HygroClip

Humidity goes Digital

HygroClip®

Digital Measuring Technology for better paper quality

- Measuring instruments for paper and cardboard stacks and moving webs of paper
- High accuracy due to direct measuring of equilibrium humidity
- Display of the relative humidity and temperature
- Optimised, on both sides ventilated measuring chamber for fast measurement
- Sword hygrometer, battery /accumulator powered, with auto-power-off-function
- Digital web probe BFC-DIO for the on-line measurement of the mowing web allows continuous measurement and production process control
- Simple data transfer and archiving of measured values with validated WINDOWS-software HW3
- Better security due to simple calibration capability
- Traceable measured values
- SWISS MADE

rotronic®

LEADING IN HUMIDITY MEASUREMENT

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Paper and Its Environment

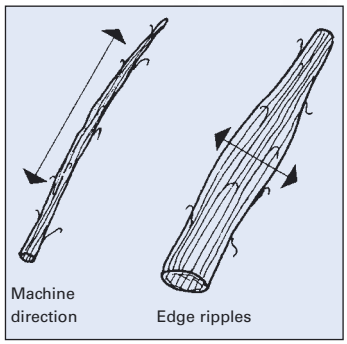
Hygroscopic materials such as paper contain water in the form of vapour in larger pores, and liquid in the narrow capillaries of the material's structure. As with air, it is possible to express the levels of moisture in solid materials in two different ways:

Moisture content

Moisture content defines the percentage of a papers weight which is water (both in liquid or vapour phase); and is usually referred to as 'percent moisture content'. This term is widely used in many areas of industry as a 'quantitative' parameter and therefore generally used as the basis for process control in the paper production industry. However moisture cannot fully define paper quality, and it has little influence on the interaction between paper and the environment.

Equilibrium Relative Humidity

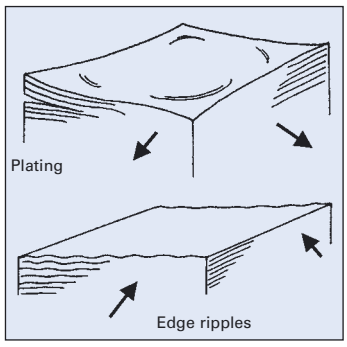
Paper, as a hygroscopic material, strives to reach equilibrium with the ambient humidity.Therefore the humidity of the air within the structure of paper will be the same as the humidity of the paper stack. Equilibrium Relative Humidity (ERH) can be simply defined as 'the value of relative humidity of the surrounding air where there is no net exchange of moisture with the paper'. If there is a difference between the %rh of the ambient air and the ERH of the paper, an exchange of water vapour will take place, and the result will be a change in the values of ERH and moisture content. If %rh and ERH are the same, no exchange will take place, and all parameters will remain stable. ERH is therefore a very useful parameter in defining the performance and quality of paper.



Expansion-parameters

Interaction between stack humidity and ambient air

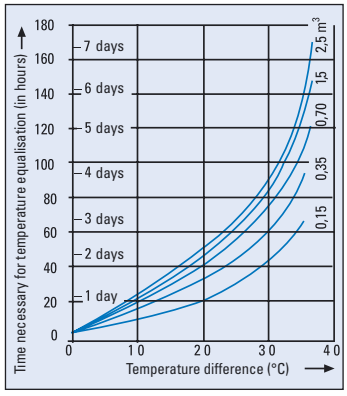
Paper is usually manufactured to a specific ERH value. If paper is exposed to humidity conditions which are higher or lower than the papers ERH, problems such as plating, edge ripples, curl, cockling, tight edges and dimensional changes can occur. These cause poor print quality, especially in the offset process, and can also cause production problems such as mis-feeds or web breaks.



Arrows show the paper stack absorbing or desorbing humidity.

ROTRONIC sword hygrometers measure both the ERH and temperature of the paper stack, which should ideally be left wrapped or covered until used. By measuring the humidity and temperature of the ambient air, it can be ascertained whether paper quality will change after unpacking, and thereby negatively affecting the planned printing. A difference between ERH and the ambient humidity by up to ±5 %rh is acceptable. But if the humidity difference is too large (>8-10 %rh), then water vapour exchange takes place too quickly and this in consequence can lead to a deformation of the paper edges and the print quality affected, or the paper wasted.

