Main catalogue

Measurement solutions for multiple parameters

HUMIDITY

TEMPERATURE

CO_2

DIFFERENTIAL PRESSURE

PRESSURE

FLOW

WATER ACTIVITY

DEW POINT

mA/V

rotronic
MEASUREMENT SOLUTIONS

ROTRONIC Instruments (UK) Ltd is a wholly owned subsidiary of ROTRONIC AG, with a team of sales, technical, calibration and support staff dedicated to humidity, temperature, low dew point, CO2, pressure and airflow measurement products.

BUYING FROM ROTRONIC UK

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

WARRANTY

All Rotronic products have 24 month warranty (HygroGen2 12 months).

SERVICE AND CALIBRATION

Our technical support team offer a wide range of services including UKAS 0766 accredited laboratory calibration for temperature, humidity and dew point. For our latest UKAS scope visit www.ukas.org. Contact:

service@rotronic.co.uk

THE ROTRONIC UK TEAM

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Nicola Savage

OUR SERVICE TO YOU

- High quality products
- Competitive prices
- ISO 9001 quality system
- UKAS 0766 / ISO 17025 calibration laboratory for temperature, humidity and dew point
- Comprehensive 24 month warranty (HygroGen2 12 months)
- Dedicated product specialists
- Mapping and validation services
- Training courses and seminars
- 48 hour turnaround on standard calibration and repairs on request

HOW TO CONTACT US

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Rotronic measuring instruments: precision at the highest level

Based in Switzerland and established in 1965, Rotronic offers a wide range of handheld instruments, transmitters, industrial probes, data loggers, OEM products and monitoring systems.

Well known for the measurement of relative humidity and temperature, we have long since added to our portfolio to include other important parameters:

- Low dew point
- Indoor CO_2
- Differential pressure
- Process pressure
- Flow

We offer reliable solutions for wide ranging applications from the pharmaceutical and foodstuff industries, through to museums and galleries, heating, ventilation and air conditioning as well as meteorology.

Rotronic products guarantee reliability: we offer validated software and products that comply with international standards such as GAMP and FDA. Rotronic is an officially accredited ISO-17025 calibration laboratory (SCS-0065) and with locations in more than 40 countries around the world you can rely on a competent and efficient sales and service support network.

Rotronic is a Member of Process Sensing Technologies (PST)
Process Sensing Technologies (PST) provides a comprehensive suite of instruments and analyzers for precision measurements. Essential for process and environmental monitoring and control, these products ensure safety, increase efficiency and reduce energy consumption – saving customers a considerable amount of money every year.

Headquarters in Switzerland

A member of:

Rotronic Monitoring System: modular, flexible and reliable

The Rotronic Monitoring System (RMS) is a modular system of interconnected hardware elements and server software. It guarantees maximum flexibility in planning and installation and ensures excellent availability of live data securely throughout the operation.

The data loggers record all measurements from Rotronic and third-party products and transmit them to the database. It stores all the information and makes it available to defined users, regardless of which device they use to access the monitoring system. Data is available in the form required and at any location.

Rotronic RMS

Rotronic guarantee

- Highest accuracy at ±0.5 %RH
- ISO 9001 quality with factory adjustment certificate
- ISO 17025 (SCS0065)
- Validated software
- Products compliant to current industry standards
- 24 month product warranty (HG2 calibrator 12 months)
- More than 50 years of experience in humidity measurement
- Eco-friendly, professional and free disposal of old devices and accessories

Contents

CO₂

Applications

Rotronic Monitoring system – RMS

Software

Services

Theory

Measurement of humidity

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

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

Probes and various sensors

The probes can be fitted with various Rotronic sensors to adapt them to any application:
- HT-1 sensor: Specially developed for all high-temperature applications
- HH-1 sensor: Suitable for applications with hydrogen peroxide (H_2O_2)

Rotronic has customers and partners around the world with wide ranging 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 probes and devices. Our high-quality Rotronic products are engineered for the wide range of demands made on measuring equipment and with the know-how gained from our many years of experience in the field.

Hygroclip2 – Advanced probe

AIR CHIP TECHNOLOGY

The Rotronic HC2A-S(3) probe is a premium high-end metrology 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 HT-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 compliant to FDA & GAMP at all times. Thanks to its digital interface, it is compatible with all Rotronic devices without adjustment and can be connected to third-party systems using the scalable analogue outputs.

The HC2A-S(3) 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.

VIDEO HUMIDITY

Interested? Then scan the QR code!

STANDARD AND HIGH PRECISION PROBES

HC2A-S / HC2A-S-HH / HC2A-S3 and HC2A-SH/HC2A-S3H

The HC2A-S / HC2A-S-HH / HC2A-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 HC2A-SH/HC2A-S3H fulfills the highest demands for measuring accuracy.

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

FEATURES
- Accuracy: standard probe (HC2A-S / HC2A-S-HH): ±0.8 %RH, ±0.1 K, at 10...30 °C
- Accuracy: high precision probe (HC2A-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 or Default analog scaling/ outputStandard: 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
- Standard analog output scaling: 0...1 V = -40...60 °C / 0...100 %RH

HC2A-S
HC2A-SH
HC2A-HH

HC2A-S3
HC2A-S3H

108 mm

Ø 15 mm

Order code	HC2A-S / HC2A-S-HH / HC2A-S3	HC2A-SH / HC2A-S3H
Probe type	S: black, S3: white	SH: black, S3H: white
Dimensions	Ø 15 x 108 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® HT-1 (HC2A-S-HH: HH-1), Pt100 1/3 Class B	
Filter type	S: polyethylene white, 20 µm S3: polyethylene white, 40 µm	SH: polyethylene white, 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 HC2A-S-HH is especially suitable for environments with hydrogen peroxide (H_2O_2) using the HH-1 sensor.

COMPATIBLE

- Handheld instruments   HP32, HP23-A
- Data loggers   HL-NT2, HL-NT3, LOG-HC2
- Transmitters   HF5, HF8, PF4
- Meteorology transmitters   MP102H, MP402H

DELIVERY PACKAGE

- Factory adjustment certificate
- Short instruction manual
- Polyethylene filter

RECOMMENDED ACCESSORIES

- Mounting flange   AC5005
- Filters see page 18
- Extension cable 2 m, black   E2-02A
- 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 HC2A-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 analog output scaling: 0…1 V = -40…60 °C / 0…100 %RH
- Adjusted at 23 °C and 10, 35, 80 %RH

HC2A-SM

Order code	HC2A-SM
Probe type	Chrome steel standard
Dimensions	Ø 15 x 109 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® HT-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

Available with ATEX certificate, see page 167

COMPATIBLE

- Handheld instruments   HP32, HP23-A
- Data loggers   HL-NT2, HL-NT3, LOG-HC2
- Transmitters   HF5, HF8, PF4

DELIVERY PACKAGE

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

RECOMMENDED ACCESSORIES

- Mounting gland   AC1303-M
- Filters see page 18
- Extension cable 1 m, metal connector   E2-01A-M
- Extension cable 2 m, metal connector   E2-02A-M
- Extension cable 5 m, metal connector   E2-05A-M
- 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] (HC2-HK40)/ 0...100 %RH
- Digital interface (UART) and scalable analog outputs, 0...1 V
- Standard analog 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	HC2A-IC1xx*	HC2A-IC3xx*	HC2A-IC4xx*	HC2A-IC5xx*	HC2A-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 ® HT-1, HH-1 ,Pt100 1/3 Class B				
Response time	‹15 s, without filter				
Material	PPS, stainless steel 1.4301				
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	HC2A-IC3xx*-A	HC2A-IC4xx*-A	HC2A-IC5xx*-A	HC2A-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 ® HT-1, Pt100 1/3 Class B			
Response time	‹15 s, without filter			
Material	PPS, stainless steel 1.4301			
Weight	290 g	320 g	350 g	380 g
* xx = cable length in meters (02, 05), 80 g per meter cable				

The HC2A-ICxx-HH is especially suitable for environments with hydrogen peroxide (H_2O_2) using the HH-1 sensor.
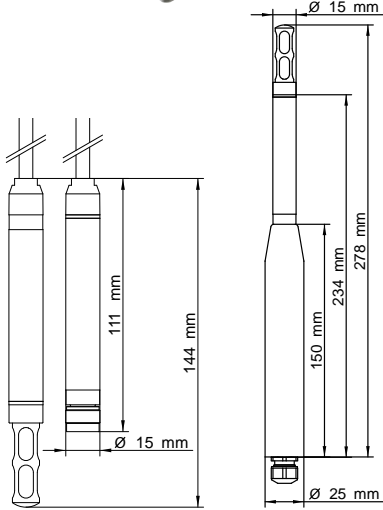
HC2A-ICxxx
HC2A-ICxxx-HH

HC2A-ICxxx-A

COMPATIBLE

- Handheld instruments   HP32, HP23-A
- Data loggers   HL-NT2, HL-NT3, LOG-HC2
- Transmitters   HF5, HF8, PF4

DELIVERY PACKAGE

- Factory adjustment certificate

RECOMMENDED ACCESSORIES

- Filters see page 18
- 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] Peak load: 100 h
Permissible continuous load: 190 °C

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; -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

STEEL INDUSTRIAL PROBES

Ø 15/25 mm

Order code	HC2A-IM1xx*	HC2A-IM3xx*	HC2A-IM4xx*	HC2A-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® HT-1, Pt100 1/3 Class B			
Response time	‹15 s, without filter			
Housing material	Stainless steel, DIN 1.4305			
Weight	260 g	400 g	540 g	680 g
* xx = cable length in meters (02, 05), 80 g per meter cable				

SCREW-IN PROBES

Ø 15 mm

| Order code	HC2A-IE1xx*	HC2A-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 ® HT-1, Pt100 1/3 Class B	
Pressure	Pressure resistant to 100 bar / 1450 PSI	
Response time	‹15 s, without filter	
Housing material	Stainless steel, DIN 1.4305	
Weight	290 g	
* xx = cable length in meters (02, 05), 80 g per meter cable		
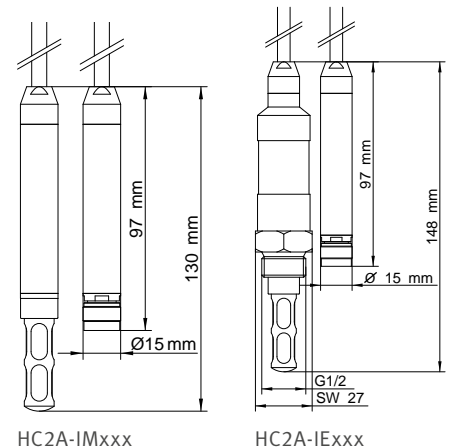
HC2A-IMxxx   HC2A-IExxx

COMPATIBLE

- Handheld instruments   HP32, HP23-A
- Data loggers   HL-NT2, HL-NT3, LOG-HC2
- Transmitters   HF5, HF8, PF4

DELIVERY PACKAGE

- Factory adjustment certificate

RECOMMENDED ACCESSORIES

- Filters see page 18
- Calibration device (HC2A-IM)   ER-15
- Calibration device (HC2A-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] Peak load: 100 h
  Permissible continuous load: 190 °C

HIGH TEMPERATURE HANDHELD PROBES

The handheld probe is especially suitable for portable measurements of high temperatures. It measures humidity and temperature and calculates the dew/frost point.
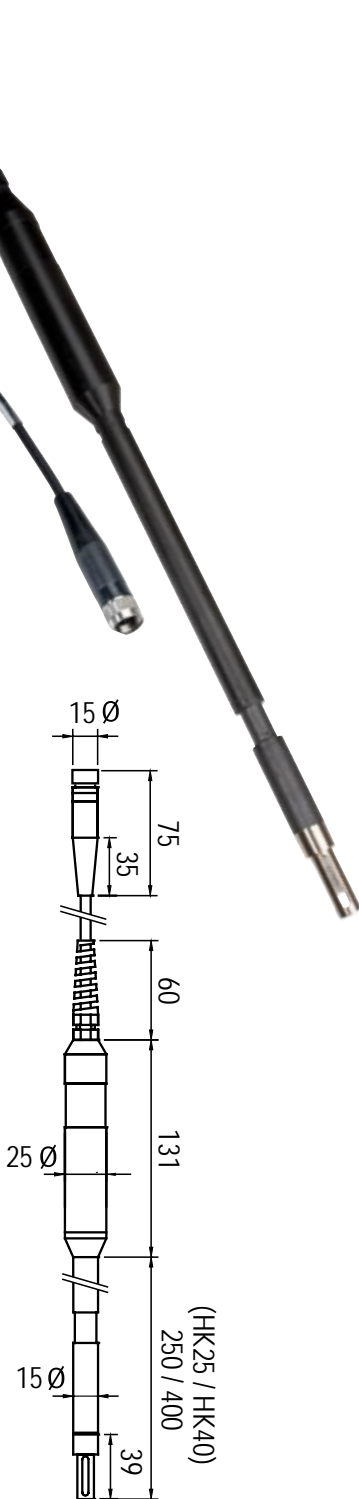
APPLICATIONS
Climate and temperature chambers, dryers, air ducts.

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	
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	

15 Ø
75
35
60
25 Ø
131
(HK25 / HK40)
250 / 400
15 Ø
39

HYGROWIN USB PROBE

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.

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
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 software.

DELIVERY PACKAGE

- Factory adjustment certificate
- HW4-LITE software (download)

RECOMMENDED ACCESSORIES

- 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 installed discretely. The 4 mm probe has a spike tip for insertion in walls.

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 probe, Ø 5 mm
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, DIN 1.4305	Brass, nickel-plated
Weight	85 g	85 g
Cable length	2 m	
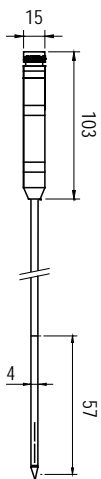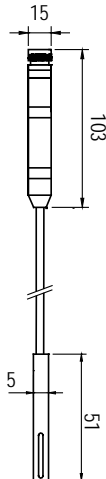
HC2-C04   HC2-C05

COMPATIBLE

- Handheld instruments   HP32, HP23-A
- Data loggers   HL-NT2, HL-NT3, LOG-HC2
- Transmitters   HF5, HF8, PF4

DELIVERY PACKAGE

- 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, gallery walls, laboratories and in cleanrooms for humidity and temperature measurement.

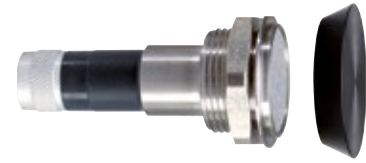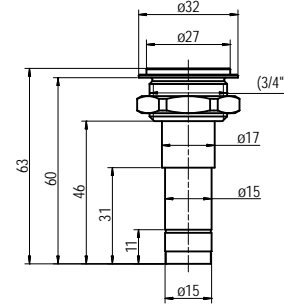| Order code	HC2-IS25	HC2-IT25	HC2-IP25
Accuracy	±1.5 %RH, ±0.2 K, at 0…90 %RH and 10…30 °C		
Power supply	3.3…5 VDC, adjusted at 3.3 VDC, current: ~4.5 mA		
Filter type	Sintered steel	Teflon	Polyethylene
Sensor type	ROTRONIC HYGROMER® WA-1, Pt100 1/3 Class B		
Response time	‹20 s	‹25 s	‹20 s
Housing material	Polycarbonate, stainless steel DIN 1.4301		
Weight	50 g		

HC2-IS25, steel filter, cover

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 the 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	ROTRONIC HYGROMER® WA-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
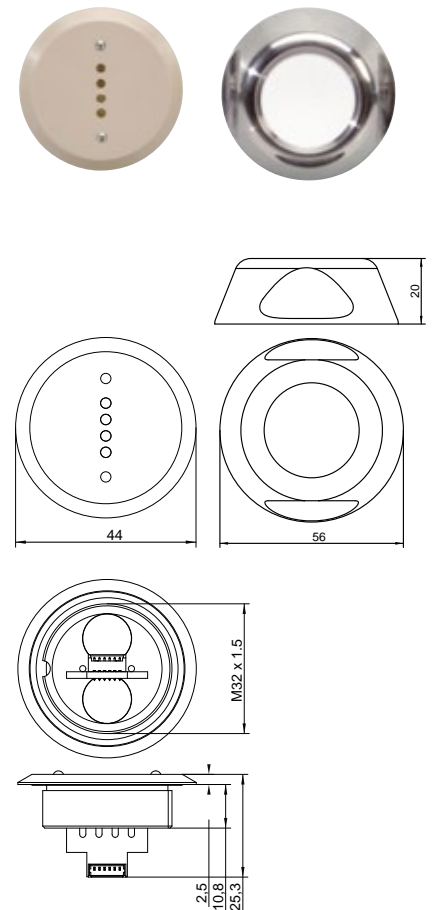
COMPATIBLE

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

DELIVERY PACKAGE

- 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
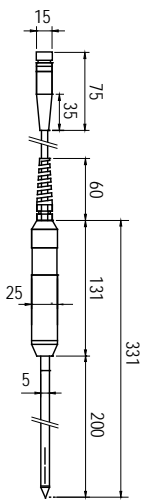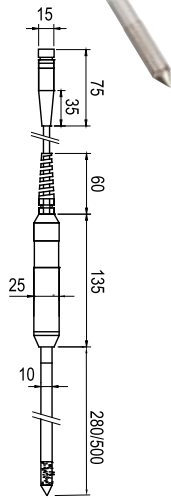
INSERTION PROBES

Ø 5 mm / 10 mm

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

APPLICATIONS
Water activity measurement, page 148
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 laser cut slots
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 — HP32, 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

DELIVERY PACKAGE

- 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

HygroFlex8 transmitter

Analog outputs

Web probe BFC-UART

Web probe BFC-UART
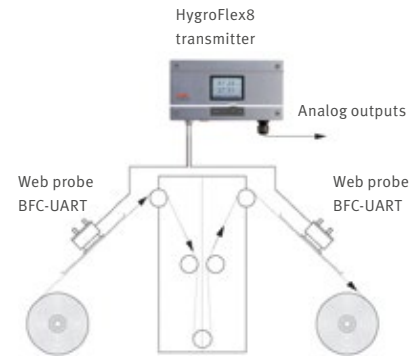
SWORD PROBES

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

FEATURES
- Accuracy: ±0.8 %RH, ±0.1 K, at 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	
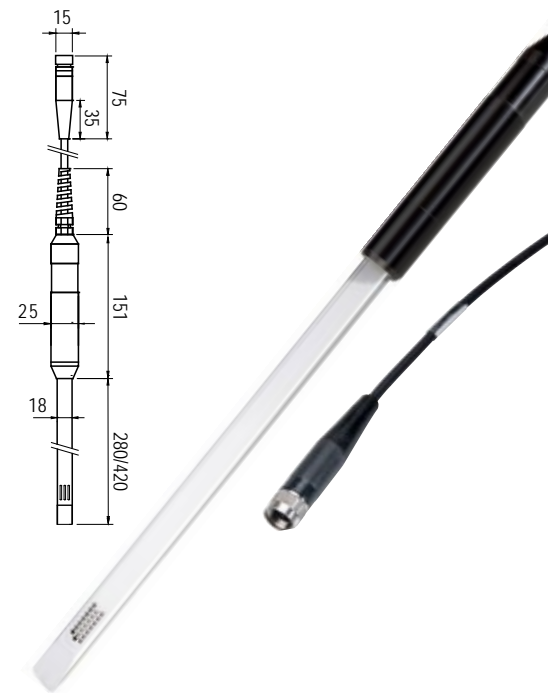
COMPATIBLE

- Handheld instruments — HP32, HP23-A
- Data loggers — HL-NT2, HL-NT3, LOG-HC2
- Transmitters — HF5, HF8, PF4

DELIVERY PACKAGE

- 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
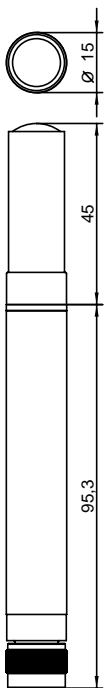
XD PROBES

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 application: -40...85 °C / 0...100 %RH
- UART digital interface
- Various voltage outputs available
- 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® HT-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 withRotronic data loggers, transmitters or handheld instruments.

DELIVERY PACKAGE

- Factory adjustment certificate
- Polyethylene filter
- Short instruction manual

* Requires optional HW4 software and service cable

RECOMMENDED ACCESSORIES

• Mounting flange	AC5005
• Filters see page 18	
• 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 XD-SERIES 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	
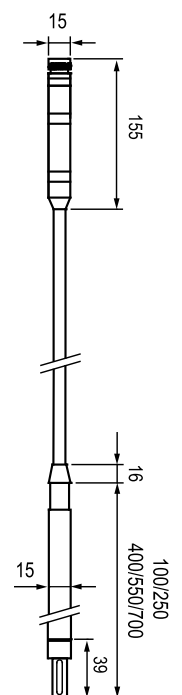
Note
Not compatible with Rotronic data loggers, transmitters or handheld instruments.

DELIVERY PACKAGE

- Factory adjustment certificate
- Short instruction manual

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

RECOMMENDED ACCESSORIES

Filters see page 18	
Mounting flange	AC5005
Extension cable 2 m, with open ends, black	E2-02XX
Calibration device	ER-15
Humidity standard for calibration 10 %RH	EA10-SCS
Humidity standard for calibration 35 %RH	EA35-SCS
Humidity standard for calibration 80 %RH	EA80-SCS
Service cable to PC	XD-AC3001

FILTER / CARRIER HC2A ADVANCED PROBES

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 routines, mechanical impacts, high bioactivity, condensation, airborne chemical contaminants and required response time are some of the many considerations.

Plastic filter carrier	Metal filter carrier
• Maximum temperature 100 °C • Mechanical protection	• Maximum temperature 200 °C • Mechanical protection

Overview filters

	Teflon filters	Polyethylene filters	Sintered steel filters (stainless steel)	Wire mesh filters (metal)
Maximum temperature (consider range of application of filter carrier)	200 °C	100 °C	200 °C	200 °C
Protection against particulates	✔ ✔	✔ ✔	✔	✔
Protection against abrasives in the air			✔ ✔ ✔	✔
Pore size	10 µm	40 µm	25 µm	10 µm
Max. air velocity [m/s] (continuous load)	50	50	70	50

✔ = low
✔ ✔ = medium
✔ ✔ ✔ = high

Filters & carriers

	Probe	Overview probes																
	Range of application (temp.)	-50...100 °C										-40...85°C		-100...200°C				-50...120°C
	Probe	HC2A-S	HC2A-S3	HC2A-S-I	HC2A-S3-I	HC2A-SH	HC2A-S3H	HC2A-S-HH	HC2A-S3-HH	HC2A-SM	HC2A-SM-HH	XD33A-S3X	XD33A-S3X-I	HC2A-ICxxx	HC2A-ICxxx-I	HC2A-IMxxx	HC2A-IExxx	HC2A-ICxxx-HH
-50...100 °C	SPA-PCB				✔							✔						
	SPA-PCW				✔							✔						
-100...200°C	SPA-SS				✔					✔		✔				✔		✔
-50...100 °C	SPA-PCB-PE				✔							✔						
	SPA-PCB-PTFE				✔							✔						
	SPA-PCB-WM				✔							✔						
	SPA-PCW-PE				✔							✔						
	SPA-PCW-PTFE				✔							✔						
	SPA-PCW-WM				✔							✔						
	SPA-SS-PE				✔					✔		✔						
	SPA-PE				✔					✔		✔						
-100...200°C	SPA-SS-PTFE				✔					✔		✔				✔		✔
	SPA-SS-WM				✔					✔		✔				✔		✔
	SPA-SSS				✔					✔		✔				✔		✔
	SPA-WM				✔					✔		✔				✔		✔
	SPA-PTFE				✔					✔		✔				✔		✔

HC2A-S / HC2A-S3 / HC2A-S-I / HC2A-S3-I / HC2A-SH / HC2A-S3H / HC2A-S-HH / HC2A-S3-HH / HC2A-SM / HC2A-SM-HH

Order code	Filter carrier	Filter element	Pore size	Range of application	
SPA-PCB	Polycarbonate, black	No filter, only filter carrier		-50...100 °C	
SPA-PCB-PE		Polyethylene, white	40-50 µm		
SPA-PCB-PTFE		PTFE, white	10 µm		
SPA-PCB-WM		Wire mesh 1.4401	10 µm		
SPA-PCW	Polycarbonate, white	No filter, only filter carrier		-50...100 °C	
SPA-PCW-PE		Polyethylene, white	40-50 µm		
SPA-PCW-PTFE		PTFE, white	10 µm		
SPA-PCW-WM		Wire mesh 1.4401	10 µm		
SPA-PE	No filter carrier, only filter	Polyethylene, white	40-50 µm		
SPA-PTFE	No filter carrier, only filter	PTFE, white	10 µm	-100...200 °C	

HC2A-IC / HC2A-IM / HC2A-IE

Order code	Filter carrier	Filter element	Pore size	Range of application	
SPA-SS	1.4301	No filter, only filter carrier		-100...200 °C	
SPA-SS-PTFE		PTFE, white	10 µm		
SPA-SS-WM		Wire mesh 1.4401	10 µm		
SPA-SSS	Filter carrier incl. filter	Sintered steel 1.4404	25 µm		
SPA-WM	No filter carrier, only filter	Wire mesh 1.4401	10 µm		

HC2A-SM / HC2A-SM-HH

Order code	Filter carrier	Filter element	Pore size	Range of application	
SPA-SS	1.4301	No filter, only filter carrier		-50…100 °C	
SPA-SS-PE		Polyethylene, white	40-50 µm		
SPA-SS-PTFE		PTFE, white	10 µm		
SPA-SS-WM		Wire mesh 1.4401	10 µm		
SPA-SSS	Filter carrier incl. filter	Sintered steel 1.4404	25 µm	-100…200 °C	
SPA-WM	No filter carrier, only filter	Wire mesh 1.4401	10 µm		

Note
The range of application depends on the component with the smallest temperature range.

FILTER / CARRIER HC2 PROBES

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 routines, mechanical impacts, high bioactivity, condensation, airborne chemical contaminants and required response time are some of the many considerations.

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

Overview filters

	Teflon filters	Polyethylene filters	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	40 µm	-	150 µm	25 µm	10 µm
Max. air velocity [m/s] (continuous load)	50	50	15	10	70	50

✔ = 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		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 probes 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	
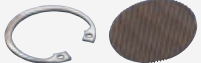
Suitable for HF3

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, CF1	

The HygroFlex series

HygroFlex transmitters are the perfect instruments for the constant monitoring of temperature and humidity in building management systems, cleanrooms, data centers, museums, storage rooms, libraries and many 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 features an interchangeable probe that can be swapped out 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	±2 %RH
	±0.3 K	±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 signals		
Functions		
Data logging		
Relay		
Hygrostat / Thermostat		
Beep tone		
Analog input		
Psychrometric parameters		Dew/Frost point

HF4	HF5 / HS5	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
✓	✓		✓
✓	✓		✓
✓	✓		
	✓		✓
			✓
	HS5		4 (2 relays with Ethernet option)
	HS5		✓
			✓
			✓
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 freely available Rotronic SW21 software enables you to change the output scaling, calibrate the transmitter and adjust the humidity sensor.

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 (D)
- Wall version (W)

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 WALL AND DUCT VERSIONS

APPLICATIONS

Measures relative humidity and temperature in HVAC applications.

2 or 2x2-wire

Order code	HF120
Output signal	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 signal	0…10 V 4…20 mA Only voltage output can be changed
Supply voltage	15…40 VDC / 12…28 VAC
Display	Optional (without backlight)
Temperature range	Scalable
Probes	Not interchangeable Standard, duct probe 100 mm (optional, duct probe 300 mm)
Filter type	Polyethylene

Wall version
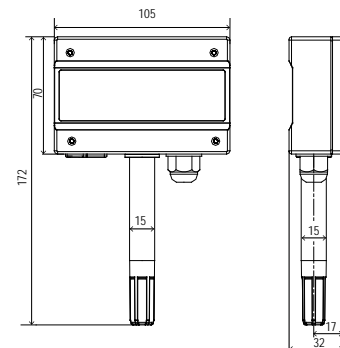
Duct version
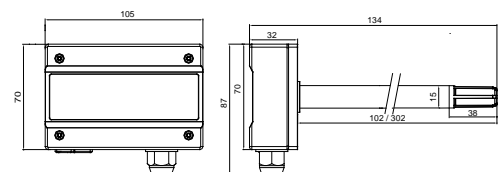
COMPATIBLE

- SW21 PC software, see page 197

DELIVERY PACKAGE

- Factory adjustment certificate
- Short instruction manual

RECOMMENDED ACCESSORIES

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

HF1 SPACE MOUNT VERSION

APPLICATIONS
Offices or rooms where good looks are important.

2 or 2x2-wire

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

3-wire

Order code	HF13x
Output signal	0…1 V / 0…5 V / 0…10 V / 4…20 mA Only voltage output can be changed
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 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 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 2014/30/EU	
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 % increase 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 (type W, type D), ±1 K (type S)	
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 high accuracy measurement of humidity and temperature is of critical importance. The transmitters can be used in a wide range of industries for HVAC applications, greenhouses, museums, storage rooms, libraries, swimming pools 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
- Wall mount (W)
- Duct mount (D)

OUTPUT PARAMETERS

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

OUTPUT SCALING

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

DISPLAY

- Display with or without backlight
- Without display
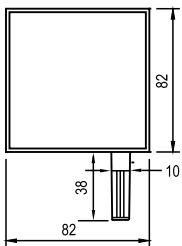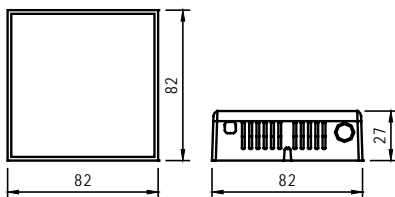
HF3 SPACE MOUNT VERSION

APPLICATIONS

Offices or rooms where good looks are important.

