

# MAIN CATALOGUE 2009/10

HUMIDITY AND TEMPERATURE MEASUREMENT



**rotronic**  
LEADING IN HUMIDITY MEASUREMENT

# HOW TO CONTACT ROTRONIC?

ROTRONIC is a family owned group of companies with headquarters in Switzerland, and subsidiaries and distributors world-wide. Contact information can be found at [www.rotronic-humidity.com](http://www.rotronic-humidity.com).

Rotronic Instruments (UK) Ltd is a wholly owned subsidiary of Rotronic AG, with a team of sales, technical and support staff dedicated to humidity measurement products.



## Buying from ROTRONIC UK

Contact our experienced sales team for product and application advice, current pricing and availability. Our field sales team offer on-site application consultancy and product technical support throughout the United Kingdom. Terms and conditions of trading see page 103.



## Warranty

All ROTRONIC products now have a 24 month warranty.



## Service and Calibration

Our technical support team offer a wide range of services including repairs, calibration and service contracts. Contact [service@rotronic.uk](mailto:service@rotronic.uk).



## The ROTRONIC UK Humidity team

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### Service and Calibration

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## Our Service to You

- Competitive prices
- High quality products
- ISO9001 production quality system
- Comprehensive 24 month warranty
- Dedicated team, specialising in humidity
- 48 hour turnaround on repairs and calibration on request
- UKAS calibration laboratory

INVESTOR IN PEOPLE



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## ROTRONIC: LEADING IN HUMIDITY MEASUREMENT

**ROTRONIC has been manufacturing humidity instruments since 1967. To provide our customers with the best precision and flexibility at competitive prices for a wide range of applications, we continuously develop our products to stay at the forefront of humidity measurement technology.**

All products are developed, manufactured and tested at our headquarters in Switzerland within an ISO 9001:2000 quality system. Our in-house SCS accredited calibration laboratory (SCS 065) and professional service team are able to repair and calibrate instruments even after many years of use. We also have a worldwide network of subsidiaries and distributors with specialists who have been trained in the sales and servicing of ROTRONIC products.

We have a dedicated team of development engineers and experts who work continuously on new designs and products enhancements. A team of technicians assemble the high quality products that will provide precise measurement results for many years. Additionally there is our service division and calibration laboratory, where probes are calibrated, adjusted and certified. If a problem should arise, instruments can be repaired or replaced within the shortest possible time.

With years of experience with humidity instrumentation, ROTRONIC is ideally placed to provide OEM solutions for almost any application. This is a convenient and affordable way for OEM's to access precise and customised measurement products without the high cost of development. Contact us, and we'll help you find the ideal solution.

### ROTRONIC benefits

- Comprehensive warranty
- Market leading accuracy
- ISO 9001 quality with adjustment certificate for all instruments
- Validated Windows software
- Products comply with all current industrial standards
- More than 40 years of experience in humidity measurement
- Environmentally conscious



# AIRCHIP3000 TECHNOLOGY



## Electronics.

ROTRONIC pioneered digital technology in humidity instruments with the HygroClip concept. After ten successful years, the time was right for new and advanced electronics.

The result of our intensive research and development work is the AirChip3000 found in the latest generation of our products, giving them a degree of flexibility, precision and functionality that was not previously possible.

This innovation in humidity and temperature measurement has much to offer:

- measures relative humidity, temperature and calculates dew point.
- excellent reproducibility
- conforms to FDA 21 CFR Part 11 and GAMP4 (audit trail)
- auto-diagnostics and digital multi-point adjustment
- can be used as a simulator tool for system qualification
- UART interface for digital data and two analog signals 0...1 V

ROTRONIC HygroClip2 probes can be connected to all new-generation instruments and interchanged without the need for further calibration or adjustment.



## Humidity sensors.

We have developed the Hygromer® sensor continuously since its introduction in 1979, always using the best materials and state of the art production techniques. Even today it still has the widest application range of any humidity sensor on the market at 0...100 %rh and -100...200 °C.

Its long term stability is legendary and many sensors manufactured 20 or more years ago are still in daily use today. It is also able to withstand exposure to condensation without influencing its calibration.

The Hygromer® sensor is used in all ROTRONIC products in the Hygromer® and HygroClip® ranges.



## Mechanical components.

Use of the right mechanical components is essential for precise measurement of humidity and temperature. The best humidity sensors and best electronic systems cannot compensate measurement errors caused by mechanical inadequacies at the point of measurement. ROTRONIC probes therefore combine excellent mechanical stability with optimal thermal properties to achieve the highest possible measurement performance.



## Accuracy.

HygroClip2 probes are adjusted according to international standards with an air flow of 1 m/s at 23 ±5 °C. Accuracy ranges between ±2 %rh / 0.3 K and ±0.5 %rh / 0.1 K depending on the product and adjustment profile selected. Accuracy specifications in this catalogue are defined by product comparison with the reference instruments used in our production plants (traceable to national standards). All the information in this catalogue is correct and true as at the time of publication. Subject to technical change without notice. Errors and omissions excepted.

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# HUMIDITY PROBES



## HYGROCLIP2 PROBE

The HygroClip2 is a completely new type of probe in a class of its own in terms of accuracy and performance. Thanks to the new AirChip3000 technology, it also boasts a unique calibration and adjustment process as well as many other superb innovations. At the same time ROTRONIC has taken humidity measurement technology to a whole new level of performance and reliability: the HygroClip2 offers you the best possible reproducibility and a superb system accuracy of  $\pm 0.8\% \text{rh}$  and  $\pm 0.1 \text{ K}$ .

The new HygroClip2 is available in various formats: from a simple plug-in probe for handheld instruments and data loggers to the highly developed cable probes for high temperature and other special applications, we can provide you with exactly the right probe to suit your needs. As standard, they all have high accuracy, which can be increased further by specific adjustments within our patented AirChip, making every probe in our range a high-end product for all applications.

### Applications

For HVAC monitoring & control, the pharmaceutical industry, building management systems, the paper industry, research, museums and many others.

### Highlights

- Measures relative humidity, temperature and dew/frost point
- Records up to 2,000 measurement pairs (%rh/°C)
- Range of application 0...100 %rh / -100...200 °C (depending on probe type)
- UART interface
- Self-testing function
- Trend indication

### HygroClip2 with AirChip3000 technology

- Compensates temperature and humidity at 30,000 reference points and can store 2,000 measurement pairs. If programmed by the user, it can self test and correct deviations automatically
- Freely configurable. Signal scaling, alarm limits and data logging intervals can be set by the user
- Active information and alarm generation
- Combines an ASIC (application specific integrated circuit), a microcontroller and a memory (EEPROM) on one micro-chip
- Thanks to the analog, freely scalable signal (2 x 0...1V) and the UART interface, it can be integrated not only in ROTRONIC products, but also in most OEM and customer solutions
- Can be interchanged in a few seconds without the need for readjustment
- Can be used as a reference in system qualification



## STANDARD CLIMATE PROBES

### Applications

HVAC, food stores, health inspection agencies, warehouse mapping, building automation systems, paper, textile and pharmaceutical industries

### Use

Handheld instruments, data loggers, transmitters, OEM systems

### Highlights

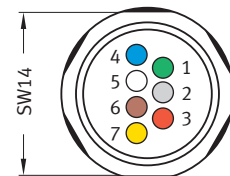
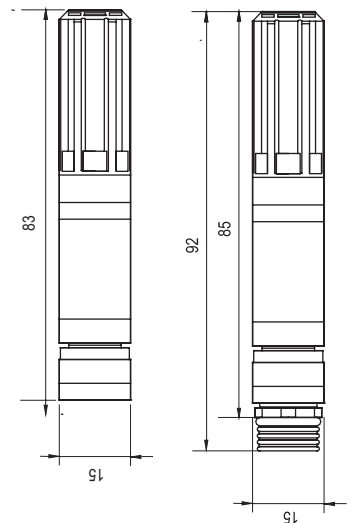
- Measures relative humidity, temperature and dew/frost point
- Saves up to 2,000 measurement pairs\*
- Range of application 0...100 %rh / -50...100 °C
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C
- Probe with adjustment profile 'Standard' factory adjustment certificate

| Order code    | HC2-S                        | HC2-SH            | HC2-S3            | HC2-S3H           |
|---------------|------------------------------|-------------------|-------------------|-------------------|
| Type          | Standard probe               |                   | Meteorology probe |                   |
| Material      | Polycarbonate housing        |                   |                   |                   |
| Color         | Anthracite                   |                   | White             |                   |
| Adjustment    | At 23 °C and 10, 35, 80 %rh  |                   |                   |                   |
| Accuracy      | ±0.8 %rh / ±0.1 K            | ±0.5 %rh / ±0.1 K | ±0.8 %rh / ±0.1 K | ±0.5 %rh / ±0.1 K |
| Weight        | Approx. 10 g                 |                   |                   |                   |
| Filter        | Polyethylene filter included |                   |                   |                   |
| Sensor        | Hygromer IN-1                |                   | Hygromer V-1      |                   |
| Response time | <15 s                        |                   | <15 s             |                   |

\* Optional, requires HW4 software

| Order code    | HC2-R                                               | HC2-R3       |
|---------------|-----------------------------------------------------|--------------|
| Type          | Exchange/refurbished probe with new humidity sensor |              |
| Material      | Polycarbonate housing                               |              |
| Color         | Anthracite                                          | White        |
| Adjustment    | At 23 °C and 10, 35, 80 %rh                         |              |
| Accuracy      | ±0.8 %rh / ±0.1 K                                   |              |
| Weight        | Approx. 10 g                                        |              |
| Filter        | Polyethylene filter included                        |              |
| Sensor        | Hygromer IN-1                                       | Hygromer V-1 |
| Response time | <15 s                                               | <15 s        |

\* Optional, requires HW4 software



Electrical connections:  
(all HygroClip2 probes with connector)

- 1 ● V+ (3.2 VDC to max. 5 VDC, ±0%; recommended: 3.3 VDC)
- 2 ● GND (ground, digital and power)
- 3 ● RXD (UART)
- 4 ● TXD (UART)
- 5 ○ Analog signal %rh (0...100 %rh=0...1 V)
- 6 ● Analog signal °C (-40...60 °C = 0...1 V)
- 7 ● AGND (analog ground)

## PROBES for measurements in confined spaces

### Applications

Measurements in packaging and small spaces where it is not possible to work with standard probes, concrete building structures, research applications, etc.

### Use

Handheld devices, data loggers, transmitters, OEM products

### Highlights

- Measures relative humidity, temperature and dew/frost point
- Saves up to 2,000 measurement pairs (optional, requires HW4 software)
- Range of application 0...100 %rh / -40...85 °C
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C
- Probe with 'Standard' adjustment profile, factory adjustment certificate

| Order code   | HC2-C04                               | HC2-C05                  |
|--------------|---------------------------------------|--------------------------|
| Type         | Cable probe, Ø 4 mm, cable length ~2m | Ø 5 mm, cable length ~2m |
| Material     | Stainless steel V2A                   | Brass, nickel-plated     |
| Handle color | Anthracite                            |                          |
| Adjustment   | At 23 °C and 10, 35, 80 %rh           |                          |
| Accuracy     | ±1.5 %rh / ±0.3 K                     |                          |
| Weight       | Approx. 150 g                         | Approx. 160 g            |

## HIGH-TEMP. HANDHELD PROBES 15 mm

### Applications

For measurements in air ducts, dryers, climatic chambers, etc. up to 200°C

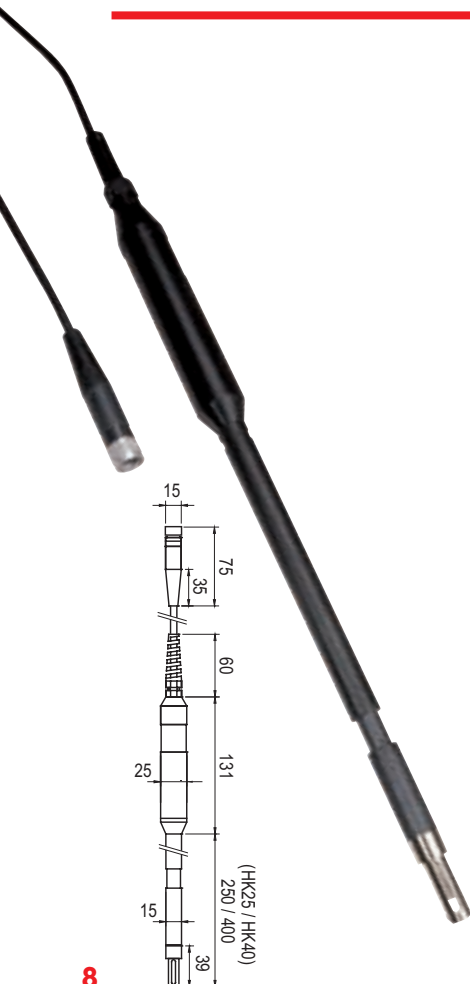
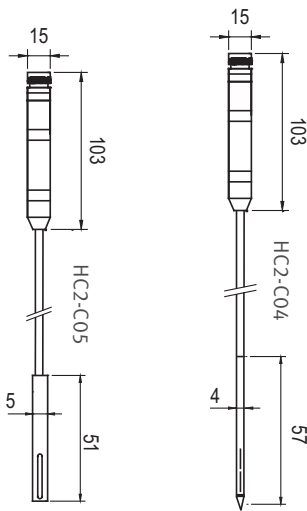
### Use

Handheld instruments and data loggers

### Highlights

- Measures relative humidity, temperature and dew/frost point
- Saves up to 2,000 measurement pairs (optional, requires HW4 software)
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C
- Probe with 'Standard' adjustment profile, factory adjustment certificate

| Order code     | HC2-HK25                                                             | HC2-HK40                    |
|----------------|----------------------------------------------------------------------|-----------------------------|
| Type           | Handheld probe ~2m TPU cable                                         |                             |
| Range of appl. | 0...100 %rh / -100...150 °C                                          | 0...100 %rh / -100...200 °C |
| Adjustment     | At 23 °C and 10, 35, 80 %rh                                          |                             |
| Accuracy       | ±0.8 %rh / ±0.1 K / Response time $\tau_{63}$ : without filter <15 s |                             |
| Probe length   | 250 mm                                                               | 400 mm                      |
| Handle color   | Anthracite                                                           |                             |
| Filter carrier | NSP-ME (order filter separately, see pages 99-100)                   |                             |
| Weight         | Approx. 210 g                                                        | Approx. 240 g               |



## INSERTION PROBE 5 mm, for measurements in bulk materials

### Applications

Measurements in dust-free bulk materials, granules, capsules and building materials such as concrete, bricks, etc. Temperature range of application to 85 °C

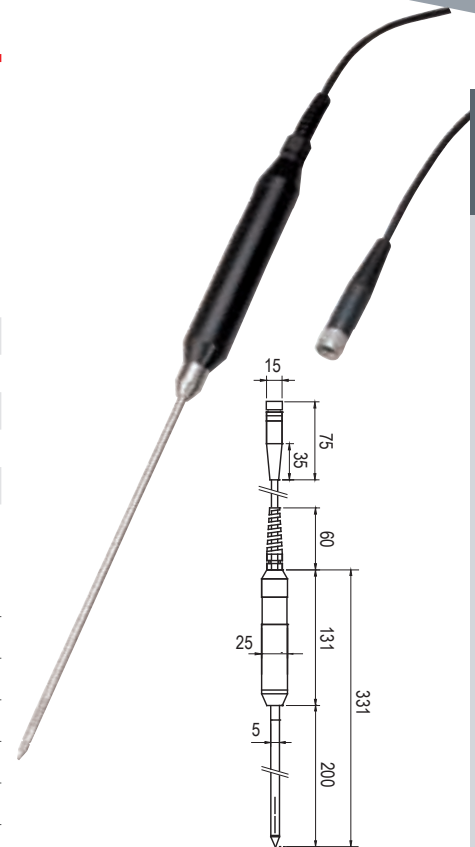
### Use

Handheld devices and data loggers

### Highlights

- Measures relative humidity, temperature and dew/frost point
- Saves up to 2,000 measurement pairs (optional, requires HW4 software)
- Range of application 0...100 %rh / -40...85 °C
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C
- Probe with 'Standard' adjustment profile, factory adjustment certificate

| Order code   | HC2-P05                                                     |
|--------------|-------------------------------------------------------------|
| Type         | Ø 5 x 200 mm, insertion probe with air slots, ~2m TPU cable |
| Adjustment   | At 23 °C and 10, 35, 80 %rh                                 |
| Accuracy     | ±1.5 %rh / ±0.3 K / Response time $\tau_{63}$ : <15 s       |
| Handle color | Anthracite                                                  |
| Weight       | Approx. 160 g                                               |



## INSERTION PROBES 10 mm, for measurements in bulk materials

### Applications

Measurements in dusty bulk materials such as flour, sugar and building materials such as concrete, sand etc. Temperature range of application to 85 °C

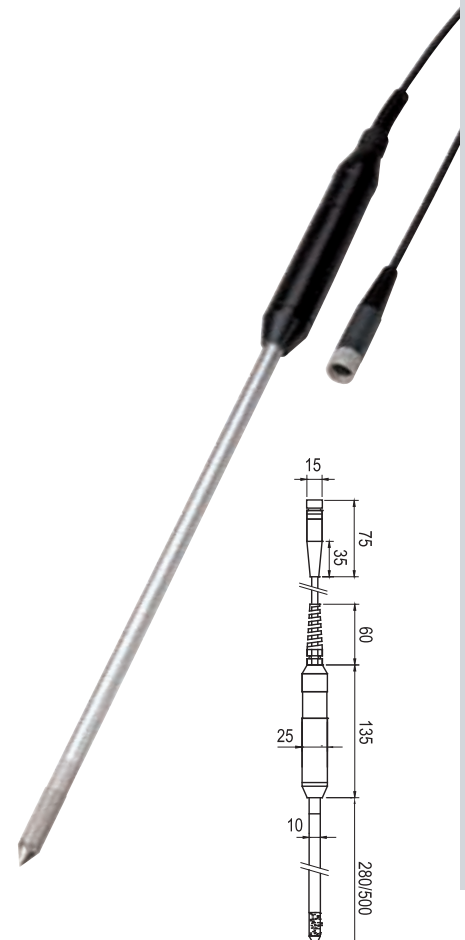
### Use

Handheld devices and data loggers

### Highlights

- Measures relative humidity, temperature and dew/frost point
- Saves up to 2,000 measurement pairs (optional, requires HW4 software)
- Range of application: 0...100 %rh / -40...85 °C
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C
- Probe with 'Standard' adjustment profile, factory adjustment certificate

| Order code          | HC2-HP28                                                | HC2-HP50 |
|---------------------|---------------------------------------------------------|----------|
| Type                | Insertion probe with steel sinter filter, ~2m TPU cable |          |
| Adjustment          | At 23 °C and 10, 35, 80 %rh                             |          |
| Accuracy            | ±0.8 %rh / ±0.1 K / Response time $\tau_{63}$ : <20 s   |          |
| Probe length        | 280 mm                                                  | 500 mm   |
| Handle color        | Anthracite                                              |          |
| Steel sinter filter | ET-Z10 included                                         |          |
| Weight              | Approx. 200 g                                           |          |



## SWORD PROBES 22 x 4 mm

### Applications

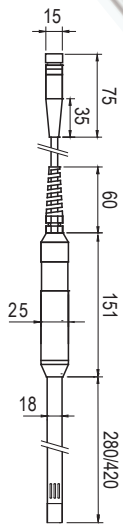
For measurement in stacks of paper, cardboard, textiles, etc.

### Use

Handheld instruments and data loggers

### Highlights

- Measures relative humidity, temperature and dew/frost point
- Saves up to 2,000 measurement pairs (requires HW4 software)
- Range of application: 0...100 %rh / -40...85 °C
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C
- Probe with 'Standard' adjustment profile, factory adjustment certificate



| Order code   | HC2-HS28                                      | HC2-HS42      |
|--------------|-----------------------------------------------|---------------|
| Type         | Sword probe with air slots, ~2m TPU cable     |               |
| Adjustment   | At 23 °C and 10, 35, 80 %rh                   |               |
| Accuracy     | ±0.8 %rh / ±0.1 K / Response time τ 63: <15 s |               |
| Probe length | 280 mm                                        | 420 mm        |
| Handle color | Anthracite                                    |               |
| Weight       | Approx. 240 g                                 | Approx. 300 g |

## INDUSTRIAL PROBES 15 mm

### Applications

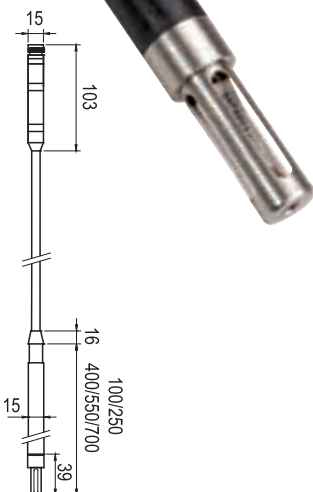
Measurements in all environments up to 200 °C such as industrial dryers and climatic chambers

### Use

Transmitters, handheld devices, data loggers, OEM products

### Highlights

- Measures relative humidity, temperature and dew/frost point
- Use as a reference for system validation
- Saves up to 2,000 measurement pairs (requires HW4 software)
- Range of application 0...100 %rh / -100...200 °C
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C
- Probe with 'Standard' adjustment profile, factory adjustment certificate



| Order code     | HC2-IC1xx*                                                      | HC2-IC3xx*    | HC2-IC4xx*    | HC2-IC5xx*    | HC2-IC7xx*   |
|----------------|-----------------------------------------------------------------|---------------|---------------|---------------|--------------|
|                | *xx = cable length in m (02, 05, etc), 80g per additional metre |               |               |               |              |
| Type           | PPS industrial probe with ROTRONIC connector                    |               |               |               |              |
| Adjustment     | At 23 °C and 10, 35, 80 %rh                                     |               |               |               |              |
| Accuracy       | ±0.8 %rh / ±0.1 K / Response time τ 63: without filter < 15 s   |               |               |               |              |
| Probe length   | 100 mm                                                          | 250 mm        | 400 mm        | 550 mm        | 700 mm       |
| Filter carrier | NSP-ME (order filter separately, see pages 99-100)              |               |               |               |              |
| Weight         | Approx. 230 g                                                   | Approx. 260 g | Approx. 290 g | Approx. 230 g | Approx. 250g |

## INDUSTRIAL PROBES 15 / 25 mm

### Applications

Measurements in all types of industrial processes and environments up to 200 °C

### Use

Handheld devices, data loggers, transmitters, OEM products

### Highlights

- Measures relative humidity, temperature and dew/frost point
- Use as reference for system validation
- Saves up to 2,000 measurement pairs (optional, requires HW4 software)
- Range of application 0...100 %rh / -100...200 °C
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C
- Probe with 'Standard' adjustment profile, factory adjustment certificate

| Order code     | HC2-IC3xx*-A                                                      | HC2-IC4xx*-A  | HC2-IC5xx*-A  | HC2-IC7xx*-A  |
|----------------|-------------------------------------------------------------------|---------------|---------------|---------------|
|                | *xx = cable length in m (02, 05) 80 g per m cable length          |               |               |               |
| Type           | PPS industrial probe with ROTRONIC connector                      |               |               |               |
| Adjustment     | At 23 °C and 10, 35, 80 %rh                                       |               |               |               |
| Accuracy       | ±0.8 %rh / ±0.1 K / Response time $\tau$ 63: without filter <15 s |               |               |               |
| Probe length   | 250 mm                                                            | 400 mm        | 550 mm        | 700 mm        |
| Filter carrier | NSP-ME (order filter separately, see pages 99-100)                |               |               |               |
| Weight         | Approx. 290 g                                                     | Approx. 320 g | Approx. 350 g | Approx. 380 g |



## INDUSTRIAL PROBES 15 mm

### Applications

Measurements in all types of industrial processes to 200 °C

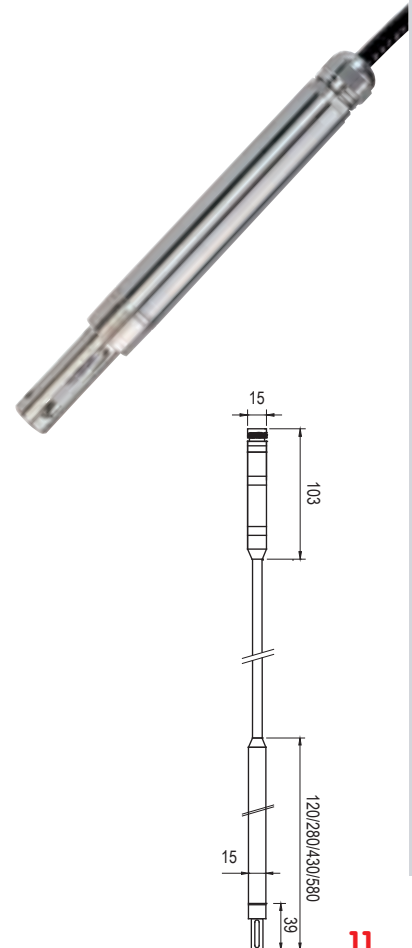
### Use

Handheld devices, data loggers, transmitters, OEM products

### Highlights

- Measures relative humidity, temperature and dew/frost point
- Use as a reference for system validation
- Saves up to 2,000 measurement pairs (optional, requires HW4 software)
- Range of application 0...100 %rh / -100...200 °C
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C
- Probe material: DIN 1.4305 or AISI 302 / AFNOR Z10 CNF 18-9
- Probe with 'Standard' adjustment profile, factory adjustment certificate

| Order code     | HC2-IM1xx*                                                        | HC2-IM3xx*    | HC2-IM4xx*    | HC2-IM5xx*    |
|----------------|-------------------------------------------------------------------|---------------|---------------|---------------|
|                | *xx = cable length in m (02, 05) 80 g per m cable length          |               |               |               |
| Type           | Industrial probe of chrome nickel steel with ROTRONIC connector   |               |               |               |
| Adjustment     | At 23 °C and 10, 35, 80 %rh                                       |               |               |               |
| Accuracy       | ±0.8 %rh / ±0.1 K / Response time $\tau$ 63: without filter <15 s |               |               |               |
| Probe length   | 120 mm                                                            | 280 mm        | 430 mm        | 580 mm        |
| Filter carrier | SP-MSB15 (order filter separately, see pages 99-100)              |               |               |               |
| Weight         | Approx. 260 g                                                     | Approx. 400 g | Approx. 540 g | Approx. 680 g |



## SCREW-IN PROBES

### Applications

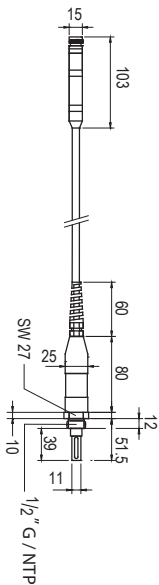
Measurements in all types of industrial processes  
up to 100 bar and to 200 °C

### Use

Transmitters, OEM products

### Highlights

- Measures relative humidity, temperature and dew/frost point
- Screw-in probe with ROTRONIC connector, steel housing
- Suitable for pressures up to 400bar (5800 psi)
- Saves up to 2,000 measurement pairs (optional, requires HW4 software)
- Range of application 0...100 %rh / -100...200 °C / 0...400 bar / 0...5800 PSI
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C
- Probe material: DIN 1.4305 or AISI 302 / AFNOR Z10 CNF 18-9
- Probe with 'Standard' adjustment profile, factory adjustment certificate



| Order code     | HC2-IE1xx*                                                        | HC2-IE3xx*                       |
|----------------|-------------------------------------------------------------------|----------------------------------|
|                | *xx = cable length in m (02, 05) 80 g per m cable length          |                                  |
| Type           | 1/2" G with ROTRONIC connector                                    | 1/2" NPT with ROTRONIC connector |
| Adjustment     | At 23 °C and 10, 35, 80 %rh                                       |                                  |
| Accuracy       | ±0.8 %rh / ±0.1 K / Response time $\tau$ 63: without filter <15 s |                                  |
| Filter carrier | SP-MSB15 (order filter separately, see pages 99-100)              |                                  |
| Weight         | Approx. 290 g                                                     |                                  |

## PROBES

| Detailed specifications               |                                                                                                                     |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Power supply / Connections            |                                                                                                                     |
| Supply voltage (VDD)                  | HC2-IC, HC2-IM and HC2-IE: 3.3 V $\pm$ 0.1 V, other types: 3.2 ...5.0 VDC $\pm$ 0%                                  |
| Nominal current consumption           | <4,0 mA at VDD = 3,3 VDC                                                                                            |
| Humidity measurement                  |                                                                                                                     |
| Sensor                                | ROTRONIC Hygromer® IN-1 (exception HC2-S3, Hygromer® V-1)                                                           |
| Measurement range                     | 0...100 %rh                                                                                                         |
| Accuracy at 23 °C                     | $\pm$ 0.8 %rh                                                                                                       |
| Repeatability                         | 0.3 %rh                                                                                                             |
| Long term stability                   | <1 %rh/year                                                                                                         |
| Temperature measurement               |                                                                                                                     |
| Sensor                                | Pt100 1/3 Class B                                                                                                   |
| Measurement range                     | -100...200 °C                                                                                                       |
| Accuracy at 23 °C                     | $\pm$ 0.1 K                                                                                                         |
| Repeatability                         | 0.05 °C                                                                                                             |
| Long term stability                   | <1 °C/year                                                                                                          |
| Response time                         | 4 sec for 63 % of the change from 23 to 80 °C (1 m/sec air flow at sensor)                                          |
| Calculated parameters                 |                                                                                                                     |
| Psychrometric calculations            | Dew point or frost point                                                                                            |
| Start-up time / Refresh rate          | <2 s / <0.9 s (main clock 5 MHz)                                                                                    |
| Configurable analogue outputs         |                                                                                                                     |
| Output 1 standard                     | Relative humidity; 0...100 %rh = 0...1 V                                                                            |
| Output 2 standard                     | Temperature -40...60 °C = 0...1 V                                                                                   |
| Scale limits                          | -999.99...+9999.99 units, user configurable with HW4 software                                                       |
| Digital interface (service connector) |                                                                                                                     |
| Type of interface                     | UART (universal asynchronous receiver transmitter)                                                                  |
| Maximum length service cable          | 5 m (16.4 ft) without signal amplifier                                                                              |
| General specifications                |                                                                                                                     |
| Housing material                      | Polycarbonate / ABS                                                                                                 |
| Connector material                    | Anodized anticorodal aluminium                                                                                      |
| Filter material                       | Depending on probe / filter type                                                                                    |
| Protection                            | IP 65                                                                                                               |
| CE/EMC compatibility                  | CE-compliant, 2007/108/EC<br>EN 61000-6-1: 2001, EN 61000-6-2: 2005<br>EN 61000-6-3: 2005, EN 61000-6-4: 2001 + A11 |
| Solder                                | Lead-free (RoHS-compliant)                                                                                          |
| FDA/GAMP compatibility                | FDA 21 CFR Part 11 / GAMP 4                                                                                         |
| Electronics operating range           | -50...100 °C / 0...100 %rh, non-condensing                                                                          |
| Max. air velocity at probe            | 40 m/s (7,870 ft/min)                                                                                               |

## PROBES FOR SPECIAL APPLICATIONS

We have probes with optimised sensors and/or filters that offer improved resistance to pollutants and other harmful substances in various special applications. They can be ordered with the order numbers given below and connected with a standard handheld, data logger or transmitters

### For all special applications involving pollutants and other harmful substances:

To attain optimum accuracy, probes should be calibrated at more regular intervals than usual and adjusted if necessary. ROTRONIC does not keep stock of special probes. It is the customer's responsibility to keep spare probe for critical application scenarios.

#### Hygromer HH sensor

The HH sensors were specifically developed for use in sterilization processes involving Hydrogen Peroxide ( $H_2O_2$ ).  $H_2O_2$  is very aggressive and will destroy every sensor sooner or later. The HH sensors are manufactured using a specific formula so that they can resist  $H_2O_2$  and other harmful substances or process chemicals for a longer period of time.

#### Hygromer V-1 sensor

The Hygromer V-1 sensors are based on the tried-and-tested IN-1 sensor. They were developed for applications with long periods of condensation as often occur in, for example, agricultural meteorology. Robust in construction, they have excellent long term stability and resistance to thawing. At <20 seconds, their response times are still very short. This also establishes the sensors for use in drying processes using alcohol in air. Such processes are often used in the food and pharmaceutical industries.

#### Hygromer M1R

The Hygromer M1R sensors are highly suitable for applications with rapid changes in climatic conditions as typically occur in, for example, high altitude meteorology.

They are used in weather balloons, which pass through immense differences in altitude with corresponding climatic changes in a very short time. The sensor has extremely short response times of <3 seconds and still reacts quickly at low temperatures. It may be used in temperatures ranging from -80...140 °C.

It is not possible to specify lifetimes for the sensors because they depend very fundamentally on the particular application. Depending on the humidity, temperature, pollutants/harmful substances involved and the number of cycles, they can vary immensely.

| Order code   | Application / Harmful substance / Problem           | Contains                                           |
|--------------|-----------------------------------------------------|----------------------------------------------------|
| HC2-S-HH     | Disinfection / Sterilization with $H_2O_2$          | HygroClip2 with Hygromer HH                        |
| HC2-IC102-HH | Applications with ozone                             | Industrial HygroClip2 (2 m cable) with Hygromer HH |
| HC2-S-V1     | Agricultural meteorology / Drying with alcohol      | HygroClip2 with Hygromer V1                        |
| HC-IC102-V1  | Climatic chambers to 200 °C                         | HygroClip2 with Hygromer V1                        |
| HC2-S-M1R    | Weather balloons: cold, rapid changes in conditions | HygroClip2 with ultra-fast Hygromer M1R            |



V-1 sensor



HH1-SK sensor



M3-R sensor

# TRANSMITTERS

## HYGROFLEX3 SERIES

The new HygroFlex3 series is the latest development in HVAC transmitters for relative humidity, temperature and dew point. Based on AirChip3000 technology, the transmitters offer high accuracy at a low cost.

The new generation boasts a unique calibration and adjustment process as well as many other unbeatable innovations. At the same time we have taken the sensor technology to a whole new level of performance and reliability:

The HygroFlex3 series offers you maximum reproducibility and a guaranteed system accuracy of  $\pm 2\%$  rh and  $\pm 0.3\text{ K}$ . The transmitters come in various versions and there are also thermostats/hygrostats available for the duct and wall versions. Many useful functions can be activated with the optional HW4 software.

### Applications

HVAC applications in cost-sensitive applications, building management systems, museums, libraries, etc.

### Highlights

- Unique calibration and adjustment process
- Highest reproducibility
- Guaranteed system accuracy of  $\pm 2\%$  rh and  $0.3\text{ K}$
- Space, wall and duct mount versions
- Many useful functions can be accessed with optional HW4 software



TECHNOLOGY

## HF3X SPACE MOUNT

### Applications

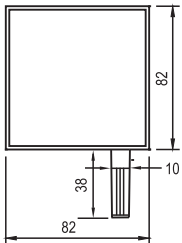
HVAC applications, cost-sensitive installations, building management systems, etc.

### Highlights and common features

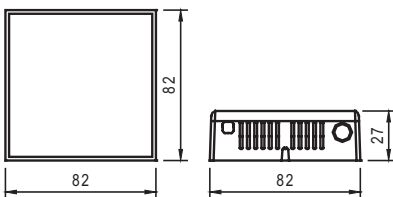
- Measures relative humidity, temperature and dew/frost point
- Range of application -40...60 °C; -10...60 °C with LCD, 0...100 %rh
- Automatic sensor test & drift compensation \*
- Saves up to 2,000 measurement pairs\*
- Use as simulator for system validation \*
- UART service interface
- Integrated, extractable probe
- Adjustment profile «Standard», factory certificate
- Adjusted at 23 °C and 10, 35, 80 %rh
- Accuracy:  $\pm 2$  %rh /  $\pm 0.3$  K



Type R



Type S



| Space version         | HF320-S series            | HF320-R series |
|-----------------------|---------------------------|----------------|
| Type                  | 2- or 2 x 2-wire          |                |
| Signals               | Signals freely scalable * |                |
| Probe                 | Fixed                     | Extractable    |
| Integrated LC display | Optional                  |                |

\* Optional, requires HW4 software

| Space version      | HF33x-S series                                   | HF33x-R series |
|--------------------|--------------------------------------------------|----------------|
| Type               | 3/4-wire                                         |                |
| Signals            | Signals freely selectable and scalable by user * |                |
| Probe              | Fixed                                            | Extractable    |
| Integrated display | Optional                                         |                |

\* Optional, requires HW4 software

## HF3 WALL & DUCT VERSIONS

### Applications

HVAC applications, cost-sensitive installations, building management systems, etc.

