HS5

Hygrostat/Thermostat

Instruction Manual



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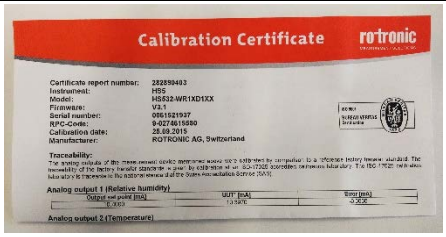
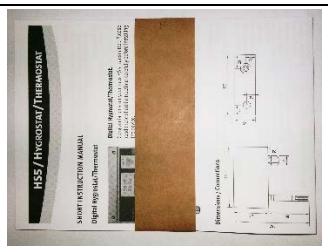
Scope:

This manual is valid for the HS5 transmitter series with firmware version V3.x. The low-order digit of the firmware version stands for minor changes, e.g. correction of errors, that do not influence the main functionality of the device.

1 Short Description of the Product

The HS5 is a humidity and temperature transmitter equipped with an IP connection for transfer of the measured values in a local data network (LAN) to a PC running the HW4 software. An integrated relay and two analog outputs (current or voltage) allow switching operations to be carried out when predefined alarm states occur. In addition to this, the results of extensive psychrometric calculations can also be integrated in the alarm scheme. Together with the keypad and display on the front panel, the device can also be used as stand-alone hygrostat or thermostat without integration in a LAN. Use of the tried-and-tested HC2 Hygroclip humidity and temperature probe guarantees highest measuring accuracy and long-term stability.

1.1 Delivery Package

Hygrostat / Thermostat Per order code (A HygroClip2 probe must be ordered separately)	
Factory adjustment certificate	
Short instruction manual	
Mounting screws and wall plugs	

1.2 Main Features of the HS5 Transmitter

- • Measures relative humidity and temperature
- • All psychrometric calculations available
- • Outstanding accuracy and repeatability
- • Highest precision
- • Dry mechanical relay
- • Digital communication via Ethernet
- • Freely scalable analog signals
- • Update possible via the Internet

The device and its possibilities should be kept abreast of new developments with firmware updates.

1.3 Technical Drawing

The HS5 comes as wall-mounted unit in a normal ROTRONIC housing. The following drawings show the relevant overall dimensions in mm.

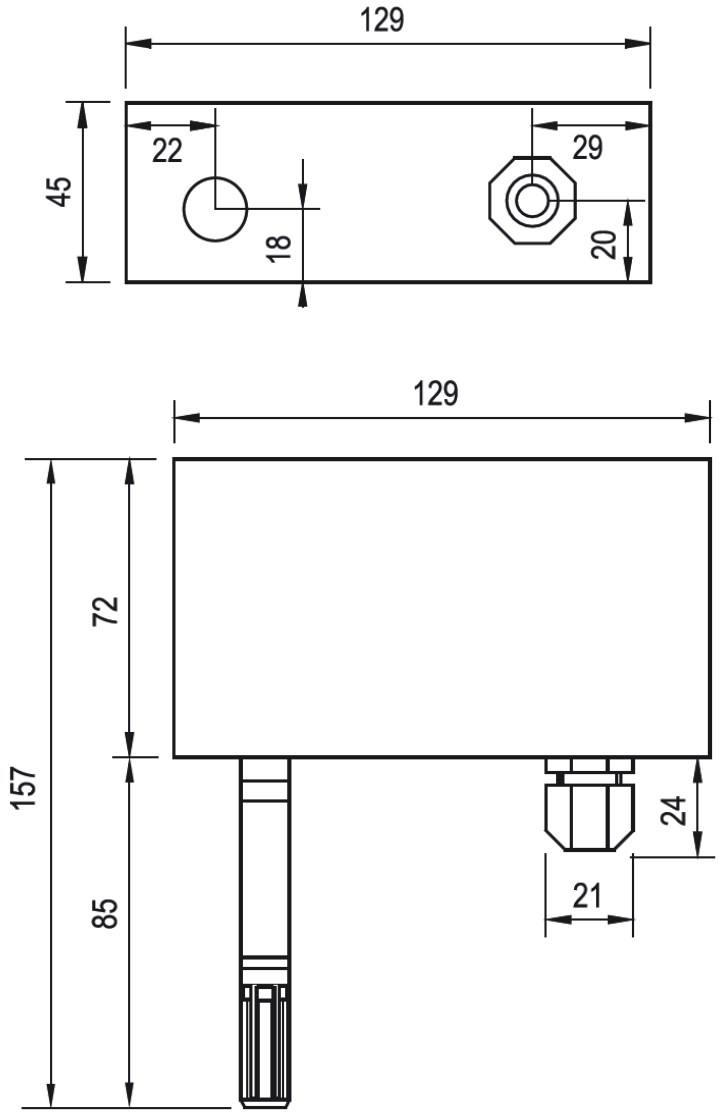


Figure 1: Overall dimensions of the HS5

2 General Description

2.1 Power Supply

The HS5 is only available as three-conductor version without galvanic isolation. For configuration purposes, the device can also be supplied with power via the service interface (Mini-USB port inside housing).

2.1.1 Power Supply / Current Consumption

Power supply specifications for the HS5:

Operating Voltage	Current Consumption
15...40 VDC	<70 mA / <150 mA (with Ethernet interface)
14…28 VAC – 50/60 Hz	<70 mA / <450 mA (with Ethernet interface)

The device does not have galvanic isolation!

2.2 Connections

The electronics of the HS5 are contained on two circuit boards. The boards are connected electrically with a 16-pole ribbon cable.

The board in the top part of the housing with display and keypad has a service socket allowing serial UART communication (UART: Universal Asynchronous Receiver Transceiver) between the device and a PC for administration and data transfer purposes. An AC3006 service cable is needed for this for protocol conversion between the UART socket and USB port (USB: Universal Serial Bus) of a PC running the ROTRONIC HW4 software. The HC2 probe connection (E2 connection socket) is located at the bottom of the housing.

The board in the bottom part of the housing has three screw terminal blocks for:

- operating voltage and ground (15 – 40 VDC / 12 – 28 VAC)
- 2 analog outputs (can be switched between voltage and current)
- 1 relay changeover contact (normally open, normally closed).

