

# HYGROPALM21/22-A



## KURZBEDIENUNGSANLEITUNG

### Portables Feuchte- und Temperaturanzeigergerät

#### Allgemeine Beschreibung

Der **HygroPalm21** ist ein Temperatur und Feuchtemessgerät mit einem integrierten Fühler. Es können die Temperatur, die Feuchte- / Tau- und Frostpunkt-Werte im Display angezeigt werden. Der **HygroPalm22-A** ist ein reines Anzeigergerät, d.h. die Messung erfolgt durch die anschließbaren Fühler, der HygroClip2-Serie. Der Fühler misst immer relative Feuchte- und Temperatur; alle andern angezeigten Werte sind aus diesen beiden Werten berechnet.

#### Programmierung ab Werk

Bestimmte Grundeinstellungen, wie z.B. die Anzeige von metrischen oder englischen Masseinheiten, Sprachversion sowie die Konfiguration der Fühleranschlüsse des HygroPalm21/22-A erfolgen durch das Werk. All diese Einstellungen können mit der Software-HW4 (Zubehör) geändert werden.

Diese Kurzbedienungsanleitung beschränkt sich auf die Beschreibung der wichtigsten Funktionen. Die detaillierte Bedienungsanleitung finden Sie im Internet unter: [www.rotronic.com](http://www.rotronic.com)

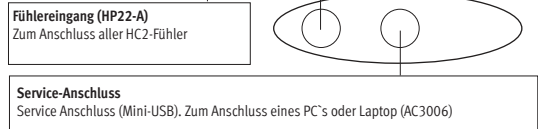


#### Spannungsversorgung

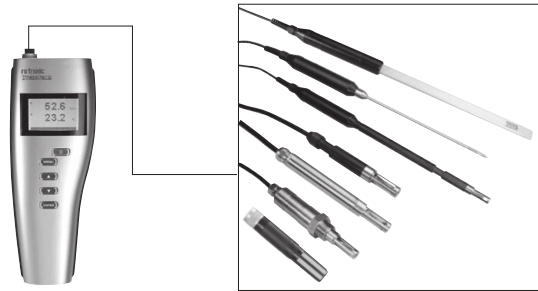
Der HygroPalm21/22-A wird mit einer normalen 9V-Alkalibatterie betrieben. Um die Batterie einzusetzen, öffnen Sie die Batterie-Verriegelung indem Sie an der Schraube im Gegenuhrzeigersinn drehen um dann den Batteriehalter herauszuziehen, und die Batterie einzusetzen.

Gemessene Parameter	HP21	HP22-A
Feuchte / Temperatur	•	•
<b>Berechnete Parameter</b>		
Tau- / Frostpunkt	•	•
Nasskugeltemperatur (Tw)		•
Enthalpie (H)		•
Wasserdampfdichte (Dv)		•
Wasserdampfgehalt (Q)		•
Mischungsverhältnis (R)		•
Sättigungs-Wasserdampfdichte (Dvs)		•
Dampfpartialdruck (E)		•
Wasserdampfdruck (Ew)		•

#### Anschlüsse

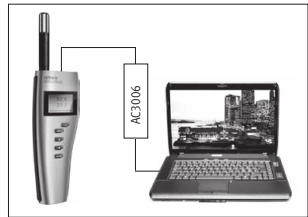


Am HygroPalm22-A können alle Fühler der HygroClip2-Serie angeschlossen werden. Der Fühler kann ohne Neu-Kalibration ersetzt oder getauscht werden. Dadurch steht dem vielfältigen Einsatz nichts im Wege.



#### Verbindung zum PC

Über das optional erhältliche Service Kabel AC3006 kann das HP21 und 22-A am Laptop oder PC angeschlossen werden. Um Werte anzuzeigen, Einstellungen zu verändern braucht es zusätzlich die HW4 Software.



#### Funktions Tasten

**HOLD:** (nur HP22-A)  
Kurz drücken, der Messwert wird eingefroren.  
**AN / AUS:**  
Mehr als 1 Sekunde drücken zum Ein- und Ausschalten des Gerätes.

**MENU**  
Aktiviert das interne Menü. Durch nochmaliges drücken gelangt man ins nächst höhere Menü oder verlässt das Menü.

**AUF / AB**  
Dies Tasten dienen zur Navigation, zur Auswahl von Menüpunkten und zum Ändern von Zahlenwerten.

**ENTER**  
Diese Taste dient zur Bestätigung einer Auswahl innerhalb des Menüs.

**Display mit Hintergrundbeleuchtung**  
Das LCD-Display ist mit einer Hintergrundbeleuchtung ausgestattet. Diese kann über das Menü eingestellt werden. Folgende Funktionen stehen zur Verfügung (Ausgeschaltet, immer an, oder bei drücken einer Taste). Die Einstellungen können unter MENU > Device Settings > Back Light > ENTER mit Hilfe der AUF/AB-Tasten verändert und mit ENTER bestätigt werden.

**HP21:** Die erste Linie im Display zeigt je nach Einstellung die relative Feuchte oder den Tau- oder Frostpunkt. In der zweiten Linie wird die Temperatur angezeigt.  
**HP22-A:** Die erste Linie im Display zeigt den Feuchtwert, die zweite den Temperaturwert und die dritte den gerechneten Wert.

- ▲ Steigender Wert (Endwert ist noch nicht erreicht)
- ▼ Sinkender Wert (Endwert ist noch nicht erreicht)
- ◆ Konstanter Wert (Endwert ist erreicht)

Bei einem Alarm wird das Symbol [!] im rechten Displayrand angezeigt.

#### Praktische Tipps zur Messung von Feuchte

Da die Feuchte temperaturabhängig ist, ist es wichtig, dass die Temperatur von der Umgebung mit der Temperatur am Fühler übereinstimmt. Bei einer Umgebungsfeuchte von 50 %rF, wirkt sich eine Temperaturdifferenz von 1°C mit einem Fehler von 3 %rF aus. Bevor der Messwert abgelesen wird, sollte das Messgerät einige Zeit der zu messenden Umgebungstemperatur angepasst werden. Je höher die Temperaturdifferenz zwischen Umgebung und dem Sensor ist um so länger muss das Messgerät der neuen Umgebung angepasst werden. Diese Zeit kann verkürzt werden, wenn ein für die Applikation optimaler Fühler eingesetzt wird. Ist der Sensor kälter als die Umgebungstemperatur kann es vorkommen, dass sich auf dem Sensor Kondensation bildet. Werden die Temperatur und Feuchte Limits nicht überschritten, hat dies keinen Einfluss auf die Kalibration des Sensors. Jedenfalls muss der Sensor trocken bevor weitere Messungen gemacht werden. Stehende Luft ist ein perfekter Isolator. Wenn keine Luftbewegung vorherrscht, können extreme Temperatur- und Feuchtesprünge in einer kurzen Distanz angezeigt werden. Achten Sie daher, dass der Sensor mit Luft umströmt wird, dies stellt sicher, dass die Messung genauer und schneller ist.

#### Sprache

Standardmässig wird der HP21 und HP22-A mit einer englischen Menüführung ausgeliefert. Es stehen jedoch weitere Sprachen zur Verfügung. Im Internet finden Sie unter [www.rotronic.com](http://www.rotronic.com) -> Downloads -> Language files die Anleitung zur Änderung der Sprache sowie die Sprachfiles.

#### Auswahl der Anzeigewerte

Im Normalmodus (Menü nicht aktiv) drücken Sie ENTER um zwischen den folgenden Werten, welche im Display angezeigt werden, auszuwählen.

- Relative Feuchte- und Temperatur
- Tau-/Frostpunkt- und Temperatur (HP21)
- Relative Feuchte- und Temperatur und kalkulierter Wert (HP22-A)

**Hinweis (HP22-A):** Sobald der kalkulierte Werte im Display angezeigt wird, kann der Wert vom Frostpunkt (Werkseinstellung) auf andere kalkulierte Parameter durch drücken der AUF-/AB Taste verändert werden.

#### Einheiten

Unter MENU > Device Settings > Units kann mit Hilfe der AUF/AB-Pfeile die Einheit (°C/°F) beim HP21 und (Metrisch/Englisch) beim HP22-A ausgewählt werden. Durch drücken der ENTER-Taste wird die Auswahl übernommen. Durch zweimaliges drücken der MENU-Taste gelangt man in den Normalmodus zurück.

#### Batterieladestands Anzeige

Erreicht die Batterie einen Kapazität welcher kleiner als 20% ist erscheint im Display „Low Batterie“.

#### Periodische Kalibrierung des Fühlers

Sowohl der Pt100 Temperatursensor als auch die dazugehörige Elektronik sind sehr stabil und müssen nach der Werkskalibrierung normalerweise nicht verändert oder kalibriert werden. Die Langzeitstabilität der ROTRONIC Hygromer® Feuchtefühler ist typischerweise besser als 1 %rF pro Jahr. Für eine maximale Genauigkeit empfehlen wir eine Kalibrierung der Fühler ca. alle sechs bis zwölf Monate. In Anwendungen wo der Sensor Schadstoffen ausgesetzt ist, kann eine häufigere Kalibrierung notwendig sein.

#### Menüstruktur (mit englischem Sprachfile)

HAUPTMENÜ	AUSWAHL / INFO	BEMERKUNGEN
<b>Device Settings</b>		
Units	Metric / English	
Back Light	Key Press / On / Off	Hintergrundbeleuchtung Modus
Contrast (HP22-A)		Kontrast Einstellung
Trend (HP22-A)	On / Off	Trendindikator
<b>Device Information</b>		
Version	Firmware version	
Serial Nbr	Serial number	
Address	RS-485 address	
Type	Device type	
Name	Device name	Kundenspezifisch
Sensor Test (HP21)	Humidity sensor status	

Probe Information		
Version (HP22-A)	Firmware version	
Serial Nbr (HP22-A)	Serial number	
Address (HP22-A)	RS-485 address	
Name (HP22-A)	Device name	Kundenspezifisch
SensorTest (HP22-A)	Humidity sensor status	Zustand des Sensors
Record (HP22-A)	On / Off	Datenaufzeichnung im Fühler (max. 2000 Werte)
<b>Humidity Adjust</b>		
RefValue	Humidity reference value	± 0,1 %rF Schritte
Acquired (HP22-A)		Anzahl gespeicherte Kalibrationspunkte
<Acquire> (HP22-A)		Kalibrationswert wird in den Speicher geschrieben
<Delete> (HP22-A)		Löscht alle Kalibrationspunkte
<Adjust> (HP21)		Nur 1 Punkt Justage (Offset)
<Adjust> (HP22-A)		Justiert den Fühler
<b>Temperature Adjust</b>		
RefValue	Temperature reference value	± 0,1 °C Schritte
<Adjust>		Nur 1 Punkt Justage (Offset)

#### Technische Daten

Spannungsversorgung: 9V-Alkalibatterie

#### Messbereich HP21

Feuchte / Genauigkeit: 0...100 %rF / ±1,0 %rF @ 23 °C  
 Stabilität: <1 %rF/Jahr  
 Temperatur / Genauigkeit: -10...60 °C / ±0,2 °C @ 23 °C  
 Stabilität: <0,1 °C/Jahr  
 Maximaler Luftstrom am Fühler: 20 m/s

#### Messbereich HP22-A

Feuchte und Temperatur: Je nach Fühler

#### Zulässige Umgebungsbedingungen

Bei Lagerung: -20...70 °C / 0...100 %rF, nicht kondensierend  
 Im Betrieb: -10...60 °C / 0...100 %rF, nicht kondensierend

#### Abmessung:

270 x 70 x 30 mm

#### Gewicht:

ca. 200 gr.

#### ROTRONIC AG, CH-8303 Bassersdorf

Tel. +41 44 838 11 44, [www.rotronic.com](http://www.rotronic.com)

#### ROTRONIC Messgeräte GmbH, D-76275 Ettlingen

Tel. +49 7243 383 250, [www.rotronic.de](http://www.rotronic.de)

#### ROTRONIC SARL, 56, F-77183 Croissy Beaubourg

Tél. +33 1 60 95 07 10, [www.rotronic.fr](http://www.rotronic.fr)

#### ROTRONIC Italia srl, I-20157 Milano

Tel. +39 2 39 00 71 90, [www.rotronic.it](http://www.rotronic.it)

#### ROTRONIC Instruments (UK) Ltd, West Sussex RH10 9EE

Phone +44 1293 571000, [www.rotronic.co.uk](http://www.rotronic.co.uk)

#### ROTRONIC Instrument Corp, NY 11788, USA

Phone +1 631 427-3898, [www.rotronic-usa.com](http://www.rotronic-usa.com)

#### ROTRONIC South East Asia Pte Ltd, Singapore 339156

Phone +65 6294 6065, [www.rotronic.com.sg](http://www.rotronic.com.sg)

#### ROTRONIC Shanghai Rep. Office, Shanghai 200233, China

Phone +86 40 08162018, [www.rotronic.cn](http://www.rotronic.cn)

# HYGROPALM21/22-A



## SHORT INSTRUCTION MANUAL

### Portable humidity and temperature instrument

#### General description

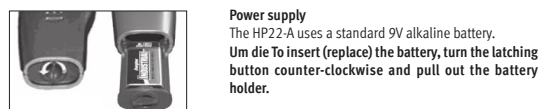
The HygroPalm21 is a highly accurate hand-held indicator that displays relative humidity, temperature and the dew or frost point.

The HygroPalm22-A is a highly accurate hand-held indicator that displays relative humidity, temperature and a calculated parameter such as the dew or frost point.

#### Programming

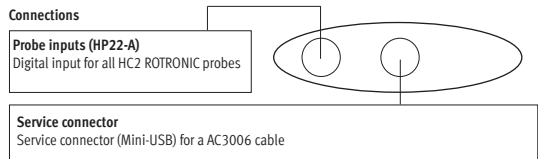
The basic settings of the devices such as display, units (Metric / English), language and probe settings will be done in the factory. Some of the settings can be changed afterwards using the HW4 Software (optional).

These short instructions are limited to a description of the main functions and installation of the device. The detailed instruction manual can be found on the internet: [www.rotronic.com](http://www.rotronic.com)

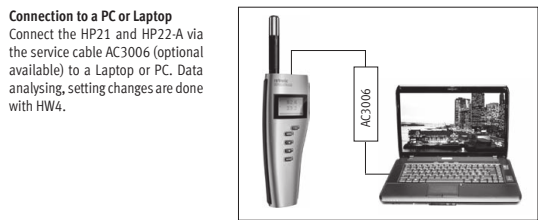
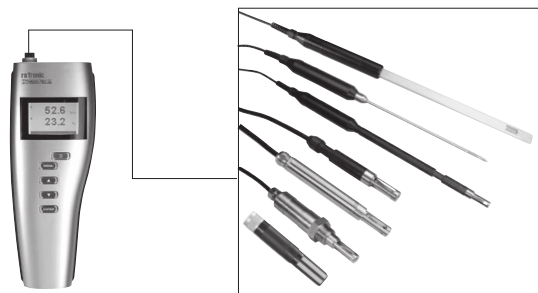


**Power supply**  
The HP22-A uses a standard 9V alkaline battery.  
**Um die To insert (replace) the battery, turn the latching button counter-clockwise and pull out the battery holder.**

Measured Parameters	HP21	HP22-A
Humidity / Temperature	•	•
<b>Calculated Parameters</b>		
Dew- / Frostpoint	•	•
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)		•



All HygroClip2-series probes can be connected to the HygroPalm22-A probe input. A calibration of the device, after changing the probe is not necessary.