### Highlights and common features

- Measures relative humidity, temperature and dew/frost point
- Range of application -40...60 °C, 0...100 %rh
- Automatic sensor test & drift compensation \*
- Saves up to 2,000 measurement pairs\*
- Use as simulator for system validation \*
- UART service interface
- Adjustment profile «Standard», factory certificate
- Adjusted at 23 °C and 10, 35, 80 %rh
- Accuracy:  $\pm 2$  %rh /  $\pm 0.3$  K

| Duct version | HF320-D series           | HF33x-D series                          |
|--------------|--------------------------|-----------------------------------------|
| Type         | 2- or 2 x 2-wire         | 3/4-wire                                |
| Signals      | Signals freely scalable* | Signals freely selectable and scalable* |
| Filter       | Polyethylene filter      |                                         |

| Duct version         | HF346-D                                                   |
|----------------------|-----------------------------------------------------------|
| Type                 | Thermostat/Hygrostat with 2 single pole changeover relays |
| Switching range      | Scalable*                                                 |
| Switching parameters | Temperature, humidity, dew point                          |
| Switch points        | Potentiometer & LED for fine adjustment                   |

\* Optional, requires HW4 software

| Wall version | HF320-W series           | HF33x-W series                          |
|--------------|--------------------------|-----------------------------------------|
| Type         | 2- or 2 x 2-wire         | 3/4-wire                                |
| Signals      | Signals freely scalable* | Signals freely selectable and scalable* |
| Filter       | Polyethylene filter      |                                         |

| Wall version         | HF346-W                                                   |
|----------------------|-----------------------------------------------------------|
| Type                 | Thermostat/Hygrostat with 2 single pole changeover relays |
| Switching range      | Scalable*                                                 |
| Switching parameters | Temperature, humidity, dew point                          |
| Switch points        | Potentiometer & LED for fine adjustment                   |

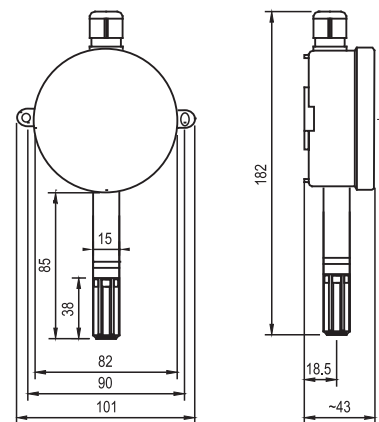
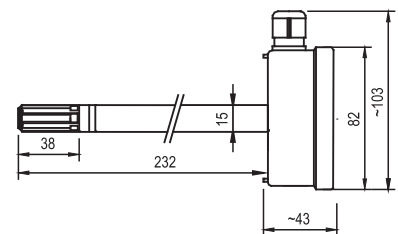
\* Optional, requires HW4 software



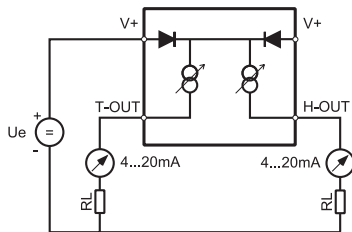
Duct version  
Type D



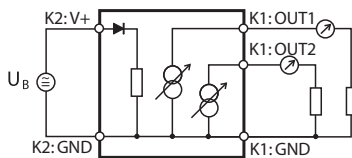
Wall version  
Type W



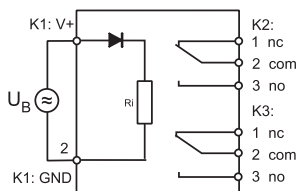
# TRANSMITTERS



Schematic 2-wire types



Schematic 3-wire types



Schematic hygrostat/thermostat

## Order information (for accessories see pages 99-102)

### HF3x transmitters with analog signals

#### Power supply and output signal type

|        |  |  |  |  |                                                           |
|--------|--|--|--|--|-----------------------------------------------------------|
| HF320- |  |  |  |  | 2- or 2 x 2-wire, <28 VDC,<br>common supply V+, 4...20 mA |
| HF331- |  |  |  |  | 3/4-wire (15...40 VDC / 12...28 VAC, 0...20 mA)           |
| HF332- |  |  |  |  | 3/4-wire (15...40 VDC / 12...28 VAC, 4...20 mA)           |
| HF333- |  |  |  |  | 3/4-wire (5...40 VDC / 5...28 VAC, 0...1 V)               |
| HF334- |  |  |  |  | 3/4-wire (10...40 VDC / 8...28 VAC, 0...5 V)              |
| HF335- |  |  |  |  | 3/4-wire (15...40 VDC / 12...28 VAC, 0...10 V)            |

#### Instrument type

|   |  |  |   |  |                                                                |
|---|--|--|---|--|----------------------------------------------------------------|
| D |  |  | X |  | Duct mount, Ø 15 x 235 mm (standard)                           |
| S |  |  |   |  | Space mount                                                    |
| R |  |  |   |  | Space mount with external sensor<br>(Accuracy: ±1 %rh / 0.2 K) |
| W |  |  | X |  | Wall mount, Ø 15 x 85 mm (standard)                            |

#### Output parameters

|   |  |  |   |   |   |                                      |
|---|--|--|---|---|---|--------------------------------------|
| B |  |  | X | X | X | Humidity (0...100 %rh) & temperature |
| H |  |  | X | X | X | Only humidity (0...100 %rh)          |
| T |  |  | X | X | X | Only temperature                     |
| A |  |  |   |   |   | Dew point & temperature              |

#### Standard scaling temperature \*

|   |   |  |  |  |                          |
|---|---|--|--|--|--------------------------|
| 1 | X |  |  |  | Temperature (0...50 °C)  |
| 6 | X |  |  |  | Temperature (0...100 °F) |

#### Optional display

|   |  |  |  |  |                                |
|---|--|--|--|--|--------------------------------|
| D |  |  |  |  | Backlit display (only HF33x-S) |
| X |  |  |  |  | Without display                |

#### Standard scaling dew point / frost point

|  |  |  |   |   |   |                |
|--|--|--|---|---|---|----------------|
|  |  |  | X | X | X | No calculation |
|  |  |  | X | B | X | -50...50       |
|  |  |  | X | C | X | -50...100      |

## Order information (for accessories see pages 99-102)

### Hygrostat / Thermostat HF346

#### Power supply

|        |  |  |  |  |                                      |
|--------|--|--|--|--|--------------------------------------|
| HF346- |  |  |  |  | 3/4-wire (18...40 VDC / 12...28 VAC) |
|--------|--|--|--|--|--------------------------------------|

#### Instrument type

|   |  |  |  |  |                                      |
|---|--|--|--|--|--------------------------------------|
| D |  |  |  |  | Duct mount, Ø 15 x 235 mm (standard) |
| W |  |  |  |  | Wall mount, Ø 15 x 85 mm (standard)  |

#### Output parameters relay

|   |   |   |   |   |   |                         |
|---|---|---|---|---|---|-------------------------|
| B |   |   | X | X |   | Humidity & temperature  |
| H | X | X | X | X |   | Only humidity           |
| T |   |   | X | X | X | Only temperature        |
| A |   |   |   |   | X | Temperature & dew point |

#### Control range potentiometer temperature \*

|   |   |  |  |  |            |
|---|---|--|--|--|------------|
| 1 | X |  |  |  | 0...50 °C  |
| 6 | X |  |  |  | 0...100 °F |

#### Control range potentiometer dew point / frost point \*

|   |   |  |  |  |          |
|---|---|--|--|--|----------|
| B | X |  |  |  | -50...50 |
|---|---|--|--|--|----------|

#### Control range potentiometer humidity\*

|   |   |  |  |  |             |
|---|---|--|--|--|-------------|
| 4 | X |  |  |  | 0...100 %rh |
|---|---|--|--|--|-------------|

\* Other scaling on request

## TRANSMITTERS

| Detailed specifications                |                                                                                        |                                                                |                   |
|----------------------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------|
| Power supply / Connections             | HF32                                                                                   | HF33                                                           | HF34              |
| Supply voltage                         | 10...28 VDC                                                                            | 15...40 VDC or                                                 | 8...40 VDC        |
|                                        | $V_{\min} = 10 \text{ V} + (0.02 \times \text{load}^*)$                                | 12...28 VAC                                                    | 12...28 VAC       |
| Current consumption                    | Max. 2 x 20 mA                                                                         | <50 mA                                                         | 44 mA             |
| Electrical connections                 | Type D and W: screw terminals and M16 cable gland<br>Type R & S: screw terminals       |                                                                | N/A               |
| Humidity measurement                   | HF32                                                                                   | HF33                                                           | HF34              |
| Sensor                                 | ROTRONIC Hygromer® IN-1                                                                |                                                                |                   |
| Measurement range                      | 0...100 %rh                                                                            |                                                                |                   |
| Accuracy at 23 °C                      | ±2.0 %rh (type D, S and W) / ±1.0 %rh (type R)                                         |                                                                | ±2.0 %rh          |
| Repeatability                          | 0.3 %rh                                                                                |                                                                |                   |
| Long term stability                    | <1 %rh/year                                                                            |                                                                |                   |
| Response time                          | Typically 10 s for 63% of a change 35 → 80 %rh (1 m/sec air flow at sensor)            |                                                                |                   |
| Temperature measurement                | HF32                                                                                   | HF33                                                           | HF34              |
| Sensor                                 | Pt100 1/3 Class B                                                                      |                                                                |                   |
| Measurement range                      | -40...60 °C / -40...140 °F                                                             |                                                                |                   |
| Accuracy at 23 °C                      | ±0.3 K (type D, S and W) / ±0.2 K (type R)                                             |                                                                |                   |
| Repeatability                          | 0.05 °C                                                                                |                                                                |                   |
| Long term stability                    | <0.1 °C/year                                                                           |                                                                |                   |
| Response time                          | 4 sec for 63 % of a change from 23 to 80 °C (1 m/sec air flow at sensor)               |                                                                |                   |
| Calculated parameters                  | HF32                                                                                   | HF33                                                           | HF34              |
| Psychrometric calculations             | Dew point or frost point                                                               |                                                                |                   |
| Start-up time                          | Typically 3.4 s                                                                        | Typically 1.9 s                                                |                   |
| Signal type (freely definable by user) | 4...20 mA                                                                              | 0...20 mA, 4...20 mA<br>0...1 V, 0...5 V, 0...10 V             | No analog signals |
| Scale limits                           | -999.99 ... +9999.99 units                                                             |                                                                |                   |
| *Minimum/Maximum load (in Ω)           | 0/500 Ω                                                                                | 0/500 Ω (current signal), min. 1000 Ω (voltage signal)         |                   |
| Optional display (only types R and S)  | LCD, 1 or 2 decimals,<br>without backlight                                             | LCD, 1 or 2 decimals,<br>with backlight<br>and trend indicator | N/A               |
| Probe material                         | Polycarbonate, except for types R and S                                                |                                                                | Polycarbonate     |
| Filter material                        | Polyethylene, except for types R and S                                                 |                                                                | Polyethylene      |
| Housing material / Protection          | ABS / IP 65, except for types R and S: IP 20                                           |                                                                |                   |
| Weight                                 | 90 g                                                                                   |                                                                | 105 g             |
| CE/EMC compatibility                   | EN 61000-6-1: 2001, EN 61000-6-2: 2005<br>EN 61000-6-3: 2005, EN 61000-6-4: 2001 + A11 |                                                                |                   |
| Solder                                 | Lead-free (RoHS-compliant)                                                             |                                                                |                   |
| Fire resistance                        | Conforms to UL94-HB                                                                    |                                                                |                   |
| FDA/GAMP compatibility                 | Conforms to FDA21 CFR Part 11 and GAMP4                                                |                                                                |                   |
| Electronics operating range            | -40...60 °C / -10...60 °C (models with display) 0...100 %rh, non-condensing            |                                                                |                   |
| Temperature limits at probe            | -40...60 °C                                                                            |                                                                |                   |
| Maximum wind velocity at probe         | 20 m/s (7,870 ft /min), except for types R and S                                       |                                                                |                   |
| Configurable relay outputs             | HF34                                                                                   |                                                                |                   |
| Switch point adjustment                | Potentiometer with scale (2 one-pole change-over relays)                               |                                                                |                   |
| Switch point limits                    | -999.99...+9999.99 units (potentiometer minimum and maximum)                           |                                                                |                   |
| Relay status indicator                 | LED (in housing)                                                                       |                                                                |                   |
| Breaking capacity                      | 250 VAC / 6 A at ohmic load                                                            |                                                                |                   |
| Service interface                      | UART IO D78F0114H (universal asynchronous receiver transmitter)                        |                                                                |                   |

# TRANSMITTERS

## HYGROFLEX4 SERIES

The new HygroFlex4 series is the latest development in HVAC transmitters for relative humidity, temperature and dew point. Based on AirChip3000 technology, these precision instruments achieve a new level of accuracy in this category of product, and are more precise than the HF3 series.

The new generation boasts a unique calibration and adjustment process as well as many other unbeatable innovations. At the same time we have taken the sensor technology to a whole new level of performance and reliability:

The HygroFlex4 series offers maximum reproducibility and a system accuracy of  $\leq \pm 1$  %rh and  $\pm 0.2$  K. The transmitters are available in wall and duct mount versions. Many useful functions can be activated with the optional HW4 software.

### Applications

High performance HVAC applications, building management systems, museums, libraries, etc.

### Highlights

- Unique calibration and adjustment process
- Highest reproducibility
- System accuracy of  $\leq \pm 1$  %rh and  $\pm 0.2$  K
- Wall and duct versions
- Many useful functions can be activated with the optional HW4 software



## HF4 WALL & DUCT VERSIONS

### Applications

HVAC applications, building management systems, museums, libraries, etc.

### Highlights and common features

- Measures relative humidity, temperature and dew/frost point
- Range of application -40...60 °C; -10...60 °C with LCD, 0...100 %rh
- Automatic sensor test & drift compensation \*
- Records up to 2,000 measurement pairs \*
- Use as a simulator for system validation \*
- UART service interface
- Integrated probe
- Adjustment profile «Standard», factory certificate
- Adjusted at 23 °C and 10, 35, 80 %rh
- Accuracy:  $\pm 1$  %rh /  $\pm 0.2$  K
- Can be mounted on a DIN rail (see accessories, page 102)

| Wall version | HF420-W series                                  | HF43x-W series                          |
|--------------|-------------------------------------------------|-----------------------------------------|
| Type         | 2- or 2 x 2-wire                                | 3/4-wire                                |
| Signals      | Signals freely scalable*                        | Signals freely selectable and scalable* |
| Features     | Alarm indicators, display and keypad (optional) |                                         |
| Filter       | Polyethylene filter                             |                                         |

| Duct version | HF420-D series                                    | HF43x-D series                          |
|--------------|---------------------------------------------------|-----------------------------------------|
| Type         | 2- or 2 x 2-wire                                  | 3/4-wire                                |
| Signals      | Signals freely scalable*                          | Signals freely selectable and scalable* |
| Features     | Horizontal version with display/keypad (optional) |                                         |
| Filter       | Polyethylene filter                               |                                         |

\* Requires HW4 software

For networkable transmitters see pages 76-81



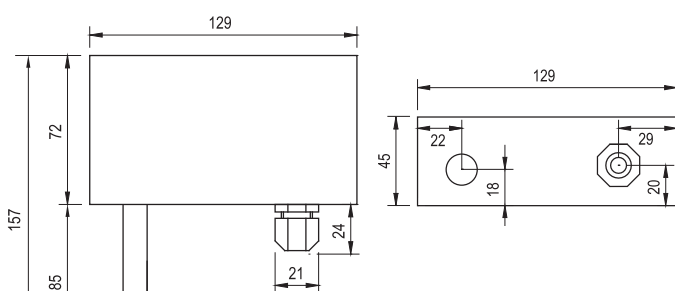
Wall version  
Type W



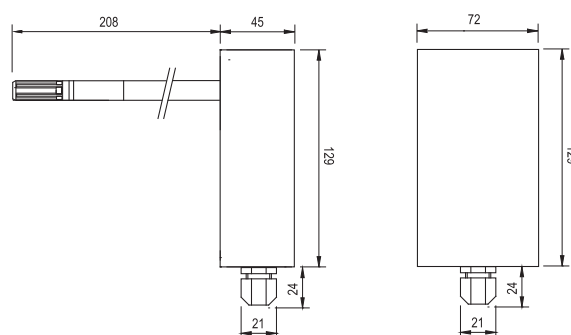
Duct version vertical mounting  
Type D



Duct version horizontal mounting  
Type D



HF4X wall version



HF4X duct version (vertical mounting)

## TRANSMITTERS

### Order information (for accessories see pages 99-102)

#### Transmitters with analog output signals

##### Power supply and output signal type

|        |  |  |  |  |  |  |                                                                                                   |
|--------|--|--|--|--|--|--|---------------------------------------------------------------------------------------------------|
| HF420- |  |  |  |  |  |  | 2- or 2 x 2-wire, <10...28 VDC, common V+, 4...20 mA<br>(Only display without backlight possible) |
| HF431- |  |  |  |  |  |  | 3/4-wire, 15...40 VDC / 12...28 VAC, 0...20 mA                                                    |
| HF432- |  |  |  |  |  |  | 3/4-wire, 15...40 VDC / 12...28 VAC, 4...20 mA                                                    |
| HF433- |  |  |  |  |  |  | 3/4-wire, 5...40 VDC / 5...28 VAC, 0...1 V                                                        |
| HF434- |  |  |  |  |  |  | 3/4-wire, 10...40 VDC / 8...28 VAC, 0...5 V                                                       |
| HF435- |  |  |  |  |  |  | 3/4-wire, 15...40 VDC / 12...28 VAC, 0...10 V                                                     |

##### Instrument type

|  |   |  |  |   |  |  |                          |
|--|---|--|--|---|--|--|--------------------------|
|  | D |  |  | X |  |  | Duct probe Ø 15 x 208 mm |
|  | W |  |  |   |  |  | Wall probe, Ø 15 x 85 mm |

##### Output parameters

|  |  |   |   |   |  |   |   |                         |
|--|--|---|---|---|--|---|---|-------------------------|
|  |  | B |   |   |  | X | X | Humidity & temperature  |
|  |  | H | X | X |  | X | X | Only humidity           |
|  |  | T |   |   |  | X | X | Only temperature        |
|  |  | A |   |   |  |   |   | Temperature & dew point |

##### Scaling of the output signals \* (humidity: always 0...100 %rh)

|  |  |  |   |   |  |  |  |                              |
|--|--|--|---|---|--|--|--|------------------------------|
|  |  |  | X | X |  |  |  | No temperature output signal |
|  |  |  | 1 | X |  |  |  | 0...50 °C                    |
|  |  |  | 2 | X |  |  |  | 10...40 °C                   |
|  |  |  | 3 | X |  |  |  | -40...60 °C                  |
|  |  |  | 4 | X |  |  |  | -30...70 °C                  |
|  |  |  | 5 | X |  |  |  | -40...85 °C                  |
|  |  |  | 6 | X |  |  |  | 0...100 °F                   |
|  |  |  | 7 | X |  |  |  | 0...200 °F                   |
|  |  |  | 9 | X |  |  |  | -50...200 °F                 |

##### Optional display

|  |  |  |  |   |  |  |                                                       |
|--|--|--|--|---|--|--|-------------------------------------------------------|
|  |  |  |  | D |  |  | Display with backlight (only for horizontal mounting) |
|  |  |  |  | X |  |  | No display                                            |

##### Electrical connections (analogue signals to terminals)

|  |  |  |  |   |  |                                                                    |
|--|--|--|--|---|--|--------------------------------------------------------------------|
|  |  |  |  | 1 |  | M16 x 1.5 cable gland (horizontal, type D with display and type W) |
|  |  |  |  | 2 |  | M16 x 1.5 cable gland (vertical, type D without display)           |
|  |  |  |  | 3 |  | 1/2" conduit adapter (horizontal, type D with display and type W)  |
|  |  |  |  | 4 |  | 1/2" conduit adapter (vertical, type D without display)            |

##### Standard scaling dew point / frost point

|  |  |  |  |  |  |   |   |                |
|--|--|--|--|--|--|---|---|----------------|
|  |  |  |  |  |  | X | X | No calculation |
|  |  |  |  |  |  | B | X | -50...50 °C    |
|  |  |  |  |  |  | C | X | -50...100 °C   |
|  |  |  |  |  |  | D | X | -50...200 °F   |

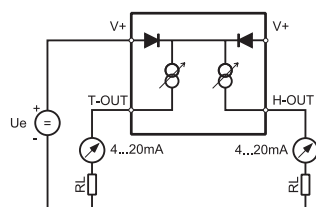
\* Others on request

#### Off-the-shelf types:

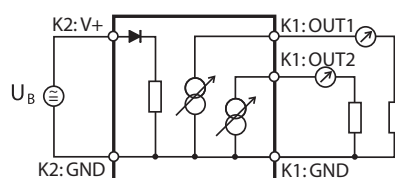
|               |                |                                                 |
|---------------|----------------|-------------------------------------------------|
| Duct version: | HF420-DB1XX2XX | 2-wire, → 4...20 mA = 0...100 %rh / 0...50 °C   |
|               | HF432-DB1XX2XX | 3/4-wire, → 4...20 mA = 0...100 %rh / 0...50 °C |
| Wall version: | HF420-WB1XX1XX | 2-wire, → 4...20 mA = 0...100 %rh / 0...50 °C   |
|               | HF432-WB1XX1XX | 3/4-wire, → 4...20 mA = 0...100 %rh / 0...50 °C |

# TRANSMITTERS

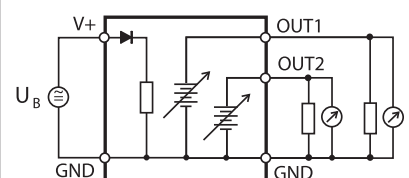
| Detailed specifications       |                                                                                  |                                                                                        |
|-------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Power supply / Connections    | HF42                                                                             | HF43                                                                                   |
| Supply voltage                | 10...28 VDC<br>V min = 10 V + (0.02 x load*)                                     | 15...40 VDC / 12...28 VAC                                                              |
| Current consumption           | 2 x 20 mA                                                                        | <50 mA                                                                                 |
| Electrical connections        | Screw terminals and M16 cable gland or 1/2" conduit adapter                      |                                                                                        |
| Humidity measurement          | HF42                                                                             | HF43                                                                                   |
| Sensor                        | ROTRONIC Hygromer® IN-1                                                          |                                                                                        |
| Measurement range             | 0...100 %rh                                                                      |                                                                                        |
| Accuracy at 23 °C             | ±1.0 %rh                                                                         |                                                                                        |
| Repeatability                 | 0.3 %rh                                                                          |                                                                                        |
| Long term stability           | <1 %rh/year                                                                      |                                                                                        |
| Response time                 | Typically 10 s for 63% of a change from 35 → 80 %rh (1 m/sec air flow at sensor) |                                                                                        |
| Temperature measurement       | HF42                                                                             | HF43                                                                                   |
| Sensor                        | Pt100 1/3 Class B                                                                |                                                                                        |
| Measurement range             | -50...100 °C / -58...212 °F                                                      |                                                                                        |
| Accuracy at 23 °C             | ±0.2 K                                                                           |                                                                                        |
| Repeatability                 | 0.05 °C                                                                          |                                                                                        |
| Long term stability           | <0.1 °C/year                                                                     |                                                                                        |
| Response time                 | Typically 4 s for 63 % of a change from 23 to 80 °C (1 m/sec air flow at sensor) |                                                                                        |
| Calculated parameters         | HF42                                                                             | HF43                                                                                   |
| Psychrometric calculations    | Dew point or frost point                                                         |                                                                                        |
| Start-up time                 | Typically 3.4 s                                                                  | Typically 1.9 s                                                                        |
| Signal type                   | 4...20 mA                                                                        | 0...20 mA, 4...20 mA, 0...1 V, 0...5 V, 0...10 V<br>Definable by user                  |
| *Minimum/Maximum load (in Ω)  | 0/500 Ω                                                                          | 0/500 Ω (current signal), min. 1000 Ω (voltage signal)                                 |
| Service interface             | UART IO D78F0114H (universal asynchronous receiver transmitter)                  |                                                                                        |
| Service cable maximum length  | 5 m (16.4 ft)                                                                    |                                                                                        |
| General specifications        | HF42                                                                             | HF43                                                                                   |
| Optional display              | LCD, 1 or 2 decimals,<br>without backlight                                       | LCD, 1 or 2 decimals,<br>with backlight and trend indicators                           |
| Probe material                | Polycarbonate                                                                    |                                                                                        |
| Filter material               | Polyethylene                                                                     |                                                                                        |
| Housing material / Protection | ABS / IP 65 (except with USB or Ethernet interface)                              |                                                                                        |
| Weight                        | 250 g                                                                            |                                                                                        |
| CE/EMC compatibility          | EMC Directive 2004/108/EC:                                                       | EN 61000-6-1: 2001, EN 61000-6-2: 2005<br>EN 61000-6-3: 2005, EN 61000-6-4: 2001 + A11 |
| Solder                        | Lead-free (RoHS-compliant)                                                       |                                                                                        |
| Fire resistance               | Conforms to UL94-HB                                                              |                                                                                        |
| FDA/GAMP compatibility        | Conforms to 21 CFR Part 11 and GAMP4                                             |                                                                                        |
| Electronics operating range   | -40...60 °C / (models with display: -10...60 °C) 0...100 %rh, non-condensing)    |                                                                                        |
| Temperature limits at probe   | -50...100 °C                                                                     |                                                                                        |
| Maximum air velocity at probe | 20 m/s (7,870 ft /min)                                                           |                                                                                        |



Schematic 2-wire types



Schematic 3-wire current signal



Schematic 3-wire voltage signal

# TRANSMITTERS

## HYGROFLEX5 SERIES

The HygroFlex5 series offers you ultimate performance and flexibility thanks to its interchangeable HygroClip2 probes. The transmitters come in wall and duct mount versions. Many useful functions can be accessed with optional HW4 software.

HF5-Series is available with analog and digital outputs, so compatibility with almost any monitoring or control system is assured. Digital versions may be networked together to form a dedicated environmental monitoring system using HW4 software.

The new generation device not only has a unique calibration and adjustment process, but also allows probes to be interchanged in just a few seconds. This easy interchangeability during operation reduces down-time and service costs to a huge extent. The possibility of using every probe as a simulator with fixed output values is a big advantage for system validation. In the case of networked devices this can even be carried out online from a remote PC workstation.

### Applications

High specification HVAC applications, building management systems, museums, libraries, environmental monitoring systems.

### Highlights

- Unique calibration and adjustment process
- Highest reproducibility
- Wall and duct versions; the wall version also serves for the connection of cable based probes
- Many useful functions can be activated with the optional HW4 software



## HF5 WALL & DUCT VERSIONS

### Applications

HVAC applications, building management systems, museums, libraries, etc.

### Highlights and common features

- Probe interchangeable in just a few seconds
- Measures relative humidity, temperature and dew/frost point
- Calculates all psychrometric values
- Range of application -40...60 °C; -10...60 °C with LCD, 0...100 %rh
- Automatic sensor test & drift compensation \*
- Use as a simulator for system validation \*
- UART service interface
- Precision: dependent on the probe and adjustment profile used
- Can be mounted on a DIN rail (see accessories, page 102)
- Suitable probes: all HygroClip2 (HC2x) probes (ordered separately)
- Includes flange for duct mounting

| Wall version | HF52-W series                                                                     | HF53-W series                           |
|--------------|-----------------------------------------------------------------------------------|-----------------------------------------|
| Type         | 2- or 2 x 2-wire                                                                  | 3/4-wire                                |
| Signals      | Signals freely scalable*                                                          | Signals freely selectable and scalable* |
| Features     | Alarm indicators, display and keypad (optional)<br>Optional USB & RS485 interface |                                         |

| Duct version | HF520-D series                                  | HF53x-D series                          |
|--------------|-------------------------------------------------|-----------------------------------------|
| Type         | 2- or 2 x 2-wire                                | 3/4-wire                                |
| Signals      | Signals freely scalable*                        | Signals freely selectable and scalable* |
| Features     | Alarm indicators, display and keypad (optional) |                                         |

\* Optional, requires HW4 software

Note: Version without display for vertical mounting



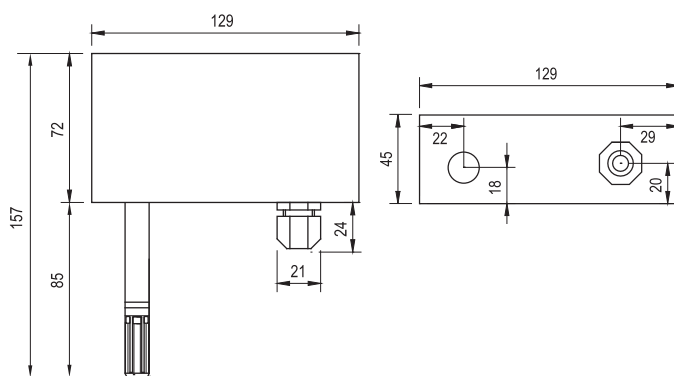
Wall version  
Type W



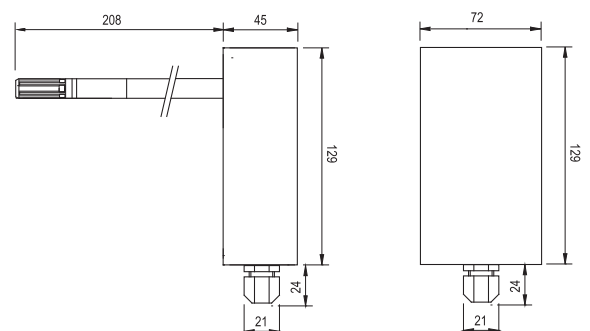
Duct version vertical mounting  
Type D



Duct version horizontal mounting  
Type D



HF5x wall version



HF5x duct version (vertical mounting)

# TRANSMITTERS

## Order information (for accessories see pages 99-102)

HF5 transmitters with analog signals

Power supply and output signal type

|        |  |  |  |  |  |  |                                                            |
|--------|--|--|--|--|--|--|------------------------------------------------------------|
| HF520- |  |  |  |  |  |  | 2- or 2 x 2-wire, <10...28 VDC common supply V+, 4...20 mA |
|        |  |  |  |  |  |  | Only display without backlight possible                    |
| HF531- |  |  |  |  |  |  | 3/4-wire (15...40 VDC / 12...28 VAC, 0...20 mA)            |
| HF532- |  |  |  |  |  |  | 3/4-wire (15...40 VDC / 12...28 VAC, 4...20 mA)            |
| HF533- |  |  |  |  |  |  | 3/4-wire (5...40 VDC / 5...28 VAC, 0...1 V)                |
| HF534- |  |  |  |  |  |  | 3/4-wire (10...40 VDC / 8...28 VAC, 0...5 V)               |
| HF535- |  |  |  |  |  |  | 3/4-wire (15...40 VDC / 12...28 VAC, 0...10 V)             |

Instrument type

|  |   |  |  |  |   |  |                            |
|--|---|--|--|--|---|--|----------------------------|
|  | D |  |  |  | X |  | Duct mount , Ø 15 x 208 mm |
|  | W |  |  |  |   |  | Wall mount                 |

Output parameters \*

|  |   |   |   |  |   |   |                                                          |
|--|---|---|---|--|---|---|----------------------------------------------------------|
|  | B |   |   |  | X | X | Humidity & temperature                                   |
|  | H | X | X |  | X | X | Only humidity                                            |
|  | T |   |   |  | X | X | Only temperature                                         |
|  | 1 | X | X |  |   |   | Humidity & dew point                                     |
|  | A |   |   |  |   |   | Temperature & dew point                                  |
|  | C |   |   |  |   |   | Temperature & wet bulb temperature (Tw) in °C            |
|  | D |   |   |  |   |   | Temperature & enthalpy (H) in kJ/kg                      |
|  | E |   |   |  |   |   | Temperature & specific humidity (Q) in g/kg              |
|  | F |   |   |  |   |   | Temperature & absolute humidity (Dv) in g/m <sup>3</sup> |
|  | G |   |   |  |   |   | Temperature & mixing ratio (R) in g/kg                   |

Further calculations are possible. Please consult our price list in this regard.