These screw terminals are accessed through a screw cable gland. An external RJ45 socket is used to connect the HS5 to an Ethernet LAN (LAN: Local Access Network). The MAC address (MAC: Media Access Control) of the HS5 is printed on the top side of the RJ45 socket enclosure. It can be used for unique identification of the device in a LAN.

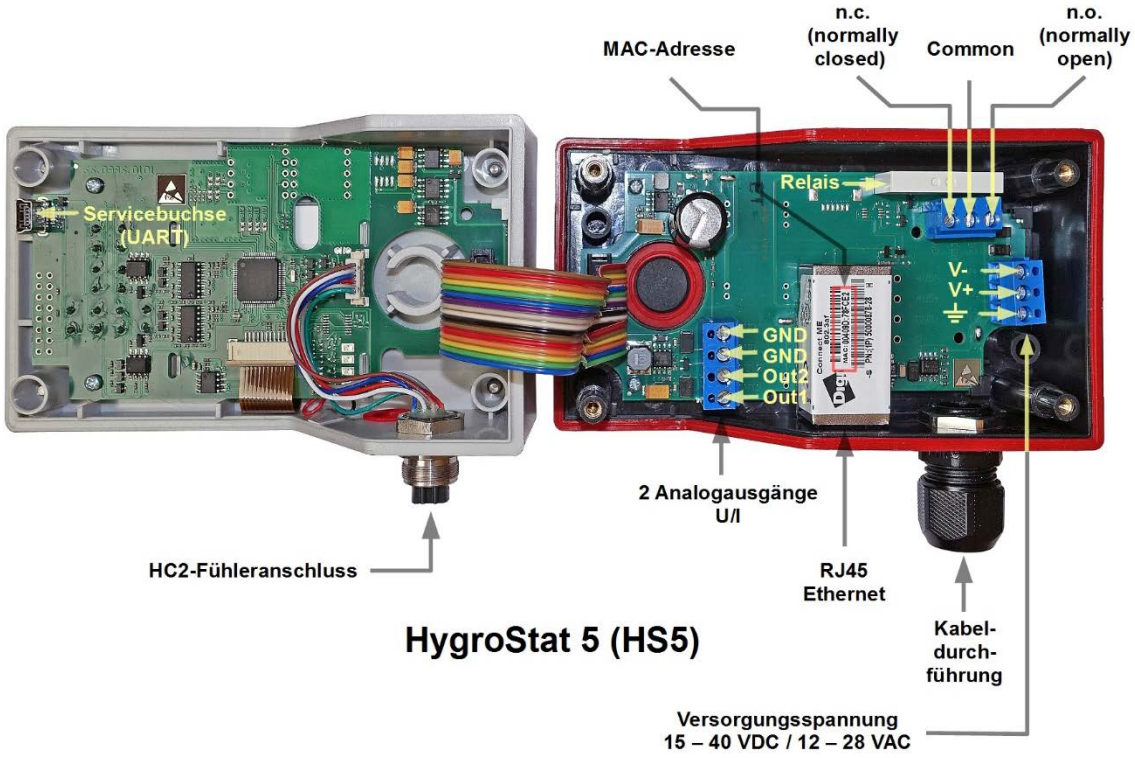


Figure 2: Inside view with description of the main components of the HS5

2.3 HC2 Connection

The HS5 optionally comes with a HC2 connection socket. It can be used for all HC2 probes in the ROTRONIC portfolio. Alternatively, one pin of the socket can be used as analog current or voltage input. It must be established on ordering the device whether the pin can evaluate current or voltage signals; it cannot be reconfigured to do so later on.

2.3.1 Units

The following unit systems are available for the HC2 connection:

- %RH
- °C / °F
- mV / mA

2.3.2 Simulation Value

When the simulation value has been activated, a defined simulation value is used instead of the current measured value.

2.4 Analog Outputs

The ROTRONIC HW4 software enables free configuration and scaling of the analog outputs. The measured values (humidity, temperature, calculation value) can be assigned to any analog output (Out1, Out2) and the required range scaled at will.

The following output ranges are available:

Type	Range
Voltage	• 0…1 V • 0…5 V • 0…10 V
Current	• 0…20 mA • 4…20 mA

The different variants of the analog output each have a minimal offset:

Signal Type	Maximum Offset at Start of Range
0...1 V	3 mV

0...5 V	50 mV
0...10 V	90 mV
0...20 mA	4 µA
4...20 mA	No offset

2.4.1 Scale

The scale can be changed at will with the ROTRONIC HW4 software in a range from -9,999 to +99,999. The limits of the sensor must, however, be observed.

The devices have one of the following optional default settings on delivery:

Humidity	Temperature	Analog Input
• 0…100 %RH	• 0...50 °C • 0...70 °C • +10...40 °C • 0…+100 °F • 0…+200 °F	• 0…3.2 V • 0…25 mA

2.5 Relays

The HS5 provides a freely configurable internal isolated relay changeover contact.

- Normally closed (NC)
- Common (COM)
- Normally open (NO)

The relay can be controlled by freely configurable alarms. The following can also be set:

- **Time delay**
  The relay is only switched on when an alarm endures for a certain minimum time.

- **Switch off when alarm finished**
  The relay automatically disengages when the alarm is no longer active; otherwise the relay remains active until it is reset manually.

- **Maximum duty cycle**
  The relay stays on for at most the time set and is then switched off.

The relay can only be activated by one measured value. Assignment of more than one measured value is not possible.

2.6 Service Interface

Using the HW4 software, the service interface (UART) allows device settings, loading of language data and updating of the firmware. The service interface is located inside the housing. It is connected to the computer with the HW4 software with an AC3006 or AC3009 connection cable.

2.7 Display and Keys

The optional LCD for the HS5 has a backlight.
The display unit is variably configurable. Depending on the version (humidity, temperature, calculated value), the different parameters can be assigned to the lines in the display. There are three display lines available. They can be assigned the following parameters:

- Humidity
- Temperature
- Calculation
- No value

The first line of the display shows the relative humidity, the second the temperature, the third the calculated value such as dew point / frost point. A trend indicator can also be configured for every line.

The front side of the HS5 has a three-line black-and-white LCD in the middle and a membrane keypad on the right.

Keys

- **Menu** (open and close operating menu)
- √ (confirm menu line or entry)
- **-** (to next menu line or decrease value)
- **+** (one menu item back or increase value)

If the keypad is not disabled by the HW4 software, it can be used for extensive settings and adjustments. The key press points are marked in the following view of the HS5 front panel in red.



