MAIN CATALOGUE

MEASUREMENT DEVICES FOR RELATIVE HUMIDITY, TEMPERATURE AND CO_2

rotronic

HOW TO CONTACT ROTRONIC

ROTRONIC is a family owned group of companies with headquarters in Switzerland, and subsidiaries and distributors worldwide. Contact information can be found at www.rotronic.com/international

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

Buying from ROTRONIC UK

Contact our experienced sales team for product and application advice, pricing and availability.
Our field sales team offer on-site application consultancy and technical product support throughout the United Kingdom. For our terms and conditions of trading see page 153.

Warranty

All ROTRONIC products have 24 month warranty.

Calibration and Service

Our technical support team offer a wide range of services including UKAS calibration for temperature, humidity and dew point, repairs and service contracts.
Contact service@rotronic.uk.

The ROTRONIC UK Humidity Team

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Our Service to You

- High quality products
- Competitive prices
- ISO 9001 quality system
- Comprehensive 24 month warranty
- Dedicated team, specialising in humidity
- 48 hour turnaround on calibration and repairs on request
- UKAS calibration laboratory accredited for temperature, humidity and dew point

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ROTRONIC MEASURING INSTRUMENTS: PRECISION AT THE HIGHEST LEVEL

With us as partner you can choose from a **comprehensive range** of handheld instruments, transmitters, industrial probes, OEM products and data loggers.

ROTRONIC measuring instruments operate in a wide range of applications: in the pharmaceutical/foodstuff industries, ventilation/air-conditioning applications, drying processes and measurements of paper moisture as well as meteorology.

From us you buy **guaranteed reliability**: you work with **validated software**, we are an officially **accredited SCS calibration laboratory**, many of our products fulfill international regulations **(GAMP/FDA-compliant)** and no matter where you are, with more than **40 distributors** worldwide, you can rely on a competent and efficient sales and service network.

YOU WANT TO STAY UP-TO-DATE ON THE LATEST PRODUCTS? YOU ARE LOOKING FOR NEW SOFTWARE UPDATES?

Nothing easier than that.
Visit our website at www.rotronic.com

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

AIR CHIP TECHNOLOGY

Electronics.

ROTRONIC pioneered digital technology in humidity instruments with the HygroClip concept. After ten succesful 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 GAMP5 (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 ±0.5 %RH / 0.1 K and ±2 %RH / 0.3 K depending on the product and adjustment profile selected. Accuracy specifications in this catalog are defined by product comparison with the reference instruments used in our production plants (traceable to national standards). All the information in this catalog 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

AIR CHIP TECHNOLOGY

HygroClip2 probe

The HygroClip2 is a completely new type of probe that is in a class of it's 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 probes offers you the best possible reproducibility and a superb system accuracy of ±0.8 %RH and ±0.1 K.

HygroClip2 probes are available in various types: 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 calculates the dew/frost point
- Range of application 0...100 %RH / -100...200 °C (depending on probe type)
- UART interface
- 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 adjustment
- Can be used as a reference in system qualification

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HC2-S

HC2-S3

Standard probes HC2-S / HC2-S3

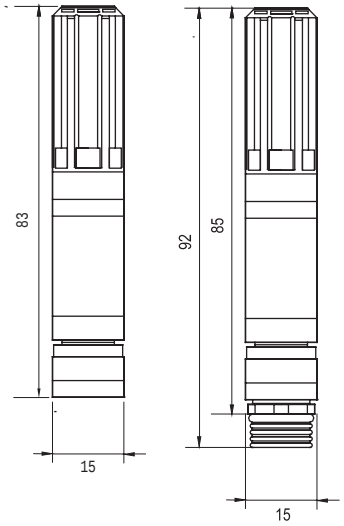
The HC2-S / HC2-S3 is the most versatile probe from ROTRONIC and forms the basis of the product portfolio. It measures humidy and temperature and calculates the dew/frost point.

Applications

HVAC, food industry, building services equipment, paper, textile and pharmaceutical industries

Features

- Accuracy: ±0.8 %RH, ±0.1 K, at 23 °C ±5 K
- Range of application: -50...100 °C / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1 V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH



Order code	HC2-S	HC2-S3
Probe type	Standard probe, black	Meteorology probe, white
Dimensions	Ø 15 x 83 mm	
Range of application	-50...100 °C, 0...100 %RH	
Accuracy	±0.8 %RH, ±0.1 K, at 23 °C ±5 K	
Power supply	3.2...5 VDC, calibrated at 3.3 VDC	
Current consumption	~4.5 mA	
Long-term stability	<1 %RH / year	
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 Class A	
Filter type	Polyethylene standard filter, 20 µm, gray	Polyethylene standard filter, 40 µm, white
Response time	<15 s, without filter	
Maximum wind velocity	3 m/s, without filter 20 m/s with polyethylene filter	
Housing material	Polycarbonate	
Weight	10 g	

Compatible products

• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8
• Meteorology transmitters	MP102H, MP402H

Included

- Factory calibration certificate
- Short instruction manual
- Polyethylene filter

Typical accessories

• Mounting flange	AC5005
• Polyethylene filter, gray	NSP-PCB-PE40
• Polyethylene filter, white	NSP-PCW-PE40
• Extension cable 2 m, black	E2-02A
• Extension cable 2 m, white	E3-02A
• Active adapter cable, open ends, 2 m	E2-02XX-ACT/01
• Calibration device	ER-15
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80%RH	EA80-SCS

High-precision probes HC2-SH / HC2-S3H

The HC2-SH / HC2-S3H fulfills the highest demands on measuring accuracy. It measures humidity and temperature and calculates the dew/frost point.

Applications

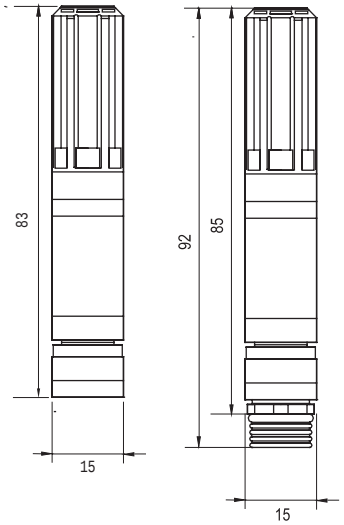
HVAC, food industry, building services equipment, paper, textile and pharmaceutical industries

Features

- Accuracy: ±0.5 %RH, ±0.1 K, at 23 °C ±5 K
- Range of application: -50...100°C / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1V = -40...60 °C / 0...100 %RH
- Adjusted at 23°C and 10, 20, 30, 40, 50, 60, 70, 80, 90 %RH, then calibrated at 20, 50, 80 %RH

HC2-SH HC2-S3H

Order code	HC2-SH	HC2-S3H
Probe type	Standard probe, black	Meteorology probe, white
Dimensions	Ø 15 x 83 mm	
Range of application	-50...100 °C, 0...100 %RH	
Accuracy	±0.5 %RH, ±0.1 K, at 23 °C ±5 K	
Power supply	3.2...5 VDC, calibrated at 3.3 VDC	
Current consumption	~4.5 mA	
Long-term stability	<1 %RH / year	
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 Class A	
Filter type	Polyethylene standard filter, 20 µm, gray	Polyethylene standard filter, 40 µm, white
Response time	<15 s, without filter	
Maximum wind velocity	3 m/s, without filter 20 m/s with polyethylene filter	
Housing material	Polycarbonate	
Weight	10 g	



Compatible products

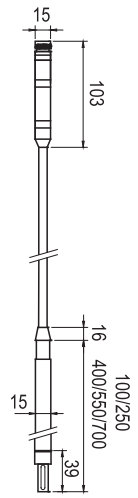
• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8
• Meteorology transmitters	MP102H, MP402H

Included

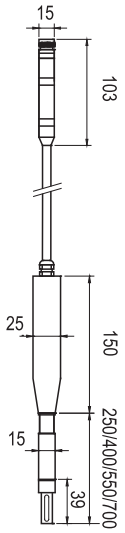
- Factory calibration certificate
- Short instruction manual
- Polyethylene filter

Typical accessories

• Mounting flange	AC5005
• Polyethylene filter, gray	NSP-PCB-PE40
• Polyethylene filter, white	NSP-PCW-PE40
• Extension cable 2 m, black	E2-02A
• Extension cable 2 m, white	E3-02A
• Calibration device	ER-15
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS



HC2-ICxxx



HC2-ICxxx-A

Industrial probes

The ROTRONIC industrial probe is especially suitable for high temperature and demanding industrial environments. It measures humidity and temperature and calculates the dew/frost point.

Applications

Production environments, high temperatures, industrial manufacturing, drying processes, climatic chambers

Features

- Range of application: -100...200°C[1] / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH

Standard industrial probes Ø 15 mm

Order code	HC2-IC1xx*	HC2-IC3xx*	HC2-IC4xx*	HC2-IC5xx*	HC2-IC7xx*
Dimensions	Ø 15 x 100 mm	Ø 15 x 250 mm	Ø 15 x 400 mm	Ø 15 x 550 mm	Ø 15 x 700 mm
Accuracy	±0.8 %RH, ±0.1 K, at 23 °C ±5 K				
Power supply	3.3 VDC ±0.1 VDC, current: ~4.5 mA				
Sensor type	ROTRONIC HYGROMER ® IN-1, Pt100 Class A				
Response time	<15 s, without filter				
Material	PEEK, brass, chemically nickel-plated				
Weight	230 g	260 g	290 g	230 g	250 g

* xx = cable length in meters (02, 05), 80 g per meter cable

Industrial probes

Order code	HC2-IC3xx*-A	HC2-IC4xx*-A	HC2-IC5xx*	HC2-IC7xx*-A
Dimensions	Ø 15/25 x 250 mm	Ø 15/25 x 400 mm	Ø 15/25 x 550 mm	Ø 15/25 x 700 mm
Accuracy	±0.8 %RH, ±0.1 K, at 23°C ±5 K			
Power supply	3.3 VDC ±0.1 VDC, current: ~4.5 mA			
Sensor type	ROTRONIC HYGROMER ® IN-1, Pt100 Class A			
Response time	<15 s, without filter			
Material	PEEK, brass, chemically nickel-plated			
Weight	290 g	320 g	350 g	380 g

* xx = cable length in meters (02, 05), 80 g per meter cable

Compatible products

• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8

Included

- Factory calibration certificate

Typical accessories

• Sintered steel filter	SP-S15
• Wire mesh filter	SP-M15
• Teflon filter	SP-T15
• Calibration device	ER-15
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

[1] Short term peak load

Industrial probes

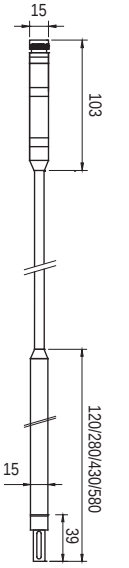
The metal industrial probe is especially suitable for high temperature, demanding industrial environments. The probe measures humidity and temperature and calculates the dew/frost point.

Applications

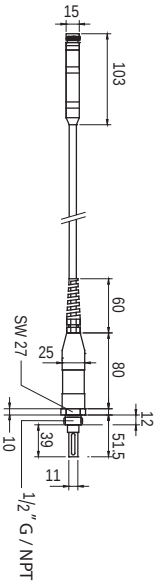
Food and pharmaceutical production, drying processes, industrial manufacturing

Features

- Range of application: -100...200 °C[1], (screw-in probe; -50...200 °C[1]) / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1 V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH
- Cannot be used with 2-wire transmitters



HC2-IMxxx



HC2-IExxx

Metal industrial probes

Order code	HC2-IM1xx*	HC2-IM3xx*	HC2-IM4xx*	HC2-IM5xx*
Dimensions	Ø 15 x 130 mm	Ø 15 x 280 mm	Ø 15 x 430 mm	Ø 15 x 580 mm
Accuracy	±0.8 %RH, ±0.1 K, at 23°C ±5 K			
Power supply	3.3 VDC ±0.1 VDC, current: ~4.5 mA			
Sensor type	ROTRONIC HYGROMER ® IN-1, Pt100 Class A			
Response time	<15 s, without filter			
Housing material	Stainless steel, DIN 1.4305			
Weight	260 g	400 g	540 g	680 g

* xx = cable length in meters (02, 05), 80 g per meter cable

Screw-in probes

Order code	HC2-IE1xx*	HC2-IE3xx*
Probe type	½" G with ROTRONIC connector	½" NPT with ROTRONIC connector
Accuracy	±0.8 %RH, ±0.1 K, at 23°C ±5 K	
Power supply	3.3 VDC ±0.1 VDC, current: ~4.5 mA	
Sensor type	ROTRONIC HYGROMER ® IN-1, Pt100 Class A	
Pressure	Pressure-resistant to 100 bar / 1450 PSI	
Response time	<15 s, without filter	
Housing material	Stainless steel, DIN1.4305	
Weight	290 g	

* xx = cable length in meters (02, 05), 80 g per meter cable

Compatible products

• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8

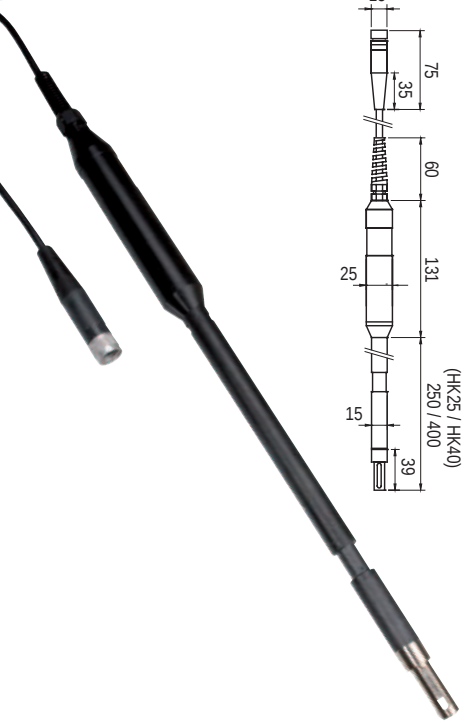
Included

- Factory calibration certificate

Typical accessories

• Sintered steel filter	SP-S15
• Wire mesh filter	SP-M15
• Teflon filter	SP-T15
• Calibration device	ER-15
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

[1] Short term peak load



High-temperature handheld probe

The handheld probe is especially suitable for portable measurements of high temperatures. It measures humidity and temperature and calculates the dew/frost point.

Applications

Climatic and temperature chambers, dryers, air ducts

Features

- Range of application: -100...200 °C[1] / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH

Order code	HC2-HK25	HC2-HK40
Probe type	Handheld probe with 2 m TPU cable	
Dimensions	Ø15 x 250 mm	Ø15 x 400 mm
Accuracy	±0.8 %RH, ±0.1 K, at 23 °C ±5 K	
Power supply	3.3 VDC ±0.1 VDC, current: ~4.5 mA	
Sensor type	ROTRONIC HYGROMER ® IN-1, Pt100 Class A	
Response time	‹15 s, without filter	
Housing material	PEEK, PPS, brass, chemically nickel-plated	
Weight	210 g	240 g

Compatible products

• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8

Included

- Factory calibration certificate

Typical accessories

• Sintered steel filter	SP-S15
• Wire mesh filter	SP-M15
• Teflon filter	SP-T15
• Calibration device	ER-15
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

[1] Short term peak load

HygroWin USB probe

A PC-based accurate humidity and temperature monitoring package. The probe is mounted on 3 m cable with a USB connector. HW4 software included.

Applications

Server rooms, laboratories, test facilities, paper industry

Features

- Can be connected directly to a PC / laptop on a USB port
- Range of application: -40...85 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH

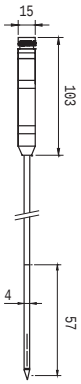
Order code	HC2-WIN-USB
Probe type	HC2 probe with direct USB connection, 3 m USB cable
Accuracy	±2 %RH, ±0.3 K, at 23 °C ±5 K
Power supply	Via USB cable
Sensor type	ROTRONIC HYGROMER ® IN-1, Pt100 Class A
Filter type	Polyethylene standard filter, 20 µm, gray
Response time	‹15 s, without filter
Weight	110 g
Housing material	Polycarbonate

Included

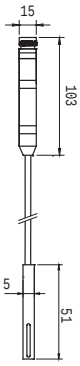
- Factory calibration certificate
- HW4 software (restricted to HygroWin USB probes)

Typical accessories

• Calibration device	ER-15
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS



HC2-C04



HC2-C05

Miniature probes

The miniature probe is used for humidity and temperature measurement in confined spaces. It also calculates the dew and frost point and can be mounted discretely.

Applications

Museums, glass cabinets, building material tests, automotive and aviation industries, testing laboratories, paper, textile and pharmaceutical industries

Features

- Range of application: -40...85 °C / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1 V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH

Order code	HC2-C04	HC2-C05
Probe type	Cable probe, Ø 4 mm, cable: 2 m	Cable probe, Ø 5 mm, cable: 2 m
Accuracy	±1.5 %RH, ±0.3 K, at 23°C ±5 K	
Power supply	3.3 VDC ±0.1 VDC, current: ~4.5 mA	
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 Class A	
Response time	<15 s, without filter	
Housing material	Stainless steel, DIN1.4305	Brass, nickel-plated
Weight	85 g	85 g

Compatible products

• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8

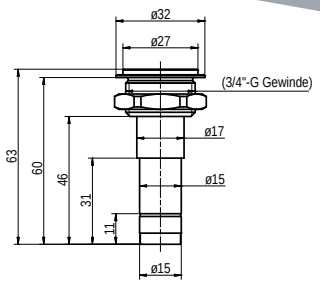
Included

- Factory calibration certificate

Typical accessories

• Extension cable 2 m, black	E2-02A
• Teflon filter sleeve for HC2-C05	SP-T05
• Calibration device	ER-05
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

Flush mount probes



The flush mount probe is installed in the walls of glass cabinets, showcases, laboratories and in clean rooms for humidity and temperature measurement in inconspicuous manner.

Applications

Medical industry, clean rooms, museums, hotels, ships, HVAC, exhibition rooms

Features

- Range of application: -40...85 °C / 0...99 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH

HC2-IS25, steel filter, cover

HC2-IP25, PE-HD filter, cover

Order code	HC2-IS25	HC2-IT25	HC2-IP25
Probe type	Wall flush mount probe		
Accuracy	±1.5% RH, ±0.2 K at 0...90% RH and 23 °C ±5 K		
Power supply	3.2...5 VDC, calibrated at 3.3 VDC, current: ~4.5 mA		
Filter type	Sintered steel	Teflon	Polyethylene
Sensor type	ROTRONIC HYGROMER ® WA-1, Pt100 Class A		
Response time	‹35 s	‹35 s	‹35 s
Housing material	Polycarbonate, stainless steel DIN 1.4301		
Weight	50 g		

Compatible products

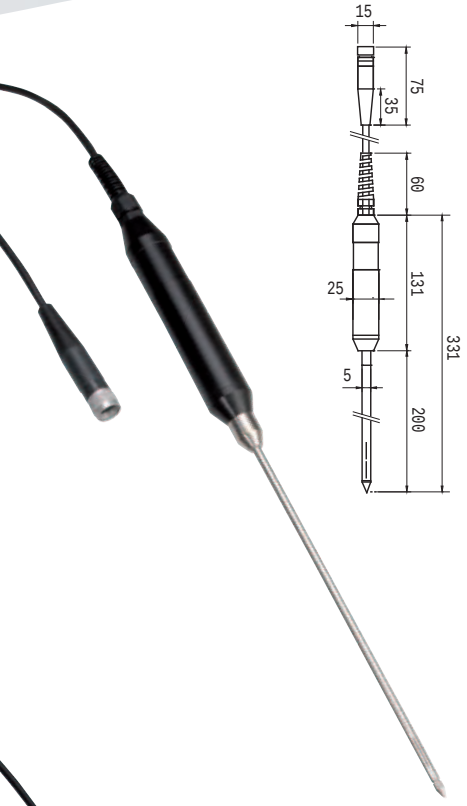
• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8

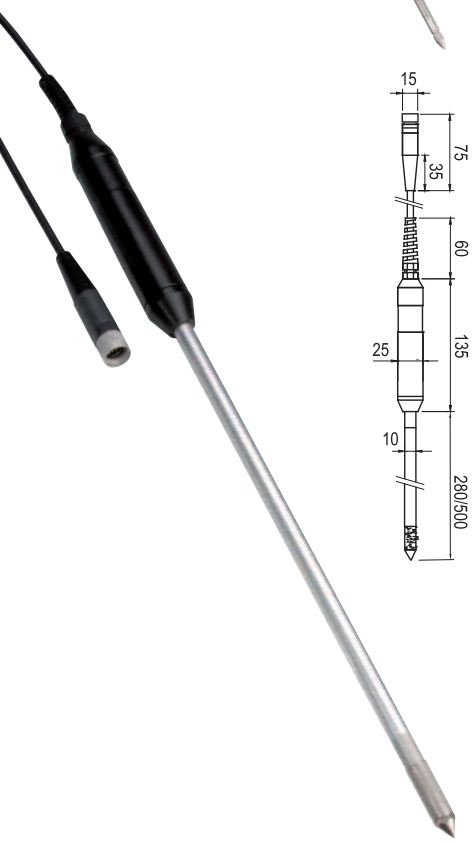
Included

- Factory calibration certificate
- Protection cover

Typical accessories

• Extension cable 2 m, black	E2-02A
• Calibration device	EIx-25
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS





Insertion probes 5 mm / 10 mm

The insertion probe is suitable for measurement in dust-free bulk materials, bricks, concrete, etc. It measures humidity and temperature and calculates the dew/frost point.

Applications

Water activity measurement, see page 86

Portable measurement with handheld instruments and data loggers

Features

- Range of application: -40...85 °C / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1 V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH

Order code	HC2-P05
Probe type	Ø 5 x 200 mm, insertion probe with 2 m cable
Accuracy	±1.5 %RH, ±0.3 K, at 23 °C ±5 K
Power supply	3.2...5 VDC, calibrated at 3.3 VDC, current: ~4.5 mA
Filter type	No filter available
Sensor type	ROTRONIC HYGROMER ® IN-1, Pt100 Class A
Response time	‹15 s
Material	Stainless steel DIN 1.4305 (probe), POM (handle)
Weight	160 g

Order code	HC2-HP28	HC2-HP50
Probe length	Ø 10 x280 mm	Ø 10 x 500 mm
Accuracy	±0.8 %RH, ±0.1 K, at 23°C ±5 K	
Power supply	3.2...5 VDC, calibrated at 3.3 VDC, current: ~4.5 mA	
Filter type	Sintered steel	
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 Class A	
Response time	‹20 s, with filter	
Material	Stainless steel DIN 1.4305 (probe), POM (handle)	
Weight	200 g	300 g

Compatible products

• Handheld instruments	HP22-A, HP23-A
• Water activity measurement instruments	HP23-AW-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8
• Benchtop display unit	HygroLabC1

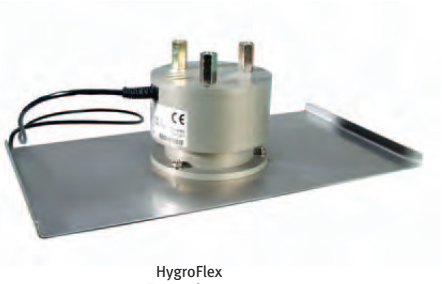
Included

- Factory calibration certificate

Typical accessories

• Replacement filter HC2-HP28 / 50 (sintered steel)	ET-Z10
• Calibration device HC2-P05	ER-05
• Calibration device HC2-HP28/50	EGL
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

Web probe

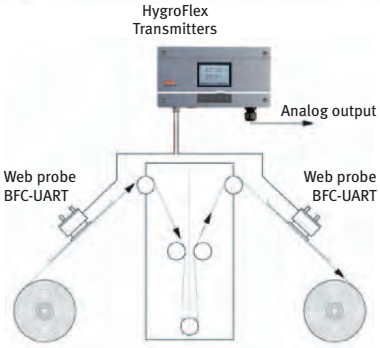


Applications

Paper and printing industries, production and processing of textiles, all types of production webs

Features

- Range of application: -40...85 °C / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1 V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH



Order code	BFC-UART
Probe type	HC2 web probe
Accuracy	±0.8 %RH, ±0.1 K, at 23 °C ±5 K
Power supply	3.2...5 VDC, calibrated at 3.3 VDC, current: ~4.5 mA
Filter type	Wire mesh filter
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 Class A
Response time	‹15 s, without filter
Housing material	Aluminum, stainless steel DIN 1.4301
Weight	1070 g

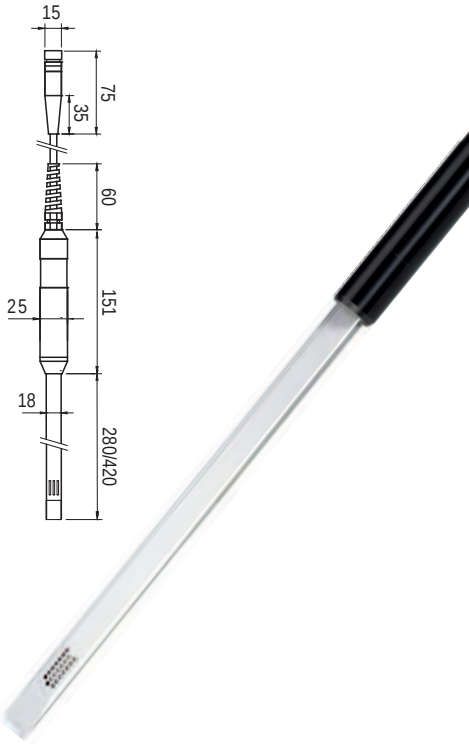
Sword probes

Applications

Paper, printing and textile industries with handheld instruments and data loggers

Features

- Range of application: -40...85 °C / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1 V = -40...60 °C / 0...100 %RH
- Adjusted at 23°C and 10, 35, 80 %RH



Order code	HC2-HS28	HC2-HS42
Probe length	280 mm	420 mm
Accuracy	±0.8 %RH, ±0.1 K, at 23°C ±5 K	
Power supply	3.2...5 VDC, calibrated at 3.3 VDC, current: ~4.5 mA	
Filter type	No filter	
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 Class A	
Response time	‹15 s	
Material	Aluminum (probe), POM (handle)	
Weight	220 g	240 g

Compatible products

• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8

Included

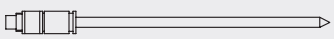
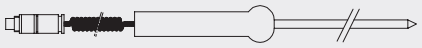
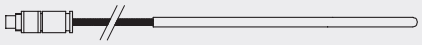
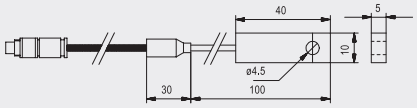
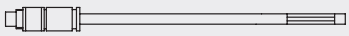
- Factory calibration certificate
- Short instruction manual (BFC-UART)

Typical accessories

• Replacement filter (BFC-UART)	ET-W37-Set
• Calibration device, web probe	WP14-S
• Calibration device, sword probes	EGS
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

Pt100 probes

All Pt100 probes are Class A sensors and have a 4-wire connection.
Connection: 4-pin Binder connector plug series 711.
τ90: Response time to reach 90 % of actual temperature change (air/water) with an air flow velocity of 2 m/s.

Specifications			
Order code	**Probe type**	**Cable**	
AC1900	Fixed probe 100 x 3 mm DIN 1.4404 -70...500°C, τ90: 80 / 6 s	Without cable	
AC1902	Insertion probe with handle DIN 1.4404 -70...500 °C, τ90: 80 / 6 s	1 m, PUR cable Max. 80 °C Min. -40 °C	
AC1903	Cable probe 200 x 6 mm Not waterproof, DIN 1.4404 -70...500 °C, τ90: 170 / 15 s	2 m, thermoplastic cable Max. 110 °C Min. -50 °C	
AC1904	Cable probe 50 x 6 mm Waterproof, DIN 1.4301 -50...110 °C, τ90: 185 / 20 s	2 m, thermoplastic cable Max. 110 °C Min. -50 °C	
AC1905	Surface probe 40 x 10 x 5 mm DIN 1.4301 -70...500°C, τ90:approx. 90 s	2 m, silicon cable Max. 180 °C Min. -55 °C	
AC1909	Fixed probe for measurements in air 100 x 4 mm, DIN 1.4401 -50...200°C, τ90: 20 / -- s	Without cable	
AC1913-A	Kapton foil probe 20 x 15 x 2 mm -50...200 °C, τ90: approx. 7 s	1 m, four PFA wires Max. 200 °C Min. -190 °C	
AC1916-A-T	Cable probe 60 x 6 mm Waterproof DIN 1.4571 -100...180°C, τ90: 185 / 20 s	2 m PTFE cable Max. 180°C Min. -100 °C	

AC1900

AC1904

Compatible products

• Handheld instrument	TP22
• Transmitter	TF5
• Docking stations	HL-DS series

Included

- Temperature probe

Typical accessories

• Adapter for Pt100 probes for HP22/23 or HF5/8	HC2-PT100-B4

Accessories		
Order code	Probe type	
HC2-PT100-B4	Adapter for Pt100 probes for HP22-A and HP23-A	
AC1960-50	Screw-in measuring sleeve for 3 mm probes Thread 1/4" G Immersion depth 50 mm	
AC1960-100	Screw-in measuring sleeve for 3 mm probes Thread 1/4" G Immersion depth 100 mm	
AC1607/2	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 °C, min. -40 °C	2 m
AC1607/3	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 °C, min. -40 °C	3 m
AC1607/5	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 °C, min. -40 °C	5 m

Pt100 temperature sensors

A Pt100 sensor changes its electrical resistance with temperature. Its resistance value is 100 ohms at 0 °C. This characteristic is used in a bridge circuit to generate a signal suitable for further processing.

There are five quality classes
with the following tolerances at 0 °C.

Class B: ±0.3 °C
Class A: ±0.15 °C
Class B 1/3: ±0.1 °C
Class B 1/5: ±0.06 °C
Class B 1/10: ±0.03 °C

The table illustrates the tolerance for each
Pt100 sensor class at different temperatures.

Tolerance										
	Class A		Class B		1/3 Class B		1/5 Class B		1/10 ClassB	
Temp. °C	± K	± Ω	± K	± Ω	± K	± Ω	± K	± Ω	± K	± Ω
-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

TRANSMITTERS

The HygroFlex Series

HygroFlex transmitters are perfect instruments for constant monitoring of temperature and humidity in building management systems, museums, storage rooms and libraries. The transmitters come as duct, space and wall versions and together with the optional HW4 software package, our products can serve many applications. Customer requirements and the field of application decide on the right choice of model: for example, the HygroFlex5 has a probe that can be changed in a matter of seconds, while the **HygroFlex7 series** is perfect for harsh industrial environments thanks to its solid housing.