**Connection to a PC or Laptop**  
Connect the HP21 and HP22-A via the service cable AC3006 (optional available) to a Laptop or PC. Data analysing, setting changes are done with HW4.

#### Functions Key

- HOLD: (only HP22-A)**  
Short press, the measured value is frozen.  
**ON / OFF:**  
Press more than 1 second to turn on and off the device.
- MENU**  
Activates the internal menu. Press this key again to go back to the previous menu or to exit the menu.
- UP / DOWN**  
When the menu is active, use to navigate the menu, make a selection or change a value.
- ENTER**  
When the menu is active, use to navigate the menu, make a selection or change a value.

**Display and display modes**  
The LC display has a backlight which can be set to be on all the time or whenever a key is pressed. The backlight can also be disabled. Using the HP21/22 MENU > Device Settings > Back Light using the up / down buttons and confirm it with ENTER.

**HP21:** The first line of the display shows, depends on the settings, the humidity, dew- or frost point, on the second line the temperature.  
**HP22-A:** The first line shows humidity, the second line the temperature and the third line the calculated value.

The display can also be configured to show a trend indicator on each line:

▲ increasing value ▼ decreasing value ▲ Constant value (End value is reached)

In the event of an alarm the symbol [!] appears to the right of the value.

#### Practical advice for measuring humidity

The most common source of error when measuring relative humidity is a difference between the temperature of the probe and the temperature of the environment. At a humidity condition of 50 %RH, a temperature difference of 1 °C results in an error of 3 %RH on relative humidity. When using the HP21/22 hand-held indicator, it is good practice to monitor the display for temperature stability. The probe should be given sufficient time to equilibrate with the environment to be measured. The larger the initial temperature difference between the probe and the environment to be measured, the more time temperature equilibration requires. This time can be shortened, and errors avoided, by using the probe configuration that fits best for your application. In extreme situations, condensation may occur on the sensors when the probe is colder than the environment. As long as the humidity / temperature limits of the humidity sensor are not exceeded, condensation does not alter the calibration of the sensor. However, the sensor has to dry out before it can provide a valid measurement. Non-moving air is an excellent insulator. When there is no air movement, surprising differences in temperature and humidity can be noted over short distances. Air movement at the probe generally results in measurements that are both faster and more accurate.

#### Changing the parameters shown on the display

The temperature unit of the HP21 (°C or °F) HP22-A (metric or English) can be changed from the keypad MENU > Device Settings > Unit.

- Relative humidity and temperature
- Dew / frost point and temperature (HP21)
- Relative humidity, temperature and calculated parameter (HP22-A)

**Note HP22-A:** As soon the calculated value is shown in the display, the parameter can be changed by using the UP / DOWN buttons

#### Changing the units

The temperature unit of the HP21 (°C or °F) HP22-A (metric or English) can be changed from the keypad MENU > Device Settings > Unit.

- Press the MENU key to show the internal menu on the display
- With the menu item Settings highlighted, press the ENTER key
- With the menu item Unit highlighted, press the ENTER key
- Use the UP or DOWN key to change the temperature unit as desired

Press the MENU key twice to exit the menu and return the HP21 to normal operation

#### Low battery indicator

When the battery is hold to about 20% of its initial charge, "Low Battery" appears at the bottom of the display.

#### Periodic calibration check of the probe

Both the PT100 RTD temperature sensor used in the probe and associated electronics are very stable and should not require any calibration after the initial factory adjustment. Long term stability of the ROTRONIC Hygromer® humidity sensor is typically better than 1 %RH per year. For maximum accuracy, calibration of the probe should be verified every 6 to 12 months. Applications where the probe is exposed to significant pollution may require more frequent verifications.

#### Menu structure (English language file)

MAIN MENU	SELECTIONS / INFORMATION	NOTES
<b>Device Settings</b>		
Units	Metric / English	
Back Light	Key Press / On / Off	Display backlight mode
Contrast (HP22-A)		LC display contrast adjustment
Trend (HP22-A)	On / Off	Trend indication on the display
<b>Device Information</b>		
Version	Firmware version	
Serial Nbr	Serial number	
Address	RS-485 address	
Type	Device type	
Name	Device name	User defined
Sensor Test (HP21)	Humidity sensor status	Off / Good / SQ-Tuned / Bad

Probe Information (HP22 only)		
Version	Firmware version	
Serial Nbr	Serial number	
Address	RS-485 address	
Name	Device name	User defined
SensorTest	Humidity sensor status	Off / Good / SQ-Tuned / Bad
Record	On / Off	Data recording by the probe (max. 2000 values)
<b>Humidity Adjust</b>		
RefValue	Humidity reference value	±0.1 %RH steps
Acquired (HP22-A)		Number of cal. points in probe memory
<Acquire> (HP22-A)		Save cal. point to probe memory
<Delete> (HP22-A)		Erases all calibration points
<Adjust> (HP21)		Effect depends on number of calibration points
<Adjust> (HP22-A)		1-point adjustment only (offset)
<b>Temperature Adjust</b>		
RefValue	Temperature reference value	±0.1 °C steps
<Adjust>		1-point adjustment only (offset)

#### Technical data

Battery type: 9 V alkaline

#### Measuring range HP21

Humidity / accuracy: 0...100 %RH / ±1.0 %RH @ 23 °C  
Long term stability: <1 %RH/year  
Temperature / accuracy: -10...60 °C / ±0.2 °C @ 23 °C  
Long term stability: <0.1 °C/year  
Maximum air velocity at probe: 20 m/s

#### Measuring range HP22-A

Humidity and temperature: Depends on the probe

#### Environmental limits

Storage and transit: -20...70 °C / 0...100 %RH, non condensing  
Operating limits at electronics: -10...60 °C / 0...100 %RH, non condensing  
Dimensions: 270 x 70 x 30 mm  
Weight: About 200 gr.

**ROTRONIC AG**, CH-8303 Bassersdorf  
Tel. +41 44 838 11 44, [www.rotronic.com](http://www.rotronic.com)  
**ROTRONIC Messgeräte GmbH**, D-76275 Ettlingen  
Tel. +49 7243 383 250, [www.rotronic.de](http://www.rotronic.de)  
**ROTRONIC SARL**, 56, F-77183 Croissy Beaubourg  
Tél. +33 1 60 95 07 10, [www.rotronic.fr](http://www.rotronic.fr)  
**ROTRONIC Italia srl**, I-20157 Milano  
Tel. +39 2 39 00 71 90, [www.rotronic.it](http://www.rotronic.it)  
**ROTRONIC Instruments (UK) Ltd**, West Sussex RH10 9EE  
Phone +44 1293 571000, [www.rotronic.co.uk](http://www.rotronic.co.uk)  
**ROTRONIC Instrument Corp**, NY 11788, USA  
Phone +1 631 427-3898, [www.rotronic-usa.com](http://www.rotronic-usa.com)  
**ROTRONIC South East Asia Pte Ltd**, Singapore 339156  
Phone +65 6294 6065, [www.rotronic.com.sg](http://www.rotronic.com.sg)  
**ROTRONIC Shanghai Rep. Office**, Shanghai 200233, China  
Phone +86 40 08162018, [www.rotronic.cn](http://www.rotronic.cn)

# HYGROPALM21/22-A



## MODE D'EMPLOI ABRÉGÉ

### Appareil d'affichage portable d'humidité et température

#### Généralités

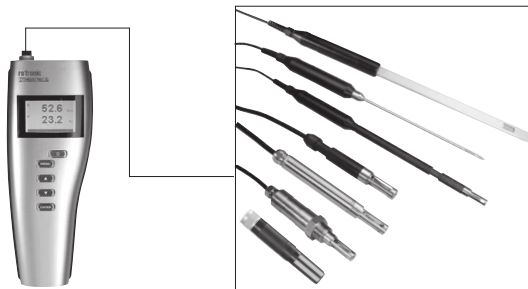
L'**HygroPalm21** est un appareil de mesure de l'humidité et de la température équipé d'un capteur intégré. Il peut afficher les valeurs de température, d'humidité et les points de rosée et de gel. L'**HygroPalm22-A** est un pur appareil d'affichage, c'est-à-dire que les mesures sont effectuées par les capteurs compatibles de la série HygroClip2. Le capteur mesure toujours l'humidité et la température, toutes les autres valeurs affichées sont calculées à partir de ces deux mesures.

#### Programmation à la sortie d'usine

Certains réglages de base, comme par exemple l'affichage en unités métriques ou anglaises, la version de la langue ainsi que la configuration des entrées du capteur des HygroPalm21/22-A sont effectués en usine. Tous ces réglages peuvent être modifiés par le logiciel HW4 (accessoire).

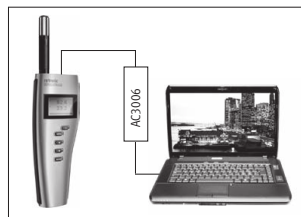
Ce mode d'emploi abrégé se limite à la description des fonctions essentielles de cet appareil. Vous trouverez un mode d'emploi détaillé sur notre site Internet: [www.rotronic.com](http://www.rotronic.com)

Tous les capteurs de la série HygroClip2-peuvent être raccordés à l'HygroPalm22-A. Le capteur peut être remplacé ou échangé sans nécessiter de répéter l'étalonnage. Ceci contribue à élargir particulièrement le champ d'applications.



#### Raccordement à un PC

Le câble de service AC3006 disponible en option permet de raccorder les HP21 et 22-A à un ordinateur portable ou un PC. Le logiciel HW4 est nécessaire de plus pour afficher les valeurs et modifier les réglages.



#### Touches de fonction

##### HOLD: (seulement HP22-A)

Pression brève sur le bouton, la valeur mesurée est verrouillée.  
**ON / OFF:** Pression longue d'1 seconde pour éteindre ou allumer l'appareil.

##### MENU

Active le menu interne. Pressions répétées pour naviguer dans les menus d'un même niveau ou quitter le menu actuel.

##### HAUT / BAS

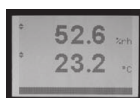
Ces touches permettent de sélectionner les options des menus et de modifier les valeurs numériques.

##### ENTER

Cette touche sert à confirmer la sélection de l'option du menu.

##### Affichage rétroéclairé

L'affichage LCD est équipé d'un dispositif de rétroéclairage. Celui-ci peut être paramétré par un menu. Les fonctions suivantes sont disponibles (désactivé, activé en permanence ou activé par pression d'une touche). Les réglages peuvent être modifiés dans le MENU > Device Settings > Back Light > ENTER à l'aide des touches HAUT/BAS et confirmés par la touche ENTER.



**HP21:** la première ligne de l'affichage indique, selon les réglages, l'humidité relative ou les points de rosée ou de gel. La température est affichée sur la seconde ligne.

**HP22-A:** la première ligne de l'affichage indique la valeur d'humidité, la seconde affiche la valeur de température et la troisième la valeur calculée.

▲ Valeur croissante (valeur définitive non atteinte)    ▲ Valeur constante (valeur déf. atteinte)  
▼ Valeur décroissante (valeur définitive non atteinte)    ▼ Valeur constante (valeur déf. atteinte)

En cas d'alarme, le symbole [!] est affiché sur le côté droit de l'écran.

#### Conseils pratiques pour la mesure de l'humidité

L'humidité dépend de la température, il est donc important que la température au capteur soit la même que celle de l'environnement. Avec une humidité de l'environnement de 50 %HR, une différence de température d'1°C produit une erreur de 3 %HR. Une certaine durée d'adaptation de la température de l'appareil à celle de l'environnement est nécessaire avant de lire la mesure. Plus la différence de température entre l'environnement et l'appareil de mesure est importante plus cette durée d'adaptation doit être prolongée. Toutefois, celle-ci peut être réduite en utilisant pour chaque application le capteur optimal. De la condensation peut se former à la surface de si celui-ci est plus froid que la température ambiante. Cela n'a pas d'influence sur l'étalonnage de l'élément sensible si les valeurs limites de température et d'humidité ne sont pas dépassées. L'élément sensible doit impérativement être sec avant d'effectuer d'autres mesures. L'air stagnant est un parfait isolant. Lorsque la circulation d'air est inexistante, des écarts extrêmes de température et d'humidité peuvent être enregistrés sous des durées très courtes. Veillez donc à ce que l'élément sensible soit correctement ventilé pour obtenir des mesures précises et rapides.

#### Langage

Les HP21 et HP22-A sont livrés en standard avec un système de menus en anglais. Toutefois, d'autres langages sont disponibles. Vous trouverez sur Internet les indications pour le changement de langue et les fichiers nécessaires sous [www.rotronic.com](http://www.rotronic.com) -> Downloads -> Language files.

#### Sélection de la valeur d'affichage

En mode normal (menu désactivé), appuyez sur ENTER pour sélectionner et afficher les valeurs suivantes.

- Humidité relative et température
- Points de rosée, de gel et température (HP21)
- Humidité relative, température et valeur calculée (HP22-A)

**Remarque (HP22-A):** La valeur du point de gel (réglage d'usine) peut être modifiée pour d'autres paramètres à calculer, en appuyant sur les touches HAUT/BAS, dès que la valeur calculée est affichée sur l'écran.

#### Unités

Le MENU > Device Settings > Units permet de sélectionner les unités (°C/°F) sur l'HP21 et (métrique/anglaise) sur l'HP22-A à l'aide des touches HAUT/BAS. Le choix est confirmé en appuyant sur la touche ENTER. Le retour en mode normal est effectué en appuyant deux fois sur la touche MENU.

#### Affichage de l'état de la pile

Le message «Low Batterie» apparaît si la capacité de la pile tombe à 20% de sa pleine charge.

#### Étalonnage périodique des capteurs / transmetteurs de mesure

L'élément sensible de température Pt100 RTD ainsi que l'électronique correspondante sont très stables et ne doivent normalement pas être modifiés ou ajustés après leur étalonnage en usine. La stabilité à long terme des capteurs pour l'humidité Hygromer® de ROTRONIC est typiquement inférieure à 1 %HR par an. Nous conseillons, pour une précision maximale, un intervalle d'étalonnage pour les capteurs de six à douze mois. Un étalonnage plus fréquent peut s'avérer nécessaire pour les éléments sensibles exposés à des polluants.

