSW	Read Only	
17	0x0010	Barometer [hPa]	32 Bit float LSW	Read Only	32 Bit float
18	0x0011		32 Bit float MSW	Read Only	
19	0x0012	Saturation Vapor Pressure [hPa]	32 Bit float LSW	Read Only	32 Bit float
20	0x0013		32 Bit float MSW	Read Only	
21	0x0014	Vapor Pressure [hPa]	32 Bit float LSW	Read Only	32 Bit float
22	0x0015		32 Bit float MSW	Read Only	
31	0x001E	Test (0x0201 von 0x04030201)	32 Bit unsigned LSW	Read Only	32 Bit (0x04030201)
32	0x001F	Test (0x0403 von 0x04030201)	32 Bit unsigned MSW	Read Only	
65	0x0040	Temperature [°C] / 0.01	16 Bit signed	Read Only	-4000…12500 read as -40.00…125.00 °C
66	0x0041	Rel. Humidity [%] / 0.01	16 Bit signed	Read Only	0…10000 read as 0.00…100.00 %
93	0x005C	Serial Number Board	32 Bit unsigned LSW	Read Only	32 Bit unsigned
94	0x005D		32 Bit unsigned MSW	Read Only	
95	0x005E	Serial Number Sensor	32 Bit unsigned LSW	Read Only	32 Bit unsigned
96	0x005F		32 Bit unsigned MSW	Read Only	
97	0x0060	Modbus Address	16 Bit unsigned	Read Write	0…255 only
99	0x0062	Communication Mode	16 Bit unsigned	Read Write	2 Modbus 4 ASCII (single mode) 8 addressed ASCII
102	0x0065	Barometric Pressure / 0.1 [hPa]	16 Bit unsigned	Read Write	7000…13000 only read as 700.0hPa…1300.0hPa

Modbus can be used to configure and scale the two analog outputs retrospectively. To do this, first define the measured variable for the output signal. The example values below refer to the register addresses (0x0000 to 0x0015) for all measured variables provided by the DKRF77x. (See the table above.) In the second step, the respective measured value limits and then the output signal in mV must be specified.

Reg No. Dec	Register Address Hex	Register Description	Data Format	Register Type	Example Values	
128	0x007F	Output Value Ch0	16 Bit unsigned	Read Write	0	Temperature
129	0x0080	Output Value Ch1	16 Bit unsigned	Read Write	2	Rel. Humidity
130	0x0081	Phys. Min. Ch0	32 Bit float LSW	Read Write	-40	-40 °C Temp.
131	0x0082		32 Bit float MSW	Read Write		
132	0x0083	Phys. Max. Ch0	32 Bit float LSW	Read Write	80	+80 °C Temp.
133	0x0084		32 Bit float MSW	Read Write		
134	0x0085	Phys. Min. Ch1	32 Bit float LSW	Read Write	0	0 % RH
135	0x0086		32 Bit float MSW	Read Write		
136	0x0087	Phys. Max. Ch1	32 Bit float LSW	Read Write	100	100 % RH
137	0x0088		32 Bit float MSW	Read Write		
138	0x0089	Analog Min. Ch0	32 Bit float LSW	Read Write	0	0 V
139	0x008A		32 Bit float MSW	Read Write		
140	0x008B	Analog Max. Ch0	32 Bit float LSW	Read Write	10000	10 V
141	0x008C		32 Bit float MSW	Read Write		

142	0x008D	Analog Min. Ch1	32 Bit float LSW	Read Write	0	0 V
143	0x008E		32 Bit float MSW	Read Write		
144	0x008F	Analog Max. Ch1	32 Bit float LSW	Read Write	10000	10 V
145	0x0090		32 Bit float MSW	Read Write		

4.1.2 Meaning of the expressions

Register Address	Binary address of a register in the Modbus data unit
Register Number	Natural register number, starting with 1 (address + 1)
Dec	Decimal
Hex	Hexadecimal or sexadecimal
LSW	“Least Significant Word” (lowest value, bits 15...0)
MSW	“Most Significant Word” (highest value, bits 31...16)
16 Bit signed	Numeric value in the range -32768...+32767
16 Bit unsigned	Numeric value in the range 0...65535
32 Bit unsigned	Numeric value in the range 0...4294967295, CDAB
32 Bit float	Floating point number encoded in “binary32” format (IEEE 754), CDAB (CDAB = “Little Endian Byte Swap” or “Word Swap”)
Read Only	Register entry cannot be changed with Modbus function
Read Write	Register entry can be changed with Modbus function

4.2 ASCII protocol

The transmission specifications for ASCII mode are as follows:

Transmission specifications in ASCII mode

Baud rate: 9600
Data bits: 8
Parity: none
Stop bits: 1
Encoding: ASCII character set, 1 byte per character
Probe echo: off

If you do not already have software for communicating with the probes using the ASCII protocol, we recommend using a terminal program such as PuTTY.