CONTENTS

HygroFlex3 series 22-25

HygroFlex4 series 26-28

HygroFlex5 series 29-32

HygroFlex7 series 33-36

HygroFlex8 series 37-39

ThermoFlex5 series 40-42

		
Transmitters	**HF3**	**HF4**
Range of electronics without LCD	-40...60 °C	-40...60 °C
with LCD	-10...60 °C	-10...60 °C
Temperature limits at probe	-40...60 °C	-50...100 °C
Accuracy	±2 %RH ±0.3 K	±1 %RH ±0.2 K
FDA / GAMP conformity	✔	✔
Probes		
Type	1x fixed probe	1x fixed probe
Housing		
Space mount version (type R/S)	✔	
Wall version (type W)	✔	✔
Duct version, 15 mm probe (type D)	✔	✔
Duct version, 25/15 mm probe (type D)		
Cable version (type C)		
Display	✔	✔
Keypad		✔
IP protection	IP65 (except type R/S IP20)	IP65
Power supply		
15...40 VDC / 12...28 VAC	✔	✔
15...40 VDC / 12...28 VAC galvanically isolated		
85...240 VAC galvanically isolated		
Power over Ethernet		
Output		
2 or 2 x 2-wire current output	2x	2x
3/4-wire current or voltage output	2x	2x
RS-485		✔
Ethernet		✔
Wireless		✔
Analog and digital combined		
Modbus (ASCII)		✔
Functions		
Data logging		
Relays	2	
Hygrostat / Thermostat	✔	
Beep tone		
Analog input		
Psychrometric calculations	Dew/Frost point	Dew/Frost point

			
HF5	**HF7**	**HF8**	**TF5**
-40...60 °C -10...60 °C	-40...85 °C -10...60 °C	-40...85 °C -10...60 °C	-40...60 °C -10...60 °C
-50...100 °C (probe dependent)	-50...100 °C (type W) -100...150 °C (type D) -100...200 °C (type C)	-50...100 °C (probe dependent)	-70...500 °C (probe dependent)
±0.8 %RH / ±0.1 K (probe dependent)	±1 %RH ±0.2 K	±0.8 %RH / ±0.1 K (probe dependent)	±0.15 K (probe dependent)
✔	✔	✔	✔
1x interchangeable HC2 probe	1x fixed probe	2x interchangeable HC2 probes	1x interchangeable Pt100 probe
✔	✔	✔	✔
✔	✔		
	✔		
	✔		
✔	✔	✔	✔
✔		✔	✔
IP65	IP67	IP65	IP65
✔	✔	✔	✔
✔		✔	
✔		✔	
✔		✔	
2x	2x		1x
2x	2x	4x	1x
✔		✔	✔
✔		✔	
✔			
✔		✔	
		✔	
		4 (2 relays with Ethernet option)	
		✔	
		✔	
		✔	
All	Dew/Frost point	All	

HF3 SERIES

Features

- Accuracy: ±2 %RH / ±0.3 K at 23 °C ±5 K
- Ranges at probe: -40...60 °C / 0...100 %RH
- Ranges of electronics: -40...60 °C / 0...100 %RH, -10...60 °C with LCD
- Use as a simulator for system validation*
- Service interface
- Adjusted at 23 °C and 10, 35, 80 %RH

Power supply

- Low voltage; 2 x 2 or 3 / 4-wire

Signal outputs

- Current output
- Voltage output
- 2 relays (only duct and wall versions)

Versions

- Space mount (type S) with integrated probe
- Space mount (type R) with fixed probe, extractable
- Duct (type D)
- Wall (type W)

Output parameters

- Humidity & temperature
- Humidity only or Temperature only
- Humidity & dew point
- Temperature & dew point

Output scaling

- Relative humidity: range scalable, standard scaling 0...100 %RH
- Temperature: range scalable, typical: -40...60 °C
- Dew point: range scalable

Display

- Display with or without backlight, trend indicators
- Without display

HF3 SPACE MOUNT VERSION

Applications

Measures relative humidity and temperature and calculates the dew/frost point in offices, laboratories and rooms where design is important.

2 or 2x2-wire**

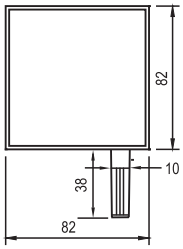
	HF320 Type S	HF320 Type R
Output signals	4...20 mA	
Supply voltage	10...28 VDC	
Display	Optional (without backlight)	

3/4-wire**

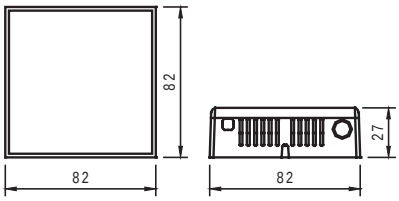
	HF33x Type S	HF33x Type R
Output signals	0...1 V 0...5 V 0...10 V 0...20 mA 4...20 mA Customer rescaling possible*	
Supply voltage	15...40 VDC / 12...28 VAC	
Display	Optional (with backlight)	

Temperature range	Scalable*	
Probes	Fixed internal	Extractable

Type R



Type S



COMPATIBLE PRODUCTS

- HW4 software, page 117

INCLUDED

- Factory adjustment certificate
- Product qualification
- Short instruction manual

TYPICAL ACCESSORIES

- Service cable: AC3006 / AC3009*
- Calibration device (type R): EGL

References

* Requires optional HW4 software and service cable

** See Theory page 149

HF3 DUCT AND WALL VERSIONS

Applications

Measures relative humidity and temperature and calculates the dew/frost point in HVAC applications. Also available as a hygrostat/thermostat.

2 or 2x2-wire **

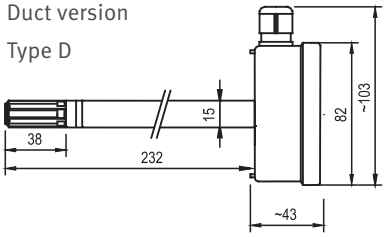
	HF320 Type W/D
Output signals	4...20 mA
Supply voltage	10...28 VDC

3/4-wire**

	HF33x Type W/D	HF346 Type W/D (hygro-/thermostat)
Output signals	0...1 V 0...5 V 0...10 V 0...20 mA 4...20 mA Customer rescaling possible*	2 change-over relays
Supply voltage	15...40 VDC 12...28 VAC	12...28 VAC 18...40 VDC
Switching range		Scalable*
Switch points		Software and potentiometer

Duct version

Type D



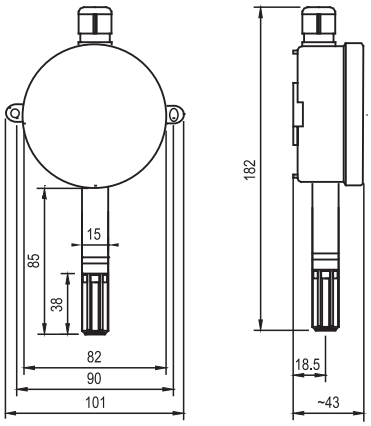
Temperature range	Scalable*
Probes	Fixed
Filter type	Polyethylene

COMPATIBLE PRODUCTS

- Probe not interchangeable
- HW4 software, page 117

Wall version

Type W



INCLUDED

- Factory adjustment certificate
- Product qualification
- Short instruction manual

TYPICAL ACCESSORIES

• Service cables:	AC3006 / AC3009*
• Replacement filter, PE, gray:	NSP-PCG-PE
• Calibration device:	ER-15

References

* Requires optional HW4 software and service cable

** See Theory page 149

Technical data	HF320 Analog 2-wire	HF33x Analog 3/4-wire	HF346 Hygrostat / Thermostat 3/4-wire
General			
Parameters	Humidity and temperature		
Calculated parameters	Dew/Frost point		
Housing material / Protection	ABS / IP65, except type R/S IP20		
Dimensions	101 x 182 x 43 mm (type W), 103 x 82 x 278 mm (type D), 82 x 82 x 27 mm (type S), 120 x 82 x 27 mm (type R)		
Weight	140 g		
Probe material	Polycarbonate		
Probe connection	Fixed, type R extractable		
Filter material	Polyethylene		
Display (only type R/S)	LCD, 1 or 2 decimals, without backlight	LCD, 1 or 2 decimals, with backlight	N/A
Electrical connections	Type D/W: screw terminals inside, M16 cable gland		
Power supply	10...28 VDC	15...40 VDC / 12...28 VAC	8...40 VDC / 12...28 VAC
Current consumption	2x20 mA max.	‹60 mA DC / ‹150 mA AC (type W/D) ‹100 mA DC / ‹250 mA AC (type R/S)	‹25 mA DC / ‹35 mA AC
Ranges of housing / electronics	-40...60 °C / -10...60 °C (with display)	0...100 %RH	
Ranges at probe	-40...60 °C		
Firmware upgrade	Via HW4 software		
Service interface	UART service interface (Universal Asynchronous Receiver Transmitter)		
CE / EMC compatibility	EMC Directive 2004/108/EC		
Fire protection class	Corresponds to UL94-HB		
FDA / GMP conformity	Conforms to 21 CFR Part 11 and GAMP5		
Humidity measurement			
Sensor	ROTRONIC Hygromer® IN-1		
Measurement range	0...100 %RH		
Accuracy at 23°C ±5 K	±2.0 %RH / ±1.0 %RH (type R)		
Adjustment at 23 °C	10, 35, 80 %RH		
Long-term stability	‹1 %RH/year		
Response time	‹15 s t63 (63 % of a jump 35...80 %RH) without filter		
Scale limits	-999...+9999 units		
Maximum wind velocity	20 m/s with filter		
Temperature measurement			
Sensor	Pt100 Class A		
Measurement range	-40...60 °C / -40...140 °F		
Accuracy at 23°C ±5 K	±0.3 K / ±0.2 K (type R)		
Adjustment points	1		
Long-term stability	‹0.1 °C / year		
Response time	‹15 s t63 (63 % of a jump 35...80 %RH) without filter		
Scale limits	-999...+9999 units		
Analog output			
Number	2		No analog signals
Current	4...20 mA	0(4)...20 mA	
Voltage	N/A	0...1/5/10 V	
Galvanic isolation	N/A	N/A	
Maximum load	2x500 Ω	≤2x500 Ω (current output) ≥1 kΩ/V (voltage output)	
Switch output			
Type	No relay		Relay
Number			2
Switch parameters			Humidity, temperature and dew point
Switch point adjustment			Potentiometer & LED in housing
Breaking capacity			250 VAC / 6 A at ohmic load

HF4 SERIES

Features

- Accuracy: ±1 %RH / ±0.2 K at 23 °C ±5 K
- Ranges at probe: -50...100 °C / 0...100 %RH
- Ranges of electronics: -40...60 °C / 0...100 %RH; -10...60 °C with LCD
- Digital outputs
- Use as a simulator for system validation *
- Service interface
- Adjusted at 23 °C and 10, 35, 80 %RH

Power supply

- Low voltage; 2x2 or 3/4-wire

Signal outputs

- Current output
- Voltage output
- RS-485
- Ethernet / WLAN
- Modbus ASCII

Versions

- Duct (type D)
- Wall (type W)

Output parameters

- Humidity & temperature
- Humidity only or Temperature only
- Humidity & dew point
- Temperature & dew point

Output scaling

- Relative humidity: range scalable, standard scaling 0...100 %RH
- Temperature: range scalable, typical: -40...60 °C
- Dew point: range scalable

Display

- Display with backlight (excl. 2-wire), trend indicators and keypad
- Without display

HF4 DUCT AND WALL VERSIONS

Applications

Measures relative humidity and temperature and calculates the dew/frost point.
Suitable for HVAC and light industrial applications.

2 or 2x2-wire **

	HF320 Type W/D
Output signals	4...20 mA
Supply voltage	10...28 VDC
Display	Optional (without backlight, keypad) Type D only horizontal version possible with display (see photos)

3/4-wire**

	HF43x Type W/D	HF456 Type W/D (digital)
Output signals	0...1 V 0...5 V 0...10 V 0(4)...20 mA Customer rescaling possible*	RS-485 Ethernet WLAN Modbus ASCII
Supply voltage	15...40 VDC 12...28 VAC	5...35 VDC 12...28 VAC
Display	Optional (with backlight, keypad) Type D only horizontal version possible with display (see photos)	

Temperature range	Scalable*
Probes	Fixed
Filter type	Polyethylene

COMPATIBLE PRODUCTS

- HW4 software, page 117

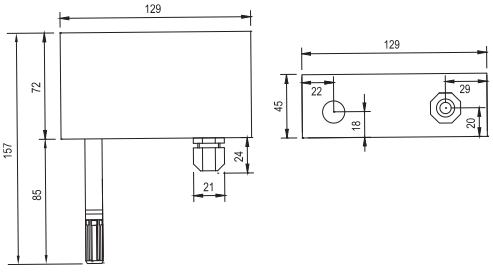
INCLUDED

- Factory adjustment certificate
- Product qualification
- Short instruction manual
- Screws and plugs for mounting
- Hex key
- Mounting flange (type D)

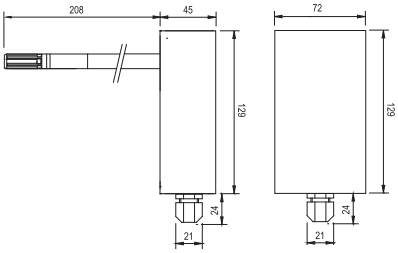
TYPICAL ACCESSORIES

• Service cables:	AC3006 / AC 3009*
• Replacement filter, polyethylene, black:	NSP-PCB-PE
• Calibration device:	ER-15
• Mounting kit DIN top-hat rail (type W):	AC5002

Wall version, type W



Duct version, type D



References

* Requires optional HW4 software and service cable

** See Theory page 149

Technical data	HF420 Analog 2-wire	HF43x Analog 3/4-wire	HF456 Digital 3/4-wire
General			
Parameters	Humidity and temperature		
Calculated parameters	Dew/Frost point		
Housing material / Protection	ABS / IP65		IP40
Dimensions	129 x 157 x 45 mm (type W), 129 x 253 x 72 mm (type D)		
Weight	220 g		
Probe material	Polycarbonate		
Probe connection	Fixed		
Filter material	Polyethylene		
Display	LCD, 1 or 2 decimals without backlight, menu navigation, 4 keys	LCD, 1 or 2 decimals with backlight, menu navigation, 4 keys	
Electrical connections	Screw terminals inside, M16 cable gland		Socket (USB/Ethernet)
Power supply	10...28 VDC	15...40 VDC / 12...28 VAC	
Current consumption	2 x 20 mA max.	‹270 mA	‹420 mA
Ranges of housing / electronics	-40...60 °C / -10...60 °C (with LCD), 0...100 %RH		
Ranges at probe	-50...100 °C		
Firmware upgrade	Via HW4 software		
Service interface	UART service interface (Universal Asynchronous Receiver Transmitter)		
CE / EMC compatibility	EMC Directive 2004/108/EC		
Fire protection class	Corresponds to UL94-HB		
FDA / GMP conformity	Conforms to 21 CFR Part 11 and GAMP5		
Humidity measurement			
Sensor	ROTRONIC Hygromer® IN-1		
Measurement range	0...100 %RH		
Accuracy at 23°C ±5 K	±1.0 %RH		
Adjustment at 23 °C	10, 35, 80 %RH		
Long-term stability	‹1 %RH/year		
Response time	‹15 s t63 (63 % of a jump 35...80 %RH) without filter		
Scale limits	-999...+9999 units		
Maximum wind velocity	40 m/s with Polyethylene filter		
Temperature measurement			
Sensor	Pt100 Class A		
Measurement range	-50...100 °C / -58...212 °F		
Accuracy at 23°C ±5 K	±0.2 K		
Adjustment points	1		
Long-term stability	‹0.1 °C / year		
Response time	‹15 s t63 (63 % of a jump 35...80 %RH) without filter		
Scale limits	-999...+9999 units		
Analog output			
Number	2		No analog signals
Current	4...20 mA	0(4)...20 mA	
Voltage	N/A	0...1/5/10 V	
Galvanic isolation	N/A	N/A	
Maximum load	2x500 Ω	≤2x500 Ω (current output) ≥1 kΩ/V (voltage output)	
Digital output			
RS-485	No digital outputs		RS-485
USB			USB & RS-485
Ethernet			Ethernet RJ45 & RS-485
Wireless			Wireless & RS-485
Modbus ASCII			Modbus ASCII

HF5 SERIES

Features

- Interchangeable HC2 probes
- Accuracy: see chapter «Probes»
- Ranges at probe: see chapter «Probes»
- Ranges of electronics: -40…60 °C / 0…100 %RH; -10…60 °C with LCD
- Digital outputs, also combinable with analog outputs
- Use as a simulator for system validation *
- Service interface

Power supply

- Low voltage; 2x2 or 3/4-wire
- Low voltage, galvanically isolated; 3/4-wire
- Mains voltage, galvanically isolated; 3/4-wire
- Power over Ethernet (PoE)

Signal outputs

- Current outputs
- Voltage outputs
- RS-485
- USB
- Ethernet / WLAN

Versions

- Duct (type D)
- Wall (type W)
- Cable (type C)

Output parameters

- Humidity & temperature
- Humidity & all psychrometric parameters
- Temperature & all psychrometric parameters

Output scaling

- Relative humidity: range scalable, standard scale 0…100 %RH
- Temperature: range scalable, typical: -40…60 °C
- Psychrometric parameters: range scalable

Display

- Display with backlight (excl. 2-wire), trend indicator and keypad
- Without display

References

* Requires optional HW4 software and service cable

Order codes on request.

HF5 DUCT AND WALL VERSIONS

Applications

Measures relative humidity and temperature and calculates all psychrometric parameters suitable for HVAC, industrial processes and the pharmaceutical industry.

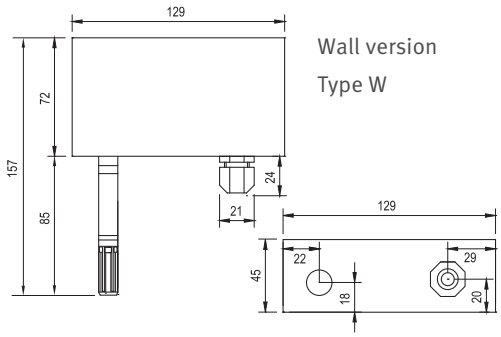
2x2-wire **

	HF520 Type W/D
Output signals	4...20 mA
Supply voltage	10...28 VDC
Display	Optional (without backlight, keypad) Type D only horizontal version possible with display (see photos)

3/4-wire**

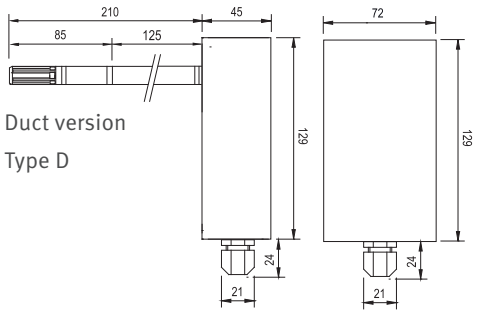
	HF5xx Type W/D	
Output signals	0...1 V 0...5 V 0...10 V 0(4)...20 mA Customer rescaling possible*	RS-485 Ethernet WLAN
Supply voltage	Low voltage: 15...40 VDC / 12...28 VAC Galvanically isolated: 9...36 VDC / 7...24 VAC Power over Ethernet	
Display	Optional (with backlight, keypad) Type D only horizontal version possible with display (see photos)	

Temperature and humidity ranges and all psychrometric parameters	Scalable*
Probes	1 interchangeable HC2 probe input



Wall version

Type W



Duct version

Type D

3/4-wire**
Mains voltage

	HF5xx Type W/D	
Output signals	0...1 V 0...5 V 0...10 V 0(4)...20 mA Customer rescaling possible*	RS-485 Ethernet WLAN
Supply voltage	Mains voltage: 85...240 VAC Power over Ethernet: patch cable Cat. 5	
Version	Type W, type D (only horizontal possible)	
Display	Optional (with backlight, keypad)	
Probes	1 interchangeable HC2 probe input	
Temperature and humidity ranges and all psychrometric parameters	Scalable*	

Compatible products

- All HC2 probes (order separately), page 4
- HW4 software, page 117

Included

- Product qualification
- Short instruction manual
- Screws and plugs for mounting
- Hex key
- Mounting flange (type D)

Typical accessories

• Standard climate probe:	HC2-S
• Probe extension cable 2 m:	E2-02A
• Service cables:	AC3006 / AC3009*
• Mounting kit DIN top-hat rail (type W):	AC5002

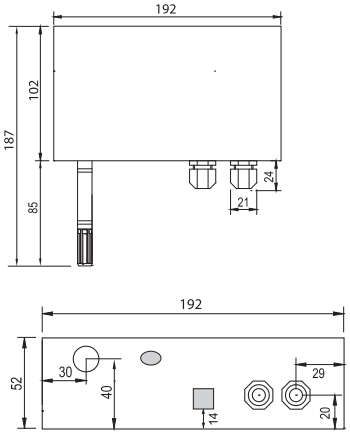
References

* Requires optional HW4 software and service cable

** See Theory page 149

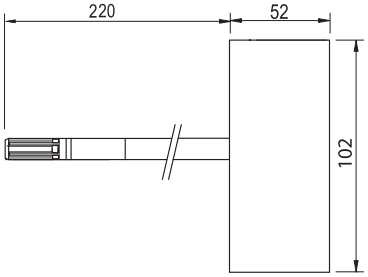
Wall version

Type W



Duct version

Type D



Technical data	HF520 2-wire	HF53/4/x 3/4-wire	HF56x, mains voltage 3/4-wire	HF55x, digital 3/4-wire
General				
Parameters	Humidity and temperature			
Calculated parameters	All psychrometric parameters			
Housing material / Protection	ABS / IP65 (models with USB or Ethernet interface, IP40)			
Dimensions	129 x 72 x 45 mm (type D/W)		192 x 102 x 52 mm (type D/W)	129 x 72 x 45 mm (type D/W)
Weight	220 g		500 g	220 g
Probe material	Probe dependent			
Probe connection / Interface	E2 (threaded coupling) / UART			
Filter material	Probe dependent			
Display	LCD, 1 or 2 decimals, without backlight, menu navigation, 4 keys	LCD, 1 or 2 decimals, with backlight, menu navigation, 4 keys		
Electrical connections	Screw terminals inside M16 cable gland Socket (USB/Ethernet)		2xM16 cable gland	Screw terminals inside M16 cable gland Socket (USB/Ethernet)
Power supply	10...28 VDC	15...40 VDC / 12...28 VDC galv. isolated 9...36 VDC / 7...24 VAC	85...240 VAC	Power over Ethernet (PoE) IEEE 802.3af
Current consumption	2 x 20 mA max.	270 mA max. (without Ethernet) 420 mA max. (with Ethernet)	30 mA max. (without Ethernet) 45 mA max. (with Ethernet)	CLASS 1
Ranges of housing / electronics	-25...60°C / -10...60°C (with LCD), 0...100 %RH	-40...60 °C / -10...60 °C (with LCD), 0...100 %RH		
Ranges at probe	Probe dependent			
Firmware upgrade	Via HW4 software			
Service interface	UART service interface (Universal Asynchronous Receiver Transmitter)			
CE / EMC compatibility	EMC Directive 2004/108/EC			
Fire protection class	Corresponds to UL94-HB			
FDA / GMP conformity	Conforms to 21 CFR Part 11 and GAMP5			
Humidity measurement with HC2-S (probe-dependent)				
Sensor	ROTRONIC Hygromer® IN-1			
Measurement range	0...100 %RH			
Accuracy at 23°C ±5 K	±0.8 %RH			
Adjustment at 23 °C	10, 35, 80 %RH			
Long-term stability	<1 %RH/year			
Response time	<15 s t63 (63 % of a jump 35...80 %RH) without filter			
Scale limits	-999...+9999 units			
Maximum wind velocity	40 m/s with Polyethylene filte			
Temperature measurement with HC2-S (probe-dependent)				
Sensor	Pt100 Class A			
Measurement range	-50...100 °C / -58...212 °F			
Accuracy at 23°C ±5 K	±0.1 K			
Adjustment points	1			
Long-term stability	<0.1 °C / year			
Response time	<15 s t63 (63 % of a jump 35...80 %RH), without filter			
Scale limits	-999...+9999 units			
Analog output				
Number	2			No analog outputs
Current	4...20 mA	0(4)...20 mA		
Voltage	N/A	0...1/5/10 V		
Galvanic isolation	N/A	HF54 and HF56		
Maximum load	2x500 Ω	≤2x500 Ω (current output) ≥1 kΩ/V (voltage output)		
Digital output				
RS-485	No digital outputs	RS-485 & analog		RS-485
USB		USB & RS-485 & analog		USB & RS-485
Ethernet		Ethernet RJ45 & RS-485 & analog		Ethernet RJ45 & RS-485
Wireless		Wireless & RS-485 & analog		Wireless & RS-485

HF7 SERIES

Features

- Accuracy: ±1.0 %RH / ±0.2 K at 23 °C ±5 K
- Ranges at probe: max. -100...200 °C[1]
  0...100 %RH
- Ranges of electronics: -50...100 °C / 0...100 %RH
  -10...60 °C with LCD
- Metal housing (aluminum diecast) and probe otions
  stainless steel or PPS
- Various probe lengths available
- Use as a simulator for system validation *
- Service interface
- Adjusted at 23 °C and 10, 35, 80 %RH

POWER SUPPLY

- Low voltage; 2x2 or 3/4-wire

SIGNAL OUTPUTS

- Current outputs
- Voltage outputs

VERSIONS

- Duct (type D)
- Wall (type W)
- Cable (type C)

OUTPUT PARAMETERS

- Humidity & temperature
- Humidity only or Temperature only
- Humidity & dew point
- Temperature & dew point

OUTPUT SCALING

- Relative humidity: range scalable, standard scale 0...100 %RH
- Temperature: range scalable, typical: -50...100 °C
- Dew/Frost point: range scalable

DISPLAY

- Display with backlight (excl. 2-wire), trend indicator
- Without display

References

* Requires optional HW4 software and service cable

Order codes on request.

[1] Short-term peak load

HF7 DUCT AND WALL VERSIONS

Applications

Measures relative humidity, temperature and dew/frost point in industrial environments and outdoors. For use in harsh conditions.

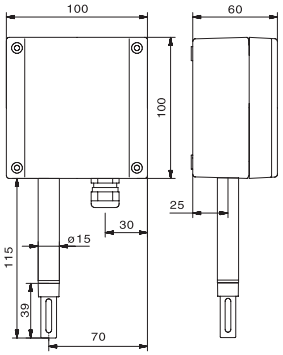
2 or 2x2-wire **

	HF720 Type W/D
Output signals	4...20 mA
Supply voltage	10...28 VDC
Probes	Fixed, PPS (stainless steel probe not possible)
Display	Optional (without backlight)

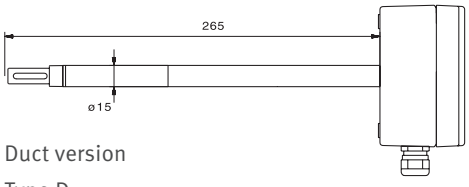
3/4-wire **

	HF73x Type W/D
Output signals	0...1 V 0...5 V 0...10 V 0(4)...20 mA Customer rescaling possible
Supply voltage	15...40 VDC / 12...28 VAC
Probes	Fixed, PPS / stainless steel
Display	Optional (with backlight)

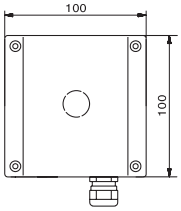
Temperature range	Scalable*
Temperature limit at probe	-50...100 °C (type W) -100...150 °C (type D)
Filter carrier	Slotted sleeve (order filter separately)



Wall version
Type W



Duct version
Type D



HF7 CABLE VERSION

2 or 2x2-wire **

	HF720 Type W/D
Output signals	4...20 mA
Supply voltage	10...28 VDC
Probes	Fixed, PPS with 2 meter cable
Display	Optional (without backlight)

3/4-wire **

	HF73x Type C
Output signals	0...1 V 0...5 V 0...10 V 0(4)...20 mA Customer rescaling possible
Supply voltage	15...40 VDC / 12...28 VAC
Probes	Fixed, PPS with 2 meter cable Fixed, stainless steel with 2 or 5 meter cable
Display	Optional (with backlight)

Temperature range	Scalable*
Temperature limit at probe	-100...200 °C
Filter carrier	Slotted sleeve (order filter separately)

COMPATIBLE PRODUCTS

- HW4 software, page 117

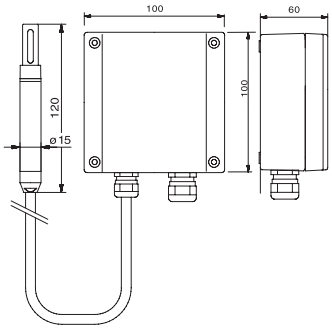
INCLUDED

- Factory adjustment certificate
- Product qualification
- Short instruction manual
- Note: filter must be ordered separately

TYPICAL ACCESSORIES

• Teflon filter:	SP-T15
• Sintered steel filter	SP-S15
• Wire mesh filter:	SP-M15
• Service cables:	AC3006 / AC 3009*

Cable version
Type C



References

* Requires optional HW4 software and service cable

** See Theory page 149

[1] Short-term peak load

Technical data	HF720, analog 2-wire	HF73x, analog 3/4-wire
General		
Parameters	Humidity and temperature	
Calculated parameters	Dew/Frost point	
Housing material / Protection	Aluminum / IP67 (without display)	
Dimensions	215 x 100 x 60 mm (type W), 325 x 100 x 100 (type D), 100 x 100 x 60 (type C)	
Weight	600 g + 140 g per probe extension unit	
Probe material	PPS	PPS or stainless steel
Probe connection	Fixed, possible with 2/5 meter cable (type C)	
Filter carrier	Slotted sleeve	
Filter material	Filter is not supplied with transmitter (must be ordered separately)	
Display	LCD, 1 or 2 decimals, without backlight	LCD, 1 or 2 decimals, with backlight
Electrical connections	Screw terminals inside, M16 cable gland	
Power supply	10...28 VDC	15...40 VDC / 12...28 VAC
Current consumption	2 x 20 mA max.	150 mA max.
Application temp. housing / electronics	-40...85 °C / -10...60 °C (with LCD), 0...100 %RH	
Application temp. probe	-100...100 °C (type W) -100...150 °C (type D) -100...200 °C[1] (type C)	
Firmware upgrade	Via HW4 software	
Service interface	UART service interface (Universal Asynchronous Receiver Transmitter)	
CE / EMC compatibility	EMC Directive 2004/108/EC	
Fire protection class	Non flammable	
FDA / GMP conformity	Conforms to 21 CFR Part 11 and GAMP5	
Humidity measurement		
Sensor	ROTRONIC Hygromer® IN-1	
Measurement range	0...100 %RH	
Accuracy at 23°C ±5 K	±1.0 %RH	
Adjustment at 23 °C	10, 35, 80 %RH	
Long-term stability	‹1 %RH/year	
Response time	‹15 s t63 (63 % of a jump 35...80 %RH) without filter	
Scale limits	-999...+9999 units	
Maximum wind velocity	40 m/s with Polyethylene filte	
Temperature measurement		
Sensor	Pt100 Class A	
Measurement range	Dependent on probe type, see application temperature for probe	
Accuracy at 23°C ±5 K	±0.2 K	
Adjustment points	1	
Long-term stability	‹0.1 °C / year	
Response time	‹15 s t63 (63 % of a jump 35...80 %RH) without filter	
Scale limits	-999...+9999 units	
Analog output		
Number	2	
Current	4...20 mA	0(4)...20 mA
Voltage	N/A	0...1/5/10 V
Galvanic isolation	N/A	N/A
Maximum load	2x500 Ω	≤2x500 Ω (current output) ≥1 kΩ/V (voltage output)

[1] Short-term peak load

HF8 SERIES

Features

- 2 interchangeable HC2 or analog probes
- Accuracy: see chapter «Probes»
- Ranges at probe: see chapter «Probes»
- Ranges of electronics: -40…60 °C / 0…100 %RH -10…60 °C with LCD
- Digital outputs, in combination with with analog outputs
- Analog inputs (U/I)
- Data logging, up to 10,000 measured values
- Relay outputs
- Use as a simulator for system validation *
- Service interface

Power supply

- Low voltage; 3/4-wire
- Low voltage, galvanically isolated; 3/4-wire
- Mains voltage, galvanically isolated; 3/4-wire
- Power over Ethernet (PoE)

Signal outputs

- Current output
- Voltage output
- RS-485
- Ethernet
- Switch output (relays)

Versions

- Wall
- Cable

Output parameters

- Humidity & temperature
- Humidity & all psychrometric parameters
- Temperature & all psychrometric parameters

Output scaling

- Relative humidity: range scalable, standard scale: 0...100 %RH
- Temperature: range scalable, typical: -40…60 °C
- Psychrometric parameters: range scalable

Display

- Display with backlight, trend indicator and keypad
- Without display

References

* Requires optional HW4 software and service cable

Order codes on request.