#### Structure des menus (avec le fichier de langue anglaise)

MENU PRINCIPAL	CHOIX / INFOS	REMARQUES
<b>Device Settings</b>		
Units	Metric / English	
Back Light	Key Press / On / Off	Mode de rétroéclairage
Contrast (HP22-A)		Réglage du contraste
Trend (HP22-A)	On / Off	Indicateur de la tendance
<b>Device Information</b>		
Version	Firmware version	
Serial Nbr	Serial number	
Address	RS-485 address	
Type	Device type	
Name	Device name	Selon le client
SensorTest (HP21)	Humidity sensor status	

Probe Information		
Version (HP22-A)	Firmware version	
Serial Nbr (HP22-A)	Serial number	
Address (HP22-A)	RS-485 address	
Name (HP22-A)	Device name	Selon le client
SensorTest (HP22-A)	Humidity sensor status	État de l'élément sensible
Record (HP22-A)	On / Off	Enregistrement des données dans le capteur (2000 valeurs maximum)
Humidity Adjust		
RefValue	Humidity reference value	Pas de ±0,1 %HR
Acquired (HP22-A)		Nombre de points d'étalonnage enregistrés
<Acquire> (HP22-A)		La valeur d'étalonnage est enregistrée dans la mémoire
<Delete> (HP22-A)		Efface tous les points d'étalonnage
<Adjust> (HP21)		Ajustage sur un seul point (offset)
<Adjust> (HP22-A)		Ajuste le capteur
Temperature Adjust		
RefValue	Temperature reference value	Pas de ±0,1 °C
<Adjust>		Ajustage sur un seul point (offset)

#### Caractéristiques techniques

Tension d'alimentation: Pile alcaline de 9V

#### Gamme de mesure HP21

Humidité / Précision: 0...100 %HR / ±1,0 %HR @ 23 °C  
Stabilité: <1 %HR / an  
Température / Précision: -10...60 °C / ±0,2 °C @ 23 °C  
Stabilité: <0,1 °C / an  
Flux d'air maximum au capteur: 20 m/s

#### Gamme de mesure HP22-A

Humidité et température: Selon le capteur

#### Conditions environnementales admissibles

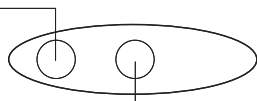
Pour l'entreposage: -20...70 °C / 0...100 %HR, sans condensation  
En fonctionnement: -10...60 °C / 0...100 %HR, sans condensation

Dimensions: 270 x 70 x 30 mm  
Poids: 200 g environ

Paramètres mesurés	HP21	HP22-A
Humidité / Température	•	•
Paramètres calculés		
Point de rosée / Point de gel	•	•
Température mouillée (Tw)		•
Enthalpie (H)		•
Densité de la vapeur d'eau (Dv)		•
Teneur en vapeur d'eau (Q)		•
Rapport de mélange (R)		•
Pression de saturation de la vapeur d'eau (Dvs)		•
Pression partielle de la vapeur (E)		•
Pression de vapeur d'eau saturante (Ew)		•

#### Raccordements

**Entrée capteur (HP22-A)**  
Pour le raccordement de tous les capteurs HC2



**Raccordement de service**  
Raccordement de service (mini USB). Pour le raccordement d'un PC ou laptop (AC3006)

**ROTRONIC AG**, CH-8303 Bassersdorf  
Tel. +41 44 838 11 44, [www.rotronic.com](http://www.rotronic.com)  
**ROTRONIC Messgeräte GmbH**, D-76275 Ettlingen  
Tel. +49 7243 383 250, [www.rotronic.de](http://www.rotronic.de)  
**ROTRONIC SARL**, 56, F-77183 Croissy Beaubourg  
Tél. +33 1 60 95 07 10, [www.rotronic.fr](http://www.rotronic.fr)  
**ROTRONIC Italia srl**, I-20157 Milano  
Tel. +39 2 39 00 71 90, [www.rotronic.it](http://www.rotronic.it)  
**ROTRONIC Instruments (UK) Ltd**, West Sussex RH10 9EE  
Phone +44 1293 571000, [www.rotronic.co.uk](http://www.rotronic.co.uk)  
**ROTRONIC Instrument Corp**, NY 11788, USA  
Phone +1 631 427-3898, [www.rotronic-usa.com](http://www.rotronic-usa.com)  
**ROTRONIC South East Asia Pte Ltd**, Singapore 339156  
Phone +65 6294 6065, [www.rotronic.com.sg](http://www.rotronic.com.sg)  
**ROTRONIC Shanghai Rep. Office**, Shanghai 200233, China  
Phone +86 40 08162018, [www.rotronic.cn](http://www.rotronic.cn)



# HYGROPALM21/22-A



## MANUALE D'ISTRUZIONI BREVE

Strumento portatile per la visualizzazione di umidità e temperatura

### Descrizione generica

**HygroPalm21** è uno strumento per la visualizzazione della misura di temperatura e umidità, con sonda integrata. A display possono essere visualizzati i valori per temperatura, umidità, punto di rugiada e del ghiaccio.

**HygroPalm22-A** è solo uno strumento di visualizzazione, e quindi la misurazione viene effettuata sulle sonde collegate della serie HygroClip2. La sonda misura sempre umidità relativa e temperatura; tutti gli altri valori visualizzati sono calcolati sulla scorta di questi due valori.

### Programmazione di fabbrica

Determinate impostazioni di base, come ad es. la visualizzazione di unità di misura metriche o inglesi, la versione della lingua e la configurazione delle entrate della sonda dell'HygroPalm21/22-A sono effettuate in fabbrica. Mediante il software HW4 (accessorio) è possibile modificare tali impostazioni. La presente guida rapida si limita a descrivere le funzioni principali dello strumento. Le istruzioni d'uso dettagliate sono disponibili in Internet all'indirizzo: [www.rotronic.com](http://www.rotronic.com)

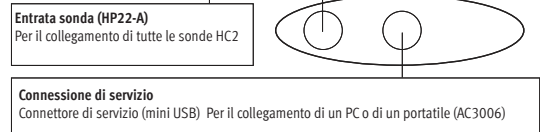


### Tensione di alimentazione

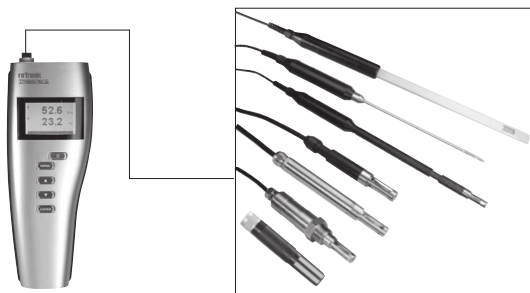
Per l'alimentazione dell'HygroPalm21/22-A si utilizza una normale batteria alcalina da 9V. Per inserire la batteria, aprire il fermo della batteria ruotando la vite in senso antiorario e poi estrarre il supporto della batteria e quindi inserire la batteria stessa.

Parametri misurati	HP21	HP22-A
Umidità / Temperatura:	•	•
Parametri calcolati		
Punto di rugiada / del ghiaccio	•	•
Temperatura di bulbo bagnato (Tw)		•
Entalpia (H)		•
Densità del vapore acqueo (Dv)		•
Percentuale del vapore acqueo (Q)		•
Rapporto di miscela (R)		•
Saturazione densità del vapore acqueo (Dvs)		•
Pressione parziale vapore (E)		•
Pressione parziale del vapore acqueo (Ew)		•

### Connessioni



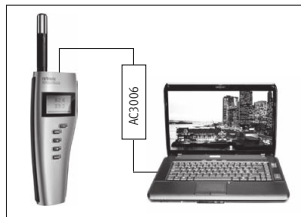
Tutte le sonde della serie HygroClip2 si lasciano collegare all'HygroPalm22-A. È possibile sostituire o cambiare la sonda senza dover effettuare una nuova calibrazione. Ciò favorisce naturalmente un ampio spettro applicativo.



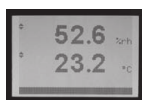
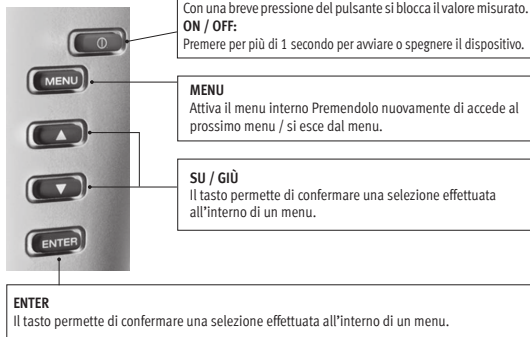
### Collegamento al PC

Tramite il cavo optional di servizio AC3006 è possibile collegare l'HP21 o 22-A ad un portatile o al PC.

Per la visualizzazione dei valori o la modifica delle impostazioni si deve disporre del software HW4.



### Tasti funzionali



### Display con retroilluminazione

Il display LCD è dotato di retroilluminazione. Il menu ne permette la regolazione. Sono disponibili le seguenti funzioni (spento, sempre acceso, o accesso alla pressione di un tasto). Si possono modificare le impostazioni in MENU > Device Settings > Back Light > ENTER utilizzando quindi i tasti su e giù e poi confermando con ENTER.

**HP21:** la prima riga del display indica, in base alle impostazioni, umidità relativa o punto di rugiada o del ghiaccio. Nella seconda riga è riportata la temperatura.

**HP22-A:** la prima riga del display riporta il valore dell'umidità, la seconda la temperatura e la terza il valore calcolato.

- ▲ Valore in crescita (il valore di fondo scala non è ancora stato raggiunto)
- ▼ Valore in diminuzione (il valore di fondo scala non è ancora stato raggiunto)
- ◆ Valore costante (il valore di fondo scala è stato raggiunto)

In caso di allarme si visualizza il simbolo [!] al bordo destro del display

### Consigli pratici per la misurazione dell'umidità

L'umidità dipende dalla temperatura, quindi è importante che la temperatura ambiente corrisponda alla temperatura sulla sonda. Con un'umidità ambiente del 50 %ur. una differenza di temperatura di solo 1 °C comporta un errore di ben il 3 %ur. Prima di procedere alla lettura del valore misurato, si deve lasciar adeguare lo strumento alla temperatura ambiente. Tanto maggiore è la differenza di temperatura tra ambiente e sensore, tanto più a lungo si deve attendere per tale adeguamento. È possibile ridurre tali tempistiche utilizzando la sonda ottimale per l'applicazione in essere. Se il sensore è più freddo della temperatura ambiente, potrebbe formarsi della condensa sul sensore stesso. Se non si superano i limiti di temperatura e umidità, ciò non comporta alcun influsso per la calibrazione del sensore.

Comunque prima di effettuare altre misurazioni si deve lasciar asciugare il sensore. L'aria stagnante rappresenta un isolamento perfetto. Se non si hanno movimenti d'aria, è possibile far visualizzare a brevi distanze anche notevoli sbalzi di temperatura e umidità. Si raccomanda di controllare che il flusso d'aria circonda perfettamente il sensore, in quanto ciò garantisce misurazioni rapide e precise.

### Lingua

Come standard si consegnano i modelli HP21 e HP22-A con guida a menu in lingua inglese. Sono però disponibili anche altre lingue. In Internet, all'indirizzo [www.rotronic.com](http://www.rotronic.com) -> Downloads -> Language files sono disponibili le istruzioni per la modifica della lingua e i relativi file di lingua.

### Selezione dei valori da visualizzare

In modalità standard (menu non attivo) premere ENTER per effettuare la selezione dei valori che si desiderano visualizzare a display.

- Umidità relativa e temperatura
- Punto di rugiada e ghiaccio e temperatura (HP21)
- Umidità relativa e temperatura e valore calcolato (HP22-A)

**Nota (HP22-A):** non appena a display appare il valore calcolato, è possibile modificare il valore del punto di ghiaccio (impostazione di fabbrica) per passare ad altri parametri calcolati, premendo i tasti SU / GIÙ.

### Unità di misura

In MENU > Device Settings > Units è possibile selezionare l'unità di misura (°C/°F) nel HP21 e (metrica/inglese) nel HP22-A, utilizzando i tasti SU / GIÙ. Premendo il tasto ENTER si accetta la selezione. Premendo due volte il tasto MENU si torna alla modalità standard

### Indicazione della carica della batteria

Se la batteria raggiunge una capacità inferiore al 10%, a display appare il messaggio "Low Batterie".

### Calibrazione periodica della sonda

Sia il sensore per la temperatura Pt100 sia i relativi dispositivi elettronici sono estremamente stabili e di solito non vanno più modificati o calibrati dopo la calibrazione effettuata di fabbrica. La stabilità a lungo termine della sonda per l'umidità Hygromer® ROTRONIC risulta di solito migliore ad un valore dell'1 % di umidità relativa/anno. Per ottenere la massima precisione possibile, consigliamo di effettuare una calibrazione della sonda ogni sei - dodici mesi. Per applicazioni che prevedono un'esposizione del sensore a sostanze nocive potrebbe essere necessario effettuare più spesso la calibrazione.

### Struttura del menu (con file di lingua inglese)

MENU PRINCIPALE	SELEZIONE/INFORMAZIONE	ANNOTAZIONI
<b>Device Settings</b>		
Units	metrica / inglese	
Back Light	con pressione / On / Off	modalità della retroilluminazione
Contrast (HP22-A)		regolazione contrasto
Trend (HP22-A)	On / Off	indicatore di trend
<b>Device Information</b>		
Version	versione firmware	
Serial Nbr	numero di serie	
Address	indirizzo RS-485	
Type	modello strumento	
Name	nome strumento	customizzato
Sensor Test (HP21)	stato sensore umidità	

Probe Information		
Version (HP22-A)	versione firmware	
Serial Nbr (HP22-A)	numero di serie	
Address (HP22-A)	indirizzo RS-485	
Name (HP22-A)	nome strumento	customizzato
SensorTest (HP22-A)	Humidity sensor status	stato del sensore
Record (HP22-A)	On / Off	registrazione dati nella (max. 2000 valori)
Humidity Adjust		
RefValue	valore di riferimento umidità	in passi di ±0,1 %ur
Acquired (HP22-A)		numero dei punti di calibrazione memorizzati
<Acquire> (HP22-A)		il valore di calibrazione viene memorizzato
<Delete> (HP22-A)		cancella tutti i punti di calibrazione
<Adjust> (HP21)		solo regolazione a 1 punto (Offset)
<Adjust> (HP22-A)		Jregola la sonda
Temperature Adjust		
RefValue	valore di riferimento temperatura	in passi di ±0,1 °C
<Adjust>		solo regolazione a 1 punto (Offset)

### Dati tecnici

Tensione di alimentazione: batteria alcalina da 9V

### Range di misurazione HP21

Umidità / precisione: 0...100 %ur / ±1,0 %ur @ 23 °C  
 Stabilità: <1 %ur / anno  
 Temperatura / precisione: -10...60 °C / ±0,2 °C @ 23 °C  
 Stabilità: <0,1 °C / anno  
 Flusso massimo di aria sulla sonda: 20 m/s

### Range di misurazione HP22-A

Umidità e temperatura: in base al tipo di sonda

### Condizioni ambiente ammesse

Stoccaggio: -20...70 °C / 0...100 %ur, non condensante  
 In esercizio: -10...60 °C / 0...100 %ur, non condensante

Dimensioni: 270x70x30 mm  
 Peso: 200 gr. circa.

