Main Catalogue

Measurement devices for relative humidity, temperature, CO₂ and differential pressure

76.23 %RH

45.45 ºC

2.18 PA

645 PPM

rotronic

MEASUREMENT SOLUTIONS

ROTRONIC MEASURING INSTRUMENTS: PRECISION AT THE HIGHEST LEVEL

With us as your 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, climate chambers, drying processes and measurement 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 compliance)** and no matter where you are, with 9 subsidiaries and more than **40 distributors** worldwide, you can rely on a competent and efficient sales and service network.

Guaranteed benefits

- Highest accuracy at ±0.5 %RH
- ISO 9001 quality with a Factory adjustment certificate
- ISO 17025
- Validated Windows software
- Products compliant to current industrial standards
- More than 40 years of experience in humidity measurement
- Environmentally conscious and professional

CONTENTS

HUMIDITY

TEMPERATURE

WATER ACTIVITY

METEOROLOGY

CO$_2$

DIFFERENTIAL PRESSURE

SOFTWARE

SERVICES

THEORY

PROBES

HygroClip2 probe

When it comes to measuring humidity with the highest accuracy, the HygroClip2 probe is in a class of its own. Thanks to the new AirChip, it also boasts a unique calibration and adjustment process as well as many other innovations. At the same time ROTRONIC has also improved the sensor technology, taking humidity measurement to a whole new level of performance and reliability: the HygroClip2 probe offers the best possible reproducibility and guaranteed system accuracy of ±0.8 %RH and ±0.1 K.

Probes in the HygroClip2 series come in various versions: from a simple plug-in probe for handheld instruments and data loggers to highly developed cable probes for high temperature and other special applications, we can provide you with exactly the right probe to suit your needs. Common to all is their high precision, which can be increased further by specific adjustments within our patented AirChip, making every probe in our range a high-end product for normal and industrial applications.

Applications

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

Features

- Measures relative humidity and temperature and calculates the dew/frost point
- Range of application 0…100 %RH / -100…200 °C (probe dependent)
- UART interface
- IP protection: IP65

HygroClip2 with AirChip3000 technology

- Temperature compensation of humidity at 30,000 reference points. If programmed accordingly, it can self test and correct drift 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 microchip
- Thanks to the analog, freely scalable signal (2 x 0…1 V) and the UART interface, the chip can be integrated not only in ROTRONIC products, but also in most OEM and customer solutions
- Digital communication enables fast probe exchange without the need for adjustment
- Can be used as a reference in system qualification

CONTENTS

Standard and high precision probes

HC2-S / HC2-S3 and HC2-SH/HC2-S3H

The HC2-S / HC2-S3 is the most versatile probe from ROTRONIC and forms the basis of the product portfolio. It measures humidity and temperature and calculates the dew/frost point. The HC2-SH / HC2-S3H fulfills the highest demands for measuring accuracy.

Applications

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

Features

- Accuracy standard probe (HC2-S): ±0.8 %RH, ±0.1 K, at 23 °C ±5 K
- Accuracy high precision probe (HC2-SH): ±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
- Output scaling: 0...1 V = -40...60 °C / 0...100 %RH
- Standard: adjusted at 23 °C and 10, 35, 80 %RH
- High precision: adjusted at 23 °C and 10, 20, 30, 40, 50, 60, 70, 80, 90 %RH, then calibrated at 20, 50, 80 %RH

HC2-S
HC2-SH

HC2-S3
HC2-S3H

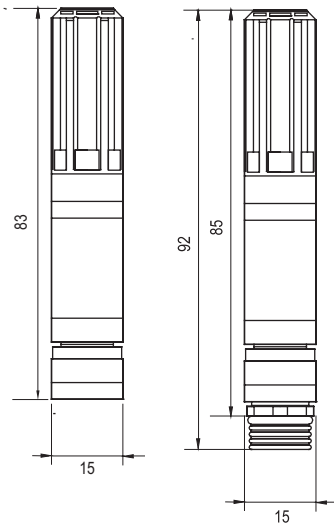| Order code	HC2-S / HC2-S3	HC2-SH / HC2-S3H
Probe type	S: black, S3: white	SH: black, S3H: white
Dimensions	Ø 15 x 83 mm	
Range of application	-50...100 °C, 0...100 %RH	
Accuracy	±0.8 %RH, ±0.1 K, at 23 °C ±5 K	±0.5 %RH, ±0.1 K, at 23 °C ±5 K (10...90 %RH)
Power supply	3.3...5 VDC, adjusted at 3.3 VDC	
Current consumption	~4.5 mA	
Long-term stability	‹1 %RH / year	
Sensor type	ROTRONIC HYGROMER® IN-1, SMD Pt100 Class A	
Filter type	S: polyethylene gray, 20 μm S3: polyethylene white, 40 μm	SH: polyethylene gray, 20 μm S3H: polyethylene white, 40 μm
Response time	‹15 s, without filter	
Max. wind velocity	3 m/s, without filter 20 m/s with polyethylene filter	
Housing material	Polycarbonate	
Weight / Protection	10 g / IP65	

Note:
HC2-S-HEATED, page 117
HC2-S-HH (special sensor for H_2O_2)

Compatible

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

Included

- Factory adjustment certificate
- Short instruction manual
- Polyethylene filter

Recommended accessories

• Mounting flange	AC5005
• Polyethylene filter, gray, 20 μm	NSP-PCB-PE
• Polyethylene filter, white, 40 μm	NSP-PCW-PE40
• Extension cable 2 m, black	E2-02A
• Extension cable 2 m, white	E3-02A
• 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

INDUSTRIAL PROBES, STEEL

The HC2-SM is the robust probe from ROTRONIC for harsh environments and adds to the wide product portfolio. It measures humidity and temperature and calculates the dew/frost point.

Applications
Food, paper, textile, pharmaceutical and cosmetic 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-SM
Probe type	Chrome steel standard
Dimensions	Ø 15 x 110 mm
Range of application	-50…100 °C, 0…100 %RH
Accuracy	±0.8 %RH, ±0.1 K, at 23 °C ±5 K
Power supply	3.3…5 VDC, adjusted at 3.3 VDC
Current consumption	~4.5 mA at 3.3 VDC
Long-term stability	‹1 %RH / year
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 Class A
Filter type	Wire mesh filter
Response time	‹15 s, without filter
Max. wind velocity	3 m/s, without filter 25 m/s with wire mesh filter
Housing material	Stainless steel 1.4301
Weight / Protection	47 g / IP65

HC2-SM

Note: Cannot be operated with two-wire transmitters.

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

INCLUDED
- Factory adjustment certificate
- Short instruction manual
- Wire mesh filter

RECOMMENDED ACCESSORIES
• Mounting gland	AC1305-M
• Sintered steel filter	SP-S15
• Extension cable 2 m, black	E2-02A
• Extension cable 2 m, white	E2-05A
• 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
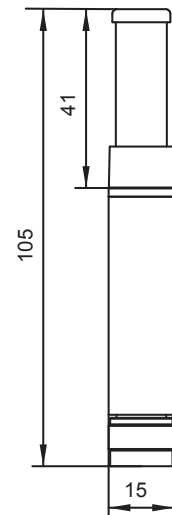
INDUSTRIAL CABLE PROBES

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

Applications

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

Features

- Accuracy: ±0.8 %RH, 0.1 K, at 23 ºC ±5 K
- Range of application: -100...200 ºC[1] / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1 V = -40...60 ºC / 0...100 %RH
- Adjusted at 23 ºC and 10, 35, 80 %RH

HC2-ICxxx   HC2-ICxxx-A
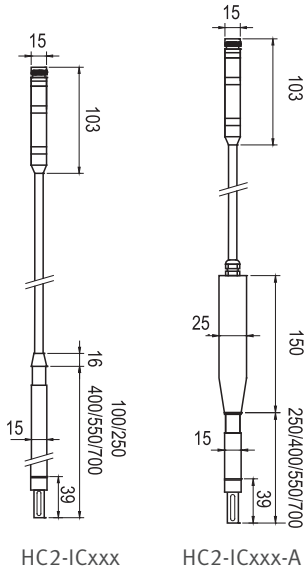
STANDARD INDUSTRIAL PROBES Ø 15 mm

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 ºC ±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 Ø 15/25 mm

Order code	HC2-IC3xx*-A	HC2-IC4xx*-A	HC2-IC5xx*-A	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 ºC ±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

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

INCLUDED

- Factory adjustment certificate

RECOMMENDED ACCESSORIES

• Filters see page 22.	
• 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 CABLE PROBES, STEEL

The metal industrial probe is especially suitable for high temperatures, demanding industrial environments and applications where hygiene plays an important role. The probe measures humidity and temperature and calculates the dew/frost point.

Applications
Food and pharmaceutical production, drying processes, industrial manufacturing

Features

- Accuracy: ±0.8 %RH, 0.1 K, at 23 °C ±5 K
- 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

HC2-IMxxx   HC2-IExxx

STEEL 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, DIN1.4305			
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

Note: Cannot be operated with two-wire transmitters.

COMPATIBLE

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

INCLUDED

- Factory adjustment certificate
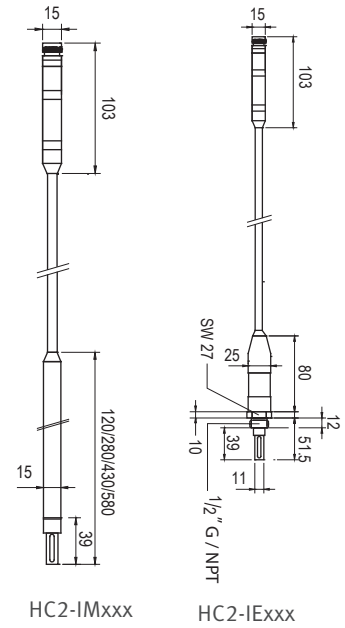
RECOMMENDED ACCESSORIES

• Filters see page 22.	
• 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
Climate and temperature chambers, dryers, air ducts

Features

- Accuracy: ±0.8 %RH, 0.1 K, at 23 °C ±5 K
- Range of application: -100…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

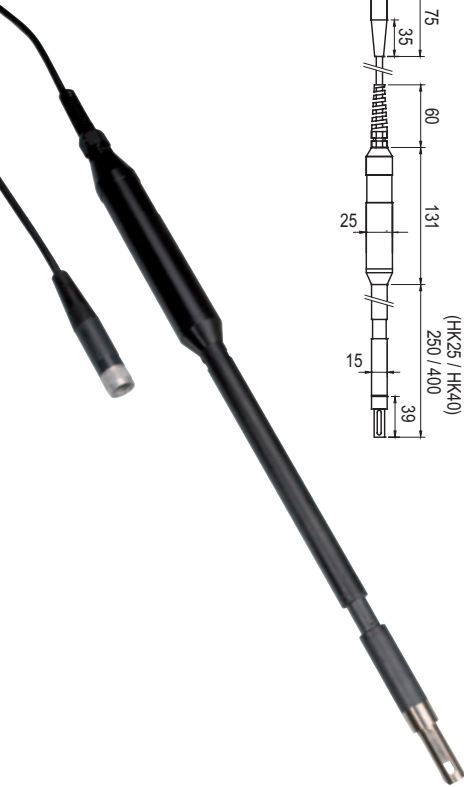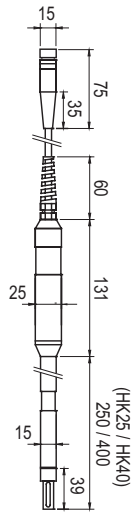| Order code	HC2-HK25	HC2-HK40
Probe type	Handheld probe with 2 m TPU cable	
Dimensions	Ø 15 x 250 mm	Ø 15 x 400 mm
Accuracy	±0.8 %RH, ±0.1 K, at 23 °C ±5 K	
Power supply	3.3 VDC ±0.1 VDC, current: ~4.5 mA	
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 Class A	
Response time	‹15 s, without filter	
Housing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

COMPATIBLE

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

INCLUDED

- Factory adjustment certificate
- Wire mesh filter

RECOMMENDED ACCESSORIES

• Filters see page 22.	
• Humidity standard for calibration 10% RH	EA10-SCS
• Humidity standard for calibration 35% RH	EA35-SCS
• Humidity standard for calibration 80% RH	EA80-SCS
• Calibration device	ER-15

HygroWin USB probes

The USB cable mount (3 m) probe measures humidity and temperature. It is ideal for PC based monitoring applications. HW4 Lite monitoring and logging software comes with the probe.

Applications
Residential and office rooms

Features

- Accuracy: ±2 %RH, 0.3 K, at 23 °C ±5 K
- Connects directly to a PC 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, SMD 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 adjustment certificate
- HW4 Lite software

Recommended 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

Note: A maximum of three probes can be used with HW4 Lite.

Miniature probes

The miniature probe is used for humidity and temperature measurement in confined spaces. It also calculates the dew/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

- Accuracy: ±1.5 %RH, 0.3 K, at 23 ºC ±5 K
- Range of application: -40...85 ºC / 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 ºC 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 23ºC ±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

Note: Cannot be used with two-wire transmitters.
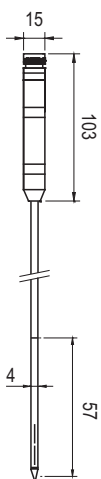
HC2-C04
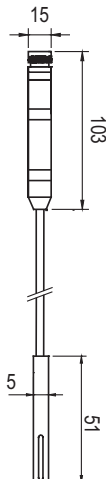
HC2-C05

Compatible

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

Included

- Factory adjustment certificate

Recommended accessories

• Extension cable 2 m, black	E2-02A
• Teflon filter 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 mounted in the walls of glass cabinets, showcases, laboratories and in clean room panels for humidity and temperature measurement.
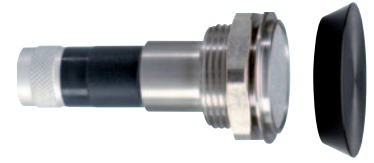
Applications
Medical technology industry, clean rooms, museums, hotels, ships, HVAC, exhibition rooms

HC2-IS25, steel filter, cover
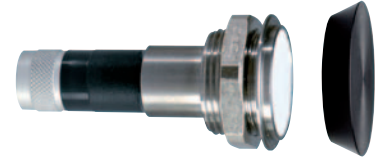
HC2-IP25, PE-HD filter, cover

Features

- Accuracy: ±1.5 %RH, 0.2 K at 0…90 %RH and 23 °C ±5 K
- Range of application: -40…85 °C / 0…99 %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-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	3.3…5 VDC, adjusted 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	‹20 s	‹25 s	‹20 s
Housing material	Polycarbonate, stainless steel DIN 1.4301		
Weight	50 g		

Compatible

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

Included

- Factory adjustment certificate
- Protection cover

Recommended accessories

• Extension cable 2 m, black	E2-02A
• Calibration device flush mount probe	Elx-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, Ø 5 mm / 10 mm

The insertion probe is suitable for measurement in dust-free (P05) or dusty (HP28/50) bulk materials, bricks, concrete, etc. It measures humidity and temperature and calculates the dew/frost point.

Applications

Water activity measurement, page 106
Portable measuring units with handheld instruments and data loggers

Features

- Accuracy: ±0.8/1.5 %RH, 0.1/0.3 K, at 23 ℃ ±5 K
- Range of application: -40...85 ℃ / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1 V = -40...60 ℃ / 0...100 %RH
- Adjusted at 23 ℃ 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 ℃ ±5 K
Power supply	3.3...5 VDC, adjusted 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 x 280 mm	Ø 10 x 500 mm
Accuracy	±0.8 %RH, ±0.1 K, at 23℃ ±5 K	
Power supply	3.3...5 VDC, adjusted 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

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

INCLUDED

- Factory adjustment certificate

RECOMMENDED 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 and all types of production webs

Features

- Accuracy: ±0.8 %RH, 0.1 K, at 23 °C ±5 K
- 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	3.3...5 VDC, adjusted 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

HygroFlex transmitter

Analog output

Web probe BFC-UART

Web probe BFC-UART
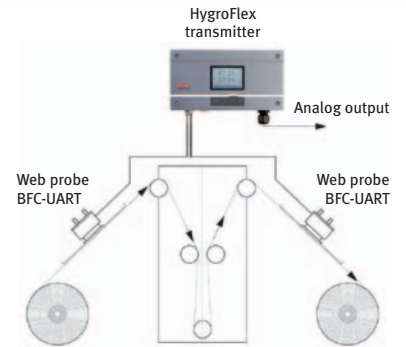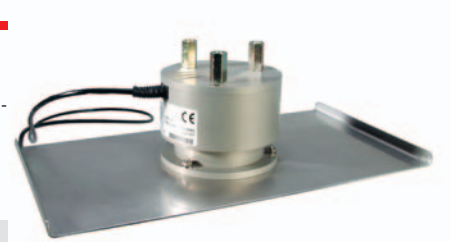
SWORD PROBES

Applications

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

Features

- Accuracy: ±0.8 %RH, 0.1 K, at 23 °C ±5 K
- 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	3.3...5 VDC, adjusted 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
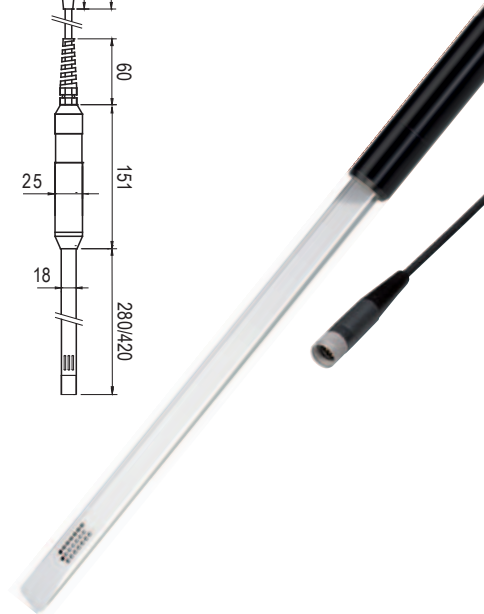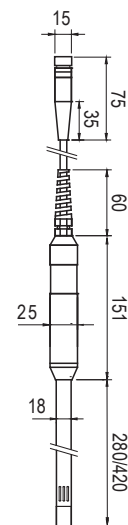
COMPATIBLE

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

INCLUDED

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

RECOMMENDED ACCESSORIES

• Replacement filter (BFC-UART)	ET-W37-Set
• Calibration device, web probe	WP-14-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

XD PROBES

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

Applications

OEM, HVAC, climate chambers, snow guns and meteorology

Features

- Accuracy at 23 °C ±5 K: ±0.8 %RH, ±0.2 K
- Housing colors: 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*

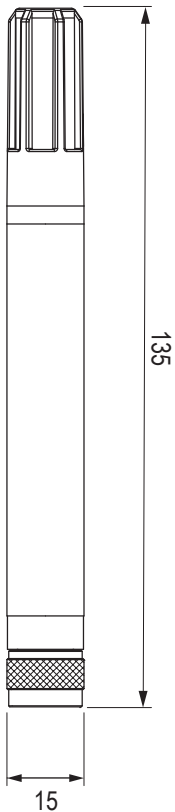| Order code	XD33-S3X	XD33-W3X
Housing color	Black	White
Range of application	-40...85 °C	
Accuracy at 23 °C ±5 K	±0.8 %RH, ±0.2 K	
Power supply	5...24 VDC / 5...16 VAC (0...1 V) 16...24 VDC / 12...16 VAC (all output versions)	
Current consumption	‹12 mA	
Long-term stability	‹1 %RH / year	
Sensor type	ROTRONIC HYGROMER® IN-1 / SMD 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

RECOMMENDED ACCESSORIES

• Mounting flange	AC5005
• Polyethylene filter, gray, 20 µm	NSP-PCB-PE
• Polyethylene filter, white, 40 µm	NSP-PCW-PE40
• Extension cable 2 m, with open ends, black	E2-02XX
• Extension cable 2 m, with open ends, white	E3-02XX
• 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
• Service cable to PC	XD-AC3001

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15

Note: Not compatible with data loggers / transmitters / handheld instruments.

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* HW4 software and a service cable is needed to change the analog signals.

XD INDUSTRIAL PROBES

The industrial versions are especially suitable for high temperatures and demanding industrial environments.

Applications

Industrial manufacturing, climate chambers, drying processes

Features

- Accuracy at 23 ºC ±5 K: ±0.8 %RH, ±0.2 K
- Remote electronics
- Range of application: -100...200 ºC[1] / 0...100 %RH
- Digital interface UART
- Standard output scaling: 0...1 V = -100...200 ºC / 0...100 %RH
- Adjusted at 23 ºC and 10, 35, 80 %RH
- Freely scalable output signals: 0...1/5/10 VDC and 0/4...20 mA*

Order code	XD33-SC12FE	XD33-SC15FE
Cable length	2 meters	5 meters
Range of application	-100...200 ºC[1]	
Accuracy at 23 ºC ±5 K	±0.8 %RH, ±0.2 K	
Power supply	5...24 VDC / 5...16 VAC (0...1 V) 16...24 VDC / 12...16 VAC (all output versions)	
Current consumption	‹50 mA	
Long-term stability	‹1 %RH / year	
Sensor type	ROTRONIC HYGROMER® IN-1 / Pt100 Class A	
Probe length	100/250/400/550/700 mm	
Response time	‹15 s	
Housing material	PEEK	
Interface	UART or RS-485	

INCLUDED

- Factory adjustment certificate
- Short instruction manual

RECOMMENDED ACCESSORIES

• Filters see page 22	
• Mounting flange	AC5005
• Extension cable 2 m, with open ends, black	E2-02XX
• 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
• Service cable to PC	XD-AC3001

[1] Short-term peak load
* HW4 software and a service cable is needed to change the analog signals.
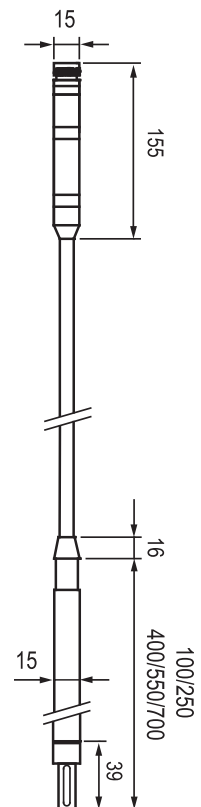
Note: Not compatible with data loggers / transmitters / handheld instruments.

SYSTEM OVERVIEW

Regardless of the ATEX safety class required, the ROTRONIC ATEX measuring system consists of an intrinsically safe HygroClip EX probe and a Zener barrier (only one analog output 4...20 mA for temperature or humidity measurement). If both humidity and temperature measurements are required, a transmitter and connection cable must be used (digital signal).

HYGROCLIP EX PROBES

- Intrinsically Safe probes
- Measure relative humidity & temperature
- Accuracy at 23 ºC ±5 K: ±1 %RH / ±0.3 K
- Range of application electronics: -40...40 ºC
- Temperature of medium at probe: max. -40...80 ºC for ATEX applications, max. -50...200 ºC for non-ATEX applications

HTSXX TRANSMITTERS

- Transmitters for interchangeable HygroClip EX probes
- Display the humidity and temperature or the calculated value
- Up to 3 analog outputs
- Range of application electronics: -40...60 ºC

Max. 200 m

Connection cable XX ET-7018
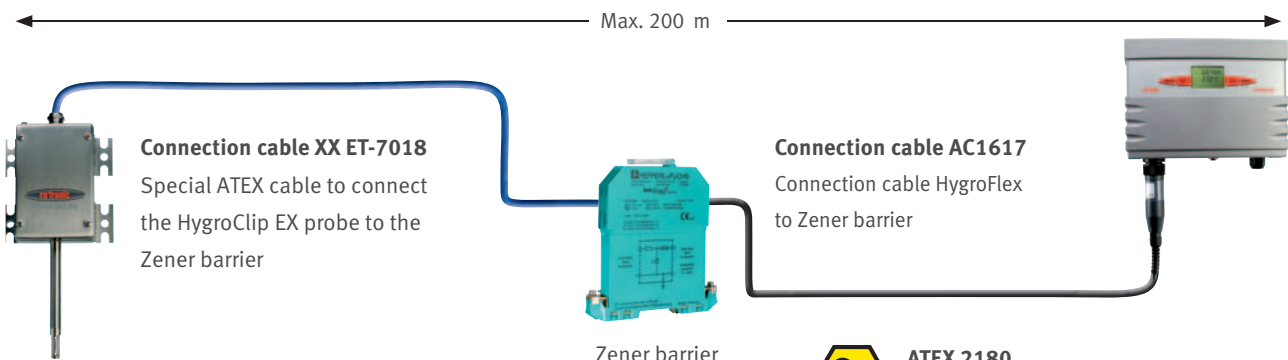Special ATEX cable to connect the HygroClip EX probe to the Zener barrier

Connection cable AC1617
Connection cable HygroFlex to Zener barrier

Zener barrier

ATEX 2180
Directive 94/9/EC

Applications

Zone 0/20 T5	Zone 1/21 T6	Zone 1/21 T6	Safe zone Zener barrier or galvanic isolation
Class ll, Division 1 Group E, F, G		Class l, Division 1 Group A, B, C, D	
		HygroClip IC-1-EX ll 1 G EEx ia llC T5 resp. ll 2 G EEx ia lC T6 II 1/2 D IP6X T 80 ºC	
		HygroClip IE-1-EX ll 1 G EEx ia llC T5 resp. ll 2 G EEx ia lC T II 1/2 D IP6X T 80 ºC	
Only the sinter filter may be used in zone 20/21		HygroClip ID-EX ll 1 G EEx ia llC T5 resp. ll 2 G EEx ia lC T II 1/2 D IP6X T 80 ºC	
Only the sinter filter may be used in zone 21		HygroClip IW-1-EX ll 1 G EEx ia llC T5 resp. ll 2 G EEx ia lC T6 II 2D IP6X T 80 ºC	

Note:

The total cable length between HygroClip EX probe and HygroFlex transmitter may not exceed 200 m.