HF8 WALL VERSION

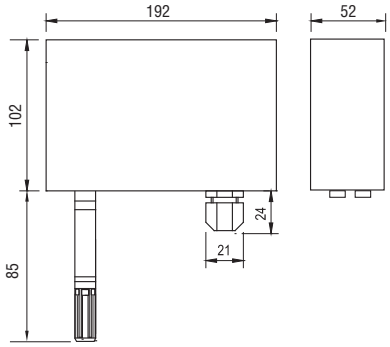
Applications

Measures relative humidity, temperature and all calculated (psychrometric) parameters. Suitable for HVAC, clean rooms, industrial processes, food and pharmaceutical industries.

3/4-wire **

	HF8xx Type W	
Output signals	0...1 V 0...5 V 0...10 V 0(4)...20 mA Customer rescaling possible	RS-485 Ethernet Relays
	Analog and digital combined	
Supply voltage	Low voltage: 15...40 VDC / 12...28 VAC Galvanically isolated: 9...36 VDC / 7...24 VAC Mains voltage: 85...265 VAC Power over Ethernet	
Display	Optional (with backlight, keypad)	
Temperature and humidity ranges and all psychrometric parameters	Scalable*	
Probes	Interchangeable	

Wall version, type W



COMPATIBLE PRODUCTS

- All HC2 probes (please order separately), page 4
- HW4 software, page 117

INCLUDED

- Product qualification
- Short instruction manual
- Screws and plugs for mounting
- Hex key

TYPICAL ACCESSORIES

• Standard climate probe:	HC2-S
• Industrial probe:	HC2-IC102
• Probe extension cable 2 m:	E2-02A
• Service cables:	AC3006 / AC 3009*
• Mounting kit DIN top-hat rail	AC5002

References

* Requires optional HW4 software and service cable

** See Theory pagee 149

Technical data	HF832 Low voltage	HF842 Low voltage, galvanically isolated	HF862 Low voltage, galvanically isolated	HF857 Power over Ethernet
General				
Parameters	Humidity and temperature			
Calculated parameters	All psychrometric parameters			
Housing material / Protection	ABS / IP65 (models with USB or Ethernet interface, IP40)			
Dimensions /Weight	192 x 102 x 52 mm / 550 g			
Probe and filter material	Probe dependent			
Probe connection / Interface	E2 (threaded coupling) / UART			
Display	LCD, 1 or 2 decimals, with backlight, menu navigation, 4 keys			
Electrical connections	Screw terminals inside M16 cable gland Socket (Ethernet)		2xM16 cable gland	Screw terminals inside M16 cable gland Socket (Ethernet)
Power supply	15...40 VDC 14...28 VAC	9...36 VDC 7...24 VAC	85...265VAC	Power over Ethernet (PoE) IEEE 802.3af
Current consumption	380 mA max.		20 mA max. (without Ethernet) 60 mA max. (with Ethernet)	CLASS 1
Ranges of housing / electronics	-40...85 °C (-10...60 °C with display), 0...100 %RH			
Ranges at probe	Probe dependent			
Firmware upgrade	Via HW4 software			
Service interface	UART service interface (Universal Asynchronous Receiver Transmitter)			
CE / EMC compatibility	EMC Directive 2004/108/EC			
Fire protection class	Corresponds to UL94-HB			
FDA / GMP conformity	Conforms to 21 CFR Part 11 and GAMP5			
Humidity measurement with HC2-S (probe-dependent)				
Sensor	ROTRONIC Hygromer® IN-1			
Measurement range	0...100 %RH			
Accuracy at 23°C ±5 K	±0.8 %RH			
Adjustment at 23 °C	10, 35, 80 %RH			
Long-term stability	‹1 %RH/year			
Response time	‹15 s t63 (63 % of a jump 35...80 %RH) without filter			
Scale limits	-999...+9999 units			
Maximum wind velocity	40 m/s with Polyethylene filte			
Temperature measurement with HC2-S (probe-dependent)				
Sensor	Pt100 Class A			
Measurement range	-50...100 °C / -58...212 °F			
Accuracy at 23°C ±5 K	±0.1 K			
Adjustment points	1			
Long-term stability	‹0.1 °C / year			
Response time	‹15 s t63 (63 % of a jump 35...80 %RH) without filter			
Scale limits	-999...+9999 units			
Analog output				
Number	4			No analog outputs
Current	0(4)...20 mA			
Voltage	0...1/5/10 V			
Galvanic isolation	N/A	Yes		
Maximum load	≤4x500 Ω (current output) ≥1 kΩ/V (voltage output)			
Digital output				
RS-485	RS-485 & analog			N/A
Ethernet	Ethernet RJ45 & RS-485 & analog			Ethernet RJ45
Switch output				
Type	Relay (change-over switch, switch, pulse)			No relay
Number	4 (except models with Ethernet 2)			
Switch parameters	Every probe and parameter			
Breaking capacity	250 VAC / 2 A at ohmic load			
Analog input				
Supply	Max. 5V / 10mA			
Pull-up load	1 MΩ / 5 V			
Pull-down load	130 Ω			

TF5 SERIES

Features

- Interchangeable Pt100 probes
- Accuracy: see chapter «Probes»
- Ranges at probe: see chapter «Probes»
- Ranges of electronics: -40...60 °C / 0...100 %rh
  -10...60 °C with LCD
- Temperature measurement with Pt100 4-wire probe, 4-pin Binder connection
- Use as a simulator for system validation*
- Service interface

Power supply

- Low voltage; 2x2 or 3/4-wire

Signal outputs

- Current output
- Voltage output
- RS-485
- Ethernet RJ45

Versions

- Wall (type W)
- Cable (type C)

Output parameters

- Temperature

Output scaling

- Temperature: range scalable, typical -40...60 °C

Display

- Display with backlight
  (excl. 2-wire), trend indicator and keypad
- Without display

TF5 WALL VERSION

Applications

Measures temperature in production processes, dryers and storage areas.

2-wire **

	TF520 Type W
Output signals	4...20 mA
Supply voltage	10...28 VDC
Display	Optional (without backlight)

3/4-wire **

	TF53x Type W
Output signals	0...1 V 0...5 V 0...10 V 0(4)...20 mA Customer rescaling possible
Supply voltage	15...40 VDC / 12...28 VAC
Display	Optional (with backlight)

Temperature range	Scalable*
Probes	Interchangeable

COMPATIBLE PRODUCTS

- Pt100 probes, page 16
- All 4-wire Pt100 probes can be used
- HW4 software, page 117

INCLUDED

- Product qualification
- Short instruction manual
- Screws and plugs for mounting
- Hex key
- Connector for third-party probe

TYPICAL ACCESSORIES

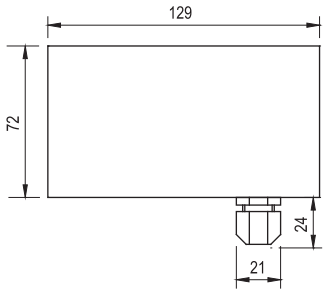
• Service cables:	AC3006 / AC 3009*
• Rod probe 100 x 3 mm:	AC1900
• Cable probe 50x6 mm, waterproof, 2 m cable:	AC1904
• Extension cable 2 m:	AC1607/2
• Extension cable 5 m:	AC1607/5
• Mounting kit DIN top-hat rail	AC5002

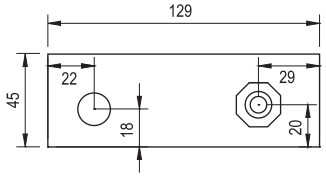
References

* Requires optional HW4 software and service cable

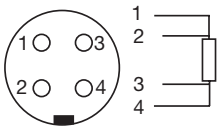
** See Theory page 149

Wall version, type W





Pt100 input



4-wire Pt100

Technical data	TF520 2-wire	TF53x 3/4-wire
General		
Parameters	Temperature	
Housing material / Protection	ABS / IP65 (except models with USB or Ethernet interface)	
Dimensions	129 x 72 x 45 mm	
Weight	220 g	
Probe material	Probe dependent	
Probe connection	4-pin Binder, threaded coupling	
Display	LCD, 1 or 2 decimals without backlight, menu navigation, 4 keys	LCD, 1 or 2 decimals with backlight, menu navigation, 4 keys
Electrical connections	Screw terminals inside, M16 cable gland Socket (USB/Ethernet)	
Power supply	10…28 VDC	15…40 VDC / 12…28 VDC
Current consumption	20 mA	25 mA max.
Ranges of housing / electronics	-40…60 °C / -10…60 °C (with LCD), 0…100 %RH	
Ranges at probe	Probe dependent	
Firmware upgrade	Via HW4 software	
Service interface	UART service interface (Universal Asynchronous Receiver Transmitter)	
CE / EMC compatibility	EMC Directive 2004/108/EC	
Fire protection class	Corresponds to UL94-HB	
FDA / GMP conformity	Conforms to 21 CFR Part 11 and GAMP5	
Temperature measurement with AC1900 (probe dependent)		
Sensor	Pt100 Class A	
Measurement range	-70…500 °C	
Accuracy at 23 °C ±5 K	±0.2 K	
Long-term stability	‹0.1 °C / year	
Response time	See chapter Probes: from page 4	
Scale limits	-999…+9999 units	
Analog output		
Number	1	
Current	4…20 mA	0(4)…20 mA
Voltage	N/A	0…1/5/10 V
Maximum load	500 Ω	≤500 Ω (current output) ≥1 kΩ/V (voltage output)
Digital output		
RS-485	No digital outputs	RS-485
USB		USB & RS-485
Ethernet		Ethernet RJ45 & RS-485

CO_2 TRANSMITTERS

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CO_2 TRANSMITTERS 45

CO_2 AND TEMPERATURE TRANSMITTERS 46

CO_2 TRANSMITTERS
FOR SPECIAL APPLICATIONS 47-48

Fundamentals of CO_2

Carbon dioxide (CO_2) is a colorless and odorless gas that exists in the earth's atmosphere and which is dangerous in high concentrations. The proportion of CO_2 in natural ambient air is about 0.04 % or 400 ppm. When humans and animals exhale this gas, it is quickly mixed with the ambient air, including in rooms that are well ventilated.

A high CO_2 content becomes apparent in humans through rapid fatigue and loss of concentration. The negative effects become noticeable more quickly in small rooms in which there are many people (e.g. conference rooms).

In order to initiate suitable countermeasures such as an increase in the supply of fresh air, it is important in modern climate control systems to measure not only parameters such as relative humidity and temperature, but also the CO_2 content. The concentration of CO_2 is regarded as an important indicator for the quality of room air.

Guidelines

350 - 450 ppm	400 - 1,200 ppm	› 1,000 ppm	5,000 ppm (0.5 %)	38,000 ppm (3.8 %)	› 100,000 ppm (10 %)
Fresh air outdoors	Room air	Fatigue and loss of concentration become apparent.	Maximum permissible value at the workplace during an 8-hour workday	Breathing air (direct exhalation)	Nausea, vomiting, loss of consciousness and death

Measurement technique

The measurement technique is based on the principle of NDIR. Non-dispersive infrared sensors are mainly used as gas sensors, primarily to measure carbon dioxide (CO_2).

Calibration

All probes are pre-calibrated and have a lifetime of more than 15 years in normal applications.
The automatic baseline correction means the sensors require no further calibration if they are used in indoor air applications.

CO_2 TRANSMITTERS

Use in building automation systems to control fans, air dampers, valves, etc. Control is based on CO_2 measurement and supports a healthy room climate.

Applications

Ventilation control in residential rooms, offices, classrooms, cinemas, etc.

Features

• Measurement range:	0…2,000 ppm
• Measurement technique:	Infrared (NDIR) with automatic calibration
• Accuracy:	± 30 ppm
• Power supply:	24 VDC/AC
• Output 1:	0...10 VDC (CO_2)
• Output 2:	4...20 mA (CO_2)
• Range of application:	0…50 °C

Order code	Device type
CF3-W-EU CF3-W-EU-Disp	Installed in the climate zone and fits directly on standard EU surface mounted junction boxes. Dimensions: 100 x 80 x 25 mm
CF3-W-US CF3-W-US-Disp	Installed in the climate zone and fits directly on standard EU surface mounted junction boxes. Dimensions: 130 x 85 x 30 mm
CF3-D CF3-D-Disp	Installed in ventilation pipes and has a duct probe. Dimensions: 142 x 84 x 46 mm
CF3-W-EU-Disp-FLI	Measures the CO_2 concentration in rooms and emits an audible and light-signal alarm (fresh air indicator) when 1400 ppm is exceeded. Fits directly on standard EU surface mounted junction boxes. Dimensions: 100 x 80 x 28 mm
CF3-W-US-Disp-FLI	Measures the CO_2 concentration in rooms and emits an audible and light-signal alarm (fresh air indicator) when 1400 ppm is exceeded. Fits directly on standard US surface mounted junction boxes. Dimensions: 130 x 85 x 30 mm

Included

- Short instruction manual

CF3-W-EU

CF3-W-US-Disp

CF3-W-US-Disp-FLI

CO_2 AND TEMPERATURE TRANSMITTERS

Use in building automation systems to control fans, air dampers, valves, etc. Control is based on CO_2 and temperature measurement, helps to save energy costs and supports a healthy room climate.

CF5-W-Disp

Applications

Ventilation control in residential rooms, offices, classrooms, cinemas, etc.

Features

• Measurement range:	0...2,000 ppm
• Measurement technique:	Infrared (NDIR) with automatic calibration
• Accuracy:	± 30 ppm
• Power supply:	24 VDC/AC
• Output 1:	0/2...10 VDC or 0/4...20 mA (CO_2)
• Output 2:	0/2...10 VDC or 0/4...20 mA (°C)
• Temperature measurement:	0...50 °C
• Range of application:	0...50 °C

CF5-D

Order code	Device type
CF5-W CF5-W-Disp	Installed in the climate zone. Dimensions: 120 x 82 x 30 mm
CF5-D CF5-D-Disp	Installed in ventilation pipes and has a duct probe. Industrial housing with IP65 protection. Dimensions: 142 x 84 x 46 mm, probe: 245 mm

Included

- Short instruction manual
- Factory adjustment certificate

CO_2 SPECIAL APPLICATIONS

Applications

Ventilation control in underground garages, food transport/storage, vehicle depots, tunnels, mines, etc.

Features

• Measurement range:	0...4 %vol (0...40,000 ppm)
• Measurement technique:	Infrared (NDIR) with automatic calibration
• Accuracy:	± 200 ppm
• Power supply:	24 VDC/AC
• Output 1:	0/4...20 mA or 0/2...10 VDC (CO_2)
• Output 2:	0/4...20 mA or 0/2...10 VDC (CO_2)
• Output 3:	Relay 1, open ‹1.4 %, closed ›1.5 % (CO_2)
• Output 4:	Relay 2, open ‹2.9 %, closed ›3.0 % (CO_2)
• Range of application:	0...50 °C

Order code	Device type
CF8-W-Disp-AL	Measures CO_2 in very high concentrations. Integrated relay function. Installed in the climate zone. Dimensions: 142 x 84 x 46 mm

CF8-W-Disp-AL

Applications

Ventilation control in greenhouses and similar environments

Features

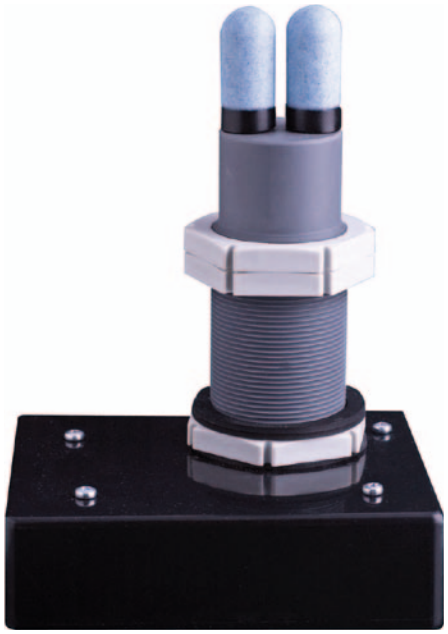
• Measurement range:	0...4 %vol (0...40,000 ppm)
• Measurement technique:	Infrared (NDIR) with automatic calibration
• Accuracy:	± 200 ppm
• Power supply:	24 VDC/AC
• Output 1:	0/4...20 mA or 0/2...10 VDC (CO_2)
• Output 2:	0/4...20 mA or 0/2...10 VDC (°C)
• Output 3:	Relay 1, open ‹1.9 %, closed ›2.0 % (CO_2)
• Temperature measurement:	0...50°C
• Range of application:	0...50 °C

Order code	Device type
CF8-W-Disp-GH	The greenhouse model is equipped with an extra dust and water filter and is suitable for adverse ambient conditions. Measures CO_2 and temperature. Dimensions: 142 x 84 x 46 mm

CF8-W-Disp-GH

Included

- Short instruction manual
- Factory adjustment certificate



CO_2 SPECIAL APPLICATIONS

Applications

Ventilation control in incubators and climate chambers.

Features

• Measurement range:	0...3 %vol (0...30,000 ppm)
• Measurement technique:	Infrared (NDIR) with automatic calibration
• Accuracy:	± 300 ppm
• Power supply:	24 VDC/AC
• Output 1:	0/4...20 mA (CO_2)
• Output 2:	0...5 VDC (CO_2)
• Range of application:	0...50 °C / 0...95 %RH

Order code	Device type
CF8-D/W-Disp-IN	Installed in the climate zone or directly in the ventilation ducts. The output is pre-programmed for transmission via DDC (direct digital control) of climate chambers. IP67 protection.

Included

• Short instruction manual

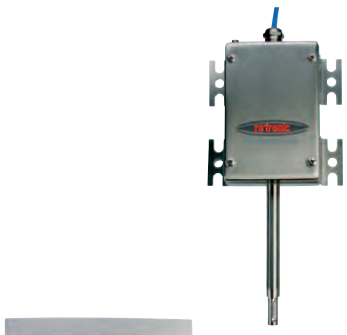
ATEX/FM MEASURING SYSTEM

System overview 50

EX probes 51

Transmitters 52

Specifications 53



System overview

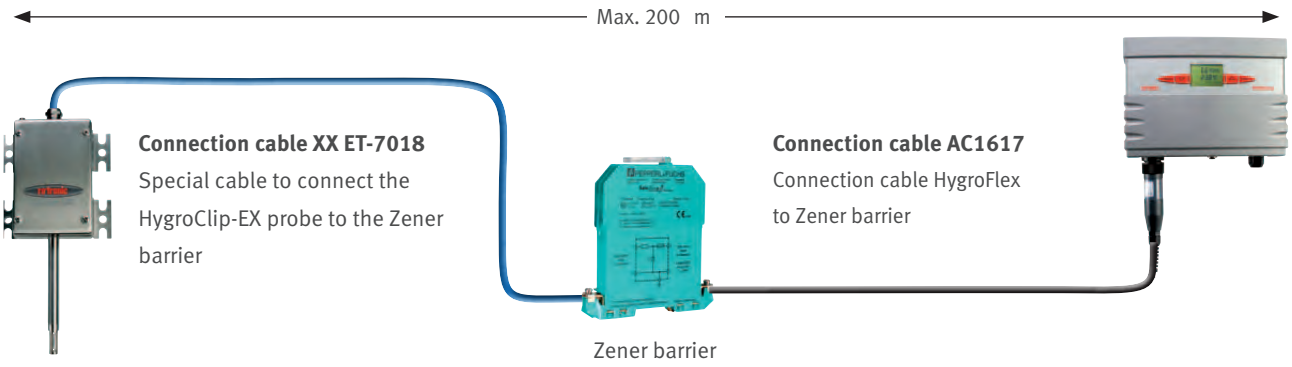
The ROTRONIC ATEX / FM Intrinsically safe probes and transmitters meet your application requirements with flexible configurations and instrument options.

HygroClip-EX probes

- Intrinsically safe probes
- Measure relative humidity & temperature
- Accuracy at 23 °C ±5 K: ±1 %RH / ±0.3 K
- Operating range of electronics: -40...40 °C
- Temperature at probe: -50...200 °C

HTSxx - transmitters

- Transmitters for interchangeable HygroClip-Ex probes
- Display humidity and temperature measurements and a calculated psychrometric value
- Up to 3 analog outputs
- Operating range of electronics: -40...60 °C



Applications

ATEX 2180

Zone 0/20 T5	Zone 1/21 T6	Zone 1/21 T6	Safe zone
Class II, Division1 Group E, F, G		Class I, Division1 Group A, B, C, D	Zener barrier or galvanic isolation
		HygroClip IC-1-EX Ⓔx II 1 G EEx ia IIC T5 resp. II 2 G EEx ia IC T6 Ⓔx II 1/2 D IP6X T 80 °C	
		HygroClip IE-1-EX Ⓔx II 1 G EEx ia IIC T5 resp. II 2 G EEx ia IC T Ⓔx II 1/2 D IP6X T 80 °C	
Only the sinter filter may be used in zone 20/21		HygroClip ID-EX Ⓔx II 1 G EEx ia IIC T5 resp. II 2 G EEx ia IC T Ⓔx II 1/2 D IP6X T 80 °C	
Only the sinter filter may be used in zone 21		HygroClip IW-1-EX Ⓔx II 1 G EEx ia IIC T5 resp. II 2 G EEx ia IC T6 Ⓔx 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 must NOT be calibrated in the EX zone as the accessories are not EX-compliant.

HygroClip - EX probes

Features

- Intrinsically safe probes ATEX & FM approved
- Power supply via HygroFlex transmitter (15 VDC)
- Measures relative humidity & temperature
- Operating range of electronics: -40...40 °C
  Temperature at probe: -50...200 °C; 0...100 %RH
- Accuracy at 23 °C ±5 K: ±1% RH / ±0.3 K
- Housing: Chrome nickel steel, V4A/AISI 316/1.440

Cable probes

Order code	HygroClip IC-1-EX	HygroClip IC-3-EX
Probe length	Ø15 x 120 mm	Ø15 x 270 mm
Cable length	2 m	2 m

Screw-in probes

Order code	HygroClip IE-1/EX	HygroClip IE-3/EX
Thread	½" G	½" NPT
Cable length	2 m	2 m

Wall/Duct probes

Order code	HygroClip IW-EX	HygroClip ID-EX
Type	Wall probe	Duct probe
Probe length	Ø15 x 150 mm	Ø15 x 250 mm

Compatible products

- Transmitters HTS series

Included

- ATEX / FM certificate
- Instruction manual
- Connection diagram
- ATEX / FM certificate

Typical accessories

- Connection cable HygroClip-EX Zener barrier (blue)
  XX ET-7018 (xx = length in meters)
- Connection cable HygroFlex Zener barrier AC1617-ZB/xx
  (For xx = 2, 5,10, in 5 m steps, max 200 m)
- Zener barrier ZB1, use with HygroFlex
- ZB1-420 Zener barrier for a 2-wire system with humidity or temperature only output

HygroClip IC-EX

HygroClip IE/EX

HygroClip IW-EX

HygroClip ID-EX

Transmitters HTS series

Features

- Interchangeable HygroClip-EX probes
- Measures relative humidity & temperature
- All psychrometric calculations available
- Operating range of electronics: -40...60 °C / 0...100 %RH
  -10...60 °C with LCD
- Service interface
- Suitable probes: HYGROCLIP - IC-EX, IE-EX, IW-EX and ID-EX

Power supply

Low voltage: 3 / 4-wire

Mains voltage: 3 / 4-wire

Signal outputs

- Current outputs
- Voltage outputs
- RS-232 or RS-485 interface
- Ethernet

Versions

- ABS housing
- Metal housing

Output parameters

- Humidity & temperature
- Humidity only or temperature only
- Humidity & dew point or other calculated psychrometric value
- Temperature & dew point or other calculated psychrometric value

Output scaling

- Relative humidity: range scalable, standard scaling 0...100 %RH
- Temperature: range scalable, typical: -40...60 °C
- Dew point: range scalable

Display/Keypad

- LCD display with 3 lines, keypad
- Without display

Specification: probe	IC-1-EX	IC-3-EX	IE-1/EX	IE-3/EX	IW-EX	ID-EX
Probe type	Cable probe		Screw-in probe		Wall probe	Duct probe
Dimensions/Thread	Ø15 x 120 mm	Ø15 x 270 mm	½" G	½" NPT	Ø15 x 150 mm	Ø15 x 250 mm
Range of application	Electronics: -40…40 °C; temperature at probe max.: -50…200 °C					
Accuracy	±1 %RH, ±0.2 K, at 23 °C ±5 K					
Power supply	4…20 mA in two-wire circuit, via Zener barrier					
Sensor type	Humidity: ROTRONIC HYGROMER ® IN-1; temperature Pt100 1/3 DIN					
Response time	‹15 s t63 (63 % of a jump 35…80 %RH) without filter					
Housing material / Dimensions	Stainless steel / 150 x 100 x 58 mm					
Protection	IP 66					
Electrical connection	Cable gland / Terminal block					
EC approval	PTB 01 ATEX 2180					
FM approval & marking	3015571 / IS / I, II, III / 1 / ABCDEFG / T6 – 12.0724.0006 IP66					
Weight	1.7 kg	1.9 kg	1.9 kg	1.95 kg	1.3 kg	1.65 kg

Specification: transmitter	HTS1	HTS3
General		
Parameters	Humidity and temperature	
Calculated parameters	–	All psychrometric parameters
Housing material / Protection	ABS (metal housing: optional) / IP65	
Dimensions	207 x 150 x 58 mm	
Weight	310 g	
Probe material	Probe dependent	
Probe connection / Interface	Threaded coupling / DIO	
Filter material	Probe dependent	
Display	LCD, 3 lines	
Electrical connections	Screw terminals inside, M16 cable gland	
Power supply	12…35 VDC, 12…24 VAC or 90…250 VAC, 3.5 VA	
Current consumption	12…35 V DC (140 mA), 12…24 V AC or 90…250 V AC, 3.5 VA	
Operating range of electronics	-40…60 °C / -30…60 °C (with LCD), 0…100 %RH	
Ranges at probe	Probe dependent	
Service interface	RS-232	
CE / EMC compatibility	EMC Directive 2004/108/EC	
FDA / GMP conformity	Conforms to 21 CFR Part 11 and GAMP5	
Scale limits	-999…+9999 units	
Analog output		
Number	2	3
Current	0(4)…20 mA	
Voltage	0…1/5/10 V	
Maximum load	≤ 2x500 Ω (current output) ≥ 1 kΩ / V (voltage output)	
Digital output		
RS-485	N/A	RS-485
RS-232	N/A	RS-232

WIRELESS

Interfaces, LAN, GPRS, USB

The **new wireless measuring instruments** are ideal for a wide variety of humidity and temperature monitoring functions and offer users distinct benefits in practical use: the wireless transmission saves wiring costs and allows easier and faster data transfer from inaccessible points.

Customers may choose from a variety of transmission technologies: LAN interface, GPRS remote transmission technology or USB interfaces.

System overview 56-57

Remote wireless data logger 58-59

Interfaces: LAN, GPRS, USB 60-63

Specifications 64

System overview

USB-radio network

LAN-based radio network

GPRS radio network

Remote wireless data loggers

Wireless data loggers for a wide range of humidity and temperature monitoring tasks. Wireless transmission means you can save on the wiring costs and data can be sent from inaccessible locations. Thanks to the advanced data logging function, the data is not lost in the event of an interruption in wireless tranmission and can be retrieved at any time.

