ASCON TECNOLOGIC

# Humidity, Temperature & Dew Point Transmitter

# H5 LINE

**User manual**
**21/04 - Code: ISTR_M_H5_E_02_--**

S E R I E

CE

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# *Preface*

In order to guarantee the safe use of your device, we recommend that you read this manual carefully. The following notes give you information on how to use this manual.



## User Requirements

The products described in this manual should be installed, operated and maintained only by qualified application programmers and software engineers, electricians or persons instructed by them, who are familiar with automation safety concepts and applicable national standards.

Ascon Tecnologic Srl assumes no liability for damage to any product resulting from the disregard of information contained in this manual.

## Purpose of this manual

This manual contains the information necessary to understand and to configure the H5 line Humidity and Temperature transmitter.

This manual is written on the assumption that the reader possesses basic knowledge of Fieldbus techniques, in particular for Modbus. Use this manual if you are responsible for configuring and installing Ascon Tecnologic modules with Modbus interface.

## Using this manual

Specifications within the text of this manual are given in the International System of Units (SI), with non SI equivalents in parentheses.

Fully capitalized words within the text indicate markings found on the equipment.

Words in bold style within the text indicate markings found in the Configuration Tools.

Warnings, Cautions and Notes are used to emphasize critical instructions.

**NOTICE:**

This product must be used by qualified operators and with appropriate procedures, exclusively for the purposes set out in this manual.

In this manual, the following symbols are used to indicate and classify the precautions to be taken. These precautions must be strictly observed, the relative non-observance can cause serious injuries to people and things.

***DANGER!***
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.


**WARNING!**
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**Caution**
Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

**Note:** Highlights important information about an operating procedure or the equipment.

Per un uso agevole di questo manuale sono stati previsti i seguenti aiuti:

- A main table of contents covering all subject matter is provided at the front of this manual.
- A table of contents covering information within a section or an appendix is provided at the front of the individual section or appendix.
- Appendices covering specific topics are provided following the last section in the manual.
  - MODBUS Addresses Map;
  - Suggestions and examples;
  - Definitions, symbols and conversion tables.

## Getting started

In the first section you are introduced to Ascon Tecnologic modules basics. The following sections contain general information that applies to all modules or module groups of the series. Topics are for example:

- Overview of the product;
- Terminal installation and wiring;
- Common technical data.

## Related documents

For additional information regarding MODBUS in general, refer to the documents issued by the respective Users Organisations. If you need specific information on an Ascon Tecnologic, refer to the specific data sheet.

## Current documentation on Internet

Make sure you are always working with the latest documentation published. The latest changes or additional information can be found on the Internet at:

`http://www.ascontecnologic.com`

Ascon Tecnologic Products pages are to be updated frequently. It is possible therefore that the Data Sheets published on the Internet would have a publishing date more recent than the date of this manual.

## We are interested in your comments

Ascon Tecnologic srl makes any effort to improve the quality of its manuals.
Nevertheless errors and omissions are always possible. If you have suggestions or indications about the content or the form of this manual, Ascon Tecnologic srl will greatly appreciate your comments. You can send an e-mail to:
`support@ascontecnologic.com`

## Legal statement



## Validity of documentation

This manual mainly contains the description of H5 line Humidity and Temperature transmitter that was available when this manual was published.
Ascon Tecnologic srl reserves the right to make any technical extension and change to the equipment that would serve the purpose of technical progress. Up to the time that a new manual revision is published, any update or change will be documented on the Internet at:

`http://www.ascontecnologic.com`

# *Chapter 1*
# *Getting started*

## 1-1 Product description

The **H5** line transmitters are Humidity, Temperature & Dew Point electronic measuring instruments that determine measurements by means of a highly accurate, condensation resistant capacitive sensor integrated in a silicon microchip (the "**Humi-Chip**" module).

This technology provides accurate process measurements, reliability and excellent long-term stability. Accurate Dew Point calculation is obtained by the integrated humidity and temperature sensors.

**Caution**

The sensor must not be used in the presence of contaminating or aggressive chemicals.

The "Humi-chip" module that incorporates the sensor can be easily replaced without the need for re-calibration; its environmental limits are: 0... 100% for Relative Humidity (RH) and -30... +90°C for Temperature and Stability: <0.5 RH% per year for Long-term drift.

When purchasing, if the ordering code is correctly composed, the transmitter can be installed and used with no further settings.

Expert users using the "Controller Explorer" software can easily set the transmitter parameters. Through the serial port the user can connect the H5 to a Personal Computer and in this way configure:

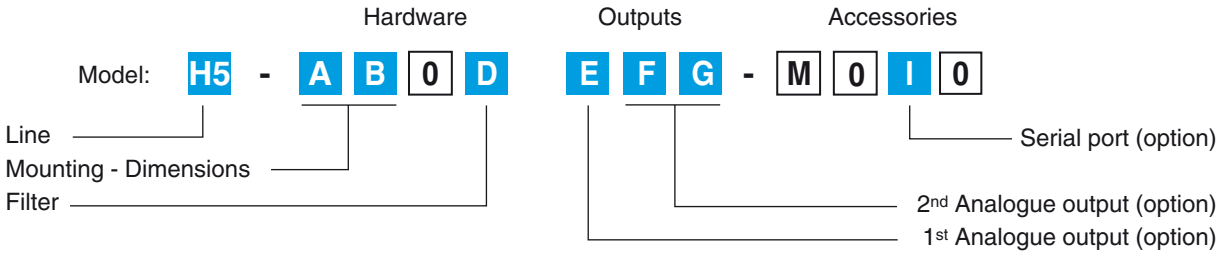
- The analogue outputs;
- The alarms;
- The data logger;
- The event tracer.


**WARNING!**

In order to install and use the transmitter, follow the instructions in chapters 1... 4. The procedure to configure the transmitter parameters can be found at chapters 5... 9.

## 1-2 Order Code

Hardware options are added to H5 transmitters as required by the user. The options that are to be installed are specified by the first part of the Ordering Code.




Where:

| Mounting | Dimensions | A | B |
|---|---|---|---|
| Wall | Ø20 x L110 | P | 0 |
| Duct | Ø20 x L250 | C | 2 |
| | Ø20 x L530 | C | 5 |
| Remote | Ø20 x L160, cable 2 m | R | 2 |
| | Ø20 x L160, cable 5 m | R | 5 |

| Filter | D |
|---|---|
| Stainless steel wire mesh | R |
| Sintered stainless steel | S |
| Teflon | T |

| 1st Analogue output - Humidity [1] - [3] | E |
|---|---|
| Not fitted | 0 |
| 4... 20 mA/0... 100% UR | 1 |
| 0... 10 V/0... 100% UR | 2 |
| 0... 1 V/0... 100% UR | 3 |

| 2nd Analogue output - Temperature [3] | | F |
|---|---|---|
| Not fitted | | 0 |
| Temperature (**T**) | 4... 20 mA | 1 |
| | 0... 10 V | 2 |
| | 0... 1 V | 3 |
| | PT100 - IEC751 compliant **[4]** | P |
| Dew Point (**DP**) | 4... 20 mA | 4 |
| | 0... 10 V | 5 |
| | 0... 1 V | 6 |
| ΔT (**T - DP**) | 4... 20 mA | 7 |
| | 0... 10 V | 8 |
| | 0... 1 V | 9 |

| Temperature range [2] (°F on request) | G |
|---|---|
| (if F = 0 or F = P) | 0 |
| -30... +70°C | 1 |
| -20... +30°C | 2 |
| 0... 50°C | 3 |
| 0... 100°C | 4 |

| Serial Communications + Special Functions | I |
|---|---|
| Not fitted | 0 |
| RS485 Modbus + Alarms + Events + Data logging | 5 |

Example: H5-R50R-141-M050

**Notes: 1.** On request, the 1st analogue output can be used for T, DP or ΔT.

**2.** Suggested temperature ranges:
DP: -30... +70°C or 0... 100°C
ΔT: 0... 50°C.

**3.** Other measure ranges available (selectable using the serial communications).

## 1-3 Hardware configuration (1st part of the Order Code)

### 1-3-1 Mounting type (fields A and B of the Order Code)

The H5 line can be installed in different modes also through dedicated accessories:

- Wall installation, mounting the transmitter directly;
- Sensor remote installation (cable of 2 or 5 m long) also with the wall mounting bracket for remote sensor (Order Code: **AH-SMP01**);

- Sensor remote installation (cable of 2 or 5 m long) also with the wall mounting bracket for remote sensor (Order Code: **AH-FLA20**).

| Mounting | Dimensions | A | B |
|---|---|---|---|
| Wall | Ø20 x L110 | **P** | **0** |
| Duct | Ø20 x L250 | **C** | **2** |
| | Ø20 x L530 | **C** | **5** |
| Remote | Ø20 x L160, cable 2 m | **R** | **2** |
| | Ø20 x L160, cable 5 m | **R** | **5** |
| | Ø20 x L160, cable 10 m | **R** | **1** |

### 1-3-2 Probe sheath material

The probe for duct mounting is made in polycarbonate that can be used in the food and beverage industries.

### 1-3-3 Sensor protection filter (field D of the Order Code)

Environmental protection for the Humi-chip module is provided by one of three user selected filter types:

- Wire mesh stainless steel filter with threaded filter protection.
  Porosity of 25 µm and response time of 5 s (0... 63%) make it suitable for clean environments dust and moderate wind conditions.
- Stainless steel sintered filter with threaded connection.
  Porosity of 5 µm and response time of 10 s (0... 63%) make it suitable for dusty environments, not moisture resistant.
- Teflon filter with threaded connection.
  Porosity of 1 µm and response time of 120 s (0... 90%) make it suitable for aggressive chemical environments, not suitable with highgrade humidity.

| Filter | D |
|---|---|
| Stainless steel wire mesh | **R** |
| Sintered stainless steel | **S** |
| Teflon | **T** |

## 1-4 Output configuration (2nd part of the Order Code)

Using the order code, the user can order the configuration of the output ports necessary to the application:

- Number of analogue outputs (0, 1 or 2);
- Output type (Current/Voltage output, Relative Humidity, Temperature, Dew Point and ΔT);
- Temperature output range;
- If the analogue output configuration cannot be specified in the Ordering Code, the user may configure the outputs with the Controller Explorer software (see "Chapter 5 - ***Advanced functions***" for details.

| 1st Analogue output - Humidity [1] - [3] | E |
|---|---|
| Not fitted | **0** |
| 4... 20 mA/0... 100% UR | **1** |
| 0... 10 V/0... 100% UR | **2** |
| 0... 1 V/0... 100% UR | **3** |

| 2nd Analogue output - Temperature [3] | | F |
|---|---|---|
| Not fitted | | **0** |
| Temperature (**T**) | 4... 20 mA | **1** |
| | 0... 10 V | **2** |
| | 0... 1 V | **3** |
| | PT100 - IEC751 compliant | **P** |
| Dew point (**DP**) | 4... 20 mA | **4** |
| | 0... 10 V | **5** |
| | 0... 1 V | **6** |
| ΔT - Temperature difference (**T - DP**) | 4... 20 mA | **7** |
| | 0... 10 V | **8** |
| | 0... 1 V | **9** |

## 1-5 Accessories configuration (3rd part of the Order Code)

The transmitter allows the installation of some optional accessories in order to guarantee good application flexibility. The available options are the RS485 communications port with the Real Time Clock (RTC) to activate special functions such as: alarm events and data logger.

| Serial Communications + Special Functions | I |
|---|---|
| Not fitted | **0** |
| RS485 Modbus + Alarms + Events + Data logging | **5** |

## 1-6 Transmitter configuration

### 1-6-1 Basic configuration

If all hardware configurations and options can be specified in the Ordering Code, the transmitter can be installed and used immediately.

### 1-6-2 Advanced configuration

If all hardware configurations and options are not specified in the Ordering Code, the transmitter can be configured with the Humidity Explorer software.

## 1-7 Usage

The main function of the instrument is to read the environmental conditions from the Humi-Chip sensor: Relative Humidity (RH), Temperature (T), Dew Point (DP) and Temperature difference (ΔT) between the temperature and the Dew Point Temperature ( (ΔT = T - DP). After the values are converted they can be retransmitted through the analogue outputs and can be used to configure the alarms.

The measures together with the min./max. values are always available as Modbus variables. The limit values can be reset through the serial line and the Modbus protocol.

No buttons are available on the transmitter. The only operator interface is through the Modbus protocol.

When the analogue outputs are installed in the instrument, each can be configured to retransmit the value of one of the 4 variables RH, T, DP or ΔT. During the configuration phase the user can also select the transmission mode (current/voltage).

# Chapter 2
# Start up

## 2-1 Installation

Consult the installation manual for further details.

## 2-2 Installation Precautions

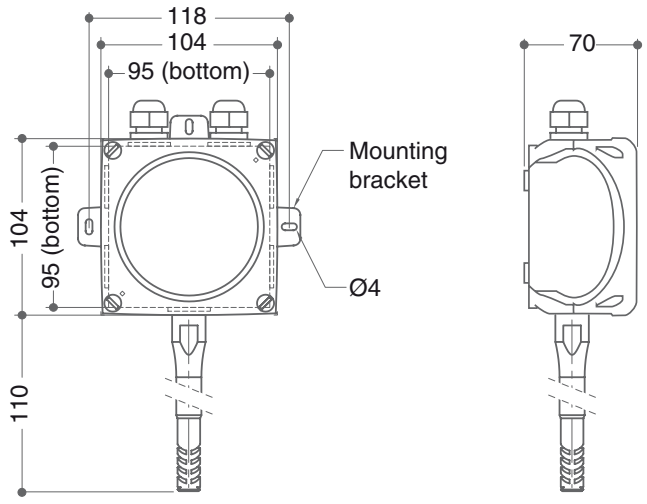
Humi-Chip measurement module incorporates an integrated temperature sensor.
The measured values are correct when the Humi-Chip Humidity and Temperature are both in equilibrium with the surrounding ambient conditions.
For optimum performance, the following recommendations must be observed:

1. Install the sensor in the most representative location of the ambient to be controlled;
2. Avoid the following conditions:
   - Direct exposure to sun and atmospheric agents;
   - Installing the sensor next to heaters, coolers, steam vents and humidifiers;
   - Turbulences which can generate unstable pressures.