**ROTRONIC AG**, CH-8303 Bassersdorf

Tel. +41 44 838 11 44, [www.rotronic.com](http://www.rotronic.com)

**ROTRONIC Messgeräte GmbH**, D-76275 Ettlingen

Tel. +49 7243 383 250, [www.rotronic.de](http://www.rotronic.de)

**ROTRONIC SARL**, 56, F-77183 Croissy Beaubourg

Tél. +33 1 60 95 07 10, [www.rotronic.fr](http://www.rotronic.fr)

**ROTRONIC Italia srl**, I-20157 Milano

Tel. +39 2 39 00 71 90, [www.rotronic.it](http://www.rotronic.it)

**ROTRONIC Instruments (UK) Ltd**, West Sussex RH10 9EE

Phone +44 1293 571000, [www.rotronic.co.uk](http://www.rotronic.co.uk)

**ROTRONIC Instrument Corp**, NY 11788, USA

Phone +1 631 427-3898, [www.rotronic-usa.com](http://www.rotronic-usa.com)

**ROTRONIC South East Asia Pte Ltd**, Singapore 339156

Phone +65 6294 6065, [www.rotronic.com.sg](http://www.rotronic.com.sg)

**ROTRONIC Shanghai Rep. Office**, Shanghai 200233, China

Phone +86 40 08162018, [www.rotronic.cn](http://www.rotronic.cn)

<b>E-M-HP22-V2_13</b> Document code	Rotronic AG Bassersdorf, Switzerland Unit
<b>HygroPalm HP22-A hand-held indicator:          User Guide</b> Document title	<p style="text-align: right;"><b>Instruction Manual</b></p> <p style="text-align: right;">Document Type</p> <p style="text-align: center;">Page 1 of 16</p>

## HygroPalm HP22-A Hand-Held Indicator User Guide



<b>E-M-HP22-V2_13</b> Document code	Rotronic AG Bassersdorf, Switzerland Unit
<b>HygroPalm HP22-A hand-held indicator: User Guide</b> Document title	<b>Instruction Manual</b> Document Type Page 2 of 16

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## Applicability:

This manual is valid for the HP22 with firmware version 2.x, where 2.x can be 2.0, 2.1 etc. Changes to the last digit of the version number reflect minor firmware changes that do not affect the manner in which the instrument should be operated.

## 1 Overview

The HP22 is a highly accurate hand-held indicator that displays relative humidity, temperature and a calculated parameter such as the dew or frost point. The HP22 operates with a regular 9V alkaline battery and is available with a wide assortment of HygroClip 2 humidity-temperature probes to meet almost any requirement. The HygroClip 2 probes feature well proven, durable sensors. Digital signal processing ensures consistent product performance and also facilitates the task of field maintenance with features such as potentiometer free – digital calibration.

Depending on the probe model, the HP22 can measure conditions within the range of 0 to 100 %RH and -100 to 200°C (-148 to 392°F). The temperature operating range of the HP22 electronics is limited to -10...60°C.

Based on the ROTRONIC AirChip 3000 digital technology the HP22 indicator and HygroClip 2 probes offer the following user functions:

- User configurable settings
- Calculation of psychrometric parameters such as the dew or frost point
- HOLD function
- Humidity temperature calibration and adjustment
- Simulator mode
- Automatic humidity sensor test and drift compensation
- Sensor failure mode
- Data recording

The ability for the user to easily update both the HP22 and HygroClip 2 probe firmware means that the indicator and probes can be kept up-to-date regarding any future functionality improvement.

## 2 General description

### 2.1 Power supply

The HP22 operates with a regular 9V alkaline battery

### 2.2 Measured parameters

The probes used with the HP22 measure relative humidity with a ROTRONIC Hygromer<sup>®</sup> IN1 capacitive sensor and temperature with a Pt100 RTD.

### 2.3 Calculated parameters

Using the ROTRONIC HW4 software, the HP22 can be configured by the user to calculate one of the following parameters:

- Dew point (Dp) above and below freezing
- Frost point (Fp) below freezing and dew point above freezing
- Wet bulb temperature (Tw)
- Enthalpy (H)
- Vapor concentration (Dv)
- Specific humidity (Q)
- Mixing ratio by weight (R)

<b>E-M-HP22-V2_13</b> Document code	Rotronic AG Bassersdorf, Switzerland Unit
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- Vapor concentration at saturation (Dvs)
- Vapor partial pressure (E)
- Vapor saturation pressure (Ew)

Note: some of the above parameters depend on the value of the barometric pressure. Using the ROTRONIC HW4 software, a fixed barometric pressure value can be specified. For instructions see the following HW4 manual: **E-M-HW4v3-F2-006**

## 2.4 Service connector

The service connector is a UART digital interface (Universal Asynchronous Receiver Transmitter) with a mini-USB type connector. This allows connecting the HP22 either to a PC running the ROTRONIC HW4 software or to a probe input of another instrument that is compatible with the HygroClip 2 (HC2) probes. In both cases a service cable is required. See "Maintenance" for the location of the service connector and for the type of service cable to be used.

- Connecting the HP22 to a PC is used to configure the HP22, gain access to the HP22 and probe functions such as humidity and temperature adjustment, read data from the HP22 on the PC and update the firmware of either the HP22 or probe.
- Connecting the HP22 to another instrument is useful only when the other instrument has its own display and keypad, and has a more powerful internal menu than the HP22 (example HP23 hand-held calibrator). This allows showing the data measured by the HP22 on the other instrument display and also allows using the other instrument internal menu to do for example a humidity and temperature adjustment of the HP22.

## 3 User configurable settings and functions

The HP22 can be used just as any conventional humidity and temperature indicator and most users will never need to use the HP22 configurable settings and functions.

Making use of the HP22 configurable settings and functions is entirely up to the user and the appropriate settings depend on the user application. We have provided below a short description of the HP22 functions and also indicated the factory default settings.

### 3.1 Function overview

MEASUREMENT ACCURACY AND RELIABILITY (PROBE FUNCTIONS)	
AirChip 3000 Functions	Description
▶ Humidity / temperature adjustment	<ul style="list-style-type: none"> <li>○ 1-point or multi-point humidity calibration or adjustment</li> <li>○ 1-point or 2-point temperature calibration or adjustment</li> <li>○ Generate a time stamp for calibrations and adjustments</li> <li>○ Retain and view last adjustment date and adjustment values</li> <li>○ Generate calibration and adjustment protocols</li> </ul>
▶ Automatic humidity sensor test and optional drift compensation	<p>Tests the humidity sensor for drift caused by contaminants and can be used to automatically apply a correction. The test is automatically carried out at regular intervals of time. Can be configured, enabled, or disabled</p> <p>The humidity sensor status can be verified either with the HW4 software or with the instrument display and is shown as Good, SQ-tuned (corrected for drift) or Bad (defective)</p>



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▶ Data recording	<p>The data recording function differs from a true data logging function in the sense that the AirChip 3000 does not time stamp the data. The data recording function can be used to investigate events such as a sensor malfunction as well as to retrieve data that would otherwise be lost</p> <ul style="list-style-type: none"> <li>○ Start or stop data recording - up to 2000 value pairs (%RH and temperature)</li> <li>○ Starting a recording session erases all previously recorded data</li> <li>○ The recording mode and log interval can be specified</li> <li>○ When the device is powered off, the recording session is paused but not ended. As long as the recording session has not been ended, the device automatically resumes recording data when powered up again</li> <li>○ The recorded data can be downloaded to a PC with the HW4 software, time stamped and viewed</li> </ul>
------------------	--

MEASUREMENT LOOP VALIDATION	
Functions	Description
▶ Simulator mode	Used to make the HP22 generate fixed values for the humidity, temperature and calculated parameter. Can be configured, enabled or disabled

DEVICE SAFEGUARDS	
Functions	Description
▶ Device write protection	Used to protect the HP22 with a password to prevent unauthorized digital access by a digital user. Can be configured, enabled or disabled
▶ Internal menu access from keypad	Used to prevent accidental changes to the HP22 settings and temperature-humidity adjustment by disabling the MENU key on the optional keypad. Can be enabled or disabled

## 3.2 Factory default settings

### Notes:

- Configuration of the HP22 and probe by the user and access to its functions requires a PC with the ROTRONIC HW4 software (version 2.1.1 or higher) installed. Service cable AC3006 is used to connect the HP22 service connector to a USB port of the PC.
- Settings and functions that can also be either partially or fully accessed from the keypad are marked with the letter **K** (see also Operation > Internal Menu).

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Configurable Settings		Factory default
Unit system (Metric or English)	<b>K</b>	Metric, except USA: English
Psychrometric calculation		Dew / frost point
Fixed pressure value		1013.25 hPa or 29.92 In Hg
Data refresh rate		1 sec.
Display resolution		1 decimal
Display backlight (optional)	<b>K</b>	On Key Press
Displayed parameters	<b>K</b>	%RH and temperature
Trend indicator (display)		Enabled
Communication protocol		RO-ASCII
RS-485 address		0
Device name		Instrument model

Functions		Factory default
Humidity / temperature adjustment	<b>K</b>	
Device write protection		Disabled (HP22 and probe)
Menu access from keypad		Enabled
Limit humidity output to 100 %RH		Enabled (probe)
Out-of-limit value digital / display alarm		Disabled (HP22 and probe)
Data recording (probe)	<b>K</b>	Enabled (loop mode – 10 min. interval)
Automatic humidity sensor test		Disabled (probe)
Humidity sensor drift compensation		Disabled (probe)
Monitor probe alarms		Enabled
Loss of communication with probe		Disabled
Simulator mode		Disabled (HP22 and probe)

- For a detailed description of all AirChip 3000 / HP22 main functions see document **E-T-AC3000-DF-V1**
- Instructions regarding the configuration of the HP22 and probe as well as access to the functions are provided in the following manuals:

**E-M-HW4v3-Main**  
**E-M-HW4v3-F2-006**  
**E-M-HW4v3-F2-001**  
**E-M-HW4v3-DR-001**  
**E-M-HW4v3-A2-001**  
**E-M-AC3000-CP**

- The factory default setting for dew / frost point calculation is frost point below freezing

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### 3.3 Interaction between the HP22 and probe functions

It is important to note that when used together, the HP22 indicator and HC2 probe (HygroClip 2) constitute a 2-component system. Each system component has its own microprocessor, firmware and functions. Some of these functions are unique to each system component. Other functions are found in both components.

The functions and settings of the HP22 indicator and HygroClip 2 probe (HC2) operate together as indicated below:

Function / Setting	HP22	HC2	Notes
Device protection	X	X	Individual to the HP22 and HC2 probe
RS-485 address	X	X	Individual to the HP22 and HC2 probe
Device Name	X	X	User defined description The device name of the HC2 probe is not displayed by HW4 and is replaced with the HP22 Input Name
Calculation	X	X	Psychrometric calculation HP22 setting overrides HC2 probe setting
Data refresh rate	X		When set above 1 s, causes the HC2 probe not to be powered in between measurements
Simulator function	X	X	Generates fixed humidity and / or temperature value When enabled, the HP22 settings override the HC2 probe settings
Unit system	X	X	The HP22 setting overrides HC2 probe setting. The HC2 probe settings still apply when the probe is used alone <b>Make sure to use the same humidity symbol and the same temperature unit for both the HP22 and probe.</b>
Out-of-limits value alarm	X	X	The HP22 settings are independent from the HC2 probe settings. The HC2 probe settings have an effect only when the HP22 is enabled to monitor alarms generated by the probe When out-of-limit values have been defined for the same parameter for both the HP22 and probe, alarms are triggered based on the narrowest set of limits.
Analog outputs	X	X	Parameter and scale The HC2 probe settings have no effect on the HP22

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## 4 Operation

### 4.1 Display



The LC display of the HP22 has a backlight which can be set to be on all the time or whenever a key is pressed. The backlight can also be disabled.

The upper line corresponds to relative humidity or dew / frost point and the bottom line corresponds to temperature.

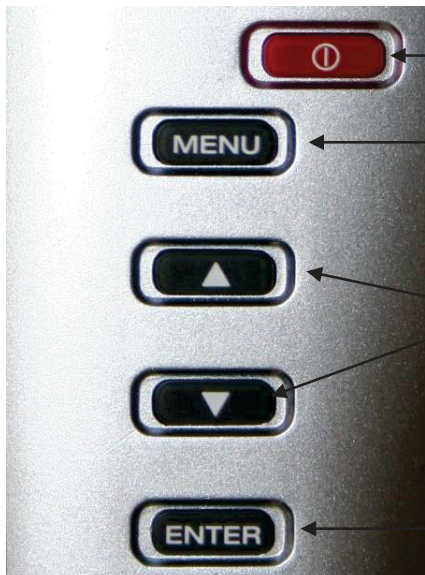
The display can be configured to show a trend indicator on each line:

- ▲ : increasing value
- ▼ : decreasing value

In the event of an alarm the display shows the symbol [!] to the right of the value.

For instructions see the following HW4 manual: **E-M-HW4v3-F2-006**.

### 4.2 Keypad



- ON/OFF:** Turns the instrument on or off  
Activates / de-activates HOLD function
- MENU:** Press this key to activate the internal menu. Press this key again to exit the menu
- UP / DOWN:** When the menu is active, use these keys to navigate the menu, make a selection or change a value
- ENTER:** When the menu is active, press this key to confirm a selection.

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#### 4.4 ON/OFF key

The ON/OFF key is used as follows:

- To turn the instrument on: press the ON/OFF key
- To turn the instrument off: press the ON/OFF key for more than 1 second
- To activate the HOLD function: press the ON/OFF key briefly (less than 1 second)
- To deactivate the HOLD function: press the ON/OFF key briefly (less than 1 second)

#### 4.5 Changing the parameters shown on the display

When the menu is not active, press the ENTER key to change which parameters are shown on the display:

- Relative humidity and temperature
- Relative humidity, temperature and calculated parameter (when calculated parameter is enabled)

#### 4.6 HOLD function

When the HOLD function is active, the word "HOLD" appears at the bottom of the LC display. The display is frozen and shows the values that were either last measured or last calculated at the time the ON/OFF key was pressed. Likewise, communication with the ROTRONIC HW4 software is frozen. The ENTER key can still be used to change the parameters shown on the display, but the values are not updated.