HygroClip EX probes may NOT be calibrated in the EX zone because the accessories are not EX-compliant.

HygroClip EX probes

Features

- Intrinsically Safe probes, ATEX and FM approved
- Power supply via HygroFlex transmitter
- Measures relative humidity & temperature
- Range of application electronics: -40...40 °C

  Medium temperature at probe:

  max. -40...80 °C for ATEX applications

  max. -50...200 °C for non ATEX applications
- Accuracy at 23 °C ±5 K: ±1% RH / ±0.3 K
- Housing: chrome nickel steel, V4A/AISI 316/1.440

HygroClip IC-EX

Cable probes

Order code	HygroClip IC-1-EX	HygroClip IC-3-EX
Probe length	Ø 15 x 120 mm	Ø 15 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

HygroClip IE/EX

Wall/Duct probes

Order code	HygroClip IW-EX	HygroClip ID-EX
Type	Wall probe	Duct probe
Probe length	Ø 15 x 150 mm	Ø 15 x 250 mm

Compatible

- Transmitters HTS series

HygroClip IW-EX

Included

- Factory adjustment certificate
- Instruction manual
- Connection diagram
- Type examination certificate, ATEX and FM

Recommended accessories

- Connection cable HygroClip-EX Zener barrier (blue)

  ET-7018
- Connection cable HTS to Zener barrier AC1617-ZB/xx

  (For xx = 2, 5, 10, in 5 m steps, max 200 m)
- Zener barrier ZB1, use with HTS
- ZB1-420 Zener barrier for a two-wire system (only temperature or humidity)
- Sintered steel filter   SP-S15
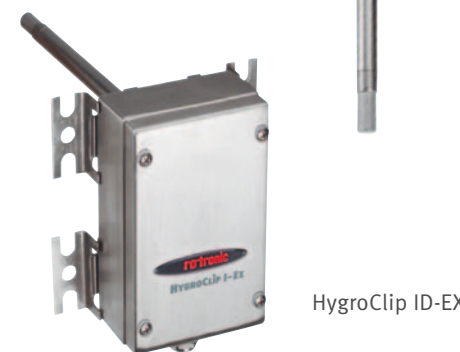
HygroClip ID-EX

Transmitters HTS series

Features

- Measures relative humidity & temperature
- All psychrometric calculations available
- Range of application electronics: -40...60 ºC / 0...100 %RH
  -10...60 ºC 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

- Plastic housing
- Metal housing

Output parameters

- Humidity & temperature
- Humidity only or temperature only
- Humidity & Temperature + calculated parameter

Output scaling

- Relative humidity: range selectable, standard scale: 0...100 %RH
- Temperature: range selectable
- Dew point: range selectable

Display/Keypad

- LC display with 2 lines, foil keypad
- Without display

HygroClip specifications	IC-1-EX	IC-3-EX	IE-1/EX	IE-3/EX	IW-EX	ID-EX
Probe type	Cable probes		Screw-in probes		Wall probe	Duct probe
Dimensions/Thread	Ø 15 x 120 mm	Ø 15 x 270 mm	½" G	½" NPT	Ø 15 x 150 mm	Ø 15 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					
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

Transmitter specifications	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 connection / Interface	Threaded coupling / DIO	
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 VDC (140 mA), 12…24 VAC or 90…250 VAC, 3.5 VA	
Application temp. housing / electronics	-40…60 °C / -30…60 °C (with LCD), 0…100 %RH	
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, measurement range -100…200 °C / 0…100 %RH	
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

FILTER CARRIERS/FILTERS

Description

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. Specific conditions such as high air velocities, pollutants in the air, disinfection and cleaning measures, mechanical impacts, high bioactivity, condensation, airborne chemical contaminants and required response time are some of the many considerations.
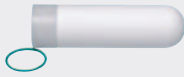
Plastic filter carrier

- **Maximum temperature 120 °C**
- Mechanical protection

Metal filter carrier

- **Maximum temperature 200 °C**
- Mechanical protection

Overview filters

	Teflon filters	Polyethylene filters	MFD filters (membrane)	Polypropylene filters (screen)	Sintered steel filters (stainless steel)	Wire mesh filters (metal)
Maximum temperature (consider range of application of filter carrier)	200 °C	100 °C	120 °C	120 °C	200 °C	200 °C
Protection against particulates	✔✔	✔✔	✔		✔	✔
Protection against abrasives in the air					✔✔✔	✔
Fast response time (low damping)			✔	✔✔		
Pore size	10 µm	20/40 µm	–	150 µm	5 µm	20...25 µm
Max. air velocity [m/s] (continuous load)	20	20	15	10	40	25

✔ = low
✔✔ = medium
✔✔✔ = high
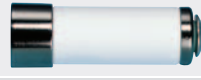
Filters and filter carriers for standard probes HC2-S / HC2-S3
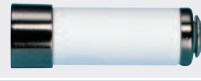
Order code	Filter carrier	Filter element	Pore size	Range of application	
NSP-PCB-PE	Polycarbonate, black	Polyethylene, gray	20 µm	-50...100 °C	
NSP-PCB-PE40		Polyethylene, white	40 µm		
NSP-PCB-WM		Wire mesh	20...25 µm		
NSP-PCB-TF		Teflon	10 µm		
NSP-PCB-MFD		MFD	–		
NSP-PCB-PP100		Polypropylene	150 µm		
NSP-PCB		No filter element, only carrier			
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-PE	No carrier, only filter	Polyethylene, gray	20 µm	-50...100 °C	
Particulate filter / Waterproof					
NSP-POM-FD2	POM, white	Teflon	2 µm	-50...100 °C	

Filters and filter carriers for industrial probe series HC2-IC / HC2-HK
Special thread

Order code	Filter carrier	Filter element	Pore size	Range of application	
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	Sintered steel 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 / IE
Thread: M12 x 1.5
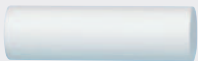
Order code	Filter carrier	Filter element	Pore size	Range of application	
SP-MC15	Brass, nickel-plated	Wire mesh DIN 1.4401	20…25 µm	-100…200 °C	
SP-SC15		Sintered steel DIN 1.4401	5 µm	-100…200 °C	
SP-TC15		Teflon	10 µm	-80…200 °C	
Spare parts					
SP-MSB15	Brass, nickel-plated	No filter element, only 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 application	
SP-T05	No filter carrier, only filter	Teflon	10 µm	-40...285 °C	

Filters for handheld probe HC2-HP28/HP50

Order code	Filter carrier	Filter element	Pore size	Range of application	
ET-Z10	No filter carrier, only filter	Sintered steel DIN 1.4401	5 µm	-40...85 °C	
SP-TS12	No filter carrier, only filter	Teflon	10 µm	-40...85 °C	

Filters and filter carriers HF3

Order code	Filter carrier	Filter element	Pore size	Range of application	
NSP-PCG-PE	Polycarbonate, gray	Polyethylene, gray	20 µm	-40...85 °C	
NSP-PCG-WM		Wire mesh	20...25 µm	-80...85 °C	
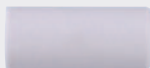
Filters and filter carriers for MP100A/400A

Order code	Filter carrier	Filter element	Pore size	Range of application	
SP-W3-25	Polycarbonate, white	Wire mesh	20 µm	-40...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: 20...25 µm	
ET-W37-Set	Flat wire mesh filter with circlip, Ø 37 mm for BFC-UART Pore size: 20...25 µm	

Filter for HF1, CP11, CL11

Order code	Description	
NSP-PCB-PE-AZ	Filter for HF1, CP11, CL11	

TRANSMITTERS

THE HYGROFLEX SERIES

HygroFlex transmitters the are perfect instruments for constant monitoring of temperature and humidity in building management systems, clean rooms, data centers, museums, storage rooms and libraries. The transmitters are available in duct, wall, and compact space versions and, together with the optional HW4 software package, and a Rotronic datacable can be configured exactly as required. Customer needs and the application determine on the model: for example, the **HygroFlex5** has an interchangeable probe that can be changed in a matter of seconds, while the **HygroFlex1 series** is ideal for cost-sensitive HVAC applications thanks to its unbeatable value for money.

CONTENTS

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Transmitters	HF1	HF3
Range of application electronics	-20...50 °C	-40...60 °C
with LCD	-20...50 °C	-10...60 °C
Temperature limits at probe	-20...50 °C	-40...60 °C
Accuracy at 23 °C	±3.0 %RH	±2 %RH
	±0.3 °K	±0.3 °K
FDA / GAMP conformity		✔
Probe		
Probe connection	Not interchangeable	Not interchangeable
Housing		
Space mount version	✔	✔
Wall version	✔	✔
Duct version, 15 mm probe	✔	✔
Duct version, 25/15 mm probe		
Cable version		
Display	✔	✔
Keypad		
IP protection	IP65 (space mount version IP20)	IP65 (space mount version IP20)
Power supply		
15...40 VDC / 12...28 VAC	✔	✔
15...40 VDC / 12...28 VAC galvanically isolated		
85...240 VAC galvanically isolated		
Power over Ethernet(POE)		
Output		
2 or 2 x 2-wire current output	2	2
3/4-wire current or voltage output	2	2
RS-485		
Ethernet		
Wireless		
Analog and digital combinable		
Modbus (ASCII)		
Functions		
Data logging		
Relay		
Hygrostat / Thermostat		
Beep tone		
Analog input		
Psychrometric Parameters		Dew/Frost point

	HF4	HF5	HF7	HF8
	-40…60 °C	-40…60 °C	-40…85 °C	-40…85 °C
	-10…60 °C	-10…60 °C	-10…60 °C	-10…60 °C
	-50…100 °C	Probe dependent	-50…100 °C (type W)	Probe dependent
			-100…150 °C (type D)	
			-100…200 °C (type C)	
	±1 %RH	Probe dependent	±1 %RH	Probe dependent
	±0.2 K		±0.2 K	
	✔	✔	✔	✔
	Not interchangeable	1x interchangeable HC2 probe	Not interchangeable	2x interchangeable HC2 probes
	✔	✔	✔	✔
	✔	✔	✔	✔
			✔	
			✔	
	✔	✔	✔	✔
	✔	✔		✔
	IP65	IP65	IP67	IP65
	✔	✔	✔	✔
		✔		✔
		✔		✔
		✔		✔
	2	2	2	
	2	2	2	4
	✔	✔		✔
	✔	✔		✔
	✔	✔		
		✔		✔
	✔			
				✔
				4 (2 relays with Ethernet option)
				✔
				✔
				✔
	Dew/Frost point	All	Dew/Frost point	All

HF1 series

Features

- Accuracy: ±3 %RH / ±0.3 K at 23 °C ±5 K
- Operating Range - Electronics: -20…50 °C / 0…100 %RH
- Small size
- Easy mechanical installation
- USB service interface
- Adjusted at 35 % RH / 80 %RH

POWER SUPPLY

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

SIGNAL OUTPUTS

- Current output
- Voltage output

VERSIONS

- Space mount version with fixed probe, internal
- Duct version
- Wall version

OUTPUT PARAMETERS

- Humidity & temperature

OUTPUT SCALING

- Relative humidity: range selectable, standard 0…100 %RH
- Temperature: range selectable, standard 0…50 °C

DISPLAY

- Display with or without backlight
- Without display

Order code on request.

HF1 DUCT AND WALL VERSIONS

Applications
Measures relative humidity and temperature in HVAC applications.

2 or 2x2-wire

	HF120
Output signals	4...20 mA
Supply voltage	10...28 VDC
Display	Optional (without backlight)

3/4-wire

	HF13x
Output signals	0...1 V 0...5 V 0...10 V 4...20 mA Customer rescaling possible
Supply voltage	15...40 VDC / 12...28 VAC
Display	Optional (with backlight)

Temperature range	Scalable
Probe	Not interchangeable Standard, duct probe 100 mm (optional, duct probe 300 mm)
Filter type	Polyethylene

COMPATIBLE
• SW21 software , see page 155

INCLUDED
• Factory adjustment certificate
• Short instruction manual

RECOMMENDED ACCESSORIES
• USB service cable: AC0003
• Calibration device: ER-15
• Mounting gland: AC5005

Wall version
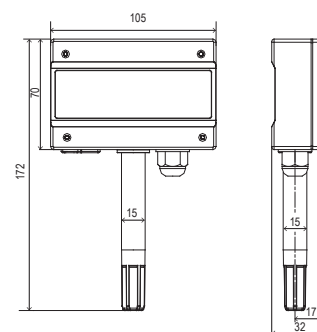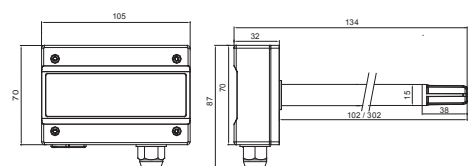
Duct version

HF1 SPACE MOUNT VERSION

Type S

Type L

Applications

Measures relative humidity and temperature in offices and rooms where design is important.

2 or 2x2-wire

	HF120
Output signals	4…20 mA
Supply voltage	10…28 VDC
Display	Optional (without backlight)

3/4-wire

	HF13x
Output signals	0…1 V / 0…5 V / 0…10 V / 4…20 mA Customer rescaling possible
Supply voltage	15…40 VDC / 12…28 VAC
Display	Optional (with backlight)

Specifications	HF1 Analog 2-wire	HF1 Analog 3/4-wire
General		
Parameters	Humidity and temperature	
Housing material / Protection	ABS / IP65, except type L/S IP20	
Dimensions	105 x 172 x 32 mm (type W), 105 x 87 x 134(334) mm (type D), 86 x 86 x 24 mm (type L/S)	
Weight	140 g	
Probe connection	Fixed	
Filter material	Polyethylene	
Display	LCD, 1 or 2 decimals, without backlight	LCD, 1 or 2 decimals, with backlight
Electrical connections	Type D/W: screw terminals inside, M16 cable gland	
Power supply	10…28 VDC	15…40 VDC / 12…28 VAC
Current consumption	2x20 mA max.	‹55 mA (current output) ‹15 mA (voltage output)
Range of application	-20…50 °C / 0…100 %RH (non-condensing)	
Service interface	USB Mini	
CE / EMC compatibility	EMC Directive 2004/108/EC	
Humidity measurement		
Sensor	ROTRONIC HYGROMER® IN-1	
Measurement range	0…100 %RH	
Accuracy at 23°C ±5 K	±3.0 %RH (10…90 %RH)	
Long-term stability	‹1.5 %RH/year	
Response time	‹30 s t63 (63 % of a jump 35…80 %RH) without filter	
Maximum wind velocity	20 m/s with filter	
Temperature measurement		
Sensor	NTC	
Measurement range	-20…50 °C / 0…100 °F	
Accuracy at 23°C ±5 K	±0.3 K	
Response time	4 s	
Analog output		
Number	2	
Current	4…20 mA	4…20 mA
Voltage	N/A	0…1/5/10 V

HF3 series

Features

- Accuracy: ±2 %RH / ±0.3 K at 23°C ±5 K
- Temperature limit at probe: -40…60 °C / 0…100 %RH
- Range of application electronics: -40…60 °C / 0…100 %RH,
  -10…60 °C with LCD
- 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

Versions

- Space mount version with fixed probe, internal
- Space mount version with fixed probe, retractable
- Duct version
- Wall version

Output parameters

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

Output scaling

- Relative humidity: range selectable, standard 0…100 %RH
- Temperature: range selectable
- Dew point: range selectable

Display

- Display with or without backlight
- Without display

Order code on request.

HF3 SPACE MOUNT VERSION

Applications

Measures relative humidity and temperature and calculates the dew/frost point in offices 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	18…40 VDC / 13…28 VAC	
Display	Optional	
	(with backlight)	

Temperature range	Scalable*	
Probe	Fixed internal	Retractable
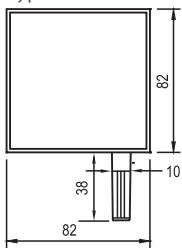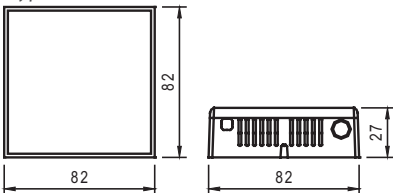
COMPATIBLE

• HW4 software, see page 148

INCLUDED

• Factory adjustment certificate

• Product qualification

• Short instruction manual

RECOMMENDED ACCESSORIES

• Service cable: AC3006 / AC3009* (page 86)

• Calibration device (type R):   ER-10MS

Reference

* Requires optional HW4 software and service cable

Type R

Type S

HF3 DUCT AND WALL VERSIONS

Applications

Measures relative humidity and temperature and calculates the dew/frost point in HVAC applications focused on relability and repeatability.

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
Output signals	0…1 V 0…5 V 0…10 V 0…20 mA 4…20 mA Customer rescaling possible*
Supply voltage	18…40 VDC / 13…28 VAC

Temperature range	Scalable*
Probe input	Fixed
Filter type	Polyethylene

COMPATIBLE

• HW4 software, see page 148

INCLUDED

• Factory adjustment certificate

• Product qualification

• Short instruction manual

RECOMMENDED ACCESSORIES

• Service cable:	AC3006 / AC3009* (page 86)
• Replacement filter, PE, gray:	NSP-PCG-PE
• Calibration device:	ER-15
• Mounting gland:	AC5005

Reference

* Requires optional HW4 software and service cable

Duct version
Type D
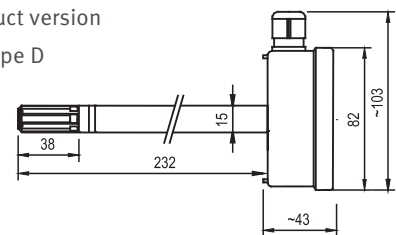
Wall version
Type W
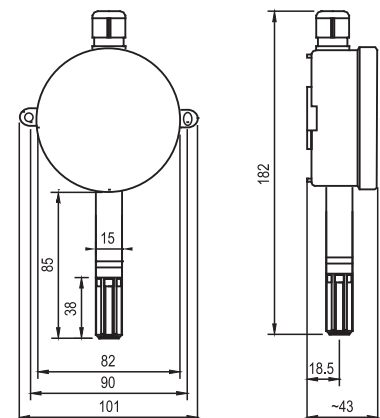
Specifications	HF320 Analog 2-wire	HF33x Analog 3/4-wire
General		
Parameters	Humidity and temperature	
Calculated parameters	Dew/Frost point	
Housing material / Protection	ABS / IP65, except type R/S IP20	
Dimensions	101 x 182 x 43 mm (type W), 103 x 82 x 278 mm (type D), 82 x 82 x 27 mm (type S), 120 x 82 x 27 mm (type R)	
Weight	140 g	
Probe material	Polycarbonate	
Probe connection	Fixed, type R retactable	
Filter material	Polyethylene	
Display (only type R/S)	LCD, 1 or 2 decimals, without backlight	LCD, 1 or 2 decimals, with backlight
Electrical connections	Type D/W: screw terminals inside, M16 cable gland	
Power supply	10...28 VDC	18...40 VDC / 13...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)
Application temperature	-40...60 °C / -10...60 °C (with LCD)	
housing / electronics	0...100 %RH	
Application temperature 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	
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)
Accuracy at 23 °C	0.03 mA	0.02 mA 2 mV (0...1 V), 5 mV (0...10 V)

HF4 series

Features

- Accuracy: ±1 %RH / ±0.2 K at 23°C ±5 K
- Temperature limit at probe: -50…100 °C / 0…100 %RH
- Range of application electronics: -40…60 °C / 0…100 %RH;
  -10…60 °C with LCD
- Digital outputs
- Use as 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 version
- Wall version

OUTPUT PARAMETERS

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

OUTPUT SCALING

- Relative humidity: range selectable, standard 0…100 %RH
- Temperature: range selectable
- Dew point: range selectable

DISPLAY

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

Order code on request.

HF4 DUCT AND WALL VERSIONS

Applications

Measures relative humidity and temperature and calculates the dew/frost point.

Suitable for HVAC and light industrial applications.
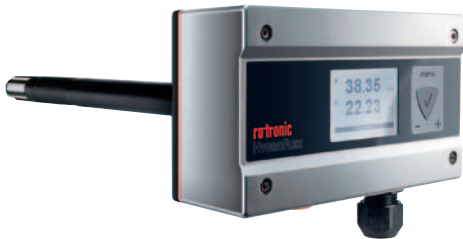
2 or 2x2-wire

	HF420 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 pictures)

3/4-wire

	HF43x Type W/D	HF456 Type W/D (digital)
Output signals	0…1 V 0…5 V 0…10 V 0…20 mA 4…20 mA Customer rescaling possible*	RS-485 Ethernet WLAN Modbus ASCII
Supply voltage	18…40 VDC 13…28 VAC	6…35 VDC 5…28 VAC
Display	Optional (with backlight, keypad) Type D only horizontal version possible with display (see photos)	

Temperature range	Scalable*
Probe input	Fixed
Filter type	Polyethylene

COMPATIBLE

• HW4 software, see page 148

INCLUDED

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

RECOMMENDED ACCESSORIES

• Service cable:	AC3006 / AC 3009* (page 86)
• Replacement filter, polyethylene, black:	NSP-PCB-PE
• Calibration device:	ER-15
• Mounting kit DIN top-hat rail (type W):	AC5002
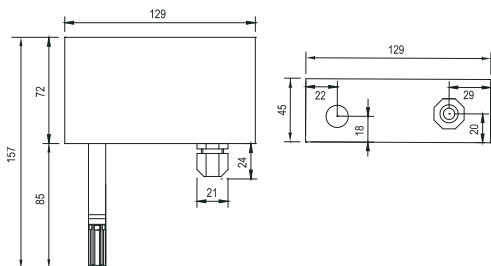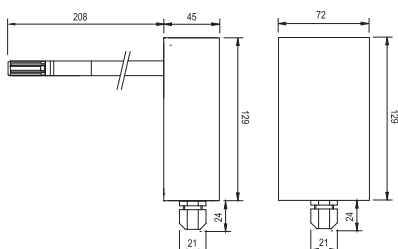
Reference

* Requires optional HW4 software and service cable

Wall version, type W

Duct version, type D

Specifications	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	18...40 VDC / 13...28 VAC	6...35 VDC / 5...28 VAC
Current consumption	2 x 20 mA max.	‹270 mA	‹420 mA
Application temp. housing / electronics	-40...60 ºC / -10...60 ºC (with LCD), 0...100 %RH		
Measurement range	-50...100 ºC		
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 23ºC ±5 K	±1.0 %RH		
Adjustment at 23 ºC	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 polyethylene filter		
Temperature measurement			
Sensor	Pt100 Class A		
Measurement range	-50...100 ºC / -58...212 ºF		
Accuracy at 23ºC ±5 K	±0.2 K		
Adjustment points	1		
Long-term stability	‹0.1 ºC / 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	No analog outputs
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)	
Accuracy at 23 ºC	0.03 mA	0.02 mA 2 mV (0...1 V), 5 mV (0...10 V)	
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
- Housing material: ABS / Aluminium
- Accuracy: see chapter «Probes», page 4
- Temperature limit at probe: see chapter «Probes»
- Range of application electronics: -40…60 °C / 0…100 %RH;
  -10…60 °C with LCD
- Digital outputs, also combinable with analog outputs
- Use as 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 version
- Wall version
- Cable version

OUTPUT PARAMETERS

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

OUTPUT SCALING

- Relative humidity: range selectable, standard scale 0…100 %RH
- Temperature: range selectable
- Psychrometric parameters: range selectable

DISPLAY

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

Reference

* Requires optional HW4 software and service cable

Note:
HF520 (2-wire version)
is not compatible with HC2-SM, HC2-IE, HC2-IM, HC2-C05 probes

HF5 DUCT AND WALL VERSIONS

Applications

Measures relative humidity and temperature and calculates all psychrometric parameters in applications which require the highest accuracy, repeatablity, and relability. Areas such as pharmaceuticals, precision electronics, and all critical manufacturing areas.