Applications

Phamaceutical and food industries, meteorology, environmental engineering, museums/glass cabinets, monitoring of storerooms, mechanical engineering, chemical industry, research and development

Features

- Interchangeable probes (HC2-S3)
- Radio frequency: 433.92 or 915 MHz for optimum penetration through brickwork and walls
- High storage capacity: up to 500,000 measured values with serial number, time and date
- Flash memory for data security in the case of power failures
- Long-term recording up to 6 years without battery replacement possible
- Transmission distance with USB wireless adapter: up to 100 m
- Data security: PIN (for activation and data access)
- Temperature application range: -40 to + 85 °C
- Plastic housing, white, IP65

Wireless humidity/temperature data loggers

Order code	Device type
LOG-HC2-RC	Standard version 433.92 MHz (HC2 probe must be ordered separately)
LOG-HC2-RC-US	USA version 915 MHz (HC2 probe must be ordered separately)

Wireless temperature data logger (PT1000)

Features

- PT1000 integrated temperature probe or remote with 30 cm cable
- Accuracy: ± 0.1 °C
- Radio frequency: 433.92 or 915 MHz for best penetration through brickwork and walls
- High storage capacity: up to 500,000 measured values with serial number, time and date
- Flash memory for data security in the case of power failures
- Long-term recording up to 6 years without battery replacement possible
- Transmission distance with USB wireless adapter: up to 100 m with internal probe, up to 300 m with external probe (free field)
- Data security: PIN (for activation and data access)
- Temperature application range: -40 to + 85 °C
- Plastic housing, white, IP69 (submersible)

Order code	Device type
LOG-PT1000-RC	Stainless steel sensor tip at housing standard version (433.92 MHz)
LOG-PT1000-RC-US	Stainless steel sensor tip at housing USA version (915 MHz)
LOG-PT1000-ET030-RC	Remote sensor with 30 cm cable standard version (433.92 MHz)
LOG-PT1000-30-RC-US	Remote sensor with 30 cm cable USA version (915 MHz)

Compatible products

- LAN interface
- GPRS logger
- USB wireless adapter

Included

- Short instruction manual
- Battery

LAN INTERFACE

Applications

Using an existing Ethernet infrastructure and the wireless interface, remote data loggers can be accessed from any networked PC. The connection between the PC and the remote wireless logger is made by the LAN Interface.

Features

- Manages up to 100 digital wireless data loggers
- Network connection: RJ-45 connector at a 100 Mbps Ethernet LAN
- Communication: via TCP/IP protocol
- Wireless: SMA connector for of external antenna
- Radio frequencies: 433.92 MHz (915 MHz for USA)
- Configurable via web browser
- Housing material: aluminum
- Power supply via mains power adapter

Order code	Device type
LAN-INTERFACE	433.92 MHz version with standard antenna
LAN-INTERFACE-US	915 MHz USA version with standard antenna

COMPATIBLE PRODUCTS

- Wireless data loggers
- Ground plane antenna

INCLUDED

- Short instruction manual
- Mains power adapter

GPRS LOGGER AND INTERFACE FOR WIRELESS DATA LOGGERS

Applications

The LOG-GPRS is an autonomous data logger with energy saving GPRS remote transmission technology and short-range wireless interface. Designed for efficient management of measured data with worldwide access via the Internet.
Manages up to:

- 12 digital LOG-HC2-RC wireless loggers with HC2 probes
- 24 LOG-PT1000-RC wireless loggers with internal or external Pt1000 probes

Features

- Storage capacity: 2 MB for up to 500,000 measured values
- Stored measured values with serial number, time and date
- Sampling interval: 1 s to 12 h
- Power supply: 1 x 3.6 V type DD lithium battery with 35 Ah
- Range of application: max. -10 °C with type D, max. -55 °C with lithium type DD
- External power supply (optional) 12-14 V, optimized for solar panels
- Direct local data access via radio frequency: 433.92 / 915 MHz
- Probe input for one HC2 probe (UART), directly on housing
- GPRS \ GSM modem and 2 antennas (GPRS and 433.92 / 915 MHz)
- Data management and configuration via Web Access
- Aluminum diecast housing IP67

Order code	Device type
LOG-GPRS-3V	Power supply by battery, standard version (433.92 MHz)
LOG-GPRS-3V-US	Power supply by battery, USA version (915 MHz)
LOG-GPRS-12V	External power supply: 12-14 V, standard version (433.92 MHz)
LOG-GPRS-12V-US	External power supply: 12-14 V, USA version (915 MHz)

COMPATIBLE PRODUCTS

- Wireless data loggers
- Ground plane antenna
- Meteorology climate probes

INCLUDED

- Short instruction manual

USB WIRELESS ADAPTER

Applications

The USB wireless adapter serves as interface to a PC. For programming and downloading of the wireless data logger via HW4 software.

Features

- Radio frequency: 433.92 MHz or 915 MHz
- Interchangeable antenna
- Easy handling

Order code	Device type
LOG-DS-EXT	USB wireless adapter with interchangeable SMA antenna standard version (433.92 MHz)
LOG-DS-EXT-US	USB wireless adapter with interchangeable SMA antenna USA version (915 MHz)

COMPATIBLE PRODUCTS

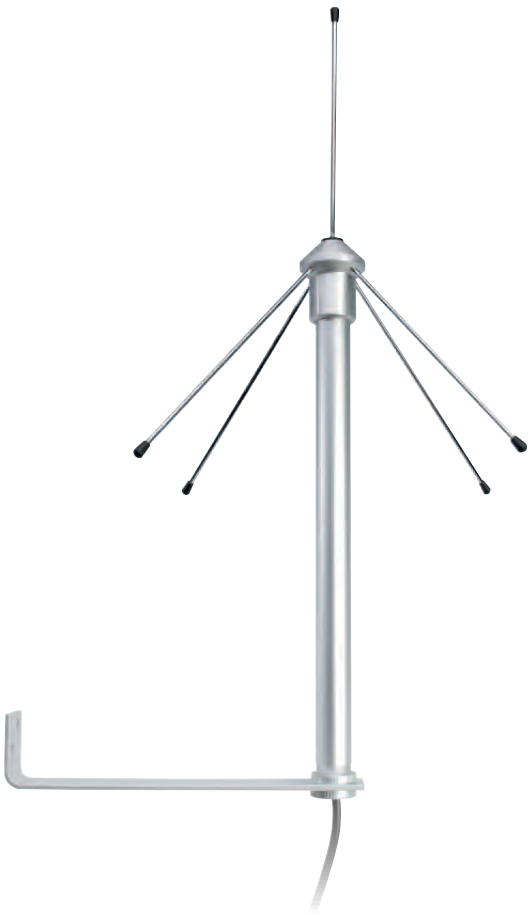
- Wireless data loggers
- Ground plane antenna

INCLUDED

- Short instruction manual

Accessories

433 MHz ground plane antenna



Features

- Industrial antenna for improved reception, higher range
- Suitable for use both indoors and outdoors
- Incl. 2.5 m coaxial cable (50 Ω) and SMA connector
- Dimensions (Ø x H): 190 mm x 460 mm

Order code	Device type
LOG-AN-GP433	433 MHz ground plane antenna, cable length 2.5 m

Compatible products

- LAN interface
- GPRS logger

Included

- Short instruction manual

Technical data	LOG-HC2-RC	LOG-PT1000-RC	LOG-PT1000-ET030-RC
Type	Digital input for HC2 probes (UART)	Pt1000 temperature probe	Pt1000 remote temperature probe with cable
Range of application	-40...+85 °C		
Accuracy	-	±0.1 °C (resolution: 0.01°C)	
Radio frequency	433.92 MHz (US: 915 MHz)		
Storage capacity	Up to 500,000 measured values		
Logging interval	1 min to 12 h		
Power supply	Lithium (Li-SOCl2) battery 2400 mAh		
Battery life	Battery life up to 6 years depending on storage interval		
Transmission distance	Max. 300 m (with standard antenna)		
Data security	4-digit PIN (access code for activation/reading out)		
Calibration / Adjustment	Via HW4 software (with AC3001)		
Dimensions without probe	140 mm x Ø 20 mm		
Software	HW4 V3.1 or later		

Technical data	LAN interface	GPRS logger	USB wireless adapter
Type	100 MBit Ethernet LAN interface with short-range wireless interface	Autonomous data logger with Internet and short-range wireless communication	Local readout device for data logger to PC
Radio frequency	433.92 MHz (US: 915 MHz)		
Probe inputs	-	1 x HC2 probe (UART)	-
Storage capacity	-	Up to 500,000 measured values	-
Sampling cycle	-	5 s to 12 h	-
Power supply	Via mains adapter, 5 V, min. 200 mA	2 x 1.5 V type D battery / 1 x 3.6 V type DD 35 Ah lithium battery or 12-14 V (external, only with LOG-GPRS-12 V	USB power supply via PC
Transmission distance	Up to 100 m (with standard antenna) for short-range wireless communication at 433.92 / 915 MHz		
Dimensions (H x L x W) without antenna	30 mm x 130 mm x 80 mm	58 mm x 80 mm x 173 mm	15 mm x 77 mm x 20 mm
Software	HW4 V3.1 or later	HW4 V3.1 or later	HW4 V3.1 or later

DATA LOGGERS

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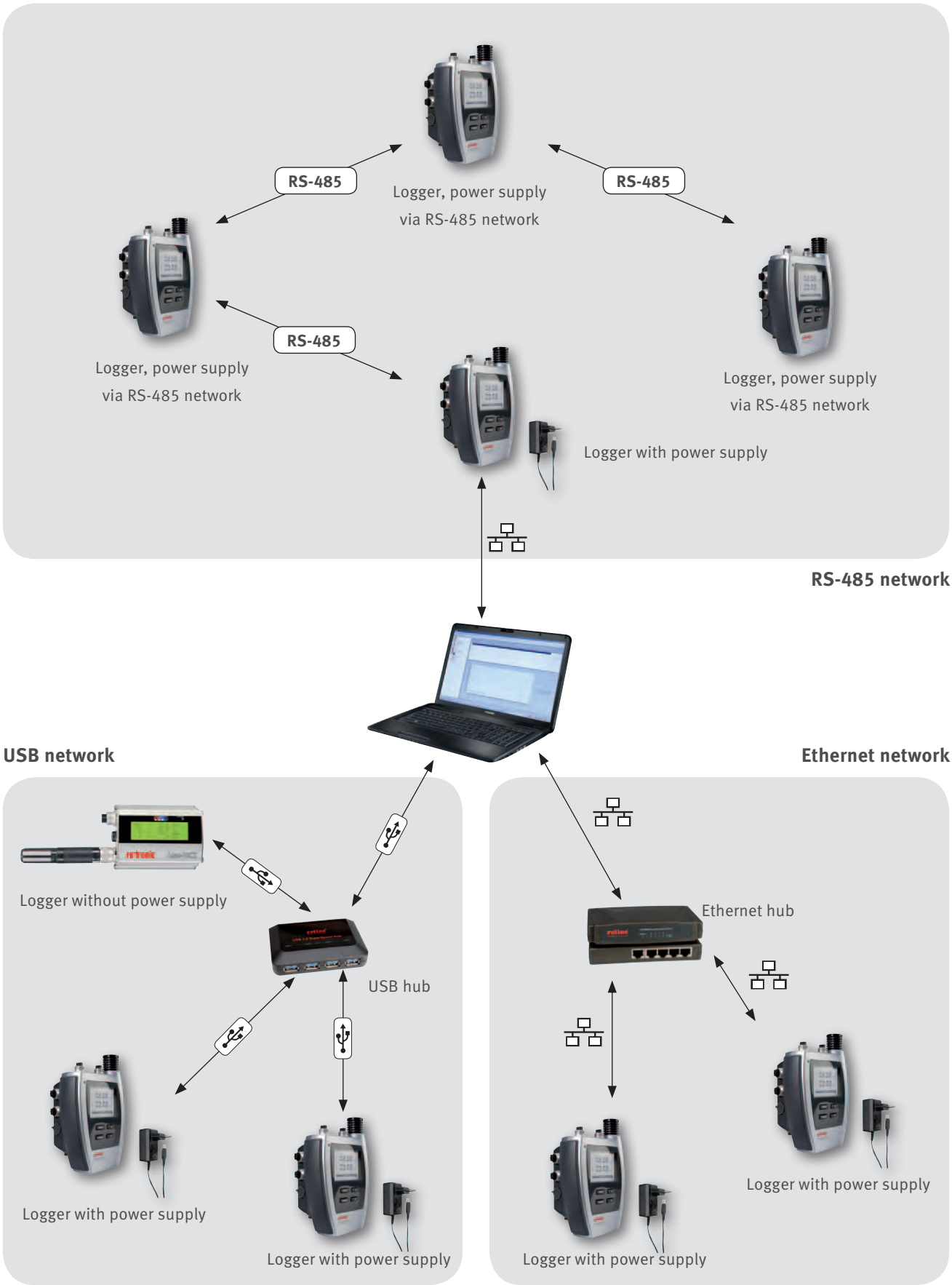
DATA LOGGER SYSTEMS FROM ROTRONIC



HygroLog series – Overview

The long term recording of humidity and temperature conditions is very important in the pharmaceutical industry, production processes, storage, 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 and product quality.

The ROTRONIC data loggers completely fulfill the requirements of 21 CFR Part 11 and GAMP5. They are extremely accurate and easy to use. The data can be read out directly from the integrated flash card (HL-NT logger) or easily with the HW4 software. The data can be saved either in tamper-proof LOG mode or in easily accessible Excel compatible files. The measured values can be monitored and stored securely online on a server or PC. A large range of interchangeable probes enables high flexibility in use and simple maintenance of the system. The HL-NT loggers can be ordered in a variety of configurations.

			
	HL-NT series	**HL20/21**	**LOG-HC2**
Memory capacity	47,000	20,000	2,000,000
Sensor	Probe-dependent	HYGROMER IN-1/ Pt100 Class A	Probe dependent
Range of electronics	-30…70 °C (-10…60 °C, with display)	-10…60 °C	-20…65 °C
Calculated values	All psychrometric parameters	Dew/Frost point	Formula editor
Integrated clock	Yes		
Power supply	9 V battery/rechargeable battery	3 AA batteries	USB / rechargeable battery
Configurable logging interval	Yes		
Programmable alarms	Yes		
Interface	Only with docking station	UART	USB
Conforms to 21 CFR Part 11 and GAMP5	Yes		No
Protection	IP40	IP65	IP60
CE / EMC compatibility: EMC Directive 2004/108/EC	Yes		

HygroLog HL20 humidity and temperature logger

The compact data logger for humidity and temperature measurement offers high precision and reliability at an economical price. The HL20 series is easy to use and suitable for a wide range of applications. Thanks to its integrated batteries, the HL20 provides hours of operation and offers its users maximum flexibility.

Applications

Warehouses, storage facilities, museums, office buildings, shipping, libraries, test facilities.

Features

- Operating range of electronics: -10…60 °C, 0…100 %RH
- 20,000 data point memory
- Freely selectable logging interval, 5 s…1 h
- Integrated clock with time stamp for every measurement
- Adjusted at 10, 35, 80 %RH and 23 °C
- Programmable alarms
- Battery operation
- Interface (UART) for connection to PC

HL20 with display

Order code	HL-20D
Device type	Autonomous data logger with display

HL20 set with display

Order code	HL-20D-SET
Device type	Autonomous data logger with display
Set contents	HL20, HW4 software, data cable AC3006

HL20 without display

Order code	HL-20
Device type	Autonomous data logger, without display

HL20 set without display

Order code	HL-20-SET
Device type	Autonomous data logger, without display
Set contents	HL20, HW4 software, data cable AC3006

Included

- Factory adjustment certificate, short instruction manual, 3 AA batteries
- Screw with plug for wall mounting

Typical accessories

• HW4 software	HW4-E-Vx
• PC data cable	AC3006

HygroLog HL21 temperature logger

The HL21 is an inexpensive, compact temperature logger. The HL21 has a robust design and provides high accuracy measurements.

Applications

Warehouses, storage facilities, museums, office buildings, shipping, libraries, test facilities.

Features

- Operating range of electronics: -10...60 °C, 0...100 %RH
- 20,000 data point memory
- Freely selectable logging interval, 5 s...1 h
- Integrated clock with time stamp for every measurement
- Programmable alarms
- Battery operation
- Interface (UART) for connection to PC

HL21 with display

Order code	HL-21D
Device type	Autonomous data logger with display

HL21 set with display

Order code	HL-21D-SET
Device type	Autonomous data logger with display
Set contents	HL21, HW4 software, data cable AC3006

HL21 without display

Order code	HL-21
Device type	Autonomous data logger, without display

HL21 set without display

Order code	HL-21-SET
Device type	Autonomous data logger, without display
Set contents	HL21, HW4 software, data cable AC3006

Included

- Factory adjustment certificate
- Short instruction manual
- 3 AA batteries
- Screw with plug for wall mounting

Typical accessories

• HW4 software	HW4-E-Vx
• PC data cable	AC3006

Universal logger LOG-HC2-P1/RO1

The rugged and compact data logger measures and records temperature, humidity, air pressure and illuminance simultaneously. A four-line LCD with backlight and rechargeable battery ensures maximum performance combined with high ease of use. For mounting in switch cabinets and industrial environments, the logger can be attached to a DIN top-hat rail.

Applications

Server rooms, production areas, shipping, aviation, residential and office rooms.

Features

- 2,000.000 data point memory
- Operating range of electronics: -20...65 °C, 10...95 %RH
- Logging of measured data:
  - 2 interchangeable HC2 probes for relative humidity and temperature
  - air pressure
  - light
  - 3-axis acceleration / position
- Power supply. rechargeable lithium polymer battery with 2,300 mAh for long-term recording, chargeable via USB cable or mains power adapter
- Built in battery life indicator
- 4-line display with backlight to display the measured data
- LED status indicator (for recording, alarm and charge status)
- PC software for data evaluation and logger configuration
- Typical battery life: 535 days
  - Logging interval: 1 s - 12 h
  - Measured parameters: 2 x humidity and temperature, air pressure, light and axis acceleration
- Not compatible with HW4 software
- Interface (USB)
- Protection: IP60
- Dimensions: 61x77x36 mm

Order code	LOG-HC2-P1
Device type	Universal logger

Included

- Mains power adapter
- USB cable for connection to PC
- Software for PC connection for evaluation of the data and for logger configuration
- Short instruction manual

Typical accessories

• Standard probe	HC2-S
• Industrial probe	HC2-IC102

UNIVERSAL LOGGER with analog connection

The rugged and compact universal logger measures and records up to five different parameters simultaneously. A four-line LCD with backlight and rechargeable battery ensure maximum performance combined with high ease of use. External third-party sensors can be supplied with power from the logger if necessary. For mounting in switch cabinets and industrial environments, the logger can be attached to DIN top-hat rail.

Applications

Server rooms, production areas, shipping, aviation, residential and office rooms.

Features

- 2,000,000 data point memory
- Operating range of electronics: -20...65 °C, 0...95 %RH
- Logging of measured data
  - 2 x interchangeable HC2 probes for relative humidity and temperature
  - air pressure
  - light
  - 3-axis acceleration / position
  - 4 analog inputs (0...3 V/12 Bit)
- Alarm output
- Power supply. rechargeable lithium polymer battery with 2,300 mAh for long-term recording, chargeable via USB cable or mains power adapter
- Calculation of battery life with enclosed software
- 4-line display with backlight to display the measured data
- LED status indicator (for recording, alarm and charge status)
- PC software for data evaluation and logger configuration
- Typical battery life: 535 days
  - Logging interval: 1 s - 12 h
  - Measured parameters: 2 x humidity and temperature, air pressure, light and axis acceleration
- Not compatible with HW4 software
- Interface (USB)
- Protection: IP60

Order code	LOG-HC2-RO1
Device type	Universal logger with 4 additional analog inputs and 3-axis acceleration

INCLUDED

- Mains power adapter
- USB cable for connection to PC
- Software for PC connection for evaluation of the data and for logger configuration
- Short instruction manual

TYPICAL ACCESSORIES

• Standard probe	HC2-S
• Industrial probe	HC2-IC102

HygroLog HL-NT2

The HL-NT2 is the entry level version in the HL-NT data logger series. Additional probes can be connected to the data logger via a docking station.

Applications

Clean rooms, storerooms, server rooms, production areas, residential and office rooms, shipping.

Features

- Saves 47,000 data records per MB card storage capacity (incl. 32 MB card)
- Operating range of electronics: -30…70 °C (-10…60 °C, with display), 0…100 %RH
- Calculation of all psychrometric parameters
- Integrated clock with time stamp for every measured value
- Freely selectable logging interval, 5 s…24 h
- Power supply: 9 V (battery, rechargeable battery or docking station)
- Networkable with PC, via docking station (USB, RS-485, Ethernet, WLAN)
- Audible alarm
- IP40

HygroLog NT2 with interchangeable probe and display

Order code	HL-NT2-DP
Device type	Data logger with 32 MB flash card
Probe type	Interchangeable HC2-S probe, fitted in device

HygroLog NT2 with display, without probe

Order code	HL-NT2-D
Device type	Data logger with 32 MB flash card
Probe type	Without probe, HC2 internal connection

HygroLog NT2 with integrated probe, without display

Order code	HL-NT2-P
Device type	Data logger with 32 MB flash card
Probe type	Interchangeable HC2-S probe, fitted in device

HygroLog NT2 without display, without probe

Order code	HL-NT2
Device type	Data logger with 32 MB flash card
Probe type	Without probe, HC2 internal connection

Included

- Flash card 32 MB, battery
- Short instruction manual
- Extended cap for probe
- Factory adjustment certificate (for models supplied with a probe)

Typical accessories

• PC access set, USB	Hygrodata-HL-E-USB
• USB docking st. with 4 probe inputs	HL-DS-U2

HygroLog HL-NT3

The HL-NT3 has three probe inputs. Additional probes can be connected to the logger using a docking station.

Applications

Clean rooms, storerooms, server rooms, production areas, residential and office rooms, shipping.

Features

- Three probe inputs
- Saves 47,000 data records per MB card storage capacity (incl. 32 MB card)
- Operating range of electronics: -30…70 °C (-10…60 °C, with display), 0…100 %RH
- Calculation of all psychrometric parameters
- Integrated clock with time stamp for every measured value
- Freely selectable logging interval, 5 s…24 h
- Power supply: 9 V (battery, rechargeable battery or docking station)
- Networkable with PC, via docking station (USB, RS-485, Ethernet, WLAN
- Audible alarm
- IP40

HygroLog NT3 with interchangeable probe and display

Order code	HL-NT3-DP
Device type	Data logger with 32 MB flash card, 2 ext. probe inputs
Probe type	Interchangeable HC2-S probe, fitted in device

HygroLog NT3 with display, without probe

Order code	HL-NT3-D
Device type	Data logger with 32 MB flash card, 2 ext. probe inputs
Probe type	Without probe, HC2 internal connection

HygroLog NT3 with integrated probe, without display

Order code	HL-NT3-P
Device type	Data logger with 32 MB flash card, 2 ext. probe inputs
Probe type	Interchangeable HC2-S probe, fitted in device

HygroLog NT3 without display, without probe

Order code	HL-NT3
Device type	Data logger with 32 MB flash card, 2 ext. probe inputs
Probe type	Without probe, HC2 internal connection

Typical accessories

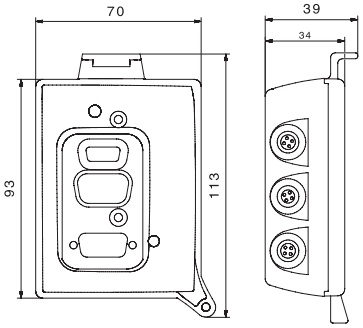
• PC access set, USB	Hygrodata-HL-E-USB
• USB docking st. with 4 probe inputs	HL-DS-U2
• Probe extension cable, 30 cm	E2-F3A

Included

- Flash card 32 MB, battery
- Short instruction manual
- Extended cap for probe
- Factory adjustment certificate (for models supplied with a probe)

HL-DS-U2

HL-DS-U4-WL



Docking stations for HygroLog NT

Depending on the model, the docking stations serve purely as mounting bracket or offer additional functions such as, for example, external power supply, interface module or extension module with digital or analog probe inputs as a well as relay outputs.

Features

- Protection: IP40
- Range of application: -30...70 °C, 0...100 %RH

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	Digital inputs (switch contact)	Pt100 inputs	RS-232 & RS-485	USB & RS-485	Ethernet TCP/IP RJ45 & RS-485	Ethernet TCP/IP RJ45	WLAN & RS-485	WLAN	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-WEB*	✔				2					✔				✔
HL-DS-NT4-WL	✔				2						✔			
HL-DS-PT2	✔				2	4		✔						
HL-DS-PT4	✔				2	2			✔					
HL-DS-PT4-WL	✔				2	2					✔			
HL-DS-R-1	✔				2			✔					2	
HL-DS-U1	✔	4	✔		2		✔							
HL-DS-U2	✔	4	✔		2			✔						
HL-DS-U2-420	✔	4		✔	2			✔						
HL-DS-U4	✔	4	✔		2				✔					
HL-DS-U4-420	✔	4		✔	2				✔					
HL-DS-U4-420-WEB*	✔	4		✔	2					✔				✔
HL-DS-U4-WEB*	✔	4	✔		2					✔				✔
HL-DS-U4-WEB-WL*	✔	2	✔		2							✔		✔
HL-DS-U4-WL	✔	2	✔		2						✔			

* WEB: Access to data logger without HW4 software possible

Included

- Screws for mounting
- Short instruction manual
- Configuration data sheet (LAN / WLAN docking stations)

Typical accessories

• Probe extension cable, 2 m, black	E2-02A
• AC adapter, 85...264 VAC to 15 VDC	AC1211-V1
• Extension cable for HC2 probes with open ends	A-02xx

Order code	Description
AC adapter	
AC1211-V1	AC adapter for HygroLog NT docking stations, 240 VAC › 12 VDC
AC1213B	AC adapter 85-264 VAC / 15 VDC, 100 W, for mounting on DIN rail
Connection sets	
Hygrodata-HL-E	PC connection set, consisting of: HW4-E standard software, docking station HL-DS-NT2 and RS-232 data cable
Hygrodata-HL-P	PC connection set, consisting of: HW4-P professional software, docking station HL-DS-NT2 and RS-232 data cable
Hygrodata-HL-E-USB	PC connection set, consisting of: HW4-E standard software, docking station HL-DS-NT3 and USB data cable
Hygrodata-HL-P-USB	PC connection set, consisting of: HW4-P professional software, docking station HL-DS-NT3 and USB data cable
HW4 software	
HW4-E-Vx	Standard software for programming and data management
HW4-P-Vx	Professional software with networking and additional graphic functions
HW4-OPC-Vx	HW4-P with OPC server functionality
HW4-VAL	HW4-OPC with comprehensive validation documentation
Probe cables	
E2-F3A	Probe extension cable 30 cm, to prevent self-heating of the internal probe in loggers with connected Ethernet or wireless docking stations
E2-01A	Probe extension cable for HC2 probes, 1 m, black
E3-01A	Probe extension cable for HC2 probes, 1 m, white
E2-02A	Probe extension cable for HC2 probes, 2 m, black
E3-02A	Probe extension cable for HC2 probes, 2 m, white
E2-05A	Probe extension cable for HC2 probes, 5 m, black
E3-05A	Probe extension cable for HC2 probes, 5 m, white
E2-02A-S	Probe extension cable for HC2 probes, 2 m, black, with short connector
E3-02A-S	Probe extension cable for HC2 probes, 2 m, white, with short connector
Communication cables	
AC0001	Standard Ethernet patch cable, 3 m, RJ45 connector
AC0002	Standard USB A/B cable, 1.8 m
AC0004	Standard RS-232 cable, 1.8 m
AC0005	Ethernet patch cable, Cat. 5e, unshielded twisted pair, 3 m, crossover
AC1614/02	RS-485 cable to HygroLog NT docking station, for cabling via terminal box
Signal amplifier	
AC3003	Signal amplifier set for cable lengths up to 100 m. The set consists of: - 2 connection cables with electronic amplifier - open cable ends for connection via terminal box
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
Other accessories	
DESK-NT	Desk top stand for HygroLog NT in combination with a docking station
ET-409	4-pin Binder connector, Pt100 probes to a docking station
AC0200	Rechargeable battery 9 V / 170 mA

HANDHELD INSTRUMENTS

The HygroPalm Series

HygroPalm handheld instruments are perfect for climatic measurements. They are precise, feature many practical functions and are extremely easy to use. Every HygroPalm is **adjusted** and **configured** on delivery and can be integrated in the operating process immediately. The instruments can further be adjusted to specific applications via **user-friendly software** or directly with the keypad.

A large range of **interchangeable probes** enables flexible use, easy maintenance and simple calibration. All HP23 transmitters can be used for adjustment of transmitters and for system validation.

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HANDHELD HUMIDITY AND TEMPERATURE MEASURING INSTRUMENTS 78-81

HANDHELD TEMPERATURE MEASURING INSTRUMENTS 82-83

HANDHELD INSTRUMENTS FOR MEASUREMENTS IN STACKS OF PAPER AND CARDBOARD 84-85

HygroPalm21

The HP21 is the ideal instrument for humidity and temperature measurements in simple applications. The integrated HC2 probe guarantees measuring results of the highest accuracy.

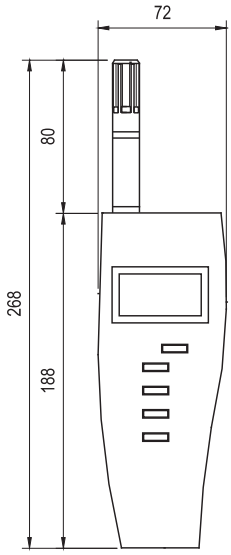
Applications

Portable inspection and random tests in HVAC, the pharmaceutical industry and building management systems.

Features

- Operating range of electronics -10...60 °C / 0...100 %RH
- Accuracy at 23°C ±5 K: ±1%RH, 0.2 K
- Adjusted at 23 °C and 10, 35, 80 %RH
- Service interface (UART)
- Calculation of dew and frost point

Order code	HP21
Device type	Handheld instrument with fixed probe
Probe type	M1-R / Pt100 Class A with polyethylene filter
Response time	‹ 5 s, without filter
Material	ABS (device), polycarbonate (probe)
Power supply	9 V battery
Weight	Approx. 200 g



Included

- Factory adjustment certificate
- Short instruction manual
- Battery

Typical accessories

• Service cable	AC3006
• Polyethylene filter, gray	NSP-PCB-PE40
• Calibration device for HC2-S probes	ER-15
• Desk top stand	DESK-HP
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

HygroPalm22-A

The HygroPalm22-A can be combined with all HC2 probes from ROTRONIC. The HygroPalm22-A measures relative humidity and temperature, can perform all psychrometric calculations and has trend indicators as well as a hold function to freeze the measured values.

Applications

Portable inspection and random tests in HVAC, the pharmaceutical industry, building management and many more.

