

Operating Instructions for Manual Humidity Precision Measuring Unit

Model: HND-F215



1. Contents

1. Contents.....	2
2. Note	3
3. Instrument Inspection.....	3
4. Regulation Use.....	3
5. Operating Principle.....	4
6. Electrical Connection	4
6.1 Mains operation	4
7. Operation	5
7.1 Safety Requirements	5
7.2 Connections.....	6
7.3 Displays	6
7.4 Push buttons.....	7
7.5 Instrument Configuration.....	8
7.6 Measurements Using the Combination Measuring Sensor HND-FF31	10
7.7 Measurements Using the Flow Measuring Probes HND-FF32 a. HND-FF33	11
7.8 Notes for Special Functions	12
7.9 How to Calibrate Meas. of Rel. Humidity Using HND-FF31	17
7.10 Error and System Messages.....	19
7.11 Error and System Messages during HND-FF31 Calibration	20
8. Maintenance	20
9. Technical Information.....	20
10. Order Codes	22
10.1 Probe for humidity, temperature and flow measurement	22
10.2 Accessories for humidity precision measuring units HND-F and probe HND-FF	23
11. Declaration of Conformance	24

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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EWG-machine guidelines.

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.

Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:

The standard delivery includes:

- Manual Humidity Precision Measuring Unit model: HND-F215
- Operating Instructions

4. Regulation Use

Any use of the Manual Humidity Precision Measuring Unit, model: HND-F215, which exceeds the manufacturer's specification may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Operating Principle

The KOBOLD HND-F215 manual measuring unit allows for the measurement of gas humidity and gas temperature or the gas respectively water flow. Appropriate probes are available for both measuring applications (for more technical data, see subsequent pages). The device offers extensive functions, a high degree of accuracy, and decisive advantages in operation in order to support the user in determining the various measured quantities.

In addition to the standard basic functions like minimum/maximum value memory, hold function, dew-point calculation, or a calibration function for humidity measurement, the improved device design KOBOLD HND-F215 has a minimum/maximum alarm, adjustable alarm, a real-time clock, and logger function.

6. Electrical Connection

6.1 Mains operation



When using a power supply device please note that operating voltage has to be 10,5 to 12 V_{DC}. Do not apply over-voltage!! Cheap 12 V-power supply devices often have excessive no-load voltage. We, therefore, recommend using regulated voltage power supply devices. Trouble-free operation is guaranteed by our power supply HND-Z002. Prior to connecting the plug power supply device with the mains supply make sure that the operating voltage stated at the power supply device is identical to the mains voltage.

- Treat device and sensor carefully. Use only in accordance with above specification. (do not throw, hit against etc.). Protect plug and socket from soiling. Only use for the HND specified sensors. Connecting the instrument to others, may damaged the instrument and the probe.
- Switch off instrument to change sensors.
- When connecting the probe the connector may not lock correctly. In such case take the plug not at the casing but at the buckling protection at the end of the plug. If the plug is entered correctly, it will slide in smoothly.
- To disconnect sensor/probe, the interface or the power supply device do not pull at the cable but at the plug.

7. Operation

7.1 Safety Requirements

This device has been designed and tested in accordance with the safety regulations for electronic devices. However, its trouble-free operation and reliability cannot be guaranteed unless the standard safety measures and special safety advises given in this manual will be adhered to when using the device.

1. Trouble-free operation and reliability of the device can only be guaranteed if the device is not subjected to any other climatic conditions than those stated under chapter 9. Technical Information.
2. If the device is transported from a cold to a warm environment condensation may cause in a failure of the function. In such a case make sure the device temperature has adjusted to the ambient temperature before trying a new start-up.
3. If device is to be connected to other devices (e.g. via serial interface) the circuitry has to be designed most carefully. Internal connection in third party devices (e.g. connection GND and earth) may result in not-permissible voltages impairing or destroying the device or another device connected.



Warning: If device is operated with a defective mains power supply (short circuit from mains voltage to output voltage) this may result in hazardous voltages at the device (e.g. sensor socket at interface).

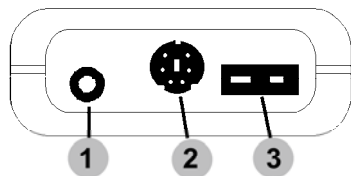
4. If there is a risk whatsoever involved in running it, the device has to be switched off immediately and to be marked accordingly to avoid re-starting. Operator safety may be a risk if:
 - there is visible damage to the device
 - the device is not working as specified
 - the device has been stored under unsuitable conditions for a longer time.

In case of doubt, please return device to manufacturer for repair or maintenance.