The bottom side of the device is equipped with the following seen from the left:

- E2 socket for connection of a HC2 probe
- RJ45 socket for connection to a LAN (optional)
- Waterproof cable gland M16x1.5

2.7.1 Alarms

Measured values with an alarm are shown with an exclamation mark **[!]**. Alarms are configured with the HW4 software.

2.7.2 Decimals

The HS5 adjusts the number of decimal places automatically on the basis of the current measured value. The display therefore always shows the measured value clearly with the corresponding number of significant decimals.

2.8 HW4 Software Compatibility

HS5 hygrostat / thermostat transmitters are fully integrated in the HW4 software.

HS5 Version	Supported in HW4 from Version:
HS5	HW4 V3.7

3 Mechanical Installation

3.1 General

The HS5 can be mounted on a wall or on a DIN top-hat rail. The device is not sensitive to position. However, for exact measurement, the device must not move and must not be exposed to vibrations.

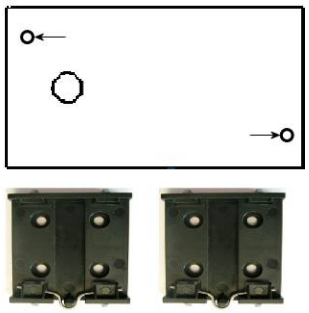
3.2 Housing

The housing can be opened by unscrewing four screws. The screw breakthroughs for wall mounting and electrical connections for the power supply, analog outputs, service interface and the relay are to be found inside the housing.



Figure 3: Front view HS5 housing

3.3 Mounting



Method 1: The HS5 comes with two screws, two wall plugs and two rubber washers. There are two screw depressions in the bottom part of the housing (closed on delivery). Use the template delivered with the HS5 to drill the holes in the wall and put in the wall plugs. Place a rubber washer under each screw head. Put a screw in each depression and push through the bottom of the depression.

Method 2: The mounting kit **AC5002** (not included in delivery package) is needed for mounting on a DIN top-hat rail (35 mm / 1 3/8"). The mounting kit consists of two clips, which are fastened to the back of the housing with the screws supplied.

Figure 4: Mounting kit AC5002 and drilling points for wall mounting

3.4 HC2 / Analog Connection

The HS5 can optionally be ordered with an E2 socket. This interface and its possible uses are described below.

3.4.1 Use of HC2 Probe

The HS5 can optionally be set up for a HC2 probe. After connection of a HC2 probe, it is possible to measure and display three parameters:

- Humidity
- Temperature / Calculation

All HC2 probes currently available can be connected. The measured data of the HC2 probe is evaluated digitally and shown in the display in three lines. Two of the measured values can be tapped via the analog outputs (chapter 5.1) and processed further. The optional Ethernet interface (chapter 5.2) of the HS5 can output all measured values.

3.4.2 Use of Analog Input

The device menu is used to switch between use of a HC2 probe and an analog third-party probe. The display of the HS5 switches automatically to the units mA / mV of the analog input.

The input is reconfigured with the device menu:

MENU > *Probe Information* > *Sensor Type*

Select between the following options:

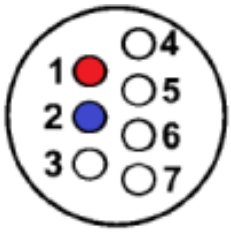
- HC2 Digital HC2 probes are read out
- Analog In Analog input is used

The HS5 then asks the user to confirm the sensor change and restarts with the corresponding display configuration.

Remark:
The HS5 does not contain a power supply for an analog third-party probe. If adequate, the power supply for the HC2 probe can be used via the pins V+ and GND (see Abbildung 5).

When using an analog probe, be sure to define both the voltage signal range and the measurement range of the probe. The HW4 software requires definition of the measurement range for an analog probe. The HW4 software can also be used to change the probe type for the input.

Pin Configuration E2 Connection



1) V+: Digital probe: 3.3 VDC,10 mA
2) GND: Digital and supply ground
3) RXD: UART digital probe
4) TXD: UART digital probe
5) ANA IN: Analog input: 0…3.2 V / 0…25 mA
6) NU: Not used
7) AGND: (Analog GND)

Figure 5: Pin configuration of the E2 socket (view from front)

4 Electrical Installation

This section describes the general safety precautions for electric wiring.

4.1.1 Cable Grip and Cable Specifications

The HS5 comes with a sealing M16 cable grip with screw cable gland. The M16 cable grip only offers effective sealing if cables with external diameters of 6 to 7 mm (0.236 to 0.275 inch) with connection wires per 18 AWG are used.

4.1.2 General Connection Information

Heavy machinery and measuring instruments should not share the same electric cables for power supply. If this cannot be avoided, noise filters and surge protectors should be used, as integrated in most UPS devices.

4.1.3 Signal Cable Information

The following guidelines are derived from the European standard EN 50170 for the transmission of signals by copper wires. Note on installation planning: when determining the position of machinery and equipment, the rules given in EN 50170 should be followed with due regard to local circumstances.

All ROTRONIC products are tested for electromagnetic compatibility according to EMC Directive 2004/108/EC and the following European standards:

- EN 61000-6-1: 2007, EN 61000-6-2: 2005
- EN 61000-6-3: 2007, EN 61000-6-4: 2007

Whenever the level of electromagnetic interference is expected to be high, both the devices and signal cables should be placed as far away as possible from the source of interference.

In general, signal cables should be installed in bundles or channels / conduits, separate from other cables as indicated in the table below:

• Bus signals such as RS-485 • Data signals for PCs, printers, etc. • Shielded analog inputs • Unshielded DC voltage (<= 60 V) • Shielded process signals (<= 25 V) • Unshielded AC voltage (<= 25 V) • Coaxial cables for CRT monitors	**in common bundles or channels / conduits**
• DC voltage from 60 V to 400 V (unshielded) • AC voltage from 25 V to 400 V (unshielded)	**in separated bundles or channels / conduits, without minimum distance**
• DC and AC voltage > 400 V (unshielded) • Telephone lines • Lines leading into EX-rated areas	**in separated bundles or channels / conduits, without minimum distance**

4.2 Wiring

This section describes the wiring of the device with connection possibilities.

