Driesen + Kern GmbH

Bedienungsanleitung / User Manual

DKRF500 · DKRF505· DKRF505/XXS
DKRF510 · DKRF515 · DKRF517



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Version 1.1 (EN), Last Updated: 11.2025

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1 Preface and Safety Instructions

Thank you for purchasing a quality product made by Driesen + Kern! We are looking forward to working with you and wish you all the best for your measurements at hand.

To ensure the longevity of your new product and that all your measurements run smoothly you should carefully read this manual and closely follow all instructions.
Failure to comply with the instructions in this manual and operation outside of the specified limitations can void the guarantee.

Should you encounter problems with the operation or installation of the device try to solve them with the help of this manual (refer to **chapter 6**).

If you have questions that are not being answered in the manual or you discover a defect of the product, please read **chapter 6.2** for information on how to contact our support team at Driesen + Kern.

Safetey instructions are highlighted on the margin as follows:



Stop! Most important safety instruction whose non-compliance will potentially cause health risks or damages to the product.



Warning! Warns of installation or configuration errors and incorrect use which can cause data loss or malfunction.



Information Notes describing optimal configuration and operation of the device as well as tips to prevent errors in measurement.

2 Product Features

2.1 Models

Several different models from the DKRF500 Series are available, ranging from a 8 mm tube like probe with polymer filter to a robust 13 mm probe with a stainless steel sinter filter, to screw-in type probes with pressure resistance up to 30 bar and to transmitters with external probe heads for measurements up to +120°C (diameter 4 mm and 13 mm, ½" or M8 threads). Refer to the following overview for model specifics.



◄ **DKRF500,** standard type: electronics built into the probe tube, plug-in connection cable, temperature range **up to +80°C max.**

▼ **DKRF505** transmitter: electronics built into tube, remote probe head, operation **up to +120°C** possible.



▼ **DKRF505/XXS** and **DKRF510**: Miniaturized probes with small diameter for hard to reach spots, temperature range up to **+80°C max (probe body) and +120° (probe head)**





▼ **DKRF515**: Pressure-resistant model for rough conditions, protection up to 2 bar, plug-in connection cable, temperature range **up to +80°C max.**



▼ **DKRF517**: High-pressure model for measurements up to 30 bar, plug-in connection cable, temperature range **up to +80°C max**. Default threads either ½“ or M8.



2.2 Output Options

DKRF500, **DKRF505**, **DKRF505/XXS**, **DKRF510**, **DKRF515** and **DKRF517** transmitters come with both two analog outputs and a digital interface, by default.

2.2.1 Analog Outputs

Probes with analog outputs provide **two** voltage signals each of which can be configured for different measured variables.

- Potential **measured variables** are:

Temperature	[°C]	default
Relative humidity	[%]	default
Absolute humidty	[g/m3]	option
Dew point Humidity	[°C]	option
Mixing ratio	[g/kg]	option
Wet-bulb temperature	[°C]	option
Absolute humidity	[ppm]	option
Specific enthalpy	[J/kg]	option
Barometric pressure	[hPa]	option
Saturarion vapor pressure	[hPa]	option
Vapor pressure	[hPa]	option

- **Output signal** will be configured according to your order:

0…1	volt	
0…2.5	volt	
0…5	volt	
0…10	volt	
X…Y	volt	(custom configuration)

- **Scaling** will also be configured according to your order:

0…100%	Relative humidity	default
-40…+80	°C (Temperature)	default for transmitters w. integrated probe
-40…+120	°C (Temperature)	default for transmitters w. remote probe
X…Y	°C (Temperature)	custom range

2.2.2 Digital Protocols

The RS485 interface can be operated with Modbus or ASCII protocols.

All measured variables can be transmitted simultaneously including calculated variables such as absolute humidity and dew point. Data transfer can be established in an ASCII format or binary with a check sum (only Modbus).

2.3 Accuracy

DKRF500 HumiProbe Series transmitters can be delivered with one of three accuracy levels which needs to be specified upon ordering. Options are: Standard accuracy (SA, without certificate), enhanced accuracy (EA, includes ISO9001 calibration certificate), and highest accuracy (DA, includes ISO17025 calibration / DAkkS certificate). See the following table for specifications.

Accuracy				
		SA Standard Accuracy	**EA** Enhanced Accuracy	**DA** Highest Accuracy
RH	**0…80%**	**±2.5%**	**±1.8%**	**±1.5%**
	beyond	**±3.0%**	**±2.3%**	**±2.0%**
T	**-40…+90°C**	**±0.3°C**	**±0.2°C**	**±0.2°C**
	-20…+60°C	**±0.3°C**	**±0.2°C**	**±0.1°C**
	beyond	**±0.6°C**	**±0.3°C**	**±0.2°C**