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 pictures)

3/4-wire

	HF5xx Type W/D	
Output signals	0…1 V 0…5 V 0…10 V 0…20 mA 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 (POE)	
Display	Optional (with backlight, keypad) Type D only horizontal version possible with display (see photos)	
Housing	ABS or aluminum	

Temperature and humidity ranges and all psychrometric parameters	Scalable*
Probe input	1 interchangeable HC2 probe
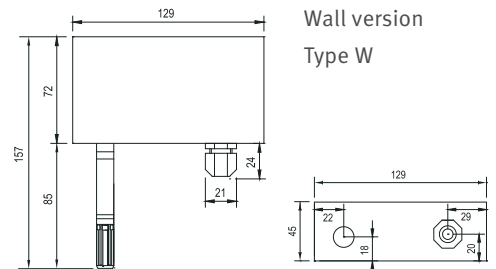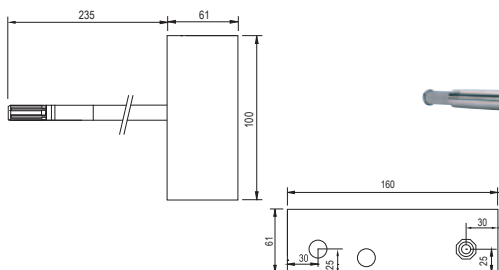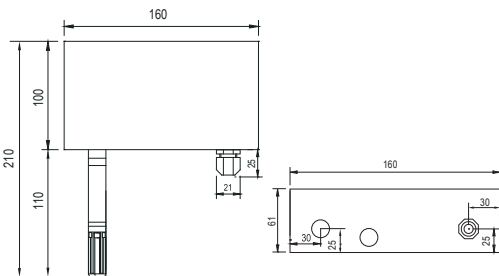
Wall version
Type W
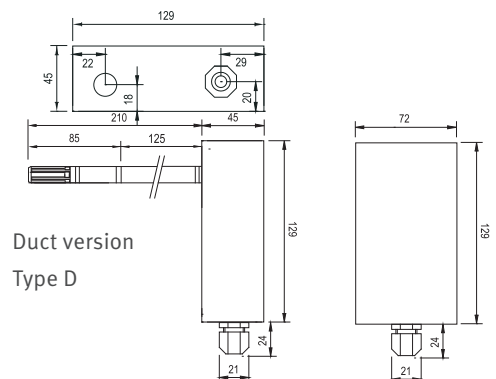
Duct version
Type D

41
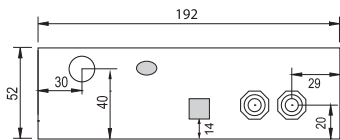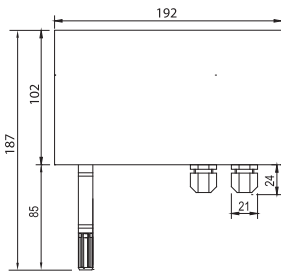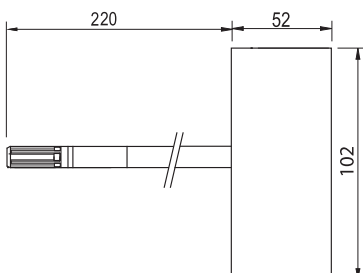
3/4-wire
Mains voltage

	HF5xx Type W/D	
Output signals	0…1 V 0…5 V 0…10 V 0…20 mA 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)	
Probe input	1 interchangeable HC2 probe	
Temperature and humidity ranges and all psychrometric parameters	Scalable*	
Housing	ABS	

COMPATIBLE

- All HC2 probes (order separately), page 4 ff.
- HW4 software, see page 148

INCLUDED

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

RECOMMENDED ACCESSORIES

- Standard climate probe: HC2-S
- Probe extension cable 2 m: E2-02A
- Service cable: AC3006 / AC3009* (page 86)
- Mounting kit DIN top-hat rail (type W):   AC5002
- Calibration cable for HP23 Handheld: AC2001

Reference

* Requires optional HW4 software and service cable

Wall version

Type W

Duct version

Type D

Specifications	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), Al/IP65 (also with Ethernet interface)			
Dimensions	ABS: 129 x 72 x 45 mm (type D/W) Al: 160 x 100 x 61 mm		192 x 102 x 52 mm (type D/W)	ABS: 129 x 72 x 45 mm type D/W Al: 160 x 100 x 61 mm
Weight	ABS: 220 g	ABS: 220 g, Al: 750 g	ABS: 500 g	ABS: 220 g / Al: 750 g
Probe connection / Interface	E2 (threaded coupling) / UART			
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 galvanically. 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 (3.8 W)
Application temp. housing / electronics	-25...60 ºC / -10...60 ºC (with LCD), 0...100 %RH	-40...60 ºC / -10...60 ºC (with LCD), 0...100 %RH		
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				
Humidity measurement	Probe dependent (chapter Probes, page 4)			
Temperature measurement				
Temperature measurement	Probe dependent (chapter Probes, page 4)			
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)		
Accuracy at 23 ºC	0.06 mA	0.02 mA 10 mV		
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
- Temperature limit at probe: max. -100...200 °C[1]
  0...100 %RH
- Range of application electronics: -40...85 °C / 0...100 %RH
  -10...60 °C with LCD
- Aluminum diecast housing and probe of stainless steel or PPS
- Various probe lengths available
- Use as 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 version

• Wall version

• Cable version

OUTPUT PARAMETERS

• Humidity & temperature

• Humidity only or temperature only

• Humidity & dew point

• Temperature & dew point

OUTPUT SCALING

• Relative humidity: range selectable, standard scale 0...100 %RH

• Temperature: range selectable

• Dew/Frost point: range selectable

DISPLAY

• Display with backlight (excl. 2-wire), trend indicators

• Without display

Reference

* Requires optional HW4 software and service cable

[1] Short-term peak load

Order code on request.

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
Probe	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…20 mA 4…20 mA Customer rescaling possible
Supply voltage	18…40 VDC / 13…28 VAC
Probe	Fixed, PPS / stainless steel
Display	Optional (with backlight)

Temperature range	Scalable
Temperature limit at probe	-50…100 ºC (type W) -100…150 ºC (type D)
Filter carrier	Slotted sleeve (order filter separately)

Wall version
Type W

Duct version
Type D

45
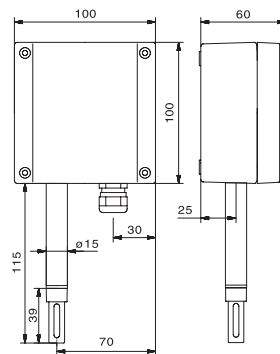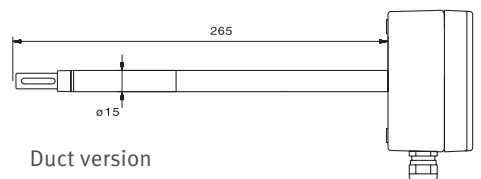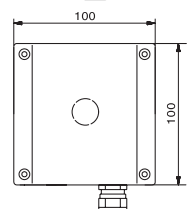
HF7 CABLE VERSION

2 or 2x2-wire

	HF720 Type W/D
Output signals	4...20 mA
Supply voltage	10...28 VDC
Probe	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...20 mA 4...20 mA Customer rescaling possible
Supply voltage	18...40 VDC / 13...28 VAC
Probe	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 ºC [1]
Filter carrier	Slotted sleeve (order filter separately)

Cable version

Type C
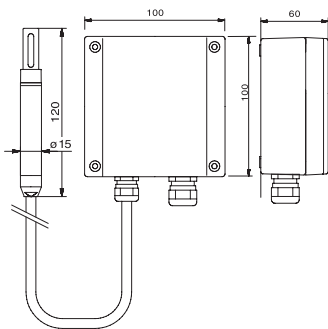
COMPATIBLE

• HW4 software, see page 148

INCLUDED

• Factory adjustment certificate

• Product qualification

• Short instruction manual

• Note: filter must be ordered separately

RECOMMENDED ACCESSORIES

• Teflon filter:	SP-T15
• Sintered steel filter	SP-S15
• Wire mesh filter:	SP-M15
• Service cable:	AC3006 / AC 3009* (page 86)
• Mounting gland:	AC1303-M

Reference

* Requires optional HW4 software and service cable

[1] Short-term peak load

Specifications	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 (150 mm)	
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	18...40 VDC / 13...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	
Measurement range	-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	
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)
Accuracy at 23 °C	0.03 mA	0.02 mA 2 mV (0...1 V), 5 mV (0...10 V)

[1] Short-term peak load

HF8 SERIES

Features

- 2 interchangeable HC2 or analog probes
- Accuracy: see chapter «Probes», page 4
- Temperature limit at probe: see chapter «Probes», page 4
- Range of application electronics: -40…60 °C / 0…100 %RH
  -10…60 °C with LCD
- Digital outputs, also combinable with analog outputs
- Analog inputs
- Data logging, up to 10,000 measured values
- Relay outputs
- Use as 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

SIGNAL OUTPUTS

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

VERSIONS

- Wall version
- Cable version

OUTPUT PARAMETERS

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

OUTPUT SCALING

- Relative humidity: range selectable, standard scale 0…100 %RH
- Temperature: range selectable
- Psychrometric parameters: range selectable

DISPLAY

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

Reference

* Requires optional HW4 software and service cable

HF8 WALL VERSION

Applications

Measures relative humidity and temperature and calculates all psychrometric parameters in applications which require the highest accuracy, repeatablity, and relability. Areas such as pharmaceuticals, precision electronics, and all critical manufacturing areas.

3/4-wire

	HF8xx Type W	
Output signals	0...1 V 0...5 V 0...10 V 0...20 mA 4...20 mA Customer rescaling possible	RS-485 Ethernet Relays
	Analog and digital combinable	
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 (POE)	
Display	Optional (with backlight, keypad)	
Temperature and humidity ranges and all psychrometric parameters	Scalable*	
Probe	2 interchangeable HC2	

Wall version, type W

COMPATIBLE

• All HC2 probes (please order separately), page 4

• HW4 software, see page 148

INCLUDED

• Product qualification

• Short instruction manual

• Screws and plugs for mounting

RECOMMENDED ACCESSORIES

• Standard climate probe:	HC2-S
• Industrial probe:	HC2-IC102
• Probe extension cable 2 m:	E2-02A
• Service cable:	AC3006 / AC 3009* (page 86)
• Mounting kit DIN top-hat rail	AC5002

Reference

* Requires optional HW4 software and service cable
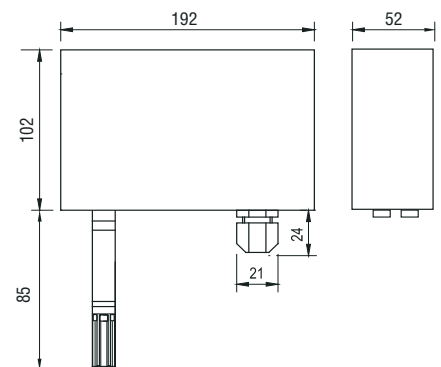
Specifications	HF832 Low voltage	HF842 Low voltage, galvanically isolated	HF862 Mains voltage, galvanically isolated
General			
Parameters	Humidity and temperature		
Calculated parameters	All psychrometric parameters		
Housing material / Protection	ABS / IP65 (models with Ethernet interface, IP40)		
Dimensions /Weight	192 x 102 x 52 mm / 550 g		
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
Power supply	15...40 VDC 14...28 VAC	9...36 VDC 7...24 VAC	85...265 VAC
Current consumption	380 mA max.		20 mA max. (without Ethernet) 60 mA max. (with Ethernet)
Application temp. housing / electronics	-40...85 ºC (-10...60 ºC with display), 0...100 %RH		
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			
Humidity measurement	Probe dependent (chapter Probes, page 4)		
Temperature measurement			
Temperature measurement	Probe dependent (chapter Probes, page 4)		
Analog output			
Number	4		
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)		
Accuracy at 23 ºC	0.02 mA 10 mV		
Digital output			
RS-485	RS-485 & analog		
Ethernet	Ethernet RJ45 & RS-485 & analog		
Switch output			
Type	Relay (single pole double throw, latching or non-latching)		
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		

XB

The OEM transmitter consists of a cable probe, a printed circuit board and an optional 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
Climate chambers, incubators, monitoring of industrial processes, etc.

Features

- Accuracy at 23 °C ±5 K: ±1.0 %RH / ±0.2 K
- Range of application probe: depending on probe from 0...100 %RH / -100 to 200 °C[1]
- Range of application 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, optional housing
- Probes
  - PPS and chrome 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

- HW4 software

INCLUDED

- Factory adjustment certificate
- Short instruction manual

RECOMMENDED ACCESSORIES

- Service cable AC3006 / AC 3009* (page 86)

Reference
* Requires optional HW4 software and service cable
[1] Short-term peak load
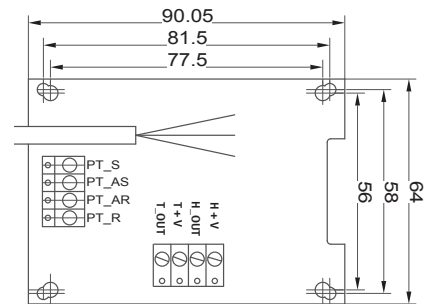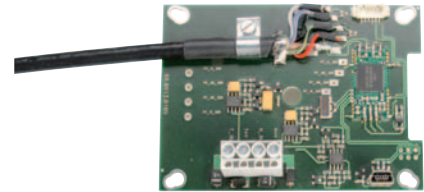
PPS probe Ø 15mm

PPS probe Ø 25/15mm

Chrome steel probe Ø 15mm

DATA LOGGERS

Data logger systems from ROTRONIC

Wireless network

Receiver   Transmitter

433 / 915 MHz

RS-485 network

RS-485   RS-485

Logger
with power supply
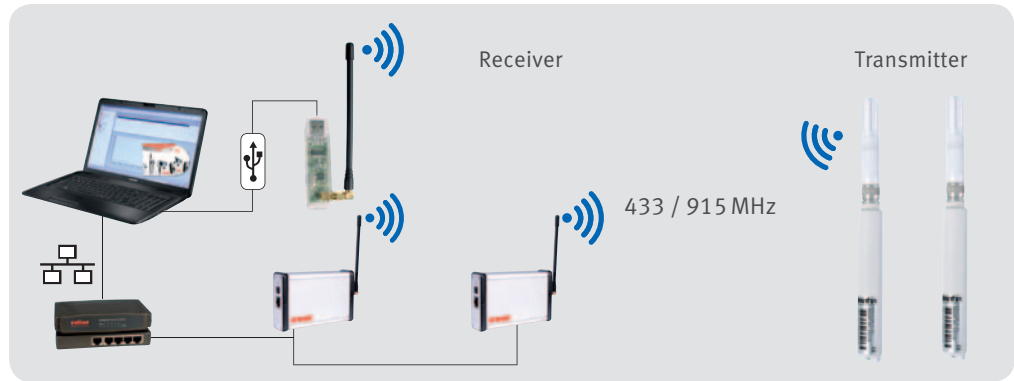
Logger, power supply
via RS-485 network

USB network

Logger with
power supply

Logger without
power supply

USB hub

Ethernet network

Ethernet hub   Logger with power supply

CONTENTS
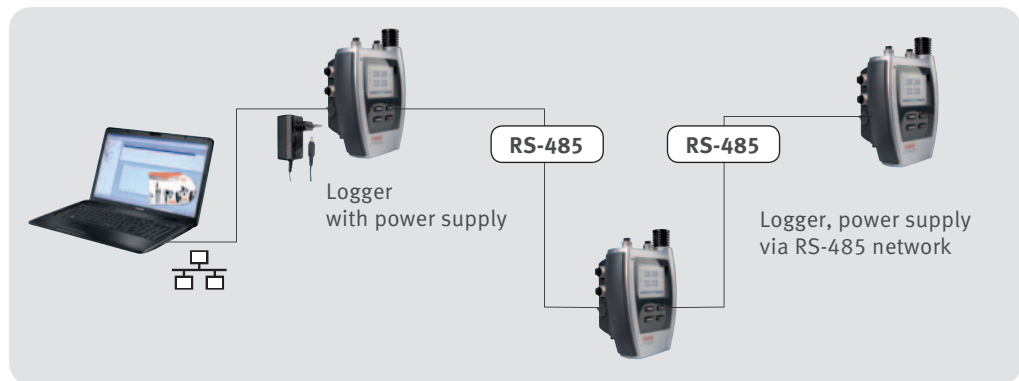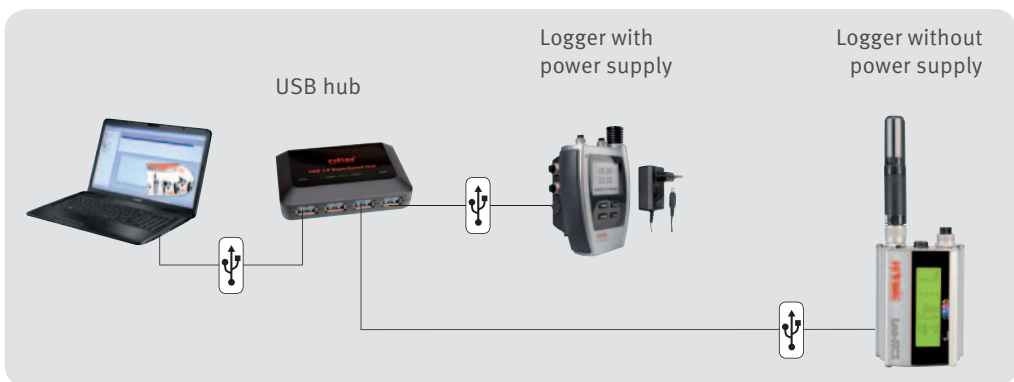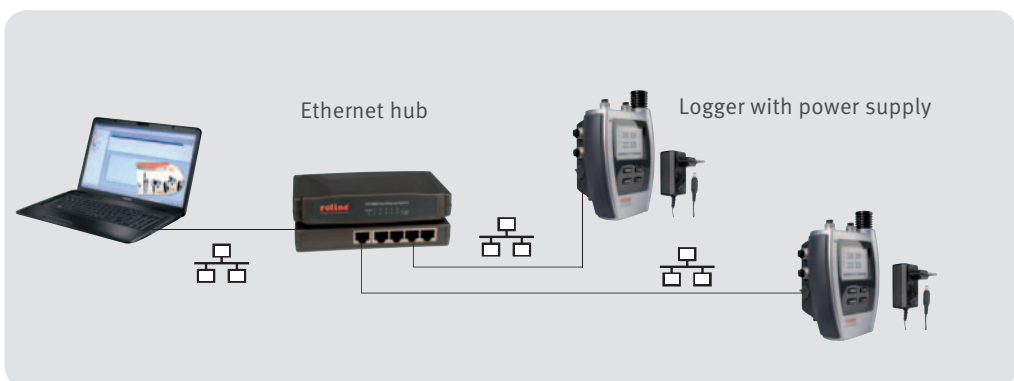
HygroLog series – Overview

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. Wireless transmission saves wiring costs and simplifies and speeds up data transfer from inaccessible points.

ROTRONIC data loggers fulfill the requirements of 21 CFR Part 11 and GAMP5 completely. 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 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.

	Compact	Universal	High-end	Wireless
	HL-20	LOG-HC2	HL-NT series	LOG-HC2-RC
Memory capacity	20,000	2,000,000	47,000 measured values per MB on memory card	500,000
Sensor	HYGROMER IN-1 / Pt100 Class A	Probe-dependent	Probe dependent	Probe-dependent
Range of application electronics	-10...60 ºC	-20...65 ºC	-30...70 ºC (-10...60 ºC, with display)	-40...85 ºC
Calculations	Dew/Frost point	Customized calculations	All psychrometric parameters	Only in HW4
Integrated clock	Yes			
Power supply	3 AA batteries	USB / Rechargeable battery	9 V battery/Rechargeable battery/Mains	Integrated battery
Configurable logging interval	Yes			
Programmable alarms	Yes			
Interface	UART	USB	Docking station	Wireless
Conforms to 21 CFR Part 11 and GAMP5	Yes	No	Yes	No
Protection	IP40	IP60	IP40	IP65
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 a reasonable 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, factories, museums, office buildings, clean rooms, shipping, libraries and test facilities

Features

- Range of application: -10...60 °C, 0...100 %RH
- 20,000 measured value pairs
- Accuracy at 23 °C ±5 K:
  ±0.8 %RH at 10...60 %RH / ±0.3 °C; ±1.3 %RH at 60...100 %RH / ±0.3 °C
- 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 visual alarms
- Battery operation

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 consisting of	HL-20D, HW4 Lite software, connection 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 consisting of	HL-20, HW4 Lite software, connection cable AC3006

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

Recommended accessories

• HW4 software	HW4 Lite
• PC connection cable	AC3006
• Calibration device	HL-20-CAL

Universal loggers LOG-HC2-P1

The rugged and compact data logger measures and records temperature, humidity, air pressure and light 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 top-hat rail.

Applications

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

Features

- 2,000,000 data point memory
- Range of applications electronics: -20…65 °C, 0…95 %RH
- Logging of measured data:
  - 2 interchangeable HC2 probes for relative humidity and temperature
  - Air pressure: 0…2000 mbar absolute
  - Illuminance: 0…65,000 lux
  - 3-axis acceleration / position: ±15 g
- Power supply: rechargeable lithium polymer battery with 2,300 mAh for long-term recording, chargeable via USB cable or AC adapter
- Logging interval: 1 s….12 h (two separate intervals can be set)
- Calculation of battery life with included 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
  - based on this configuration:
  - Logging interval: 5 minutes
  - Measured data: 2 x humidity & temperature, air pressure, light and 3-axis acceleration
- Not compatible with HW4 software
- Interface (USB)
- Protection: IP60
- Dimensions: 61x77x36 mm

Order code	LOG-HC2-P1
Device type	Universal logger

Included

- AC adapter
- USB cable for connection to PC
- Software for PC connection for evaluation of the data and for logger configuration
- Short instruction manual
- Mounting plate

Recommended accessories (order probes seperately)

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

HygroLog HL-NT2

The HL-NT2 is the basic logger in the HL-NT data logger series. Additional probes can be connected to the data logger using 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
- Range of application: -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 and visual alarms
- IP40

HygroLog NT2 with interchangable probe and display

Order code	HL-NT2-DP
Device type	Data logger with 128 MB flash card
Probe type	HC2-S probe, fitted internally

HygroLog NT2 with display, without probe

Order code	HL-NT2-D
Device type	Data logger with 128 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 128 MB flash card
Probe type	HC2-S probe, fitted internally

HygroLog NT2 without display, without probe

Order code	HL-NT2
Device type	Data logger with 128 MB flash card
Probe type	Without probe, HC2 internal connection

Recommended accessories

• PC connection set, USB	Hygrodata-HL-E-USB
• USB docking station with 4 probe inputs	HL-DS-U2

Included

- Flash card 128 MB, battery
- Short instruction manual
- Spare cap for probe
- Factory adjustment certificate
  (for models with integrated probe)

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HYGROLOG HL-NT3

The HL-NT3 has two additional external probe inputs. Further probes can be connected to the logger using an appropriate docking station.

Applications

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

Features

- Two external probe inputs plus optional internal probe
- Saves 47,000 data records per MB card storage capacity
- Range of application: -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 and visual alarms
- IP40

HYGROLOG NT3 with interchangeable probe and display

Order code	HL-NT3-DP
Device type	Data logger with 128 MB flash card, 2 external. probe inputs
Probe type	Interchangeable HC2-S probe, fitted internally

HYGROLOG NT3 with display, without probe

Order code	HL-NT3-D
Device type	Data logger with 128 MB flash card, 2 external. probe inputs
Probe type	Without probe, HC2 internal connection

HYGROLOG NT3 with interchangeable probe, without display

Order code	HL-NT3-P
Device type	Data logger with 128 MB flash card, 2 external. probe inputs
Probe type	Interchangeable HC2-S probe, fitted internally

HYGROLOG NT3 without display, without probe

Order code	HL-NT3
Device type	Data logger with 128 MB flash card, 2 external. probe inputs
Probe type	Without probe, HC2 internal connection

INCLUDED

- Flash card 128 MB, battery
- Short instruction manual
- Spare cap for probe
- Factory adjustment certificate
  (for models with included probe)

RECOMMENDED ACCESSORIES

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

Docking stations for HygroLog NT

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

Features

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

HL-DS-U2

HL-DS-U4-WL

Overview docking stations

Order code	Inputs						Interfaces							
	External power supply	HygroClip2/Analog probe inputs	Analog input 0…2.5 V	Analog input 0(4)…20 mA	Digital inputs (switch contact)	Pt100 inputs	RS232 & RS-485	USB & RS-485	Ethernet TCP/IP RJ45 & RS-485	Ethernet TCP/IP RJ45	WLAN & RS-485	WLAN	Relay outputs	Use with Internet Browser *
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 via browser
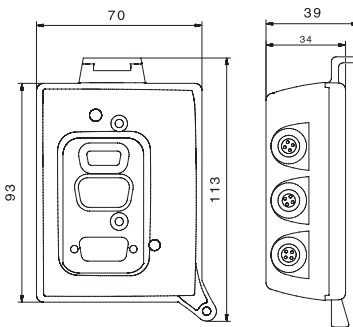

70 · 39 · 34 · 93 · 113

Recommended accessories

• Probe extension cable, 2 m, black	E2-02A
• AC adapter, 85…264 VAC to 12 VDC	AC1211-V1
• Cable to connect an analog probe (open ends)	A-02xx

Included

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

ACCESSORIES FOR DATA LOGGERS AND DOCKING STATIONS

Order code	Description
AC adapter	
AC1211-V1	AC adapter for HygroLog NT docking stations, 240 VAC / 12 VDC
Connection sets	
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 network and access control options 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 docking station
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 RS232 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 - AC3021
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 card	
AC-NT128MB	128 MB flash card, industrial type -40...85 ºC
Other accessories	
DESK-NT	Desktop stand for HygroLog NT in combination with a docking station
ET-409	4-pin Binder connector, to connect Pt100 probes to selected docking station
AC0200	Rechargeable battery 9 V / 170 mA

Autonomous 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 to the system from inaccessible points. Thanks to the advanced secure data logging function, the data is not lost in the event of an interruption in wireless transmission and can be retrieved at any time.
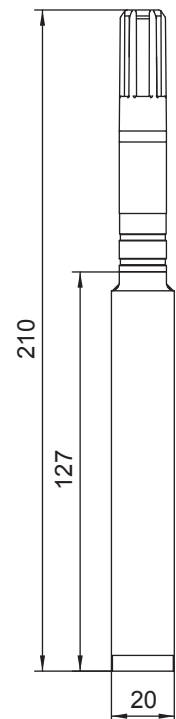
Applications

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

Features

- Interchangeable HC2 probes
- 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 (free field)
- Data security: PIN (for activation and data access)
- Range of application: Electronics -40 to +85 °C, measuring range probe dependent.
- Plastic housing, white, IP65

Wireless humidity/temperature data loggers

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

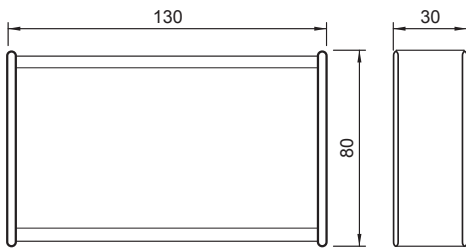| Specifications	LOG-HC2-RC
Type	Digital input for HC2 probes (UART)
Range of application	Electronics: -40...+85 °C Measuring range probe dependent
Radio frequency	433.92 MHz (US: 915 MHz)
Storage capacity	500,000 measured values
Logging interval	1 min. to 12 h
Power supply	Lithium battery 2400 mAh / 3.6 V
Battery life	Up to 6 years depending on logging interval and data transmission
Transmission distance	Max. 100 m (free field)
Data security	4-digit PIN (access code for activation/reading out)
Calibration / Adjustment	Via HW4 software and service cable AC3001
Dimensions without probe	140 mm x Ø 20 mm
Software	HW4 V3.2 or later

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 via the LAN interface.