4.2.1 Electrical Diagrams

The HS5 is wired with a four-pin connection cable for transmission of the electrical power and measured values. The maximum permissible cable length depends on the voltage drop caused by the flow of current to the devices connected to the HS5 outputs. The effective load of a HS5 output comprises the cable and load resistance and should amount to at least 1000 ohm. The cable resistance should not be more than 1/1000 of the load resistance.

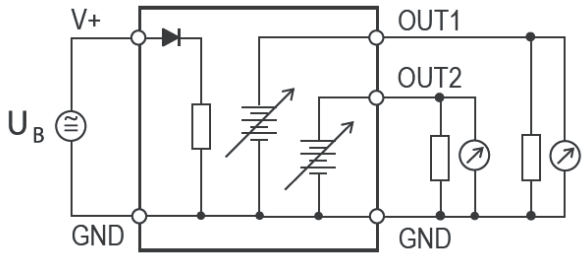


Figure 6: Voltage outputs

The maximum permissible length of the cable connecting the unit to other devices is determined by the total resistance resulting from addition of the cable resistance and resistance of the devices connected to the unit in series. This resistance should not exceed 500 ohm (load).

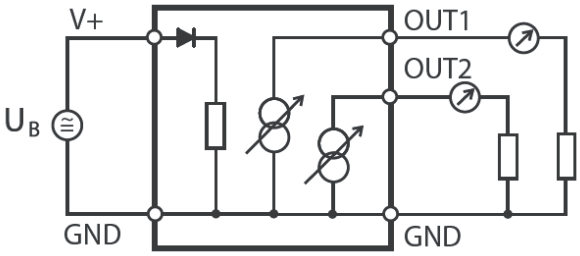


Figure 7: Current outputs

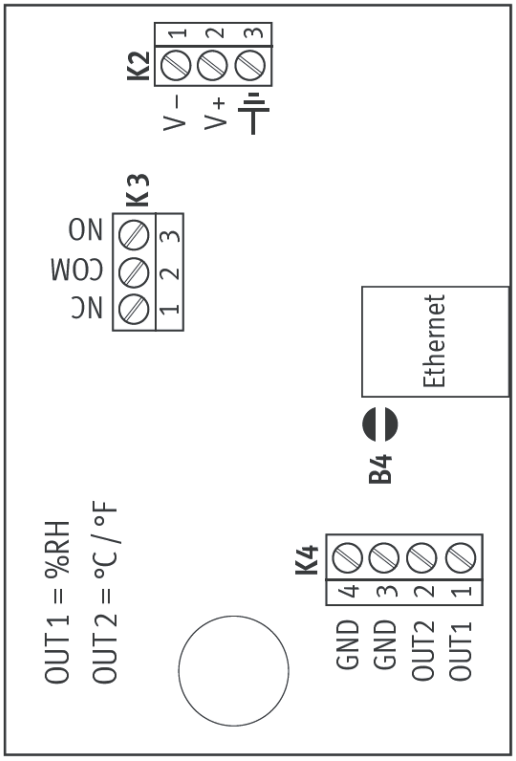


Figure 8: Connection terminals on the board

Terminals	Description
K2-1: V-	Power supply: 15…40 VDC (-) or 14…28 VAC
K2-2: V+	Power supply: 15…40 VDC (+) or 14…28 VAC
K2-3: ⏚	Protective ground

K3-1: NC	Normally closed – closed when not energized
K3-2: COM	Common – common contact
K3-3: NO	Normally open – open when not energized

K4-1: OUT1	Relative humidity analog output (+)
K4-2: OUT2	Temperature analog output (+)
K4-3: GND	Ground (connected to other GND), see note below
K4-4: GND	Ground (connected to other GND)

Note:

Terminal K2-3 (protective ground) is connected ex works with GND due to the closed solder jumper B5. If this is not wanted, open solder jumper **B5**.

Warning:

Before connecting the HS5 to an active Ethernet network, make sure it is configured correctly for IP communication. Otherwise conflicts could disturb communication in the network.

5 Operation

This chapter describes handling of the device in operation.

5.1 Analog Outputs

The analog outputs of the HS5 must be configured as required with the HW4 software. Finish mechanical and electrical installation and feed the HS5 transmitter the necessary voltage.

5.2 Ethernet Connection

The HS5 with digital option uses the standard RO-ASCII protocol. Users who wish to evaluate the measured data without ROTRONIC HW4 software are asked to consult ROTRONIC.

The Ethernet interface of the HS5 can be used best together with a PC with installed HW4 software (version 3.2 or later). Users may in principle access the measured data of the HS5 with any communication software. This is described in detail in the document **E-M-AC3000-CP**.

Before connecting the HS5 to an active Ethernet network, it is first necessary to configure the TCP/IP settings. You can find instructions for this in the HW4 manual **E-M-HW4v3-Main** (chapter 7.4) and the technical guidelines **E-M-TCPIP-Conf**. The manuals can be downloaded from the website www.rotronic.com.

***WARNING**:*
Before connecting the HS5 to an active Ethernet network, make sure it is configured correctly for IP communication. Otherwise conflicts could disturb communication in the network.

5.2.1 Scaling of the Analog Input

The analog input can be scaled within the range 0…3.2 V / 0…25 mA. If, for example, only 1...2.5 V are to be shown in the display due to the application or a connected third-party probe, the analog input must be scaled accordingly. Abbildung 9 illustrates scaling of the analog input.

Legend:

Input-Range: 0…3.2 V / 0…25 mA
RangeLo: 0 V / 0 mA (lowest input value)
RangeHi: 3.2 V / 25 mA (highest input value)
ScaleLo: Bottom scale limit (min. value shown in display)
ScaleHi: Top scale limit (max. value shown in display)