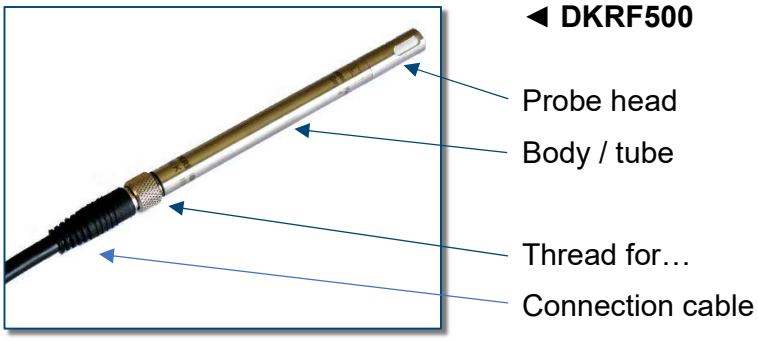
2.4 Box Content

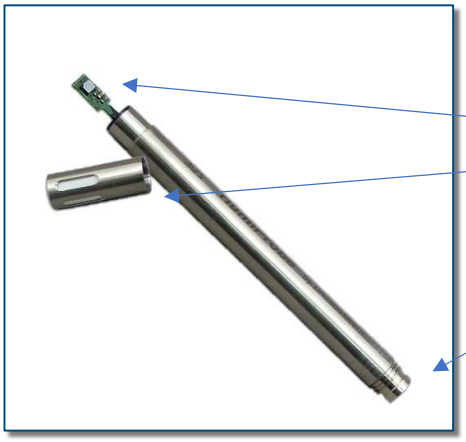
Upon receiving your delivery, please make sure that the box contents matches the delivery order.

Besides the probe (body and head) and a quick start guide the following items / accessories may be included in your delivery:

Connection cable	2 m, 5 m, 10 m (or custom) with open ends or…
RS232 adapter	RS485 to RS232 adapter and 9-pin D-sub connector or…
USB adapter	RS485 to USB adapter with USB plug or…
Custom connector	Custom made connector according to specifications
Flansch500/515	Mounting flange for installation in ducts or pipes
WM400/410/415	Wall mount, stainless steel bracket
TR351-G03/05/12	Radiation shield with angle or Z bracket
Filter500/Filter415	Polymer filter (500, pluggable) / stainless steel sinter filter (415, protects probe against dust and und droplets)

2.5 Logger Layout



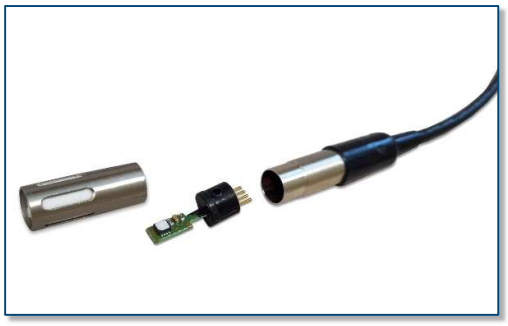


◄ **DKRF500, filter cap removed**

Models **DKRF500**, **DKRF505** and **DKRF515** come with a removable filter cap which allows you to replace the sensor.

▼ Removed filter cap of **DKRF505** with sensor





▼ Removed filter cap of **DKRF515** (with screwed sinter filter, not pluggable)



Models **DKRF505/XXS**, **DKRF510** and **DKRF517** vdon't have a filter option and may thus only be used in clean air. The sensor of these models is not user-replaceable.

2.6 Areas of Application & Limitations of Use

A number of factors can complicate the measurement of relative humidity. The following information is to help prolong the sensor's longevity and increase the accuracy of measurements. If you have any doubts or questions regarding the limitations of use, please don't hesitate to contact us for further advice.

2.6.1 Chemicals

The HumiProbes work on the basis of a capacitive humidity sensor in **CMOSens** technology. This technology along with some other protective measures makes the sensor relatively resistant against dust and other pollutants. However, **chemicals, in particular detergents, solvents, and acids** can affect the measurement or even **damage the sensor**.



Please note that these substances mostly only become dangerous at higher temperatures or reach an increased and damaging concentration through outgassing after a long period of exposure. If and how you can perform measurements in such places, maybe with the help of filters and bypasses, has to be determined case by case. Refer to **chapter 2.6.5.** for more information.

2.6.2 Humidity and Temperature Range

The transmitter can be used within a **range from 0…100% RH**, but condensation is to be avoided. Refer to **chapter 2.6.3.** for more information.

Temperature operating range is limited by the electronics, the sensor cable, the sensor itself as well as the materials used. Operating ranges are specified for every model individually and **may not be exceeded**. Models whose body include the probe head and electronics usually have a range of **-40 to +80°C**. Models with a remote (external) probe head usually provide a temperature range of **-40 to +120°C**.



2.6.3 High Humidity

Under conditions with a very high level of humidity, a temperature difference of a few degrees can lead to condensation at the sensor. Ein kurzzeitiges Auftreten des Betauungszustandes ist für den Sensor unproblematisch. Short-term condensation on the sensor is permissible. **In no case should the sensor permanently or regularly be moistened for hours, since this will lead to corrosion inside the sensor and on the conductors.** Should this have happened, immediately place the sensor in a heated and ventilated room to dry. Remove the sensor filter for faster drying.