Features

- Manages up to 100 wireless data loggers at the same time
- Network connection: RJ-45 connector at a 100 MBit Ethernet LAN
- Wireless: SMA connector for external antenna
- Radio frequencies: 433.92 MHz (915 MHz for USA)
- Configurable via web browser
- Housing material: aluminum
- Power supply via AC 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

- Wireless data loggers
- Ground plane antenna

INCLUDED

- Short instruction manual
- AC adapter

Specifications	LAN interface
Type	Network (Ethernet) readout device for wireless data loggers
Radio frequency	433.92 MHz (US: 915 MHz)
Power supply	Via mains adapter, 5 V, min. 500 mA
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
Software	HW4 V3.2 or later

USB WIRELESS ADAPTER

Applications

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

Features

- Programming and downloading data from wireless data loggers
- 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)

Specifications	USB wireless adapter
Type	Local programming and interface device for wireless data loggers
Radio frequency	433.92 MHz (US: 915 MHz)
Power supply	USB power supply via PC
Transmission distance	Up to 100 m (w/ standard antenna) for short-range wireless communication at 433.92 / 915 MHz
Dimensions (H x L x W) without antenna	15 mm x 77 mm x 20 mm

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

Note: Any antenna (Yagi, rod, etc.) with an SMA connector can be used.

COMPATIBLE

- Wireless data loggers
- Ground plane antenna

INCLUDED

- Short instruction manual

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 into the operating process immediately. The instruments can further be adjusted for specific applications via **user-friendly software** or directly with the keypad.

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

HYGROPALM21

The HP21 is the ideal instrument for humidity and temperature measurement. The fixed probe guarantees accurate measurement.

Applications

Portable inspection and spot checks in HVAC and building management systems

Features

- Fixed probe
- Range of application -10…60 ºC / 0…100 %RH
- Accuracy at 23ºC ±5 K: ±1 %RH, 0.2 K
- Adjusted at 23 ºC and 10, 35, 80 %RH
- Service interface (UART)
- Calculation of dew/frost point
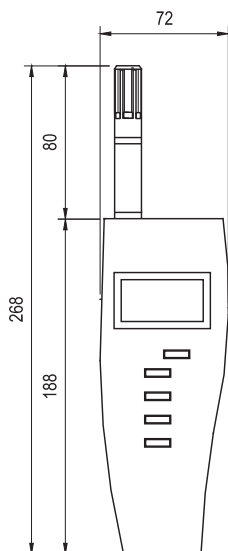
Order code	HP21
Device type	Handheld instrument with integrated probe
Probe type	IN-1 / Pt100 Class A with polyethylene filter
Response time	‹5 s, without filter
Material	ABS (device), polycarbonate (probe)
Power supply	9 V battery
Weight	200 g

INCLUDED

- Factory adjustment certificate
- Short instruction manual
- Battery

TYPICAL ACCESSORIES

• Service cable	AC3006
• Polyethylene filter, gray, 20 µm	NSP-PCB-PE
• Calibration device for HC2-S probe	ER-15
• Desktop 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. It measures relative humidity and temperature, can perform all psychrometric calculations and has trend indicators as well as a hold function to freeze measured values.

Applications
Portable inspection and spot checks in HVAC, the pharmaceutical industry and building management systems

Features

- Combinable with all ROTRONIC HC2 probes
- Range of electronics: -10...60 °C / 0...100 %RH
- All psychrometric calculations
- Service interface (UART)
- Measurement range and 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	200 g

Order code	HP22-A-SET
Set consists of:	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

COMPATIBLE
- With all ROTRONIC HC2 probes

INCLUDED
- Short instruction manual
- Battery

TYPICAL ACCESSORIES

|	
• Polyethylene filter, gray, 20 µm	NSP-PCB-PE
• Desktop 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

72

80

268

188
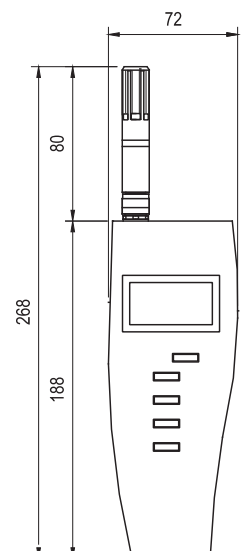
HygroPalm23-A

The HygroPalm23-A is the high-end product in our range of handheld instruments. In addition 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 and warehouses

Features

- Two probe connections for all ROTRONIC HC2 probes or analog third-party probes
- Data recording function up to 10,000 data points (with date, time, batch no.)
- Adjustment of transmitters HF3, HF4, HF5, HF7, HF8, via service cable
- All psychrometric calculations
- Integrated real time clock with time stamp for every measured value
- Battery charging function
- Service interface (USB)
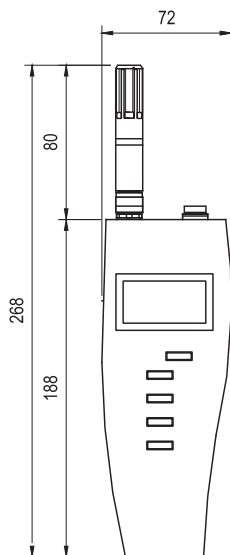
Order code	HP23-A
Probe type	Compatible with all HC2 probes (order separately)
Range of electronics	-10...60 °C / 0...100 %RH
Material	ABS
Power supply	9 V battery or rechargeable battery
Weight	200 g

Order code	HP23-A-SET
Set consists of:	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

Included

- Short instruction manual
- Battery

Compatible

- All ROTRONIC HC2 probes
- HF3, HF4, HF53/4/5/6, HF7, HF8 for adjustment with service cable (AC2001)
- HW4 software

Specifications handheld instruments

| Features	HP21	HP22-A	HP23-A
Probe type	Fixed probe	HC2-xx	HC2-xx or analog third-party probe (with cable A-02XX)
Probe interchangeable	No	Yes	Yes
Humidity / Temperature sensor	HYGROMER® IN-1 Pt100 Class A	Probe-dependent	
Number of probe inputs	N/A	1	2
Measurement range (probe)	-10…60 °C 0…100 %RH	Probe-dependent (chapter Probes, page 4)	
Accuracy, at 23 °C ±5 K	±1 %RH / ±0.2 K	Probe dependent (Chapter Probes, page 4)	
Long-term stability	‹1 %RH / year		
Response time humidity sensor	‹15 s t63	Probe dependent (Chapter Probes, page 4)	
Initialization time	‹2 s		
Range of electronics	-10…60 °C / 0…100 %RH		
Display resolution	2 decimals		
Illuminated display	Yes		
Alarm indicators	No	No	Yes
Battery indicator	«Battery Low» indicator		Battery status indicator
Real time clock	No	No	Yes
Functions			
Trend indicators	Yes		
Probe adjustment via HW4 software	Service cable AC3006		USB cable AC0003
Adjustment of a HF transmitter possible	No	No	Yes
Adjustment via keypad	Single-point %RH & °C	Single & multi-point %RH & °C	
Probe adjustment with dew point reference	No		Yes
Calculations	Dew point / Frost point	All psychrometric parameters	
Data logging	No		20,000 data records (2 x 10,000 pairs of measured values)
User information	Via service cable & HW4 software		
Password protection	Via service cable & HW4 software		
Electrical specifications			
Power supply	9 V battery or rechargeable battery		
Rechargeable battery charge	No		Yes
Current consumption (without backlight)	~5 mA	~6 mA	~10 mA
Supply for third-party probe	No		Yes, 5 VDC
Communication interfaces	UART, service cable AC3006		Mini USB, service cable AC0003
Max. length probe cable	5 m		
Mechanical specifications			
Housing material	ABS (device), polycarbonate (probe)		
Dimensions	274 x 72 x 35 mm	196 x 72 x 35 mm (without probe)	
Weight	200 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 and textile technicians and printers.

Features

- Measurement range: 0…50 °C / 5…99.9 %RH
- Accuracy at 23 °C ±5 K: 1.5 %RH, 0.3K
- Adjusted at 23 °C and 35, 80 %RH
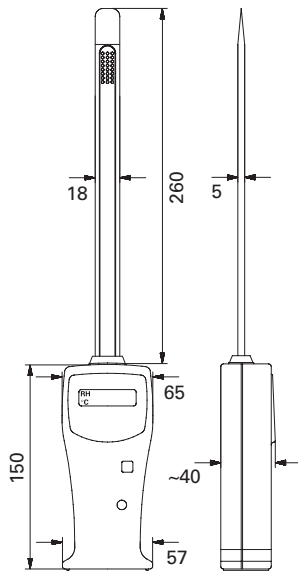
Order code	GTS
Device type	Handheld instrument with sword probe for measurements in stacks of paper
Sensors	HYGROMER® IN-1 / Pt100 Class A
Display	LCD, 3-digit
Response time	‹15 s t63
Material	ABS (device), aluminum (probe)
Power supply	9 V battery
Dimensions	420 x 70 x 40 mm (device), 260 x 18 x 5 mm (probe)
Weight	400 g

Order code	GTS set
Set consists of:	GTS handheld instrument with sword probe
	Calibration device EGS
	SCS humidity standard, EA50-SCS (5 ampoules, 50 %RH with SCS certificate)
	Adjustment screwdriver
	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

MEASURING INSTRUMENT WITH FOLDING PROBE

This precision instrument with folding probe 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

Features

- Folding sword probe
- Measurement range: -25...75 °C / 5...99.9 %RH
- Accuracy at 23 °C ±5 K: 1.5 %RH, 0.3K
- Battery indicator
- 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	350 g
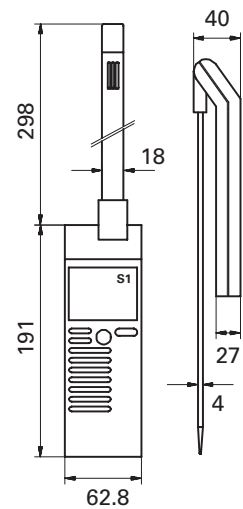
Order code	S1-SET
Set consists of:	S1 handheld instrument with folding sword probe
	Calibration device EGS
	SCS humidity standard, EA50-SCS (5 ampoules, 50 %RH with SCS certificate)
	Carry case, AC1115

INCLUDED

- Factory adjustment certificate
- Battery
- Short instruction manual

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

CALIBRATION

Although ROTRONIC probes have excellent long-term stability, we still recommend that their calibration be 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 today work to ISO 9000 standards and are therefore obligated to calibrate their measuring equipment on a regular basis. Regulatory authorities such as the US FDA, EMEA, and Swissmedic 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 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 calibrate your devices yourself: with a HygroGen humidity and temperature generator or with your own calibration device and SCS-certified humidity standards
2. Calibration at ROTRONIC (see chapter «Services», page 156)
3. We come to you with our Calibration Mobile (selected countries)

CONTENTS

HYGROGEN2

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

Applications

The HygroGen2 is an autonomous, portable generator for calibration of humidity and temperature measuring instruments. The generator sets a new standard in 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 simple, flexible calibration with the advantage that the calibrated instruments can be quickly returned to service. The HygroGen2 offers numerous outstanding benefits particularly to the pharmaceutical industry.

Touch screen monitor

Features

- Generates a stable reference environment
- Reaches equilibrium humidity in typically 5 minutes
- Excellent temperature uniformity
- Suitable for all humidity and temperature probes
- Calibrates up to 6 probes simultaneously
- Standard range of application: 5...95 %RH, 0...60 °C
  Extended ranges: 2...99 %RH, -5...60 °C (optional)
- Easy-to-use touch screen 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 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, preventing algae and bateria growth
- Automatic calibration of HC2 probes (optional)
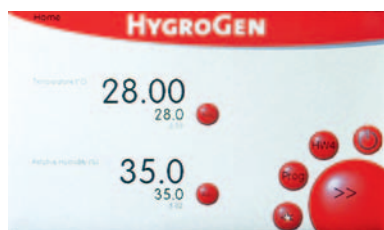
HygroGen2 chamber door with up to 6 probe connections. External monitor with HW4 software.

INCLUDED

- Instruction manual
- SCS / NVLAP (Americas) certificate for reference probe

TYPICAL ACCESSORIES

- See HygroGen2 accessories - page 76
- «AutoCal» automatic calibration
- Extended ranges of application «HumiExt» and «TempExt»

HygroGen2 specifications	Relative humidity	Temperature
Control		
Probe	Control or reference probe for HG2 with SCS certificate (Swiss Calibration Service) SCS-3T-4H, (Amercias-NVLAP Certificate 3T-4H)	
Controller	Integrated PC	
Range Optional	5...95 %RH 2...99 %RH	0...60 °C -5...60 °C
Stability in equilibrium	‹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	
Working principle	Mixing of the air flows Drying: desiccant cartridge Humidity: piezo humidifier	Peltier element with radial chamber ventilation
Performance		
Response time	5 min. (35 to 80 %RH)	5 min. (20 to 30 °C)
Reference probe specification	±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, graphic 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 at the back	
Dew point mirror connection	Inlet and outlet temperature controlled, 6 mm Swagelok	
Profiles	20 user profiles selectable	
Optional functions	AutoCal (automatic adjustment of one temperature and 10 humidity points for HC2 probes) Temperature (-5...60 °C) and Humidity (2...99 % RH) range extensions	
Mechanical & electrical		
Chamber dimensions	2 liters, effective work volume 1.5 l, Ø 110 mm, 145 mm deep	
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	Consisting of: - HygroGen with touch screen interface - 1x desiccant cartridge - 1x water fill syringe with tube - Integrated software HW4-P - Reference probe HG2-SG Chamber door must be ordered separately (page 76)
HG2-AutoCal-Code	HG2 auto calibration function, activation code
HG2-TempExt-Code	HG2 extended temperature range -5...60 °C, activation code
HG2-HumiExt-Code	HG2 extended humidity range 2...99 %RH, activation code
HG2-AutoC/RangeE-C	HG2 auto calibration function and extended T/RH range, activation code

HG2-D-88888 door with plugs
and probe sleeves

Door cross section

HygroGen bag

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-D-111111	HG2 door with 6 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-D-888888	HG2 door with 6 x 30 mm Ø inputs including plugs (use special B1 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, lightweight
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 consisting 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 (single-point calibration)

Applications

On-site calibration and adjustment of ROTRONIC probes (third-party probes also possible). With the humidity standards, a calibration device and the HW4 software running on a PC, this is easy to do. It is also possible to calibrate and adjust probes with the handheld instrument HP23-A (HW4 software then not necessary).

Features

- Traceable to national standards
- Ampoules contain unsaturated salt solutions
- Inexpensive calibration on site
- Simple and safe use
- Unlimited lifetime
- Practical packs of 5 ampoules of the same humidity value (approx. 0.8 ml per ampoule)

Order code	Humidity value	Measurement uncertainty at 23 ºC
EA00-SCS	0.5 %RH	±0.3 %RH
EA10-SCS	10 %RH	
EA11-SCS	11 %RH	
EA20-SCS	20 %RH	
EA35-SCS	35 %RH	±0.4 %RH
EA50-SCS	50 %RH	±0.6 %RH
EA60-SCS	60 %RH	
EA65-SCS	65 %RH	
EA75-SCS	75 %RH	±0.7 %RH
EA80-SCS	80 %RH	
EA95-SCS	95 %RH	±0.8 %RH

COMPATIBLE

- With all calibration devices (see next page)

INCLUDED

- SCS 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 RO-TRONIC 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 a stabilization period. Stabilization takes longer for high humidity values. The probe can then be calibrated or adjusted by comparison with the reference value of the humidity standard.
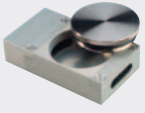
Order code	Use		Order code	Use	
Push-on calibration devices. Gasket with O-ring and thumb screw					
ER-15	For 1 probe Ø 14…15 mm Brass, nickel-plated		**ERV-15**	For 1 probe Ø 14…15 mm Vertical calibration position Brass, nickel-plated	
EDM 15/15	For 2 probes Ø 14…15 mm Brass, nickel-plated		**ER-05**	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, Ematal-coated	
EM-G	For probe types E, HP…IE… Screw-on probes (½"G / ½"NPT)				
Calibration devices for special probes					
EGS	For all sword probes Aluminum, Ematal-coated		**WP-14-S**	For bell probes: HC2-AW, HC2-AW-USB, AW-DIO	
Elx-25	For flush mount probes Ø 25 mm Brass, nickel-plated		**HL-20-CAL**	For HL-20	

ACCESSORIES - CONTENTS
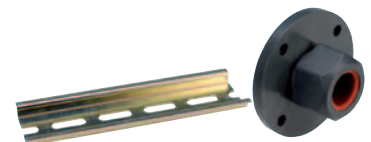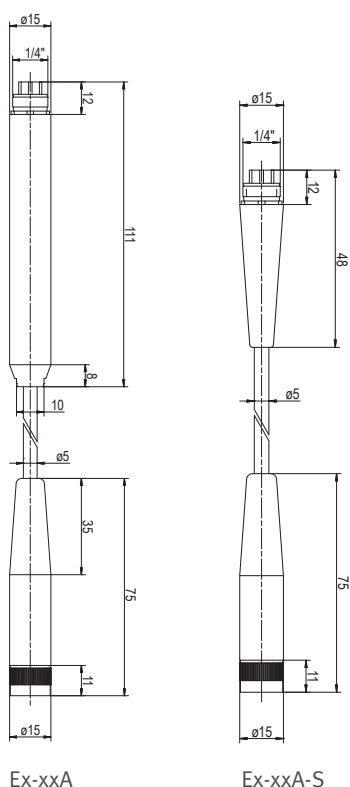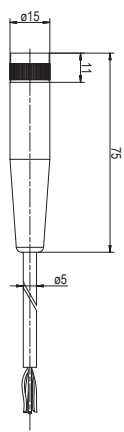
HC2 PROBE EXTENSION
CABLES for transmitters / handheld instruments / data loggers

| Probe | | Max. 5 meters | Transmitter Handheld Data logger |

| Probe | Max. 100 meters | With signal amplifier AC3003 (digital) | Transmitter Handheld Data logger |
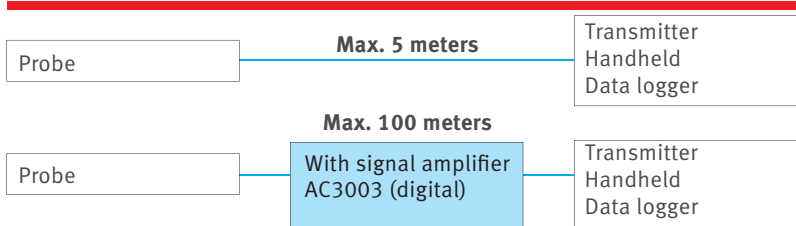
Features

- Range of application -40…90 ºC
- 30 cm type to place probe away from instruments with 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

Ex-xxA

Ex-xxA-S

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

Features

- Range of application -40…70 ºC
- 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
- Ends tin-plated
- Range of application: -40…100 ºC
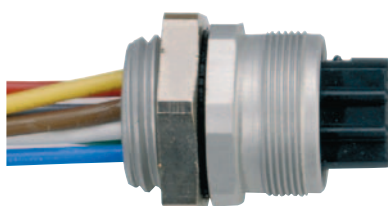
| Order code | E2-XX |

EXTENSION CABLES with open ends

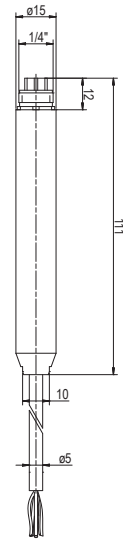| Order code	Color	Shaft	Length	Range of application
Supply voltage 3.3 VDC (without voltage regulator)				
E2-01XX	Black	Normal	1 m	
E2-02XX			2 m	
E2-02XX-S		Short [S]	2 m	
E2-05XX		Normal	5 m	-40...90 ºC
E2-05XX-S		Short [S]	5 m	
E3-01XX	White	Normal	1 m	
E3-02XX			2 m	
E3-05XX			5 m	
Supply voltage 5...24 VDC / 5...16 VAC (with voltage regulator)				
E2-01XX-ACT/01	Black	Normal	1 m	
E2-02XX-ACT/01			2 m	
E2-05XX-ACT/01			5 m	-40...70 ºC
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 voltage regulator)				
E2-01XX-ACT-HV	Black	Normal	1 m	
E2-02XX-ACT-HV			2 m	-40...70 ºC
E2-05XX-ACT-HV			5 m	
Wire assignment				
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 = 0...1V		
Brown	Out2	Analog output 1, standard temperature -40...60 ºC = 0...1V		
Yellow	AGND	Analog GND		

E2-01xx

E2-02xx-S
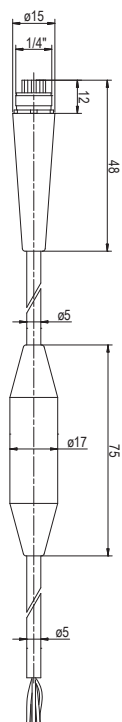
DIGITAL SIGNAL AMPLIFIERS

Features

- Color: black
- Range of application: -40...70 °C
- Power supply: 3.3 V / 4.8 mA

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

AC3003L
With long shaft

AC3003

SERVICE CABLE HF TRANSMITTER

Features

- Transfer of measured values from HP22/23 to HF3/4/5/7/8
- USB-Mini to 7-pin connector

Service cable HF transmitter	
Order code	Description
AC2001	Service cable HF transmitter

USB CONVERTERS 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 application: -40...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
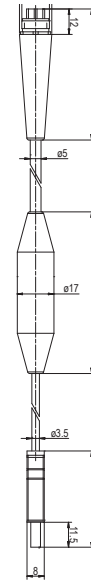
AC3001   AC3001-L
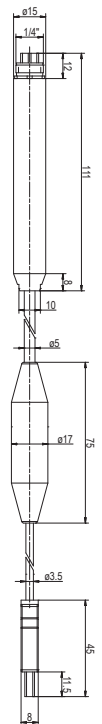
USB CONVERTERS with open ends for HC2 probes

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 application: -40...70 °C

USB adapter for HC2 probes

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

AC3001-XX
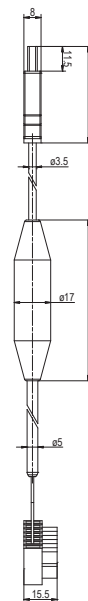
RS-232 CONVERTERS for HC2 probes

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 application: -40...70 °C

RS-232 adapter for HC2 probes

| Order code	Description	Cable length
AC3002	Active UART to RS-232 converter cable	2.8 m
AC1207	AC adapter 9 V	

AC3002
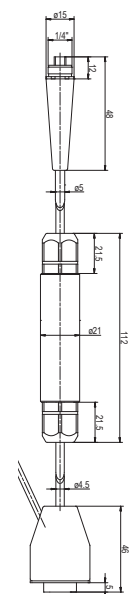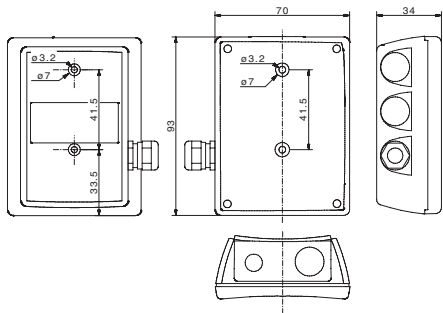
ETHERNET CONVERTER for HC2 probes

Features

- To connect HC2 probes to a PC via Ethernet interface
- Requires HW4 software on the PC
- Power supply via AC adapter (order separately)
- Range of application: -40…70 °C

Ethernet adapter for HC2 probes		
Order code	Description	Cable length
AC3005	UART ↔ Ethernet	35 cm
AC1207	AC adapter 9 V	
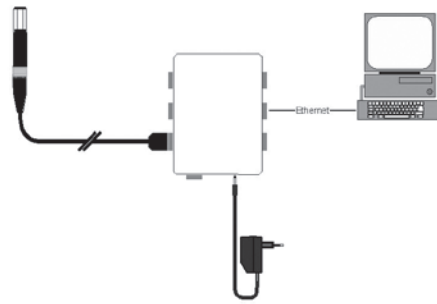
Power supply via AC adapter

RS-485 AND MODBUS CONVERTER

for HC2 probes

Features

- To connect HC2 probes to a RS-485 or Modbus network
- It is possible to switch between Modbus and RS-485 protocol in the HW4 software
- Power supply: 5…28 VDC
- Range of application: -40…70 °C

Self-heating of the adapter can lead to errors in the measured values; it is therefore advisable to place the probe a short distance away with an extension cable (e.g. E2-F3A).
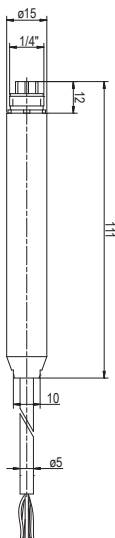
RS-485 / Modbus adapters		
Order code	Description	Cable length
E2-01XX-MOD	Adapter cable for HC2 RS-485 and MODBUS	1 m
E2-02XX-MOD		2 m
E2-05XX-MOD		5 m

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 slave
- Range of application: -40...70 °C
- Cable length: 1 m

RS-485 ‹-› USB converter	
Order code	Description
AC3010	RS-485-USB converter
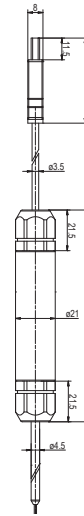
ETHERNET / RS-485 CONVERTER

Features

- Compatible with all HF4 to HF8 with a RS-485 interface, HL-NT
- 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 application: -40...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 application: -40...70 °C

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

AC3006

AC3009

AC3006 / AC3009

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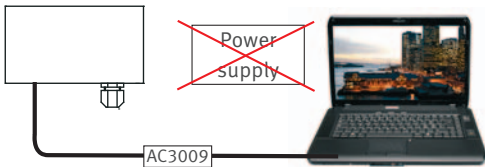
Features

- 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)
- Requires HW4 software
- For programming (settings, scaling, firmware update, etc.) of compatible instruments
- Two different types:
  AC3006, the instrument must be supplied with power
  AC3009, the instrument is supplied with power via the USB interface

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

Service cable	
Order code	Description
AC3006	Service cable without power supply
AC3009	Service cable with power supply via USB interface

SERVICE CABLE for HP23-A / HP23-AW-A / HF1 /TF1

Features

- Requires HW4 software
- For programming (settings, re-scaling, firmware update, etc.)