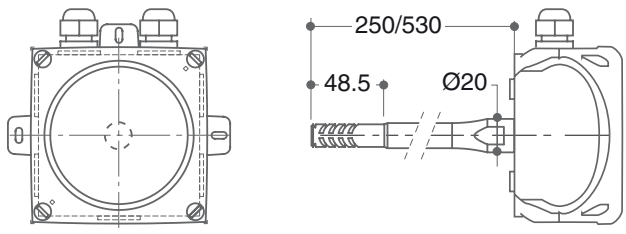
## 2-3 Dimensions

### 2-3-1 Transmitter

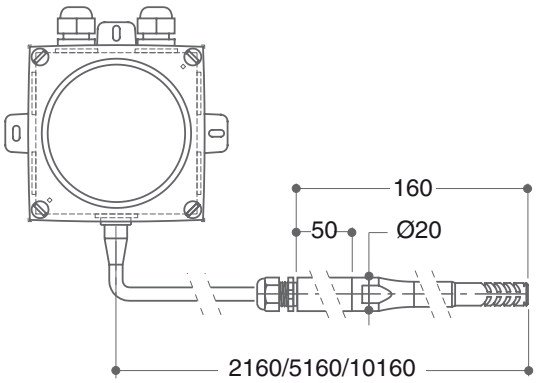
*Wall mounting*




*Conduit mounting*

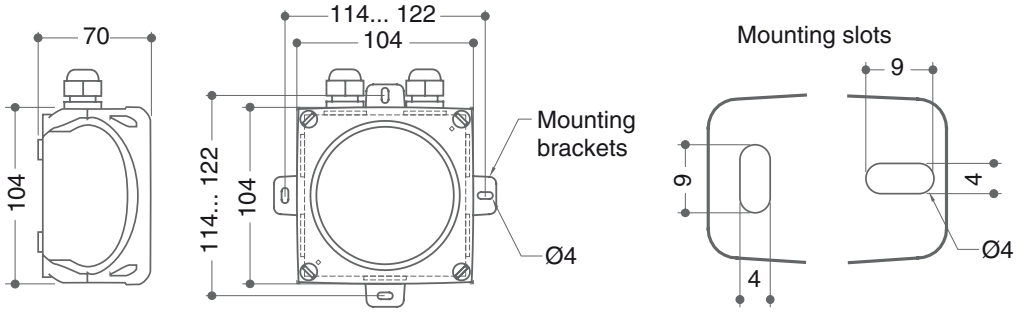


*Remote sensor mounting*

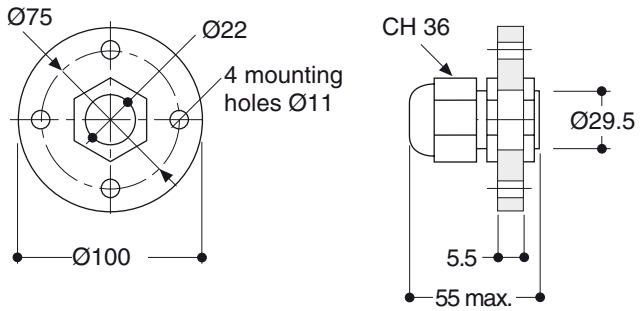



*Outputs* **Output M16 Conduit**

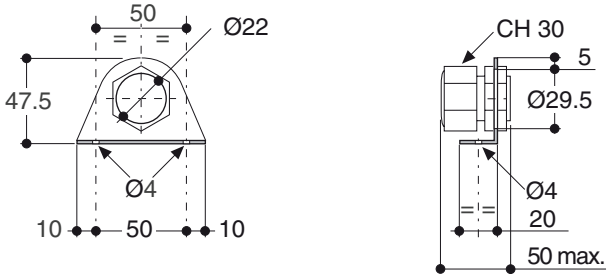

*Mounting holes*




*Mounting for Duct model H5-C...* **Adjustable flange Ø100 self locking (AH-FLA20 optional)**

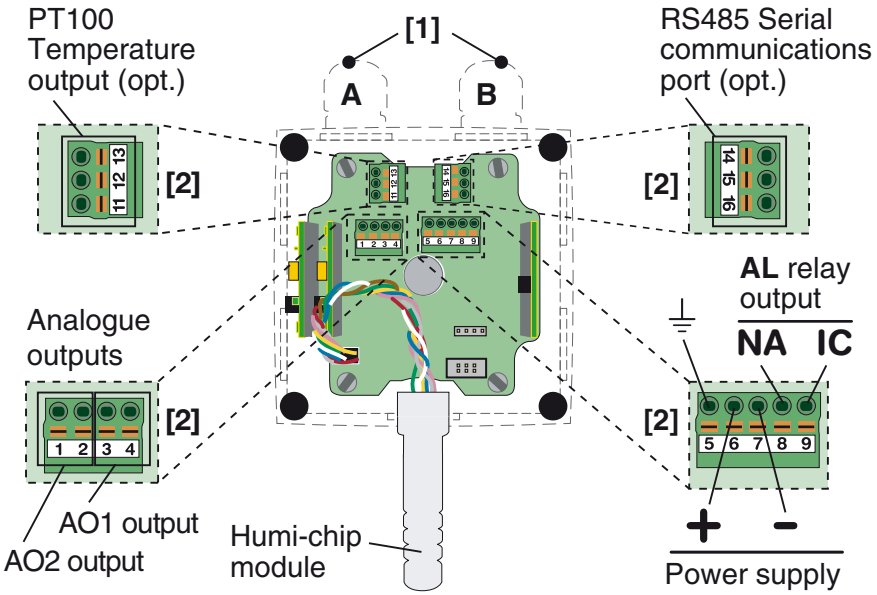



*Wall mounting bracket for remote sensor* **Bracket for remote sensor (AH-SMP01 optional)**



## 2-4 Electrical connections

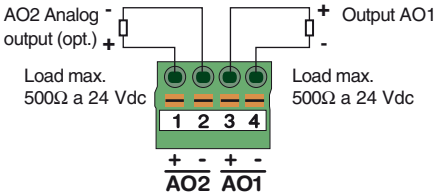
### 2-4-1 Version with internal removable spring terminals and M16 conduits



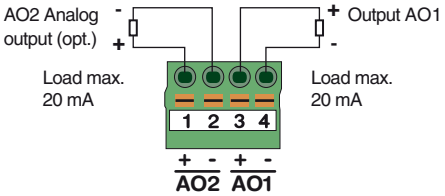

**Notes:**
1. Two M16 conduit for output cables up to Ø8.5 mm.
2. Spring terminal strip for cable sections of 0.14... 1.5mm² (AWG28... AWG16).
3. The AO1 output is isolated from the optional AO2 output.

*Analogue output terminals*

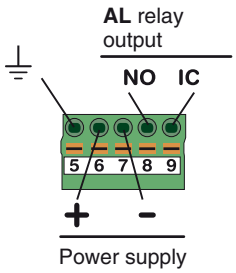
**AO1 and AO2 set as current outputs (0/4... 20 mA)**




**AO1 and AO2 set as voltage outputs (0... 1, 0... 5, 0...10Vdc)**



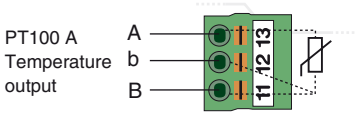

*Power supply and alarm relay output*




*Serial communications port*


**Note:** When the RS485 communications port is not present in the transmitter on the same terminals are present the signals of the embedded RS232 communications port. (see "*Chaper 8 - Configuration*").

*PT100 output terminals*



# *Chapter 3*
# *Basic Functions*

## 3-1 Transmitter functions

The H5 line transmitters receive humidity/tempearture data from an external sensor and convert them in order to retransmit analogue signals or display decimal values.

The basic functions of the H5 instruments include also some calculations in order to obtain new values from the data acquired.

### 3-1-1 Data acquired from the Humi-Chip

Humidity and Temperature data are received from the Humi-Chip in digital format; once data are in the transmitter, they are linearized and converted. Using Relative Humidity (RH) and Temperature (T) measurements the instrument calculates the Dew Point (DP) and the Temperature - Dew Point temperature difference (∆T).

The measurement is made once every second continuously.

The variable values, stored and displayed, have 1 decimal digit.

The Relative Humidity (0... 100%) acquired by the sensor is composed by a 12 bit value. The Temperature (-40... +123.8°C) is composed by a 14 bit value. Both these values are processed in order to compensate the non linearity of the reply.

*Relative Humidity (RH)* The Relative Humidity value acquired from the Humi-Chip sensor is modified by a 2nd order polynomial calculation in order to obtain a non-linearity error of ±0.1%RH.

Temperature (T) The Temperature measurement is made using a BANDGAP sensor type that is inserted in the same body of the Humidity sensor and with which it shares the electronic interface. The measurement is corrected in order to delete non linearity errors normally present near to the range limits.

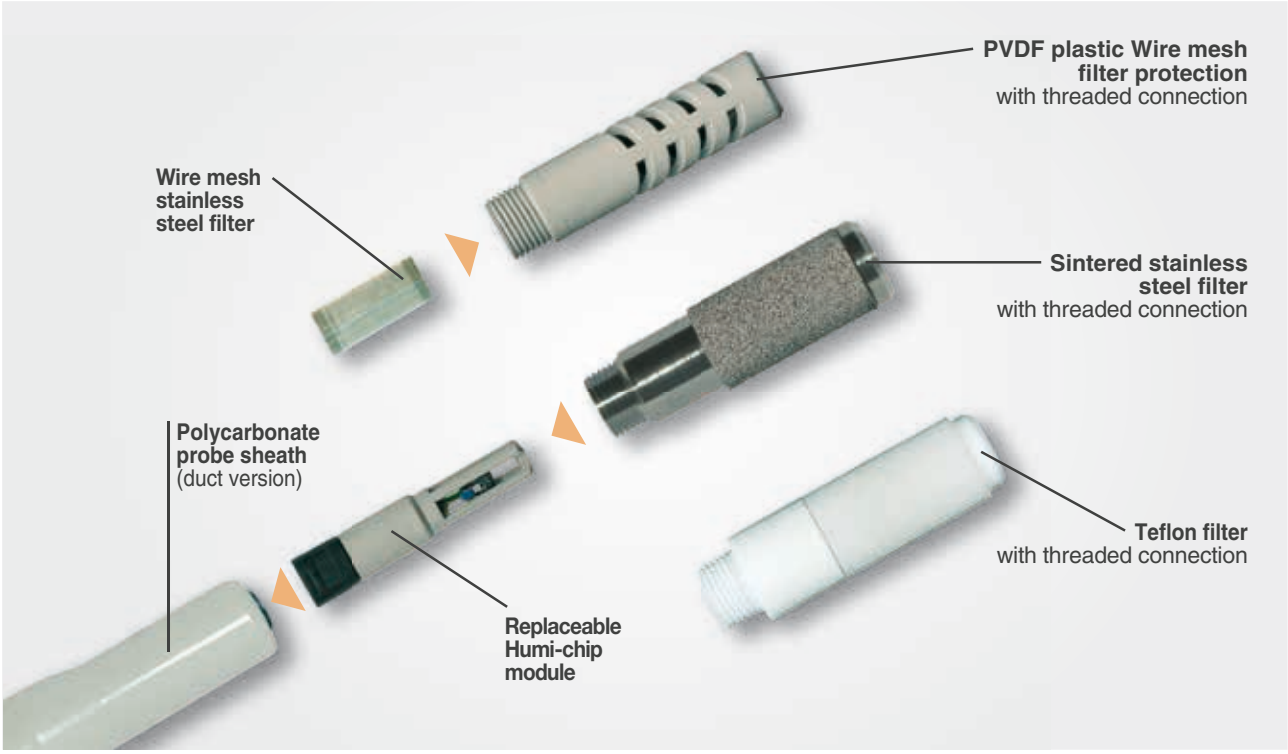
### 3-1-2 Data calculated by the instrument

*Dew Point and ∆T)* The Dew Point value is calculated starting from the final RH and T values, while ∆T (difference between the Temperature and the Dew Point Temperature) is calculated making the algebraic difference between the 2 values:

$\Delta T = T - DP$.

# Chapter 4
# Maintenance

## 4-1 Cleaning/replacing the dust filter




The dust filter should be cleaned from time to time depending on the working conditions. Cleaning is done by:

1. Removing the filter from the probe as decribed in the "*Replacing the Humi-Chip module*" paragraph ((points 1, 2 and 3);
2. Clean the wire mesh filter by washing it with water. TheTeflon and the Sintered stainless steel filters should be cleaned with compresed air (the air pressure must be applied within the filter). Make sure to perform the cleaning far from the Humi-Chip module so as not to cause damage.

If this is not sufficient, the filter should be replaced.

## 4-2 Replacement of the Humi-Chip module

The sensor of the “Humi-Chip” module does not need any periodic calibration. The replacement sensor is delivered factory calibrated.

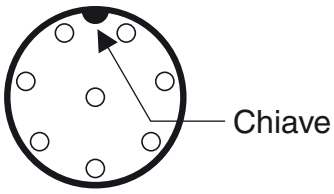
Calibration is not required after replacement. If the replacement of the “Humi-Chip” module is necessary, proceed as follows:

1. Switch off the power supply;
2. Verify that the “Humi-Chip” module is at a safe temperature;
3. Unscrew (**A**) the filter (or the plastic protection), then (**B**) slide it away from the sensor;

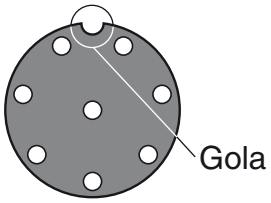

4. When present, (**C**) separate the stainless steel wire mesh filter from the Humi-Chip module then (**D**) gently withdraw the sensor module in order to separate the Humi-Chip from the mounting connector. The Humi-Chip module must be gripped from the body (**D’**) and not from the ventilated part of the sensor (**D”**);


5. Insert the new module aligning the insertion key present in the Humi-Chip connector to the groove of the correspondent 8 pin connector; gently push the new module in position. Humi-Chip module must be gripped from the body (**D’**) and not from the ventilated part of the sensor (**D”**);

**Connettore sul modulo Humi-Chip (maschio)**




**Connettore sullo stelo del trasmettitore (femmina)**




6. When present, re-install the wire mesh filter and its plastic protection, or re-install the filter.

# Chapter 5
# Advanced functions

**Caution**
This chapter and those that follow are devoted to advanced users only.
An not-correct transmitter configuration may cause a malfunction.

Expert users can modify the configuration of the H5 transmitter in order to adjust the transmitter features to the project specification. Using the 485 serial communications port and the Modbus protocol the user can change:

- Type and range of the analogue outputs;
- Serial port settings and Modbus address;
- Alarm parameters (reset, start-up disabling, source, destination and type);
- Relay output setting;
- The setup of the Events (EVENT) and Data logging (LOGGER) (when the RTC option is installed);
- Download EVENT/LOGGER data.

## 5-1 Analogue Outputs

The 2 analogue outputs are optional and programmable, they can function as Current/Voltage retransmission outputs.

| Output type | Signal type |
|---|---|
| Current Output (mA) | 0... 20 mA |
| | 4... 20 mA |
| Voltage Output (V) | 0... 1 V |
| | 0... 5 V |
| | 0... 10 V |

Each output can be connected to one of the 4 measured/calculated variables (**RH**, **T**, **DP** and **ΔT**). The range of the output is the same of the variable range.
It is possible, for each analogue output, to define the range of the connected variable (start and end of range).

## 5-2 Serial Port Setting

Using the serial comunications port the user can set also the RS485 communications parameters:

- Node address;
- Protocol;
- Baudrate.

