Main Catalogue

Measurement solutions for multiple parameters

HUMIDITY

TEMPERATURE

DEW POINT

WATER ACTIVITY

DIFFERENTIAL PRESSURE

PRESSURE

FLOW

CO_2

rotronic
MEASUREMENT SOLUTIONS

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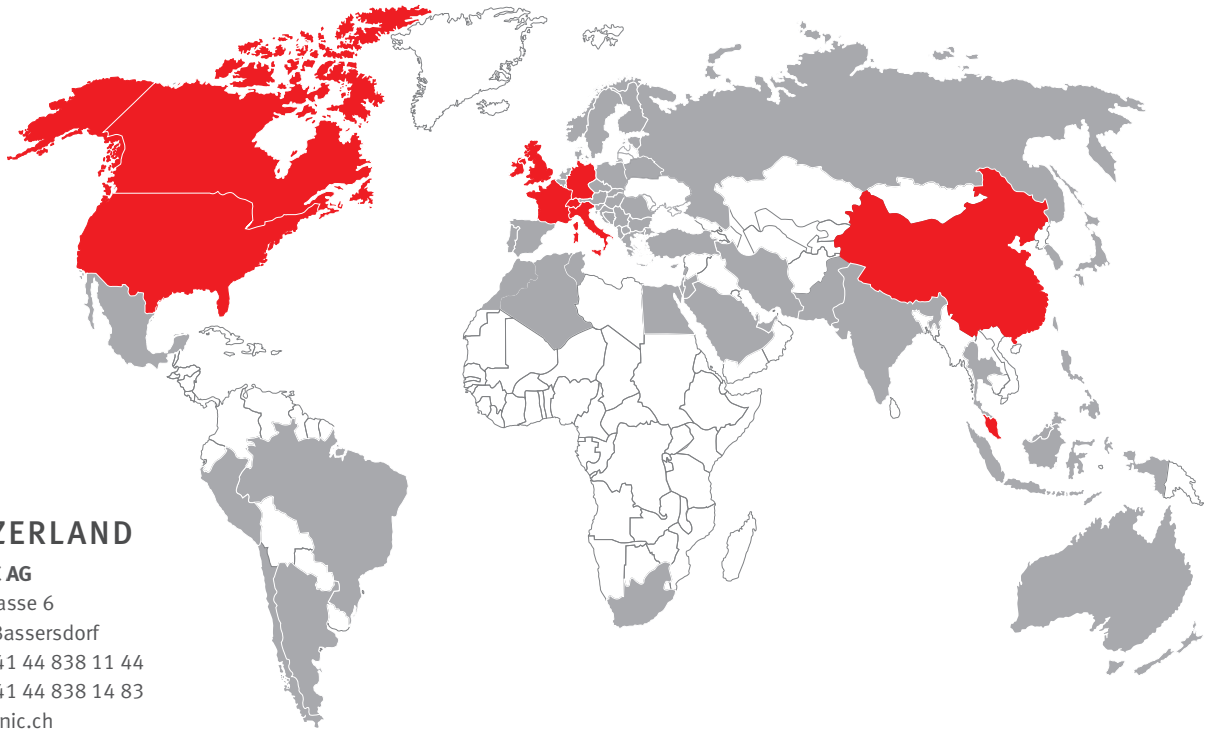
ROTRONIC International

ROTRONIC Partners



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ROTRONIC MEASURING INSTRUMENTS: PRECISION AT THE HIGHEST LEVEL

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

CO_2

Dew point

GUARANTEED BENEFITS

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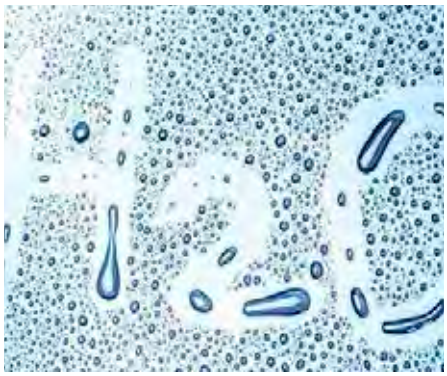


Humidity

Temperature

Dew point

Differential pressure

Pressure

Flow

Subject to technical changes without notice. Printing and other errors rexcepted.

CO_2

Applications

Software

Services

Theory

Measurement of humidity

Moisture is measured in a variety of applications. ROTRONIC offers a range of probes and sensors in its portfolio for various applications.

- HygroClip2: The standard probe for a variety of applications
- Industrial probes: With remote sensor for high temperature applications

Probes and various sensors

The probes can be equipped with various ROTRONIC sensors to adapt them to any application:

- IN-1 sensor: Long-standing sensor suitable for many applications
- HT-1 sensor: Specially developed for high-temperature applications
- HH-1 sensor: Suitable for applications with hydrogen peroxide (H_2O_2)

ROTRONIC has customers and partners around the world with all sorts of requirements. From drying processes, cleanrooms and the food industry, to building automation and meteorological stations, ROTRONIC can always offer the perfect solution to customers with its range of humidity measuring equipment. Our high quality ROTRONIC products are engineered for the wide range of demands on the measuring equipment and our many years of experience in the field.

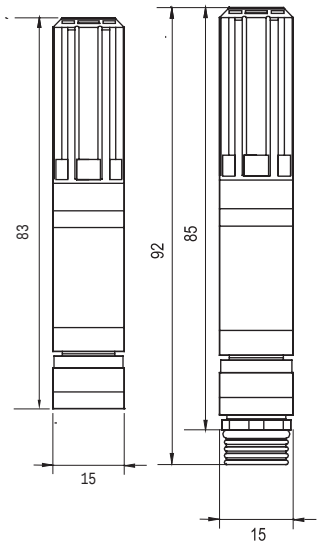
HC2-S probe

AIR CHIP TECHNOLOGY

ROTRONIC's HygroClip2 probe is a premium high end metrological product. Extremely accurate and boasting high long-term stability, the probe has established itself on the market as the benchmark. The highly integrated measurement electronics of the AirChip3000 and the IN-1 sensor form an unbeatable combination. The sensor is robust and suitable for a wide variety of applications. The AirChip3000 can be adjusted and calibrated in the field and is traceable to factory calibration data according to FDA & GAMP at all times. Thanks to its digital interface, it is compatible with all ROTRONIC devices and can be connected to third-party systems.
The HC2-S probe is well suited to many applications and unique in its functions and quality. Firmware updates allow our customers to benefit from all further product software developments.

HC2-S
HC2-SH
HC2-S-HH

HC2-S3
HC2-S3H



Standard and high precision probes

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

The HC2-S / HC2-S-HH / 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 / HC2-S-HH): ±0.8 %RH, ±0.1 K, at 10...30 °C
- Accuracy high precision probe (HC2-SH): ±0.5 %RH, ±0.1 K, at 10...30 °C
- 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

Order code	HC2-S / HC2-S-HH / 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 10...30 °C	±0.5 %RH, ±0.1 K at 10...30 °C (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(HC2-S-HH: HH-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 / IP protection	10 g / IP65	

The HC2-S-HH is especially suitable for environments with hydrogen peroxide (H_2O_2) using the HH-1 sensor.

Compatible

• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8, PF4
• Meteorology transmitters	MP102H, MP402H

Included

- Factory adjustment certificate
- Short instruction manual
- Polyethylene filter

Recommended accessories

• Mounting gland/flange	AC5005
• Filters (page 18-21)	
• 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

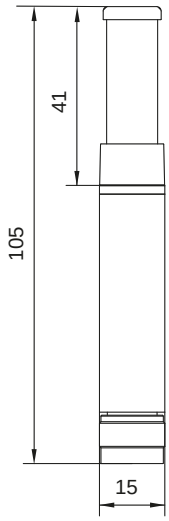
Food, paper, textile, pharmaceutical and cosmetic industries.

Features

- Accuracy: ±0.8 %RH, ±0.1 K, at 10...30 °C
- 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 10...30 °C
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, Pt100 1/3 Class B
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 / IP protection	47 g / IP65

HC2-SM



Available with ATEX certificate, see page 165

Compatible

• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8, PF4

Included

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

Recommended accessories

• Mounting gland	AC1305-M
• Filters (page 18-21)	
• 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 probe is 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 10...30 °C
- 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

Industrial probes Ø 15 mm

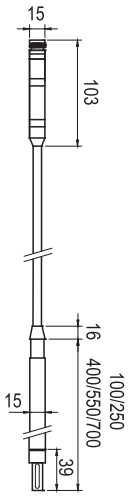
Order code	HC2-IC1xx*	HC2-IC3xx*	HC2-IC4xx*	HC2-IC5xx*	HC2-IC7xx*
Dimensions	Ø 15 x 100 mm	Ø 15 x 250 mm	Ø 15 x 400 mm	Ø 15 x 550 mm	Ø 15 x 700 mm
Accuracy	±0.8 %RH, ±0.1 K, at 10...30 °C				
Power supply	3.3...5 VDC, adjusted at 3.3 VDC, current: ~4.5 mA				
Sensor type	ROTRONIC HYGROMER® IN-1, HH-1, Pt100 1/3 Class B				
Response time	<15 s, without filter				
Material	PEEK, brass, chemically nickel-plated				
Weight	230 g	260 g	290 g	310 g	340 g

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

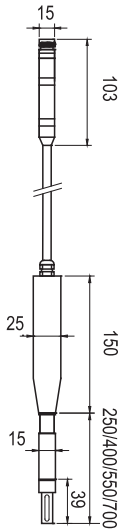
Industrial probes Ø 15/25 mm

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 10...30 °C			
Power supply	3.3...5 VDC, adjusted at 3.3 VDC, current: ~4.5 mA			
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 1/3 Class B			
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



HC2-ICxxx
HC2-ICxxx-HH



HC2-ICxxx-A

The HC2-ICxx-HH is especially suitable for environments with hydrogen peroxide (H_2O_2) using the HH-1 sensor.

Compatible

• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8, PF4

Included

- Factory adjustment certificate

Recommended accessories

- Filters (page 18-21)
- 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 (3x5 min.)

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 10...30 °C
- 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

Steel industrial probes

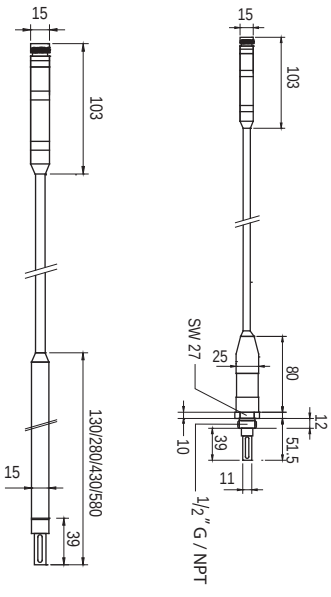
Order code	HC2-IM1xx*	HC2-IM3xx*	HC2-IM4xx*	HC2-IM5xx*
Dimensions	Ø 15 x 130 mm	Ø 15 x 280 mm	Ø 15 x 430 mm	Ø 15 x 580 mm
Accuracy	±0.8 %RH, ±0.1 K, at 10...30 °C			
Power supply	3.3...5 VDC, adjusted at 3.3 VDC, current: ~4.5 mA			
Sensor type	ROTRONIC HYGROMER ® IN-1, Pt100 1/3 Class B			
Response 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 10...30 °C	
Power supply	3.3...5 VDC, adjusted at 3.3 VDC, current: ~4.5 mA	
Sensor type	ROTRONIC HYGROMER ® IN-1, Pt100 1/3 Class B	
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



HC2-IMxxx HC2-IExxx

Compatible

• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8, PF4

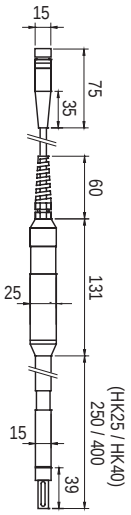
Included

- Factory adjustment certificate

Recommended accessories

• Filters (page 18-21)	
• Calibration device (HC2-IM)	ER-15
• Calibration device (HC2-IE)	EM-G
• 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 (3x5 min.)



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 10...30 °C
- 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 10...30 °C	
Power supply	3.3...5 VDC, adjusted at 3.3 VDC, current: ~4.5 mA	
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 1/3 Class B	
Response time	‹15 s, without filter	
Housing material	PEEK, brass, chemically nickel-plated	
Weight	210 g	240 g
Filter	Wire mesh filter	
Cable length	2 m	

Compatible

• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8, PF4

Included

- Factory adjustment certificate
- Wire mesh filter

Recommended accessories

• Filters (page 18-21)	
• 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 (3x5 min.)

HygroWin USB probes

The USB probe measures humidity and temperature. It is ideal for basic monitoring applications. The HW4-Lite PC software is included.

Applications

Residential and office rooms.

Features

- Accuracy: ±2 %RH, ±0.3 K, at 10...30 °C
- 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 10...30 °C
Power supply	Via USB cable
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 1/3 Class B
Filter type	Polyethylene standard filter, 20 µm, gray
Response time	‹15 s, without filter
Weight	110 g
Housing material	Polycarbonate
Cable length	3 m

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

Included

- Factory adjustment certificate
- Software code HW4-LITE

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

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.

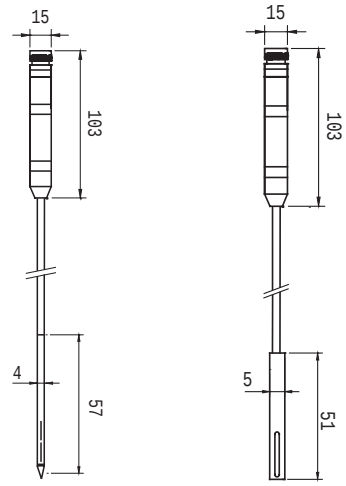
Applications

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 10...30 °C
- Range of application: -40...85 °C / 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard output scaling: 0...1 V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH

Order code	HC2-C04	HC2-C05
Probe type	Cable probe, Ø 4 mm, cable: 2 m	Cable probe, Ø 5 mm, cable: 2 m
Accuracy	±1.5 %RH, ±0.3 K, at 10...30 °C	
Power supply	3.3...5 VDC, adjusted at 3.3 VDC, current: ~4.5 mA	
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 1/3 Class B	
Response time	<15 s, without filter	
Housing material	Stainless steel, DIN1.4305	Brass, nickel-plated
Weight	85 g	85 g
Cable length	2 m	



HC2-C04 HC2-C05

Compatible

• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8, PF4

Included

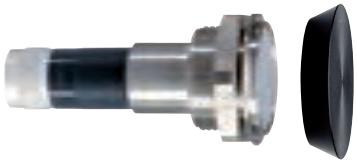
- Factory adjustment certificate

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

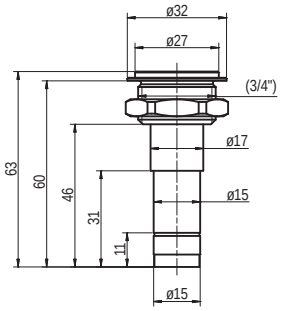
Flush mount probes

The flush mount probe is mounted in the walls of glass cabinets, showcases, laboratories and in cleanroom panels for humidity and temperature measurement.



HC2-IS25, steel filter, cover

Order code	HC2-IS25	HC2-IT25	HC2-IP25
Accuracy	±1.5 %RH, ±0.2 K, at 0...90 %RH and 10...30 °C		
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 1/3 Class B		
Response time	‹20 s	‹25 s	‹20 s
Housing material	Polycarbonate, stainless steel DIN 1.4301		
Weight	50 g		

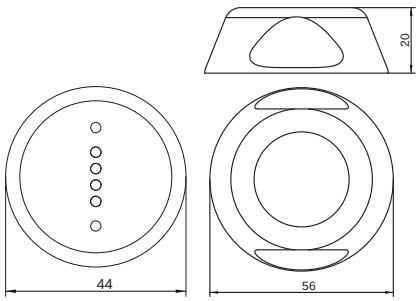


Cleanroom probe

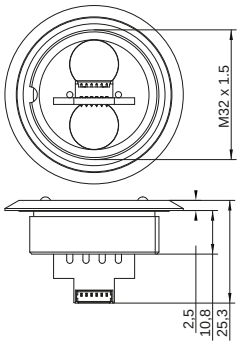
The HC2-CRP is perfectly suited for monitoring humidity and temperature in cleanrooms. With its innovative magnetic connection, it is simple to remove for cleaning or when calibration is due.

Features

- Accuracy: ±1.5 %RH / ±0.2 K
- Easy mounting thanks to magnetic contact
- UART digital interface
- Adjusted at: 23 °C and 10, 35, 80 %RH



Order code	HC2-CRP-SET
Probe type	Cleanroom probe
Range of application	-5...60 °C / 0....100 %RH
Accuracy	±1.5 %RH / ±0.2 K
Power supply	3.3...5 VDC
Current consumption	3.5 mA
Long-term stability	‹1 %RH / year
Sensor	HYGROMER® AW-1
Filter type	Teflon, 5 µm
Response time	49 s
Housing material	Stainless steel 1.4301 / PEEK
Weight	155 g (without mounting bracket)
Protection	IP65



Compatible

- CRP1, CRP5, HF5, HF8, PF4 and others

Included

- Factory adjustment certificate, short instruction manual
- HC2-CRP, HC2-CRP-HOLDER

Recommended accessories

• Calibration device	ER-CRP
• Cable 10 cm open end	PB-10-xx
• Cable A for PicoBlade	A-xx-PB
• Teflon filter	SP-CRP

Insertion probes, Ø 5 mm / 10 mm

The insertion probe is suitable for measurement in dust-free (HC2-P05) or dusty (HC2-HP28/50) bulk materials, bricks, concrete, etc. It measures humidity and temperature and calculates the dew/frost point.

Applications

Water activity measurement, page 139

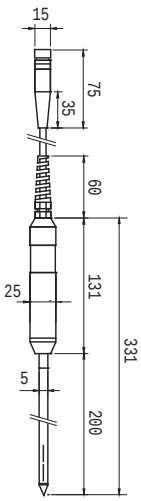
Portable measuring units with handheld instruments and data loggers.

Features

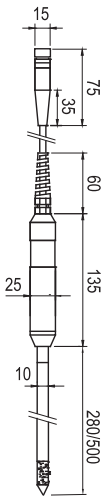
- Accuracy: ±0.8/1.5 %RH, ±0.1/0.3 K, at 10...30 °C
- Range of application: -40...85 °C / 0...100 %RH
- Digital interface (UART)
- Standard output scaling: 0...1 V = -40...60 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH

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 10...30 °C
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 1/3 Class B
Response time	‹15 s
Material	Stainless steel DIN 1.4305 (probe), POM (handle)
Weight	160 g
Cable length	2 m

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 10...30 °C	
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 1/3 Class B	
Response time	‹20 s, with filter	
Material	Stainless steel DIN 1.4305 (probe), POM (handle)	
Weight	200 g	300 g
Cable length	2 m	



HC2-P05



HC2-HPxx

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, PF4
• Laboratory analyzer	HygroLab C1

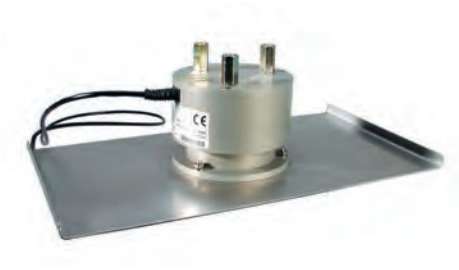
Included

- Factory adjustment certificate

Recommended accessories

• Replacement filter (HC2-HP28 / 50 sintered steel)	ET-Z10
• Calibration device (HC2-P05)	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

Web probe



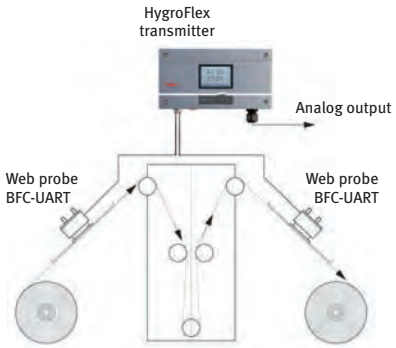
Applications

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

Features

- Accuracy: ±0.8 %RH, ±0.1 K, at 10...30 °C
- Range of application: -40...85 °C / 0...100 %RH
- Digital interface (UART)
- 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 10...30 °C
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 1/3 Class B
Response time	‹15 s, without filter
Housing material	Aluminum, stainless steel DIN 1.4301
Weight	1070 g
Cable length	1 m



Sword probes

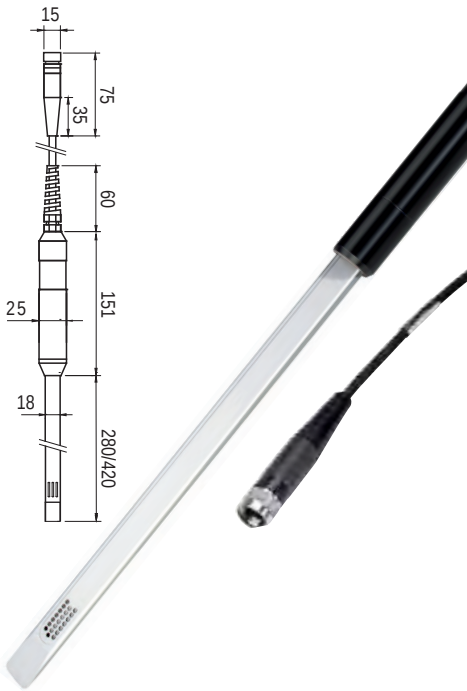
Applications

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

Features

- Accuracy: ±0.8 %RH, ±0.1 K, at 10...30 °C
- 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 10...30 °C	
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 1/3 Class B	
Response time	‹15 s	
Material	Aluminum (probe), POM (handle)	
Weight	220 g	240 g
Cable length	2 m	



Compatible

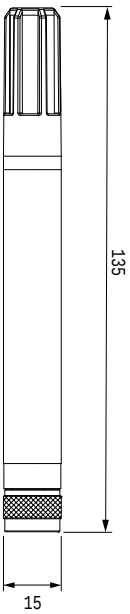
• Handheld instruments	HP22-A, HP23-A
• Data loggers	HL-NT2, HL-NT3, LOG-HC2
• Transmitters	HF5, HF8, PF4

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 probe)	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
• Carry case (only HC2-HS28)	AC1126



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

HVAC, climate chambers, snow guns and meteorology.

Features

- Accuracy: ±0.8 %RH, ±0.2 K, at 10...30 °C
- Housing colors: black and white
- Range of electronics: -40...85 °C / 0...100 %RH
- UART digital interface
- 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	±0.8 %RH, ±0.2 K, at 10...30 °C	
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, Pt100 1/3 Class B	
Filter type	Polyethylene standard filter, 20 µm, gray	
Response time	‹15 s, without filter	
Housing material	Polycarbonate	
Weight	20 g	

Note: Not compatible with ROTRONIC data loggers, transmitters and handheld instruments

Included

- Factory adjustment certificate
- Polyethylene filter
- Short instruction manual

* Requires optional HW4 software and service cable

Recommended accessories

• Mounting gland/flange	AC5005
• Filters (page 18-21)	
• 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

XD INDUSTRIAL PROBES

The industrial version is especially suitable for high temperatures and demanding industrial environments.

Applications

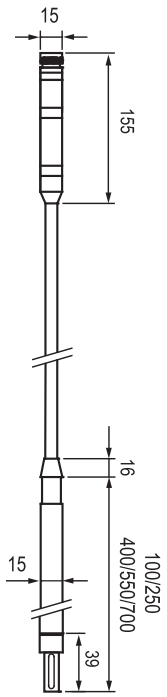
Industrial manufacturing, climate chambers, drying processes.

Features

- Accuracy: ±0.8 %RH, ±0.2 K, at 10...30 °C
- Remote electronics
- Range of application: -100...200 °C[1] / 0...100 %RH
- UART digital interface
- Standard output scaling: 0...1 V = -100...200 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH
- Freely scalable analog output signals: 0...1/5/10 VDC and 0/4...20 mA*

Order code	XD33-SC12FE	XD33-SC15FE
Cable length	2 m	5 m
Range of application	-100...200 °C[1]	
Accuracy	±0.8 %RH, ±0.2 K, at 10...30 °C	
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 1/3 Class B	
Probe length	100/250/400/550/700 mm	
Response time	‹15 s	
Housing material	PEEK	
Interface	UART	

Note: Not compatible with ROTRONIC data loggers, transmitters and handheld instruments



Included

- Factory adjustment certificate
- Short instruction manual

[1] Short-term peak load
* Requires optional HW4 software and service cable

Recommended accessories

• Filters (page 18-21)	
• Mounting gland/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

Filters / Carriers

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

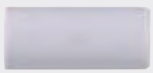
- **Maximum temperature 200 °C**
- Mechanical protection

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

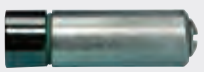
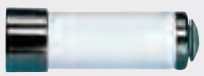
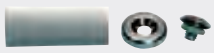
Suitable for standard probes HC2-S / HC2-S3
Thread: ROTRONIC round thread

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	

Suitable for industrial probes HC2-IC / HC2-HK
Thread: ROTRONIC round 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-CRNI	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	

Suitable for industrial probes HC2-IM / HC2-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	

Suitable 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	-80...200 °C	

Suitable 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	

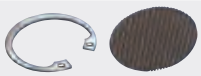
Suitable for HF3

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	

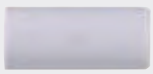
Suitable for MP100A/400A

Order code	Filter carrier	Filter element	Pore size	Range of application	
SP-W3-25	Polycarbonate, white	Wire mesh	20 µm	-40...85 °C	

Suitable 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	

Suitable for HF1, CP11, CL11

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

The HygroFlex series

HygroFlex transmitters are the perfect instruments for constant monitoring of temperature and humidity in building management systems, cleanrooms, data centers, museums, storage rooms and and many other industrial applications. The transmitters are available in duct, wall, and compact space versions and, together with the optional HW4 software package and a Rotronic data cable, can be configured exactly as required. Customer needs and the application determine 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.

		
Transmitters	**HF1**	**HF3**
Range of application electronics	-20...50 °C	-40...60 °C
with display option	-20...50 °C	-10...60 °C
Temperature limits at probe	-20...50 °C	-40...60 °C
Accuracy at 23 °C	±3.0 %RH ±0.3 K	±2 %RH ±0.3 K
FDA / GAMP conformity		✔
Probes		
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	2x	2x
3/4-wire current or voltage output	2x	2x
RS-485		
Ethernet		
Wireless		
Analog and digital available		
Functions		
Data logging		
Relay		
Hygrostat / Thermostat		
Beep tone		
Analog input		
Psychrometric parameters		Dew/Frost point

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

HF1 SERIES

The HygroFlex1 series is the latest development in inexpensive HVAC transmitters for relative humidity and temperature. The devices are equipped with the tried-and-tested Hygromer® IN-1 sensor and boast unbeatable value for money. The ROTRONIC SW21 software enables you to change the scale, calibrate the transmitter and adjust the humidity.

Features

- Accuracy: ±3 %RH, ±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
- Adjusted at 35 %RH / 80 %RH

Power supply

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

Signal outputs

- Current output
- Voltage output

Versions

- Space mount version with integrated probe
- 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

HF1 DUCT AND WALL VERSIONS

Applications

Measures relative humidity and temperature in HVAC applications.

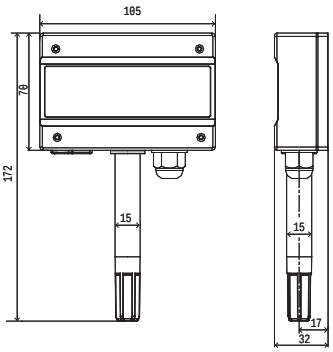
2 or 2x2-wire

Order code	HF120
Output signals	4...20 mA
Supply voltage	10...28 VDC
Display	Optional (without backlight)
Temperature range	Scalable
Probes	Not interchangeable Standard, duct probe 100 mm (optional, duct probe 300 mm)
Filter type	Polyethylene

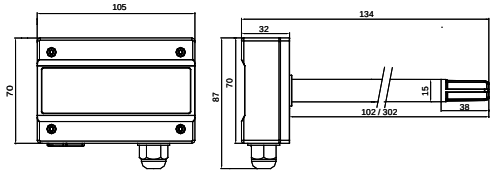
3-wire

Order code	HF13x
Output signals	0...10 V 4...20 mA Customer rescaling possible
Supply voltage	15...40 VDC / 12...28 VAC
Display	Optional (with backlight)
Temperature range	Scalable
Probes	Not interchangeable Standard, duct probe 100 mm (optional, duct probe 300 mm)
Filter type	Polyethylene

Wall version



Duct version



COMPATIBLE

- SW 21, see page 175

INCLUDED

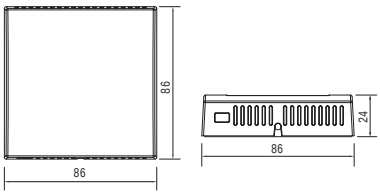
- Factory adjustment certificate
- Short instruction manual

RECOMMENDED ACCESSORIES

• USB service cable	AC0003
• Calibration device	ER-15
• Mounting gland/flange	AC5005

Type S

Type L



HF1 SPACE MOUNT VERSION

Applications

Offices or rooms where good looks are important.

2 or 2x2-wire

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

3-wire

Order code	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)

Technical data	HF1 Analog 2-wire	HF1 Analog 3-wire
General		
Parameters	Humidity and temperature	
Housing material / IP 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	Connections: screw terminals inside (type D/W) Cable gland: M16	
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 τ63 (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

The HygroFlex3 series is ideal for all applications where exact measurement of humidity and temperature is of critical importance. The transmitters can be used in a wide range of industries in HVAC applications, greenhouses, museums, storage rooms, libraries, railway stations or for climate control in office buildings.