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

SERVICE CABLE for HL-NT

Features

- Connects HL-NT docking station to a PC
- Requires HW4 software
- For programming (settings, scaling, firmware update, etc.) of HL-NT 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 fixed values and certificate
- For system validation
- Values cannot be changed with the HW4 software
- Range of application: -40...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	
Other types available on request		

PROTECTIVE CAPS

Features

- Protects probes/connectors during cleaning cycles against water and chemical substances, e.g. H2O2

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 PF4, HF4, HF5, HF8, AC3011 (2 pc.)
AC5002 DIN 120	Top-hat rail 120 mm long (PF4, HF4 and HF5, AC3011)
AC5002 DIN 180	Top-hat rail 180 mm long (HF56x, HF8)

AC5002
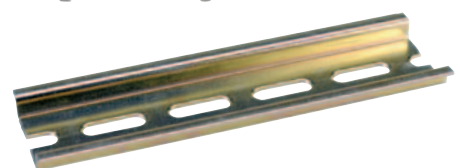
MOUNTING GLAND
WITH FLANGE for temperatures ‹ 100 °C

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

MOUNTING GLANDS /
MOUNTING FLANGE for temperatures ‹100 °C / ›100 °C

Mounting gland   Mounting flange

Mounting glands / Mounting flange for temperatures ›100 °C				
Order code	Dimensions	Material	Gasket	Temperature
Mounting gland for 15 mm probe				
AC1303-M	M20 x 1.5	Brass, nickel-plated	Viton	To 200 °C
AC1305-M	M25 x 1.5	Brass, nickel-plated	TPE	To 100 °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		Buna-N/FPM	To 95 °C
Mounting flange AC1305 for AC1303-M AC1306 for AC1304-M AC1307 for AC1305-M				
AC1305	Ø 80 mm	Steel, nickel-plated	-	To 200 °C
AC1306			-	
AC1307			-	

HYGROCLIP HOLDERS for 15 / 25 mm

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

AC1319

AC1320

DESKTOP STAND

for HygroPalm HP21 – HP23-A / TP22

Features

- Desktop stand for the handheld instruments HP21, HP22(-A), HP23(-A), HP-23-AW(-A), TP22
- Also works with the TP22 and HygroPalm 1 to 3 (old series)

Desktop stand for HygroPalm HP21 – HP23-A / TP22	
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 / HygroLog HL-NT	
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 ‹-› handheld instrument (max. 2 m)
  1x instruction manual
- Can also be used for the HygroPalm 1/2/3 and HygroClip S.
- 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
- Can also be used for the HygroPalm 1/2/3 and HygroClip S
- 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 mini 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

TEMPERATURE

ALL YOU NEED TO MEASURE TEMPERATURE

The range of ROTRONIC temperature measuring equipment comprises of Pt100 probes and instruments such as transmitters, handhelds and data loggers.

PROBES

TRANSMITTERS

DATA LOGGER

HANDHELD INSTRUMENT
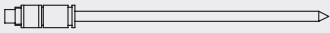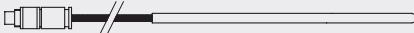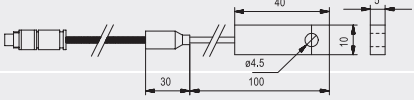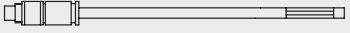
Pt100 probes

All Pt100 probes are Class A sensors 4-wire with a 4-pin Binder connector plug.

Steckertyp: Binder 4-pol Stecker.

τ90: Response time to reach 90 % of an 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: 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...120 °C, τ90: 20 / s	Without cable	
AC1913-A	Kapton foil probe 20 x 15 x 2 mm -50...120 °C, τ90: 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

AC1902

AC1909
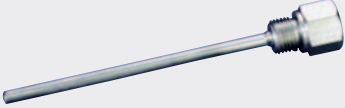
Compatible

• Handheld instrument	TP22
• Transmitters	TF5, PF4
• Docking stations	HL-DS

Included

• Temperature probe

Accessories		
Order code	Probe type	
HC2-PT100-B4	Adapter for Pt100 probes for HP22-A, HP23-A, and HL-NT	
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 ºC, min. -40 ºC	2 m
AC1607/3	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 ºC, min. -40 ºC	3 m
AC1607/5	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 ºC, min. -40 ºC	5 m
AC1607/10	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 ºC, min. -40 ºC	10 m

PT100 TEMPERATURE SENSORS

A Pt100 sensor changes its electrical resistance with changes in temperature. Its resistance value is 100 Ohms at 0 ºC. 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 ºC.

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

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

Tolerance										
	Class A		Class B		1/3 Class B		1/5 Class B		1/10 Class B	
Temp. ºC	± 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

New standard

The manufacturing tolerances were formerly sub-divided into the accuracy Classes A and B (see above). The new standard contains the additional classes AA and C. Within the validity range of every class for wire-wound resistors and film resistors, the limit deviations tl are given in dependence on the temperature t in Celsius:

Class AA: $tl = 0.1\ K + 0.0017 \cdot t$
Class A: $tl = 0.15\ K + 0.002 \cdot t$
Class B: $tl = 0.30\ K + 0.005 \cdot t$
Class C: $tl = 0.6\ K + 0.01 \cdot t$

Example for Class B: At 200 ºC deviations in the measured value of up to ± 1.3 K are allowed.

TF1 SERIES

Features

- Accuracy: ±0.3 K at 23 °C ±5 K
- Range of application: -20...50 °C / 0...100 %RH
- Small size
- Easy mechanical installation
- USB service interface

POWER SUPPLY

- Low voltage: 2 or 3/4-wire

SIGNAL OUTPUT

- Current output
- Voltage output

VERSION

- Space mount version with integrated probe
- Wall version
- Duct version

OUTPUT PARAMETER

- Temperature

OUTPUT SCALING

- Temperature: range selectable, standard: 0...50 °C

DISPLAY

- Display with or without backlight
- Without display

TF1 DUCT AND WALL VERSIONS

Applications

Measures temperature in HVAC applications.

2-wire

	TF120
Output signal	4...20 mA
Supply voltage	10...28 VDC
Display	Optional (without backlight)

3/4-wire

	TF13x
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
Probe	Fixed
Filter type	Polyethylene

COMPATIBLE

• Software 21, page 155

INCLUDED

• Factory adjustment certificate

RECOMMENDED ACCESSORIES

• Service cable:	AC0003
• Calibration device:	ER-15
• Mounting gland:	AC5005

Wall version
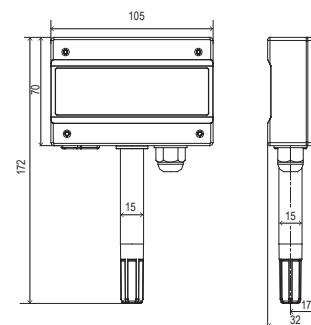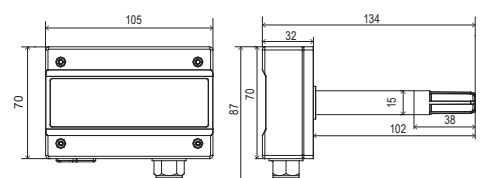
Duct version

TF1 SPACE MOUNT VERSION

Applications
Measures temperature in offices and rooms where design is important.

Type S

Type L
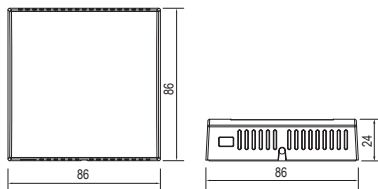
2-wire

	TF120
Output signal	4...20 mA
Supply voltage	10...28 VDC
Display	Optional (without backlight)

3/4-wire

	TF13x
Output signal	0...1 V / 0...5 V / 0...10 V / 4...20 mA
	Customer rescaling possible
Supply voltage	15...40 VDC / 12...28 VAC
Display	Optional (with backlight)

Specifications	TF120 Analog 2-wire	TF13x Analog 3/4-wire
General		
Parameters	Temperature	
Housing material / Protection	ABS / IP65 (space mount version IP20)	
Dimensions	Wall version: 105 x 172 x 32 mm Duct version: 105 x 87 x 134(334) mm Space mount version: 86 x 86 x 24 mm	
Weight	140 g	
Probe connection	Fixed	
Filter material	Polyethylene	
Display	LCD, 1 or 2 decimals, without backlight	LCD, 1 or 2 decimals, with backlight
Electrical connections	Type D/W: screw terminals inside, M16 cable gland	
Power supply	10...28 VDC	15...40 VDC / 12...28 VAC
Current consumption	2x20 mA max.	‹55 mA (current output) ‹15 mA (voltage output)
Range of application	-20...50 ºC / 0...100 %RH (non-condensing)	
Service interface	USB Mini	
CE / EMC compatibility	EMC Directive 2004/108/EC	
Temperature measurement		
Sensor	NTC	
Measurement range	-20...50 ºC / 0...100 ºF	
Accuracy at 23ºC ±5 K	±0.3 K	
Response time	4 s	
Analog output		
Number	1	
Current	4...20 mA	
Voltage	N/A	0...1/5/10 V

TF5 series

Features

- Interchangeable Pt100 probes
- Accuracy: see chapter Probes on page 94
- Temperature limit at probe: see chapter «Probes» on page 94
- Range of application electronics: -40...60 ºC / 0...100 %RH
  -10...60 ºC with LCD
- Temperature measurement with Pt100 probe, 4-pin Binder connection
- Service interface

Power supply

- Low voltage: 2 or 3/4-wire

Signal output

- Current output
- Voltage output

Version

- Wall version
- Cable version

Output parameter

- Temperature

Output scaling

- Temperature: range selectable

Display

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

Order code on request.

TF5 WALL VERSION

Applications

Measures temperature in production processes, storage areas and drying processes.

2-wire

	TF520 Type W
Output signal	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...20 mA
	4...20 mA
	Customer rescaling possible
Supply voltage	15...40 VDC / 12...28 VAC
Display	Optional (with backlight)

Temperature range	Scalable*
Probe	Interchangeable (-100...200 °C)

Wall version, type W
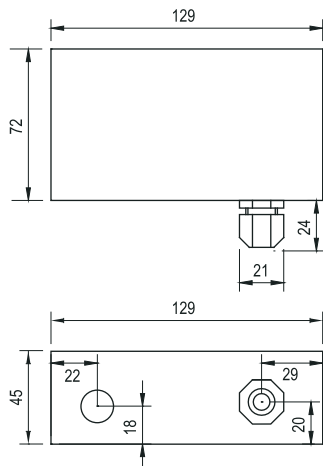
Pt100 input
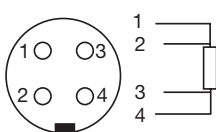
4-wire Pt100

COMPATIBLE

• Pt100 probes, page 94

• Fundamentally, however, all 4-wire Pt100 probes can be used

• HW4 software, page 148

INCLUDED

• Product qualification

• Short instruction manual

• Screws and plugs for mounting

• Connector for third-party probe

RECOMMENDED ACCESSORIES

• Service cable:	AC3006 / AC3009*, page 86
• Fixed probe 100 x 3 mm:	AC1900
• Cable probe 50 x 6 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

Specifications	TF520 2-wire	TF53x 3/4-wire
General		
Parameters	Temperature	
Housing material / Protection	ABS / IP65	
Dimensions	129 x 72 x 45 mm	
Weight	220 g	
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.
Application temp. housing / electronics	-40...60 ºC / -10...60 ºC (with LCD), 0...100 %RH	
Temperature scaling	Max. -100...200 ºC	
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 compatibility	Conforms to 21 CFR Part 11 and GAMP5	
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

WIRELESS DATA LOGGERS

Receiver   Transmitter

433 / 915 MHz
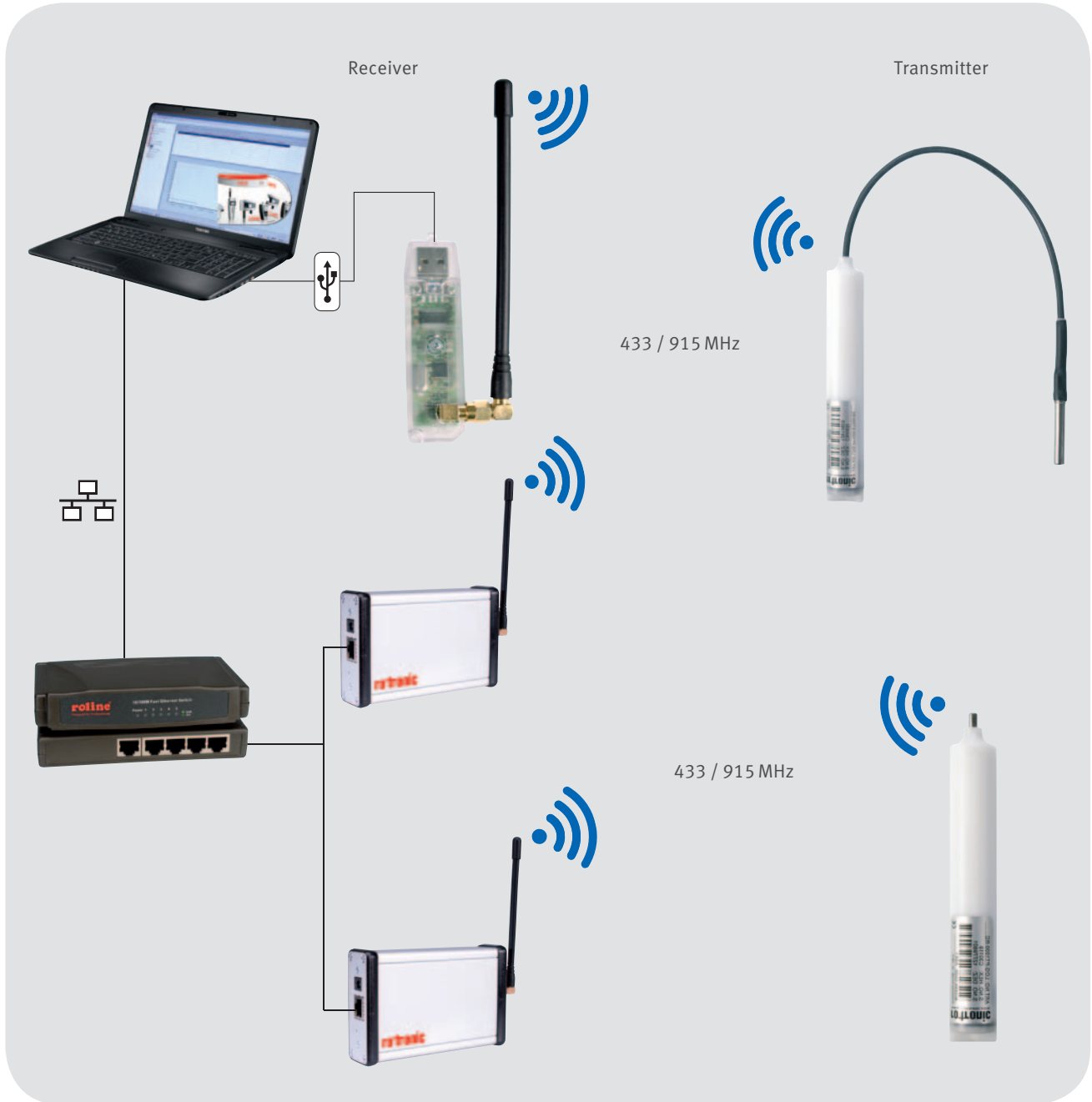
433 / 915 MHz

Wireless temperature data loggers

Features

- Pt1000 integrated temperature probe or remote with 30 cm cable
- Accuracy: ±0.2 °C at 23 °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, IP68 (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 (other cable lengths available on request) standard version (433.92 MHz)
LOG-PT1000-30-RC-US	Remote sensor with 30 cm cable (other cable lengths available on request) USA version (915 MHz)

Compatible

- LAN interface
- USB wireless adapter

Included

- Short instruction manual
- Battery

Note:
See the chapter «Humidity data loggers» on page 62 for suitable receivers and accessories.
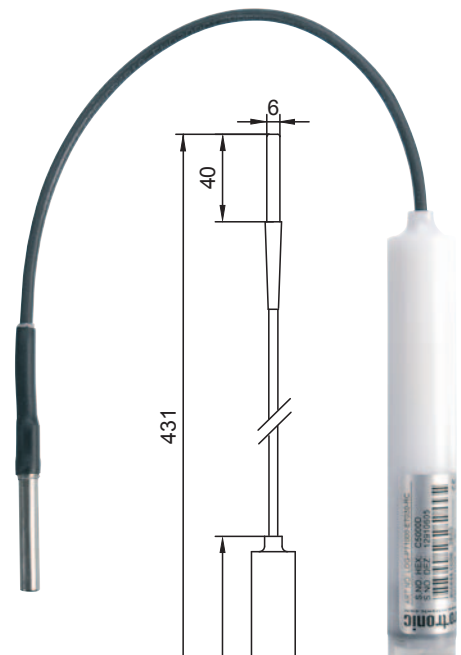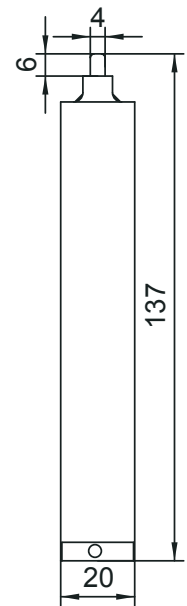
ThermoPalm TP22

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

Applications

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

Features

- Interchangeable Pt100 probes
- Range of application handheld: -10…60 °C / 0…100 %RH
- Service interface (UART)
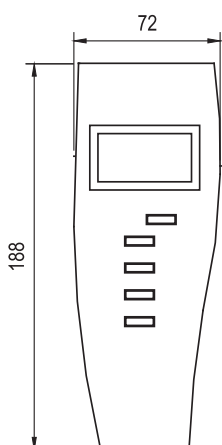
Order code	TP22
Probe type	Freely selectable from the complete product range, 4-wire connection, page 94
Range of application	-10…60 °C, electronics / up to 600 °C at probe
Housing material	ABS
Power supply	9 V battery
Weight	200 g

Compatible

- All ROTRONIC temperature probes, page 94
- All Pt100 probes with 4-wire connection
- HW4 software

Included

- Short instruction manual
- Battery

Recommended accessories

• Temperature probes, page 94	AC19xx
• Extension cable for probe, 2 m	AC1607/2
• Service cable	AC3006

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188

Specifications handheld instruments	
Features	**TP22**
Probe type	Pt100 probes
Probe interchangeable	Yes
Temperature sensor	Pt100 4-wire
Number of probe inputs	1
Measurement range (probe)	Probe dependent (max. -100...200 °C)
Initialization time	‹2 s
Range of application instrument	-10...60 °C / 0...100 %RH
Display resolution	2 decimals
Illuminated display	Yes
Alarm indicators	Yes
Battery indicator	«Battery Low» indicator
Functions	
Trend indicator	Yes
Probe adjustment per software	Single & multi-point with service cable AC3006
Adjustment per keypad	Single-point
User information	Via service cable & HW4 software
Password protection	Via service cable & HW4 software
Electrical specifications	
Power supply	9 V battery or rechargeable battery
Rechargeable battery charge	No
Current consumption (without backlight)	‹10 mA
Communication interfaces	UART, service cable AC3006
Mechanical specifications	
Housing material	ABS (housing)
Dimensions	196 x 72 x 35 mm
Weight	180 g
CE / EMC directives	EMC 2004/108/EC
FDA/GAMP compatibility	Conforms to 21 CFR Part 11 and GAMP5
IP protection	IP40

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 is by definition the free or non chemically bound water in foods and other products. The bound water cannot be measured with this method.

Why is water activity measured?

The free water in a product influences its microbiological, chemical and enzymatic stability. This is especially important in the case of perishable products such as foodstuffs, grain, seeds, etc. as well as in the case of 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. Control of water activity therefore 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 AirChip3000 digital technology for high performance and easy digital calibration, ROTRONIC water activity probes are suitable for almost any application. All water activity stations and probes incorporate temperature measurement as a standard feature. 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 using 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 extremely small internal volume of the sensor chamber ensures humidity equilibrium is reached very quickly in the case of all products.

CONTENTS

WATER ACTIVITY PROBES

HC2-AW-USB

Applications

For water activity measurements in flour, grain, spices and bulk materials and in solid and pasty products such as meat, sausage as well as oils, fats, etc.

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
- AW Quick function for fast measurement results (typically 4-5 minutes)

Order code	HC2-AW-USB	HC2-AW-USB-SW
Feature	Measurement probe	Probe + software HW4-P-Quick
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

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 unit
Filter type	Wire mesh filter with 20…25 µm pore size
Weight	550 g

Ø 68

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COMPATIBLE

- HC2-AW-USB: with PC
- HC2-AW: with benchtop display unit HygroLab C1 and handheld instrument HP23-AW-A

INCLUDED

- Factory adjustment certificate

RECOMMENDED ACCESSORIES

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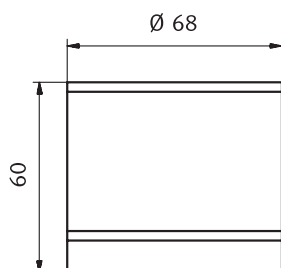
INSERTION PROBES

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	3.3…5 VDC, adjusted at 3.3 VDC, current: ~4.5 mA
Filter type	No filter available (laser-cut slots)
Response time	‹15 s t63
Material	Stainless steel DIN 1.4305 (probe), POM (handle)
Weight	160 g
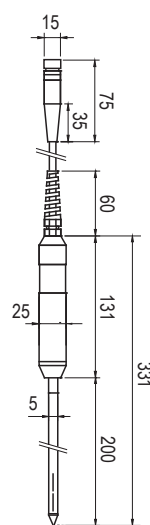
10 MM INSERTION PROBE

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	3.3…5 VDC, adjusted at 3.3 VDC, current: ~4.5 mA	
Filter type	Sintered steel	
Response time	‹20 s, with filter t63	
Material	Stainless steel DIN 1.4305 (probe), POM (handle)	
Weight	200 g	300 g
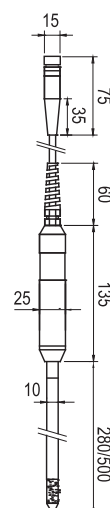
COMPATIBLE

• Handheld instrument:	HP23-AW-A
• Benchtop display unit:	HygroLab C1

INCLUDED

- Factory adjustment certificate

RECOMMENDED ACCESSORIES

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

LABORATORY ANALYZER 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 probe benchtop display analyzer for measurement of water activity, temperature and relative humidity
- Multi-channel 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 (included)
Calculations	All psychrometric calculations available
Power supply	12 VDC with AC adapter (included)
Interfaces	Ethernet and USB
Range of application	0…1 aW, 0…100 %RH, -10…60 °C
LCD	3-line alphanumeric with trend indicator
Current consumption	Max. 120 mA
Dimensions /Weight	225 x 170 x 70 mm / 1100 g
Material	Aluminum
Protection	IP21

COMPATIBLE

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

INCLUDED

- 12 VDC AC adapter
- Short instruction manual
- Software HW4-P-Quick
- Standard USB A/B cable

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: spot checks of cheese, meat, tobacco, building materials, animal feeds, bakery products, paper, medicines, horticulture, agriculture, etc.