Features

- Compatible with all ROTRONIC HC2 probes
- Operating range of electronics: -10...60 °C / 0...100 %RH
- All psychrometric calculations
- Adjusted at 23 °C and 10, 35, 80 %RH
- Service interface (UART)
- Accuracy: probe dependent

Order code	HP22-A
Device type	Handheld instrument for interchangeable HC2 probes
Probe type	Compatible with all HC2 probes (order separately)
Material	ABS
Power supply	9 V battery
Weight	Approx. 200 g

Compatible products

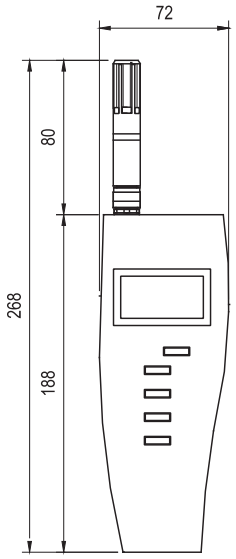
- With all ROTRONIC HC2 probes

Included

- Short instruction manual
- Battery

Typical accessories

• Standard probes	HC2-S
• Service cable	AC3006
• Extension cable, black, 2 m	E2-02A
• Polyethylene filter, gray	NSP-PCB-PE40
• Calibration device for HC2-S probes	ER-15
• Desk top stand	DESK-HP
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS



HygroPalm23-A

The HygroPalm23-A is the high-end product in our range of handheld instruments. In additon to measuring humidity and temperature, it also calculates all psychrometric parameters and provides a variety of additional functions. The HP23-A is a full function data logger and has the capability to record measurements with a simple push of a button. In addition, all ROTRONIC transmitters in the AirChip3000 series can be adjusted with the HP23-A via a service cable.

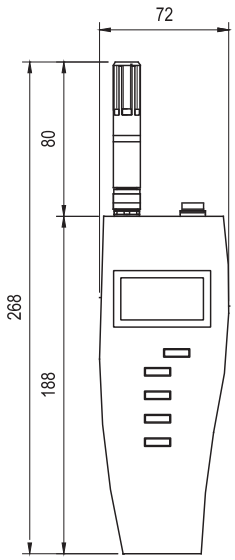
Applications

Portable applications in HVAC, the pharmaceutical industry, building management systems, museums, warehouses, and many more.

Features

- Data recording function up to 10'000 data records (with date, time, batch no.)
- Two probe connections for all ROTRONIC HC2 probes or analog third-party probes
- Adjustment of transmitters HF3, HF4, HF5, HF7, HF8, via service cable
- All psychrometric calculations
- Integrated real time clock
- Battery charging function
- Interface (USB)
- Accuracy: probe dependent

Order code	**HP23-A**
Probe type	Compatible with all HC2 probes (order separately)
Operating range of electronics	-10...60 °C / 0...100 %RH
Material	ABS
Power supply	9 V battery or rechargeable battery
Weight	Approx. 200 g



Compatible products

- All ROTRONIC HC2 probes
- HF3, HF4, HF5, HF7, HF8 for adjustment with service cable (AC2001)
- HW4 software

Included

- Short instruction manual
- Battery

Typical accessories

• Standard probes	HC2-S
• Extension cable 2 m, black	E2-02A
• USB cable for connection to PC	AC0003
• Service cable mini USB / 7-pin connector	AC2001
• Desk top stand	DESK-HP

Handheld instrument sets

ROTRONIC offers instrument sets containing the most important components in our product range. Packed in rugged carry cases, the sets are ideal for mobile use.

Order code	HP22-A-SET
Set contents:	Handheld instrument, HP22-A
	Standard probe, HC2-S
	Extension cable, 2 m, E2-02A
	Calibration device, ER15
	Humidity standard for calibration 50 %RH, EA50-SCS
	Carry case, AC1127

Order code	HP23-A-SET
Set contents:	Handheld instrument, HP23-A
	Standard probe, HC2-S
	Extension cable, 2 m, E2-02A
	Calibration device, ER15
	Humidity standard for calibration 80 %RH, EA80-SCS
	HW4 software, HW4-E-Vx
	Service cable, AC2001
	USB-A to USB-Mini cable, AC0003
	Carry case, AC1127

Compatible products

- With all ROTRONIC HC2 probes
- HF3, HF4, HF5, HF7, HF8 (only HP23-A-SET) for adjustment with service cable (AC2001)
- HW4 software

Included

- Short instruction manual
- Battery

Typical accessories

• Standard probes	HC2-S
• Desk top stand	DESK-HP
• USB cable for connection to PC	AC0003
• Service cable mini USB	AC2001

ThermoPalm TP22

The TP22 is the ideal instrument for temperature measurements. With interchangeable Pt100 4-wire probes, it can be equipped for nearly every application.

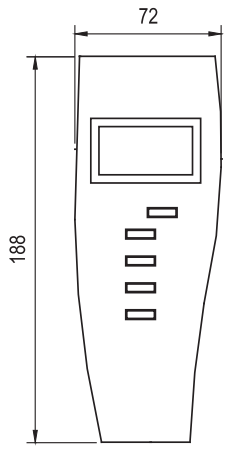
Applications

Portable inspections in HVAC, random tests in the pharmaceutical industry, building management systems, museums, warehouses and many more.

Features

- Interchangeable Pt100 probes
- Operating range of electronics handheld: -10...60 °C / 0...100 %RH
- Measurement range: probe dependent, -100...600 °C
- Service interface (UART)

Order code	TP22
Probe type	Freely selectable from the complete range, 4-wire connection, page 16
Operating range of electronics	-10...60 °C, electronics / up to 600 °C at probe
Housing material	ABS
Power supply	9 V battery
Weight	Approx. 200 g



Compatible products

- All ROTRONIC temperature probes
- All Pt100 probes with 4-wire connection, Binder plug
- HW4 software, page 117

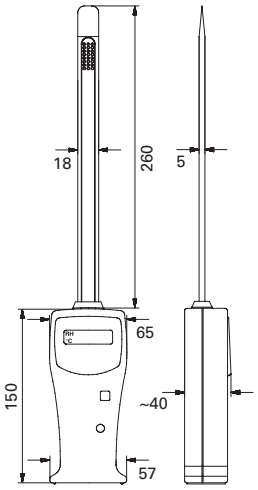
Included

- Short instruction manual
- Battery

Typical accessories

• Temperature probes, page 16	AC19xx
• Extension cable for probe, 2 m	AC1607/2
• Service cable	AC3006

Specifications handheld instruments				
Features	**HP21**	**HP22-A**	**HP23-A**	**TP22**
Probe type	Integrated M1-R sensor	HC2-xx	HC2-xx or analog third-party probe	Pt100 probes
Probe interchangeable	No	Yes	Yes	Yes
Humidity / Temperature sensor	Hygromer® M1-R Pt100 Class A	Probe dependent		
Number of probe inputs	N/A	1	2	1
Measurement range (probe)	-10...60 °C, 0...100 %RH	Probe dependent (chapter Probes, page 4)		-100...600 °C
Accuracy, at 23 °C ±5 K	±1 %RH / ±0.2 K	Probe dependent (chapter Probes, page 4)		±0.1 K
Long-term stability	<1 %RH / year			-
Response time humidity sensor	<15 s	Probe dependent (chapter Probes, page 4)		-
Initialization time	<2 s			
Range of electronics	-10...60 °C / 0...100 %RH			
Display resolution	3 or 4 decimals -> adjustable with HW4 software, page 117			
Backlight display	Yes			
Alarm indicators	Yes			
Battery indicator	«Battery Low» indicator		Battery status indicator	«Battery Low» indicator
Real-time clock with back-up battery	No	No	Yes	No
Functions				
Trend indicators	Yes			
Probe adjustment via software	Single & multi-point %RH & °C, with service cable AC3006		Single & multi-point %RH & °C, with USB cable AC0003	Single & multi-point with service cable AC3006
Adjustment of a HF transmitter possible	No	No	Yes	No
Adjustment per keypad	Single-point %RH & °C	Single & multi-point %RH & °C		Single-point
Probe adjustment with dew point reference	No		Yes	No
Calculations	Dew point / Frost point	All psychrometric calculations possible		-
Data logging	-		16,000 data records in ASCII mode	-
User information	Via service cable & HW4 software			
Password protection	Via service cable & HW4 software			
Sensor diagnostics (drift, status)	Via service cable & HW4 software			No
Electrical specifications				
Power supply	9 V battery or rechargeable battery			
Rechargeable battery charge	No		Yes	No
Current consumption (without backlight)	~5 mA	~6 mA	~10 mA	<10 mA
Supply for third-party probe	No		Yes, battery voltage	No
Communication interfaces	UART, service cable AC3006		Mini USB, service cable AC0003	UART, service cable AC3006
Max. length probe cable	5 m			
Mechanical specifications				
Housing material	ABS (device), polycarbonate (probe)			
Sensor protection	Polyethylene filter	Dependent on probe used		N/A
Dimensions	274 x 72 x 35 mm	196 x 72 x 35 mm (without probe)		196 x 72 x 35 mm
Weight	200 g			180 g
CE / EMC directives	EMC 2004/108/Ec			
FDA/GAMP compatibility	Conforms to 21 CFR Part 11 and GAMP5			
IP protection	IP40			



Measuring instruments for the paper industry

The GTS from ROTRONIC is a proven instrument for measurement of equilibrium relative humidity and temperature in stacks of paper and cardboard.

Applications

Humidity measurements in stacks of paper, cardboard and textiles. Perfect for paper technicians, service engineers and consultants.

Features

- Operating range of electronics: -10...60 °C / 0...100 %RH
- Accuracy at 23 °C ±5 K: 1.5 %RH, 0.3K
- Adjusted at 23 °C and 35, 80 %RH
- Measurement range: 0...50 °C / 5...99.9 %RH

Order code	**GTS**
Device type	Handheld instrument with rigid sword probe for measurements in stacks of paper and textiles
Sensors	HYGROMER® IN-1 / Pt100 Class A
Display	LCD, 3-digit
Response time	‹15 s
Material	ABS (device), aluminum (probe)
Power supply	9 V battery
Dimensions	420 x 70 x 40 mm (device), 260 x 18 x 5 mm (probe)
Weight	Approx. 400 g

Order code	**GTS set**
Set contents:	GTS handheld instrument with rigid sword probe
	Calibration device EGS
	SCS calibration standard EA50-SCS (5 ampoules, 50%RH with SCS certificate)
	Adjustment tool
	Carry case AC1102

Included

- Factory adjustment certificate
- Short instruction manual
- Battery

Typical accessories

• Calibration device for sword probes	EGS
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

Sword hygrometer with folding probe

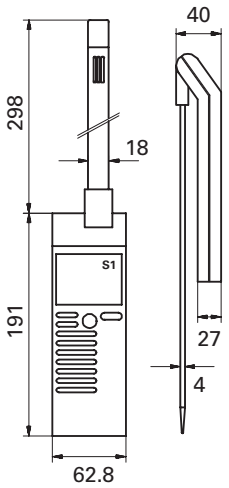
This precision instrument with folding sword is widely used in the paper industry. It measures relative humidity and temperature and shows the results directly on its display.

Applications

Humidity measurements in stacks of paper and cardboard for paper technicians and printers. Also used in the textile industry.

Features

- Folding sword probe
- Operating range of electronics: -10…50 °C / 0…100 %RH
- Measurement range: -25…75 °C / 5…99.9 %RH
- Accuracy at 23 °C ±5 K: 1.5 %RH, 0.3K
- Battery power monitor
- Adjusted at 23 °C, 35 %RH, 80 %RH
- Auto power off



Order code	S1
Device type	Handheld instrument with folding sword probe
Sensor	HYGROMER® IN-1
Display	LCD, 3-digit
Response time	‹15 s
Material	ABS (device), aluminum (probe)
Power supply	9 V battery
Dimensions	191 x 63 x 26 (device), 280 x 18 x 4 (probe)
Weight	Approx. 350 g

Included

- Factory adjustment certificate
- Battery
- Short instruction manual

Typical accessories

• Calibration device	ER-15
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

WATER ACTIVITY

The measurement of water activity or equilibrium relative humidity is a key parameter in the quality control of moisture-sensitive products or materials. Water activity a measure of the water vapor pressure generated by definition the free or non chemically bound water in foods and other products. The bound water and moisture content 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 foodstuffs, grain, seeds, etc. as well as in many products in the pharmaceutical and cosmetic industries. If there is too much free water available, the products spoil, and if there is too little water available, other product properties can be influenced negatively.

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

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

The measurement of water activity also provides useful information on properties such as the cohesion, storage life, agglomeration or pourability of powders, tablet stability, and the 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 standard temperature measurement. The water activity measurement stations measure in a range of 0...1 aW, which equates to 0...100 %RH, and supply a digital output signal, which can be displayed directly on a PC (HC2-AW-USB) or the HygroLab C1 and HP23-AW-A display units. Digital calibration can be performed with these instruments or with HW4 software. The HC2-AW 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 small internal volume of the sensor chamber ensures humidity equilibrium is reached quickly in the case of all products.

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Water activity probes

HC2-AW-USB

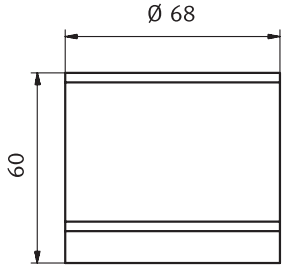
Applications

Water activity measurements on a wide variety of materials. Suitable for both the Food and Pharmaceutical industries.

Features

- Measurement range: 0…1 aW (0…100 %RH), -40…85 °C
- On/Off switch
- USB interface for direct connection to a PC
- Power supply via USB interface
- Adjusted at 23 °C and 10, 35, 80 %RH

Order code	HC2-AW-USB	HC2-AW-USB-SW
Feature	Measurement probe	Meas. probe + software HW4-P-Quick-V3
Connection	Via USB to PC, 3 m cable	
Accuracy at 23 °C ±5 K	±0.008 aW / 0,8 %RH / ±0.1 K	
Power supply	Via USB interface	
Filter type	Wire mesh filter with 20…25 µm pore size	
Weight	550 g	



HC2-AW

Features

- As HC2-AW-USB, but with UART interface for display instruments

Order code	HC2-AW
Feature	Measurement probe
Connection	Via UART, 1 m cable
Accuracy at 23 °C ±5 K	±0.008 aW / 0,8 %RH / ±0.1 K
Power supply	Via display instruments
Filter type	Wire mesh filter with 20…25 µm pore size
Weight	550 g

Compatible products

- HC2-AW-USB: with PC
- HC2-AW: with bench-top instrument HygroLab C1 and handheld instrument HP23-AW-A

Included

- Factory adjustment certificate

Typical accessories

- Sample holders: WP-14S
  WP-40
  WP-40TH
- Calibration device: WP-14-S
- Disposable sample containers: PS-14, PS-40

Insertion probes

5 / 10 mm for measurements in bulk materials

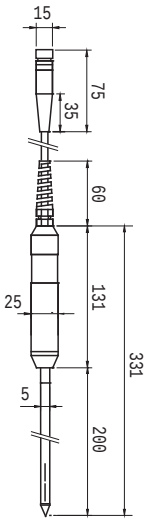
Applications

5 mm insertion probe: direct measurement of water activity in dust-free bulk materials such as tablets, grain, gel capsules and granulated materials.

10 mm insertion probe: measurements in dusty bulk materials such as flour, sugar, etc.

Features

- Range of application: -40...85 °C / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard configuration: 0...1 V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH

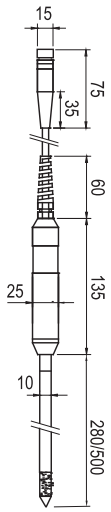


5 mm insertion probe

Order code	HC2-P05
Probe type	Ø 5 x 200 mm, insertion probe with 2 m cable
Accuracy at 23 °C ±5 K	±0.015 aW, ±1.5 %RH, ±0.3 K
Power supply	3.2...5 VDC, calibrated at 3.3 VDC, current: ~4.5 mA
Filter type	No filter available (laser-cut slotted sleeves)
Response time	‹15 s
Material	Stainless steel DIN 1.4305 (probe), POM (handle)
Weight	160 g

10 mm insertion probe

Order code	HC2-HP28	HC2-HP50
Probe length	Ø 10 x 280 mm	Ø 10 x 500 mm
Accuracy at 23 °C ±5 K	±0.008 aW, ±0.8 %RH, ±0.1 K	
Power supply	3.2...5 VDC, calibrated at 3.3 VDC, current: ~4.5 mA	
Filter type	Sintered steel	
Response time	‹20 s, with filter	
Material	Stainless steel DIN 1.4305 (probe), POM (handle)	
Weight	200 g	300 g



Compatible products

- Handheld instrument: HP23-AW-A
- Bench-top display unit: HygroLab C1

Included

- Factory adjustment certificate

Typical accessories

- Replacement filter HC2-HP28 / 50: ET-Z10

Bench-top display unit HygroLab C1

Applications

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

Features

- 4-channel benchtop display unit for measurement of water activity, temperature and relative humidity
- Multichannel display
- Suitable for many applications
- AW Quick function for fast measurement results (typically 4-5 minutes)
- Audible alarm to indicate completed measurement

Order code	**HygroLab C1**
Probe connections	4
Parameters shown	% RH, aW, °C, °F
AW Quick function	Integrated and via HW4 software
Calculations	All psychrometric calculations available
Power supply	9 VDC with AC adapter
Interfaces	Ethernet and USB
Range of application	0...1 aW, 0...100 %RH, -10...60 °C
LCD	3-line alphanumeric with trend indicators
Current consumption	Max. 20 mA
Dimensions /Weight	225 x 170 x 70 mm / 1100 g
Material	Aluminum

Compatible products

• Water activity probe:	HC2-AW
• Insertion probes:	HC2-P05, HC2-HP28 / 50
• HW4 software	

Included

- 9 VDC AC adapter
- Short instruction manual
- Software HW4-P-Quick-V3

Handheld instrument HP23-AW-A

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.

Applications

Water activity measurements in production processes: QC checks of cheese, meat, tobacco, building materials, animal feeds, bakery products, paper, medicines, horticulture, agriculture, pharmaceutical, etc.

Features

- Handheld instrument for measurement of relative humidity and temperature and calculation of water activity
- AW Quick function for fast measurement results (typically 4-5 minutes)
- Audible alarm to indicate completed measurement
- Saves up to 20,000 data records with %RH, °C, date and time
- Battery charging function

Order code	HP23-AW-A
Probe connections	2
Parameters shown	% RH, aW, °C, °F
AW Quick function	Integrated and via HW4 software
Calculations	All psychrometric calculations available
Power supply	9 V battery or USB/ mains adapter via mini USB
Interfaces	USB
Range of application	0...1 aW, 0...100 %RH, -10...60 °C
LCD	3-line alphanumeric with trend indicators
Current consumption	Max. 10 mA
Dimensions / Weight	188 x 72 / 200 g
Material	ABS

Compatible products

- Water activity probe: HC2-AW
- Insertion probes: HC2-P05, HC2-HP28 / 50
- All HC2 probes
- HW4 software

Included

- Short instruction manual
- Battery

Water activity 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 is in the depth (14 and 40 mm respectively) of the sample holders and disposable sample containers.

HP23-AW-A-SET-14

Order code	**HP23-AW-A-Set-14**	
Set contents:	Handheld instrument:	HP23-AW-A
	Measurement probe:	HC2-AW
	Sample holder:	WP-14-S
	Disposable sample container (100 pc.):	PS-14
	Humidity standards 10 %RH:	EA10-SCS
	Humidity standards 35 %RH:	EA35-SCS
	Humidity standards 50 %RH:	EA50-SCS
	Humidity standards 80 %RH:	EA80-SCS
	Carry case:	AC1124

HP23-AW-A-Set-40

Order code	**HP23-AW-A-Set-40**	
Set contents:	Handheld instrument:	HP23-AW-A
	Measurement probe:	HC2-AW
	Sample holder:	WP-40
	Disposable sample container (100 pc.):	PS-40
	Humidity standards 10 %RH:	EA10-SCS
	Humidity standards 35 %RH:	EA35-SCS
	Humidity standards 50 %RH:	EA50-SCS
	Humidity standards 80 %RH:	EA80-SCS
	Carry case:	AC1124

Included

- Short instruction manual
- Battery
- Factory adjustment certificate

Accessories

Sample holders WP-14-S / 40 / 40TH

Applications

The stainless steel sample holders were developed specifically for the two water activity probes HC2-AW(-USB). There are two sizes available:

- WP14-S for small samples and for calibration
- WP40 for larger samples (insert included for small samples)

Both products provide excellent sample containment and optimum temperature stability. The WP-40TH can be attached to a water bath for additional control.

Order code	WP-14-S	WP-40	WP-40TH
Use with	PS14	PS14 / PS40	PS14 / PS40
Height	14 mm	40 mm	40 mm
Material	V2A steel		Brass, nickel-plated
Weight	350 g	1250 g	1550 g

Disposable sample containers PS-14/PS-40

Applications

The disposable sample containers ensure the optimum sample volume is introduced into the WP-14-S or WP-40 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
Use with	WP-14-S / WP-40 / WP-40TH	WP-40 / WP-40TH
Height	14 mm	40 mm
Unit	100 pc.	

Clamp sealing mechanism

Applications

In the case of very dry or very moist samples additional mechanical sealing of the AW measurement probe and sample holder may be necessary to prevent external conditions influencing the sample.

Order code	AW-HKS
Use with	WP-40 / WP40TH
Weight	1100 g

METEOROLOGY

Meteorological

In meteorology the precision of measurement data is critical for accurate weather forecasting and environmental research. ROTRONIC humidity probes have an excellent reputation for providing precise results even in the most demanding environments, especially where high humidity and low temperatures prevail. Our 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 an appropriate weather protection shield, the probe temperature will not be correct, and since relative humidity is temperature dependent, there will be significant measurement errors. Poorly ventilated weather protection shields can result in a micro-climate around the probes causing consequential measurement errors.

Ventilated protection shields are therefore used in applications which require a high level of accuracy. High-accuracy measurements are even more important when it comes to HVAC energy optimization. The more accurate the measurements, the smaller the control errors and the greater the energy savings.

ROTRONIC's meteorology probes installed in combination with ventilated weather and radiation protection shields provide the best possible measurement results. They can offer practically the same performance as that achieved by a dew point mirror meteorological system as used in various national meteorological organizations at a significantly lower price.

MeteoSwiss The actively ventilated weather protection shields were developed in close co-operation with MeteoSwiss and are specified worldwide. Tests conducted together with MeteoSwiss clearly demonstrated the unmatched accuracy obtained by the combination of ROTRONIC probes and ventilated weather protection!

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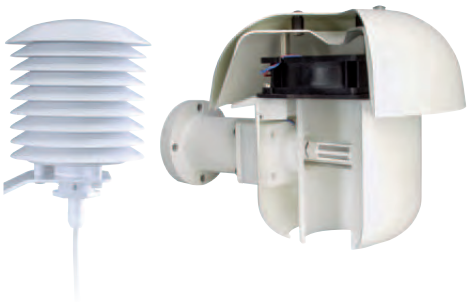
WEATHER AND RADIATION PROTECTION 101-102



MP102H/402H for interchangeable probe HC2-S3

Applications

Weather stations, snow guns, status monitoring of roads, bridges and airports, snow and ice warning systems, research in very remote areas.

Features

- Humidity and temperature measurement using the interchangeable HC2-S3 probe
- Direct PT100 Sensors are available as an option
- Voltage or current output signal
- Freely scalable
- Excellent long-term stability
- Service interface (UART) to PCB
- RS-485 interface
- Connection with cable (3...99 m) with open ends or Tuchel T7 connector

Order code	MP102H	MP402H
Output	Voltage output 0...1/5/10 VDC	Current output 0(4)...20 mA
Range of application	-40...80 °C / 0...100 %RH	
Voltage range	5...24 VDC	15...24 VDC

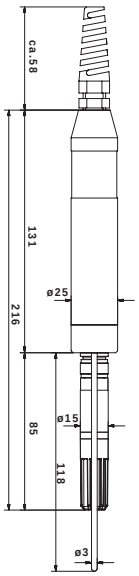
Compatible products

• Meteorology probes:	HC2-S3 and HC2-S3H
• Actively ventilated shield:	RS12T / RS24T
• Naturally ventilated shield:	AC1003

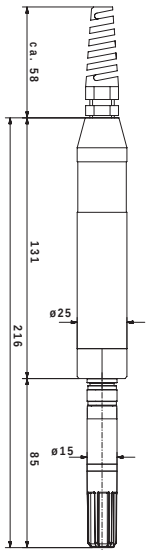
Included

- Short instruction manual

Order codes on request.



With external PT100



Without external PT100

HC2-S3 / HC2-S3H

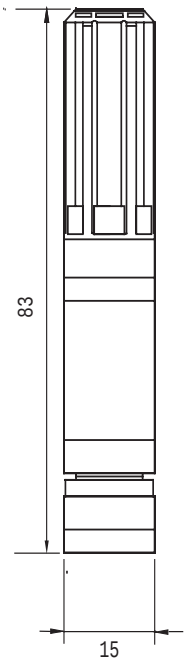
Applications

Meteorology stations, building automation systems, agricultural meteorology.

Features

- Measures relative humidity and temperature, calculates the dew/frost point
- Digital interface (UART) and analog outputs 0...1 V
- Adjusted at 23°C and 10, 35, 80 %RH (HC2-S3)
- Adjusted at 23°C and 10, 20, 30, 40, 50, 60, 70, 80, 90 %RH (HC2-S3H)

Order code	HC2-S3	HC2-S3H
Probe type	Meteorology probe, white	
Range of application	-50...100 °C, 0...100 %RH	
Accuracy at 23 °C ±5 K	±0.8 %RH, ±0.1 K	±0.5 %RH, ±0.1 K
Long-term stability	‹1%RH / year	
Filter type	Polyethylene standard filter, 40 µm, white	
Response time	‹15 s (without filter)	



Compatible products

• Meteorology transmitters:	MP102H/402H
• Actively ventilated shield:	RS12T / RS24T
• Naturally ventilated shield:	AC1000

Included

- Factory adjustment certificate
- Polyethylene filter

Typical accessories

• Polyethylene filter, white (40 µm):	NSP-PCW-PE40
• Connection cable with voltage reg. & 2 m cable, white:	E3-02XX-ACT/01
• Calibration device:	ER-15
• Humidity standard for calibration 10 %RH:	EA10-SCS
• Humidity standard for calibration 35 %RH:	EA35-SCS
• Humidity standard for calibration 80 %RH:	EA80-SCS

MP100A / MP400A

Standard meteorology probes with fixed sensors; analog technology

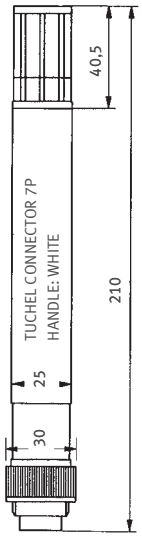
Applications

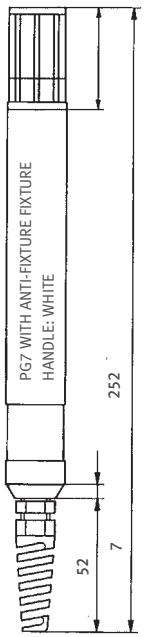
Weather stations, agriculture, ice warning systems, snow making systems.

Features

- Very robust, excellent long-term stability
- Voltage and current outputs for humidity and temperature
- Hygromer® IN-1 sensor / Pt100 Class A
- Cable length compensation up to 100 m
- Connection with Tuchel T4/T7 connector or cable with open ends

Order code	MP100A	MP400A
Output	Voltage output 0...1 VDC	Current output 0(4)...20 mA
Range of application	-40...60 °C / 0...100 %RH	
Accuracy at 23 °C ±5 K	10...95 %RH: ±1.5 %RH, ‹10 and ›95 %RH: ±2.5 %RH	
Resistant to	Thawing and dust particles	
Measurement	Temperature with Pt100 - direct or linear output signal	
Filter	Wire mesh filter ~ 20 µm pore size	





Compatible products

• Actively ventilated shield:	RS12T/24T
• Naturally ventilated shield:	AC1002

Included

- Factory adjustment certificate
- Wire mesh filter
- Instruction manual

Typical accessories

• Calibration device:	EM-25
• Humidity standard for calibration 10 %RH:	EA10-SCS
• Humidity standard for calibration 35 %RH:	EA35-SCS
• Humidity standard for calibration 80 %RH:	EA80-SCS

Order codes on request.

HC2-S3C03 / HC2-S3C03-PT15

The cable probes for agricultural meteorology and outdoor applications equipped with a high-speed sensor and new filter technology that significantly improves protection of the sensor against the formation of bio-film.

Applications

Meteorology, agriculture and OEM.