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 display
- Service interface
- Adjusted at 23 °C and 35, 80 %RH

Power supply

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

Signal outputs

- Current output
- Voltage output

Versions

- Space mount version with integrated probe
- 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, standard: -40…60 °C
- Dew point: range selectable

Display

- Display with or without backlight
- Without display

HF3 SPACE MOUNT VERSION

Applications

Offices or rooms where good looks are important.

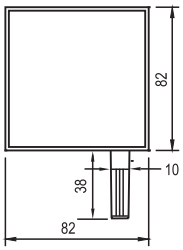
2 or 2x2-wire

Order code	HF320 Type S	HF320 Type R
Output signals	4...20 mA	
Supply voltage	10...28 VDC	
Display	Optional (without backlight)	
Temperature range	Scalable*	
Probes	Fixed internal	Retractable

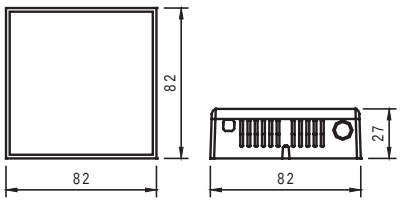
3-wire

Order code	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*	
Probes	Fixed internal	Retractable

Type R



Type S



Compatible

- HW4 software, see page 170

Included

- Factory adjustment certificate
- Short instruction manual

Recommended accessories

• Service cable	AC3006 / AC3009* (page 82)
• Calibration device: (type R)	ER-10MS

* Requires optional HW4 software and service cable

HF3 DUCT AND WALL VERSIONS

Applications

Heating, ventilation, air-conditioning.

2 or 2x2-wire

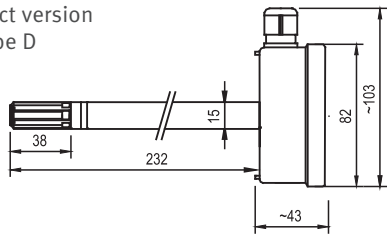
Order code	HF320 Type W/D
Output signals	4...20 mA
Supply voltage	10...28 VDC

3/4-wire

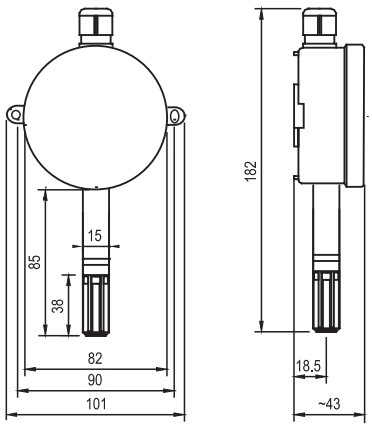
Order code	HF33x Type W/D
Output signals	0...1 V 0...5 V 0...10 V 0...20 mA 4...20 mA Customer rescaling possible*
Supply voltage	18...40 VDC / 13...28 VAC

Temperature range	Scalable*
Probes	Fixed
Filter type	Polyethylene

Duct version
Type D



Wall version
Type W



Compatible

- HW4 software, see page 170

Included

- Factory adjustment certificate
- Short instruction manual

Recommended accessories

• Service cable	AC3006 / AC3009* (page 82)
• Replacement filter, PE, gray	NSP-PCG-PE
• Calibration device	ER-15
• Mounting gland/flange	AC5005

* Requires optional HW4 software and service cable

Technical data	HF320 Analog 2-wire	HF33x Analog 3-wire
General		
Parameters	Humidity and temperature	
Calculated parameters	Dew/Frost point	
Housing material / IP 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 retractable	
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 / Storage conditions	-40...60 °C / 0...100 %RH, -10...60 °C (with display)	
Measurement range	-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 compatibility	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	35, 80 %RH	
Long-term stability	‹1 %RH/year	
Response time	‹15 s τ63 (63 % of a jump 35...80 %RH) without filter	
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
Maximum load	≤2x500 Ω (current output)	≤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

The HygroFlex4 series is ideal for all applications where exact measurement of humidity and temperature is of critical importance.

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 display
- Digital communication
- Service interface
- Adjusted at 23 °C and 10, 35, 80 %RH

Power supply

- Low voltage: 2x2 or 3-wire

Signal outputs

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

Versions

- Duct version
- Wall version

Output parameters

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

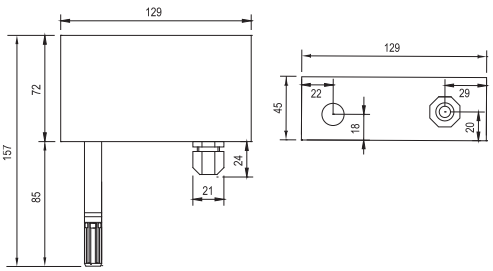
Output scaling

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

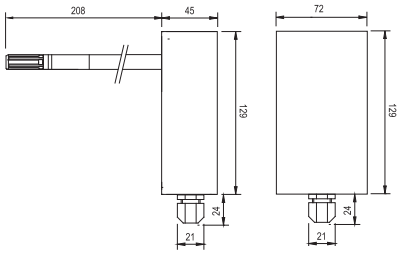
Display

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

Wall version, type W



Duct version, type D



HF4 DUCT AND WALL VERSIONS

Applications

HVAC applications, greenhouses, museums, storage rooms, libraries, railway stations, climate control in office buildings.

2 or 2x2-wire

Order code	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)
Temperature range	Scalable*
Probes	Fixed
Filter type	Polyethylene

3-wire

Order code	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
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 pictures)	
Temperature range	Scalable*	
Probes	Fixed	
Filter type	Polyethylene	

Compatible

- HW4 software, see page 170

Included

- Factory adjustment certificate
- Short instruction manual
- Mounting gland/flange (type D)

Recommended accessories

• Service cable	AC3006 / AC 3009* (page 82)
• Replacement filter, polyethylene, black	NSP-PCB-PE
• Calibration device	ER-15
• Mounting kit DIN top-hat rail (type W)	AC5002

* Requires optional HW4 software and service cable

Technical data	HF420 Analog 2-wire	HF43x Analog 3-wire	HF456 Digital
General			
Parameters	Humidity and temperature		
Calculated parameters	Dew/Frost point		
Housing material / IP 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 °C / -10...60 °C (with LCD), 0...100 %RH		
Measurement range	-50...100 °C		
Firmware upgrade	Via HW4 software		
Service interface	UART service interface (Universal Asynchronous Receiver Transmitter)		
CE / EMC compatibility	EMC Directive 2004/108/EC		
Fire protection class	Corresponds to UL94-HB		
FDA / GMP compatibility	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 τ63 (63 % of a jump 35...80 %RH) without filter		
Maximum wind velocity	20 m/s with polyethylene filter		
Temperature measurement			
Sensor	Pt100 1/3 Class B		
Measurement range	-50...100 °C / -58...212 °F		
Accuracy at 23 °C ±5 K	±0.2 K		
Adjustment points	1		
Long-term stability	‹0.1 °C / year		
Response time	‹15 s τ63 (63 % of a jump 35...80 %RH) without filter		
Analog output			
Number	2		No analog outputs
Current	4...20 mA	0/4...20 mA	
Voltage	N/A	0...1/5/10 V	
Maximum load	≤2x500 Ω (current output)	≤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)	
Digital output			
RS-485	No digital outputs		RS-485
USB			USB & RS-485
Ethernet			Ethernet RJ45 & RS-485
Wireless			Wireless & RS-485

HF5 SERIES

Available with ATEX certificate,
see page 165

The HF5 series is compatible with HygroClip2 probes with AirChip technology – thanks to whose precision the probes achieve unprecedented accuracy. This device generation also boasts a unique calibration and adjustment process as well as many other innovations.

Features

- Interchangeable HC2 probes
- Housing material: ABS / Aluminum
- 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 display
- Digital outputs, also combinable with analog outputs
- Use as simulator for system validation *
- Service interface

Power supply

- Low voltage: 2x2 or 3-wire
- Low voltage, galvanically isolated; 4-wire
- Mains voltage, galvanically isolated; 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 & psychrometric parameters
- Temperature & psychrometric parameters

Output scaling

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

Display

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

* Requires optional HW4 software and service cable

HF5 DUCT AND WALL VERSIONS

Applications

HVAC applications, food and pharmaceutical industries, printing and paper industries, meteorology, agriculture, archaeology.

2x2-wire

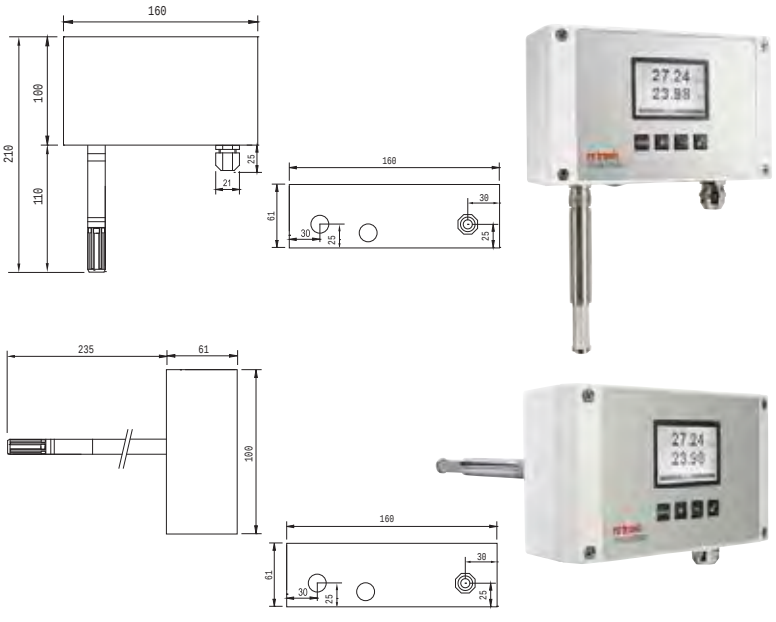
Order code	HF520 Type W/D
Output signals	4...20 mA
Supply voltage	10...28 VDC

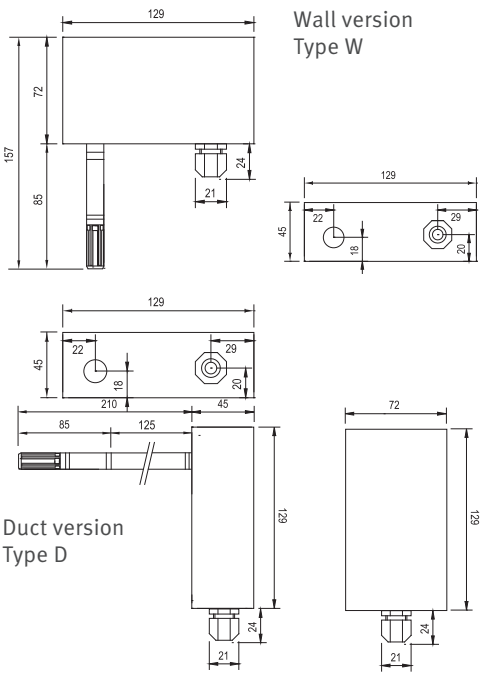
3/4-wire

Order code	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 (not for aluminum version)
Supply voltage	Low voltage: 15...40 VDC / 12...28 VAC Galvanically isolated: 9...36 VDC / 7...24 VAC (not for aluminum version) Power over Ethernet	
Housing	ABS or aluminum	
Display	Optional (with backlight, keypad) Type D only horizontal version possible with display (see pictures)	

Output ranges	Scalable*
Probes	1x interchangeable HC2 probe

Note: HF520 (2-wire version) is not compatible with HC2-S3-Heated





Wall version
Type W

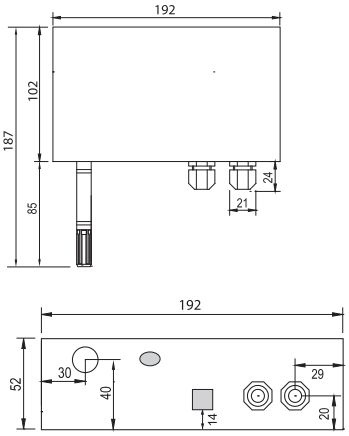
Duct version
Type D

* Requires optional HW4 software and service cable

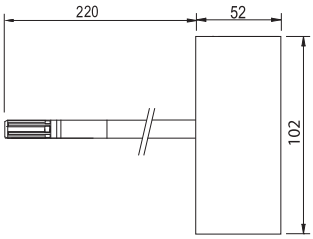
4-wire
Mains voltage

Order code	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)	
Probes	1x interchangeable HC2 probe	
Output ranges	Scalable*	
Housing	ABS	

Wall version type W



Duct version type D



Compatible

- All HC2 probes (order separately),see page 4
- HW4 software, see page 170

Included

- Product qualification
- Short instruction manual
- Mounting gland/flange (type D)

Recommended accessories

• Standard climate probe	HC2-S
• Probe extension cable 2 m	E2-02A
• Service cable	AC3006 / AC3009* (page 82)
• Mounting kit DIN top-hat rail (type W)	AC5002
• Calibration cable with HP23	AC2001

* Requires optional HW4 software and service cable

Technical data	HF520 2-wire	HF53/4/x 3-wire	HF56x, mains voltage 4-wire	HF55x, digital
General				
Parameters	Humidity and temperature			
Calculated parameters	All psychrometric parameters			
Housing material / IP 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 min. 10 + 0.02 x load	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)
Start-up time	1 min.			
Application temp. housing / electronics	-40...60 °C / -10...60 °C (with display), 0...100 %RH	-40...60 °C / -10...60 °C (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 compatibility	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 °C	0.02 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

The HygroFlex HF7 transmitters are used wherever harsh environments demand an optimal solution. There is hardly an industrial process anymore in which humidity, temperature or dew point / frost point does not need to be considered.

Features

- Accuracy: ±1.0 %RH, ±0.2 K, at 10...30 °C
- 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 display
- Aluminum diecast housing and probe of stainless steel or PEEK
- 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-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, standard: -50...100 °C
- Dew/Frost point: range selectable

DISPLAY

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

* Requires optional HW4 software and service cable
[1] Short-term peak load (3 x 5 min.)

HF7 DUCT AND WALL VERSIONS

Applications

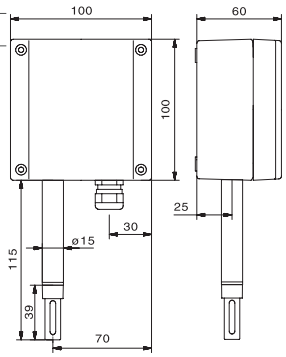
Measures relative humidity, temperature and dew/frost point in industrial environments and outdoors. For use in harsh conditions.

2 or 2x2-wire

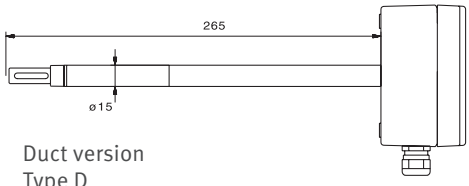
Order code	HF720
Output signals	4...20 mA
Supply voltage	10...28 VDC
Probes	Fixed, PEEK
Display	Optional (without backlight)
Output ranges	Scalable*
Temperature limit at probe	-50...100 °C (type W) -100...150 °C (type D)
Filter carrier	Slotted sleeve (order filter separately)

3-wire

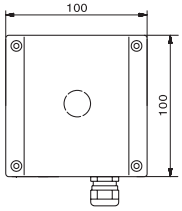
Order code	HF73x
Output signals	0...1 V 0...5 V 0...10 V 0...20 mA 4...20 mA Customer rescaling possible*
Supply voltage	18...40 VDC / 13...28 VAC
Probes	Fixed, PEEK / stainless steel
Display	Optional (with backlight)
Output ranges	Scalable*
Temperature limit at probe	-50...100 °C (type W) -100...150 °C (type D)
Filter carrier	Slotted sleeve (order filter separately)



Wall version
Type W



Duct version
Type D



* Requires optional HW4 software and service cable

HF7 CABLE VERSION

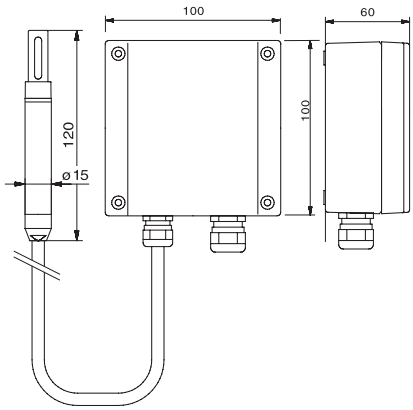
2 or 2x2-wire

	HF720
Output signals	4...20 mA
Supply voltage	10...28 VDC
Probes	Fixed, PEEK with 2 meter cable
Display	Optional (without backlight)
Output ranges	Scalable*
Temperature limit at probe	-100...200 °C [1]
Filter carrier	Slotted sleeve (order filter separately)

3-wire

	HF73x
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
Probes	Fixed, PEEK with 2 meter cable Fix, stainless steel with 2 or 5 meter cable
Display	Optional (with backlight)
Output ranges	Scalable*
Temperature limit at probe	-100...200 °C [1]
Filter carrier	Slotted sleeve (order filter separately)

Cable version
Type C



COMPATIBLE

- HW4 software, see page 170

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 82)
• Mounting gland	AC1303-M

* Requires optional HW4 software and service cable

[1] Short-term peak load (3 x 5 min.)

Technical data	HF720, analog 2-wire	HF73x, analog 3-wire
General		
Parameters	Humidity and temperature	
Calculated parameters	Dew/Frost point	
Housing material / IP protection	Aluminum / IP67 (without display) IP65 (with 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	PEEK	PEEK or stainless steel 1.4305
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, min. 10 + 0.02 x load	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 compatibility	Conforms to 21 CFR Part 11 and GAMP5	
Humidity measurement		
Sensor	ROTRONIC HYGROMER® IN-1	
Measurement range	0…100 %RH	
Accuracy at 10…30 °C	±1.0 %RH	
Adjustment at 23 °C	10, 35, 80 %RH	
Long-term stability	<1 %RH/year	
Response time	<15 s τ63 (63 % of a jump 35…80 %RH) without filter	
Temperature measurement		
Sensor	Pt100 Class A	
Measurement range	Dependent on probe type, see application temperature for probe	
Accuracy at 10…30 °C	±0.2 K	
Adjustment points	1	
Long-term stability	<0.1 °C / year	
Response time	<15 s τ63 (63 % of a jump 35…80 %RH) without filter	
Analog output		
Number	2	
Current	4…20 mA	0/4…20 mA
Voltage	N/A	0…1/5/10 V
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 (3 x 5 min.)

HF8 SERIES

The HF8 is ideal for all applications where exact measurement of humidity and temperature is critical. Thanks to its multifunctional design, it can be used without hesitation in practically all industrial applications.

Features

- Two 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 display
- 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-wire
- Low voltage, galvanically isolated; 4-wire
- Mains voltage, galvanically isolated; 4-wire

Signal outputs

- Current outputs, voltage outputs
- RS-485, Ethernet, switch outputs (relays)

Versions

- Wall version, cable version

Output parameters

- Humidity & temperature
- Humidity & psychrometric parameters
- Humidity & psychrometric parameters

Output scaling

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

Display

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

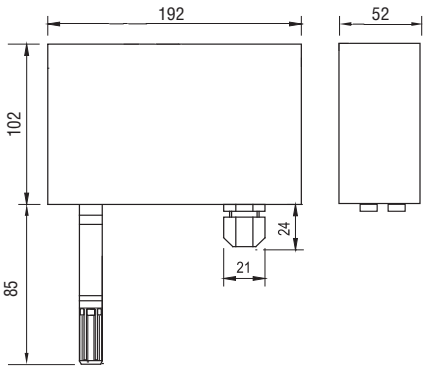
* Requires optional HW4 software and service cable

HF8 WALL VERSION

Applications

HVAC, industry, pharmaceutical industry.

Wall version
type W



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	
Display	Optional (with backlight, keypad)	
Output ranges	Scalable*	
Probes	2x interchangeable HC2 probes	

COMPATIBLE

- All HC2 probes (order separately) page 4 ff.
- HW4 software, see page 170

INCLUDED

- Product qualification
- Short instruction manual

RECOMMENDED ACCESSORIES

• Standard climate probe	HC2-S
• Industrial probe	HC2-IC102
• Probe extension cable 2 m	E2-02A
• Service cable	AC3006 / AC 3009* (page 82)
• Mounting kit DIN top-hat rail	AC5002

* Requires optional HW4 software and service cable

Technical data	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 / IP 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 °C (-10...60 °C 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 compatibility	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 °C	0.02 mA 10 mV		
Digital output			
RS-485	RS-485 & analog		
Ethernet	Ethernet RJ45 & RS-485 & analog		
Switch output			
Type	Relay (change-over switch, switch, pulse)		
Number	4x (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

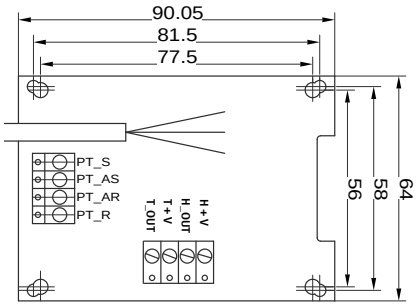
The OEM transmitter consists of a cable probe, a printed circuit board and an optional housing. Thanks to its compact size, high accuracy and choice of analog outputs, the transmitter can be adapted to customer requirements and used practically everywhere.

Applications

Climate chambers, incubators, monitoring of industrial processes, etc.

Features

- Accuracy: ±1.0 %RH, ±0.2 K, at 10...30 °C
- 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), 2-wire (XB20)

Signal outputs

- Current outputs, voltage outputs

Version

- Printed circuit board with cable probe

Probes

- PEEK 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 or frost point & temperature or humidity

PEEK probe Ø 15mm

PEEK probe Ø 25/15mm

Chrome steel probe Ø 15mm

Compatible

- HW4 software, see page 170

Included

- Factory adjustment certificate
- Short instruction manual

Recommended accessories

• Service cable	AC3006 / AC 3009* (page 82)

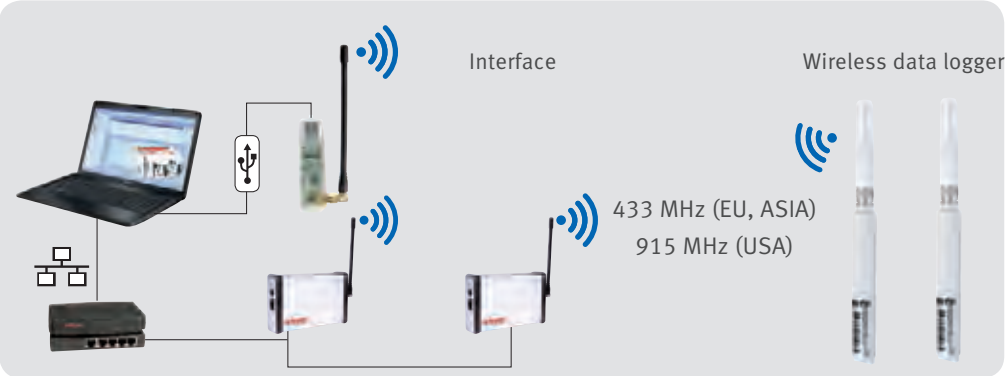
* Requires optional HW4 software and service cable
[1] Short-term peak load (3 x 5 min.)

The HygroLog series

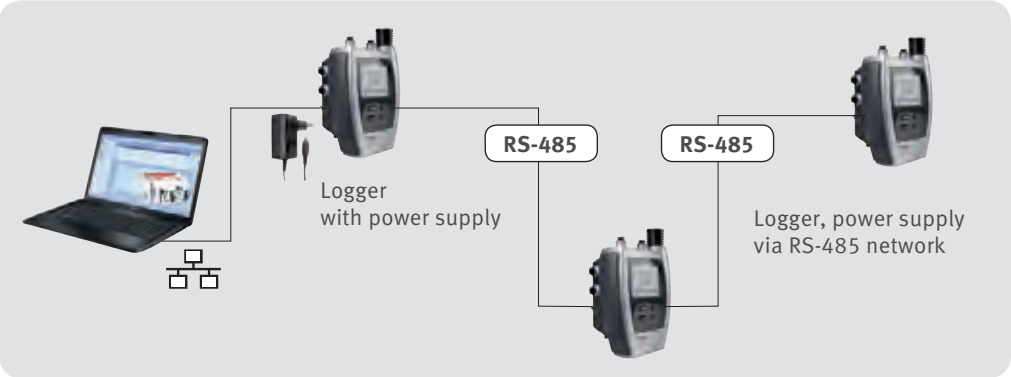
The long-term recording of humidity and temperature conditions is very important in the pharmaceutical industry, production processes, storage, test facilities and many other areas. Once logged, the temperature and humidity data can be evaluated statistically. This provides valuable information on conditions that can have an influence on people and product quality. Wireless transmission saves wiring costs and simplifies data transfer from inaccessible points. ROTRONIC data loggers fulfill the requirements of 21 CFR Part 11 and GAMP5 completely. The data can be read out easily with the HW4 software. The measurements can be recorded either in tamper-proof LOG mode or in easily accessible Excel files.

DATA LOGGER SYSTEMS FROM ROTRONIC

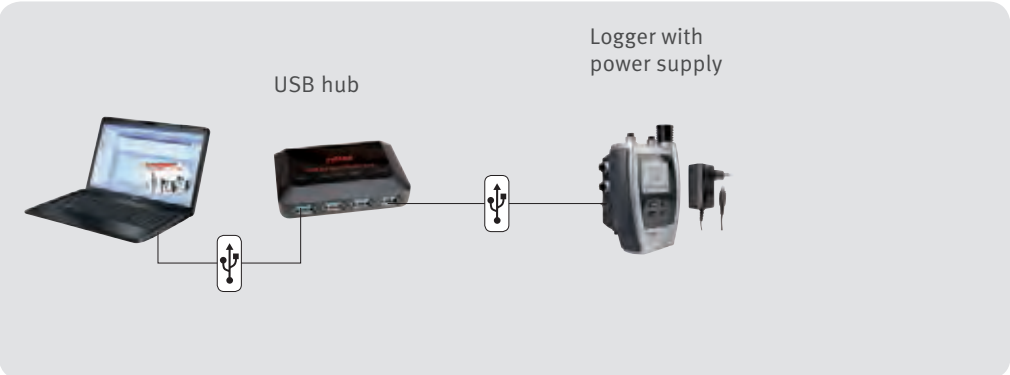
Wireless network



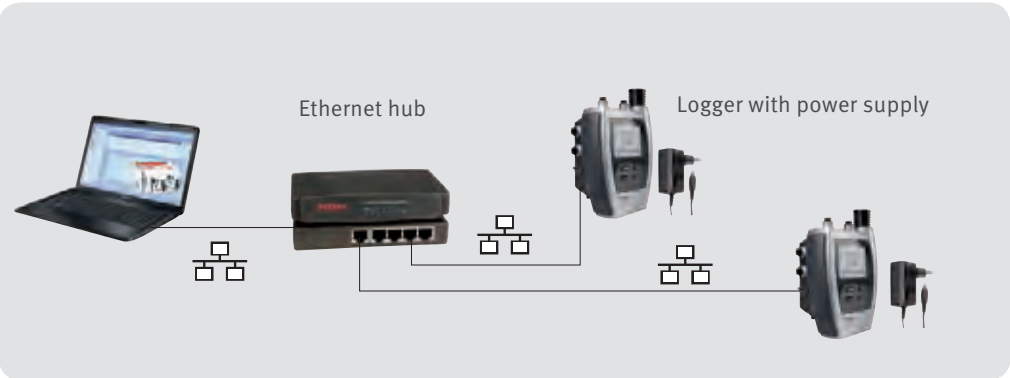
RS-485 network



USB network



Ethernet network



Overview

	Basic	Compact	High-end	Wireless
				
	HL-1D	**HL-20**	**HL-NT series**	**LOG-HC2-RC**
Memory capacity	64,000 measured values	20,000 measured values	47,000 measured values per MB on memory card	175,000 measured values
Sensor	HYGROMER IN-1 / NTC	HYGROMER IN-1 / Pt100 Class A	Probe dependent	Probe dependent
Range of application	-10...70 °C 0...100 %RH	-10...60 °C 0...100 %RH	-30...70 °C 0...100 %RH (-10...60 °C, with display)	-40...85 °C 0...100 %RH
Calculations	–	Dew/Frost point	All psychrometric parameters	Only in HW4
Integrated clock	Yes			
Power supply	1 x CR2 battery	3x AA batteries	9 V battery/Rechargeable battery/Mains	Integrated battery
Configurable logging interval	Yes			
Programmable alarms	Yes			
Interface	USB	UART, requires AC3006 service cable	Docking station	Wireless
FDA / GAMP compatibility	21 CFR Part 11 / GAMP5	Yes	Yes	No
IP protection	IP67	IP40	IP40	IP65
CE / EMC compatibility: EMC Directive 2004/108/EC	Yes			

HYGROLOG HL-1D Basic logger

The HL-1D is the smallest humidity logger available from ROTRONIC. It offers the most important logging functions and is fully compatible with the HW4 software.

Features

- Accuracy: ±3.0 %RH, ±0.3 °
- Compact with very high level of IP67 protection
- High storage capacity: 64,000 data point memory
- MIN / MAX / AVG function on display
- Free evaluation and configuration software HW4-LITE
- Very long battery life: 3 years at logging interval of 5 min.
- Conforms to FDA 21 CFR Part 11 / GxP / GAMP5

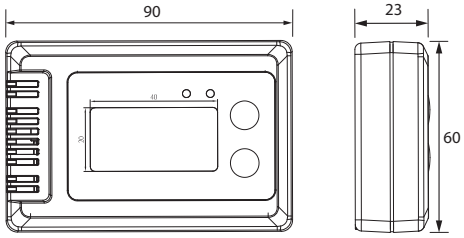
USB-Mini port (settings and data download)

Battery compartment

Data logging

The values stored in the HL-1D can be downloaded with the HW4 software and displayed graphically. The user determines the logging interval, the alarm limits, the recording mode and much more.