A paper humidity of more than 60% ERH can cause the drying time of the printing ink to take up to three times longer than usual. For storage and transportation of paper and card, the optimum ambient humidity is approximately 45%rh (for temperatures from 10 °C to 30°C). By checking the stack when delivered, and temporary storage in a conditioned area (to avoid large temperature changes), ink drying can be optimised. How long the paper or card stack needs to be stored depends on the temperature difference between the stack and the ambient, and of course the stack size. A storage time of one to two days for a difference of 10°C for a 1m3 stack volume is considered to be a rule of thumb. Should the paper humidity be too low (<42%rh), this can lead to static charges.These cause the printing press to grip several sheets at a time and this can lead to significant maintenance cost and down-time.



Undesirable changes to the paper, as well as delays in printing processes can be avoided by measurement of the stack ERH and temperature with sword hygrometers and comparing this with the ambient conditions in the room.

ROTRONIC sword-probes are developed specifically for the paper and print industry. In comparison to traditional sword hygrometers, the measuring chamber is much smaller, is ventilated on both sides and for this reason it equilibrates quickly with the surrounding paper and provides the user with measurement results in a very short time.

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Handhelds for Measurement in Paper and Card Stacks

ROTRONIC have been developing instruments for the paper and print industry for more than 35 years, and as a consequence we have significant experience in providing optimised solutions and expertise for this specialist field. All ROTRONIC instruments are factory calibrated and measure both equilibrium relative humidity and temperature simultaneously. Verification of the accuracy of measurement by the user is possible at any time using ROTRONIC's unique certified calibration system. Calibration points are selectable over the whole measuring range, and a purpose designed calibration device guarantees best possible performance and easy application.

Typical areas of application include; quality checks during paper production, during and after storage, pre-delivery inspection, dispatch, quality control of goods received and measurements during printing to avoid poor print quality and machine down time.

Key features:

- Direct measurement of the ERH, small measurement chamber volume
- Robust and stable humidity probes
- Combined %rh/°C measurement
- Ergonomic, state-of-the-art handheld equipment
- Large display with HOLD function
- Battery/accumulator operated

Advantages:

- Fast, precise and reliable measurements
- Low maintenance requirement, hardly any down-time
- Both values immediately available
- Comfortable and simple to use
- Results are easy to read on-site
- Can be used anywhere

HygroPalm 2-Set-HS28 – Measurement Set

The handheld HygroPalm-2 is a new portable humidity and temperature measuring instrument based on state-of-the-art-digital technology. The advantages are clear; highest precision is ensured by digital signal processing and data transfer. Calibration data is stored in the probe, thus re-calibration is not necessary when changing or replacing probes.

Set contents & features:

- Digital Handheld HygroPalm 2
- Interchangeable digital sword probe HygroClip-HS28
- Second input for any HygroClip-probe
- Large, easy to read display and keypad
- Display of absolute humidity (e.g. dew point, moisture content etc.)
- Multipoint calibration via the keypad or HW3 software
- EGS calibration device to fit the HygroClip-HS28
- Humidity calibration standards EA50-SCS (5 ampoules 50 %rh with SCS certificate)
- Robust carry case AC1117
- RS232 interface and data cable AC1622
- HW3 software with calibration/evaluation features

Order code:
HygroPalm 2-Set-HS28

Interchangeable HygroClip Digital Probes for HygroPalm

HygroClip SP05 5mm diameter insertion probe for measurements in paper rolls
Laser cut slots allow air interchange between sensor and material, probe length 200 mm
HygroClip S ambient condition probe
Cost effective probe for optimum measurement of ambient conditions

Measuring range:	-40…85 oC, 0…100 %rh
System accuracy:	±1.5 %rh, ±0.3 K (at 23°C)
	±1,0 %rh, ±0,2 K with SCS certificate (at 23°C)

Order code:

HygroClip SP05	Insertion probe for probe input 1 of HygroPalm
HygroClip SP05-B5	Insertion probe with Binder 5-pin connector for probe input 2
HygroClip S	Ambient condition probe for HygroPalm input 1

GTS Sword Hygrometer

The GTS sword hygrometer is specially designed for the paper and print industries. Its classic design, robust construction and new electronics make it the industry standard for equilibrium relative humidity measurement in paper or card stacks. Typical applications include paper production, quality control and conversion.