2 or 2x2-wire

Order code	HF320 Type S	HF320 Type R
Output signal	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 signal	0…1 V 0…5 V 0…10 V 0…20 mA 4…20 mA Customer selection possible*	
Supply voltage	18…40 VDC / 13…28 VAC	
Display	Optional (with backlight)	
Temperature range	Scalable*	
Probes	Fixed internal	Retractable

Type R

82
38
10
82

Type S

82
82
27
82

COMPATIBLE

- HW4 software, see page 192

DELIVERY PACKAGE

- Factory adjustment certificate
- Short instruction manual

RECOMMENDED ACCESSORIES

- Service cable   AC3006 / AC3009* (page 88)
- Calibration device (type R)   ER-10MS

* Requires optional HW4 software and service cable

HF3 WALL AND DUCT VERSIONS

APPLICATIONS

Heating, ventilation, air-conditioning.

2 or 2x2-wire

Order code	HF320 Type S
Output signal	4…20 mA
Supply voltage	10…28 VDC

3/4-wire

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

Temperature range	Scalable*
Probes	Fixed
Filter type	Polyethylene

Duct version
Type D
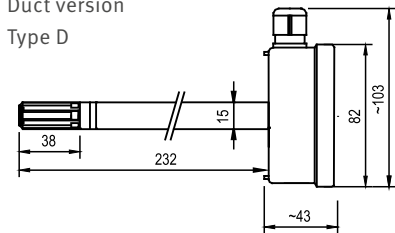
Wall version
Type W
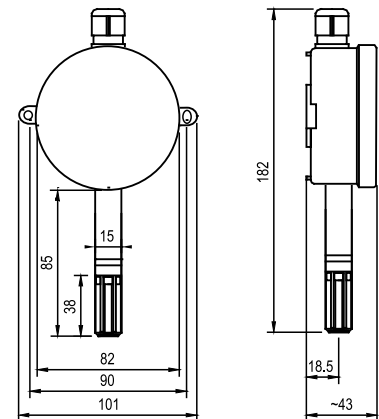
COMPATIBLE

• HW4 software, see page 192

DELIVERY PACKAGE

• Factory adjustment certificate
• Short instruction manual

RECOMMENDED ACCESSORIES

• Service cable	AC3006 / AC3009* (page 88)
• Replacement filter, PE, gray	NSP-PCG-PE
• Calibration device	ER-15
• Mounting 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 2014/30/EU	
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 t63 (63 % increase 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 % increase 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 critical.

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

VERSIONS

- Wall version (W)
- Duct version (D)

OUTPUT PARAMETERS

- Humidity & temperature
- Humidity
- Temperature
- Humidity & dew point

OUTPUT SCALING

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

DISPLAY

- Display with backlight (excl. 2-wire), trend indicators and keypad
- Without display
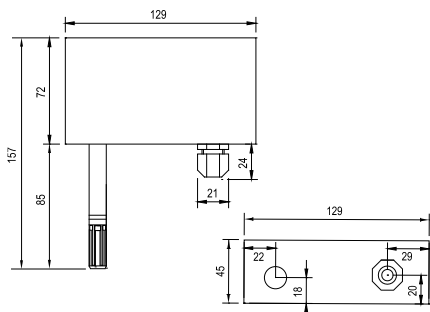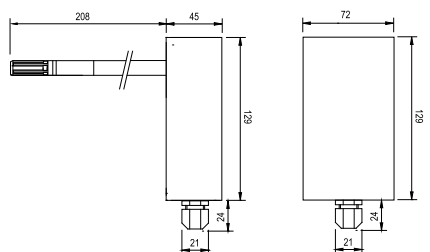
HF4 WALL AND DUCT VERSIONS

APPLICATIONS

HVAC applications, greenhouses, museums, storage rooms, libraries, swimming pools, climate control in office buildings

2 or 2x2-wire

Order code	HF420 Type W/D
Output signal	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 signal	0…1 V 0…5 V 0…10 V 0…20 mA 4…20 mA Customer selection possible*	RS-485 Ethernet WLAN
Supply voltage	18…40 VDC 13…28 VAC	9…35 VDC 7…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	

Wall version, type W

Duct version, type D

COMPATIBLE

- HW4 software, see page 192

DELIVERY PACKAGE

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

RECOMMENDED ACCESSORIES

- Service cable   AC3006 / AC3009*
  (page 88)
- Replacement filter, PE, 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
General		
Parameters	Humidity and temperature	
Calculated parameters	Dew/Frost point	
Housing material / IP protection	ABS / IP65	
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	
Power supply	10…28 VDC	18…40 VDC / 13…28 VAC
Current consumption	2 x 20 mA max.	‹270 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 2014/30/EU	
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 % increase 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 % increase 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 (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)

HF5 SERIES

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

FEATURES

- Interchangeable HC2 probes
- Housing material: ABS / Aluminum
- Accuracy: See chapter «Probes» on page 6
- Temperature limit at probe: See chapter «Probes» on page 6
- Range of application electronics: -40...60 °C / 0...100 %RH; -10...60 °C with display
- Digital outputs, also combinable with analog outputs
- Use as %RH / °C 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

SIGNAL OUTPUTS

- Current outputs, voltage outputs
- RS-485, USB, Ethernet

VERSIONS

- Wall mount (W), duct mount (D), cable version (C) with a selected probe

OUTPUT PARAMETERS

- Humidity & temperature
- Humidity & a psychrometric parameter
- Temperature & psychrometric parameters

OUTPUT SCALING

- Relative humidity: range selectable, standard scale 0...100 %RH
- Temperature: range selectable, standard scale 0...50 °C
- Psychrometric parameters: range selectable

DISPLAY

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

Available with ATEX certificate, see page 172

* Requires optional HW4 software and service cable

HF5 WALL AND DUCT VERSIONS

APPLICATIONS

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

2x2-wire

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

3/4-wire

Order code	HF5xx Type W/D	
Output signal	0…1 V 0…5 V 0…10 V 0…20 mA 4…20 mA Customer selection possible*	RS-485 Ethernet (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)	
Housing	ABS or aluminum	
Display	Optional (with backlight, keypad) Type D only horizontal version possible with display (see pictures)	
Output ranges	Scalable*	
Probes	1 interchangeable HC2 probe input	

Note

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

Wall version
Type W (aluminum)
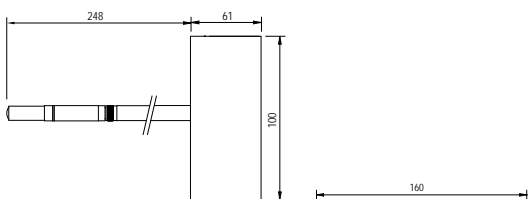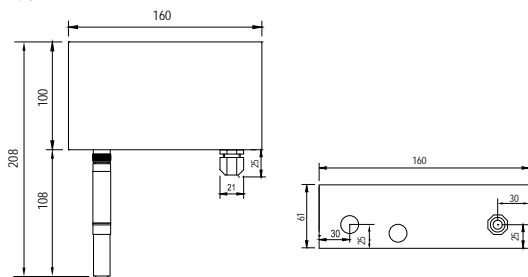
Duct version
Type D (aluminum)
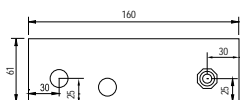
Wall version
Type W (ABS)
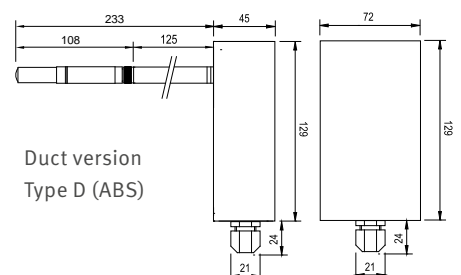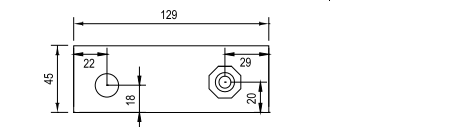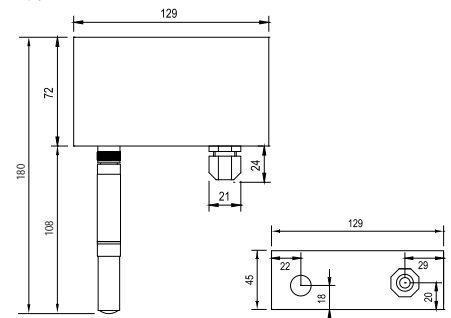
Duct version
Type D (ABS)

*   Requires optional HW4 software and service cable
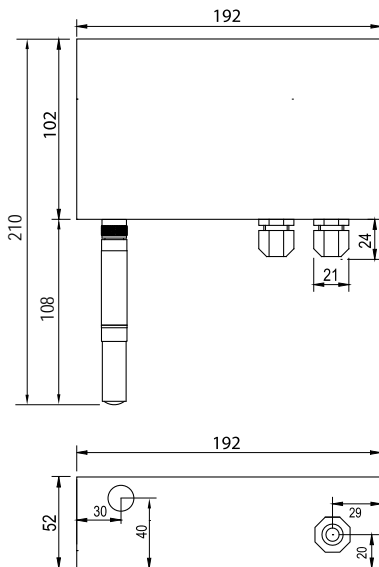
HF5 WALL VERSIONS

4-wire mains voltage

Order code	HF5xx Type W/D	
Output signal	0...1 V 0...5 V 0...10 V 0...20 mA 4...20 mA Customer selection possible*	RS-485 Ethernet
Supply voltage	Mains voltage: 100...240 VAC	
Versions	Type W	
Display	Optional (with backlight, keypad)	
Probes	1 interchangeable HC2 probe input	
Output ranges	Scalable*	
Housing	ABS	

Wall version type W

COMPATIBLE

- All HC2 probes (order separately), page 4
- HW4 software, see page 192

DELIVERY PACKAGE

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

RECOMMENDED ACCESSORIES

- Standard climate probe   HC2A-S
- Probe extension cable 2 m   E2-02A
- Service cable: AC3006*, (page 88)
- 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
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)
Weight	ABS: 220 g	ABS: 220 g, Al: 750 g	ABS: 500 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
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	100...240 VAC
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)
Start-up time	1 min.		
Application temp. housing / electronics	-40...60 °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 2014/30/EU		
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		
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	
USB		USB & RS-485 & analog	
Ethernet		Ethernet RJ45 & RS-485 & analog	

HS5 SERIES

The HS5 transmitters are the latest development in transmitters for humidity and temperature. They are also able to output the results of all psychrometric calculations as analog signals. The instruments measure with interchangeable HygroClip2 probes, enabling an unprecedented class of accuracy.

APPLICATIONS

HVAC applications, food and pharmaceutical industries, hospitals.

FEATURES

- Measurement of humidity and temperature
- All psychrometric calculations available
- Highest precision
- Potential-free mechanical relay
- Digital communication via Ethernet

POWER SUPPLY

- Low voltage: 3-wire

SIGNAL OUTPUTS

- Current output 4…20 mA
- Voltage output 0…10 V
- Ethernet (optional)
- Switch output (relay)

VERSIONS

- Wall mount (W)

OUTPUT PARAMETERS

- Relative humidity and temperature
- A psychrometric parameter (two outputs available)

OUTPUT SCALING

- Relative humidity: 0…100 %RH
- Temperature: 0…50 °C
- Psychrometric parameters: range selectable
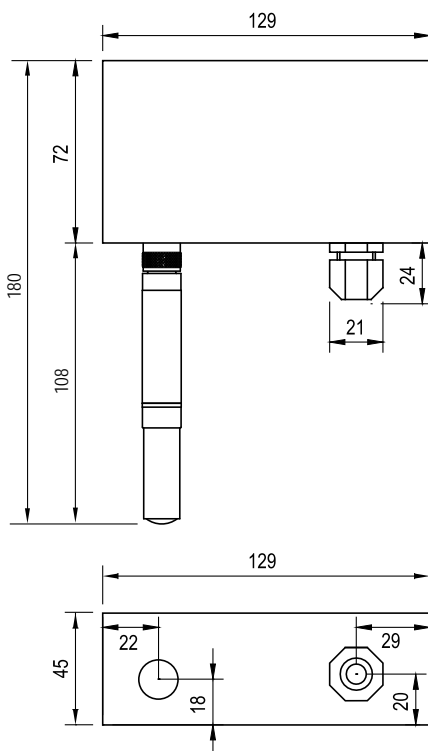
DELIVERY PACKAGE

- Factory adjustment certificate
- Short instruction manual

Technical data	HS5
General	
Device type	Hygrostat and thermostat
Parameters	Relative humidity and temperature
Psychrometric parameters	Yes
Housing material	ABS
IP protection	IP65
Mounting position	Wall mounting
Display	Illuminated graphic LCD
Menu navigation	4 keys (in version with display)
Dimensions	129 x 72 x 45 mm
Weight	240 g
Electrical connections	1 x M16 x 1.5, to terminals
Power supply	15…40 VDC / 12…28 VAC
Current consumption	‹70 mA (Ethernet version ‹150 mA)
Range of application / Storage conditions	-40…60 °C / 0…90 %RH -10…60 °C / 0…90 %RH with LCD
Trend indicator	Yes
External memory function	Yes, 2000 data point memory
Firmware update	Via HW4 software
Service interface	UART
Fire protection class	Corresponds to UL94-HB
CE / EMC compatibility	EMC Directive 2014/30/EU
FDA / GMP conformity	21 CFR Part 11 and GAMP5
Initialization time	‹5 s
Measurement of temperature and relative humidity	
Probe types	All HygroClip2 probes
Accuracy at 23 ±5 K	Probe dependent
Response time $\tau 63$	Probe dependent
Measurement range	Probe dependent
Measurement interval	1 s
Humidity adjustment	Via keyboard/software: multi-point
Temperature adjustment	Via keypad 1-point Via software 2-point
Outputs	
Circuit type	3-wire
Analog outputs	2, freely configurable
Analog output type	0…10 V, 4…20 mA, freely scalable
Resolution analog output	16 bit
Digital communication	Ethernet
Minimum load	›10 kΩ (voltage output)
Maximum load	‹500 Ω (current output)
Load compensation	Yes
Switch output	1 relay (freely configurable)
Type of relay	Change-over switch
Switching capacity	‹50 VAC / ‹75 VDC / ‹1 A

HF7 series

The HygroFlex HF7 transmitters are used wherever harsh environments demand an optimal solution. There is hardly an industrial process 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 a %rh/°C 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

- Wall version (W), duct version (D), cable version (C)

OUTPUT PARAMETERS

- Humidity & temperature
- Humidity
- Temperature
- 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 WALL AND DUCT 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 signal	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 signal	0…1 V 0…5 V 0…10 V 0…20 mA 4…20 mA Customer selection 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
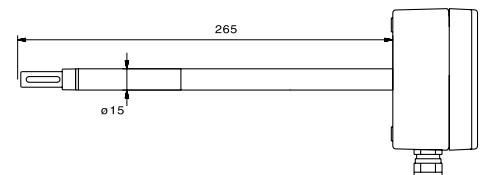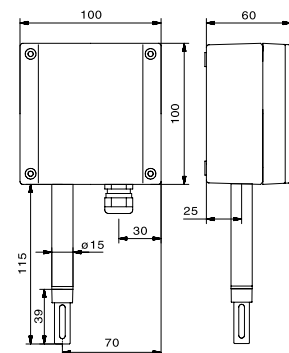
Duct version
Type D

*   Requires optional HW4 software and service cable

47
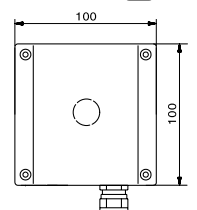
HF7 cable version

2 or 2x2-wire

Order code	HF720
Output signal	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

Order code	HF73x
Output signal	0…1 V 0…5 V 0…10 V 0…20 mA 4…20 mA Customer selection possible*
Supply voltage	18…40 VDC / 13…28 VAC
Probes	Fixed, PEEK with 2 meter cable Fixed, 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

100

60

120

ø 15

100
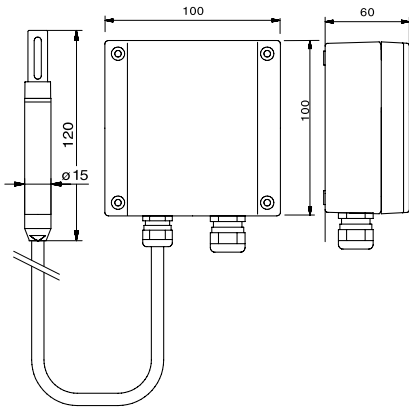
COMPATIBLE

- HW4 software, see page 192

DELIVERY PACKAGE

- 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 88)
- 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 2014/30/EU	
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 % increase 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 % increase 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 high accuracy measurement of humidity and temperature is critical. Thanks to its multifunctional design, it can be used in practically all industrial applications.

FEATURES

- 2 interchangeable HC2 or analog probes
- Accuracy: See chapter «Probes» on page 6
- Temperature limit at probe: See chapter «Probes» on page 6
- 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 a %rh/°C 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 mount (W), cable mount (C)

OUTPUT PARAMETERS

- Humidity & temperature
- Humidity & a psychrometric parameter
- Temperature & a psychrometric parameter

OUTPUT SCALING

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

DISPLAY

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

* Requires optional HW4 software and service cable

HF8 WALL VERSION

APPLICATIONS

HVAC, industry, pharmaceutical industry.

3/4-wire

Order code	HF5xx Type W/D	
Output signal	0…1 V 0…5 V 0…10 V 0…20 mA 4…20 mA Customer selection 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	
Versions	Type W, type D (only horizontal possible)	
Display	Optional (with backlight, keypad)	
Output ranges	Scalable*	
Probes	2 interchangeable HC2 probes	

Wall version
Type W
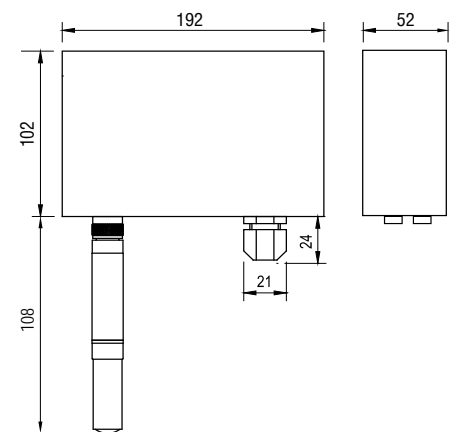
COMPATIBLE

- All HC2 probes (order separately) see page 6
- HW4 software, see page 192

DELIVERY PACKAGE

- Product qualification
- Short instruction manual

RECOMMENDED ACCESSORIES

- Standard climate probe   HC2A-S
- Industrial probe   HC2A-IC102
- Probe extension cable 2 m   E2-02A
- Service cable   AC3006 / AC 3009* (page 88)
- 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 2014/30/EU		
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	4 (except models with Ethernet 2)		
Switch parameters	Every probe and parameter		
Breaking capacity	250 VAC / 2 A at ohmic load		
Analog input			
Supply	Max. 5V / 10mA		
Pull-up load	1 MΩ / 5 V		
Pull-down load	130 Ω		

XB

The OEM transmitter consists of a cable probe, a printed circuit board and an optional housing. Thanks to its compact size, high accuracy and choice of analog outputs, the transmitter can be adapted to meet 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 dependent up to 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*

POWER SUPPLY

- 2-wire (XB20), low voltage 3/4 wire (XB3X)

SIGNAL OUTPUTS

- Current outputs, voltage outputs

VERSIONS

- Printed circuit board with cable probe (C)

PROBES

- PEEK and chrome steel probes
- Probe diameter: 15 mm or 25/15 mm
- Probe length up to 720 mm
- Cable lengths 2 and 5 m

OUTPUT PARAMETERS

- Humidity & temperature
- Dew or frost point & temperature or humidity
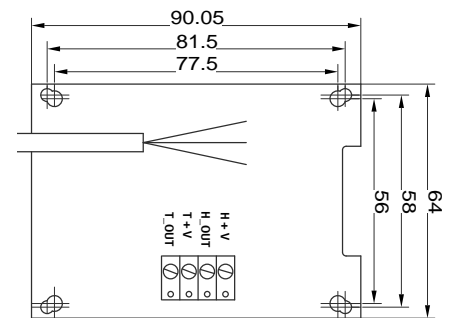
PEEK probe Ø15 mm

PEEK probe Ø15/25 mm

Chrome steel probe Ø 15mm

COMPATIBLE

- HW4 software, see page 192

DELIVERY PACKAGE

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

RECOMMENDED ACCESSORIES

- Wire mesh (SP-M15), sinter steel (SP-S15 and Teflon (SP-T15) filters
- Service cable   AC3006 / AC 3009* (page 88)

*   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. The Rotronic data loggers fulfill the requirements of FDA 21 CFR Part 11 and GAMP5 completely. The data can be read out easily with Rotronic 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

Interface

Wireless data loggers

433 MHz (EU, ASIA)
915 MHz (USA/North America)

RS-485 NETWORK

RS-485

RS-485

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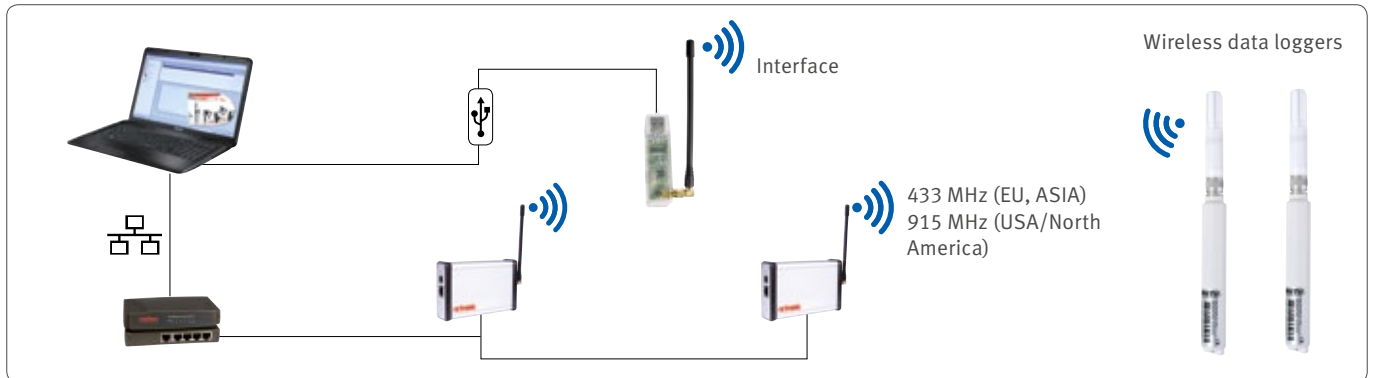
Logger, power supply
via RS-485 network

USB NETWORK

Logger with
power supply

USB hub

ETHERNET NETWORK

Ethernet hub

Logger with power supply
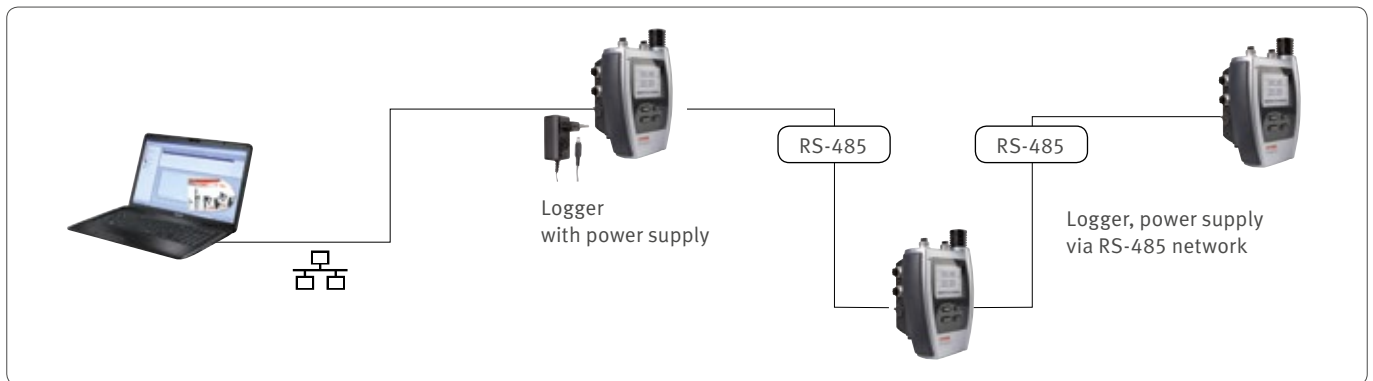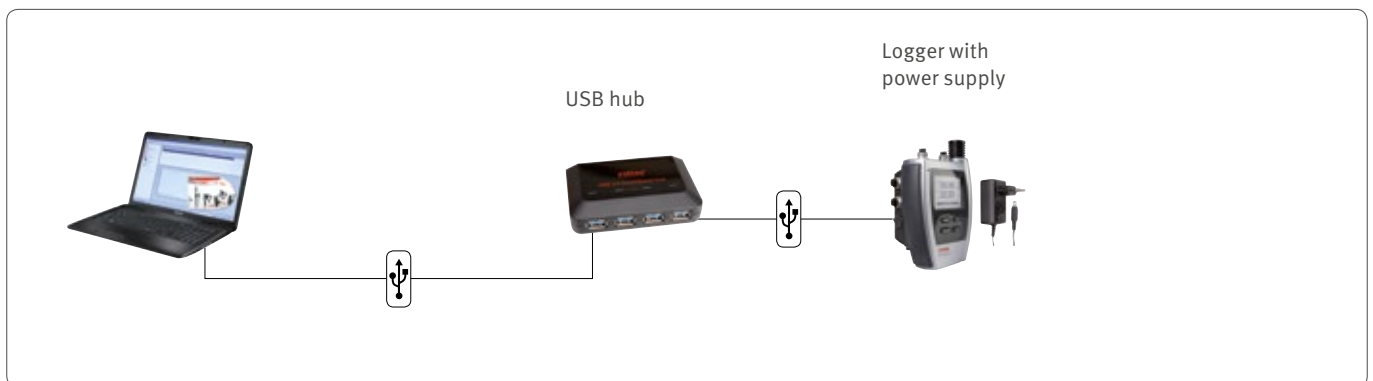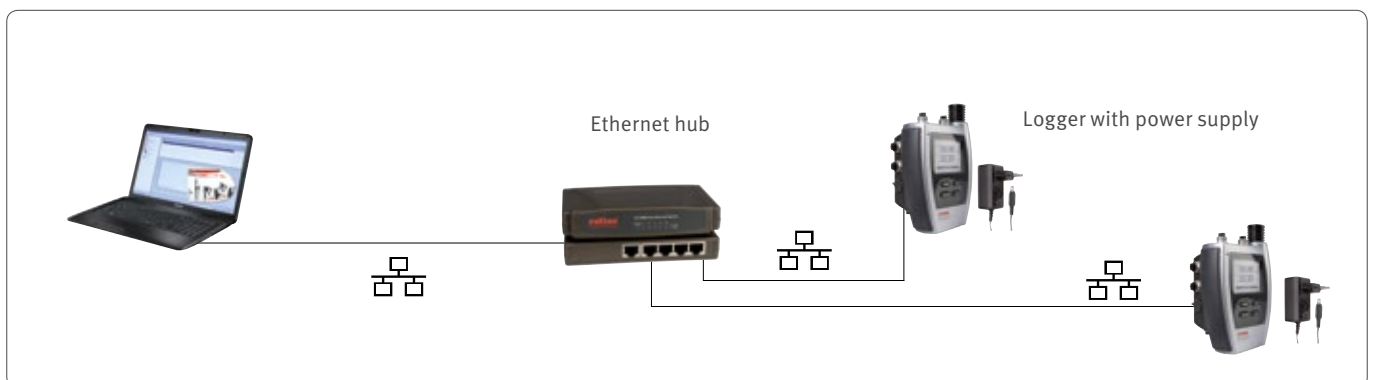
OVERVIEW

	Display	Basic	Compact	High-end	Wireless
	HD1	**HL-1D**	**HL-20**	**HL-NT series**	**LOG-HC2-RC/ML-RC-B**
Memory capacity	–	32,000 lines (each line contains %RH + °C)	20,000 lines	47,000 measured values per MB on memory card	175,000 lines
Sensor	HYGROMER IN-1 / NTC	HYGROMER IN-1 / NTC	HYGROMER IN-1 / Pt100 Class A	Probe dependent	Probe dependent
Range of application	0…50 °C 0…95 %RH	-30…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 point	–	Dew/Frost point	All psychrometric parameters	Only in HW4
Integrated clock	Yes				
Power supply	4x AA batteries	1x CR2 battery	3x AA batteries	9 V battery/Rechargeable battery/Mains	Integrated battery
Configurable logging interval	No	Yes			
Programmable alarms	Yes				No
Interface	–	USB	UART, requires AC3006 service cable	Docking station	Wireless
FDA / GMP compatibility	No	21 CFR Part 11 / GAMP5-compliant HW4 software	Yes	Yes	Yes
IP protection	IP30	IP67	IP40	IP40	IP65
Standards	–	EN 12830	–	–	EN12830
CE / EMC compatibility			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 HW4-LITE software.