Features

- Handheld instrument for measurement of water activity, relative humidity and temperature
- AW Quick function for fast measurement results (typically 4-5 minutes)
- Audible alarm to indicate completed measurement
- Saves up to 10,000 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 optional HW4 software
Calculations	All psychrometric calculations available
Power supply	9 V battery or 9 V AC 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. 20 mA (with backlight)
Dimensions / Weight	188 x 72 x 30 mm / 200 g
Material	ABS

Compatible

- 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 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 consists of:	Handheld instrument:	HP23-AW-A
	Measurement probe:	HC2-AW
	Sample holder:	WP-14-S
	Disposable sample containers (100 pcs):	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 consists of:	Handheld instrument:	HP23-AW-A
	Measurement probe:	HC2-AW
	Sample holder:	WP-40
	Disposable sample containers (100 pcs)	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
water activity probes HC2-AW(-USB). There are two sizes available:
- WP-14-S for small samples and for calibration
- WP-40 for larger samples, icludes insert to use 14mm sample containers
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	PS-14	PS-14 / PS-40	PS-14 / PS-40
Height	14 mm	40 mm	40 mm
Material	V2A steel		Brass, nickel-plated
Weight	350 g	1250 g	1550 g

WP-14-S

WP-40

WP-40TH

Disposable sample containers PS-14/PS-40

Applications

The disposable sample containers ensure the optimum sample volume is filled
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 soi-
ling 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
Depth	14 mm	40 mm
Unit	100 pc.	

PS-14

PS-40

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-KHS
Use with	WP-40 / WP-40TH
Weight	1100 g

METEOROLOGY

METEOROLOGY

In meteorology the precision of measurement data is critical for accurate weather forecasting and climate research. ROTRONIC humidity and temperature probes have an excellent reputation for providing precise results even in the most demanding of 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.

Even the best probes measure inaccurately if the conditions at the probe 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 meteorology probes 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 by various national meteorological organizations at a significantly lower price.

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

CONTENTS

HC2-S3 / HC2-S3H

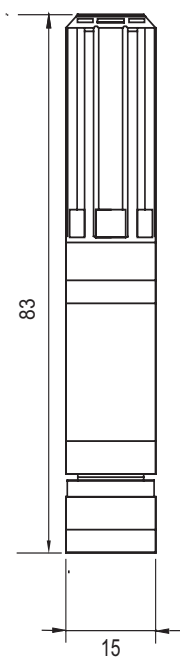## Applications

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
Power supply	3.3...5 VDC, adjusted at 3.3 VDC	
Long-term stability	‹1 %RH / year	
Filter type	Polyethylene standard filter, 40 µm, white	
Response time	‹15 s (without filter)	

COMPATIBLE

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

INCLUDED

- Factory adjustment certificate
- Polyethylene filter

RECOMMENDED 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

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15

HC2-S-HEATED / HC2-S3-HEATED

Applications

High-humidity applications such as tunnels/caves, cheese cellars, etc.

Features

- Measures relative humidity and temperature, calculates the dew/frost point
- Automatic condensation function
- No long-term thawing on sensor
- SMD Thermo sensor element

Order code	HC2-S-HEATED	HC2-S3-HEATED
Color	Black	White
Range of application	-50...100 °C, 0...100 %RH	
Accuracy at 23 °C ±5 K	±1.3 %RH, ±0.15 K	
Power supply	3.3...5 VDC, adjusted at 3.3 VDC	
Long-term stability	‹1 %RH / year	
Filter type	Polyethylene standard filter, 20 µm	
Response time	‹10 s (without filter)	
Current consumption	‹35 mA at VDD = 3.3 VDC	

COMPATIBLE

- Meteorology transmitters: MP102H/402H
- Transmitters: HF5 / HF8
- Naturally ventilated shield: AC1000

INCLUDED

- Factory adjustment certificate
- Polyethylene filter
- Short instruction manual

RECOMMENDED ACCESSORIES

- Polyethylene filter, white (40 µm):   NSP-PCW-PE40
- Connection cable with voltage reg. & 2 m cable, white: E3-02XX-ACT/01

Heating and measuring phase

Measure | Heat | Wait | Measure | Heat

0 1 2 3 4 5 6 7 8   t (min)

6 min
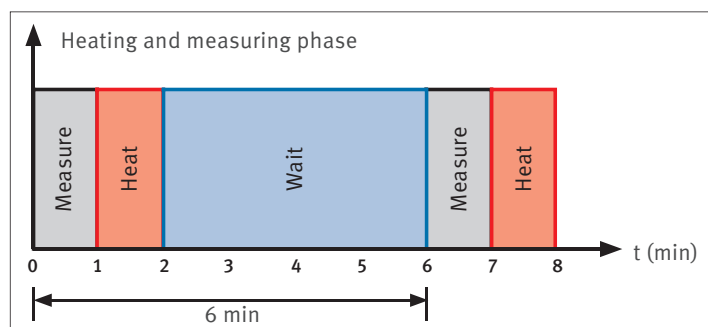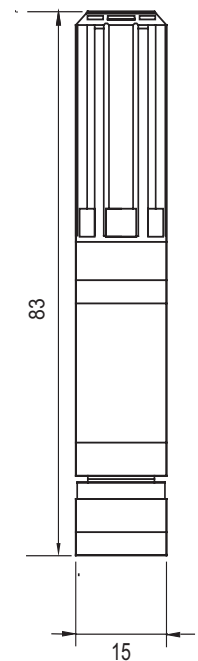
HYGROMET 4

The heated meteorology probe.

Applications
Wherever high humidity prevails for a short or long time.

Features

- No long-term condensation on sensor
- Measures relative humidity and temperature, calculates all psychrometric parameters
- Freely programmable sensor heater
- Integrated real-time clock
- Connection via Tuchel connector or cable with open ends

Order code	HM433/4/5	HM431/2
Output	Voltage output 0…1/5/10 V	Current output 0/4…20 mA
Range of application	-40…85 ºC / 0…100 %RH	
Accuracy at 23 ºC ±5 K	Heated: ±1.5 %RH / ±0.1 K Unheated: ± 0.8 %RH / ±0.1 K	
Resistant to	Condensation	
Measurement	Humidity: SMD Thermo Temperature: external Pt100	
Filter	Polyethylene, 20 µm	
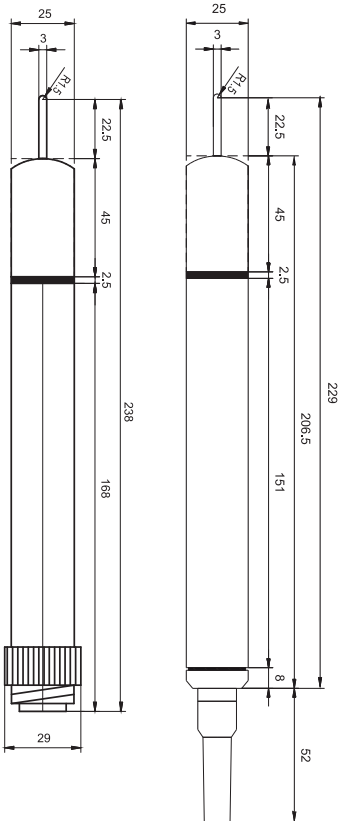
COMPATIBLE

- Actively ventilated shield: RS12T / 24T
- Naturally ventilated shield: AC1002 / AC1003

INCLUDED

- Factory adjustment certificate
- Instruction manual

HC2-S3C03 / HC2-S3C03-PT15

The cable probes for agricultural meteorology and outdoor applications are equipped with a 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 and temperature, calculates the dew/frost point
- HYGROMER® IN-1 sensor / Pt100 1/3 Class B
- Service interface (UART)
- Freely scalable analog signals 0...1 V
- Standard configuration 0...1 V = -40...60 ºC / 0...100 %RH

Order code	HC2-S3C03	HC2-S3C03-PT15
Adjustment	At 23 ºC and 10, 35, 80 %RH	
Accuracy at 23 ºC ±5 K	±1 %RH / ±0.2 K	±1 %RH / ±0.1 K (passive Pt100)
Range of application	-50...100 ºC / 0...100 %RH	
Filter	Polyethylene, white ~ 40 µm pore size	
Voltage	5...24 VDC / 5...16 VAC	
Version	3 m cable with open ends	

COMPATIBLE

• Naturally ventilated shield:	AC1000

INCLUDED

- Factory adjustment certificate
- Filter

RECOMMENDED 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

140

15
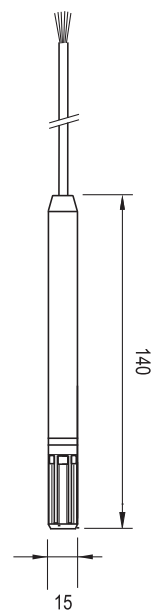
MP100A / MP400A

Standard meteorology probes with fixed sensors (analog technology).

Applications
Weather stations, agriculture, ice warning systems and snowmaking systems.

Features

- Very robust, therefore high long-term stability
- Voltage and current outputs for humidity and temperature
- HYGROMER® IN-1 sensor / Pt100 1/3 Class B
- 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…85 °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	Condensation and dust particles	
Measurement	Temperature with Pt100 - direct or linear output signal	
Filter	Wire mesh filter ~ 20 µm pore size	
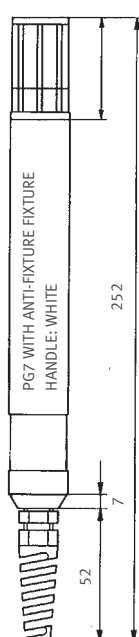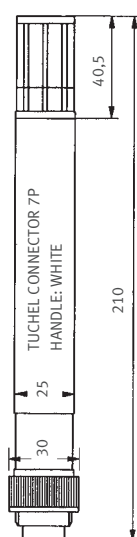
COMPATIBLE

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

INCLUDED

- Factory adjustment certificate
- Wire mesh filter (SP-W3-25)
- Instruction manual

RECOMMENDED 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

TUCHEL CONNECTOR 7P
HANDLE: WHITE

40,5
210
25
30

PG7 WITH ANTI-FIXTURE FIXTURE
HANDLE: WHITE

252
7
52

Specifications	HM433/4/5	HM431/2	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) 15...24 VDC (0...10 V output)	15...24 VDC	4.8...30 VDC	10...30 VDC	5...24 VDC / 5...16 VAC	
Current consumption	<55 mA		<4 mA at 4.8 VDC	<50 mA at 10 VDC	<20 mA	
Application temp. housing / electronics	-40...85 °C				-50...100 °C	
Cable length compensation	To 99 m			N/A		
Humidity measurement						
Sensor	ROTRONIC SMD Thermo		ROTRONIC HYGROMER® IN-1			
Measurement range	0...100 %RH		0...100 %RH			
Accuracy at 23 °C ±5 K	Heated: ±1.5 %RH Unheated: ±0.8 %RH		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	SMD Thermo / Pt100		Pt100 1/3 Class B			Pt100 1/5 Class B
Measurement range	-40...85 °C		-50...100 °C			
Accuracy at 23 °C ±5 K	±0.1 K		±0.3 K		±0.2 K	±0.1 K
Response time	<15 s t63					
Analog output						
Current	N/A	0(4)...20 mA	N/A	0(4)...20 mA	N/A	
Voltage	0...1 / 5 / 10 VDC	N/A	0...1 V	N/A	0...1 V	
Digital output						
	RS-485 UART		N/A			

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 interchangeable HC2-S3 probe
- Calculates all psychrometric parameters
- Direct Pt100 sensors available as an option
- Voltage or current output signal
- Freely scalable
- High 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

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

INCLUDED

- Short instruction manual

Order codes on request.
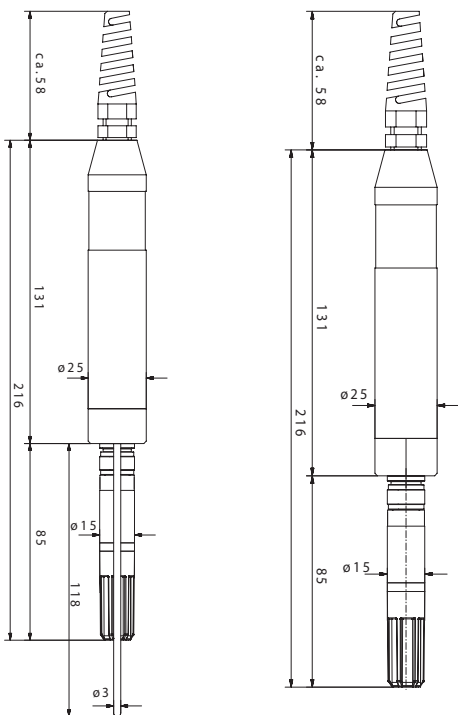
With external Pt100   Without external Pt100

Specifications	MP102H	MP402H
General		
Parameters	Humidity and temperature	
	Calculates all psychrometric parameters	
Housing material / Protection	Polyoxymethylene / IP65	
Weight	150 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
Current consumption	‹50 mA	
Application temp. housing / electronics	-40...80 ºC	
Cable length compensation	To 99 m	
Humidity measurement		
Sensor	ROTRONIC HYGROMER® IN-1 (HC2-S3)	
Measurement range	0...100 %RH (HC2-S3)	
Accuracy at 23 ºC ±5 K	±0.8 %RH (HC2-S3)	
Response time	‹15 s t63 (63 % of a jump 35...80 %RH) without filter	
Temperature measurement		
Sensor	Pt100 Class A (HC2-S3)	
Measurement range	-50...100 ºC (HC2-S3)	
Accuracy at 23 ºC ±5 K	±0.1 K (HC2-S3)	
Response time	‹15 s t63	
Direct Pt100 (option)	Pt100 1/3 Class B Pt100 1/5 Class B Pt100 1/10 Class B	
Analog output		
Current	N/A	0(4)...20 mA
Voltage	0...1 VDC 0...5 VDC 0...10 VDC	N/A
Digital output		
	RS-485 UART	

ACTIVELY VENTILATED SHIELDS

Applications

Snow guns, weather stations, agricultural meteorology and 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 ºC	
Material	Aluminum, POM, RAL 9010	
Power supply	12 VDC, 2 W	24 VDC
Fan	Papst fan IP54	
Ventilation	3.5 m/s / 900 l/min.	
Fan lifetime	At 40ºC ~70,000 h (approx. 8 years)	

COMPATIBLE

- Mounting sets (see below)

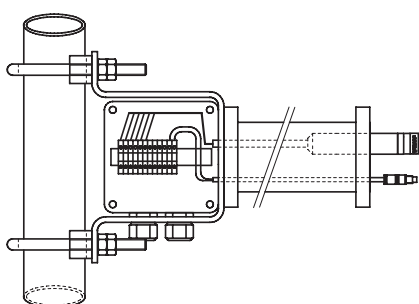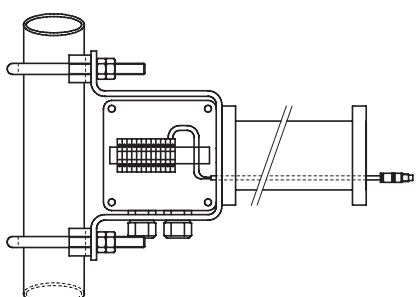## INCLUDED

- 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	

Additional models available on request
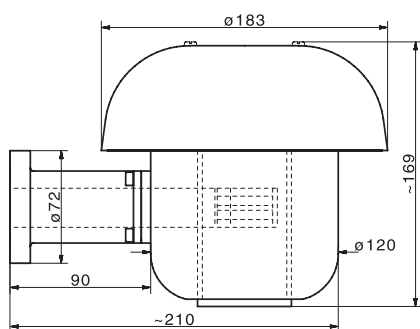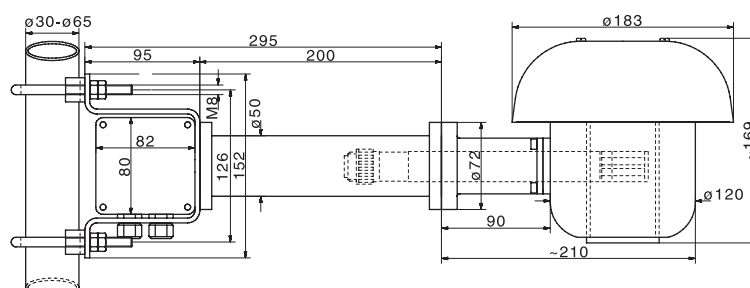
MKRS-HC2

NATURALLY VENTILATED SHIELDS

Naturally ventilated radiation shields are used where the natural ventilation (wind) provides sufficient air flow, e,g, measurement stations in the mountains.

Applications
Snow guns, weather stations and building management systems.

Features

- Easy-to-install protective shield for wall and mast mounting
- 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

AC1000 with HC2-S3+E3-02XX

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 Ø15 mm	Probe screw connection Ø25 mm	
Dimensions	Ø 130 x 140 mm	Ø 130 x 160 mm	Ø 130 x 215 mm

INCLUDED

- Installation instructions
- Mounting hardware

AC1002 with MP100A-T4

AC1003 with MP102H

CO$_2$

ALL YOU NEED TO MEASURE CO$_2$

The range of ROTRONIC CO$_2$ measuring equipment includes a comprehensive choice of transmitters, handheld instruments, data loggers and a display panel. They are all perfectly suited for monitoring and controlling indoor air quality.

TRANSMITTERS

DATA LOGGERS

HANDHELD INSTRUMENTS

ACCESSORIES

Transmitters	CF3-W-EU-(Disp) CF3-W-US-(Disp)	CF3-W-EU-Disp-FLI CF3-W-US-Disp-FLI	CF3-D-(Disp)
Working principle	Nondispersive infrared (NDIR) with automatic baseline correction (ABC)		
CO_2 measurement range (optional)	0...2000 ppm 0...5000 ppm	0...2000 ppm 0...5000 ppm	0...2000 ppm 0...5000 ppm
Temperature measurement range			
Accuracy CO_2	±30 ppm, ±3 % of reading		
Accuracy temperature			
Housing			
Wall version	✔	✔	
Duct version			✔
Display option	✔	✔	✔
IP protection	IP30	IP30	IP65
Dimensions	EU: 100 x 80 x 28 mm US: 130 x 85 x 30 mm	EU: 100 x 80 x 28 mm US: 130 x 85 x 30 mm	142 x 85 x 46 mm Probe: 245 x 22 x 15
Outputs			
0...10 VDC	✔	✔	✔
0...20 mA			
4...20 mA	✔		✔
Modbus interface			
RS-485 interface			
Functions			
Visual alarm (LED)		✔	
Audible alarm (beep tone)		✔	
Relay			

CF3-W-IND-(Disp)	CF5-W-(Disp)	CF5-D-(Disp)	CF5-W-IND-Disp
Non-dispersive infrared (NDIR) with automatic baseline correction (ABC)			
0...2000 ppm 0...5000 ppm	0...2000 ppm 0...5000 ppm	0...2000 ppm 0...5000 ppm / 0...10 %vol	0...2000 ppm 0...5000 ppm / 0...10 %vol
	0...50 °C (32...122 °F)	0...50 °C (32...122 °F)	0...50 °C (32...122 °F)
±30 ppm, ±3 % of reading			
	±0.5 °C	±0.5 °C	±0.5 °C
✔	✔		✔
		✔	
✔	✔	✔	✔
IP54	IP30	IP65	IP54
142 x 85 x 46 mm	120 x 82 x 30 mm	142 x 85 x 46 mm Probe: 245 x 22 x 15	142 x 85 x 46 mm
✔	✔	✔	✔
	✔	✔	✔
	✔	✔	✔
		Optional	
		Optional	
	✔		
	✔		
	Optional		

CF3 series

Features

- Measures CO_2 by infrared measurement technique (NDIR)
- Standard measurement range: 0...2000 ppm
- Accuracy: ±30 ppm, ±3 % of reading
- Range of application: 0...50 °C / 0...95 %RH
- Analog output signals
- Automatic calibration

POWER SUPPLY

- Low voltage: 3/4-wire

SIGNAL OUTPUTS

- Current output
- Voltage output

VERSION

- Space mount version
- Duct version
- Wall version

OUTPUT PARAMETERS

- CO_2

OUTPUT SCALING

- CO_2: range selectable, standard 0...2000 ppm

DISPLAY

- Display optional

CF3 SPACE MOUNT VERSION

Applications
Measures CO_2 in offices, conference rooms, classrooms, public buildings, etc.

EU version

Standard EU and US

Order code	CF3-W-EU-Disp	CF3-W-US-Disp
Output signals	0...10 VDC 4...20 mA	
Supply voltage	16...29 VDC / VAC	
Display	Optional	

Standard EU and US with alarm

Order code	CF3-W-EU-Disp-FLI	CF3-W-US-Disp-FLI
Output signals	0...10 VDC	
Supply voltage	16...29 VDC / VAC	
Display	Yes	
Alarm function	Audible and light signal, alarm threshold at 1400 ppm (adjustable)	

CO_2 measurement range	Standard 0...2000 ppm Optional 0...5000 ppm	
Dimensions	100 x 80 x 28 mm	130 x 85 x 30 mm

US version

INCLUDED

- Factory adjustment certificate
- Short instruction manual
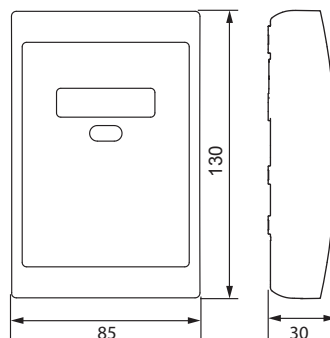

US version FLI

EU version

100

80

28

US version

130

85

30
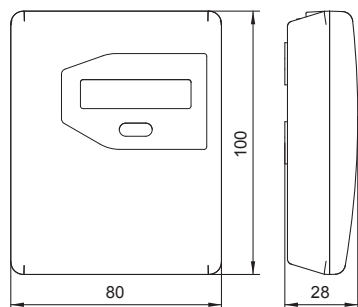
CF3 DUCT AND WALL VERSIONS

Applications

Measures CO_2 in ventilation pipes and industrial applications

Duct version

Order code	CF3-D-Disp
Output signals	0...10 VDC 4...20 mA
Supply voltage	16...29 VDC / VAC
Display	Optional
Dimensions	142 x 85 x 46 mm, probe: 245 mm
Protection	IP65

Wall version (industry)

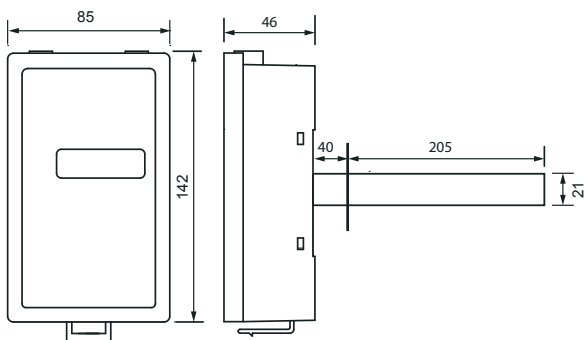| Order code	CF3-W-IND-Disp
Output signals	0...10 VDC 4...20 mA
Supply voltage	16...29 VDC / VAC
Display	Optional
Dimensions	142 x 85 x 46 mm
Protection	IP54

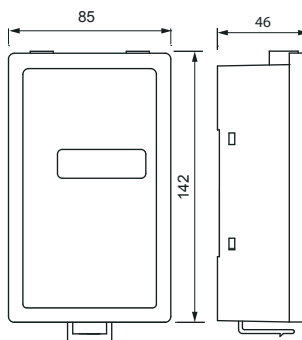|	
CO_2 measurement range	Standard 0...2000 ppm, optional 0...5000 ppm

INCLUDED

- Factory adjustment certificate
- Short instruction manual

CF3-D-Disp

CF3-W-Disp

Specifications	CF3-W-EU-Disp CF3-W-US-Disp	CF3-W-EU-Disp-FLI CF3-W-US-Disp-FLI	CF3-D-Disp	CF3-W-IND-Disp
General				
Parameters	Carbon dioxide (CO_2)			
Housing material	ABS			
Protection	IP30	IP30	IP65	IP54
Dimensions	EU: 100 x 80 x 28 mm US: 130 x 85 x 30 mm		142 x 85 x 46 mm	
Weight	80 g	110 g	250 g	220 g
Display	Optional (4 digits, 7-segment LCD)	Standard (4 digits, 7-segment LCD)	Optional (4 digits, 7-segment LCD)	
Electrical connections	Screw terminals 1.5 mm²			
Power supply	16...29 VDC / VAC			
Power consumption	‹1 W			
Application temperature housing / electronics	0...50 °C / 0...95 %RH (non-condensing)			
CE / EMC compatibility	EMC Directive 89/336/EEC			
CO_2 measurement				
Measurement technique	Nondispersive infrared (NDIR) with automatic baseline correction (ABC)			
Measurement range	Standard 0...2000 ppm, optional 0...5000 ppm			
Accuracy	±30 ppm ±3 % of reading			
Warm-up time	‹1 min.			
Long-term stability	‹±10 ppm			
Pressure dependence	+1.6 % of measured value per kPa change from normal pressure (101.3 kPa)			
Maintenance	No maintenance necessary in normal indoor use			
Lifetime	›15 years			
Analog output				
Number	2	1	2	
Current	4...20 mA	N/A	4...20 mA	
Voltage	0...10 VDC			
Functions				
Alarm function	N/A	Audible and light signal, alarm threshold at 1400 ppm (adjustable)	N/A	
Self test	Complete function test			

CF5 SERIES

Features

- Measures CO_2 by infrared measurement technique (NDIR) + temperature
- Standard measurement range: 0...2000 ppm
- Accuracy: ±30 ppm, ±3 % of reading
- Range of application: 0...50 °C / 0...95 %RH
- Analog output signals
- Automatic calibration

POWER SUPPLY

- Low voltage: 3/4-wire

SIGNAL OUTPUTS

- Current output
- Voltage output
- Modbus / RS-485

VERSION

- Space mount version
- Duct version
- Wall version

OUTPUT PARAMETERS

- CO_2 and temperature

OUTPUT SCALING

- CO_2: range selectable, standard 0...2000 ppm

DISPLAY

- Display optional

CF5 SPACE MOUNT VERSION

Applications

Measures CO_2 and temperature in offices, conference rooms, classrooms, public buildings, etc.