Technical data	HL-1D
General	
Parameters	Humidity & temperature
Sensor type	HYGROMER® IN-1 / NTC
Accuracy at 23 °C ±5 K	±3.0 %RH, ±0.3 K
Range of application / Storage conditions	-20...70 °C / 0...100 %RH
IP protection	IP67
Weight	85 g
Dimensions	90 x 60 x 23 mm
Logging interval	30 s...24 h
Battery	1 x CR2
Battery life	Up to 3 years (logging interval 1 h)
Battery charge indicator	Yes (HW4 software, display and LED indicator)
Storage capacity	64,000 data point memory
Function	MIN/MAX/AVG on display
Display	LCD
Resolution	0.1 %RH, 0.1 °C
Display refresh rate	5 s (standard) or same as logging interval
LED indicators	2x LEDs
	Right LED flashes green during data logging
	Left LED flashes red when limits broken or low battery
Communication	USB-Mini port (cable optional)
FDA/GMP compatibility	Conforms to FDA 21 CFR Part 11 / GxP / GAMP5



Included

- Battery, 1x CR2
- Short instruction manual
- Function and calibration certificate
- HW4-LITE key code

Recommended accessories

• USB-Mini cable	AC0003

HygroLog HL-20 Precision compact logger

The compact data logger for humidity and temperature measurement offers high precision and reliability at a reasonable price. The HL-20 series is easy to use and suitable for a wide range of applications. Thanks to its integrated batteries, the HL-20 provides hours of operation and offers its users maximum flexibility.

Applications

Warehouses, factories, museums, office buildings, cleanrooms, shipping, libraries and test facilities.

Features

- Range of application: -10...60 °C / 0...100 %RH
- 20,000 data point memory
- Accuracy at 10...30 °C: ±1.3 %RH (0...10 %RH) / ±0.8 %RH (10...60 %RH) / ±1.3 %RH (60...100 %RH) ±0.3 K
- Freely selectable logging interval, 5 s...1 h
- Integrated clock with time stamp for every measurement
- Adjusted at 10, 35, 80 %RH and 23 °C
- Programmable alarms
- Free HW4-LITE software for device configuration and export of the data

Order code	Display	Incl. AC3006 service cable
HL-20D	Yes	No
HL-20D-SET1	Yes	Yes
HL-20	No	No
HL-20D-SET1	No	Yes

HL-20-D

HL-20D-SET

HL-20

HL-20-SET

Included

- Factory adjustment certificate, short instruction manual, 3x AA batteries
- Screw with plug for wall mounting
- HW4-LITE key code

Recommended accessories

• Service cable	AC3006
• Calibration device	HL-20-CAL
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

High-end loggers – HygroLog HL-NT series

The HL-NT is a first-class data logger that can be adapted to customer requirements with the docking station.

Applications

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

Features

- Up to 7 probe inputs
- 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 alarm and visual alarm
- IP40

HL-NT2-P

HL-NT2-DP

HL-NT3-P

HL-NT3-DP

Order code	Display	Incl. interchangeable HC2 probe	2 additional HC2 probe inputs
HL-NT2	No	No	No
HL-NT2-P	No	Yes	No
HL-NT2-D	Yes	No	No
HL-NT2-DP	Yes	Yes	No
HL-NT3	No	No	Yes
HL-NT3-P	No	Yes	Yes
HL-NT3-D	Yes	No	Yes
HL-NT3-DP	Yes	Yes	Yes

Included

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

Recommended accessories

- PC connection set: USB Hygrodata-HL-E-USB
- Ethernet docking station with 4 probe inputs HL-DS-U4
- Probe extension cable, 30 cm: E2-F3A

Docking stations for HygroLog-NT

Depending on the model, the docking stations serve purely as a wall 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

- IP protection: IP40
- Range of application: -30…70 °C / 0…100 %RH

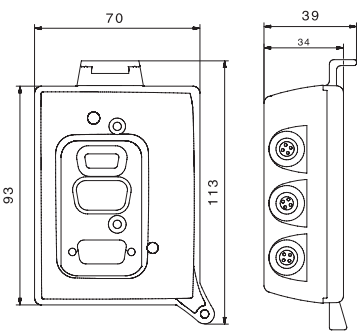
Overview docking stations

Order code	Inputs				Interfaces								
	External power supply (12-24 VDC)	HygroClip2 or analog inputs	Analog input 0…2.5 V (via E2 socket)	Digital inputs (switch contact)	Pt100 inputs	RS-232 & RS-485	USB & RS-485	Ethernet TCP/IP RJ-45 & RS-485	Ethernet TCP/IP RJ-45	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	4	2		✔							
HL-DS-U2	✔	4	4	2			✔						
HL-DS-U2-420	✔	4	4	2			✔						
HL-DS-U4	✔	4	4	2				✔					
HL-DS-U4-420	✔	4	4	2				✔					
HL-DS-U4-420-WEB*	✔	4	4	2					✔				✔
HL-DS-U4-WEB*	✔	4	4	2					✔				✔
HL-DS-U4-WEB-WL*	✔	2	4	2							✔		✔
HL-DS-U4-WL	✔	2	4	2						✔			

* WEB: Access to data logger without HW4 software possible via browser

HL-DS-U2

HL-DS-U4-WL



Included

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

Recommended accessories

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

Order code	Description
AC adapter	
AC1211-V1	Mains 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-V3	Standard software for programming and data management
HW4-P-V3	Professional software with network and access control options and additional graphic functions
HW4-OPC-V3	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, RJ-45 connector
AC0002	Standard USB A/B cable, 1.8 m
AC0004	Standard RS-232 cable, 1.8 m
AC0005	Ethernet patch cable, cat. 5e, unshielded twisted pair, 3 m, crossover
AC1614/02	RS-485 cable to HygroLog NT docking station, for cabling via terminal box
Signal amplifier	
AC3003	Signal amplifier set for cable lengths up to 100 m. The set consists of: - 2x 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 °C
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 stations

Autonomous wireless data loggers LOG-HC2-RC / HL-RC-B

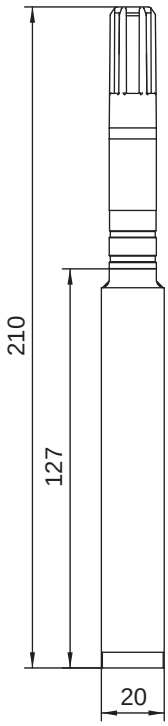
Wireless data loggers for a wide range of humidity and temperature monitoring tasks. Wireless transmission means you can save on the wiring costs and data can be sent to the system from inaccessible points. Thanks to the advanced secure data logging function, the data is not lost in the event of an interruption 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 probe (not included)
- Radio frequency: 433 or 915 MHz for best penetration through brickwork and walls
- High storage capacity: up to 175,000 measured values RH & T) 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: -40...85 °C / 0...100 %RH
- Plastic housing, white, IP65



Order code	Device type
LOG-HC2-RC	Standard version 433 MHz
LOG-HC2-RC-US	Standard version 915 MHz
HL-RC-B	Standard version 433 MHz with battery power monitor
HL-RC-B-US	Standard version 915 MHz with battery power monitor

Compatible

- ROTRONIC HC2 probe, page 4
- LAN interface, page 58
- USB wireless adapter, page 59

Included

- Short instruction manual
- Battery

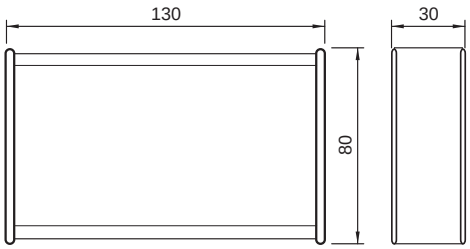
LAN INTERFACE

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 MHz (915 MHz for USA)
- Configurable via web browser
- Housing material: aluminum
- Power supply via mains adapter

Order code	Device type
LAN-INTERFACE	433 MHz version with standard antenna
LAN-INTERFACE-US	915 MHz USA version with standard antenna



Technical data	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

COMPATIBLE

- Wireless data loggers, page 57, 101
- Ground plane antenna, page 59

INCLUDED

- Short instruction manual
- Mains adapter

USB WIRELESS ADAPTER

The USB wireless adapter acts an interface to a PC, for programming and downloading data from wireless data loggers via the HW4 software.

Features

- Programming and downloading data from wireless data loggers
- Radio frequency: 433.92 MHz (EU, Asia) / 915 MHz (USA)
- Interchangeable antenna
- Easy handling with transmission distance up to 100 m (standard antenna)

Order code	Device type	LOG-PT1000-RC LOG-PT1000-ET030-RC LOG-HC2-RC	LOG-PT1000-RC-US LOG-PT1000-30-RC-US LOG-HC2-RC-US	HL-RC-T HL-RC-T030 HL-RC-B	HL-RC-T-US HL-RC-T030-US HL-RC-B-US
LOG-DS-EXT	USB wireless adapter with interchangeable SMA antenna, standard version (433 MHz)	X			
LOG-DS-EXT-US	USB wireless adapter with interchangeable SMA antenna, standard version (915 MHz)		X		
HL-DS-EXT	USB wireless adapter with interchangeable SMA antenna, standard version (433 MHz) with battery power monitor			X	
HL-DS-EXT-US	USB wireless adapter with interchangeable SMA antenna, standard version (915 MHz) with battery power monitor				X

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, page 57, 101
- Ground plane antenna

INCLUDED

- Short instruction manual

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

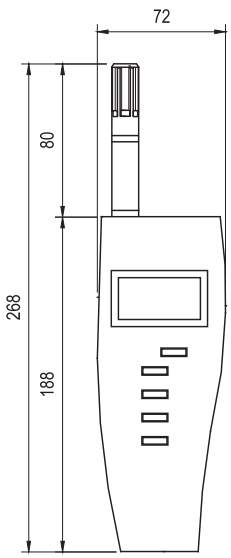
The HP21 is the ideal instrument for humidity and temperature measurement. The integrated HC2 probe guarantees accurate measuring results.

Applications

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

Features

- Fixed probe
- Range of application -10...60 °C / 0...100 %RH
- Accuracy: ±1 %RH, 0.2 K, at 10...30 °C
- Adjusted at 23 °C and 10 / 35 / 80 %RH
- Service interface (UART)
- Calculation of dew/frost point



Order code	HP21
Device type	Handheld instrument with integrated probe
Sensor type	ROTRONIC HYGROMER® IN-1, Pt100 1/3 Class B
Filter type	Polyethylene standard filter, 20 µm
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

Recommended 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 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

HygroPalm22-A

The HygroPalm22-A can be combined without adjustment 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

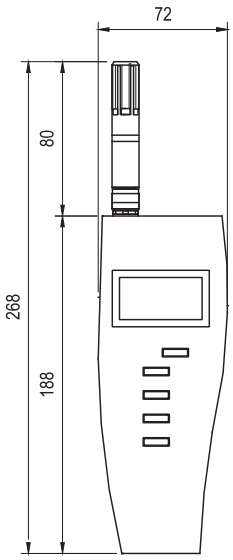
Portable inspection and spot checks in HVAC, the pharmaceutical industry and building management systems.

Features

- Compatible with all ROTRONIC HC2 probes (not included)
- Range of application: -10...60 °C / 0...100 %RH
- All psychrometric calculations
- Service interface (UART)
- Accuracy, probe-dependent

Order code	HP22-A
Device type	Handheld instrument for interchangeable HC2 probes
Filter 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

Recommended 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 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS
• 5 VDC Mains adapter	AC1212

HygroPalm23-A

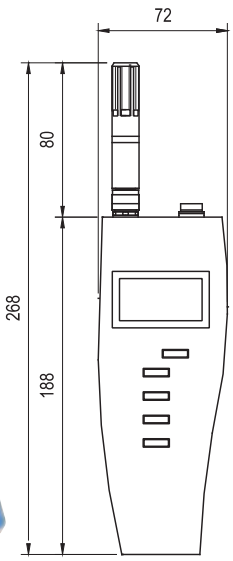
The HygroPalm23-A is the high-end product in our range of handheld instruments. In addition to measuring humidity and temperature, it also calculates all psychrometric parameters and provides a variety of additional functions. The HP23-A is a full function data logger and has the capability to record 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, etc.

Features

- Two probe connections for all ROTRONIC HC2 probes or analog third-party probes (not included)
- Data recording function up to 10,000 data records (with date, time, batch no.)
- Adjustment of transmitters via service cable
- All psychrometric calculations
- Battery charging function
- Service interface (USB)



Order code	HP23-A
Probe type	Compatible with all HC2 probes (not included)
Range of application	-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-Vxx
	Service cable, AC2001
	USB-A to USB-Mini cable, AC0003
	Carry case, AC1127

Included

- Short instruction manual
- Battery

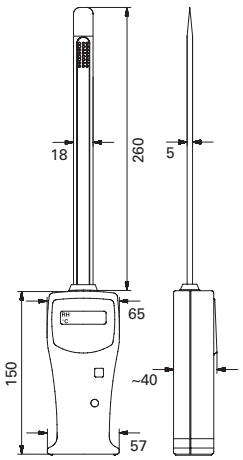
Compatible

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

Recommended 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 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS
• 5 VDC mains adapter	AC1212

Specifications handheld instruments			
Features	**HP21**	**HP22-A**	**HP23-A**
Probe type	Fixed probe	Any HC2 probe (not included)	Any HC2 probe (not included) or analog third-party probe (with cable A-02XX)
Probe interchangeable	No	Yes	Yes
Humidity / Temperature sensor	HYGROMER® IN-1 Pt100 1/3 Class B	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 10...30 °C	±1 %RH / ±0.2 K	Probe dependent (chapter Probes, page 4)	
Long-term stability	<1 %RH / year		
Response time humidity sensor	<15 s τ63	Probe dependent (chapter Probes, page 4)	
Initialization time	<2 s		
Range of application	-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 transmitters	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		9 V battery, rechargeable battery, USB cable, 5 VDC Mains adapter
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		USB-Mini, 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 / GMP compatibility	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: 1.5 %RH, 0.3 K, at 10...30 °C
- Adjusted at 23 °C and 35 / 80 %RH

Order code	GTS
Device type	Handheld instrument with sword probe for measurements in stacks of paper
Range of application / Storage conditions	0...50 °C (32...122 °F) / 0...100 %RH
Sensors	HYGROMER® IN-1, Pt100 1/3 Class B
Display	LCD, 3-digit
Response time	‹15 s τ63
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

Recommended 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 instruments for the paper industry

There is also a suitable solution for monitoring of quality and processes in the paper industry for fans of the HygroPalm.

Applications

Humidity measurements in stacks of paper and cardboard for paper technicians and printers

Features

- Compatible with all other ROTRONIC HC2-S probes
- Range of application device: -10...60 °C / 0...100 %RH
- Range of application sword probe: -40...85 °C / 0...100 %RH
- All psychrometric calculations
- Service interface (UART)
- Accuracy probe: ±0.8 %RH, ±0.1 K, at 10...30 °C
- Adjusted at 23 °C and 10 / 35 / 80 %RH

Order code	HP22-A-PAPER-SET
Set consists of:	Handheld instrument, HP22-A
	Sword probe, HC2-HS28
	Calibration device EGS
	Humidity standard for calibration 50 %RH, EA50-SCS
	Carry case, AC1126

Compatible

- With all ROTRONIC HC2 probes

Included

- Paper instrument set
- Factory adjustment certificate
- Short instruction manual
- Battery

Recommended accessories

• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA35-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

Long-term stability of ROTRONIC probes

Although ROTRONIC probes have excellent long-term stability, we still recommend that their calibration is checked regularly. One calibration per year is normally sufficient. Some of our customers, however, calibrate their probes more often; the range of calibration intervals extends from once a year to calibration before every measurement – depending on internal quality assurance procedures.

The long-term stability of ROTRONIC probes is better than 1 %RH per year under normal conditions. These exist when the concentration of contaminants/pollutants in the air does not exceed maximum allowable concentration (MAC) levels. If the probes are exposed to large humidity and temperature variations, more frequent calibrations may be required

Why is calibration essential?

Many companies today work to ISO 9001 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 HG2 humidity and temperature generator or with your own calibration device and SCS-certified humidity standards
2. Calibration at ROTRONIC:
   (see chapter «Services», page 176)
3. We come to you with our Calibration Mobile (selected countries)

HygroGen2 with external MBW473 dew point reference

HygroGen2 chamber door with up to 6 probe connections. External monitor with HW4 software.

HygroGen2

The HygroGen2 is an independent, transportable climate generator for calibration of humidity and temperature measuring devices. The generator sets a new standard in portable calibration. The generator allows simple, flexible and inexpensive calibration with the advantage that the calibrated instruments can be quickly returned to service.

Applications

On-site calibration solution for all users of humidity and temperture measuring equipment.

Features

- Generates a stable reference environment
- Reaches equilibrium humidity in typically 5 minutes
- Very high temperature homogeneity
- 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 USB probes
- The integrated HW4 software ensures easy calibration and adjustment of all ROTRONIC probes.
- External heated connections for a chilled mirror reference are standard. This allows the user to adjust the reference probes with extremely high precision or to reduce the total calibration uncertainty.
- The water quality is kept at a high level by a UV sterilizer, meaning algae and bacteria cannot form.
- Automatic calibration of HC2 probes (optional)
- «AutoCal+» MBW chilled mirror as AutoCal calibration reference (optional)
- «Remote Control» enables remote access to the HG2-S from Windows, Mac, iOS and Android devices

Included

- Instruction manual
- SCS certificate for reference probe

Recommended accessories

- See HygroGen2 accessories - page 72
- «AutoCal» automatic calibration
- Extended ranges of application «HumiExt» and «TempExt»
- ‹‹AutoCal+›› chilled mirror reference
- ‹‹Remote Control›› LAN remote

HygroGen2 specifications	Relative humidity	Temperature
Control		
Probes	Control or reference probe for HG2 with SCS certificate (Swiss Calibration Service) SCS-3T-4H	
Controller	Integrated PC	
Range	5…95 %RH 2…99 %RH (optional)	0…60 °C -5…60 °C (optional)
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 (10…30 °C) ±1.3 %RH (-10…60 °C)	±0.1 K (10…30 °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	7x ports on front panel, 2x ports at the back	
Chilled mirror connection	Heated connections (inlet and outlet), 6 mm Swagelok	
Profiles	20x user programs can be saved, up to 200 set-points per program	
Optional functions	- «AutoCal» / «AutoCal+» - Range extension for humidity & temperature - Remote control	
Mechanical & electrical		
Chamber dimensions	2 liters, effective working volume 1.5 liters, 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	Safety: EN 61010-1:2001 / EMC: EN 61326-1:2006 EN 61326-1:2006 EN 61000-6-1:2007	

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 72)
MBW473-RP2-SCS	MBW473 reference chilled mirror with measurement probe and SCS certificate
HG2-Package-1	Consisting of: - HG2-S - HG2-D-888888 - MBW473-RP2-SCS - HG2-EF-Bundle2 (activation keys for: AutoCal, AutoCal+ & LAN remote control)
HG2-AutoCal-Code	HG2 auto calibration function, activation key
HG2-AutoCal+-Code	HG2 extension for use of MBW chilled mirror as external reference, activation key, requirement: AutoCal
HG2-TempExt-Code	HG2 extended temperature range -5…60 °C, activation key code
HG2-HumiExt-Code	HG2 extended humidity range 2…99 %RH, activation key code
HG2-Remote-Code	HG2 LAN remote control, activation key code

HG2-D-888888 door with plugs and probe sleeves

Door cross section

HygroGen bag, lightweight

HygroGen transit case

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-x	Special B1 probe sleeve, outer Ø 15 mm, inner Ø selectable (details on request)
HG2-D-888888	HG2 door with 6 x 30 mm Ø inputs including plugs (use special B1 sleeves for smaller diameters)
HG2-B8-x	Special B8 probe sleeve, outer Ø 30 mm, inner Ø selectable (details on request)
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-Bx-x	Customer-specific plug
Accessories	
HG2-TB	HygroGen bag, lightweight
HG2-TC	HygroGen transit case
AC3015	USB-Mini 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

Equipped with ROTRONIC humidity standards, a suitable calibration device and the HW4 software, it is easy to calibrate and adjust probes on-site at your premises. It is also possible to calibrate and adjust probes with the handheld instrument HP23-A (HW4 software then not necessary).

Applications

Calibration and adjustment of ROTRONIC probes (third-party probes also possible).

Features

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

Order code	Nominal value	Measurement uncertainty at 23 °C
EA00-SCS	0.5 %RH	±0.3 %RH
EA10-SCS	10 %RH	
EA11-SCS	11.3 %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	75.3 %RH	±0.7 %RH
EA80-SCS	80 %RH	
EA95-SCS	95 %RH	±0.8 %RH

Compatible

- With all calibration devices, page 74

Included

- SCS certificate
- Textile pads
- Calibration instructions

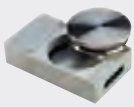
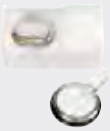
Recommended accessories

• Textile pads in tubes (50 pc.)	EA-PADS
	HW4-E-V3
	AC3001

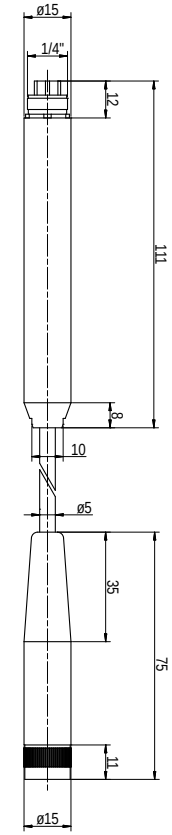
Calibration devices

Applications

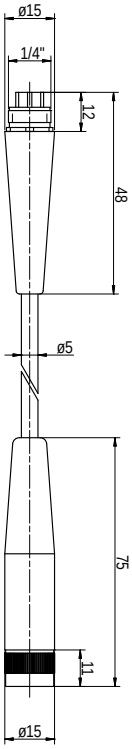
ROTRONIC calibration devices are small, airtight chambers that fit ROTRONIC probes precisely. The lower part of the device consists of a screw-on lid into which the humidity standard is poured on to an absorbent textile pad. The specified humidity is generated in the calibration device after a stabilization period. High humidity values require a longer stabilization period. 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, enamel coated	
EM-G	For probe types E, HP...IE... Screw-on probes (½"G / ½"NPT) Brass, nickel-plated				
Calibration devices for special probes					
EGS	For all sword probes Brass, nickel-plated		**WP-14-S**	For bell probes HC2-AW, HC2-AW-USB, AW-DIO POM, stainless steel 1.4305	
ER-CRP	For HC2-CRP cleanroom probes POM, FKM, PA, PUR, PEEK		HL-20-CAL	For HL-20 POM Spring steel 1.4310	
EM-25-HM	For HM4 probes POM, brass, nickel-plated				

Other calibration devices on request.



Ex-xxA



Ex-xxA-S

Extension cables for HC2 probes

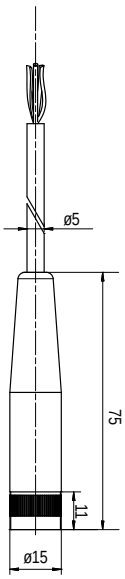
The HC2 extension cables can be used to place HC2 probes away from transmitters, handheld instruments or data loggers. They make it possible to extend up to 5 meters without a need for an AC3003 signal amplifier (100 meters with signal amplifier).

Features

- Range of application -40...90 °C

Extension cables for HC2 probes

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



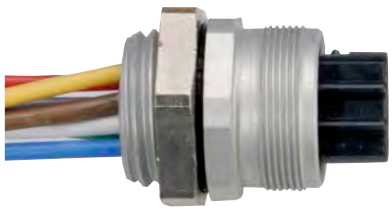
Extension cables for analog probes

Features

- Range of application -40...70 °C
- Open ends for connection of an analog probe to a HP23-A, HF8 or HL-NT

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

Order code	Cable length	Color
A-01XX	1 m	Black
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 °C

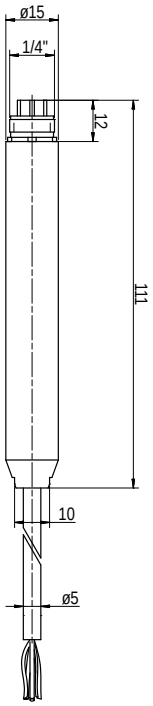
Order code E2-XX

Extension cables

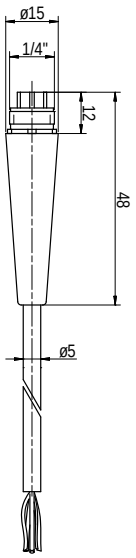
for HC2 probes with open ends

The HC2 probe extension cables with open ends can be used to integrate HC2 probes into analog or digital networks.

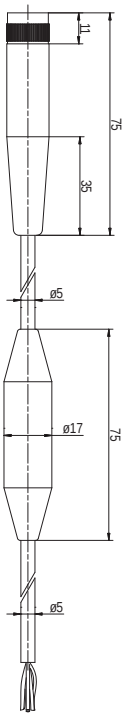
Extension cables for HC2 probes with open ends				
Order code	**Cable length**	**Shaft**	**Color**	**Range of application**
Supply voltage 3.3 VDC (without electronic control)				
E2-01XX	1 m	Normal	Black	-40...90 °C
E2-02XX	2 m			
E2-02XX-S	2 m	Short [S]		
E2-05XX	5 m	Normal		
E2-05XX-S	5 m	Short [S]		
E3-01XX	1 m	Normal	White	
E3-02XX	2 m			
E3-05XX	5 m			
Supply voltage 5...24 VDC / 5...16 VAC (with electronic control)				
E2-01XX-ACT/01	1 m	Normal	Black	-40...70 °C
E2-02XX-ACT/01	2 m			
E2-05XX-ACT/01	5 m			
E3-01XX-ACT/01	1 m	Normal	White	
E3-02XX-ACT/01	2 m			
E3-05XX-ACT/01	5 m			
Supply voltage 5...40 VDC / 6...28 VAC (with electronic control)				
E2-01XX-ACT-HV	1 m	Black	1 m	-40...70 °C
E2-02XX-ACT-HV	2 m		2 m	
E2-05XX-ACT-HV	5 m		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	TxD	UART		
White	Out1	Analog output 1, standard humidity 0...100 %RH = 0...1 V		
Brown	Out2	Analog output 2, standard temperature -40...60 °C = 0...1 V		
Yellow	AGND	Analog GND (connect to GND when using docking stations)		



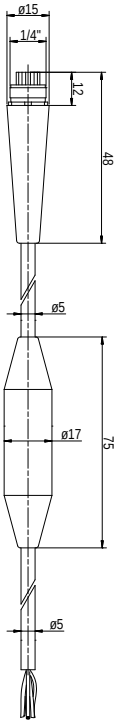
E2-01xx



E2-02xx-S



AC3003-L
With long shaft



AC3003

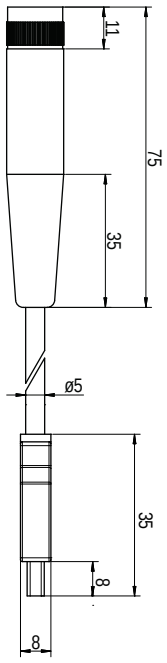
Digital signal amplifiers

Using a digital signal amplifier, it is possible to achieve probe line distances of up to 100 meters.

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 stranded 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



AC2001

Service cable HF transmitters

Features

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

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

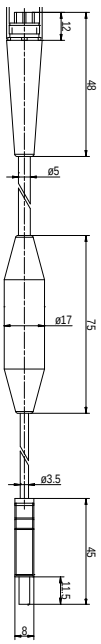
USB CONVERTERS for HC2 probes

Features

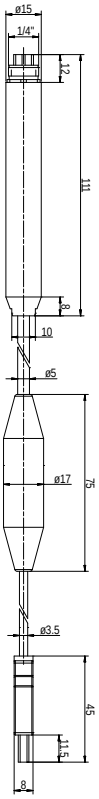
- To connect HC2 probes to a PC via the USB interface
- Requires HW4 software on the PC
- Power supply via USB interface
- Range of application: -40...70 °C
- Cable length: 2.8 m

USB converters 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



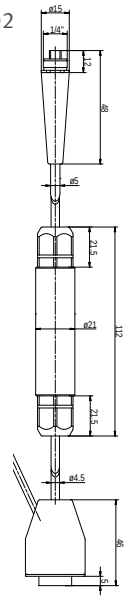
RS-232 ADAPTER for HC2 probes

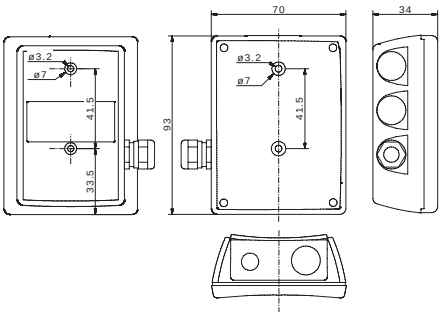
Features

- To connect HC2 probes to a PC via the RS-232 interface
- Requires HW4 software on the PC (power supply 9 V, mains 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	Mains adapter 9 V	

AC3002



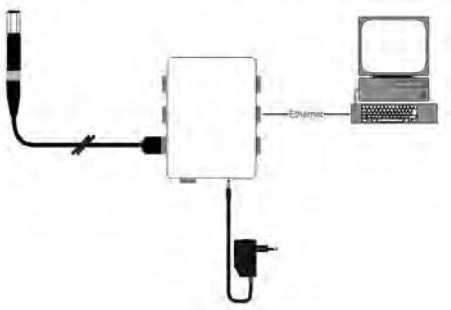


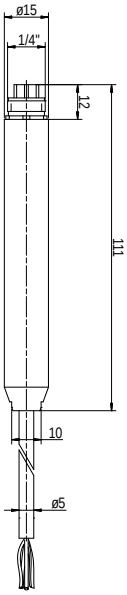
Ethernet converter for HC2 probes

Features

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

Ethernet converter for HC2 probes		
Order code	**Description**	**Cable length**
AC3005	UART ‹› Ethernet	35 cm
AC1207	Mains adapter 9 V	





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

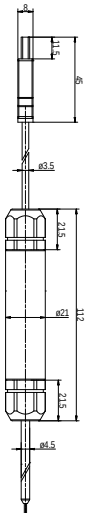
Note: Self-heating of the converter can lead to errors in the measured values; it is therefore advisable to place the probe a short distance away using an extension cable (e.g. E2-F3A).