FEATURES

- Accuracy: ±3.0 %RH, ±0.3 K
- Compact with very high level of IP protection
- High storage capacity: 32,000 lines
- Free evaluation and configuration software HW4-LITE
- Very long battery life: up to 3 years
- Conforms to EN12830. Version V3.0 and later
- Programmable logging mode

USB-Mini port
(settings and
data download)

Battery compart-
ment

Configuration & evaluation

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	-30…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	32,000 lines (each line contain %RH & °C)
Function	MIN/MAX/AVG
Display	LCD
Resolution	0.1 %RH, 0.1 °C
Display refresh rate	5 s (standard) or same as logging interval
LED indicators	2 LEDs
	Right LED flashes green during data logging
	Left LED flashes red when limits exceeded or low battery state
Communication	USB-Mini port (cable optional)
FDA/GMP compatibility	FDA 21 CFR Part 11 / GAMP 5-compliant HW4 software
Standards	EN12830 (V3.0 and later)

90

23

60
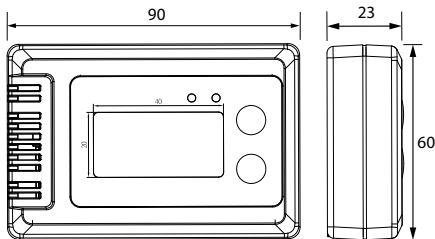
DELIVERY PACKAGE

- Battery, 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, transportation, 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 visual alarms
- Free HW4-LITE software for device configuration and analysing recorded data

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

HL-20-D   HL-20D-SET

HL-20   HL-20-SET

DELIVERY PACKAGE

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

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 modular data logger that can be adapted to meet customer requirements with a wide range of docking stations.

APPLICATIONS
Cleanrooms, storerooms, server rooms, production areas, residential and office rooms, transportation.

FEATURES
- Up to 7 interchangeable probe inputs
- Range of application: logger -30…70 °C (-10…60 °C, with display) 0…100 %RH
- Range of application: probes up to -100…200 °C (peak load), 0…100 %RH
- Calculation of all psychrometric parameters
- Integrated clock with time stamp for every measured value
- Freely selectable logging interval, 5 s…24 h
- Power supply: 9 V (battery, rechargeable battery or docking station)
- Networkable with PC, via docking station (USB, RS-485, Ethernet, WLAN)
- Audible and visual alarms
- IP40

HL-NT2-P   HL-NT2-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

HL-NT3-P   HL-NT3-DP

DELIVERY PACKAGE

- 128 MB flash card, battery
- Short instruction manual
- Factory adjustment certificate (for models supplied with a probe)

RECOMMENDED ACCESSORIES

- PC access 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

HL-DS-U2

HL-DS-U4-WL

Overview docking stations														
Order code	**Inputs**						**Interfaces**							
	External power supply (12-24 VDC)	HygroClip2 or analog inputs	Analog input 0...2.5 V	Analog input 0(4)...20 mA	Digital inputs (switch contact)	Pt100 inputs	RS-232 & RS-485	USB & RS-485	Ethernet TCP/IP RJ45 & RS-485	Ethernet TCP/IP RJ45	WLAN & RS-485	WLAN	Relay outputs	Use with Internet browser *
HL-DS-NT0														
HL-DS-NT1	✓													
HL-DS-NT2	✓						✓							
HL-DS-NT3	✓							✓						
HL-DS-NT4	✓				2				✓					
HL-DS-NT4-WEB*	✓				2					✓				✓
HL-DS-NT4-WL	✓				2						✓			
HL-DS-PT2	✓				2	4	✓							
HL-DS-PT4	✓				2	2			✓					
HL-DS-PT4-WL	✓				2	2					✓			
HL-DS-R-1	✓				2		✓						2	
HL-DS-U1	✓	4	✓		2		✓							
HL-DS-U2	✓	4	✓		2			✓						
HL-DS-U2-420	✓	4		✓	2			✓						
HL-DS-U4	✓	4	✓		2				✓					
HL-DS-U4-420	✓	4		✓	2				✓					
HL-DS-U4-420-WEB*	✓	4		✓	2					✓				✓
HL-DS-U4-WEB*	✓	4	✓		2					✓				✓
HL-DS-U4-WEB-WL*	✓	2	✓		2							✓		✓
HL-DS-U4-WL	✓	2	✓		2						✓			

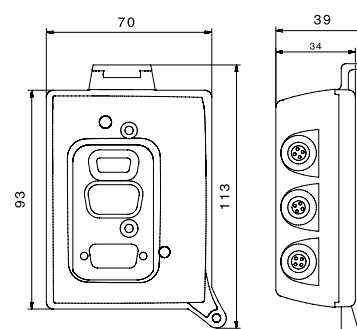* WEB: Access to data logger without HW4 software possible via browser.

DELIVERY PACKAGE

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

RECOMMENDED ACCESSORIES

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

Order code	Description
AC adapter	
AC1211-V1	AC adapter for HygroLog NT docking stations, 240 VAC / 12 VDC
Connection sets	
Hygrodata-HL-E-USB	PC connection set, consisting of: HW4-E standard software, docking station HL-DS-NT3 and USB data cable
Hygrodata-HL-P-USB	PC connection set, consisting of: HW4-P professional software, docking station HL-DS-NT3 and USB data cable
HW4 software	
HW4-E-V3	Standard software for programming and data management. Licensed for a single PC.
HW4-P-V3	Professional software with network and access control options and additional graphic functions. Licensed for multiple PC use on the same site
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 possible self-heating of the internal probe in loggers with connected Ethernet docking station
E2-01A	Probe extension cable for HC2 probes, 1 m, black
E3-01A	Probe extension cable for HC2 probes, 1 m, white
E2-02A	Probe extension cable for HC2 probes, 2 m, black
E3-02A	Probe extension cable for HC2 probes, 2 m, white
E2-05A	Probe extension cable for HC2 probes, 5 m, black
E3-05A	Probe extension cable for HC2 probes, 5 m, white
E2-02A-S	Probe extension cable for HC2 probes, 2 m, black, with short connector
E3-02A-S	Probe extension cable for HC2 probes, 2 m, white, with short connector
Communication cables	
AC0001	Standard Ethernet patch cable, 3 m, RJ45 connector
AC0002	Standard USB A/B cable, 1.8 m
AC0004	Standard RS-232 cable, 1.8 m
AC0005	Ethernet patch cable, cat. 5e, unshielded twisted pair, 3 m, crossover
AC1614/02	RS-485 cable to HygroLog NT docking station, for cabling via terminal box
Signal amplifier	
AC3003	Signal amplifier set for cable lengths up to 100 m. The set consists of: - 2 connection cables with electronic amplifier - open cable ends for connection via terminal box
Memory 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 station

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 recorded
- 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	Display
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
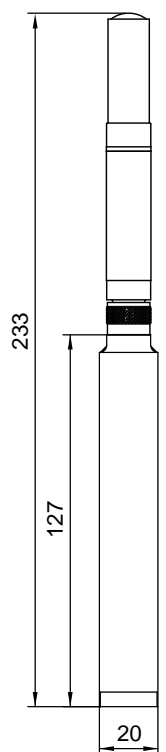
COMPATIBLE
- Rotronic HC2 probe, page 11
- LAN interface, page 64
- USB wireless adapter, page 65

DELIVERY PACKAGE
- 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 simultaneously
- 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/North America)
- Configurable via web browser
- Housing material: aluminum
- Power supply via AC adapter

Order code	Device type
LAN-INTERFACE	433 MHz version with standard antenna
LAN-INTERFACE-US	915 MHz USA/North America version with standard antenna
HL-LAN-INTERFACE	433 MHz version, compatible with RMS and HL-RC data loggers
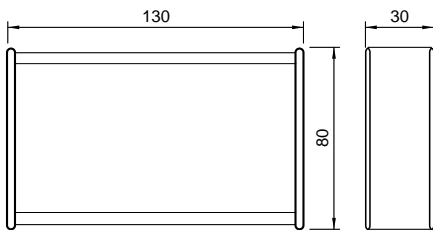
Technical data	LAN interface
Type	Network (Ethernet) readout device for wireless data loggers
Radio frequency	433.92 MHz (US: 915 MHz)
Power supply	Via AC adapter, 5 V, min. 500 mA
Transmission distance	Up to 100 m (with standard antenna) for short-range wireless communication at 433.92 / 915 MHz
Dimensions (H x L x W) without antenna	30 x 130 x 80 mm
Software	HW4 V3.2 or later (V3.8 HL-LAN-INTERFACE)

COMPATIBLE

- Wireless data loggers, page 63, 104
- Ground plane antenna, page 66

DELIVERY PACKAGE

- Short instruction manual
- AC adapter

USB WIRELESS ADAPTER

The USB wireless adapter acts as 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/North America))
- 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

COMPATIBLE

- Wireless data loggers, page 63, 104
- Ground plane antenna, page 66

DELIVERY PACKAGE

- Short instruction manual

433 MHZ GROUND PLANE ANTENNA

FEATURES
- Industrial antenna for improved reception, higher range
- Suitable for use both indoors and outdoors
- Includes 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 63, 104
- Ground plane antenna, page 66

DELIVERY PACKAGE
- Short instruction manual

THERMO HYGROMETER DISPLAY HD1

The compact HD1 thermo hygrometer display is ideal for monitoring temperature, relative humidity and dew point in cabinets, rooms or your work environment. You can mount the HD1 easily on the wall thanks to its integrated fastening points or set it up on a flat surface at your workplace.

FEATURES
• MAX/MIN/AVG function
• Audible and visual alarms
• Time and date
• Industrial accuracy

Technical data	HD1
General	
Parameters	Relative humidity and temperature
Range of application	0…50 °C / 0…95 %RH, non-condensing
Power supply	4x AA batteries
Battery life	Approximately 1 year
Dimensions	98 x 120 x 40 mm (H x W x D)
Housing	ABS
IP protection class	IP 30
Weight	270 g
Functions	
Resolution	0.1 °C / °F / %RH
Measurement interval	10 s
Humidity measurement	
Humidity sensor	ROTRONIC HYGROMER® IN-1
Measurement range	0…100 %RH
Accuracy	±3 %RH (@ 25 °C, 10-90 %RH) Remaining range ±5 %RH
Temperature measurement	
Sensor	NTC
Measurement range	0…50 °C / 32…+122 °F
Accuracy	±0.5 K
Dew point calculation	-20…50 °C / -4…122 °F
MIN/MAX/AVG	MIN: Minimum measurement, shows the minimum value since the last reset MAX: Maximum measurement, shows the maximum value since the last reset AVG: Average value over the last 7 days
LED	Flashing red: When alarm values have been exceeded (Hi/Lo)
Beeper	When alarm values have been exceeded (Hi/Lo)
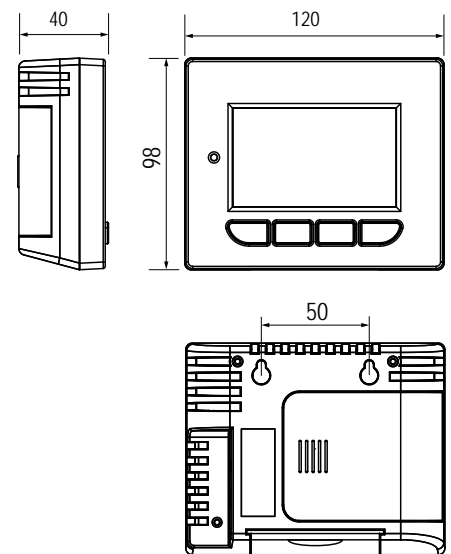
DELIVERY PACKAGE

• Factory adjustment certificate
• Short instruction manual
• 4x AA batteries

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 at the factory 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 for all applications. They are easy to maintain and probes can be calibrated. All HP32 handhelds can be used for adjustment of transmitters and for system validation.
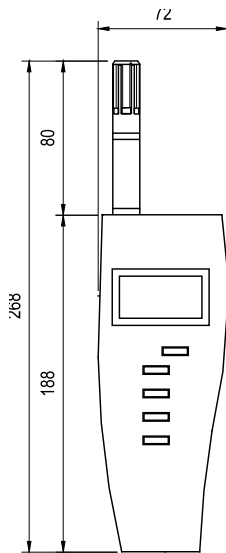
HYGROPALM21

The HP21 is the ideal instrument for humidity and temperature measurement in simple applications. 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
- Calculation of dew/frost point
- Adjusted at 23 °C and 10 / 35 / 80 %RH
- Service interface (UART)
- LC display with trend indicators

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

DELIVERY PACKAGE

- Factory adjustment certificate
- Short instruction manual
- Battery

RECOMMENDED ACCESSORIES

- Service cable   AC3006
- Polyethylene filter, gray, 20 µm   NSP-PCB-PE
- Calibration device for HC2A-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

HYGROPALM32

The HygroPalm32 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
- High flexibility thanks to HC2 compatibility
- Easy use
- All psychrometric calculations
- Graphic display of saved data
- Visual and audible alarms
- Magnetic attachment, e.g. to ventilation shafts
- Programmable logging
- Professional HW4 evaluation software

Order code	HP32
Device type	Handheld instrument for interchangeable HC2 probes
Filter type	Compatible with all HC2 probes (order separately)
Material	ABS, TPR
Power supply	Integrated rechargeable battery
Weight	185 g

65.2

150

COMPATIBLE
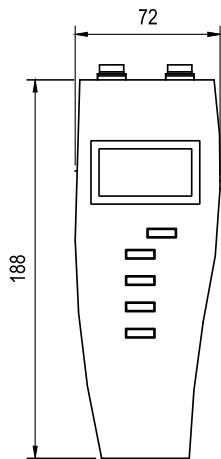
- With all Rotronic HC2 probes

DELIVERY PACKAGE

- Short instruction manual
- Soft case
- USB-Micro service cable AC0006

RECOMMENDED ACCESSORIES

- Polyethylene filter, gray, 20 μm   NSP-PCB-PE
- Humidity standard for calibration 10 %RH   EA10-SCS
- Humidity standard for calibration 35 %RH   EA35-SCS
- Humidity standard for calibration 80 %RH   EA80-SCS

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 for 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, HC2A-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

COMPATIBLE

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

DELIVERY PACKAGE

- 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 AC adapter	AC1212

Specifications handheld instruments

Features	HP21	HP32	HP23-A
Probe type	Fixed probe	HC2A-xx (not included)	HC2A-xx (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	Yes	Yes
Battery indicator	Yes		
Real time clock	No	Yes	Yes
Functions			
Adjustment of transmitters	No	No	Yes
Adjustment via keypad	Single-point %RH & °C	Single & multi-point %RH Single-point °C	
Probe adjustment with dew point reference	No		Yes
Calculations	Dew point / Frost point	All psychrometric parameters	
Data logging	No	8 x 8,000 measurement points	20,000 data records (2 x 10,000 pairs of measurement points)
Electrical specifications			
Power supply	9 V battery or rechargeable battery	Integrated rechargeable battery	9 V battery, rechargeable battery, USB cable, 5 VDC AC adapter
Rechargeable battery charge	No		Yes
Battery life (typical, without backlight)	80 h	4…7 h	80 h (1 probe)
Communication interfaces	UART service cable AC3006	Micro USB Service cable AC0006	Mini USB Service cable AC0003
Max. length probe cable		5 m	
Mechanical specifications			
Housing material	ABS (housing), polycarbonate (probe)	ABS, TPR (housing)	ABS (housing), polycarbonate (probe)
Dimensions	274 x 72 x 35 mm	150 x 65 x 31 mm (without probe)	188 x 72 x 35 mm (without probe)
Weight	200 g	185 g	200 g
CE / EMC directives	2014/30/EU		
FDA / GMP compatibility	FDA 21 CFR Part 11 / GAMP 5-compliant HW4 software		
IP protection class	IP40	IP65	IP40

Measuring instrument
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 rigid 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 rigid sword probe
	Calibration device, EGS
	SCS humidity standard, EA50-SCS (5 ampoules, 50 %RH with SCS certificate)
	Adjustment screwdriver
	Carry case, AC1102
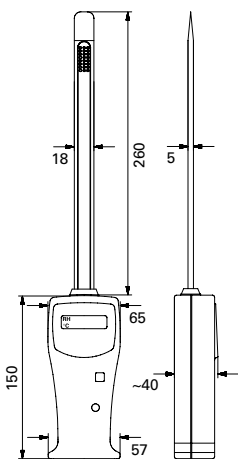
The white paper contains detailed theory about humidity in the paper production and printing industries.
www.rotronic.com/gts

DELIVERY PACKAGE

- 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

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.

HygroGen2 with external MBW473 dew point reference

HG2-S and HG2-XL in comparison

HYGROGEN2

Since its launch, the Rotronic HygroGen has defined the standard for portable humidity and temperature calibration. Hundreds of users worldwide have identified that this tool for the rapid generation of stable temperature and humidity conditions can save significant amounts of time in performing calibrations of all types of humidity instruments from all manufacturers.

The HygroGen2 further satisfies the stringent demands of quality and compliance regulations with its ability to calibrate instruments over their full working range, and is embraced throughout the pharmaceutical industry as the leading instrument in its class and is favored in ISO 17025 humidity calibration laboratories across the world.

Being portable and robust, it can be set up at the installation location allowing for complete system qualification. The rock-solid stability, minimal thermal gradients and quick set-point changes of HygroGen2-S are now replicated in a new family member: HygroGen2-XL, which boasts a chamber with 10 times the capacity.

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

FEATURES
- Generates stable humidity and temperature conditions (‹±0.1 %RH, ‹±0.01 °C)
- Calibration solution for the laboratory and on-site
- Humidity equilibrium typically in only 5 minutes for HG2-S, 15 minutes for HG2-XL
- Calibrates multiple probes simultaneously
- «AutoCal» automatic calibration (optional)
- «Remote API» logging and control with third-party software (optional)
- Integrated FDA 21 CFR part 11 compliant Rotronic HW4 software

VIDEO HYGROGEN2

Interested? Then scan the QR code!

DELIVERY PACKAGE

- Instruction manual
- SCS certificate for reference probe

RECOMMENDED ACCESSORIES

- See HygroGen2 accessories – page 76
- «AutoCal» automatic calibration
- Extended ranges of application «HumiExt» and «TempExt»
- «ExtRef» chilled mirror reference
- «RemoteSS» remote screen sharing
- «RemoteAPI» programming interface for remote control

HygroGen2 Specifications		HG2-S	HG2-XL
Chamber volume		2 liters	20 liters
Working volume		1.5 liters	17 liters
Humidity changes (‹±0.1 %RH stability)	5...95 %RH	‹5 minutes	‹15 minutes
Temperature changes (‹±0.01 °C stability)	23...50 °C	‹5 minutes	‹15 minutes
	23...0 °C	‹25 minutes	‹35 minutes
Temperature gradients	15...50 °C	‹±0.05 °C	‹±0.05 °C
	5...60 °C	‹±0.1 °C	‹±0.1 °C
	0...5 °C	‹±0.15 °C	‹±0.15 °C
Probe mounting		Up to 6 probes through door ports	8 probes through the door, plus internal shelf racks
Weight & dimensions		13 kg, 45 x 41x 21 cm	37 kg, 80 x 62 x 41 cm
Working principle	Mixed flow with desiccant dryer cell and piezoelectric humidifier; Peltier thermoelectric element with radial chamber mixing fan		
Control probe specification	± 0.8 %RH (10...30 °C), ± 2 %RH (0...60 °C) ± 0.1 K (10...30 °C), ± 0.3 K (0...60 °C)		
Typical calibration uncertainty	± 1.5 %RH (k=2) at 23 °C, ± 0.15°C (k=2) 15...50 °C		
Sensor	HygroClip2, capacitive RH sensor, Pt100 temperature sensor		
Control type	Embedded multiple PID controller, touch screen graphical user interface		
Programmer function	20 user programs can be saved, up to 200 set-points per program can be changed		
External sample loop for MBW reference	Temperature controlled outlet and inlet, 6 mm fittings		
USB ports	7 front, 2 rear		
Integrated software	Rotronic HW4 (FDA 21 CFR part 11 compliant)		
Water level	Low and high alarm, bar graph status indication		
Water quality	UV sterilization, auto time cycling		
Desiccant condition	Condition monitored during control operation		
Optional enhanced features	Temperature and humidity range extensions, AutoCal, External MBW/RHS Reference Integration, Remote Screen Share, Remote API		
Power supply	110...240 VAC 50/60 Hz, 3 A (240 VAC) 6A (110 VAC)		
Housing	Powder coated aluminum and steel, IP20		
Operating conditions	10-35 °C, ‹2000 m altitude		
CE	Safety:	EN 61010-1:2001	
	EMC:	EN 61326-1:2006	
		EN 61000-6-1:2007	

Order code	Description
HG2-S	HygroGen2 with touch screen, calibrated control/reference probe, set-point control & programmer function, heated sample loop, desiccant cell, fill syringe, embedded HW4-P software. Order chamber door separately
HG2-XL	HygroGen2-XL with touch screen, calibrated control/reference probe, set-point control & programmer function, heated sample loop, 2 x desiccant cell, fill syringe, embedded HW4-P software.
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	Extension (activation key): automatic calibration function
HG2-ExtRef-Code	Extension (formerly Autocal+, requires AutoCal or RemoteAPI, activation key): MBW/RHS External Reference Integration - enables MBW chilled mirror as external reference
HG2-TempExt-Code	Extension (activation key): extended temperature range -5...60 °C
HG2-HumiExt-Code	Extension (activation key): extended humidity range 2...99 %RH
HG2-RemoteSS-Code	Extension (formerly Remote, activation key): Remote Screen Share
HG2-RemoteAPI-Code	Extension (activation key): programming interface for remote control
HG2-EF-Bundle1	Bundle 1 (activation key): [TempExt / HumiExt / AutoCal]
HG2-EF-Bundle2	Bundle 2 (activation key): [AutoCal / ExtRef / RemoteSS]
HG2-EF-Bundle3	Bundle 3 (activation key): [TempExt / HumiExt / AutoCal / ExtRef / RemoteSS]
HG2-EF-Bundle4	Bundle 4 (activation key): [RemoteAPI / ExtRef / RemoteSS]
HG2-EF-Bundle5	Bundle 5 (activation key): [TempExt / HumiExt / RemoteAPI / ExtRef / RemoteSS]
HG2-EF-Bundle6	Bundle 6 (activation key): [TempExt / HumiExt / AutoCal / RemoteAPI / ExtRef / RemoteSS]

HG2-D-888888 door with plugs
and probe sleeves

Door cross section

HygroGen bag

HygroGen case

HygroGen2 / HygroGen2-XL accessories	
Consumables	
HG2-DES-3	Desiccant for molecular sieve (3 kg)
Chamber doors, plugs and probe sleeves	
HG2-D-11111	HG2-S door, 5 x 15 mm ports (for 5 HygroClips) with 5 bungs; order specific B1 sleeves to suit smaller probe diameters
HG2-D-888888	HG2-S door, 6 x 30 mm ports with 6 bungs; order specific B8 sleeves to suit smaller probe diameters
HG2-HFW	HG2-S door for HF3 and HF4 wall mount transmitters, also HP21 handheld with fixed probe
HG2-DP-00000	HG2-S clear acrylic door (no ports) for instruments with displays
HG2-B1	15 mm bung for HG2-D-11111
HG2-B1-xx	B1 probe sleeves for HG2-D-11111 (external: 15 mm; internal: probe diameter see xx diameter codes)
HG2-B8	30 mm bung for HG2-D-888888
HG2-B8-xx	B8 probe sleeves for HG2-D-888888 (external: 30 mm; internal: probe diameter see xx diameter codes)
HG2-D-xxxxx	HG2-S custom door for › 30 mm ports, please ask your Rotronic dealer for the doors available
HG2-Bxx	Custom bung
HG2-Bxx-xx	Custom probe adaptor sleeves
HG2-D-888888-Map	HG2-D888888 door with detachable mapping rig
Accessories	
HG2-TB	HG2-S transit bag, lightweight
HG2-TC	HG2-S heavy-duty transit case
HG2-AC3001-L/050	HygroClip2 calibration cable, 50 cm, USB connector
HG2-AC3001-L/050(5)	HygroClip2 calibration cable, 50 cm, USB connector Bundle of 5 pieces HG2-AC3001-L/050
HG2-PRT-Ring	PRT mounting ring for permanent monitoring of HG2-S using external temperature reference

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 HP32-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
EA05-SCS	5 %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

DELIVERY PACKAGE

- SCS certificate
- Textile pads
- Calibration instructions

RECOMMENDED ACCESSORIES

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

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	
Push-on calibration devices. **Gasket with O-ring and thumb screw**		
ER-15	For 1 probe Ø 14…15 mm Brass, nickel-plated	
EDM 15/15	For 2 probes Ø 14…15 mm Brass, nickel-plated	
ER-20K	For 1 probe Ø 20 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	
EM-G	For probe types E, HP…IE… Screw-in probes (½" G / ½" NPT) Brass, nickel-plated	
Calibration devices for special probes		
EGS	For all sword probes Brass, nickel-plated	
ER-CRP	For HC2-CRP cleanroom probes POM, FKM, PA, PUR, PEEK	
EM-25-HM	For HM4 probes POM, brass, nickel-plated	

Order code	Use	
Push-on calibration devices. **Gasket with O-ring and thumb screw**		
ERV-15	For 1 probe Ø 14…15 mm Vertical calibration position Brass, nickel-plated	
ER-05	For 1 probe Ø 4…5 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 HC2A-S probes		
EMV-25	For 1 probe Ø 25 mm (PG11) Vertical calibration position Aluminum, Ematal-coated	
Calibration devices for special probes		
WP-14-S	For bell probes HC2-AW, HC2-AW-USB, AW-DIO POM, stainless steel 1.4305	
HL-20-CAL	For HL-20 POM Spring steel 1.4310	

Other calibration devices on request.

Ex-xxA

Ex-xxA-S
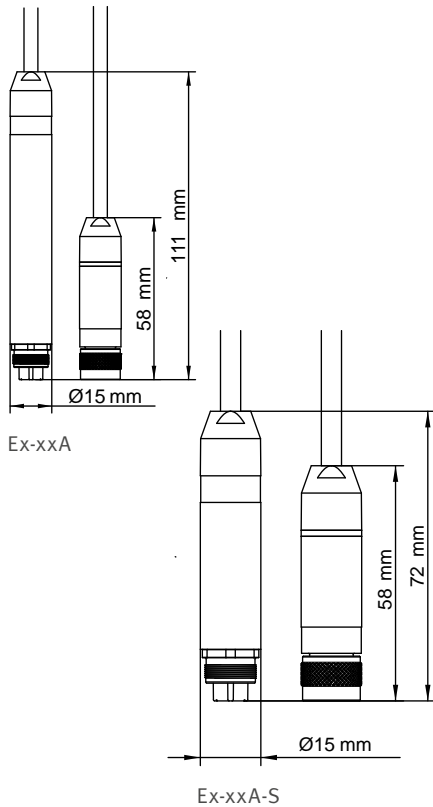
EXTENSION CABLES

For HC2 probes

The HC2 extension cables extend the HC2 probes away from transmitters, The HC2 extension cables extend the HC2 probes away from transmitters, handheld instruments or data loggers. and data loggers. The HC2 extension cables can be used up to 5 meters. For longer cable runs, use the AC3003 signal amplifier for distances up to 100 meters.

FEATURES
• Range of application -40…90 ºC

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	
E2-01A-M	1 m	Normal	Black, with metal connector
E3-02A-M	2 m		
E3-05A-M	5 m		
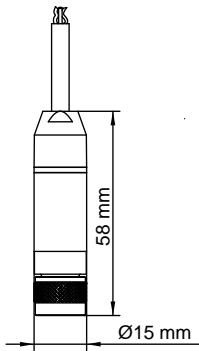
EXTENSION CABLES

For use with HC2-S3C03(PT15) meteorological probe and analogue probes.