In case of occasional condensation, the sensor works fine after the condensate has dried off. **Condensates with contaminant loads (e. g. acid formers, solvents) can cause a reduction of the sensor's longevity and an irreversible drift of measured values or even a permanent damage to the sensor as described in chapter 2.6.1.**



For operation under conditions with very high humidity we recommend the high humidity transmitter DKRF676 which comes with a dedicated heating unit which prevents condensation at the probe head and helps speed up drying.



2.6.4 High Humidity and High Temperature

Warning, **sensor may not be used at high humidity and high temperature at the same time!**



When operating outside the recommended ranges the humidity signal can temporarily increase by up to 3%. After a short period of time the sensor returns to its original calibration. Application beyond the maximum operating range is not recommended.



2.6.5 Adjustments for Demanding Environments

The following steps can help mitigate environmental conditions' impact on the sensor:

1. Install the probe with its head downward sloping, if possible. This helps built up condensation to drip off more easily. See **chapter 3.1.1**!
2. Install a bypass with better manageable conditions. If applicable, convert to absolute humidity or dew point – conduct temperature measurement remotely.
3. Build a baffle plate or an immersion pipe in order to prevent the sensor from moistening and from potential airborne pollutants!
4. Remove the sensor filter for faster drying. Please note that drying in unventilated locations can take up to several hours. Without the filter the sensor is not protected against dust or droplets any longer which makes this step suitable only in environments with relatively clean air.

3 Installation and Connection

3.1 Installation on Site

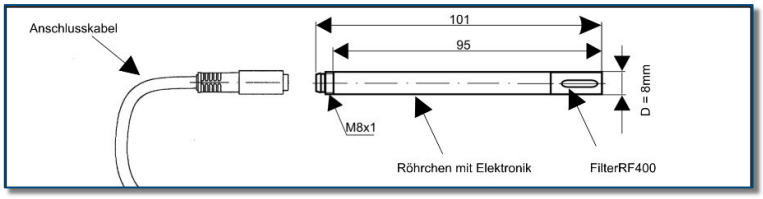
3.1.1 Sensor Head Position

Carefully choose the set-up location when installing the transmitter. A continuous airstream ensures fast response times, and the environment should be free of contaminants, dust and droplets. Any potential for the creation of condensation ought to be also eliminated. In any case the measuring head of the humidity probe should be mounted downward sloping so that potential condensate accumulation on the sensor is reduced and is able to drip off more easily. Install the first 10 cm of the connection cable vertically, facing downwards to prevent fluid from reaching the probe via the cable. Please not that prolonged exposure even to pure water will lead to corrosion!

3.1.2 Installation without Accessories

The probes (including the remote / external probe heads) can be freely integrated in existing mounting fixtures and brackets, e. g. in PG glands suitable for the probes diameter.

▼ **DKRF500 (w/o accessories)**, technical drawing

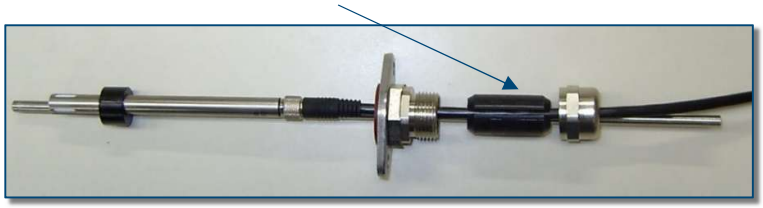


3.1.3 Installation with Flange

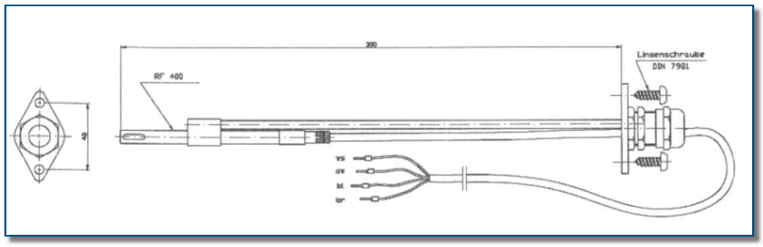
With the help of a flange the probe can be installed in a duct. Suitable for the DKRF500 are the models FLANSCH500S and FLANSCH500L, suitable for the DKRF515 are FLANSCH515S and FLANSCH515L.

▼ **Montage with Flansch500L (long version)**,

feed cable through the slot

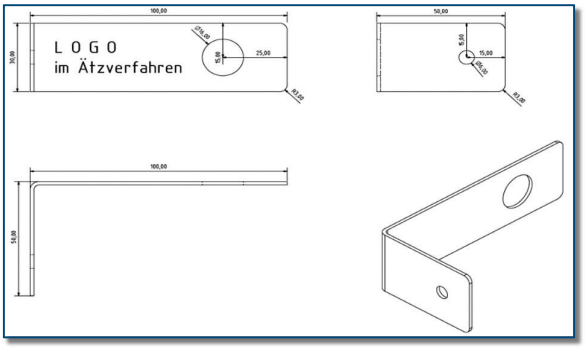


▼ **DKRF500 with Flansch500S**, technical drawing



3.1.4 Installation with Holding Bracket

With the help of the holding bracket you can fasten the probe to a wall especially easily and metrologically correct.