RS-485 / Modbus converters		
Order code	**Description**	**Cable length**
E2-01XX-MOD	Converter 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 a 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

Note: 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

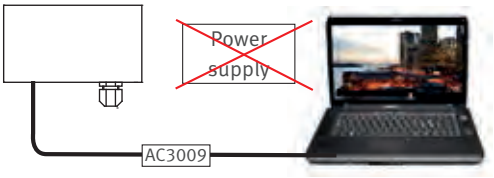
RS-485 T-junction box

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

Order code	Description	Length
AC3006	Service cable for a powered device	1.8 m
AC3009	Service cable with power supply via USB interface	3.6 m
AC0002	Standard USB A/B cable	1.8 m
AC0003	USB-A to USB-Mini cable	1.8 m

AC0003

AC0002

	AC3006	AC3009	AC0002	AC0003
HF1				✔
HF3	✔	✔		
HF4	✔	✔		
HF5	✔	✔		
HF7	✔	✔		
HF8	✔	✔		
TF5	✔	✔		
PF4	✔	✔		
HL-20	✔	✔		
HL-NT			✔	
HL-1D				✔
TL-1D				✔
CL11				✔
HP21	✔	✔		
HP22	✔	✔		
HP23				✔
TP22	✔	✔		
CP11				✔
AwTherm				✔
HygroLab C1			✔	
CRP1	✔	✔		
CRP5	✔			

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 probe

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

Mounting gland with flange

AC5005

Mounting gland with flange for temperatures <100 °C	
Order code	Description
AC5005	Mounting gland with flange for 15 mm probes M20 x 1.5 / to 100 °C

AC1303-M
AC1304-M
AC1301-MEX

Mounting glands without flange	
Order code	Name
AC1303-M	Mounting gland for 15 mm probe M20 x 1.5 / brass, nickel-plated / to 200 °C
AC1304-M	Mounting gland for 25 mm probe M32 x 1.5 / brass, nickel-plated / to 200 °C
AC1301-MEX	Mounting gland for 15 mm ATEX probes M25 x 1.5 / brass, nickel-plated / to 95 °C

AC1305
AC1306

Mounting flange		
Order code	Use with	Name
AC1305	AC1303-M	Mounting flange for AC1303-M Ø 80 mm / steel, nickel-plated / to 200 °C
AC1306	AC1304-M	Mounting flange for AC1304-M Ø 80 mm / steel, nickel-plated / to 200 °C

HygroClip holders for 15 / 25 mm

AC1319

AC1320

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

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 HygroPalm 1 to 3 (old series)

Desktop stand for HygroPalm HP21 – HP23-A / TP22	
Order code	**Description**
DESK-HP	Desktop stand

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 the HygroPalm
- Set contains screws for mounting 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, HC2-HS42)
  1x calibration device ER-15
  1x pack humidity standards
  1x 9 V battery
  1x extension cable probe ‹-› handheld instrument (max. 2 m)
- Dimensions: 450 x 360 x 140 mm (external)

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
  Cutout for extension cable
- Dimensions: 395 x 300 x 105 mm (external)

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
- Dimensions: 395 x 300 x 105 mm (external)

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 mini screwdriver
- Dimensions: 450 x 365 x 135 mm (external)

Order code: AC1102

Universal carry case small

Features

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

Order code: AC1123

Universal carry case large

Features

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

Order code: AC1125

ALL YOU NEED TO MEASURE TEMPERATURE

The portfolio of temperature measuring equipment from ROTRONIC comprises a compact choice of Pt100 probes and devices ranging from transmitters to handheld instruments and data loggers.

Probes

Transmitters

Data Loggers

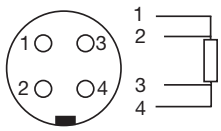
Handheld instrument

Pt100 probes

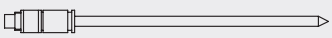
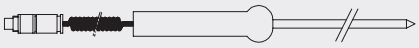
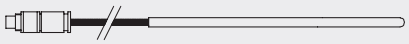
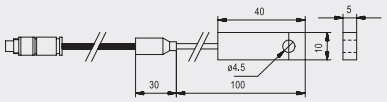
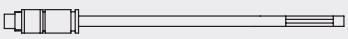
ROTRONIC offers a wide range of its own Pt100 probes, but other 4-wire temperature probes can also be used.

Accuracy: Class A
Wire technique: 4-wire
Connection: 4-pin Binder connector plug
τ90: Time needed to reach 90% of the new measured value after a temperature jump (air velocity = 2 m/s)

Pt100 input



4-wire Pt100

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 249 x 3 mm 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...200 °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 -80...180 °C, τ90: 185 / 20 s	2 m PTFE cable Max. 180 °C Min. -50 °C	

AC1900

AC1904

AC1902

AC1909

Compatible

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

Included

- Temperature probe

Order code	Probe type	
HC2-PT100-B4	Adapter for Pt100 probes to HP22-A, HP23-A, HF5, HF8, PF4 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	
AC1607/02	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 °C, min. -40 °C	2 m
AC1607/03	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 °C, min. -40 °C	3 m
AC1607/05	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 °C, min. -40 °C	5 m
AC1607/10	Extension cable for Pt100 probes, 4-pin Binder male/female connectors Max. 85 °C, min. -40 °C	10 m

TF1 SERIES

The TF-1 series consists of HVAC transmitters for temperature measurement at an unbeatable price.
Scaling and device settings can be made with the freely available ROTRONIC SW21 software.

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-wire

SIGNAL OUTPUT

- Current output
- Voltage output

VERSIONS

- 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

Heating, ventilation, air-conditioning.

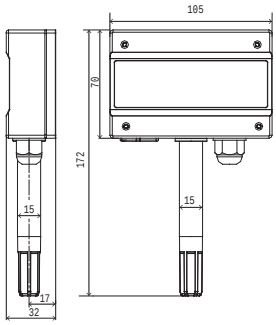
2-wire

Order code	TF120
Output signal	4...20 mA
Supply voltage	10...28 VDC
Display	Optional (without backlight)
Temperature range	Scalable
Probes	Fixed
Filter type	Polyethylene

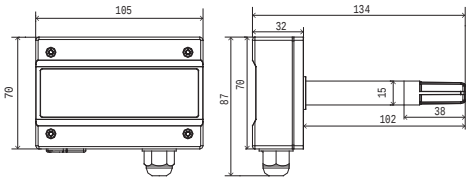
3-wire

Order code	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
Probes	Fixed
Filter type	Polyethylene

Wall version



Duct version



COMPATIBLE

- SW21 software , see page 175

INCLUDED

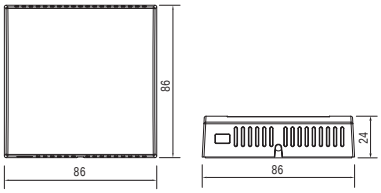
- Factory adjustment certificate

RECOMMENDED ACCESSORIES

• USB service cable	AC0003
• Calibration device	ER-15
• Mounting gland/flange	AC5005

Type S

Type L



TF1 SPACE MOUNT VERSION

Applications

Office and rooms where good looks are important.

2-wire

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

3-wire

Order code	TF13x
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)

Technical data	TF120 Analog 2-wire	TF13x Analog 3-wire
General		
Parameters	Temperature	
Housing material	ABS	
Protection	Type D/W: IP65, type S/L: 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	Screw terminals inside	
Power supply	10...28 VDC	15...40 VDC / 12...28 VAC
Current consumption	‹20 mA	‹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	
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	
Analogue output		
Number	1	
Current	4...20 mA	
Voltage	N/A	0...1/5/10 V

TF5 series

The TF5 series is compatible with all Pt100 probes in the ROTRONIC range. This device generation boasts a unique calibration and adjustment process.

Features

- Interchangeable Pt100 probes
- Accuracy: see chapter «Probes» on page 90
- Temperature limit at probe: see chapter «Probes» on page 90
- Range of application electronics: -40...60 °C / 0...100 %RH
  -10...60 °C with display
- Temperature measurement with Pt100 probe, 4-pin Binder connection
- Service interface

Power supply

- Low voltage: 2 or 3-wire

Signal outputs

- Current output
- Voltage output

Versions

- Wall version

Output parameter

- Temperature

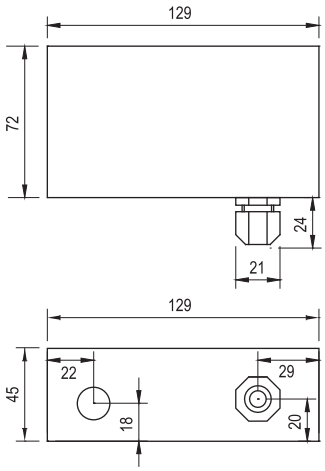
Output scaling

- Temperature: range selectable, standard: -40...60 °C

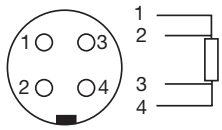
Display

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

Wall version, type W



Pt100 input



4-wire Pt100

TF5 WALL VERSION

Applications

Production processes, storage, shipping and drying processes.

2-wire

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

3-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*
Probes	Interchangeable (-100...200 °C)

COMPATIBLE

- Pt100 probes, page 90
- All Pt100 probes with 4-wire connection
- HW4 software, page 170

INCLUDED

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

RECOMMENDED ACCESSORIES

• Service cable	AC3006 / AC3009*, (page 82)
• Extension cable 2 m	AC1607/02
• Extension cable 5 m:	AC1607/05
• Mounting kit DIN top-hat rail	AC5002

* Requires optional HW4 software and service cable

Technical data	TF520 2-wire	TF53x 3-wire
General		
Parameters	Temperature	
Housing material	ABS	
Protection	IP65	
Dimensions	129 x 72 x 45 mm	
Weight	220 g	
Probe connection	4-pin Binder, threaded coupling	
Display/Operation (optional)	LCD, 1 or 2 decimals without backlight, menu navigation, 4 keys	LCD, 1 or 2 decimals with backlight, menu navigation, 4 keys
Electrical connections	Connections: screw terminals inside Cable gland: M16	
Power supply	10…28 VDC	15…40 VDC / 12…28 VDC
Current consumption	‹20 mA	‹25 mA
Range of application/Storage conditions	-40…60 °C / -10…60 °C (with LCD), 0…100 %RH	
Temperature scaling	Max. -100…200 °C	
Firmware update	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	21 CFR Part 11 and GAMP5	
Analogue output		
Number	1	
Current	4…20 mA	0(4)…20 mA
Voltage	N/A	0…1/5/10 V
Permissible load	≤500 Ω	≤500 Ω (current output) ≥1 kΩ/V (voltage output)

TL-CC1

The ROTRONIC cold-chain temperature logger TL-CC1 is easy to configure (without software), generates PDF reports automatically and comes at an unbeatable price.

Applications

Monitoring of the cold chain during transport of sensitive freight such as pharmaceuticals, foods and technical products.

Features

- PDF report generation without software installation
- Freely configurable
- Clear alarm indication
- All-in-one logger: configuration tool, PDF report, instruction manual and calibration certificate
- High storage capacity, single use, single journey
- Conforms to GxP, EN 12830 and FDA 21 Part 11 / GAMP 5

PDF report

Technical data	TL-CC1
General	
Parameter	temperature
Temperature sensor	NTC thermistor
Accuracy at -30...70 °C	±0.5 K
Resolution	0.1 °C
Range of application / Storage conditions	-30...70 °C / -22...158 °F, ‹ 80 %RH
IP protection	IP65 (in plastic bag)
Weight	Approx. 10 g
Battery	CR2032 (not replaceable)
Dimensions without bag	80 x 43 x 2.5 mm
Dimensions with bag	105 x 55 x 2.5 mm
Logging interval	0.5/5/10/30/60/90/120 min.
Start delay	0.5/5/10/30/60/90/120 min.
Alarm ranges	-20...-10 °C, -10...0 °C, 2...8 °C, 0...15 °C, 0...25 °C, 15...25 °C, freely selectable values
Alarm type	Deactivated, single or cumulative
Storage period	12 months
Storage capacity	8192 data points
Event marking	Up to 8 points
Use	START/STOP button, MARK button
Alarm indication	LED indicators PDF reports
Communication	USB 2.0 port, type A
Operating system	Windows
Conformity	GxP, EN 12830, FDA 21 CFR Part 11 and GAMP5

Included

- 10 pc. per box
- Short instruction manual

TL-1D

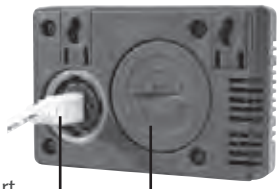
TL-1D temperature data logger: compact, accurate and inexpensive.

Applications

Warehouses, factory halls, museums, office buildings, cleanrooms, shipping, libraries, test facilities, room monitoring in HVAC systems.

Features

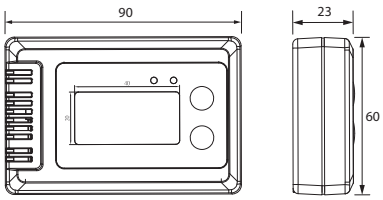
- Accuracy: ±0.3 K, at 23 °C ±5 K
- Compact with very high level of IP protection
- High storage capacity: 64,000 data point memory
- MIN/MAX/AVG function
- Free evaluation and configuration software HW4-LITE
- Very long battery life (3 years at logging interval of 5 min.)
- Conforms to FDA CFR 21 Part 11 / GxP / GAMP5



Technical data	TL-1D
General	
Parameter	Temperature
Sensor type	NTC thermistor
Accuracy at 23 °C ±5 K	±0.3 K
Range of application / Storage conditions	-20...70 °C / 0...100 %RH
IP protection	IP67
Weight	85 g
Dimensions	90 x 60 x 23 mm
Logging interval	30 s...24 h
Battery	1 x CR2
Battery life	Up to 3 years (logging interval 1 h)
Battery charge indicator	Yes (HW4 software, display and LED indicator)
Storage capacity	64,000 measured values
Function	MIN/MAX/AVG on display
Display	LCD
Resolution	0.1 °C
Display refresh rate	5 s (standard) or same as logging interval
LED indicators	2x LEDs
	Right LED flashes green during data logging
	Left LED flashes red when limits broken or low battery
Communication	USB-Mini port (cable optional)
FDA/GMP compatibility	Conforms to FDA 21 CFR Part 11 / GxP / GAMP5

Data logging

The values stored in the TL-1D can be downloaded with the HW4 software and displayed graphically. The user determines the logging interval, the alarm limits, the recording mode and much more.



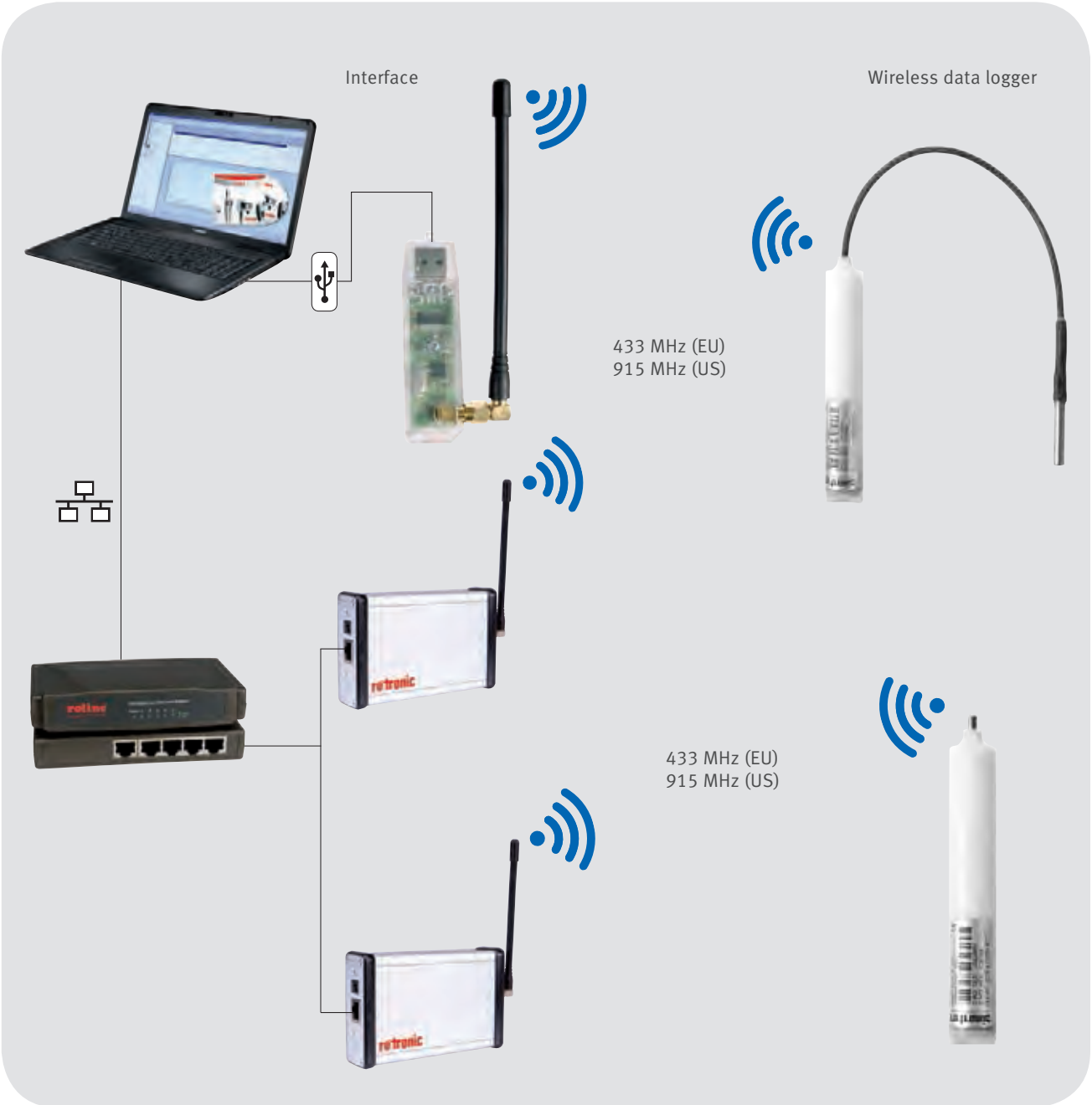
Included

- Short instruction manual
- Battery CR2
- HW4-LITE key code
- Function and calibration certificate

Recommended accessories

• USB service cable	AC0003

Wireless data loggers



Wireless temperature data loggers

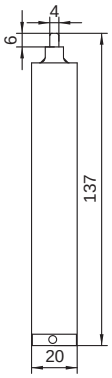
The wireless temperature data loggers allow measured data to be sent to a computer conveniently and reliably over a radio frequency. The stainless steel sensor tip at the housing is highly resistant and therefore suitable for various conditions.

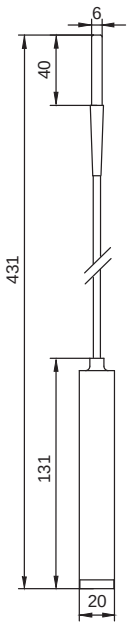
Applications

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

Features

- Pt1000 integrated temperature probe or remote with 30 cm cable
- Accuracy: ±0.2 K at 23 °C ±5 K
- Radio frequency: 433 or 915 MHz for best penetration through brickwork and walls
- High storage capacity: up to300,000 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)
- Range of application: -40...+85 °C (electronics)
- Plastic housing, white, IP68 (submersible)





Housing probe

Order code	Device type
LOG-PT1000-RC	Stainless steel sensor tip at housing Standard version (433 MHz)
LOG-PT1000-RC-US	Stainless steel sensor tip at housing USA version (915 MHz)
HL-RC-T	Stainless steel sensor tip at housing Standard version (433 MHz) with battery power monitor
HL-RC-T-US	Stainless steel sensor tip at housing Standard version (915 MHz) with battery power monitor

Remote probe

Order code	Device type
LOG-PT1000-ET030-RC	Remote sensor with 30 cm cable Standard version (433 MHz)
LOG-PT1000-30-RC-US	Remote sensor with 30 cm cable USA version (915 MHz)
HL-RC-T030	Remote sensor with 30 cm cable Standard version (433 MHz) with battery power monitor
HL-RC-T030-US	Remote sensor with 30 cm cable USA version (915 MHz) with battery power monitor

Other cable lengths available on request

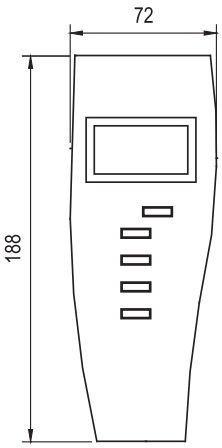
Compatible

- LAN Interface
- USB wireless adapter

Included

- Short instruction manual
- Battery

ThermoPalm TP22



The TP22 is the ideal instrument for temperature measurements. The instrument can be equipped for any application with the interchangeable Pt100 probes from ROTRONIC.

Applications

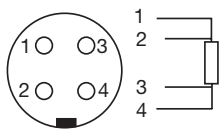
HVAC, pharmaceutical industry, building management systems, museums, warehouses.

Features

- Interchangeable Pt100 probes
- Range of application: -10...60 °C / 0...100 %RH
- Service interface (UART)

Order code	TP22
Probe type	All ROTRONIC temperature probes, page 90
Wire technique	4-wire
Connection	4-pin Binder
Range of application / Storage conditions	-10...60 °C
Housing material	ABS
Power supply	9 V battery
Weight	200 g

Pt100 input



4-wire Pt100

Compatible

- All ROTRONIC temperature probes, page 90
- All Pt100 probes with 4-wire connection
- HW4 software, see page 170

Included

- Short instruction manual
- Battery

Recommended accessories

• Extension cable for probe, 2 m	AC1607/2
• Service cable	AC3006

Technical data	
Features	**TP22**
Probe type	Pt100 probes
Probe interchangeable	Yes
Sensor type	Pt100 4-wire
Number of probe inputs	1
Measurement range	Probe dependent (max. -100...200 °C)
Initialization time	‹2 s
Range of application / Storage conditions	-10...60 °C / 0...100 %RH
Display resolution	2 decimals
Illuminated display	Yes
Alarm indicators	Yes
Battery indicator	«Battery Low» indicator
Functions	
Trend indicators	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
Rechargeable battery charge	No
Current consumption	‹10 mA (without backlight)
Service interface	UART
Mechanical specifications	
Housing material	ABS
Dimensions	196 x 72 x 35 mm
Weight	180 g
CE / EMC directives	EMC 2004/108/EC
FDA/GAMP compatibility	21 CFR Part 11 and GAMP5
IP protection	IP40

Low dew point probe

The dew point is the point at which the air is saturated with water vapor and condenses. Expertise in low dew point measurement means being able to measure residual moisture in extremely dry environments. Using new measurement electronics and a new sensor, ROTRONIC has launched a premium, high-precision probe on to the market. Combined with our conventional HF5 transmitters and HW4 software, the low dew point probe is easy to integrate into the ROTRONIC range. The probe is designed for compressed air systems and is also used in cold and adsorption driers. ROTRONIC offers the probe with an ATEX certificate for use in potentially explosive atmospheres.

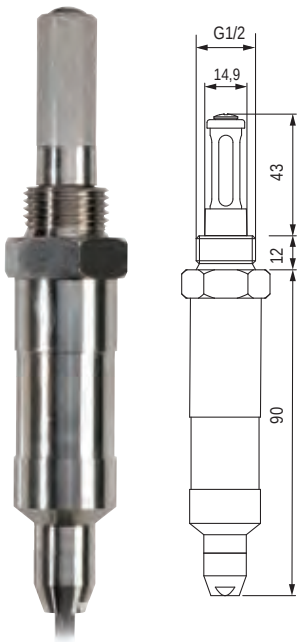
AIRCHIP4000

The powerful AirChip4000, a further development of the AirChip3000, consists of an EEPROM, a microcontroller and a high-performance ASIC. All software functions such as calibration, adjustment and digital communication are identical in the AirChip3000 and AirChip4000. For our customers this means that all innovations and achievements of the AirChip3000 are also available in the new chip integrated in the low dew point probe. The HC2-LDP low dew point probe therefore fits in perfectly in the ROTRONIC world and is compatible with the HF5, HF8 and PF4 transmitters as well as the HP22-A and HP23-A handheld instruments.

LDP-1 DEW POINT SENSOR

Coinciding with the new development of the low dew point probe, ROTRONIC has also launched a new sensor on to the market. The LDP-1 was developed specifically for measurement of low dew point values. This capacitive sensor is mechanically stable, based on a ceramic substrate and boasts high long-term stability. Together with the AirChip4000, it delivers high-quality measurements of residual moisture.

Standard dew point probe -60 °C Td HC2-LDP



The probe is designed for dew point and temperature measurement in compressed air and closed gas systems. ROTRONIC offers the probe with an ATEX certificate for use in environments with ATEX requirements.

Applications

Compressed air systems, industrial gases, granulate and general drying processes, clean rooms.

Features

- Accuracy: ±2 K Td (at -50...20 °C Td), ±3,5 K Td (at -60...-50 °C Td), ±0.,2 K (at 0...30 °C)
- Range of application: -70...85 °C Td / -40...85 °C / -1...100 bar
- High repeatability
- Compatible with HF5 / HF8 / PF4 transmitters and handheld instruments
- Adjusted at 23 °C and -60, -7 °C Td

Order code	HC2-LDP102-M	HC2-LDP105-M
Probe type	Digital dew point & temperature probe	
Range of application	-70...85 °C Td / -40...85 °C / -1...100 bar	
Accuracy	±2 K Td (-50...20 °C Td), ±3.5 K Td (-60...-50 °C Td) ±0.2 K, at 0...30 °C	
Cable length	2 m	5 m
Power supply	3.3...5 VDC	
Current consumption	‹1.5 mA	
Long-term stability	‹1 °C Td/year	
Sensor type	HYGROMER® LDP-1 / Pt1000, 1/3 Class B	
Measurement interval	2 s	
Filter type	Sintered stainless steel, 50 µm	
Response time 63: @ -50 °C Td	Typically ‹10 min., with filter (dew point) Typically ‹15 min., with filter (temperature)	
Housing material	Stainless steel, 1.4301	
Weight / IP protection	260 g / IP65	

Available with ATEX certificate,
see page 167

Compatible

- HF5, HF8, PF4, HP22-A, HP23-A, AC3001, HW4

Included

- Factory adjustment certificate
- Sealing ring G1/2" AC4003

Recommended accessories

• Measurement chamber with fixed valve, POM	LDP-FCPB1
• Measurement chamber with fixed valve, stainless steel	LDP-FCSB1
• Measurement chamber base body, POM	LDP-MCP
• Measurement chamber base body, stainless steel	LDP-MCS

Measurement chambers

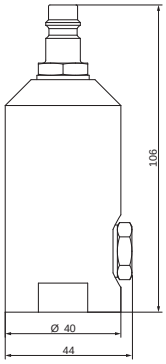
For optimal measurement, ROTRONIC supplies measurement chambers for connection to pressure systems.

Measurement chambers with fixed valve

Order code	LDP-FCPB1	LDP-FCSB1
Range of application	-40...85 °C / -1...16 bar	-50...100 °C / -1...16 bar
Air flow	1 liter per min. at 8 bar	
Dimensions	44 x 106 mm	
Connections	G1/2" thread, quick connector DN7.2	
Material	POM	Stainless steel 1.4301, brass (fixed valve, quick connector)

LDP-FCSB1

LDP-FCPB1

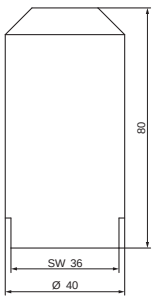


Measurement chamber base bodies

Order code	LDP-MCP	LDP-MCS
Range of application	40...85 °C / -1...100 bar	-50...100 °C / -1...100 bar
Dimensions	40 x 80 mm	
Connections	1 x G1/2" thread, 2 x G1/4" thread	
Material	POM	Stainless steel, 1.4301

LDP-MCS

LDP-MCP



Spare parts

Order code	Description
SP-S15/50	Filter, sintered steel, 50 µm
AC4001-B1	Fixed valve, brass, 1 l/min., incl. sealing ring G1/4"
AC4002-B	Quick connector, brass, incl. sealing ring G1/4"
AC4003	Seal ring G1/2"

SP-S15/50

AC4002-B

AC4001-B1

Differential pressure and temperature measurement

The PF4 differential pressure transmitter was developed in collaboration with cleanroom* experts. The thermal measurement technique allows exact measurements in the lowest measurement ranges. Thanks to the differential pressure measurement devices, ROTRONIC customers can now measure a further important parameter in addition to humidity, temperature, low dew point and CO_2. Equipped with the optional temperature probe or a HygroClip2 probe, the device can be used for a wide variety of applications.

 * Further cleanroom products (page 158)

PF4 series

The thermal measurement technique of the PF4 transmitter allows exact measurements in the smallest of ranges. The differential pressure transmitter enables ROTRONIC customers to measure a further important parameter in addition to humidity, temperature low dew point and CO2.