## 5-3 Alarms

The transmitter has 5 alarms that can be freely and independently addressed to the relay alarm output. When more than one alarm is simultaneously active on the relay output, the relay status is determined by the **AND**/**OR** logical status of the alarms. First are evaluated the inputs that are connected in **AND** then those connected in **OR**. When in alarm mode, the output relay can be set to be activated (contact closed - NA configuration) or released (contact open - NC configuration).
The input of each alarm can be combined with any of the system measurements: **Humidity**, **Temperature**, **DP**, **T**, **ΔT** and **Humi-chip break.**
Each alarm can be configured as **minimum** or **maximum**, **absolute**, **deviation or band threshold**, **instantaneous** or **delayed**, **inhibit at activation** (Blocking) or **acknowledge** (Latching). Each alarm can also be configured for **signal source**, **type of alarm**, **reset method**, **power up activation mode** and **destination**. The alarm status is always available in STATUS REGISTER.

**Note:** The alarm parameter format is referred to the input range associated to the alarm.

### 5-3-1 Alarm ackowledge

There are 2 different reset modes:

| Name | Description |
|---|---|
| Auto | The alarm is activated when an alarm condition is detcted, the alarm status is removed as soon as the alarm condition is removed. |
| Latching | The alarm is activated when an alarm condition is detected, the alarm status is removed only when the alarm has been acknowledged and the alarm condition has been removed (**note**) |

**Note:** The alarm acknowledge can be done only through serial communications commands.
The tables with the alarm status related to the ackowledge type follows:
**AUTO**

| Status | Status transitions | | | | Indication | Relay output |
|---|---|---|---|---|---|---|
| | Input variable | | Acknowledge | | | |
| | Normal condition | Alarm condition | Acknolegdge not done | Done (ACK) | | |
| Normal | No status changes | Alarm | | | OFF | Not active |
| Alarm | Normal | No status changes | | | ON | Active |

**Latching**

| Status | Status transitions | | | | Indication | Relay output |
|---|---|---|---|---|---|---|
| | Input variable | | Acknowledge | | | |
| | Normal condition | Alarm condition | Not done | Done (ACK) | | |
| Alarm | | | No status changes | ACK | ON | Active |
| Acknowledge | Normal | No status changes | | | ON | Active |

### 5-3-2 Start-Up Disabling (Blocking)

At Power ON each alarm can be programmed to function in nomal mode or in blocking mode. When in normal mode, the alarm will be active or not depending on the input status also at Power ON; when in blocking mode, the first alarm activation is always inhibited; the alarm activation is postponed to the reset mode set.

**Start-Up Disabling (Blocking)**

| Name | Description |
|---|---|
| Normal | The alarm is never inhibited |
| Blocking | The first alarm condition after Power ON is discarded |

### 5-3-3 Alarm Source

There are 5 different sources that can activate the alarms:

| Name | Description |
|---|---|
| RH | Relative Humidity Input |
| T | Temperature Input |
| DP | Dew Point Input (internally calculated) |
| ΔT | ΔT Input (internally calculated) |
| Fault sens | Sensor break condition signalled by the diagnostic routines |

### 5-3-4 Relay output alarm destination

Each alarm is identified by a specific Modbus variable in which are present both the alarm logical value and the content of the configuration register. In addition, it is possible to address the function to the relay output. All the alarms can be addressed to the relay output in OR mode.

| Name | Description |
|---|---|
| None | No alarm destination |
| AND Relay | The alarm is connected in AND mode to the other alarms and in OR mode to the relay alarm output |
| OR Relay | The alarm is connected in OR mode to the other alarms on the relay alarm output |

### 5-3-5 Alarm types

In the table that follows are described the alarm types available:

| Name | Description |
|---|---|
| None | Alarm disabled |
| Fault-sens | Sensor break alarm |
| Hi | Input Higher than the Hi alarm threshold |
| Lo | Input Lower than the Lo alarm threshold |
| DevHi | Input Higher than a specified value from the reference value |
| DevLo | Input Lower than a specified value from the reference value |
| BandOut | Input external to the band defined by the threshold values from the reference value |
| BandIn | Input internal to the band defined by the threshold values from the reference value |
| Rate | When the changing rate of the variable connected to the alarm is higher than the specified threshold, the alarm is activated. The threshold is in digit/s |
| Hi+delay | Input Higher than the Hi alarm threshold for a specified period of time |
| Lo+delay | Input Lower than the Lo alarm threshold for a specified period of time |
| DevHi+ delay | Input Higher than a specified value from the reference value for a specified period of time |
| DevLo+ delay | Input Lower than a specified value from the reference value for a specified period of time |
| BandOut+ delay | Input external to the band defined by the threshold values from the reference value for a specified period of time |

| Name | Description |
|---|---|
| BandIn+ delay | Input internal to the band defined by the threshold values from the reference value for a specified period of time |
| Rate+ delay | When the changing rate of the variable connected to the alarm is higher than the specified threshold for a specified period of time, the alarm is activated. The threshold is in digit/s |

## 5-4 Relay Output

Relay output is always present on H5 line, the relay has 1 NO contact for signal loads. The relay is activated by the presence of any alarms set. The contact can be programmed to function in direct (contact closed when energized) or reverse (contact open when energized) mode.

## 5-5 Real Time Clock (RTC) and Associated Functions

An optional Real Time Clock (associated with the RS485 Serial Communications Adapter) can be installed in the transmitter. The RTC maintains the current date and time and gives the time base for tracing events and data logging. These two special functions can be activated using a Modbus command.

### 5-5-1 Date and time

The format of date and time data is standard (ref: CEI 870-5-4).
The internal clock can be adjusted only through the Modbus protocol. The information is structured on 4 words as follows:

**DATE Register**

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Value | x | x | x | x | M | M | M | M | x | x | x | J | J | J | J | J |
| | Month | | | | | | | | Day | | | | | | | |

**Note:** **M** = **MONTH** setting -> value 1... 12;
**J** = **DAY** setting -> value 1... 31.

**YEAR Register**

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Value | x | x | x | x | M | M | M | M | x | x | x | J | J | J | J | J |
| | Year | | | | | | | | | | | | | | | |

**Note:** **A** = **YEAR** setting -> value 00... 99

**TIME1 Register**

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Value | x | x | x | x | M | M | M | M | x | x | mn | mn | mn | mn | mn | mn |
| | Ora | | | | | | | | Minuti | | | | | | | |

**Note:** **H** = **HOUR** setting -> value 0... 23;
**mn** = **MINUTES** setting -> value 0... 59.

**TIME2 Register**

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Value | ms | ms | ms | ms | ms | ms | ms | ms | ms | ms | ms | ms | ms | ms | ms | ms |
| | milliseconds | | | | | | | | | | | | | | | |

**Note:** **ms** = **MILLISECONDS** setting -> value 0... 59999.

### 5-5-2 Tracing Events (DATA EVENT) and Data Logging (DATA LOGGER)

The function is programmable in different operation modes. Every time the system stores the data, it registers all the variable registers, date and time registers plus a register relative to the alarm status which also codes the type of event. It is possible to enable the two storage capabilities separately.

A different functioning mode, called interlaced, activates both the functions with the peculiarity that, when an alarm event happens and during the whole time the alarm is active, the EVENT recording takes place at a frequency different from the one used when no alarms were active. The two times are user programmable via dedicated Modbus registers. The interval between 2 data acquisitions can be set from a minimum of 1 minute to a maximum of 59 minutes.

Data are stored in EEPROM and are not erasable by the user. The circular buffer can store 1024 records and, when full, new data are written in place of older ones.

*Operation*

These functions, specific of this high-end model, can be set, separately and independently, through the Modbus in different modes (register **851**).

**0** No functions active (default);

**1** Data EVENT running;

**2** Data EVENT and data LOGGER independently running;

**3** Data EVENT and data LOGGER running in interlaced mode.

**4** Normally the data logger acquires data at the sampling time written in register **430**; when an event occurs (as an alarm), the data logger starts acquiring at the sampling time written in register **431** (normally shorter than the one in register **430**);

Register **432** sets the data Event and data Logger status:

**0** Functions stopped (default);

**1** Data acquisition enabled (data Event and data Logger running).

*Data format*

Registered data have always the same format, independently from the function that requires the data. Each record is composed by 7 registers:

**Record composition**

| Registers | Data format |
|---|---|
| Event type | (note) |
| Data_RH | RH value |
| Data_T | T value |
| Data_DP | DP value |
| Data_date | See "DATE register" at page 18 |
| Data_year | See "YEAR register" at page 18 |
| Data_time | See "TIME1 register" at page 19 |

The Event type register directly qualifies the type of stored record. If the value is 0 the record is a data LOGGER record. All bit indications, are valid only if the record is a data EVENT record.

- bit 0... bit 3 Show the alarm type set in ALn-type (t) correspondent to the alarm event occurred;
- bit 4... bit 7 Not used (0 default);
- bit 8... bit 12 Show the number of the activated alarm (AL1... AL5);
- bit 13 Not used (0 default);
- bit 14 Shows if the event is an alarm activation (status changes from OFF to ON) or an alarm end (status changes from ON to OFF): 0 = alarm start/1= alarm end;
- bit 15 Shows the type of the stored: 0 = LOGGER/1 = EVENT.

**EVENT_type register**

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Value** | RT | AL | 0 | AL5 | AL4 | AL3 | AL2 | AL1 | 0 | 0 | 0 | t | t | t | t | t |
| | **Alarm_status** | | | **Alarm_ALn** | | | | | **ALn-type** | | | | | | | |

**Note:** ALx-type (t) = Alarm type set in

- Alarm-ALn (AL1... AL5) = bit 1... bit 5 identify the occurred alarm (those set to 1);
- Alarm-status (AL) = 0 alarm event END; 1 alarm event START;
- Alarm-status (RT) = 0 LOGGER record; 1 EVENT record.

Data are physically registered in EEPROM and are not user erasable. The buffer memory can store 1024 records, is circular (when full, new data overwrite the oldest registered).

*Access to stored data*

To access the database an index register and up to **56** reading registers must be used. The index register (register **2000**) points the first reading record, considering that *index 0* corresponds to the last stored record (i.e. the most recent). The read registers are those at addresses **2001**... **2056**. Accessing all the **56** reading registers allow the user to read **8 complete data records**.

In any case (a single register or a multiple consecutive registers reading) the reading procedure must be preceeded by the write index register process.

A particular case can be found when the reading request starts at address **2001**. In this case, at the end of the data transfer, the index register is automatically incremented of the amount of transferred registers. This procedure allows to perform continuous multiple reading through the reading address without writing the index register at the end of each reading.

In order to guarantee the correct reading sequence, the number of acquired registers must be a multiple of the registers contained in a record; this means that is recommended to make a complete reading of each record, otherwise the index register does not count the not-completed record reading so the incomplete record will be read again at the beginning (first element) of the subsequent reading cycle.

## 5-6 Commands

The available Commands/Functions using the Modbus protocol are:

- Reset the min/MAX variable values;
- Alarm acknowledge;
- Sensor check;
- Event tracer - Data logger Start/Stop command;
- Sensor calibration;
- Sensor substitution.

The commands can be submitted only through the serial communications port using the Modbus protocol.

## 5-7 Calibration commands

**Caution**

Transmitters are factory calibrated and no further calibrations are required even after replacing the Humi-chip sensor. If the user should have the necessity to make a fine calibration, the alignment can be made on 1 or 2 points and minimizes measurement errors in real working conditions. This type of calibration does not modify the internal calibration of the sensor.

The calibration and the sensor change functions can also be run by the user and

are protected by a public password. To access the procedure the user must use the register **306** for sensor calibration (to calibrate both Humidity and Temperature) and register **307** to write the sensor substitution data.

### 5-7-1 Humi-Chip sensor calibration

The calibration procedure must be done through the specific Modbus commands or using “Humidity explorer” software.

There are two different modes to calibrate the sensor; both can be accessed and enabled by the user through a specific command. To access the calibration registers the user must insert the public password writing the value **0x1234** at register **1101**.

The sensor calibration can be done using the 1 or 2 point methods. The reference points are chosen by the user, who must insert the exact calibration values. More far are the two points more accurate will be the variable measurement.

For these operations 4 different registers are reserved to calibrate the Humi-chip sensor, 2 to calibrate the humidity and 2 to calibrate the temperature measurement.

The user can reset the calibration procedure using a specific command.

**Humidity and Temperature Calibration Method through Modbus Commands**

The command register of the calibration procedure is register **306**.

The example that follows describes the 2 point humidity calibration procedure. To calibrate with only one point, the user can omit points **4**, **5** and **6** of the list (writing the register of humidity Hi point data). This method functions like the offset.

It is possible to calibrate the humidity measurement (registers **905** and **906**) and/or Temperature (registers **908** and **909**).

2. The sensor must be in stable environmental conditions according with the first point to be calibrated (**Low**).
3. Write in register **306** the code of calibration Low: **0x2210** (**8720**).
4. Write in register **905** the humidity reference value; the new Low Calibration value has been acquired.
5. Change the environmental conditions to those of the second point (**High**) to be calibrated. To obtain a valid sensor calibration the conditions of the sensor must be stable.
6. Write in register **306** the code of calibration High: **0x2220** (**8736**).
7. Write in register **906** the humidity reference value; the new High Calibration value has been acquired.
8. Write in register **306** the code **0x2250** (**8784**) to specify that the new calibration values are to be accepted and the transmitter returns to the normal operation mode.

| Calibration value | Operation | Command for register 306 |
|---|---|---|
| Humidity low | Calibration Humidity reference low (1st point) | 0x2210 |
| Humidity high | Calibration Humidity reference high (2nd point) | 0x2220 |
| Temperature low | Calibration Temperature reference low (1st point) | 0x2230 |
| Temperature high | Calibration Temperature reference (2nd point) | 0x2240 |
| -- | Calibration end - store calibration data | 0x2250 |
| -- | Reset Humidity sensor calibration | 0x2300 |
| -- | Reset Temperature sensor calibration | 0x2400 |
| -- | Reset the calibrations and the offsets (**RH** and **T**) and returns to the initial condition with a system reset | 0x2500 |

To reset a calibration procedure and return back to the default conditions, the user must write the correct reset command to register **306**.

### 5-7-2 Sensor replacement

The sensor substitution procedure is not a real calibration proccss, but is the way to write in the transmitter the date of the sensor replacement.

The Humi-chip characteristics ensure a good measure long term stability (long term stability <0.5% per year) only if the sensor is used in its best working conditions. When the Humi-Chip is mounted in environments with high rates of pollution or conditions near to the sensor limits, permanent drifts can be generated in the sensor performance and the Humi-Chip module must be replaced.

For this scope in the transmitter are present some registers in which the user can store the information about sensor installation date and time. Also these registers are protected by a public password that must be inserted prior to modifying these registers. Every time the sensor is replaced the date and time registers are to be modified as follows:

- Write registers **901**, **902** and **903** with the correct data;
- Write in register **307** the access code **0x4432**;
- The new date and time information are stored.

The correct date and time format is described at paragaph "*5-7 - Calibration commands*" at page 18.