Features

- Measures relative humidity, temperature and calculates the dew/frost point
- Hygromer® IN-1 sensor / Pt100 Class A
- Service interface (UART)
- Freely scalable analog signals 0...1 V
- Standard configuration 0...1 V = -40...60 °C / 0...100 %RH

Order code	HC2-S3C03	HC2-S3C03-PT15
Adjustment	At 23 °C and 10, 35, 80 %RH	
Accuracy at 23 °C ±5 K	±1 %RH / ±0.2 K	±1 %RH / ±0.1 K (passive Pt100)
Range of application	-50...100 °C / 0...100 %RH	
Filter	Polyethylene, white ~ 40 µm pore size	
Voltage	5...24 VDC / 5...16 VAC	
Design	Cable with open ends	

Compatible products

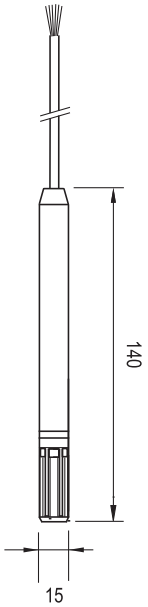
• Naturally ventilated shield:	AC1000

Included

- Factory adjustment certificate
- Filter

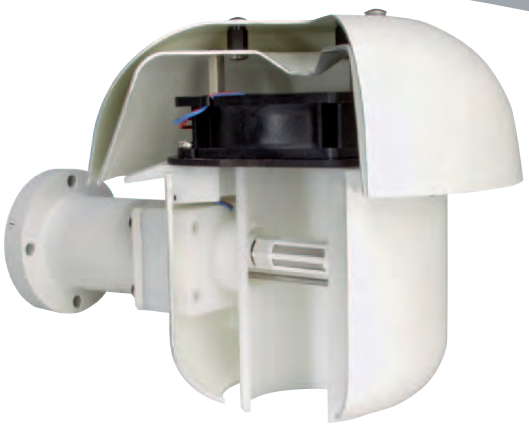
Typical accessories

• Calibration device:	ER-15
• Humidity standard for calibration 10 %RH:	EA10-SCS
• Humidity standard for calibration 35 %RH:	EA35-SCS
• Humidity standard for calibration 80 %RH:	EA80-SCS
• Active UART to USB converter cable, open ends:	AC3001-XX



Specifications	MP102H	MP402H	MP100A (analog)	MP400A (analog)	HC2-S3C03	HC2-S3C03-PT15
General						
Parameters	Humidity and temperature					
Housing material / Protection	Polyoxymethylene / IP65					
Weight	150 g		120 g		80 g	
Supply voltage	5...24 VDC (0...1 V output) 10...24 VDC (0...5 V output) 20...24 VDC (0...10 V output)	15...24 VDC	4.8...30 VDC	10...30 VDC	5...24 VDC / 5...16 VAC	
Current consumption	‹50 mA		4 mA at 4.8 VDC	‹ 50 mA at 10 VDC	‹20 mA	
Operating range of electronics	-40...85 °C				-50...100 °C	
Cable length compensation	Up to 99 m			N/A		
Humidity measurement						
Sensor	ROTRONIC Hygromer® IN-1 (HC2-S3)		ROTRONIC Hygromer® IN-1			
Measurement range	0...100 %RH (HC2-S3)		0...100 %RH			
Accuracy at 23°C ±5 K	±0.8 %RH (HC2-S3)		10...95 %RH: ±1.5 %RH		±1.0 %RH	
Long-term stability	‹1 %RH/year					
Response time	‹15 s t63 (63 % of a jump 35...80 %RH) without filter					
Temperature measurement						
Sensor	Pt100 1/3 Class A (HC2-S3)		Pt100 1/3 Class B			Pt100 1/5 Class B
Measurement range	-50...100 °C (HC2-S3)		-50...100 °C			
Accuracy at 23°C ±5 K	±0.1 K (HC2-S3)		±0.3 K		±0.2 K	±0.1 K
Long-term stability	‹1% RH/year					
Response time	‹15 s t63 (63 % of a jump 35...80 %RH) without filter					
Separate Pt100 (optional)	Pt100 1/3 Class B Pt100 1/5 Class B Pt100 1/10 Class B		N/A			
Analog output						
Current	N/A	0(4)...20 mA	N/A	0(4)...20 mA	N/A	
Voltage	0...1, 0...5, 0...10 VDC	N/A	0...1 V	N/A	0...1 V	
Digital output						
	RS-485 UART		N/A			

Actively ventilated shields



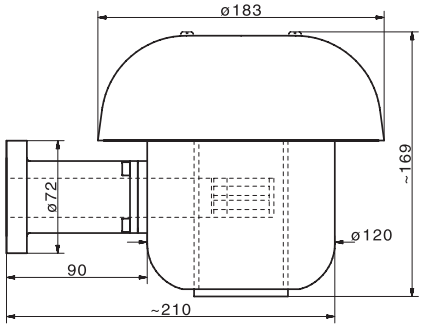
Applications

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

Features

- Easy-to-install protective shield with integrated fan
- Special white coating (RAL 9010) minimizes solar heating
- Simple probe mounting
- Suitable for various probes

Order code	RS12T	RS24T
Range of application	-30...60 °C	
Material	Aluminum, POM, RAL 9010	
Power supply	12 VDC, approx. 2 W	24 VDC
Fan	Papst fan IP54	
Ventilation	3.5 m/s / 900 l/min	
Fan lifetime	At 40°C ~70,000 h (approx. 8 years)	



Compatible products

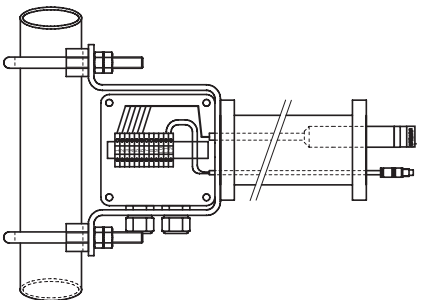
- Mounting set (see below)

Included

- Installation instructions

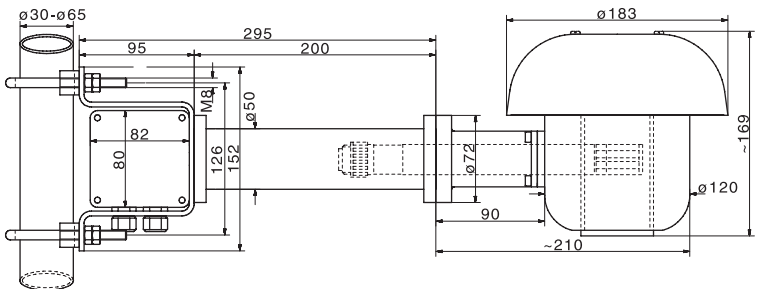
Mounting sets - for RS12/24T

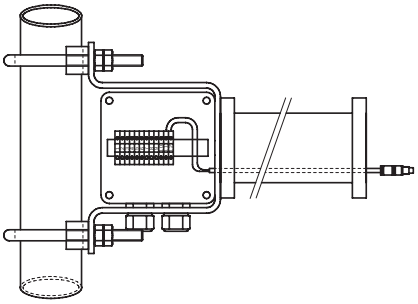
Order code	MKRS-HC2	MKRS-MP102-402
Use with	HC2-S3/S3H	MP102H/402H
Probe connection	E2 connector	Open ends to terminals
Mast diameter	30-65 mm	



MKRS-HC2

Further models available on request





MKRS-MP102-402

Naturally ventilated shields

AC1000 with HC2-S3+E3-02XX

AC1002 with MP100A-T4

AC1003 with MP102H

Naturally ventilated shields are used where the natural ventilation provides sufficient air flow.

Applications

Snow guns, weather stations, building management systems.

Features

- Easy-to-install protective shield
- Multi-plate system for natural ventilation
- Simple probe mounting
- Suitable for various probes (Ø 15 and 25 mm)
- For mast diameters of 25...50 mm
- Protection against wind speeds up to 70 m/s and horizontal precipitation

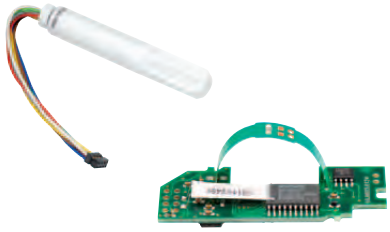
Order code	AC1000	AC1002	AC1003
Use with	HC2-S3/S3H + E3-02A or HC2-S3C03	MP100A/400A	MP102H/402H
Number of plates	9	10	14
Mounting shield	Mounting bracket + clamp for mast mounting (Ø 25...50 mm)		
Mounting probe	Probe screw connection Ø 15 mm	Probe screw connection Ø 25 mm	
Dimensions	Ø 130 x 140 mm	Ø 130 x 160 mm	Ø 130 x 215 mm

Included

- Installation instructions
- Mounting hardware

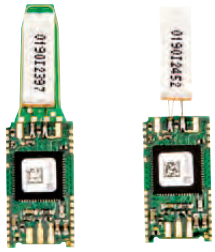
OEM - CONTENTS

Products from the OEM range 104



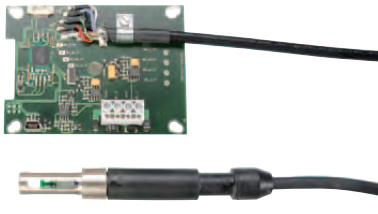
Why not become an OEM customer? 105

Humidity & Temperature module HC2-ROPCB 106



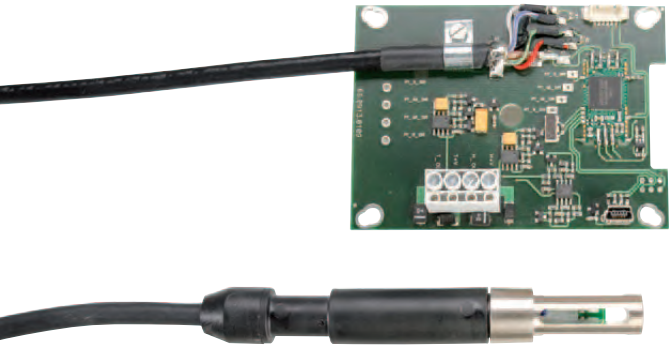
HC2-XD Probe 107

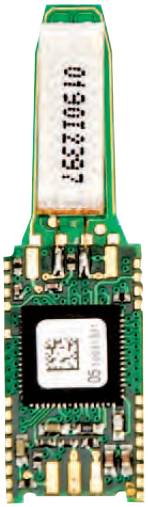
XB Transmitter 108

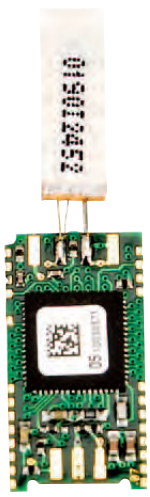


HFM53 Transmitter 109

OEM PRODUCTS FROM THE RANGE







Why not become an OEM customer?

ROTRONIC AG manufactures OEM products for a variety of international customers. Please complete the questionnaire below for your new product and send it to a Rotronic representative. We will gladly advise you and realize your product.

Product name:	Desired name for the product
Application:	Detailed description of the application/installation
Schematic:	Diagram of the application and product with dimensions
Range of application:	Humidity and Temperature application ranges
Quantity:	Quantity required/year
Price:	Target price
Humidity measurement:	
Measurement range:	0…100 %RH
Accuracy:	Select within the range ±0.8…2 %RH at 23 °C
Output signal:	Select from 4...20 mA, 0...1,5,10 VDC, digital
Temperature measurement:	
Measurement range:	Select within the range -100...200 °C
Accuracy:	± 0.3 °K
Output signal:	Select from 4...20 mA, 0...1,5,10 VDC, digital
Transmitter type:	2-wire or 3/4-wire
Supply voltage:	DC and / or AC as required
Mechanical form:	Wall, duct or cable version
Test:	Are specific tests required?
Calibration:	SCS (Swiss Calibration Certificate)
Documentation:	What documents are needed (data sheets, manual, short instruction manual)? In what format?
Packaging:	How is the product to be packed (e.g. cardboard box, blister packaging, etc.)?

Humidity & temperature module HC2-ROPCB

HC2-ROPCB-F

HC2-ROPCB

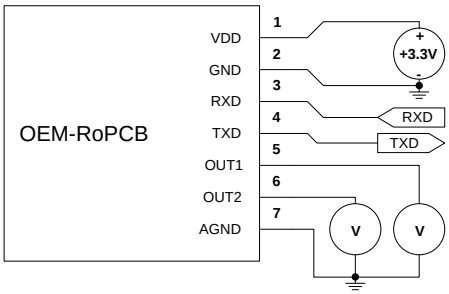
In the HC2-ROPCB humidity & temperature module, we make the heart of our sensor technology available to our OEM customers. Based on AirChip3000 technology, the sensor signal is processed to output a digital UART signal or a 0...1 VDC analog signal.

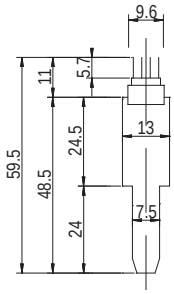
Applications

OEM transmitters.

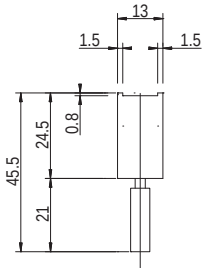
Features

- Adjusted humidity & temperature module
- Accuracy: ± 0.8 %RH / ± 0.1 K at 23 °C
- Low current consumption of 4.5 mA at 3.3 VDC
- Supply voltage*: 3.2...5 VDC, calibrated at 3.3 VDC
- Range of application: -50...100 °C / 0...100 %RH
- Calculates dew/frost point
- Two scalable analog outputs, 0...1 VDC
- Simple wiring
- Standard output scaling: 0...1 V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH
- Power supply: low voltage 3/4-wire
- Version: OEM module with sensor and electronics





HC2-ROCB-F



HC2-ROCB

OEM module with sensor frame

Order code	HC2-ROPCB-F

OEM module without sensor frame

Order code	HC2-ROPCB

Compatible products

- HW4 software
  (for communication the service cable AC3001-xx must be soldered to the module)

Included

- Factory adjustment certificate
- Short instruction manual
- ESD box

* The module is adjusted with a supply voltage of 3.3 VDC.
If a different supply voltage is selected, the module must be readjusted.

XD PROBE

Thanks to its wide power supply range and freely selectable output signals, the XD probe is suitable for a wide variety of applications.

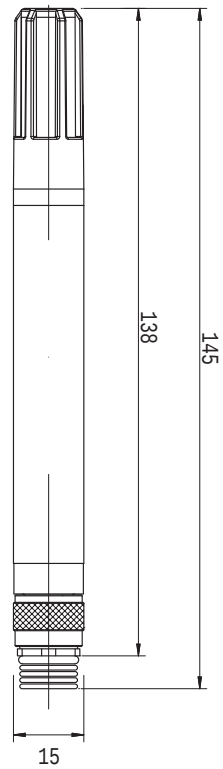
Applications

HVAC, climate chambers, snow guns, meteorology.

Features

- Accuracy at 23 °C ±5 K: ±0.8 %RH, ±0.2 K
- Available in black and white
- Range of application: -40...85 °C / 0...100 %RH
- Digital interface (UART)
- Standard output scaling: 0...1 V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH
- Freely scalable output signals: 0...1/5/10 VDC*

Order code	XD33-S3X	XD33-W3X
Housing color	Black	White
Range of application	-40...85 °C	
Accuracy at 23 °C ±5 K	±0.8 %RH, ±0.2 K	
Power supply	5...24 VDC / 5...16 VAC (depending on output signal)	
Current consumption	‹ 50 mA	
Long-term stability	‹1 %RH / year	
Sensor type	ROTRONIC HYGROMER® IN-1 / Pt100 Class A	
Filter type	Polyethylene standard filter, 20 µm, gray	
Response time	‹15 s, without filter	
Housing material	Polycarbonate	
Weight	20 g	



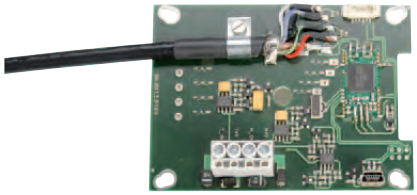
Included

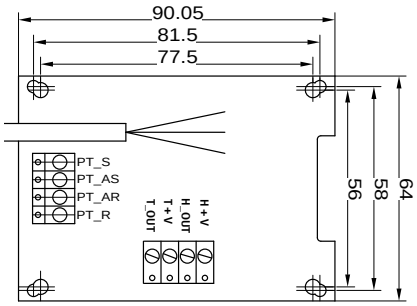
- Factory adjustment certificate
- Polyethylene filter
- Short instruction manual

Typical accessories

• Mounting flange	AC5005
• Polyethylene filter, gray	NSP-PCB-PE40
• Polyethylene filter, white	NSP-PCW-PE40
• Extension cable 2 m, black	E2-02A
• Extension cable 2 m, white	E3-02A
• Calibration device	ER-15
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

* HW4 software to and service cable AC3001-XD are required change the analog signals





PPS probe Ø15mm

PPS probe Ø25/15mm

PPS and stainless steel probes Ø15mm

XB

The XB OEM transmitter consists of a cable probe and PCB with or without a housing. Thanks to its compact size, high accuracy and choice of analog outputs, the transmitter can be adapted to customer requirements and used practically everywhere.

Applications

OEM transmitters in climate chambers, incubators, monitoring of industrial processes, etc.

Features

- Accuracy at 23 °C ±5 K: ±1.0 %RH / ±0.2 K
- Ranges of application:
  depending on probe from 0...100% RH and-100 to 200 °C
- Ranges of electronics: -40...85 °C
- Large choice of probes
- Freely scalable analog outputs
- Simulator mode
- Direct 4-wire Pt100 connection (optionally available)
- Power supply
  - Low voltage 3/4-wire (XB3x)
  - Low voltage 2-wire (XB20)
- Signal outputs
  - Current output
  - Voltage output
- Version
  - Printed circuit board with cable probe
- Probes
  - PPS and stainless steel probes
  - Probe diameter: 15 mm or 25/15 mm
  - Probe length to 700 mm
  - Cable lengths 2 and 5 m
- Output parameters
  - Humidity & temperature
  - Dew/Frost point & temperature or humidity

Compatible products

- HW4 software, page 117

Included

- Factory adjustment certificate
- Short instruction manual

Typical accessories

• Service cables:	AC3006 / AC3009

[1] Short-term peak load

HFM53 TRANSMITTER

The robust housing and remote interchangeable probe connection of the HFM53 transmitter make this transmitter ideal for outdoor use.

Applications

Outdoor, meteorology, monitoring of industrial processes, etc.

Features

- Interchangeable HC2 probes
- Accuracy: probe dependent
- Ranges of probes: probe-dependent
- Robust housing
- Cable-mount remote probe connection
- Ranges of electronics: -40...60 °C / 0...100 %RH
- Analog outputs
- Use as a simulator for system validation*
- Service interface (UART)
- Power supply: low voltage 3/4-wire;
  15...40 VDC / 12...28 VAC
- Signal outputs
  - Current output
  - Voltage output
- Cable version
- Output parameters
  - Humidity & temperature
  - Humidity & all psychrometric parameters
  - Temperature & all psychrometric parameters
- Output scaling
  - Relative humidity: range scalable, standard configuration 0...100 %RH
  - Temperature: range scalable, typical: -40...60 °C
  - Psychrometric parameters: range scalable

COMPATIBLE PRODUCTS

- All HC2 probes (order separately), page 4
- HW4 software, page 117

INCLUDED

- Factory adjustment certificate
- Product qualification
- Short instruction manual

TYPICAL ACCESSORIES

• Standard climate probe (meteorology):	HC2-S3
• Service cables:	AC3006 / AC3009

Order codes on request.

CALIBRATION

Although ROTRONIC probes have excellent long-term stability, we still recommend that their calibration is checked regularly. One calibration per year is normally sufficient. Some of our customers, however, 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 procedures.

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

Why is calibration essential?

Many companies 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, EMEA, Swissmedic, etc. also demand that measuring instruments are calibrated with traceability to national standards. Internal company quality standards may also specify that a specific measurement accuracy must be achieved and that this must be verifiable at all times. It is therefore in the interest of every user to have equipment calibrated and adjusted (if necessary) regularly in order to obtain the best-possible performance. We offer calibration devices for all our probes. We can even supply you with suitable devices for the calibration of probes from other manufacturers.

What are the calibration options?

1 You can calibrate your probes yourself: using a HygroGen humidity and temperature generator or with a calibration device and SCS-certified humidity standards (see the following pages)
2 Calibration at ROTRONIC:
(See chapter "Services", page 140)
3 We come to you with our Calibration Mobile:
(see chapter "Services", page 145)

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HygroGen2 112-113

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Humidity standards 115

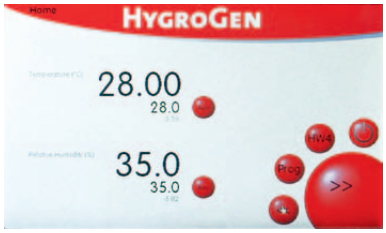
Calibration devices 116

HygroGen2

Portable humidity and temperature generator to calibrate measuring instruments (multi-point calibration).

Applications

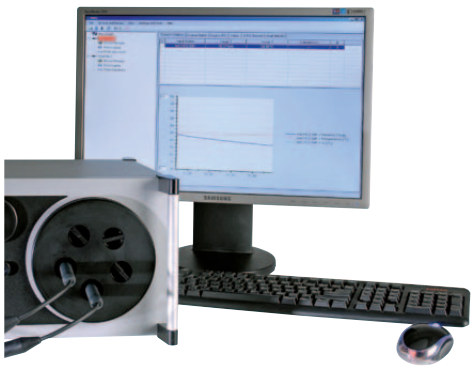
The new HygroGen2 is an autonomous, portable generator for the calibration of humidity and temperature measuring instruments. The generator sets a new standard for portable calibration. The HygroGen2 works like a "mobile calibration laboratory" and is intended for companies that regularly need to calibrate a large number of probes. The calibrator allows fast, flexible calibration with the significant advantage that the calibrated instruments can be quickly returned to service. The HygroGen offers numerous time and cost saving benefits particularly to the pharmaceutical industry.



Touchscreen monitor

Features

- Generates a stable reference environment
  Control Range: 0...60 °C
- Reaches equilibrium humidity in typically 3 minutes
- Suitable for all humidity and temperature probes
- Calibrates up to 5 probes simultaneously
- Easy-to-use touchscreen monitor
- DVI interface for external monitor
- USB interface for connection of keyboard, mouse and ROTRONIC HC2 probes
- The integrated HW4 software ensures easy calibration and adjustment of all ROTRONIC HC2 probes.
- External heated connections for a dew point mirror reference are standard. This allows the user to adjust the reference probes with extremely high precision or to reduce the total calibration uncertainty.
- The water quality is kept at a high level by a UV sterilizer, meaning algae and bacteria cannot form.



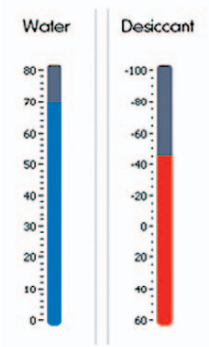
HygroGen2 chamber door with up to 5 probe ports. External monitor with HW4 software.

Included

- Instruction manual
- SCS certificate for reference probe

Typical accessories

- See HygroGen2 accessories



HygroGen2 specifications	Relative humidity	Temperature
Control		
Probe	HC2-SG, capacitive RH sensor, temperature sensor Pt100 Class A	
Controller	Integrated PC	
Ranges	5…95 %RH	0…60 °C
Stability	‹0.1 %RH	‹0.01 °C
Temperature homogeneity	‹0.05 °C (15…50 °C), ‹0.1 °C (5…60 °C), ±0.15 at 0 °C	
Generation method	Mixing of the air flows Drying: desiccant cartridge Humidity: piezo humidifier	Peltier element with radial chamber ventilation
Performance		
Response time	3 min. (35 to 80 %RH)	5 min. (20 to 30 °C)
Probe specifications	±0.8 %RH (23 ±5 °C) ±2 %RH (0…60°C)	±0.1 K (23 ±5 °C) ±0.3 K (0…60 °C)
Typical calibration uncertainty	±1.5 %RH at 23 °C	±0.15 °C, 15…50 °C
System functions		
Water level	Low and high alarm, graphical display of the current level	
Water quality	UV-sterilized water in reservoir	
Desiccant status	Condition monitored during operation	
USB connections	7 on front panel, 2 on rear panel	
Connections	Inlet and outlet - temperature-controlled, 6 mm	
Program functions	20 user programs can be saved, up to 200 set-points per program can be changed	
Mechanical & electrical		
Total chamber volume	2 liters, effective work volume 1.5 l	
Power supply	110…240 VAC 50/60 Hz, 3 A	
Housing / Dimensions	Powder coated aluminum / 450 x 406 x 205 mm	
Weight	13 kg	
CE / EMC compatibility	EMC Directive 2004/108/EC	

Order code	Description
HG2-S	Comprises: - HygroGen with touchscreen interface - Set-point input with controller and programming functions - 1x desiccant cartridge - 1x water fill syringe with tube - Integrated software HW4-P - Reference probe HG2-SG Chamber door must be ordered separately

HG2-D-88888 door with plugs and probe sleeves

Door cross section

HygroGen bag (soft)

HC2-SG

HygroGen2 accessories	
Consumables	
HG2-DC	Additional desiccant cartridge, filled
HG2-FILL	Water fill syringe with tube
Chamber doors, plugs and probe sleeves	
HG2-D-11111	HG2 door with 5 x 15 mm Ø inputs including plugs (use special B1 sleeves for smaller diameters)
HG2-B1-xx	Special B1 probe sleeve, outside Ø 15 mm, inside Ø xx mm
HG2-D-88888	HG2 door with 5 x 30 mm Ø inputs including plugs (use special B8 sleeves for smaller diameters)
HG2-B8-xx	Special B8 probe sleeve, outside Ø 30 mm, inside Ø xx mm
HG2-DP-00000	HG2 Acrylic door, transparent (without probe inputs) for instruments with display
HG2-D-xxxxx	Customer-specific HG2 chamber door for >30 mm
HG2-B-xx	Customer-specific plug
Accessories	
HG2-TB	HygroGen bag (soft)
AC3015	Mini USB cable, adapter cable 30 cm long with 90° connector for transmitters with fixed probe
HG2-AC3001-L/050	HC2 converter cable for HG2-S, with USB connector, 50 cm, USB
HG2-AC3001-L/050(5)	HC2 converter cable for HG2-S, with USB connector, 50 cm, USB (set of 5x HG2-AC3001-L/050)
Certified probes (replacement)	
HC2-SG	Control or reference probe for HG2 with SCS certificate (Swiss Calibration Service) SCS-3T-4H (calibrated at: temperature 23/5/50 °C, humidity 10/35/65/95 %RH)

Humidity standards

Applications

On-site calibration and adjustment of ROTRONIC probes (third-party probes also possible). With the humidity standards, a calibration device and HW4 software, running on a PC this is easily achieved. It is also possible to calibrate and adjust probes with the handheld instrument HP23-A.

Features

- Ampoules contain unsaturated salt solutions (except 0.5%RH vale)
- Inexpensive on-site calibration method
- Simple and safe use
- Unlimited storage life
- Practical packs of 5 ampoules of the same humidity value (approx. 0.8 ml per ampoule)

Order code	Humidity value	Uncertainty at 23 °C
EA00-SCS	0.5 %RH	±0.3 %RH
EA05-SCS	5 %RH	
EA10-SCS	10 %RH	
EA11-SCS	11 %RH	
EA20-SCS	20 %RH	
EA35-SCS	35 %RH	±0.5 %RH
EA50-SCS	50 %RG	±0.9 %RH
EA60-SCS	60 %RH	
EA65-SCS	65 %RH	
EA75-SCS	75 %RH	
EA80-SCS	80 %RH	±1.2 %RH
EA95-SCS	95 %RH	

Compatible products

- With all calibration devices (see next page)

Included

- SCS traceable calibration certificate
- Textile pads
- Calibration instructions

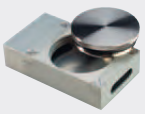
Typical accessories

• Textile pads in tubes (50 pc.)	EA-PADS

Calibration devices

Applications

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 on to an absorbent textile pad. The specified humidity is generated in the calibration device after the stabilization period, this takes longer for high humidity values. The probe can then be calibrated or adjusted by comparison to the traceable value of the humidity standard.

Order code	Use		Order code	Use	
Push-on calibration devices. Gasket with O-ring and thumb screw					
ER-15	For 1 probe Ø 14...15 mm Brass, nickel-plated		ERV-15	For 1 probe Ø 14...15 mm Vertical calibration position Brass, nickel-plated	
EDM 15/15	For 2 probes Ø 14...15 mm Brass, nickel-plated		ER-05	For 1 probe Ø 4...5 mm Brass, nickel-plated	
ER-20K	For 1 probe Ø 20 mm Brass, nickel-plated		ER-12K	For 1 probe Ø 12 mm Brass, nickel-plated	
Screw-on calibration devices. Gasket with seal face on probe. Cannot be used for HC2-S probes					
EM-25	For 1 probe Ø 25 mm (PG11) Brass, nickel-plated		EMV-25	For 1 probe Ø 25 mm (PG11) Vertical calibration position Aluminum, anodized	
EM-G	For probe types E, HP... IE... Screw-on probes (½" G / ½"NPT)				
Calibration devices for specialized probes					
EGS	For all sword probes Aluminum, anodized		WP14-S	For water activity probes: HC2-AW, HC2-AW-USB, AW-DIO	
Elx-25	For flush mount probes Ø 25 mm Brass, nickel-plated				

SOFTWARE-CONTENTS

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OVERVIEW OF FUNCTIONS 119-120

DESCRIPTION OF FUNCTIONS 120-122

Key features

- Instrument monitoring
- Recording of measured values on a PC
- Alarm functions
- Tabular and graphical display of measured values
- Graphic and statistical analysis evaluation recorded measured data
- Room layout
- Instrument configuration
- Programming of and data retrieval from data loggers
- Calibration and probe adjustment
- Psychrometric calculations
- Password protection and assignable user rights

Software versions

HW4 Standard

Single-user applications

Visualization of multiple loggers and measured values

Monitoring (1 instrument at a time), data logger programming, data retrieval, probe and transmitter scaling, instrument settings, alarm function, service and configuration tool for ROTRONIC instruments, time synchronization, adjustment and calibration of ROTRONIC probes

No password protection

Order code: HW4-E-Vx

HW4 Professional

Network applications in the pharmaceutical , food and many other industries

All functions of the Standard edition

Fulfils the requirements for electronic data records and signatures (FDA21 CFR Part 11, Annex 11)

Grouping of devices, graph overlays, printing of reports

Order code: HW4-P-Vx

HW4 Professional with water activity measurement

All functions of the Professional edition

AW Quick function for faste determination of water activity. Equilibrium and standard methods also available.