If you are using an RS232 or USB adapter, you may need to select the (virtual) COM port in the software and set the transmission parameters. These settings are often already taken over by the software itself.

The exact transmission specifications are listed in chapter 3.6.1 (Connection of the RS485 interface) (9600/8/N/2). (There is no checksum calculation.)

The following setting also applies to the ASCII protocol:

Encoding: 1 byte per character

Probe echo: off

A command contains a data command consisting of several ASCII characters with a carriage return as terminator.

There are two different syntaxes, one for bus operation “ASCII stream addressed” (with probe address) and one for single operation “ASCII stream” (without address). The

operating mode can be freely selected by the user; single operation is usually set. In any case, the syntax of the previously set operating mode must be strictly adhered to..

1. Bus operation (ASCII stream addressed)

This is preceded by a prefix (optional) and an address (mandatory). The address also consists of several ASCII characters in plain text format.

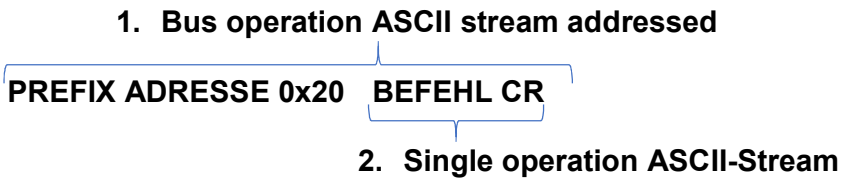
Addresses in the range 0…255 can be freely assigned. Upon delivery, the address 0 is usually preset, but only if the “preset” bus operation was ordered.

2. Single operation (ASCII stream)

Only the pure command is permitted here – without any additions before or after!

Since communication is only with a single transmitter, no address may be specified.

Command syntax:



The PREFIX is optional and is used for synchronization on the bus. It consists of 3 bytes and has the following format:

?#: = ASCIICode 0x3Fhex 0x23hex 0x3Ahex

The address must follow directly after the PREFIX (without spaces).

In “ASCII stream” mode, neither a PREFIX nor an address may be prefixed.

Otherwise, an error message will be generated.

4.2.1 Commands

Command	Meaning
Meter	Sends sensor data once
MeterMode	Sends sensor data cyclically every 2 seconds
s	Exits meter mode
config	Changes the RS485 address
sensorhistogram	Retrieves the sensor's histogram
uscal	Initiates sensor calibration

The commands are described in more detail below. The standard address 0 in the delivery state is assumed. The following applies:

[SPACE] = ASCII code 32dez / 0x20hex
[CR] = ASCII code 13dez / 0x0dhex
[TAB] = ASCII code 09dez / 0x09hex

The output syntax of the sensor data string is defined as follows:

Sensor value [SPACE]°C[TAB]Sensor value [SPACE]% [CR]

The sensor value always has a constant length of 8 characters, 2 decimal places, a decimal separator, and places before the decimal point. The sign, only –, is output if necessary, otherwise the string is padded with spaces.

4.2.2 Commands in Detail

Das Carriage-Return-Zeichen am Ende einer Befehlssequenz muss bei manuellem Betrieb über ein Terminalprogramm durch Enter ausgelöst werden.

Querying transmitter information
Command sequence Info[CR]
Response:
DKrF773 series rH-T transducer
SNr: 5151047
SW.V. 3.0.60 Apr 8 2025 08:39:23
HW.V. 1.2
(c) Driesen+Kern GmbH Germany www.driesen-kern.com
Range analog: -40..80°C / 0..100% -> 0..10000 mV
Mode digital: Addressed ASCIIStream/addr.:240

One-time request for sensor values
Command sequence Meter[CR]
Response 23.82 °C[TAB]43.25 %[CR]

One-time request for sensor values at Bus operation
Command sequence 0[SPACE]Meter[CR]
Response 23.82 °C[TAB]43.25 %[CR]

Starting the continuous data stream at Single operation only
Command sequence MeterMode[CR]
Response ..enabled[CR]

Stopping the continuous data stream
Command sequence s[CR]
Response ..stopped[CR]

Changing the RS485 address
Command sequence 0[SPACE]config[CR]
Response TransmitMode[CR][LF]
(1)..analogue[mV][CR][LF]
(2)..RS485[CR][LF]
(8)..RS232[CR][LF]
1 >
Transmitter waiting for input.
Send a 2[CR] for RS485 mode.
Transmitter sends:
RS485Address 0 >
Transmitter waiting for input.
Send a number between 0...255 here: 12[CR]
Transmitter sends:
[CR][LF]12[CR][LF]StartupInfo 1 >

Transmitter waits for input.