# Chapter 6
# The Modbus Protocol

## 6-1 Communication Lines

H5 line transmitters can be equipped with an optional RS485 serial communications line which can excahange data using the Modbus Protocol. This serial line is used to configure and manage the instrument.

When the RS485 line is not present, it is always possible to configure the transmitter using the internal RS232 line that communicates with the same Modbus protocol.

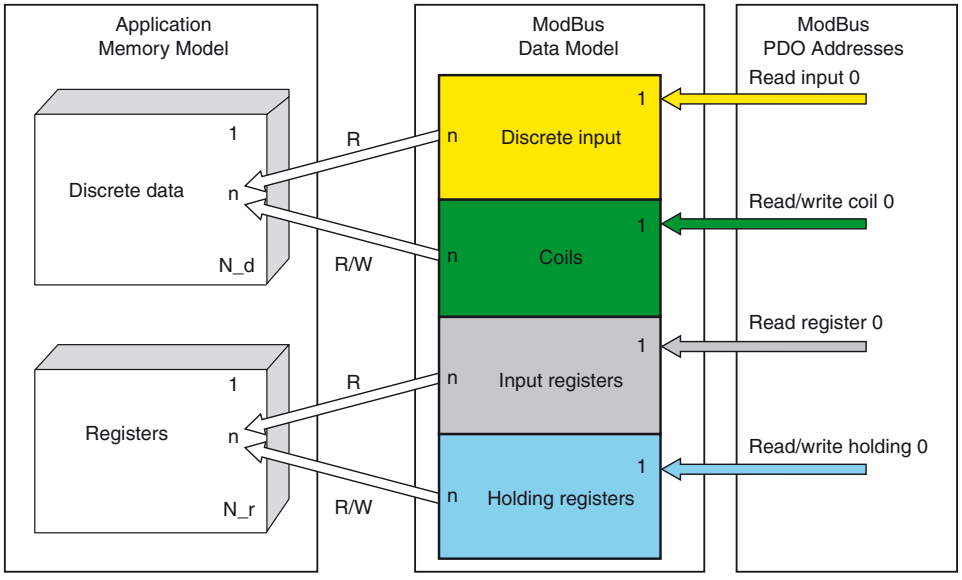
## 6-2 Modbus Functions

In the transmitter the following Modbus Functions has been implemented:

- 01 Read Coil Status;
- 02 Read Input Status;
- Read Holding Registers;
- Read Input Registers;
- Force Single Coil;
- Preset Single register:
- Read Status;
- Diagnostic Registers;
- Force Multiple Coils;
- Preset Multiple Registers.

This implementation of the Modbus protocol considers functions 01 and 02 identical as functions 03 and 04. Due to this type of use, the memory area orgaization is divided in two parts:

- DISCRETE DATA (bit area);
- REGISTERS DATA (word area).



Data are divided in types ad assigned to the address ranges that follow:

| Data type | Address Range | Sub-field | Data sub-type |
|---|---|---|---|
| Discrete data (area bit) | 1... 400 | 1... 100 | Phisical digital I/O |
| | | 101... 200 | Digital I/O extension |
| | | 201... 300 | Alarms |
| | | 301... 400 | Status variables |
| Registers (Area word) | 1... 1200 | 1... 120 | Field process I/O data |
| | | 121... 200 | Device Id/Info area |
| | | 201... 300 | Field process I/O extension |
| | | 301... 400 | Non retentive device Mngmt |
| | | 401... 800 | Retentive device Mngmt |
| | | 801... 1000 | Configuration data |
| | | 1001... 1050 | Diagnostics |
| | | 1101... 1200 | Reserved registers |

**Writing and Readin limits:**

| | |
|---|---|
| Coils writing in only one message | max. 128 |
| Coils reading in only one message | max. 160 |
| Registers writing in only one message | max. 16 |
| Registers reading in only one message | max. 125 |

## 6-3 Common Registers and Diagnostics

### 6-3-1 MODBUS Exception Responses

The response codes are:

| Code | Name | Meaning |
|---|---|---|
| 01 | ILLEGAL FUNCTION | The function code received in the query is not an allowable action for the server (or slave) |
| 02 | ILLEGAL DATA ADDRESS | The data address received in the query is not an allowable address for the server (or slave). |
| 03 | ILLEGAL DATA VALUE | A value contained in the query data field is not an allowable value for server (or slave) |
| 07 | NEGATIVE ACKNOWLEDGE - NACK | The server (or slave) is in the wrong state to process a request of this type or an attempt to write to a read only address has been made. |

**Note:** Code 07 has not been provided by Modbus.org Protocol. Use it for Ascon Tecnologic products compatibility only.

### 6-3-2 Status register

Accessed by the Function Code 07 - Read Exception Status

Reads 8 output of Exception Status.

| Bit | Name | Meaning |
|---|---|---|
| 1 | AL1-Status | Alarm status AL1 (0 = Normal operation; 1 = Alarm status) |
| 2 | AL2-Status | Alarm status AL2 (0 = Normal operation; 1 = Alarm status) |
| 3 | AL3-Status | Alarm status AL3 (0 = Normal operation; 1 = Alarm status) |
| 4 | AL4-Status | Alarm status AL4 (0 = Normal operation; 1 = Alarm status) |
| 5 | AL5-Status | Alarm status AL5 (0 = Normal operation; 1 = Alarm status) |
| 6 | BitCmd-Ack | Alarm Ack status (Acknowledge status /Alarm reset) |
| 7 | OP3 status | OP3 Relay output status (0 = Contact open; 1 = Contact closed) |
| 8 | Faut sensor | Sensor break alarm |

### 6-3-3 Diagnostics

Accessed by Function Code 08 - Diagnostics.
The only supported sub code is 0 (0000h) – Return Query Data.
The answer message is identical to the whole request message.

## 6-4 Discrete data (input and coils)

Registers in this area can be accessed as single bits. The access can be done with function codes **01**; **02**; **05**; **15**. Codes **01** and **02** have identical functionality.

**Alarms:**

| Coil | Name | Meaning | Access |
|---|---|---|---|
| 201 | AL1-Status | Alarm status AL1 (0 = Normal operation; 1 = Alarm) | R |
| 202 | AL2-Status | Alarm status AL2 (0 = Normal operation; 1 = Alarm) | R |
| 203 | AL3-Status | Alarm status AL3 (0 = Normal operation; 1 = Alarm) | R |
| 204 | AL4-Status | Alarm status AL4 (0 = Normal operation; 1 = Alarm) | R |
| 205 | AL5-Status | Alarm status AL5 (0 = Normal operation; 1 = Alarm) | R |
| 206 | Fault-sensor | Sensor break alarm | R |

**Status variable:**

| Coil | Name | Meaning | Access |
|---|---|---|---|
| 301 | BitCmd_Res | Min/Max Reset | W |
| 302 | BitCmd_Ack | Alarm Acknowledge (note) | R/W |
| 303 | BitCmd_tst | Check sensor | W |
| ... | ... | ... | ... |
| 308 | OP3-Status | OP3 Relay output status<br>(0 = Contact open; 1 = Contact closed) | R |

**Note:** Writing the variable Alarm Ack can be performed the alarm acknowledge. When reading the variable the response is 0.

## 6-5 Data registers

The area REGISTER DATA adrresses integer registers of 16 bit (word).

### 6-5-1 Variables and Parameters

All the input variables RH, T, DP and ΔT, are represented with 1 decimal digit.

**Measure inputs:**

| Register | Name | Meaning | Access |
|---|---|---|---|
| 1 | RT | RH Value (0... 100.0%) – Relative Humidity reached | R |
| 2 | T | T Value (-40... +123.8°C) –<br>Temperature measure reached | R |
| 3 | DP | DP Value (-40... +123.8°C) –<br>Dew Point value reached | R |
| 4 | ΔT | ΔT Value (-40... +123.8°C) –<br>ΔT calculated as T - TDP reached | R |
| 5 | RH_MAX | RH Max Value –<br>Max. Relative Humidty value reached | R |
| 6 | RH_min | RH Min Value –<br>Min. Relative Humidty value reached | R |
| 7 | T_MAX | T Max Value – Max. Temperature value reached | R |
| 8 | T_min | T Min Value – Min. Temperature value reached | R |
| 9 | DP_MAX | DP Max Value – Max. Dew Point value reached | R |

| Register | Name | Meaning | Access |
|---|---|---|---|
| 10 | DP_min | DP Min Value – Min. Dew Point value reached | R |
| 11 | DT_MAX | ΔT Max Value – Max. Temperature difference reached | R |
| 12 | DTmin | ΔT Min Value – Min. Temperature difference reached | R |

Reading the value associated to AO1 and AO2 analogue outputs (the value is connected to the variable present in the confiuration registers and represent its content):

| Register | Name | Meaning | | Access |
|---|---|---|---|---|
| 13 | OP1 | Analogue OP1 Out Value – Current analogue output value | Opt. | R |
| 14 | OP2 | Analogue OP2 Out Value – Current analogue output value | Opt. | R |

Atmospheric pressure value used for the calulations (the variable is not used, for this reason is Read only):

| Register | Name | Meaning | Access |
|---|---|---|---|
| 15 | Pressure | Pressure compensation 1013.25 hPa (NOT USED) | R |

**Global Alarm Status**

| Register | Name | Meaning | Access |
|---|---|---|---|
| 16 | Global_al | Global Alarm Status | R |

**Alarms indication (note)**

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | FAULT | AL5 | AL4 | AL3 | LA2 | AL1 |

**Note:** The bit status 1 means that the correspondet alarm or output is active.

**Node address**

| Register | Name | Meaning | Access |
|---|---|---|---|
| 41 | NodeAddr | Serial Comm. Address (replied at reg. 801)(note) | R/W |

**Protocol**

| Register | Name | Meaning | Access |
|---|---|---|---|
| 41 | NodeAddr | Serial Comm. Address (replied at reg. 801) (note) | R/W |

**Baudrate**

| Register | Name | Meaning | Access |
|---|---|---|---|
| 109 | Baudrate | Baud Rate selection register Register (replied at reg. 802) (note) | R/W |

**Note:** Registers **41**, **108** e **109**, are present for conformity to historical Ascon Tecnologic settings. Registers **41** and **109** are replied at registers **801** and **802**. Writing to and reading at one of the registers (**41** and **801**, **109** and **802**) produce the same effect on both the registers.

### 6-5-2 Idendity Registers

Fixed product identification registers (for details on these registers see "*Chapter 8 - Configuration*" at page 31).

| Register | Name | Meaning | Access |
|---|---|---|---|
| 121 | ManuConf | Factory Code (600) | R |
| 122 | ProdCode-1 | Product Code (H5) | R |
| 123 | ProdCode-2 | Product Code | R |
| 124 | ProdCode-1 | Hardware Release | R |
| 125 | ProdCode-2 | Software Release | R |
| 126 | SpecialCode | Reserved<br>(Reserved to special product versions) | R |

### 6-5-3 Command registers

Commands that can be used during the normal transmitter functioning (for details on these registers see "*Chapter 8 - Configuration*" at page 31).

| Register | Name | Meaning | Access |
|---|---|---|---|
| 301 | Cmd_Res | min/MAX Reset | W |
| 302 | Cmd_Ack | Alarm Ack | W |
| 303 | Cmd_tst | Sensor test | W |

**Note:** Pulse type commands. Writing 1 in a register the relative command is executed; when exiting the operation the register is automatically reset to zero (0).

**Sensor calibration commands**

A detailed description is present at paragraph "*Chapter 5 - Advanced functions*" at page 13.

| Register | Name | Meaning | Access |
|---|---|---|---|
| 306 | Cmd:Calsens | Sensor calibration | W |
| 307 | Cmd_SCngsens | Sensor change | W |

Registers to access analogue outputs calibration (AO1 and AO2) password protected.

| Register | Name | Meaning | Access |
|---|---|---|---|
| 399 | Module_Cmd | Command to activate the module calibration phases | R/W |

**System commands**

A detailed description is present at "*Chapter 7 - Commands*" at page 29

| Register | Name | Meaning | Access |
|---|---|---|---|
| 400 | Command | System commands | R/W |

### 6-5-4 Retentive registers

**High (HI) and low (LO) output limits.**

| Register | Name | Meaning | Access |
|---|---|---|---|
| 401 | AO1_LO | Start of range analogue output 1 (AO1) | R/W |
| 402 | AO1_HI | End of range analogue output 1 (AO1) | R/W |
| 403 | AO2_LO | Start of range analogue output 2 (AO2) | R/W |
| 404 | AO2_HI | End of range analogue output 2 (AO2) | R/W |

### Alarm setting

| Register | Name | Meaning | Access |
|---|---|---|---|
| 405 | AL1-SP | Alarm_1 Threshold | R/W |
| 406 | AL2-SP | Alarm_2 Threshold | R/W |
| 407 | AL3-SP | Alarm_3 Threshold | R/W |
| 408 | AL4-SP | Alarm_4 Threshold | R/W |
| 409 | AL5-SP | Alarm_5 Threshold | R/W |
| 410 | AL1-hy | Alarm_1 Hysteresis | R/W |
| 411 | AL2-hy | Alarm_2 Hysteresis | R/W |
| 412 | AL3-hy | Alarm_3 Hysteresis | R/W |
| 413 | AL4-hy | Alarm_4 Hysteresis | R/W |
| 414 | AL5-hy | Alarm_5 Hysteresis | R/W |
| 415 | AL1-delay | Alarm_1 delay | R/W |
| 416 | AL2-delay | Alarm_2 delay | R/W |
| 417 | AL3-delay | Alarm_3 delay | R/W |
| 418 | AL4-delay | Alarm_4 delay | R/W |
| 419 | AL5-delay | Alarm_5 delay | R/W |
| 420 | AL1-reference | Alarm_1 reference | R/W |
| 421 | AL2-reference | Alarm_2 reference | R/W |
| 422 | AL3-reference | Alarm_3 reference | R/W |
| 423 | AL4-reference | Alarm_4 reference | R/W |
| 424 | AL5-reference | Alarm_5 reference | R/W |

### Relay output setting

| Register | Name | Meaning | Access |
|---|---|---|---|
| 425 | OP1-action | Alarm relay output setting<br>(0 = normal operation/1 = reverse operaton) | R/W |

### Real Time Clock (RTC) setting

| Register | Name | Meaning | Access |
|---|---|---|---|
| 426 | RTC_time1 | RTC time (hour and minute) | R/W |
| 427 | RTC_time2 | RTC time (millisecond) | R/W |
| 428 | RTC_date | RTC date (month and day) | R/W |
| 429 | RTC_year | RTC year | R/W |
| 430 | RTC_sample1 | RTC data logger sampling time<br>(in minutes max. 59) | R/W |
| 431 | RTC_sample2 | Data logger sampling time during EVENT tracing<br>(max. 59) | R/W |
| 432 | Cmd_memo_<br>eventlog | EVENT and LOGGER Acquisition Start/Stop<br>[*5-5-2 - Tracing Events (DATA EVENT) and Data Logging (DATA LOGGER)*] | R/W |