Warning: Do not use this product as safety or emergency stop device, or in any other application where failure of the product could result in personal injury or material damage. Failure to comply with these instructions could result in serious injury and material damage.

7.2 Connections



- 1 **Interface:** Connection for electrical isolated interface adapter (accessories: HND-Z031)
- 2 **Connection for meas. probes:** the following sensor types can be connected:
 - HND-FF31 (atmospheric humidity and temperature T1)
 - HND-FF33 (flow speed air, 0.55..20m/s)
 - HND-FF32 (flow speed water, 0.05..5m/s)
- 3 **Temperature input T2:** Connection for NiCr-Ni-temperature probe (type K) for surface temperature measurements etc.

The **mains socket** is located at the left side of the measuring instrument.

7.3 Displays



1 Main display

2 Secondary display

Depending on the measuring probes/sensors connected the following measuring results can be displayed:

-HND-FF31:

Main display

r.H.: relative atmospheric humidity in %

Secondary display

T1: temperature of the HND-FF31

Td: dew point temperature of air

kJ/kg: enthalpy with surface temperature probe at T2:

T2: surface temperature

ΔTd: dew point ratio = $T2 - Td$

Use the "Set/Menu"-key  to change over between the measuring results in the secondary display.

-HND-FF32 and/or HND-FF33:

Main display **m/s.:** flow speed

Secondary display

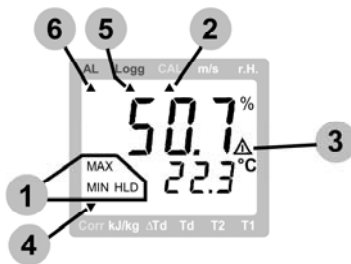
t.AVG: time left till average flow value in seconds will be displayed

with temperature probe at T2 as soon as the average time has been reached:

Secondary display

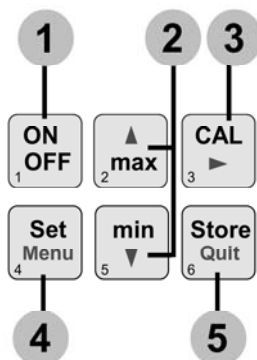
T2: temperature

Special display – elements



- 1 Min/Max/Hold:** shows if a min., max. or hold value is displayed in either the main or the secondary display.
- 2 CAL-arrow:** indicates that a humidity calibration is carried out at the moment.
- 3 Warning triangle:** indicates a low battery
- 4 Corr arrow:** indicates active status of correction factor (Corr) or zero displacement (Offset) of the temperature channel displayed.
- 5 Logger arrow:** indicates that the logger function is activated.
- 6 Alarm arrow:** indicates an alarm

7.4 Push buttons



- 1 On/off key**
- 2 in/max when taking measurements:**
 - press shortly: min. or max. measuring value will be displayed
 - press for 1 sec.: the value shown will be deleted
- 3 CAL:** (for HND-FF31-measuring probe only)
 - press for 2 sec.: humidity calibration will be started
 - press for more than 10 sec.: reset of humidity calibration to factory calibration
- 4 Set/Menu:**
 - press (Set) shortly: display changes between: T1, T2, Td, ΔTd, kJ/kg (if existing)
 - press (Menu) for 2 sec.: configuration will be activated
- 5 Store/Quit:**
 - Measurement: Hold current measuring value ('HLD' in display) for flow measurements in the 'AVGHold' mode:
 - start new measurement
 - or handling of logger functions
 - Set/Menu: Acknowledge setting, return to measuring.

7.5 Instrument Configuration



Note: Some menu items will be shown depending on the actual device configuration (e.g. there are some items disabled when the logger contains data). Please note the hints by the menu items.

For configuration of the device press key "Menu" (key 4) for 2 seconds; the main menu (display 'SEt') of the configuration will be called up. Use key "Menu" (key 4) to select a sub-menu; use the key "►" (key 3) to actually go into the sub-menu selected and to change parameters.

Use key "▲" (key 2) or key "▼" (key 5). to set the individual values. Press the key "Menu" (key 4) again to memorize the changes made and to change over to the main menu. Use key "Quit" (key 6) to leave the configuration.



Read Logger': Read Out Logger Data (will be displayed only if data are memorized in the individual value logger mode)

 For more information please refer to the chapter 'data logger - how to display individual values'.

'Set Configuration': General Device Configurations

 Setting general configuration:

*Please note: the points marked by *1 will only be displayed if no data is stored in the logger.*

'AVG': Selection of Averaging Proceedings for Flow Measurement *1

(only HND-FF32/33)

 **Cont:** continuous averaging - the average value calculated from the measurings conducted during the averaging period will be displayed

 **Hold:** press key for averaging - flow measurements will be taken during the averaging period, then the average value will be calculated and displayed till the next flow measurement is started.