Send 0 (for hidden) or 1 (for visible) here:
1[CR]

Transmitter sends:
[CR][LF]...wait for RESET!

After 10 seconds, the device completes the process and is ready for use with the new address 12.

Retrieving the histogram:
Command sequence sensorhistogram[CR]
Response see illustration in section 4.7

4.3 Relay switch (optional)

4.3.1 Description and hardware configuration

The **DKRF77x** series can be optionally equipped with a relay switch. When ordering, please specify the trigger thresholds, alarm mode, and hysteresis (see **Chapter 4.3.2**).

Alternatively, you can program the switching values yourself.

The switching contact is capable of cleanly disconnecting voltages up to 60 volts and conducting currents up to 1 A.

The contacts are located on the top of the circuit board and marked with Alarm A and Alarm B. Please ensure that the higher potential is connected to contact A than to contact B.

4.3.2 Threshold value exceedance with hysteresis

All channels available on the transmitter can be used for triggering. All channels on which no alarm is to be detected can be hidden. The various channel alarms can be calculated using an AND or an OR function and transferred to the switching contact.
However, only those channels that are also connected to the analog outputs can be included.

An alarm in the logical sense always means closing the contact. With the help of the alarm modes described below, a two-point controller with hysteresis can be simulated (https://en.wikipedia.org/wiki/Hysteresis).

Each available channel can be set independently with two threshold values, hysteresis, and mode. These settings are stored in the non-volatile memory of the transmitter.

Alarm mode 0:

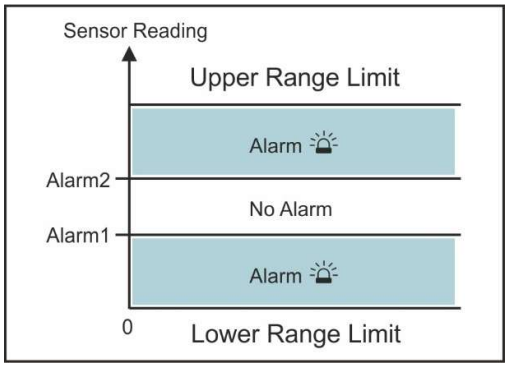
No alarm is activated for the selected channel.

Alarm mode 1:

Two alarm ranges apply to the selected channel:

If the sensor value is greater than alarm threshold 1 ± hysteresis and less than alarm threshold 2 ± hysteresis, there is no alarm.

If this condition does not apply, an alarm is triggered.

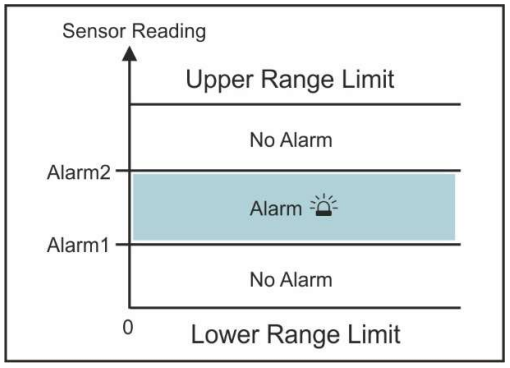


Alarm mode 2:

There is only one alarm range for the selected channel:

If the sensor value is greater than alarm threshold 1 ± hysteresis and less than alarm threshold 2 ± hysteresis, an alarm is triggered.

If this condition does not apply, no alarm is triggered.



4.3.3 Alarm settings

If the optional relay switch is integrated in the sensor, you can use this command to activate and change the alarm settings of the device.

Setalarm <cr>
You can set alarm values for both output channels. These values are threshold1, threshold2, and hysteresis. Both channels can be processed with logical AND/OR gates for calculation. Alarm status TRUE means that the circuit is closed.