Features

- Accuracy: ±1.0 % full scale
- Fast response time
- Freely configurable analog signals
- Integrated relay switch contact
- High resistance to pressure
- Thermal mass flow measurement at low flow rate
- High immunity to dust and humidity in the environment
- Integrated damping function for variable response times

Power supply

- Low voltage: 3-wire

Signal outputs

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

Version

- Wall version

Output parameters

- Differential pressure
- Differential pressure & temperature
- Differential pressure, temperature & relative humidity

Measurement ranges

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

Display

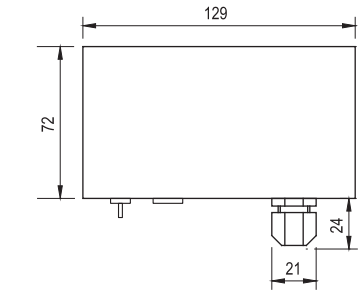
- Display with backlight, trend indicator and keypad
- Without display

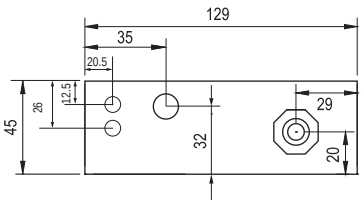
PF4 WALL VERSION

Differential pressure

Differential pressure & temperature

Differential pressure, relative humidity & temperature





Applications

Cleanrooms, operating theaters, HVAC, filter technology and applications where small pressure differences prevail.

3-wire

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

COMPATIBLE

- HW4 software, see page 170

INCLUDED

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

RECOMMENDED ACCESSORIES

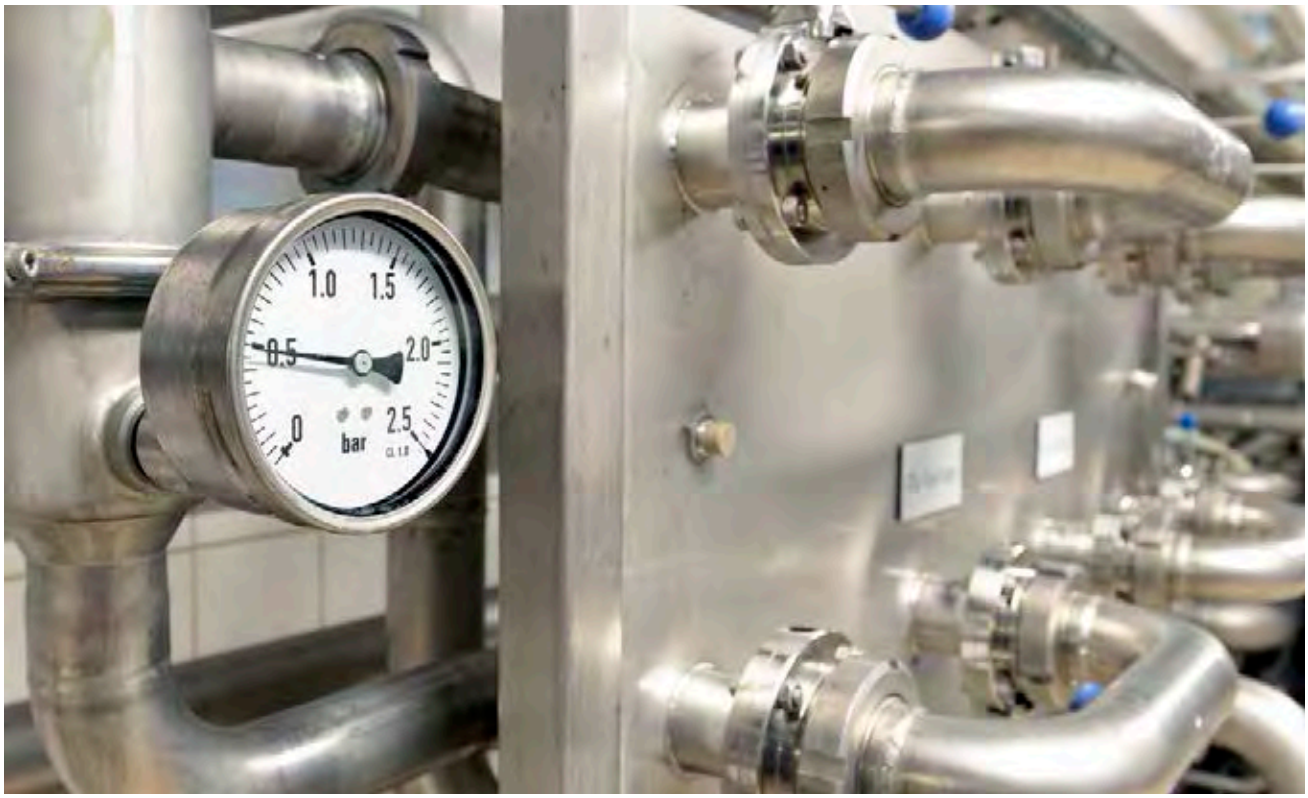
• Service cable	AC3006 / AC3009* (page 82)
• Temperature probe	AC19xx (page 90)
• Mounting kit DIN top-hat rail	AC5002
• HC2 probes	(page 4)
• Connection hose	Ø 4 mm AC6001/xx

* Requires optional HW4 software and service cable

Technical data	PF43x-1 Analog 3-wire	PF43x-L Analog & digital 3-wire
General		
Parameters	Differential pressure, temperature and relative humidity	
Housing material	ABS	
IP protection	IP65	IP40
Mounting position	Any mounting position	
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
Range of application / Storage conditions	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	21 CFR Part 11 and GAMP5	
Differential pressure measurement		
Measurement principle	Thermal mass flow measurement	
Measurement ranges	-25...+25 Pa / -50...+50 Pa / -100...+100 Pa / -250...+250 Pa / -500...+500 Pa	
Medium	Air and non-aggressive gases	
Accuracy at 23°C ±3 K	±1.0 % full scale	
Long-term stability	‹0.3 % full scale /year	
Dependence on ambient pressure	0.1 % full scale/hPa	
Measurement interval	1 s	
Pressure resistance	2x bar (2,000 hPa)	
Leak rate	‹180 µl/min.	
Pressure connections	Hose connector Ø 4 mm x 10 mm	
Measurement of temperature and relative humidity (type-dependent)		
Probe connections	Temperature: 4-pin Binder for 4-wire Pt100 probes, page 90 Humidity: ROTRONIC E2 for ROTRONIC HC2 probes, page 4 Accuracy: probe-dependent	
Outputs		
Analog outputs	2, freely configurable	
Analog output type	0/4...20 mA or 0...1/5/10 V	
Switch output	1x relay	
Switching capacity	‹50 VAC / ‹75 VDC / ‹1 A	
Accuracy, analog output	±10 mV (voltage output) ±20 µA (current output)	
Permissible load	›10 kΩ (voltage output) ‹500 Ω (current output)	
Ethernet	No digital outputs	Ethernet RJ-45

Further cleanroom products (page 158)

Compressed air – A valuable source of energy



Apart from electricity, compressed air is nowadays the most-used source of energy throughout industry. In addition to this, pressure measurement technology is one of the most important and frequently used methods of monitoring and controlling machinery and plants. To advance process optimization further, numerous parameters are nowadays compared and requirements balanced against each other. ROTRONIC uses the piezo-resistive effect for its pressure measurement devices, thereby supplying a premium transmitter to the market.

BF2

The piezo-resistive measurement technique allows exact measurements at very low pressures and with very high chemical resistance.
The BF2 enables easy monitoring and evaluation of process pressure applications. In compressed air systems, the BF2 is the perfect complement to ROTRONIC low dew point probes.

Applications

Compressed air systems, machinery control and monitoring systems.

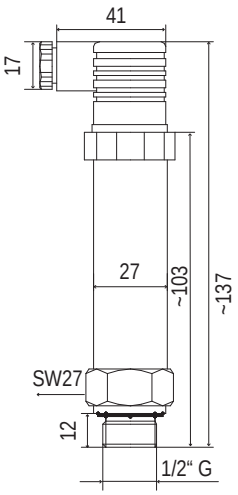
Features

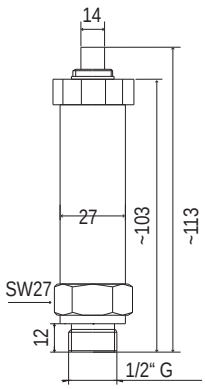
- Accuracy: ±0.25 %FS
- Wide operating temperature range
- Full stainless steel construction
- RS-485 communication
- Temperature compensation (BF227) -10 °C...80 °C

BF220

BF227

Technical data	BF220	BF227
General		
Parameters	Absolute pressure	
Housing material	Stainless steel (1.4878)	
Diaphragm	Stainless steel (1.4404)	
IP protection	IP65	IP63
Mounting position	90° to pressure pipe (max. 30° inclination)	
Dimensions	137 x 41 x 27 mm	113 x 14 x 27 mm
Weight	220 g	235 g
Electrical connections	Hirschmann (DIN 43650)	7-PIN
Power supply	15...30 VDC	10...28 VDC
Range of application	-30...80 °C	-40...80 °C
Storage conditions	-40...120 °C	-40...80 °C
CE / EMC compatibility	EMC Directive 2004/108/EC	
Absolute pressure measurement		
Measurement principle	Piezo-resistive steel sensor	
Measurement range	0...10 bar	
Medium	Air and non-aggressive gases	
Accuracy at 23 °C	±0.25 %FS	±0.15 %FS
Pressure resistance	15 bar	
Outputs		
Analog	4...20 mA	4...20 mA
Digital		RS-485
Permissible load	‹750 Ω	‹900 Ω





Included

- Factory certificate
- Short instruction manual

The smart art of flow measurement

The quality of air in rooms is of immense importance for the well-being of the people in them and ultimately also for their efficiency and effectiveness. To achieve good air quality, ventilation and air conditioning systems must work without any failure occuring and use accurate measurements. The ROTRONIC AF1 probe provides smart and intelligent testing and evaluation of the effectiveness of such systems.

AFP1 – Mini vane probe

This new-generation multifunctional and intelligent handheld instrument is suitable for determining mulitple parameters such as relative humidity, temperature, dew point, air velocity and volume flow. The data can be displayed, recorded and exported using a smartphone application.

Applications

Warehouses, factory halls, museums, office buildings, libraries, HVAC systems.

Features

- Intelligent multi-parameter measuring instrument
- Simple recording of data via iOS or ANDROID-APP
- App with integrated logging function

Technical data	AFP1
General	
Sensor type	Vane anemometer ROTRONIC HYGROMER® IN-1 NTC
Measurement range	0.5...20 m/s 0...100 %RH -20...+60 °C
Accuracy	±0.2 m/s, ±3 % of measured value ±3 %RH (at 25 °C) ±0.3 K (at -20...50 °C)
Power supply	2 x 3 V CR2032 batteries
Dimensions measurement probe	150 x ø18 mm or 150 x ø28 mm
Rod length	Retracted: 0.55 m / Extended: 1.2 m

Included

- Factory certificate
- Short instruction manual, app (available online)
- Soft case
- Batteries 2 x 3 V (CR2032)

AF1 SERIES

The AF1 series is an inexpensive, highly accurate and stable transmitter for the measurement of air velocity and temperature. The devices are equipped with a calorimetric sensor and boast outstanding long-term stability. The measurement range and output signal can be set easily without additional software via dip switches.

Applications

Laminar flow cabinets, HVAC systems, cleanrooms, monitoring of air consumption.

Features

- Measurement ranges of 2 m/s; 3 m/s; 10 m/s; 20 m/s
- High stability and repeatability
- Excellent value for money
- Freely selectable output signals 4...20 mA; 0...10 V

POWER SUPPLY

- Low voltage: 3-wire

SIGNAL OUTPUTS

- Current output 4...20 mA
- Voltage output 0...10 V

VERSIONS

- Duct version
- Wall version (cable length 2 m)

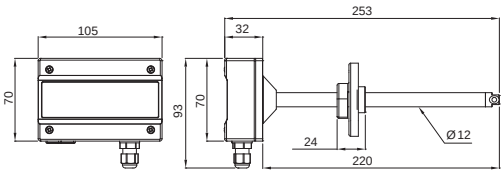
OUTPUT PARAMETER

- Air velocity

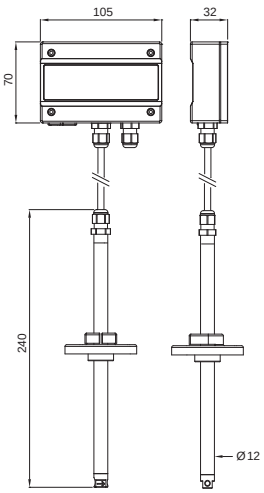
OUTPUT SCALING

- Air velocity: 2 m/s; 3 m/s; 10 m/s; 20 m/s

Duct version



Wall version



INCLUDED

- Factory adjustment certificate
- Short instruction manual
- Mounting flange

Technical data	AF1
General	
Parameters	Air velocity m/s
Housing material	Polycarbonate
IP protection	IP65
Dimensions	105 x 70 x 32 mm
Weight	Duct version: 165 g Duct version: 260 g
Electrical connections	Connections: screw terminals Cable gland: M12 x 1.5 (Ø cable 3...6.5 mm)
Power supply	8...35 VDC or 12...30 VAC
Current consumption	‹ 200 mA
Range of application	Electonics: 0...50 °C Environment: 0...50 °C
Storage conditions	-20...60 °C
CE / EMC compatibility	EMC Directive 2004/108/EC
Air velocity measurement	
Measurement principle	Calorimetric
Measurement ranges	2 m/s; 5 m/s; 10 m/s; 20 m/s
Environment	Air and non-aggressive gases
Accuracy at 25 °C, 45 %RH, 1013 mbar	±3 %FS
Measurement interval	1 s
Pressure resistance	10 bar
Step response	τ90 after 3 s
Outputs	
Analog outputs	2
Analog output type	4...20 mA or 0...10 V
Permissible load	›10 kΩ (voltage output) ‹500 Ω (current output)

All you need to measure CO_2

Carbon dioxide (CO_2) is a colorless and odorless gas that can only be detected with a measuring instrument and which can be deadly for humans and animals in high concentrations. ROTRONIC CO_2 products enable efficient energy savings and air monitoring in indoor rooms, provide CO_2 monitoring in underground garages/tunnels and perform valuable service in greenhouses, incubators, transport and storage applications. The ROTRONIC CO_2 product portfolio comprises a comprehensive range of transmitters, handheld instruments and data loggers.

Transmitters

Transmitter series	CF1
Working principle	Non-dispersive infrared (NDIR) with automatic baseline correction (ABC)*
CO_2 measurement range	0...2000 ppm
Relative humidity temperature range	0...100 %RH
Temperature measurement range	0...50 °C
Accuracy CO_2	±30 ppm, ±3% of measured value
Accuracy temperature	± 0.3, ± 1 K type S with display
Accuracy relative humidity	± 3.0 %RH
Housing	
Space mount version	✔
Wall version	
Duct version	
Display option	✔
IP protection	IP20
Outputs	
0...10 VDC	✔
0...20 mA	
4...20 mA	✔
Functions	
Visual alarm (LED)	✔
Audible alarm (beep tone)	
Relay	✔

* Automatic baseline correction (ABC) is an automatic self-adjustment function that ensures the expected lifetime of CO_2 sensors beyond 15 years without further adjustment (standard indoor applications).

CF3	CF5	CF8
Non-dispersive infrared (NDIR) with automatic baseline correction (ABC)		
0...2000 ppm	0...2000 ppm	0...4 %vol (0...40000 ppm)
	0...50 °C	0...50 °C
±30 ppm, ±3% of measured value	±30 ppm, ±3% of measured value	±200 ppm
	± 0.5 K	± 0.5 K
✔	✔	
✔	✔	✔
✔	✔	
✔	✔	✔
IP30 / IP54 / IP65	IP30 / IP54 / IP65	IP54
✔	✔	✔
	✔	✔
✔	✔	✔
✔		
✔		
		✔

CF1 SERIES

Measures the concentration of CO_2 in rooms and emits an alarm by relay when a threshold is exceeded. Fits directly on standard EU and US surface-mounted boxes.

Features

- 3-in-1 transmitter: temperature, relative humidity and CO_2 concentration
- Compact design
- Accuracy: ±30 ppm ±3%, ±3 %RH, ±0.3 K
- Measurement ranges: 0...2000 ppm, 0...100 %RH, 0...50 °C
- Analog output signals
- Relay output

POWER SUPPLY

- Low voltage: 3-wire

SIGNAL OUTPUTS

- Current output
- Voltage output

VERSIONS

- Space mount version R
- Space mount versions S

OUTPUT PARAMETERS

- Temperature, relative humidity and CO_2

OUTPUT SCALING

- CO_2 range adjustable to 5000 ppm, standard: 0 ... 2000 ppm
- Temperature range selectable, standard: 0...50 °C
- Relative humidity range selectable, standard: 0...100 %RH

DISPLAY

- Display with or without backlight
- Without display

CF1 SPACE MOUNT VERSION

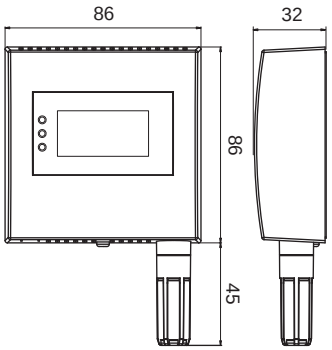
Applications

Office rooms, conference rooms, residential rooms, classrooms, public buildings and other rooms where air quality plays a role.

EU version

Order code	CF13x-R
Output signals	0...10 VDC 4...20 mA
Supply voltage	12...28 VAC / 15...40 VDC
Display	Optional
LED indicators	LED scale for good/medium/bad air quality
Temperature measurement range	Standard 0...50 °C
Measurement range rel. humidity	Standard 0...100 %RH
CO_2 measurement range	Standard 0...2000 ppm
Relay	Yes
Dimensions	131 x 86 x 32 mm

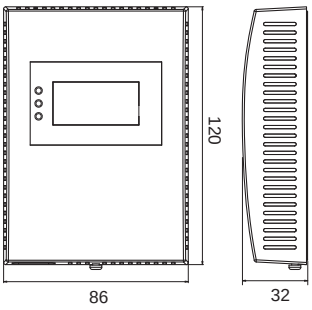
Type R



US version

Order code	CF13x-S
Output signal	0...10 VDC 4...20 mA
Supply voltage	12...28 VAC / 15...40 VDC
Display	Optional
LED indicators	LED scale for good/medium/bad air quality
Temperature measurement range	Standard 0...50 °C
Measurement range rel. humidity	Standard 0...100 %RH
CO_2 measurement range	Standard 0...2000 ppm
Relay	Yes
Dimensions	120 x 86 x 32 mm

Type S



COMPATIBLE

- SW21 software, page 175

INCLUDED

- Factory adjustment certificate
- Short instruction manual

RECOMMENDED ACCESSORIES

- Service cable AC3006 / AC3009 (page 82)

CF3 SERIES

The CF3 series comes as space-mount and industrial versions. This transmitter not only boasts high accuracy and long lifetime, but is also requires no maintenance.

Features

- Infrared measurement technique (NDIR)
- Standard measurement range: 0...2000 ppm
- Accuracy: ±30 ppm, ±3 % of measured value
- Range of application: 0...50 °C / 0...95 %RH
- Analog output signals
- Automatic calibration
- Long lifetime
- Maintenance-free

POWER SUPPLY

- Low voltage: 3-wire

SIGNAL OUTPUTS

- Current output
- Voltage output

VERSIONS

- Space mount version
- Duct version
- Wall version

OUTPUT PARAMETER

- CO_2

OUTPUT SCALING

- CO_2: adjustable up to 5,000 ppm, 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

US version

Standard EU and US

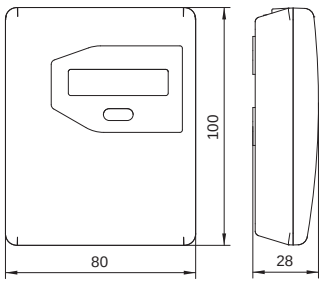
Order code	CF3-W-EU-Disp	CF3-W-US-Disp
Output signal	0...10 VDC 4...20 mA	
Supply voltage	16...29 VDC / VAC	
Display	Optional	

Standard EU and US with alarm

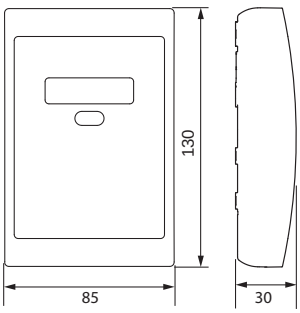
Order code	CF3-W-EU-Disp-FLI	CF3-W-US-Disp-FLI
Output signal	0...10 VDC	
Supply voltage	16...29 VDC / VAC	
Display	Yes	
Alarm functions	Audible and light signal, alarm threshold at 1400 ppm (adjustable)	
CO_2 measurement range	Standard 0...2000 ppm Optional 0...5000 ppm	
Dimensions	100 x 80 x 28 mm	130 x 85 x 30 mm

US version FLI

EU version



US version



INCLUDED

- Short instruction manual

CF3 DUCT AND WALL VERSIONS

Applications

Ventilation pipes and industrial applications.

Duct version

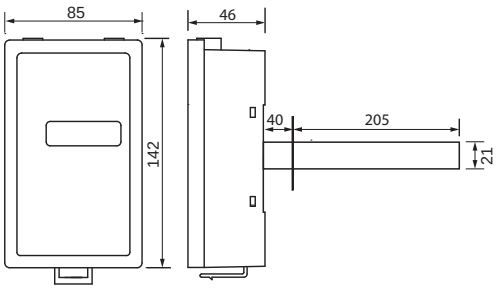
Order code	CF3-D-Disp
Output signal	0...10 VDC 4...20 mA
Supply voltage	16...29 VDC / VAC
Display	Optional
Dimensions	142 x 85 x 46 mm, probe: 245 mm
IP protection	IP65

Wall version (industry)

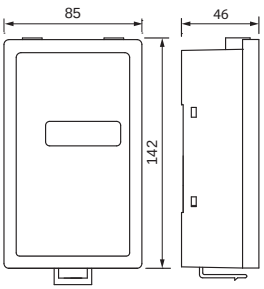
Order code	CF3-W-IND-Disp
Output signals	0...10 VDC 4...20 mA
Supply voltage	16...29 VDC / VAC
Display	Optional
Dimensions	142 x 85 x 46 mm
IP protection	IP54

CO_2 measurement range	Standard 0...2000 ppm

CF3-D-Disp



CF3-W-Disp



INCLUDED

- Short instruction manual

Technical data	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			
IP 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 mm^2			
Power supply	16...29 VDC / VAC			
Power consumption	‹1 W			
Range of application / Storage conditions	0...50 °C / 0...95 %RH (non-condensing)			
CE / EMC compatibility	EMC Directive 89/336/EEC			
CO_2 measurement				
Measurement technique	Non-dispersive infrared (NDIR) with automatic baseline correction (ABC)			
Measurement range	Standard 0...2000 ppm			
Accuracy	±30 ppm, ±3 % of measured value			
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 functions	N/A	Audible and light signal, alarm threshold at 1400 ppm (adjustable)	N/A	
Self test	Complete function test			

CF5 SERIES

The CF5 series equipped with CO_2 and temperature sensors comes in space-mount and industrial versions. This transmitter not only boasts high accuracy and long lifetime, but is also requires no maintenance.

Features

- Infrared measurement technique (NDIR) + temperature
- Standard measurement range: 0...2000 ppm
- Accuracy: ±30 ppm, ±3% of measured value, ±0.5 K
- Range of application: 0...50 °C / 0...95 %RH
- Analog output signals
- Automatic calibration
- Temperature measurement
- Long lifetime
- Maintenance-free

POWER SUPPLY

- Low voltage: 3-wire

SIGNAL OUTPUTS

- Current output
- Voltage output

VERSIONS

- Space mount version
- Duct version
- Wall version

OUTPUT PARAMETERS

- CO_2 and temperature

OUTPUT SCALING

- CO_2: range adjustable to 5000 ppm, standard 0...2000 ppm

DISPLAY

- Display optional

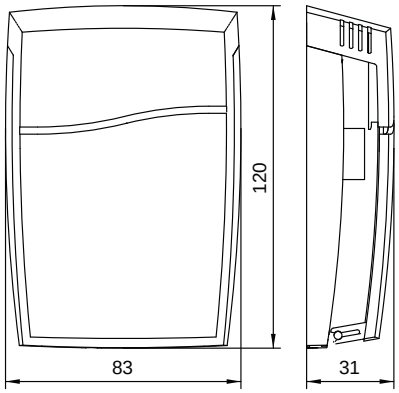
CF5 SPACE MOUNT VERSION

Applications

Offices, conference rooms, classrooms, public buildings and other rooms where air quality is important.

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
Dimensions	83 x 120 x 31 mm



INCLUDED

- Short instruction manual

RECOMMENDED ACCESSORIES

• Service cable	CF5/8 Comm Cable

CF5 DUCT AND WALL VERSIONS

Applications

Ventilation pipes and industrial applications.

Duct version

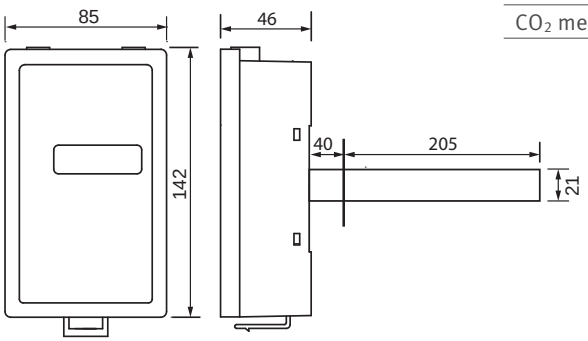
Order code	CF5-D-Disp
Output signals	0...10 VDC 0/4...20 mA
Supply voltage	16...29 VDC / VAC
Display	Optional
Dimensions	142 x 85 x 46 mm, probe: 245 mm
IP protection	IP65

Wall version

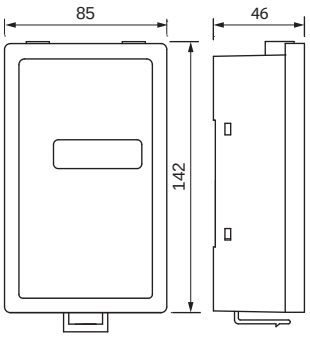
Order code	CF5-W-IND-Disp
Output signal	0...10 VDC 0/4...20 mA
Supply voltage	16...29 VDC / VAC
Display	Optional
Dimensions	142 x 85 x 46 mm
IP protection	IP54

CO_2 measurement range	Standard 0...2000 ppm

CF5-D-Disp



CF5-W-Disp



Included

- Short instruction manual

Recommended accessories

• Service cable	CF5/8 Comm Cable
• Zero calibration kit	CO2 CALIBRATOR

Technical data	CF5-W-Disp	CF5-D-Disp	CF5-W-IND-Disp
General			
Parameters	Carbon dioxide (CO_2) and temperature		
Housing material	ABS		
IP 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 °C / 0...95 %RH (non-condensing)		
CE / EMC compatibility	EMC Directive 89/336/EEC		
CO_2 measurement			
Measurement technique	Non-dispersive infrared (NDIR) with automatic baseline correction (ABC)		
Measurement range	Standard 0...2000 ppm		
Accuracy	±30 ppm, ±3% of measured value		
Warm-up time	‹1 min.		
Long-term stability	‹0.3% of measurement range		
Pressure dependence	+1.6% of measured value per kPa deviation 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 °C / 0...100 %RH		
Accuracy at 23°C ±5 K	0.5 K		
Analog output			
Number	2		
Current	0/4...20 mA		
Voltage	0...10 VDC		

Greenhouse

Applications

Greenhouses and applications with adverse environmental conditions.

Order code	CF8-W-Disp-GH
Output signals	0...10 VDC 0/4...20 mA
Supply voltage	16...29 VDC / VAC
CO_2 measurement range	0...4 %vol (0...40,000 ppm)
Measurement range	0...50 °C
Relay	Open ‹900 ppm, closed ›1000 ppm (range adjustable)
IP protection	IP54

Incubator

Applications

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	Ø 40 x 102 mm
IP protection	IP67

Included

- 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.

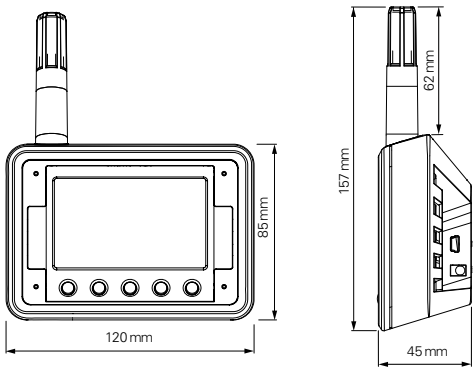
Applications

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

Features

- Benchtop or wall mounting
- Measures and records CO_2, relative humidity and temperature
- Accuracy: ±30 ppm, ±3 %RH, ±0.3 K
- 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
- Includes free logging and configuration software SW21

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



Included

- Short instruction manual
- Mains adapter AC1214
- ROTRONIC software SW21
- USB cable
- Factory adjustment certificate

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

CO_2 DISPLAY

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

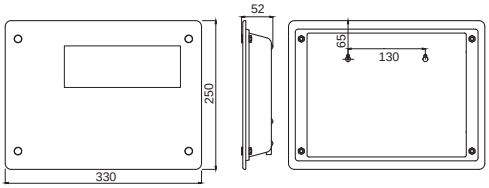
Applications

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

Features

- Benchtop or wall mounting
- Measures and records CO_2, relative humidity and temperature
- Accuracy: ±30 ppm, ±2.5 %RH, ±0.3 K
- 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 flash drive
- Display of date and time

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



Included

- Short instruction manual
- Mains adapter AC1214
- Mounting hardware
- 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
• Zero calibration kit	CO2 CALIBRATOR

Handheld instrument– CP11

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

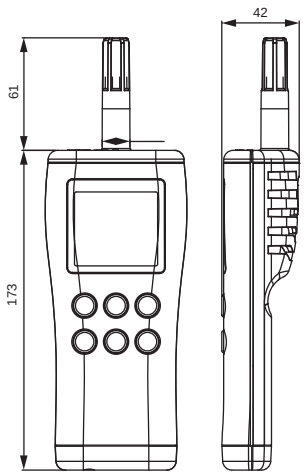
Applications

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

Features

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

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



Included

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

Recommended accessories

• Mains 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
• Zero calibration kit	CO2 CALIBRATOR

Technical data	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 / IP 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	Mains adapter AC1214	4x AA batteries / optional mains 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 conformity 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		
Null 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 τ90		

Zero calibration kit

The zero calibration kit offers a quick means for field calibration by producing air virtually free of CO_2 from the ambient air.