Scaling of the output signals \* (humidity: always 0...100 %rh)

|  |  |   |   |  |  |  |                              |
|--|--|---|---|--|--|--|------------------------------|
|  |  | X | X |  |  |  | No temperature output signal |
|  |  | 1 | X |  |  |  | 0...50 °C                    |
|  |  | 2 | X |  |  |  | 10...40 °C                   |
|  |  | 3 | X |  |  |  | -40...60 °C                  |
|  |  | 4 | X |  |  |  | -30...70 °C                  |
|  |  | 5 | X |  |  |  | -40...85 °C                  |
|  |  | 6 | X |  |  |  | 0...100 °F                   |
|  |  | 7 | X |  |  |  | 0...200 °F                   |
|  |  | 8 | X |  |  |  | 0...300 °F                   |
|  |  | 9 | X |  |  |  | -50...200 °F                 |

Optional display

|  |  |  |  |  |   |  |                                                       |
|--|--|--|--|--|---|--|-------------------------------------------------------|
|  |  |  |  |  | D |  | Display with backlight (only for horizontal mounting) |
|  |  |  |  |  | X |  | No display                                            |

Electrical connections (analogue signals to terminals) & interfaces

|  |  |  |  |  |   |  |                                                                                 |
|--|--|--|--|--|---|--|---------------------------------------------------------------------------------|
|  |  |  |  |  | 1 |  | M16 x 1.5 cable gland, only analogue signals, horizontal mounting               |
|  |  |  |  |  | 2 |  | M16 x 1.5 cable gland, vertical mounting without display, only analogue signals |
|  |  |  |  |  | 7 |  | M16 x 1.5 & USB & RS485, communication interface, horizontal mounting           |

Scaling of the calculated output parameters \*

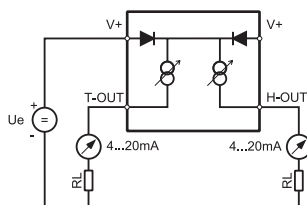
|  |  |  |  |  |   |   |                |
|--|--|--|--|--|---|---|----------------|
|  |  |  |  |  | X | X | No calculation |
|  |  |  |  |  | B | X | -50...50       |
|  |  |  |  |  | C | X | -50...100      |
|  |  |  |  |  | D | X | -50...200      |

\* Others on request

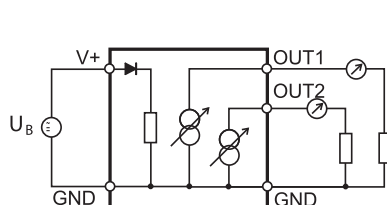
# TRANSMITTERS

## Detailed specifications

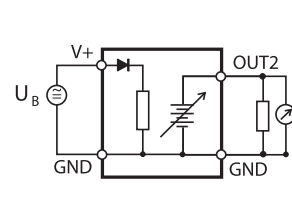
| Power supply / Connections         | HF52                                                                                  | HF53                                                                                   |
|------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Supply voltage                     | 10...28 VDC, 4...20 mA current loop<br>$V_{min} = 10 V + (0.02 \times \text{load}^*)$ | 15...40 VDC / 12...28 VAC<br>at 500 $\Omega$                                           |
| Current consumption                | 2 x 20 mA                                                                             | <50 mA                                                                                 |
| Electrical connections             | Screw terminals and M16 cable gland or 1/2" conduit adapter                           |                                                                                        |
| Humidity measurement               | HF52                                                                                  | HF53                                                                                   |
| Sensor                             | ROTRONIC Hygromer® IN-1 (depending on the HygroClip2 used)                            |                                                                                        |
| Measurement range                  | 0...100 %rh                                                                           |                                                                                        |
| Accuracy at 23 °C                  | ± 0.8 %rh (probe dependent)                                                           |                                                                                        |
| Repeatability                      | 0.3 %rh                                                                               |                                                                                        |
| Long term stability                | <1 %rh/year                                                                           |                                                                                        |
| Response time                      | Typically 10 s for 63 % of a jump 35 → 80 %rh (1 m/sec air flow at sensor)            |                                                                                        |
| Temperature measurement            | HF52                                                                                  | HF53                                                                                   |
| Sensor                             | Pt100 1/3 Class B (in all HygroClip2 probes)                                          |                                                                                        |
| Measurement range                  | -100...200 °C / -148...392 °F                                                         |                                                                                        |
| Accuracy at 23 °C                  | ±0.1 K (probe dependent)                                                              |                                                                                        |
| Repeatability                      | 0.05 °C                                                                               |                                                                                        |
| Long term stability                | <0.1 °C/year                                                                          |                                                                                        |
| Response time                      | Typically 4 s for 63 % of a change from 23 to 80 °C (1 m/sec air flow at sensor)      |                                                                                        |
| Calculated parameters              | HF52                                                                                  | HF53                                                                                   |
| Psychrometric calculations         | All types available                                                                   |                                                                                        |
| Start-up time                      | Typically 3.4 s                                                                       | Typically 1.9 s                                                                        |
| Signal type (selectable by jumper) | 4...20 mA                                                                             | 0...20 mA, 4...20 mA, 0...1 V, 0... 5 V, 0...10 V                                      |
| Scale limits                       | -999.99...+9999.99 units, user scaleable                                              |                                                                                        |
| * Maximum load (in $\Omega$ )      | 0/500 $\Omega$                                                                        | 0/500 $\Omega$ (current signal),<br>min. 1000 $\Omega$ (voltage signal)                |
| Type of interface                  | USB or Ethernet TCP/IP (cable connection or wireless) & RS485                         |                                                                                        |
| Service interface                  | UART (universal asynchronous receiver transmitter) on mini USB connector              |                                                                                        |
| Service cable maximum length       | 5 m (16.4 ft)                                                                         |                                                                                        |
| Optional display                   | LCD, 1 or 2 decimals,<br>without backlight                                            | LCD, 1 or 2 decimals,<br>with backlight and trend indicator                            |
| Probe material                     | Polycarbonate                                                                         |                                                                                        |
| Filter material                    | Polyethylene                                                                          |                                                                                        |
| Housing material / Protection      | ABS / IP 65 (except for models with USB interface)                                    |                                                                                        |
| Weight                             | Approx. 250 g                                                                         |                                                                                        |
| CE/EMC compatibility               | EMC Directive 2004/108/EC                                                             | EN 61000-6-1: 2001, EN 61000-6-2: 2005<br>EN 61000-6-3: 2005, EN 61000-6-4: 2001 + A11 |
| Solder                             | Lead free (RoHS-compliant)                                                            |                                                                                        |
| Fire resistance                    | Conforms to UL94-HB                                                                   |                                                                                        |
| FDA/GAMP compatibility             | Conforms to FDA 21CFR Part 11 and GAMP4                                               |                                                                                        |
| Electronics operating range        | -40...60 °C / (models with display: -10...60 °C) 0...100 %rh, non-condensing          |                                                                                        |
| Maximum wind velocity at probe     | 40 m/s (7,870 ft/min)                                                                 |                                                                                        |



Schematic 2-wire types



Schematic 3-wire current signal



Schematic 3-wire voltage signal

# TRANSMITTERS



## HYGROFLEX6 SERIES

HygroFlex6 series provides the highest specification and widest range of configurations for industrial applications. The transmitters come in wall, cable and duct versions. Many useful functions can be activated with the optional HW4 software. The measuring circuits of the HF6x series are galvanically isolated.

This new instrument generation not only boasts a unique calibration and adjustment process, but also allows every transmitter to be used as a simulator with fixed values. This is a big advantage for system validation. In the case of networked transmitters this can even be done online from a PC running ROTRONIC HW4 software.

### Applications

HVAC applications, building management systems, museums, libraries, etc.

### Highlights

- Unique calibration and adjustment process
- Highest reproducibility
- Wall, duct and cable versions
- Many useful functions can be activated with the optional HW4 software

## HF6 WALL/CABLE MOUNT

### Applications

HVAC applications, building management systems, museums, libraries, etc.

### Highlights and common features

- Measures relative humidity, temperature and dew/frost point
- Electronics operating range -40...60 °C; -10...60 °C with LCD, 0...100 %rh
- Automatic sensor test & drift compensation \*
- Saves up to 2,000 measurement pairs \*
- Use as a simulator for system validation \*
- UART service interface
- Integrated probe
- Adjustment profile «Standard», factory certificate
- Adjusted at 23 °C and 10, 35, 80 %rh
- Accuracy:  $\pm 1$  %rh /  $\pm 0.2$  K
- Mains or low voltage power supply

| Wall mount | HF624-W series                                  | HF63x-W series                          |
|------------|-------------------------------------------------|-----------------------------------------|
| Type       | 2- or 2 x 2-wire, galvanically isolated         | 3/4-wire                                |
| Signals    | Signals freely scalable*                        | Signals freely selectable and scalable* |
| Features   | Alarm indicators, display and keypad (optional) |                                         |
| Filter     | Polyethylene filter                             |                                         |

| Cable mount | HF624-2 series                                                              | HF63x-2 series                          |
|-------------|-----------------------------------------------------------------------------|-----------------------------------------|
| Type        | 2- or 2 x 2-wire, galvanically isolated                                     | 3/4-wire                                |
| Signals     | Signals freely scalable*                                                    | Signals freely selectable and scalable* |
| Features    | Alarm indicators, display and keypad (optional)<br>PPS probe with 2 m cable |                                         |
| Filter      | Polyethylene filter                                                         |                                         |

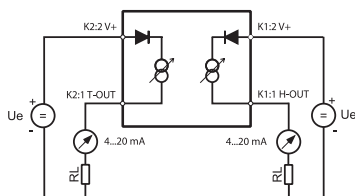
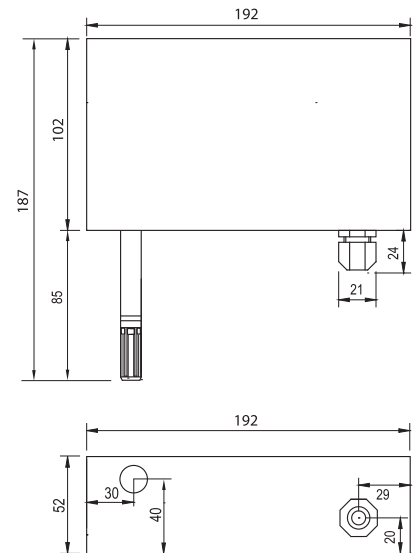
\* Optional, requires HW4 software



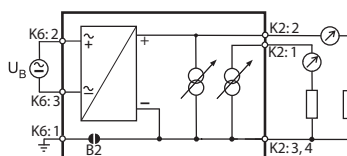
Wall version  
Type W



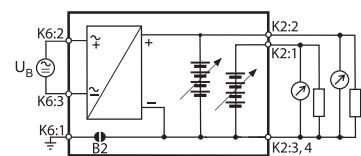
Cable version  
Type 2



Schematic 2-wire types



Schematic 3-wire current signal  
Low voltage



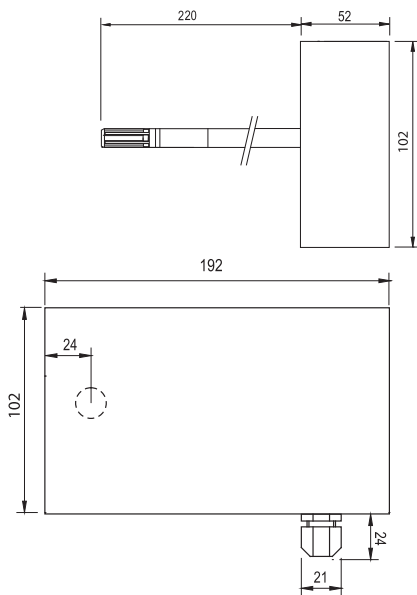
Schematic 3-wire voltage signal  
Low voltage



Duct version  
Type D



Duct version  
Type D



## HF6 DUCT MOUNT

### Applications

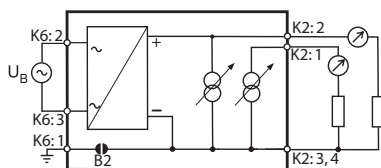
HVAC applications, building management systems etc.

### Highlights and common features

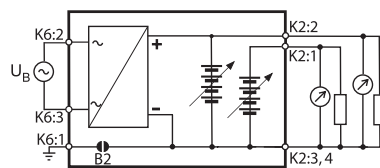
- Measures relative humidity, temperature and dew/frost point
- Range of application -40...60 °C, 0...100 %rh
- Automatic sensor test & drift compensation \*
- Saves up to 2,000 measurement pairs \*
- Use as a simulator for system validation \*
- UART service interface
- Integrated probe
- Adjustment profile «Standard», factory adjustment certificate
- Adjusted at 23 °C and 10, 35, 80 %rh
- Accuracy:  $\pm 1$  %rh /  $\pm 0.2$  K
- Mains or low voltage power supply

| Duct version | HF624-D series                                  | HF63xD series                           |
|--------------|-------------------------------------------------|-----------------------------------------|
| Type         | 2- or 2 x 2-wire, galvanically isolated         | 3/4-wire                                |
| Signals      | Signals freely scalable*                        | Signals freely selectable and scalable* |
| Features     | Alarm indicators, display and keypad (optional) |                                         |
| Filter       | Polyethylene filter                             |                                         |

\* Optional, requires HW4 software



Schematic 3-wire current signal  
Mains voltage power supply



Schematic 3-wire voltage signal  
Mains voltage power supply

# TRANSMITTERS

## Order information (for accessories see pages 99-102)

### Transmitters with analog output signals

#### Power supply and output signal type

|        |  |  |  |  |  |  |  |                                                 |
|--------|--|--|--|--|--|--|--|-------------------------------------------------|
| HF624- |  |  |  |  |  |  |  | 2 x 2-wire, <10...28 VDC, galvanically isolated |
| HF631- |  |  |  |  |  |  |  | 3/4-wire, 15...40 VDC / 12...28 VAC, 0...20 mA  |
| HF632- |  |  |  |  |  |  |  | 3/4-wire, 15...40 VDC / 12...28 VAC, 4...20 mA  |
| HF633- |  |  |  |  |  |  |  | 3/4-wire, 5...40 VDC / 5...28 VAC, 0...1 V      |
| HF634- |  |  |  |  |  |  |  | 3/4-wire, 10...40 VDC / 8...28 VAC, 0...5 V     |
| HF635- |  |  |  |  |  |  |  | 3/4-wire, 15...40 VDC / 12...28 VAC, 0...10 V   |
| HF636- |  |  |  |  |  |  |  | 3/4-wire, 85...265 VAC, 0...20 mA               |
| HF637- |  |  |  |  |  |  |  | 3/4-wire, 85...265 VAC, 4...20 mA               |
| HF638- |  |  |  |  |  |  |  | 3/4-wire, 85...265 VAC, 0...1 V                 |
| HF639- |  |  |  |  |  |  |  | 3/4-wire, 85...265 VAC, 0...5 V                 |
| HF63A- |  |  |  |  |  |  |  | 3/4-wire, 85...265 VAC, 0...10 V                |

#### Instrument type

|  |   |  |  |  |  |  |  |                                    |
|--|---|--|--|--|--|--|--|------------------------------------|
|  | 2 |  |  |  |  |  |  | PPS cable probe 2 m, Ø 15 x 100 mm |
|  | D |  |  |  |  |  |  | Duct version, Ø 15 x 220 mm        |
|  | W |  |  |  |  |  |  | Wall version, Ø 15 x 85 mm         |

#### Output parameters

|  |  |   |   |   |  |  |   |   |                            |
|--|--|---|---|---|--|--|---|---|----------------------------|
|  |  | P |   |   |  |  | X | X | Humidity and passive Pt100 |
|  |  | B |   |   |  |  | X | X | Humidity & temperature     |
|  |  | H | X | X |  |  | X | X | Only humidity              |
|  |  | T |   |   |  |  | X | X | Only temperature           |
|  |  | 1 | X | X |  |  |   |   | Humidity & dew point       |
|  |  | A |   |   |  |  |   |   | Temperature & dew point    |

#### Scaling of the output signals (humidity: always 0...100 %rh)

|  |  |   |   |   |  |  |  |  |                                 |
|--|--|---|---|---|--|--|--|--|---------------------------------|
|  |  |   | X | X |  |  |  |  | No temperature output signal    |
|  |  |   | 1 | X |  |  |  |  | 0...50 °C                       |
|  |  |   | 2 | X |  |  |  |  | 10...40 °C                      |
|  |  |   | 3 | X |  |  |  |  | -40...60 °C                     |
|  |  |   | 4 | X |  |  |  |  | -30...70 °C                     |
|  |  |   | 5 | X |  |  |  |  | -40...85 °C                     |
|  |  |   | 6 | X |  |  |  |  | 0...100 °F                      |
|  |  |   | 7 | X |  |  |  |  | 0...200 °F                      |
|  |  |   | 9 | X |  |  |  |  | -50...200 °F                    |
|  |  | P | P | 3 |  |  |  |  | With passive Pt100 1/3 Class B  |
|  |  | P | P | 5 |  |  |  |  | With passive Pt100 1/5 Class B  |
|  |  | P | P | A |  |  |  |  | With passive Pt100 1/10 Class B |

#### Optional display

|  |  |  |  |   |  |  |  |                                                             |
|--|--|--|--|---|--|--|--|-------------------------------------------------------------|
|  |  |  |  | D |  |  |  | Display (only display without backlight possible for HF624) |
|  |  |  |  | X |  |  |  | No display                                                  |

#### Probe extension

|  |  |  |  |   |  |  |  |                                         |
|--|--|--|--|---|--|--|--|-----------------------------------------|
|  |  |  |  | S |  |  |  | Standard length (D = 220 mm, W = 85 mm) |
|  |  |  |  | 1 |  |  |  | Standard length (S) + 150 mm            |
|  |  |  |  | 2 |  |  |  | Standard length (S) + 300 mm            |
|  |  |  |  | 3 |  |  |  | Standard length (S) + 450 mm            |
|  |  |  |  | 4 |  |  |  | Standard length (S) + 600 mm            |

#### Electrical connections (analog signals to terminals) \*

|  |  |  |  |   |  |  |  |                                                                     |
|--|--|--|--|---|--|--|--|---------------------------------------------------------------------|
|  |  |  |  | 1 |  |  |  | M16 x 1.5 cable gland (horizontal, type D with display and type W)  |
|  |  |  |  | 3 |  |  |  | x 1/2" conduit adapter (horizontal, type D with display and type W) |

#### Standard scaling dew point / frost point

|  |  |  |  |  |  |   |   |                |
|--|--|--|--|--|--|---|---|----------------|
|  |  |  |  |  |  | X | X | No calculation |
|  |  |  |  |  |  | B | X | -50...50       |
|  |  |  |  |  |  | C | X | -50...100      |
|  |  |  |  |  |  | D | X | -50...200      |

\*Types with mains voltage have 2 M16 cable glands or conduit adapters

## TRANSMITTERS

| Detailed specifications        |                                                                                                                   |                                                                      |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Power supply / Connections     | HF62                                                                                                              | HF63                                                                 |
| Supply voltage                 |                                                                                                                   |                                                                      |
|                                | 10...28 VDC, 4...20 mA current loop<br>V min = 10 V + (0.02 x load*)<br>* = resistance in $\Omega$                | 15...40 VDC / 12...28 VAC at 500 $\Omega$<br>85...265 VAC            |
| Current consumption            | 2 x 20 mA, 4...20 mA current loop                                                                                 | <50 mA                                                               |
| Electrical connections         | Screw terminals and M16 cable gland or 1/2" conduit adapter                                                       |                                                                      |
| Humidity measurement           | HF62                                                                                                              | HF63                                                                 |
| Sensor                         | ROTRONIC Hygromer® IN-1                                                                                           |                                                                      |
| Measurement range              | 0...100 %rh                                                                                                       |                                                                      |
| Accuracy at 23 °C              | ±1 %rh                                                                                                            |                                                                      |
| Repeatability                  | 0.3 %rh                                                                                                           |                                                                      |
| Long term stability            | <1 %rh/year                                                                                                       |                                                                      |
| Response time                  | Typically 10 s for 63 % of a change 35 → 80 %rh (1 m/sec air flow at sensor)                                      |                                                                      |
| Temperature measurement        | HF62                                                                                                              | HF63                                                                 |
| Sensor                         | Pt100 1/3 Class B                                                                                                 |                                                                      |
| Measurement range              | -100...150 °C / -148...302 °F                                                                                     |                                                                      |
| Accuracy at 23 °C              | ±0.2 K                                                                                                            |                                                                      |
| Repeatability                  | 0.05 K                                                                                                            |                                                                      |
| Long term stability            | <0.1 °C/year                                                                                                      |                                                                      |
| Response time                  | Typically 4 s for 63 % of a change from 23 to 80 °C (1 m/sec air flow at sensor)                                  |                                                                      |
| Calculated parameters          | HF62                                                                                                              | HF63                                                                 |
| Psychrometric calculations     | Dew point or frost point                                                                                          |                                                                      |
| Start-up time and refresh rate | HF62                                                                                                              | HF63                                                                 |
| Start-up time                  | Typically 3.4 s                                                                                                   | Typically 1.9 s                                                      |
| Signal type                    | 4...20 mA                                                                                                         | 0...20 mA, 4...20 mA / 0...1 V, 0...5 V, 0...10 V                    |
| Scale limits                   | -999.99 ... +9999.99 units, user programmable                                                                     |                                                                      |
| * Maximum load (in $\Omega$ )  | 0/500 $\Omega$                                                                                                    | 0/500 $\Omega$ (current signal), min. 1000 $\Omega$ (voltage signal) |
| Service interface              | UART (universal asynchronous receiver transmitter)                                                                |                                                                      |
| Service cable maximum length   | 5 m (16.4 ft)                                                                                                     |                                                                      |
| General specifications         | HF62                                                                                                              | HF63                                                                 |
| Optional display               | LCD, 1 or 2 decimals,<br>without backlight                                                                        | LCD, 1 or 2 decimals,<br>with backlight and trend indicator          |
| Probe material                 | Polycarbonate                                                                                                     |                                                                      |
| Filter material                | Polyethylene depending on filter, order separately, see pages 99/100                                              |                                                                      |
| Housing material / Protection  | ABS / IP 65                                                                                                       |                                                                      |
| Weight                         | Approx. 300 g                                                                                                     |                                                                      |
| CE/EMC compatibility           | EMC Directive 2004/108/EC: EN 61000-6-1: 2001, EN 61000-6-2: 2005<br>EN 61000-6-3: 2005, EN 61000-6-4: 2001 + A11 |                                                                      |
| Solder                         | Lead free (RoHS compliant)                                                                                        |                                                                      |
| Fire resistance                | Conforms to UL94-HB                                                                                               |                                                                      |
| FDA/GAMP compatibility         | Conforms to 21 CFR Part 11 and GAMP4                                                                              |                                                                      |
| Electronics operating range    | -40...60 °C / -10...60 °C (models with display); 0...100 %rh, non-condensing                                      |                                                                      |
| Temperature limits at probe    | -100...150 °C (applies to cable and duct models)                                                                  |                                                                      |
| Maximum air velocity at probe  | 40 m/s (7,870 ft / min)                                                                                           |                                                                      |

# TRANSMITTERS

## HYGROFLEX7 SERIES

The HygroFlex7 series is equipped with sturdy metal housings and stainless steel probes for harsh industrial conditions. In common with other HygroFlex transmitters, the HF7 provides superb accuracy and reproducibility and comes in wall, cable and duct mount versions. Many useful features can be activated with the optional HW4 software, including in-transmitter logging, output scaling and self-diagnostics.

The HF7 series not only has a unique calibration and adjustment process, but also allows every transmitter to be used as a simulator with fixed values. This is a major advantage in system configuration and validation.

### Applications

Industrial applications, building management systems, underground railways, tunnelling, etc.

### Highlights

- Unique calibration and adjustment process
- Highest reproducibility
- All metal construction of wall, cable and duct versions
- Highly configurable via HW4 software



## HF7 WALL/CABLE VERSION

### Applications

Industrial processes in harsh environments

### Highlights and common features

- Measures relative humidity, temperature and dew/frost point
- Application range -100...150 °C / 0...100 %rh (depending on model)
- Automatic sensor test & drift compensation \*
- Integral 2,000 measurement pair logging \*
- Use as a simulator for system validation \*
- UART service interface
- Fixed probe/cable probe
- Adjustment profile «Standard», factory certificate
- All metal construction
- Accuracy:  $\pm 1$  %rh /  $\pm 0.2$  K



Wall version  
Type W

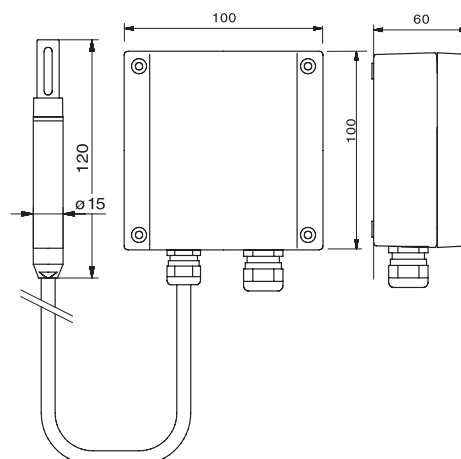
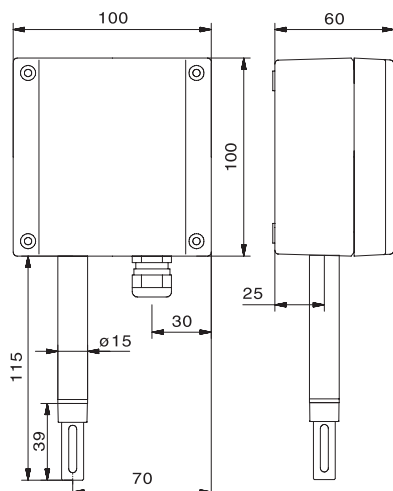


Cable version  
Type C

| Wall version   | HF720-W series                           | HF73x-W series                          |
|----------------|------------------------------------------|-----------------------------------------|
| Type           | 2- or 2 x 2-wire, 4...20 mA              | 3/4-wire                                |
| Signals        | Signals freely scalable*                 | Signals freely selectable and scalable* |
| Features       | Without display                          | Without display                         |
| Filter carrier | Slotted sleeve (order filter separately) |                                         |

| Cable version  | HF720-C series                           | HF73x-C series                          |
|----------------|------------------------------------------|-----------------------------------------|
| Type           | 2- or 2 x 2-wire, 4...20 mA              | 3/4-wire                                |
| Signals        | Signals freely scalable*                 | Signals freely selectable and scalable* |
| Features       | Without display                          |                                         |
| Filter carrier | Slotted sleeve (order filter separately) |                                         |

\* Optional, requires HW4 software



## HF7 DUCT VERSION

### Applications

Industrial processes in harsh environments

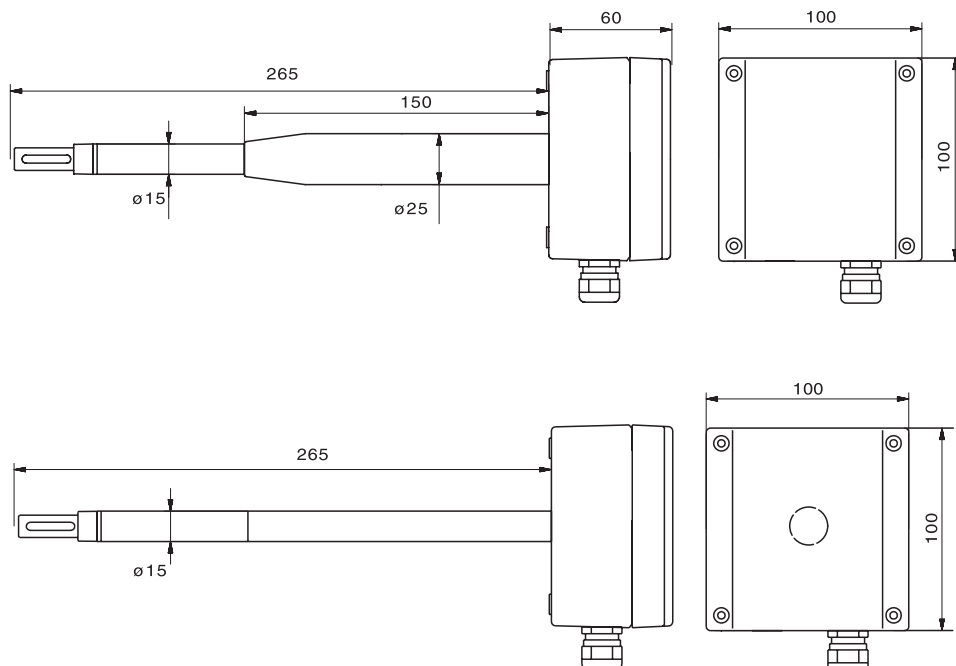
### Highlights and common features

- Measures relative humidity, temperature and dew/frost point
- Application range -100...100 °C, 0...100 %rh
- Automatic sensor test & drift compensation \*
- Integral 2,000 measurement pair logging \*
- Use as a simulator for system validation \*
- UART service interface
- Integrated probe Ø 15 x 200 mm
- Adjustment profile «Standard», factory adjustment certificate
- All metal construction
- Accuracy:  $\pm 1$  %rh /  $\pm 0.2$  K



| Duct version   | HF720-D series                           | HF73x-D series                          |
|----------------|------------------------------------------|-----------------------------------------|
| Type           | 2- or 2 x 2-wire, 4...20 mA              | 3/4-wire                                |
| Signals        | Signals freely scalable*                 | Signals freely selectable and scalable* |
| Filter carrier | Slotted sleeve (order filter separately) |                                         |

\* Requires HW4 software



# TRANSMITTERS

## Order information (for accessories see pages 99-102)

### Transmitters with analogue output signals

#### Power supply and output signal type

|        |  |  |  |  |  |                                                |
|--------|--|--|--|--|--|------------------------------------------------|
| HF720- |  |  |  |  |  | 2 x 2-wire, <10...28 VDC, 4...20 mA            |
| HF731- |  |  |  |  |  | 3/4-wire, 15...40 VDC / 12...28 VAC, 0...20 mA |
| HF732- |  |  |  |  |  | 3/4-wire, 15...40 VDC / 12...28 VAC, 4...20 mA |
| HF733- |  |  |  |  |  | 3/4-wire, 5...40 VDC / 5...28 VAC, 0...1 V     |
| HF734- |  |  |  |  |  | 3/4-wire, 10...40 VDC / 8...28 VAC, 0...5 V    |
| HF735- |  |  |  |  |  | 3/4-wire, 15...40 VDC / 12...28 VAC, 0...10 V  |

#### Instrument type

|   |  |  |  |  |  |                                               |
|---|--|--|--|--|--|-----------------------------------------------|
| N |  |  |  |  |  | Steel cable probe Ø 15 x 120 mm, 2 m          |
| D |  |  |  |  |  | Steel duct probe Ø 15 x 265 mm (standard)     |
| A |  |  |  |  |  | Steel duct probe, Ø 25/15 x 265 mm (standard) |
| W |  |  |  |  |  | Steel wall probe Ø 15 x 115 mm (standard)     |

#### Output parameters

|   |  |  |  |  |  |                         |
|---|--|--|--|--|--|-------------------------|
| B |  |  |  |  |  | Humidity & temperature  |
| H |  |  |  |  |  | Only humidity           |
| T |  |  |  |  |  | Only temperature        |
| 1 |  |  |  |  |  | Humidity & dew point    |
| A |  |  |  |  |  | Temperature & dew point |

#### Scaling of the output signals (humidity: always 0...100 %rh)

|   |   |  |  |  |  |                              |
|---|---|--|--|--|--|------------------------------|
| X | X |  |  |  |  | No temperature output signal |
| 1 | X |  |  |  |  | 0...50 °C                    |
| 2 | X |  |  |  |  | 10...40 °C                   |
| 3 | X |  |  |  |  | -40...60 °C                  |
| 4 | X |  |  |  |  | -30...70 °C                  |
| 5 | X |  |  |  |  | -40...85 °C                  |
| 6 | X |  |  |  |  | 0...100 °F                   |
| 7 | X |  |  |  |  | 0...200 °F                   |
| 9 | X |  |  |  |  | -50...200 °F                 |

#### Optional display

|  |  |  |  |   |  |            |
|--|--|--|--|---|--|------------|
|  |  |  |  | X |  | No display |
|--|--|--|--|---|--|------------|

#### Probe extension (duct and cable probes)

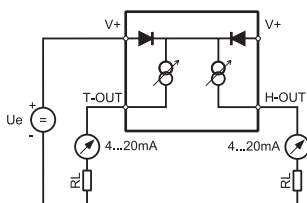
|   |  |  |  |  |  |                                                      |
|---|--|--|--|--|--|------------------------------------------------------|
| S |  |  |  |  |  | Standard length (N = 120 mm, D/A 265 mm, W = 115 mm) |
| 1 |  |  |  |  |  | Standard length (S) + 150 mm                         |
| 2 |  |  |  |  |  | Standard length (S) + 300 mm                         |
| 3 |  |  |  |  |  | Standard length (S) + 450 mm                         |
| 4 |  |  |  |  |  | Standard length (S) + 600 mm                         |

#### Electrical connections (analogue signals to terminals)

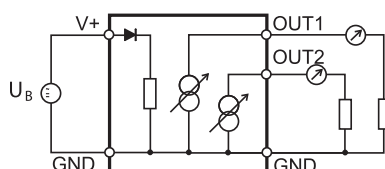
|   |  |  |  |  |  |                       |
|---|--|--|--|--|--|-----------------------|
| 1 |  |  |  |  |  | M16 x 1.5 cable gland |
| 3 |  |  |  |  |  | ½" conduit adapter    |

#### Standard scaling dew point / frost point

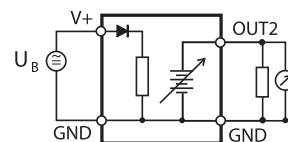
|   |   |  |  |  |  |                |
|---|---|--|--|--|--|----------------|
| X | X |  |  |  |  | No calculation |
| B | X |  |  |  |  | -50...50       |
| C | X |  |  |  |  | -50...100      |
| D | X |  |  |  |  | -50...200      |



36 Schematic 2-wire types



Schematic 3-wire current signal



Schematic 3-wire voltage signal

## TRANSMITTERS

| Detailed specifications        |                                                                                                                   |                                                           |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Power supply / Connections     | HF72                                                                                                              | HF73                                                      |
| Supply voltage                 |                                                                                                                   |                                                           |
|                                | 10...28 VDC , 4...20 mA current loop<br>V min = 10 V + (0.02 x load*)                                             | 5, 10, 15...40 VDC / 5, 8, 12...28 VAC                    |
| Current consumption            | 2 x 20 mA, 4...20 mA current loop                                                                                 | <50 mA                                                    |
| Electrical connections         | Screw terminals and M16 cable gland or 1/2" conduit adapter                                                       |                                                           |
| Humidity measurement           | HF72                                                                                                              | HF73                                                      |
| Sensor                         | ROTRONIC Hygromer® IN-1                                                                                           |                                                           |
| Measurement range              | 0...100 %rh                                                                                                       |                                                           |
| Accuracy at 23 °C              | ±1 %rh                                                                                                            |                                                           |
| Repeatability                  | 0.3 %rh                                                                                                           |                                                           |
| Long term stability            | <1 %rh/year                                                                                                       |                                                           |
| Response time                  | Typically 10 s for 63% of a change from 35 → 80 %rh (1 m/sec air flow at sensor)                                  |                                                           |
| Temperature measurement        | HF72                                                                                                              | HF73                                                      |
| Sensor                         | Pt100 1/3 Class B                                                                                                 |                                                           |
| Measurement range              | -100...150 °C / -148...302 °F                                                                                     |                                                           |
| Accuracy at 23 °C              | ±0.2 K                                                                                                            |                                                           |
| Repeatability                  | 0.05 K                                                                                                            |                                                           |
| Long term stability            | <0.1 °C/year                                                                                                      |                                                           |
| Response time                  | Typically 4 s for 63% of a jump from 23 to 80 °C (1 m/sec air flow at sensor)                                     |                                                           |
| Calculated parameters          | HF72                                                                                                              | HF73                                                      |
| Psychrometric calculations     | Dew point or frost point                                                                                          |                                                           |
| Start-up time and refresh rate | HF72                                                                                                              | HF73                                                      |
| Start-up time                  | Typically 3.4 s                                                                                                   | Typically 1.9 s                                           |
| Signal type                    | 4...20 mA                                                                                                         | 0...20 mA, 4...20 mA / 0...1 V, 0...5 V, 0...10 V         |
| Scale limits                   | -999.99...+9999.99 user scaleable units                                                                           |                                                           |
| *Maximum load (in Ω)           | 0/500 Ω                                                                                                           | 0/500 Ω (current signal),<br>min. 1000 Ω (voltage signal) |
| Service interface              | UART (universal asynchronous receiver transmitter)                                                                |                                                           |
| Service cable maximum length   | 5 m (16.4 ft)                                                                                                     |                                                           |
| General specifications         | HF72                                                                                                              | HF73                                                      |
| Probe material                 | Stainless steel V2A / 1.4305 / AISI 302                                                                           |                                                           |
| Filter material                | Depending on filter, order separately, see pages 99/100                                                           |                                                           |
| Housing material / Protection  | IP 65 aluminium diecast                                                                                           |                                                           |
| Weight                         | Approx. 800 g + 140 g per probe extension unit                                                                    |                                                           |
| CE/EMC compatibility           | EMC Directive 2004/108/EC: EN 61000-6-1: 2001, EN 61000-6-2: 2005<br>EN 61000-6-3: 2005, EN 61000-6-4: 2001 + A11 |                                                           |
| Solder                         | Lead-free (RoHS-compliant)                                                                                        |                                                           |
| Fire resistance                | Incombustible                                                                                                     |                                                           |
| FDA/GAMP compatibility         | Conforms to FDA 21 CFR Part 11 and GAMP4                                                                          |                                                           |
| Electronics operating range    | -50...100 °C / 0...100 %rh, non-condensing                                                                        |                                                           |
| Temperature limits at probe    | -100...150 °C (applies to cable and duct models)                                                                  |                                                           |
| Maximum air velocity at probe  | 40 m/s (7,870 ft/min)                                                                                             |                                                           |

# TRANSMITTERS

## **HYGROFLEX & HYGROCLIP-EX**

HygroFlex series may be used together with the intrinsically safe HygroClip-EX probes. The relative humidity and temperature can be displayed and output as analog signals. Calculated psychrometric values such as dew point or mixing ratio can also be derived with the HTS3 models and output as a linearized analog signal.