FEATURES
• Range of application -40…70 ºC
• Open ends for connection of HC2-S3C03(PT15) meteorological probe and analogue probes to a HP23-A, HF5, 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 ºC
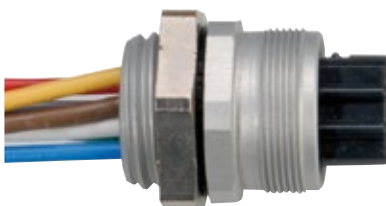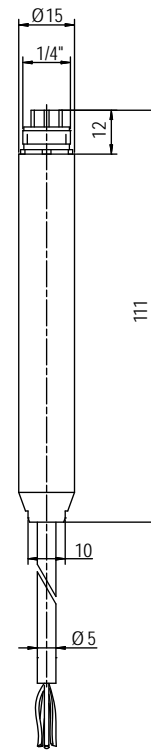
Order code: E2-XX
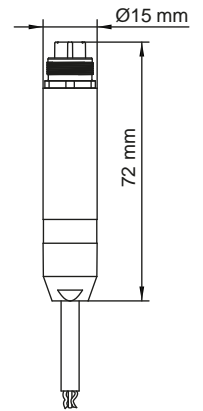
EXTENSION CABLES

For HC2 probes with open ends

The HC2 probe extension cables with open ends can be used to integrate HC2 probes into users' analog or digital networks.
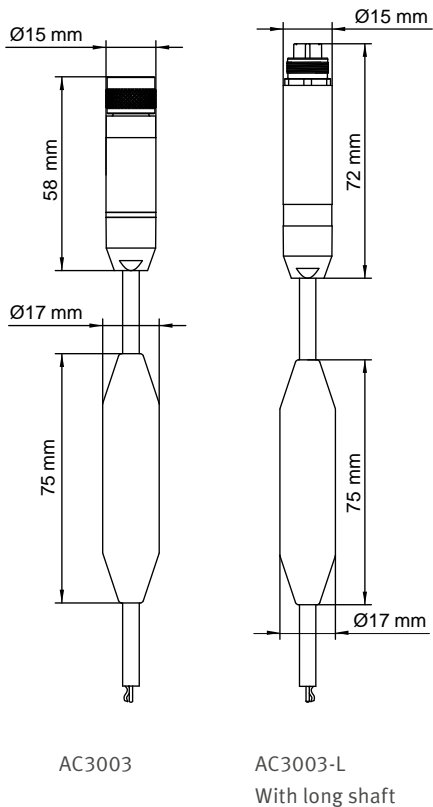
Extension cables for HC2 probes with open ends				
Order code	**Cable length**	**Shaft**	**Color**	**Range of application**
Supply voltage 3.3 VDC (without electronic control)				
E2-01XX	1 m	Normal	Black	-40..90 °C
E2-02XX	2 m			
E2-02XX-S	2 m	Short [S]		
E2-05XX	5 m	Normal		
E2-05XX-S	5 m	Short [S]		
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)		

Ø15
1/4"
12
111
10
Ø5

E2-01xx

Ø15 mm
72 mm

E2-02xx-S

Ø15 mm

Ø15 mm

58 mm

72 mm

Ø17 mm

75 mm

75 mm

Ø17 mm

AC3003

AC3003-L
With long shaft

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	‹100m (Cat5 cable not included)
AC3003-Cable-L	Cat. 5 cable S/FTP stranded wire	‹100m (Cat5 cable not included)
AC3003/10	AC3003 with luster terminal and pre-assembled Cat. 5 cable, normal shaft	10 m
AC3003/20		20 m
AC3003/50		50 m
AC3003/80		80 m
AC3003/100		100 m

Ø15 mm

58 mm

ø5

35

8

8
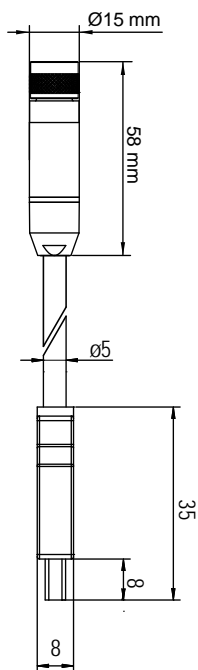
AC2001

SERVICE CABLE
HF TRANSMITTERS

FEATURES
- Transfer of measured values from HF3/4/5/7/8 to HP32/23
- USB-Mini to 7-pin connector

| Service cable for HF-series transmitters	
Order code	Description
AC2001	Service cable for HF-series transmitters

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	Short shaft
AC3001-L	USB converter cable	Long shaft [L]
XD-AC3001	Active UART to USB converter cable for XD probes	Short shaft

AC3001   AC3001-L
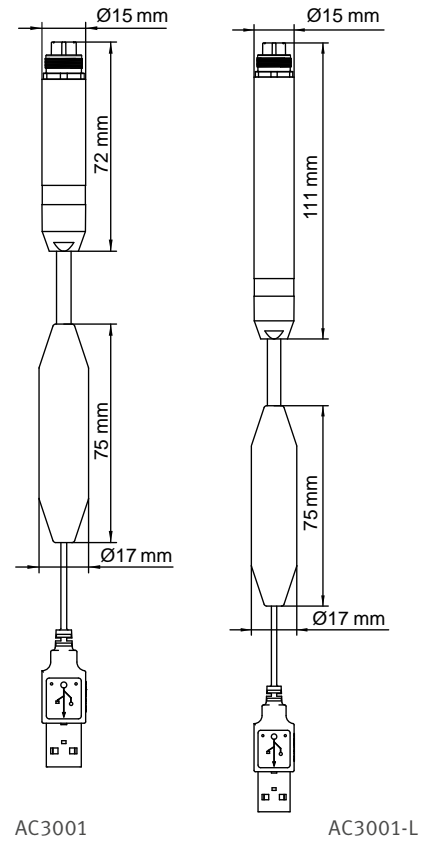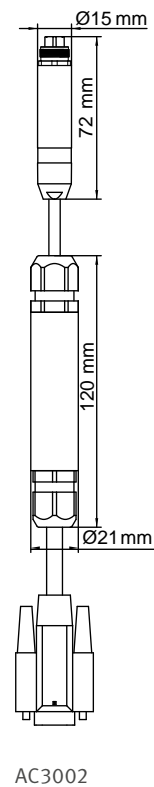
RS-232 ADAPTER

For HC2 probes

FEATURES

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

| RS-232 adapter for HC2 probes		
Order code	**Description**	**Cable length**
AC3002	Active UART to RS-232 converter cable	2.8 m
AC1207	AC adapter 9 V	

AC3002

ETHERNET CONVERTER

For HC2 probes

FEATURES
- To connect HC2 probes to a PC via the Ethernet interface
- Requires HW4 software on the PC
- Power supply via AC 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	AC adapter 9 V	
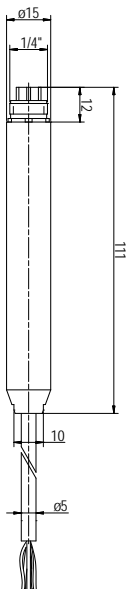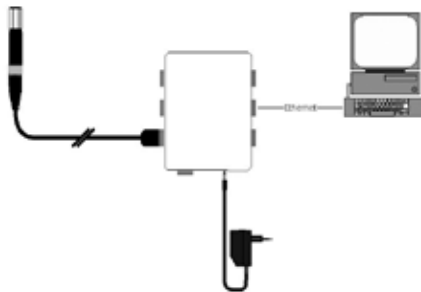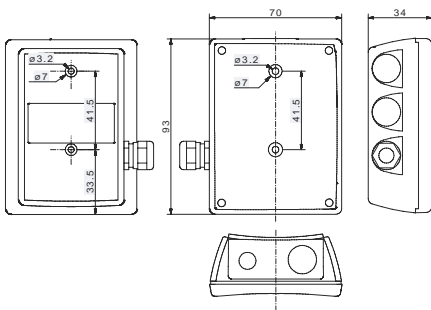
RS-485 AND MODBUS CONVERTER

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

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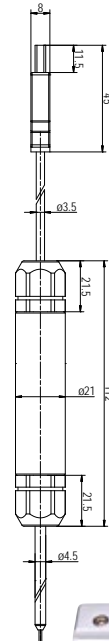
ETHERNET / RS-485 CONVERTER

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.

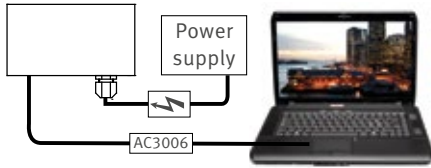| Ethernet / RS-485 converter	
Order code	**Description**
AC3011	RS-485 Masterbox

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

SERVICE CABLES

AC3006

AC3009

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) ensure that the computer or laptop is galvanically isolated from the main power supply.

AC3006 / AC3009

Service cables		
Order code	**Description**	**Length**
AC3006	Service cable without power supply	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

AC0006

AC0003

AC0002

	AC3006	AC3009	AC0002	AC0003	AC0006
HF1				✓	
HF3	✓	✓			
HF4	✓	✓			
HF5	✓	✓			
HF7	✓	✓			
HF8	✓	✓			
TF5	✓	✓			
PF4	✓	✓			
HL-20	✓	✓			
HL-NT			✓		
BL-1D				✓	
HL-1D				✓	
TL-1D				✓	
CL11				✓	
HP21	✓	✓			
HP32					✓
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

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

Other types available on request.

PROTECTIVE CAPS

FEATURES

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

Protective caps	
Order code	Protection
Protection E2/E3	Connectors
Protection filter	Sensor
Protection HC2	Complete HC2 probe

Protection filter

Protection HC2   Protection E2/E3

MOUNTING KITS

Mounting kits	
Order code	Description
AC5002	DIN top-hat rail adapter for PF4, HF4, HF5, HF8, AC3011 (2 pc.)
AC5012	Mounting plate for HF4, HF5, HS5

AC5002

AC5012

DESKTOP STAND

For HygroPalm HP21, HP23-A / TP22

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

Desktop stand for HygroPalm HP21, HP22, HP23-A / TP22	
Order code	Description
DESK-HP	Desktop stand

UNIVERSAL DESKTOP STAND

For HygroPalm HP21, HP22-A, HP22-A, 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, HP22-A, HP23-A / HygroLog HL-NT	
Order code	Description
DESK-NT	Desktop stand

ALL YOU NEED TO MEASURE TEMPERATURE

The portfolio of temperature measuring equipment from Rotronic comprises a range of Pt100 4-wire probes and devices including transmitters, handheld instruments and data loggers.
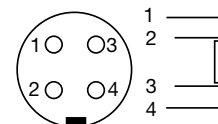
PROBES

TRANSMITTERS

DATA LOGGERS

HANDHELD INSTRUMENTS

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 increase (air velocity = 2 m/s)	

Pt100 input

4-wire Pt100

Order code	Probe type	Measurement range class A accuracy (IEC 60751)
AC1900	Fixed probe 100 x 3 mm DIN 1.4404	-50...300 °C
AC1902	Insertion probe with handle 249 x 3 mm DIN 1.4404	-50...300 °C
AC1903	Cable probe 200 x 6 mm Not waterproof DIN 1.4404	-50...300 °C
AC1904	Cable probe 50 x 6 mm Waterproof DIN 1.4301	-50...300 °C
AC1905	Surface probe 40 x 10 x 5 mm DIN 1.4301	-50...300 °C
AC1909	Fixed probe for measurements in air, 100 x 4 mm DIN 1.4401	-50...300 °C
AC1913-A	Kapton foil probe, 20 x 15 x 2 mm	-50...200 °C
AC1916-A-T	Cable probe 60 x 6 mm Waterproof DIN 1.4571	-30...200 °C

Order code	Probe type	
HC2-PT100-B4	Adapter for Pt100 probes to HP32, HP23-A, HF5, HF8, PF4 and HL-NT	
AC1960-100	Screw-in measuring sleeve for 3 mm probes Thread 1/4" G Insertion 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

AC1900

AC1904

AC1902

AC1909

Probe operating range	Cable operating range	
-70...500 °C, τ90: 80 / 6 s	Without cable	
-70...500 °C, τ90: 80 / 6 s	1 m, PUR cable Max. 115 °C Min. -45 °C	
-70...500 °C, τ90: 170 / 15 s	2 m, thermoplastic cable Max. 105 °C Min. -40 °C	
-50...110 °C, τ90: 185 / 20 s	2 m, thermoplastic cable Max. 105 °C Min. -40 °C	
-70...500 °C, τ90: 90 s	2 m, silicon cable Max. 150 °C Min. -25 °C	
-50...120 °C, τ90: 20 s	Without cable	
-50...200 °C, τ90: 7 s	1 m, four PFA wires Max. 200 °C Min. -50 °C	
-100...250 °C, τ90: 185 / 20 s	2 m PTFE cable Max. 180 °C Min. -50 °C	

COMPATIBLE

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

DELIVERY PACKAGE

- Temperature probe

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 OUTPUTS
- Current output
- Voltage output

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

OUTPUT PARAMETER
- Temperature

OUTPUT SCALING
- Temperature: range selectable, standard: 0…50 °C

DISPLAY
- Display with or without backlight
- Without display

TF1 WALL AND DUCT 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
Probe	Fixed
Filter type	Polyethylene

3-wire

Order code	TF13x
Output signals	0...1 V 0...5 V 0...10 V 4...20 mA Only voltage output can be changed
Supply voltage	15...40 VDC / 12...28 VAC
Display	Optional (with backlight)
Temperature range	Scalable
Probe	Fixed
Filter type	Polyethylene

Wall version

Duct version

COMPATIBLE

- SW21 PC software, see page 197

DELIVERY PACKAGE

- Factory adjustment certificate
- Short instruction manual

RECOMMENDED ACCESSORIES

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

TF1 SPACE MOUNT VERSION

APPLICATIONS

Offices and rooms where good looks are important.

Type S

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 Only voltage output can be rescaled
Supply voltage	15…40 VDC / 12…28 VAC
Display	Optional (with backlight)

Technical data	TF120 Analog 2-wire	TF13x Analog 3-wire
General		
Parameter	Temperature	
Housing material	ABS	
Protection	Type D/W: IP65, type S: 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 2014/30/EU	
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	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 includes a unique calibration and adjustment function.

FEATURES
- Interchangeable Pt100 probes
- Accuracy:See chapter «Probes» on page 93
- Temperature limit at probe: See chapter «Probes» on page 93
- 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

VERSION

- 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

TF5 WALL VERSION

APPLICATIONS

Production processes, storage, transportation and drying processes.

2-wire

Order code	TF520 Type W
Output signal	4…20 mA
Supply voltage	10…28 VDC
Display	Optional (without backlight)
Temperature range	Scalable*
Probes	Interchangeable (-100…600 °C)

3-wire

Order code	TF53x Type W
Output signals	0…1 V 0…5 V 0…10 V 0…20 mA 4…20 mA Customer selection possible*
Supply voltage	15…40 VDC / 12…28 VAC
Display	Optional (with backlight)
Temperature range	Scalable*
Probes	Interchangeable (-100…600 °C)

Wall version, type W
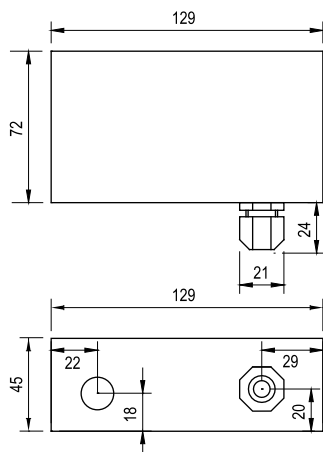
Pt100 input
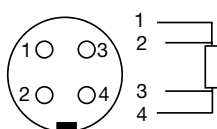
4-wire Pt100

COMPATIBLE

- Pt100 probes, page 94
- All Pt100 probes with 4-wire connection
- HW4 software, page 192

DELIVERY PACKAGE

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

RECOMMENDED ACCESSORIES

- Service cable   AC3006 / AC3009*, page 88
- 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		
Parameter	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 VAC
Current consumption	‹20 mA	‹20 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 2014/30/EU	
Fire protection class	Corresponds to UL94-HB	
FDA / GMP compatibility	21 CFR Part 11 and GAMP5	
Analog output		
Number	1	
Current	4…20 mA	0(4)…20 mA
Voltage	N/A	0…1/5/10 V
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 the transportation 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

DELIVERY PACKAGE

- 10 pc. per box
- Short instruction manual

TL-1D

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

APPLICATIONS
Warehouses, factories, museums, office buildings, cleanrooms, transportation, 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: 32,000 lines
- Free evaluation and configuration software HW4-LITE
- Very long battery life: up to 3 years
- Conforms to EN12830. Version 3.0 and later
- Programmable logging mode

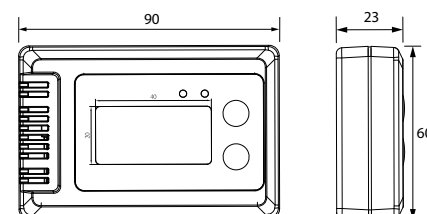| Technical data	TL-1D
General	
Parameter	Temperature
Sensor type	NTC thermistor
Accuracy at 23 °C ±5 K	±0.3 K
Range of application / Storage conditions	-30…70 °C / 0…100 %RH
IP protection	IP67
Weight	85 g
Dimensions	90 x 60 x 23 mm
Logging interval	30 s…24 h
Battery	1 x CR2
Battery life	Up to 3 years (logging interval 1 h)
Battery charge indicator	Yes (HW4 software, display and LED indicator)
Storage capacity	32,000 lines
Function	MIN/MAX/AVG
Display	LCD
Resolution	0.1 °C
Display refresh rate	5 s (standard) or same as logging interval
LED indicators	2 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	FDA 21 CFR Part 11 / GAMP 5-compliant HW4 software
Standards	EN12830 (V3.0 and later)

USB-Mini port (settings and data download)

Battery compartment

Configuration & evaluation
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.
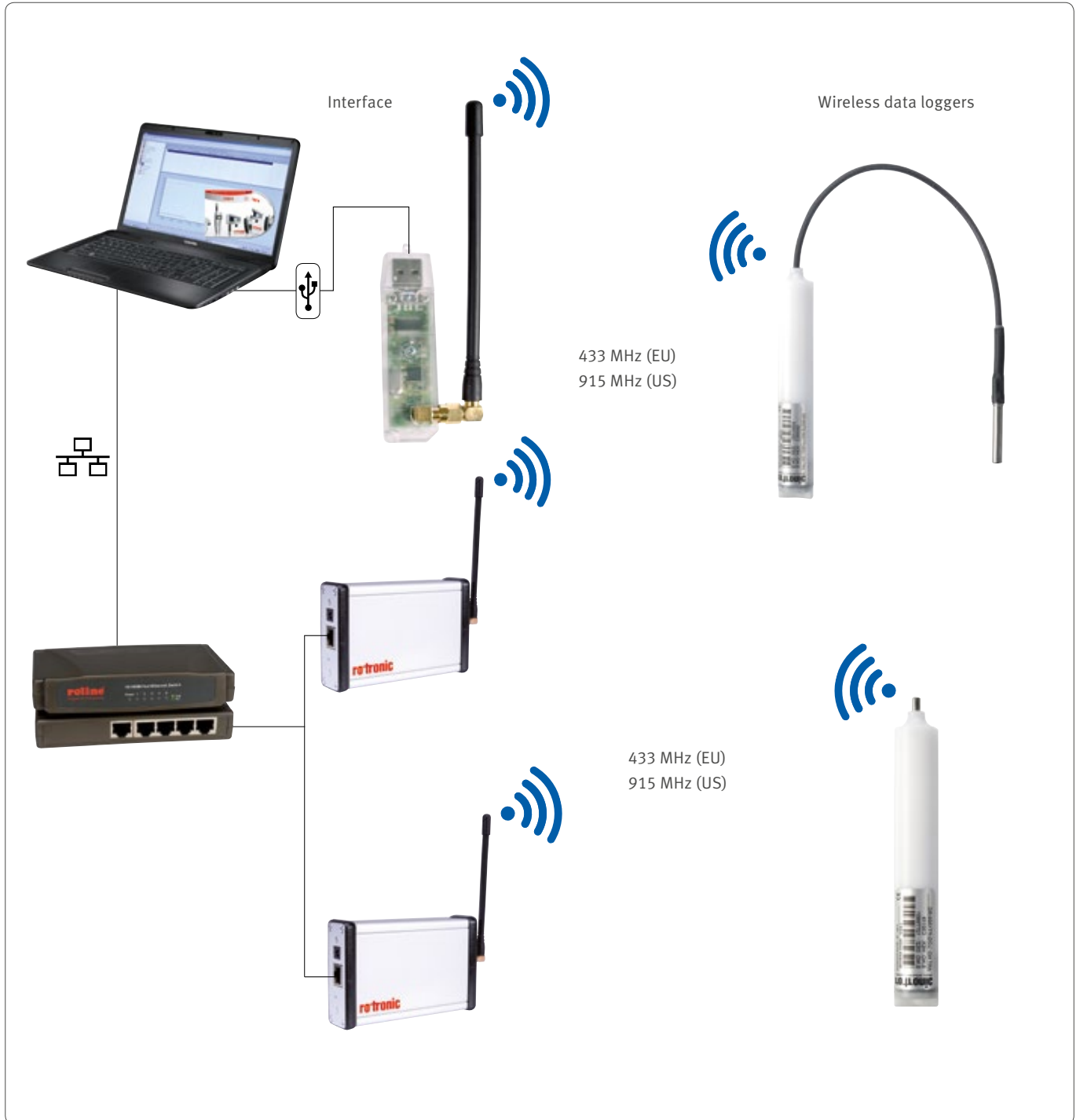
90 23

60

DELIVERY PACKAGE

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

RECOMMENDED ACCESSORIES

- USB service cable   AC0003

WIRELESS DATA LOGGERS

Interface

Wireless data loggers

433 MHz (EU)
915 MHz (US)

433 MHz (EU)
915 MHz (US)

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 environmental and other 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 probe with 30 cm cable
- Accuracy: ±0.1 K at 23 °C ±5 K
- Radio frequency: 433 or 915 MHz for best penetration through brickwork and walls
- High storage capacity: up to 300,000 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
- Plastic housing, white, IP69 (submersible)
- EN12830

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.
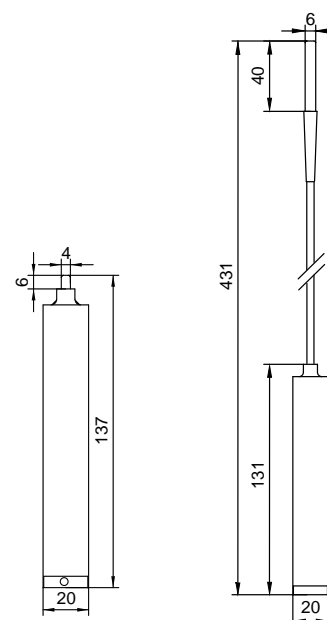
COMPATIBLE

- LAN Interface
- USB wireless adapter

DELIVERY PACKAGE

- Short instruction manual
- Battery

THERMOPALM31-S

Quick and reliable core temperature measurements

APPLICATIONS

Food preparation, use in laboratories and production in the chemical and pharmaceutical industries, temperature measurement in gases and fluids, quality assurance, documentation of cold chains and many more.
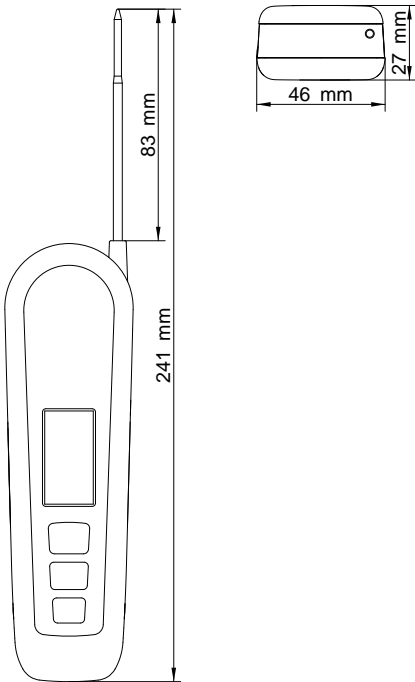
FEATURES
- Automatic storage of the maximum and minimum value
- Data-hold mode
- Units can be switched between °C and °F
- Compact with high level IP protection
- Display with backlight
- Automatic range selection and display resolution of 0.1 °C/°F
- HACCP certification: ISO22000: 2005

Technical data		TP31-S
Measurement range		-50..300 °C (-58..572 °F)
Sensor type		NTC
Unit of measurement		°C / °F
Resolution		0.1 °C/°F @ T ‹ 199 °C/°F 1 °C/°F @ T › 199 °C/°F
Precision @ 23 °C (73 °F)	-50...-20 °C -58..-4 °F	±2.0 °C ±3.6 °F
	-20...100 °C -4...212 °F	±1.0 °C ±1.8 °F
	100...300 °C 212..572 °F	±1 % of measured value
Response time		0.5..2 s
Operating conditions		0 °C..60 °C (32 °F..140 °F) 10 %RH...90 %RH
Storage conditions		-30 °C...70 °C (-22 °F...158 °F) ‹80 %RH
IP protection		IP65
Display		LCD, one row, backlit
Battery		2x type AAA, LR03
Battery life		100 h (typically)
Diameter of probe tube		3 mm
Housing materials		ABS, stainless steel
Weight (with batteries)		188 g

83 mm

27 mm

46 mm

241 mm

DELIVERY PACKAGE

- Short instruction manual
- 2 type AAA, LR03 batteries
- Function and calibration certificate

THERMOPALM31-IR

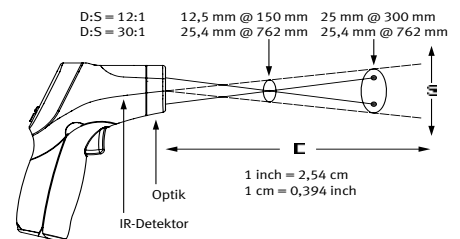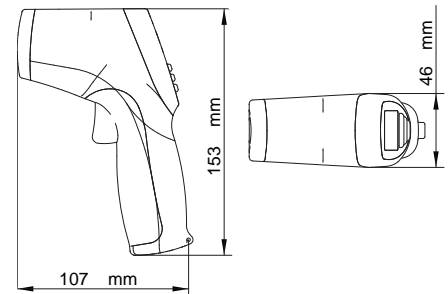Non-contact temperature measurement

APPLICATIONS

Food preparation, safety and fire tests, plastic injection molding, asphalt, silkscreen printing, measurement of ink and drier temperatures, HVAC (heating, ventilation and air-conditioning), motor maintenance and many more.

FEATURES

- 12:1 or 30:1 optics
- Two-beam laser sight
- Automatic data hold
- Units can be switched between °C and °F
- Emissivity adjustable between 0.10 and 1.00
- MAX temperature display
- Automatic range selection and display resolution
- Activatable trigger lock
- Freely selectable upper and lower alarm limits

Technical data		TP31-IR121	TP31-IR301
Measurement range		-50 °C...650 °C (-58 °F...1202 °F)	-50 °C...1000 °C (-58 °F...1832 °F)
Ratio D:S		12:1	30:1
Display resolution		0.1 °C/°F @ T ‹ 1000 °C/°F 1 °F @ T › 1000 °F	
Precision @ 23 °C (73 °F)	-50...20 °C -58...68 °F	±2.5 °C ±4.5 °F	
	20..300 °C 68...572 °F	±1.0 % of measured value ±1.0 °C ±1.0 % ±1.8 °F	
	›300 °C ›572 °F	±1.5 % of measured value	
Repeatability	-50...20 °C -58...68 °F	±1.3 °C ±2.3 °F	
	›20 °C ›68 °F	±0.5 % of measured value or ±0.5 °C ±0.5 % of measured value or ±0.9 °F	
Response time		150 ms	
Emissivity		0.10...1.00 (0.01 steps)	
Operating conditions		0...50 °C (32...122 °F) 10...90 %RH	
Storage conditions		-10...60 °C (14...140 °F) ‹80 %RH	
Power supply		9 V battery (NEDA 1604A or IEC 6LR61)	

153 mm
107 mm
46 mm

D:S = 12:1   12,5 mm @ 150 mm   25 mm @ 300 mm
D:S = 30:1   25,4 mm @ 762 mm   25,4 mm @ 762 mm

1 inch = 2,54 cm
1 cm = 0,394 inch

Optik

IR-Detektor

ℹ️ DELIVERY PACKAGE

- Short instruction manual
- 9 V battery
- Function and calibration certificate

Dew point measurement

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 product range. The probe is designed for compressed air systems and is also used in cold and adsorption driers. Rotronic offers the probe with the option of an ATEX certificate for use in potentially explosive atmospheres.

VIDEO DEW POINT MEASUREMENT

Interested? Then scan the QR code!

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 into the Rotronic product range and is compatible with the HF5, HF8 and PF4 transmitters as well as the HP32 and HP23-A handheld instruments.

LDP-1 dew point sensor

Aspart of the 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.
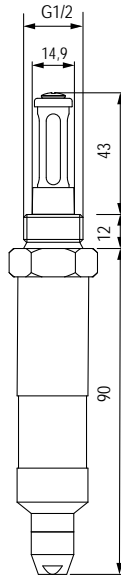
Standard dew point probe -60 °C Td

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, cleanrooms.

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: -60…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

Available with ATEX certificate, see page 175.

Order code	HC2-LDP102-M	HC2-LDP105-M
Probe type	Digital dew point & temperature probe	
Range of application	-60…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 τ63: @ -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	

COMPATIBLE

- HF5, HF8, PF4,HP22-A, HP32, HP23-A, AC3001, HW4

DELIVERY PACKAGE

- Factory adjustment certificate
- Sealing ring 1/2"G   AC4003

RECOMMENDED ACCESSORIES

- Measurement chamber with fixed flow valve, POM   LDP-FCPB1
- Measurement chamber with fixed flow 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 flow 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	1/2"G thread, quick connector DN7.2	
Material	POM	Stainless steel 1.4301, brass (fixed flow valve, quick connector)

LDP-FCSB1

LDP-FCPB1
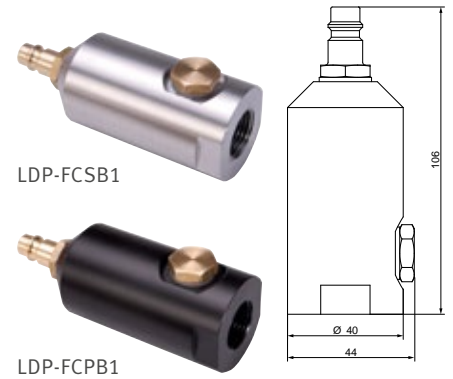
Measurement chamber base bodies

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 1/2"G thread, 2 x 1/4"G thread	
Material	POM	Stainless steel, 1.4301

LDP-MCS

LDP-MCP
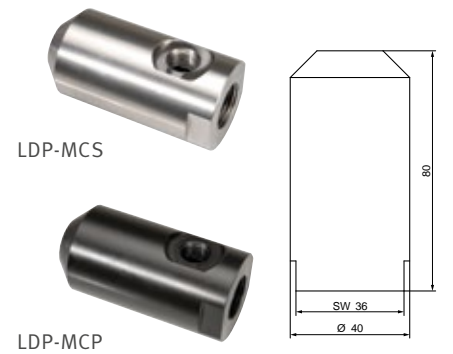
Spare parts

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

SP-S15/50

AC4002-B   AC4001-B1
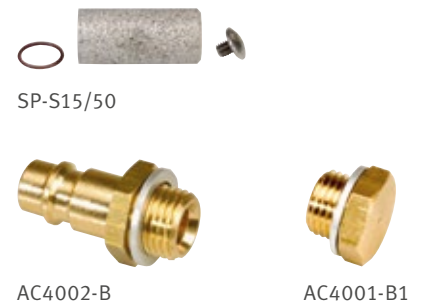
DIFFERENTIAL PRESSURE AND TEMPERATURE MEASUREMENT

The PF4 differential pressure transmitter was developed in collaboration with cleanroom specialists*. 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.

VIDEO DIFFERENTIAL PRESSURE

Interested? Then scan the QR code!

PF1 SERIES

Measurement by means of the PF1 transmitter's diaphragm enables exact measurements in small measurement ranges without risk of cross contamination. The PF1 is valued by planners, installers and end customers for its clever housing design, stable sensors and outstanding value for money.

APPLICATIONS
Filter and room pressure monitoring, HVAC, pneumatics, process measurement technology.