Key features:

- Direct display of the relative humidity and temperature values
- High accuracy and fast response time
- Stable, yet light aluminium sword for fast temperature equilibrium, sword length 260 mm
- Simple 1 key control
- Auto-power-off and HOLD-function
- Battery status indicator

Order code:
GTS

GTS-Set for the paper specialist

A set containing all the hygrometer tools you will need:

- GTS handheld sword hygrometer
- Robust carry case
- Calibration device EGS
- Humidity standards EA50-SCS
  (5 ampoules 50 %rh with SCS certificate)
- Adjustment tool

Order code:
GTS-Set

S1 Sword Hygrometer

The S1 is a sword hygrometer widely used by paper consultants, merchants and quality inspectors. Its fold away sword make it easy to store and transport, as well as allowing the display position to be adjusted.

Key features:

- Adjustable probe position, folding sword
- Large, easy to read display
- Simple operation
- Hold function
- Auto-power-off function
- Battery status indicator
- Battery powered (rechargeable batteries can be used)
- Temperature display in °C or °F

Order code:

S1	Handheld device with integrated sword probe
S1-Set	Contents: S1, EA50-SCS, EGS, Adjustment tool, AC1115
AC1115	Carry case for S1

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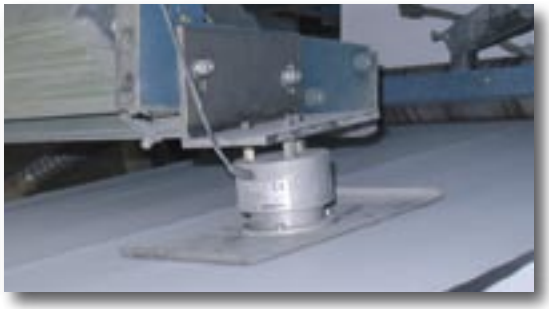
On-Line Equilibrium Relative Humidity Measurement

In the paper and print industry, equilibrium relative humidity (ERH) can have a significant influence on the quality of paper, print quality and the success of conversion or coatings. If ERH is too low, curl, static and dusting problems can occur; too high and web breaks or dimensional changes can badly affect production quality and efficiency. Paper manufacturers can only provide the average ERH for a roll; and in some cases variations across the width of the web and along the length of the roll can occur. On-line ERH measurement provides the manufacturer, converter or printer with the information they need to minimise the impact of the problems caused by variations in ERH.

The digital probe BFC-DIO from ROTRONIC provides an inexpensive and practical measurement of the equilibrium relative humidity on moving webs of paper. The probe can be installed over or under the paper. At slow web speeds (<100m/min) the probe can be in direct contact with the web, but at higher speeds, or if the paper has a course surface, friction may increase the probes temperature too much, so a small air gap is required.

The surface ERH and temperature of the paper conditions the very small measurement cell of the BFC probe, and the sensors accurately transmit this information in a digital format to the monitoring or control hardware. If ambient conditions are subject to large variations, this can also be measured and the on-line ERH measurements compensated.

Key features:

- On-line ERH measurement with digital BFC-DIO
- Digital HygroFlex transmitters
- Temperature compensated
- Combined %rh/°C measurement
- Validated Windows monitoring software
- Software based alarm and control options

Your benefit:

- Allows continued monitoring and process control
- Precise measurement and secure signal transmission
- Accurate measurements at all temperatures
- Both key parameters immediately available
- Simple observation and recording of the measured values
- Alarm signal when pre-set limits are exceeded

Digital web probe BFC-DIO

Order code:	Digital probe BFC-DIO
BFC-DIO-T7	Probe with 1 m cable, 7 pin Tuchel connector compatible with HygroFlex probe input 1
BFC-DIO	Probe with 1 m cable, Binder 5 pin-connector, compatible with HygroFlex probe input 2
AC1616/005	5 m extension cable for BFC-DIO-T7
AC1619	1 pair of connectors male/female, 7 pin Tuchel with signal amplifier for DIO, suitable for cable connection, length: max. 200m
AC1604/5	Extension cable with Binder 5 pin connector
EBFC	Calibration device for BFC-DIO
ET-W37-Set	Spare filter for BFC-DIO

The BFC-DIO probe is used in combination with a HygroFlex transmitter. With active extensions cables, probes can be placed up to 200 m from the transmitter. It is possible to connect up to 2 probes simultaneously to the HygroFlex-3 transmitter, and up to 32 transmitters can be networked using the RS485 interface, allowing multiple measurement points to be monitored using a single PC.