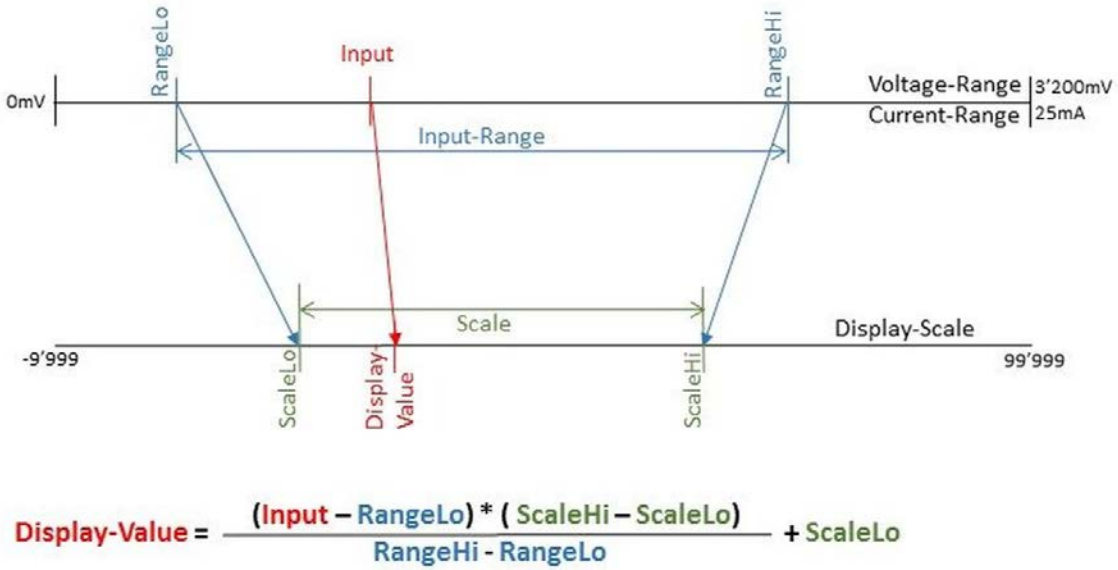


Figure 9: Graphic representation of scaling the analog input

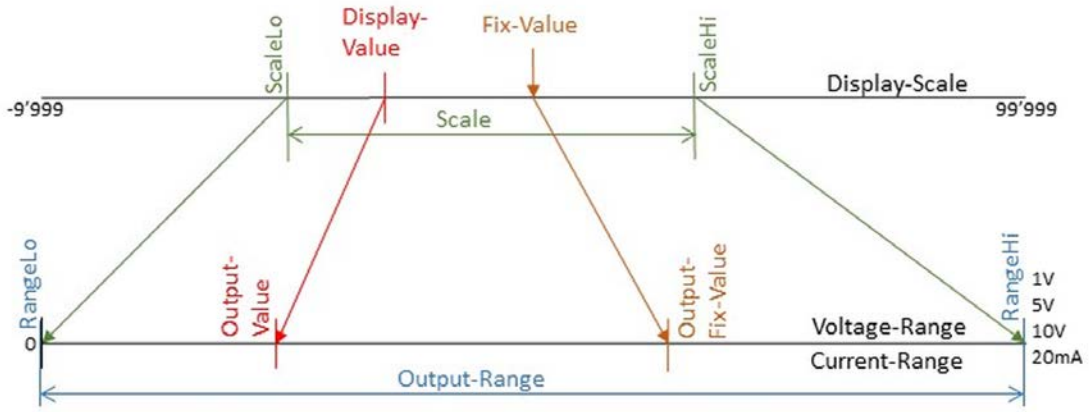
Example:

An ambient pressure sensor with an analog output of 500…1000 mV (900…1100 hPa) is to be connected and its signal shown in hPa. The Input-Range with the limits RangeLo = 500 mV and RangeHi = 1000 mV and the display range Scale with ScaleLo = 900 and ScaleHi = 1100 mean that an input voltage of 500 mV shows the value 900 in the display and an input voltage of 1000 mV the value 1100. The unit is configured with the HW4 software as “hPa”.

5.2.2 Scaling of the Analog Outputs

The display range (Scale = ScaleHi - ScaleLo) of the Display-Value can be selected freely within the complete display range (Display-Scale), but may not exceed the maximum display range of -9,999…99,999.

The output range (Output-Range = RangeHi - RangeLo) of the output signal (Output-Value) can be selected freely within the complete output range (Voltage- / Current-Range),but may not exceed the maximum output range, cf. chapter 2.4 (0…1 V / 0…5 V / 0…10 V / 0…24 mA / 4…24 mA). Fixed values (Fix-Value) are treated in the same way as Display-Values.



$$\text{Output-Value} = \frac{(\text{Display-Value} - \text{ScaleLo}) * (\text{RangeHi} - \text{RangeLo})}{\text{ScaleHi} - \text{ScaleLo}} + \text{RangeLo}$$

Figure 10: Graphic representation of scaling the analog output

5.3 Display and Keys

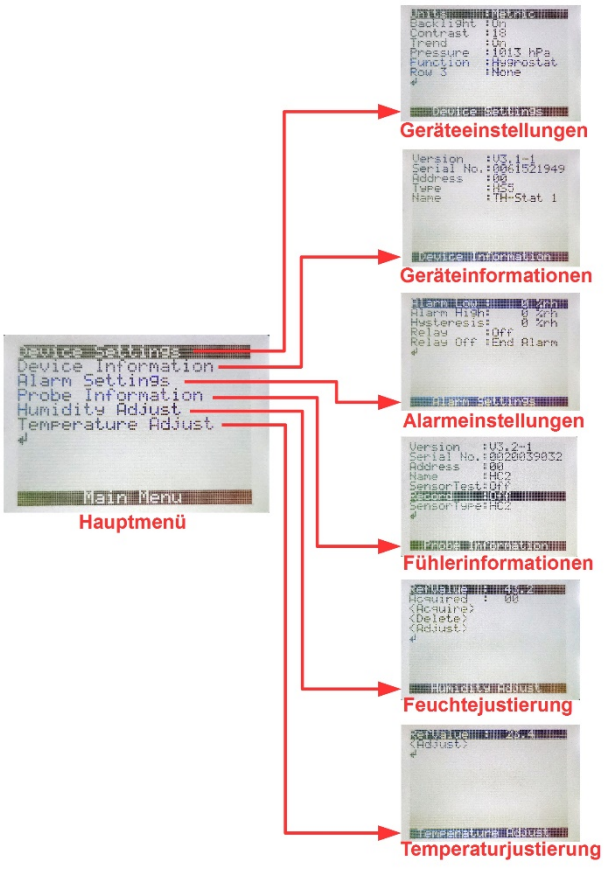
The HS5 is configured ex works such that it can be used and managed as hygrostat or thermostat within broad limits without a service cable and LAN integration. It is integrated in an IP network (LAN) with a PC running the HW4 software via the RJ45 socket. Alternatively, it can be connected to a USB port on the PC with the help of an AC3006 service cable via the internal service socket. The HW4 software enables full use of all setting possibilities.