't.AVG': Setting of Averaging Period *1 (only with HND-FF32-FF33)

 1 .. 30: Time for averaging (in seconds) during flow measuring



'Unit': Selection of Temperature Unit °C /°F *1

 °C: All temperature values in degrees Celsius

 °F: All temperature values in degrees Fahrenheit

'Offset T1': Zero Displacement of Sensor Temperature T1 *1

(only with HND-FF31)

 -10.0 °C...10.0 °C The zero point of the measurement of channel 1 will be displaced by this value.

 -18.0 °F...18.0 °F: Zero point displacement is deactivated (=0.0°)

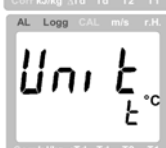
off:

'Offset T2': Zero Displacement of Temperature T2 *1

 -10.0 °C...10.0 °C or The zero point of the measurement of channel 1 will be displaced by this value.

 -18.0 °F...18.0 °F: Zero point displacement is deactivated (=0.0°)

off:





'Corr': Selection of Display Correction Factor *1

- max** 1.001...1.200: The temperature value (referring to 0 °C or. 32 °F) will be multiplied by this factor.
min off: Factor is deactivated (=1.000)



'Power.off': Selection of Power-Off Delay

- max** 1...120: Power-off delay in minutes. Device will be automatically switched off as soon as this time has elapsed if no key is pressed/no interface communication takes place. (deactivated when cyclic logger is running)
min off: automatic power-off function deactivated (continuous operation)



'Address': Selection of Base Address'

- max** 01, 11, 21, ..., 91: Base address for interface communication.
min



'Set Alarm': Alarm Settings

- CAL** Settings for the alarm function:
*Please note: the points marked by *2 will only be displayed if the alarm functions 'on' or 'no'. So' have been selected.*



'Alarm': Selection of Alarm Function

- max** off: Alarm off
min no.So: Alarm on, the "AL" arrow will be displayed in case of alarm
 on: Alarm on, in case of alarm the "AL" arrow will be displayed; in addition an audible alarm signal will be given.



'Alarm Input': Selection of Alarm Input *2

- max** arrow points to the input channel
min



'Alarm Low': Setting of Min. Alarm *2

- max** Setting of the display limit value triggering a min. alarm.
min



'Alarm High': Setting of Max. Alarm *2

- max** Setting of the display limit value triggering a max . alarm
min



'Set Logger': Logger Settings (not possible if there are data in the logger memory)

- CAL** Setting for the logger function:



'Function': Selection of Logger Function

- max** off: Logger function off (Use key 6 for Hold-function)
min Stor: Individual value logger (Press key 6 to store an individual value set)
 CYCL: Cyclic logger (Start by pressing key 6)
note: if function "AVG Hold" is chosen, the cyclic logger is not supported.



'Cycle Time': Setting of Cycle Time (only with Func = CYCL)

- max** 1 ... 3600: Cycle time in seconds giving the intervals between the logger data recordings
min



'Set Clock': Setting of the Real-Time Clock

CAL Setting of the internal real-time clock:



'Clock': Set the Time

max Setting of the time (hours : minutes)
min



'Year': Set the Year

max Setting of the year.
min Time span that can be set: 1997 ... 2100



'Date': Set the Date

max Setting of the date (day. month)
min

7.6 Measurements Using the Combination Measuring Sensor HND-FF31

The HND-FF31 has been especially designed to carry out measurements of ambient temperature. All HND-FF31-probes are interchangeable without recalibration being required. The scope of supply includes one sensor to measure relative atmospheric humidity and another one to measure the ambient temperature T1.

rel. humidity r.H. [%]

Relative humidity measured in the tip of the probe. Resolution 0.1 %

Ambient temperature T1

Temperature measured in the tip of the probe. Resolution 0.1 °C or 0.1 °F.

Other values on display will be calculated by the measuring device (acc. to Mollier diagram).

Dew point temperature Td

Cold air cannot absorb as much steam as warm air. This means that the **relative** humidity increases as the temperature decreases. If 100 % have been reached, the air is saturated with steam; another decrease in temperature results in part of the steam condensing to water, becoming visible as fog or precipitation (dew). The dew point temperature indicates at which temperature a 100 % saturation would be reached and as of when "dew" can be expected.

Enthalpy h [kJ/kg]

Enthalpy refers to the energy content of air. This value always refers to dry air at 0 ° C. I.e. the energy content of air with a relative humidity of 0 % and 0 ° C is 0kJ/kg. The warmer the air the higher the relative humidity, the higher the energy content. Therefore, more energy is required to heat up humid air than dry air.