### 6-5-5 Configuration registers

The Configuration Registers Adress range from 801... 1000. Read "*Chapter 8 - Configuration*" for details about Configuration Registers management. All Configuration registers are protected by "*Public password*" 0x1234 (4660) which is to be written at address 1101, the registers are recordered only if are followed by the command 400 0x5354 (21337).

| Register | Name | Meaning | Access |
|---|---|---|---|
| 801 | NodeAddr | Serial Comm. Address (replied at register 41) | R/W |
| 802 | BaudRate | Baud Rate setting (replied at register 109) | R/W |
| 803 | Unit | Engineering Units °C/°F | R/W |
| 804 | Decimal | Decimal digits | R |
| 805 | OP2-Type | Analogue OP2 out type | R/W |
| 806 | OP2-Source | Analogue OP2 signal source | R/W |
| 807 | OP3-Type | Analogue OP3 out type | R/W |
| 808 | OP3-Source | Analogue OP3 signal source | R/W |
| 809 | AL1-type | AL1 alarm type | R/W |
| 810 | AL2-type | AL2 alarm type | R/W |
| 811 | AL3-type | AL3 alarm type | R/W |
| 812 | AL4-type | AL4 alarm type | R/W |
| 813 | AL5-type | AL5 alarm type | R/W |
| 814 | AL1-reset | AL1 Reset Latching/Blocking | R/W |
| 815 | AL2-reset | AL2 Reset Latching/Blocking | R/W |
| 816 | AL3-reset | AL3 Reset Latching/Blocking | R/W |
| 817 | AL4-reset | AL4 Reset Latching/Blocking | R/W |
| 818 | AL5-reset | AL5 Reset Latching/Blocking | R/W |
| 819 | AL1-source | AL1 Source | R/W |
| 820 | AL2-source | AL2 Source | R/W |
| 821 | AL3-source | AL3 Source | R/W |
| 822 | AL4-source | AL4 Source | R/W |
| 823 | AL5-source | AL5 Source | R/W |
| 824 | AL1-out | AL1 Destination Out | R/W |
| 825 | AL2-out | AL2 Destination Out | R/W |
| 826 | AL3-out | AL3 Destination Out | R/W |
| 827 | AL4-out | AL4 Destination Out | R/W |
| 828 | AL5-out | AL5 Destination Out | R/W |
| … | … | … | … |
| 851 | RTC_func_eventlog | EVENT and LOGGER setting | R/W |
| … | … | … | … |
| 901 | SensorCal_date | Date - sensor calibration (month, day)(note) | R/W |
| 902 | SensorCal_year | Date - sensor calibration (year)(note) | R/W |
| 903 | SensorCal_Time | Date - sensor calibration (hour, minute)(note) | R/W |
| 904 | Sensor_humi_adj | Humidity Offset | R/W |
| 905 | SensorCal_value_humi_low | Humidity LO calibration setting (note) | R/W |
| 906 | SensorCal_value_humi_high | Humidity HI calibration setting (note) | R/W |
| 907 | Sensor_temp_adj | Temperature Offset | R/W |
| 908 | SensorCal_value_temp_low | Temperature LO calibration setting (note) | R/W |
| 909 | SensorCal_value_temp_high | Temperature HI calibration setting (note) | R/W |
| … | … | … | … |
| 1000 | CoolReset | Cool Reset (value = 298) | W |

**Note:** For a detailed description of these registers see paragraph "*5-7 - Calibration*".

### 6-5-6 Diagnostic Registers

Registers reserved for diagnostic purposes.

**Analogue output diagnostic**

| Register | Name | Meaning | Access |
|---|---|---|---|
| 1001 | diag_reg0 | Analogue Outputs calibration diagnostic | R |

| Value | Values displayed |
|---|---|
| 0 | No error |
| 1 | Error values (CRC fault) |

**Analogue Output diagnostic**

| Register | Name | Meaning | Access |
|---|---|---|---|
| 1003 | diag_reg2 | Analogue Output diagnostic | R |

| Value | Values displayed |
|---|---|
| 0 | Normal mode |
| 1 | Diagnostic mode. OP1 and OP2 output value |

### 6-5-7 DATA EVENT and DATA LOGGER registers

Index to access a specific address of the EVENT/LOGGER log records.

| Register | Name | Meaning | Access |
|---|---|---|---|
| 2000 | event_log_index | Index of the log reading element | W |

Registers of the EVENT/LOGGER records

| Register | Name | Meaning | Access |
|---|---|---|---|
| 2001 | event_log[0] | Event_type[i] | R |
| 2002 | event_log[1] | Data_RH[i] | R |
| 2003 | event_log[2] | Data_T[i] | R |
| 2004 | event_log[3] | Data_DP [i] | R |
| 2005 | event_log[4] | Data_date[i] | R |
| 2006 | event_log[5] | Data_year[i] | R |
| 2007 | event_log[6] | Data_time[i] | R |
| 2008 | event_log[7] | Event_type[i+1] | R |
| … | - | - | - |
| 2049 | event_log[48] | Data_time[i+6] | R |
| 2050 | event_log[49] | Event_type[i+7] | R |
| 2051 | event_log[50] | Data_RH[i+7] | R |
| 2052 | event_log[51] | Data_T[i+7] | R |
| 2053 | event_log[52] | Data_DP [i+7] | R |
| 2054 | event_log[53] | Data_date[i+7] | R |
| 2055 | event_log[54] | Data_year[i+7] | R |
| 2056 | event_log[55] | Data_time[i+7] | R |

**Note:** **i** = Index of the log reading element (value of the event_log_index).

# Chapter 7
# Commands

Commands are divided in two parts:

- Program commands;
- System and special commands.

## 7-1 Program commands

Program commands are present as coils and as registers. They can be found at addresses **301**... **308**.

### 7-1-1 Cmd_Res

| Register | Name | Meaning | Access |
|---|---|---|---|
| 301 | Cmd_Res | Min/Max Reset | W |

Pulse type command. Writing 1 all minimum and maximum registers are reset (registers 5... 12). Exiting the command the register is automatically reset.

### 7-1-2 Cmd_Ack

| Register | Name | Meaning | Access |
|---|---|---|---|
| 302 | Cmd_Ack | Alarm Ack | W |

Pulse type command. Writing 1 all registers of alarms configured as latching are reset (registers 5... 12). Exiting the command the register is automatically reset.

### 7-1-3 Cmd_tst

| Register | Name | Meaning | Access |
|---|---|---|---|
| 303 | Cmd_tst | Sensor test | W |

Pulse type command. Writing 1 the system tests the sensor. Exiting the command the register is automatically reset.

### 7-1-4 Cmd_calsens

| Register | Name | Meaning | Access |
|---|---|---|---|
| 306 | Cmd_Calsen | Humi-chip sensor calibration | W |

Carefully read paragraph "*5-7 - Calibration commands*" at page 18 for details.

### 7-1-5 Cmd_cngsens

| Register | Name | Meaning | Access |
|---|---|---|---|
| 307 | Cmd_Cngsens | Humi-chip sensor calibration | W |

Carefully read paragraph "*5-7 - Calibration commands*" at page 18 for details.

## 7-2 System Commands

System commands are present only as registers. Calibration commands, channel selection and activate the calibration status use registers **398** and **399** that are password protected. Operating System commands use only the register at address **400**.

### 7-2-1 Calibration Commands

| Register | Name | Meaning | Access |
|---|---|---|---|
| 399 | Module_Cmd | Activate calibration status | R/W |

Carefully read paragraph "*5-7 - Calibration commands*" 18 for details.

### 7-2-2 Operating System Commands

| Register | Name | Meaning | Access |
|---|---|---|---|
| 400 | Command | Operating system command | R/W |

Available commands:

| Value | Command |
|---|---|
| 21332 (0x5354) | STORE parameters in EEPROM |
| 21075 (0x5253) | RESTORE parameters in EEPROM |
| 21076 (0x5254) | Transmitter RESET |

### 7-2-3 Cmd_memo_eventlog

| Registro | Nome | Note | Accesso |
|---|---|---|---|
| 432 | Cmd_memo_eventlog | Operating system command | R/W |

The command is stored in EEPROM. Avaliable settings:

| Value | Operation |
|---|---|
| 0 | Stop – acquisition stopped (default) |
| 1 | Start – acquisition running |

# Chapter 8
# Configuration

This chapter describes the configuration registers and setting procedures. The transmitter configuration can be done only through the serial communications port using Modbus protocol. In this way the user can set the serial communications parameters, the output and the alarm functioning modes.

All Configuration registers are protected by "*Public password*" **0x1234** (**4660**) which is to be written at address **1101**. To definitively store the new configuration data, the user must, before exiting the configuration phase, send the **STORE** command (**21332**) to address **400**.

To exit the configuration and inhibit futher access to these addresses, the user must, before exiting the configuration phase, write a **0** (zero) to address **1101**.

## 8-1 Registers

### 8-1-1 Modbus Register Setting

| Register | Name | Meaning | Access |
|---|---|---|---|
| 41 | NodeAddr | Serial Comm. Address (replied at reg. 801) | R/W |
| 801 | NodeAddr | Serial Comm. Address (replied at reg. 41) | R/W |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |

Setting Values for NodeAddr register.

| Value | Address |
|---|---|
| 0 not valid | 0 reserved |
| 1 | 1 |
| ... | ... |
| F7h (default) | 247 |
| F8... FFh not valid | 248... 256 reserved |

**Note:** Register 41 is present for conformity to historical Ascon Tecnologic settings. Register **41** is replied at register **801**. Writing to and reading at one of the registers (**41** and **801**) has the same effect on both the registers.

### 8-1-2 Baud Rate Setting

| Register | Name | Meaning | Access |
|---|---|---|---|
| 109 | Baudrate | Baud Rate selection register (replied at reg. 802) (note) | R/W |
| 802 | BaudRate | Baud Rate selection register (replied at reg. 109) (note) | R/W |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |

Setting Values for Baudrate register.

| Value | Baud Rate |
|---|---|
| 0 | 300 |
| 1 | 1200 |
| 2 | 2400 |
| 3 | 4800 |
| 4 (default) | 9600 |
| 5 | 19200 |

**Note:** Register **109** is present for conformity to historical Ascon settings. Register **109** is replied at register **802**. Writing to and reading at one of the registers (**109** and **802**) has the same effect on both the registers.

### 8-1-3 Temperature Engineering Units

| Register | Name | Meaning | Access |
|---|---|---|---|
| 803 | Unit | Temperature engineering units °C/°F | R/W |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Setting Values for Unit register:

| Value | Baud Rate |
|---|---|
| 0 (default) | °C |
| 1 | °F |

**Note:** All unused bits are set to 0.

### 8-1-4 Decimal digits

| Register | Name | Meaning | Access |
|---|---|---|---|
| 804 | Decimal | Number of decimal digits to be considered for conversion | R |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

**Note:** The register is READ ONLY. It is set to 1 that means 1 decimal digit.

### 8-1-5 Analogue Output Type

| Register | Name | Meaning | Access |
|---|---|---|---|
| 805 | OP1-Type | AO1 Analogue Output Type | R/W |
| 807 | OP2-Type | AO2 Analogue Output Type | R/W |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Setting Values for **OPx-**Type register:

| Value | OPx-Type |
|---|---|
| 0 (default) | 4... 20 mA |
| 1 | 0... 20 mA |
| 2 | 0... 10 V |
| 3 | 0... 5 V |
| 4 | 0... 1 V |

**Note:** All unused bits are set to 0.

### 8-1-6 Input Source for Analogue Outputs

| Register | Name | Meaning | Access |
|---|---|---|---|
| 806 | OP1-Source | Input Source for Analogue Output AO1 | R/W |
| 808 | OP2-Source | Input Source for Analogue Output AO2 | R/W |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Setting Values for **OPx-Source** registers:

| Value | OPx-Source |
|---|---|
| 0 (default) | RH |
| 1 | T |
| 2 | DP |
| 3 | ΔT |

**Note:** All unused bits are set to 0.

### 8-1-7 Alarm Type Setting

| Register | Name | Meaning | Access |
|---|---|---|---|
| 809 | AL1-Type | Alarm AL1 - Alarm type | R/W |
| 810 | AL2-Type | Alarm AL2 - Alarm type | R/W |
| 811 | AL3-Type | Alarm AL3 - Alarm type | R/W |
| 812 | AL4-Type | Alarm AL4 - Alarm type | R/W |
| 813 | AL5-Type | Alarm AL5 - Alarm type | R/W |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Setting values for ALx-Type registers (see “Alarm types” for details):

| Value | Alx-Type |
|---|---|
| 0 (default) | None |
| 1 | Fault-sens (break sensor) |
| 2 | Hi |
| 3 | Lo |
| 4 | DevHi |
| 5 | DevLo |
| 6 | BandOut |
| 7 | BandIn |
| 8 | Rate |
| 9 | Hi+delay |
| 10 | Lo+delay |
| 11 | DevHi+delay |
| 12 | DevLo+delay |
| 13 | BandOut+delay |
| 14 | BandIn+delay |
| 15 | Rate+delay |

**Note:** All unused bits are set to 0.

### 8-1-8 Alarm Reset Type Setting

| Register | Name | Meaning | Access |
|---|---|---|---|
| 814 | AL1-Reset | AL1 reset type Latching/Blocking | R/W |
| 815 | AL2-Reset | AL2 reset type Latching/Blocking | R/W |
| 816 | AL3-Reset | AL3 reset type Latching/Blocking | R/W |
| 817 | AL4-Reset | AL4 reset type Latching/Blocking | R/W |
| 818 | AL5-Reset | AL5 reset type Latching/Blocking | R/W |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Setting values for **ALx-Reset** register:

| Value | ALx-Reset |
|---|---|
| 0 (default) | Auto |
| 1 | Latching |
| 2 | Auto + Blocking |
| 3 | Latching + Blocking |

**Note:** All unused bits are set to 0.

### 8-1-9 Alarm Source Setting

| Register | Name | Meaning | Access |
|---|---|---|---|
| 819 | AL1-Source | AL1 Alarm source | R/W |
| 820 | AL2-Source | AL2 Alarm source | R/W |
| 821 | AL3-Source | AL3 Alarm source | R/W |
| 822 | AL4-Source | AL4 Alarm source | R/W |
| 823 | AL5-Source | AL5 Alarm source | R/W |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Setting values for **ALx-Source** registers:

| Value | ALx-Source |
|---|---|
| 0 (default) | RH Value |
| 1 | T Value |
| 2 | DP Value |
| 3 | ΔT Value |

**Note:** All unused bits are set to 0.

### 8-1-10 Alarm Output Setting

| Register | Name | Meaning | Access |
|---|---|---|---|
| 824 | AL1-out | Setting the Alarm output for AL1 | R/W |
| 825 | AL2-out | Setting the Alarm output for AL2 | R/W |
| 826 | AL3-out | Setting the Alarm output for AL3 | R/W |
| 827 | AL5-out | Setting the Alarm output for AL4 | R/W |
| 828 | AL5-out | Setting the Alarm output for AL5 | R/W |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Setting values for ALx-out registers:

| Value | ALx-Out |
|---|---|
| 0 (default) | None |
| 1 | OR on relay output OP3 |
| 2 | AND on relay output OP3 |

**Note:** All unused bits are set to 0.

### 8-1-11 Register of analogue outputs value on sensor error

| Register | Name | Meaning | Access |
|---|---|---|---|
| 829 | error_sens_value | Analogue output value in case of sensor error | R/W |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

The value that is to be inserted is the percentage of the output signal and is written in decimal units. The entered value can be between **0... 1010** (101%). A number greater than **1010**, is automatically entered as **1010** with no error message.

