Humidity

Humidity measurement module

USER MANUAL

Manual Version: [2.0]_b

www.zennio.com

CONTENT

DOCUMENT UPDATES

Version	Changes	Page(s)
[2.0]_b	Minor corrections.	-
[2.0]_a	**Changes in the application program:** • New communication object for humidity calibration.	-

1 INTRODUCTION

The humidity module manages the **humidity sensor**. It allows obtaining and monitoring humidity and calculate the dew point temperature, as well as **sending those values to the bus and reporting condensation** and **high/low humidity events**.

This module does not require connecting inputs to the devices as all the communication takes place through the KNX bus. For this, the previous configuration of a certain parameters is required.

Important: *to confirm whether a particular device or application program incorporates the humidity module, please refer to the* ***device user manual****, as there may be significant differences between the function of each Zennio device. Moreover, to access the proper humidity user manual, it is always recommended to make use of the specific download links provided at the Zennio website (www.zennio.com) within the section of the specific device being parameterized.*

2 CONFIGURATION

Please note that the screenshots and object names shown next may be slightly different depending on the device and on the application program.

2.1 CONFIGURATION

The humidity functional module is capable of measure and monitor humidity and calculate the dew point temperature, which is, the value at which the temperature of the air must decrease so that the existing water vapour begins to condense.

The device is able to calculate the dew point and determine whether condensation on the surface will occur, taking into account the measurements of temperature and humidity. Please, refer to ANNEX I. Dew Point Theory and Condensation for further information.

Furthermore, **humidity and dew point values can be sent to the bus** with a configurable period and **condensation and high/low humidity situations can be reported**.

ETS PARAMETERISATION

When the humidity sensor is enabled, two visible objects will appear by default, with which the relative humidity and dew point temperature can be read periodically or sent after a certain increase/decrease, depending on the setting. These objects will be "**[Hum] Current Humidity**" and "**[Hum] Dew Point Temperature**" respectively.

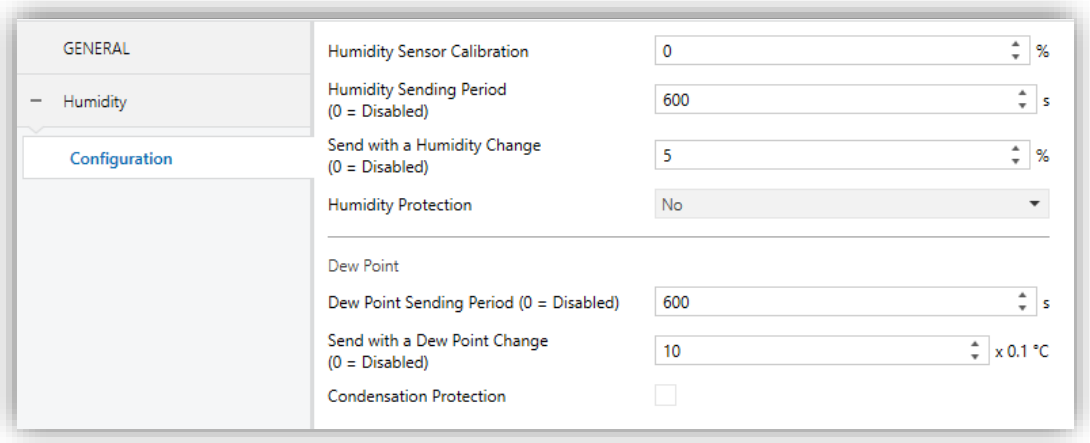

Figure 1. Humidity – Configuration.

- **Humidity Sensor Calibration** *[-12…0…12]*[1] [*%*]: defines an offset to be applied to the measurement received from the sensor. In addition, it is possible to modify this offset through the object "**[Hum] Sensor Calibration**, always within the range -12% - 12%.

- **Humidity Sending Period** [*0…600…65535*] [*s*]: sets every how much time the value of the current humidity should be sent to the bus (through "**[Hum] Current Humidity**"). The value "0" leaves this periodical sending disabled.

- **Send with a Humidity Change** [*0…5…25*] [*%*]: defines a threshold so that whenever a new reading of the current humidity is found to differ (from the last value sent to the bus) more than such threshold, an extra sending will take place. Sending period, if set, will not be restarted. The value "0" leaves this sending with a humidity change disabled.

- **Humidity Protection**: drop-down list with the following options:

  - No: no alarm is enabled.