Note:

Unauthorized use of the menu can be prevented by locking the setting "Display Menu" (using the HW4 software *> Device Manager > Display).*

5.4 Main Menu

The main menu is opened by pressing the key "menu". It leads to the six submenus Device Settings, Device Information, Alarm Settings, Probe Information, Humidity Adjust and Temperature Adjust. The device is returned to display mode by pressing the key "menu" again or confirming the symbol ↵.



The menu "Device Settings" is used to make basic functional settings for the HS5.

The menu "Device Information" only shows information on the device. Entries cannot be made in it.

The menu "Alarm Settings" is used to set alarm conditions and to enable / disable the relay.

The menu "Probe Information" gives information on the connected HC2 probe. Detailed information on the HC2 probe is to be found in the HC2 manual.

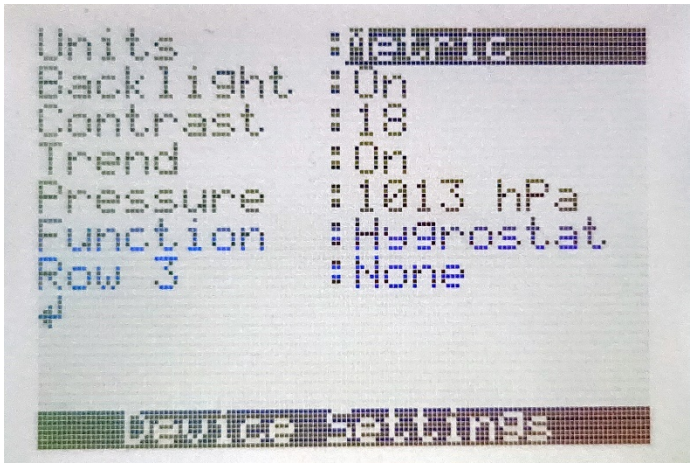
The menu "Humidity Adjust" is used to adjust the humidity sensor of the HC2 probe (max. 99 calibration points).

The menu "Temperature Adjust" is used to adjust the temperature sensor of the HC2 probe (one-point adjustment).

5.5 Submenus

The submenus enable fine parameterization of the HS5. To open a submenu, move to the menu name in the main menu with the + or - key and then press the √ key. The further settings in the various submenus are described below.

5.5.1 Device Settings



To select an item in the submenu, move to it with the + or - key and then press the √ key. The following possibilities can then be selected.

The "menu" or "√" key is used to return to the selection list of the submenu item concerned. Pressing "menu" again returns you to the main menu, and then pressing it again closes the main menu and restores the device to display mode.

Units: *Metric* or *English*

Backlight: *On* (constantly on) or *Key Press* (on for one minute when a key is pressed)

Contrast: Value range *0 … 99*, 18 is a good choice

Trend: *On* enables a trend indicator at the left edge of a display line:
▼ falling, ▲ rising, ◆ constant
Off disables display of a trend indicator

Pressure: *Local atmospheric pressure* (default setting 1013 hPa) can be adjusted with the + and - keys

Function: - selects the *mode* Hygrostat, + the mode Thermostat

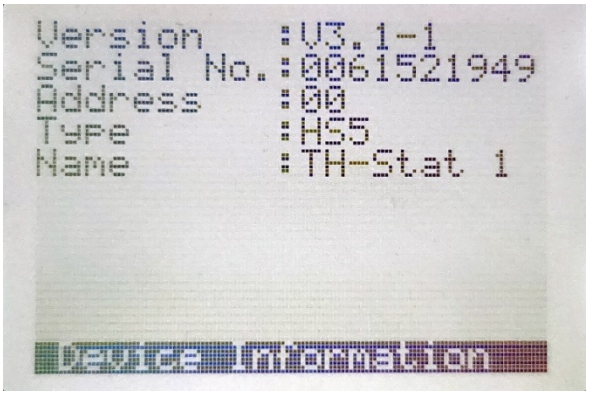
Row 3: The *function of the third (bottom) display line* is selected here.

None leads to an inverse display (light against dark background) of the name of the HS5 in line 3.

Calc leads to display of the calculated parameter Dew Point (presettable with the HW4 software) in line 3.

↵: Back to display mode

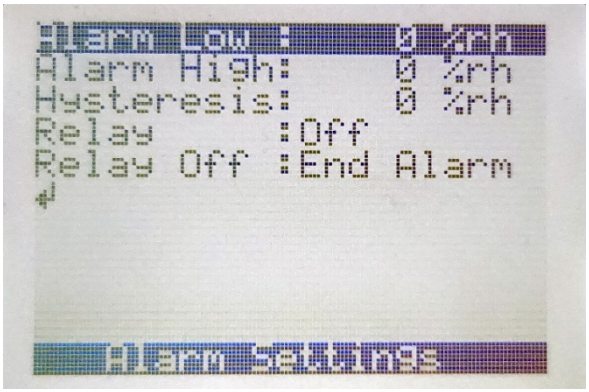
5.5.2 Device Information



Version: *Hardware version*
Serial No.: *Serial number*
Address: *RS485 address* (default *00*)
Type: *Device type HS5*
Name: *Device name* assigned with HW4 software (default *TH-Stat 1*)
It is not possible to make settings in this menu.

5.5.3 Alarm Settings

An alarm is emitted when the bottom alarm threshold is not reached or the top alarm threshold is passed. These are relative humidity values (%rh) when the HS5 is being used as hygrostat and temperature values (°C, K) when it is being used as thermostat. When an alarm condition occurs, the relay is energized immediately if it has been enabled. The humidity or temperature value at which the alarm state is canceled is determined by the size of the hysteresis. The symbol [!] at the top right of the displayed value indicates that there is an alarm for this value.



Alarm Low (bottom alarm threshold) in
% relative humidity or °C temperature
Alarm High (top alarm threshold) in
% relative humidity or °C temperature
Hysteresis in
% relative humidity or °C temperature
Relay:
- *Off* (relay disabled),
+ *On* (relay enabled)
Relay Off: Action of relay
when alarm condition no longer exists:
Endless: Relay stays energized
End Alarm: Relay is de-energized immediately
Timeout: Relay is de-energized after a certain delay (delay according to settings via HW4)
E or T:
↵: Back to main menu

5.5.4 Probe Information

The HC2 probe (HygroClip 2) is an independent measuring instrument. Detailed information on it is to be found in the corresponding document (to be found at www.rotronic.com). The first five lines contain information only and cannot be changed.