HygroFlex 3 digital transmitter with analogue and digital outputs

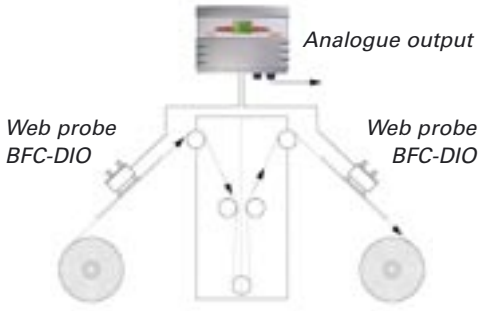
HygroFlex 3 is particularly suitable for the combined monitoring and control tasks. The analogue output signals can be connected to a control system whilst simultaneous data transfer through the RS232/485 interface to a PC is in progress. Validated ROTRONIC HW3 software provides the monitoring and storage of measured values. Additionally it features alarm functions such as notification via e-mail when the pre-set values limits are exceeded. To help improve customer satisfaction, documentation showing the measured values during the production process can be supplied with the paper product. HW3 complies with FDA CFR21 part 11, which means that records cannot be altered without an audit trail being left.

Key features of the HygroFlex-3 transmitter

- Humidity, temperature, and calculated value (dew-point, etc.)
- Three linear output signals (all measured and calculated values)
- Jumper configurable output signals
- Simultaneous digital output for humidity and temperature or for the measuring transmitter configuration
- Networkable (RS485), direct PC connection (RS232)
- Second probe input
- Freely programmable by the user and HW3 software
- External test connector
- Optional display with keypad

HygroFlex measurement transmitter

Order code:	HygroFlex 3 Standard Versions
HTS31X	HygroFlex 3; 4...20 mA=0...100 %rh; 0...100 °C; 12...35 VDC/24 VAC
HTS32X	HygroFlex 3; 4...20 mA=0...100 %rh; 0...100 °C; 90...250 VAC
HTS31D	HygroFlex 3; 4...20 mA=0...100 %rh; 0...100 °C; 12...35 VDC/24 VAC; LCD-display and keypad
HTS32D	HygroFlex 3; 4...20 mA=0...100 %rh; 0...100 °C; 90...250 VAC; LCD-display and keypad
HygroData HTS	Validated WINDOWS software HW3 with RS232 data cable



Calibration – ROTRONIC Humidity standards

SCS* Humidity standards

ROTRONIC is accredited by METAS/SAS (Reg. No. 065) as an internationally recognised SCS calibration laboratory for relative humidity and temperature. ROTRONIC humidity standards are delivered in packs of 5 sealed ampoules of each value. Each ampoule is marked with its humidity value and a unique batch serial number.

With ROTRONIC humidity standards, calibration uncertainties typically of ±1 %rh are reached. SCS-certificates define the uncertainty of the applied humidity standard, as well as the traceability to meet the requirements of quality systems such as ISO 9001.

Order code:
EA-xx-SCS (where xx= 0, 5, 10, 11.3, 20, 35, 50, 65, 75.3, 80 and 95 %rh)

** SCS- Swiss Calibration Service*



Summary & Technical Data

TECHNICAL DATA	BFC-DIO
Humidity measuring range	0...100 %rh
Temperature measuring range	0...50 °C
System accuracy at 23 °C	±1.5 %rh, 0.3 K / ±1.0 %rh, 0.2 K with SCS certificate
Reproducibility	<0.5 %rh, 0.1 K
Response time	%rh < 15 s if probe and web have the same temperature
Long term stability	< 1%rh, 0.1 °C / year
Humidity/temperature sensors	Hygromer IN-1 / Pt100 1/3 DIN
Digital adjustment points	35, 80, 10, & 0 %rh, one point user defined, T0 & Tmax
Operating range (electronics)	0...50 °C
Output signal	DIO Digital to HygroFlex, 200m max cable length with active extension
Power supply	VDC (supply through HygroFlex)
Complies with	CE EN61000-6-2:2001, EN6100-6-4:2001

TECHNICAL DATA	HYGROFLEX
Measuring range	depending on the probe, 0...100 %rh, -50...200 °C, 0...2000 hPa
Operating range (electronics)	0...100 %rh (non condensing), -40...60 °C, with display -30...60 °C
Display/ keypad (optional)	LCD-display with 3 lines, membrane keypad
Display resolution (optional)	0.1 %rh, 0.1 °C, 0.01, calculated values: 0.01
Housing (material, size)	ABS, 207 x 150 x 58.3 mm, metal housing optional
Type of protection	IP65
Weight	950 g
Power supply	Standard version: 12...35 VDC (140 mA), 12...24 VAC Option: 90...250 VAC, 3.5 VA
Cable connection	M16 screw cable glands (7 mm cable)
Terminals	18 AWG
Analogue outputs (standard configuration 4...20 mA)	current outputs (0/4...20 mA), max. load 500 Ω, other output signals selectable by jumpers) voltage outputs (0...1, 5, 10 V), min. load 1000 Ω. Automatic load compensation
CE sign	examined in accordance with the following standards: CE: EN61000-6-2:2001, EN61000-6-4:2001

Calibration devices

ROTRONIC calibration devices are small air-tight chambers which are precisely engineered to suit all probes types. The lower part consists of a screw-in lid into which the humidity standard is applied on a textile pad. After 60 minutes of equilibrium, the humidity in the chamber will be of the same value as indicated on the ampoule, and the instrument can be calibrated against the humidity standard.