Order code: HW4-P-QUICK-Vx

HW4 Professional with OPC server

Network applications with integration into the customer's own software

All functions of the Professional edition

Contains an OPC server with which the data can be integrated into the customer's software

Order code: HW4-P-OPC-Vx

HW4 Validated Software

For users subject to regulatory requirements (GxP)

As HW4 OPC

Includes HW4 e-compliance package. This comprehensive documentation package supports the user in the qualification/validation of HW4-based solutions

Order code: HW4-VAL-Vx

HW4 Trial version

Full functionality of the Professional edition, including OPC functions

Limited trial period of 30 days

Download at **www.rotronic.com**

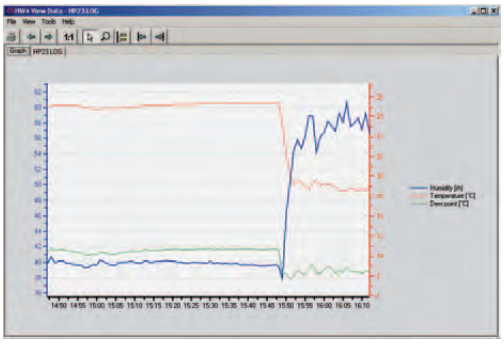
Qualification / Computerized system validation

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

Function overview					
All versions of HW4 support the HygroLog HL-NT series, HL20 and 21, HygroFlex HF3-HF8, HygroLab (C1), HygroPalm HP21 to HP23-A and future instruments. You can find a compatibility list on the internet at www.rotronic.com	Standard	Professional	Professional with water activity	Professional with OPC server	HW4-VAL
HW4 Product key	**24 xxx**	**64 xxx**	**86 xxx**	**88 xxx**	**12 xxx**
Viewing measured values/Monitoring					
Display of measured values on a monitor for multiple instruments	✔	✔	✔	✔	✔
Monitor display of measured values consolidated into groups		✔	✔	✔	✔
ROTRONIC networkable products		✔	✔	✔	✔
Archiving of data					
Automatic saving of the measured data (monitoring)		✔	✔	✔	✔
Simultaneous management of the log settings for instruments in a group		✔	✔	✔	✔
Display of measured values					
Numeric and graphical display	✔	✔	✔	✔	✔
Graphical comparisons and overlay functions		✔	✔	✔	✔
Customer-specific room layout		✔	✔	✔	✔
Analysis and calculation tool					
Psychrometric calculations	✔	✔	✔	✔	✔
Statistical data	✔	✔	✔	✔	✔
Printing/Reports					
Automatic generation of adjustment, calibration and configuration reports		✔	✔	✔	✔
Printout as table or graph	✔	✔	✔	✔	✔
Users and passwords					
Password protection		✔	✔	✔	✔
User names and rights freely definable		✔	✔	✔	✔
Alarms					
Visual display of active alarms	✔	✔	✔	✔	✔
Alarm via email, SMS, relay, report printout		✔	✔	✔	✔
Flexible programming of alarm priority possible for every instrument		✔	✔	✔	✔
OPC server (OLE for Process Control)					
Server client functions				✔	✔
Electronic record, electronic signature, audit trail					
Logging of all HW4 user events & automatic generation of reports		✔	✔	✔	✔
Data integrity guaranteed at all times		✔	✔	✔	✔

Function overview					
All versions of HW4 support the HygroLog HL-NT series, HL20 and 21, HygroFlex HF3-HF8, HygroLab (C1), HygroPalm HP21 to HP23-A and future instruments. You can find a compatibility list on the internet at www.rotronic.com	Standard	Professional	Professional with water activity	Professional with OPC server	HW4-VAL
HW4 Product key	**24 xxx**	**64 xxx**	**86 xxx**	**88 xxx**	**12 xxx**
Standards, laws, directives, instructions					
US FDA: 21 CFR 11	✔	✔	✔	✔	✔
US FDA: 21 CFR 210-211, Drugs and 21 CFR 110, Human Food	✔	✔	✔	✔	✔
EU Guidelines of good manufacturing practice of medicinal products	✔	✔	✔	✔	✔
EU Annex 11 to the EU Guidelines of good manufacturing practice of medicinal products	✔	✔	✔	✔	✔
Validation					
System Qualification Guide CD (only in English)					✔
Water activity measurement					
AwQuick and AwE			✔		
Supported interfaces					
RS-232, USB, Ethernet, WLAN	✔	✔	✔	✔	✔
RS-485		✔	✔	✔	✔
Instrument-specific functions					
Instrument settings, scaling, programming, data retrieval, data logging function	✔	✔	✔	✔	✔
Adjustment and calibration of ROTRONIC probes	✔	✔	✔	✔	✔
Simultaneous adjustment of probes in one group		✔	✔	✔	✔
Time synchronization for HygroLog NT	✔	✔	✔	✔	✔
Supported operating systems					
Microsoft Windows XP Service Pack 2, Vista, Windows 7	✔	✔	✔	✔	✔

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 in table or graph form.
The graph module can be configured by the user.

Room layout

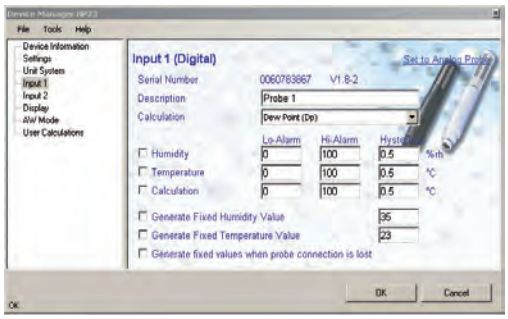
For clear presentation of the measured values, the room layout of the building or process can be stored within HW4 software.
Drawings and images can be imported in BMP or JPG format. Once the room layout has been imported, the instruments can be placed in the room layout and their measured values shown.

Archiving of data/File formats

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

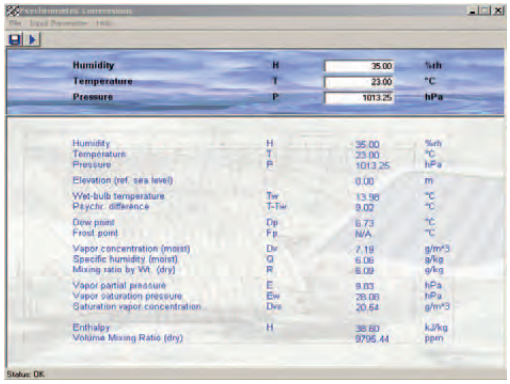
Instrument configuration

HW4 software can be used to adjust the settings of ROTRONIC instruments and probes. The following functions and settings can be changed.
Assignment and scaling of transmitter outputs
Definition of alarm values
Relay switch points
Adjustment and calibration of probes

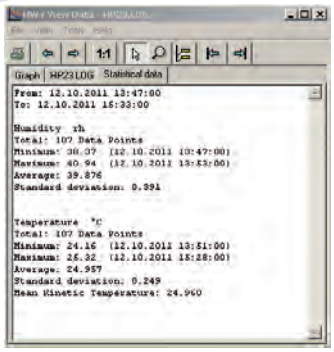


Psychrometric calculation tool

All ROTRONIC instruments measure relative humidity and temperature. 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 in HW4 software uses WMO* verified formulas for these calculations and allows users to define their own output parameter scaling.
Other advanced options such as dew/frost point differentiation are also included.



* WMO = World Meteorological Organisation



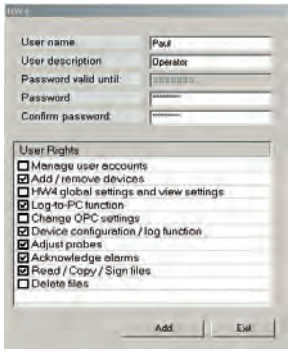
Statistical functions

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 from recorded measurements:

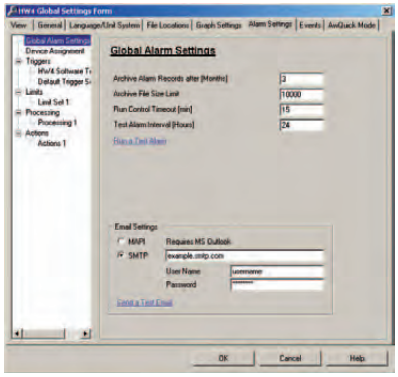
- min., max. and mean value
  (during a defined period or during the time of an alarm)
- standard deviation
- mean kinetic temperature
- number of measured values



Users and passwords

User names and passwords can be defined and assigned freely.

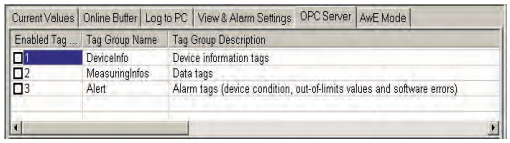
Every user can be granted different rights. Users can be blocked and reactivated again. Users that have been deleted cannot be recreated under the same name.



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 measured values lie outside defined limits or when a data logger sends an error message. The following actions can be carried out when an alarm occurs:

- reporting of the alarm on the screen
- sending of emails
- switching of relays
- starting of applications



OPC server (Object Linking and Embedding for Process Control)

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

ACCESSORIES-CONTENTS

Overview filter carriers/filters 124

Filters / Filter carriers 125-127

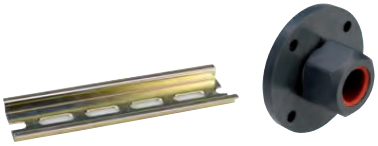
Connection & extension cables 128-130

PC connection cables / converter cables / T-junction box 131-133

Service cables 134

Simulators 135

Mounting hardware 135-136



Desktop stands / Carry cases 137-139

Filter carriers/Filters

Description

ROTRONIC filter carriers protect the humidity and temperature sensors against mechanical damage. Filters act as a protective barrier against contaminants/pollutants that can influence the sensor. When choosing the correct combination of filter carrier and filter there are many factors to consider. Air velocity at the sensor, airborne chemical contaminates, mechanical protection of the sensor, and required response time are some of the many considerations.

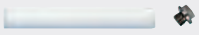
Plastic filter carrier		Metal filter carrier	
• **Maximum temperature 120 °C** • Mechanical protection		• **Maximum temperature 200 °C** • Mechanical protection	

Overview filters	Teflon filters	Polyethylene filters	Membrane filters e.g. teflon	Screen filters	Sintered steel	Wire mesh filters
Maximum temperature (observe range of application of filter carrier)	200 °C	100 °C	120 °C	120 °C	200 °C	200 °C
Protection against particulates	✔✔	✔✔	✔		✔	✔
Fast response time (low damping)			✔	✔✔		
Max. air velocity [m/s] (continuous load)	20	20	15	10	40	25

Filters and filter carriers for standard probes HC2-S / HC2-S3					
Order code	**Filter carrier**	**Filter element**	**Pore size**	**Range of electronics**	
NSP-PCB-PE	Polycarbonate Black	Polyethylene, gray	20 µm	-50...100 °C	
NSP-PCB-PE40		Polyethylene, white	40 µm		
NSP-PCB-WM		Wire mesh	20...25 µm		
NSP-PCB-TF		Teflon	10 µm		
NSP-PCB-MFD		MFD	Fleece		
NSP-PCB-PP100		Polypropylene	150 µm		
NSP-PCB		No filter element, only carrier			
NSP-PCB-SET		Consisting of:			
		1x polyethylene, gray	20 µm	SET	SET
		1x wire mesh	20...25 µm		
		1x Teflon	10 µm		
NSP-PCW-PE	Polycarbonate White	Polyethylene, gray	20 µm	-50...100 °C	
NSP-PCW-PE40		Polyethylene, white	40 µm		
NSP-PCW-WM		Wire mesh	20...25 µm		
NSP-PCW-TF		Teflon	10 µm		
NSP-PCW		No filter element, only carrier			
NSP-PCW-SET		Consisting of:			
		1x polyethylene, gray	20 µm	SET	SET
		1x wire mesh	20...25 µm		
		1x Teflon	10 µm		
Particulate filter / Waterproof					
NSP-POM-FD2	POM, white	Teflon	2 µm	-50...100 °C	

Filters and filter carriers for industrial probe series HC2-IC					
Order code	**Filter carrier**	**Filter element**	**Pore size**	**Range of electronics**	
NSP-ME-WM	Brass, nickel-plated	Wire mesh DIN 1.4401	20...25 µm	-100...200 °C	
NSP-ME-SS		Sintered steel DIN 1.4401	5 µm	-100...200 °C	
NSP-ME-TF		Teflon	10 µm	-80...200 °C	
Spare parts					
NSP-ME	Brass, nickel-plated	No filter element, only carrier		-100...200 °C	
SP-M15	No filter carrier, only filter	Wire mesh DIN 1.4401	20...25 µm	-100...200 °C	
SP-S15	No filter carrier, only filter	Wire mesh DIN 1.4401	5 µm	-100...200 °C	
SP-T15	No filter carrier, only filter	Teflon	10 µm	-80...200 °C	

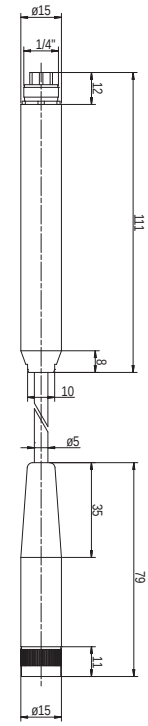
Filters and filter carriers for industrial probe series HC2-IM / HC2-IE					
Order code	**Filter carrier**	**Filter element**	**Pore size**	**Range of electronics**	
SP-MC15	Brass, nickel-plated	Wire mesh DIN 1.4401	20...25 µm	-100...200 °C	
SP-SC15		Sintered steel DIN 1.4401	5 µm	-100...200 °C	
SP-TC15		Teflon	10 µm	-80...200 °C	
Spare parts					
SP-MSB15	Brass, nickel-plated	No filter element, only carrier		-100...200 °C	
SP-M15	No filter carrier, only filter	Wire mesh DIN 1.4401	20...25 µm	-100...200 °C	
SP-S15	No filter carrier, only filter	Sintered steel DIN 1.4401	5 µm	-100...200 °C	
SP-T15	No filter carrier, only filter	Teflon	10 µm	-80...200 °C	

Filter for 5 mm probe HC2-C05					
Order code	**Filter carrier**	**Filter element**	**Pore size**	**Range of electronics**	
SP-T05	No filter carrier, only filter	Teflon	10 µm	-80...200 °C	

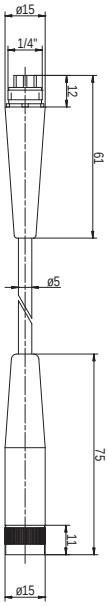
Filters for handheld probe HC2-HP28/HP50					
Order code	**Filter carrier**	**Filter element**	**Pore size**	**Range of electronics**	
ET-Z10	No filter carrier, only filter	Sintered steel DIN 1.4401	5 µm	-80...200 °C	
SP-TS12	No filter carrier, only filter	Teflon	10 µm	-40...200 °C	

Filters and filter carriers transmitter HF3					
Order code	**Filter carrier**	**Filter element**	**Pore size**	**Range of electronics**	
NSP-PCG-PE	Polycarbonate gray	Polyethylene gray	20 µm	-40...85 °C	
NSP-PCG-WM		Wire mesh	20...25 µm	-80...85 °C	

Filters for web and water activity probes HC2-AW-USB, HC2-AW, BFC-UART		
Order code	**Description**	
ET-W24-Set	Flat wire mesh filter with circlip, Ø 24 mm for HC2-AW (-USB) Pore size: approx. 20...25 µm	
ET-W37-Set	Flat wire mesh filter with circlip, Ø 37 mm for BFC-UART Pore size: approx. 20...25 µm	



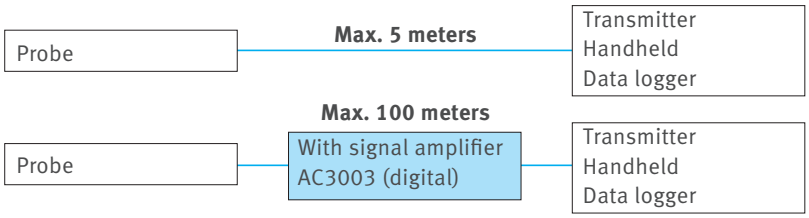
E2-02A



E2-02A-S

HC2 PROBE EXTENSION CABLES

for transmitters / handheld instruments / data loggers

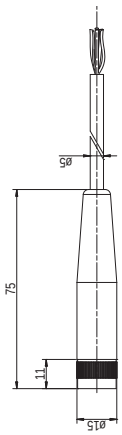


Features

- Ranges of application -40...90 °C
- 30 cm type used in conjunction where Ethernet or wireless Ethernet could cause self heating

HC2 probe extension cables

Order code	Color	Shaft	Cable length
E2-F3A	Black	Normal	30 cm
E2-01A			1 m
E2-02A			2 m
E2-02A-S		Short [S]	2 m
E2-05A		Normal	5 m
E3-F3A	White		30 cm
E3-01A			1 m
E3-02A			2 m
E3-02A-S		Short [S]	2 m
E3-05A		Normal	5 m



A-01XX

CABLES

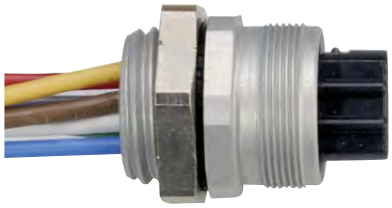
to connect an analog probe to a HP23-A, HF8, HL-NT

Features

- Range of electronics -40...70 °C
- Open ends

Cables to connect an analog probe to a HP23-A, HF8, HL-NT

Order code	Color	Cable length
A-01XX	Black	1 m
A-02XX		2 m
A-05XX		5 m



HC2 CONNECTOR

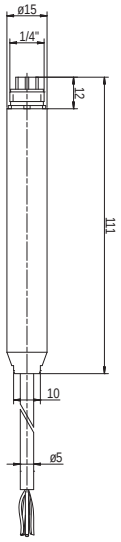
Features

- Maximum wall thickness: 4 mm
- Hole diameter: 12.5 mm
- 30 cm long, color-coded wires
- Tinned ends
- Range of application: -40...100 °C

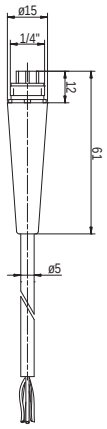
Order code	E2-XX

EXTENSION CABLES with open ends

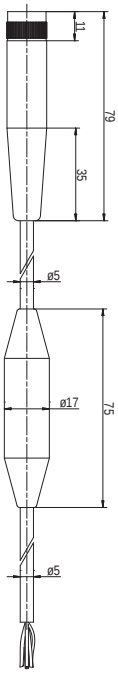
Order code	Color	Shaft	Length	Range of electronics
Supply voltage 3.3 VDC (requires a regulated 3.3 VDC supply)				
E2-01XX	Black	Normal	1 m	-40...90 °C
E2-02XX			2 m	
E2-02XX-S		Short [S]	2 m	
E2-05XX		Normal	5 m	
E2-05XX-S		Short [S]	5 m	
E3-01XX	White	Normal	1 m	
E3-02XX			2 m	
E3-05XX			5 m	
Supply voltage 5...24 VDC / 5...16 VAC (with electronic control)				
E2-01XX-ACT/01	Black	Normal	1 m	-40...70 °C
E2-02XX-ACT/01			2 m	
E2-05XX-ACT/01			5 m	
E3-01XX-ACT/01	White	Normal	1 m	
E3-02XX-ACT/01			2 m	
E3-05XX-ACT/01			5 m	
Supply voltage 5...40 VDC / 6...28 VAC (with electronic control)				
E2-01XX-ACT-HV	Black	Normal	1 m	-40...70 °C
E2-02XX-ACT-HV			2 m	
E2-05XX-ACT-HV			5 m	
Wire color code				
Green	VDD (+)	3.3 VDC		
		5...24 VDC / 5...16 VAC		
		5...40 VDC / 6...28 VAC		
Gray	GND	Digital and power supply GND		
Red	RXD	UART		
Blue	TXT	UART		
White	Out1	Analog output 1, standard humidity 0...100 %RH		
Brown	Out2	Analog output 2, standard temperature -40...60 °C		
Yellow	AGND	Analog GND		



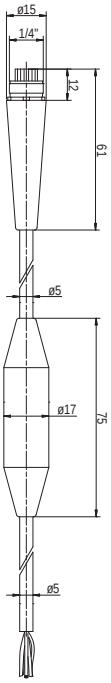
E2-01xx



E2-02xx-S



AC3003L
With long shaft



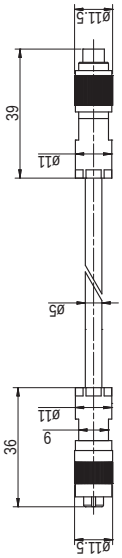
AC3003

Digital signal amplifiers

Features

- Color: black
- Range of application -40 to 70 °C

Digital signal amplifiers		
Order code	**Description**	**Cable length / Shaft**
AC3003	UART signal amplifier, probe and instrument side with tinned ends	Normal shaft
AC3003-L	UART signal amplifier, probe and instrument side with tinned ends	Long shaft [L]
AC3003-Cable-D	Cat. 5e cable S/FTP «solid wire»	100 m
AC3003-Cable-L	Cat. 5e cable S/FTP «stranded wire»	100 m
AC3003/10	AC3003 with pre-mounted cat. 5 cable, normal shaft	10 m
AC3003/20		20 m
AC3003/50		50 m
AC3003/80		80 m
AC3003/100		100 m



PT100 extension cables

Features

- Extension cable for PT100 4-wire temperature probe
- Range of electronics: -40 to 100 °C
- 4-pin Binder female to 4-pin Binder male connector

PT100 extension cables	
Order code	**Cable length**
AC1607/1	1 m
AC1607/2	2 m
AC1607/3	3 m
AC1607/5	5 m
AC1607/10	10 m

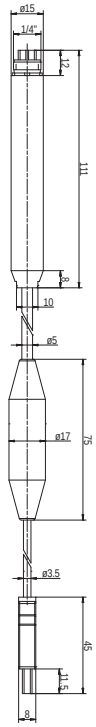
USB ADAPTERS for HC2 probes

Features

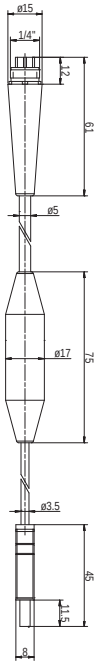
- To connect HC2 probes to a PC via the USB interface
- Requires HW4 software on the PC
- Power supply via USB interface
- Range of electronics: -40 to 70 °C
- Cable length: 2.8 m

USB adapters for HC2 probes		
Order code	**Description**	**Shaft**
AC3001	Active UART to USB converter cable	Short shaft
AC3001-L		Long shaft [L]
XD-AC3001	Active UART to USB converter cable for XD Probes	Short shaft

AC3001-L



AC3001

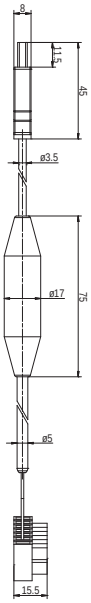


USB ADAPTER with open ends for HC2 probes

Features

- To connect HC2 probes (with open ends) to a PC via the USB interface
- Requires HW4 software on the PC
- The probe requires a separate power supply (5...24 VDC / 5...16 VAC)
- Cable length 2.8 m
- Range of electronics -40...70 °C

USB adapters for HC2 probes	
Order code	**Description**
AC3001-XX	Active UART to USB converter cable, open ends (incl. luster terminal)

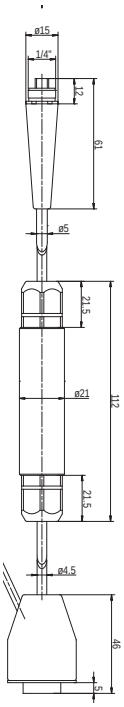


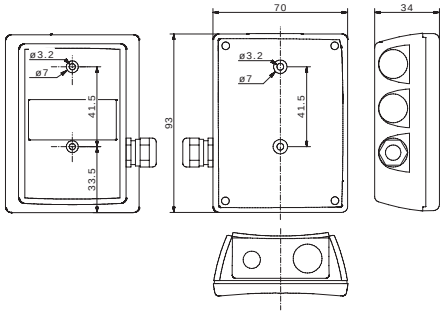
RS-232 ADAPTERS for HC2 probes

Features

- To connect HC2 probes to a PC via the RS-232 interface
- Requires HW4 software on the PC (power supply 9 V, AC adapter AC1207 must be ordered separately)
- Range of electronics -40 to 70 °C

RS-232 adapters for HC2 probes		
Order code	**Description**	**Cable length**
AC3002	Active UART to RS-232 converter cable	2.8 m
AC1207	AC adapter RNG 11, 9 V	
XD-AC3002	Active UART to RS2-32 converter cable for XD probe	



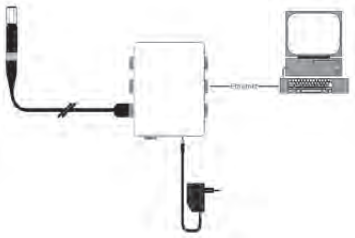


ETHERNET ADAPTERS for HC2 probes

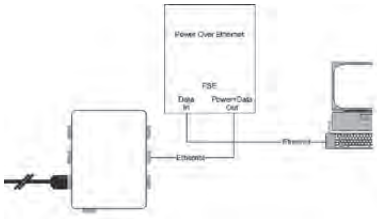
Features

- Connects HC2 probes to a PC via Ethernet interface
- Requires HW4 software on the PC
- Power supply via AC adapter (order separately) or via PoE
- Range of electronics: -40 to 70 °C

Ethernet adapters for HC2 probes		
Order code	**Description**	**Cable length**
AC3005	UART ‹› Ethernet	35 cm
AC1207	AC adapter RNG 11, 9 V	

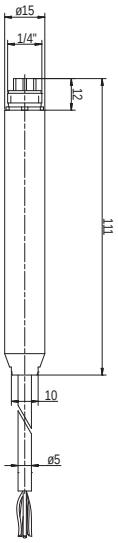


Power supply via AC adapter



Power supply via PoE

RS-485 / MODBUS ADAPTER for HC2 probes



Features

- Connects HC2 probes to a RS-485 or Modbus network
- Programmable between Modbus and RS-485 protocol in the HW4 software
- Power supply: 5...28 VDC
- Range of electronics: -40 to 70 °C

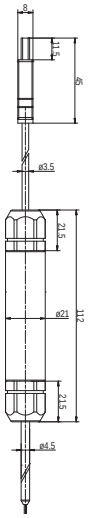
Self-heating of the adapter can lead to errors of the measured values; it is therefore advisable to place the probe a short distance away with an extension cable (e.g. E2-F3A).

RS-485 / Modbus adapters		
Order code	**Description**	**Cable length**
E2-01XX-MOD	Adapter cable for HC2 RS-485 / MODBUS	1 m
E2-02XX-MOD		2 m
E2-05XX-MOD		5 m

RS-485 / USB converter

Features

- Compatible with HF456, HF53x, HF54x, HF55x with digital interface
- Power supply via USB interface
- Acts in a RS-485 network as a slave
- Range of electronics: -40 to 70 °C
- Cable length: 1 m



RS-485 ‹-› USB converter	
Order code	Description
AC3010	RS-485-USB converter

Ethernet / RS-485 converter

Features

- Compatible with all HF4 to HF8 Transmitters with a RS-485 interface, HL-NT Data Loggers
- Enables connection of up to 64 RS-485 slaves to an Ethernet network
- Has an IP address, but no RS-485 address , not considered as a RS-485 device
- Range of electronics: -40 to 70 °C
- Current consumption: 85 mA

Requires an external 12-24 VDC power supply. The power supply can simultaneously be used to supply the connected RS-485 devices.

Ethernet / RS-485 converter	
Order code	Description
AC3011	RS-485 Masterbox

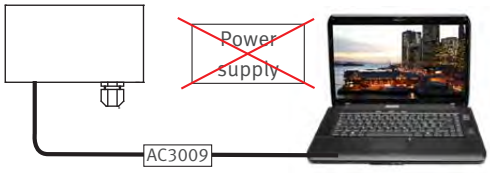
RS-485 T-junction box

Features

- Passive RS-485 T-junction box
- For simple installation of RS-485 networks
- Wall mounting
- 240 Ohm terminator, connectable via jumper
- Range of electronics: -40...70 °C

RS-485 T-junction box	
Order code	Description
AC3021	RS-485 T-junction box

AC3006



AC3009

SERVICE CABLES for HF, HP21 / 22, HL-20

Features

- Connects ROTRONIC instruments via their service interface (UART) to a USB interface
- Compatible with HF3, HF4, HF5, HF7, HF8, HP21 and HP22, HL-20(D) / HL-21(D)
- Requires HW4 software
- For programming (settings, re-scaling, firmware update, etc.) compatible instruments
- Two different types:
  AC3006, the instrument must be supplied with power
  AC3009, the instrument is supplied with power via the USB interface

Note: AC3006 used in combination with a 2-wire instrument: with all 2-wire types (HF320, HF420, HF520, HF620, HF720, XB20) ensure that a computer or laptop is galvanically isolated from the mains power supply.

Service cable	
Order code	**Description**
AC3006	Service cable (requires external power supply)
AC3009	Service cable (power supplied via USB port)

SERVICE CABLE for HP23-A / HP23-AW-A

Features

- Connects HP23-A and HP23-AW-A to a PC
- Requires HW4 software
- For programming (settings, re-scaling, firmware update, etc.) of HP23-A, HP23-AW-A

Service cable for HP23-A / HP23-AW-A		
Order code	**Description**	**Length**
AC0003	USB-A to mini USB cable	1.8 m

SERVICE CABLE for HL-NT

Features

- Connects the HL-NT docking station to a PC
- Requires HW4 software
- For programming (settings, re-scaling, firmware update, etc.) of HL-NT data loggers

Service cable for HL-NT docking station		
Order code	**Description**	**Length**
AC0002	Standard USB A/B cable	1.8 m

HC2 simulators

Features

- Humidity /Temperature simulators with any 2 fixed values and certificate
- For system validation
- Values cannot be changed with HW4 software
- Range of electronics: -40 to 100 °C

HC2 simulators		
Order code	**Humidity**	**Temperature**
HC2-SIMC-000/0023	0 %RH	23 °C
HC2-SIMC-035/0023	35 %RH	
HC2-SIMC-050/0023	50 %RH	
HC2-SIMC-080/0023	80 %RH	

Protective caps

Features

- Protects probes/connectors during cleaning cycles against water and chemical substances, e.g. H_2O_2

Protective caps	
Order code	**Protects**
Protection-E2/E3	Connectors
Protection-Filter	Sensor
Protection-HC2	Complete HC2

Protection-E2/E3

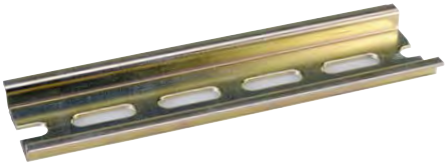
Protection-Filter

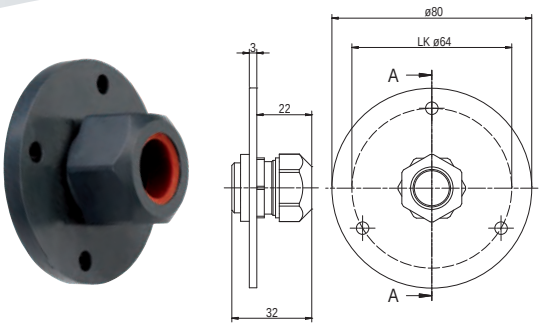
Protection-HC2

Mounting kit for DIN top-hat rails

Mounting kit for DIN top-hat rails	
Order code	**Description**
AC5002	DIN top-hat rail adapter for HF4, HF5, HF8, AC3011 (2 pc.)
AC5002 DIN 120	Top-hat rail 120 mm long (HF4 and HF5, AC3011)
AC5002 DIN 180	Top-hat rail 180 mm long (HF56x, HF8)

AC5002





Mounting gland with flange

for temperatures ‹ 100 °C

Mounting gland	
Order code	**Description**
AC5005	Mounting gland/ flange for 15 mm probe

Mounting gland

Mounting flange

Mounting glands / Mounting flanges for temperatures › 100 °C

Mounting glands / Mounting flanges for temperatures › 100 °C				
Order code	**Dimensions**	**Material**	**Gasket**	**Temperature**
Mounting gland for 15 mm probe				
AC1301-M	M20 x 1.5	Brass, nickel-plated	Perbunan	To 100 °C
AC1303-M			Viton	To 200 °C
Mounting gland for 25 mm probe				
AC1304-M	M32 x 1.5	Brass, nickel-plated	Viton	To 200 °C
Mounting gland for 15 mm ATEX probe				
AC1301-MEX	M25 x 1.5		Viton	To 200 °C
Mounting flange AC1305 for AC1301-M and AC1303-M AC1306 for AC1304-M				
AC1305	Ø 80 mm	Steel, nickel-plated	-	To 200 °C
AC1306			-	

AC1319

AC1320

HygroClip holders for 15 / 25 mm

HygroClip holder	
Order code	**Description**
AC1319	Ø 15 mm, gray
AC1320	Ø 25 mm, gray

Desktop stand

for HygroPalm HP21 – HP23-A

Features

- Desktop stand for the handheld instruments HP21, HP22(-A), HP23(-A), HP-23-AW(-A)

Desktop stand for HygroPalm HP21 – HP23-A	
Order code	**Description**
DESK-HP	Desktop

Universal desktop stand

for HygroPalm HP21 – HP23-A / HygroLog HL-NT

Features

- Desktop stand for the handheld instruments HP21, HP22(-A), HP23(-A), HP23-AW(-A) and HL-NT loggers with docking station
- Set contains a clip for mounting of the HygroPalm
- Set contains screws for mounting of the docking station to the desktop stand

Desktop stand for HygroPalm HP21 – HP23-A	
Order code	**Description**
DESK-NT	Desktop stand

Carry cases

ROTRONIC case inserts are specially designed for the safe transport of ROTRONIC instruments and accessories. Cases from third parties can destroy the sensors (through chemical emissions).