The HOLD function is automatically disabled whenever the instrument is turned off. The values that were displayed while the HOLD function was active are not memorized and are lost.

**WARNING:** while the HOLD function is active, functions such as probe adjustment from the keypad should not be used because both the measured and calculated values are no longer updated.

#### 4.7 Changing the unit system

The unit system (metric or English) can be changed from the keypad (Menu > Settings > Unit).

- Press the MENU key to show the internal menu on the display
- With the menu item Settings highlighted, press the ENTER key
- With the menu item Unit highlighted, press the ENTER key
- Use the UP or DOWN key to change the unit system as desired
- Press the MENU key twice to exit the menu and return the HP22 to normal operation

The optional HW4 software can also be used to change the unit system.

#### 4.8 Low battery indicator

When the battery is down to about 20% of its initial charge, "Low Battery" appears at the bottom of the display.



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## 4.9 Internal menu

**Note:** Unauthorized access to the menu can be prevented by disabling the “display menu” setting (use the HW4 software > Device Manager > Display)

Main Menu	Menu Items	Selections / Information	Notes
<b>Device Settings</b>			
	<b>Units</b>	Metric / English	
	<b>Back Light</b>	Key Press / On / Off	Display backlight mode
	<b>Contrast</b>		LC display contrast adjustment
	<b>Trend</b>	On / Off	Trend indication on the display
	<b>AutoPwrOff</b>	OFF 1 min 5 min 15 min 30 min 45 min 60 min	The HP22 powers itself down after a user specified time period
<b>Device Information</b>			
	<b>Version</b>	Firmware version	
	<b>Serial Nbr</b>	Serial number	
	<b>Address</b>	RS-485 address	
	<b>Type</b>	Device type	
	<b>Name</b>	Device name	User defined
<b>Probe Information</b>			
	<b>Version</b>	Firmware version	
	<b>Serial Nbr</b>	Serial number	
	<b>Address</b>	RS-485 address	
	<b>Name</b>	Device name	User defined
	<b>SensorTest</b>	Humidity sensor status	Off / Good / SQ-Tuned / Bad
	<b>Record</b>	On / Off	Data recording by the probe (max. 2000 values)
<b>Humidity Adjust</b>			
	<b>RefValue</b>	Humidity reference value	± 0.1 %RH steps
	<b>Acquired</b>		Number of cal. points in probe memory
	<b>&lt;Acquire&gt;</b>		Save cal. point to probe memory
	<b>&lt;Delete&gt;</b>		Erases all calibration points
	<b>&lt;Adjust&gt;</b>		Effect depends on number of calibration points
<b>Temperature Adjust</b>			
	<b>RefValue</b>	Temperature reference value	± 0.1 °C steps
	<b>&lt;Adjust&gt;</b>		1-point adjustment only (offset)

- **Record:** both the recording mode (start / stop and the log interval cannot be changed from the menu and are as configured with the ROTRONIC HW4 software

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- **SensorTest:** Off means that the humidity sensor has not been tested due to the configuration settings of the test. For a description of the automatic humidity sensor test and drift compensation (SQ-tuning) see documents **E-T-AC3000-DF-V1** and **E-M-HW4v3-F2-006**

## 4.10 Practical advice for measuring humidity

The most common source of error when measuring relative humidity is a difference between the temperature of the probe and the temperature of the environment. At a humidity condition of 50 %RH, a temperature difference of 1°C (1.8 °F) typically results in an error of 3 %RH on relative humidity.

When using the HP22 hand-held indicator, it is good practice to monitor the display for temperature stability. The probe should be given sufficient time to equilibrate with the environment to be measured. The larger the initial temperature difference between the probe and the environment to be measured, the more time temperature equilibration requires. This time can be shortened, and errors avoided, by using the probe configuration that fits best for your application.

In extreme situations, condensation may occur on the sensors when the probe is colder than the environment. As long as the humidity / temperature limits of the humidity sensor are not exceeded, condensation does not alter the calibration of the sensor. However, the sensor has to dry out before it can provide a valid measurement.

Non-moving air is an excellent insulator. When there is no air movement, surprising differences in temperature and humidity can be noted over short distances. Air movement at the probe generally results in measurements that are both faster and more accurate.

## 5 Maintenance

### 5.1 Replacing the battery

To replace the battery, turn the latching button counter-clockwise and pull out the battery holder.



### 5.2 Service cable

- Cable AC3006 converts UART (service connector) to USB and is used to connect the HP22 to a USB port of a PC running the ROTRONIC HW4 software. Prior to using this cable, the ROTRONIC USB driver must be installed on the PC. Both the driver and the installation instructions (document **E-M-HW4v3-Main**) are located on the HW4 CD.

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- As an alternative, cable AC2001 is used to connect the HP22 to a probe input of the HP23 hand-held calibrator. For service purposes, the HP23 offers essentially the same functionality as the HW4 software.

### 5.3 Location of the service connector (mini USB type)



**WARNING:** the service connector is a UART interface with a mini-USB connector type. Do not connect the service connector directly to the USB port of a PC or hub.

The service connector (UART interface) can be accessed without opening the enclosure after removing the protective red round cover.

### 5.4 Periodic calibration check of the probe

Both the Pt 100 RTD temperature sensor used in the probe and associated electronics are very stable and should not require any calibration after the initial factory adjustment. Long term stability of the ROTRONIC Hygromer humidity sensor is typically better than 1 %RH per year. For maximum accuracy, calibration of the probe should be verified every 6 to 12 months. Applications where the probe is exposed to significant pollution may require more frequent verifications.

#### a) Procedure for adjusting the probe from the HP22 keypad

##### *Temperature adjustment*

The keypad of the HP22 allows only a 1-point adjustment of temperature. The effect of a 1-point temperature adjustment is to add the same offset to all measured values.

- When temperature is stable, press the MENU key to show the internal menu on the display
- Use the (-) key to select Temperature Adjust and press the ENTER key
- Make sure that the text line beginning with RefValue is highlighted and press the ENTER key
- Use the (+) or (-) key to change the reference value to match the temperature reference
- Use the (-) key to highlight the Adjust text line and press the ENTER key
- The HP22 confirms the adjustment with the message "Adjust OK"
- Press the MENU key twice to exit the menu and return the HP22 to normal operation

##### **Notes:**

- Any temperature adjustment should be done prior to adjusting humidity
- The calibration point is automatically deleted from the probe memory after an adjustment
- Because the HP22 has no real time clock, the date of the adjustment is not written to the probe. If retaining the adjustment date is important, use the HW4 software to adjust the probe.

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### **Humidity adjustment**

The keypad of the HP22 allows a multi-point adjustment of humidity. The effect of a humidity adjustment depends on the number of calibration points present in the probe memory prior to the adjustment:

- one calibration point: offset added to all measured values
- two calibration points: offset and slope
- three or more calibration points: offset, slope, linearity

For maximum accuracy use at least 3 to 4 calibration points distributed equally across the measurement range of interest. The calibration points (maximum 100) can be acquired in any order but we recommend going from low humidity values to high humidity values.

- When humidity is stable, press the MENU key to show the internal menu on the display
- Use the (-) key to select Humidity Adjust and press the ENTER key
- Make sure that the text line beginning with RefValue is highlighted and press the ENTER key
- Use the (+) or (-) key to change the reference value to match the reference humidity
- Use the (-) key to highlight the Acquire text line and press the ENTER key
- Note that the "Acquired" counter is incremented by 1 (number of calibration points in the probe memory)
- When all calibration points have been acquired, use the (-) key to highlight the Adjust text line and press the ENTER key. **Do not adjust the probe before having acquired all calibration points.**
- The HP22 confirms the adjustment with the message "Adjust OK"
- Press the MENU key twice to exit the menu and return the HP22 to normal operation

#### **Notes:**

- All calibration points are automatically deleted from the probe memory after an adjustment
- Instructions for using the ROTRONIC calibration devices and humidity standards are provided in document **E-M-CalBasics**
- Because the HP22 has no real time clock, the date of the adjustment is not written to the probe. If retaining the adjustment date is important, use the HW4 software to adjust the probe.

#### **b) Using the HW4 software to adjust the probe connected to the HP22:**

- Use cable AC3006 to connect the service connector of the HP22 to a USB port of a PC with the HW4 software installed. Note that the ROTRONIC USB driver must be installed on the PC as explained in the HW4 manual **E-M-HW4v3-Main**.
- Start HW4 on the PC and search for the HP22 (HW4 Main Menu Bar > Devices and Groups > Search for USB Masters).
- After finding the HP22 with HW4, expand the device tree to see the HP22 functions. Select Probe and Probe Adjustment.
- For further instructions see HW4 manual **E-M-HW4v3-A2-001**

## **5.5 Cleaning or replacing the probe dust filter**

See document **E-M-HC2 Probes-V1**

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## 6 Firmware updates

Firmware updates will be available on the ROTRONIC website for downloading. Firmware files are given a name that shows both to which device the file applies and the version number of the firmware. All firmware files have the extension HEX.

**NOTE:** the PCB of the HP22 has been modified at the same time as firmware version 2.0 was released. Instruments with the previous PCB can be updated from firmware version 1.x to firmware version 2.x. but the HOLD function will not work.

Procedure for updating the firmware:

- Use cable AC3006 to connect the service connector of the HP22 to a USB port of a PC with the ROTRONIC HW4 software installed. Note that the ROTRONIC USB driver must be installed on the PC as explained in the HW4 manual **E-M-HW4v3-Main**.
- Copy the firmware update file from the ROTRONIC website to the PC.
- Start HW4 software on the PC and search for the HP22 (HW4 Main Menu Bar > Devices and Groups > Search for USB Masters).
- After finding the HP22, expand the device tree to see the HP22 functions. Select Device Manager. In the Device Manager menu bar select Tools > Firmware Update. For instructions see document **E-M-HW4v3-F2-006**

## 7 Technical data

### 7.1 Specifications

General	HP22
Device type	Humidity-temperature hand-held indicator with one probe input (HygroClip 2)
Battery type	9 V alkaline
Low battery indication	Yes

Humidity and temperature measurement
See document <b>E-M-HC2 Probes</b> > Specifications

Calculated parameters	HP22
Psychrometric calculations	Dew point (Dp) above and below freezing Frost point (Fp) below freezing and dew point above freezing 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)

Start-up time and data refresh rate	HP22
Start-up time	3 s (typical)
Data refresh rate	1 s (typical)



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<b>Service connector</b>	<b>HP22</b>
Interface type	UART (Universal Asynchronous Receiver Transmitter)
Maximum service cable length	5 m (16.4 ft)

<b>General specifications</b>	<b>HP22</b>
Display	LC, 1 or 2 decimals resolution, backlight, trend, alarm and low battery indication
Probe material	Polycarbonate
Probe dust filter material	Polyethylene
Housing material	ABS
Housing protection grade	IP 40
Overall dimensions	270 x 70 x 30 mm (10.63 x 2.76 x 1.17")
Probe dimensions	80 x 15 mm (3.15 x 0.59")
Weight	About 198 g (7.0 oz)

<b>Conformity with standards</b>	<b>HP22</b>
CE / EMC immunity	EMC Directive 2004/108/EG: EN 61000-6-1: 2001, EN 61000-6-2: 2005 EN 61000-6-3: 2005, EN 61000-6-4: 2001 + A11
Solder type	Lead free (RoHS directive)
FDA / GAMP directives	compatible

<b>Environmental limits</b>	<b>HP22</b>
Storage and transit	-20...+70 °C / 0...100 %RH, non condensing
Operating limits at electronics	-10...60 °C (limited by LC display) 0...100 %RH, non condensing
Temperature limits at probe	Depends on probe model
Maximum humidity at probe	100 %RH up to 80 °C (176 °F) 75 %RH at 100 °C (212 °F) 45 %RH at 125 °C (260 °F) 15 %RH at 150 °C (302 °F)
Maximum air velocity at probe	20 m/s (3,935 ft /min)
Critical environments	Humidity sensor: as per DV04-14.0803.02 - Critical chemicals

## 7.2 Dew point accuracy

See document **E-M-HC2 Probes > Dew point accuracy**

## 8 Accessories

For accessories and parts such as the HW4 configuration software, service cables, calibration accessories and spare dust filters, please see document **E-M-HC2-accessories**

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## 9 Supporting documents

Document File Name	Contents
<b>E-M-HC2 Probes-V1</b>	HygroClip 2 (HC2) Humidity Temperature Probes, User Guide
<b>E-M-HC2-accessories</b>	Accessories and parts for probes, indicators and transmitters
<b>E-T-AC3000-DF-V1</b>	AirChip 3000 Description and Main Functions
<b>E-M-HW4v3-DIR</b>	List of the HW4 manuals
<b>E-M-HW4v3-Main</b>	HW4 software version 3: General instructions and functions common to all devices
<b>E-M-HW4v3-F2-006</b>	HW4 software version 3: Device Manager – HP22 hand-held indicator
<b>E-M-HW4v3-F2-001</b>	HW4 software version 3: Device Manager – HC2 probe series
<b>E-M-HW4v3-A2-001</b>	HW4 software version 3: Probe Adjustment function AirChip 3000 devices
<b>E-M-HW4v3-DR-001</b>	HW4 software version 3: Data Recording Function AirChip 3000 Devices
<b>E-M-AC3000-CP</b>	AirChip 3000 Communication Protocol
<b>E-M-CalBasics</b>	Temperature and humidity calibration basics Instructions for using the ROTRONIC humidity standards
<b>E-T-HumiDefs</b>	Humidity Definitions

Note: All document file names have an extension corresponding to the document release number. This extension is not shown in the above table.

## 10 Document releases

Doc. Release	Date	Notes
_10	Feb. 11, 2010	Original release
_11	Jun. 20, 2010	Updated document to HW4 v.3
_12	Jan. 25, 2012	Minor editorial corrections
_13	Nov. 16, 2012	Added Auto Power Off



<b>HygroClip2 ADVANCED</b>	<b>rotronic</b>
E-M-HC2A-V1_2.docx	<b>Manual</b>

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## **Applicability:**

This manual applies to all HC2A probes with firmware version 1.x. Changes to the last digit of the version number reflect minor firmware changes that do not affect the manner in which the probe should be operated.

## **1 Overview**

The HC2A series are digital humidity-temperature probes based on the AirChip3000 technology. These probes feature a UART serial interface and two 0...1 V linear analog output signals.

The HC2A probes are designed for use with the HygroClip2 generation of ROTRONIC humidity-temperature instruments: transmitters, data loggers, hand-helds, etc.