All humidity and temperature values calculated from the measuring values refer to a standard atmospheric pressure of 1013 mbar. For measuring atmospheric air, the deviations do not have to be taken into account. When taking measurements in pressure vessels or under similar conditions, the values have to be corrected in accordance with a suitable correction table.

Additional Measurements with NiCr-Ni-Surface Probe at T2:

Surface temperature T2

The second temperature channel can amongst other things be used to take measurements of surface temperatures

Dew point distance ΔT_d

This measurement refers to measurements of T1, T2 and relative atmospheric humidity.

The combination sensor is used to measure the ambient air, whose condition is issued to calculate the dew point Td. The surface sensor is used to measure surfaces within this ambient air, with ΔT_d stating the temperature difference between those measurements and the dew point.

Example: measuring the ambient temperature results in a Td of 5 °C. As long as the surface-temperature (T2) of a window exceeds 5°C ($\Delta T_d > 0$ °C) the surface won't sweat! When T2 falls below 5 °C, ($\Delta T_d < 0$ °C) it will sweat.

Other examples for application: detection of 'humid corners', monitoring of heat exchangers, weather forecast etc.

7.7 Measurements Using the Flow Measuring Probes HND-FF32 a. HND-FF33

Two types of measuring probes are available for flow speed measurements:

Please note:

- use **HND-FF32** to measure **water** flow
- use **HND-FF33** to measure **air** flow

Incorrect use will result in incorrect measurements!

Please observe max. measuring ranges for flow measurements!

-HND-FF32: 0.05 ... 5.00 m/s (water)

-HND-FF33: 0.55 ... 20.00 m/s (air)

Higher speeds may destroy the measuring head or may, at least, permanently influence measuring accuracy.

An arrow on the measuring head indicates the required flow direction.

Flow measuring probes are 'free-jet calibrated', i.e. the diameter of the flow channel has to be 5 times bigger than the diameter of the flow measuring head (= approx. 5 cm, otherwise measuring errors up to 40 %).

When evaluating the measuring results please also note that in a channel the flow speed is usually higher in the middle of the channel than at its edges. Therefore, use appropriate tables to calculate air flow by means of flow speed.

Averaging for Flow Measurements:

When taking flow measurements fluctuations tend to be quite high. To be able to display a stable measuring value two averaging functions have been integrated in the instrument.

Continuous Averaging

The average value displayed has been calculated from the past few measurements conducted during the averaging time set. After the instrument has been switched on the time remaining till expiration of the averaging time will be displayed at the bottom line of the display. The min. and max. values memorized refer to the minimum and/or maximum average value displayed.

Average Hold

As soon as the HND-F215 instrument has been switched on the device starts calculating the average flow value during the averaging time. During measuring the **current measuring value** will be shown in the top line of the display while the bottom line shows the remaining measuring time. As soon as measurements have been completed the **average value** will be displayed and the device will switch to the HOLD mode. The min. and max. values memorized refer to the minimum and/or maximum measuring value established during averaging.

To start a new measuring series press the key "Store" (key 6).

Additional Measurements with any NiCr-Ni-Temperature Probe at T2:

Use temperature channel T2 to take measurements of medium temperature, for example. The value shown is not an average value.

7.8 Notes for Special Functions

Zero displacement ('Offset')

A zero displacement can be carried out for each of the two temperature channels T1 (HND-FF31 only) and T2:

displayed temperature = measured temperature - Offset

Standard setting: 'off' = 0.0°, i.e. no zero displacement will be carried out. The zero displacement is mainly used to compensate for sensor deviations. Unless 'off' is set, this value will be displayed shortly after the device is switched on; during operation it will be identified by means of the offset arrow in the display.

Display Correction Factor ('Corr')

This factor is applied to both sensor channels.

**temperature displayed [°C] = temperature measured [°C] * Corr or
temperature displayed [°F] = (temperature measured [°F]-32 °F) * Corr + 32 °F**

Standard setting: 'off' =1.000

This factor is used to compensate for losses of transfer in case of surface measurements, occurring if the object to be measured is extremely hot but will be cooled by lower ambient temperatures. The same can be true for sensors with a large mass. Unless 'off' is set, this value will be displayed shortly after the device is switched on; during operation it will be identified by means of the Corr-arrow in the display.

Base Address ('Adr.')

Using a interface converter it is possible to connect several instruments to a single interface. As a precondition the base addresses of all devices must not be identical. In case several devices will be connected via one interface make sure to configure the base addresses accordingly.