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 mains 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.
Range of application	0...45 °C
Rechargeable battery	Li-ion, 7.4 V
Mains adapter	12 VDC, 0.5 A

CO_2 replacement cartridges

Features

- Replacement cartridges for CO_2-CALIBRATOR
- Set with 5 cartridges

Order code **CO2 CARTRIDGE**

Compatible

- CP11
- CF5
- CF8
- CO2 display

Included

- Silicone tube 2 x 4 mm
- Short instruction manual
- Mains adapter
- 2 x set of replacement cartridges (5 pc. per set)

Recommended accessories

- Set with 5 x CO_2 replacement cartridges CO2 CARTRIDGE

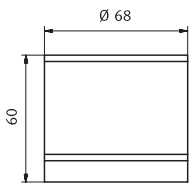
Application-specific measurements

ROTRONIC offers ideal solutions for when you don't just want to measure individual parameters, but need application-specific measurements, irrespective of whether they involve measurements in potentially explosive atmospheres, meteorological applications, cleanrooms or wherever water activity plays a role. You can find information on some of these points in the chapter "Theory" on page 189.

Water activity

HC2-AW-USB

HC2-AW



Water activity probes

Applications

Quality assurance in food manufacturing, coffee and tobacco industry, grain storage and the pharmaceutical industry.

HC2-AW-USB

Features

- Range of application: 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	±0.008 aw, ±0.8 %RH, ±0.1 K, at 10…30 °C	
Power supply	Via USB interface	
Filter type	Wire mesh filter with 20…25 µm pore size	
Weight	550 g	

HC2-AW

Features

- Like HC2-AW-USB, but with UART interface

Order code	HC2-AW
Feature	Measurement probe
Connection	Via UART, 1 m cable
Accuracy	±0.008 aw, ±0.8 %RH, ±0.1 K, at 10…30 °C
Power supply	Via display unit
Filter type	Wire mesh filter with 20…25 µm pore size
Weight	550 g

Compatible

- HC2-AW-USB: with PC
- HC2-AW: with benchtop display unit HygroLab C1 and hand-held 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

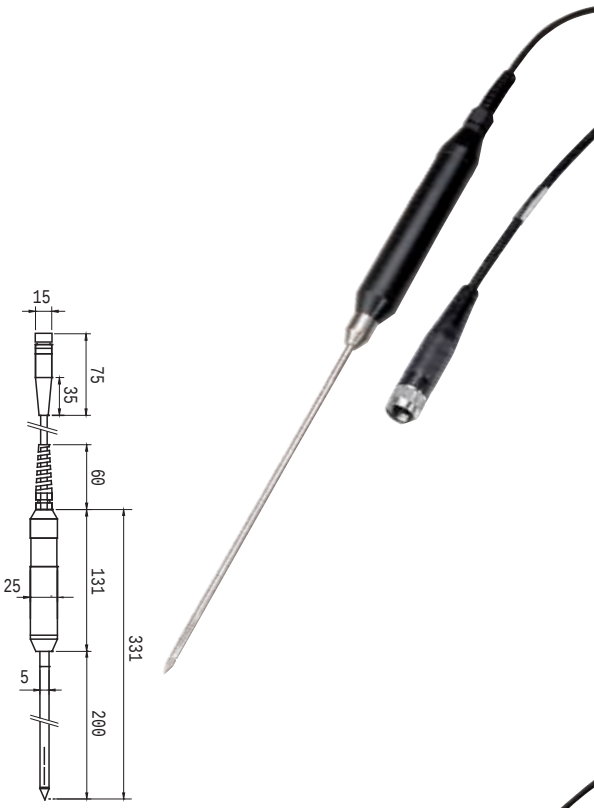
Applications

5 mm insertion probe: dust-free bulk materials such as tablets, grain, jelly capsules and granulates.

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

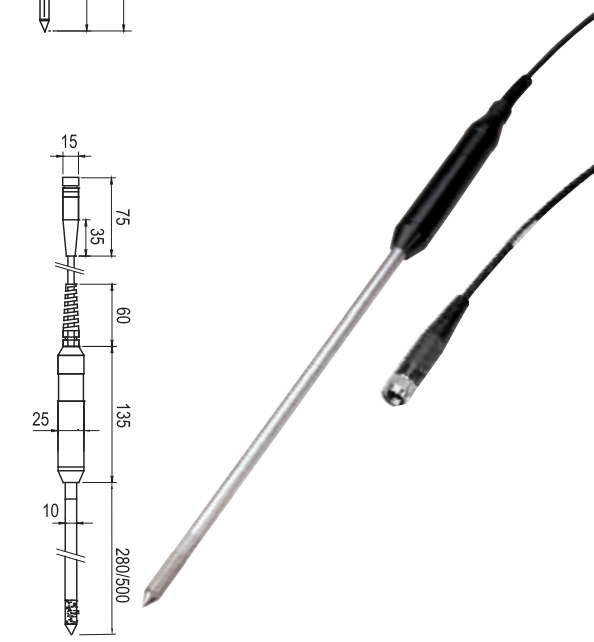
Features

- 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	±0.015 aw, ±1.5 %RH, ±0.3 K, at 10...30 °C
Power supply	3.3...5 VDC, adjusted at 3.3 VDC, current: approx. 4.5 mA
Filter type	No filter available (laser-cut slots)
Response time	‹15 s τ63
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	±0.008 aw, ±0.8 %RH, ±0.1 K, at 10...30 °C	
Power supply	3.3...5 VDC, adjusted at 3.3 VDC, current: approx. 4.5 mA	
Filter type	Sintered steel	
Response time	‹20 s, with filter τ63	
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 AwTherm

The AwTherm from ROTRONIC is a high-end laboratory instrument for water activity measurements in the food, cosmetic and pharmaceutical industries. The big advantage of AwTherm lies in the possibility to heat or cool the measurement chamber, which simplifies and optimizes the measurement process considerably in the case of tempered products, be they goods in cold storage or on heated conveyor belts.

Applications

Laboratory applications, quality assurance in food manufacturing, coffee and tobacco industry, grain storage and pharmaceutical industry.

Features

- Accuracy: ±0.005 aw, ±0.1 K (at 10...30 °C)
- Temperature control range: 0...60 °C
- High temperature stability: ±0.01 °C/min
- Variable sample container sizes: 14 / 40 mm
- Interchangeable reference probe for cleaning and calibration
- AW Quick function for fast measurement results (typically 4-5 minutes)
- Real-time clock with backup battery
- Touch panel for simple operation

Order code	AwTherm
Sensors	IN-1 / Pt100
Accuracy	±0.005 aw, ±0.1 K, at 10...30 °C
Long-term stability	‹0.01 aw/year
Measurement range	0.005...1.000 aw
Temperature control range	0...60 °C
Temperature stability	±0.01 °C/min.
Chamber temperature gradient	‹0.1 °C
Range of application	1...40 °C
AW Quick function	Yes
Interface	USB
LCD	8-line alphanumeric with touch operation
Power supply	230 V
Dimensions	400 x 180 x 180 mm
Weight	4000 g
IP protection	IP21
Standards	Corresponds to ISO 21807

Included

- AwTherm incl. AwT-MHS
- AwT-PS14 or AwT-PS40
- Mains adapter
- USB cable
- Instruction manual
- Software HW4-P-Quick

Recommended accessories

• AwTherm measurement probe	AwT-MHS
• AwTherm sample holders	AwT-PS14 / AwT-PS40
• Disposable sample containers	PS-14 / PS-40

Laboratory analyzer HygroLab C1

Applications

The HygroLab C1 from ROTRONIC is a laboratory analyzer for water activity measurements with up to four measurement probes. Thanks to the possibility of combining measurement heads and insertion probes, the HygroLab C1 offers high flexibility.

Features

- Four 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	aw / %RH / °C / °F
AW Quick function	Integrated and via included HW4 software
Calculations	All psychrometric calculations
Power supply	12 VDC with mains adapter (included)
Interfaces	Ethernet and USB
Range of application	0...1 aw / 0...100 %RH / -10...60 °C
LCD	3-line alphanumeric with trend indicators
Current consumption	›120 mA
Dimensions / Weight	225 x 170 x 70 mm / 1100 g
Material	Aluminum
IP protection	IP21

Compatible

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

Included

- 12 VDC Mains 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

Spot checks of cheese, meat, tobacco, building materials, animal feeds, bakery products, paper, medicines, in horticulture or 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	aw / %RH / °C / °F
AW Quick function	Integrated and via optional HW4 software
Calculations	All psychrometric calculations available
Power supply	9 V battery or 9 V mains adapter via USB-Mini
Interfaces	USB
Range of application	0...1 aW, 0...100 %RH, -10...60 °C
LCD	3-line alphanumeric with trend indicator
Current consumption	Max. 20 mA (with backlight)
Dimensions /Weight	188 x 72 x 30 mm / 200 g
Material	ABS
IP protection	IP30

Included

- Short instruction manual
- Battery

Compatible

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

Accessories

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

WP-14-S

WP-40

WP-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

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
Depth	14 mm	40 mm	40 mm
Internal diameter	46 mm	46 mm	46 mm
Material	V2A steel		Brass, nickel-plated
Weight	350 g	1250 g	1550 g

Disposable sample containers PS-14/PS-40

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 soiling or cross contamination. The sample containers also provide a convenient means of collecting and storing samples.

Order code	PS-14	PS-40
Use with	WP-14-S / WP-40 / WP-40TH	WP-40 / WP-40TH
Depth	14 mm	40 mm
External diameter	46 mm	46 mm
Unit	100 pc.	

Clamp sealing mechanism

Applications

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

Order code	AW-KHS
Use with	WP-40 / WP-40TH
Weight	1100 g

Meteorology

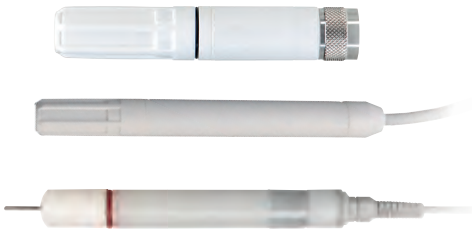
In meteorology the precision of measurement data is critical for accurate weather forecasting and climate research. ROTRONIC humidity and temperature probes have an excellent reputation for providing precise results even in the most demanding of environments, especially where high humidity and low temperatures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

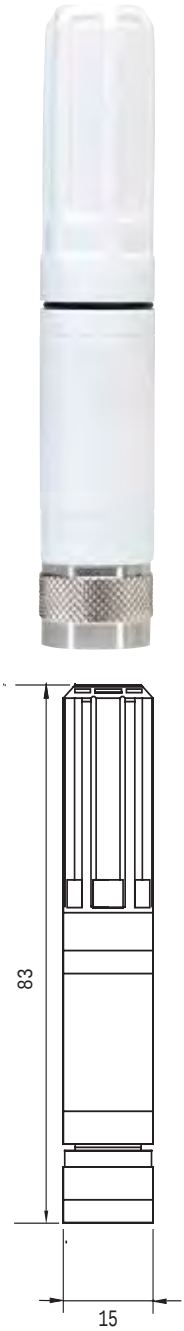
Even the best probes measure inaccurately if the conditions at the probe are not representative of the actual climatic conditions. Without an appropriate weather protection shield, the probe temperature will not be correct, and since relative humidity is temperature dependent, there will be significant 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 many national meteorological organizations at a significantly lower price.

MeteoSwiss The weather protection shields were developed in close co-operation with Meteo Swiss 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.





HC2-S3 / HC2-S3H

The HC2-S3 belongs to the family of HC2-S probes that form the basis of our product portfolio. It measures humidity and temperature and calculates the dew/frost point. The HC2-S3H fulfills the highest demands for measuring accuracy.

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	±0.8 %RH, ±0.1 K at 10...30 °	±0.5 %RH, ±0.1 K at 10...30 °C (10...90 %RH)
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 regulator & 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

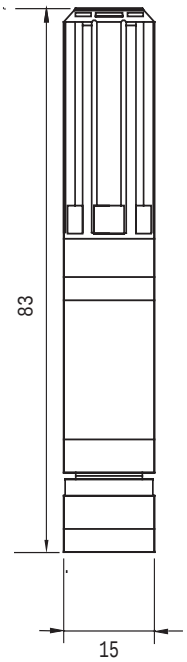
HC2-S-HEATED / HC2-S3-HEATED

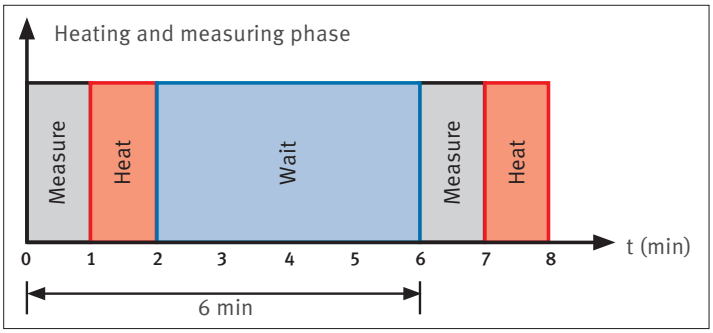
The HC2-S(3)-HEATED is suitable for use wherever high humidity prevails for a short or long time. In such environments conventional probes can become covered in condensation, thereby delivering falsified measured values.

Features

- Measures relative humidity and temperature, calculates the dew/frost point
- Automatic heating 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	±1.3 %RH, ±0.15 K at 10...30 °C	
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

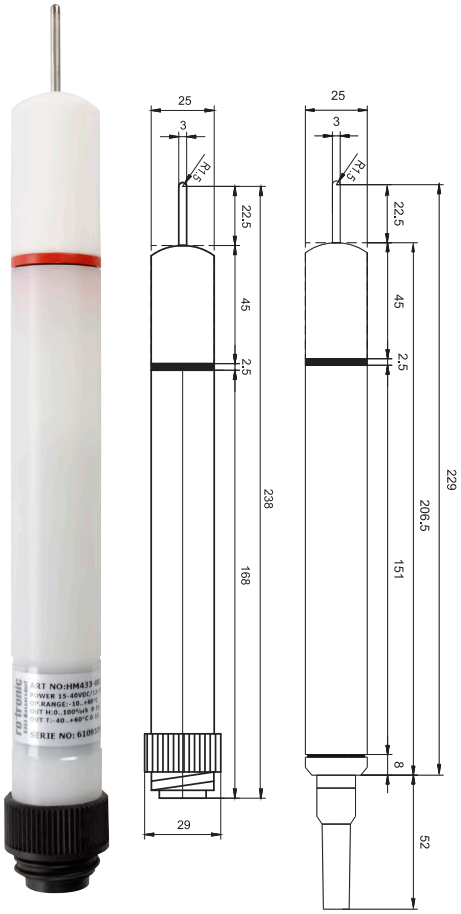
• Meteorology transmitters	MP102H/402H
• Transmitters	HF5 / HF8
• Naturally ventilated shield	AC1000

Recommended accessories

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

Included

- Factory adjustment certificate
- Polyethylene filter
- Short instruction manual



HygroMet 4

The HygroMet4 is equipped with an automatic sensor heater. It heats the sensor to 0.1...10 °C above ambient temperature depending on the setting. Heating prevents the formation of condensation on the sensor.

Applications

Meteorology, cheese cellars, tunnels, caverns, etc.

Features

- No long-term thawing 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
Analog output	Voltage output 0...1/5/10 V	Current output 0/4...20 mA
Digital output	RS-485, UART	
Range of application	-40...85 °C / 0...100 %RH	
Accuracy	Heated: 1.5 %RH / ±0.1 K at 10...30 °C Unheated: ±0.8 %RH / ±0.1 K at 10...30 °C	
Resistant to	Thawing	
Measurement	Humidity: SMD Thermo Temperature: external Pt100	
Filters	Polyethylene, 20 µm	

EM-25-HM

Compatible

• Actively ventilated shield	RS12T / 24T
• Naturally ventilated shield	AC1002 / AC1003
• Service cable	AC3010, AC3010-T

Included

- Factory adjustment certificate
- Instruction manual
- Polyethylene filter

Recommended accessories

• Polyethylene filter, white (40 µm)	NSP-25-PE
• Calibration device	EM-25-HM
• Humidity standard for calibration 10 %RH	EA10-SCS
• Humidity standard for calibration 35 %RH	EA10-SCS
• Humidity standard for calibration 80 %RH	EA80-SCS

HC2-S3C03 / HC2-S3C03-PT15

The HC2-S3C03 belongs to the family of HC2-S probes that form the basis of our product portfolio. It measures humidity and temperature and calculates the dew/frost point. It is ideal for meteorological applications because the probe has an increased input voltage power supply.

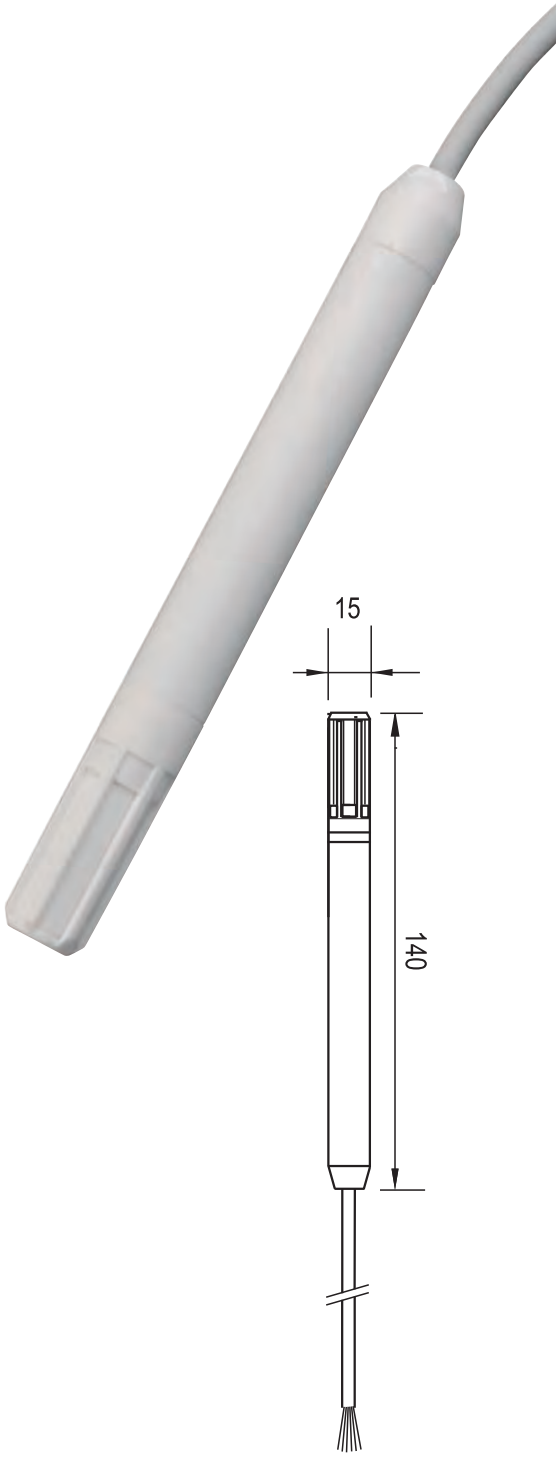
Applications

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 °C / 0...100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH

Order code	HC2-S3C03	HC2-S3C03-PT15
Accuracy	±1 %RH, ±0.2 K at 10...30 °C	±1 %RH / ±0.1 K, at 10...30 °C (passive Pt100)
Range of application	-50...100 °C / 0...100 %RH	
Filters	Polyethylene, white ~ 40 µm pore size	
Voltage	5...24 VDC / 5...16 VAC	
Version	3 m cable with open ends	



Compatible

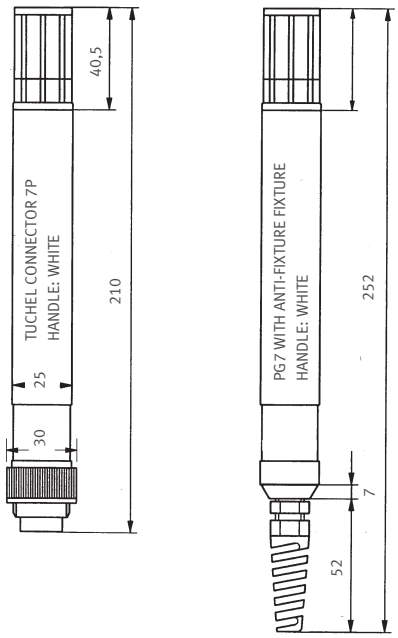
• Naturally ventilated shield	AC1000

Included

- Factory adjustment certificate
- Polyethylene 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
• Polyethylene filter, white (40 µm)	NSP-PCW-PE40



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 10...30 °C	10...95 %RH: ±1.5 %RH Remaining range: ±2.5 %RH	
Measurement	Temperature with Pt100 - direct or linear output signal	
Filters	Wire mesh filter ~ 20 µm pore size	

Compatible

• Actively ventilated shield	RS12T/24T
• Naturally ventilated shield	AC1002 / AC1003

Included

- Factory adjustment certificate
- Wire mesh filter
- 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
• Wire mesh filter	SP-W3-25

Technical data	HM433/4/5	HM431/2	MP100A (analog)	MP400A (analog)	HC2-S3C03	HC2-S3C03-PT15
General						
Parameters	Humidity and temperature					
Housing material	Polyoxymethylene				Polycarbonate	
IP protection	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	
Range of application / Storage conditions	Electronics: -40...85 °C Measuring range probe dependent				-50...100 °C	
Cable length compensation	Up 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 0...30 °C	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 τ63 (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 0...30 °C	±0.1 K		±0.3 K		±0.2 K	±0.1 K
Response time	‹15 s τ63					
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

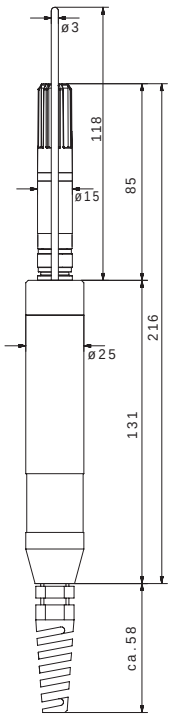
The MP102H and MP402H are meteorology transmitters with an analog output and RS-485 interface. Humidity and temperature are measured with an interchangable HygroClip HC2-S3 probe. Temperature measurement can be enhanced by an external Pt100 sensor in various accuracy classes.

Applications

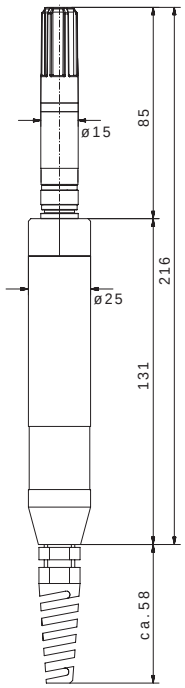
Weather stations, snow guns, status monitoring of roads, bridges and airports, snow and ice warning systems, research in very remote areas.

Features

- Humidity and temperature measurement with interchangeable HC2-S3 probes (order separately)
- 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



With external Pt100



Without external Pt100

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

Technical data	MP102H	MP402H
General		
Parameters	Humidity and temperature	
	Calculates all psychrometric parameters	
Housing material	Polyoxymethylene	
IP protection	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 °C	
Cable length compensation	Up to 99 m	
Humidity measurement		
Sensor	ROTRONIC HYGROMER® IN-1 (HC2-S3)	
Measurement range	0…100 %RH (HC2-S3)	
Accuracy at 10…30 °C	±0.8 %RH (HC2-S3)	
Response time	‹15 sτ63 (63 % of a jump 35…80 %RH) without filter	
Temperature measurement		
Sensor	Pt100 1/3 Class B (HC2-S3)	
Measurement range	-50…100 °C (HC2-S3)	
Accuracy at 10…30 °C	±0.1 K (HC2-S3)	
Response time	‹15 s τ63	
Direct Pt100 (optional)	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

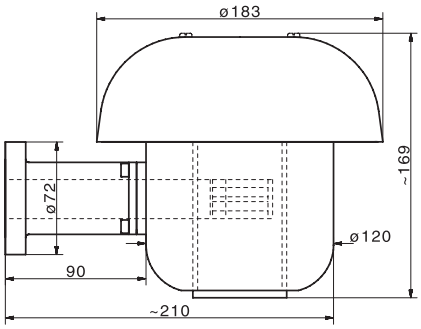
The ventilated weather and radiation protection shield RS12T with 12 VDC fan and RS24T with 24 VDC fan were developed in close cooperation with MeteoSwitzerland. This state-of-the-art device reduces the influences of thermal radiation on humidity and temperature measured values to a minimum.

Applications

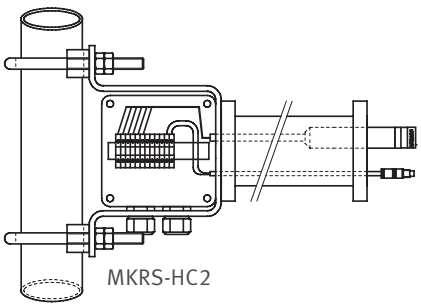
Snow guns, weather stations, agricultural meteorology and building management systems

Features

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



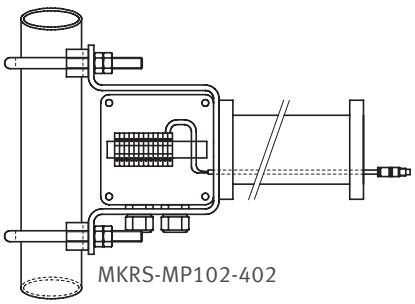
Order code	RS12T	RS24T
Range of application	-30...60 °C	
Material	Aluminum, POM, RAL 9010	
Power supply	12 VDC, 2 W	24 VDC
Fan	Papst fan IP54	
Ventilation	3.5 m/s / 900 l/min.	
Fan lifetime	At 40 °C ~70,000 h (approx. 8 years)	



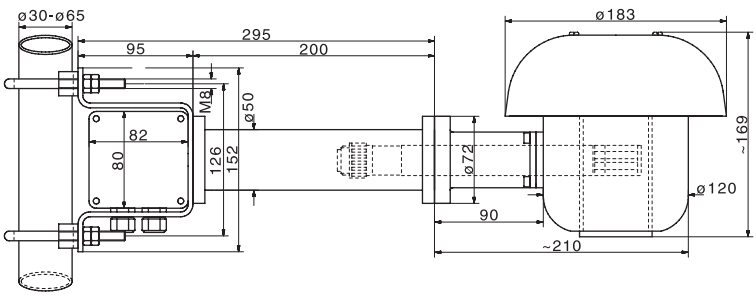
MKRS-HC2

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-MP102-402



Compatible

- Mounting sets

Included

- Installation instructions

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
- For probe diameters of 15 or 25 mm
- For mast diameters of 25…50 mm
- Protection against wind speeds up to 70 m/s and horizontal precipitation

Order code	AC1000	AC1002	AC1003
Mounting probe	Probe screw connection Ø15 mm	Probe screw connection Ø25 mm	
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)		
Dimensions	Ø 130 x 140 mm	Ø 130 x 160 mm	Ø 130 x 215 mm

AC1000 with HC2-S3+E3-02XX

AC1002 with MP100A-T4

AC1003 with MP102H

Included

- Installation instructions
- Mounting hardware

Measurements in cleanrooms

Cleanrooms are environments with low concentrations of contaminating particles. ROTRONIC offers the products CRP5 and CRP1 specifically for this application.

CRP1 series

The CRP1 cleanroom panel is a compact, easy-to-use device. Its compatibility with the HC2-S probe confirms that humidity can be measured with the highest precision. The data can be transferred via analog outputs or Modbus. The CRP1 shows measured values, alarms and measurement sequences on its display.

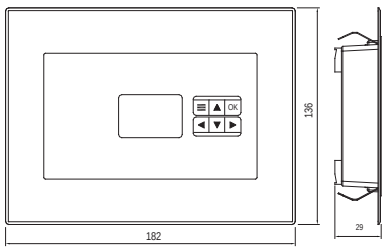
Applications

Cleanrooms, operating theaters, HVAC.