### Applications

Humidity and temperature measurement in industrial processes  
in ATEX rated (EX) zones

### Highlights

- Interchangeable probe
- Up to 3 analog output signals
- Automatic load compensation



## HTS SERIES

### Applications

Humidity measurement in industrial processes in EX zones

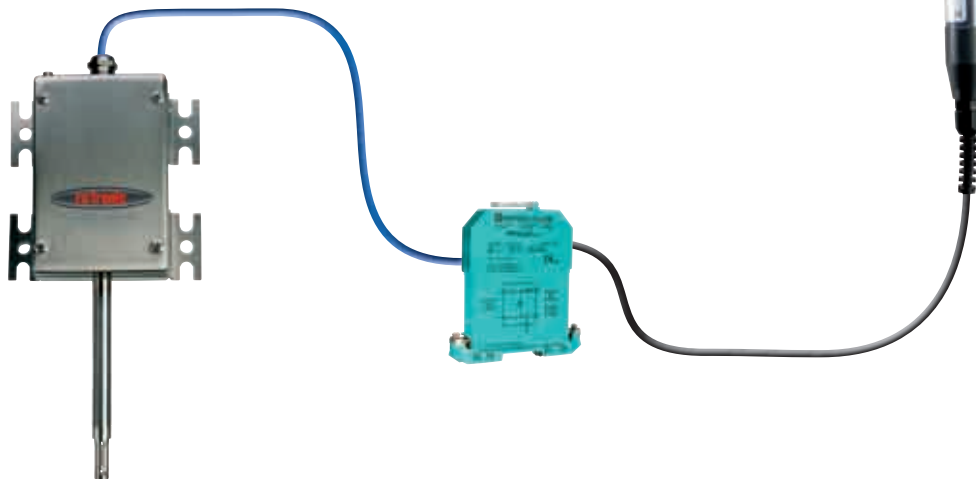
### Highlights and common features

- Interchangeable probe
- Measures relative humidity & temperature
- Electronics operating range -40...60 °C; -10...60 °C with LCD, 0...100 %rh
- Service interface
- Accuracy:  $\pm 1$  %rh /  $\pm 0.2$  K
- Suitable probes: all HygroClip Ix-EX with Tuchel connector plug

| Wall version | HTS1                                                              | HTS3                                      |
|--------------|-------------------------------------------------------------------|-------------------------------------------|
| Voltage      | Low voltage or mains voltage power supply (see order information) |                                           |
| Outputs      | 2 signals freely selectable and scalable*                         | 3 signals freely selectable and scalable* |
| Features     | Alarm indicators, display and keypad (optional)                   |                                           |

\* Optional, requires HW4 software

For detailed information visit [www.rotronic-humidity.com](http://www.rotronic-humidity.com)



### Order information

|     |   |   |   |    |                                                  |
|-----|---|---|---|----|--------------------------------------------------|
| HTS |   |   |   |    | Transmitter with ABS housing                     |
| HTM |   |   |   |    | Transmitter with metal housing                   |
|     | 1 |   |   |    | 1, 2 x 4...20 mA analog signals                  |
|     | 3 |   |   |    | 3 x 4...20 mA analog signals & digital interface |
|     |   | 1 |   |    | 12...35 VDC / 12...24 VAC power supply           |
|     |   | 2 |   |    | 90...230 VAC power supply                        |
|     |   |   | D |    | With display                                     |
|     |   |   | X |    | Without display                                  |
|     |   |   |   | E  | With Ethernet interface (only HTS3x)             |
|     |   |   |   | /9 | Customised version                               |

## HYGROCLIP-EX PROBES

### Applications

Humidity measurement in industrial processes in ATEX rated (EX) zones, compatible with HygroFlex HTS transmitters

### Highlights and common features

- Intrinsically safe probe ATEX 100
- Power supply via HygroFlex transmitter (15 VDC), or from 2 wire 4...20mA loop (RH or °C only)
- Measures relative humidity and temperature
- Electronics operating range -40...40 °C. Temperature measurement range -50...200 °C (at probe)
- Accuracy: ± 1% rh / ±0.3 K

| Order code   | HygroClip IC1-EX                         | HygroClip IC3-EX |
|--------------|------------------------------------------|------------------|
| Type         | Cable probe                              |                  |
| Probe length | 120 mm                                   | 270 mm           |
| Cable length | 2 m                                      |                  |
| Housing      | Chrome nickel steel, V4A/AISI 316/1.4401 |                  |

| Order code   | HygroClip IE1-EX                         | HygroClip IE3-EX |
|--------------|------------------------------------------|------------------|
| Type         | Screw-in probe                           |                  |
| Thread       | 1/2" G                                   | 1/2" NPT         |
| Cable length | 2 m                                      |                  |
| Housing      | Chrome nickel steel, V4A/AISI 316/1.4401 |                  |

| Order code   | HygroClip IW-EX                          | HygroClip ID-EX |
|--------------|------------------------------------------|-----------------|
| Type         | Wall probe                               | Duct probe      |
| Probe length | 150 mm                                   | 250 mm          |
| Housing      | Chrome nickel steel, V4A/AISI 316/1.4401 |                 |



HygroClip IC-EX



HygroClip IE1-EX



HygroClip IW-EX



Hygroclip ID-EX

### Order information for accessories

|               |                                                                                                                           |
|---------------|---------------------------------------------------------------------------------------------------------------------------|
| AC1617-ZB/XXX | Connection cable HygroFlex ↔ Zener barrier<br>XXX = cable length in m. For XXX = 02, 05, 10, 15, in 5 m steps, max. 200 m |
| ZB1           | Zener barrier Z722, use with HygroFlex                                                                                    |
| ZB1-420       | Zener barrier Z788, use without HygroFlex, 4...20 mA, 2-wire                                                              |
| ZB2           | Zener barrier Z722 in IP 67 housing, with space for 4 Zener barriers                                                      |

# TRANSMITTERS

## Applications

| Zone 0/20<br>T5                                                                                                                                 | Zone 1/21<br>T6                        | Zone 1/21<br>T6                                                                                         | Safe zone<br>Zener barrier or<br>galvanic<br>isolation                                | ATEX 2180  |
|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Class II, Division1<br>Group E, F, G                                                                                                            | Class I, Division1<br>Group A, B, C, D |                                                                                                         |                                                                                       |                                                                                               |
| <br>Only the sinter<br>filter may be<br>used in zone<br>20 /21 |                                        | <b>HygroClip IC-1-EX</b><br>Ⓢ II 1 G EEx ia IIC T5 resp. II 2 G EEx ia IC T6<br>Ⓢ II 1/2 D IP6X T 80 °C |    |                                                                                               |
|                                                                                                                                                 |                                        | <b>HygroClip IE-1-EX</b><br>Ⓢ II 1 G EEx ia IIC T5 resp. II 2 G EEx ia IC T<br>Ⓢ II 1/2 D IP6X T 80 °C  |    |                                                                                               |
|                                                                                                                                                 |                                        | <b>HygroClip ID-EX</b><br>Ⓢ II 1 G EEx ia IIC T5<br>resp. II 2 G EEx ia IC T<br>Ⓢ II 1/2 D IP6X T 80 °C |   |                                                                                               |
|                                                                                                                                                 |                                        | <b>HygroClip IW-1-EX</b><br>Ⓢ II 1 G EEx ia IIC T5<br>resp. II 2 G EEx ia IC T6<br>Ⓢ II 2D IP6X T 80 °C |  |                                                                                               |

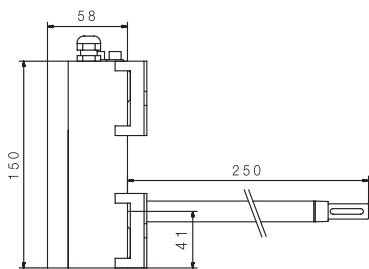
Note: The total cable length between HygroClip-EX probe and HygroFlex transmitter may not exceed 200 m.  
HygroClip-EX probes may NOT be calibrated in the EX zone because the accessories are not EX-compliant.

### Specifications HygroClip-EX probes

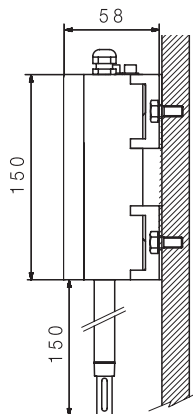
| Feature                                            | Type ID-EX                                                                     | Type IW-EX | Type IC-x-EX                                     | Type IE-x-EX                            |
|----------------------------------------------------|--------------------------------------------------------------------------------|------------|--------------------------------------------------|-----------------------------------------|
| Humidity measurement range                         | 0...100 %rh                                                                    |            |                                                  |                                         |
| Range of application                               | Electronics: -40...40 °C; 0...100 %rh, temperature at probe: max. -50...200 °C |            |                                                  |                                         |
| Accuracy at 23°C                                   | ±1 %rh, ±0.2 K                                                                 |            |                                                  |                                         |
| Reproducibility                                    | <0.5 %rh, 0.1 °C                                                               |            |                                                  |                                         |
| Response time                                      | <15 s at 1 m/s air velocity at 23 °C                                           |            |                                                  |                                         |
| Long term stability                                | <1 %rh, 0.1 °C per year                                                        |            |                                                  |                                         |
| Sensors                                            | Humidity: Hygromer® IN-1; temperature: Pt100 1/3 DIN                           |            |                                                  |                                         |
| Adjustment points                                  | Digital adjustment, 1...4 points humidity, 2 points temperature                |            |                                                  |                                         |
| Output signals & load                              | Digital, analog 4...20 mA / Max. 800 Ω at 26 VDC                               |            |                                                  |                                         |
| Power supply                                       | 4...20 mA in two-wire circuit, via Zener barrier                               |            |                                                  |                                         |
| Housing / Protection                               | Stainless steel V4A/AISI 316/1.4401, 150 x 100 x 58 mm / IP 66                 |            |                                                  |                                         |
| Probe dimensions in mm<br>(other lengths possible) | Ø 15 x 250                                                                     | Ø 15 x 150 | IC-1-EX:<br>Ø 15 x 120<br>IC-3-EX:<br>Ø 15 x 270 | 142 x 25 mm x 1/2"<br>Wrench size 27 mm |
| Electrical connection                              | Cable gland / Terminal block                                                   |            |                                                  |                                         |
| EC approval & marking                              | PTB 01 ATEX 2180                                                               |            |                                                  |                                         |
| FM approval & marking                              | 3015571 / IS / I, II, III / 1 / ABCDEFG / T6 – 12.0724.0006 IP66               |            |                                                  |                                         |

# TRANSMITTERS

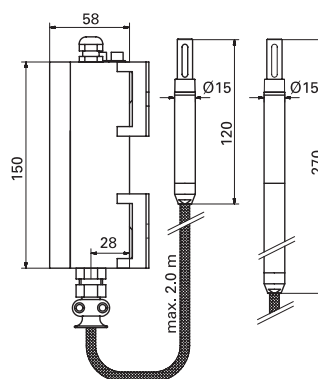
| Specifications HTS series                  |                                                                                                                                                                             |                                                        |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Feature                                    | HTS1                                                                                                                                                                        | HTS3                                                   |
| Probe connections                          | 1                                                                                                                                                                           | 1 (+1 optional), order number /9                       |
| Signal inputs                              | Digital or ROTRONIC analog: 0...2.5 V, 10 Bit A/D, power supply: 15 V DC, max. 10 mA                                                                                        |                                                        |
| Input for third-party probe (1 analog)     | No                                                                                                                                                                          | Yes. Input impedance third-party probe >1 MΩ           |
| Analog outputs                             | 2 scalable                                                                                                                                                                  | 3 scalable                                             |
| Output configuration                       | Out 1 = %rh / Out 2 = °C                                                                                                                                                    | Out 1 = %rh / Out 2 = °C / Out 3 = calculation         |
| Output signals (selectable by jumper)      | 0...1 V, 0...5 V, 0...10 V, 0...20 mA, 4...20 mA                                                                                                                            |                                                        |
| RS232 interface internally configurable    | No                                                                                                                                                                          | Yes                                                    |
| RS485-networkable (up to 32 devices)       | No                                                                                                                                                                          | Yes                                                    |
| Scalable input/output                      | -999...9999 user scaleable                                                                                                                                                  | -999...9999 user scaleable                             |
| Probe adjustment:                          |                                                                                                                                                                             |                                                        |
| 4 points %rh, 1 point (°C)                 | Yes, with optional display/keypad fitted                                                                                                                                    |                                                        |
| 4 points %rh, 2 points (°C), via PC        | No                                                                                                                                                                          | Yes                                                    |
| Psychrometric calculations                 | None                                                                                                                                                                        | All available                                          |
| Pressure compensation calculated values    | None                                                                                                                                                                        | Manually or automatically with pressure probe (option) |
| Measurement range                          | Probe-dependent, max. 0...100 %rh, -50...200 °C, 0...2000 hPa                                                                                                               |                                                        |
| Electronics operating range                | 0...100 %rh (non-condensing), -40...60 °C, with display -30...60 °C                                                                                                         |                                                        |
| Display/Keypad (option)                    | LCD display with 3 lines, foil keypad                                                                                                                                       |                                                        |
| Display resolution (option)                | 0.1 %rh, 0.1 °C, 0.01 for calculated values                                                                                                                                 |                                                        |
| Housing material, dimensions               | ABS, 207 x 150 x 58, 3 mm (metal housing: optional)                                                                                                                         |                                                        |
| Protection                                 | IP 65/NEMA4                                                                                                                                                                 |                                                        |
| Weight                                     | Approx. 310 g                                                                                                                                                               |                                                        |
| Supply voltage                             | 12...35 V DC (140 mA), 12...24 V AC or 90...250 V AC, 3.5 VA                                                                                                                |                                                        |
| Cable connection / Connection terminals    | M16 cable gland (7 mm cable) / 18 AWG                                                                                                                                       |                                                        |
| Analog outputs (factory setting 4...20 mA) | Current outputs (0/4...20 mA), max. load 500 Ω, other output ranges selectable by jumper; voltage outputs (0...1, 5, 10 V), min. load 1000 Ω<br>Automatic load compensation |                                                        |
| CE conformity                              | Conforms to EN61000-6-2:2001, EN61000-6-4: 2001                                                                                                                             |                                                        |



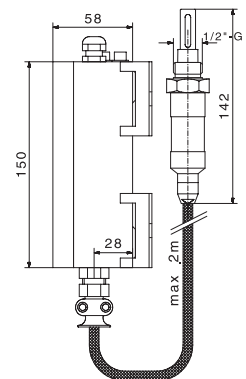
Duct probe



Wall probe



Cable probe



Screw-in probes

# HANDHELD DEVICES

## HYGROPALM SERIES

The ROTRONIC HygroPalm handheld instrument of the AirChip3000 generation are the perfect instruments for climatic measurements. They are extremely precise and feature many practical functions, but are easy to use.

HygroPalms are adjusted and configured during production and are therefore ready for immediate use. They can be configured for specific applications with user-friendly HW4 software or directly on the keypad. A large range of interchangeable probes enables easy and flexible use, straightforward maintenance and simple calibration.

The HP23 version can be used for the in-situ adjustment of transmitters and for system validation.

See the chapter on HygroClip2 probes on pages 6 - 12 for suitable probes.

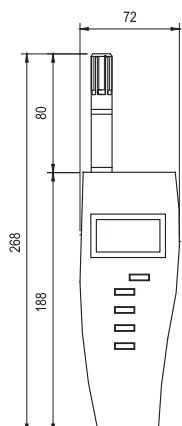
### Applications

For HVAC technicians and inspectors, the pharmaceutical industry, building management systems, the paper industry, research and many others.

### Highlights

- Measures humidity, temperature and dew/frost point
- Calculates absolute humidity
- Range of use 0...100 %rh / -10...60 °C
- UART interface
- Battery charge monitor
- Trend indicator

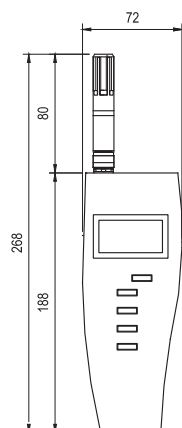




## HYGROPALM21

Order code HP21

- Fixed probe
- Application range: 0...100 %rh / -10...60 °C
- Saves up to 2,000 measurement pairs
- Measures humidity, temperature and calculates dew/frost point
- Polyethylene filter (other filters see page 99)
- Adjustment profile «Standard», factory certificate
- Adjusted at 23 °C and 10, 35, 80 %rh
- Accuracy:  $\pm 1$  %rh /  $\pm 0.2$  K
- Very fast response time thanks to new HygroMer M3-R sensor  $\tau_{63} < 3$  s

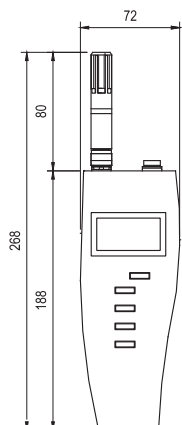


## HYGROPALM22

Order code HP22

Specifications as HP21 plus:

- Interchangeable probes
- Instrument operating range 0...100 %rh / -10...60 °C
- Saves up to 2,000 measurement pairs
- Measurement range 0...100%rh, -100...200 °C (probe-dependent)
- All psychrometric calculations available
- Adapter for Pt100 temperature probes (see page 75)
- Probe to be ordered separately



## HYGROPALM23

Order code HP23

- 2 interchangeable probe inputs
- 2 analogue inputs for 0...1 VDC or 0(4)...20 mA
- 9 V battery, rechargeable option
- All psychrometric calculations available
- Real-time clock with back-up battery
- Probe adjustment direct to dew point reference
- Instrument operating range 0...100 %rh / -10...60 °C
- Measurement range 0...100%rh, -100...200 °C (probe dependent)
- Saves up to 16,000 measurement pairs: every data record contains humidity, temperature, data, time, batch no. and user ID no.
- Remote control function for transmitters
- Mini USB interface for connection to PC

Available from spring 2009

## HANDHELD DEVICES

| Specifications HygroPalm series            |                                                    |                                          |                                      |
|--------------------------------------------|----------------------------------------------------|------------------------------------------|--------------------------------------|
| Feature                                    | HP21                                               | HP22                                     | HP23                                 |
| Humidity / Temperature sensor              | Hygromer® M3-R<br>Pt100 1/3 DIN                    | Depending on probe                       |                                      |
| Probe type                                 | Integrated                                         | HygroClip®2                              | HygroClip®2 or analogue              |
| Number of probe inputs                     | N/A                                                | 1                                        | 2                                    |
| Measurement range                          | 0...100 %rh / -10...60 °C                          | Probe dependent                          |                                      |
| Accuracy at 23 ± 5 °C                      | ±1 %rh / ±0.2 K                                    | Depending on probe used (0.8 %rh, 0.1K)  |                                      |
| Reproducibility                            | <0.02 %rh / 0.01 K                                 |                                          |                                      |
| Long term stability                        | Better than 1 %rh / year                           |                                          |                                      |
| Response time humidity sensor t 63         | <3 s                                               | Depending on sensor used, <3...<15 s     |                                      |
| Initialization time                        | <2 s                                               |                                          |                                      |
| Electronics operating range                | 0...100 %rh / -10...60 °C                          |                                          |                                      |
| Display resolution                         | 3 decimals                                         |                                          |                                      |
| Display illumination                       | Yes                                                |                                          |                                      |
| Alarm indicators                           | Yes                                                |                                          |                                      |
| Battery charge indicator                   | «Low Battery» indicator                            |                                          | Battery status indicator             |
| Real-time clock with back-up battery       | No                                                 | No                                       | Yes                                  |
| Functions                                  |                                                    |                                          |                                      |
| Trend indicator                            | Yes                                                |                                          |                                      |
| Probe adjustment with software             | 1 point & multi-point %rh & °C, with service cable |                                          |                                      |
| Probe adjustment with keys                 | 1 point %rh & °C                                   | 1 point & multi-point %rh & °C           |                                      |
| Probe adjustment with dew point reference  | No                                                 |                                          | Yes                                  |
| Psychrometric calculations                 | Dew point                                          | All psychrometric calculations available |                                      |
| Data logging                               | 2000 %rh/°C measurement pairs                      |                                          | 16,000 data records<br>in ASCII mode |
| Event logging                              | Yes                                                |                                          |                                      |
| User information                           | Via service cable & HW4 software                   |                                          |                                      |
| Device lock (password-protected)           | Via service cable & HW4 software                   |                                          |                                      |
| Sensor diagnostics (drift, status)         | Via service cable & HW4 software                   |                                          |                                      |
| Service information                        | Scheduled calibration                              |                                          |                                      |
| Audit trail/Electronic records             | Conforms to FDA 21CFR Part 11 and GAMP             |                                          |                                      |
| Electrical specifications                  |                                                    |                                          |                                      |
| Power supply                               | 9 V battery or rechargeable battery                |                                          |                                      |
| Rechargeable battery charge                | No                                                 |                                          | Yes                                  |
| Current consumption<br>(without backlight) | ~5 mA                                              | ~6 mA                                    | ~10 mA                               |
| Supply for third-party probe               | No                                                 | No                                       | Yes, battery voltage                 |
| Communication interfaces                   | Via service cable                                  |                                          | Mini USB                             |
| Service interface                          | UART                                               |                                          |                                      |
| Maximum length service cable               | 5 m                                                |                                          |                                      |
| Mechanical specifications                  |                                                    |                                          |                                      |
| Housing material                           | ABS                                                |                                          |                                      |
| Sensor protection                          | Polyethylene filter                                | Depending on probe used                  |                                      |
| Dimensions                                 | 274 x 72 x 35 mm                                   | 196 x 72 x 35 mm                         |                                      |
| Weight                                     | Approx. 300 g                                      |                                          |                                      |
| Standards                                  | EN 61000-6-4 & EN 61000-6-2                        |                                          |                                      |
| FDA / GAMP compatibility, audit trail      | Conforms to FDA 21 CFR Part 11 and GAMP4           |                                          |                                      |
| IP protection                              | IP 40                                              |                                          |                                      |

# HANDHELD DEVICES

## MEASURING DEVICES FOR THE PAPER INDUSTRY

The GTS is a classic ROTRONIC product that has been produced for many years. It was developed specifically for measurement of equilibrium relative humidity in stacks of paper and cardboard. Its robust design together with updated electronics make the GTS the most popular instrument for humidity measurements in stacks of paper and cardboard.

### Applications

For paper technicians, printers, merchants and printing equipment service engineers for ERH measurements in stacks of paper and card

### Highlights

- Fixed sword probe for equilibrium humidity and temperature
- Sturdy, very robust mechanical components
- Display of equilibrium humidity or temperature
- Easy operation by push button
- Adjustment by potentiometer
- Application range 0...100 %rh / -10...60 °C
- Battery or rechargeable battery operation
- Battery charge monitor (low battery indicator)
- Hold and auto power off functions

### GTS

Order code GTS

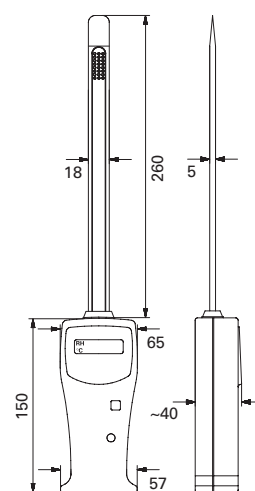
- Integrated, robust aluminium sword probe
- 9 V battery
- Adjusted at 23 °C and 35, 80 %rh
- Accuracy:  $\pm 1.5$  %rh /  $\pm 0.3$  K

### GTS SET

Order code GTS-Set

Complete set, consisting of:

- Handheld device GTS
- Carry case AC1102
- Calibration device EGS
- SCS calibration standard EA50-SCS (5 ampoules 50 %rh with SCS certificate)
- Adjustment tool



## SWORD HYGROMETER WITH FOLD-AWAY PROBE

The S1 sword hygrometer is very popular among printers and paper technicians because its probe can be folded away for safe storage and the display angled towards the user. Perfect for the paper technicians, service engineers and paper consultants.

### Applications

For paper technicians, printers and print instructors, for measurements in stacks of paper

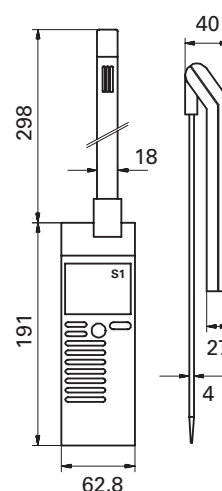
### Highlights and common features

- Sword probe for equilibrium relative humidity (ERH) and temperature
- Adjustable probe position
- Large, clear display of both parameters
- Easy operation
- Adjustment by potentiometer
- Application range 0...100 %rh / -10...60 °C
- Battery charge monitor (low battery indicator)
- Hold function
- Auto power off

### S1

Order code S1

- Integrated, hinged aluminium sword probe
- 9 V battery
- Adjusted at 23 °C and 35, 80 %rh
- Accuracy:  $\pm 1.5$  %rh /  $\pm 0.3$  K



| Specifications              | GTS                                                  | S1                                             |
|-----------------------------|------------------------------------------------------|------------------------------------------------|
| Humidity sensor             | Hygromer® IN-1                                       |                                                |
| Temperature sensor          | Pt100 Class B                                        |                                                |
| Display                     | 3-digit LCD                                          | %rh: 3-digit LCD, °C: 3 1/2-digit LCD          |
| Resolution                  | 0.1 %rh / 0.1 °C                                     |                                                |
| Units                       | %rh, °C                                              | %rh, °C, °F                                    |
| Probe adjustment            | 35 / 80 %rh                                          | 35 / 80 / 10 % / T min / T max                 |
| Electronics operating range | 0...100 %rh -10...60 °C                              | 0...100 %rh -10...50 °C                        |
| Measurement ranges %rh / T  | 5...99.9 %rh / 0...50 °C                             | 5...99.9 %rh / -25...75 °C                     |
| Response time               | <10 s                                                |                                                |
| Accuracy at 23 °C           | $\pm 1.5$ %rh / $\pm 0.3$ K ( $\pm 2.5$ <15 % >90 %) |                                                |
| Reproducibility             | <0.5 %rh / <0.1 K                                    |                                                |
| Dimensions (mm)             | 420 x 70 x 40 (device)<br>260 x 18 x 5 (probe)       | 191 x 63 x 26 (device)<br>280 x 18 x 4 (probe) |
| Housing material            | ABS                                                  |                                                |
| Probe material              | Aluminium                                            |                                                |
| Protection                  | IP 50                                                |                                                |
| Weight                      | Approx. 400 g                                        | Approx. 350 g                                  |

# DATA LOGGERS

## HYGROLOG SERIES

The long term recording of humidity and temperature conditions is very important in storage, shipping, production processes, test facilities and many other areas. Once logged, the temperature and humidity data can be evaluated statistically. This provides valuable information on conditions that can have an influence on people, materials and objects.

The ROTRONIC data loggers fulfil the requirements of FDA 21 CFR Part 11 and GAMP 4. They have a degree of functionality currently not achieved by any other logger while being highly accurate and easy to use. Data can be shown in graph or table form. A large range of interchangeable probes means simple maintenance and flexibility in different applications, and loggers are available in a range configurations to suit most uses.

### Applications

Warehouses, museums, libraries, art galleries, clean rooms, server rooms, factories, shipping, residential properties

### Highlights

- Flash card data memory
- Saves up to 47,000 data records per MB card storage capacity
- Data retrievable by card reader, PDA, PC with HW4 or docking station
- Real-time clock
- Logging interval selectable between 5 s and 24 h
- Battery or rechargeable battery operation
- Battery life more than 1 year  
(depending on rechargeable battery and options)
- Logging mode selectable: start/stop, text/protected mode
- Logger electronics operating range:  
0...100 %rh; -30...70 °C; with display -10...60 °C
- LED status indicator and audible alarm (beep tone)
- Optional display and keypad for display of measured values, status display, operation, adjustment and to view the log data
- Networkable with optional docking station
- Can be used with all HygroClip HC2-xx probes  
(see the chapter on probes, pages 6-12)



### HYGROLOG NT2

Order code HL-NT2

- Logger for interchangeable HC2-xx probes (order probes separately)
- 9 V battery
- Logger operating range: 0...100 %rh; -30 ...70 °C; with display -10...60 °C
- Measurement range 0...100%rh, -100...200 °C (probe dependent)
- 32 MB flash card
- Conforms to FDA 21 CFR Part 11 and GAMP4

### HYGROLOG NT2-D

Order code HL-NT2-D

- Same specifications as HL-NT2, but with integrated keypad & LC display

### HYGROLOG NT2-P

Order code HL-NT2-P

- As HL-NT2, but including a pre-fitted HC2-S probe

### HYGROLOG NT2-DP

Order code HL-NT2-DP

- As HL-NT2-D, but including a pre-fitted HC2-S probe



For accessories and options for all Hygrolog HL-NT loggers: see pages 51/52

## HYGROLOG NT3

The HygroLog NT3 models are especially suitable for changing measurement tasks. It is possible to directly connect two external probes, thereby opening up numerous possibilities where compact loggers with internal probes do not suffice. They are simple to use and easy to maintain; if probes have to be calibrated or replaced, this can be done in a few seconds without having to open the logger.

### Applications

Warehouses, museums, libraries, art galleries, clean rooms, server rooms, factories, shipping, residential properties

### Highlights

- Interchangeable probes, one integrated and up to two external
- Saves up to 47,000 data records per MB card storage capacity
- Data retrievable by card reader, PDA, PC with HW4 and docking station
- Real-time clock
- Logging interval selectable between 5 s and 24 h
- Battery life more than 1 year  
(depending on rechargeable battery and options)
- Logging mode selectable: start/stop, text/protected mode
- Logger operating range: 0...100 %rh; -30 ...70 °C; with display --10...60 °C
- LED status indicator and audible alarm (beep tone)
- Optional display and keypad for display of measured values, status display, operation, adjustment and to view the log data
- Networkable with optional docking station
- Can be used with all HygroClip HC2-xx probes (see the chapter on probes)



### HYGROLOG NT3

Order code HL-NT3

- Logger for interchangeable HC2-xx probes
- 9 V battery
- Logger operating 0...100 %rh / -10...60 °C
- Measurement range 0...100%rh, -100...200 °C (probe dependent)
- 32 MB flash card
- Conforms to FDA 21 CFR Part 11 and GAMP4
- Remote connection for second logger with display

### HYGROLOG NT3-D

Order code HL-NT3-D

- As HL-NT3, with integrated keypad and LC display

### HYGROLOG NT3-P

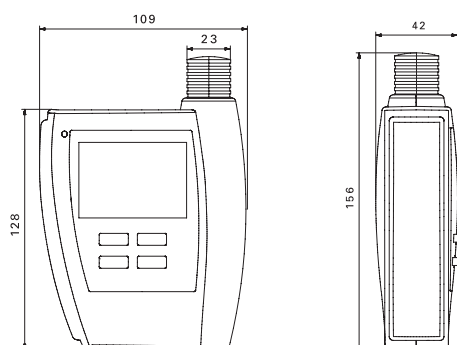
Order code HL-NT3-P

- As HL-NT3, with pre-fitted HC2-S probe

### HYGROLOG NT3-DP

Order code HL-NT3-DP

- As HL-NT3-D, with pre-fitted HC2-S probe



## DOCKING STATIONS for HygroLog NT data loggers

The docking stations for the HygroLog NT series provide various functions depending on the model. They can serve as a mounting bracket, power supply connection, interface module for Ethernet, RS485, USB, RS232 and Wireless LAN or as an upgrade to allow additional digital or analogue probes to be connected to a logger. Probe inputs can be either digital or analog (voltage or mA). The types detailed here are not compatible with devices from earlier generations.

| Overview docking stations |                       |                                 |                        |                            |               |              |               |             |                     |              |               |                               |
|---------------------------|-----------------------|---------------------------------|------------------------|----------------------------|---------------|--------------|---------------|-------------|---------------------|--------------|---------------|-------------------------------|
| Order code                | Inputs                |                                 |                        |                            |               | Interfaces   |               |             |                     |              |               |                               |
|                           | External power supply | Digital / Analog probe inputs * | Analog input 0...2.5 V | Analog input 0(4) ...20 mA | Switch inputs | Pt100 inputs | RS232 & RS485 | USB & RS485 | TCP/IP RJ45 & RS485 | WLAN & RS485 | Relay outputs | Query via Internet Explorer * |
| HL-DS-NT0                 |                       |                                 |                        |                            |               |              |               |             |                     |              |               |                               |
| HL-DS-NT1                 | ✓                     |                                 |                        |                            |               |              |               |             |                     |              |               |                               |
| HL-DS-NT2                 | ✓                     |                                 |                        |                            |               |              | ✓             |             |                     |              |               |                               |
| HL-DS-NT3                 | ✓                     |                                 |                        |                            |               |              |               | ✓           |                     |              |               |                               |
| HL-DS-NT4                 | ✓                     |                                 |                        |                            | 2             |              |               |             | ✓                   |              |               |                               |
| HL-DS-NT4-WL              | ✓                     |                                 |                        |                            | 2             |              |               |             |                     | ✓            |               |                               |
| HL-DS-NT4-WEB*            | ✓                     |                                 |                        |                            | 2             |              |               |             |                     |              |               |                               |
| HL-DS-PT2                 | ✓                     |                                 |                        |                            | 2             | 4            |               | ✓           |                     |              |               |                               |
| HL-DS-PT4                 | ✓                     |                                 |                        |                            | 2             | 2            |               |             | ✓                   |              |               |                               |
| HL-DS-PT4-WL              | ✓                     |                                 |                        |                            | 2             | 2            |               |             |                     | ✓            |               |                               |
| HL-DS-R-1                 | ✓                     |                                 |                        |                            | 2             |              |               | ✓           |                     |              | 2             |                               |
| HL-U1                     | ✓                     | 4                               | ✓                      |                            | 2             |              | ✓             |             |                     |              |               |                               |
| HL-U2                     | ✓                     | 4                               | ✓                      |                            | 2             |              |               | ✓           |                     |              |               |                               |
| HL-U2-420                 | ✓                     | 4                               |                        | ✓                          | 2             |              |               | ✓           |                     |              |               |                               |
| HL-U4                     | ✓                     | 4                               | ✓                      |                            | 2             |              |               |             | ✓                   |              |               |                               |
| HL-U4-420                 | ✓                     | 4                               |                        | ✓                          | 2             |              |               |             | ✓                   |              |               |                               |
| HL-U4-420-WEB*            | ✓                     | 4                               |                        | ✓                          | 2             |              |               |             | ✓                   |              |               | ✓                             |
| HL-U4-WEB*                | ✓                     | 4                               | ✓                      |                            | 2             |              |               |             | ✓                   |              |               | ✓                             |
| HL-U4-WEB-WL*             | ✓                     | 2                               | ✓                      |                            | 2             |              |               |             |                     | ✓            |               | ✓                             |
| HL-U4-WL                  | ✓                     | 2                               | ✓                      |                            | 2             |              |               |             |                     | ✓            |               |                               |

\* WEB: Access to data logger without HW4 software possible



## DATA LOGGERS

| Specifications accessories & options |                                                                                                                                                                                  |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Order code                           | Specifications & scope of delivery                                                                                                                                               |
| Connection sets                      |                                                                                                                                                                                  |
| Hygrodata-NT-E                       | PC connection set, consisting of HW4-E standard software, docking station HL-DS-NT2 and RS232 data cable                                                                         |
| Hygrodata-NT-P                       | PC connection set, consisting of HW4-P professional software, docking station HL-DS-NT2 and RS232 data cable                                                                     |
| Hygrodata-NT-E-USB                   | PC connection set, consisting of HW4-E standard software, docking station HL-DS-NT3 and USB data cable                                                                           |
| Hygrodata-NT-P-USB                   | PC connection set, consisting of HW4-P professional software, docking station HL-DS-NT3 and USB data cable                                                                       |
| Software                             |                                                                                                                                                                                  |
| HW4-E                                | Standard software for programming and data management                                                                                                                            |
| HW4-P                                | Professional software with additional validation functions                                                                                                                       |
| HW4-OPC                              | HW4-P with OPC server functionality                                                                                                                                              |
| HW4-VAL                              | HW4-OPC with comprehensive validation documentation                                                                                                                              |
| Probe cables                         |                                                                                                                                                                                  |
| E2-F3A                               | Probe extension cable 30 cm for loggers with connected Ethernet docking station<br>Use for probe 1 (internal probe) to prevent self-heating by the Ethernet module               |
| E2-01A                               | Probe extension cable for HygroClip HC2 probes, 1 m, black                                                                                                                       |
| E3-01A                               | Probe extension cable for HygroClip HC2 probes, 1 m, white                                                                                                                       |
| E2-02A                               | Probe extension cable for HygroClip HC2 probes, 2 m, black                                                                                                                       |
| E3-02A                               | Probe extension cable for HygroClip HC2 probes, 2 m, white                                                                                                                       |
| E2-05A                               | Probe extension cable for HygroClip HC2 probes, 5 m, black                                                                                                                       |
| E3-05A                               | Probe extension cable for HygroClip HC2 probes, 5 m, white                                                                                                                       |
| E2-02A-S                             | Probe extension cable for HygroClip HC2 probes, 2 m, black, with short connector                                                                                                 |
| E3-02A-S                             | Probe extension cable for HygroClip HC2 probes, 2 m, white, with short connector                                                                                                 |
| Communication cables                 |                                                                                                                                                                                  |
| AC0001                               | Standard Ethernet patch cable, 3 m                                                                                                                                               |
| AC0002                               | Standard USB A/B cable, 1.8 m                                                                                                                                                    |
| AC0004                               | Standard RS232 cable D-sub 9-pin, 1-8 m                                                                                                                                          |
| AC0005                               | Patch cable cat. 5e UTP, 3m, crossover                                                                                                                                           |
| AC1614-02                            | RS485 cable to HygroLog NT docking station, for cabling via terminal box                                                                                                         |
| Signal amplifier                     |                                                                                                                                                                                  |
| AC3003                               | Signal amplifier set for probe-to-logger cable lengths up to 100 m, consisting of 2 connection cables with electronic amplifier, open cable ends for connection via terminal box |
| Power supply units                   |                                                                                                                                                                                  |
| AC1211                               | AC mains adapter for HygroLog NT / docking stations / 240 VAC >12 VDC                                                                                                            |
| AC1213                               | Power supply unit 85-264 VAC/15 VDC, 100 W, DIN rail mounting                                                                                                                    |
| Memory cards & card reader           |                                                                                                                                                                                  |
| AC-NT32MB                            | 32 MB flash card, industrial type -40...85 °C                                                                                                                                    |
| AC-NT64MB                            | 64 MB flash card, industrial type -40...85 °C                                                                                                                                    |
| AC0100                               | Multicard reader for flash cards                                                                                                                                                 |
| Other accessories                    |                                                                                                                                                                                  |
| NT-DESK                              | Desktop stand for HygroLog NT in combination with a docking station                                                                                                              |
| ET-409                               | 4-pin Binder connector, to connect Pt100 probes to a docking station                                                                                                             |

# METEOROLOGY

## INTRODUCTION

In meteorology, the precision of measurement data parameters is critical for accurate weather forecasting and environmental research. ROTRONIC meteorological probes have an excellent reputation for providing precise results even in the most demanding of environments, especially where high humidity and low temperatures dominate. Our current product range offers high performance and a wide range of configurations to suit every application and budget.