The HC2A probes can also be used as a stand-alone device using either the analog output signals or the probe digital interface. Connectors, cables and digital interface adapters are available to this purpose. Digital integration with OEM applications is facilitated by the probe communication protocol options.

The HC2A probes offer the following user functions:

- User configurable settings
- Calculation of the dew or frost point
- Humidity temperature calibration and adjustment
- Simulator mode
- Data recording

The ability for the user to easily update the AirChip3000 firmware means that the HC2A probes can be kept up-to-date regarding any future functionality improvement.

Available in different configurations, the HC2A probe series is designed to meet the requirements of a large number of applications and environments.

### **1.1 *Hardware and software compatibility***

The HC2A probes are compatible only with the AirChip3000 generation of ROTRONIC humidity-temperature instruments.

Configuration of the HC2A probes and access to the probe functions requires a PC with the ROTRONIC HW4 software version 3.7 or higher or connection to a compatible instrument from ROTRONIC.



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## 2 Models

In the following tables, we have indicated the type of instrument primarily used with each probe model. The following should also be noted:

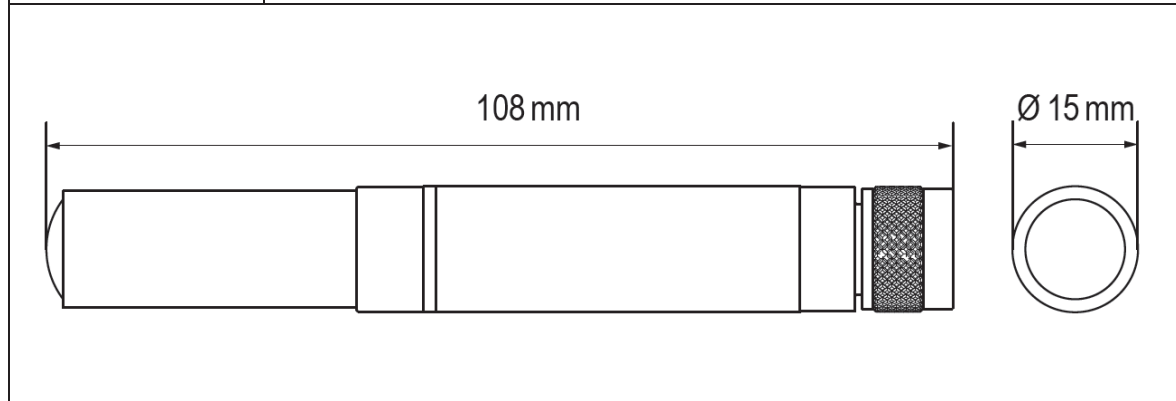
- The HC2A probes can be directly connected to a PC or to an Ethernet network using one of the available digital interface adapters (see separate document **E-M-HC2-accessories**).
- The HC2A Probes can also be used as a standalone device with two analog output signals. Different connectors are available to this purpose (see separate document **E-M-HC2-accessories**).

Regardless of the probe model, the analog outputs signals are always scaled in the same way by the factory (0...1 V = 0...100 %RH and 0...1 V = -40...60 °C). The user is responsible for reconfiguring the probe analog outputs (requires the ROTRONIC HW4 software) and for providing power to the probe.

**Climate measurement**

*For use with indicators, data loggers and transmitters, with or without an extension cable*

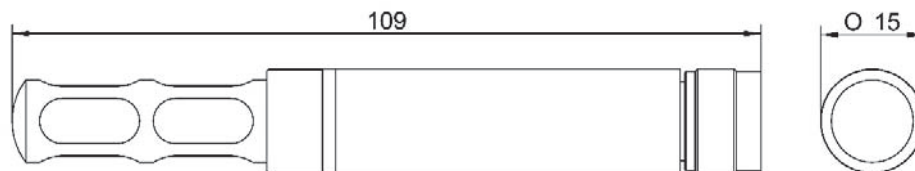
HC2A-S	Accuracy: $\pm 0.8\%RH, \pm 0.1\text{ K at } 10...30\text{ }^\circ\text{C}$ Humidity measuring range: 0...100 %RH Temperature limits: -50...100 °C (-58...212 °F) Diameter: 15 mm (0.6") Length: 108 mm (3.3") Housing material: Polycarbonate, black Standard dust filter: Polyethylene, 40 µm Sensor: HYGROMER® HT-1 Weight: 17 g (0.6 oz)
HC2A-S3	Accuracy: $\pm 0.8\%RH, \pm 0.1\text{ K at } 10...30\text{ }^\circ\text{C}$ Humidity measuring range: 0...100 %RH Temperature limits: -50...100 °C (-58...212 °F) Diameter: 15 mm (0.6") Length: 108 mm (3.3") Housing material: Polycarbonate, white Standard dust filter: Polyethylene, 40 µm Sensor: HYGROMER® HT-1 Weight: 17 g (0.6 oz)
HC2A-S-HH	Accuracy: $\pm 0.8\%RH, \pm 0.1\text{ K at } 10...30\text{ }^\circ\text{C}$ Humidity measuring range: 0...100 %RH Temperature limits: -50...100 °C (-58...212 °F) Diameter: 15 mm (0.6") Length: 108 mm (3.3") Housing material: Polycarbonate, black Standard dust filter: None Sensor: HYGROMER® HH-1 Weight: 17 g (0.6 oz)



**Climate measurement**

*For use with indicators, data loggers and transmitters, with or without an extension cable*

HC2A-SM	Accuracy: $\pm 0.8\%RH, \pm 0.1\text{ K}$ at 10...30 °C Humidity measuring range: 0...100 %RH Temperature limits: -50...100 °C (-58...212 °F) Diameter: 15 mm (0.6") Length: 108 mm (3.3") Housing material: Stainless steel, DIN 1.4301 Standard dust filter: Wiremesh filter, 10 $\mu\text{m}$ , DIN 1.4401 Sensor: HYGROMER® HT-1 Weight: 50 g (1.76 oz)
---------	---









<p>HC2A-IC702 HC2A-IC705</p>	<p>Accuracy: <math>\pm 0.8\%RH, \pm 0.1\text{ K at } 10...30\text{ }^\circ\text{C}</math></p> <p>Humidity measuring range: 0...100 %RH</p> <p>Temperature limits at sensor: <math>-100...190\text{ }^\circ\text{C} / 200\text{ }^\circ\text{C}_3 (-148...374 / 392\text{ }^\circ\text{F})</math></p> <p>Diameter barrel: 15 mm (0.6")</p> <p>Length (probe head): 744 mm (29.3")</p> <p>Cable length: 2 m (6.5 ft) 5 m (16.4 ft)</p> <p>Housing material: PEEK</p> <p>Standard filter: None, must be ordered separately</p> <p>Sensor: HYGROMER® HT-1</p> <p>Weight: 350 g / 12.3 oz, 2 m cable 590 g / 20.8 oz, 5 m cable</p>

3 The peak load at 200 °C is 100 h. See the sensor data sheet for detailed information on the pollution loads for the sensor.





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HC2A-IC702-HH HC2A-IC705-HH	<p>Accuracy: <math>\pm 1.2\% \text{RH}</math>, <math>\pm 0.1 \text{ K}</math> at <math>10 \dots 30 \text{ }^\circ\text{C}</math></p> <p>Humidity measuring range: <math>0 \dots 100\% \text{RH}</math></p> <p>Temperature limits at sensor: <math>-50 \dots 120 \text{ }^\circ\text{C}</math> (<math>-148 \dots 392 \text{ }^\circ\text{F}</math>)</p> <p>Diameter barrel: <math>15 \text{ mm}</math> (<math>0.6 \text{ }''</math>)</p> <p>Length (probe head): <math>744 \text{ mm}</math> (<math>29.3 \text{ }''</math>)</p> <p>Cable length: <math>2 \text{ m}</math> (<math>6.5 \text{ ft}</math>) <math>5 \text{ m}</math> (<math>16.4 \text{ ft}</math>)</p> <p>Housing material: PEEK</p> <p>Standard filter: None, must be ordered separately</p> <p>Sensor: HYGROMER® HH-1</p> <p>Weight: <math>350 \text{ g}</math> / <math>12.3 \text{ oz}</math>, <math>2 \text{ m}</math> cable <math>590 \text{ g}</math> / <math>20.8 \text{ oz}</math>, <math>5 \text{ m}</math> cable</p>
<p>The drawing shows two views of the probe. The top view shows the full length of the probe with a cable. The bottom view shows a close-up of the probe head with a diameter of 15 mm and a length of 111 mm. The total length of the probe is indicated as 144 / 294 / 444 / 594 / 744 mm, corresponding to the different cable lengths listed in the table.</p>	

Process measurement	
<i>For use with transmitters and data loggers</i>	
HC2A-IC302-A HC2A-IC305-A	Accuracy: $\pm 0.8\%RH, \pm 0.1\text{ K}$ at 10...30 °C Humidity measuring range: 0...100 %RH Temperature limits at sensor: -100...190 °C / 200 °C <sup>4</sup> (-148...374 / 392 °F) Diameter barrel: 25 / 15 mm (1.0 / 0.6") Length (probe head): 278 mm (10.9") Cable length: 2 m (6.5 ft) 5 m (16.4 ft) Housing material: PEEK Standard filter: None, must be ordered separately Sensor: HYGROMER® HT-1 Weight: 290 g / 10.2 oz, 2 m cable 530 g / 18.7 oz, 5 m cable
HC2A-IC402-A HC2A-IC405-A	Accuracy: $\pm 0.8\%RH, \pm 0.1\text{ K}$ at 10...30 °C Humidity measuring range: 0...100 %RH Temperature limits at sensor: -100...190 °C / 200 °C <sup>4</sup> (-148...374 / 392 °F) Diameter barrel: 25 / 15 mm (1.0 / 0.6") Length (probe head): 428 mm (16.9") Cable length: 2 m (6.5 ft) 5 m (16.4 ft) Housing material: PEEK Standard filter: None, must be ordered separately Sensor: HYGROMER® HT-1 Weight: 320 g / 11.3 oz, 2 m cable 560 g / 19.8 oz, 5 m cable

<sup>4</sup> The peak load at 200 °C is 100 h. See the sensor data sheet for detailed information on the pollution loads for the sensor.





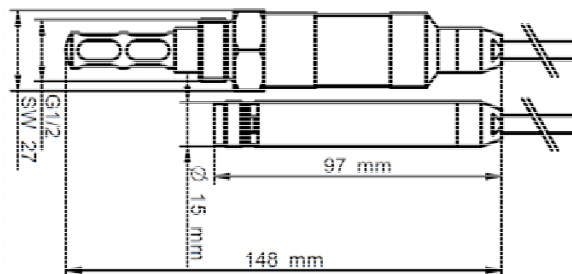




**Measurement in compressed air conduits and vessels**

**For use with transmitters and data loggers**

<p>HC2A-IE102-M HC2A-IE105-M</p>	<p>Accuracy: <math>\pm 0.8\%RH, \pm 0.1\text{ K}</math> at 10...30 °C                  Humidity measuring range: 0...100 %RH                  Temperature limits at sensor: -100...190 °C / 200 °C<sup>10 11</sup> (-148...374 / 392 °F)                  Thread: G1/2"                  Recommended torque: 70 Nm                  Pressure resistant: 100 bar / 1450 PSI                  Length (probe head): 148 mm (5.8")                  Cable length: 2 m (6.5 ft) / 5 m (16.4 ft)                  Housing material: Stainless steel, DIN 1.4301                  Standard filter: None, must be ordered separately                  Sensor: HYGROMER® HT-1                  Weight: 290 g / 10.2 oz, 2 m cable                  660 g / 23.2 oz, 5 m cable</p>
<p>HC2A-IE302-M HC2A-IE305-M</p>	<p>Accuracy: <math>\pm 0.8\%RH, \pm 0.1\text{ K}</math> at 10...30 °C                  Humidity measuring range: 0...100 %RH                  Temperature limits at sensor: -100...190 °C / 200 °C<sup>10 11</sup> (-148...374 / 392 °F)                  Thread: NPT 1/2"                  Recommended torque: 70 Nm                  Pressure resistant: 100 bar / 1450 PSI                  Length (probe head): 148 mm (5.8")                  Cable length: 2 m (6.5 ft) / 5 m (16.4 ft)                  Housing material: Stainless steel, DIN 1.4301                  Standard filter: None, must be ordered separately                  Sensor: HYGROMER® HT-1                  Weight: 290 g / 10.2 oz, 2 m cable                  660 g / 23.2 oz, 5 m cable</p>



<sup>10</sup> The peak load at 200 °C is 100 h. See the sensor data sheet for detailed information on the pollution loads for the sensor.

<sup>11</sup> The sealing ring withstands only -40...85°C

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### 3 General description

#### 3.1 Power supply

When a voltage source of 3.3...5 VDC is not available, the probe should be used together with a voltage adapter (see separate document **E-M-HC2-accessories**) so as to provide 3.3...5 VDC to the probe. Use of a voltage adapter allows powering the probe from a voltage source of 5 to 24 VDC or 5 to 16 VAC.

The HC2A probes are polarity protected by a keyed connector. There is no electrical polarity protection.

#### 3.2 Measured parameters

The HC2A probe measures relative humidity with a ROTRONIC HYGROMER® HT-1 capacitive sensor and temperature with a Pt100 RTD.

#### 3.3 Calculated parameters

Using the ROTRONIC HW4 software, the HC2A probe can be configured by the user to calculate either the dew point or the frost point.

#### 3.4 Analog output signals

The HC2A probe features two 0...1 V linear analog output signals. The default factory settings are as follows:

Output 1: 0...1 V (humidity) = 0...100 %RH

Output 2: 0...1 V (temperature) = -40...60°C

Using the ROTRONIC HW4 software any output signal can be made to correspond one of the following:

- Relative humidity
- Temperature
- Dew or frost point

The scale of each analog output can be set within the numerical limits of -999.99 and 9999.99. If so desired, any output can also be disabled (no signal).

The D/A converters used to generate the analog output signals feature a 16-bit resolution. The 0...1 V analog output signals exhibit a small positive offset of 10 mV or less at 0 V.

Minimum load requirements apply to the external device or circuit connected to the probe voltage outputs. These requirements are defined in the "Operation" chapter.

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### 3.5 *Digital interface*

The HC2A probe features a UART interface (Universal Asynchronous Receiver Transmitter) that allows two-way communication with the probe. For connecting the HC2A probe to a PC, use a digital adapter cable AC3001 (see document **E-M-HC2-accessories**). The probe can also be indirectly connected to a PC using an instrument from the ROTRONIC program.