  - High Humidity: high humidity alarm is enabled. Two extra parameters will come up:

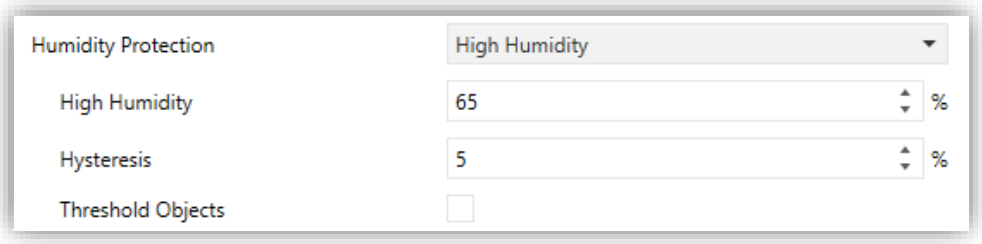

Figure 2. High Humidity Protection - Configuration

  - **High Humidity** [*0…65…100*] [*%*]: parameter to set the maximum humidity value from which the alarm will be activated. Humidity readings greater than this will cause that "1" will be sent periodically through object "**[Hum] High Humidity**". Once the humidity is below, a "0" will be sent (once).

  - **Hysteresis** [*0…5…25*] [*%*]: *dead band* or threshold around the high humidity defined above. This dead band prevents the device from sending

[1] The default values of each parameter will be highlighted in blue in this document, as follows: [*default/rest of options*].

the alarm and no-alarm over and over when the current humidity keeps fluctuating around the limit (H): once the alarm has been triggered, the no-alarm will not be sent until the current humidity is lower than that H minus the hysteresis. After that, if the current humidity reaches H again, the alarm will be re-sent.

- **Threshold Objects** [*enabled/disabled*]: parameter to enable the object "**[Hum] High Humidity Alarm Threshold**" to change the maximum humidity value from which the alarm will be activated.

➢ Low Humidity: low humidity alarm is enabled. Two extra parameters (analogous to the above two) will come up:

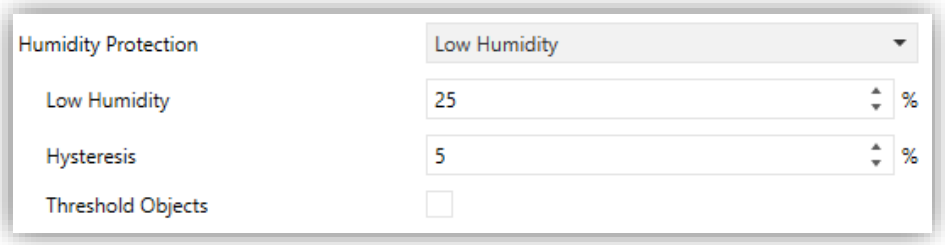

Figure 3. Low Humidity Protection - Configuration

- **Low Humidity** [*0…25…100*] [*%*]: Parameter to set the minimum humidity value from which the alarm will be activated. Humidity readings lower than this will cause that "1" will be sent periodically through object "**[Hum] Low Humidity**". Once the humidity is over, a "0" will be sent (once).

- **Hysteresis** [*0…5…25*] [*%*]: dead band or threshold around the low humidity. This dead band prevents the device from sending the alarm and no-alarm over and over when the current humidity keeps fluctuating around the limit (H): once the alarm has been triggered, the no-alarm will not be sent until the current humidity is greater than that H plus the hysteresis. After that, if the current humidity reaches H again, the alarm will be re-sent.

- **Threshold Objects** [*enabled/disabled*]: parameter which enables the communication object "**[Hum] Low Humidity Alarm Threshold**" to change the minimum humidity value from which the alarm will be activated.

- Low Humidity and High Humidity: high humidity and low humidity alarms are enabled. The following three parameters will come up, analogous to those already explained separately:

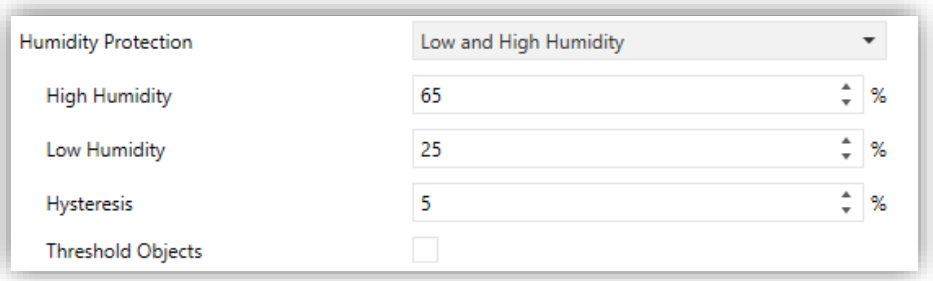

Figure 4. Low and High Humidity Protection - Configuration

- **High Humidity.**
- **Low Humidity.**
- **Hysteresis.**
- **Threshold objects:** enables both communication objects "**[Hum] Low Humidity Alarm Threshold**" and "**[Hum] High Humidity Alarm Threshold**".