Standard

Order code	CF5-W-Disp
Output signals	0...10 VDC 0/4...20 mA
Supply voltage	16...29 VDC / VAC
Display	Optional
CO_2 measurement range	Standard 0...2000 ppm, optional 0...5000 ppm

Options

RL	Relay
MB	Modbus interface
RS-485	RS-485 interface

INCLUDED

• Factory adjustment certificate
• Short instruction manual

RECOMMENDED ACCESSORIES

• Service cable	CF5/8 Comm Cable

CF5 DUCT AND WALL VERSIONS

Applications

Measures CO_2 and temperature in ventilation pipes and industrial applications

Duct version

Order code	CF5-D-Disp
Output signals	0...10 VDC 0/4...20 mA
Supply voltage	16...29 VDC / VAC
Display	Optional
Dimensions	142 x 85 x 46 mm, probe: 245 mm
Protection	IP65

Wall version (industry)

Order code	CF5-W-IND-Disp
Output signals	0...10 VDC 0/4...20 mA
Supply voltage	16...29 VDC / VAC
Display	Optional
Dimensions	142 x 85 x 46 mm
Protection	IP54

CO_2 measurement range	Standard 0...2000 ppm, optional 0...5000 ppm

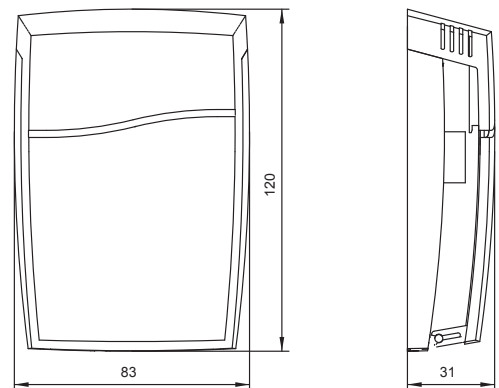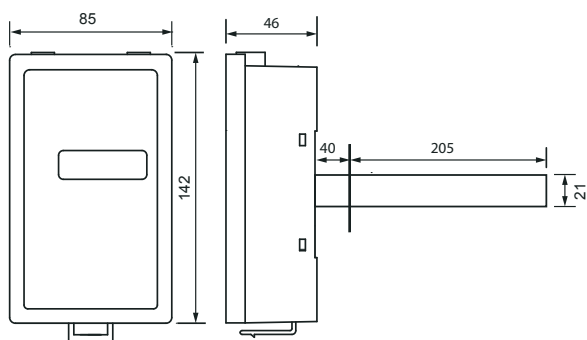| Options	
RL	Relay
10%	Measurement range 0...10 % volume
MB/RS-485	Modbus / RS-485 interface

INCLUDED

- Factory adjustment certificate
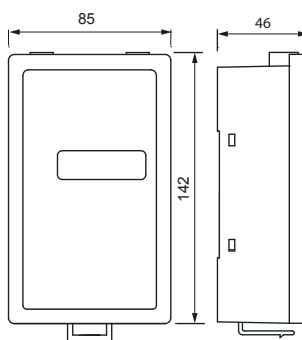- Short instruction manual

RECOMMENDED ACCESSORIES

- Service cable   CF5/8 Comm Cable

CF5-D-Disp

CF5-W-Disp

| Specifications	CF5-W-Disp	CF5-D-Disp	CF5-W-IND-Disp
General			
Parameters	Carbon dioxide (CO_2) and temperature		
Housing material	ABS		
Protection	IP30	IP65	IP54
Dimensions	120 x 82 x 30 mm	142 x 85 x 46 mm	
Weight	150 g	250 g	
Display	Optional (4 digits, 7-segment LCD)		
Electrical connections	Screw terminals 1.5 mm^2		
Power supply	16...29 VDC / VAC		
Power consumption	‹3 W		
Application temperature housing / electronics	0...50 ºC / 0...95 %RH (non-condensing)		
CE / EMC compatibility	EMC Directive 89/336/EEC		
CO_2 measurement			
Measurement technique	Nondispersive infrared (NDIR) with automatic baseline correction (ABC)		
Measurement range	Standard 0...2000 ppm, optional 0...5000 ppm		
Accuracy	±30 ppm ±3 % of reading		
Warm-up time	‹1 min.		
Long-term stability	‹± 0.3 % of measurement range		
Pressure dependence	+1.6 % of measured value per kPa change from normal pressure (101.3 kPa)		
Maintenance	No maintenance necessary in normal indoor use		
Lifetime	›15 years		
Temperature measurement			
Temperature sensor	NTC		
Measurement range	0...50 ºC / 0...100 ºF		
Accuracy	0.5 K		
Analog output			
Number	2		
Current	0/4...20 mA		
Voltage	0...10 VDC		

GREENHOUSE

Applications

Measures CO_2 and temperature in greenhouses and wherever adverse environmental conditions prevail

	CF8-W-Disp-GH
Output signals	0...10 VDC 0/4...20 mA
Supply voltage	16...29 VDC / VAC
Measurement range	0...2000 / 5000 ppm 0...4 % vol (0...40,000 ppm) 0...50 °C
Relay	Open ‹900 ppm, closed ›1000 ppm (range adjustable)
Protection	IP54
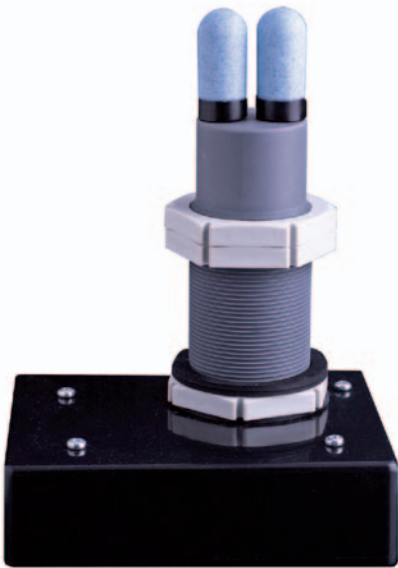
INCUBATOR

Applications

Measures CO_2 in incubators and climate chambers

Order code	CF8-D/W-IN
Output signals	0...5 VDC 4...20 mA
Supply voltage	16...29 VDC / VAC
Measurement range	0...3 % vol (0...30,000 ppm)
Dimensions	Ø40 x 102 mm
Protection	IP67

INCLUDED

- Factory adjustment certificate
- Short instruction manual

RECOMMENDED ACCESSORIES

- Service cable   CF5/8 Comm Cable

CL11 BENCHTOP DISPLAY UNIT

Benchtop display unit for monitoring indoor air quality. Measures and records CO_2, relative humidity and temperature.

Applications

Indoor air quality (IAQ) measurements in offices, schools, etc.

Features

- Measures and records CO_2, relative humidity and temperature
- Accuracy: ±2.5 %RH / ±0.3 K / ±30 ppm
- ROTRONIC HYGROMER® IN-1 humidity sensor
- 40,000 data point memory for CO_2, humidity and temperature values
- Maximum, minimum and average value display
- Adjustable audible and visual CO_2 alarm
- Real time clock with backup battery
- Includes free logging and configuration software

Order code	CL11
Probe type	CO_2 infrared (NDIR) with automatic calibration (ABC) Humidity: ROTRONIC HYGROMER® IN-1 Temperature: NTC
CO2 measurement range	0...5000 ppm
Range of application	0...50 °C / 0...95 %RH, non-condensing
Material	ABS
Power supply	AC adapter
Protection	IP30

INCLUDED

- Short instruction manual
- AC adapter AC1214
- ROTRONIC software SW21

RECOMMENDED ACCESSORIES

• Humidity calibration device	ER-15
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS
• External temperature probe	AC1215
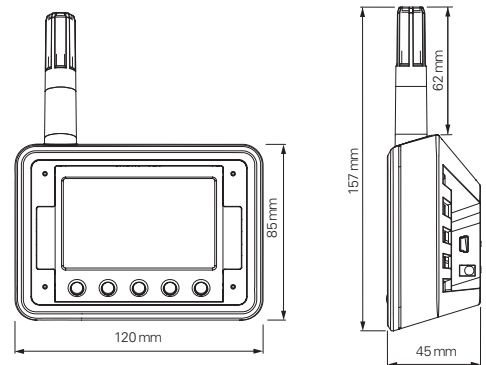
CO₂ DISPLAY

Room panel for monitoring indoor air quality. Measures and records CO_2, relative humidity and temperature.

Applications

Indoor air quality (IAQ) measurements in offices, schools, etc.

Features

- Measures and records CO_2, relative humidity and temperature
- Accuracy: ±2.5 %RH / ±0.3 K / ±30 ppm
- ROTRONIC HYGROMER® IN-1 humidity sensor
- 18,000 data point memory for CO_2, humidity and temperature values
- Adjustable visual CO_2 indicator
- Data download via USB stick
- Display of date and time

Order code	CO₂ DISPLAY
Probe type	CO_2 infrared (NDIR) with automatic calibration (ABC) Humidity: ROTRONIC HYGROMER® IN-1 Temperature: NTC
CO₂ measurement range	0...5000 ppm
Range of application	0...50 °C / 0...95 %RH, non-condensing
Material	ABS
Power supply	AC adapter, 12 V
Dimensions	330 x 250 x 50 mm

INCLUDED

- Short instruction manual
- AC adapter AC1214
- Screws and plugs for mounting
- Factory adjustment certificate

RECOMMENDED ACCESSORIES

Humidity calibration device	ER-15
Humidity standard for calibration 80 %RH	EA80-SCS
Humidity standard for calibration 35 %RH	EA35-SCS
External temperature probe	AC1215
Zero calibration kit	CO2 CALIBRATOR
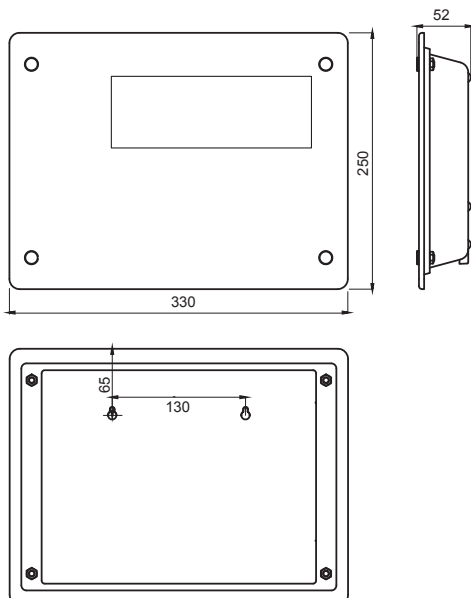
CP11

Portable monitoring of indoor air quality. Measures and records CO_2, relative humidity and temperature.

Applications

Mobile inspections and random tests of indoor air quality in offices, schools, etc.

Features

- Measures and records CO_2, relative humidity and temperature
- Accuracy: ±2.5 %RH / ±0.3 K / ±30 ppm
- ROTRONIC HYGROMER® IN-1 humidity sensor
- 18,000 data point memory for CO_2, humidity and temperature values
- Maximum, minimum and average value display
- Adjustable audible CO_2 alarm
- Adjustable automatic power off function
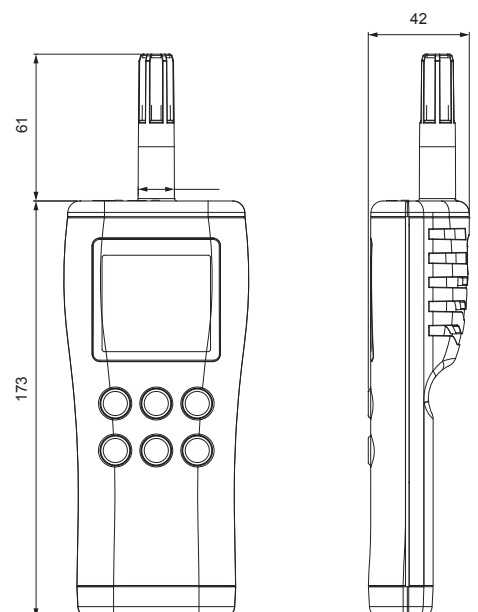- Includes logging and configuration software

Order code	CP11
Probe type	CO_2 infrared (NDIR) with automatic calibration (ABC) Humidity: ROTRONIC HYGROMER® IN-1 Temperature: NTC
CO2 measurement range	0...5000 ppm
Range of application	0...50 °C / 0...95 %RH, non-condensing
Material	ABS
Power supply	4 AA batteries / optional AC adapter
Protection	IP30

INCLUDED

- Short instruction manual
- 4 x AA batteries
- ROTRONIC software SW21
- USB cable
- Soft case

RECOMMENDED ACCESSORIES

• AC adapter 5 VDC	AC1214
• Humidity calibration device	ER-15
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

42

61

173

Specifications	CL11	CP11	CO$_2$ DISPLAY
General			
Parameters	CO$_2$, relative humidity and temperature		
Memory capacity	40,000 values with time stamp, automatic recording (%RH / °C / ppm)	18,000 values with time stamp, automatic recording (%RH / °C / ppm) 99 single values with time stamp, manual recording (%RH / °C / DP / WBT / ppm)	18,000 values with time stamp, automatic recording (%RH / °C / ppm)
Housing material / Protection	ABS / IP30		
Dimensions	157 x 120 x 45 mm	77 x 42 x 234 mm	330 x 250 x 50 mm
Weight	200 g	290 g	1400 g
Display	Two-line LCD with backlight		Seven-segment display
Alarm	Audible and visual, adjustable for CO$_2$ measurement	Audible, adjustable for CO$_2$ measurement	Visual, adjustable for CO$_2$ measurement
Power supply	AC adapter AC1214	4 AA batteries / optional AC adapter AC1214	AC adapter
Current consumption	50 mA	40 mA	‹700 mA
Application temp. housing / electronics	0...50 °C / 0...95 %RH, non-condensing		
Service interface	USB Mini port		
CE / EMC compatibility	CE conformanity 2004/108/EC		
CO$_2$ measurement			
Measurement principle	Infrared (NDIR) with automatic calibration (ABC)		
Measurement range	0...5000 ppm		
Accuracy at 23 °C ±5 K	±30 ppm ±5 % of measured value		
Zero drift	‹10 ppm/year		
Maintenance	No maintenance (standard indoor applications)		
Humidity measurement			
Sensor	ROTRONIC HYGROMER® IN-1		
Measurement range	0...100 %RH		
Accuracy at 23°C ±5 K	‹2.5 %RH (10...90 %RH)		
Adjustment points	35, 80 %RH		
Long-term stability	‹1.5 %RH/year		
Response time	‹30 s τ63, without filter		
Temperature measurement			
Sensor	NTC		
Measurement range	-20...60 °C		
Accuracy at 23°C ±5 K	±0.3 K		
Response time	4 s t90		

ZERO CALIBRATION KIT

Features

- Instrument generates CO_2 - free air for calibration of CO_2 sensors at "zero point"
- Average absorption time of 9 hours per cartridge
- Power supply via AC adapter or internal rechargeable battery
- Charging function

Order code	CO2-CALIBRATOR
Working principle	Neutralization of CO_2 from the ambient air
Purity	20...25 ppm
Dimensions	156 x 89 x 26 mm
Weight	270 g
Gas flow	320...340 ml/min.
Application temperature	0...45 ºC
Rechargeable battery	Li-ion, 7.4 V
AC adapter	2 VDC, 0.5 A

INCLUDED

- Short instruction manual
- AC adapter
- 2 x set of replacement cartridges (5 pc. per set)

CO_2 REPLACEMENT CARTRIDGES

Features

- Replacement cartridges for CO_2 CALIBRATOR
- Set with 5 cartridges

Order code	CO2 CARTRIDGE

DIFFERENTIAL PRESSURE

Differential pressure
and temperature measurement

The **PF4 series** is the latest development from ROTRONIC. The thermal measurement technique enables high-precision measurements in the smallest of ranges. With the differential pressure transmitter, ROTRONIC customers are now able to measure a further key parameter in addition to humidity, temperature and CO_2. With its optional temperature probe, the instrument is suitable for a wide range of applications.

PF4 series

Features

- Accuracy: ±1.0 % of end value
- Fast response time
- Freely configurable analog signals
- Integrated relay switch contact
- High resistance to over pressure
- Thermal mass flow measurement at low flow rate
- High immunity to dust and humidity in the environment

Power supply

- Low voltage: 3/4-wire

Signal outputs

- Current output
- Voltage output
- Ethernet
- Relay switch output

Version

- Wall version

Output parameters

- Differential pressure & temperature
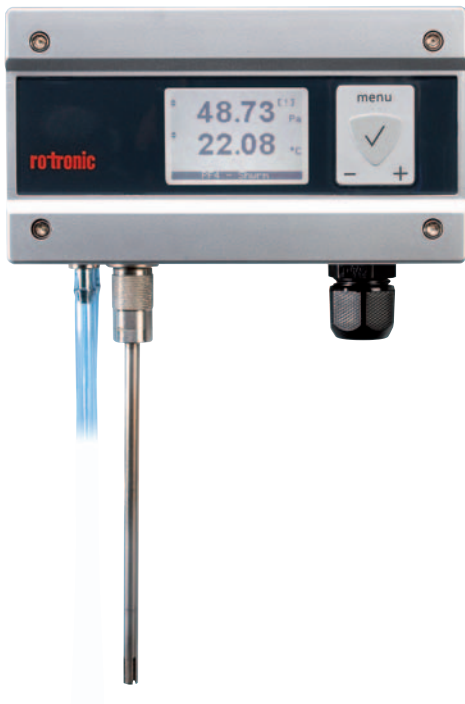- Differential pressure

Measurement ranges

- -25...+25 Pa / -50...+50 Pa / -100...+100 Pa / -250...+250 Pa / -500...+500 Pa

Display

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

Order codes on request.

PF4 WALL VERSION

Applications

Measures differential pressure and temperature in clean rooms, operating rooms and applications where small pressure differences prevail.

3/4-wire

	PF43x-1	PF43x-L
Output signals	0...1/5/10 V 0/4...20 mA (Customer rescaling possible*) Relay switch output	Ethernet 0...1/5/10 V 0/4...20 mA Relay switch output
Supply voltage	15...40 VDC / 14...28 VAC	
Display	Optional	

COMPATIBLE

• HW4 software, page 148

INCLUDED
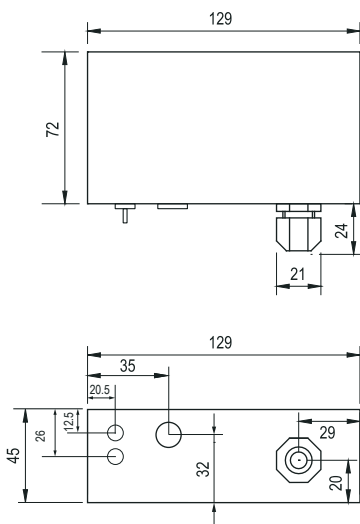
• Factory adjustment certificate
• Short instruction manual
• Screws and plugs for mounting

TYPICAL ACCESSORIES

• Service cable	AC3006 / AC3009* (page 86)
• Temperature probes	AC19xx (page 94)
• Mounting kit DIN top-hat rail	AC5002

Reference

* Requires optional HW4 software and service cable

Specifications	PF43x-1 Analog 3/4-wire	PF43x-L Analog & digital 3/4-wire
General		
Parameters	Differential pressure and temperature	
Housing material / Protection	ABS / IP65	IP40
Dimensions	129 x 72 x 45 mm	
Weight	240 g	
Display	LCD, 1 or 2 decimals with backlight, menu navigation, 4 keys	
Electrical connections	Screw terminals inside, M16 cable gland	Screw terminals inside, M16 cable gland, socket (Ethernet)
Power supply	15…40 VDC / 14…28 VAC	
Current consumption	‹70 mA	‹150 mA
Application temp. housing / electronics	0…70 °C / 0…90 %RH 0…60 °C / 0…90 %RH with display	
Firmware upgrade	Via HW4 software	
Service interface	UART service interface (inside device)	
CE / EMC compatibility	EMC Directive 2004/108/EC	
Fire protection class	Corresponds to UL94-HB	
FDA / GMP compatibility	Conforms to 21 CFR Part 11 and GAMP5	
Differential pressure measurement		
Sensor	Thermal mass flow measurement	
Measurement ranges	-25…+25 Pa / -50…+50 Pa / -100…+100 Pa / -250…+250 Pa / -500…+500 Pa	
Accuracy at 23°C ±3 K	±1.0 % of end value	
Adjustment points	Zero point, 1 freely selectable reference point	
Long-term stability	‹0.3 %/year	
Pressure dependence	0.1 %/hPa	
Measurement interval	1 s	
Response time	Configurable 0 s…30 min.	
Pressure resistance	2 bar (2,000 hPa)	
Air flow	120…180 µl/min.	
Connections	Diameter 4 mm	
Temperature measurement		
Sensor	Pt100 connection, 4-wire	
Measurement range	-100…200 °C (probe dependent)	
Adjustment points	1	
Analog output		
Number	2	
Current	0/4…20 mA	
Voltage	0…1/5/10 V	
Switch output	1 relay (configurable with HW4 software) Switching capacity: ‹50 VAC / ‹75 VDC / ‹1 A	
Accuracy analog output	±10 mV (voltage output) ±20 µA (current output)	
Digital output		
Ethernet	No digital outputs	Ethernet RJ45

SOFTWARE

SOFTWARE VERSIONS

Features

- Instrument monitoring
- Recording of measured values on a PC
- Alarm functions
- Tabular and graphical display of measured values
- Room layout graphic with live measured values
- Instrument configuration
- Programming and data retrieval from data loggers
- Probe calibration and adjustment
- Psychrometric parameters
- Assignable user rights

HW4

SW21

SOFTWARE EDITIONS

HW4 LITE

Visualization of measured values from the compact logger HL-20(D) and HC2-WIN-USB

A maximum of 3 instruments can be connected simultaneously

All functions of the Standard edition

HW4 STANDARD

Single-user applications

Visualization of multiple loggers and measured values

Monitoring (1 instrument at a time), data logger programming, data retrieval, 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 and food 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 fast determination of water activity

Order code: HW4-P-QUICK-Vx

HW4 PROFESSIONAL WITH OPC SERVER

Network applications with integration into the customer's own software tools

All functions of the Professional edition

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

Order code: HW4-P-OPC-Vx

HW4 VALIDATED SOFTWARE

For users subject to regulatory requirements (GxP)

All the functions of 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 max. 30 days

QUALIFICATION / COMPUTERIZED SYSTEM VALIDATION

Data integrity and security are of essential importance today. Companies in the pharmaceutical, food, and medical technology industries 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 solutions 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, HygroFlex HF3-HF8, HygroLab C1, HygroPalm HP21 to HP23-A and future instruments.	Lite	Standard	Professional	Professional with water activity	Professional with OPC server	HW4-VAL
HW4 product key	**20 xxx**	**24 xxx**	**64 xxx**	**86 xxx**	**88 xxx**	**12 xxx**
Viewing of measured values/Monitoring						
Display of measured values on a monitor for multiple instruments		✔	✔	✔	✔	✔
Monitor display of measured values consolidated into groups			✔	✔	✔	✔
ROTRONIC networkable products (RS-485)			✔	✔	✔	✔
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 graphic display	✔	✔	✔	✔	✔	✔
Graphic comparisons and overlay functions			✔	✔	✔	✔
Customer-specific room layout			✔	✔	✔	✔
Analysis and calculation tool						
Psychrometric parameters	✔	✔	✔	✔	✔	✔
Statistics	✔	✔	✔	✔	✔	✔
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, HygroFlex HF3-HF8, HygroLab C1, HygroPalm HP21 to HP23-A and future instruments.

	Lite	Standard	Professional	Professional with water activity	Professional with OPC server	HW4-VAL
HW4 product key	**20 xxx**	**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 Data Loggers		✔	✔	✔	✔	✔
Supported operating systems						
Microsoft Windows XP Service Pack 2, Vista, Windows 7, Windows 8	✔	✔	✔	✔	✔	✔

Functions

Viewing of measured values/Monitoring

Viewing of measured values is very easy and user-friendly. Data files for any device shown in the device tree can be copied and opened directly with the HW4 explorer. The data is presented in table or graphical formats.

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 machine can be stored within the HW4 software.

Drawings and images can be imported in BMP or JPG format. Once the room layout has been imported, the probes 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.
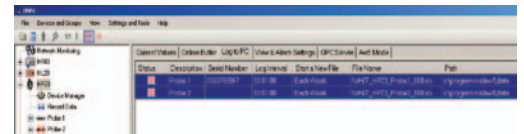
Instrument configuration

The HW4 software can be used to adjust the settings of ROTRONIC instruments and probes. Depending on the instrument and probe, 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
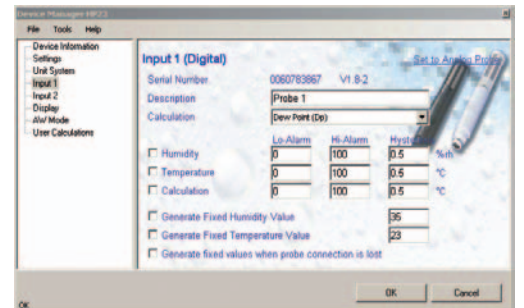
Analysis and calculation tool
Psychrometric parameters

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 parameters (e.g. mixing ratio & temperature) as input values in order to calculate the relative humidity from them. Other advanced options such as dew/frost point differentiation are also included.
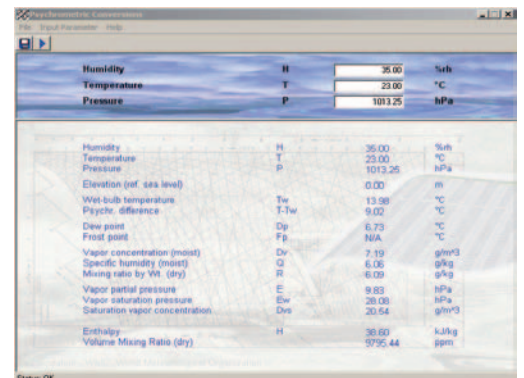
* WMO = World Meteorological Organisation   **153**
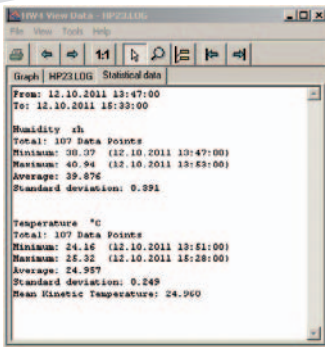
Statistical functions

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:

• 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

• total time measurements exceeded a certain value

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.