### 8-1-12 EVENT Logging Registers

| Register | Name | Meaning | Access |
|---|---|---|---|
| 825 | RTC_func_ eventlog | EVENT and LOGGER functioning mode | R/W |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Setting values for **RTC_func_eventlog** registers:

| Value | RTC_func_eventlog |
|---|---|
| 0 (default) | None |
| 1 | Data EVENT function active |
| 2 | Data event and Data logger active independently |
| 3 | EVENT and LOGGER active and interlaced. In this functioning mode, the data logger normally acquires at the rate indicated at register **430**; when an event happens the data logger acquires at a different rate (as indicated at register **431** that normally is shorter than the one at register **430**). |
| 4 | Data LOGGER function active |

**Note:** All unused bits are set to 0.

### 8-1-13 Humidity and Temperture Offset Registers

The registers contain the offset for the Relative Humidity and Temperature measurements. The value has a decimal digit that must be added or subtracted to the measurement.

| Register | Name | Meaning | Access |
|---|---|---|---|
| 904 | Sensor_humi_adj | Relative Humidity Offset | R/W |
| 907 | Sensor_temp_adj | Temperature offset | R/W |

Start-up setting:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Note:** The default value can be forced to the transmitter also in case of calibration reset writing code **0x2500** at address **306**.

### 8-1-14 Reset Register

| Register | Name | Meaning | Access |
|---|---|---|---|
| 1000 | CoolReset | Cool Reset (value = 298) | W |

# Chapter 9
# Configuration Tools

## 9-1 System requirements

To function properly Humidity Explorer requires one of the following configurations:

- Pentium II, 1GHz;
- 512 MB RAM;
- 20 MB of free space on disk;
- CD-ROM graphic card with a minimum resolution of 1024*768;
- Windows 2003, Windows XP SPII or Windows Vista 32bit.

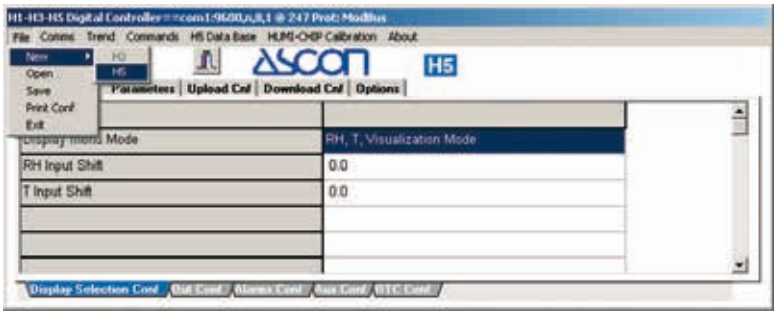
## 9-2 Installing and executing the configuration software

### 9-2-1 Installing the program

Insert the CD-ROM: the installation page should open automatically if autorun is active; if not, access your CD-ROM and double click the "*Install.exe*" icon file.

**Entering the configuration software**

After loading the software, enter the program by clicking: "*Start*"; "*Programs*"; "*Humidity Explorer*" and then selecting "*H5*" in the "*file*" "*new*" pull down menu.




**Caution**

The default parameters are:

- Serial port: COM1;
- Communications sped: 9600 baud;
- Protocol: ModBus;
- Address: 247.

To connect the transmitter make sure that the communication parameters are correctly set.

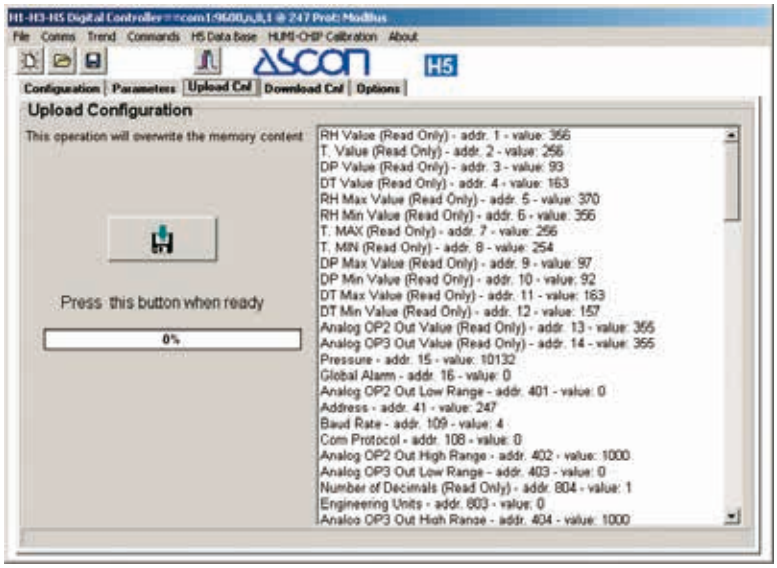
## 9-3 File menu and Parameter setting

### 9-3-1 Saving the transmitter data

**WARNING!**
Inside the new transmitters are recordered some data (e.g.: **release no.**, **configuration**, etc.) used by the program to configure itself. Upload these data from the transmitter and backup them in a file for a possible future use.

### 9-3-2 To save the transmitter settings in a file

Select the tab "*Upload Cnf*". Click on the button under the heading "*Parameters and Configuration*" to copy the transmitter settings into the Configuration software.



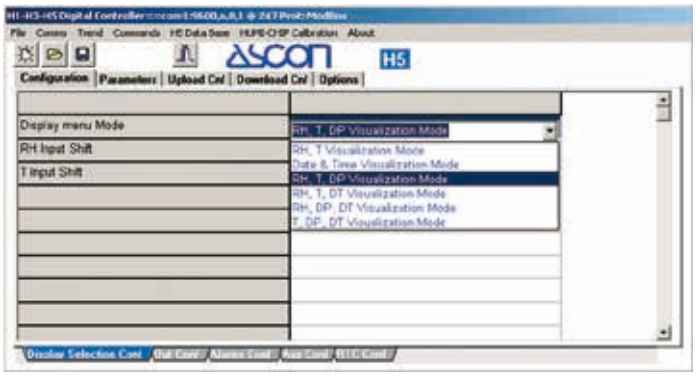

Completed the Upload procedure, store the settings as a file, these data can be saved as a permanent record and used to configure another transmitter. Click on "*File*" and then "*Save*". A "*Save as*" window will open, with a highlighted file name shown as ***.h5** (for **H5** transmitters). Over-type the * with the filename required, leaving the **.h5** as the file extension, as in normal Windows® practice. Click "**OK**". In any case the program sets the suffix automatically.

While saving the binary format of the configuration, the program writes, in the same directory, a text file in which are recorded the configuration parameters. Example:

| Address | Description | Value |
|---|---|---|
| 1 | RH Value (Read Only) | 340 |
| 2 | T. Value (Read Only) | 262 |
| 3 | DP Value (Read Only) | 91 |
| 4 | ΔT Value (Read Only) | 170 |
| 5 | RH Max Value (Read Only) | 902 |
| 6 | RH Min Value (Read Only) | 0 |
| ... | ... | ... |

### 9-3-3 Parameters setting

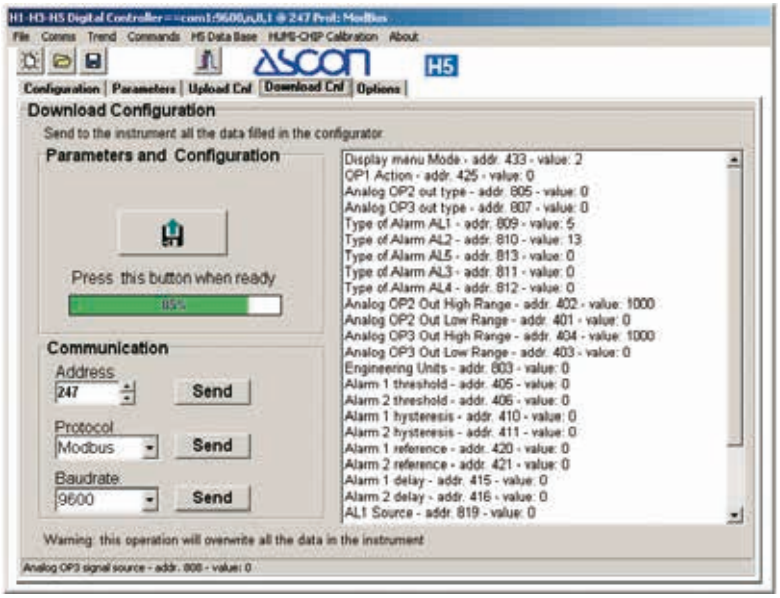
Click on the tabs "*Configuration*", "*Parameters*", "*Access*" and select the required settings. To modify the configuration parameters, please use the pull down menus as shown.




For a detailed description of all parameters see "*Chapters 5, 6* and *7*".

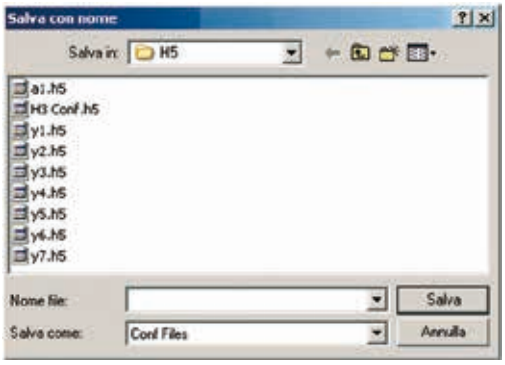
### 9-3-4 To send the parameters setting into the trasmitter (Download conf.)

When the parameters have been correctly configured on the Personal Computer, to send the data to the H5 transmitter. Serlect the tab "*Download Cnf*", then click on the button  under the heading "*Parameters and Configuration*" to send the settings to the instrument.



### 9-3-5 To store the configuration as a file (Save)

To store the transmitter settings as a file, which can be saved as a permanent record and used at a later date to configure another transmitter, click on "*File*" and then "*Save*", a "*Save as*" window will open, with a highlighted file name shown as ***.h5** (for **H5** transmitters). Over-type the * with the desired filename, leaving the **.h5** as the file extension, as in normal Windows® practice. Click "**OK**" . In any case the program sets the suffix automatically.

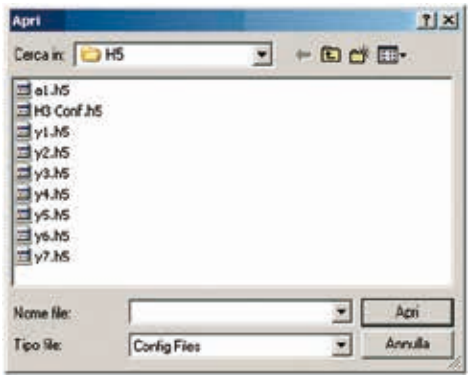



While saving the binary format of the configuration, the program writes, in the same directory, a text file in which are recorded the configuration parameters. Example:

| Address | Description | Value |
|---|---|---|
| 1 | RH Value (Read Only) | 340 |
| 2 | T. Value (Read Only) | 262 |
| 3 | DP Value (Read Only) | 91 |
| 4 | ΔT Value (Read Only) | 170 |
| 5 | RH Max Value (Read Only) | 902 |
| 6 | RH Min Value (Read Only) | 0 |
| ... | ... | ... |

### 9-3-6 To recall a previously stored file

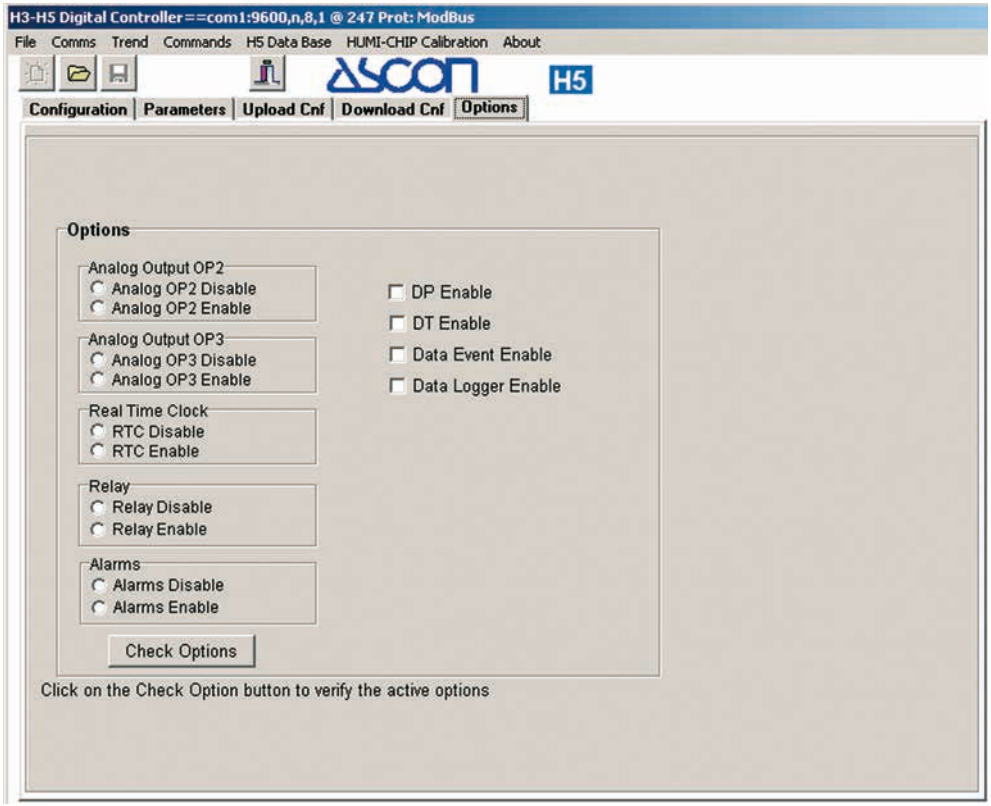
To recall a previously stored file, click on "*File*" and then "*Open*", or click on the open icon at the top of the window. In both cases, the open window will appear, which will list all previously stored file names with the file extension appropriate to the controller as listed above. Click on the file required and then click "*OK*". When required, the file can be downloaded to a new transmitter as described above.



### 9-3-7 Setting the Options

The Options tab mask allows the user to check type and number of the options installed in the transmitter and to set them as desired. For the options installed this mask can be used as an alternative of the Configuration screen and its tabs.