Version: *Hardware version of the probe*

Serial No.: *Serial number of the probe*

Address: *RS485 address* of the probe (default *00*)

Name: *Device name* assigned with HW4 (default *HC2*)

Record: *On* switches internal recording in the probe on

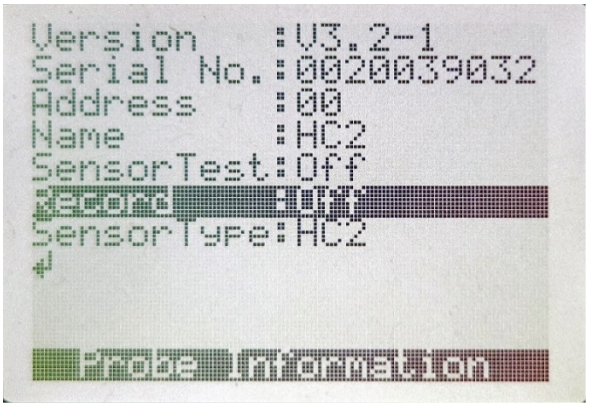
Off ends internal recording in the probe

SensorType: Used to select the probe being used.

HC2 switches to the digital HC2.

Analog In selects the analog inputs for external probes contained in the HC2 probe.

↵: Back to main menu



5.5.5 Humidity Adjust

RefValue: Enter the reference value of a humidity standard (0 … 99.9 %rh) and confirm with <Acquire>. The value shown to the right of Acquired in line 2 is then increased by 1.

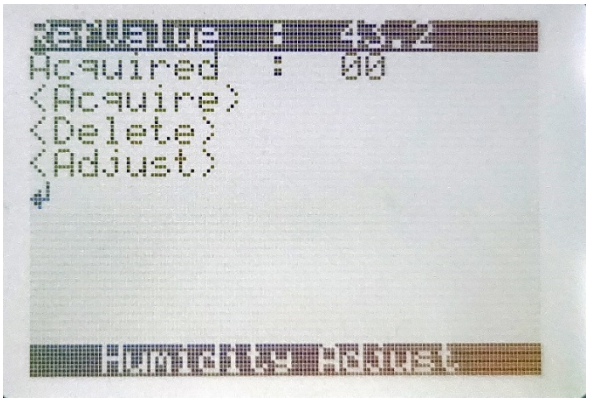
Acquired: Number of reference values acquired for an adjustment (multipoint adjustment, max. 99 reference values possible).

<Acquire>: Confirming with the "√" key adds the last reference value entered to the list of reference values.

<Delete>: Confirming with the "√" key deletes the last reference value entered.

<Adjust>: Confirming with the "√" key starts the adjustment procedure.

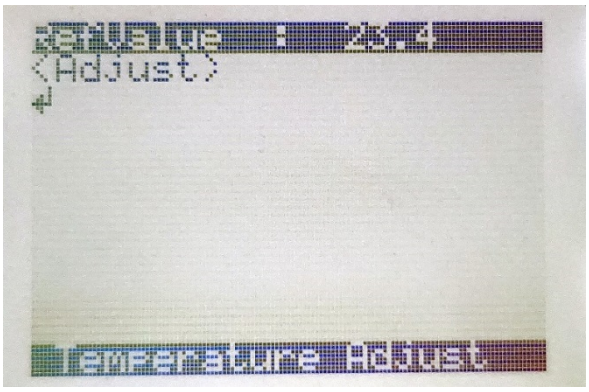
↵: Back to main menu



5.5.6 Temperature Adjust

RefValue: Enter the reference value of a temperature standard and confirm with <Acquire>.
(One-point adjustment, only one reference value can be entered.)

<Adjust>: Confirming with the "√" key starts adjustment of the temperature probe on the basis of the reference value entered.



5.6 Relay

The relay can be used in operation as an alarm switch contact. The functions have already been described in section 2.5 . The relay is configured with the HW4 software, as described in the manual **E-M-HW4v3-P-001**.

5.6.1 Connections

The relay switch contacts are located at terminal block K3 (see Abbildung 8).

Connection	Name	Description
COM	Common	Center tap of the changeover switch
NO	Normally open	Open when relay is not energized, closed when relay is energized
NC	Normally closed	Closed when relay is not energized, open when relay is energized

6 Maintenance

6.1 Service Cable

Suitable service cables

- AC3006: requires additional power supply to the device
- AC3009: supplies the device directly with 5 VDC

6.2 Service Port

The Mini-USB service port is located inside the device. The device must be opened by unscrewing the four screws on the front of the housing in order to gain access to the Mini-USB service port.
Remark: AC3006 / AC3009 may be used as service cable.



Figure 11: Location of the service port on the top side of the circuit board

6.3 Device Calibration and Adjustment Procedure

The electronics are very stable and require no maintenance. They do not normally need to be changed or recalibrated after factory calibration. For maximum accuracy, however, we recommend regular calibration of the device and adjustment when necessary.

6.3.1 Adjust HC2 Probe

Both the Pt100-RTD temperature sensor used in the probe and the corresponding electronics are very stable and do not normally need to be calibrated after initial factory calibration.

The long-term stability of the HYGROMER humidity sensor from ROTRONIC is normally better than 1 %RH per year. For maximum accuracy, it is advisable to check the calibration of the probe every six to 12 months. Applications in which the probe is exposed to considerable contamination could require more frequent checks.

Temperature Adjustment

The optional keypad of the HS5 enables one-point adjustment of the temperature or humidity in relation to a reference. A one-point adjustment results in the same offset being added to all measured values.

- When the temperature is stable, press the MENU key to open the internal menu in the display.
- Select *Temperature Adjust* with the (-) key and press ENTER.
- Make sure that the text line beginning with *RefValue* is selected and press ENTER.
- Change the reference value to the temperature reference value with the (+) or (-) key.
- Move to the text line *Adjust* with the (-) key and press ENTER.
- The HS5 confirms adjustment with the message "Adjust OK".
- Press the MENU key two times to leave the menu and return the HS5 to normal operation.

Note:

- The following principle applies: perform temperature adjustment before humidity adjustment.
- The calibration point is deleted automatically from the probe memory after adjustment.
- Since the HS5 does not have a real-time clock, the date of the adjustment is not written in the probe. If it is important to record the adjustment date, use the HW4 software to adjust the probe.