Even the best probes measure inaccurately if the surrounding conditions are not representative of the actual climatic conditions. Without appropriate weather protection shields, the probe temperature will not be correct, and since relative humidity is temperature dependent, significant measurement errors will be the result. Poorly ventilated weather protection shields can result in a micro-climate around the probes causing consequential errors of measurement.

Therefore, in applications which require a high level of accuracy, ventilated protection shields are used. High accuracy measurements are even more important when energy optimization is concerned. The more accurate the measurement, the smaller the control errors and the greater the energy savings.

ROTRONIC's meteorology probes in combination with ventilated weather and radiation protection shields provide the best possible measurement results. At a significantly lower price level, they can offer practically the same performance as that achieved by a dew point mirror meteorological system, but without the need for regular maintenance.

Weather protection shields were developed in close co-operation with Meteo Suisse and are utilized world-wide. Tests conducted clearly demonstrated the unmatched accuracy obtained by the combination of ROTRONIC probes and ventilated weather protection!

### Applications

Weather stations, snow guns, agricultural meteorology, high-Alpine meteorology, building management systems, climate modelling, ice warning systems, fog detection and wind turbines.



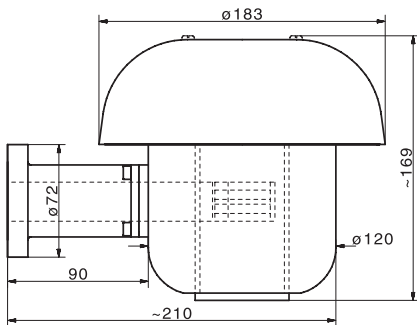
## ACTIVELY VENTILATED SHIELDS

### Applications

Snow guns, weather stations, agricultural meteorology, building management systems

### Highlights

- Simple-to-install protective shield with integrated fan
- Special white coating minimises solar heating (RAL 9010)
- Easy probe mounting
- 12 VDC or 24 VDC supply for fan
- Compatible with various probe types

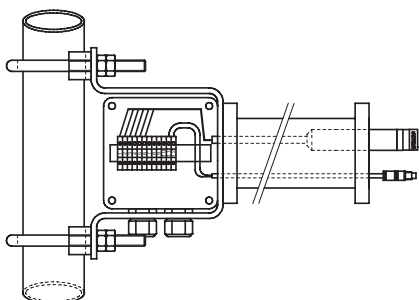


| Order code           | RS12T                                  | RS24T  |
|----------------------|----------------------------------------|--------|
| Range of application | -30...60 °C                            |        |
| Material             | Aluminium, POM, RAL 9010               |        |
| Supply               | 12 VDC, approx. 2 W                    | 24 VDC |
| Fan                  | Papst ventilator IP 54                 |        |
| Aspiration rate      | 3.5 m/s / 900 l/min                    |        |
| Longevity            | At 40 °C ~70,000 h, at 70 °C ~35,000 h |        |

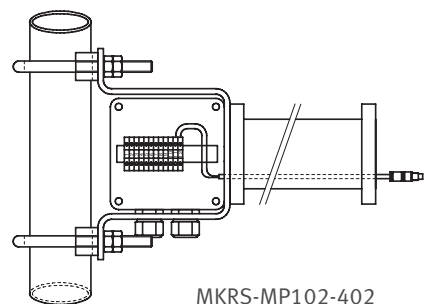
### Assembly sets for RS weather-protection shields

| Order code     | To be used with     | Probe connector | Connection: clamp box              |
|----------------|---------------------|-----------------|------------------------------------|
| MKRS-HC2       | HygroClip2 (HC2-S3) | E2              | Clamps / 2 cable screw connections |
| MKRS-MP102-402 | MP102H / MP402H     | N/A             | Clamps / 2 cable screw connections |

### Mounting connections



54 MKRS-HC2



MKRS-MP102-402

# NATURALLY VENTILATED SHIELDS

Naturally ventilated shields are used in applications where the conditions aren't so harsh and where demand for precision is not so high.

## Applications

Snow guns, weather stations, building management systems

## Highlights

- Easy-to-install protective screen
- Multi-plate system for natural ventilation
- Simple probe mounting
- Compatible with various probe types
- Mounting hardware included
- Suitable for 25...50 mm mast diameters
- Protection against wind speeds up to 68 km/h and horizontal precipitation

| Order code       | AC1002-AC1012                      | AC1003-AC1012                                      |
|------------------|------------------------------------|----------------------------------------------------|
| Number of plates | 10                                 | 14                                                 |
| Supplied with    | Mounting bracket and screws        |                                                    |
| Protection       | Probe protection tube              |                                                    |
| Use              | With probes from the MP100A series | With probes from the MP400A, MP102H, MP402H series |

| Order code       | AC1015                                   | AC1004                           |
|------------------|------------------------------------------|----------------------------------|
| Type             | HC2-S3 probe/cable protection tube       | Weather and radiation protection |
| Number of plates |                                          | 9                                |
| Supplied with    |                                          | Mounting bracket and screws      |
| Use              | Along with AC1002-AC1012 / AC1003-AC1012 | With HC2-S3 and connection cable |

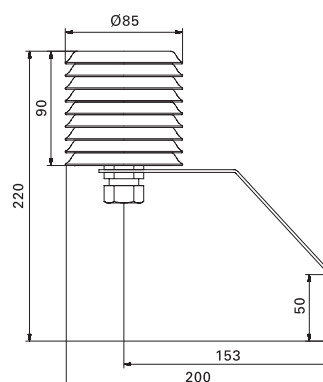
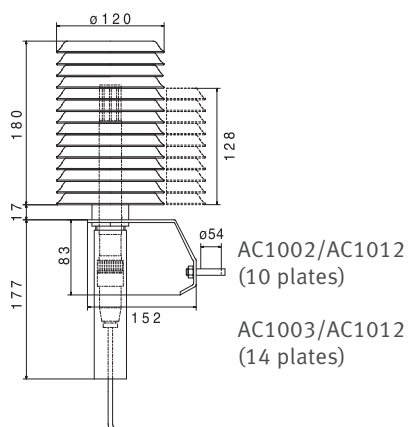
AC1002  
AC1012



AC1004



AC1015



AC1004

# HYGROMET METEOROLOGICAL PROBES

## MP102H/402H for interchangeable probes\* HC2-S3

MP102H and MP402H series probes provide truly class leading accuracy and stability . Based on the HygroClip HC2-S3 probe, they provide linear voltage or current outputs for secure transmission over extended cable lengths. An RS485 interface is available on request.

With direct 4 -wire Pt100 temperature measurement available in the same probe assembly as the new AirChip3000 technology, this ultimate meteo probe combination offers outstanding performance within a single shield installation.

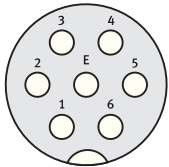
### Applications

Weather stations, snow guns, building management systems

### Highlights

- Range of application (temperature): -40...85 °C
- Current or voltage output signal
- Optional: directly connected Pt100 sensor
- UART & service interface to PCB

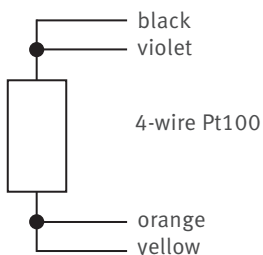
Tuchel 7-pin connector plug



Pin configuration / Wire colors

| Term        | Colour | Pin |
|-------------|--------|-----|
| +VDC        | Green  | 1   |
| Ground      | Grey   | 2   |
| Humidity    | White  | 3   |
| Temperature | Brown  | 4   |
| RS485 +     | Red    | 5   |
| RS485 -     | Blue   | 6   |
| Protection  |        | E   |

Separate Pt100 (for both types):



| Order code            |   |    |  |                                                       |
|-----------------------|---|----|--|-------------------------------------------------------|
| MP102H-               |   |    |  | Meteorology transmitter with voltage output           |
| MP402H-               |   |    |  | Meteorology transmitter with current output           |
|                       | 0 |    |  | Without additional Pt100                              |
|                       | 3 |    |  | Separate Pt100 1/3 Class B, passive, 4-wire           |
|                       | 5 |    |  | Separate Pt100 1/5 Class B, passive, 4-wire           |
|                       | A |    |  | Separate Pt100 1/10 Class B, passive, 4-wire          |
| Output signals MP102H |   |    |  |                                                       |
|                       | 2 |    |  | 0...1 V = 0...100 %rh / -30...70 °C                   |
|                       | 3 |    |  | 0...1 V = 0...100 %rh / -40...60 °C                   |
| Output signals MP402H |   |    |  |                                                       |
|                       | 4 |    |  | 0...20 mA = 0...100 %rh / 0...100 °C                  |
|                       | 5 |    |  | 0...20 mA = 0...100 %rh / -40...60 °C                 |
|                       | 6 |    |  | 0...20 mA = 0...100 %rh / -30...70 °C                 |
|                       | 7 |    |  | 4...20 mA = 0...100 %rh / 0...100 °C                  |
|                       | 8 |    |  | 4...20 mA = 0...100 %rh / -40...60 °C                 |
|                       | 9 |    |  | 4...20 mA = 0...100 %rh / -30...70 °C                 |
| (03-99)               |   | 03 |  | PUR connection cable (03 m standard, max. 99 m)       |
|                       |   | T7 |  | 7-pin Tuchel connector (not for passive 4-wire Pt100) |
|                       |   | 00 |  | Open ends                                             |

\*Order HygroClip probe HC2-S3 separately  
(Meteo probe with direct dew point output available on request)

## HYGROCLIP HC2-S3 (AIRCHIP3000)

### Applications

Meteorology stations, building automation systems, agricultural meteorology

### Use

Meteorology probe MP102H & MP402H series, OEM applications

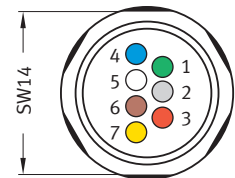
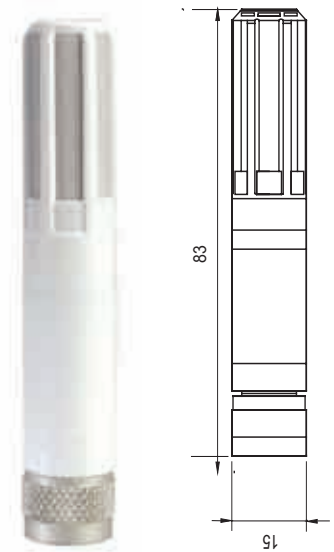
### Highlights

- Measures relative humidity, temperature and dew/frost point
- Hygromer® V-1 sensor
- Saves up to 2,000 measurement pairs \*
- Range of application 0...100 %rh / -50...100 °C
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C
- Probe with adjustment profile «Standard», factory certificate

| Order code | HC2-S3                                | HC2-S3H           |
|------------|---------------------------------------|-------------------|
| Adjustment | At 23 °C and 10, 35, 80 %rh           |                   |
| Accuracy   | ±0.8 %rh / ±0.1 K                     | ±0.5 %rh / ±0.1 K |
| Probe      | Ø15 x 85 mm                           |                   |
| Color      | White                                 |                   |
| Housing    | Polycarbonate                         |                   |
| Filter     | Polyethylene, white ~ 40 µm pore size |                   |

| Order code | HC2-R3                                         |
|------------|------------------------------------------------|
| Probe      | Interchangeable probe with new humidity sensor |

\* Requires HW4 software



Electrical connections:  
(all HygroClip2 probes with connector)

- 1 ● V+ (3.2 VDC to max. 5 VDC, ±0%; recommended: 3.3 VDC)
- 2 ● GND (ground, digital and power)
- 3 ● RXD (UART)
- 4 ● TXD (UART)
- 5 ○ Analog signal %rh (0...100 %rh=0...1 V)
- 6 ● Analog signal °C (-40...60 °C = 0...1 V)
- 7 ● AGND (analog ground)

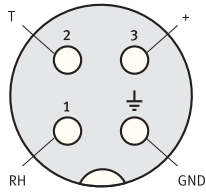
## ANALOG METEOROLOGY PROBES

Standard meteorology probes with fixed sensors; analog technology  
Hygromer® V-1 sensor

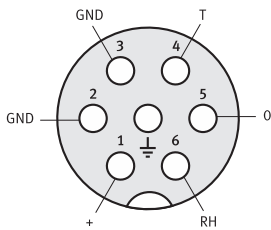
| Order code           | MP100A-xx                                                                          | MP400A-xx             |
|----------------------|------------------------------------------------------------------------------------|-----------------------|
| Output               | Linear voltage output                                                              | Linear current output |
| Precision            | Long term stability < 1 %rh / year                                                 |                       |
| Resistance           | Condensation, thawing and dust particles                                           |                       |
| Range of application | -40...60 °C                                                                        |                       |
| Measurement          | Temperature with Pt100 – direct or linear output signal                            |                       |
| Cable length         | Cable-length compensation – no measurement deviations at a distance of up to 100 m |                       |
| Filter               | Wire filter ~ 20 µm pore size                                                      |                       |



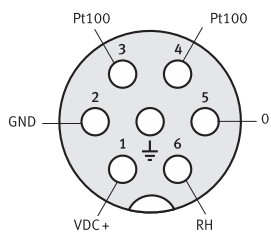
Pin configuration of the Tuche  
connector plug for MP100 & MP400  
series



Tuche T4



Tuche T7 MP100



Tuche T7 with separate Pt100

## Order code

|                   |                         |                                  |                                                             |
|-------------------|-------------------------|----------------------------------|-------------------------------------------------------------|
| MP100A-           | Output signals: voltage |                                  |                                                             |
| MP101A-           | 0...1 VDC = 0...100 %rh | -0.4...0.6 V = -40...60 °C       |                                                             |
| MP102A-           | 0...1 VDC = 0...100 %rh | 0...1 V = -30...70 °C            |                                                             |
| MP103A-           | 0...1 VDC = 0...100 %rh | 0...1 V = -40...60 °C            |                                                             |
| MP106A-           | 0...1 VDC = 0...100 %rh | Separate Pt100 in 4-wire circuit |                                                             |
| MP400A-           | Output signals: current |                                  |                                                             |
| MP400A-           | 0...20 mA = 0...100 %rh | Pt100, 4-wire passive            |                                                             |
| MP401A-           | 4...20 mA = 0...100 %rh | Pt100, 4-wire passive            |                                                             |
| MP402A-           | 4...20 mA = 0...100 %rh | 2-wire, only %rh                 |                                                             |
| MP403A-           | 4...20 mA = 0...100 %rh | 2-wire / Pt100 4-wire passive    |                                                             |
| MP404A-           | 0...20 mA = 0...100 %rh | 0...20 mA = 0...100 °C           |                                                             |
| MP405A-           | 0...20 mA = 0...100 %rh | 0...20 mA = -40...60 °C          |                                                             |
| MP406A-           | 0...20 mA = 0...100 %rh | 0...20 mA = -30...70 °C          |                                                             |
| MP407A-           | 4...20 mA = 0...100 %rh | 4...20 mA = 0...100 °C           |                                                             |
| MP408A-           | 4...20 mA = 0...100 %rh | 4...20 mA = -40...60 °C          |                                                             |
| MP409A-           | 4...20 mA = 0...100 %rh | 4...20 mA = -30...70 °C          |                                                             |
| Common parameters |                         |                                  |                                                             |
| T4                |                         |                                  | Signals & supply to Tuche 4-pin connector plug on the probe |
| T7                |                         |                                  | Signals & supply to Tuche 7-pin connector plug on the probe |
| CG                |                         |                                  | PUR cable, grey                                             |
| 02                |                         |                                  | Cable length (02 -99) in m                                  |
| C4                |                         |                                  | Cannon 4-pin connector plug at the end of the cable         |
| 00                |                         |                                  | Open ends, tin-plated                                       |
| - W4W             |                         |                                  | Sensor protection: wire filter                              |

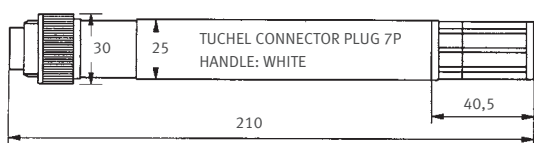
## Order codes, standard probes:

Humidity range: 0...100 %rh = 0...1 V (MP100A) or 4...20 mA (MP400A)

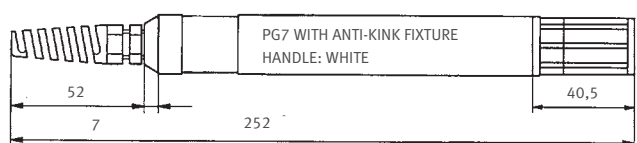
| Order code      | Range (°C)                 | Connector                  | Cable compensation |
|-----------------|----------------------------|----------------------------|--------------------|
| MP101A-T4-W4W   | -0.4...0.6 V = -40...60 °C | Tuche 4-pin connector plug | No                 |
| MP101A-T7-W4W   | -0.4...0.6 V = -40...60 °C | Tuche 7-pin connector plug | Yes                |
| MP408A-T4-W4W   | 4...20 mA = -40...60 °C    | Tuche 4-pin connector plug | No                 |
| MP408A-CGXX-W4W | 4...20 mA = -40...60 °C    | Open ends                  | No                 |

XX = length in m

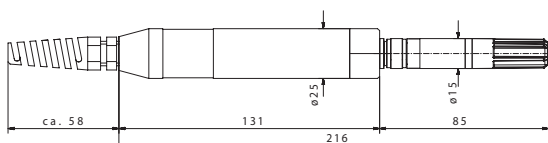
## Dimensional drawings



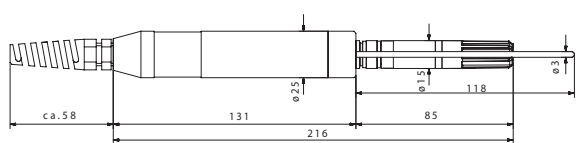
MP100A-T7



MP100A-CG



MP102H / MP402H /-0



MP102H / MP402H /-3/-5/-A

## HYGROCLIP PROBES for agricultural and other outdoor applications

New cable probes for agricultural and outside applications are equipped with a fast sensor and new filter technology which offers significantly improved protection against the growth of biofilm. Typical applications: weather stations and data recording systems.

### Applications

Agriculture, OEM and meteorology

### Use

Handheld devices, data loggers, transmitters, OEM products

### Highlights

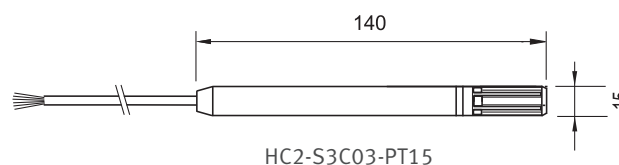
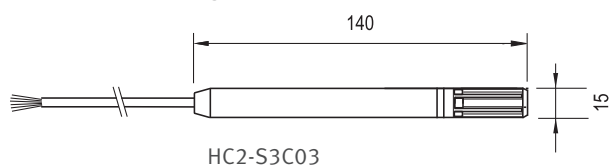
- Measures relative humidity, temperature and dew/frost point
- Hygromer® V-1 sensor
- Saves up to 2,000 readings measurement pairs \*
- Range of application 0...100 %rh / -50...100 °C
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C
- Probe with adjustment profile «Standard», factory certificate

| Order code | HC2-S3C03                             | HC2-S3C03-PT15                  |
|------------|---------------------------------------|---------------------------------|
| Adjustment | At 23 °C and 10, 35, 80 %rh           |                                 |
| Accuracy   | ±1 %rh / ±0.2 K                       | ±1 %rh / ±0.1 K (passive Pt100) |
| Filter     | Polyethylene, white ~ 40 µm pore size |                                 |
| Color      | White                                 |                                 |
| Probe      | 3 m TPU open-ended cable probe        | PT100 1/5 Class B               |
| Voltage    | 5...24 VDC / 5...16 VAC               |                                 |
| Dimensions | Ø15 x 140 mm                          | On request                      |

\* Optional, requires HW4 software



### Dimensional drawings



## METEOROLOGY

### Adapter with voltage regulator for meteorological applications (permissible voltages 5...24 VDC / 5...16 VAC)

| Order code  | Adapter                                                                |
|-------------|------------------------------------------------------------------------|
| E3-01XX-ACT | Adapter with voltage regulator for HC2-S3 probe, 1 m cable, open-ended |
| E3-02XX-ACT | Adapter with voltage regulator for HC2-S3 probe, 2 m cable, open-ended |
| E3-05XX-ACT | Adapter with voltage regulator for HC2-S3 probe, 5 m cable, open-ended |

### Specifications MP-100/400 series

| Series                                | MP102H                       | MP402H                                              | MP100A (analog)                                         | MP400A (analog)                                                                  |
|---------------------------------------|------------------------------|-----------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------|
| Output signal type                    | Voltage                      | Current                                             | Voltage                                                 | Current                                                                          |
| Supply voltage                        | 5...24 VDC                   | 15...24 VDC<br><br>V min = 10 V +<br>(0.02 x load*) | 4.8...30 VDC                                            | MP402/403:<br>8 V+ (0.02 x load)<br>Others:<br>5 V+ (0.02 x load)<br>max. 26 VDC |
| Current consumption                   | <6 mA                        | <50 mA                                              | 6 mA                                                    | 20 mA / 2x20 mA                                                                  |
| * Load (in $\Omega$ )                 | >1 k $\Omega$                | <500 $\Omega$                                       | >1 k $\Omega$                                           | <500 $\Omega$                                                                    |
| Cable-length compensation             | Yes                          | N/A                                                 | Up to 99 m                                              | N/A                                                                              |
| Range of application electronics      | -40...85 °C                  | -40...85 °C                                         | -40...60 °C<br>0...100 %rh                              | -40...60 °C<br>0...100 %rh                                                       |
| Humidity measurement range            | 0...100 %rh                  | 0...100 %rh                                         | 0...100 %rh                                             | 0...100 %rh                                                                      |
| Temperature measurement range         | Freely scalable              | Freely scalable                                     | According to<br>order number                            | According to<br>order number                                                     |
| Humidity sensor                       | N/A, HC2-S3 probe            | N/A, HC2-S3 probe                                   | Hygromer® V-1                                           | Hygromer® V-1                                                                    |
| Temperature sensor                    | N/A, HC2-S3 probe            | N/A, HC2-S3 probe                                   | Pt100 1/3 Class B                                       | Pt100 1/3 Class B                                                                |
| Separate Pt100 DIN (optional)         | According to order<br>number | According to order<br>number                        | N/A                                                     | N/A                                                                              |
| Accuracy (humidity)                   | Same as HC2-S3 probe         | Same as HC2-S3 probe                                | 10...95 %rh: $\pm 1.5$ %rh, <10, >95 %rh: $\pm 2.5$ %rh |                                                                                  |
| Accuracy (temperature)                | Same as HC2-S3 probe         | Same as HC2-S3 probe                                | $\pm 0.3$ K                                             | $\pm 0.3$ K                                                                      |
| Reproducibility                       | Same as HC2-S3 probe         | Same as HC2-S3 probe                                | <0,5 %rh/ $\pm 0.1$ K                                   | <0,5 %rh/ $\pm 0.1$ K                                                            |
| Long term stability (humidity sensor) | < $\pm 1$ %rh/year           | < $\pm 1$ %rh/year                                  | < $\pm 1$ %rh/year                                      | < $\pm 1$ %rh/year                                                               |
| Response time                         | <12 s                        | <12 s                                               | <12 s                                                   | <12 s                                                                            |
| Adjustment points                     |                              |                                                     |                                                         |                                                                                  |
| Humidity (analog)                     | N/A                          | N/A                                                 | 35, 80, H(min.)                                         | 35, 80, H(min.)                                                                  |
| Temperature (analog)                  | N/A                          | N/A                                                 | Tmin, Tmax                                              | Tmin, Tmax                                                                       |
| Humidity & temperature (digital)      | Adjustment of the<br>probe   | Adjustment of the<br>probe                          | N/A                                                     | N/A                                                                              |
| Housing material                      | POM                          | POM                                                 | POM                                                     | POM                                                                              |
| Protection                            | IP 65                        | IP 65                                               | IP 65                                                   | IP 65                                                                            |
| Weight                                | Approx. 200 g                | Approx. 200 g                                       | Approx. 200 g                                           | Approx. 200 g                                                                    |

# WATER ACTIVITY

## WATER ACTIVITY MEASUREMENT

The measurement of water activity or equilibrium relative humidity is a key parameter in the quality control of any moisture sensitive product or material. Water activity is by definition the free or non chemically bound water in foods and other products. The bound water cannot be measured with this method.

### Why is water activity measured?

The free water in a product influences its microbiological, chemical and enzymatic stability. This is especially important in the case of perishable products such as foods, grain, seeds, etc. as well as in the case of medicines and other products of the pharmaceutical and cosmetic industries. If there is too much free water available, the foods spoil, and if there is too little water available, other product properties can be affected.

The table below shows typical growth thresholds below which the specified contaminant cannot replicate and therefore spoil the product. Control of water activity therefore has a significant impact on the shelf life of a product.

The measurement of water activity also supplies useful information on properties such as the cohesion, storability, agglomeration or pourability of powders, tablets, etc. or adherence of coatings.

Based on HygroClip digital technology for high performance and easy digital calibration, ROTRONIC water activity probes are suitable for almost any application. All water activity stations and probes incorporate temperature measurement as standard.

| Water activity   | Contaminant        |
|------------------|--------------------|
| aw = 0.91...0.95 | Most bacteria      |
| aw = 0.88        | Most yeasts        |
| aw = 0.80        | Most mildews       |
| aw = 0.75        | Halophile bacteria |
| aw = 0.70        | Osmiophile yeasts  |
| aw = 0.65        | Xerophile mildew   |

Water activity measurement stations measure in the range of 0...1 aw which equates to 0...100 %ERH and supply a digital output signal to interface with HygroLab and HygroPalm water activity indicators. Digital calibration can be performed with the help of these instruments, or with PC software. The HC2-AW and AW-DIO measurement stations have a large thermal mass. This means the probes react very slowly to temperature changes so that virtually no variations arise during measurement – especially when using the AW Quick function. The extremely small internal volume of the sensor chamber ensures humidity equilibrium is reached very quickly in the case of all products. The section «Accessories» describes the sample holders, sample containers and sealing mechanism in detail.

## HYGROLAB SERIES

### Applications

Water activity measurements in the laboratory: cheese, meat, tobacco, building materials, pet foods, bakery products, paper, medicines, horticulture, agriculture, etc.

### Use

With AW-DIO probes and insertion probes for bulk materials

### Highlights

- Suitable for many applications
- AW Quick mode for results in typically 4-5 minutes
- High measurement precision
- Long term stability
- Interchangeable measurement stations
- Multichannel display
- Validated PC analysis software



### HYGROLAB 2

Order code HygroLab 2

- 4-channel benchtop display unit for measurement of water activity, temperature and relative humidity
- Display option: aw or %rh
- All psychrometric calculations available
- Definable pressure constant for calculations
- AC power supply
- RS232/485 interface
- Dimensions: 225 x 170 x 70 mm

### HYGROLAB 3

Order code HygroLab 3

- 4-channel benchtop display unit for measurement of water activity, temperature and relative humidity
- All psychrometric calculations available
- Definable pressure constant for calculations or with pressure probe
- Integrated AW Quick function
- AC power supply
- RS232/485 interface
- Dimensions: 225 x 170 x 70 mm



### HYGROLAB 3-E

Order code HygroLab 3-E

- As HygroLab 3, but with Ethernet TCP/IP interface

## HYGROPALM HP23 SERIES

In many situations it can be very useful to measure water activity in production or storage rooms, e.g. inspection of bulk materials to ensure they meet specifications.

The new HP23-AW was developed as a portable solution with most of the functionality of the HygroLab3.

### Applications

Water activity measurements in production processes: random checks of cheese, meat, tobacco, building materials, pet food, bakery products, paper, medicines, horticulture, agriculture, etc.

### Highlights

- Measures humidity and temperature (aw or %rh and °C/°F)
- Calculates absolute humidity
- Software-aided probe calibration / adjustment (one-point / multi-point)
- Range of application 0...1 aw (0...100 %rh) / -10...60 °C
- UART interface
- Battery power monitor
- Trend indicator

### HYGROPALM 23-AW

Order code HP23-AW

- 2 probe inputs for interchangeable HC2 probes, with 9 V battery
- All psychrometric calculations available
- Accelerated measurement of water activity (AW Quick mode):  
allows measurement of most products in typically 4-6 minutes
- Equilibrium humidity measurement (standard mode) with  
automatic detection of equilibrium state
- Adjusted at 23 °C and 10, 35, 80 %rh
- Accuracy:  $\pm 0.8$  %rh (0.008 aw) /  $\pm 0.1$  K (depending on probe used)
- Saves up to 2,000 data records for each of %rh, °C, date, time

Available beginning spring 2009

Not compatible with AW-DIO probe



### AW QUICK

Order code HW4-P-Quick

AW Quick is a highly developed software function for water activity analysis that is integrated in both the HygroLab 3 and in the HP23-AW handheld device. It supplies results in typically five minutes or less. It also allows conventional water activity measurement with automatic detection of humidity equilibrium.

## HYGROPALM AW SETS

The HygroPalm AW sets are the perfect solution for on-site measurements. They are supplied in a tough, lightweight ABS carry case and include everything needed for measurement and calibration.

The difference between the two sets lies in the size of the sample holders and disposable sample containers.

### Applications

Water activity measurements in production areas: checks of cheese, meat, tobacco, building materials, pet food, bakery products, paper, medicines, horticulture, agriculture, etc.

### Highlights

- Measures humidity and temperature (aw or %rh and °C/°F)
- Calculates absolute humidity
- Software-aided probe calibration / adjustment (one-point / multi-point)
- Range of application 0...1 aw (0...100 %rh) / -10...60 °C
- UART interface
- Battery power monitor
- Trend indicators



### AW1-SET-14

Order code HP23-AW-Set-14

- Contains the sample holder WP-14-S/PS-14
- For product samples such as tablets, powders, seeds, powdered spices, tea, etc.

### AW1-SET-40

Order code HP23-AW-Set-40

- Contains the sample holders WP-40/PS-40
- Suitable for measurement of, for example, pet food, ore, nuts, beans, etc.

See «Accessories» for further information.

Available beginning spring 2009

| Order information            |                 |                 |
|------------------------------|-----------------|-----------------|
| Order code HygroPalm AW sets | HP23- AW-Set-14 | HP23- AW-Set-40 |
| Consisting of:               |                 |                 |
| Handheld device              | HP23 AW         |                 |
| Measurement probe            | HC2-AW          |                 |
| Sample holder                | WP-14-S         | WP-40S          |
| Disposable sample containers | PS-14, 14 mm    | PS-40, 40 mm    |
| 35 %rh humidity standards    | EA35-SCS        |                 |
| 80 %rh humidity standards    | EA80-SCS        |                 |
| 50 %rh humidity standards    | EA50-SCS        |                 |
| 10 %rh humidity standards    | EA10-SCS        |                 |
| Carry case                   | AC1124          |                 |

## MEASUREMENT STATIONS

Water activity probes with large thermal mass, cable length ~1m

### Applications

For water activity measurements in bulk materials such as flour, grain, spices, etc.

For solid products such as meat, sausage as well as oils, fats, etc.

### Uses

Handheld and bench top devices

### Highlights

- Measures water activity
- Measurement range: 0...1 aw (0...100 %rh), 5...50 °C
- Digital interface

### HC2-AW

Order code HC2-AW

- Water activity probe with large thermal mass
- Cable length ~1m
- UART interface
- Probe with adjustment profile «Standard», factory certificate
- Adjusted at 23 °C and 10, 35, 80 %rh
- Accuracy:  $\pm 0.01$  aw / 0.8 %rh /  $\pm 0.1$  K
- Wire mesh filter with approx. 20...25  $\mu$ m pore size, material DIN1.4401

### HC2-AW-HH

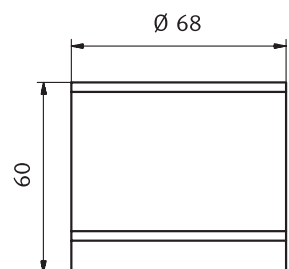
Order code HC2-AW-HH

- Like HC2-AW, but with special sensor for measurements in high humidity range

### AW-DIO

Order code AW-DIO

- Water activity probe with large thermal mass
- Cable length ~1m
- DIO interface for original HygroPalm/HygroLab devices
- Probe with adjustment profile «Standard», factory certificate
- Adjusted at 23 °C and 10, 35, 80 %rh
- Accuracy:  $\pm 0.01$  aw / 1 %rh /  $\pm 0.3$  K
- Wire filter with approx. 20...25  $\mu$ m pore size, material DIN1.4401



## INSERTION PROBE 5 mm, for measurements in bulk materials

### Applications

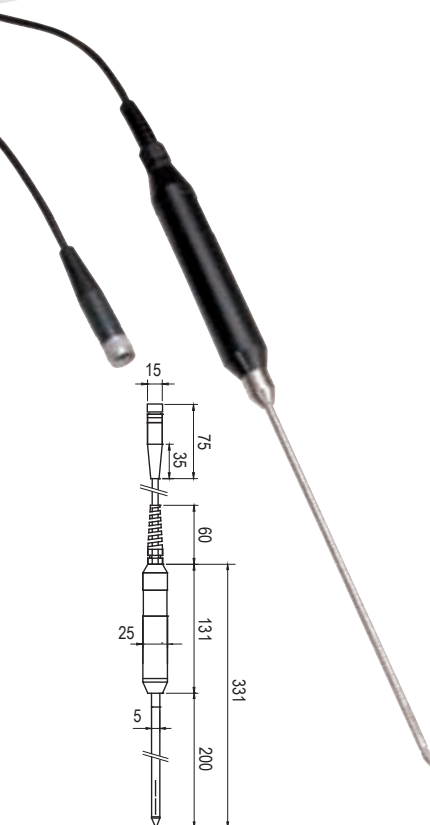
For direct measurement of water activity in dust-free bulk materials: tablets, grain, gel capsules and granulated materials. The HygroClip2 P05 is a stainless steel probe with a diameter of 5 mm and laser-cut slots to allow air to condition the sensors.