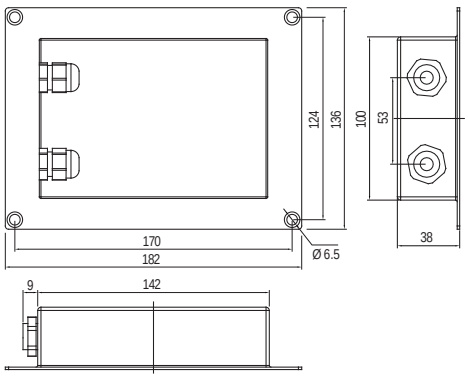
Features

- Designed for cleanrooms
- Compatible with HygroClip2 series
- Conforms to FDA 21 CFR Part 11 and GAMP
- Digital communication via RS-485 (Modbus RTU, HW4)
- Stainless steel front panel
- Alarm audible, via relay and/or via LCD

Front



Housing for wall mounting



Power supply

- Low voltage: 3-wire

Signal outputs

- Current output 4...20 mA / Voltage output 0...10 V
- 2x relay switch contacts
- RS-485 (Modbus RTU, HW4)

Versions

- Panel version with probe connection at the back

Measured parameters

- Humidity / Temperature / Psychrometric parameters (HC2 probes)

Output scaling

- Relative humidity: range selectable, standard scale 0...100 %RH
- Temperature: range selectable, standard scale -10...60 °C (14...140 °F)

Display

- Graphic LCD with backlight

Compatible

- HW4 software, see page 170

Included

- Factory adjustment certificate
- Short instruction manual
- Fittings

Recommended accessories

• HC2-S probes	page 4
• Service cable	AC3006 / AC3009* (page 82)
• Calibration accessories	(page 72)

* Requires optional HW4 software and service cable

Technical data	CRP1
General	
Parameters	Temperature and relative humidity
Housing material (front panel)	Stainless steel, plastic (resistant to cleaning)
IP protection	IP65 (integrated)
Mounting position	Wall mounting
Dimensions	Front: 182 x 136 x 29 mm Housing: 142 x 100 x 38 mm
Weight	750 g (without humidity probe)
Display	Graphic LCD with backlight
Menu navigation	6x keys
Electrical connections	Screw terminals at the back
Power supply	10…36 VDC
Current consumption	‹1 A
Range of application / Storage conditions	-10…60 °C (14…140 °F) / 0…100 %RH
Firmware update	Via HW4 software
Service interface	UART
CE / EMC compatibility	EMC Directive 2004/108/EC
Fire protection class	Corresponds to UL94-HB
FDA / GMP compatibility	21 CFR Part 11 and GAMP5
Temperature measurement / Relative humidity measurement	
Probes	See chapter ‹‹Probes›› on page 4
Measurement range	-100…200 °C (probe-dependent) / 0…100 %RH
Outputs	
Analog outputs	2x freely configurable
Analog output type	4…20 mA or 0…10 V
Switch output	2x relays
Switching capacity	‹30 VDC at 2 A ‹50 VAC at 0.5 A
Accuracy analog output	±5 mV (voltage output) ±20 µA (current output)
Permissible load	›10 kΩ (voltage output) ‹500 Ω (current output)
Digital communication	RS-485 (Modbus RTU, HW4)

CRP5 series

The differential pressure measurement of the CRP5 cleanroom panel is based on the technology of diaphragm sensors. Thanks to its functionality, this device of the highest Swiss quality can be configured perfectly for the application in question. The CRP5 stands out from the crowd with its front panel of sturdy glass and removable humidity and temperature probe.

Features

- Designed for cleanrooms
- Removable humidity & temperature probe for simple cleaning
- Conforms to FDA 21 CFR Part 11 and GAMP
- Accuracy: Pressure: ±1.0 %FS
  Temperature: ±0.2 K / Humidity: ±1.5 %RH
- Digital communication via Ethernet (Modbus TCP, HW4) and RS-485 (Modbus RTU, HW4)
- Analog and digital inputs
- Front-side pressure connections for room pressure measurement or calibration
- High chemical resistance of glass front panel
- Alarms via relay or colored TFT display
- Visual operating elements for operation with protective gloves

Power supply

- Low voltage: 3-wire

Signal outputs

- 4x Independent current and voltage outputs
- Ethernet (Modbus TCP, HW4) / RS-485 (Modbus RTU, HW4)
- 6x Relay switch contacts

Versions

- Panel version with HC2-CRP probe at the front
- Panel version with probe connection at the back

Measured parameters

- Differential pressure, temperature and relative humidity
- Analog and digital input signals
- Psychrometric calculations such as enthalpy, dew point, etc.

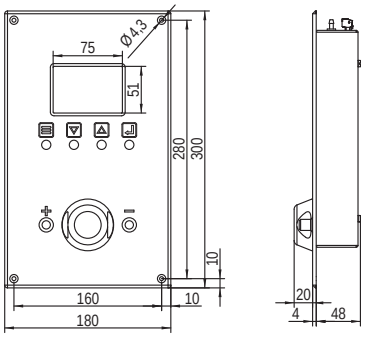
Measurement ranges

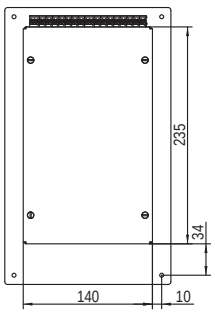
- -25...+25 Pa / -50...+50 Pa / -100...+100 Pa / -250...+250 Pa / -500...+500 Pa
- -5...60 °C (23...140 °F) / 0...100 %RH
- Analog IN: 0...3.3 V or 0...24 mA (freely scalable)
  Digital IN: 0...1.5 V (low level) / 3.5...24 V (high level)

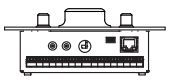
Display

- Colored TFT display with backlight

CRP5 with HC2-CRP







CRP5

Applications

Cleanrooms, operating theaters, food industry and applications where very small pressure differences need to be detected

Order code	CRP53x
Output signals	0...10 V 4...20 mA (Customer rescaling possible*) 6 x solid-state relays
Pressure ranges	±50 Pa / ±100 Pa / ±250 Pa / ±500 Pa
Configuration of the pressure connections	- Caps without holes with pressure connections at the back - Cap with hole at «+» connection for room pressure measurement - Cap with hole at «–» connection for room pressure measurement
Humidity probe	Removable probe at the front (HC2-CRP) or probe connection at the back (HC2)
Relay	1x A DC / AC 2x A DC

The magnetic HC2-CRP humidity and temperature probe can also be used independently, page 13.

Compatible

- HW4 software, see page 170

Included

- Factory adjustment certificate
- Short instruction manual

Recommended accessories

• Wall holder, 2 pc.	AC6101
• PEEK screws, 4 pc.	AC6102
• Service cable	AC3006 / AC3009* (page 82)
• Pressure connection caps	AC61000/AC61001
• Calibration accessories	page 72
• HC2-S probes	page 4
• Replacement filters	page 18

* Requires optional HW4 software and service cable

Technical data	CRP53x
General	
Parameters	Differential pressure, temperature, relative humidity, absolute pressure, digital and analog inputs
Housing material	Front: glass Back: stainless steel 1.4301
IP protection	Front: IP65 (also with detached probe) Back: IP20
Mounting position	Wall mounting
Dimensions	180 x 300 x 72 mm
Weight	1,700 g (with humidity probe) 1,550 g (without humidity probe)
Display	Colored TFT display
Menu navigation	4x optical keys
Electrical connections	Screw terminals at the back
Power supply	20…48 VDC / 16…35 VAC
Current consumption	‹450 mA
Range of application / Storage conditions	-5…60 °C (23…140 °F) / 0…100 %RH
Firmware update	Via HW4 software
Service interface	UART
CE / EMC compatibility	EMC Directive 2004/108/EC
Fire protection class	Corresponds to UL94-HB
FDA / GMP compatibility	21 CFR Part 11 and GAMP5
Differential pressure measurement	
Measurement principle	Diaphragm sensor
Measurement ranges	±25 Pa / ±50 Pa / ±100 Pa / ±250 Pa / ±500 Pa
Medium	Air and non-aggressive gases
Accuracy at 23 °C ±3 K	±1.0 %full scale
Zero drift	Compensated (manual or automatic zero adjustment)
Measurement interval	1 s
Pressure resistance	0.7 bar (70,000 Pa)
Pressure connections	Front: hosing connector Ø 6 mm x 10 mm Back: hosing connector Ø 4 mm x 10 mm
Temperature measurement / Relative humidity measurement	
Probes	HC2-CRP (page 13), HC2 (chapter Probes, page 4)
Measurement range	-100…200 °C (probe-dependent) / 0…100 %RH
Outputs	
Analog outputs	4, freely configurable
Analog output type	0 / 4…20 mA or 0…1 / 5 / 10 V
Switch output	6x solid-state relays
Switching capacity	‹60 VDC at ‹2A if polarity is considered ‹48 VAC at ‹1 A if polarity is not considered
Accuracy analog output	±5 mV (voltage output) ±20 µA (current output)
Permissible load	›10 kΩ (voltage output) ‹500 Ω (current output)
Digital communication	Ethernet (Modbus TCP, HW4) / RS-485 (Modbus RTU, HW4)

Measurement in potentially explosive environments

ROTRONIC offers devices for humidity and temperature measurement in potentially explosive atmospheres. The devices can be used in gas as well as dusty environments. These highly robust devices are extremely accurate and suitable for a wide range of ATEX applications.

HygroFlex5-EX series

The HygroFlex5-EX series is the latest development in two-channel transmitters for precise measurement of humidity and temperature in explosive atmospheres. The attached probes are cast into a stainless-steel tube and certified for operation in Zone 0/20. The transmitter itself is certified for Zone 1/21. The intelligent design of the circuitry with electrical isolation permits the measuring system to be operated without an intrinsically safe feed.

Features

- Measurement of relative humidity and temperature
- Optional output of dew point and other psychrometric calculations
- Safe operation in potentially explosive environments
- Electrically isolated analog outputs
- No intrinsically safe feed required
- Interchangeable stainless-steel probes
- Certified for two temperature classes (T4 / T5)

Power supply

- Low-voltage: 2-wire

Signal output

- Current output

Versions

- Duct version
- Wall version

Measured parameters

- Relative humidity and temperature

Measurement ranges

- 0...100 %RH
- -40...60 °C / -40...85 °C

Display

- Display with trend indicators and keypad
- Without display

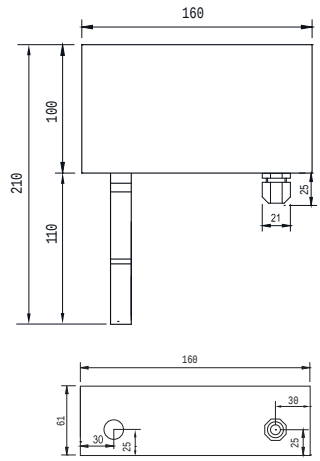
HF5-EX duct / wall version

Applications

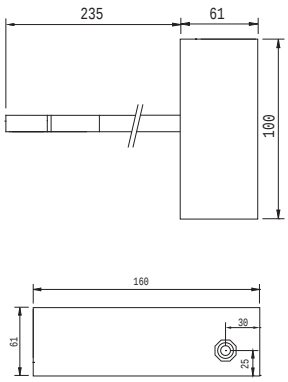
Pharmaceutical industry/biotechnology, sugar and flour mills, power stations, oil industry, warehouses.

Order code	HF520-EX-x
Output parameters	Relative humidity / Temperature / Psychrometric calculation
Display	Optional (without backlight)
Humidity probe	Interchangeable HygroClip2-EX probes

Wall-mounted version (W)

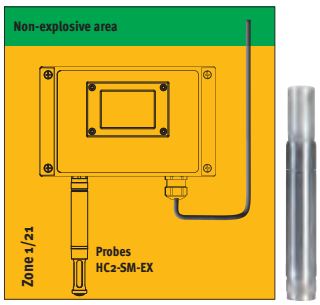


Duct-mounted version (D)

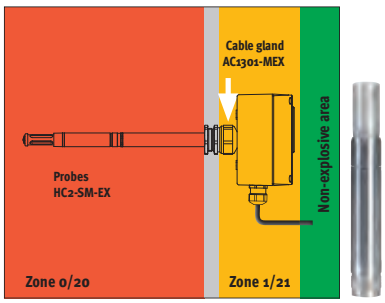


HF5-EX probes

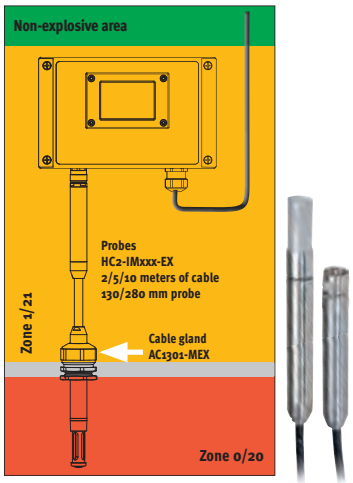
HC2-SM-EX
Wall mounting



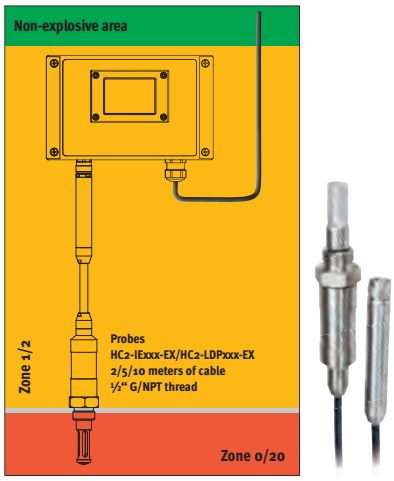
HC2-SM-EX
Duct mounting



HC2-IMxxx-EX
Cable probe for flexible installation



HC2-IExxx-EX / HC2-LDPxxx-EX
Screw-in cable probe for pressure lines or low dew point



Compatible

- HW4 software, see page 170

Included

- Factory adjustment certificate, short instruction manual
- Screws for mounting

Recommended accessories

• Service cable	AC3006 / AC3009* (page 82)
• Calibration accessories	(page 73)
• Replacement filters	(page 18)
• Cable gland	AC1301-MEX for mounting in ducts

* Requires optional HW4 software and service cable

HF520-EX	
General	
Parameters	Humidity and temperature
Calculated parameters	All psychrometric parameters
Housing material	Aluminum (DIN EN 1706 EN AC-AlSi 12 (Fe)
IP protection	IP66
Weight	Wall version: 1,030 g Duct version: 1,140 g
Startup time	Standard cold ‹60 s / warm ‹30 s
Measurement interval	20…240 s
Display	Optional, LCD without backlight
Electrical connections	Connections: Ex-e terminals (0.2…2.5 mm2) Cable gland: M16 x 1.5 (Ø cable 4.5…7 mm)
Power supply	10…28 VDC
Current consumption	2x24 mA startup / 2x20 mA operation
Application temperature Housing / electronics	-40…60 °C without display -10…60 °C with display
Service interface	UART internal service interface (only outside the explosive zone)
CE / EMC compatibility	EMC Directive 2004/108/EC
ATEX directives	EU94/9/EC (ATEX)
EX identification	II 2(1) G Ex eb mb [ia Ga] IIC T5 Gb II 2(1) D Ex tb [ia Ga] IIIC T80°C Db
Analog output	
Number	2
Current	4…20 mA, two-core
Galvanic isolation	Yes
Maximum load	500 Ω
Accuracy at 23 °C	‹20 µA

HC2-SM-EX / HC2-IM-EX / HC2-IE-EX / HC2-LDP-EX	
General	
Parameters	Humidity and temperature
Housing material / IP protection	Stainless steel (1.4301) / IP66
Cable probes	2/5/10 meters
EX identification	II 1/2 G Ex ia IIC T5…T4 Ga/Gb II 1/2 D Ex ia IIIC T80 °C …T110 °C Da/Db
Humidity measurement	
Sensor	HC2-SM/IM/IE-EX: ROTRONIC HYGROMER® IN-1 HC2-LDP-EX: ROTRONIC HYGROMER® LDP-1
Adjustment	Not via device menu (only outside the explosive zone with HW4 + AC3001)
Measurement range	0…100 %RH
Accuracy at 23 °C	0.8 %RH
Temperature measurement	
Sensor	HC2-SM/IM/IE-EX: Pt100 Class A HC2-LDP-EX: Pt1000 1/3 Class B
Measurement range	-40…60 °C / -40…85 °C
Accuracy at 23 °C	0.1 K
Accessories	
Filters	SP-FN15, sintered steel filter (1.4401)
Cable gland	AC1301-MEX for duct mounting probes

Software versions

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 HW4 software, ROTRONIC provides a solution in which validation plays a central role. The instruments and software are validated and compatible with FDA 21 CFR Part 11 (directive of the US Food and Drug Administration, FDA) and GxP.

Features

- Probe calibration and adjustment
- Device network monitoring
- Alarm functions
- Tabular and graphical display of measured values
- Recording of measured values on a PC
- Room layout
- Instrument configuration
- Logger programming, data export and direct generation of PDF reports
- Psychrometric parameters
- User management

HW4

SW21

Software editions

HW4 Lite Product key: 20 ...

- Free software for visualization, data export and evaluation of measured values for the devices HL-1D, TL-1D, HL-20(D) and HC2-WIN-USB
- A maximum of three instruments can be connected simultaneously.
  Download at **www.rotronic.com** (product key code is supplied with the data logger)

HW4 Standard (Eco) Product key: 24 ...

- 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
  Download at **www.rotronic.com**
  Order code: HW4-E-V3

HW4 Professional Product key: 64 ...

- Network applications in the pharmaceutical and food industries
- All functions of the Standard edition
- Fulfils the requirements for electronic data records and signatures (FDA 21 CFR Part 11, Annex 11)
- Grouping of devices, graph overlays, printing of reports
  Download at **www.rotronic.com**
  Order code: HW4-P-V3

HW4 Professional with water activity measurement Product key: 86 ...

- All functions of the Professional edition
- AW Quick function for fast determination of water activity
  Download at **www.rotronic.com**
  Order code: HW4-P-QUICK-V3

HW4 Professional with OPC server Product key: 88 ...

- 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
  Download at **www.rotronic.com**
  Order code: HW4-P-OPC-V3

HW4 Validated Software Package Product key: 12 ...

- For users subject to regulatory requirements (GxP)
- Like HW4 OPC but with additional «HW4 e-compliance package»
- This comprehensive documentation tool supports the user in the qualification/validation of HW4-based solutions
  Download at **www.rotronic.com**
  Order code: HW4-VAL-V3

HW4 Trial Version Product key: 05 ...

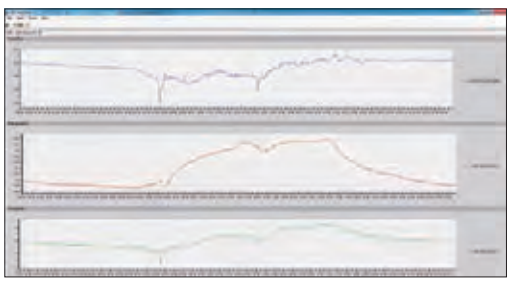
- Full functionality of the Professional edition, including OPC functions
- Limited trial period of max. 30 days
  Download at **www.rotronic.com** (contact us for a trial key code)

Function overview

Function overview						
The HW4 software from ROTRONIC constitutes a professional monitoring and configuration tool and requires licensing. Multiple use of one license is permitted as long as the installed software is used at the same postal address.	Lite HW4-LITE	Standard HW4-E-V3	Professional HW4-P-V3	Professional with water activity HW4-P-QUICK-V3	Professional with OPC server HW4-P-OPC-V3	Validated HW4-VAL-V3
HW4 product key	**20 ...**	**24...**	**64 ...**	**86 ...**	**88 ...**	**12 ...**
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, graph or PDF report	✔	✔	✔	✔	✔	✔
Users and passwords						
Password protection			✔	✔	✔	✔
Users freely selectable. Rights freely definable			✔	✔	✔	✔
Alarms						
Alarm via email, relay, report printout	✔	✔	✔	✔	✔	✔
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						
The HW4 software from ROTRONIC constitutes a professional monitoring and configuration tool and requires licensing. Multiple use of one license is permitted as long as the installed software is used at the same postal address.	Lite HW4-LITE	Standard HW4-E-V3	Professional HW4-P-V3	Professional with water activity HW4-P-QUICK-V3	Professional with OPC server HW4-P-OPC-V3	Validated HW4-VAL-V3
HW4 product key	**20 ...**	**24 ...**	**64 ...**	**86 ...**	**88 ...**	**12 ...**
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 functions	✔	✔	✔	✔	✔	✔
Adjustment and calibration of ROTRONIC probes	✔	✔	✔	✔	✔	✔
Simultaneous adjustment of probes in one group			✔	✔	✔	✔
Time synchronization for HygroLog NT data loggers		✔	✔	✔	✔	✔
Supported operating systems						
Microsoft, Vista, Windows 7, Windows 8, Windows 10	✔	✔	✔	✔	✔	✔

Description of functions



Viewing of measured values/Monitoring

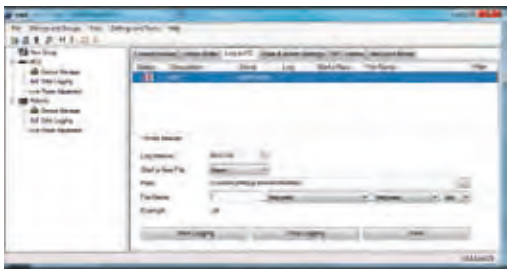
Viewing of measured values is very easy and user-friendly. Files of any device shown in the device tree can be copied and opened directly with the HW4 Explorer. The data is presented in both tabular and graphical formats.
The graph module can be configured by the user.

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, .csv 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

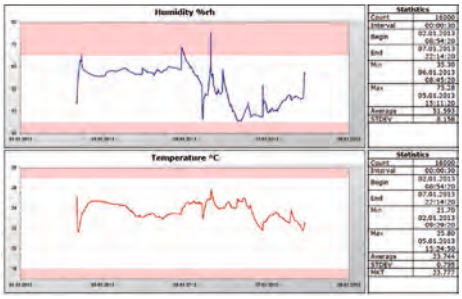
The HW4 software can be used to adjust the settings of ROTRONIC instruments and probes. Depending on the instrument and probe, the following functions and settings can be changed:

- 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 in %RH and temperature in °C/°F. These two values can be used to calculate other psychrometric values such as dew point, mixing ratio, enthalpy and wet bulb temperature. The calculation module 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



Statistical functions / PDF report

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. The statistical function and integrated PDF report enable simple and detailed data evaluation for this.

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.

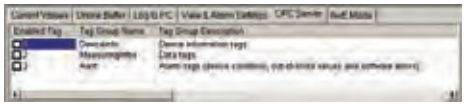
Every user can be granted different rights. Users can be blocked and reactivated again. Users that have been deleted cannot be recreated under the same name.

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

- Free software for configuration and downloading of data from the instruments: CP11 / CL11 / HF1 / CF1
- 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

HygroFlex1

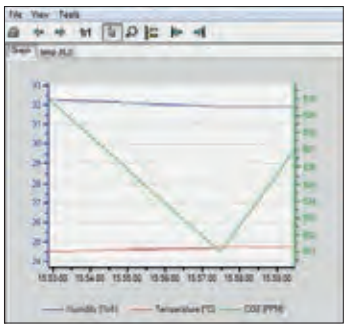
Instrument configuration and humidity adjustment

CF1

Instrument configuration and humidity adjustment

Display of measured values

Measured values can be displayed in tabular or graphic formats.



ROTRONIC AFTER SALES SERVICES

The range of services covers all customary requirements and many more.
Customer service is established practice at ROTRONIC and underlined by highly developed expertise.
The Rotronic After Sales Service supports you with innovative and future-proof solutions.

Global service from Switzerland

- SCS 0065 Accredited calibration laboratory ISO/IEC 17025
- Calibration / Adjustment with ISO 9001 factory adjustment certificate
- Repair and adjustment
- Calibrations at your premises
- Calibration seminars
- General project consultation
- Temperature mappings
- Validation & qualification
- GxP services for storage and shipping (GMP/ GDP)

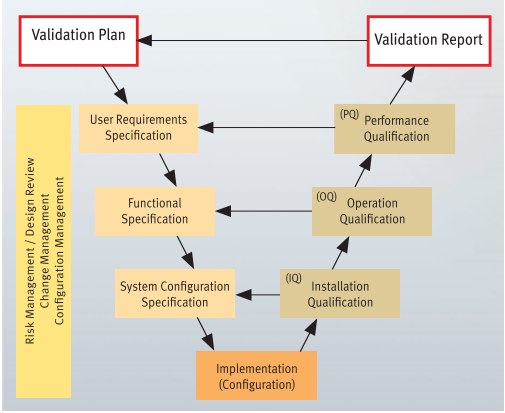
After Sales Service contact information

- Tel: +41 (44) 838 11 88
- Mail: support-rh@rotronic.ch

Project consultation

Are you responsible for planning and control of temperature and humidity in a storage/production area with existing equipment/measuring devices and must take regulations into account (e.g. GxP, FDA)?
The ROTRONIC Service group can support you from initial planning of the project to implementation of your system. This ensures optimal and efficient design for your processing unit.

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. Benefit from our know-how and let our application engineers design the optimal measuring system for you.



V-model (validation)

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.

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

Your benefits

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

Queries

- support-rh@rotronic.ch

Calibration ISO 9001 & ISO 17025 (SCS)

The accuracy of measuring instruments can only be ensured through regular calibration. ROTRONIC operates several state-of-the-art ISO 17025 (SCS) calibration laboratories throughout the world efficiently and at the highest level of quality. All our calibration systems are traceable to the national standard with the best-possible measurement uncertainty.

Calibration variant ISO 17025

Arrange a suitable calibration appointment with our SCS team and we will reserve our accredited equipment for your devices. Should your devices not attain ISO 17025 calibration, we will offer you factory calibration with the same quality of measurement.

Calibration variant ISO 9001

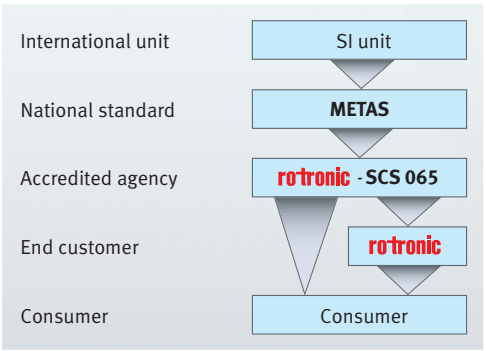
Factory calibration can also be carried out at your premises on request. For this ROTRONIC uses its specially developed HG2-S humidity and temperature generator. It offers such perfect convenience that it serves as basic hardware both at customers sites and worldwide at providers of calibration services.

We come to you

Our Calibration Mobile enables traceable humidity and temperature calibrations on site at your premises, just in time (selected countries).
www.kalibriermobil.com

ROTRONIC calibration laboratories worldwide

- USA: www.rotronic-usa.com
- England: www.rotronic.co.uk
- Germany: www.rotronic.de



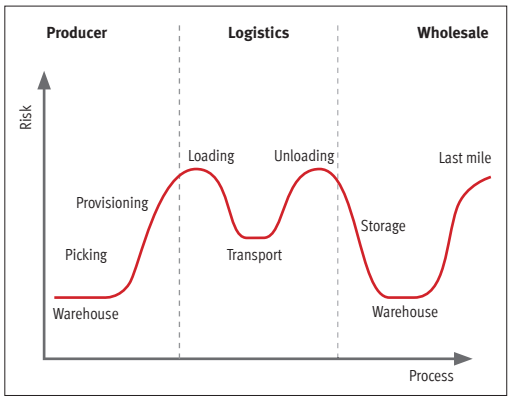
Calibration hierarchy (e.g. Switzerland)

Your benefits

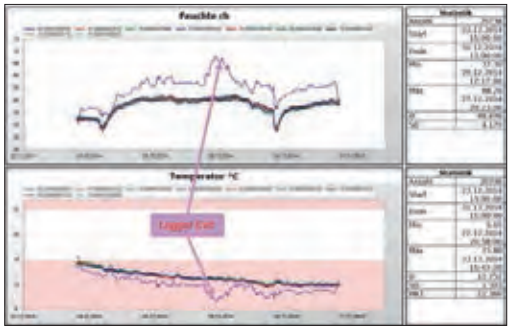
- Highly accurate SCS calibration (ISO 17025)
- Expedited calibration available

Queries

- support-rh@rotronic.ch



Risk assessment for shipping of pharmaceutical products



Example view of a temperature and humidity mapping

GxP SERVICES FOR LOGISTICS & SHIPPING

The protection of product quality during transport and storage of, for example, medicines is an important and essential component of the GxP directive. The basis for observance of legal regulations is GxP-compliant qualification of the transport equipment or storage facility. The ROTRONIC After Sales Service has specialized in these services and offers you an efficient solution tailored exactly to your requirements. Temperature mapping service available (warehouses, production rooms, climate cabinets, climate chambers, trucks, etc.).

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

ROTRONIC will discuss the modules needed for qualification with you and propose the best possible time schedule for the qualification procedure. Thanks to the modular structure of this service, you only pay for the qualification steps you need; this approach has proven itself in many reference projects and has also found favor with our customers worldwide. A ROTRONIC qualification engineer will explain and substantiate the GxP-compliant data directly on customer request in the case of an possible audit.

Temperature mapping and warehouses

Temperature mapping – production rooms

Temperature mapping – climate chambers

Temperature mapping – transport

YOUR BENEFITS

- Exact data on the climate in the room.
- Mapping conforming to FDA & GxP
- Knowledge of possible danger zones in the controlled climate

QUERIES

- support-rh@rotronic.ch

SERVICES

- Warehouse qualification & validation (climate mapping)
- Transport qualification
- Climate chamber mapping
- Maintenance & installation of the measuring systems
- On-site calibrations

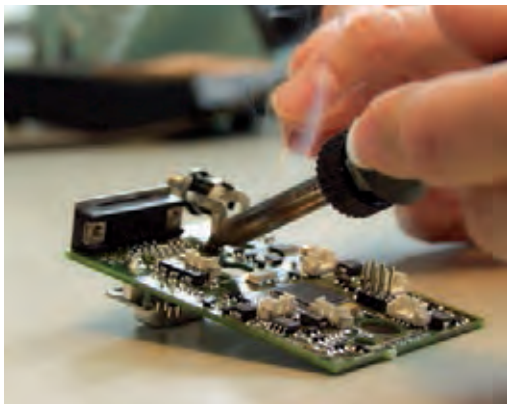
Training, courses & seminars

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 real-life calibrations so that you can put your freshly gained knowledge into practice!
Seminar in ROTRONIC training room or at your premises.

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 suitable instruments
- Pick-up service by arrangement

Repair & maintenance



Once you have opted for a measurement instrument from ROTRONIC, you will soon discover you are working with a solution that offers 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.