The ROTRONIC HW4 software (version 3.7.0 or higher) allows full access to the following:

- Measurement data (humidity and temperature) and calculated parameter (dew or frost point)
- Probe information: name, RS-485 address, humidity sensor status, etc.
- Probe alarm functions
- Probe data logging function
- Probe calibration and probe adjustment functions
- Probe configuration
- Firmware update of HygroClip2 probes

### 3.6 *Communication protocol*

The probe measurement data can be read without having to use the ROTRONIC HW4 software. The HC2A probe offers the following communication protocol options (ASCII) which can be selected by connecting the probe to a PC running the ROTRONIC HW4 software:

- **RO-ASCII:** this is the standard (default) communication protocol used by all AirChip 3000 devices and by the HW4 software. In principle, this protocol supports all of the AirChip 3000 functions but some of the functions require a certain amount of computations to be carried out by an external device such as a PC.
- **Custom:** this communication protocol can be used to provide compatibility of the HC2A probe with an existing communication system. The Custom communication protocol is limited to reading measurement data from the HC2A probe. Functions such as device configuration, humidity and temperature adjustment, etc. are not supported. The Custom protocol is applicable to all AirChip 3000 devices with a digital interface and allows RS-485 networking
- **I2C:** The I2C protocol available with the HC2A probe does not allow the networking of devices and is limited to a one way communication where the HC2A probe automatically sends data during each refresh interval to an external device with I2C input.

When using either the RO-ASCII or the Custom protocol, the HC2A probe can be set to send data automatically after each refresh cycle without requiring a data request. When this mode is enabled, the receiving device must be listening at all times in order to get the measurement data.

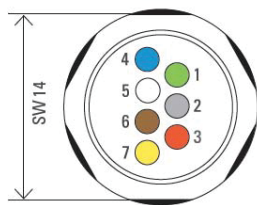
For details, see document **E-M-AC3000-CP**

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### 3.7 Connector

All standard probe models of the HC2A series use the same keyed connector (male). The connector is located either directly on the probe body or at the end of a cable. The probe connector is secured to the matching female connector with a threaded collar.

#### Pin-out diagram (7-pin male – looking at probe)



- 1 ● V+
- 2 ● GND (digital and supply)
- 3 ● RXD (UART)
- 4 ● TXD (UART)
- 5 ○ Analog signal humidity (0...100%RH = 0...1 V)
- 6 ● Analog signal °C (-40...60 °C = 0...1 V)
- 7 ● AGND (analog ground)

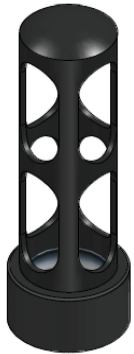
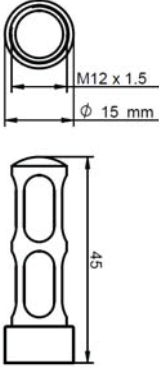
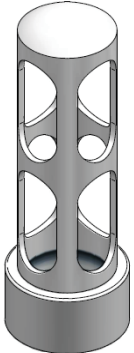
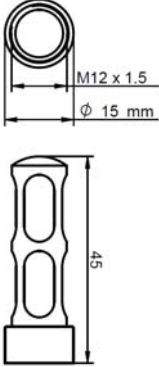
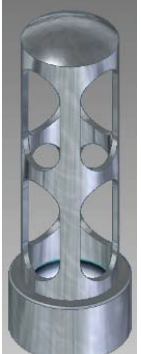
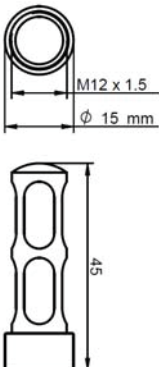
### 3.8 Filter and probes overview matrix






		Probes																	
		-50...100°C						-40...85°C		-100...200°C				-50...120°C					
temperature range		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-IIMxxx	HC2A-IExxx	HC2A-ICxxx-HH	
Carrier	-50...100°C	SPA-PCB			X							X							
		SPA-PCW			X							X							
	-100...200°C	SPA-SS			X				X			X		X				X	
Filter&Carrier	-50...100°C	SPA-PCB-PE			X							X							
		SPA-PCB-PTFE			X							X							
		SPA-PCB-WM			X							X							
		SPA-PCW-PE			X							X							
		SPA-PCW-PTFE			X							X							
		SPA-PCW-WM			X							X							
		SPA-SS-PE			X					X		X							
		SPA-PE			X					X		X							
	-100...200°C	SPA-SS-PTFE			X					X		X			X				X
		SPA-SS-WM			X					X		X			X				X
		SPA-SSS			X					X		X			X				X
		SPA-WM			X					X		X			X				X
SPA-PTFE				X					X		X			X				X	

Attention! The area of application depends on the component with the most restricted temperature range.

**3.9 Sensor protection (dust filter)**

Most probes of the HC2A series are supplied with a filter to protect the sensors against dust particles and high air velocity. Following filters and carriers are available:

Filter carrier				
Order code	Picture	Drawing	Material	Temperature range
SPA-PCB			Polycarbonate, black	-50...100 °C (-58...212 °F)
SPA-PCW			Polycarbonate, white	-50...100 °C (-58...212 °F)
SPA-SS			Stainless steel, 1.4301	-100...200 °C (-148...392 °F)

	Carrier only	Wire mesh filter	PE filter	PTFE filter	Stainless steel
<b>Filter</b>					
<b>Material</b>	PC / 1.4301	1.4401	Polyethylene	PTFE	1.4404
<b>Pore size</b>	-	10 µm	40-50 µm	10 µm	25 µm
<b>Temperature range</b>	-50...100 °C	-100...200 °C (-148...392 °F)	-50...100 °C (-58...212 °F)	-80...200 °C (-112...392 °F)	-100...200 °C (-148...392 °F)
<b>Response time %RH<sub>12</sub></b>	12 s	12 s	15 s	18 s	15 s
<b>Response time °C<sub>13</sub></b>	80 s	180 s	180 s	170 s	-
<b>Response time °C<sub>14</sub></b>	120 s	190 s	210 s	210 s	200 s
<b>Waterproof</b> (dipping 50mm)	No	No	Yes	Yes	No
<b>Max. wind speed</b>	5 m/s	50 m/s	50 m/s	50 m/s	70 m/s
<b>Suitable for fine dust</b>	No	No	>10 µm	Yes	No
<b>General information</b>	Fast response time	High temperature, fast response time, fast drying, mechanically robust	Standard filter	High chemical resistance, fine dust resistant, high temperature	High wind speed, abrasive environment, high mechanical protection
<b>Application</b>	Sterilization, H <sub>2</sub> O <sub>2</sub> , handheld devices	Meteo, agriculture, climatic chambers, storage rooms, cheese cellar	HVAC, office, storage rooms, laboratory, clean rooms	Cleanrooms, medical, injection chamber, meal manufacturing	HVAC with high wind speed, industrial applications

<sup>12</sup> T63: 100 %RH → 30 %RH

<sup>13</sup> PC carrier: 70 °C → 23 °C

<sup>14</sup> Stainless steel carrier: 70 °C → 23 °C



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## 4 User configurable settings and functions

The HC2A probe ships configured as per the factory defaults:

- Users who intend to use the probe as a stand-alone analog device can use the probe as any conventional humidity and temperature probe. A connecting cable with active electronics may be required to power the probe. Most such users will never have to use the probe configurable settings and functions.
- Users who purchased a probe for use with another ROTRONIC instrument can also use the probe right away and do not necessarily have to use the probe configurable settings and functions
- Users that intend to use the probe as a stand-alone digital device typically need to use a connecting cable with active electronics and generally need to configure either the probe or the PC

Making use of the probe configurable settings and functions is entirely up to the user and the appropriate settings depend on the user application. We have provided below a short description of the probe functions and also indicated the factory default settings.

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#### 4.1 *Function overview*

<b>MEASUREMENT ACCURACY AND RELIABILITY</b>	
<b>AirChip3000 Functions</b>	<b>Description</b>
▶ Humidity / temperature adjustment	<ul style="list-style-type: none"> <li>○ 1-point or multi-point humidity calibration or adjustment</li> <li>○ 1-point or 2-point temperature calibration or adjustment</li> <li>○ Generate a time stamp for calibrations and adjustments</li> <li>○ Retain and view last adjustment date and adjustment values</li> <li>○ Generate calibration and adjustment protocols</li> </ul>
▶ Data recording	<p>The data recording function differs from a true data logging function in the sense that the AirChip3000 does not time stamp the data. This data recording function can be used to investigate events such as a sensor malfunction as well as to retrieve data that would otherwise be lost.</p> <ul style="list-style-type: none"> <li>○ Start or stop data recording - up to 2000 value pairs (%RH and temperature). Starting a recording session erases all previously recorded data.</li> <li>○ The recording mode and log interval can be specified.</li> <li>○ When the probe is powered off, the recording session is paused but not ended. As long as the recording session has not been ended, the probe automatically resumes recording data when powered up again.</li> <li>○ The recorded data can be downloaded to a PC with the HW4 software, time stamped and viewed.</li> </ul>

<b>MEASUREMENT LOOP VALIDATION</b>	
<b>AirChip3000 Functions</b>	<b>Description</b>
▶ Simulator mode	Used to make the probe generate fixed values for the humidity, temperature and calculated parameter. Can be configured, enabled or disabled.

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<b>SAFEGUARDS</b>	
<b>AirChip3000 Functions</b>	<b>Description</b>
▶ Device write protection	Used to protect the probe with a password to prevent unauthorized digital access by a digital user. Can be configured, enabled or disabled

<b>PROCESS PROTECTION / PROTECTION OF OTHER DEVICES</b>	
<b>AirChip3000 Functions</b>	<b>Description</b>
▶ Out-of-limit value alarm	Used to specify the normal range for humidity, temperature and the calculated parameter depending on the user application. Can be configured, enabled or disabled. Out-of-limit values trigger a digital alarm
▶ Bad sensor alarm	Built-in function. Cannot be disabled A bad humidity or temperature sensor triggers a digital alarm
▶ Fail safe mode	Used to specify a "safe" fixed value for humidity and for temperature in the event of a sensor failure. Can be configured, enabled or disabled

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## 4.2 Factory default settings

Configurable Settings	Factory default
Unit system (Metric or English)	Metric
Psychrometric calculation	None
Output 1 parameter, scale and unit	Humidity: 0...100%RH
Output 2 parameter, scale and unit	Temperature: -40...60 °C
Communication protocol	RO-ASCII
RS-485 address	0
Device name	HC2A

Functions	Factory default
Humidity / temperature adjustment	Enabling / Disabling only by HW4 user rights possible
Device write protection	Disabled
Out-of-limit value digital alarm	Disabled
Data recording	Disabled
Fail safe mode	Disabled
Simulator mode	Disabled

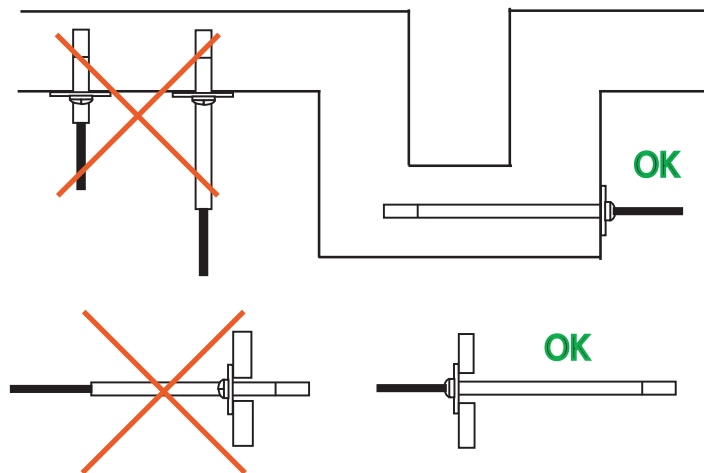
For a detailed description of all AirChip3000 / probe main functions see document **E-T-AC3000-DF-V1**. Instructions regarding the configuration of the probe and access to its functions are provided in the following manuals:

- **E-M-HW4v3-Main**
- **E-M-HW4v3-F2-001**
- **E-M-HW4v3-DR-001**
- **E-M-HW4v3-A2-001**
- **E-M-AC3000-CP**

## 5 Mechanical installation

For best results, please observe the following guidelines:

- Install the probe at a location where humidity, temperature and pressure conditions are representative of the environment or process to be measured. Avoid the following: (a) Close proximity of the probe to a heating element, a cooling coil, a cold or hot wall, direct exposure to sun rays, etc. (b) Close proximity of the probe to a steam injector, humidifier, direct exposure to precipitation, etc. (c) Unstable pressure conditions resulting from excessive air turbulence.
- When installing the probe on a wall, do not place the probe right above a heat producing device of instrument such as a transmitter or an Ethernet adapter (warm air tends to rise).
- If possible, choose a location that provides good air movement at the probe: air velocity of at least 1 meter/second (200 ft/ minute) facilitates adaptation of the probe to changing temperature.
- When installing the probe through a wall, immerse as much of the probe as possible in the environment to be measured.



Position the probe so as to prevent the accumulation of condensation water at the level of the sensor leads. Install the probe so that the probe tip is looking downward. If this is not possible, install the probe horizontally.

Depending on the probe model, a probe holder (mounting flange with a compression fitting) can facilitate installation through a wall.

Future maintenance can be made easier by providing next to the probe a calibration access orifice. During maintenance, this permits the insertion of a reference probe (calibrator). The calibration access orifice should have the same size as the orifice used to install the probe and can be equipped with a probe holder.

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## 6 Electrical installation

This section describes the general safety precautions for electric wiring.

### 6.1 General connection information

Heavy machinery and instrumentation should not share the same power supply wiring. If this cannot be avoided, noise filters and surge protectors should be used. Most UPS devices have those features already integrated.

### 6.2 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.

Whenever the level of electromagnetic interference is expected to be high, both the instruments 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:

<ul style="list-style-type: none"> <li>○ Bus signals such as RS485</li> <li>○ Data signals for PCs, printers etc.</li> <li>○ shielded analog inputs</li> <li>○ unshielded direct current (<math>\leq 60V</math>)</li> <li>○ shielded process signals (<math>\leq 25V</math>)</li> <li>○ unshielded alternate current (<math>\leq 25V</math>)</li> <li>○ coaxial cables for CRT monitors</li> </ul>	in common bundles or channels / conduits
<ul style="list-style-type: none"> <li>○ direct current from 60 V to 400 V (unshielded)</li> <li>○ alternate current from 25V to 400 V (unshielded)</li> </ul>	in separated bundles or channels / conduits, without minimum distance
<ul style="list-style-type: none"> <li>○ direct and alternate current <math>&gt; 400V</math> (unshielded)</li> <li>○ Telephone lines</li> <li>○ lines leading into EX-rated areas</li> </ul>	in separated bundles or channels / conduits, without minimum distance

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### **6.3 Analog signal wiring**

Preferably use a shielded cable to connect the analog outputs of the HC2A to other devices. The maximum cable length is determined by the maximum error that the user will accept. This can be calculated as follows:

**Error (V) = cable resistance x current through load**

### **6.4 Digital signal wiring**

Use one of the available connecting cables (see Accessories) to connect the UART digital interface of the HC2A probe to other devices. Without a signal booster, the maximum cable length should not exceed 5 m (16 ft).