### Highlights

- Measures water activity (humidity), temperature and dew point
- Saves up to 2,000 measurement pairs \*
- Range of application: 0...1 aw (0...100 %rh) / -40...85 °C
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...1 aw (0...100 %rh) / -40...60 °C
- Probe with adjustment profile «Standard», factory certificate

|              |                                                             |
|--------------|-------------------------------------------------------------|
| Order code   | HC2-P05                                                     |
| Type         | Ø 5 x 200 mm, insertion probe with air slots, ~2m TPU cable |
| Adjustment   | At 23 °C and 10, 35, 80 %rh                                 |
| Accuracy     | ± 0.015 aw (±1.5 %rh)/±0.3 K                                |
| Handle color | Anthracite                                                  |
| Weight       | Approx. 160 g                                               |

\* Requires HW4 software



## INSERTION PROBES 10 mm, for measurements in bulk materials

### Applications

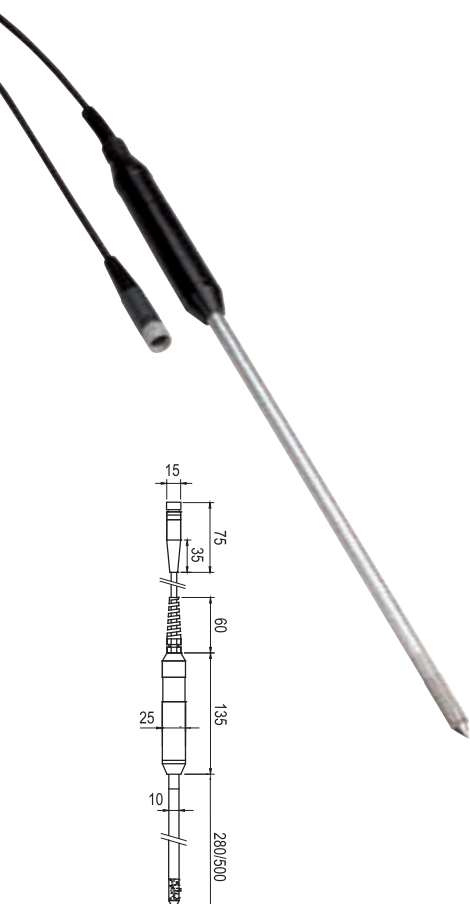
Measurements in dusty bulk materials such as flour, sugar, etc.

### Highlights

- Measures water activity (humidity), temperature and dew point
- Saves up to 2,000 measurement pairs \*
- Range of application: 0...1 aw (0...100 %rh) / -40...85 °C
- UART interface and freely scalable analog signals 0...1 V
- Standard scaling 0...1 V = 0...1 aw (0...100 %rh) / -40...60 °C
- Probe with adjustment profile «Standard», factory certificate

|                     |                                                         |               |
|---------------------|---------------------------------------------------------|---------------|
| Order code          | HC2-HP28                                                | HC2-HP50      |
| Type                | Insertion probe with steel sinter filter, ~2m TPU cable |               |
| Adjustment          | At 23 °C and 10, 35, 80 %rh                             |               |
| Accuracy            | ± 0.008 aw (±0.8 %rh)/±0.1 K                            |               |
| Probe length        | 280 mm                                                  | 500 mm        |
| Handle color        | Anthracite                                              |               |
| Steel sinter filter | ET-Z10                                                  |               |
| Weight              | Approx. 200 g                                           | Approx. 250 g |

\* Optional, requires HW4 software



## SAMPLE HOLDERS WP-14-S/40/40TH

The stainless steel sample holders were developed specifically for the water activity probes HC2-AW/AW-DIO. There are two sizes available: WP14-S for small samples (14 mm deep) and WP40 for larger samples (40 mm deep). Both products provide excellent sample containment and optimum temperature stability. The WP-40TH can be used with both disposable sample holders. Material: WP14-S and WP-40: V2A steel, WP-40-TH: brass, nickel-plated.

| Order code | WP-14-S       | WP-40             | WP-40TH                                   |
|------------|---------------|-------------------|-------------------------------------------|
|            | For PS14      | For PS14 and PS40 | With water jacket for temperature control |
| Weight     | Approx. 350 g | Approx. 1250 g    | Approx. 1550 g                            |



## DISPOSABLE SAMPLE CONTAINERS PS-14/PS-40

The disposable sample containers ensure the optimum sample volume is introduced into the WP-14-S, WP-40 or WP-40TH sample holders. They prevent the sample holders from coming into direct contact with the product being tested, thereby preventing soiling or cross contamination. The sample containers also provide a convenient means of collecting and storing samples.

| Order code | PS-14                             | PS-40                                     |
|------------|-----------------------------------|-------------------------------------------|
| Bag        | 100 sample containers for WP-14-S | 100 sample containers for WP-40 / WP-40TH |
| Weight     | Approx. 880 g                     | Approx. 1250 g                            |
| Volume     | 18.5 cm <sup>3</sup>              | 52.6 cm <sup>3</sup>                      |



## CLAMP SEALING MECHANISM

In the case of very dry or very moist samples additional mechanical sealing of the AW measurement station and sample holder may be necessary to prevent external conditions influencing the sample. The AW-KHS provides a strong mechanical seal and is compatible with the WP-40 and WP-40TH sample holders.

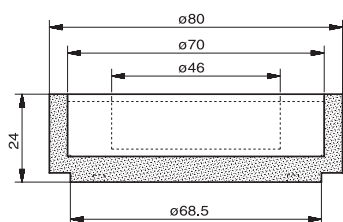
| Order code | AW-HKS         |
|------------|----------------|
| Weight     | Approx. 1100 g |

Calibration devices see page 90

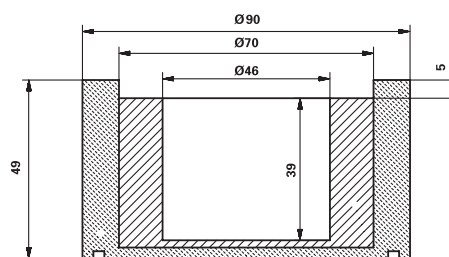


## WATER ACTIVITY

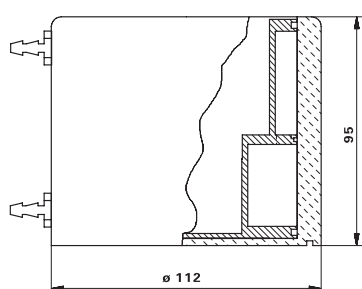
| Specifications                       |                                                                                                                                                 |                                                            |                                                   |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------|
| Feature                              | HygroLab 2                                                                                                                                      | HygroLab 3                                                 | HP23-AW                                           |
| Probe connections                    | 4                                                                                                                                               | 4                                                          | 1                                                 |
| PC interface                         | RS232/485                                                                                                                                       | TCP/IP or RS232                                            | USB                                               |
| Networking                           | Up to 64 devices using RS485                                                                                                                    |                                                            | No                                                |
| Aw Quick mode                        | Option. Only via PC                                                                                                                             | Integrated and with PC and HW4 software                    | Yes, directly readable                            |
| Calibration with keypad              |                                                                                                                                                 |                                                            |                                                   |
| 1-point %rh (aw)                     | Yes                                                                                                                                             |                                                            |                                                   |
| 4-point %rh / 2-point °C/°F          | Yes                                                                                                                                             |                                                            |                                                   |
| Calibration with PC                  | Yes                                                                                                                                             | Yes                                                        |                                                   |
| 1-point %rh (aw)                     | Yes                                                                                                                                             | Yes                                                        |                                                   |
| 4-point %rh (aw) / 2-point °C/°F     | Yes                                                                                                                                             | Yes                                                        |                                                   |
| Display units                        | %rh, aw, °C, °F,                                                                                                                                | %rh, aw, °C, °F,                                           |                                                   |
| Calculated parameters                | Dew point, wet-bulb temperature, enthalpy, ratio of mixture, water vapor content, partial water vapor pressure, saturation water vapor pressure |                                                            |                                                   |
| Audible signal at end of measurement | No                                                                                                                                              | Yes                                                        | No                                                |
| Electronics operating range          | 0...99 %rh, -10...60 °C (14...140 °F)                                                                                                           |                                                            |                                                   |
| LC display                           | 3 lines alphanumeric                                                                                                                            |                                                            |                                                   |
| Trend indicator                      | Yes                                                                                                                                             |                                                            |                                                   |
| Display resolution                   | 0.1 %rh / 0.1 °C/°F, 0.001 aw                                                                                                                   | 0.1 %rh / 0.1 °C/°F, 0.001 aw, 0.01 calculated value °C/°F | 0.001 aw, 0.01 °C/°F                              |
| Housing                              | Aluminium, 220 x 170 x 55 mm                                                                                                                    |                                                            | ABS                                               |
| Power supply                         | 9 V power supply, via AC power adapter                                                                                                          |                                                            | 9 V battery or 9 V power supply unit via mini USB |
| Current consumption                  | Max. 20 mA                                                                                                                                      |                                                            | <10 mA                                            |
| CE conformity                        | EN 61000-6-2:2001, EN 61000-6-4:2001                                                                                                            |                                                            |                                                   |
| Weight                               | 1100 g                                                                                                                                          | 1100 g                                                     | 300 g                                             |



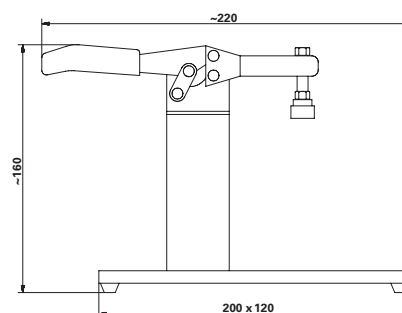
WP-14-S



WP-40



WP-40TH



AW-KHS

# TEMPERATURE MEASUREMENT

## TEMPERATURE MEASURING DEVICES

Temperature measurement is very important in many production, storage, shipping and drying processes. The law in many countries requires that, in addition to other parameters, the process and storage temperatures are carefully controlled and recorded in (for example) the food and pharmaceutical industries.

The new ThermoFlex5 transmitters from ROTRONIC meet these needs. Easy to use, simple to install and with a large measurement range, the devices can be used for almost every application. Depending on the model, the transmitters provide analogue or digital output signals. The digital models can be integrated in networks via TCP/IP, USB and RS485 interfaces.

The devices are based on the new AirChip3000 technology.



## TF5X SERIES for interchangeable Pt100 probes

### Applications

HVAC applications, building management systems, museums, libraries, warehouses, cold stores, etc.

### Highlights and common features

- Probe interchangeable in just a few seconds
- Temperature measurement with Pt100 probes in 4-wire circuit
- Range of application -40...60 °C; -10...60 °C with LCD, 0...100 %rh
- Measurement range -100...600 °C, freely scalable
- Use as a simulator for system validation \*
- UART service interface
- 4-pin Binder connector
- Can be mounted on a DIN rail (see accessories, page 102)
- Suitable probes: Pt100 probes AC1900...AC1916-AT (page 74)

\* Requires HW4 software



## TF52-W SERIES

- 2-wire 4...20 mA type
- Signal freely scalable \*
- Version with display and keypad (optional)
- Alarm indicators

## TF53-W SERIES

- 3/4-wire types with selectable output signal (mA, V)
- Signals freely selectable and scalable by user \*
- Version with display and keypad (optional)
- Backlit display
- Alarm indicator
- Optional USB & RS485 interface

\* Requires HW4 software

Dimensions as HF5 series

### Order information (for accessories see pages 100-102)

#### Power supply and output signal type

|        |  |  |  |  |                                                                                    |
|--------|--|--|--|--|------------------------------------------------------------------------------------|
| TF520- |  |  |  |  | 2-wire, <28 VDC, common V+, 4...20 mA<br>(Only display without backlight possible) |
| TF531- |  |  |  |  | 3/4-wire, 15...40 VDC / 12...28 VAC, 0...20 mA                                     |
| TF532- |  |  |  |  | 3/4-wire, 15...40 VDC / 12...28 VAC, 4...20 mA                                     |
| TF533- |  |  |  |  | 3/4-wire, 5...40 VDC / 5...28 VAC, 0...1 V                                         |
| TF534- |  |  |  |  | 3/4-wire, 15...40 VDC / 3...28 VAC, 0...5 V                                        |
| TF535- |  |  |  |  | 3/4-wire, 15...40 VDC / 12...28 VAC, 0...10 V                                      |

#### Instrument type

|   |   |  |  |  |            |
|---|---|--|--|--|------------|
| W | T |  |  |  | Wall model |
|---|---|--|--|--|------------|

#### Scaling of the output signals

|  |  |   |   |  |                                |
|--|--|---|---|--|--------------------------------|
|  |  | 1 | X |  | 0...50 °C / 0...122 °F         |
|  |  | 2 | X |  | 10...40 °C / 50...104 °F       |
|  |  | 3 | X |  | -40...60 °C / -40...140 °F     |
|  |  | 4 | X |  | -30...70 °C / -22...158 °F     |
|  |  | 5 | X |  | -40...85 °C / -40...185 °F     |
|  |  | 6 | X |  | 0...100 °F (-17.7...37.7 °C)   |
|  |  | 7 | X |  | 0...200 °F (-17.7...93.3 °C)   |
|  |  | 8 | X |  | 0...300 °F (-17.7...148.8 °C)  |
|  |  | 9 | X |  | -50...200 °F (-45.5...93.3 °C) |
|  |  | A | 3 |  | 0...100 °C                     |
|  |  | C | 4 |  | -50...150 °C                   |

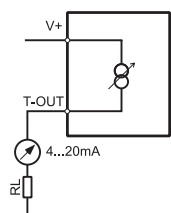
#### Optional display

|  |  |  |  |   |                          |
|--|--|--|--|---|--------------------------|
|  |  |  |  | D | With keypad & LC display |
|  |  |  |  | X | Without display          |

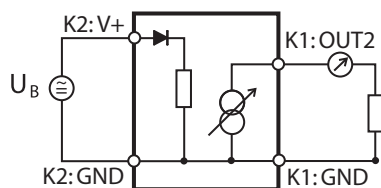
#### Electrical connections (analogue signals to terminals)

|  |  |  |  |  |   |                          |
|--|--|--|--|--|---|--------------------------|
|  |  |  |  |  | 1 | 1 M16 x 1.5 cable gland  |
|  |  |  |  |  | 5 | 1 x 1/2" conduit adapter |

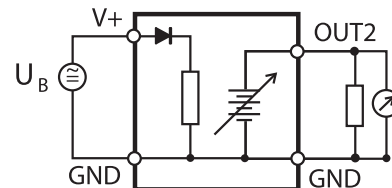
## TEMPERATURE MEASUREMENT



Schematic 2-wire types



Schematic 3-wire current signal

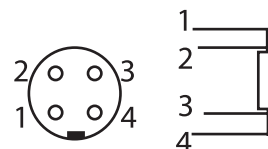


Schematic 3-wire voltage signal

The devices can be operated with the Pt100 probes on page 74.

Fundamentally, however, all Pt100 probes may be used. The drawing to the right shows the pin configuration:

Pt100 input (contact side of the flange socket / corresponds to the solder side of the connector)



4-wire Pt100

| Detailed specifications        |                                                                                                                   |                                                             |      |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|------|
| Power supply / Connections     |                                                                                                                   | TF52                                                        | TF53 |
| Supply voltage                 | 10...28 VDC<br>V min = 10 V + (0.02 x load*)                                                                      | 15...40 VDC / 12...28 VAC                                   |      |
| Current consumption            | 20 mA, 4...20 mA current loop                                                                                     |                                                             |      |
| Electrical connections         | Screw terminals and M16 cable gland or ½" conduit adapter                                                         |                                                             |      |
| Temperature measurement        |                                                                                                                   | TF52                                                        | TF53 |
| Sensor                         | Pt100 1/3 Class B (order separately)                                                                              |                                                             |      |
| Measurement range              | -100...600 °C / -58...212 °F                                                                                      |                                                             |      |
| Accuracy at 23 °C              | ±0.2 K                                                                                                            |                                                             |      |
| Repeatability                  | 0.05 °C                                                                                                           |                                                             |      |
| Long term stability            | <0.1 °C/year                                                                                                      |                                                             |      |
| Response time                  | Typically 4 s for 63 % of a change from 23 to 80 °C (1 m/sec air flow at sensor)                                  |                                                             |      |
| Start-up time and refresh rate |                                                                                                                   | TF52                                                        | TF53 |
| Start-up time                  | Typically 3.4 s                                                                                                   | Typically 1.9 s                                             |      |
| Signal type                    | 4...20 mA                                                                                                         | 0...20 mA, 4...20 mA<br>0...1 V, 0...5 V, 0...10 V          |      |
| Scale limits                   | -999.99...+9999.99 units, user programmable                                                                       |                                                             |      |
| *Maximum load                  | 0/500 Ω                                                                                                           | 0/500 Ω (current signal), min. 1000 Ω (voltage signal)      |      |
| Service interface              | UART (universal asynchronous receiver transmitter) on mini USB interface                                          |                                                             |      |
| Service cable maximum length   | 5 m (16.4 ft)                                                                                                     |                                                             |      |
| General specifications         |                                                                                                                   |                                                             |      |
| Optional display               | LCD, 1 or 2 decimals,<br>without backlight                                                                        | LCD, 1 or 2 decimals,<br>with backlight and trend indicator |      |
| Housing material / Protection  | ABS / IP 65                                                                                                       |                                                             |      |
| Weight                         | Approx. 250 g                                                                                                     |                                                             |      |
| CE/EMC compatibility           | EMC Directive 2004/108/EC<br>EN 61000-6-1: 2001, EN 61000-6-2: 2005, EN 61000-6-3: 2005, EN 61000-6-4: 2001 + A11 |                                                             |      |
| Solder                         | Lead-free (RoHS-compliant)                                                                                        |                                                             |      |
| Fire resistance                | Conforms to UL94-HB                                                                                               |                                                             |      |
| FDA/GAMP compatibility         | Conforms to FDA 21 CFR Part 11 and GAMP 4                                                                         |                                                             |      |
| Electronics operating range    | -40...60 °C / -10...60 °C (models with display) 0...100 %rh, non-condensing                                       |                                                             |      |

## THERMOPALM TP22

For HVAC technicians, the pharmaceutical industry, building management systems, the paper industry, research and many others.

### Highlights and common features

- Probe interchangeable in just a few seconds
- Temperature measurement with Pt100 probes in 4-wire circuit
- Electronics operating range -40...60 °C; -10...60 °C with LCD, 0...100 %rh
- Measurement range -100...600 °C, freely scalable
- UART service interface
- 4-pin Binder connector
- Suitable probes: Pt100 probes AC1900...AC1916-AT

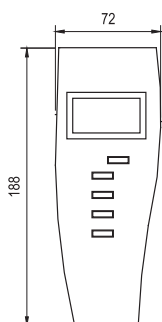
### THERMOPALM

Order code TP22

### Applications

HVAC applications, pharmaceutical industry, building management systems, paper industry, research, etc.

- For interchangeable Pt100 probes in 4-wire circuit
- Electronics operating range -10...60 °C
- Saves up to 2,000 data records (temperature, date, time)
- 9 V battery
- Accuracy:  $\pm 0.1$  K (depending on probe)



## TEMPERATURE MEASUREMENT

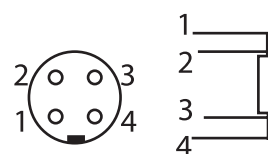
| Specifications                        | TP22                                                                     |
|---------------------------------------|--------------------------------------------------------------------------|
| Main features                         |                                                                          |
| Probe type                            | Pt100 probes in 4-wire circuit                                           |
| Measurement range                     | -100...600 °C                                                            |
| Accuracy at 23 ± 5 °C                 | ±0.1 K                                                                   |
| Reproducibility                       | 0.01K                                                                    |
| Initialization time                   | <2 seconds                                                               |
| Range of application electronics      | -10...60 °C                                                              |
| Display resolution                    | 2 decimals                                                               |
| Display illumination                  | Yes                                                                      |
| Alarm indicators                      | Yes                                                                      |
| Battery power indicator               | «Low Battery» indicator                                                  |
| Functions                             |                                                                          |
| Trend indicator                       | Yes                                                                      |
| Probe adjustment with software        | 1-point and multi-point with AC3006 service cable                        |
| Probe adjustment with keys            | 1-point                                                                  |
| Data logging                          | 2,000 readings                                                           |
| Event logging                         | Yes                                                                      |
| User information                      | Via service cable & HW4 software                                         |
| Device lock (password-protected)      | Via service cable & HW4 software                                         |
| Service information                   | Scheduled calibration                                                    |
| Audit trail / Electronic records      | Conforms to FDA 21 CFR Part 11 and GAMP                                  |
| Electrical specifications             |                                                                          |
| Power supply                          | 9 V battery                                                              |
| Rechargeable battery charge           | No                                                                       |
| Current consumption                   | <10 mA                                                                   |
| Communication interfaces              | Via service cable                                                        |
| Service interface                     | UART (universal asynchronous receiver transmitter) on mini USB interface |
| Maximum length service cable          | 5 m                                                                      |
| Mechanical specifications             |                                                                          |
| Housing material                      | ABS                                                                      |
| Dimensions                            | 274 x 72 x 35 mm                                                         |
| Weight                                | Approx. 300 g                                                            |
| Standards                             | EN 61000-6-4 & EN 61000-6-2                                              |
| FDA / GAMP compatibility, audit trail | Conforms to FDA 21 CFR Part 11 and GAMP 4                                |
| IP protection                         | IP 40                                                                    |

The devices can be connected to the Pt100 probes on page 74.

Fundamentally, however, all Pt100 probes may be used. The drawing to the right shows the pin configuration:

Pt100 input

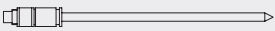
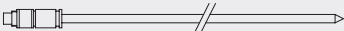
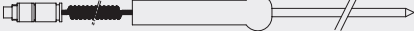
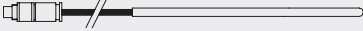
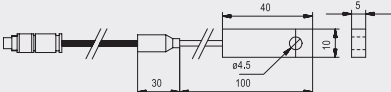
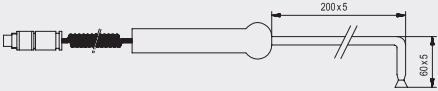
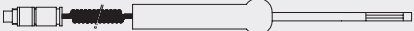
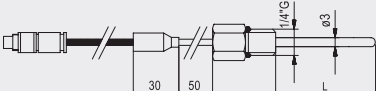
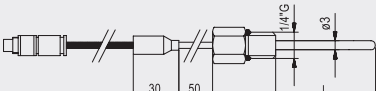
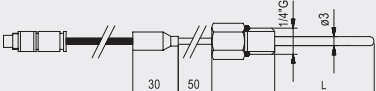
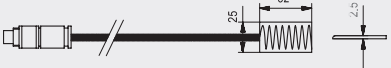
(contact side of the flange socket / corresponds to the solder side of the connector)



4-wire Pt100

# PT100 PROBES

All probes Pt100 Class A with 4-wire connection, except AC1913: Class B. Connection: 4-pin Binder connector plug series 712  
 $\tau_{90}$ : Time to adjustment of 90% of a temperature jump, specified for air / water.

| Specifications |                                                                                                                                    |                                         |                                                                                      |
|----------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------|
| Order code     |                                                                                                                                    |                                         |                                                                                      |
| AC1900         | Rod probe 100 x 3 mm, DIN 1.4401<br>-70...500 °C, $\tau_{90}$ : 8 / 6 s                                                            |                                         |    |
| AC1901         | Rod probe 250 x 3 mm, DIN 1.4401<br>-70...500 °C, $\tau_{90}$ : 8 / 6 s                                                            |                                         |    |
| AC1902         | Insertion probe with handle, DIN 1.4401<br>-70...500 °C, $\tau_{90}$ : 8 / 6 s                                                     | 1 m PUR cable<br>max. 80 °C             |    |
| AC1903         | Cable probe 200 x 6 mm, not waterproof<br>DIN 1.4401, -70...500 °C, $\tau_{90}$ : 170 / 15 s                                       | 2 m thermoplastic<br>cable, max. 110 °C |    |
| AC1904         | Cable probe 50 x 6 mm, waterproof DIN<br>1.4401, -50...500 °C, $\tau_{90}$ : 185 / 20 s                                            | 2 m thermoplastic<br>cable, max. 110 °C |  |
| AC1905         | Surface probe 40 x 10 x 5 mm<br>DIN 1.4301, -70...500 °C, $\tau_{90}$ : approx. 90 s<br>no standard                                | 2 m silicon cable<br>max 180 °C         |  |
| AC1907         | Surface probe with handle, offset<br>DIN 1.4401, -70...500 °C, $\tau_{90}$ : approx. 90 s<br>no standard. Do not calibrate in oil! | 1 m PUR helix cable<br>max. 80 °C       |  |
| AC1908         | Handheld probe for measurements in air<br>250 x 4 mm, -50...120 °C, $\tau_{90}$ : 20 / --s                                         | 1 m PUR helix cable<br>max. 80 °C       |  |
| AC1909         | Rod probe for measurements in air<br>100 x 4 mm, DIN 1.4401, -50...120 °C,<br>$\tau_{90}$ : 20 / -- s                              |                                         |  |
| AC1910         | 30 mm screw-in probe 1/4" G<br>DIN 1.4401, -70...500 °C, $\tau_{90}$ : 8 / 6 s                                                     | 2 m silicon cable<br>max. 180 °C        |  |
| AC1911         | 50 mm screw-in probe 1/4" G<br>DIN 1.4401, -70...500 °C, $\tau_{90}$ : 8 / 6 s                                                     | 2 m silicon cable<br>max. 180 °C        |  |
| AC1912         | 100 mm screw-in probe 1/4" G<br>DIN 1.4401, -70...500 °C, $\tau_{90}$ : 8 / 6 s                                                    | 2 m silicon cable<br>max. 180 °C        |  |
| AC1913         | Silicon foil probe, 26 x 32 x 2.5 mm<br>-50...200 °C, $\tau_{90}$ : approx. 7 s, no standard                                       | 1 m silicon cable<br>max. 180 °C        |  |
| AC1916-A-T     | Cable probe 60 x 6 mm, waterproof<br>DIN 1.4571 (316Ti)-100...180 °C<br>$\tau_{90}$ : 185 / 20                                     | 2 m PTFE cable<br>max. 180 °C           |  |

| Accessories  |                                                                                      |                                                                                     |
|--------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Order code   |                                                                                      |                                                                                     |
| HC2-PT100-B4 | Adapter for Pt100 probes for HP22 and HP23                                           |  |
| AC1960-50    | Screw-in measuring sleeve for 3 mm probes<br>Thread 1/4" G<br>Immersion depth 50 mm  |  |
| AC1960-100   | Screw-in measuring sleeve for 3 mm probes<br>Thread 1/4" G<br>Immersion depth 100 mm |  |
| AC1607-2     | Extension cable for Pt100 probes, 4-pin Binder male/female plugs                     | 2 m                                                                                 |
| AC1607-3     | Extension cable for Pt100 probes, 4-pin Binder male/female plugs                     | 3 m                                                                                 |
| AC1607-5     | Extension cable for Pt100 probes, 4-pin Binder male/female plugs                     | 5 m                                                                                 |

## PT100 TEMPERATURE SENSORS

A Pt100 sensor changes its electrical resistance with every change in temperature. Its value is 100 Ohms at 0 °C. This characteristic is used in a bridge circuit to generate a signal suitable for further processing. Like any manufactured product, a Pt100 sensor is subject to variations. Today there are five accuracy classes by selection: Class B, Class A, 1/3, 1/5 and 1/10. They correspond to tolerances at 0 °C of  $\pm 0.3$ ,  $\pm 0.15$ ,  $\pm 0.1$ ,  $\pm 0.06$  and  $\pm 0.03$  °C. The table below illustrates this.

Due to the cost of the selection process, a 1/10 Pt100 sensor is much more expensive than the 1/3 version usually used. The lower adjustment point is normally 0 °C and the tolerance range expands from there. If the adjustment point is then moved to the target temperature, the performance potential available is used and investments in the wrong place avoided. This procedure should not be used for portable Pt100 measuring devices. Another way of obtaining optimum results is to use the probes in a 3 or 4-wire system, thereby eliminating falsification by connection cable resistance. ROTRONIC only uses platinum Pt100 temperature sensors for temperature measurement. To ensure precision measurements, the temperature and humidity sensors should be matched to one another.

| Temp. °C | Tolerance |              |         |              |             |              |             |              |              |              |
|----------|-----------|--------------|---------|--------------|-------------|--------------|-------------|--------------|--------------|--------------|
|          | Class A   |              | Class B |              | 1/3 Class B |              | 1/5 Class B |              | 1/10 Class B |              |
|          | $\pm K$   | $\pm \Omega$ | $\pm K$ | $\pm \Omega$ | $\pm K$     | $\pm \Omega$ | $\pm K$     | $\pm \Omega$ | $\pm K$      | $\pm \Omega$ |
| -200     | 0.55      | 0.24         | 1.3     | 0.56         | 0.44        | 0.19         | 0.26        | 0.11         | 0.13         | 0.06         |
| -100     | 0.35      | 0.14         | 0.8     | 0.32         | 0.27        | 0.11         | 0.16        | 0.06         | 0.08         | 0.03         |
| 0        | 0.15      | 0.06         | 0.3     | 0.12         | 0.10        | 0.04         | 0.06        | 0.02         | 0.03         | 0.01         |
| 100      | 0.35      | 0.13         | 0.8     | 0.30         | 0.27        | 0.10         | 0.16        | 0.05         | 0.08         | 0.03         |
| 200      | 0.55      | 0.20         | 1.3     | 0.48         | 0.44        | 0.16         | 0.26        | 0.10         | 0.13         | 0.05         |
| 300      | 0.75      | 0.27         | 1.8     | 0.64         | 0.60        | 0.21         | 0.36        | 0.13         | 0.18         | 0.06         |
| 400      | 0.95      | 0.33         | 2.3     | 0.79         | 0.77        | 0.26         | 0.46        | 0.16         | 0.23         | 0.08         |
| 500      | 1.15      | 0.38         | 2.8     | 0.93         | 0.94        | 0.31         | 0.56        | 0.19         | 0.28         | 0.09         |
| 600      | 1.35      | 0.43         | 3.3     | 1.06         | 1.10        | 0.35         | 0.66        | 0.21         | 0.33         | 0.10         |
| 650      | 1.45      | 0.46         | 3.6     | 1.13         | 1.20        | 0.38         | 0.72        | 0.23         | 0.36         | 0.11         |

# NETWORKABLE PRODUCTS

Some models of the new transmitter generation do not provide analogue signals, but have a digital interface. They are used primarily where it is important to record climatic data electronically and to control conditions digitally if necessary.

## HF456 SERIES

### Applications

Transmitters with integrated probes for HVAC applications, building management systems, museums, libraries, etc.

### Highlights and common features

- Measures relative humidity, temperature and dew/frost point
- Range of application electronics: -40...60 °C; -10...60 °C with LCD, 0...100 %rh
- Automatic sensor test & drift compensation \*
- Saves up to 2,000 measurement pairs \*
- Use as a simulator for system validation \*
- UART service interface
- Integrated probe
- USB or Ethernet / Ethernet wireless & RS485 interface
- Configuration, monitoring, calibration via HW4 software / PC
- Display / Keypad (optional)
- Backlight
- Adjustment profile «Standard», factory certificate
- Adjusted at 23 °C and 10, 35, 80 %rh
- Accuracy:  $\pm 1$  %rh /  $\pm 0.2$  K
- Power supply possible via RS485 cable
- MODBUS ASCII protocol available

## HF456-W SERIES

- Model for wall mounting

## HF456-D SERIES

- Model for duct mounting

\* Optional, requires HW4 software



## HF556 SERIES

### Applications

Transmitters with interchangeable probes for HVAC applications, building management systems, museums, libraries, etc.

### Highlights and common features

- HygroClip2 probes interchangeable in just a few seconds
- Measures relative humidity & temperature
- Calculates all psychrometric values
- Range of application electronics: -40...60 °C; -10...60 °C with LCD, 0...100 %rh
- Range of application probes: depending on probe used
- Automatic sensor test & drift compensation \*
- USB or Ethernet / Ethernet wireless & RS485 interface
- Configuration, monitoring, calibration via HW4 software / PC
- Display / Keypad (optional)
- Backlight
- Adjustment profile «Standard», factory certificate
- Adjusted at 23 °C and 10, 35, 80 %rh
- Precision: depending on the probe used and its adjustment profile
- Power supply possible via RS485 cable



## HF556-W SERIES

- Model for wall mounting with interchangeable probes

## HF556-D SERIES

- Model for duct mounting with interchangeable probes

\* Requires HW4 software



## HF656 SERIES

### Applications

HVAC applications, building management systems, museums, libraries, etc.