◄ **Holding bracket WM400** for **DKRF500** and **DKRF505**

Holding bracket WM410 for **DKRF505/XXS** and **DKRF510**

WM415 for **DKRF515**

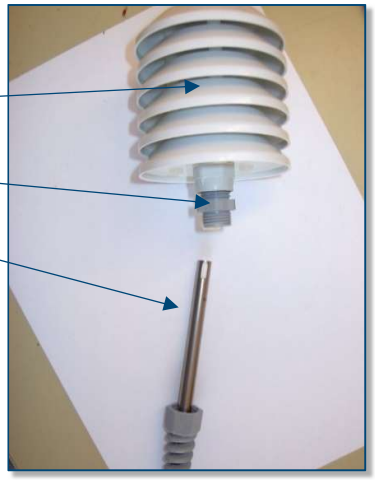
3.1.5 Using a Radiation Shield

Always use a **radiation shield** when conducting measurements outside! The radiation shield protects the probe against solar radiation to a certain degree also against precipitation (snow/rain).

Radiation shield

Gland with thread

Probe (DKRF500)



◄ **Radiation Shield TR351**

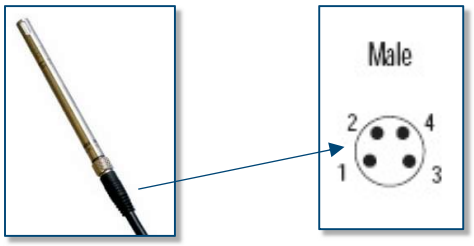
The radiation shield is available with a holding bracket for mounting on walls or roofs/poles.

Install the shield first, then insert the probe.

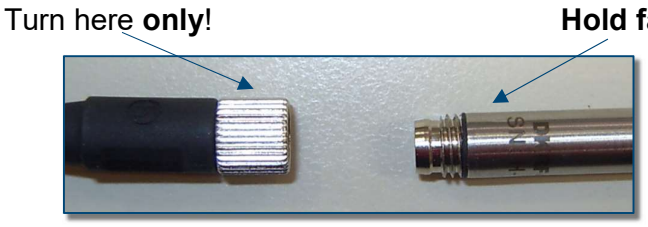
The following models of the TR351 are available:
TR351-G03 for models **DKRF510** and **DKRF505/XXS**
TR351-G05 for models **DKRF500** and **DKRF505**
TR351-G10 for model **DKRF515**

3.2 Connection

The transmitter consists of either a tube housing including the sensor and electronics or a tube with a remote probe head. At the end of the 8 mm housing you will find an M8 (male) connector with 4 pins. Custom models may come with a fixed connection cable.



Connecting probe and cable: Please plug in the probe first, then thread the knurled nut onto the probe. **Holf on to the probe!**



We strongly recommend connecting the cable to the probe without applying a voltage. When connecting the cable's wires, it should be disconnected from the transmitter in order to protect the probe against potential electrical or mechanical interferences caused by the installation.

Probes may only be supplied with a **direct current** (DC). **Maximum permissible supply voltage** of all DKRF5xy probes is **30 V**.

Minimum supply voltage for all DKRF5xy probes is 5.0 V. Please note that the required supply voltage needs to be 1 V above the configured maximum output signal, e. g. 6 V supply voltage for a 5 V output signal.

Connectors of DKRF5xy HumiProbes are made to be rather robust. Supply voltage input is designed to be polarity proof. RS485 connectors are also both polarity proof and short circuit protected. Nevertheless, **we advise against** supplying voltage or applying GND to the outputs.

Thanks to the modern electronics the probe's current consumption is quite low and usually does not exceed 2 mA.

3.2.1 Analog Output

The transmitters usually come with two analog outputs. **In order to enable analog operation, the supply voltage needs to be applied while there is no signal on the outputs.**

Models DKRF510 and DKRF515 may include a passive PT100 or PT1000 measuring shunt (available for 4-wire options) whose signals need to be separately retrieved and does not contribute to the probe's analog or digital signals.

Below you will find the wire assignment for all standard models. Please note, that wire assignment for probes with fixed cables may vary.

Refer to **appendix A** für special wire assignments (e. g. 8-wired with PT sensor, very long cables or cables with protection against fire or chemicals) and a comprehensive table listing.

▼ Wire and Pin Assignments

Default	Description
1* Brown	Supply **(-)**: 0 V **(GND)**
2* White	V_{out} Channel B (usually RH)
3* Blue	Supply **(+)**: 5.0...30 VDC
4* Black	V_{out} Channel A (Temperature)
- Yellow Green	Shield or PE**

*Pin number of 4-pin connector; **lead through cable shield which is connected to the stainless steel probe body and should connect to downstream components' shielding to ensure electromagnetic compatibility (EMC). Depending on the measurement site it might need to be connected to your electric grid's protective earth. In this case please avoid ground loops (e. g. by radial grounding or vectored interrupt of shielding) as they may interfere with measurements!

3.2.2 Digital Output

HumiProbes provide an RS485 interface as a standard feature which can also be used instead of the analog outputs. Only custom-built probes may come without a digital interface. Due to the 4-pin connector analog outputs and RS485 interface cannot be used simultaneously.