Channel 1 will be addressed by the base address set, channels 2 and 3 will have the following addresses.

(Example: base address 21 - channel 1 = 21, channel 2 = 22, channel 3 = 23)

Alarm:

3 alarm settings are available: off (off), on with horn sound (on), on - no horn sound (no.So)

Depending on the sensors in use there is the choice of which channel is surveyed by the alarm function.

If the alarm function (on, no.So) has been activated, an audible alarm signal will be given with the following cases:

- values have fallen below/exceeded the lower/upper alarm limits in the channel to be monitored
- FE 9 and/or FE11 at the channel to be monitored
- low battery
- FE 7: In case of a system error the horn will be sounded regardless of the alarm setting even if alarm = off)

If one or more alarm settings have been fulfilled the "alarm" arrow will be shown in the display; in case of access via the interface the 'PRIO'-Flag will appear.

Real Time Clock:

The real time clock is required to put logger data in a time order. If necessary please check the setting:

Setting via keys (p.r.t. configuration of the device): time (minutes. accurate), date, year.

Setting via interface: use suitable software (seconds - accurate) e.g. HND-Z034-software.

The clock setting menu will be started automatically when the device is switched on again after a battery change.

Data Logger:

As soon as key "Store" (key 6) is pressed and **.Func = Stor.** is chosen, a data set will be stored. The data stored can either be observed on the display (prt. "How to Display Individual Values" below), or be read into a PC via the interface.

When **.CYCL.** is set and the logger has been started using key "Store" (press for 2 seconds), data sets will be stored till the recording is either stopped or the logger memory is full. (not available with HND-FF... and "AVG Hold") The logger cycle time can be set. Use the interface to input the data stored into a PC.



If the logger contains already data, the connected kind of sensor (HND-FF31, HND-FF33, HND-FF32) must not be changed. In such case the instrument would display "Sens Erro". Functions like the read out of logger data or clear the memory are still accessible.

Storing of Individual Values: "Func Stor"

Data set that can be stored: 99

One data set consists of: measuring value channel 1 - 6 and time + date

Press "Store"-key to store current values. **.St.XX.** will be displayed for a short time, XX representing the number of the data set 1..99. Upon pressing the "Store"-key (key 6) for 2 seconds the selection for deleting the logger memory will be displayed assumed that there are any logger data.



delete all data sets



delete data set recorded last



do not delete (= cancel procedure)

Use the keys "**▲**" (key 2) or "**▼**" (key 5) to make a selection. Use key "Quit" (key 6) to acknowledge selection.



If the logger memory is full a warning will appear on the display: (warning triangle permanently shown, cyclic display of "LoGG FuLL" and the current measuring value)

How to display Individual Values:

Individual values can also be displayed without interface which is not possible with the cyclic logger function.

If there are data sets in the logger memory, the additional main menu **.rEAd LoGG.** will be offered upon call-up of the menu (press key "Set" (key 4) for 2 sec). When the "**►**"-key (key 3) is pressed the last data set will be displayed. Use "**►**"-key (key 3) to change over between the values of one data set (channel 1 - 6, date/time).

To change over from one data set to another use the keys "**▲**" (key 2) or "**▼**" (key 5).

Cyclic Logger Function: "Func CYCL"

Data sets that can be stored: 5400

One data set consists of: measuring value channel 1 - 6

The cycle time is set during "Device configuration".



Please Note: During long time recordings we suggest to use a mains adapter (HND-Z002).

Start logger recording:

Press "Store"-key (key 6) for 2 seconds to start recording. Then .St.XXXX. will be displayed for a short time for every logging; XXXX representing the number of the data set 1..5400.



If the logger memory is full a warning triangle will be shown on the display:
(warning triangle permanently shown, cyclic display of "LoGG FuLL" and the current measuring value)

Stop logger recording:

Press "Store"-key (key 6) for a short time to stop recording. You will then be asked to acknowledge again:



recording to be stopped



recording to be continued

Use the keys "▲" (key 2) or "▼" (key 5) to make your selection. Use "Quit"-key (key 6) to acknowledge your selection.



Please note: If you try to switch off the instrument in the cyclic recording mode you will be asked once again if the recording is to be stopped. The device can only be switched off after the recording has been stopped as the Auto-Power-Off-function is deactivated during recording.

Delete data in logger memory:

Press "Store"-key (key 6) for 2 seconds to display the selection for deleting data, if any, in the logger memory:



delete all data sets



do not delete (= cancel procedure)

Use the keys "▲" (key 2) or "▼" (key 5) to make your selection. Use "Quit"-key (key 6) to acknowledge your selection.