The technical specifications correspond to those for the HF4x and HF5x series

### Highlights and common features

- Measures relative humidity, temperature and dew/frost point
- Range of application electronics: -40...60 °C; -10...60 °C with LCD, 0...100 %rh
- Automatic sensor test & drift compensation \*
- Saves up to 2,000 measurement pairs \*
- Use as a simulator for system validation \*
- UART service interface
- Integrated probe
- USB or Ethernet / wireless & RS485 interface
- Connection to PC via HW4 software
- Mains voltage or low voltage power supply
- Adjustment profile «Standard», factory certificate
- Adjusted at 23 °C and 10, 35, 80 %rh
- Accuracy:  $\pm 1$  %rh /  $\pm 0.2$  K
- MODBUS ASCII protocol available

### HF656-W

- Wall mount with display (optional)

### HF656-C

- Wall mount with fixed cable probe and display (optional)

### HF656-D

- Duct mounting with fixed probe and display (optional)

\* Optional, requires HW4 software



## Order information HF456, HF556 and HF65x

### Power supply and probe type

|        |  |  |  |  |  |                                                                              |
|--------|--|--|--|--|--|------------------------------------------------------------------------------|
| HF456- |  |  |  |  |  | 15...40 VDC / 12...28 VAC, integrated probe                                  |
| HF556- |  |  |  |  |  | 15...40 VDC / 12...28 VAC, interchangeable probes from the HygroClip2 series |
| HF656- |  |  |  |  |  | 15...40 VDC / 12...28 VAC, integrated probe                                  |
| HF658- |  |  |  |  |  | 85...264 VAC, integrated probe                                               |

### Instrument type

|  |   |   |  |  |  |                                                       |
|--|---|---|--|--|--|-------------------------------------------------------|
|  | D | X |  |  |  | Duct probe, Ø 15 x 208 mm (standard, without display) |
|  | W |   |  |  |  | Wall probe, Ø 15 x 85 mm (standard)                   |
|  | 2 |   |  |  |  | Only HF 65xx: PPS cable probe Ø 15 mm, 2 m cable      |

### Parameters to interface

|               |   |  |  |  |  |                                                                       |
|---------------|---|--|--|--|--|-----------------------------------------------------------------------|
| HF456-/HF556- | X |  |  |  |  | Humidity & temperature                                                |
| HF65x-        | X |  |  |  |  | Humidity & temperature                                                |
| HF456-/HF556- | 1 |  |  |  |  | Humidity & temperature & dew point/frost point                        |
| HF65x-        | 1 |  |  |  |  | Humidity & temperature & dew point/frost point                        |
| HF556-        | 2 |  |  |  |  | Humidity & wet-bulb temperature (Tw) in °C                            |
| HF556-        | 3 |  |  |  |  | Humidity & temperature & enthalpy (H) in kJ/kg                        |
| HF556-        | 4 |  |  |  |  | Humidity & temperature & specific humidity (Q) in g/kg                |
| HF556-        | 5 |  |  |  |  | Humidity & temperature & absolute humidity (Dv) in g/m3               |
| HF556-        | 6 |  |  |  |  | Humidity & temperature & mixing ratio (R) in g/kg                     |
| HF556-        | 7 |  |  |  |  | Humidity & temperature & saturated water vapour pressure (Dvs) in hPa |
| HF556-        | 8 |  |  |  |  | Humidity & temperature & partial water vapor pressure (E) in hPa      |
| HF556-        | 9 |  |  |  |  | Humidity & temperature & partial water pressure (Ew) in hPa           |

### Optional display

|  |  |   |  |  |  |                        |
|--|--|---|--|--|--|------------------------|
|  |  | D |  |  |  | Display with backlight |
|  |  | X |  |  |  | No display             |

### Probe extension (only HF65x)

|  |  |  |   |  |  |                                                                   |
|--|--|--|---|--|--|-------------------------------------------------------------------|
|  |  |  | S |  |  | Standard length: 85 mm (type W), 100 mm (type 2), 208 mm (type D) |
|  |  |  | 1 |  |  | Standard length +150 mm                                           |

### Electrical connections & interface configuration (all types in horizontal mounting)

|             |  |  |  |   |  |                                                                      |
|-------------|--|--|--|---|--|----------------------------------------------------------------------|
|             |  |  |  | 5 |  | RS485 interface to terminals, M16 x 1.5 cable gland                  |
|             |  |  |  | 6 |  | RS485 interface to terminals, 1/2" conduit adapter                   |
|             |  |  |  | 7 |  | USB & RS485, M16 x 1.5 cable gland                                   |
|             |  |  |  | 8 |  | USB & RS485, 1/2" conduit adapter                                    |
|             |  |  |  | 9 |  | Ethernet RJ45 & RS485, M16 x 1.5 cable gland                         |
|             |  |  |  | A |  | Ethernet RJ45, 1/2" conduit adapter                                  |
|             |  |  |  | B |  | Ethernet wireless & RS485, M16 x 1.5 cable gland                     |
|             |  |  |  | C |  | Ethernet wireless, 1/2" conduit adapter                              |
| HF4x-/HF6x- |  |  |  | D |  | Only HF4x and HF6x: Modbus ASCII to terminals, M16 x 1.5 cable gland |
| HF4x-/HF6x- |  |  |  | E |  | Only HF4x and HF6x: Modbus ASCII to terminals, 1/2" conduit adapter  |

### Units of the output parameters

|  |  |  |  |  |   |               |
|--|--|--|--|--|---|---------------|
|  |  |  |  |  | M | Metric units  |
|  |  |  |  |  | E | English units |

## NETWORKABLE PRODUCTS AND SOFTWARE

| General information            |                                                                                                                   |                            |                               |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------|
| Specifications                 | HF456                                                                                                             | HF556                      | HF656                         |
| Supply voltage                 | 5...40 VDC / 12...28 VAC or 230 VAC 50/60 Hz                                                                      |                            |                               |
| Current consumption            | USB interface: 50 mA, TCP/IP interface: 300 mA                                                                    |                            |                               |
| Electrical connections         | Screw terminals and M16 cable gland or ½" conduit adapter plus USB or RJ45 connector                              |                            |                               |
| Humidity measurement           | HF456                                                                                                             | HF556                      | HF656                         |
| Sensor                         | Hygromer® IN-1                                                                                                    | Depending on probe         | Hygromer® IN-1                |
| Measurement range              | 0...100 %rh                                                                                                       |                            |                               |
| Accuracy at 23 °C              | ±0.8 %rh                                                                                                          | Depending on probe         | ±0.8 %rh                      |
| Repeatability                  | 0.3 %rh                                                                                                           |                            |                               |
| Long term stability            | <1 %rh/year                                                                                                       |                            |                               |
| Response time                  | Typically 10 s for 63% of a change 35>80 %rh (1 m/sec air flow at sensor)                                         |                            |                               |
| Temperature measurement        | HF456                                                                                                             | HF556                      | HF656                         |
| Sensor                         | Pt100 1/3 Class B                                                                                                 | Depending on probe         | Pt100 1/3 Class B             |
| Measurement range              | -50...100 °C / -58...212 °F                                                                                       | Depending on probe         | -100...150 °C / -148...302 °F |
| Accuracy at 23 °C              | ±0.2 K                                                                                                            | ±0.1 K, depending on probe | ±0.2 K                        |
| Repeatability                  | 0.05 K                                                                                                            |                            |                               |
| Long term stability            | <0.1 °C/year                                                                                                      |                            |                               |
| Response time                  | Typically 4 s for 63 % of a change from 23 to 80 °C (1 m/sec air flow at sensor)                                  |                            |                               |
| Calculated parameters          | HF456                                                                                                             | HF556                      | HF656                         |
| Psychrometric calculations     | Dew point or frost point                                                                                          | All calculations available |                               |
| Digital interface              | HF456                                                                                                             | HF556                      | HF656                         |
| Communication interface        | USB & RS485 or Ethernet TCP/IP (cable connection or wireless) & RS485 or MODBUS ASCII                             |                            |                               |
| Start-up time and refresh rate | HF456                                                                                                             | HF556                      | HF656                         |
| Start-up time                  | Typically 1.9 s                                                                                                   |                            |                               |
| Type of interface              | UART (universal asynchronous receiver transmitter) on mini USB                                                    |                            |                               |
| Service cable maximum length   | 5 m (16.4 ft)                                                                                                     |                            |                               |
| General specifications         | HF456                                                                                                             | HF556                      | HF656                         |
| Optional display               | LCD, 1 or 2 decimals, with backlight and trend indicators                                                         |                            |                               |
| Probe material                 | Polycarbonate                                                                                                     |                            |                               |
| Housing material / Protection  | ABS / IP 20                                                                                                       |                            |                               |
| Weight                         | Approx. 300 g                                                                                                     |                            |                               |
| CE/EMC compatibility           | EMC Directive 2004/108/EC: EN 61000-6-1: 2001, EN 61000-6-2: 2005<br>EN 61000-6-3: 2005, EN 61000-6-4: 2001 + A11 |                            |                               |
| Solder                         | Lead-free (RoHS-compliant)                                                                                        |                            |                               |
| Fire resistance                | Conforms to UL94-HB                                                                                               |                            |                               |
| FDA/GAMP compatibility         | Conforms to FDA 21 CFR Part 11 and GAMP4                                                                          |                            |                               |
| Electronics operating range    | -40...60 °C / -10...60 °C (models with display) 0...100 %rh, non-condensing                                       |                            |                               |

## DIGITAL INTERFACES

HygroClip2 probes can be integrated directly into Ethernet networks with data loggers and/or transmitters with the inexpensive AC3005 TCP/IP interfaces.

One HygroClip HC2 probe can be connected to an AC3005 interface.

The user-friendly HW4 software is used for device management and configuration. Adjustment and calibration are also possible directly via the network.

### ACTIVE TCP/IP ADAPTER

#### Applications

Monitoring applications without local data recording via TCP/IP with a measuring point per place of use

#### Use

With all HygroClip2 probes

#### Highlights and common features

- Simple networking via Internet, directly connectable
- Compatible with HW4 software
- Open protocol, can also be operated with third-party software

#### AC3005

Order code AC3005

- 1 probe input for HC2-x probes
- TCP/IP interface
- Operation with AC1211 power adapter

#### AC0001

Order code AC0001

- Standard Ethernet patch cable for connection to an RJ45 interface

#### AC0005

Order code AC0005

- Crossover Ethernet patch cable



# SOFTWARE



## SOFTWARE OVERVIEW

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The new ROTRONIC devices are equipped with a practical interface for configuration of the devices and for the display and recording of data. The ROTRONIC HW4 software is one of the most comprehensive and user-friendly validated software packages available on the market today. It is not possible to describe the functionality of the software in full detail here.

A free trial version can be downloaded on the Internet from: [www.rotronic-humidity.com](http://www.rotronic-humidity.com)

### HW4 TRIAL Trial version

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- Product key: 05 xxx
  - Full functionality of the Professional Edition, including OPC functions
  - Limited trial period of max. 30 days
- 

### HW4-E Single-user applications

---

- Product key: 24 xxx Standard Edition
  - Display of an unlimited number of loggers and measured values
  - Monitoring (one device at a time), data logger programming, data retrieval, scaling, device settings, alarm function, service and configuration tool for ROTRONIC devices, date/time synchronisation, adjustment and calibration of ROTRONIC probes
  - No password protection
- 

### HW4-P Networked applications in the pharmaceutical and food industries

---

- Product key: 64 xxx Professional Edition
  - All functions of the Standard Edition
  - Fulfills the requirements for electronic data records and signatures (FDA 21 CFR Part 11, Annex 11)
  - Grouping of devices, graph overlays, printing of reports
- 

### HW4-OPC Networked applications with integration in customer's software programs

---

- Product key: 88 xxx
  - All functions of the Professional Edition
  - Contains an OPC server with which the data can be integrated into the customer's own software
- 

### HW4-VAL For users subject to regulatory requirements (GxP)

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- Product key: 12 xxx
  - As HW4 OPC
  - Includes «HW4 e-compliance package». This comprehensive documentation tool supports the user in the qualification/validation of HW4-based solutions
-

## QUALIFICATION / COMPUTERISED SYSTEM VALIDATION

Data integrity and security are of essential importance today. Companies in the food, pharmaceutical and medical technology industries must prove that their data are measured and managed reliably. For this they need software and devices that can be validated. Combining ROTRONIC's HW4-compatible devices and HW4 software, ROTRONIC supplies a solution in which validation plays a central role. The devices and software are validated and compatible with FDA 21 CFR Part 11 (directive of the US Food and Drug Administration, FDA) and GxP.



### COMPLIANCE DECLARATION

DV04-30.787.03-1\_11

for

Software

HW4 VERSION 2.0.1.15990

Physical devices

HYGROLOGNT: FIRMWARE RELEASE 1.2

DOCKING STATIONS FOR THE HYGROLOG NT:

DS-NT4, DS-NT4-WL, DS-U1, DS-U2, DS-U4, DS-U4-4-4-20, DS-U4-WL: v 1.4

DS-PT2, DS-PT4, DS-PT4-WL: v1.1

DS-R1 : v1.0

DS-U4WEB : v1.0

HYGROFLEX, HYGROFLEX M, HYGROLAB, HYGROPALM, M23, M33: FIRMWARE RELEASE 4.0

HYGROCLIP DI FIRMWARE VERSION 1

HYGROCLIP ALARM FIRMWARE VERSION 2

HYGROSTAT MB FIRMWARE VERSION 1

We attest that the validated version of the Rotronic HW4 software and associated devices fulfil the requirements defined in the Rotronic ERES White Paper, version 2.0, based on the following paragraphs:

21 CFR PART 11

21 CFR 110

21 CFR 210, 21 CFR 211

EU ANNEX 11 TO THE

EU GUIDELINES OF GOOD MANUFACTURING PRACTICE FOR MEDICINAL PRODUCTS

validated by ROTRONIC Instrument Corp.

Inspected by Kereon AG,

August 2007

The HW4 software and devices have been reviewed against the specifications and the ERES White Paper, version 1.0, in order to provide evidence that the above mentioned regulations are fulfilled accordingly.

The measuring devices and the software have been validated and verified against the specifications provided by the manufacturer.

Inspected by Yves Samson  
Kereon AG

Accepted by the manufacturer  
ROTRONIC AG

## HW4 FUNCTIONS

### VIEWING OF MEASURED VALUES/MONITORING

Viewing of measured values is very easy and user-friendly. Files of any device shown in the device tree can be copied and opened directly with the HW4 explorer. The data is presented as required in either table or graph form. Both the table and the graph are shown for online monitoring.

The graph module can be configured by the user.

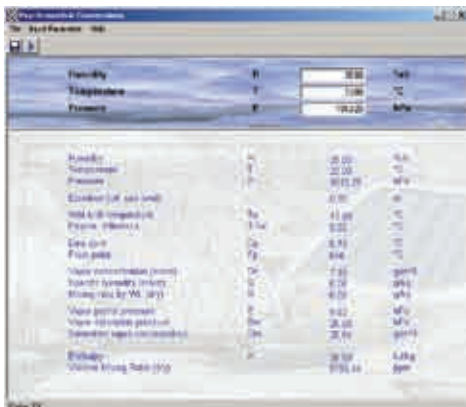


### FILE FORMATS/HANDLING OF DATA/EXPORT FUNCTIONS

The file formats can be defined by the user. The formats .xls and .log are available for log files. The .log format saves the data in a binary format that can only be read by HW4, while the .xls format can be opened with an editor or Excel. The data can also be exported in other formats.

### ARCHIVING OF DATA

The data can be written automatically into different files. For example, the user can configure the system to create a new file every hour, day, week, month or after 200,000 measurements.



### ANALYSIS AND CALCULATION TOOL/PSYCHROMETRIC CALCULATIONS

All ROTRONIC devices measure relative humidity in %rh and temperature in °C/°F. These two values can be used to calculate other psychrometric values such as dew point, mixing ratio, enthalpy and wet-bulb temperature. The calculation module of the HW4 software uses WMO\* verified formulas for these calculations and allows the user to define their own parameters (e.g. mixing ratio ratio & temperature) as input values in order to calculate the relative humidity from them. Other advanced options such as dew/frost point differentiation are also included.

\* WMO = World Meteorological Organisation

## STATISTICAL FUNCTIONS

For many users detailed data, which can be very extensive, is not necessarily of much interest. For them it is merely important that the measured values lie within a certain range. This is the role of the statistical function. It shows the following values:

- Minimum
- Maximum
- Mean
- Standard deviation
- Number of measured values
- Mean kinetic temperature

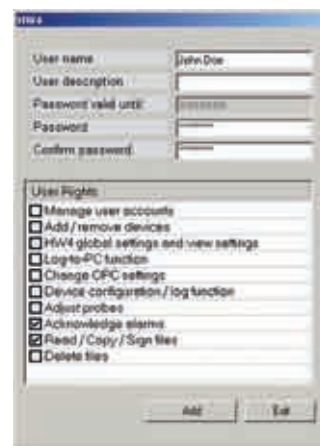


## PRINTING OF REPORTS

If required, reports can be printed as desired or copied into other software for reporting, emailing etc.

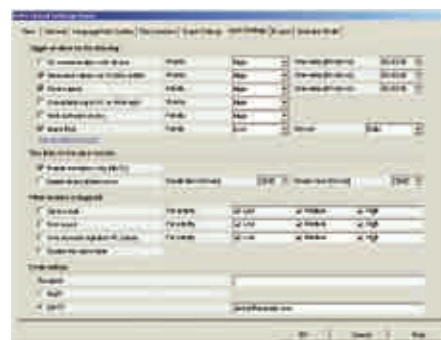
## USERS AND PASSWORDS

User names and passwords may be assigned freely (HW4-P). Every user can be granted different rights. Users that have been deleted cannot be recreated under the same name.



## ALARMS

In monitoring mode HW4 can trigger an alarm when certain events occur. Such an event can be when a device or a file storage path is not available, when a software error occurs, when measured values lie outside defined limits or when a data logger sends an error message. The alarms can be shown on the screen and/or printed out. Audible alarms are also possible. HW4 is even able to send an e-mail to one or more recipients (HW4-P).



## OPC\*SERVER

HW4-OPC contains an OPC server with which the measured values can be integrated into the customer's own software.



\* Object Linking and Embedding for Process Control

# SERVICES

## CALIBRATION



Even though ROTRONIC instruments have excellent long term stability, we recommend that probes are calibrated regularly, typically once per year is sufficient. More frequent calibration and maintenance can be necessary if the probes are used in polluted/contaminated atmospheres. If in doubt ask, we will be glad to advise you.

Humidity and temperature measuring devices are precision instruments that must be serviced regularly in order to retain their reliability. Measurement errors can cause considerable damage in the production and storage of products. In-company and national/international standards require regular calibration. ISO standards obligate companies to check their measuring devices on a regular basis. Regulatory authorities (e.g. FDA, EMEA, Swissmedic) also demand that measuring devices be calibrated with traceability to national standards.

## WHAT ARE THE CALIBRATION OPTIONS?

### a) Calibration at ROTRONIC AG

As a calibration laboratory accredited by METAS (Metrology and Accreditation Switzerland) for the parameters of relative humidity and temperature, we can offer you calibration services and Swiss Calibration Service (SCS) certificates in conformity with the national standard.

### b) You calibrate your devices yourself – with your own calibration device and SCS-certified humidity standards or a humidity/temperature generator from the HygroGen series.

You can find further information on these products in the chapter Calibration (page 88).

### c) We come to you – our Calibration Mobile saves you time and trouble\*.

Use of our Calibration Mobile is economical upwards of ~15 measuring devices. It is interesting for customers who need to calibrate regularly, but who want to keep the work and costs for this within bounds. We offer this service in the following countries: A, B, CZ, CH, D, DK, F, I, NL, P.



\*The Calibration Mobile is only available in certain European countries.

Our mobile calibration service at your premises with our Calibration Mobile saves you practically all the administrative and operational work and expense of shipping of the measuring devices and the consequential delay. Our technician calibrates the instruments in our Calibration Mobile and can return them back into your process in a matter of hours. This method is particularly interesting for customers who still use measuring devices with integrated probes. The interchangeable HygroClip probes allow practically interruption-free operation in every process. They can be replaced within seconds. In this way you can achieve a maximum in efficiency with a minimum number of probes.

## SERVICE DIVISION

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We are able to repair your devices should they become defective. Our service division with its experienced and well-trained staff will repair your defective device quickly and competently.

## ENGINEERING

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ROTRONIC also offers engineering services, for example

### Humidity and temperature mapping

In many companies in the pharmaceutical and food industries it is necessary to document climatic conditions in production and, primarily, storage rooms. Often it is not clear where the readings should be taken and how many devices are necessary for this. ROTRONIC offers a mapping service for this:

To this end we set up data loggers at your premises to record temperature and humidity conditions and gradients. Using the measured data we can generate reports and make recommendations regarding the installation of instrumentation and control equipment and correct placement of data loggers for on-going measurements.

On request ROTRONIC will design your measuring system.

## SYSTEM VALIDATION

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Data loggers and measuring systems as well as the HW4 software from ROTRONIC are validated according to FDA 21 CFR Part 11 and GAMP4. On request we will validate your system. Ask us for a proposal.

The systems can be installed by you, us or one of our partners. Just ask us, we will be glad to advise you.

In countries outside Switzerland: contact one of our subsidiaries or distributors. You can find their addresses at [www.rotronic-humidity.com](http://www.rotronic-humidity.com).



# CALIBRATION



Even though ROTRONIC probes have excellent long term stability, we recommend that they have their calibration checked regularly. One calibration per year normally suffices. Some of our customers calibrate their probes more often; the range of calibration intervals extends from once a year to calibration before every measurement – depending on internal quality assurance rules.

The long term stability of ROTRONIC probes is better than 1%rh per year under normal conditions. Normal conditions exist when the concentration of contaminants/pollutants in the air does not exceed maximum allowable concentration (MAC) levels.

## WHY IS CALIBRATION ESSENTIAL?

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Many companies today work to ISO 9000 standards and are therefore obligated to calibrate their measuring equipment on a regular basis. Regulatory authorities such as the US FDA, EMA, Swissmedic, etc. also demand that devices be calibrated with traceability to national standards. In some situations, internal company quality standards may also specify that a specific measurement uncertainty must be demonstrated and that this must be verifiable at all times. It is therefore in the interest of every user to have equipment calibrated and adjusted regularly in order to obtain the best-possible quality. We offer calibration devices for all our probes. We can even supply you with suitable devices for calibration of probes from other manufacturers. Our competitors trust our humidity standards. Please contact us regarding custom-made products.



## ACCREDITED CALIBRATION LABORATORY FOR HUMIDITY AND TEMPERATURE SCS 065

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As a calibration laboratory accredited by METAS (Metrology and Accreditation Switzerland) for the parameters of relative humidity and temperature, we can offer you calibration services and Swiss Calibration Service (SCS) certificates in conformity with the national standard. Accreditations and certificates are acknowledged reciprocally by most national organisations (ILAC – MRA).

## SCS\* HUMIDITY STANDARDS

ROTRONIC humidity standards are delivered in packs of five ampoules of the same humidity value. Every ampoule is marked with its humidity value and a serial number. The most frequently used values are 35 and 80 %rh, which are used for two-point calibrations. All ampoules except for the 0 %rh standard contain an unsaturated salt solution; the 0 %rh standard consists of a highly porous molecular sieve. An SCS certificate documenting traceability to national standard and specifying the uncertainty of the humidity standard is enclosed with every pack. The different national agencies for metrology recognise each others' certificates reciprocally through the ILAC Mutual Recognition Agreement. As a result, an instrument calibration certificate from Switzerland (SCS) is accepted worldwide by local certification bodies.



| Order information |                |                         |
|-------------------|----------------|-------------------------|
| Order code        | Humidity value | Uncertainty at 23 ± 2°C |
| EA00-SCS          | 0.5 %rh        | ± 0.1 %rh               |
| EA05-SCS          | 5.0 %rh        | ± 0.1 %rh               |
| EA10-SCS          | 10.0 %rh       | ± 0.3 %rh               |
| EA11-SCS          | 11.3 %rh       | ± 0.3 %rh               |
| EA20-SCS          | 20.0 %rh       | ± 0.3 %rh               |
| EA35-SCS          | 35.0 %rh       | ± 0.5 %rh               |
| EA50-SCS          | 50.0 %rh       | ± 0.9 %rh               |
| EA65-SCS          | 65.0 %rh       | ± 0.9 %rh               |
| EA75-SCS          | 75.3 %rh       | ± 0.9 %rh               |
| EA80-SCS          | 80.0 %rh       | ± 1.2 %rh               |
| EA95-SCS          | 95.0 %rh       | ± 1.2 %rh               |

Other values on request



DPH 911  
Reference dew point mirror for  
certification of SCS\* humidity standards

## PROBE CALIBRATION BY SOFTWARE AND CALIBRATION INTERFACE

ROTRONIC probes can be calibrated and adjusted via the connected instrument with either an integrated keypad or a calibration interface to a PC running HW4 software.

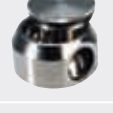
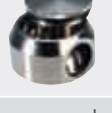
\* SCS: Swiss Calibration Service

## CALIBRATION DEVICES

ROTRONIC calibration devices are small, airtight chambers that precisely fit ROTRONIC probes. The lower part of the device consists of a screw-on lid into which the humidity standard is poured onto an absorbent textile pad. The specified humidity is generated in the calibration device after a stabilisation period of 30...180 minutes. The probe can then be calibrated or adjusted in comparison with the reference value of the humidity standard.

We can also supply calibration devices suitable for other manufacturers probes, provided they are cylindrical, and have a leak proof construction. Ask us for a recommendation!

Calibration devices perform at their best only if they are properly maintained. Wash the calibration devices carefully after use, and let them dry. Make sure that no salt deposits form inside the device or threads, as this may cause errors. Worn O-rings should be replaced.

| Order code                                                                                    | Use                                                                                   |                                                                                     | Order code | Use                                                                                              |                                                                                       |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Push-on calibration devices. Gasket with O-ring and thumb screw                               |                                                                                       |                                                                                     |            |                                                                                                  |                                                                                       |
| ER-15                                                                                         | For 1 probe<br>Ø 14...15 mm<br><br>Brass, nickel-plated                               |   | ERV-15     | For 1 probe<br>Ø 14...15 mm<br>Vertical calibration position<br>Brass, nickel-plated             |   |
| EDM 15/15                                                                                     | For 2 probes<br>Ø 14...15 mm<br><br>Brass, nickel-plated                              |  | EGL        | For 1 probe<br>Ø 10 mm<br><br>Brass, nickel-plated                                               |  |
| ER-05                                                                                         | For 1 probe<br>Ø 4...5 mm<br><br>Brass, nickel-plated                                 |  | ER-18K     | For 1 probe<br>Ø 18 mm<br><br>Brass, nickel-plated                                               |  |
| ER-20K                                                                                        | For 1 probe<br>Ø 20 mm<br><br>Brass, nickel-plated                                    |  | ER-10-MS   | For 1 probe<br>HF3x, L1x-S, M1x-S series<br>Vertical calibration position<br>Aluminium, anodised |  |
| Screw-on calibration devices. Gasket with seal face on probe. Cannot be used for HC2-S probes |                                                                                       |                                                                                     |            |                                                                                                  |                                                                                       |
| EDM 15/25                                                                                     | For 2 probes<br>1 x Ø 15 mm (M12 x 1.5)<br>1 x Ø 25 mm (PG11)<br>Brass, nickel-plated |  | EM-15      | For 1 probe<br>Ø 15 mm (M12 x 1.5)<br><br>Brass, nickel-plated                                   |  |
| EM-25                                                                                         | For 1 probe<br>Ø 25 mm (PG11)<br><br>Brass, nickel-plated                             |  | EMV-15     | For 1 probe<br>Ø 15 mm (M12 x 1.5)<br>Vertical calibration position<br>Aluminium, anodised       |  |
| EMV-25                                                                                        | For 1 probe<br>Ø 25 mm (PG11)<br>Vertical calibration pos.<br>Aluminium, anodised     |  | EM-G       | For probe types E, HP...IE...<br>Screw-on probes (½"G)                                           |  |
| Calibration devices for special probes                                                        |                                                                                       |                                                                                     |            |                                                                                                  |                                                                                       |
| EBFC                                                                                          | For plate probes<br>Types BFC & BFC-DIO<br><br>Aluminium, anodised                    |  | WP14-S     | For bell probes:<br>AWD, AWVC, AW-DIO<br><br>Stainless steel, DIN 1.4401/POM                     |  |
| EGS                                                                                           | For all sword probes<br>Aluminium, anodised                                           |  |            |                                                                                                  |                                                                                       |

## PORTABLE ROTRONIC HUMIDITY GENERATOR

HygroGen® is a portable humidity/temperature generator that can be used in laboratories, workshops or on-site where instruments are used. The speed of generation and simple operation makes it ideal for HVAC service technicians as well as for customers who wish to calibrate a large number of probes inexpensively and easily themselves. There are three models available.

### Main features

- Generates a controlled reference environment
- Fully integrated temperature control \*
- Suitable for all humidity/temperature probes
- Self-contained – needs only a mains socket
- Measurement chamber for up to 5 probes
- Large control range
- Equilibrium humidity reached quickly
- Portable, stainless steel housing

\* Except HygroGen 0

### Your benefits

- Any value can be set
- Large temperature range
- Reduces calibration time and costs
- Easy to use, no installation required
- Simultaneous calibration of up to 5 instruments
- Also suitable for extreme values
- Saves time
- Mobile use

The HygroGen uses a mixed flow method to generate the humidity required by the user. A desiccant is used to generate low humidity, and a saturator to generate high humidity. The temperature is controlled using a Peltier element (except for HygroGen 0). Measurement and control are effected by a combination of a ROTRONIC HygroClip probe and a multi-loop controller. Set-points can be entered easily either with the keys of the multi-loop controller or via the standard Ethernet interface and software.

The key advantages of the HygroGen devices are the speed with which the set values are reached and their high control stability. This means a multi-point calibration can be performed in a matter of minutes, rather than hours. A further feature of the calibration chamber is the availability of two additional probe connections at which calibrated reference probes can be connected.



## PROBE OPTIONS

The HygroGen chamber contains three connection sockets for the control and optional monitoring probes. A HygroClip probe is used for control of the humidity and a special Pt100 direct HygroClip for temperature. Depending on the application, a variety of different configurations are possible; the most common configuration is a second HygroClip probe in the third socket for monitoring purposes. When a HygroClip probe is used, the digital output signal socket at the back of the HygroGen can be used to connect a HygroLab or HygroPalm indicator.



## HYGROGEN SERIES

### HYGROGEN 1A



This self-contained humidity generator for calibration of humidity measuring devices only needs a mains power socket and is light enough at 17 kg to be portable for on-site use.

The wide control range of 5...95 %rh / 5...50 °C and extremely high control stability make the HygroGen indispensable wherever there is a need for fast and precise calibration.

### HYGROGEN 2A

The HygroGen 2A is equipped with a sampling loop and pump for connection of a reference dew point mirror. The maximum dew point is limited by the ambient temperature to which the lines of the sampling loop are exposed.

### HYGROGEN 0

The HygroGen 0 does not include active temperature control of the chamber. The ambient conditions therefore define the chamber temperature, with carefully designed ventilators ensuring the best-possible homogeneity.

Order number: see table on next page.

#### Technical data and order information

| Specifications                         | HygroGen 0                                                                                              | HygroGen 1A                                                                                                                                 | HygroGen 2A |
|----------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Maximum control range                  | 5...95 %rh                                                                                              | 5...95 %rh and 5...50 °C (optional 0 °C ...60 °C)                                                                                           |             |
| Minimum control range                  | 10...90 %rh<br>in a range of 10...30 °C                                                                 | 10...90 %rh in a range of 10...50 °C                                                                                                        |             |
| Control stability                      | $\leq \pm 0.2$ %rh                                                                                      | $\leq \pm 0.2$ %rh, 0.1 °C (at 23 °C) 0.2 °C (complete range)                                                                               |             |
| Temperature gradient                   | $\leq \sim 0.2$ °C (5...50°C) $< 0.1$ at 23 °C                                                          |                                                                                                                                             |             |
| Set-point stabilisation time           | 2 minutes (35 / 80 %rh<br>humidity change, 23 °C)                                                       | 2 minutes (35 / 80 %rh humidity change, 23 °C),<br>10 minutes (23 / 45 °C temperature change)                                               |             |
| Reference probe                        | HygroClip S1 calibrated at 5, 23 & 50 °C, 10, 35, 65 & 95 %rh,<br>verifiable to SCS standard (UK: UKAS) |                                                                                                                                             |             |
| Precision of reference probe           | $\leq \pm 1.0$ %rh (10...95 %rh) $\pm 0.2$ K                                                            |                                                                                                                                             |             |
| Pump and connections for sampling loop | No                                                                                                      | Yes                                                                                                                                         |             |
| External interfaces                    | Ethernet, ROTRONIC DIO (two additional connections fitted)                                              |                                                                                                                                             |             |
| Desiccant                              | Molecular sieve, user refillable                                                                        |                                                                                                                                             |             |
| Saturator                              | Humidifier with front filling. Low water level warning on controller display                            |                                                                                                                                             |             |
| Chamber volume                         | Approx. 2 litres                                                                                        |                                                                                                                                             |             |
| Housing / Dimensions                   | Stainless steel / 455 x 420 x 212 mm (max.)                                                             |                                                                                                                                             |             |
| Ambient conditions                     | Max. 80 %rh at 10...30 °C                                                                               | Max. 80 %rh for temperatures up to 31 °C,<br>decreasing linearly to 50 %rh at 40 °C<br>Indoor use only. Altitude to 2,000 m above sea level |             |
| Weight                                 | 15 kg                                                                                                   | 17 kg                                                                                                                                       | 17.5 kg     |
| Power supply                           | 110/230 VAC, 3 A 50/60 Hz                                                                               |                                                                                                                                             |             |
| Certification marks                    | EN61326: 1998, EN61000-3-2: 2000, EN61000-3-3: 1995, EN61010-1: 2001                                    |                                                                                                                                             |             |

## CALIBRATION

| Technical data and order information  |                                                                                                                                                                                                            |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Order code                            | Specifications                                                                                                                                                                                             |
| HygroGen 1A                           | Humidity and temperature calibrator with 1x HG-DC, 1x HG-FILL, instruction manual.<br>Order chamber door(s) separately.                                                                                    |
| HygroGen 2A                           | Humidity and temperature calibrator with connection for sampling loop and pump<br>for connection of a dew point mirror with 1x HG-DC, 1x HG-FILL, instruction manual.<br>Order chamber door(s) separately. |
| HygroGen 0                            | Humidity calibrator with 1x HG-DC, 1x HG-FILL, instruction manual. Order chamber door(s) separately.                                                                                                       |
| Accessories, spare parts and upgrades |                                                                                                                                                                                                            |
| HG-D-11234                            | Chamber door for five probes, Ø 25, 20, 15, 15 and 10 mm, including plugs                                                                                                                                  |
| HG-D-11111                            | Chamber door for five Ø 15 mm probes, including plugs                                                                                                                                                      |
| HG-D-xxxxx                            | Chamber door for max. five probes, custom configuration, including bungs. See table below for the configurations.                                                                                          |
| HG-DP-99999                           | Clear chamber door with five adjustable probe fittings for probes with 9...17 mm Ø                                                                                                                         |
| HG-D-99999                            | Insulated chamber door with five adjustable probe fittings for probes with 9...17 mm Ø                                                                                                                     |
| HG-DP-00000                           | Clear chamber door without openings, for calibration of, for example, data loggers with displays                                                                                                           |
| HG-Bxx                                | Customer-specified plug<br>(xx = probe diameter per table below)                                                                                                                                           |
| HG-B25A                               | 25 mm plug with 6 mm hole for Pt100 or cable                                                                                                                                                               |
| HG-DC                                 | Desiccant cartridge, filled with molecular sieve desiccant                                                                                                                                                 |
| HG-DES                                | Desiccant refill pack (molecular sieve)                                                                                                                                                                    |
| HG-FILL                               | Fill tube and syringe                                                                                                                                                                                      |
| HG-CON                                | Spare/Replacement controller, preconfigured and with backup disk                                                                                                                                           |
| HG-TC                                 | HygroGen heavy duty transit case                                                                                                                                                                           |
| HG-ICS                                | Inner chamber sleeve (spare part)                                                                                                                                                                          |
| HG-ITOOLS                             | PC software for controller; enables PC view of controller set-points, charting of set-points and process variables and firmware updates                                                                    |
| 11.01.6218                            | RS232 cable, HygroGen controller to PC                                                                                                                                                                     |
| B5-02-B5                              | Interface cable for control/reference probe to HygroLab or HygroPalm 2/3                                                                                                                                   |
| HG-OC                                 | Upgrade to 0 °C (only in combination with a service)                                                                                                                                                       |
| HG-60C                                | Upgrade to 60 °C (only in combination with a service)                                                                                                                                                      |
| HG-RSF                                | Upgrade to ramp/soak function (only in combination with a service)                                                                                                                                         |
| Probe & display options               |                                                                                                                                                                                                            |
| HygroClip-S1                          | Control or reference probe with SCS (Swiss Calibration Service) calibration certificate, one included as standard                                                                                          |
| HygroLab 2                            | Benchtop display unit for control/reference probes (needs 1x B5-02-B5 per probe)                                                                                                                           |
| AC1207                                | Mains adapter for HygroLab (required)                                                                                                                                                                      |
| HygroPalm 2                           | Handheld display unit for control/reference probes (needs 1x B5-02-B5 per probe)                                                                                                                           |

| Order numbers for chamber doors and bungs |            |    |    |                                                                        |   |    |    |    |      |   |   |    |    |    |    |    |      |
|-------------------------------------------|------------|----|----|------------------------------------------------------------------------|---|----|----|----|------|---|---|----|----|----|----|----|------|
| x =                                       | 1          | 2  | 3  | 4                                                                      | 5 | 6  | 7  | 8  | 9    | A | B | C  | D  | E  | F  | G  | H    |
| Ø (mm)                                    | 15         | 20 | 25 | 10                                                                     | 5 | 12 | 18 | 30 | 9-17 | 6 | 4 | 22 | 23 | 13 | 19 | 21 | 18.5 |
| Example:                                  | HG-D-11234 |    |    | Door for 2 x 15 mm, 1 x 25 mm, 1 x 20 mm, 1 x 10 mm probes, with bungs |   |    |    |    |      |   |   |    |    |    |    |    |      |
|                                           | HG-B-7     |    |    | Bung 18 mm Ø                                                           |   |    |    |    |      |   |   |    |    |    |    |    |      |

Other dimensions available on request

## HUMIDITY STANDARDS AND CERTIFICATES

| CERTIFICATE OF FACTORY CALIBRATION                                                                                                                                                                                                                                                                                                                                                                                                                         |              | ROTRONIC AG                     |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------------------|-------|
| Art No:                                                                                                                                                                                                                                                                                                                                                                                                                                                    | HC2-S        |                                 |       |
| Serial No:                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0060263937   |                                 |       |
| RPC:                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1-0048785472 |                                 |       |
| ROTRONIC AG certifies that this instrument meets the published specifications. It has been calibrated using standards and instruments as stated below and corresponds to the test requirements of ISO 9001:2005. The reference and service standards are traceable to national standards. The calibrated values are valid under the below conditions only at the time of measurement and are referenced to the indicated references and working standards. |              |                                 |       |
| Reference system                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |                                 |       |
| RAG-THUNDER-1                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |                                 |       |
| Temperature adjustment [°C]                                                                                                                                                                                                                                                                                                                                                                                                                                |              | Adjusted                        |       |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              | -0.10                           |       |
| Humidity adjustment [%rh]                                                                                                                                                                                                                                                                                                                                                                                                                                  |              | Adjusted @ Temp[°C]             |       |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 34.85        | 23.53                           |       |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 22.24        | 23.52                           |       |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 76.94        | 23.64                           |       |
| Temperature calibration [°C]                                                                                                                                                                                                                                                                                                                                                                                                                               |              | Reference Calibrated            |       |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 23.52        | 23.45                           |       |
| Humidity calibration [%rh]                                                                                                                                                                                                                                                                                                                                                                                                                                 |              | Reference Calibrated @ Temp[°C] |       |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 78.76        | 78.76                           | 23.62 |
| Calibration Date: 12.12.2008                                                                                                                                                                                                                                                                                                                                                                                                                               |              |                                 |       |
| Finaltest - CH-8303 Bessendorf, 16.12.2008, Document: -, Inspector: F. Wolfensberger                                                                                                                                                                                                                                                                                                                                                                       |              |                                 |       |

## FACTORY ADJUSTMENT CERTIFICATE

All ROTRONIC probes are delivered with a factory adjustment certificate.