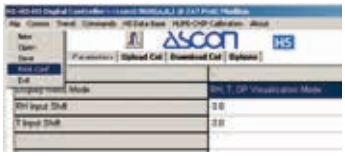
After having read the Options installed in the transmitter using the "*Check Options*" button, the user can enable or disable each option by clicking on the desired check mark window.




### 9-3-8 Printing the configuration

To print the present configuration of the instrument: select "*file*" from the main window, select "*Print Conf*" from the menu.

The following will be printed: all the configuration tab sheets; all the parameter tab sheets; the Access page. The printing will be equal to the "*print screen*".



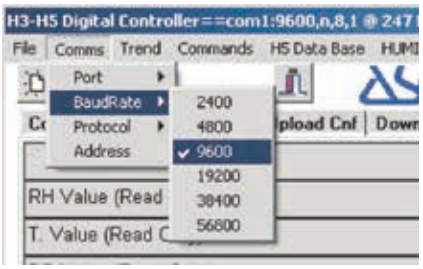
## 9-4 Communications menu

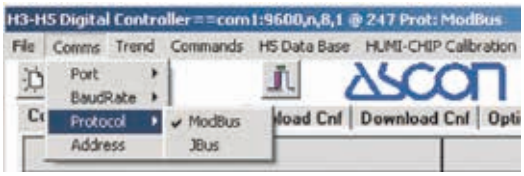
### 9-4-1 Communications parameters setting

Control the header of the program window, all the communications parameters are listed there. Correct the wrong values by clicking the "*Comms*" pull down menu and making the correct selection in the various sub-menus.

Click on "*Comms*" and "*Port*" and check that the port number corresponds to the one being used on the computer. Click on the correct port number if there is a check mark in the wrong setting.

Click on "*Comms*" and "**Baudrate**" and check that it is set to 9600 for instruments **without** the RS485 communications option. For instruments **with** RS485, control that the setting in the configuration software is the same as in the instrument. Correct the value if there is a check mark in the wrong position.




**Caution**

The default parameters are:

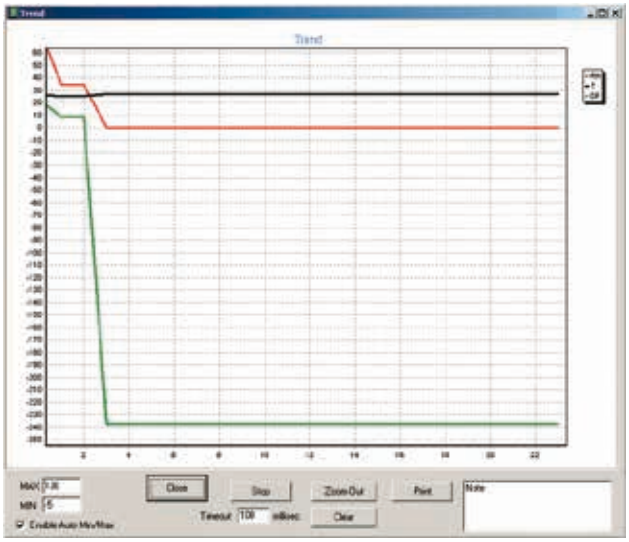
- Serial port: COM1;
- Communications sped: 9600 baud;
- Protocol: ModBus;
- Address: 247.

To connect the transmitter make sure that the communication parameters are correctly set.

Click on "*Comms*" and "*Protocol*" and check that it is set to "*Mbus*". Correct it if the mark is on the wrong setting.

## 9-5 Trend Menu

The trend menu is available on the main page of the configuration software. The trend menu allows to display on a graphic page the time trend of the process variable of the connected transmitter. The time scale is available as "*Number of acquisitions*".



**Functions of the buttons:**

- **Close**: The program returns to the main page of the configurator;
- **Zoom out**: Shows the entire acquisition time (from the beginning to the button stroke moment);
- **Reset**: Restarts the acquisition procedure;
- **Stop**: Stops the acquisition;
- **Print**: Prints the tdisplayed trend page;
- **MAX**: High end setpoint limit;
- **MIN**: Low end setpoint limit;
- **Enable auto min./max.** (automaticalluy limits the range): If enabled, the range of the Trend is automatically updated;;
- **Pause**: Time (in milliseconds) elapsed between two transmitter queries;
- **Note**: Field available for user's notes, can only be used in combination with printing.

## 9-6 Menu "Commands"

### 9-6-1 Min./Max. Reset

This menu item allows to reset the registers containing the min./max. values stored in the transmitter, the corresponding register is automatically reset.

### 9-6-2 Alarm Ack

This menu item allows to reset all alarms recorded and configured as latching. The register is automatically reset.

### 9-6-3 Store configuration on EEPROM

This menu item allows the storage the custom configuration set by the user in the non volatile memory (EEPROM) of the transmitter.

### 9-6-4 Device Reset

This menu item allows for the transmitter reset.

### 9-6-5 Restore Default configuration

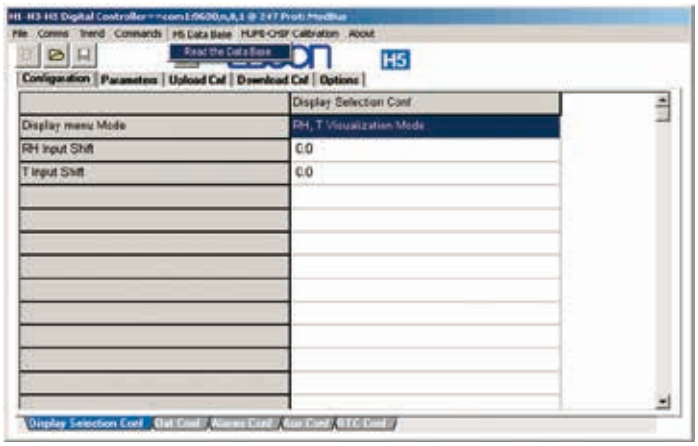
This menu item allows to reload the original configuration in the transmitter.

**Caution**
All data in the transmitter will be lost (parameters set by the user, stored data, etc.).

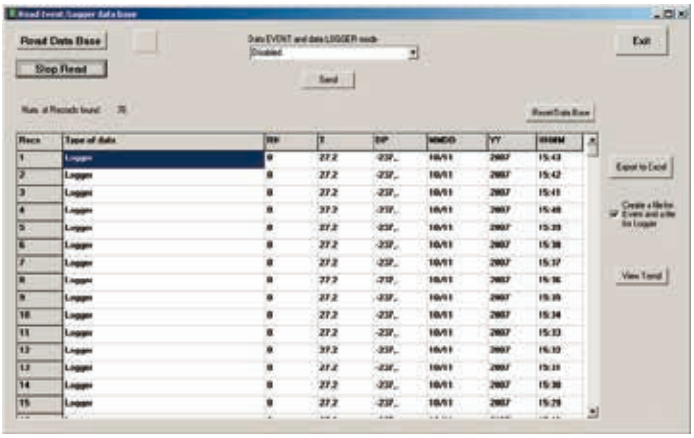
## 9-7 Database

Data from "*Data event*" and "*Data Logger*" functions are stored in the transmitter memory and can be retrieved by the Humidity Controller program in order to made them available to the user.

From the **H5** menu run the command "*Read the Data-Base*".



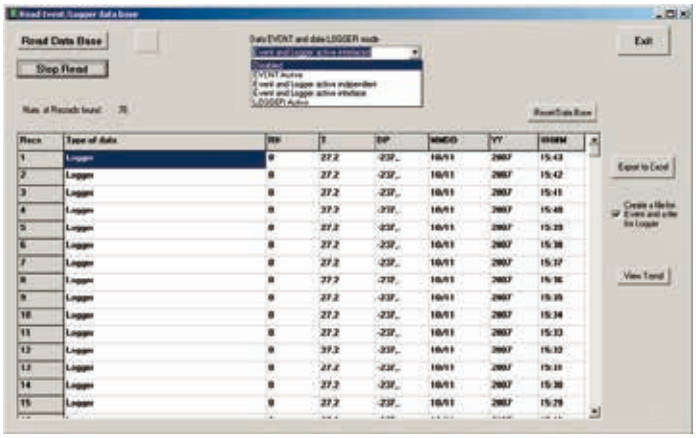

Humidity Controller will display the database screen that contains all the messages stored by the system.




Using this screen the user can:

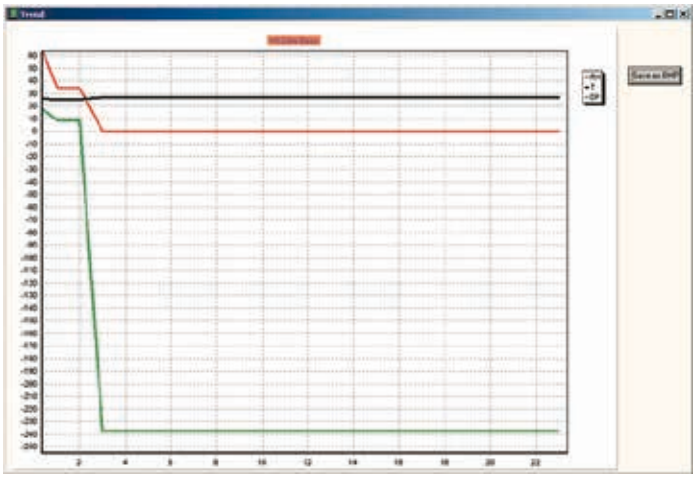
- Read the Event/Logger data;
- Start/stop the database reading;
- Set how the Event/Logger functions must work.

Please refer to "*Chapter 10 - "Data event" and "Data logger"*" at page 49.




Pressing the "*Export to Excel*" button, the user can save in a spreadsheet the data in the database. Will be presented to the user mask "*Save As*" and if the option "*Create a file for Event and files for Logger*" is disabled the system will create a single file with the name set by the user containing all data in the database. If the option "*Create a file for Event and files for Logger*" is active, the system will create two files where the file-name specified by the user will be integrated with "*_EVENTS*" and "*Logger*" depending the contents of the file.

From this screen the user can also reset the database and display the trend graph of the data stored in the system. "*Save BMP*" allows the user to convert the graph of the trend in **BMP** graphic format and save it.



## 9-8 Sensor Calibration

**Caution**

The Humi-chip sensor requires no calibration as is supplied pre-calibrated. If the user has the need to fine-calibrate in presence of well known conditions, the sensor can be calibrated on one or two points, without altering the original sensor data calibration.

### 9-8-1 "Humi-Chip" sensor calibration procedure

The calibration procedure must be done using the "*Humidity Explorer*" software or through Modbus commands (please refer to paragraph "*5-7 - Calibration commands*" at page 18 for details).

The sensor calibration can be performed on one or two points. The reference points are chosen by the user who must enter the exact values of the calibra-

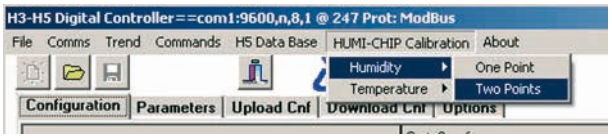
tion being performed. The farther away the 2 points are, the more accurate the calibration will be.

Through a specific command, the calibration procedure can be reset at any time.

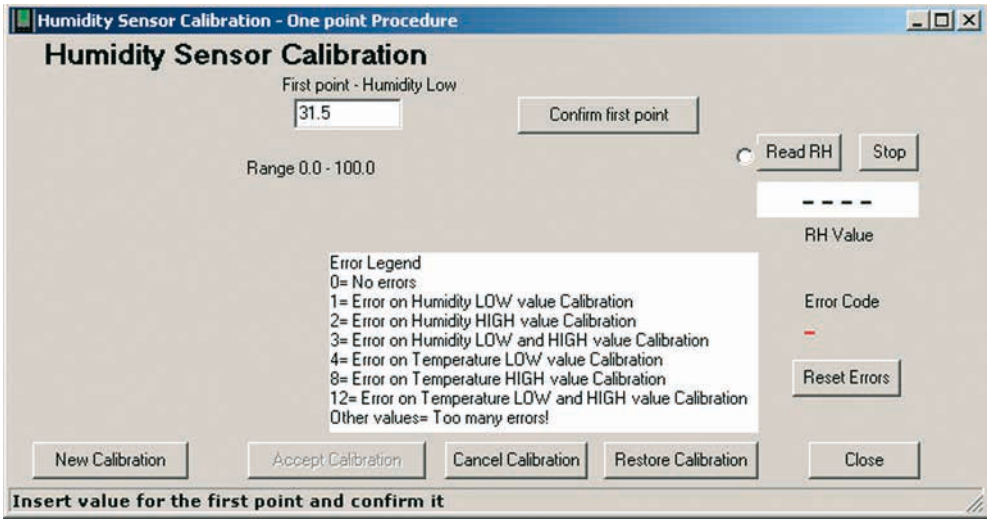
**Calibrate Humidity/Temperature Reading**

*1 Point Calibration*

1. From the menu select the 1 point calibration mode;




2. From the menu select the 1 point calibration mode;



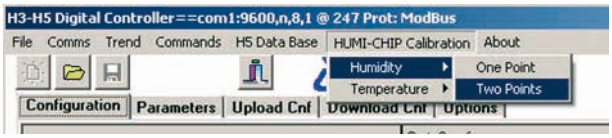

3. Confirm the value just inserted. In case of error, the system will report any malfunction using numerical codes in the "*Error Code*" box.
4. Press the key "*Accept Calibration*" in order to force the system accepting the calibration just done.

In the calibration screen the following buttons can be found:

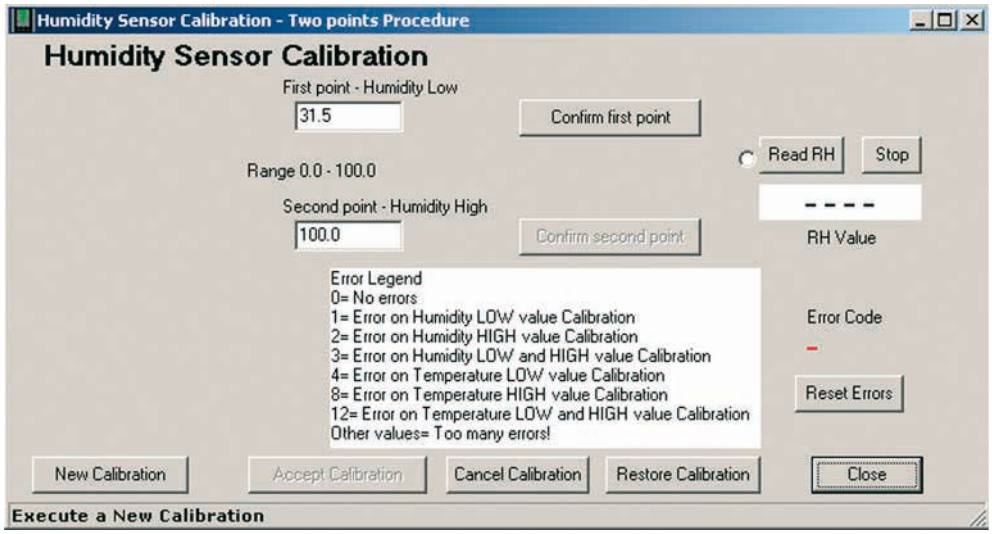
| | |
|---|---|
| *Confirm first point*: | Notifies the system the insertion of the first reference value; |
| *Read RH (T)*: | Reads the Humidity or Temperature value; |
| *Stop*: | Stops the Relative Humidity or Temperature reading; |
| *Reset Errors*: | Cleans the codes of all the stored error messages; |
| *New Calibration*: | Starts a new calibration session; |
| *Accept Calibration*: | Notifies the system that the user wants to store the calibration data; |
| *Cancel Clibration*: | Cancel the calibration process; |
| *Restore Calibration*: | Restore a previously saved calibration procedure; |
| *Close*: | Close the window and end the calibration process. |

*2 Points Calibration*

1. From the menu select the 2 points calibration mode;




2. Lead the process (and the sensor) to a stable condition of humidity or temperature for the desired Low Range; enter the umidity (or temperature) value in the "*First point - Humidity Low*" (o "*First point - Temperature Low*") calibration screen box. Confirming the value just inserted using the "*Confirm first point*" button. At this point the program displays the "*Second point - Humidity High*" (or *"Second point - Temperature High*") screen, change the process functioning conditions in order to reach the second calibration point, wait until the readings are stable. Insert the High Range value in the "*Second point - Humidity High*" (o "*Second point - Temperature High*") box and confirm it pressing the "*Confirm second point*" button.