The parameters related to dew point temperature and condensation protection are detailed below.

- **Dew Point sending period** [*0…600…65535*] [*s*]: sets every how much time the value of the current dew point temperature should be sent to the bus (through "**[Hum] Dew Point Temperature**"). The value "0" leaves this periodical sending disabled.
- **Send with a Dew Point Change** [*0…10…255*] [*x0.1ºC*]: defines a threshold so that whenever a new reading of the current dew point is found to differ (from the last value sent to the bus) more than such threshold, an extra sending will take place. Periodic sending time, if any, will not be restarted. The value "0" leaves this sending with a dew point change disabled.
- **Condensation Protection** [*enabled/disabled*]: checkbox to enable/disable the condensation alarm. If enabled, the object "**[Hum] Surface Temperature**" is added to obtain the surface temperature measurement and, comparing it to the

dew point, determine if condensation will occur (see ANNEX I. Dew Point Theory and Condensation for details). Moreover, two extra parameters will come up.

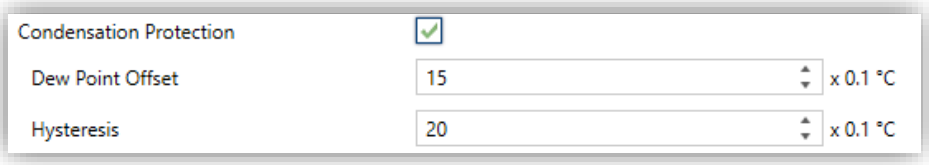

Figure 5. Condensation Protection - Configuration

- **Dew Point Offset** [*0…15…255*] [*x0.1 ºC*]**:** value that will be added to the theoretical dew point temperature calculated by the system, whose result will be used as trigger for the condensation alarm notification, which will be send periodically through "**[Hum] Condensation**".

- **Hysteresis** [*0…20…200*] [*x0.1ºC*]: dead band or threshold around the dew point. This dead band prevents the device from sending the condensation alarm and no-alarm over and over when it keeps fluctuating around the limit: once the alarm has been triggered, the no-alarm will not be sent until the current temperature is greater than that the dew point temperature (the theoretical plus the previous configured offset) plus the hysteresis. After that, if the current temperature reaches the limit again, the alarm will be re-sent.

ANNEX I. DEW POINT THEORY AND CONDENSATION

Dew point or **dew point temperature** is defined as the temperature at which the air mass is notable to hold more water and, thus, the water begins to condense.

Therefore, dew point temperature only depends on the amount of water in the air (absolute humidity) as well as the pressure in the mass of air. So that, only modifying the air temperature, the dew point temperature does not vary.

The **relative humidity** is, approximately, the ratio of the amount of humidity in the air to the total amount of humidity the air can hold (saturation). On the other hand, as air temperature increases, the capacity to hold water increases as well. This means that, keeping the absolute humidity constant, the relative humidity varies with the air temperature, according to:

Temperature ↑, relative humidity ↓

Temperature ↓, relative humidity ↑

For this reason, it can be understood that relative humidity relates the current temperature of the air to the absolute humidity of the air and, hence, the dew point temperature. In such a way, an approximation of the dew point temperature could be known by lowering the air temperature until a relative humidity of 100% was obtained, which is known as the saturation point.

An approximation of the ratio between the dew point temperature and the temperature of the air can be represented according to the following formula:

$$T_{DP} = T_{air} + 35\log(^{RH}/_{100})$$

Having calculated the **dew point temperature**, a **comparison** can be made **between this and the temperature of a surface** to determine if **condensation** will occur on it.

An offset can be configured to notify the condensation before it occurs. The comparison that will be made to activate the condensation alarm follows the following equation.

$$T_{surf} \leq T_{DP} + Offset \rightarrow Alarm\ activated$$

A hysteresis can be parameterized in such a way that, once the alarm has been triggered, it will not be deactivated until the surface temperature meets the following equation:

$$T_{surf} - Offset - Hysteresis \geq T_{DP} \rightarrow Alarm\ deactivated$$

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Zennio Avance y Tecnología S.L.
C/ Río Jarama, 132. Nave P-8.11
45007 Toledo (Spain).

Tel. +34 925 232 002.

www.zennio.com
info@zennio.com