In addition to the probe type and serial number, the certificates show the ambient temperature, adjustment points, inspection equipment used and the date of calibration.

A factory adjustment certificate normally suffices for companies outside the pharmaceutical, chemical and food industries.

## SCS\* CERTIFICATE

\* SCS = Swiss Calibration Service

SCS certificates are required primarily by companies in the pharmaceutical, chemical and food industries. As an accredited calibration laboratory for relative humidity and temperature, we are able to perform SCS calibrations with the best possible measurement uncertainty. ROTRONIC is accredited by METAS (Metrology and Accreditation Switzerland) with the number SCS 065.

| KALIBRIERTZERTIFIKAT / CALIBRATION CERTIFICATE |                                                               |
|------------------------------------------------|---------------------------------------------------------------|
| Zertifikats-Nr.                                | 00000197                                                      |
| Auftraggeber / Customer                        | Rotronic AG                                                   |
| Auftragsnummer / Order no.                     |                                                               |
| Auftraggeber / Order no.                       | 99-2003-09                                                    |
| Segment / Object                               | Sensoren / Sensors                                            |
| Hersteller / Manufacturer                      | Rotronic AG                                                   |
| Teil / Model                                   | HygroClip 9                                                   |
| Serial-Nr. / Serial No.                        | 30407 801                                                     |
| Spezifikation / Specification                  | ET 90000                                                      |
| Kalibrier-Datum / Date of calibration          | 10.12.2008                                                    |
| Benutzungs-Nachweis / Remarks                  | HygroClip 9 zusammen mit HygroLog-D (SR 30403 801) kalibriert |
| Stempel und Datum / Stamp and date             | Unter der Aufschrift des Head of the calibration laboratory   |
| Stempel und Datum / Stamp and date             | Für die Kalibrierung                                          |

| KALIBRIER-PROTOKOLL / CALIBRATION-PROTOCOL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 | SP- / INSTRUMENT                                                                                                                                                                                                                                  |                 |                                            |                 |                                            |  |                        |                 |                        |                 |                        |                 |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------|-----------------|--------------------------------------------|--|------------------------|-----------------|------------------------|-----------------|------------------------|-----------------|----|----|-------|-------|------|-----|----|----|-------|-------|------|-----|----|----|-------|-------|------|-----|----|----|-------|-------|------|-----|--|
| PRÜFUNG / CALIBRATED INSTRUMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 | SP- / INSTRUMENT                                                                                                                                                                                                                                  |                 |                                            |                 |                                            |  |                        |                 |                        |                 |                        |                 |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |  |
| <ul style="list-style-type: none"> <li>Spannung / Supply</li> <li>Ausgang / Output</li> <li>Anschlusssymbol / Connecting cable</li> <li>Datentransfer / Data transfer</li> <li>SCS-Kalibrierung / SCS calibration</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 | <ul style="list-style-type: none"> <li>via HygroLog-D</li> <li>LCD HygroLog-D</li> <li>in Visual-T Visual</li> <li>Manual</li> <li>1 x Folien / 1 x HygroLog-D</li> </ul>                                                                         |                 |                                            |                 |                                            |  |                        |                 |                        |                 |                        |                 |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |  |
| WERT-TABELLE / DATA TABLE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |                                                                                                                                                                                                                                                   |                 |                                            |                 |                                            |  |                        |                 |                        |                 |                        |                 |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |  |
| <table border="1"> <thead> <tr> <th colspan="2">Klimaanpassung / Climate adjustment</th> <th colspan="2">geometrische Werte / Geometrical data</th> <th colspan="2">Messunsicherheit / Measurement uncertainty</th> </tr> <tr> <th>relative Feuchte [%rh]</th> <th>Temperatur [°C]</th> <th>relative Feuchte [%rh]</th> <th>Temperatur [°C]</th> <th>relative Feuchte [%rh]</th> <th>Temperatur [°C]</th> </tr> </thead> <tbody> <tr> <td>30</td> <td>23</td> <td>19.94</td> <td>23.54</td> <td>19.9</td> <td>0.2</td> </tr> <tr> <td>30</td> <td>23</td> <td>34.97</td> <td>23.59</td> <td>34.9</td> <td>0.2</td> </tr> <tr> <td>30</td> <td>23</td> <td>50.00</td> <td>23.62</td> <td>50.0</td> <td>0.2</td> </tr> <tr> <td>30</td> <td>23</td> <td>65.03</td> <td>23.65</td> <td>65.0</td> <td>0.2</td> </tr> </tbody> </table> |                 | Klimaanpassung / Climate adjustment                                                                                                                                                                                                               |                 | geometrische Werte / Geometrical data      |                 | Messunsicherheit / Measurement uncertainty |  | relative Feuchte [%rh] | Temperatur [°C] | relative Feuchte [%rh] | Temperatur [°C] | relative Feuchte [%rh] | Temperatur [°C] | 30 | 23 | 19.94 | 23.54 | 19.9 | 0.2 | 30 | 23 | 34.97 | 23.59 | 34.9 | 0.2 | 30 | 23 | 50.00 | 23.62 | 50.0 | 0.2 | 30 | 23 | 65.03 | 23.65 | 65.0 | 0.2 |  |
| Klimaanpassung / Climate adjustment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | geometrische Werte / Geometrical data                                                                                                                                                                                                             |                 | Messunsicherheit / Measurement uncertainty |                 |                                            |  |                        |                 |                        |                 |                        |                 |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |  |
| relative Feuchte [%rh]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Temperatur [°C] | relative Feuchte [%rh]                                                                                                                                                                                                                            | Temperatur [°C] | relative Feuchte [%rh]                     | Temperatur [°C] |                                            |  |                        |                 |                        |                 |                        |                 |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |  |
| 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 23              | 19.94                                                                                                                                                                                                                                             | 23.54           | 19.9                                       | 0.2             |                                            |  |                        |                 |                        |                 |                        |                 |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |  |
| 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 23              | 34.97                                                                                                                                                                                                                                             | 23.59           | 34.9                                       | 0.2             |                                            |  |                        |                 |                        |                 |                        |                 |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |  |
| 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 23              | 50.00                                                                                                                                                                                                                                             | 23.62           | 50.0                                       | 0.2             |                                            |  |                        |                 |                        |                 |                        |                 |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |  |
| 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 23              | 65.03                                                                                                                                                                                                                                             | 23.65           | 65.0                                       | 0.2             |                                            |  |                        |                 |                        |                 |                        |                 |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |  |
| <p>*) Distanzkonstante 5 / Delay transfer 5</p> <p>**) Distanzkonstante 6 / Delay transfer 6</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                                                                                                                                                                                                                                                   |                 |                                            |                 |                                            |  |                        |                 |                        |                 |                        |                 |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |  |
| <p>Die angegebene Messunsicherheit wurde durch die Messung multipliziert mit einem Erweiterungsfaktor k = 2, was für eine Normalverteilung entspricht und einer 95% Wahrscheinlichkeit.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 | <p>The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to a coverage probability of approximately 95%.</p> |                 |                                            |                 |                                            |  |                        |                 |                        |                 |                        |                 |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |    |    |       |       |      |     |  |

# OEM PRODUCTS

Original equipment manufacturers (OEM) require individual solutions to suit the needs of their customers. ROTRONIC has been producing customized humidity measurement products for the OEM market for many years and therefore has wide experience in the field. We are able to meet virtually every requirement. Our OEM capabilities today are greater than ever before. Regardless of whether you need a simple sensor or a complex industrial transmitter – we have a solution for you.

The new HygroClip2 (HC2) probes, which are based on the revolutionary AirChip3000 technology, are especially interesting for OEM manufacturers. On the one hand they stand out for their compact dimensions and superb precision at a reasonable price, while on the other, the universal UART interface and freely scalable 0...1 V analogue outputs make them easy to integrate with systems.

Different customers rarely have the same requirements. The key to success therefore lies in the flexibility with which specific wishes can be realised. Since every project has different requirements, our experienced team first discusses the objectives, technical requirements and target costs in an initial meeting and then works out a proposal based on these discussions. Once the final specification has been agreed, prototypes are built for testing and technical approval. During this phase ROTRONIC can support the customer in assessing the stability of the product and, if required, also carry out tests in our own accredited test facilities. We can naturally also advise on final assembly and calibration if required. Wherever possible, we use existing products or sub-assemblies for the manufacture of customised devices. This results in significant savings in design and development costs and also saves time. Time-consuming tests can then often also be dispensed with.

## OEM CABLE PROBES

### Applications

HVAC, food stocks, health inspection agencies, agriculture, OEM and meteorology applications, etc.

### Use

Handheld devices, data loggers, transmitters, OEM products

### Highlights and common features

- Measures humidity, temperature and dew point
- Hygromer® V-1 sensor
- Polypropylene filter
- Integral 2000 measurement pair data logging (requires HW4 software)
- Application range 0...100 %rh / -40...85 °C
- UART interface and freely scalable analogue signals 0...1 V
- Standard scaling 0...1 V = 0...100 %rh / -40...60 °C



## OEM PRODUCTS



For many manufacturers our OEM probes are an inexpensive alternative to the development of their own instruments, and avoid the need for assembly and calibration costs. The table below illustrates the range of configurations available.

### OEM PROBES TYPE XA

- Factory adjusted at 23 °C and 10, 35, 80 %rh
- Accuracy:  $\pm 1$  %rh /  $\pm 0.2$  K

| Analogue OEM cable probes of the type XA                     |    |   |   |   |   |   |   |   |   |   |  |                                                                    |
|--------------------------------------------------------------|----|---|---|---|---|---|---|---|---|---|--|--------------------------------------------------------------------|
| Device type                                                  |    |   |   |   |   |   |   |   |   |   |  |                                                                    |
| XA                                                           |    |   |   |   |   |   |   |   |   |   |  | OEM probe with UART configuration interface                        |
| C                                                            | 2- |   |   |   |   |   |   |   |   |   |  | Cable probe, black (polycarbonate) with black system cable         |
| E                                                            | 1- |   |   |   |   |   |   |   |   |   |  | Screw-in probe 1/2" gas thread                                     |
| E                                                            | 3- |   |   |   |   |   |   |   |   |   |  | Screw-in probe 1/2" NPT thread                                     |
| Cable length                                                 |    |   |   |   |   |   |   |   |   |   |  |                                                                    |
|                                                              | 1  |   |   |   |   |   |   |   |   |   |  | 1 m, open ends                                                     |
|                                                              | 2  |   |   |   |   |   |   |   |   |   |  | 2 m, open ends                                                     |
| Power supply and output signal type                          |    |   |   |   |   |   |   |   |   |   |  |                                                                    |
|                                                              |    | 0 | X |   |   |   |   |   |   |   |  | *2- or 2 x 2-wire, $\leq 28$ VDC, common V+ 4...20 mA, max. 100 °C |
|                                                              |    | 1 | X |   |   |   |   |   |   |   |  | *3/4-wire (5...35 VDC / 12...24 VAC, 0...20 mA, max. 100 °C)       |
|                                                              |    | 2 | X |   |   |   |   |   |   |   |  | *3/4-wire (5...35 VDC / 12...24 VAC, 4...20 mA, max. 100 °C)       |
|                                                              |    | 3 | X |   |   |   |   |   |   |   |  | 3/4-wire (5...35 VDC / 12...24 VAC, 0...1 V, max. 100 °C)          |
|                                                              |    | 4 | X |   |   |   |   |   |   |   |  | 3/4-wire (5...35 VDC / 12...24 VAC, 0...5 V, max. 100 °C)          |
| Sensor                                                       |    |   |   |   |   |   |   |   |   |   |  |                                                                    |
|                                                              |    |   |   | I |   |   |   |   |   |   |  | IN-1                                                               |
|                                                              |    |   |   | V |   |   |   |   |   |   |  | V-1                                                                |
|                                                              |    |   |   | H |   |   |   |   |   |   |  | HH-1                                                               |
| Filter                                                       |    |   |   |   |   |   |   |   |   |   |  |                                                                    |
|                                                              |    |   |   | P | E |   |   |   |   |   |  | Polyethylene filter, 20 $\mu$ m, grey                              |
| Output parameters                                            |    |   |   |   |   |   |   |   |   |   |  |                                                                    |
|                                                              |    |   |   |   |   | B |   |   | X | X |  | Humidity and temperature                                           |
|                                                              |    |   |   |   |   | H | X | X |   |   |  | Only humidity                                                      |
|                                                              |    |   |   |   |   | T |   |   |   |   |  | Only temperature                                                   |
|                                                              |    |   |   |   |   | 1 |   |   |   |   |  | Humidity and frost point                                           |
|                                                              |    |   |   |   |   | A |   |   |   |   |  | Temperature and frost point                                        |
| Scaling of the output signals (humidity: always 0...100 %rh) |    |   |   |   |   |   |   |   |   |   |  |                                                                    |
|                                                              |    |   |   |   |   | X | X |   |   |   |  | No temperature output signal                                       |
|                                                              |    |   |   |   |   | 1 | X |   |   |   |  | 0...+50 °C / 0...100 %rh                                           |
|                                                              |    |   |   |   |   | 2 | X |   |   |   |  | 10...+40 °C / 0...100 %rh                                          |
|                                                              |    |   |   |   |   | 3 | X |   |   |   |  | -40...+60 °C / 0...100 %rh                                         |
|                                                              |    |   |   |   |   | 4 | X |   |   |   |  | -30...+70 °C / 0...100 %rh                                         |
|                                                              |    |   |   |   |   | 5 | X |   |   |   |  | -40...+85 °C / 0...100 %rh                                         |
|                                                              |    |   |   |   |   | 6 | X |   |   |   |  | 0...100 °F / 0...100 %rh                                           |
|                                                              |    |   |   |   |   | 7 | X |   |   |   |  | 0...200 °F / 0...100 %rh                                           |
| Standard scaling dew point / frost point                     |    |   |   |   |   |   |   |   |   |   |  |                                                                    |
|                                                              |    |   |   |   |   |   |   |   | X | X |  | No calculation                                                     |
|                                                              |    |   |   |   |   |   |   |   | B | X |  | -50...50                                                           |

\* In these probes the electronics are separated from the sensors by a 0.25 m cable. This prevents measurement errors by possible self-heating.

We can manufacture further products, such as digital versions and other scaling possibilities, to suit your needs.

## H290 TRANSMITTER SUB-ASSEMBLY

H290 is an OEM humidity and temperature measuring system with impressive specifications. It is particularly suitable for applications such as climatic chambers and drying systems. It can be supplied as a probe and PCB combination for fitting in the customer's own enclosures or housings. H290 delivers a linear output signal of 4...20 mA or 0...10 V from a power supply of 10...35 VDC or 12...24 VAC. Temperature is measured by a Pt100 or thermistor, depending on the customer's requirements. H290 is equipped with a temperature compensation system with integrated cable length compensation for operation in a large range of -100...200 °C. This means exact measurements are obtained regardless of the temperature or differential in temperature between sensor and electronics.

We are able to fulfill customer wishes for special versions, housings and probes in almost every variant. Just ask us!



## SENSORS

### HYGROMER® IN-1

For industrial applications where there is a risk of corrosion

- Response time <15 s
- 6 x 19 mm
- 0...100 %rh / -50...200 °C
- Surface protection: Teflon



### HYGROMER® WA-1

General water activity measurements

- Response time <15 s
- 7 x 14 mm
- 0...100 %rh / -50...200 °C
- Surface protection: Teflon



### HYGROMER® V-1

High humidity environments, long phases of condensation, large temperature changes, agriculture, meteorological stations

- Response time <15 s
- 7 x 21 mm
- 0...100 %rh / -50...200 °C
- Surface protection: Teflon



### HYGROMER® M3-R

Extremely fast sensor for weather balloons and other applications with fast temperature and humidity changes: handheld devices, process automation systems

- Response time <3 s
- 5.5 x 14 mm
- 0...100 %rh / -80°... + 150°C
- Special protective frame for very high air velocities

### HYGROMER® M1-SK

Similar to M3-R, but with surface protection

- Response time <3 s
- 7.5 x 20 mm
- 0...100 %rh / -80...140 °C
- Special electrodes with reinforced connections and surface protection

### HYGROMER® HH-1

Corrosion-resistant sensor for measurements in environments with hydrogen peroxide, sterilisers, autoclaves, etc.

- Response time <10 s
- 5.5 x 14 mm
- 0...100 %rh / -80...200 °C
- Special electrodes with reinforced connections
- No surface protection

### HYGROMER® HH1-SK

Similar to HH-1, but with surface protection

- Response time <12 s
- 8 x 15 mm
- 0...100 %rh / -80...140 °C
- Special electrodes with reinforced connections and surface protection

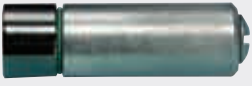
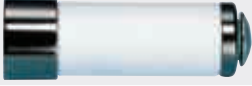
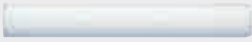
## EXAMPLES OF OEM PRODUCTS:



# ACCESSORIES

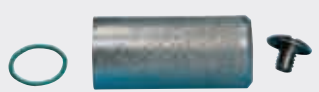
## FILTERS

We have a range of filters available for optimum protection of the sensors. By choosing the right filter, you will obtain optimum performance regarding sensor protection and probe response times.

| Technical data and order information for filters       |                             |                                                    |                                                                  |                                                                                       |
|--------------------------------------------------------|-----------------------------|----------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Order code                                             | Probe                       | Material / Filter carrier                          | Filter element                                                   |                                                                                       |
| NSP-PCB-PE<br>NSP-PCB-PE40<br>NSP-PCB-WM<br>NSP-PCB-TF | HC2-S                       | Polycarbonate, black                               | Polyethylene, grey<br>Polyethylene, white<br>Wire mesh<br>Teflon |  |
| NSP-PCW-PE<br>NSP-PCW-PE40<br>NSP-PCW-WM<br>NSP-PCW-TF | HC2-S3                      | Polycarbonate, white                               | Polyethylene<br>Polyethylene, white<br>Wire mesh<br>Teflon       |  |
| NSP-PCG-PE<br>NSP-PCG-WM                               | HF3x                        | Polycarbonate, grey                                | Polyethylene, grey<br>Wire mesh                                  |  |
| NSP-ME-WM                                              | HC2-IC probes               | Filter carrier, nickel-plated brass,<br>HC2 thread | Wire mesh<br>DIN 1.4401                                          |  |
| NSP-ME-SS                                              | HC2-IC probes               | Filter carrier, nickel-plated brass,<br>HC2 thread | Sintered steel<br>DIN 1.4401                                     |  |
| NSP-ME-TF                                              | HC2-IC probes               | Filter carrier, nickel-plated brass,<br>HC2 thread | Teflon                                                           |  |
| SP-MC15                                                | HC2-IM and<br>HC2-IE probes | Filter carrier, nickel-plated brass,<br>HC1 thread | Wire mesh<br>DIN 1.4401                                          |  |
| SP-SC15                                                | HC2-IM and<br>HC2-IE probes | Filter carrier, nickel-plated brass,<br>HC1 thread | Sintered steel<br>DIN 1.4401                                     |  |
| SP-TC15                                                | HC2-IM and<br>HC2-IE probes | Filter carrier, nickel-plated brass,<br>HC1 thread | Teflon                                                           |  |
| SP-T05                                                 | H2C-C05                     | Filter                                             | Teflon                                                           |  |
| ET-Z10                                                 | HC2-HP28/50                 | Steel sinter filter, DIN 1.4401                    |                                                                  |  |

## ACCESSORIES

### Technical data and order information for filter spare parts

| Order code | Probe                       | Material / Filter carrier                                                                       |                                                                                     |
|------------|-----------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| NSP-ME     | HC2-IC probes               | Filter carrier, nickel-plated brass,<br>for HC2-IC probes<br>Order filter element separately    |  |
| SP-MSB15   | HC2-IM and<br>HC2-IE probes | Filter carrier, nickel-plated brass,<br>for HC2-IM/IE probes<br>Order filter element separately |  |
| SP-M15     | All<br>industrial probes    | Wire mesh filter<br>For use with NSP-ME or SP-MSB15                                             |  |
| SP-S15     | All<br>industrial probes    | Steel sinter filter<br>For use with NSP-ME or SP-MSB15                                          |  |
| SP-T15     | All industrial probes       | Teflon filter<br>For use with NSP-ME or SP-MSB15                                                |  |

### Passive connection cables

| Order code                               | Use / Info                                                                  | Description                                                                                              | Range of application |
|------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------|
| E2-XX                                    | For OEM applications, panel connection                                      | Connector plug for HygroClip2 probes,<br>30 cm connection wires, open ends                               | Max. 100 °C          |
| E2-F3A                                   | To separate probes from devices<br>with self-heating                        | 0.3 m extension cable for HygroClip2 probes,<br>plug/socket. Colour: anthracite                          | Max. 100 °C          |
| E2-nnA                                   | For nn = 01, 02, 05                                                         | Extension cable for HygroClip2 probes,<br>plug/socket. Colour: anthracite, nn = length in m              | Max. 100 °C          |
| E3-F3A                                   | To separate probes from devices<br>with self-heating                        | 0.3 m extension cable for HygroClip2 probes,<br>plug/socket. Colour: white                               | Max. 100 °C          |
| E3-nnA                                   | For nn = 01, 02, 05                                                         | Extension cable for HygroClip2 probes,<br>plug/socket. Colour: white, nn = length in m                   | Max. 100 °C          |
| E2-nnXX                                  | For OEM applications<br>Max. supply voltage: 5.2 VDC<br>For nn = 01, 02, 05 | Connection cable for HygroClip2 probes,<br>open ends, tin-plated. Colour: anthracite<br>nn = length in m | Max. 100 °C          |
| E3-nnXX                                  | For OEM applications<br>Max. supply voltage: 5.2 VDC<br>For nn = 01, 02, 05 | Connection cable for HygroClip2 probes,<br>open ends, tin-plated. Colour: white<br>nn = length in m      | Max. 100 °C          |
| Connection cables with voltage regulator |                                                                             |                                                                                                          |                      |
| E2-nnXX-ACT                              | Supply voltage<br>5...24 VDC / 5...16 VAC<br>For nn = 01, 02, 05            | Adapter cable for HygroClip2 probes,<br>open ends, tin-plated. Colour: anthracite<br>nn = length in m    | Max. 70 °C           |
| E3-nnXX-ACT                              | Supply voltage<br>5...24 VDC / 5...16 VAC<br>For nn = 01, 02, 05            | Adapter cable for HygroClip2 probes,<br>open ends, tin-plated. Colour: white<br>nn = length in m         | Max. 70 °C           |

## ACCESSORIES

| Technical data and order information   |                                                                                      |                                                                                  |                      |
|----------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------|
| Extension cable for Pt100 probes       |                                                                                      |                                                                                  | Range of application |
| AC1607/nn                              | nn = length in m<br>For nn = 01, 02, 03, 05, 10, 15, 20                              | Extension cable for Pt100 probes                                                 | Max. -40...90 °C     |
| Active connection and converter cables |                                                                                      |                                                                                  |                      |
| AC3001                                 | Replaces MOK-xx-WIN<br>Requires AC adaptor AC1207                                    | Active converter cable for HygroClip2 probes for direct USB connection to a PC   | Max. 70 °C           |
| AC3002                                 | Replaces MOK-xx-WIN                                                                  | Active converter cable for HygroClip2 probes for direct RS232 connection to a PC | Max. 70 °C           |
| AC3003                                 | Signal amplifier set for HygroClip2 probes                                           | Enables cable lengths between probe and transmitter of up to 100 m               | Max. 70 °C           |
| AC3005                                 | Connects HygroClip2 probes to an Ethernet network. Requires AC adaptor AC1211        | For direct connection of a HygroClip2 probe to a TCP/IP network (Ethernet)       | Max. 70 °C           |
| AC3006                                 | Connects AirChip3000 devices to a PC / HW4                                           | Service cable, converts the UART signal to USB                                   | Max. 70 °C           |
| AC3007                                 | For direct RS232 connection<br>Requires mains adapter AC1207 (9 VDC)                 | Active converter cable for AC3000 devices<br>Mini USB service interface to RS232 | Max. 70 °C           |
| AC3009                                 | Active converter cable for AC3000 devices                                            | Mini USB service interface to USB                                                | Max. 70 °C           |
| AC3010                                 | For direct connection of networkable AirChip3000 devices in operation without master | USB to RS485 converter<br>Cable with open ends                                   | Max. 70 °C           |

| Standard cables                 |                                                 |                                                                 |                                                                                       |
|---------------------------------|-------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------------|
| AC0001                          | Standard Ethernet patch cable, 3 m, RJ45        |                                                                 |  |
| AC0002                          | Standard USB A/B cable, 1.8 m                   |                                                                 |  |
| AC0003                          | Standard USB A to Mini USB cable, 1.8 m         |                                                                 |  |
| AC0004                          | Standard RS232 cable, 1.8 m, 9-pin, male/female |                                                                 |  |
| AC0005                          | Crossover Ethernet patch cable, 3 m RJ45        |                                                                 |  |
| Mains adapters and card readers |                                                 |                                                                 |                                                                                       |
| AC0100                          | For HygroLog NT flash cards                     | Universal card reader                                           |  |
| AC1207                          | For active adapter and converter cables         | Mains adapter RNG 11, 9 V / 200 mA, 3.5 mm stereo jack, tip +   |  |
| AC1211                          | For HygroLog NT / docking stations              | Mains adapter 240 VAC ↔ 12 VDC                                  |  |
| AC1212                          | For HP2x series                                 | Mains adapter 240 VAC ↔ Mini USB                                |  |
| AC1213                          | For power supply via RS485                      | Power supply unit 85-264 VAC / 15 VDC, 100 W, DIN rail mounting |                                                                                       |

## ACCESSORIES

| Technical data and order information |                                                                                  |                                           |                                                                                       |
|--------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------|
| Mounting hardware                    |                                                                                  |                                           |                                                                                       |
| AC5001                               | Adapter for 15 mm probes to 25 mm holes                                          | 25/15 mm probe adapter to HF4X and HF5X   |    |
| AC5002                               | For mounting of HF4x, HF5X, HF6X, transmitters on top hat rail                   | Mounting kit for DIN top hat rail (2 pc.) |    |
| AC5003                               |                                                                                  | Gasket for internal Ethernet interface    |    |
| AC5004                               | HF4, HF5, HF6, HP2X                                                              | Cover for service interface               |    |
| AC5005                               | For temperatures <100 °C                                                         | Mounting flange for 15 mm probes          |   |
| AC1301-M                             | For temperatures to 100 °C<br>Perbunan gasket, M20 x 1.5<br>Brass, nickel-plated | Mounting gland for 15 mm probes           |  |
| AC1301-MEX                           | Ditto, for HygroClip EX probes                                                   | Mounting gland for 15 mm probes           |  |
| AC1302-M                             | For temperatures to 100 °C<br>Perbunan gasket, M32 x 1.5<br>Brass, nickel-plated | Mounting gland for 25 mm probes           |  |
| AC1303-M                             | For temperatures to 200 °C<br>Perbunan gasket, M20 x 1.5<br>Brass, nickel-plated | Mounting gland for 15 mm probes           |  |
| AC1304-M                             | For temperatures to 200 °C<br>Perbunan gasket, M32 x 1.5<br>Brass, nickel-plated | Mounting gland for 25 mm probes           |  |
| AC1305                               | Ø 80 mm, steel, nickel-plated                                                    | Mounting flange for AC1301-M and AC1303-M |  |
| AC1306                               | Ø 80 mm, steel, nickel-plated                                                    | Mounting flange for AC1302-M and AC1304-M |  |

# TERMS AND CONDITIONS OF TRADING

## 1. General

- 1.1 These general conditions of sale and supply shall be binding when such have been stated as being applicable in an offer or confirmation of order of and by ROTRONIC Instruments (UK) Ltd
- 1.2 Orders shall only become binding upon ROTRONIC Instruments (UK) Ltd after it has issued a written confirmation of order.
- 1.3 These general conditions of sale and supply shall become valid as from January 1, 2000.

## 2. Prices

Prices shall be deemed net plus transportation and packaging charges (V.A.T. at prevailing rate applies), provided that alternative conditions have not already been agreed. ROTRONIC Instruments (UK) Ltd however hereby reserves the right to make price adjustments to cover definite increases in costs as for example the cost of wages, goods and materials.

## 3. Delivery period

The delivery period shall be the date laid down in the contract of sale and such may be extended should difficulties arise that may have been caused by act of God or force majeure such as war, epidemics and among other things storm and tempest.

## 4. Despatch

All deliveries shall be effected for the account and the risk of the customer. Any complaints concerning damage, loss or delay are to be reported to ROTRONIC Instruments (UK) Ltd within 7 days after the receipt of the consignment; but complaints concerning any faulty packaging shall be rendered on the same day as the receipt of the consignment.

## 5. Works deliveries

Should the consignment and invoicing be directly effected by the works supplier of ROTRONIC Instruments (UK) Ltd, the conditions of sale and supply of that particular works supplier shall be valid for customers in respect of that particular contract. In such cases, these present conditions of sale and supply shall have no validity and damage indemnity claims or claims of any other nature cannot be made enforceable against ROTRONIC Instruments (UK) Ltd hereunder.

## 6. Return of goods and materials

The return of goods and materials shall require the written permission of ROTRONIC Instruments (UK) Ltd and may only be effected if the goods and materials are in irreproachable condition and still in their original packaging, and only then if such are usually maintained in stock by ROTRONIC Instruments (UK) Ltd. A copy of the delivery note or the invoice must be enclosed. Returns without either a copy of the delivery note or the invoice will not be accepted. An appropriate surcharge will be levied by ROTRONIC Instruments (UK) Ltd on the purchaser to defray the cost of any inconvenience caused.

## 7. Settlement

Provided that alternative conditions have not already been agreed, invoices are to be settled net within 30 days without any deductions. Purchasers will be charged the usual bank overdraft rate of interest in respect of overdue payments.

## 8. Retention of ownership rights

All goods and materials supplied shall remain the property of ROTRONIC Instruments (UK) Ltd until full payment of the debited invoice amount shall have been received. The purchaser and the holder of the goods and materials shall in addition be under a duty hereunder to contract insurance cover for the goods and materials and, in their capacity as the insured, to assign any insurance claim of the purchaser to ROTRONIC Instruments (UK) Ltd

## 9. Warranty

ROTRONIC Instruments (UK) Ltd will grant a warranty for plant and equipment for a period of 24 months from the date of delivery in respect of any evidenced faulty workmanship and materials. Should a delivered consignment prove to be contrary to contract upon inspection, the customer shall grant ROTRONIC Instruments (UK) Ltd the opportunity hereunder of removing the fault, or else the customer may demand replacement. Should the supply or delivery of any improvement or replacement not prove possible, the customer may choose between having the purchase price reduced or in demanding the contract of, sale to be rescinded (conversion). Damage resulting from natural wear and tear, act of God, force majeure, non compliance with the operating instructions shall be excluded from the warranty as well as mechanical interference by the customer or by third parties with plant and equipment of ROTRONIC Instruments (UK) Ltd without its written permission.

## 10. Cancellation

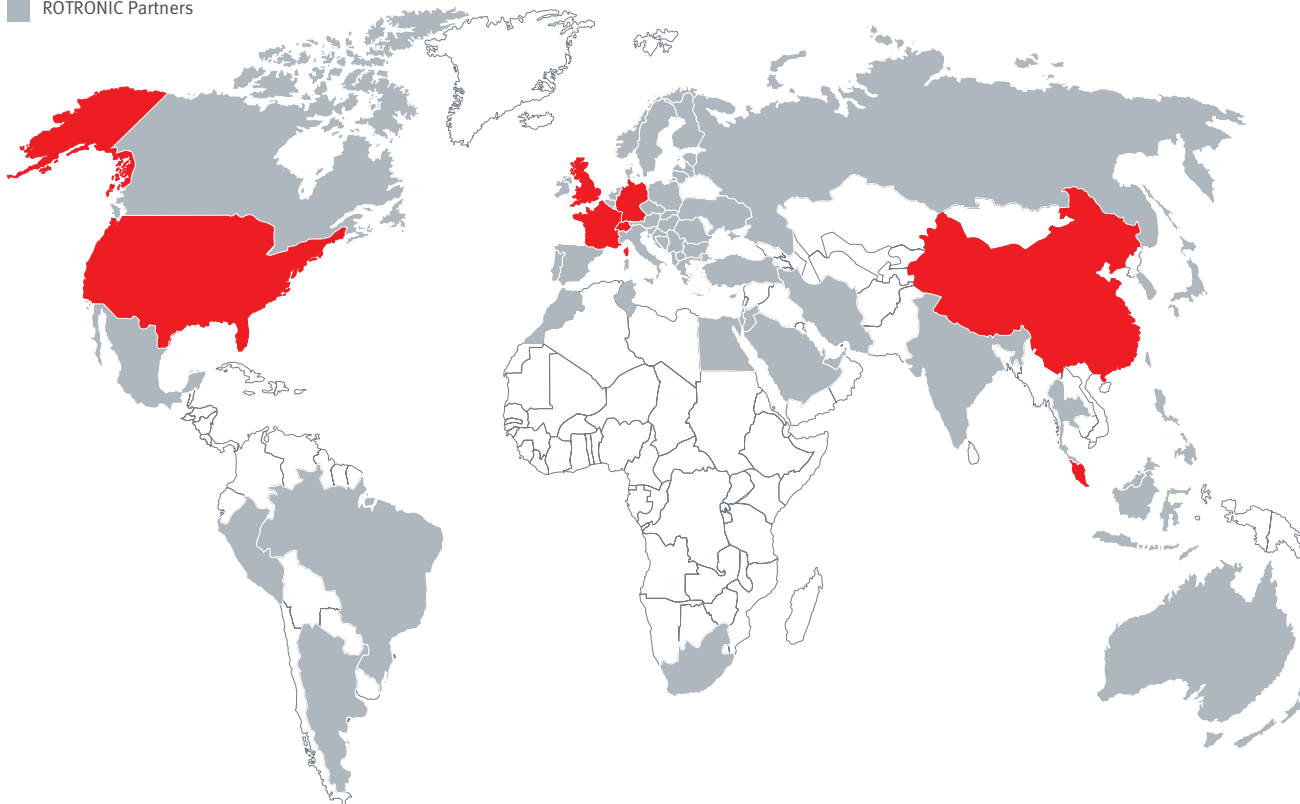
Cancellation of orders shall only be possible hereunder with the written approval of ROTRONIC Instruments (UK) Ltd. Any costs which shall have already been incurred or price increases as a result of reductions in amounts ordered shall be for the account of the purchaser. Partial supplies of an order contracted upon call shall be claimed within the agreed supply and delivery periods, otherwise ROTRONIC Instruments (UK) Ltd may cause the relative consignment and invoice billing there fore to be made.

## 11. Place of jurisdiction

The place of jurisdiction hereunder shall be London, England. The purchaser expressly declares and agrees hereunder to waive the usual place of domicile as place of jurisdiction in favour of the foregoing jurisdiction agreed hereunder. Legal relationships hereunder shall be subject to UK law.

ROTRONIC is represented in more than 40 countries around the world. An up-to-date list of all our partners is available at [www.rotronic-humidity.com/international](http://www.rotronic-humidity.com/international)

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■ ROTRONIC Partners



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