FEATURES
- Accuracy: ±1.5 % full scale
- MEMS-based diaphragm sensor
- Compact design
- Measurement range manually adjustable
- Excellent value for money

POWER SUPPLY

- Low voltage: 3-wire or 2-wire

SIGNAL OUTPUTS

- Current output 4…20 mA (2-wire)
- Voltage output 0…10 V (3-wire)

VERSION
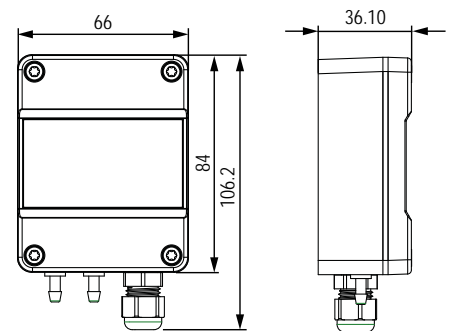
- Wall mount

OUTPUT PARAMETER

- Differential pressure

MEASUREMENT RANGES

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

DELIVERY PACKAGE

- Factory adjustment certificate
- Short instruction manual
- Mounting screws

RECOMMENDED ACCESSORIES

- Mounting kit DIN top-hat rail   AC5002
- Connection tubing   Internal Ø 4 mm AC6001/xx

PF1 SERIES

Technical data	PF120 Analog 2-wire	PF132 Analog 3-wire
General		
Parameter	Differential pressure	
Housing material	ABS	
IP protection	IP65	
Mounting position	Wall mounting, any mounting position	
Dimensions	84 x 66 x 36 mm Incl. steel conduit screw fitting: 105 x 66 x 36 mm	
Weight	100 g	
Display	LCD, 4 digits (optional)	
Electrical connections	Screw terminals inside, M12 cable gland	
Power supply	10…32 VDC	13…32 VDC
Current consumption	0…20 mA	› 10 mA (RL›4.7 kΩ)
Range of application / Storage conditions	-10..+50 °C / 0..90 %RH / -20..+70 °C / 0..90 %RH	
CE / EMC compatibility	EMC Directive 2014/30/EU	
Fire protection class	Corresponds to UL94-HB	
Differential pressure measurement		
Measurement principle	MEMS diaphragm sensor	
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	±1.5 % full scale measurement range ≤ 50 Pa ±1.0 % full scale measurement range > 50 Pa	
Long-term stability	0.1 %FS/y	
Pressure resistance	≤ ±100 Pa =› 1 kPa ≤ ±500 Pa =› 15 kPa	
Burst pressure	≤ ±100 Pa =› 15 kPa ≤ ±500 Pa =› 20 kPa	
Zero adjustment	By button	
Pressure connections	Tubing connector Ø 4.0 mm x 10 mm	
Outputs		
Analog outputs	1	
Analog output type	4…20 mA	0…10 V
Permissible load	‹ 500 Ω	› 4.7 kΩ

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 CO_2.

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 mount

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

Note: Further cleanroom products page 166

Differential
pressure

Differential pressure &
temperature

Differential pressure, relative
humidity & temperature

PF4 WALL VERSION

APPLICATIONS

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

3-wire

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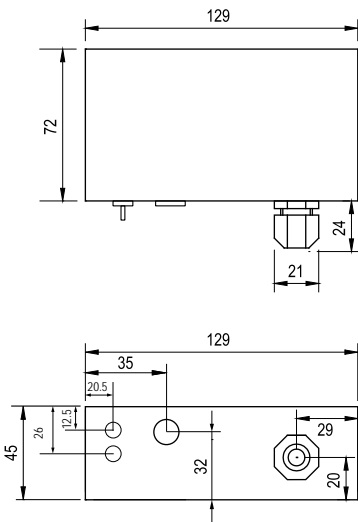
COMPATIBLE

- HW4 software, page 192

DELIVERY PACKAGE

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

RECOMMENDED ACCESSORIES

- Service cable   AC3006 / AC3009*, page 88
- Temperature probe   AC19xx, page 94
- Mounting kit DIN top-hat rail   AC5002
- HC2A-S probe   see page 6
- Connection tubing   Internal Ø 4mm 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 2014/30/EU	
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/hP	
Measurement interval	1 s	
Pressure resistance	2 bar (2›000 hPa)	
Leak rate	‹180 µl/min.	
Pressure connections	Tubing 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 probe, page 94 Humidity: Rotronic E2 for Rotronic HC2A-S probe, page 6 Accuracy: probe dependent	
Outputs		
Analog outputs	2, freely configurable	
Analog output type	0/4…20 mA or 0…1/5/10 V	
Switch output	1 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 RJ45

*   Further cleanroom products page 166

Process/Air pressure measurement

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 equipment, thereby supplying a premium transmitter to the market.

BF1

The BF1 is a transmitter for the measurement of barometric ambient pressure. Using a diaphragm sensor, the pressure is measured and then converted electronically to an output signal. The BF1 is valued by planners, installers and end customers for its clever housing design, stable sensors and outstanding value for money.
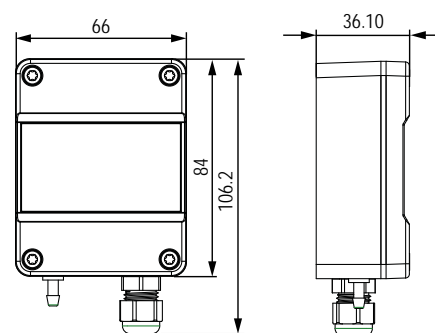
APPLICATIONS
Laboratories, climate chambers, HVAC.

FEATURES
- Accuracy: ±2.5 %full scale
- MEMS-based diaphragm sensor
- Compact design
- Excellent value for money

Technical data	BF120 Analog 2-wire	BF132 Analog 3-wire
General		
Parameter	Pressure	
Housing material	ABS	
IP protection	IP65	
Mounting position	Wall mounting, any mounting position	
Dimensions	84 x 66 x 36 mm Incl. steel conduit screw fitting: 105 x 66 x 36 mm	
Weight	100 g	
Display	LCD, 4 digits (optional)	
Electrical connections	Screw terminals inside, M12 cable gland	
Power supply	10...32 VDC	13...32 VDC
Current consumption	0...20 mA	‹10 mA (RL › 4.7 kΩ)
Range of application / Storage conditions	-10..+50 °C / 0..90 %RH -20..+70 °C / 0..90 %RH	
CE / EMC compatibility	EMC Directive 2014/30/EU	
Fire protection class	Corresponds to UL94-HB	
Barometric pressure measurement		
Measurement principle	MEMS diaphragm sensor	
Measurement ranges	700...1200 hPa	
Medium	Air and non-aggressive gases	
Accuracy at 23 °C ±3 K	±2.5 %full scale	
Long-term stability	0.1 %FS/a	
Pressure resistance	Measurement range ≤ ±100 Pa: 1 kPa Measurement range ≤ ±500 Pa: 15 kPa	
Pressure connections	Tubing connector Ø 4.0 mm x 10 mm	
Outputs		
Analog outputs	1	
Analog output type	4...20 mA	0...10 V
Permissible load	‹ 500 Ω	› 4.7 kΩ

66
36.10
84
106.2

DELIVERY PACKAGE
- Factory certificate
- Short instruction manual
- Mounting screws

RECOMMENDED ACCESSORIES
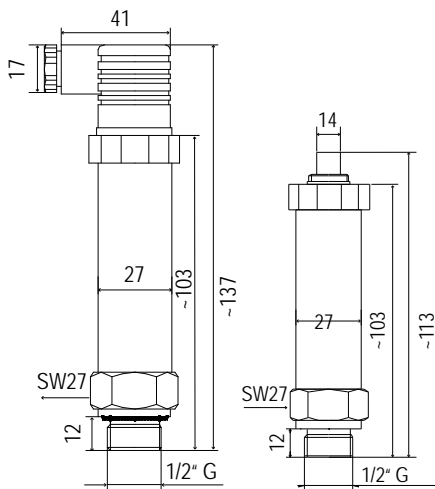- Mounting kit DIN top-hat rail   AC5002
- Connection tube   Ø 4.0 mm AC6001/xx

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 2014/30/EU	
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

DELIVERY PACKAGE

- Factory certificate
- Short instruction manual

BL-1D

In addition to humidity and temperature, the BL-1D also logs ambient pressure and dew point. Thanks to its full HW4 functionality, its compact size and easy handling, the BL-1D is ideal for numerous applications.

FEATURES

• Accuracy: ±3.0 hPa, ±3.0 %RH, ±0.3 K
• Compact with very high level of IP protection
• High storage capacity: 32,000 lines
• Free evaluation and configuration software HW4-LITE
• Very long battery life: up to 3 years
• Conforms to EN12830

Technical data	BL-1D
General	
Parameters	Pressure / Humidity / Temperature
Sensor type	BOSCH BMP280 / HYGROMER® IN-1 / NTC
Accuracy at 23 °C ±5 K	±3.0 hPa, ±3.0 %RH, ±0.3 K
Range of application / Storage conditions	-30..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	32,000 lines (each line contains °C/%RH/Pa/DP)
Function	MIN/MAX/AVG
Display	LCD
Resolution	1 hPa, 0.1 %RH, 0.1 °C
Display refresh rate	5 s (standard) or same as logging interval
Communication	USB-Mini port (cable optional)
FDA/GMP compatibility	FDA 21 CFR Part 11 / GAMP 5-compliant HW4 software
Standards	EN 12830

Configuration & evaluation

The values stored in the BL-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.
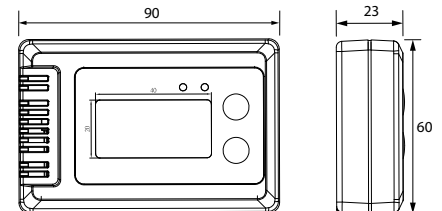
DELIVERY PACKAGE

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

RECOMMENDED ACCESSORIES

• USB-Mini cable   AC0003

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 failure and use accurate measurements. The Rotronic AFP1 probe enables smart and intelligent testing and evaluation of the functionality of such systems.

AF1 SERIES

The AF1 series is an inexpensive, highly accurate and stable transmitter for the measurement of air velocity and temperature. The devices have a calorimetric sensor and excellent long-term stability. The measurement range and output signal can be set quite simply via DIP switches without additional software.

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
- Modbus RTU via RS-485

POWER SUPPLY

- Low-voltage: 3-wire

SIGNAL OUTPUTS

- Current output 4...20 mA
- Voltage output 0...10 V
- Modbus RTU via RS-485

VERSIONS

- Wall mount (cable length 2 m)
- Duct mount
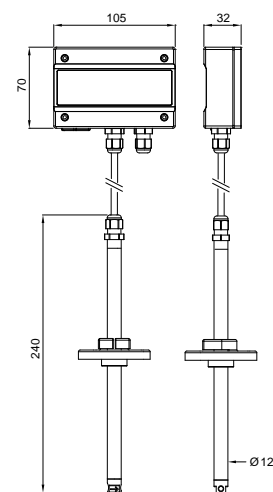
OUTPUT PARAMETERS

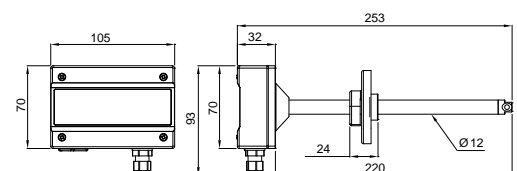- Air velocity, temperature

OUTPUT SCALING

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

Wall mount

Duct mount

DELIVERY PACKAGE

- 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	Cable version: 260 g Duct version: 165 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	0…50 °C
Storage conditions	-20…60 °C
CE / EMC compatibility	EMC Directive 2014/30/EU
Air velocity measurement	
Measurement principle	Calorimetric
Measurement ranges	2 m/s; 5 m/s; 10 m/s; 20 m/s
Medium	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
Temperature measurement	
Measurement range	0..50 °C
Accuracy at 25 °C, 45 %RH, 1013 mbar	±0.3 K
Outputs	
Analog outputs	2
Analog output type	4…20 mA or 0…10 V
Permissible load	›10 kΩ (voltage output) ‹500 Ω (current output)
Interface	RS-485
Protocol	MODBUS RTU

AFP1 MINI VANE PROBE

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

APPLICATIONS
office buildings, museums, libraries, HVAC systems, processing lines, warehouses.

FEATURES
- Intelligent multi-parameter measuring instrument
- Simple recording of data via iOS or Android app
- Data export to a PC

Technical data	AFP1
General	
Sensor type	Vane anemometer ROTRONIC HYGROMER® IN-1 NTC
Measurement range	1…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 ø28/18 mm
Rod length	Retracted: 0.55 m / Extended: 1.2 m
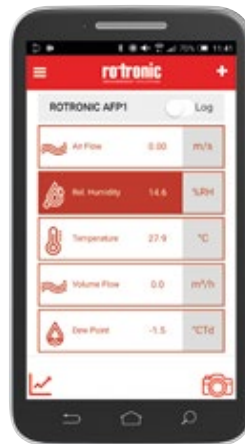
Dimensions (in mm)
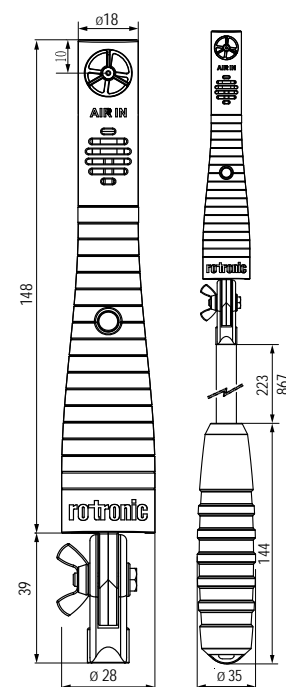
DELIVERY PACKAGE

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

CO2 MEASUREMENT FOR MONITORING INDOOR AIR

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

VIDEO CO2

Interested? Then scan the QR code!

Transmitter series	CF1
Working principle	Non-dispersive infrared (NDIR) with automatic baseline correction (ABC)*
CO_2 measurement range	0...2000 ppm (adjustable to 5000 ppm)
Relative humidity temperature range	0…100 %RH
Temperature measurement range	0...50 °C
Accuracy CO_2 in measurement range 2000 ppm	±30 ppm, ±3% of measured value
Accuracy CO_2 in measurement range 5000 ppm	±30 ppm, ±10% of measured value
Accuracy temperature	± 0.3 K, ± 1 K type S with display
Accuracy relative humidity	± 3.0 %RH
Housing	
Space mount	✓
Wall mount	
Duct version	✓
Display option	✓
IP protection	Type S/R: IP 30; type D: IP 65, without probe
Outputs	
0...10 VDC	✓
0…20 mA	
4…20 mA	✓
Functions	
Visual alarm (LED)	Only in space mount versions type S/R
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
±40 ppm, ±3% of measured value	±30 ppm, ±3% of measured value	±200 ppm
	± 0.5 K	± 0.5 K
✓	✓	
✓	✓	✓
✓	✓	
✓	✓	✓
IP30 / IP54 / IP65	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
- Compact design
- Accuracy: ±40 ppm ±3%, ±3 %RH, ±0.3 K
- Measurement ranges: 0…2000/5000 ppm, 0…100 %RH, 0…50 °C
- Analog output signals
- Relay output

POWER SUPPLY

- Low-voltage: 3-wire

SIGNAL OUTPUTS

- Current output
- Voltage output

VERSION

- Space mount (R)
- Space mount (S)
- Duct (D)

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 is important.
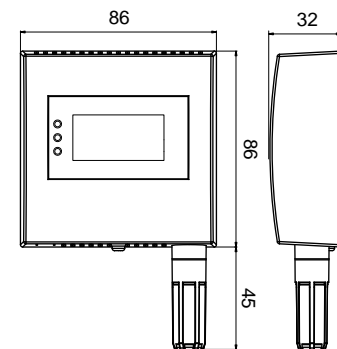
EU version

Order code	CF13x-R
Output signals	4...20 mA 0...10 VDC
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
Relative humidity measurement range	Standard 0...100 %RH
CO₂ measurement range	Standard 0...2000 ppm
Relay	Yes
Dimensions	131 x 86 x 32 mm

Type R

US version

Order code	CF13x-S
Output signals	4...20 mA 0..10 VDC
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
Relative humidity measurement range	Standard 0...100 %RH
CO₂ measurement range	Standard 0...2000 ppm
Relay	Yes
Dimensions	120 x 86 x 32 mm

Type S

COMPATIBLE

• SW21 software, page 197

DELIVERY PACKAGE

• Factory adjustment certificate
• Short instruction manual

RECOMMENDED ACCESSORIES

• USB-Mini cable   AC0003
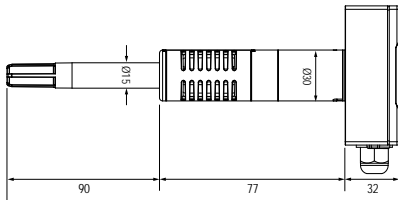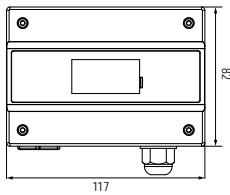
CF1 DUCT VERSION

APPLICATIONS

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

Duct version

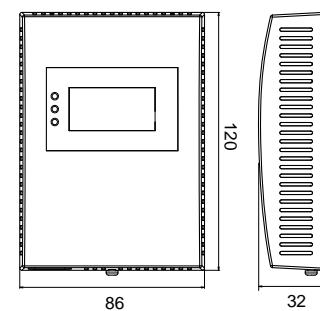| Order code	CF13x-D
Output signals	4...20 mA 0...10 VDC
Supply voltage	12...28 VAC / 15...40 VDC
Display	Optional
Temperature measurement range	Standard 0...50 °C
Relative humidity measurement range	Standard 0...100 %RH
CO₂ measurement range	Standard 0...2000 ppm
Relay	Yes
Dimensions	82 x 117 x 32 mm

COMPATIBLE

• SW21 software, page 197

DELIVERY PACKAGE

• Factory adjustment certificate

• Short instruction manual

RECOMMENDED ACCESSORIES

• USB-Mini cable   AC0003

CF3 SERIES

The CF3 series comes in space-mount and industrial versions. This transmitter not only boasts high accuracy and long lifetime, but 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

VERSION

- Space mount version
- Wall mount (W)
- Duct mount (D)

OUTPUT PARAMETER

- CO_2

OUTPUT SCALING

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

DISPLAY

- Display optional

EU version

US version

US version FLI
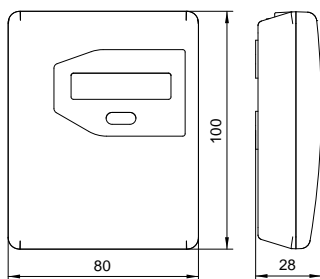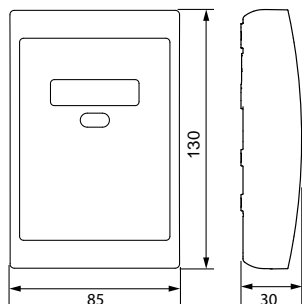
CF3 SPACE MOUNT VERSION

APPLICATIONS

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

Standard EU and US

Order code	CF3-W-EU-Disp	CF3-W-US-Disp
Output signals	0..10 VDC 4...20 mA	
Supply voltage	16...29 VDC / VAC	
Display	Optional	
CO₂ measurement range	Standard 0...2000 ppm Optional 0...5000 ppm	
Dimensions	100 x 80 x 28 mm	130 x 85 x 30 mm

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	
Alarms	Audible and visual signal, alarm threshold at 1400 ppm (adjustable)	
CO₂ measurement range	Standard 0...2000 ppm Optional 0...5000 ppm	
Dimensions	100 x 80 x 28 mm	130 x 85 x 30 mm

EU version

US version

DELIVERY PACKAGE

• Short instruction manual

CF3 WALL AND DUCT VERSIONS

APPLICATIONS

Ventilation pipes and industrial applications.

Wall version (industry)

Order code	CF3-W-EU-Disp
Output signals	4...20 mA 0..10 VDC
Supply voltage	16...29 VDC / VAC
Display	Optional
Dimensions	142 x 85 x 46 mm
IP protection	IP54
CO₂ measurement range	Standard 0...2000 ppm

CF3-W-Disp
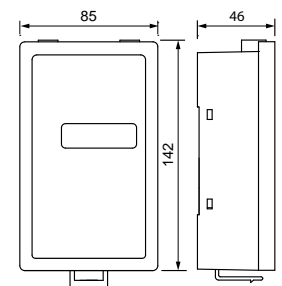
DELIVERY PACKAGE

• Short instruction manual

Technical data	CF3-W-EU-Disp CF3-W-US-Disp	CF3-W-EU-Disp-FLI CF3-W-US-Disp-FLI	CF3-W-IND-Disp
General			
Parameters	Carbon dioxide (CO_2)		
Housing material	ABS		
IP protection	IP30	IP30	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	220 g
Display	Optional (4 digits, 7-segment LCD)	Standard (4 digits, 7-segment LCD)	Optional (4 digits, 7-segment LCD)
Electrical connections	Screw terminals 1.5 mm²		
Power supply	16…29 VDC / VAC		
Power consumption	‹1 W		
Range of application / Storage conditions	0…50 °C / 0…95 %RH (non-condensing)		
CE / EMC compatibility	EMC Directive 2014/30/EU		
CO₂ 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	
Current	4…20 mA	N/A	
Voltage	0..10 VDC		
Functions			
Alarms	N/A	Audible and visual signal, alarm threshold at 1400 ppm (adjustable)	
Self test	Complete function test		

CF5 SERIES

The CF5 series equipped with CO_2 and temperature sensors comes in wall and duct version. This transmitter not only boasts high accuracy and long lifetime, but 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

VERSION

- Wall mount (W)
- Duct mount (D)

OUTPUT PARAMETERS

- CO_2 and temperature

OUTPUT SCALING

- CO_2 : adjustable to 5,000 ppm, standard 0...2000 ppm

DISPLAY

- Display optional
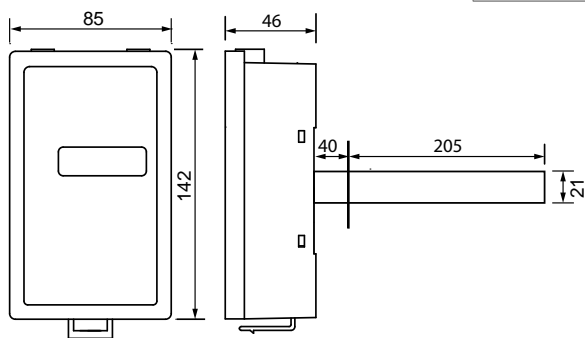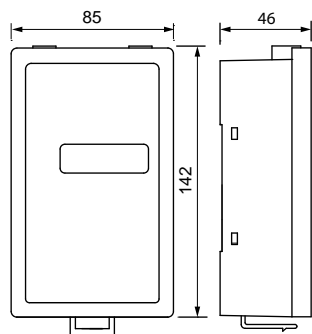
CF5 WALL AND DUCT VERSIONS

APPLICATIONS

Ventilation ducts and industrial applications.

Duct version

Order code	CF5-D-Disp
Output signals	4...20 mA 0..10 VDC
Supply voltage	16...29 VDC / VAC
Display	Optional
Dimensions	142 x 85 x 46 mm, probe: 245 mm
IP protection	IP65
CO₂ measurement range	Standard 0...2000 ppm

Wall version (industry)

Order code	CF5-W-IND-Disp
Output signals	4...20 mA 0..10 VDC
Supply voltage	16...29 VDC / VAC
Display	Optional
Dimensions	142 x 85 x 46 mm
IP protection	IP54
CO₂ measurement range	Standard 0...2000 ppm

CF5-D-Disp

CF5-W-Disp

DELIVERY PACKAGE

• Short instruction manual

RECOMMENDED ACCESSORIES

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

Technical data	CF5-D-Disp	CF5-W-IND-Disp
General		
Parameters	Carbon dioxide (CO₂) and temperature	
Housing material	ABS	
IP protection	IP65	IP54
Dimensions	142 x 85 x 46 mm	
Weight	250 g	
Display	Optional (4 digits, 7-segment LCD)	
Electrical connections	Screw terminals 1.5 mm²	
Power supply	16…29 VDC / VAC	
Power consumption	‹3 W	
Range of application (housing / electronics)	0…50 °C / 0…95 %RH (non-condensing)	
CE / EMC compatibility	EMC Directive 2014 / 30 / EU	
CO₂ 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 change from normal pressure (101.3 kPa)	
Maintenance	No maintenance necessary in normal indoor use	
Lifetime	›15 years	
Temperature measurement		
Temperature sensor	NTC	
Measurement range	0…50 °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	

CF8 INCUBATOR

APPLICATIONS

Incubators and climate chambers.

Order code	CF8-D/W-IN
Output signals	4...20 mA 0..5 VDC
Supply voltage	16...29 VDC / VAC
CO$_2$ measurement range	0...3 %vol (0...30,000 ppm)
Measurement range	0..50 °C
Dimensions	Ø40 x 102 mm
IP protection	IP67

DELIVERY PACKAGE

• 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, conference rooms, 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	AC adapter
IP protection	IP30

DELIVERY PACKAGE

- Short instruction manual
- AC 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

CO₂ DISPLAY

Room / Wall panel for monitoring indoor air quality. Measures and records CO₂, relative humidity and temperature.
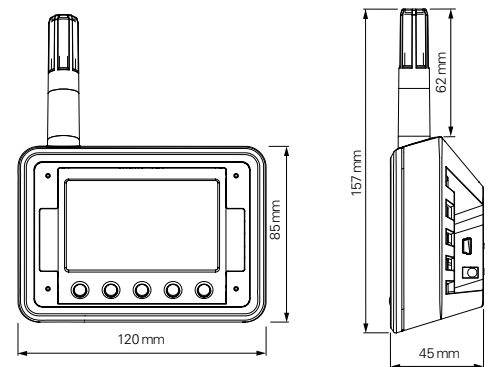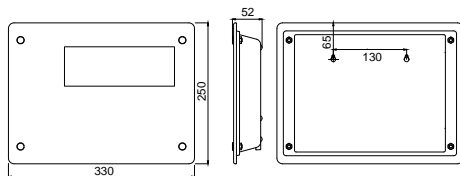
APPLICATIONS
Indoor air quality (IAQ) measurements in offices, conference rooms, schools, etc.

FEATURES
- Benchtop or wall mounting
- Measures and records CO₂, 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 CO₂, humidity and temperature values
- Adjustable, visual CO₂ alert indicator
- Data download via USB flash drive
- Display of date and time

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

DELIVERY PACKAGE
- Short instruction manual
- AC 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 value 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	4 AA batteries / optional AC adapter
IP protection	IP30
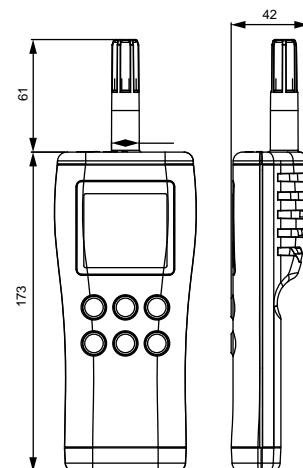
DELIVERY PACKAGE

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

RECOMMENDED ACCESSORIES

5 VDC AC adapter	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	CO_2 CALIBRATOR

Technical data	CL11	CP11	CO₂ Display
General			
Parameters	CO₂, 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		
Alarm	Audible and visual, adjustable for CO₂ measurement	Audible, adjustable for CO₂ measurement	Visual, adjustable for CO₂ measurement
Power supply	AC adapter AC1214	4 AA batteries / optional AC adapter AC1214	AC adapter
Current consumption	50 mA	40 mA	‹700 mA
Application temp. housing / electronics	0...50 °C / 0...95 %RH, non-condensing		
Service interface	USB-Mini port		
CE / EMC compatibility	CE conformity 2014/30/EU		
CO₂ 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 63, 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 and inexpensive 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 AC adapter or internal rechargeable battery
- Charging function

Order code	CO2 CALIBRATOR
Working principle	Neutralization of CO_2 from the ambient air
Purity	20...25 ppm
Dimensions	156 x 89 x 26 mm
Weight	270 g
Gas flow	320...340 ml/min.
Range of application	0..45 °C
Rechargeable battery	Li-ion, 7.4 V
AC adapter	12 VDC, 0.5 A

CO2 REPLACEMENT CARTRIDGES

FEATURES

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

Order code **CO2 CARTRIDGE**

COMPATIBLE

- CP11
- CF5
- CF8
- CO2 Display

DELIVERY PACKAGE

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

RECOMMENDED ACCESSORIES

- Set with 5 x CO2 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 environments, meteorological applications, cleanrooms or wherever water activity plays a role. You can find information on some of these in the chapter "Theory" on page 189.

WATER ACTIVITY

Download the aw
white paper from
www.rotronic.com/aw
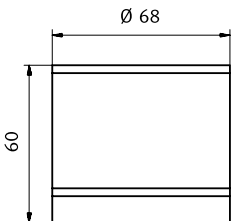
VIDEO WATER ACTIVITY

Interested? Then scan the QR code!