EGS

Order code:

EGS	for all sword probes, push-on type
EBF	for BFC plate probe
ER-05	for insertion probe HygroClip-SP05, push-on type
ER-15	for ambient air probe HygroClip-S, push-on type


ER-05


ER-15

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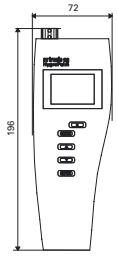
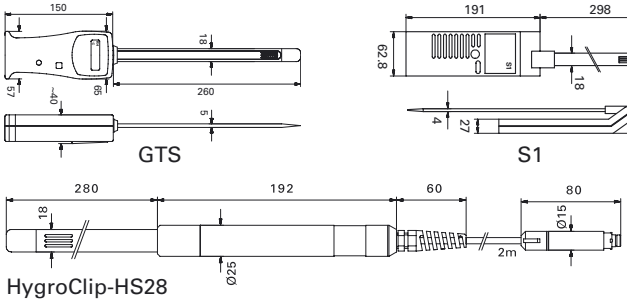
Summary & Technical Data

FEATURES	HYGROPALM 2 SET HS28	S1	GTS
Humidity sensor Hygromer®	Hygromer® AC-1		
Temperature sensor	Pt100 1/3 DIN		
Sensor connections (combined %rh/°C)	2	integrated probe	
Signal input	2 digital	N/A	
RS232 interface	yes	no	
Display	3-lines LCD, alphanumeric	humidity 3-digit LCD Temp. 31/2 digit LCD	3-digit LCD (%rh or °C)
Displayed values	% rh, °C, °F, calculated values	% rh°C, °F	% rh,°C, °F
Resolution	0.1 %rh / 0.1 °C, calculation 0.01		
Probe adjustment			
1 point %rh, °C	with keypad or HW3 software	with potentiometer	
4 point %rh,2 point °C	with keypad or HW3 software	no	
3- point %rh, T min/Tmax	with keypad or HW3 software	35 / 80 / 10 %	N/A
2- point %rh, Tmin /Tmax	with keypad or HW3 software	N/A	35 / 80 %
Adjustment against reference probe	yes	no	
Calculated values and displays			
Dew point or wet bulb temperature	yes	no	
Psychometric calculated values	yes	no	
Pressure compensation calculated values	manually constant	no	
Formula editor	yes	no	
Operating range (electronics)			
Humidity/temperature	0…100 %rh, non condensing / -10...+60 °C	0…100 %rh -10…+50 °C	
Measuring range %rh /T	probe dependent 0…100 %rh / -50…200 °C	5…99,9 %rh / -25…75 °C	5…99,9 %rh -10…+50 °C
System accuracy at 23 °C	probe accuracy: max. ±1 %rh / ±0.2 K	±1.5 %rh / ±0.3 K (±2.5 <15 %>90 %)	
Reproducibility	< 0.5 %rh / < 0.1 K		
Long term stability	< 1 %rh / year		
Power supply			
9 V PP3 Alkaline Batteries	yes		
9 V rechargeable batteries	applicable battery recharge via Docking Station	yes	yes
External power supply (8...20 VDC)	Optional; with docking station & adapter	no	no
Protection rating	IP 50		
Housing material	ABS		
Size in mm	195 x 70 x 35	190 x 63 x 26	420 x 70 x 40

Drawings



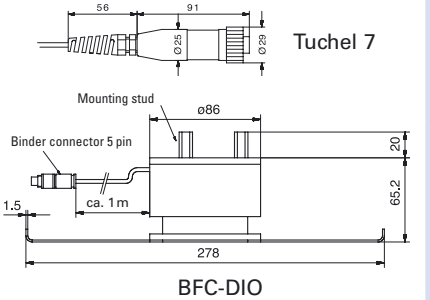
HygroPalm



GTS

HygroClip-HS28

S1



BFC-DIO

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