To enable digital mode a signal level needs to be applied pior to or at the same time supply voltage is applied.

By default, we provide a 2 m connection cable with open ends. Other cable lengths as well as adapter options for RS232 or USB are available upon request. The order code has the following options:

-0 without connector, open ends
-USB USB interface with type A plug
-RS232 RS232 interface with 9 pin sub-D connector

Adapter options **USB** or **RS232** include a plug-type connector and are still based on the RS485 probe. Thus you can conveniently remove the adapter and use the probe on an RS485 bus system.

3.2.3 Using the USB Interface

Probes with **USB** option come with a connection cable for a USB interface. It features a standard USB plug compatible with most common computers. The probe is powered through the USB port and requires no setting up. However, USB drivers for your operating system must be installed. Download Windows, Linux or Mac OS drivers here:
www.driesen-kern.com ► Support ► Software & Updates

Please install the driver first before connecting the probe to your USB port. Communication is established via a virtual COM port which will be automatically assigned by your operating system after the device has been detected.

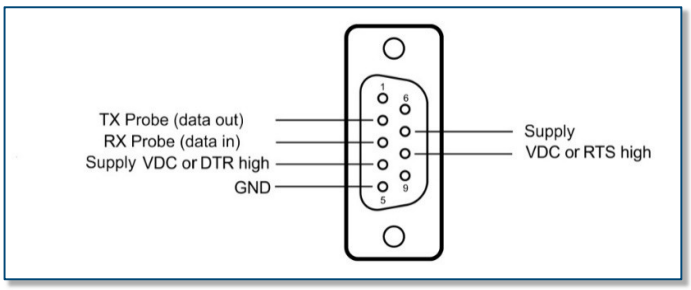
Go to Start\Settings\Bluetooth and other Devies to find the entry: **Silicon Labs CP210x USB to UART Bridge (COMx)**
COMx identifys the COM port which can now be accessed using a terminal program. Configuring and operating the probe via USB is identical to the RS232 option. Refer to **chapter 3.2.4** for RS232 instructions.

3.2.4 Using the RS232 Interface

RS232 option provides a cable and adapter for the RS232 interface. The connector is a 9 pin sub-D plug suitable for all common RS232 ports.

The probe can be powered through the RS232 interface of the PC by setting DTR and/or RTS lines to logical high or by applying an external voltage to both pins. Supply voltage may range from 5.0…12 V; current consumption without analog output is below 1 mA.

▼ RS232 Pin Assignment



Pins on a 9 pin sub-D female connector

Accessing the probe with a PC does not require additional drivers. Conveniently connect the RS232 adapter directly to the port of your computer.

3.2.5 Using the RS485 Interface

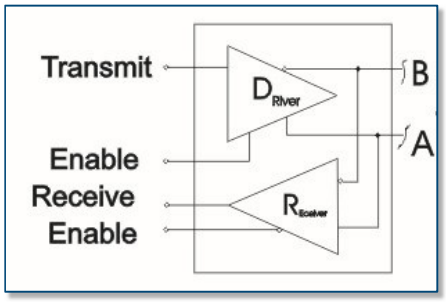
HumiProbes with Modbus or ASCII protocols provide a built-in RS485 interface. Due to the design of the interface up to 250 probes of the same type and one master can be used without additional equipment.

▼ Wire and Pin Assignments

Default	Description
1* Brown	Supply **(-)**: 0 V **(GND)**
2* White	RS485 A
3* Blue	Supply **(+)**: 5.0...30 VDC
4* Black	RS485 B
- Yellow Green	Shield or PE**

*Pin number of 4 pin connector, **protective earth

▼ Typical Design of the RS485 Interface



Bus Specification:
Standard RS485, 2 wire technology, half duplex,
-7 V to +10 V Common-Mode Input Voltage Range

To enable the RS485 interface the probe needs to receive a signal from the computer prior to or at the same time supply voltage is applied.

Up to 250 probes can be combined to a network the bus. Without additional electronic components the number of connected transmitters (or other RS485 devices) is limited by how many the master can power. The network can be connected to a PC using an RS485 to RS232 or USB (common type A plug) adapter. Refer to **chapter 3.2.4** for specifications of the RS232's 9 pin sub-D connector and it's pin assignment. Every individual probe can be accessed and configured using a Modbus or terminal application. **Chapter 4** explains the Modbus register assignment as well as the ASCII commands.

Signal Specifications:
Baud: **9600**
Data bits: **8**
Parity: **0** (none)
Stop bits: **2**

These specifications cannot be changed by the user.

4 Operation

Once the transmitter has been correctly installed at the measuring site and its cable is connected to your downstream equipment it can be put into operation by applying the supply voltage (**digital mode requires active signal level!**).

When measuring humidity and especially when calibrating humidity instruments the temperature equilibrium between sensor and surroundings is of utmost importance. Even a small difference in temperature of only ±1°C at ambient conditions of +20°C and 50% RH can result in a measuring error of ±3% RH. At humidity levels of 90% RH it can even increase to ±5.4% RH.