The Serial Interface

All measuring and setting data of the device can be read and/or changed by means of the serial interface and a suitable electrically isolated interface adapter (HND-Z031, HND-Z032). In order to avoid transmission errors, there are several security checks implemented.

The following **standard software packages** are available for data transfer:

- **HND-Z034:** Software for temperature display and/or read out of logger data.
- **BUS-SW9M:** 9-channel software to display the humidity (channel 1), the temperature. (channel 2, 3)

The following interface functions will be supported:

Channel						DLL-Code	Name/function
1	2	3	4	5	6		
x	x	x	x	x	x	0	Read nominal value
x	x	x	x	x	x	3	Read system status
x						12	Read ID number
1)	1)	1)	1)	1)	1)	22	Read min. alarm limit
1)	1)	1)	1)	1)	1)	23	Read max. alarm limit
2)						32	Read configuration flag
2)						160	Set configuration flag
x	x	x	x	x	x	199	Read meas. type in display
x	x	x	x	x	x	200	Read min. display range
x	x	x	x	x	x	201	Read max. display range
x	x	x	x	x	x	202	Read unit of display
x	x	x	x	x	x	204	Read decimal point of display
x						208	Read channel count
	x	x				216	Read offset correction
		x				218	Read corr. factor (1000..1200)
3)	3)	3)	3)	3)	3)	224	Read logger data (cyclic logger)
4)						225	Read logger cycle
5)						226	Set logger cycle
6)						227	Start logger recording
7)						228	Read count of logger data
7)						229	Read logger state
3)						231	Read logger stop time
x)						233	Read real-time clock
x						234	Set real-time clock
7)						236	Read logger size
x						240	Reset unit
x						254	Read program identification
8)						260	Read logger data (man. logger)

For HND-FF31

Channel 1: rel atmospheric humidity
Channel 2: temperature T1
Channel 3: temperature T2
Channel 4: dew point temperature Td
Channel 5: dew point distance .Td
Channel 6: enthalpy h

For HND-FF32/HND-FF33

Channel 1: flow speed
Channel 3: temperature T2
Channel 2, 4, 5, 6: not supported.

For NiCr-Ni (without HND-FF31/32/33)

Channel 3: temperature T2
Channel 1, 2, 4, 5, 6: not supported.
Logger handling still works with channel 1.

1) only when alarm is activated for referring channel

2) configuration flags: 50: 0 = logger off 1 = logger on
51: 0 = man. logger 1 = cyclic logger

3) only when logger function = CYCL, data present and logger stopped.

4) only when logger function = CYCL

5) only when logger function = CYCL and no data in memory

6) only when logger function = Stor, or logger function = CYCL and no data in memory

7) only when logger is activated (CYCL or Stor)

8) only when logger function = Stor and data in memory

7.9 How to Calibrate Meas. of Rel. Humidity Using HND-FF31

Due to the natural aging process of the polymer humidity sensor we recommend to calibrate the sensor at least once a year to ensure optimum measuring accuracy. For optimum recalibration and linearity check, please return device to manufacturer. Use integrated calibration function for 2-point on-site calibration.



Please note: Automatic temperature compensation during calibration

The rel. humidity to be found in the calibration equipment is quite often highly dependent on temperature. This dependence is automatically compensated for when calibrating with the integrated calibration equipment and automatic detection. In case you want to enter calibration values manually, make sure to enter the respective temperature with the values.

How to carry out calibration



Please note: the calibration is only possible, if the logger memory is empty.

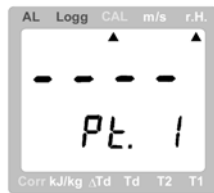
Start calibration: press "CAL" (key 3) for 2 sec. (after more than 10 sec. the factory calibration will be set). The display prompts you to measure the first humidity value. Use "Set"-key (key 4) to stop calibration whenever you want to. In such a case the last calibration before this one will be used.

1) Selection automatic detection / manual input

Press "CAL"-key (key 3) for a short time to switch over between the various possibilities existing:



automatic detection (acceptable humidity variables see above)
Display will switch over between the acceptable variables.



manual input

If you want to use other humidity values than those provided in the automatic detection, please enter them here.

0 ... 100.0 %: input range for rel. atmospheric humidity.
(please note Watch out for 'Automatic temperature compensation during calibration')

2) Calibration point 1



Put sensor in suitable calibration equipment.

- As long as the individual values in the display for the automatic detection keep changing, a valid value could not be detected (humidity value measured may deviate from value set by manufacturer by approx. 10 %).

- In case of manual input, enter value here.

As soon as the display stops blinking and changing between values, a stable value has been detected and can be taken over by means of the "Store"-key (key 6). Then the next calibration step will be displayed.