Setup alarm parameters for:
(1)..Temperature [°C]
(2)..relative Humidity [%]
(3)..other
? >1
Alarm mode for Temperature [°C]:
(1).. deactivated
No alarm calculation on this output channel.
(2).. ONE ALARM-ON Area
Alarm is true, if actual transmitter value is greater than threshold1 and smaller than threshold2.
(3).. TWO ALARM-ON Areas
Alarm is true, if actual transmitter value is smaller than threshold1 or greater than threshold2.

? >2
Threshold1 [°C] (-20.. +80) ? >20
Threshold2 [°C] (-20.. +80) ? >50
Hysteresis [°C] ? >5
Logical channel alarm linkage of output ch1 and output ch2:

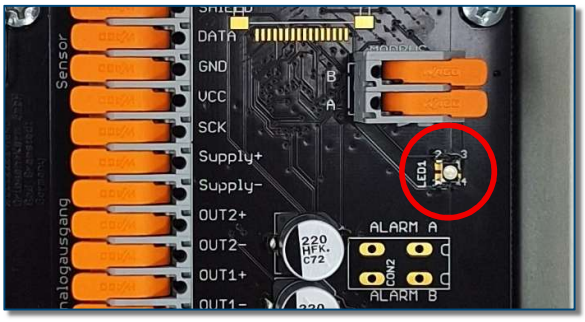
(1).. OR linkage
If alarm on outputch1 **OR** on outputch2 true, then close alarm switch.
(2).. AND linkage
If alarm on outputch1 **AND** on outputc2 true, then close alarm switch.
 ? >1 Configuration change successfully finished

4.4 Sensor damage monitoring

The transmitter continuously monitors the sensor for damage and indicates any damage using an internal LED.

If the probe or cable is damaged, the LED inside the transmitter housing flashes red.

▼ Position of the LED on the circuit board of the **DKRF77x** series



4.5 Histogram

Transmitters in the **DKRF77x** series have a function for checking the environmental conditions at the installation site. Divided into 10% or 10°C increments, it is possible to see how much time the transmitter spent in the corresponding decile value range pairs during the measurement and whether it was operated outside the recommended operating conditions.

The histogram can only be accessed via ASCII mode.

▼ Example **histogram** for use within 20…30 °C and 50…60% RH

DKrF770 series rH-T-Transducer

SNr: 254

SW.V. 4.4.16 Jul 15 2025 14:59:01

HW.V. 1.2

(c) Driesen+Kern GmbH Germany www.driesen-kern.com

Range analog: -40..80'C / 0..100% -> 4..20 mV

Mode digital: ASCIIStream - not addressable

SensorHistogram: DKrF770 series rH-T-Transducer

Histogram	0..10%rH	10..20%rH	20..30%rH	30..40%rH	40..50%rH	50..60%rH	60..70%rH	70..80%rH	80..90%rH	90..100%rH	>100%rH
>130'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
120..130'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
110..120'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
100..110'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
90..100'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
80.. 90'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
70.. 80'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
60.. 70'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
50.. 60'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
40.. 50'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
30.. 40'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
20.. 30'C	0,	0,	0,	0,	0,	803,	0,	0,	0,	0,	0
10.. 20'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
0.. 10'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
-10.. 0'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
-20..-10'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
-30..-20'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0
-40..-30'C	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0

2357 measurements total. 0 hours operating time total. Values in seconds.

5 Maintenance and care

Die **DKRF77x**-Transmitter sind durch ihre Bauweise sehr wartungsarm.

5.1 Calibration

The **DKRF77x** series transducers are equipped with digital, calibrated measuring heads. For models with plug-in measuring heads, these can be ordered as spare parts with a calibration certificate to reduce downtime to a minimum.

You can send in the heads for calibration. They will then be calibrated in our laboratory, adjusted if necessary, and returned to you with a new certificate.

Calibration in a third-party laboratory is also possible via the integrated Modbus interface. Please contact us at service@driesen-kern.de if you would like more information.

5.2 Submission for recommended annual calibration

The recommended calibration interval is one year, as is typical in the industry.
To ensure that your calibration order is processed as quickly as possible, please download the Service & Support Request form from our website and fill in all the necessary information. You will find the form in the Support section at:

www.driesen-kern.com ► Support ► Support Form

To ensure proper calibration of the probe, please send it to:

Driesen + Kern GmbH
Service
Am Hasselt 25
D-24576 Bad Bramstedt

5.3 Probe and filter replacement

The transducers from the **DKRF77x** series are based on a modern combined humidity and temperature sensor. Due to the low cost of calibrated replacement measuring probes for models with cable probes (**DKRF773** and **DKRF774**), it is hardly economical to perform calibration or adjustment on site.