WATER ACTIVITY PROBES

APPLICATIONS
Quality assurance in food manufacturing, coffee processing and the tobacco industry, grain storage and 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)

HC2-AW-USB

HC2-AW

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
- Same as HC2-AW-USB, but with UART interface

Ø 68

60

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 laboratory analyzer HygroLab C1 and handheld instrument   HP23-AW-A

DELIVERY PACKAGE

- Factory adjustment certificate

RECOMMENDED ACCESSORIES

- Sample holders   WP-14-S
                                          WP-40
                                          WP-40TH
- Calibration device   WP-14-S
- Calibration standards   EAxx-SCS
- 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 τ 63
Material	Stainless steel DIN 1.4305 (probe), POM (handle)
Weight	160 g
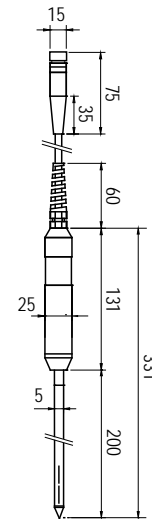
10 MM INSERTION PROBE

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 τ 63	
Material	Stainless steel DIN 1.4305 (probe), POM (handle)	
Weight	200 g	300 g
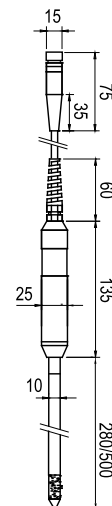
COMPATIBLE

- Handheld instrument — HP23-AW-A
- Laboratory analyzer — HygroLab C1

DELIVERY PACKAGE

- 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, cosmetics and pharmaceutical industries. The significant advantage of the 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 processing and the tobacco industry, grain storage and pharmaceutical industry.

FEATURES
- Accuracy: ±0.005 aw, ±0.1 K
- 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

DELIVERY PACKAGE

- AwTherm incl. AwT-MHS
- AwT-PS14 or AwT-PS40
- AC 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 probe inputs. Thanks to the possibility of combining measurement heads and insertion probes, the HygroLab C1 offers high flexibility.

FEATURES

- 4-probe benchtop display analyzer for measurement of water activity, temperature and relative humidity
- AW Quick function for fast measurement results (typically 4 – 5 minutes)
- Multi-channel display
- Suitable for many applications
- Audible alarm to indicate completed measurement
- Ethernet and USB interfaces

Order code	HygroLab C1
Probe connections	4
Parameters shown	aw / %RH / °C / °F
AW Quick function	Integrated and via optional HW4 software
Calculations	All psychrometric calculations
Power supply	12 VDC with AC adapter (included)
Interfaces	Ethernet and USB
Range of application	0…1 aw / 0…100 %RH / -10…60 °C
LCD	3-line alphanumeric with trend indicator
Current consumption	›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

DELIVERY PACKAGE

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

HANDHELD INSTRUMENT HP23-AW-A

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

APPLICATIONS

Aw checks of cheese, meat, tobacco, building materials, animal feeds, bakery products, paper, medicines, in horticulture and 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 AC 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

COMPATIBLE

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

DELIVERY PACKAGE

- Short instruction manual
- Battery

ACCESSORIES

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

APPLICATIONS

The stainless steel sample holders were developed specifically for the water activity probes HC2-AW(-USB). There are two sizes available:
- WP-14-S for small samples and for calibration
- WP-40 for larger samples

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

WP-14-S

WP-40

WP-40TH

DISPOSABLE SAMPLE CONTAINERS PS-14 / PS-40

APPLICATIONS

The disposable sample containers ensure the optimum sample volume is filled into the WP-14-S or WP-40 sample holders. They prevent the sample holders from coming into direct contact with the product being tested, thereby preventing 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.	

PS-14

PS-40

CLAMP SEALING MECHANISM

APPLICATIONS

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

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

METEOROLOGY

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 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 MeteoSwiss and are utilized worldwide. Tests conducted together with MeteoSwiss clearly demonstrated the unmatched accuracy obtained by the combination of Rotronic probes and ventilated weather protection.
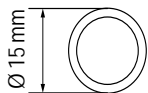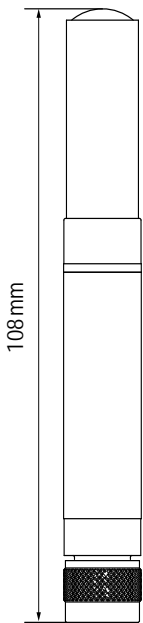
CONTENTS

HC2A-S3 / HC2A-S3H

The HC2A-S3 belongs to the family of HC2A-S probes that form the basis of our product portfolio. It measures humidity and temperature and calculates the dew/frost point. The HC2A-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 (HC2A-S3)
- Adjusted at 23 °C and 10, 20, 30, 40, 50, 60, 70, 80, 90 %RH (HC2A-S3H)

Order code	HC2A-S3	HC2A-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 °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	
Long-term stability	‹1 %RH / year	
Filter type	Polyethylene standard-filter, 40 µm, white	
Response time	‹15 s (without filter)	

108 mm

Ø 15 mm

COMPATIBLE

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

DELIVERY PACKAGE

- Factory adjustment certificate
- Polyethylene filter

RECOMMENDED ACCESSORIES

- Polyethylene filter, white (40 µm) — NSP-PCW-PE40
- Connection cable with voltage regulator and 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
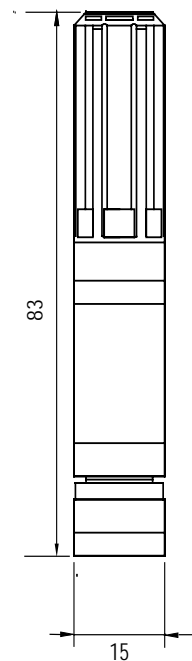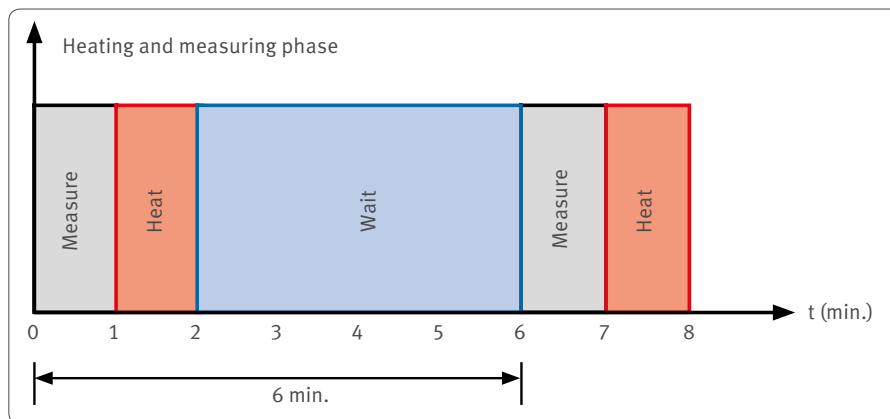- Humidity standard for calibration 80 %RH — EA80-SCS

HC2-S-HEATED / HC2-S3-HEATED

The HC2-S(3)-HEATED is suitable for use wherever high humidity prevails. In such environments conventional probes can become covered in condensation, thereby delivering incorrect 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	

Heating and measuring phase

Measure | Heat | Wait | Measure | Heat — t (min.) 0 1 2 3 4 5 6 7 8, 6 min.

83 / 15

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

DELIVERY PACKAGE
• Factory adjustment certificate
• Polyethylene filter
• Short instruction manual

RECOMMENDED ACCESSORIES
• Polyethylene filter, white (40 µm) — NSP-PCW-PE40
• Connection cable with voltage regulator and 2 m cable, white — E3-02XX-ACT/01
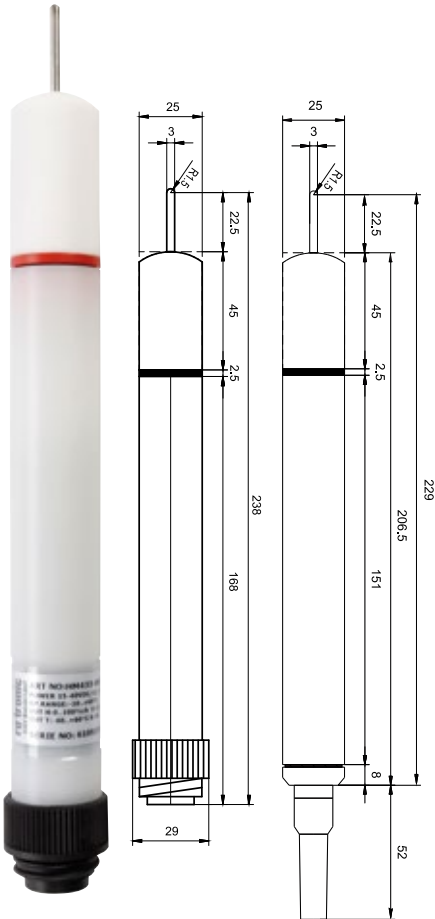
HYGROMET4

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 fitted 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	
Power Supply	15…24 VDC	5…24 VDC
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	
Filter	Polyethylene, 20 µm	

EM-25-HM

COMPATIBLE

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

DELIVERY PACKAGE

- 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 EA35-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 since the probe has an increased input voltage range.

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	
Filter	Polyethylene, white ~ 40 µm pore size	
Power supply	5…24 VDC / 5…16 VAC	
Version	3 m cable with open ends	

15

140
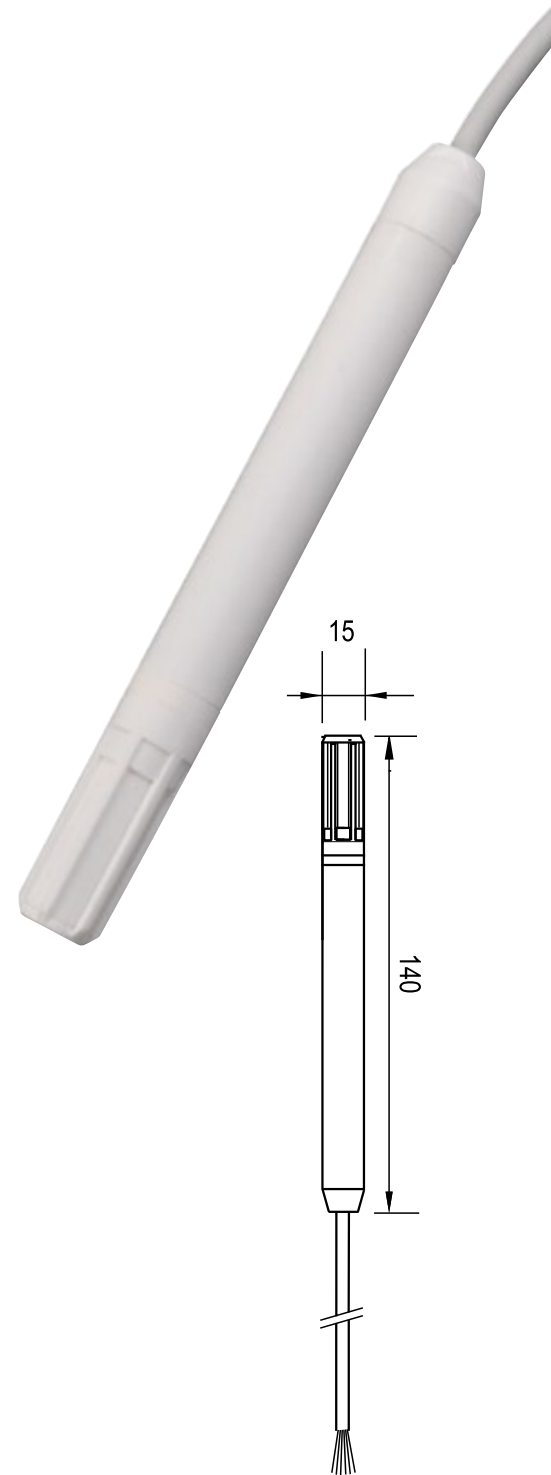
COMPATIBLE

- Naturally ventilated shield AC1000

DELIVERY PACKAGE

- 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 and snow making 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 fitted 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	
Power Supply	15…24 VDC	5…24 VDC
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	
Filter	Wire mesh filter ~ 20 µm pore size	
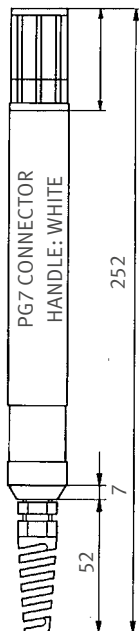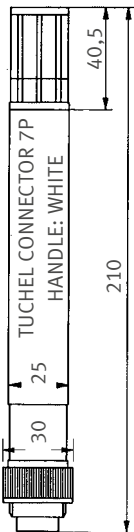
COMPATIBLE

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

DELIVERY PACKAGE

- 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)	HC2A-S3C03	HC2A-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	-40...85 °C				-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

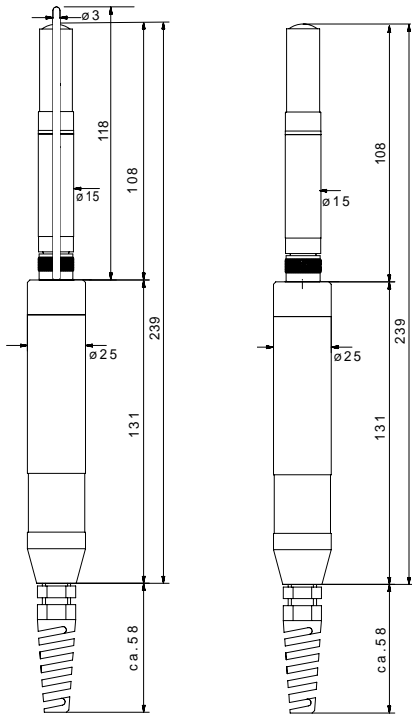**For interchangeable probe HC2A-S3**

The MP102H and MP402H are meteorology transmitters with an analog output and RS-485 interface. Humidity and temperature are measured with an interchangeable HygroClip2 HC2A-S3 probe. Temperature measurement can be enhanced by an external Pt100 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 HC2A-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

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	
Power Supply	5…24 VDC	15…24 VDC

With external Pt100   Without external Pt100

COMPATIBLE

- Meteorology probes   HC2A-S3 and HC2A-S3H
- Actively ventilated shield   RS12T / RS24T
- Naturally ventilated shield   AC1003

DELIVERY PACKAGE

- 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 (HC2A-S3)	
Measurement range	0...100 %RH (HC2A-S3)	
Accuracy at 10...30 °C	±0.8 %RH (HC2A-S3)	
Response time	‹15 s τ63 (63 % increase 35...80 %RH) without filter	
Temperature measurement		
Sensor	Pt100 1/3 Class B (HC2A-S3)	
Measurement range	-50...100 °C (HC2A-S3)	
Accuracy at 10...30 °C	±0.1 K (HC2A-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 MeteoSwiss. This state-of-the-art device reduces the influences of thermal radiation on humidity and temperature measured values to a minimum.
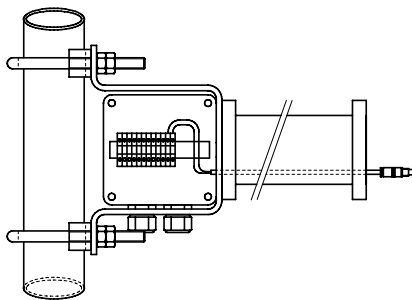
APPLICATIONS
Snow guns, weather stations, agricultural meteorology and building management systems.

FEATURES
- Easy-to-install protection shield with integrated fan
- Special white coating (RAL 9010) minimizes solar heating
- Simple probe mounting
- Suitable for various probes
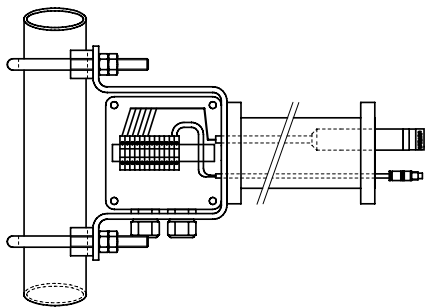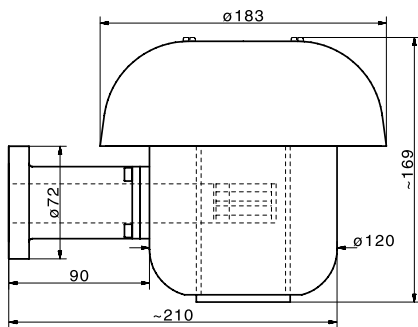
Order code	RS12T	RS24T
Range of application	-30...60 °C	
Material	Aluminum, POM, RAL 9010	
Power supply	12 VDC, 2 W	24 VDC
Fan	Papst fan IP54	
Ventilation	3.5 m/s / 900 l/min.	
Fan lifetime	At 40 °C ~70,000 h (approx. 8 years)	

Order code	MKRS-HC2	MKRS-MP102-402
Use with	HC2A-S3/S3H	MP102H/402H
Probe connection	E2 connector	Open ends to terminals
Mast diameter	30-65 mm	

Further models available on request.

MKRS-HC2

MKRS-MP102-402
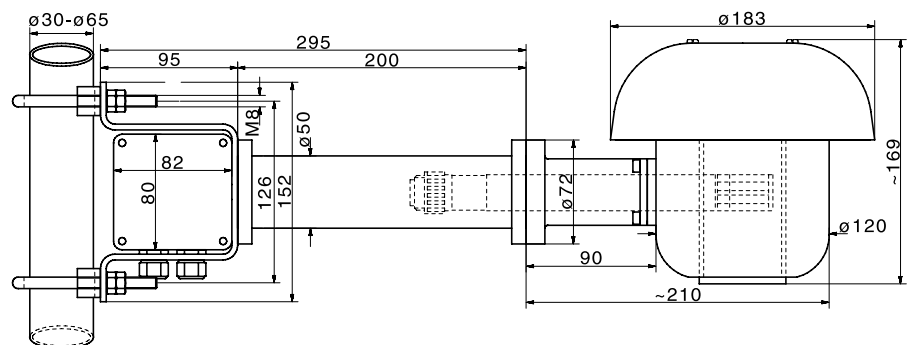
COMPATIBLE

- Mounting sets

DELIVERY PACKAGE

- 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 protection 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	HC2A-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	Ø130 x 140 mm	Ø130 x 160 mm	Ø130 x 215 mm

AC1000 with HC2A-S3+E3-02XX

AC1002 with MP100A-T4

AC1003 with MP102H

ℹ️ **DELIVERY PACKAGE**

- Installation instructions
- Mounting hardware

MEASUREMENTS IN CLEANROOMS

Cleanrooms are environments with a low concentration of particles. A positive pressure in the room prevents contaminated air from flowing from the unclean to the cleaner area. To ensure that the guidelines and statutory requirements for a particular application can be fulfilled, it is necessary to measure and monitor the quality of the air in the room constantly. Apart from differential pressure, temperature and air humidity are also important measurement parameters. Rotronic offers reliable cleanroom solutions for qualification, routine checks and continuous monitoring.

VIDEO CRP5

Interested? Then scan the QR code!

VIDEO DIFFERENTIAL PRESSURE

Interested? Then scan the QR code!

CRP1 SERIES

The CRP1 cleanroom panel is a compact, easy-to-use device. Its compatibility with HygroClip2 probes enables humidity measurement of 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
- Alarms: audible alarm, via relay and/or via LCD

POWER SUPPLY

- Low-voltage: 3-wire

SIGNAL OUTPUTS

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

VERSION

- 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

Front
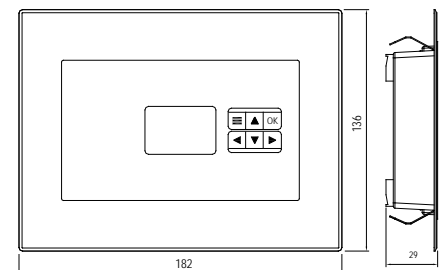
Housing for wall mounting

COMPATIBLE

- HW4 software, page 192

DELIVERY PACKAGE

- Factory adjustment certificate
- Short instruction manual
- Fittings

RECOMMENDED ACCESSORIES

- HC2A-S probes   See page 6
- Service cable   AC3006 / AC3009*, page 82
- Calibration accessories   See page 72

* Requires optional HW4 software and service cable.

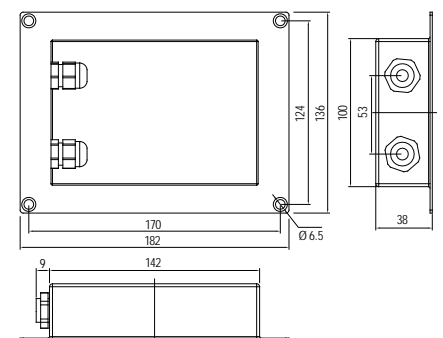| Technical data	CRP1
General	
Parameters	Temperature and relative humidity
Housing material (front panel)	Stainless steel, plastic (resistant to cleaning)
IP protection	IP65 (integrated)
Mounting position	Wall mounting
Dimensions	Front: 182 x 136 x 29 mm
	Housing: 142 x 100 x 38 mm
Weight	750 g (without humidity probe)
Display	Graphic LCD with backlight
Menu navigation	6 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 2014/30/EU
Fire protection class	Corresponds to UL94-HB
FDA / GMP compatibility	21 CFR Part 11 and GAMP5
Measurement of temperature and relative humidity	
Probes	See chapter "Probes" on page 4
Measurement range	-100...200 °C (probe dependent) / 0...100 %RH
Outputs	
Analog outputs	2, freely configurable
Analog output type	4...20 mA or 0...10 V
Switch output	2 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 diaphragm sensor technology. 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 manufactured with 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 color TFT display
- Visual operating elements for operation with protective gloves

POWER SUPPLY

- Low-voltage: 3-wire

SIGNAL OUTPUT

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

VERSION

- 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

- Color TFT display with backlight

CRP5

APPLICATIONS

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

CRP5 with HC2-CRP probe

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)
Relays	1 A DC / AC 2 A DC
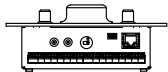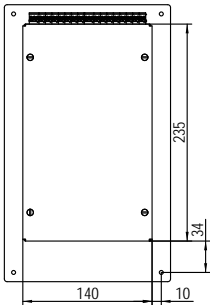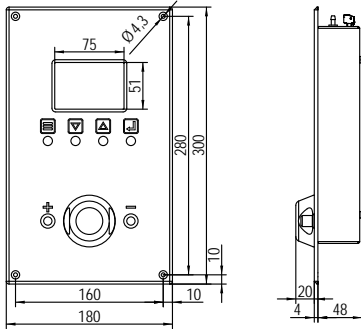
The magnetic HC2-CRP humidity and temperature probe can also be used independently, see page 13.

COMPATIBLE

• HW4 software, page 192

DELIVERY PACKAGE

• Factory adjustment certificate
• Short instruction manual

RECOMMENDED ACCESSORIES

• Wall holder, 2 pc.	AC6101
• PEEK screws, 4 pc.	AC6102
• Service cable	AC3006 / AC3009*, page 88
• Pressure connection caps	AC61000/AC61001
• Calibration accessories	See page 81
• HC2A-S probes	See page 6

* 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
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	Color TFT display
Menu navigation	4 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 2014/30/EU
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	±50 Pa / ±100 Pa / ±250 Pa / ±500 Pa
Medium	Air and non-aggressive gases
Accuracy at 23 °C ±3 K	±1.0 %FS
Zero drift	Compensated (manual or automatic zero adjustment)
Measurement interval	1 s
Pressure resistance	0.7 bar (70,000 Pa)
Pressure connections	Front: tubing connector Ø 6 mm x 10 mm Back: tubing connector Ø 4 mm x 10 mm
Measurement of temperature and relative humidity	
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	6 solid-state relays
Switching capacity	‹50 VDC at ‹2A if polarity is considered ‹35 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)

VIDEO CRP5

Interested? Then scan the QR code!

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 rated applications.

HygroFlex5-EX series

The HygroFlex5-EX series is the latest development in two-channel transmitters for precise measurement of humidity and temperature in dust and gas potentially explosive atmospheres. The interchangeable 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 power supply for many applications.

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 power supply required
- Interchangeable stainless steel probes
- Certified for two temperature classes (T4 / T5)

POWER SUPPLY

- Low-voltage: 2-wire

SIGNAL OUTPUT

- Current output

VERSIONS

- Wall mount (W)
- Duct mount (D)

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

Storerooms, pharmaceutical / biotechnology industry, sugar and flour mills, power stations, oil industry.

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

Wall version (W)
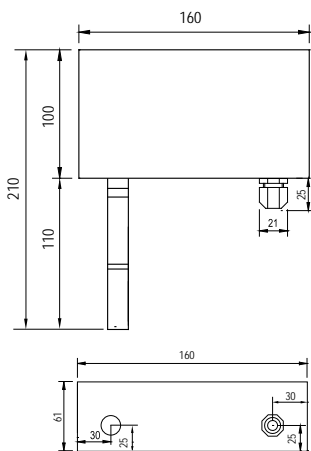
Duct version (D)
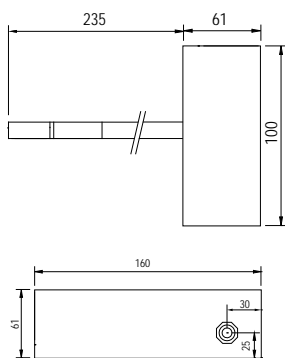
HF5-EX probes

HC2-SM-EX
Wall mounting
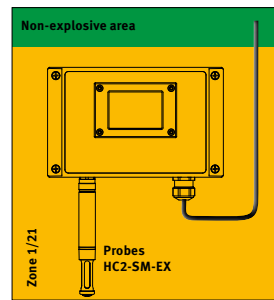
HC2-SM-EX
Duct mounting
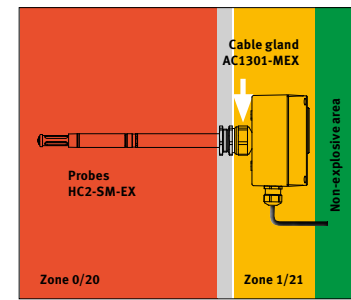
HC2-IMxxx-EX
Cable probe for flexible installations
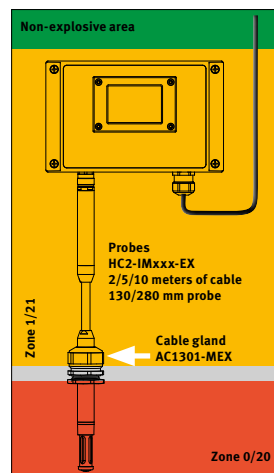
HC2-IExxx-EX / HC2-LDPxxx-EX
Screw-in cable probe for pressure lines or low dew point
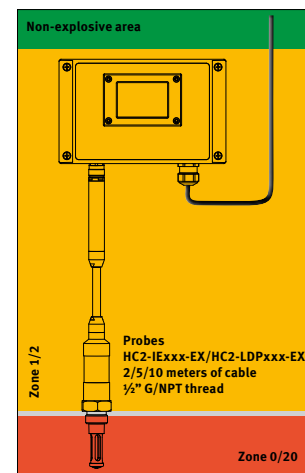
COMPATIBLE

- HW4 software, see page 192

DELIVERY PACKAGE

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

RECOMMENDED ACCESSORIES

- Service cable   AC3006* page 88
- Calibration accessories   See page 81
- Replacement filters   See page 18
- Cable gland   AC1301-MEX for mounting in ducts

* Requires optional HW4 software and service cable.

| Technical data	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 2014/30/EU
ATEX directives	2014/34/EU (ATEX)
EX identification	II 2(1) G Ex eb mb [ia Ga] IIC T5 Gb II 2(1) D Ex tb [ia Da] 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

Technical data	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 1/3 Class B HC2-LDP-EX: Pt1000 1/3 Class B
Measurement range	-40...60 °C / -40...85 °C
Accuracy at 23 °C	0.1 K
Accessories	
Filter	SP-FN15, sintered steel filter (1.4401)
Cable gland	AC1301-MEX for duct mounting and cable probes (IM)

RMS – Rotronic Monitoring System
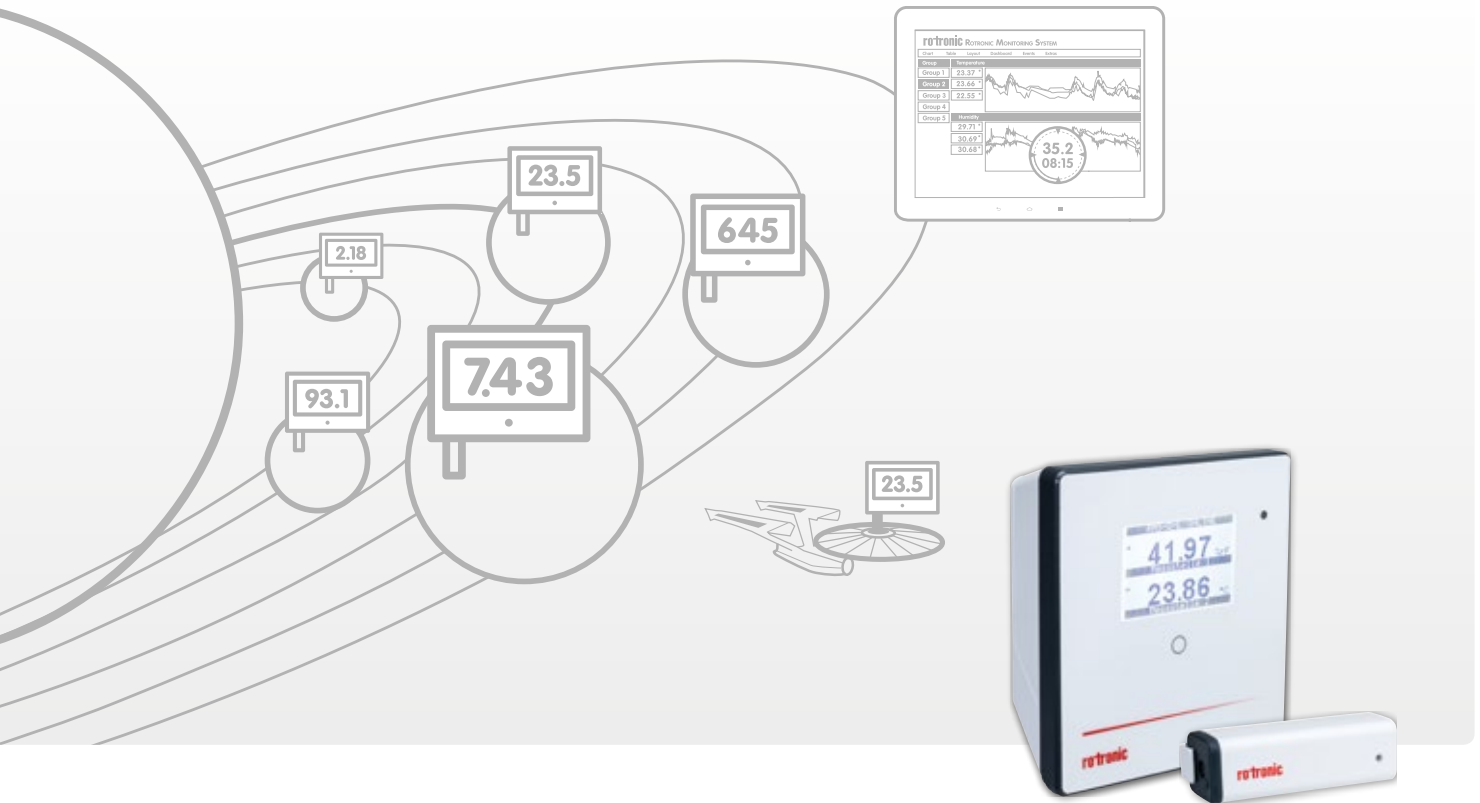
High quality standards in production and storage necessitate a comprehensive monitoring system that delivers various measured data reliably. The adaptive Rotronic Monitoring System (RMS) conforms to FDA and GAMP regulations and is the perfect solution for a variety of applications:
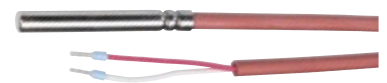
- Electronics industry
- Medical and pharmaceutical industries, healthcare
- Warehouses and transportation
- Archives and museums
- Food and tobacco industries
- Data centers
- Cold stores and cooling chambers
- Cleanrooms and laboratories
- Climate monitoring
- Monitoring and alarms

VIDEO UNIVERSAL RMS

Interested? Then scan the QR code!