After heavy fluctuations of temperature, please wait for the humidity readings to stabilize!

HumiProbe models can be used in Modbus or ASCII Stream mode.

If you intend to use an analog Modbus probe in ASCII Stream mode, you need to change the register for Communication Mode (decimal no. 99, hex 0x0062) from 0x12 (Modbus) to 0x14 (ASCII). Should you require ASCII-addressed mode, the corresponding address is 0x18.

When applying a supply voltage (without a signal level) the probe automatically powers up in analog mode outputting the measurement as voltages. Probes in digital mode (power up with active signal level) require being contacted and do not output readings automatically. The exception being the ASCII protocol with MeterMode enabled by the user. Should you need to use more than one RS485 probe on a shared bus, each unit needs to be assigned an address and put into bus mode before operation. MeterMode cannot be enabled on bus mode probes. Modbus probes can also be accessed only through their individual address. Ex works, the default pre-configured address usually is 240 (decimal). When using more than one probe the address of each probe needs to be individually changed before operation to avoid duplicates.

4.1 Modbus Protocol

With the widely-used Modbus RTU protocol readings are transmitted binary. If you do not already use a software compatible with Modbus protocols, we recommend Modbus Poll. A trial version free of charge is available on the internet.

When using an RS232 or USB adapter, selecting the correct virtual COM port and configuring the transmission specifications is required. In some cases these modifications may be automatically made by the software.

Refer to **chapter 3.2.5** for details of the transmission specifications (**9600/8/N/2**). (There is no checksum calculation.)

Supported actions:

Code	
03 (0x03)	Read register
06 (0x06)	Write to register

Pre-configured Modbus address ex works is 240 dec or 0xF0 hex.,

Please refer tot he following table for the register assignments.

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…125000 read as -40.00°C…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	0x12 Modbus 0x14 ASCII (single mode) 0x18 addressed ASCII
102	0x0065	Barometric Pressure / 0.1 [hPa]	16 Bit unsigned	Read Write	7000…13000 only read as 700.0hPa…1300.0hPa

Using Modbus, configuration and scaling of both analog outputs can be done later. This requires choosing the measured value for the output signal, and subsequently defining the measuring range and assigning corresponding output signals in mV. The example values below reference the register addresses (0x0000 to 0x0014) for all available measurands. (See table above.)

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 Expressions defined

Register Address	Binary address of a Modbus data unit's register
Register Number	Natural register number, starting at 1 (Address + 1)
Dec	Decimal
Hex	Hexadecimal or sedecimal
LSW	Least Significant Bit (Bits 15…0)
MSW	Most Significant Bit (Bits 31…16)
16 Bit signed	Numeric value ranging from -32768…+32767
16 Bit unsigned	Numeric value ranging from 0…65535
32 Bit unsigned	Numeric value ranging from 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 cannot be changed using Modbus
Read Write	Register can be changed using Modbus

4.2 ASCII Protocol

Unless you have a custom-made software with which to access the probe via ASCII protocols we recommend using a terminal application such as PuTTY.

When using an RS232 or USB adapter, selecting the correct virtual COM port and configuring the transmission specifications is required. In some cases these modifications may be automatically made by the software.

Refer to **chapter 3.2.5** for details of the transmission specifications (**9600/8/N/2**). (There is no checksum calculation.)

ASCII protocol also requires:

Encoding: **1 byte per character**
Probe echo: **off**

Command syntax includes the command consisting of several ASCII characters as well as a carriage return as terminator.

There are two different options: (1) ASCIISTream addressed for operation with a bus (with probe address), and (2) individual operation as a single unit with ASCIIStream (without address). This mode can be changed by the user. Usually, individual operation is pre-configured by default. In any case, the appropriate syntax of either mode of operation needs to be adhered to.

1. **Bus mode (ASCIIStream addressed)**

This mode requires a prefix (optional) and the address (mandatory). The address consists of several ASCII characters in plain text.

Addresses can freely be selected from 0…255. Ex works, the pre-configured address is usually 0 if bus mode was ordered.

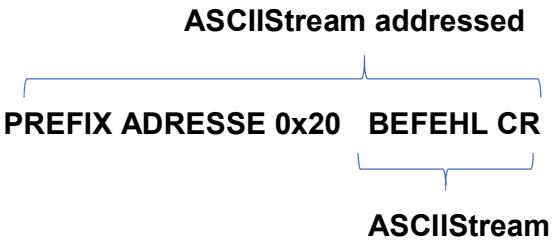
Address and command are separated by space (ASCII code 32 decimal or 0x20 hex).

2. **Individual operation (ASCIIStream)**

This syntax only requires the command without any prefixes or suffixes.

As there is only one device to receive commands, you may not specify an address.

Command syntax:



The prefix is optional and serves the synchronisation of the bus. It is comprised out of 3 Byte and has the following format:

?#: = ASCIICode 0x3Fhex 0x23hex 0x3Ahex

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

When using ASCIIStream neither a prefix nor an address may be put in front, or else an error occurs.