Simply order the appropriate replacement probe (including the corresponding certificate). Probes with fixed cables must be replaced together with the cable and reconnected to the transmitter. Plug-in probes can be replaced without cables. To replace, unscrew the threaded ring, pull the measuring head off the cable, and plug the new sensor head back onto the measuring cable. They are immediately ready for use again! The accuracy after replacing the replacement measuring head corresponds to its accuracy class.

Probe types for which a pluggable cable is possible (but not mandatory):

Model	Replacement probe	
DKRF773-300	DKRF300-x-C-0	Substitute x for SA, EA or DA!
DKRF773-312	DKRF312-x-C-0	Substitute x for SA, EA or DA!
DKRF773-317	DKRF317/M8, /G ½, /G¼-x-C-0	Substitute x for SA, EA or DA!
DKRF774-316D	DKRF316D-x-C-0	Substitute x for SA, EA or DA!

Even if the sensor cable is damaged, all you need to do is order a replacement connection cable (2, 5, 10, or 15 meters long).

The filter is also replaceable on some models. The following table provides information about the corresponding accessories.

Model	Filter type	
DKRF773-300	Filter300 (white Polymer filter)	
DKRF773-300S	Filter300 (white Polymer filter)	
DKRF773-312	Filter312 (stainless-steel sintered)	With screw-in thread
DKRF774-316D	Filter315 (stainless-steel sintered)	With screw-in thread

6 Troubleshooting

If you encounter problems when operating the sensor, please first try to resolve them using this troubleshooting guide. If you are unable to resolve your problem using the troubleshooting guide in this operating manual, please contact Driesen + Kern support. For more information, see **Chapter 6.2**.

6.1 Causes and solutions

Symptom	Potential cause	Remedy
No function	Cable connection wired incorrectly	Pay attention to the wire assignment when wiring the connection cable. See **Chapters 3.5** and **3.6** for more information.
	Supply voltage not applied correctly	Observe the specifications of your sensor!
	Defective cable/incorrect cable	Use the correct cable. If necessary, use the internal LED to check for cable breaks.
	Probe not addressed	RS485 probes must be addressed before use in order to be able to communicate with them. If necessary, use a terminal program such as PuTTY. See **Chapter 4**.
Unplausible values	Dirty filter	Check and clean the filter. For unproblematic media, measure briefly without the filter to determine whether the values without the filter are plausible. If this is the case, a new filter must be installed. See **Chapter 5.3** for more information.
	Error in downstream measuring system	Test the outputs with a digital voltmeter. If the values are correct, there is a fault in the input amplifier of the downstream measuring system (very rare!). A 100-ohm resistor connected in series at the output of the probe can remedy this problem.
Continuous min/max values	Cable defect	Replace the cable.
	Sensor defect	Have the sensor replaced.
Humidity value too high	Filter cap saturated with moisture	During installation, ensure that the sensor is mounted in such a way that little or no moisture can collect on it and that any moisture can drip off if possible. Vertical downward mounting is recommended.
Meter mode interval is irregular	This is a feature, not a bug!	If necessary, measure without the filter to determine whether it is the cause of the problem.

6.2 Support request (online)

Not all problems can be solved with the help of troubleshooting. For support cases as well as calibration and repair orders, Driesen + Kern provides a form on its website that facilitates the processing of support cases or calibration/repair orders.

You can find the form at:

www.driesen-kern.com ► Support ► Support Form

The form can be easily filled out on your computer, so you can send it back to support@driesen-kern.de right away – or include it with your return shipment for calibration or repair.

Appendix – Certificate of Conformity

Driesen + Kern GmbH

Certificate of Conformity

Driesen + Kern GmbH
Physikalisch-Technische-Messgeräte

Product: **Combined Humidity and Temperature Transducers DKRF771, DKRF772, DKRF773-300, DKRF773-300S, DKRF773-310XXS, DKRF773-312, DKRF773-317/M8, DKRF773-317/G1/4, DKRF773-317/G1/2 and DKRF774-316**

This is to certify that above products are calibrated using dedicated equipment which is calibrated according to ISO/IEC 17025 and calibrated by comparison against natural standards, natural physical constants, consensus standards, or by ratio type measurements using self-calibrating techniques.
The specification given in datasheets are met by the above products.

Certificate of conformity V.18

Driesen + Kern GmbH

(Oliver Driesen, Managing Director)

Bad Bramstedt, 20.07.2025

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