RMS – FOR EVERY APPLICATION

The Rotronic Monitoring System is a modular system of hardware elements and software. It guarantees maximum flexibility at installation time, and ensures excellent availability of the data during operation. The data loggers record all measurements by Rotronic and third-party sensors and transmit them to the database. It stores all information and makes it available to all users, regardless of whether they access the database by PC, Mac, tablet or smartphone.

DATA FLOW

INPUT TRANSDUCERS

The data loggers read out Rotronic measuring instruments or other input transducers such as cameras or third-party sensors. In this way the RMS monitors various parameters, both from Rotronic and third-party products.
- Rotronic measuring instruments
- Digital measuring instruments from other suppliers
- Analog instruments from other suppliers

DATA LOGGER

The data logger stores all measured data and sends it to the database. Should the connection be lost, the logger stores the data internally to protect data integrity and fills the data gaps when the connection has been restored.
- Automatic internal storage
- Backfilling of data gaps
- Wireless/LAN interface

SOFTWARE / DATABASE

The database covers the complete monitoring system. It contains all the measured values of the system and saves all actions. The server or cloud software alerts the relevant users in the case of problems and manages the user-specific access rights.
- SQL database
- Cloud solution can be validated
- Server solution can be validated

OUTPUT SIZE

The database can be accessed with smartphones, tablets and all PCs with a web browser. Visualization and alerting are therefore possible worldwide and on all common platforms.
- Real-time monitoring
- Supports all common browsers

NETWORK ENVIRONMENT

RMS Cloud / Private RMS Cloud
Hosted Software/Database Server

Firewall

Internet

Firewall

External Site

Router

Local Client

Mobile Communications
smartphone

Firewall

Wireless Client

Tablet PC

smartphone

Service Provider
Telephone Alarm

Alarm

Local Production or Warehouse Site

Local RMS Server
Local Software / Database Server

Ethernet

Router

LAN

Ethernet

Local Client

Mini Logger

Wall Logger

Wireless Input Module

Wireless Output Module

Wireless Gateway

Wireless Client

DIN Rail Data Logger

Wall Logger

Input Module

Output Module

Tablet PC

CRP5

PF4

HF5

HL-NT

RMS Extension for Rotronic Instruments

smartphone

X
RS485 Network

Y
Various Sensors

Z
Ethernet Sensors

IP Cameras

RMS Converter for Third-Party Instruments

WiFi   868 MHz

MONITORING SOFTWARE

The RMS Software fulfills all requirements for server-based monitoring. The software is linked to a database that archives all the measured data and actions of the system. The data can be accessed from anywhere in the world via all common platforms as long as an internet connection is available.
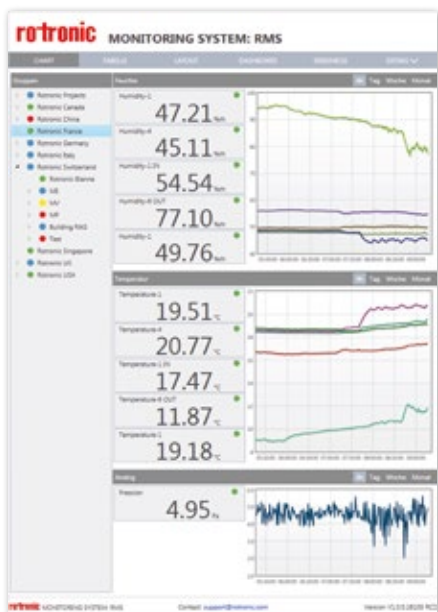
DATA HISTORY ALWAYS AVAILABLE

The database allows access to all historical data at any time, thereby ensuring traceability according to FDA and GMP. This data can be put together into a complete PDF report quickly, automatically and easily.

- Chart
- Table
- Layout
- Dashboard
- Events (audit trail)
- Analysis
- Reporting (PDF & CSV)

ALARMS

Whether by voice call, email, SMS or switching of an alarm relay: the RMS offers clear alarm functions and records all events in the database:

- Errors
- Warnings
- System messages
- Reminders
- Alarms

VALIDATION AT THE TOUCH OF A BUTTON

The RMS Server Software enables validation at the touch of a button. The system checks data integrity automatically by self-test in that it switches all input modules into their various states and checks the alarms that are meant to be triggered. The software then generates a validation report on the complete system.

- The validation documents comply with GAMP5 requirements
  (see Rotronic Validation Guide on the Rotronic website)

EASY USER MANAGEMENT

The intelligent user management function makes it possible to assign different rights to every user on the basis of data groups. For example, the same user can have only read rights in data group A, while he also has write rights in data group B.

DATA ANALYSIS

To analyze your data, you can generate reports at any time. These reports can be visualized and formatted at will.

- Charts and tables (PDF or CSV)
- Statistical data (min./max./average/standard deviation)
- MKT: mean kinetic temperature
- Audit trail
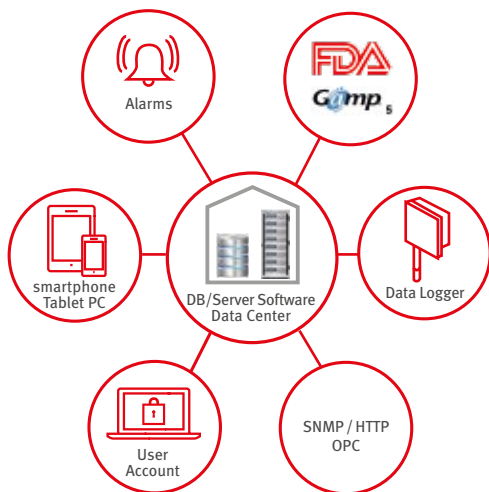
RMS SOFTWARE PRODUCTS

The RMS software was developed on the basis of FDA and GAMP5 guidelines.

Type	RMS Server Software			RMS Cloud (SaaS – Software as a Service)				
Version	Basic	Professional	Enterprise	Free	Small	Professional	Enterprise	Exclusive
Chart & table view	✓	✓	✓	✓	✓	✓	✓	✓
Layout view		✓	✓			✓	✓	✓
Dashboard view		✓	✓			✓	✓	✓
Alarm table	✓	✓	✓		✓	✓	✓	✓
Data archiving			✓				✓	✓
Audit trail		✓	✓			✓	✓	✓
Calibration/Adjustment	✓	✓	✓		✓	✓	✓	✓
Validation			✓					✓
Measuring point alarm	✓	✓	✓		✓	✓	✓	✓
Alarm scheme		∞	∞			40	200	200
Users (freely extendable)	2	5	10	1	2	5	10	10
Devices or measuring points (freely extendable)	10	40	100	2	10	40	100	100
Storage (freely extendable)	∞	∞	∞		6 months	6 months	6 months	∞
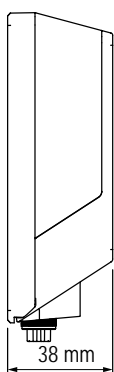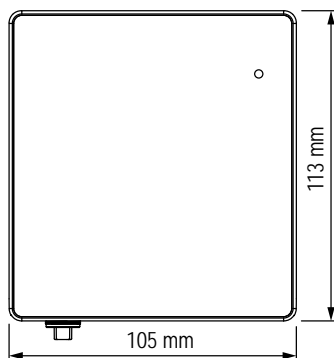
RMS WALL DATA LOGGER

The data logger is the flexible component between the probe and the database in the Rotronic Monitoring System. It stores 44,000 pairs of measured values from the interchangeable HygroClip probe, and transmits them to the RMS database via LAN or wireless link. It guarantees absolute data protection, even if power supply and communications should break down temporarily.

FEATURES

- Stores 44,000 pairs of measured values
- Fail-safe, thanks to internal battery
- 3 years battery lifetime
- Wireless or LAN interface
- Compatible with RMS Gateway, RMS Server Software and RMS Cloud
- Status LED

General specifications – Variant: RMS-LOG-L	
Device type	RMS Wall Data Logger
Measured parameters	Humidity & temperature with HygroClip HCD-S
Memory size	44,000 pairs of measured values
Range of application	-40...70 °C / 0...100 %RH
Storage conditions	-40...30 °C / 0...90 %RH
Power supply	24 VDC / Battery: 2 x AA, EVE-ER14505M PoE: 802.3af-2003, Class 1
Current consumption	‹50 mA
Battery life	3 years (at 23 °C and interval of 1 minute)
Measurement interval	10 s to 15 min.
Interface	Ethernet / Wireless 868 MHz
Wireless range	20...50 meters
Protocols	HTTP / MODBUS TCP (V1.3 and later)
Standards	
FDA / GAMP directives	FDA 21CFR Part 11 / GAMP5
Housing / Mechanical parts	
Housing material	ABS
Dimensions	105 x 113 x 38 mm
IP protection class	IP65
Local alarm	LED

113 mm

105 mm

38 mm

COMPATIBLE

- HygroClip DIGITAL   HCD-S
- RMS Gateway   RMS-GW-868
- RMS Server Software   RMS-WEB
- RMS Cloud   RMS-CLD

DELIVERY PACKAGE

- Data logger
- 2 batteries
- Wall bracket
- Short instruction manual
- 2 screws & 2 plugs
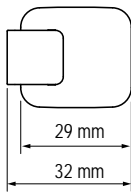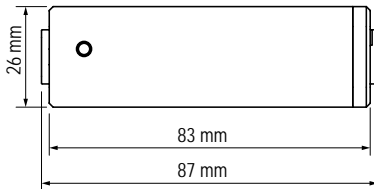
RMS MINI LOGGER

The wireless mini data logger is the low-cost data logger in the Rotronic Monitoring System. Its small housing and wireless interface make it a really flexible data logger. The mini logger is available in various sensor variants: internal temperature sensor (NTC), external temperature sensor (NTC), light, voltage measurement, current measurement or digital switch contact. With this versatility, it can monitor refrigerators and incubators, as well as door contacts and OEM analog devices.

FEATURES
- Stores 10,000 measured values
- Fail-safe, thanks to internal battery
- 3 years battery lifetime
- Depending on the version, it measures temperature, current, voltage or light, or monitors a digital switch input
- Compatible with RMS Gateway, RMS Server Software and RMS Cloud

General specifications		
Device type	RMS Mini Logger	Order code
Measured parameters	Internal temperature External temperature Light Voltage 0 – 10 V Current 0 – 20 mA Switch contact	RMS-MLOG-T-868 RMS-MLOG-T10-868 RMS-MLOG-LGT-868 RMS-MADC-868-V RMS-MADC-868-A RMS-MDI-868
Memory size	10,000 measured values	
Range of application	-30...85 °C / 0...100 %RH	
Temperature accuracy *	0.3 k @ 25 °C (RMS-MLOG-TIO-868+TIO-002)	
Voltage / Current accuracy *	10 Bit ADC	
Lux accuracy *	-3.5/+10 Lux @ 10 Lux	
Storage conditions	-30...30 °C / 0...95 %RH	
Power supply	Battery: 1 x AA, EVE-ER14505M	
Battery life	3 years (at 23 °C and interval of 1 minute)	
Measurement interval	10 s to 15 min.	
Interface	Wireless 868 MHz	
Wireless range	20...50 m, indoors	
Conformity with standards		
FDA / GAMP directives	FDA 21CFR Part 11 / GAMP5	
Housing / Mechanical parts		
Housing material	ABS	
Dimensions	83 x 29 x 29 mm	
IP protection class	IP65	

*   See data sheet for detailed information.

COMPATIBLE

- RMS Gateway   RMS-GW-868
- RMS Server Software   RMS-WEB
- RMS Cloud   RMS-CLD

DELIVERY PACKAGE

- Data logger
- Battery
- Wall bracket
- Short instruction manual
- 2 screws & 2 plugs

RMS GATEWAY

The gateway is the interface between the wireless data loggers and the server software. It can manage up to 60 data loggers simultaneously, collecting all wireless-logger measurement data and passing them on to the server software. When several gateways are used in the same network, they are configured redundantly. If one gateway should fail, the measurement values are automatically sent to the server software via another gateway.

FEATURES
- Connects up to 60 wireless data loggers simultaneously
- 5 wireless channels for parallel and redundant operation
- Compatible with RMS Wireless Data Loggers, RMS Server Software and RMS Cloud
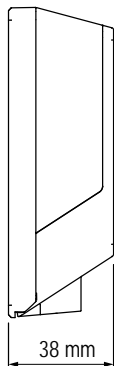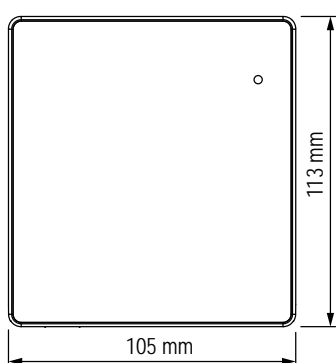
General specifications – RMS-GW-868	
Device type	RMS Gateway
Range of application	-40...70 °C / 0...100 %RH
Storage conditions	-40...30 °C / 0...95 %RH
Power supply	24 VDC / PoE: 802.3af-2003, Class 1
Current consumption	‹50 mA
Measurement interval	10 s to 15 min.
Interface	Instrument side: wireless 868 MHz Server side: Ethernet
Wireless range	20...50 m, indoors
Protocols	HTTP
Conformity with standards	
FDA / GAMP directives	FDA 21CFR Part 11 / GAMP5
Housing / Mechanical parts	
Housing material	ABS
Dimensions	105 x 113 x 39 mm
IP protection class	IP65

COMPATIBLE

- RMS Data Logger — RMS-LOG
- RMS Mini Logger — RMS-MLOG
- RMS Display — RMS-D
- RMS Server Software — RMS-WEB
- RMS Cloud — RMS-CLD

DELIVERY PACKAGE

- Gateway
- Wall bracket
- Short instruction manual
- 2 screws & 2 plugs

RMS DISPLAY

The display module can display any measurement values in the Rotronic Monitoring System. The measurement values and display element can thus be positioned anywhere in the system and inter-connected via the web software. The values are transmitted to the module by the software, via LAN or wireless link.

FEATURES

- Displays up to 4 measuring points
- Wireless or LAN interface
- Compatible with RMS Gateway, RMS Server Software and RMS Cloud
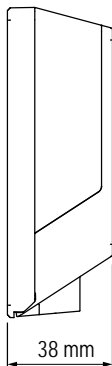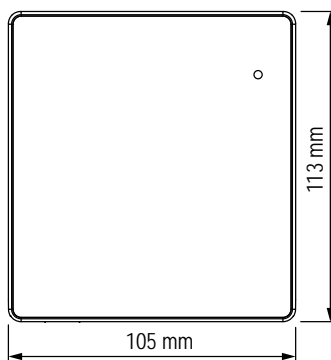
General specifications – RMS-D-L	
Device type	RMS Display
Range of application	-20...70 °C / 0...100 %RH
Storage conditions	-20...30 °C / 0...95 %RH
Power supply	24 VDC / PoE: 802.3af-2003, Class 1
Battery life	3 years (at 23 °C and interval of 1 minute)
Wireless range	20...50 m, indoors
Interface	Ethernet / Wireless 868 MHz
Protocols	HTTP
Conformity with standards	
FDA / GAMP directives	FDA 21CFR Part 11 / GAMP5
Housing / Mechanical parts	
Housing material	ABS
Dimensions	105 x 113 x 39 mm
IP protection class	IP65

113 mm

105 mm

38 mm

COMPATIBLE

- RMS Gateway   RMS-GW-868
- RMS Server Software   RMS-WEB
- RMS Cloud   RMS-CLD

DELIVERY PACKAGE

- Display
- Wall bracket
- Short instruction manual
- 2 screws & 2 plugs

RMS DIN RAIL DATA LOGGER

The RMS DIN Rail Data Logger is available as an input variant (RMS-DI) and an output variant (RMS-DO). As output module (RMS-DO), it offers two relay outputs, and as input module, two inputs that can be configured as logic inputs (5...24 VDC). The values are transmitted via LAN or wireless link.

FEATURES RMS-DI
- Stores 75,000 measured values
- Fail-safe, thanks to internal battery
- 3 years battery lifetime
- Wireless or LAN interface
- Compatible with RMS Gateway, RMS Server Software and RMS Cloud

FEATURES RMS-DO
- Wireless or LAN interface
- Compatible with RMS Gateway, RMS Server Software and RMS Cloud
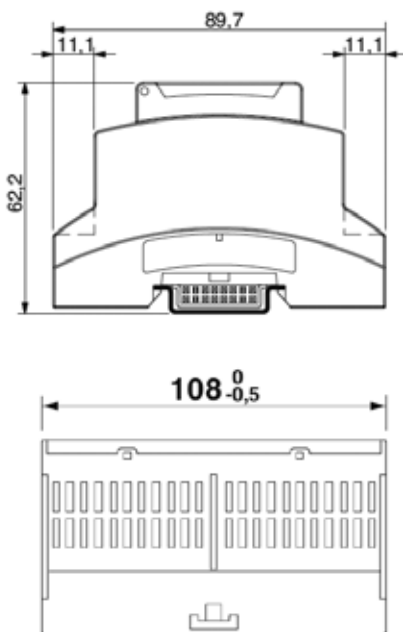
General specifications	
Device type	RMS DIN Rail Data Logger
Range of application	-40...70 °C / 0...100 %RH
Storage conditions	-40...30 °C / 0...95 %RH
Power supply	24 VDC / PoE: 802.3af-2003, Class 1
Current consumption	‹50 mA
Inputs (RMS-DI)	2 x 5...24 VDC, ‹1 mA or 2 x make contacts
Outputs (RMS-DO)	2 solid-state relays Switching capacity: 1 A / 50 V
Interface	Ethernet / Wireless 868 MHz
Protocols	HTTP
Conformity	
FDA / GAMP directives	FDA 21CFR Part 11 / GAMP5
Housing / Mechanical parts	
Housing material	PC
Dimensions	IP20
IP protection class	90 x 63 x 108 mm

COMPATIBLE

- RMS Gateway   MS-GW-868
- RMS Server Software   RMS-WEB
- RMS Cloud   RMS-CLD

DELIVERY PACKAGE

- Digital module
- 2 batteries (RMS-DI)
- Wall bracket (wall-mounted housing)
- Short instruction manual
- 2 screws & 2 plugs

RMS Converter / RMS Extension

The RMS Converter and RMS Extension allow you to integrate existing devices and networks into the RMS. They act as an interface, gathering the data of the devices and sending them to the RMS Server Software. In this way, existing Rotronic products with a digital interface can be integrated into the world of the RMS in just a few easy steps. With a USB dongle, the Converter can be enhanced to a gateway, and can connect to data loggers by wireless link. In addition, external digital OEM devices can be integrated, if desired.

FEATURES
- RMS Extension: integrates digital Rotronic devices into the RMS
- RMS Converter: integrates digital OEM devices into the RMS
- Can be extended at any time using customer-specific software features
- Compatible with all HC2-generation devices, RMS Server Software and RMS Cloud
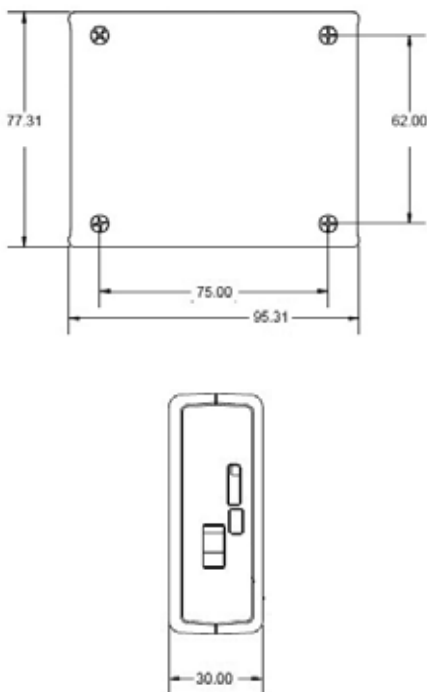
General specifications	
Device type	RMS Converter / RMS Extension
Number of measuring points	Up to 100 measuring points
Range of application	-0 .. 50 °C / 0 .. 95 %RH
Storage conditions	-0 .. 50 °C / 0 .. 95 %RH
Power supply	5 VDC (AC adapter included in delivery)
Measurement interval	10 s to 15 min.
Interface	Ethernet / USB
Protocols	Modbus TCP RoASCII HTTP Customer-specific enhancements
Supported webcams	D-Link DCS-2121
Storage capacity	7 days
Conformity with standards	
FDA / GAMP directives	FDA 21CFR Part 11 / GAMP5
Housing / Mechanical parts	
Dimensions	94 x 78 x 30 mm
IP protection class	IP20

COMPATIBLE

Data logger	HL-NT
Data logger	HygroLog-NT
Humidity transmitters	HF4…HF8
BP transmitters	PF4 / CRP5
Wireless Data Logger	HL-RC
RMS Server Software	RMS-WEB
RMS Cloud	RMS-CLD

DELIVERY PACKAGE

- Converter
- Short instruction manual
- AC adapter
- Ethernet cable
- USB cable

RMS PROBE

This digital probe is characterized by its high performance. Very low current consumption, the highest degree of accuracy and measurement results within 50 ms are its main features. This is enabled by the new AirChip4000, which together with the HYGROMER® HT-1 sensor forms a powerful combination.

FEATURES

- Measures relative humidity and temperature, calculates the dew/frost point
- With new HYGROMER® HT-1 sensor
- Absolute repeatability guaranteed
- Accuracy ±0.8 %RH, ±0.1 K
- Excellent long-term stability ‹1 %RH / year
- Developed for low-power applications
- Digital calibration and adjustment
- Compatible with RMS data loggers and RMS software

General specifications – Order code: HCD-S	
Humidity sensor	HYGROMER® HT-1
Temperature sensor	Pt1000 RTD IEC 751 1/3 Class B
Accuracy	±0.8 %RH, ±0.1 K, at 10...30 °C adjusted at 23 °C and 10, 35, 80 %RH
Long-term stability	‹1 %RH / year
Adjustment and calibration	Up to 20 points
Measurement range	-40...85 °C / 0...100 %RH
Startup time	50 ms
Measurement interval	500 ms
Response time τ63	‹15 s, without filter
Range of application / Storage conditions	-40...85 °C
Power supply	2.5...5.5 VDC
Current consumption	‹0.5 mA @ 2.5...5.5 VDC
Filter	Polyethylene
Interface	UART
Protocols	MODBUS RTU
Conformity with standards	
FDA / GAMP directives	FDA 21CFR Part 11 / GAMP5
Housing / Mechanical parts	
Housing material	PC, PPS, stainless steel 1.4301 (thumb screw)
Dimensions	Ø15 x 108 mm
IP protection class	IP65

108mm

Ø 15 mm

COMPATIBLE

- RMS Data Logger   RMS-LOG
- AC3001

DELIVERY PACKAGE

- HygroClip DIGITAL
- Short instruction manual
- Calibration certificate

ACCESSORIES

Order code	Description	Compatible with	
T10-0001	NTC10k, -200...25 °C, 6 x 50 mm with 2 m open ends, IP65	RMS-MLOG-T10-868	
T10-0002	NTC10k, -80...200 °C, 6 x 50 mm with 2 m open ends, IP65	RMS-MLOG-T10-868	
T10-0003	NTC10k, -50...200 °C, 6 x 50 mm with 2 m open ends, IP65	RMS-MLOG-T10-868	
DC-0001	Magnetic door contact	RMS-MDI-868 RMS-DI-L-R	
RMS-NPK 24.8665.0868 24.8665.1981	Network planning kit: wireless dongle, RMS Mini Logger, antenna	RMS-CONFIG	
21.99.1196	ROLINE PoE Fast Ethernet Switch, 5 ports (4x PoE)	RMS-LOG-L RMS-GW RMS-DI-L RMS-D	
21.99.1197	ROLINE PoE Fast Ethernet Switch, 8 ports, (8x PoE), 19" rack	RMS-LOG-L RMS-GW RMS-DI-L RMS-D	
WC-0001	IP webcam, resolution 640 x 480, day & night view	RMS-CONVERTER	

SOFTWARE
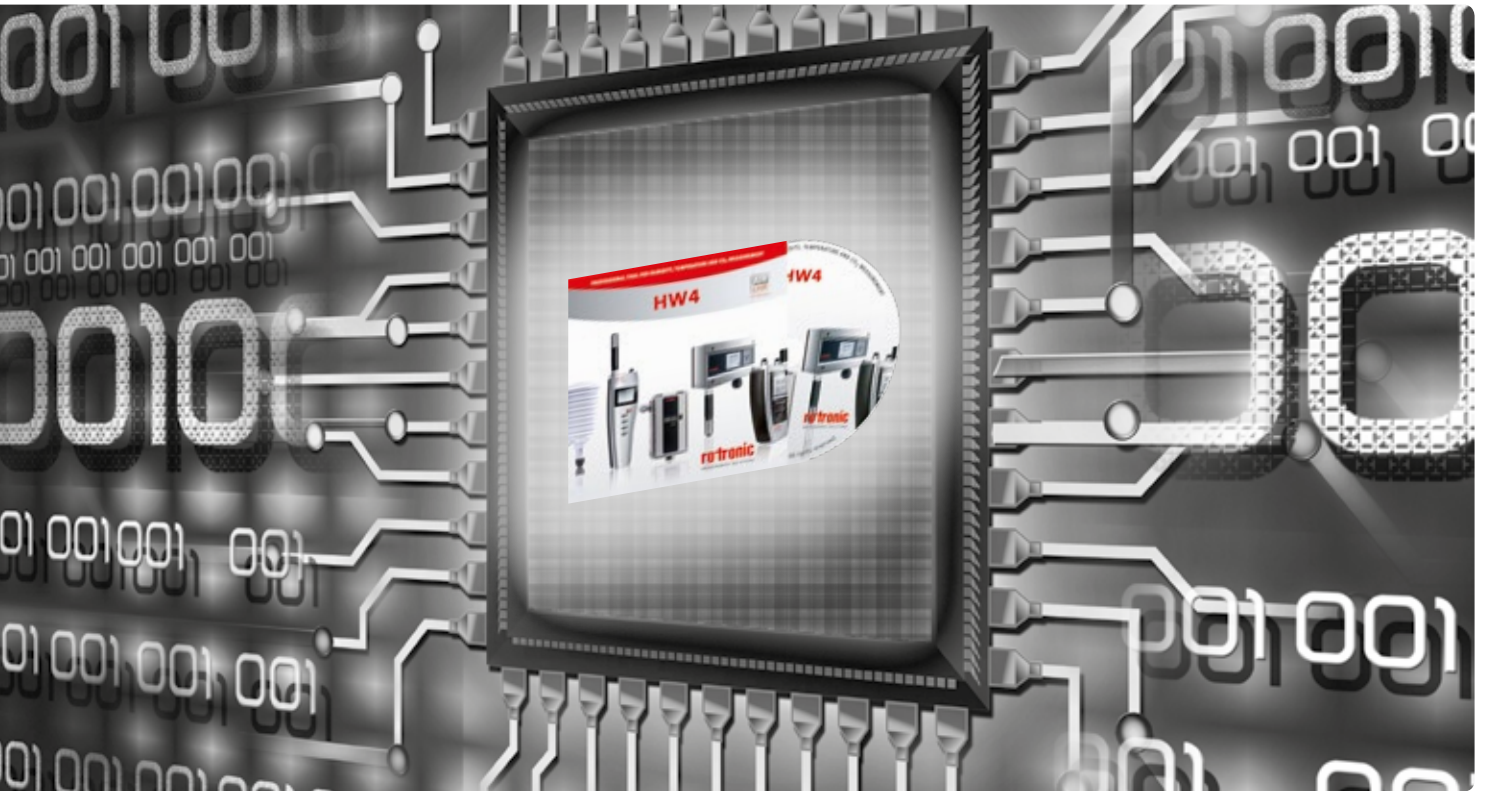
HW4 SOFTWARE
Data integrity and security are of essential importance today. Companies in the pharmaceutical, food, and medical technology industries must prove that their data is measured and managed reliably. For this they require software and devices that can be validated. Combining Rotronic HW4-compatible 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, electronic signatures

HW4

SW21

Software editions

HW4 LITE
Product key: 20 …
- Free software for visualization, data export and evaluation of measured values for the devices BL-1D, HL-1D, TL-1D, HL-20(D) and HC2-WIN-USB
- A maximum of 3 instruments can be connected simultaneously
- Download at www.rotronic.com (product key supplied with the data logger)

HW4 STANDARD (ECO)
Product key: 24 …
- Single-user applications license
- Visualization of multiple loggers and measured values
- Monitoring (one 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
- Multiple-user applications license (same site)
- Fulfils the requirements for electronic data records and signatures (FDA21 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 package
- 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 maximum 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 is licensed. Multiple use of one license is permitted as long as the installed software is used at the same site 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 network 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 is licensed. Multiple use of one license is permitted as long as the installed software is used at the same site 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, Windows Vista, Windows 7, Windows 8, Windows 10	✔	✔	✔	✔	✔	✔

DESCRIPTION OF FUNCTIONS
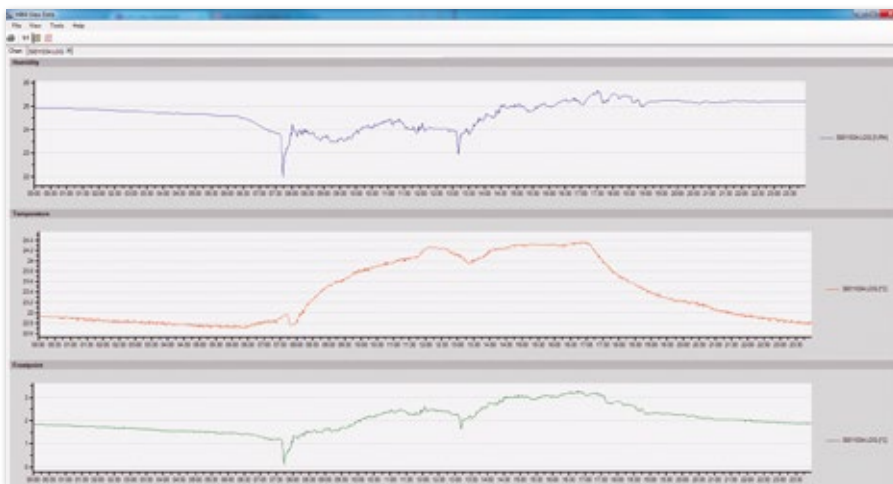
VIEWING OF MEASURED VALUES/MONITORING
Viewing of measured values is very easy and user-friendly. Files of any device shown in the device tree can be copied and opened directly with the HW4 Explorer. The data is presented in both tabular and graphical formats.