Carry case HP22-(A) / HP23-(A)

Features

- Cutouts for:
  1x HygroPalm HP22-(A) or HP23-(A)
  2x standard probes HC2-S/S3
  1x handheld probe (excl. HC2-HK40/42)
  1x calibration device ER-15
  1x pack humidity standards
  1x 9 V battery
  1x extension cable probe for a handheld instrument (max. 2 m)
  1x instruction manual
- Dimensions: 450 x 360 x 140 mm (outer)

Order code: AC1126

Carry case HP21 / HP22-(A) / HP23-(A)

Features

- Cutouts for:
  1x HygroPalm HP21, HP22-(A) or HP23-(A)
  2x standard probes HC2-S/S3
  1x calibration device ER-15
  1x pack humidity standards
  1x CD-ROM
  1x 9 V battery
  1x instruction manual
  Cutout for extension cable
- Dimensions: 395 x 300 x 105 mm (outer)

Order code: AC1127

Carry case AW

Features

- Cutouts for:
  1x HygroPalm HP23-A or HP23-AW-A
  1x water activity measurement probe HC2-AW
  1x sample holder WP-40 or WP-14-s
  4x ampoules (humidity standard)
  1x set textile pads
  1x 9 V battery
  13x Sample containers PS-14 or 6x PS-40
  1x instruction manual
- Dimensions: 395 x 300 x 105 mm (outer)

Order code: AC1124

Carry cases

Carry case GTS

Features

- Cutouts for:
  1x GTS
  1x calibration device EGS
  1x pack humidity standards
  1x 9 V battery
  1x battery charger
  1x small screwdriver
- Dimensions: 450 x 365 x 135 mm (outer)

Order code: AC1102

Carry case S1

Features

- Cutouts for:
  1x handheld instrument with sword probe S1
  1x calibration device EGS
  1x pack humidity standards
  1x 9 V battery
  1x AC adapter
  1x mini screwdriver
  1x manual
- Dimensions: 395 x 295 x 106 mm (outer)

Order code: AC1115

Universal carry case small

Features

- Universal case with resilient protective foam
- Dimensions: 395 x 300 x 105 mm (outer)

Order code: AC1123

Universal carry case large

Features

- Universal case with resilient protective foam
- Dimensions: 450 x 360 x 140 mm (outer)

Order code: AC1125

SERVICES

ROTRONIC AFTER SALES SERVICES

When you buy a product from ROTRONIC, you do not simply opt for a partner that sells you the measuring instrument, but also for a company that wants you to use the humidity and temperature measuring instruments in such a way that they afford you maximum **benefits** and are a **reliable companion** to you in your everyday work.

Do not underestimate the importance of the measurement of humidity and temperature: **wrong temperatures** or humidity can lead to **expensive damage** to products. Further, companies that sell food or pharmaceutical products to the USA are subject to strict regulations (FDA: Food and Drug Administration). Also do not forget that even the **best products** begin to **measure inaccurately** over time and need to be **recalibrated**.

If you need training in a product, want to hire our specialists to conduct humidity and temperature mapping to find the ideal storage place for your products in your production or storage rooms or need our calibration team to calibrate or adjust your measuring instruments according to SCS standard, use our after-sales services offered on the following pages.

In Switzerland, all after-sales services are available. In all other countries, the offer may be different (details on request).

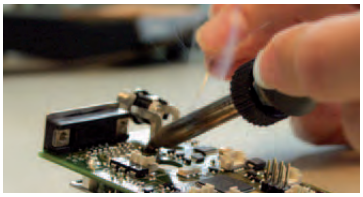
Engineering/Installation 142

Commissioning/Equipment rentals 143

Calibration and adjustment in our calibration laboratory 144

Mobile Calibration Services 145

Mapping/Repair 146



Calibration seminars Product training 147

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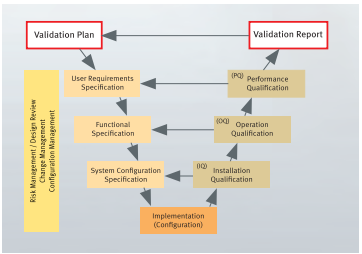


Engineering /Project planning

Our engineering/project planning service supports you from planning to implementation of your system guaranteeing an optimal design the control of your process. The uniqueness of your application can necessitate a multitude of function-specific settings and measurement systems. ROTRONIC is one of the leading suppliers in the world for humidity and temperature measurement equipment – profit from our know-how!

Case study:

Customer requirements

- Planning and control of a temperature and humidity climate in a storage/production area taking the existing equipment/measurement devices into account
- Strict compliance with the specified standards – e.g. Food and Drugs Administration (FDA)

Our approach

- Site survey of the present situation
- Evaluation of the optimum solution to meet specifications
- Detailed planning
- Implementation/Commissioning

Result

With installation of the customized measurement system, the existing infrastructures could be used seamlessly with a ROTRONIC system implemented that sets new standards as far as operation and maintenance costs are concerned!

Your benefits:

- Support from project planning through to implementation
- Optimum solution for your application at a favorable price
- Correct instrumentation supplied saving costs

Installation

Have you opted for a monitoring network, but do not know who can install it for you? ROTRONIC cooperates with reliable partners, who work regionally and are experienced in our products. They understand, for example, what is important when it comes to designing and installing a RS-485 network. If installed and configured correctly, these networks work without problem right from the start.

Your benefits:

- Inexpensive installation by specialists
- Competent partners selected and supported by us

Commissioning/Maintenance

Once the measurement system has been installed, it is commissioned. ROTRONIC engineers configure the system according to your requirements and in compliance with all standards. We will also gladly carry out maintenance and minor repairs on site for you.

Your benefits:

- Quick commissioning by specialists
- Documented configuration and settings

Equipment rental

Many customers have their measuring instruments calibrated in our accredited laboratory. Other prefer to perform the calibrations themselves. ROTRONIC makes the HygroGen2 humidity and temperature generator available for this.
Renting the device saves you investment in your own device and you are sure to receive equipment with outstanding accuracy that is traceable to the national standard at all times. Calibrate your ROTRONIC or third-party probes with the easy-to-use HygroGen.
If you initially feel a little unsure then simply hire a ROTRONIC technician as well. He will explain the calibration procedure to you and stand by you in your first own calibrations/adjustments.
ROTRONIC also rents stand alone data loggers. With them you can record humidity and temperature for your application.

HygroGen2

Typical applications for the HL20 data logger are:

- humidity and temperature monitoring in storage and production rooms
- humidity and temperature mapping in/for e.g. product packaging, cooling systems, foods, shipping processes, etc.

Your benefits:

- Fast completion of calibration work
- Calibration with certified precision equipment
- ROTRONIC puts the complete calibration documentation together on site!

We also rent data loggers for short-term use. The humidity and temperature data are recorded in an interval defined by you.

We will gladly prepare an offer tailored to your needs for you.

HL-20D

Calibration and adjustment

Even though ROTRONIC instruments have excellent long-term stability, we recommend that probes are calibrated regularly – once a year is normally sufficient. More frequent calibration may however be required if the probes are used in polluted/contaminated environments.

Humidity and temperature measuring instruments are precision instruments that must be serviced regularly to maintain reliability. Measurement errors can result in substantial product damage during production and storage.

If the last time you performed a calibration yourself is a distant memory attend one of our calibration seminars to refresh your knowledge and get some hands-on practice.

What are the calibration options?

We can calibrate your instruments both in our laboratory and on your premises or you can calibrate the instruments yourself:

a) Calibration in a ROTRONIC laboratory

- RAG factory adjustment certificate (ISO 9001 standard)
- SCS certificate (Swiss Calibration Standard, accredited laboratory ISO/IEC 17025) , US: NIST; UK: UKAS

b) We come to you

- HygroGen humidity and temperature generator (1 to about 25 calibrations)
- Calibration mobile (more than about 25 calibrations)

c) You calibrate the probes yourself

- ROTRONIC calibration device and SCS-certified humidity standards
- SCS-certified reference probes (reference measurement)

Which calibration do I need: factory adjustment certificate (ISO) or SCS certificate?

Your process requirements generally determine whether a factory adjustment certificate suffices or whether a SCS certificate is needed. SCS certificates are generally required in the pharmaceutical industry, the medical technology industry, research and development and the food industry. SCS certifications are performed with high precision reference hygrometers and for temperature calibration, an equally high precision Fluorinert (TM) bath is used.

The best possible SCS calibration accuracy can only be achieved if all process parameters are controlled and checked at the highest level – SCS certification is therefore only possible in our accredited laboratory (SCS-065).

A standard traceable adjustment certification can be carried out by you or by our calibration technicians. The following calibration methods are suitable for this:

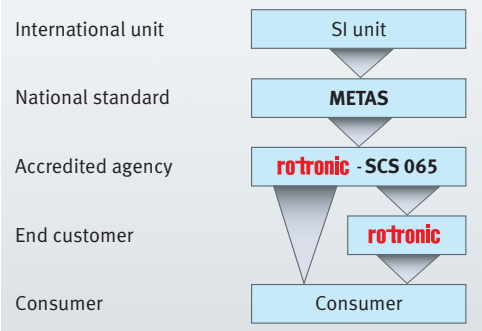
a) HygroGen2 (humidity and temperature generator from 0...60 °C and 5...95 %RH)

b) ROTRONIC humidity standards (calibration solutions from 0.5...95 %RH)

Although RAG factory adjustment certification can be carried out by an instructed person, it is completely traceable to the national standard when the above-mentioned calibration methods are used.

We will gladly advise you on the optimal service for you. Contact your local ROTRONIC partner for support.

Calibration hierarchy



Calibration mobile – how it works:

ROTRONIC offers its customers a unique calibration service – we come to you with our mobile calibration laboratory and calibrate your ROTRONIC or third-party climate probes in the shortest of times!

With our dynamic humidity generator FG-431 or portable HygroGen2 calibrator, we can calibrate your humidity and temperature probes in typically 3 to 5 minutes per calibration traceable to the national standard! All we need is a 230 VAC power socket. After calibration you not only have a precision instrument, but also a certificate traceable to the relevant national standard!
Another unique feature is the calibration range of 0.1 ... 99 %RH with a measurement uncertainty of 0.5 ...1.5 %RH depending on the humidity. Traceable to national standards – in Switzerland METAS (Federal Office of Metrology and Accreditation).

We can also perform on-site temperature calibrations. In a range of -25...125 °C with a measurement uncertainty 0.03...0.05 K depending on the interpretation and resolution of the display.

Your benefits:

- Minimal plant downtime
- No administrative costs (no shipping of the instruments)
- Direct contact with the specialists
- Minor repairs possible on site

ROTRONIC calibration mobile

Dynamic calibration unit

HygroGen2 / HP23-A

Flourinert bath (TM)

Humidity and temperature mapping

Incorrect temperature or humidity measurements can result in expensive damage to products. This must be avoided under all circumstances and steps taken immediately in the case of unintended changes in climatic conditions!

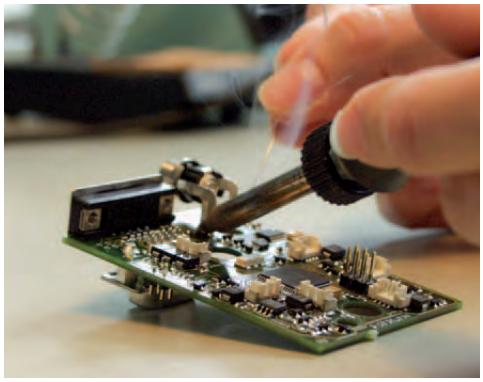
However, before an FDA-compliant system can be installed, it is first necessary to investigate where and how many measuring points should be set up to monitor the production or storage rooms. This is done with the help of a temperature and humidity mapping procedure. This mapping provides information on how many temperature zones (temperature gradients) there are in the rooms. Using the measured data, it is possible to define the optimum storage places for products or, in the extreme case, to initiate changes in the room climate!. Mapping also takes influencing factors such as direct sunlight, air conditioners, insulation, heat sources, outside temperature, into consideration, resulting in recommendations on how to optimize conditions if applicable.
Mapping is typically performed at very hot and very cold times of the year. The period of measurement analysis is about one to two weeks. A generous number of measuring points are used to ensure that every zone is covered.
We recommend renewed mapping if a production or storage area is modified or if there are other significant changes to the room.

Mapping by ROTRONIC comprises:

- Analysis of the requirements and definition of the measuring points
- Placement/Installation of the data loggers with traceable certificates
- Continuous recording of the climatic conditions
- Evaluation and analysis of the recorded data
- Preparation of GMP-compliant documentation
- Recommendations for optimization from ROTRONIC

Your benefits:

- Exact data on room climate
- FDA conformity
- Knowledge of possible problem areas



Repair

Once you have opted for a measurement instrument from ROTRONIC, you will soon discover you are working with sensors that offer a major benefit: long-term stability. Nevertheless, it is still possible that your instrument may need to be inspected and possibly repaired. In this case you can rely on a fast, high-quality and customer-orientated service from ROTRONIC.
Sometimes, following many years' of reliable service it is no longer worthwhile to repair an instrument due to the cost. In such cases we will offer you compatible new instruments.

In order to serve all our customers in a reasonable time, we work on a first-come/first-served basis. Most of our customers keep a stock of spare transmitters and probes that are important to their processes, something we also recommend, particularly for non standard products. We also offer an express repair service for emergency situations. If an instrument cannot be repaired and you do not have a reserve instrument, we will manufacture a compatible instrument in the shortest possible time.

Your benefits:

- Low costs for repairs
- Quality workmanship directly from the manufacturer
- High availability, short downtime

Calibration seminar

Our calibration seminars are used by customers from various fields to refresh their knowledge or to learn the basics of calibration.
The seminar uses a combination of theory and hands-on practice to put your new knowledge to use.

Subjects

- Principles of humidity and temperature measurement
- Principles of sensor technology and calibration
- How often should calibration be performed?
- What are the pitfalls in calibration?
- Open discussion on your application

You can find our seminar schedule on the ROTRONIC homepage at www.rotronic.ch.
On request we can also organize training specifically for you – simply contact us!

Your benefits:

- Development of know-how in calibration
- Flexible, independent and correct calibration
- Certificate of participation

Seminar in ROTRONIC training room

Product training

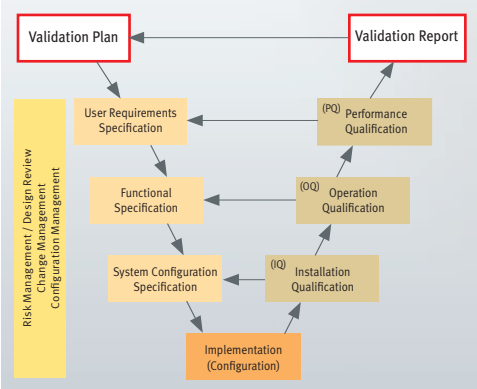
Are you interested in learning the the principles of humidity measurement or deciding which instrument is best for an application? Why not attend a ROTRONIC product training course – where you will also learn about the influencing factors such as contaminants, pollutants, dust, solvents, etc..

The courses are restricted to 10 people!
(The courses are held in our company or at your premises.)

Your benefits:

- Lower costs through correct instrument selection
- Optimal process control
- Simplified maintenance

Effective training in small groups



Validation model

Validation

Global companies are increasingly subject to obligatory international regulations. For example, manufacturers wishing to deliver pharmaceutical or food products to the USA must fulfill the requirements of the FDA[1]. Another well known code of practice is GAMP[2], which, although is not legally binding, is an acknowledged standard for validation.

Validation includes the provision of documented evidence that a system was planned/produced according to quality guidelines, is tested against specifications and has been operated in a qualified manner since it was introduced.

Missing information and poorly specified or inadequately tested systems represent a risk and can lead to high maintenance costs significant production losses and high costs. Validation by a computer-aided system (CSV[3]) is therefore critical for legal and business reasons. The latter are also valid for fields not subject to special legal regulations.

Our products, including software, conform to specific FDA requirements, are manufactured according to GAMP and provide a path to validation.

ROTRONIC supports you in validating your monitoring system:

- Development of SOP[4] for system validation (CSV)
- Preparation of project related validation plans and risk analysis
- Preparation of IQ/OQ[5] documents
- Preparation of validation reports

Your benefits:

- Competence directly from the manufacturer
- Lower costs from efficient training
- FDA/GAMP-compliant systems

FDA[1]: Food and Drug Administration
GAMP[2]: Good Automated Manufacturing Practice
CSV[3]: Computer System Validation
SOP[4]: Standard Operation Procedures
IQ/OQ[5]: Installation/Operation Qualification

HUMIDITY THEORY

Fundamental terms of humidity measurement

Water vapor density (absolute humidity)

This is the amount of water vapor (kg) contained per volume unit (m^3) of the gas mixture. In a gas mixture the water vapor generates a certain partial pressure that is part of the total barometric gas pressure. The vapor pressure can only rise to its saturation limit which is determined by the temperature. Thereafter condenses as dew or frost. The maximum pressure is called saturation pressure and is temperature dependent. The temperature dependency is, however, not contained in the term of absolute humidity.

Relative Humidity

Relative humidity is the relationship between the actual water vapor pressure and the maximum possible water vapor pressure.

$$\%RH = 100 \cdot \frac{p}{ps}$$

%RH: Relative humidity in percent
p: Water vapor pressure in the gas mixture at ambient temperature
ps: Water vapor saturation pressure at ambient temperature

100 %RH corresponds to the maximum amount of water vapor a gas mixture can contain at constant pressure and constant temperature at saturation p = ps. At constant water vapor partial pressure and changing ambient temperature the water vapor saturation pressure changes and consequently the relative humidity also changes (see water vapor saturation pressure).

To obtain useful measurements of relative humidity, it is extremely important that the measurement probe and measured material have the same temperature.

Equilibrium relative humidity (ERH)

A hygroscopic material always tries to reach humidity equilibrium with the surrounding air. Equilibrium relative humidity is the free water content in a hygroscopic material after equilibrium is reached in an environment with constant relative humidity and temperature. Humidity equilibrium then prevails when the amount of water absorbed and given off is equal.

Water activity (aW)

Water activity is a measure of the freely available water in a material. Water activity is Equilibrium Relative Humidity divided by 100. The water activity value is an important indicator of the shelf life of food products and influences the incidence and propagation of micro-organisms.

Psychrometric parameters

Dew point / Frost point (Dp / Fp)

The dew point is the temperature at which the air over water is saturated with water vapor at a constant air pressure. Frost point is the temperature at which the air over ice is saturated with water vapor at a constant air pressure. The prevailing water vapor pressure is then the same as the water vapor saturation pressure.

Wet-bulb temperature (Tw)

Is the lowest temperature that can be reached by evaporative cooling. The water given off by a wet surface is then in equilibrium with the water absorption capacity of the surrounding atmosphere.

Enthalpy (H)

Enthalpy of moist air is an energetic property. It is composed of the specific enthalpies of the components in the mixture (dry air, water vapor) and is related to the mass fraction of the dry air. It is given in J/kg.

Specific Humidity (Q) in g/kg

Is the ratio of the mass of the water vapor to the mass of the complete gas mixture containing the water vapor.

Vapor Concentration (Dv) in g/m3

Is the ratio of the mass of the water vapor to the volume of the complete gas mixture containing the water vapor.

Mixing ratio (R) in g/kg

Is the ratio of the mass of the water vapor to the mass of the dry gas mixture containing the water vapor.

Water vapor partial pressure (E) in hPa

Is the fraction of the total pressure of a gaseous mixture due to water vapor.

Water vapor saturation pressure (Ew) in hPa

Is the maximum pressure that water vapor can reach over a water surface at a given temperature.

Response time of ROTRONIC sensors

ROTRONIC defines the response time of its sensors as the time taken to complete 63% of a step change in humidity. Factors such as air flow, and thermal mass can effect the response time of the sensors.

Accuracy of HC2 probes

The accuracy of the ROTRONIC humidity and temperature probes is highest at the adjustment points. The standard factory adjustment is carried out at 23 °C.
Maximum accuracy is achieved when adjustment of the probes is at the point of use. ROTRONIC offers this service (see chapter Services, page 140).

Measurement uncertainty increases the closer the measurement approaches saturation.

Contaminants/Pollutants

Some gases and contaminants/pollutants can damage the ROTRONIC humidity sensors. The contaminants/pollutants can be divided into two categories: gases without influence and gases with an influence on the humidity sensors.

For contaminants/pollutants with an influence on the sensors and therefore with an influence on the measurement result, the maximum concentration load must be known (see table below).

Contaminants/Pollutants with an influence

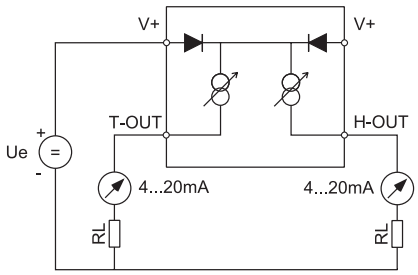
		Max. constant concentration	
Substance	**Formula**	**ppm**	**mg/m³**
Ammonia	NH_3	5500	4000
Acetone	CH_3COCH_3	3300	8000
Gasoline			150000
Chlorine	Cl_2	0.7	2
Acetic acid	CH_3COOH	800	2000
Ethyl acetate	$CH_3COOC_2H_5$	4000	15000
Ethanol	C_2H_5OH	3500	6000
Ethylene glycol	$HOCH_2CH_2OH$	1200	3000
Formaldehyde	HCHO	2400	3000
Isopropanol	$(CH_3)_2CHOH$	4800	12000
Methyl alcohol	CH_3OH	3500	6000
Methyl ethyl keton	$C_2H_5COCH_3$	3300	8000
Ozone	O_3	0.5	1
Hydrochloric acid	HCl	300	500
Hydrogen sulfide	$H2_S$	350	500
Nitrous gases	NOx	5	9
Sulfur dioxide	SO_2	5	13
Toluene/Xylene	$C_6H_5CH_3$	1300	5000
Xylene	$C_6H_5(CH_3)_2$	1300	5000

Contaminants/Pollutants without influence

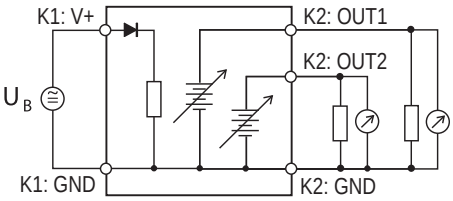
Substance	**Formula**
Argon	Ar
Helium	He
Hydrogen	H2
Neon	Ne
Nitrogen	N2
Oxygen	O2
Butane	C4H10
Ethane	C2H6
Methane	CH4
Natural gas	
Propane	C3H8

Note that the common sealing material silicon damages the sensor!
When probes are installed in, silicon must not be used!

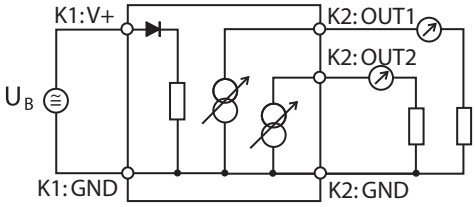
Transmitter circuits



2-wire circuit



3/4-wire circuit with voltage output



3/4-wire circuit with current output

In a 2-wire circuit the measurement output is connected to the ground wire of the power supply via a measurement resistor (load). The circuit is therefore ideal for simple wiring. However, this circuit can only provide a current output and it is not possible to integrate a protective ground in the circuit. For this reason metal probes cannot be connected to 2-wire transmitters.

The 3/4-wire circuit is characterized by the common ground of the power supply and transmitter. It is also possible to realize galvanic isolation with this circuit and ground is connected to the protective ground via the jumper B2. The jumper B2 is closed by default in all ROTRONIC transmitters with a protective ground connection. If required, the jumper in the device can be opened.
The 3/4-wire circuit is available both with voltage and current options. The measurement resistor (load) is ‹500 Ω in current circuits and ›1 kΩ in voltage circuits.

Probe use in practice

As a world leading manufacturer of humidity measurement instruments, ROTRONIC is fully aware of our responsibility to offer instruments that can withstand the harshest operating conditions, while remaining user-friendly and requiring minimal maintenance. To achieve the best possible performance from our measurement instruments we urge users to follow the guidelines outlined below.

1. Analyze the environment in which the humidity probe is used. What suspended substances and/or chemicals exist and in what concentration?
2. Install the probe at a place representative of the room climate with good airflow across the sensor.
3. Choose the right filter. Measurement is fastest without a filter. A protective open filter carrier is suggested to provide mechanical protection. For wind velocities higher than 3 m/s, however, a filter must be used. The filter protects the sensor up to airflow velocities of 40 m/s. Suitable filters must also be used in the case of contaminants/pollutants and in harsh environmental conditions.
4. Install the probe correctly to suit the application.
5. Inspect and replace the filter more frequently in harsh operating conditions. Filters can be cleaned in an ultrasonic bath. However, always keep a new filter set in stock.
6. Check that the measurement probe is working correctly by performing a calibration at least every 6 to 12 months.
7. For Calibration, use one of our calibration services or the SCS-certified humidity standards. This will insure that you have calibration traceable to national standards.

TERMS AND CONDITIONS OF TRADING

Full terms and conditions of sale and supply are available from ROTRONIC Instruments (UK) Ltd.

Please visit www.rotronic.co.uk/terms to download a PDF copy, or contact our Accounts section direct at our UK head office and UKAS accredited laboratory, the address is below.

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

Our Service to You

- High quality products
- Competitive prices
- ISO 9001 quality system
- Comprehensive 24 month warranty
- Dedicated team, specialising in humidity
- 48 hour turnaround on calibration and repairs on request
- UKAS calibration laboratory accredited for temperature, humidity and dew point

Buying from ROTRONIC UK

Contact our experienced sales team for product and application advice, pricing and availability.
Our field sales team offer on-site application consultancy and technical product support throughout the United Kingdom.

Warranty

All ROTRONIC products have 24 month warranty.

Calibration and Service

Our technical support team offer a wide range of services including UKAS calibration for temperature, humidity and dew point, repairs and service contracts.
Contact service@rotronic.uk.

The ROTRONIC UK Humidity Team

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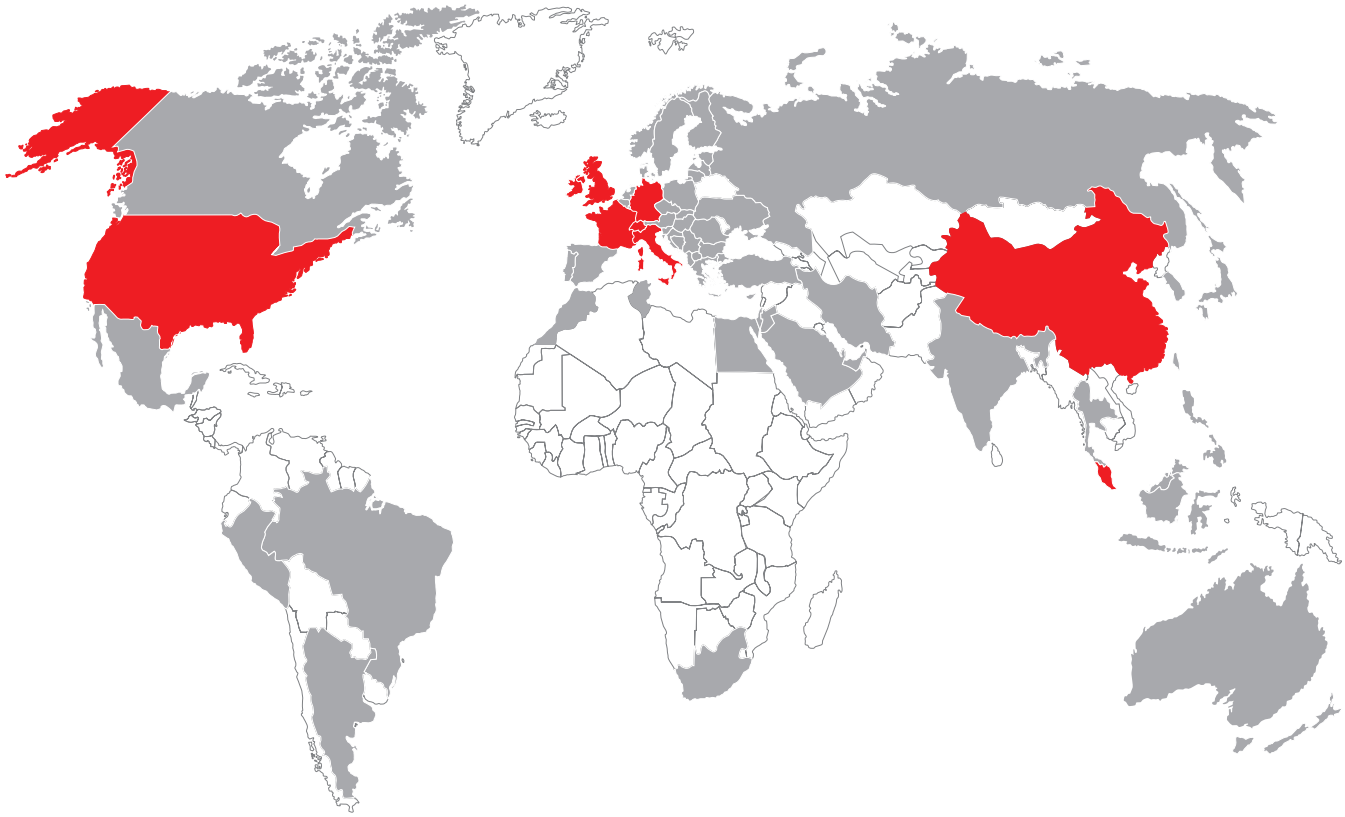
ROTRONIC WORLDWIDE

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.com/international

ROTRONIC International
ROTRONIC Partners



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