### **6.5 Grounding**

In the case of a fixed installation, ground the HC2A probe, especially if the electronics will be subjected to a low humidity environment (35 %RH or less). The power supply and digital ground (GND) and the analog ground (AGND) should be tied separately to a proper ground so as to avoid spikes in the analog signals.

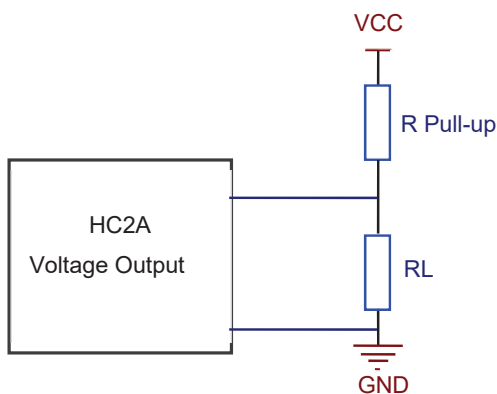


## 7 Operation

The HC2A probes are compatible with a large number of indicators, data loggers and transmitters from ROTRONIC. Operating instructions are provided in each device manual. The HC2A probes can also be used as a conventional analog probe. See Accessories, supply voltage adapters, connectors and cables. Use the HW4 software to configure the probe as desired, complete the mechanical and electrical installation and power up the probe.

### 7.1 Minimum load requirements for the probe voltage outputs

In the situation where the external device uses an internal pull-up resistor the value of this resistor should meet the requirements shown below. It is also necessary to add a pull-down resistor  $R_L$  connected to ground in order to be able to read 100% of the range of the probe voltage output.



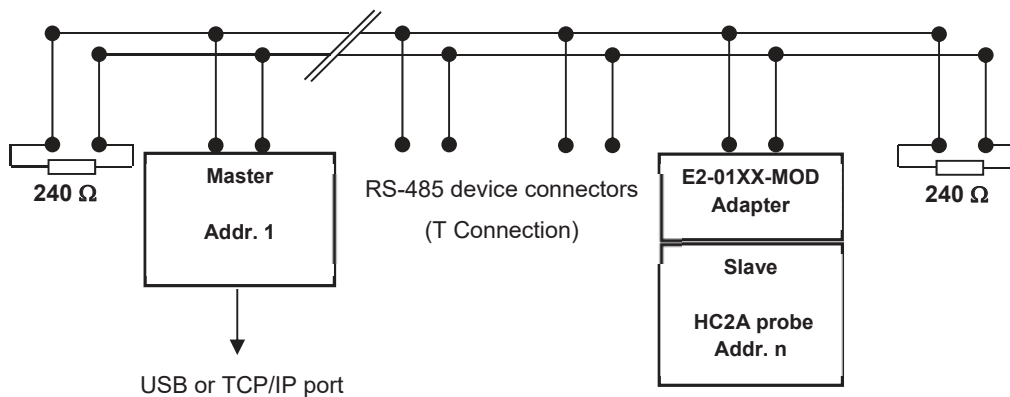
HC2A signal	VCC	R pull-up	RL
0...1V	3.3V	≥250 kOhm	1 kOhm
0...1V	5.0V	≥400 kOhm	1 kOhm
0...1V	10.0V	≥1 MOhm	1 kOhm

## 7.2 Connectivity examples for stand-alone probes

### Stand-alone operation as a digital probe (PC or network)

The HC2A probes can be connected to a PC or to an Ethernet network with one of the available digital interface adapters (see Accessories). Probe configuration and full access to all probe functions requires a PC with the ROTRONIC HW4 software installed. When using the standard RO-ASCII protocol, access to some of the probe functions is also possible without HW4. For details, see document **E-M-AC3000-CP**.

### Digital connection example: RS-485 network

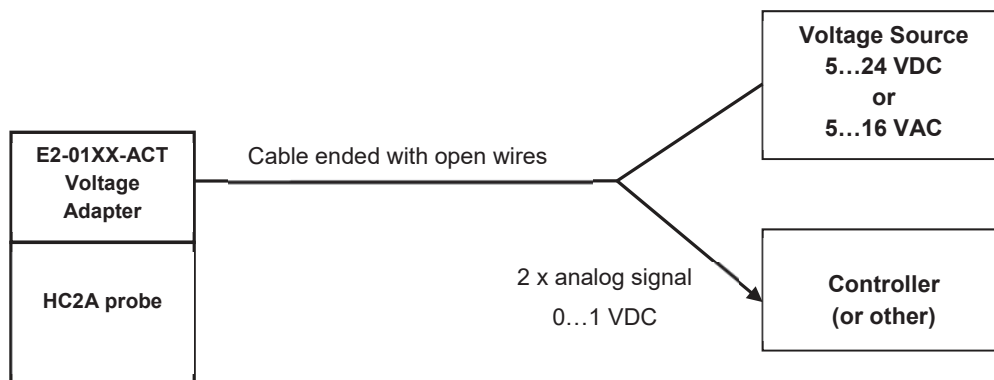


#### Note:

- The master device can be either a transmitter such as the HF5 (USB or TCP/IP interface) or an adapter such as the AC3010 cable (USB)
- Power to the combination E2-01XX-MOD and HC2A probe can be provided by an individual AC adapter or by a central voltage source connected to the RS-485 network (requires cables with 2 twisted pairs: one for the data, the other for power)

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Analog connection example:



### 7.3 Hand-held probes used with an indicator

The most common source of error when measuring relative humidity with a hand-held probe is a difference between the temperature of the probe and the temperature of the environment. At a humidity condition of 50 %RH, a temperature difference of 1°C (1.8 °F) typically results in an error of 3 %RH on relative humidity.

When using a humidity probe with a portable indicator, it is good practice to monitor the display for temperature stability. When moving the probe from one area to another, the probe should be given sufficient time to equilibrate with the environment to be measured. This time can be shortened, and errors avoided, by using the probe configuration that fits best for your application.

In extreme situations, condensation may occur on the sensors when the probe is colder than the environment. As long as the humidity / temperature limits of the humidity sensor are not exceeded, condensation does not alter the calibration of the sensor. However, the sensor has to dry out before it can provide a valid measurement.

Non-moving air is an excellent insulator. When there is no air movement, surprising differences in temperature and humidity can be noted over short distances. Air movement at the probe generally results in measurements that are both faster and more accurate.

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## 8 Maintenance

### 8.1 *Cleaning or replacing the dust filter*

Depending on the conditions of measurement, the filter should be checked from time to time. Corroded, discolored or clogged filters should be replaced.

### 8.2 *Periodic calibration check*

Both the Pt 100 RTD temperature sensor and associated electronics are very stable and should not require any calibration after the initial factory adjustment.

Long term stability of the ROTRONIC HYGROMER® humidity sensor is typically better than 1 %RH per year. For maximum accuracy, calibration of the probe should be verified every 6 to 12 months. Applications where the probe is exposed to contaminants may require more frequent verifications. Calibration and adjustment of the HC2A probe can be done with either a PC with the HW4 software installed or with the HP23 hand-held calibrator. For connecting the HC2A probe to a PC, use a digital adapter cable AC3001 (see document **E-M-HC2-accessories**).

Procedure for adjusting the HC2A probe with the ROTRONIC HW4 software:

- Connect the HC2A probe to the HW4 PC as explained in the HW4 manual **E-M-HW4v3-Main**
- Start HW4 software on the PC and search for the HC2A probe.
- After finding the HC2A probe with HW4, expand the device tree to see the HC2A probe functions and select **Probe Adjustment**.
- For further instructions see HW4 manual **E-M-HW4v3-A2-001**

### 8.3 *Validation of the output signals transmission*

If so desired, transmission of the HC2A probe output signals can be validated by using the probe simulator function. The HW4 software is required to enable and configure this function. When the function is enabled the probe generates digital and analog signals corresponding to values specified by the user.

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## 9 Firmware updates

Firmware updates will be available on the ROTRONIC website for downloading. For connecting the HC2A probe to a PC, use a digital adapter cable AC3001 (see document **E-M-HC2-accessories**).

Procedure for updating the firmware:

- Connect the HC2A probe to the HW4 PC as explained in the HW4 manual **E-M-HW4v3-Main**
- Copy the firmware update file from the ROTRONIC website to the PC.
- Start HW4 software on the PC and search for the HC2A probe.
- After finding the HC2A probe, expand the device tree to see the HC2A probe functions. Select Device Manager. In the Device Manager menu bar select Tools > Firmware Update. For instructions see document **E-M-HW4v3-F2-001**.

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## 10 Technical data

General	
Device type	Humidity temperature probe
Mechanical configuration	See models
IP protection class	IP65

Power supply and connections	
Supply voltage (VDD)	3.3...5 VDC $\pm$ 0%
Nominal current consumption	<4.5 mA
Maximum start-up current unlimited	<50mA during 2 $\mu$ s
Minimum start-up current	8 mA during 2ms and 5 mA during 2s
Maximum current spike during operation	1 mA during maximum 2 $\mu$ s
Polarity protection	Mechanical only (keyed connector)

Humidity measurement	
Sensor	ROTRONIC HYGROMER® HT-1
Measuring range	0...100 %RH
Measurement accuracy	$\pm$ 0.8 %RH, at 10...30 °C (HC2A-S(3), HC2A-IC, HC2A-IM, HC2A-IE) $\pm$ 0.5 %RH, at 10...30 °C / 10..90 %RH (HC2A-S(3)H)
Repeatability	0.3 %RH
Long term stability	<1 %RH / year
Sensor time constant	Typical 10 sec, 63% of a 35 to 80 %RH step change (1m/sec air flow at sensor)

Temperature measurement	
Sensor	Pt100 RTD, IEC 751 1/3 class B
Measuring range	-100...190 / 200 °C <sup>15</sup> (see also environmental limits)
Measurement accuracy	$\pm$ 0.1 °C, at 10...30 °C $\pm$ 0.3 °C, at 10...30 °C (HC2A-C04, HC2A-C05; see also §10.3)
Repeatability	0.05 °C
Long term stability	<0.1 °C / year
Sensor time constant	Typical 4 sec, 63 %RH of a step change (1 m/sec air flow at sensor)

<sup>15</sup> The peak load at 200 °C is 100 h. See the sensor data sheet for detailed information on the pollution loads for the sensor.

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Calculated parameters	
Psychrometric calculations	Dew or frost point (user configurable)

Start-up time and data refresh rate	
Start-up time	1.5 s (typical)
Data refresh rate	1.0 s (typical) – when not calculating any parameter

Configurable analog outputs	
Output 1	Can be made to correspond to any parameter
Factory default parameter	Relative humidity
Factory default scale	0...100 %RH
Output 2	Can be made to correspond to any parameter
Factory default parameter	Temperature
Factory default scale	-40...60 °C
Output 1 and Output 2	
Signal type	0...1 V
User configurable scaling limits	-999.99 ... 9999.99 engineering units
Offset at 0 V	+10 mV (maximum)
Ripple	<1.2 mV/x 2µs
Short circuit tolerant	Yes
Internal resistance	<10 Ω
Minimum external load	1000 Ω
Deviation from digital signal	<±1 mV from 0.002 to 1.0 V / + 2 mV from 0.0 to 0.002 V

Digital interface	
Interface type	UART (Universal Asynchronous Receiver Transmitter)
Organization	Dialog, duplex
Default configuration	Baud rate : 19200 Parity : none Data bits : 8 Stop bits : 1 Flow Control : none
Tolerance	3 %
Baud rate configuration:	No
Logical levels	Logical 0: ≤ 0.3V * VDD Logical 1: ≥ 0.8V * VDD
Maximum cable length	5 m (16.4 ft) w/o signal booster



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<b>General specifications</b>	
Housing material	See Models
Collar material (connector)	Stainless steel, DIN 1.4301
Dust filter material	See Models
Physical dimensions	See Models
Weight	See Models

<b>Conformity to standards</b>	
CE / EMC immunity	EMC Directive: 20.04.2016: 2014/30/EU  EN 61000-6-1: 2007, EN 61000-6-2: 2005 EN 61000-6-3: 2007+A1:2011+AC:2012, EN 61000-6-4: 2007+A1:2011  Performance criterion: <a href="http://www.rotronic.com">www.rotronic.com</a>
Solder type	Lead free (RoHS directive 2011/65/EU)
FDA / GAMP directives	compatible

<b>Environmental limits</b>	
Storage and transit	-50...+100 °C / 0...100 %RH, non condensing
Operating limits at electronics	-50 ... +100 °C 0...100 %RH, non condensing
Temperature limits at sensor	See Models
Maximum humidity at sensor	The sensor withstands 93 °Cdp. This results in the following conditions: 100 %RH up to 93 °C (203 °F) 78 %RH at 100 °C (212 °F) 34 %RH at 125 °C (260 °F) 17 %RH at 150 °C (302 °F)
Maximum air velocity at probe	50 m/s (3,28 ft /s), according to filter specifications
Critical environments	See HT-1 data sheet

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## 11 Accessories and parts

For accessories and parts such as the HW4 configuration software, extension cables, adapter cables, calibration accessories and spare dust filters, please see document **E-M-HC2-accessories**

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## 12 Supporting documents

Document File Name	Contents
<b>E-M-HC2-accessories</b>	Accessories and parts for probes, indicators and transmitters
<b>E-T-AC3000-DF-V1</b>	AirChip3000 Description and Main Functions
<b>E-M-HW4v3-DIR</b>	List of the HW4 manuals
<b>E-M-HW4v3-Main</b>	HW4 software version 3: General instructions and functions common to all devices
<b>E-M-HW4v3-F2-001</b>	HW4 software version 3: HC2A probe series Device configuration and AirChip3000 functions
<b>E-M-HW4v3-A2-001</b>	HW4 software version 3: Probe Adjustment function AirChip3000 devices
<b>E-M-HW4v3-DR-001</b>	HW4 software version 3: Data Recording Function AirChip3000 Devices
<b>E-M-AC3000-CP</b>	AirChip3000 Communication Protocol
<b>E-M-CalBasics</b>	Temperature and humidity adjustment basics Instructions for using the ROTRONIC humidity standards
<b>E-T-HumiDefs</b>	Humidity Definitions

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### 13 Document releases

Doc. Release	Date	Notes
V1_0	August 2016	Original release
V1_1	November 2016	Waterproof is specified more in detail, page 22 Max. wind speed adapted (technical specifications)
V1_2	April 2017	Technical drawings HC2A-SM Filter and support specifications edited Offset analogue output +10mV