3) Calibration point 2

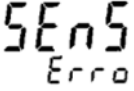


Put sensor into suitable calibration equipment prepared for the second humidity value.

Precondition: If the first value was below 50 %, this value has to be over 50% or vice versa. Otherwise proceed as above. As soon as the display stops blinking and changing between values, the measuring value can be taken over by means of the "Store"-key (key 6) and the calibration has been completed.

If error messages are displayed when calibrating the instrument, the old calibration keeps valid, the new calibration data are lost. Please refer to "Error and System Messages during HND-FF31 Calibration"

7.10 Error and System Messages

Display	Description	Remedy
	no probe/sensor connected	connect probe/sensor
	probe/sensor damaged	probe/sensor defective -> return to manufacturer for repair
	after taking logger readings the sensor was changed	reconnect the sensor used before or clear the logger memory <i>recommendation: please keep sensor attached as long as the logger contains data.</i>
	Low battery voltage, device will only continue operation for a short time	replace battery
	Low battery voltage	replace battery
	If mains operation: wrong voltage	replace power supply, if fault continues to exist: device damaged
no display or characters confused	Battery voltage too low	replace battery
	If mains op.: power supply defective or wrong voltage/polarity	check/replace power supply
	System error	disconnect battery or power supply, wait for a short time, re-connect
	device defective	return to manufacturer for repair
Err. 1	Values exceeding measuring range	Check: are there any values exceeding the measuring range specified? -> meas. value too high
	Sensor/cable defective	-> replace
Err. 2	Values below measuring range	check: are there any values below the measuring range specified? -> meas. value too low
	Sensor/cable defective	-> replace
Err. 3	Values exceeding display range	
Err. 4	Values below display range	
Err. 7	System fault	switch on again: if fault continues to exist, device is damaged -> return to manufacturer for repair
Err. 9	No probe/sensor existing or probe/sensor defective	connect probe/sensor probe/sensor damaged -> return to manufacturer for repair
Err. 11	Value cannot be calculated	One measuring variable required for calculation is missing (no sensor) or incorrect (overflow/underflow)

7.11 Error and System Messages during HND-FF31 Calibration

Display	Description	Remedy
Cal Err.1	Deviation too high (zero point)	correct humidity variable ? no -> probe no longer within permissible tolerances, return to manufacturer for recalibration.
Cal Err.2	Difference point1-point2 too small	difference has to be at least 40% if values are entered manually select suitable values
Cal Err.3	Incorrect temperature	calibration is only permissible in the temp. range from 5 ... 40°C

8. Maintenance

When to replace battery

If Δ and 'bAt' are shown in the lower display the battery has been used up and needs to be replaced. The device will, however, operate correctly for a certain time. If 'bAt' is shown in the upper display the voltage is too low to operate the device; the battery has been completely used up.



Please note: The battery has to be taken out, when storing device above 50 °C. We recommend to take out battery if device is not used for a longer period of time.

9. Technical Information

Measurement

input: humidity/temperature:
external probe HND-FF31
(see datasheet probe)
Flow: external probe
HND-FF32/33 (see datasheet probe)
(additional temperature input:
NiCr-Ni thermocouple element, type K)

Measuring range:

relative humidity: 0.0...100.0 % rH
room temperature: -40.0...+120.0 °C
(like probe HND-FF31)
surface temperature:
-80.0...+250.0 °C
flow speed:
see probe HND-FF32/33

Accuracy:	(± 1 digit, at nominal temperature 25 °C) relative humidity: $\pm 0.1\%$ room temperature (Pt 1000): $\pm 0.2\%$ surface temperature (NiCr-Ni): $\pm 0.5\%$ measured value $\pm 0.5^\circ\text{C}$ flow speed: $\pm 0.1\%$
Resolution:	0.1 % rH, 0.1 °C / 0.1 °F, 0.01 m/sec
Display:	two 4-digit LC-displays
Permiss. operating temp:	-25 to +50 °C
Storage temperature:	-25 to +70 °C
Storage humidity:	0 to 95 % rH (non-condensing)
Probe connection:	humidity/ flow: 6-pin shielded Mini-DIN plug temperature: miniature flat connector for NiCr-Ni thermocouple element (type K)
Output:	serial interface (transformer on RS232 or USB optional)
Power supply:	9 V-monobloc battery (included in the scope of delivery), external 10.5-12 VDC via jack
Material:	housing made of impact-resistant ABS plastic
Protection:	IP 65, front
Dimensions:	142 x 71 x 26 mm (HxWxD)
Weight:	approx. 160 g

Scope of functions:

Minimum/maximum value memory: for humidity, temperature, dew-point, etc.