Your benefits

- Low maintenance costs for measuring systems
- High availability of replacements
- Short production downtimes
- Pick-up service by arrangement

Queries

- support-rh@rotronic.ch

Measurement uncertainty for your calibration

Measurement range	Measurement conditions	Best possible measurement uncertainty ± [1]
Relative humidity	**Ambient temperature**	
0.5 % RH...‹20 %RH	(23 ±2) °C	0.2 %RH
20 %RH...‹40 %RH	(23 ±2) °C	0.3 %RH
40 %RH...‹65 %RH	(23 ±2) °C	0.4 %RH
65 %RH...‹85 %RH	(23 ±2) °C	0.5 %RH
85 %RH... 99 %RH	(23 ±2) °C	0.6 %RH
	Climate chamber	
10 %RH...‹20 %RH	-10 °C...‹0 °C	0.6 %RH
20 %RH...‹40 %RH	-10 °C...‹0 °C	0.9 %RH
40 %RH...‹65 %RH	-10 °C...‹0 °C	1.5 %RH
65 %RH... 95 %RH	-10 °C...‹0 °C	2.1 %RH
10 %RH...‹20 %RH	0 °C... ‹10 °C	0.3 %RH
20 %RH...‹40 %RH	0 °C... ‹10 °C	0.6 %RH
40 %RH...‹65 %RH	0 °C... ‹10 °C	0.9 %RH
65 %RH... 95 %RH	0 °C... ‹10 °C	1.2 %RH
10 %RH...‹20 %RH	10 °C...‹35 °C	0.2 %RH
20 %RH...‹40 %RH	10 °C...‹35 °C	0.5 %RH
40 %RH...‹65 %RH	10 °C...‹35 °C	0.7 %RH
65 %RH... 95 %RH	10 °C...‹35 °C	0.9 %RH
10 %RH...‹20 %RH	35 °C...‹50 °C	0.3 %RH
20 %RH...‹40 %RH	35 °C...‹50 °C	0.6 %RH
40 %RH...‹65 %RH	35 °C...‹50 °C	0.8 %RH
65 %RH... 95 %RH	35 °C...‹50 °C	1.0 %RH
10 %RH...‹20 %RH	50 °C...70 °C	0.4 %RH
20 %RH...‹40 %RH	50 °C...70 °C	0.6 %RH
40 %RH...‹65 %RH	50 °C...70 °C	1.0 %RH
65 %RH...95 %RH	50 °C...70 °C	1.6 %RH

[1] The extended measurement uncertainty given is the product of the standard uncertainty of the measurement multiplied by an extension factor k = 2, which corresponds to a confidence level of approximately 95% for a normal distribution.

Important information

What is humidity? Why is CO_2 measured? How is the accuracy of differential pressure stated? Why measure water activity? What does the use of instruments in potentially explosive atmospheres mean? ROTRONIC has been working in the field of humidity for more than 50 years now, resulting not only in a steady growth in know-how, but also in know-what and know-why. It is time to pass on this knowledge little by little. The purpose of this chapter is to shed light on the subject and give interested readers an opportunity to clarify possible questions.

Fundamental terms of humidity measurement

Water vapor density (absolute humidity)

This is the amount of water vapor (kg) contained per unit volume (m^3) of the gas mixture. In a gas mixture the water vapor generates a certain partial pressure that is part of the total barometric gas pressure. The vapor pressure can only rise to its saturation limit, which is determined by the temperature. Thereafter 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 given off is equal.

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 as the water vapor is transported through the filter more slowly due to the reduced air flow and the water exchange takes place with slower diffusion of the water molecules.

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)

This 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

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

Vapor concentration (Dv) in g/m3

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

Mixing ratio (R) in g/kg

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

Water vapor partial pressure (E) in hPa

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

Water vapor saturation pressure (Ew) in hPa

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

Mean kinetic temperature (MKT)

The mean kinetic temperature is the total influence of temperature on an object or product over a certain period of time.

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. At the same time we urge our users to ensure excellent performance of the measurement instruments at the expense of little effort. The following checklist is provided as a guide.

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 in the case of contaminants/pollutants and in harsh environmental conditions.
4. Install the probe correctly to suit the application.
5. Inspect and replace the filter more frequently in harsh operating conditions. Filters can be cleaned in an ultrasonic bath. However, always keep a new filter set in stock.
6. Check that the measurement probe is working correctly by performing a calibration at least every 6 to 12 months.
7. For calibration, use one of our calibration services or the SCS-certified humidity standards. This will ensure your calibration is traceable to national standards.

Pt100 temperature sensors

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

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

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

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 °C deviations in the measured value of up to ± 1.3 K are allowed.

Accuracy of HC2 probes

The accuracy of ROTRONIC humidity and temperature probes is highest at the adjustment points, which is why it makes sense to adjust the probes at the points where they are used. ROTRONIC offers this service (see chapter Services, page 176). 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 lies between ±0.5 %RH / 0.1 K and ±2.0 %RH / 0.3 K. With its accuracy specification, ROTRONIC states the maximum permissible deviation of the HygroClip probe from the ROTRONIC SCS reference. The accuracy specification applies at the adjusted humidity and temperature values. A validated and permanently monitored process guarantee that all HygroClip probes undergoing production match the ROTRONIC references used. In addition to this, samples are taken from every production batch and checked for accuracy against SCS references.

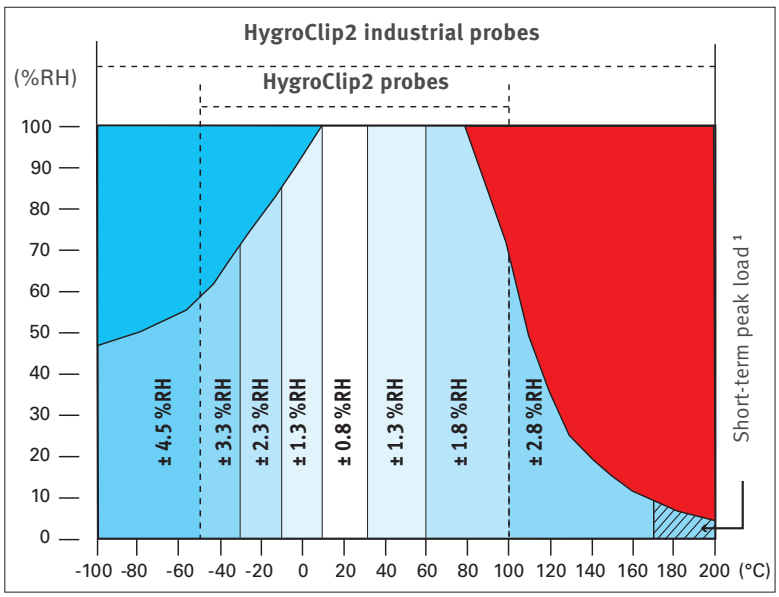
You can find information on ROTRONIC AG SCS calibration and the measurement uncertainty at www.rotronic.com.

Humidity

Accuracy of humidity measurements over the measuring range

HygroClip2 industrial probes
HC2-IC / HC2-IM/ HC2-IE / XD-Industrial

HygroClip2 probes
HC2-S(3) / HC2-SM / XD
HC2-HK / HC2-C / HC2-P / HC2-HP / HC2-HS



Continuous load
ROTRONIC HygroClip2 industrial probes are designed for continuous loads of up to 170 °C. ROTRONIC standard probes up to 100 °C.

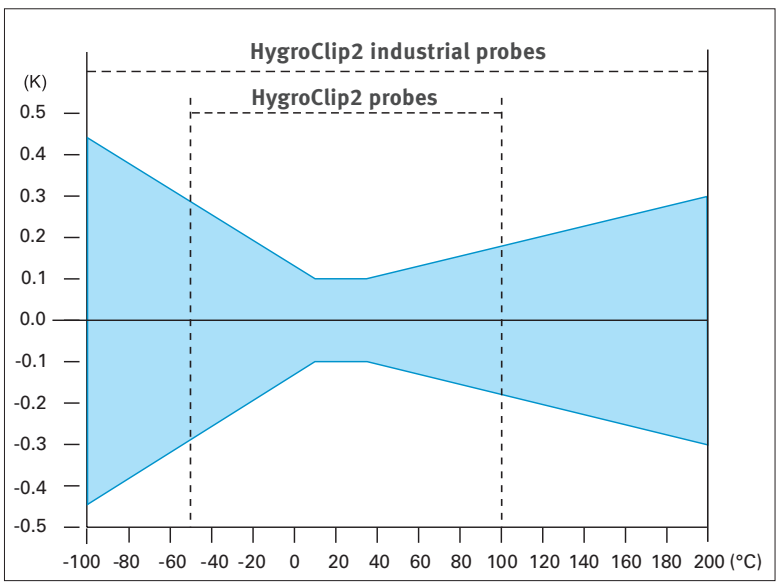
¹ Short-term peak load:
The ROTRONIC probes permit a peak load of 3x5 minutes at 200 °C without permanent damage to the probe. The time between the peak loads has no influence on this. Longer peak loads result in increased sensor drift of up to 3 %RH over 25 hours.

Temperature

Accuracy of temperature measurements over the measuring range

HygroClip2 industrial probes
HC2-IC / HC2-IM/ HC2-IE / XD-Industrial

HygroClip2 probes
HC2-S(3) / HC2-SM / XD
HC2-HK / HC2-C / HC2-P / HC2-HP / HC2-HS



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

Contaminant/Pollutant	Formula	MAC value		Permissible constant concentration					
				IN-1		HH-1		HT-1	
		ppm	mg/m³	ppm	mg/m³	ppm	mg/m³	ppm	mg/m³
Acetone	CH_3COCH_3	1000	2400	3300	8000	3700	9000	3300	8000
Ammonia	NH_3	25	18	5500	4000	5500	4000	5500	4000
Petrol		300	1200		150000		150,000		150000
Chlorine	Cl_2	0.5	1.5	0.7	2	1.5	4.5	0.7	2
Acetic acid	CH_3COOH	10	25	800	2000	1000	2500	800	2000
Ethyl acetate	$CH_3COOC_2H_5$	400	1400	4000	15000	4000	15000	4000	15000
Ethanol	C_2H_5OH	1000	1900	3500	6000	5800	10000	3500	6000
Ethylene glycol	$HOCH_2CH_2OH$	100	260	1200	3000	1200	3000	1200	3000
Formaldehyde	HCHO	1	1.2	2400	3000	2400	3000	2400	3000
Isopropanol	$(CH_3)2CHOH$	400	980	4800	12000	6000	15000	4800	12000
Methanol	CH_3OH	200	260	3500	6000	6000	8000	3500	6000
Methyl ethyl keton	$C2H_5COCH_3$	200	590	3300	8000	3300	8000	3300	8000
Ozone	O_3	0.1	0.2	1	2	1.5	3	1	2
Hydrochloric acid	HCl	5	7	300	500	300	500	300	500
Sulfur dioxide	SO_2	5	13	5	13	5	13	5	13
Hydrogen sulfide	$H2_S$	10	15	350	500	350	500	350	500
Nitrous gases	NOx	5	9	5	9	5	9	5	9
Toluene	$C_6H_5CH_3$	100	380	1300	5000	1800	7000	1300	5000
Hydrogen peroxide	H_2O_2	1	1.4	90	130	880	1200	90	130
Xylene	$C_6H_5(CH_3)_2$	100	440	1300	5000	1800	7000	1300	5000

Contaminants/Pollutants without influence

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

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

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 for 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.
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.

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 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 with these instruments or with HW4 software. The HC2-AW measurement stations have a large thermal mass. This means the probes react very slowly to temperature changes so that virtually no variations arise during measurement – especially when using the AW Quick function. The extremely small internal volume of the sensor chamber ensures humidity equilibrium is reached very quickly for all products.

CO_2

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 CO2 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 (non-dispersive infrared) sensors. This gas sensor works as a spectroscope and analyzes which wavelengths emitted by a light transmitter reach a receiver.

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.

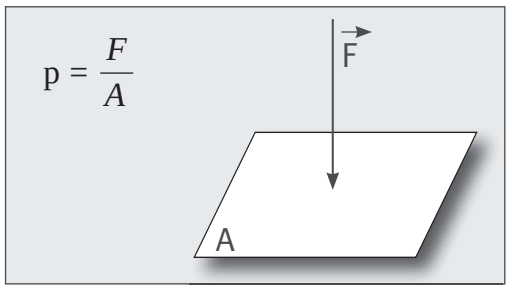
Differential pressure

What is pressure?

Pressure is the physical measurement of force per unit area and is often given in the SI unit Pascal [Pa]. Other units of measurement are also very widely used in pressure measurement technology.

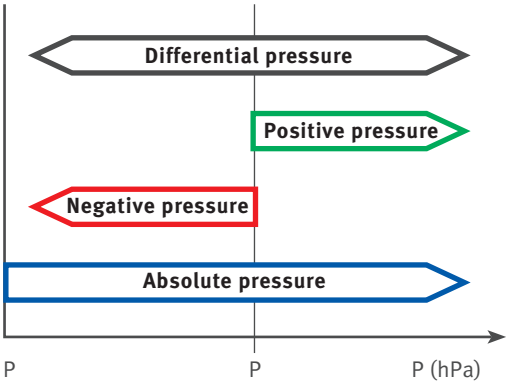
Conversion table

bar	mbar	psi	atm
1.00	1,000.00	14.50	0.987
Pa	**hPa**	**kPa**	**MPa**
100,000.00	1,000.00	100.00	0.10
mmH2O	**inchH_2O**	**mmHg**	**inchHg**
10,197.16	401.46	750.06	29.53



What is differential pressure?

Three different types of pressure are generally considered in pressure measurement technology: absolute pressure, relative pressure and differential pressure. Differential pressure is the drop in pressure between two spaces with different absolute pressures.



Where does ROTRONIC measure differential pressure?

Cleanrooms, i.e. environments in which a very low level of contamination may prevail, are pressurized slightly. This positive pressure guarantees controlled removal of dirt particles from the room. To monitor this positive pressure, one needs pressure transmitters with a very high measuring accuracy and a very low pressure measurement range. ROTRONIC offers such instruments.

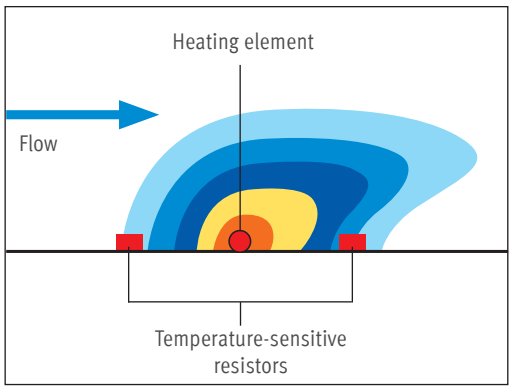
How does ROTRONIC measure differential pressure?

- Thermal mass flow principle

In this measurement technique, a heating element is placed between two temperature sensitive resistors. Due to a gas flow, the temperature profile is moved towards one of the resistors, which can be measured and evaluated.

- Strain gauge principle

In this technique the pressure is converted into a force, which stretches a diaphragm and is measured by a piezo-resistive MEMS diaphragm sensor.



Pressure measurement technology – Glossary

Measurement range:	Pressure range in which the sensor can measure
Full scale:	Difference between the maximum and minimum measured pressure
% Full scale:	Measurement deviation in relation to Full scale
System pressure:	Ambient pressure (often given as relative pressure, e.g. air pressure: 1013 hPa)

Dew point

What is dew point?

As the term implies, it is the climate point at which the relative air humidity equals 100% and begins to condense. The dew point is given in °C Td. The dew point temperature is a measurement of the water vapor content in a gas. If air is compressed or expanded, its dew point temperature changes. If air is compressed, it is able to absorb less water and the dew point rises until the air is saturated and begins to condense. In this connection, the term pressure dew point measurement is also used to describe measurement of the dew point in gases above the ambient temperature.

What does low dew point measurement mean?

A low dew point is usually when the dew point temperature falls below -30 °C Td. This means that the air is extremely dry and contains almost no water molecules. A dew point of -38 °C Td corresponds at 23 °C to a humidity value of 0.8 %RH, which corresponds to the accuracy of a ROTRONIC HygroClip2 probe. This shows why low dew point measurement is very demanding. Very complex electronics and a highly sensitive sensor are needed to deliver high-quality results in the measurement of residual moisture.

What is important in low dew point measurement?

The measurement of such small numbers of water molecules places high demands on the measuring point. For example, it is important that there is always good airflow across the sensor so that representative measured values can be obtained. ROTRONIC offers a special measurement chamber for this that was developed specifically for the mechanical design of the dew point probe. Excessive flow can lead to a local pressure drop, which influences the measurement, while insufficient flow can result in measurement of a local microclimate. The constant airflow of the measurement chamber of 1 l/min. thus guarantees stable and reliable measurement results.

The equallibrum times in dew point measurements can be considerably longer than those for humidity measurements. All the materials in the system and around the sensor must be able to dry out. Under certain circumstances it can take hours before a low dew point system has balanced out and the residual moisture has escaped from all materials.

Why is low dew point measured?

There can be many reasons for monitoring the dew point. Compressed air systems with an excessively high dew point can condense, thereby causing valves to become blocked or corroded. In addition to this, dry compressed air systems require less maintenance, which saves costs. Equipment connected to the system places high demands on dryness and require a low dew point of the compressed air. Further, there are sensitive processes such as the drying of injection molding granulate and the compressed air for spray painting systems, which place particularly high demands on the dew point of the system. Compressed air system can further be classified according to ISO 8573. Depending on the classification of the system, there are different dew points that need to be monitored and controlled.

ATEX

What does ATEX mean?

ATEX comes from French and stands for Atmosphères Explosibles. The aim of this directive is to protect people when working in potentially explosive environments. It comprises two directives that define explosion protection for operation and products in risk environments. ROTRONIC ATEX devices are based on the ATEX Product Directive 94/9/EC.

How are ATEX devices specified?

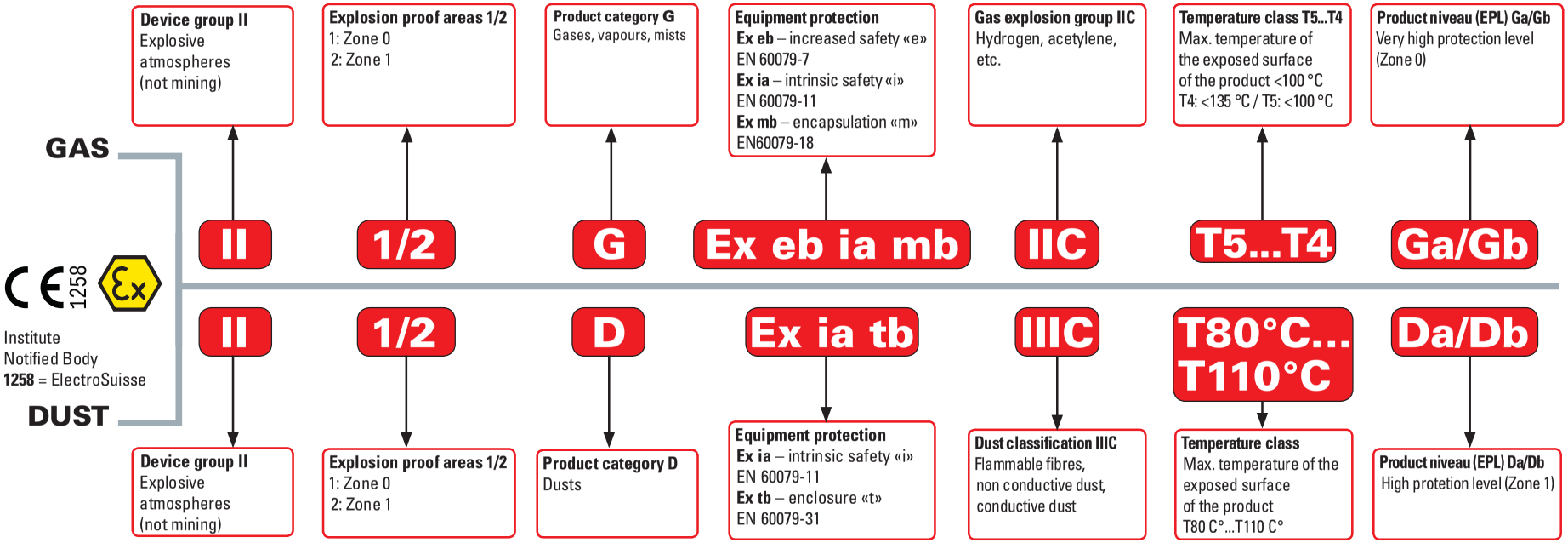
There are two device groups. Device group I is suitable for use in mining/above ground and underground. Device group II is suitable for use in other potentially explosive atmospheres. ROTRONIC offers devices falling in device group II. Potentially explosive environments are subdivided into zones. A distinction is drawn between whether the explosion hazard exists because of dust or gas.

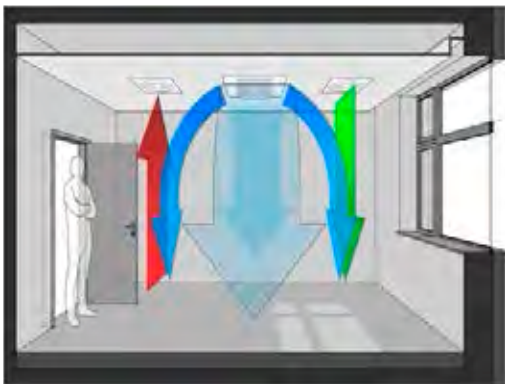
Gas zone	Dust zone	Hazard
0	20	Constantly, frequently or over a longer period of time
1	21	Occasionally
2	22	Rarely and briefly

Temperature classes define by how much the surface of the device may heat up in the case of a fault. This temperature is stated in the case of dust versions. Gas versions, by contrast, are subdivided into the following classes:

Class	T1	T2	T3	T4	T5	T6
Max. surface temperature	450 °C	300 °C	200 °C	135 °C	100 °C	85 °C

How is the label of ATEX devices made up?





Airflow

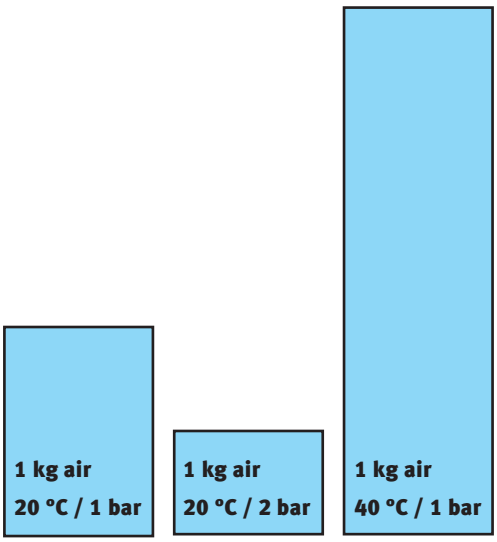
What is flow?

Flow or volume flow is the measurment of a quantity of flowing gas and is often given in the SI unit [m^3/s].

The flow velocity is closely related to it. The measurement of the velocity at which a medium flows and is usually given in m/s.

Why is flow measured?

Heating, ventilation and air conditioning systems heat/cool by way of mass transmission, i.e. aeration. In short, the process involves heat transfer or energy transport. In order to design this transfer optimally for the operation of plants and to check it in the course of maintenance work, it must be ensured that the flow velocities in the ventilation ducts are correct. An optimally designed plant has the best-possible energy efficiency and can thus be operated economically.



Is a cubic meter always the same as a cubic meter?

No! Of decisive importance for the quantification of the gas quantity being transported is the flowing mass. The volume of a kilogram of air is, however, dependent on the temperature and pressure.

Various standards, e.g. ISO 1217, define what a cubic meter of gas is. To do so, data is calculated back to a reference gas temperature and system pressure to generate comparable measurements. Experts then talk of a standard cubic meter or standard volume.

DIN 1945 / ISO 1217	(20 °C / 1 bar)
DIN 1343	(0 °C / 1013.25 mbar)

How does ROTRONIC measure flow?

ROTRONIC offers vane anemometers for airflow measurement. These probes are especially suitable for medium flow velocities in ducts. When air flows through it, the rotor turns in proportion to the flow velocity and thus the volume flow. The ROTRONIC anemometers are designed such that the air resistance is kept to a minimum.

Flow technology – Glossary

Measurement range:	Flow range in which the sensor can measure
% of measured value:	Measurement deviation in relation to the currently measured value
Nm3/h:	Standard cubic meter per hour

TERMS AND CONDITIONS OF TRADING

1. General

1.1 A contract is considered to be concluded with a written quotation, order confirmation or when the goods are despatched and invoiced by ROTRONIC. By accepting the delivery, the customer agrees to the conditions of ROTRONIC. Divergent conditions have to be stipulated in writing.

1.2 Orders shall only become binding upon ROTRONIC after it has issued a written confirmation of order.

1.3 ROTRONIC - reserve the right to amend typing errors/mistakes to price lists and technical data at any time.

2. Prices

Prices shall be deemed net including V.A.T. and Advanced Recycling Fee (ARF) SWICO (in Switzerland only) for Computer Products, excluding VAT for all other products, excl. transportation and packaging charges for all products, provided that alternative conditions have not already been agreed. ROTRONIC AG however hereby reserves the right to make price adjustments to cover definite increases in costs, e.g. goods and material.

3. Delivery period

Within Switzerland Computer Products on stock are normally delivered on a next working day. For unavailable articles, an order confirmation with the prospective delivery date, also for part deliveries, is sent to the customer. For all other products, the delivery period shall be the date in the order acknowledgement and as such will be extended should difficulties arise that may have been caused by an act of God such as war, epidemics and among other things storm and tempest.

4. Despatch

All deliveries shall be effected for the account and the risk of the customer. ROTRONIC AG reserve the right to supply against prepayment. Any complaints concerning damage, loss or delay are to be reported to ROTRONIC AG within 8 days of the receipt of the consignment. But complaints concerning any faulty packaging shall be rendered on the same day as the receipt of the consignment (Refusal of acceptance with “Die Post” or the forwarding agent).

5. Works deliveries

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

6. Return of goods and materials

Computer Products

Unless otherwise stated, the goods listed in the catalogue are covered by a right of return of 8 days from the delivery date. The goods must be in their original packaging, complete, undamaged and fully functional. On a copy of the invoice or the dispatch advice, the reason for returning the products has to be stated. Should such document/statement be missing, an administration fee of CHF 30.—will be charged. Incomplete, damaged packages are not accepted. Full costs for bringing the products into a re-sellable condition plus a handling charge (cumulative) will be deducted from the credit note, configured products such as modems, routers, firewalls, switches, etc. can only be returned in the manufacturers’ original configuration. Should ROTRONIC have to reset such products, a charge of CHF 180/working hour will be due.

Returns later than 8 days after delivery can only be accepted back after prior consultation of ROTRONIC AG. Delayed returns are charged additionally with a handling fee of CHF 30.—.

- Obsolete products, i.e. products not being in the regular online-/catalogue-assortment, - software, data carriers, - also products made to specification and - all products which are not held on stock normally cannot be returned.

There is no right of return for printers, fax machines, PCs, CPUs, scanners, hard discs, notebooks, PDAs, mobile phones, LCD displays, overhead projectors, digital cameras, transformers, power supply units, measuring equipment and similar or for consumables, data media and software. Should the above regulations not be fulfilled, ROTRONIC has the right to deduct the credit note or refuse to take the product(s) back or to make out a debit note. After return of the product(s), a credit note will be processed and then sent to the customer.

Humidity- and Temperature-Measuring Equipment

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

7. Settlement

Invoices are to be settled net within 30 days without any deductions. Purchasers will be charged the usual bank overdraft rate of interest in respect of overdue payments. Other payment modes can be agreed upon.

8. Retention of ownership rights

All goods and materials supplied shall remain the property of ROTRONIC AG until full payment of the debited invoice amount has been received.

9. Warranty

a ROTRONIC AG shall be liable for defects in the delivered goods, which it shall repair or replace, as it chooses.

b) If the repair or replacement delivery fails, the customer may, as he chooses, demand a reduction in the purchase price or declare his withdrawal from the contract.

c) The customer is obliged to inspect the goods immediately after delivery for completeness and for freedom from defects. Any defects found shall be notified to ROTRONIC AG immediately. If the customer fails to carry out the inspection or notify the defect promptly, the delivered goods are considered to be approved, unless the defect could not be detected in the inspection. Defects found later must also be notified to ROTRONIC immediately, otherwise the goods are also considered to be approved in this respect. To comply with the deadline, the customer shall forward the faulty item and a precise description of the defect as well as a copy of the original invoice to ROTRONIC AG at his own expense. The customer shall be responsible for proving dispatch in good time.
If the item proves to be fault-free, it shall be returned to the customer subject to an inspection fee in the sum of CHF 35.- plus value-added tax and dispatch costs.

d) Warranty claims shall expire two years after delivery of the goods. For computer accessories sold under the brand name “roline”, the warranty period shall be five years as regards the functional properties to be provided contractually for these products. The warranty shall only cover consistent function under general technical conditions as they existed at the time of purchase. The extended warranty period shall not apply for telephone accessories, 19" server systems, TFT displays, plasma displays, TFT and plasma holders, keyboards, consumables, transformers, batteries, parts subject to wear such as fans and other mechanically moving parts. In respect of these, warranty claims shall expire two years after delivery.

10. Cancellation

Cancellation of orders shall only be possible hereunder with the written approval of ROTRONIC AG. Any costs which have al-ready been incurred or price increases as a result of reduction in amounts ordered shall be for the account of the purchaser. Partial supplies of an order contracted upon call shall be claimed within the agreed supply and delivery periods; otherwise ROTRONIC AG may cause the relative consignment and invoice billing therefore to be made.

11. Place of jurisdiction

The place of jurisdiction shall be either ROTRONIC AG’s or the customer’s Swiss domicile. Legal relationship hereunder shall be subject to Swiss Law.

По вопросам продаж и поддержки обращайтесь:

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