4.2.1 Commands

Command	Description
Meter	One-time transmission of sensor data
MeterMode	Cyclical transmission of sensor data every 2 seconds. Must not be used with more than one RS485 units on the same bus. Intended for verifying purposes or when using only one device.
s	Ends MeterMode
config	Changes RS485 address
time	Elapsed time in seconds since applying supply voltage
Info	Responds with SNR, software/hardware, analog scaling, MOD-BUS-RS485 address, digital mode

The commands are described in the following way with the default address at delivery being 0.

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

Output syntax of sensor data string is set 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 prefix, only –, is only put out if necessary, the string is otherwise filled with SPACE.

4.2.2 Communications in Detail

We recommend using a terminal application The CarriageReturn at the end of a command sequence must be activated through Enter during manual operation via a terminal application.

Requesting transmitter specificationsAbfragen der Transmitter-Informationen

Command Info[CR]
Response:
DKrF500 series rH-T-Transducer
SNr: 5151047
SW.V. 3.0.60 Apr 8 2022 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 Meter[CR]
Response 23.82 °C[TAB]43.25 %[CR]

One-time request for sensor values @ RS485

Command 0[SPACE]Meter[CR]
Response 23.82 °C[TAB]43.25 %[CR]

Stopping MeterMode

Command s[CR]
Response ..stopped[CR]

Starting MeterMode

Command MeterMode[CR]
Response ..enabled[CR]

Changing RS485 address and digital mode

Command config[CR]
Response:
Setup basic system parameters.
Mode digital:
(0) .. ModBus
(1) .. ASCIIStream
(2) .. ASCIIStream addressed >
Transmitter waits for command.
Enter 2[CR] for RS485 mode.
Transmitter responds:
Address(240) >
Transmitter waits for command.
Select a value between 0...254:
133[CR]
Transmitter responds:
Configuration changed

Probe needs to be disconnected from power supply for a short period.

After restarting it will have adopted its new address.

Warning: If values are being transmitted, which do not meet the value range of the respective parameters, the transmitter answers with: [CR][LF]…out of range![CR][LF]>.
The input must be repeated.



Warning: If values are being transmitted, which cannot be interpreted as numbers, the transmitter answers with: [CR][LF]…incorrect![CR][LF]>
The input must be repeated.



5 Maintenance and Care

HumiProbe models DKRF500, **DKRF505**, **DKRF505/XXS**, **DKRF510, DKRF515** and **DKRF517** are very low-maintenance due to their design. The user can replace the sensor and filter of models **DKRF500**, **DKRF505** and **DKRF515**.

5.1 Calibration

The transmitters are based on a combined humidity and temperature sensor. Calibration of this sensor is meant to be done in the calibration lab of Driesen + Kern. Please return the transmitter as a whole but without the cable.

5.2 Returning the Device for Annual Calibration

The recommended calibration interval is 1 year as is typical for the industry. In order for us to process your calibration order most efficiently, please download the **Service & Support Request Form** from our website and fill out all the necessary information. You can find the writable PDF here:

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

Return the transmitter to this address for calibration and include the filled out form:

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

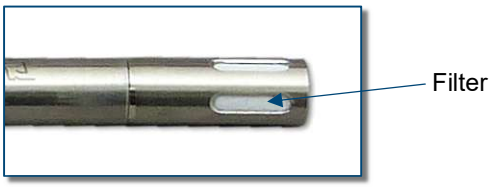
5.3 Replacing Sensor and Filter



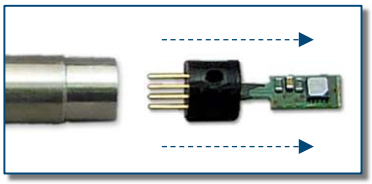
Please refrain from removing the sensor yourself unless it is damaged or calibration cannot be performed in any other way.

Changing sensors is to be done by trained personnel only, and at your own risk.

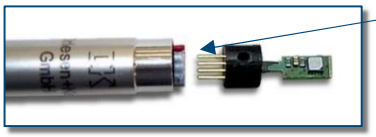
▼ Remove filter cap while turning it slightly (**DKRF500**) or unscrewing it (**DKRF515**).



▼ Remove the sensor by carefully pulling it out.

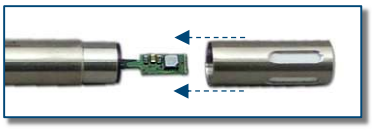


▼ Insert the new sensor (red marking on the socket helps with aligning it), change the filter from the filter cap.



Red marking on the left while sensor faced front side. Depiction for demonstration: red marking and socket is usually below the opening.

▼ Reattach filter cap (**DKRF500**) or screw it on (**DKRF515**), done!



5.4 Verify Measurements with Humidity Checks

Verifying your measurements can easily be achieved with the help of our Humidity Chesk MHT0, MHT33 and MHT75.



◄ MHT Series Humidity Checks

MHT Humidity Checks are small, handy and can be used in any position. They allow you to test a variety of humidity measuring instruments such as probes, transmitters and indicating instruments.

The MHT Humidity Checks are designed to be used in the field (e. g. industrial plants) as well as in laboratories.