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.
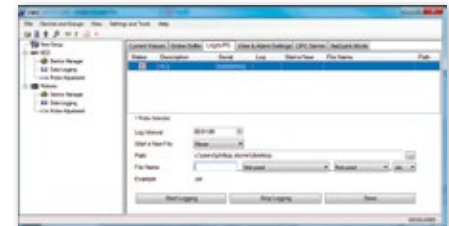
INSTRUMENT CONFIGURATION

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
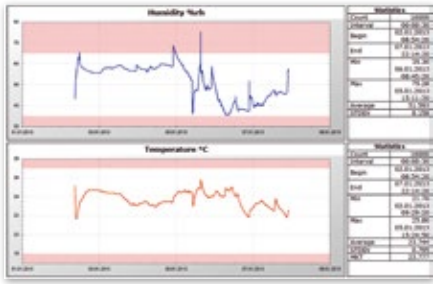
STATISTICAL FUNCTIONS / PDF REPORT

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
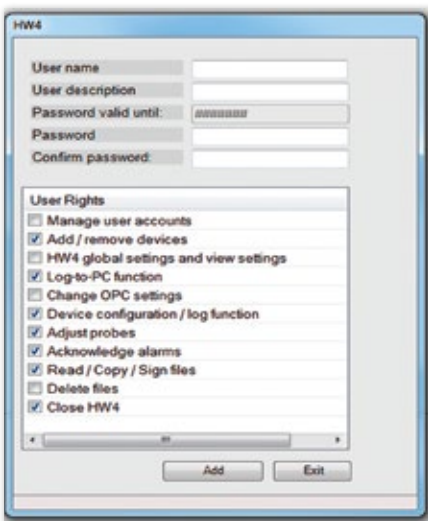• Total time measurements exceeded a certain value

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.
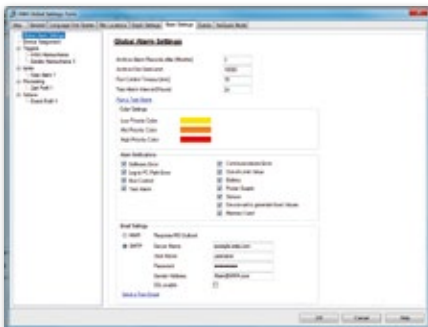
ALARMS

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
• Start-up of applications
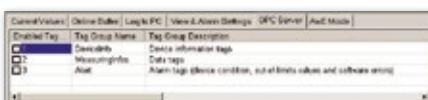
OPC SERVER (OBJECT LINKING AND EMBEDDING FOR PROCESS CONTROL)

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

SW21 SOFTWARE

FEATURES

- Free software for configuration and downloading of data from the instruments:
  CP11 / CL11 / HF1 / CF1 / BF2
- Stand-alone version or integrated in HW4 software
- Display of measured values in tabular and graphical formats
- Languages: English and German

CP11 / CL11

Instrument configuration and downloading of data.

HF1

Instrument configuration and adjustment of humidity and CO_2.

CF1

Instrument configuration and humidity adjustment.

BF2

Instrument configuration and zero adjustment.

DISPLAY OF MEASURED VALUES

Measured values can be displayed in tabular or graphical formats.
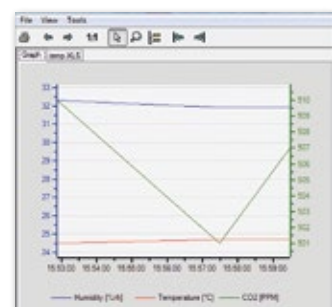
ROTRONIC AFTER SALES SERVICES

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-accredited calibration laboratory ISO/IEC 17025
* Calibration / Adjustment with ISO 9001 factory adjustment certificate
* Repair and adjustment
* On-site calibrations
* Calibration seminars
* General project consultation
* Temperature mapping
* Validation & qualification
* GxP services for storage and transportation (GMP/ GDP)

After Sales Service contact information
Telephone: +41 44 838 11 88
Mail: support-rh@rotronic.ch

International
For your local contact please refer to www.rotronic.com/international

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.
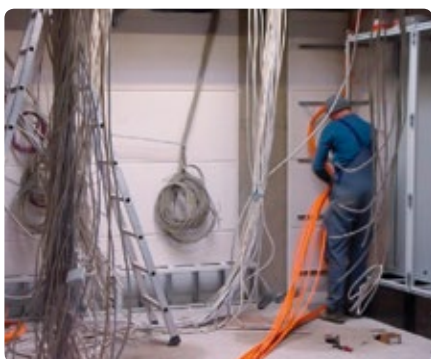
INSTALLATION

You have opted for a product from Rotronic and need help installing it? Rotronic offers a local installation service or cooperates with reliable partners who work regionally and know our products. Once they have been installed correctly, the products/networks run reliably from day one.

Your benefits
- Inexpensive installation by Rotronic specialists
- Cooperation with competent partners trained by Rotronic
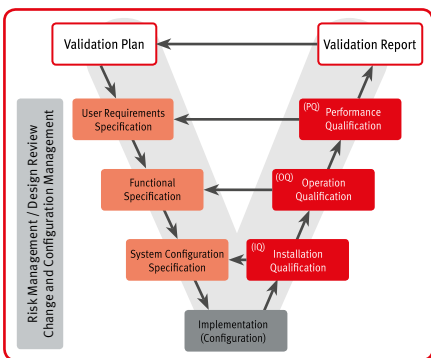
VALIDATION & QUALIFICATION

V-model (validation)

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

- Inexpensive installation by Rotronic specialists
- Competence in validation directly from the manufacturer
- 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 runs its ISO 17025 calibration laboratory, which is equipped with the very latest state-of-the-art instruments, both efficiently and at the highest 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. This generator 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

International unit	SI unit
National standard	**METAS**
Accredited agency	**rotronic** SCS 0065
End customer	**rotronic**
Consumer	Consumer
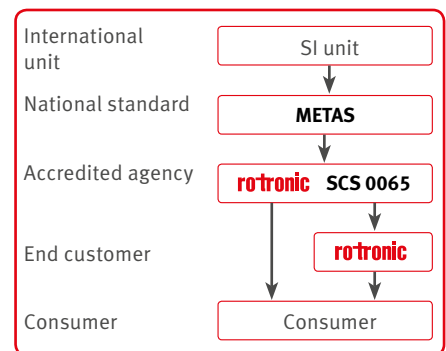
Calibration hierarchy (e.g. Switzerland)

YOUR BENEFITS

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

QUERIES

support-rh@rotronic.ch
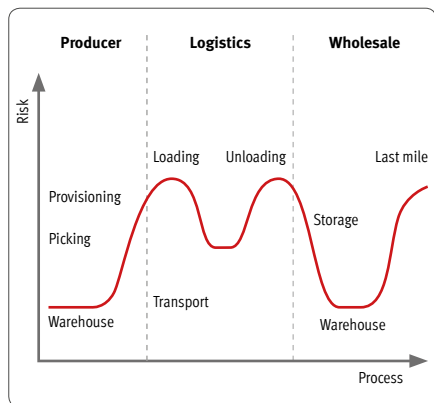
Risk assessment for shipping of
pharmaceutical products
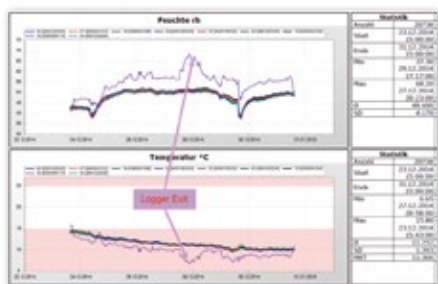
Example view of a temperature and
humidity mapping

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 specializes in these services and offers you an efficient solution tailored exactly to your requirements. Temperature mapping service (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 a possible audit.

Temperature mapping
warehouses

Temperature mapping
production rooms

Temperature mapping
climate chambers

Temperature mapping
transport

VIDEO MAPPING

Interested? Then scan the QR code!

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 and validation (climate mapping)
- Transport qualification
- Climate chamber mapping
- Maintenance and 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

EQUIPMENT HIRE

HygroGen2

Many customers have their measuring instruments calibrated in our accredited laboratory – others prefer to carry out calibration themselves – Rotronic gladly makes the HygroGen2 humidity and temperature generator available for this (country specific offer).

Renting the device saves you investment in your own device and you receive equipment with outstanding accuracy that is traceable to our SCS (ISO 17025) laboratory at all times. Calibrate your Rotronic or third-party probes with the easy-to-use HygroGen humidity and temperature generator.

If you initially feel a little unsure, simply hire a Rotronic technician as well. He will explain the calibration procedure to you and stand by you in your first own calibrations/adjustments.

FEATURES

- Generates a stable reference environment (humidity and temperature)
- Calibration solution for the laboratory and on-site
- Humidity equilibrium typically in only 5 minutes
- Calibrates up to 6 probes simultaneously
- «AutoCal» automated calibration (optional)
- Integrated touch screen PC with 9 USB ports
- Integrated FDA CFR 21 part 11 compliant Rotronic HW4 software
- Range 5...95 %RH (2...99 %RH with range extension option) 0...60 °C

See page 76 for further information on the HygroGen2 humidity and temperature generator.

VIDEO HYGROGEN2

Interested? Then scan the QR code!

DATA LOGGERS

We also rent out data loggers for short-term use (country specific offer). The humidity and temperature data are recorded in an interval defined by you.

Please contact your local Rotronic representative to discuss your requirements.

Typical applications for the HL-1D data logger are:

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

It records your data in a definable interval of time. Please contact your local Rotronic representative if you are interested.

See page 58 for further information on the HygroLog HL-1D data logger.

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, 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 (m³) of the gas mixture. In a gas mixture the water vapor generates a certain partial pressure that is part of the total barometric gas pressure. The vapor pressure can only rise to its saturation limit, which is determined by the temperature. Thereafter water is given off in liquid form (dew). The maximum pressure is called saturation pressure and is temperature dependent. The temperature dependency is, however, not included in the term of absolute humidity.

RELATIVE HUMIDITY

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

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

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

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

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

EQUILIBRIUM RELATIVE HUMIDITY (ERH)

A hygroscopic material always tries to reach humidity equilibrium with the surrounding air. Equilibrium relative humidity is the free water content in a hygroscopic material after equilibrium is reached in an environment with constant relative humidity and temperature.

Humidity equilibrium then prevails when the amount of water absorbed and given off is equal.

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 levels. The response time becomes greater at low temperatures and low 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.

VIDEO HUMIDITY

Interested? Then scan the QR code!

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)

To obtain useful measurements of relative humidity, it is extremely important that the measurement probe and measured material have the same temperature. The specific 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 below 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	0.1	0.04	0.06	0.02	0.03	0.01
100	0.35	0.13	0.8	0.3	0.27	0.1	0.16	0.05	0.08	0.03
200	0.55	0.2	1.3	0.48	0.44	0.16	0.26	0.1	0.13	0.05
300	0.75	0.27	1.8	0.64	0.6	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	1.1	0.35	0.66	0.21	0.33	0.1
650	1.45	0.46	3.6	1.13	1.2	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

ACCURACY SPECIFICATION FOR HUMIDITY AND TEMPERATURE
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 guarantees 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.

HUMIDITY

**ACCURACY OF HUMIDITY MEASUREMENTS
OVER THE MEASURING RANGE**

HygroClip2 industrial probes
HC2A-IC / HC2A-IM / HC2A-IE / XD-Industrial

HygroClip2 probes
HC2A-S(3) / HC2A-SM / XD
HC2-HK / HC2-C / HC2-P / HC2-HP / HC2-HS

Continuous load
Rotronic HC2A industrial probes are designed for continuous loads of up to 190 °C. Rotronic standard probes up to 100 °C.

[1]   **Peak load:**
The peak load at 200 °C is 100 h. See the sensor data sheet for detailed information on the pollution loads for the sensor.

TEMPERATURE

**ACCURACY OF TEMPERATURE MEASUREMENTS
OVER THE MEASURING RANGE**

HygroClip2 industrial probes
HC2A-IC / HC2A-IM / HC2A-IE / XD-Industrial
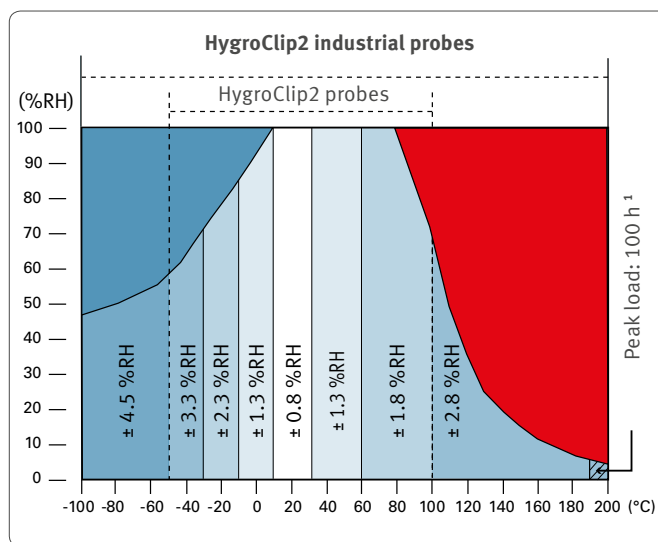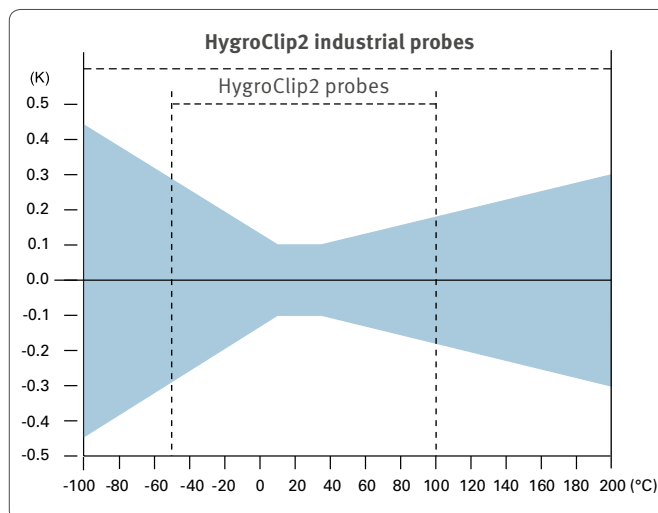
HygroClip2 probes
HC2A-S(3) / HC2A-SM / XD
HC2-HK / HC2-C / HC2-P / HC2-HP / HC2-HS

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		150000		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	H_2S	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

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

Contaminant/Pollutant	Formula
Argon	Ar
Butane	C_4H_{10}
Natural gas	
Ethane	C_2H_6
Helium	He
Methane	CH_4
Neon	Ne
Propane	C_3H_8
Oxygen	O_2
Nitrogen	N_2
Hydrogen	H_2

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.

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.

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 Rotronic water-activity probes work with digital HygroClip technology, which ensures their high performance and simple, digital calibration. They can therefore be used in practically all fields of 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 running on a PC. The HC2-AW probes have a large thermal mass. This means they 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.

Download aw white paper from **www.rotronic.com/aw**

VIDEO WATER ACTIVITY

Interested? Then scan the QR code!

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 CO$_2$ in natural ambient air is about 0.04 % or 400 ppm. When humans and animals exhale this gas, it is quickly mixed with the ambient air, including in rooms that are well ventilated.

A high CO$_2$ content becomes apparent in humans through rapid fatigue and loss of concentration. The negative effects become noticeable more quickly in small rooms in which there are many people (e.g. conference rooms).

In order to initiate suitable countermeasures such as an increase in the supply of fresh air, it is important in modern climate control systems to measure not only parameters such as relative humidity and temperature, but also the CO$_2$ content. The concentration of CO$_2$ is regarded as an important indicator for the indoor air quality.

GUIDELINES

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

MEASUREMENT TECHNIQUE

The measurement technique is based on the principle of NDIR (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.

VIDEO CO$_2$

Interested? Then scan the QR code!

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. The automatic baseline correction means the sensors require no further calibration if they are used in indoor air applications.

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
mmH$_2$O	**inchH$_2$O**	**mmHg**	**inchHg**
10,197.16	401.46	750.06	29.53

$$p = \frac{F}{A}$$
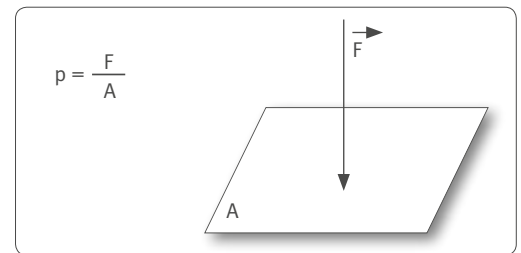
WHAT IS DIFFERENTIAL PRESSURE?

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.
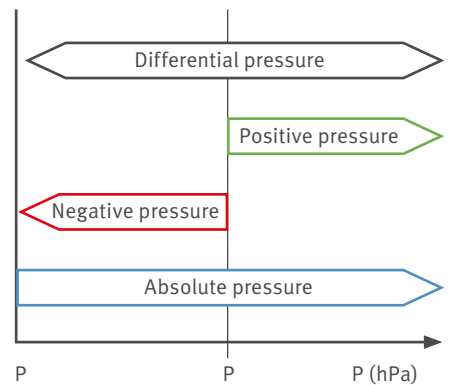
HOW DOES ROTRONIC MEASURE DIFFERENTIAL PRESSURE?

- 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.
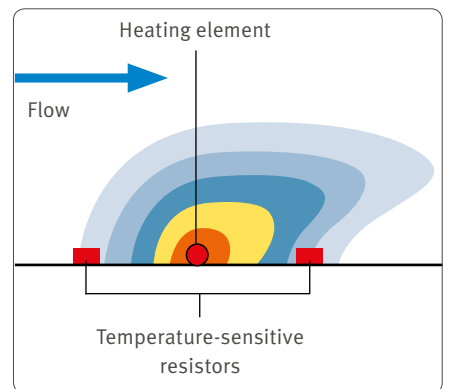
PRESSURE MEASUREMENT TECHNOLOGY – GLOSSARY

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 Hygro-Clip2 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 equilibrium 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 dried 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 the 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 systems 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.

VIDEO DEW POINT MEASUREMENT

Interested? Then scan the QR code!

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.

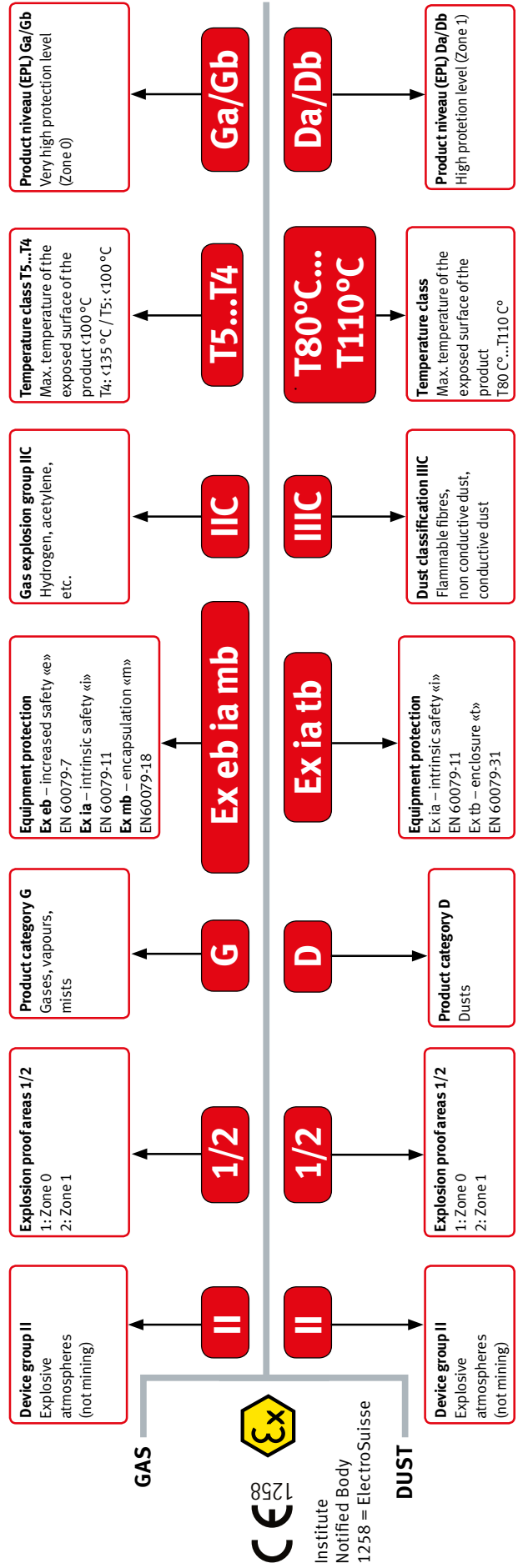## HOW ARE ATEX DEVICES SPECIFIED?

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 present in the environment.

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:

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

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

WHAT DOES THE CLASSIFICATION LABEL OF ATEX DEVICES MEAN?

GAS

Device group II
Explosive atmospheres (not mining) — **II**

Explosion proof areas 1/2
1: Zone 0
2: Zone 1 — **1/2**

Product category G
Gases, vapours, mists — **G**

Equipment protection
Ex eb – increased safety «e»
EN 60079-7
Ex ia – intrinsic safety «i»
EN 60079-11
Ex mb – encapsulation «m»
EN60079-18 — **Ex eb ia mb**

Gas explosion group IIC
Hydrogen, acetylene, etc. — **IIC**

Temperature class T5...T4
Max. temperature of the exposed surface of the product <100 °C
T4: <135 °C / T5: <100 °C — **T5...T4**

Product niveau (EPL) Ga/Gb
Very high protection level (Zone 0) — **Ga/Gb**

DUST

Device group II
Explosive atmospheres (not mining) — **II**

Explosion proof areas 1/2
1: Zone 0
2: Zone 1 — **1/2**

Product category D
Dusts — **D**

Equipment protection
Ex ia – intrinsic safety «i»
EN 60079-11
Ex tb – enclosure «t»
EN 60079-31 — **Ex ia tb**

Dust classification IIIC
Flammable fibres, non conductive dust, conductive dust — **IIIC**

Temperature class
Max. temperature of the exposed surface of the product
T80 C°...T110 C° — **T80°C...T110°C**

Product niveau (EPL) Da/Db
High protection level (Zone 1) — **Da/Db**

Institute Notified Body
1258 = ElectroSuisse

CE 1258

FLOW

WHAT IS FLOW?

Flow or volume flow is the measurement of a quantity of flowing gas and is often given in the SI unit [m³/s].

The flow velocity is closely related to it. It is a measure for 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)

1 kg air
20 °C / 1 bar

1 kg air
20 °C / 2 bar

1 kg air
40 °C / 1 bar
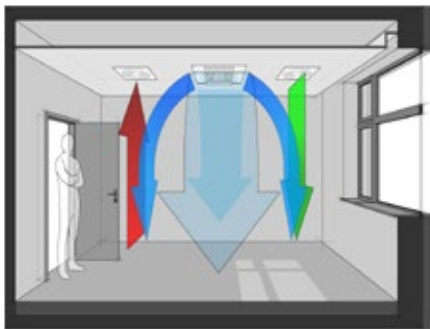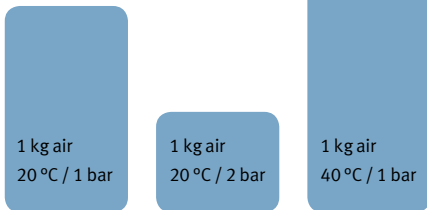
HOW DOES ROTRONIC MEASURE FLOW?

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

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

Please visit www.rotronic.co.uk/terms to download a PDF copy, or contact our Accounts section direct at our UK head office and UKAS 0766 / ISO 17025 accredited calibration laboratory, the address is below.

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- Dedicated product specialists
- Mapping and validation services
- Training courses and seminars
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- UKAS calibration laboratory accredited for temperature, humidity and dew point

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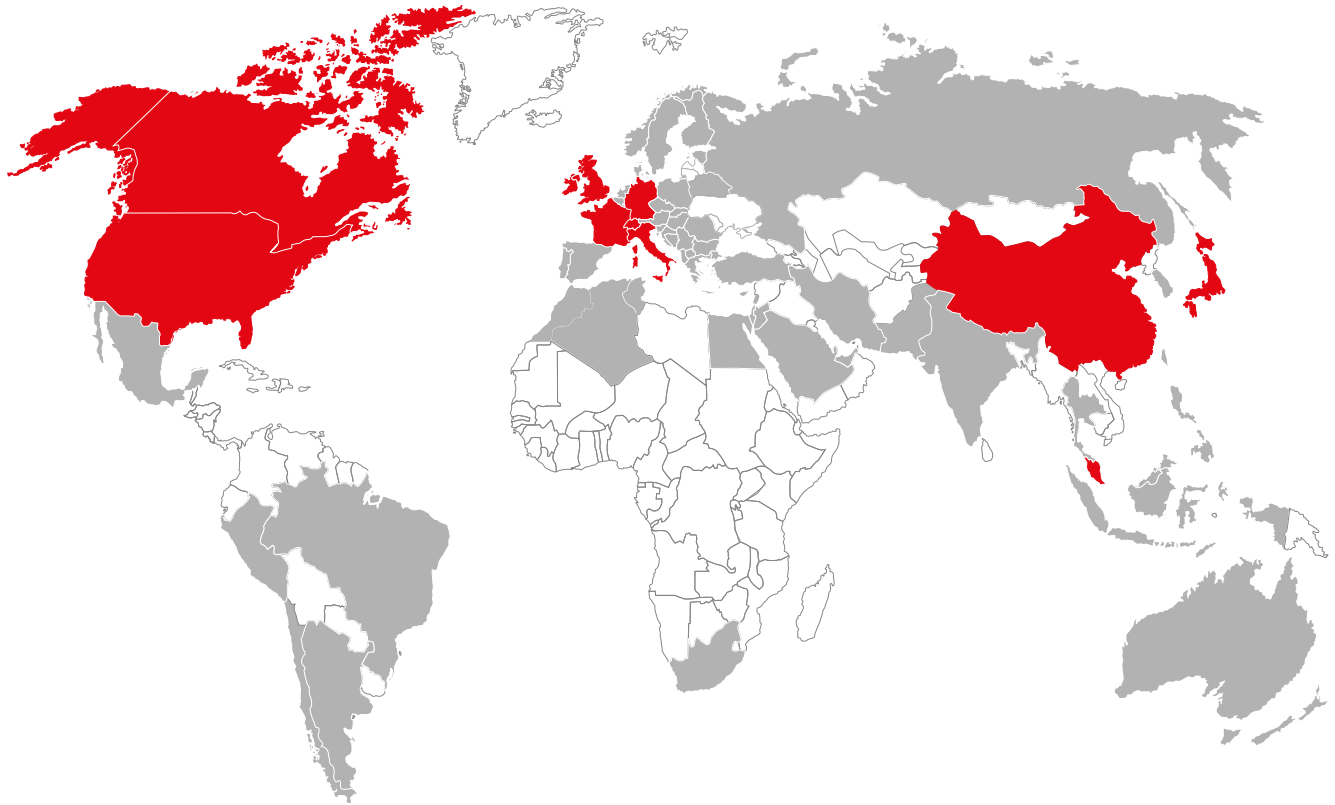| **Marketing**	**Sales Administration**
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