Software SW21

Features

- Complementary software for configuration and downloading of data from the following instruments
  - CP11: CO2 Handheld
  - CL11: CO2 Display / Logger
  - HF1: HVAC Transmitter

- Stand-alone version or integrated in HW4 software
- Display of measured values in tabular or graphic form
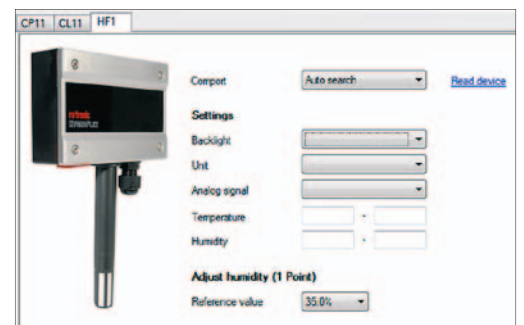- Languages: English and German

CP11 / CL11

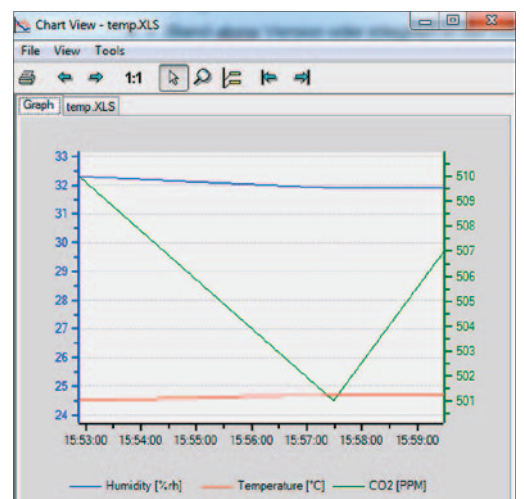Instrument configuration and downloading of data

HxgroFlex1

Instrument configuration and humidity adjustment

Display of measured values

Measured values can be displayed in tabular or graphic formats.

SERVICES

ROTRONIC AFTER SALES SERVICES

When you buy a product from ROTRONIC, you do not simply choose a company that sells you the measuring instrument, but also for a company that supports you after the sale. ROTRONIC will work with you to insure that you to use the measuring instruments to your maximum benefit.

Do not underestimate the importance of the measurement of humidity and temperature: incorrect **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 even the **best products sensors drift 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, or need our calibration team to calibrate or adjust your measuring instruments according to national standards, use our after-sales service offered on the following pages.

All after sales services are available in Switzerland. In all other countries the offer may vary (details on request).

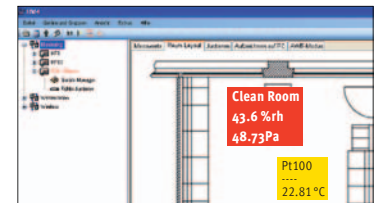# CONTENTS
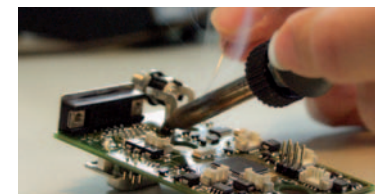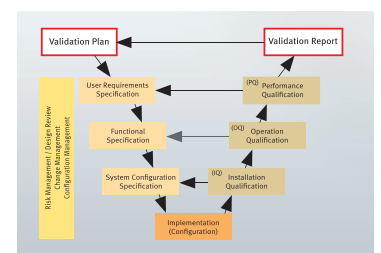
Engineering / Project planning

You work in the planning and control of temperature and humidity in a storage/production area with existing equipment/measuring devices and taking regulations into account (e.g. FDA)
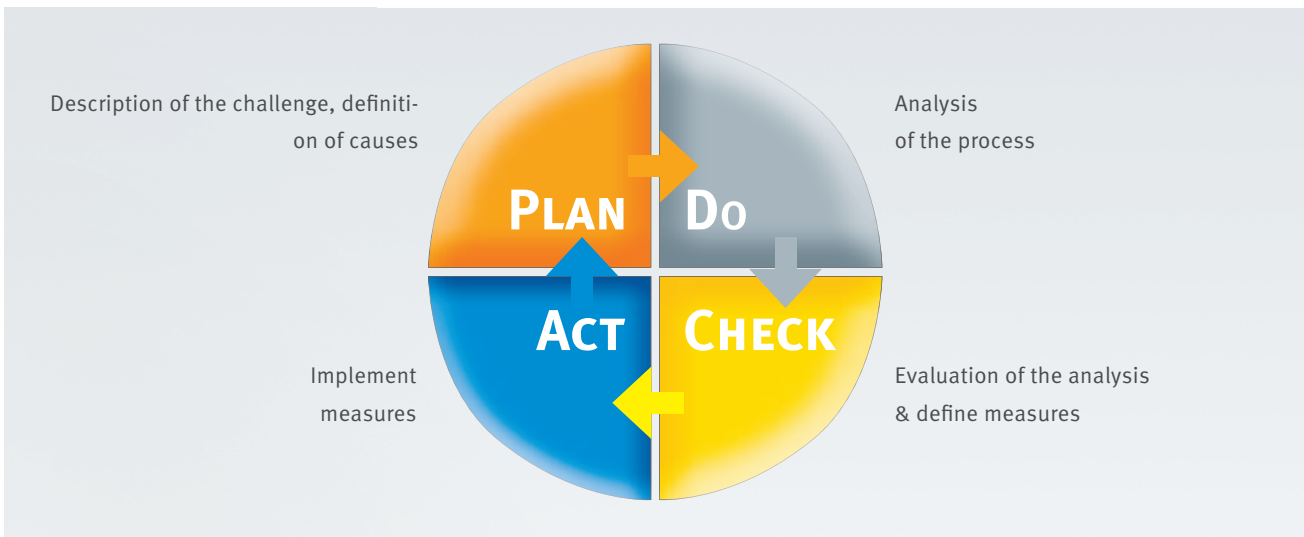**The ROTRONIC engineering/project planning service supports you from planning to implementation of your system guaranteeing optimal and efficient design for the control of your process.**

Customer benefits

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 and let our application engineers design your optimal measuring system!

PDCA method
The PDCA method is based on the GEMBA principle ("go to where the action is") and focuses on employees with exact knowledge of the situation!

Description of the challenge, definition of causes

PLAN

DO

Analysis of the process

ACT

CHECK

Implement measures

Evaluation of the analysis & define measures

EQUIPMENT HIRE

Many customers have their measuring instruments calibrated in our accredited laboratory. Others prefer to perform the calibration themselves. ROTRONIC makes the HygroGen2 humidity and temperature generator available for on-site calibrations.

Renting the device saves you investment in your own device and you receive equipment with outstanding accuracy that is traceable to the national standard. Calibrate your ROTRONIC or third-party probes with the easy-to-use HygroGen Humidity and Temperature Generator.

If you prefer, simply hire a ROTRONIC technician as well. He will explain the calibration procedure to you and support you in your calibrations/adjustments.

ROTRONIC also rents data loggers in the HL20 series. With them you can record humidity and temperature data with the required logging interval.

Please contact your local ROTRONIC representative to discuss your requirements.

HygroGen2

HL-20D

CALIBRATION

Your own measuring equipment management procedures and relevant regulations make regular calibration necessary. ROTRONIC offers you calibration services tailored to your needs and performed either at your premises or in an accredited ROTRONIC laboratory. We will gladly advise and provide a detailed quotation.

Calibration at your premises

ROTRONIC comes to you with the equipment needed for calibration and performs the necessary temperature and humidity calibrations at your premises.

Customer benefits

- Minimal plant downtime
- Direct contact with the specialists
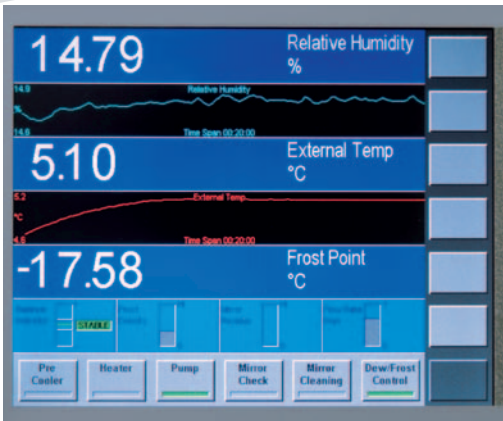- Minor repairs possible on site

Calibration in a ROTRONIC laboratory

Discuss your instruments and calibration requirements with ROTRONIC today. We will arrange a date with our ROTRONIC calibration laboratory and provide instructions to send the instruments in to the laboratory.
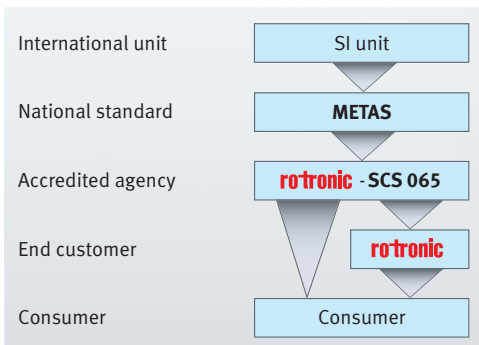
Your process monitoring and control requirements generally determine whether a factory adjustment certificate qualifies or whether a SCS certificate (ISO 17025) is required. SCS certificates are generally needed in the pharmaceutical industry, the medical technology industry, research and development and the food industry.

Customer benefits

- Highly accurate SCS calibration (ISO 17025)
- Expedited calibration available

Calibration hierarchy (e.g. Switzerland)

International unit	SI unit
National standard	**METAS**
Accredited agency	**rotronic** - **SCS 065**
End customer	**rotronic**
Consumer	Consumer

TEMPERATURE MAPPING

Incorrect temperature or humidity control can result in expensive damage to products. This must be avoided at all costs to prevent financial loss and product-specific damage. Temperature mapping is the first step in achieving a stable and controlled climate.

GxP regulations in force in various countries require documented proof that the facilities used are suitable for storage of the products. If this proof cannot be produced, manufacturers, distributors or storage operators face financial and other penalties.

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 and cabinets. This is done with the help of a temperature and humidity mapping procedure. This mapping provides information on how many different temperature zones (temperature gradients) there are in the rooms. Using the measured data, it is possible to define the optimum storage positions for products or, in an extreme case, to initiate changes in the room climate!

Mapping also takes influencing factors such as direct sunlight, air conditioners, insulation, heat sources, and external temperature into consideration. The final report may include recommendations on how to improve the room conditions. Mapping is typically performed once in the summer and once in the winter of the year. The measurement process typically has a duration of about one to two weeks.

Typical mapping applications: production & storage in the pharmaceutical industry, food industry and wherever temperature-sensitive products are stored.

Customer benefits

- Exact data on the climate in the room.
- FDA conformity
- Knowledge of possible danger zones in the controlled climate.
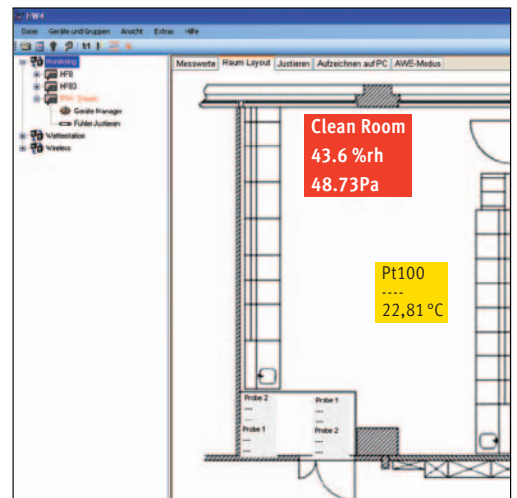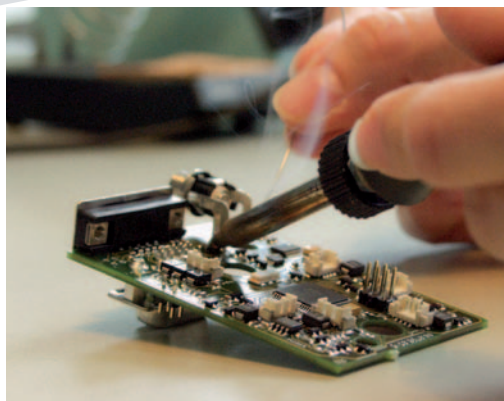
Product Repair & maintenance

Once you have opted for a measurement instrument from ROTRONIC, you will soon discover you are working with sensors that offer an unmatched benefit: long-term stability. If, however, your instrument becomes damaged, you can rely on a fast, high-quality and customer-orientated after sales service from ROTRONIC.

Our service process

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 instruments for the transmitters and probes that are important to their processes, something we also recommend, particularly for non-standard models. Sometimes it is no longer worthwhile to repair an instrument due to the high cost. ZIn such cases we offer you compatible new instruments with an attractive service discount.

We offer an express repair service for emergency cases. If an instrument cannot be repaired and you do not have a reserve instrument, we will manufacture a compatible new instrument as quickly as possible.

Customer benefits

- Low maintenance costs for measuring systems
- High availability of replacements
- Short production downtimes

TRAINING, COURSES & SEMINARS

Calibration seminars

Our calibration seminars are used by customers working in various fields to refresh their knowledge or to learn the basics of calibration.
In half a day you will be brought up to date in the subject of calibration.
You will also be given an opportunity to perform actual calibrations so that you can put your freshly gained knowledge into practice!

Seminar in ROTRONIC training room

Contents

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

Product training

Are you interested in the principles of humidity, temperature, CO_2, and differential pressure measurement or deciding which instrument is best for an application? Why not attend a ROTRONIC product training course – where you will also learn about influencing factors such as contaminants, pollutants, dust, and solvents.
The courses are restricted to 10 people! The courses are held at ROTRONIC or at your premises.

VALIDATION & QUALIFICATION

Global companies are increasingly subject to obligatory international regulations. For example, manufacturers wishing to deliver pharmaceutical products or foods to the USA must fulfill the requirements of the FDA.

Situation

Validation includes the provision of documented evidence that a system was planned and produced according to extremely strict 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 and losses in productivity. Validation by a computer-aided system is therefore critical for legal and business reasons. ROTRONIC products, including software, conform to specific FDA requirements, are manufactured according to GAMP and provide a path to validation.
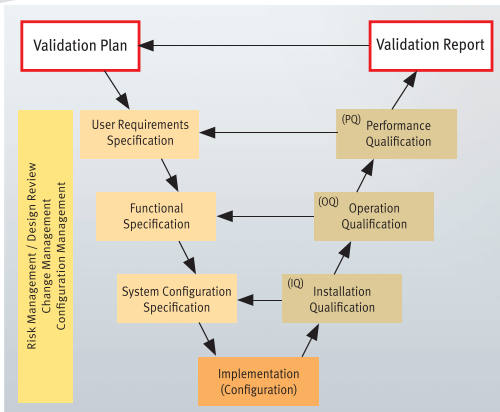
ROTRONIC supports you in the following areas:
- Development of SOP for system validation
- Preparation of project related validation plans and risk analyses
- Preparation of IQ/OQ documents
- Preparation of validation reports

Customer benefits

- Competence in validation directly from the manufacturer
- Lower costs
- FDA / GAMP-compliant systems

FDA:	Food and Drug Administration
GAMP:	Good Automated Manufacturing Practice
CSV:	Computer System Validation
SOP:	Standard Operation Procedures
IQ/OQ:	Installation/Operation Qualification

THEORY

Contents

Fundamental terms of humidity measurement

Water vapor density (absolute humidity)

This is the amount of water vapor (kg) contained per unit volume (m³) 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 water is given off in liquid form (dew). The maximum pressure is called saturation pressure and is temperature dependent. The temperature dependency is, however, not included 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 percentage

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 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 medium 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 desorbed 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, pharmaceuticals and other 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. The water vapor pressure that then prevails is 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

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

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

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

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

Water vapor saturation pressure (Ew) in hPa

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. The response time becomes greater at low temperatures and little air movement. It also increases when a filter is used.

ACCURACY OF HC2 PROBES

The accuracy of the ROTRONIC humidity and temperature probes is highest at the adjustment points. HygroClip2 probes are adjusted according to international standards with a volume flow of 10 l/min. and 1 m/s at 23 ±5 °C. Depending on the product and adjustment profile, the accuracy ranges between ±0.5 %RH / 0.1 K and ±2.0 %RH / 0.3 K. The accuracies specified for our probes relate to our production plant reference probes traceable to the national standard.

Maximum accuracy is achieved when adjustment of the probes is at the point of use. ROTRONIC offers this service (see chapter Services, page 156).

Humidity
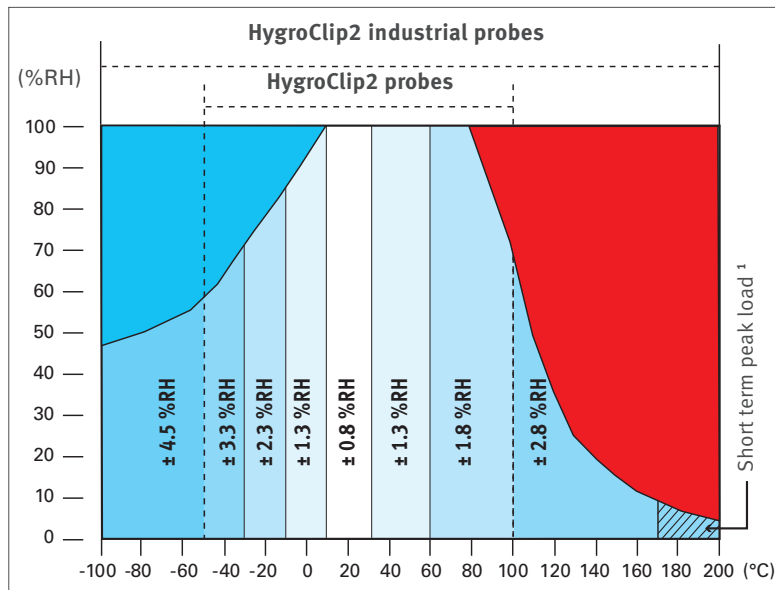
HygroClip2 industrial probes
HC2-IC1xx, HC2-IC3xx, HC2-IC4xx,
HC2-IC5xx, HC2-IC7xx
HC2-IC1xxA, HC2-IC3xx-A, HC2-IC4xxA,
HC2-IC5xxA, HC2-IC7xxA

Accuracy of humidity measurements over the measuring range
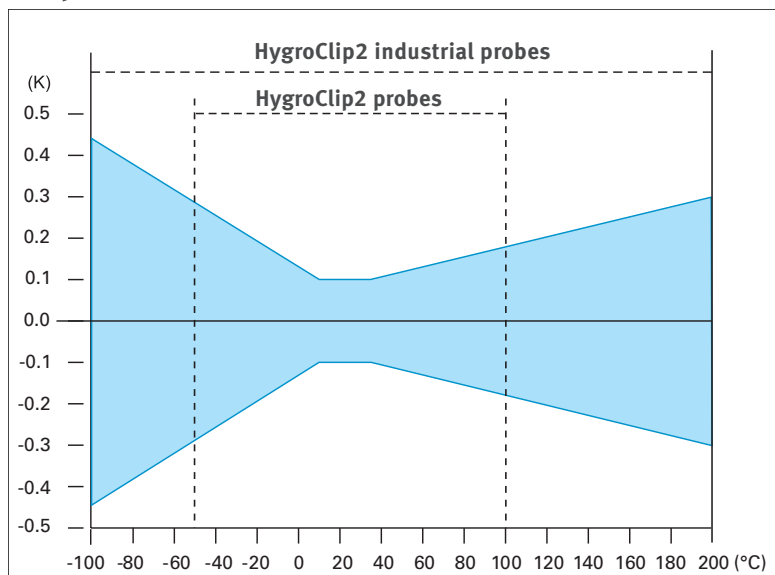
HygroClip2 probes
HC2-S, HC2-S3, HC2-R, HC2-R3

Accuracy of humidity measurements over the measuring range

[1] **Short-term peak loads:**
Rotronic probes allow a peak load of 3x5 minutes at 200 °C without suffering any permanent damage. The time between the peak loads is of no importance. Longer peak loads can result in an increased sensor drift of up to 3 %RH over a 25 hours period.

Temperature

HygroClip2 industrial probes
HC2-IC1xx, HC2-IC3xx, HC2-IC4xx,
HC2-IC5xx, HC2-IC7xx
HC2-IC1xxA, HC2-IC3xx-A, HC2-IC4xxA,
HC2-IC5xxA, HC2-IC7xxA

Accuracy of temperature measurements over the measuring range

HygroClip2 probes
HC2-S, HC2-S3, HC2-R, HC2-R3

Accuracy of temperature measurements over the measuring range

CONTAMINANTS/POLLUTANTS

Some gases and contaminants/pollutants can damage 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 constant concentration must be known (see table below).

Contaminants/Pollutants with an influence

Substance	Formula	Max. constant concentration 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	$CH3COOC2H5$	4000	15000
Ethanol	C_2H_5OH	3500	6000
Ethylene glycol	$HOCH_2CH2OH$	1200	3000
Formaldehyde	HCHO	2400	3000
Isopropanol	$(CH3)_2CHOH$	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	H_2S	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, silicon must not be used!

PROBE USE IN PRACTICE

As a world-leading manufacturer of humidity measurement instruments, ROTRONIC is fully aware of its 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 measured climate with good airflow across the sensor.
3. Choose the right filter. Measurement is fastest without a filter. 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 when contaminants, pollutants and in harsh environmental conditions are present.
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 ensure that you have calibration traceable to national standards.

Measurement of water activity

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

Why is water activity measured?

The free water in a product influences its microbiological, chemical and enzymatic stability. This is especially important in the case of perishable products such as foodstuffs, grain, seeds, as well as in the case of 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. Control of water activity therefore 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 temperature measurement as a standard feature. 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 the help of 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 extremely small internal volume of the sensor chamber ensures humidity equilibrium is reached very quickly for all products.

CO₂ Principles

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 indoor air quality.

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. Nondispersive 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.

How is differential pressure measured?

Heating element

Flow

Temperature-sensitive resistors
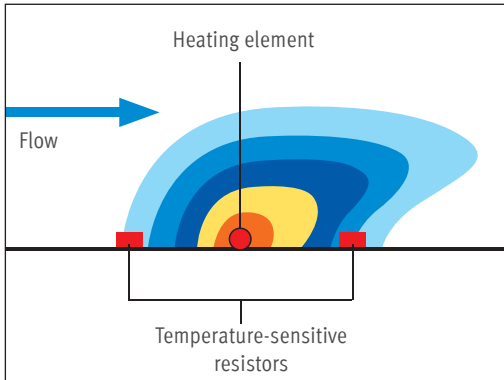
Thermal mass flow measurement

The thermal mass flow measurement technique is suitable for measurement of very low air and gas pressures upwards of a final measurement range value of 25 Pa. In this measurement technique, a heating element is placed between two temperature sensitive resistors, both upstream and downstream. A gas flow moves the temperature profile towards the downstream resistor.

A difference in temperature then arises between the two resistors and generates a voltage proportional to the mass flow. Since the flow through the sensor is caused by the difference in pressure between the two connections of the sensor, the output signal is also a measure of the differential pressure.

These sensors are calibrated for differential pressure and can measure the pressure drop over a flow element as described above. Due to their very high pneumatic resistance, the gas flows through the sensor are very low at max. 120-180 µl/min. Sensors used for volume flow measurement therefore behave almost like diaphragm-based differential pressure sensors, in which gas does not flow through the sensor, without losing the advantage of high sensitivity near zero, as typical for thermal mass flow measurement.

4 m   50 Pa
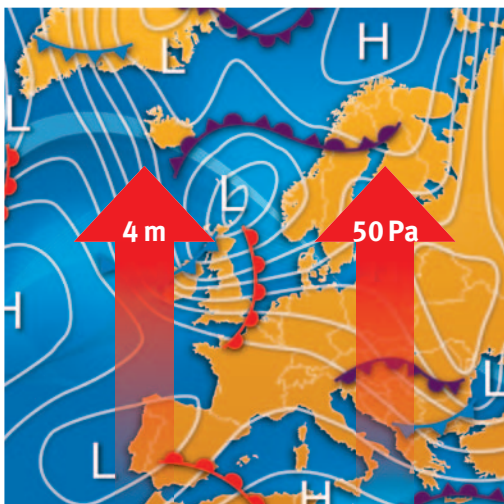
Pressure vs. altitude difference

50 Pa pressure corresponds to an altitude difference of 4 meters. The pressure at sea level is 101,325 Pa, which means a pressure of 101,275 Pa prevails four meters above sea level.

rotronic

MEASUREMENT SOLUTIONS