Probe inserted into a Humidity Check ►



In order to correctly varify your humidity measurements a temperature balance has to be established between the salt solution, ambient air within the chamber and the transmitter or probe itself.

($T_{Solution}$ = $T_{Air\ in\ chamber}$ = T_{Probe}!).
Avoid differences in temperature. Only when these three temperature values match, the entire system is balanced. Keep in mind that increasing the temperature of one part of the system from +5°C to +20°C might take a while.

In case the Humidity Check and the transmitter or probe have been in the same room together for a longer period, 20-30 minutes should be enough to establish the temperature balance.
In the field you could help this process by putting both the Humidity Check and the transmitter into a box.

The Humidity Check shows the exact humidity value in relation to temperature of the reference solution. Usually, transmitters and probes use combined humidity and temperature sensors. Check the temperature shown by your device and compare the value to the table on the Humidity Check, the humidity value next to it is the reference value your instrument should be showing.

Adhering to the following instructions will help you achieve an accuracy of up to ±2%RH.

Warning



The solutions contained in the Humidity Checks are harmful in contact with skin and must not be consumed.
Make sure that no liquid is present within the small chamber before inserting the transmitter/probe since this would damage the sensor. Moisture may have accumulated due to condensation, dropping the tester or by damage to the diffusion filter.
Protect the Humidity Checks from sun exposure and infrared radiation.
Do not touch the assembly during temperature compensation! (Thermal transfer!)
Close the Humidity Checks after each use.
Use a rubber plug with the proper hole diameter for your probe/transmitter head.
Make sure that the sensor is completely inserted into the chamber before use.

6 Troubleshooting

Should you encounter problems while using the transmitter, please try to solve them with the help of this manual first. If you are unable to solve your problem with the help of this troubleshooting guide, get in touch with Driesen + Kern support.
For more information on how to get support refer to **Chapter 6.2**.

6.1 Causes and Solutions

Symptom	Potential Cause	Solution
No function	Cable wrongly wired	Mind the wire assignment when connecting the cable. See **chapter 3.2** for details.
	DC voltage not appropriately applied	Observe your transmitter's specifications!
	Defective/wrong cable	Use the appropriate cable. Check for cable breaks.
	Probe does not have an address	RS485 probes need to be assigned an address for communication before being put to use. Use a terminal application such as PuTTY. See **chapter 4** for more instructions.
Implausible values	Dirty Filter	Check and clean the filter. If possible, remove the filter and take measurements in clean air to make sure the values are plausible without the filter. If filter is the cause, it can be replaced. See **chapter 5.3**.
	Error in downstream measuring system	Check outputs with a multimeter. If readings are correct, the error might be caused by the input amplifier of downstream equipment. (Very rare.)
Permanently measures lower/upper range limits	Cable damaged	Replace the cable!
	Sensor faulty	Have the sensor replaced!
Humidity value too high	Filter cap saturated with humidity	During installation, make sure the transmitter is mounted in such a way that no or only a little bit of moisture can collect on the device and drip off if possible. A sloping mounting is recommended. Measure without the filter to determine it as problem cause. If the filter is indeed too moist take appropriate measures to dry it at your own risk. ONLY dry the filter, not the sensor!

Irregular MeterMode interval	This is a feature, not a bug!	To reduce warming, the transmitter changes its interval when there are no or only little changes in the readings. When measurements change more rapidly the interval also decreases.

6.2 Open a Support Ticket (online)

Not every problem can be solved with the help of this troubleshooting guide. Both for support tickets as well as for calibration or repair orders Driesen + Kern offers online forms which help speed up the process.
Please find the forms here:

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

The forms can be filled out on your computer and quickly emailed back to us at support@driesen-kern.de – or just include the filled-out form in your calibration or repair delivery.

Appendices

A. Wire Assignment for Custom-Built Cables

Signal	Wire Color (standard)	Wire Color with PT100/PT1000	
Supply (-), 0V, GND	Brown	Brown	Always required
Supply (+), 5.0*…30 V	Blue	Blue	
Vout Channel 1 (e. g. Temp)	Black	Green	Analog Mode (enabled by applying supply voltage, without active signal level on the outputs)
Vout Channel 2 (e. g. Humidity)	White	Yellow	
RS485 A (non-inverted)	White	Yellow	Digital-Modus (enabled by applying a signal level prior to or at the same time as supply voltage)
RS485 B (inverted)	Black	Green	
PT100 / PT1000 (1)		Pink / Grey	Optional PT sensor (only for DKRF510/515)
PT100 / PT1000 (2)		Red / White	

* Supply voltage must not fall below 5.0 V(DC). When using the analog outputs supply voltage needs to be at least 1 V higher than the maximum allowable output voltage, 2 V higher to be safe. Analog output set to 5 V thus requires a minimum 6 V supply, preferably 7 V!

B. Certificate of Conformity

Driesen + Kern GmbH

Certificate of Conformity

Driesen + Kern GmbH
Physikalisch-Technische-Messgeräte

Product: **Humidity Transducers**
DKRF500, DKRF505, DKRF505/XXS,
DKRF510, DKRF515, DKRF 517

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, 30.1.2023

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