Humidity Adjustment

The keypad of the HS5 enables multi-point adjustment of the humidity. The effect of a humidity adjustment differs in dependence on the number of calibration points entered into the probe memory before adjustment:

- One calibration point adds an offset to all measured values.
- Two calibration points influence the offset and gradient of the measurement curve.
- Three or more calibration points influence the offset, gradient and linearity of the measurement curve.

For maximum accuracy, at least three to four calibration points distributed over the measurement range in question should be used. The calibration points (maximum 100) can be entered in any order, but we recommend working from low humidity values to high humidity values.

- When the humidity is stable, press the MENU key to open the internal menu in the display.
- Select *Humidity Adjust* with the (-) key and press ENTER.
- Make sure that the text line beginning with *RefValue* is selected and press ENTER.
- Change the reference value to the reference humidity with the (+) or (-) key.
- Move to the text line *Acquire* with the (-) key and press ENTER.
- Note that the counter "Acquired" will be increased by 1 (number of calibration points in probe memory).
- When all calibration points have been acquired, move to the text line *Adjust* with the (-) key and press ENTER. **Only adjust the probe when all calibration points have been acquired.**
- The HS5 confirms adjustment with the message "Adjust OK".
- Press the MENU key two times to leave the menu and return the HS5 to normal operation.

Note:

- All calibration points are deleted automatically from the probe memory after adjustment.
- The text line *Delete* can be used to delete all calibration points before probe adjustment.
- Since the HS5 does not have a real-time clock, the date of the adjustment is not written in the probe. If it is important to record the adjustment date, use the HW4 software to adjust the probe.

6.4 Validation of Analog Output Signals

Using the HW4 software, it is possible to set fixed values with which the analog output signals can be validated.

7 Firmware Update

The firmware can be updated with the HW4 software. Firmware updates are available for downloading on the ROTRONIC website. To update the firmware, the HS5 must be connected to the HW4 with service cable AC3006. The connection to the computer must remain intact throughout the update process and there must be a stable power supply for the complete duration of the process.

Flashing of the display backlight indicates a firmware update is in progress.

8 Technical Data

General	
Device type	Hygrostat / Thermostat transmitter with analog output signals and optional Ethernet interface
Circuit type	3-wire circuit
Mounting types	W (Wall)

Power Supply and Connections	
Supply voltage (VDD)	15...40 VDC / 14...28 VAC
Rated current consumption DC supply	<70 mA (only analog outputs) <150 mA (with Ethernet interface)
Rated current consumption AC supply	<70 mA (only analog outputs) <450 mA (with Ethernet interface)
Electrical connections	Terminal block and M16 cable grip, optional RJ-45 Ethernet connector
Polarity protection	Protective diode on V+

Humidity and Temperature Measurement	
With HC2	See document **E-M-HC2 Probes** > Specifications.
With Pt100	Accuracy: ±0.2 K Meas. range: -100…200 °C (depending on probe type)

Analog Input	
Measurement range	Voltage: 0…3.2 V Current: 0…25 mA
Accuracy	0.5% of current measured value
Temperature dependence	Voltage: ±30 mV Current: ±60 µA

Calculated Parameters

Psychrometric calculations	Dew point (Dp) above and below freezing point Frost point (Fp) below freezing point and dew point above freezing point Wet bulb temperature (Tw) Enthalpy (H) Vapor concentration (Dv) Specific humidity (Q) Mixing ratio by weight (R) Vapor concentration at saturation (Dvs) Vapor partial pressure (E) Vapor saturation pressure (Ew)

Startup Time and Measurement Interval	
Startup time	<5 s (typical)
Measurement interval	1 s (typical)

Configurable Analog Outputs		
Output 1		Can be assigned to every parameter
	Default parameter	Relative humidity / Temperature
	Default range	Per order code
Output 2		Can be assigned to every parameter
	Default parameter	Relative humidity / Temperature
	Default range	Per order code
Output 1 and output 2		
	Signal type	0…20 mA 4…20 mA 0…1 V 0…5 V 0…10 V (user-configurable)
	Accuracy analog output	±10 mV (voltage output) ±20 µA (current output)
	User-configurable range limits	-9,999...+99,999 units
	Refresh interval	1 s
	Short circuit tolerant	Yes
	Max. load	500 Ω (current output)
	Min. load resistance	1000 Ω (voltage output)

Relays	
Number of relays	1
Type of relays	Changeover switch
Switching capacity	50 VDC / 35 VAC @ 1 A, polarity arbitrary

Digital Interface	
Interface type	Ethernet, wired

Service Connector	
Interface type	UART (TTL Level)
Max. length of service cable	5 m (16.4 ft)

General Specifications	
Optional display	LC, resolution 1 or 2 decimals, backlight, trend and alarm indicators
Housing material	ABS
Housing protection grade	IP65 (without Ethernet interface) IP40 (with Ethernet interface)
Dimensions	129 x 72 x 45 mm
Weight	240 g

Conformity with Standards	
CE / EMC immunity	EMC Directive 2004/108/EC: EN 61000-6-1: 2007, EN 61000-6-2: 2005 EN 61000-6-3: 2007, EN 61000-6-4: 2007
Solder type	Lead free (RoHS directive)
Fire protection class	Corresponds to UL94-HB
FDA / GAMP directives	CFR21 Part 11 and GAMP5

Environmental Limits	
Storage and transit	0...70 °C / 0...90 %RH, non-condensing
Operation	0...70 °C / 0...90 %RH, non-condensing

9 Accessories

9.1 Service Cables

Order Code	Description	
AC3006	Service cable, USB to UART	
AC3009	Service cable, USB to UART with integrated power supply	

9.1 Mounting Elements

Order Code	Description	
AC5002	Mounting kit for DIN top-hat rail (consisting of two clips, which are fastened to the back of the housing with the screws supplied). DIN top-hat rail (35 mm / 1 3/8") not included.	

10 Additional Documents

Document Name	Contents
E-M-HC2 Probes	HC2 manual
E-M-HW4v3-Main	HW4 software main manual
E-M-TCPIP-Conf	Manual for Ethernet configuration of ROTRONIC instruments
E-M-AC3000-CP	Communication protocol for all AirChip3000 instruments
E-M-HW4v3-P-001	HW4 software manual for HS5

11 Document Versions

Doc. Release	Date	Remark
D-M-HS5-V1_00	March 2016	Release document