Hold function: »freezing« of the current value

Dew-point calculation: based on humidity and temperature

Dew-point distance measurement: with surface measurement

Calculation of enthalpy: heat unit h of the air

Calibration function for measuring humidity

Flow measurement with average value display

Additional functions

Minimum/maximum alarm

Logger function: manual 99 datasets

cyclic 5400 datasets

adjustable cycle time: 1 sec...h

Real-time clock: current time with day, month, and year

10. Order Codes

Order-no.	Housing design
HND-F215	For air or gas moisture/temperature or flow with additional functions (see technical data)

10.1 Probe for humidity, temperature and flow measurement

Order-no.	Probe type
HND-FF31	Temperature/moisture probe, calibrated and completely replaceable Measuring range: humidity 0.0...100.0 rH, temperature -40.0...120.0°C Accuracy: humidity $\pm 2\%$ rH linearity, temperature $\pm 0.5^\circ\text{C}$ Sensors: capacitive polymer probes / Pt 1000 1/3 DIN Operating temperature: handle / electronics -25...+60°C, Sensor head and tube -40...+60°C (short-term +120°C) Dimensions: probe $\varnothing 14 \times 119$ mm, handle $\varnothing 19 \times 135$ mm, 1 m cable
HND-FF32	Flow meas. probe with spring head, calibrated and completely replaceable Measuring range: 0.05...5.00 m/sec water Accuracy: $\pm 1\%$ FS, $\pm 3\%$ MV Sensors: vane anemometer Working conditions: 0...+70 °C, 0...100 % rF (non-condensing) Dimensions: measuring head $\varnothing 11 \times 15$ mm, tube $\varnothing 15$ mm, insertion opening min. 16 mm, overall length 165 mm, 5 m cable
HND-FF33	Flow meas. probe with spring head, calibrated and completely replaceable Measuring range: 0.55 ... 20.00 m/sec air Accuracy: $\pm 1\%$ FS, $\pm 3\%$ MV Sensors: vane anemometer Working conditions: 0...+70 °C, 0...100 % rF (non-condensing) Dimensions: measuring head $\varnothing 11 \times 15$ mm, tube $\varnothing 15$ mm, insertion opening min. 16 mm, overall length 165 mm, 5 m cable

10.2 Accessories for humidity precision measuring units HND-F and probe HND-FF

Order-no.	Description
HND-Z002	Plug power supply unit (220/240 V _{AC} , 50/60 Hz), 10.5 V _{DC} / 10 mA
HND-Z015	Protective housing bag, nappa leather, with cut-out for 1 x round / 1x square sensor connection
HND-Z021	Case with recess (275 x 229 x 83 mm)
HND-Z022	Universal case with egg crate foam (275 x 229 x 83 mm)
HND-Z023	Large case with recess (394 x 294 x 106 mm)
HND-Z031	Interface converter on RS232, galvanically isolated
HND-Z032	Interface converter on USB, galvanically isolated
HND-Z033	Adapter RS 232 converter on USB- interface
HND-Z034	Windows software for setting, data read-out, and printing of the data of housings of the HND- series with logger function
HND-Z051	Measuring cable (BNC on 2 x banana plugs) approx. 1 m long, for HND-F105/205
HND-Z052	100 ml conductivity paste for surface measurement and depth measurement in masonry, screed, etc. using brush probes
HND-Z053	Steel pins (3 units each 12 mm, 16 mm, and 25 mm long)
HND-Z054	Surface measuring caps (pair) for screwing onto HND-FF02/03
HND-Z055	Replacement sensor element for HND-FF11
HND-Z056	Measuring cable (2 x banana plugs, on 2 x banana plugs), length approx. 1 m, including plug adapter for HND-F110 (not for HND-FF08 and HND-FF10)
HND-Z057	Replacement measuring pins (10 units) for HND-F110
HND-Z058	Testing adapter
HND-Z061	Replacement spring head for HND-FF32
HND-Z063	Replacement spring head for HND-FF33, HND-Z001

11. Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Manual Humidity Precision Measuring Unit Model: HND-F215

to which this declaration relates is in conformity with the standards noted below:

EN 55 022 6/1993 class B
EN 50 082-1 (IEC1000-4-6, IEC1000-4-4, IEC1000-4-3, IEC1000-4-2)

Also the following EEC guidelines are fulfilled:

89/336/EEC, 92/31/EEC, 93/68/EEC Electromagnetic Compatibility Directive
73/23/EEC, 93/68/EEC Low Voltage Directive

Hofheim, 01. April 2006



H. Peters
General Manager



M. Wenzel
Proxy Holder