3. In case of error, the system will report any malfunction using numerical codes in the "*Error Code*" box.
4. Press the key "*Accept Calibration*" in order to force the system accepting the calibration just done.

In the calibration screen the following buttons can be found:

| | |
|---|---|
| *Confirm first point*: | Notifies to the system the insertion of the Low Range value (First point - Humidity (or Temperature) low); |
| *Confirm second point*: | Notifies to the system the insertion of the High Range value (Second point - Humidity (o Temperature) high); |
| *Read RH (T)*: | Reads the Humidity or Temperature value; |
| *Stop*: | Stops the Relative Humidity or Temperature reading; |
| *Reset Errors*: | Cleans the codes of all the stored error messages; |
| *New Calibration*: | Starts a new calibration session; |
| *Accept Calibration*: | Notifies to the system that the user wants to store the calibration data; |
| *Cancel Clibration*: | Cancels the calibration process; |
| *Restore Calibration*: | Restores a previously saved calibration procedure; |
| *Close*: | Closes the window and end the calibration process. |

# Chapter 10
# "Data event" and "Data logger"

## 10-1 Functioning mode

The data store function is present only using the **H5** transmitter, it user programmable with the **851** register. The **851** register allows:

**[0]** No action enabled (default);
**[1]** EVENT active;
**[2]** EVENT and LOGGER independently active;
**[3]** EVENT and LOGGER active and interlaced.
In this mode, during normal operations, the Data Logger acquires at the sampling time stored in register **430**. When an envent occurs, the Data Logger starts acquiring using the sampling time at register **431**, normally shorter than the other one;
**[4]** Data LOGGER active.
When Data LOGGER is active independently from Data EVENT, it uses the sampling time stored at register **430**. The sampling time is expressed i minutes and can be set in the range 1... 59 min. Register **432** determines the operation status: if **0** the function is disabled, if is written at **1** the function is active.

## 10-2 Data format

Registered data have always the same format, independently from the function that requires the data. Each record is composed by 7 registers:

| Registers | Data format |
|---|---|
| Event type | (Note) |
| Data_RH | RH value |
| Data_T | T value |
| Data_DP | DP value |
| Data_date | Paragraph 3.5.3 (reg. DATE) |
| Data_year | Paragraph 3.5.3 (reg. YEAR) |
| Data_time | Paragraph 3.5.3 (reg. TIME1) |

**Note:** The Event type register directly qualifies the type of stored record. If the value is 0 the record is a data LOGGER record. All bit indications, are valid only if the record is a data EVENT record.

- bits 0... 3: indicate the type of alarm set in Aln-type (t) corresponding to the alarm occurred;
- bits 4... 7: not used (0 default);
- bits 8... 12: indicate which is the alarm occurred (AL1... AL5);
- bit 13: not used (0 default);
- bit 14 indicates if the event is started or is ended:
  **0** = Alarm start/**1** = Alarm end;
- bit 15 indicates wich record type has been recorded:
  **0** = LOGGER/**1** = EVENT.

The 8 least significant bits indicate the type of alarm; bits 8 to 12 indicate which alarm has occurred; bit 14 indicates whether the indicated event has started or ended; bit 15 indicates the type of record stored (EVENT or LOGGER).

| **bit** | **15** | | | | | | | **8** | **7** | | | | | | | **0** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Value** | RT | AL | 0 | AL5 | AL4 | AL3 | AL2 | AL1 | 0 | 0 | 0 | t | t | t | t | t |
| | **Alarm_status** | | | **Alarm_ALn** | | | | | **ALn-type** | | | | | | | |

*Where:* **Alarm-ALn (AL1... AL5) =** the bit set to 1 shows wich alarm has been activated;
**Alarm-status (AL) = 0** end of the alarm event; **1** start of the alarm event;
**Alarm-status (RT) = 0** LOGGER record; **1** EVENT record.
Data are stored in EEPROM and cannot be erased by the user. The buffer can store 1024 records; when the available space is filled, the transmitter writes over the older data.

## 10-3 Accessing the stored data

The database can be accessed using an index register and up to **56 reading registers**. The index register (reg. **2000**) indicate which is the first reading record, taking into account that the index 0 corresponds to the last stored record (i.e. the most recent data). The readin registers are at addresses **2001**... **2056**. **Accessing all the 56 registers allows to read 8 complete data records**.

Each reading, whether of a single register rather than multiple consecutive registers, must be preceded by the writing of the index register.

A special case is when the read request is executed starting from address **2001**. In this case, at the end of the information transfer, the index register is incremented automatically by the system to just the number of registers transferred. This allows a sequence of multiple readings through the reading registers without having to retype each time the index register. In order to guarantee the correct reading sequence, the number of acquired registers must be a multiple of the registers contained in a record; this means that is recommended to make the complete reading of each record, otherwise the index register does not count the register that has not been fully read, but will repeat the same registrer reading as first element of the subsequent reading cycle.

# Chapter 11
# Diagnostics

The system has several diagnostic registers. Each of them is able to control or provide any information about system problems. Below is a description of each.

## 11-1 Analogue output calibration diagnostic values (diag_reg0)

The register returns the error code referred to the calibration values of analog outputs stored in EEPROM. The check is performed controlling the stored CRC code. There are two copies for each stored register to allow the data recovery.
If the error code is 1 the stored data are non valid or are not yet initialized.

| Register | Name | Meaning | Access |
|---|---|---|---|
| 1001 | diag_reg0 | Analogue Outputs calibration diagnostic values | R |

Allowed error codes:

| Value | Values displayed |
|---|---|
| 0 | No error |
| 1 | Error value (CRC fault) |

## 11-2 Analogue Output diagnostic (diag_reg2)

The register is active both in writing and reading. Writing in this register a value different than "*0*" and equal or less than "*1000*" activates the diagnostic mode for the two analogue output.
In this diagnostic mode, the system is stopped, the value inserted by the user (**0**... **1000**) is the percentage of the output (**0** = 0.0% ... **1000** = 100.0%), it is written in the register and the outputs will be placed at that value. Each output is set with respect to the type of output previously set. Write **0** in the register to return to normal operation mode.

| Register | Name | Meaning | Access |
|---|---|---|---|
| 1003 | diag_reg2 | Analogue Output diagnostic | R/W |

Valid error codes:

| Value | Values displayed |
|---|---|
| 0 | Normal mode |
| 1 | Diagnostic mode. OP1 and OP2 output value |

All the other values are reported as error. Example:

- Output OP1 set in the range 0... 20 mA;
- Output OP2 set in the range 0... 10 V.

If the value **344** is written in register **1003**, the system writes on the display (when present) the analogue output diagnostic status and the two outputs are placed at the **34.4%** of their output range:

- Output OP1 = 6.880 mA (34.4% of 20 mA)
- Output OP2 = 3.44 V (34.4% of 10 V).

## 11-3 Humi chip sensor calibration diagnostic values (diag_reg3)

This register returns the error code referred to the sensor calibration values. Each bit represents an error function. If a bit value is **1** indicates that an error has occurred for which the calibration must be repeated. Writing in the register resets all the bit.

| Register | Name | Meaning | Access |
|---|---|---|---|
| 1004 | diag_reg3 | Humi chip sensor calibration diagnostic values | R/W |

bit error definition:

| bit | 15 | | | | | | | 8 | 7 | | | | | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Default** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | TO | HO | TH | TL | HH | HL |

*Where:* **HL** Humidity sensor low range calibration value;
**HH** Humidity sensor high range calibration value;
**TL** Temperature sensor low range calibration value
**TH** Temperature sensor high range calibration value;
**HO** Humidity sensor shift;
**TO** Temperature sensor shift.

Valid error values:

| Value | Values displayed |
|---|---|
| 0 | Normal mode |
| 1 | Error codes (write **0** to erase the errors) |

# *Appendix A*
# *Modbus Address Map*

**WARNING!**
Inside the manual reference is made to the Modbus registers, while in these pages the Modbus addresses are listed. The relationship between addresses and registers is as follows:
Register = Address + 1
(example: the measured humidity value RH is at address 0, equal to register 1).

## A-1 Modbus Address Map

| Address | Name | Meaning | Access |
|---|---|---|---|
| 0 | RH | RH Value (0... 100.0%) – Relative Humidity measure reached | R |
| 1 | T | T Value (-40... +123.8°C) –Temperature measure reached | R |
| 2 | DP | DP Value (-40... +123.8°C) – Dew Point value reached | R |
| 3 | DT | ΔT Value (-40... +123.8°C) – ΔT calculated as T - TDP reached | R |
| 4 | RH_MAX | RH max. value – Max. Relative Humidty value reached | R |
| 5 | RH_min | RH min. value – Min. Relative Humidty value reached | R |
| 6 | T_MAX | T max. value – Max. Temperature value reached | R |
| 7 | T_min | T min. value – Min. Temperature value reached | R |
| 8 | DP_MAX | DP max. value – Max. Dew Point value reached | R |
| 9 | DP_min | DP min. value – Min. Dew Point value reached | R |
| 10 | DT_MAX | ΔT max. value – Max. Temperature difference reached | R |
| 11 | DTmin | ΔT min. value – Min. Temperature difference reached | R |
| 12 | OP1 | Analogue OP1 Out Value – Current analogue output value | R |
| 13 | OP2 | Analogue OP2 Out Value – Current analogue output value | R |
| 14 | Pressure | Pressure compensation 1013.25 hPa (not used) | R |
| 15 | Global_al | Global Alarm Status | R |
| ... | ... | ... | ... |
| 40 | NodeAddr | Serial Comm. Address (replied at reg. 801)(note) | R/W |
| ... | ... | ... | ... |
| 107 | Protocol | ModBud/JBus protocol register (fixed to Modbus)(note) | R/W |
| 108 | Baudrate | Baud Rate selection register Register (replied at reg. 802) (note) | R/W |
| ... | ... | ... | ... |
| 120 | ManuConf | Factory Code (600) | R |
| 121 | ProdCode-1 | Product Code (H5) | R |
| 122 | ProdCode-2 | Product Code | R |
| 123 | ProdCode-1 | Hardware Release | R |

| Address | Name | Meaning | Access |
|---|---|---|---|
| 124 | ProdCode-2 | Software Release | R |
| 125 | SpecialCode | Reserved (Reserved to special product versions) | R |
| ... | ... | ... | ... |
| 300 | Cmd_Res | Min./MAX. Reset (**2**) | W |
| 301 | Cmd_Ack | Alarm acknowledge (**2**) | W |
| 302 | Cmd_tst | Sensor test (**2**) | W |
| ... | ... | ... | ... |
| 305 | Cmd:Calsens | Sensor calibration | W |
| 306 | Cmd_SCngsens | Sensor change | W |
| ... | ... | ... | ... |
| 398 | Module_Cmd | Command to activate the module calibration phases | R/W |
| 399 | Command | System commands | R/W |
| 400 | OP1_LO | Start of range analogue output 1 (AO1) | R/W |
| 401 | OP1_HI | End of range analogue output 1 (AO1) | R/W |
| 402 | OP2_LO | Start of range analogue output 2 (AO2) | R/W |
| 403 | OP2_HI | End of range analogue output 2 (AO2) | R/W |
| 404 | AL1-SP | Alarm_1 Threshold | R/W |
| 405 | AL2-SP | Alarm_2 Threshold | R/W |
| 406 | AL3-SP | Alarm_3 Threshold | R/W |
| 407 | AL4-SP | Alarm_4 Threshold | R/W |
| 408 | AL5-SP | Alarm_5 Threshold | R/W |
| 409 | AL1-hy | Alarm_1 Hysteresis | R/W |
| 410 | AL2-hy | Alarm_2 Hysteresis | R/W |
| 411 | AL3-hy | Alarm_3 Hysteresis | R/W |
| 412 | AL4-hy | Alarm_4 Hysteresis | R/W |
| 413 | AL5-hy | Alarm_5 Hysteresis | R/W |
| 414 | AL1-delay | Alarm_1 delay | R/W |
| 415 | AL2-delay | Alarm_2 delay | R/W |
| 416 | AL3-delay | Alarm_3 delay | R/W |
| 417 | AL4-delay | Alarm_4 delay | R/W |
| 418 | AL5-delay | Alarm_5 delay | R/W |
| 419 | AL1-reference | Alarm_1 reference | R/W |
| 420 | AL2-reference | Alarm_2 reference | R/W |
| 421 | AL3-reference | Alarm_3 reference | R/W |
| 422 | AL4-reference | Alarm_4 reference | R/W |
| 423 | AL5-reference | Alarm_5 reference | R/W |
| 424 | OP1-action | Alarm relay output setting<br>(0 = normal operation/1 = reverse operaton) | R/W |
| 425 | RTC_time1 | RTC time (hour and minute) | R/W |
| 426 | RTC_time2 | RTC time (millisecond) | R/W |
| 427 | RTC_date | RTC date (month and day) | R/W |
| 428 | RTC_year | RTC year | R/W |
| 429 | RTC_sample1 | RTC data logger sampling time (in minutes max. 59) | R/W |
| 430 | RTC_sample2 | Data logger sampling time during EVENT tracing (max. 59) | R/W |
| 431 | Cmd_memo_<br>eventlog | EVENT and LOGGER Acquisition Start/Stop<br>(see Chapter 5.5.2 for details) | R/W |
| 432 | Cmd_cngmenu | Change display mode | R/W |
| ... | ... | ... | ... |
| 800 | NodeAddr | Serial Comm. Address (replied at register 41) | R/W |
| 801 | BaudRate | Baud Rate setting (replied at register 109) | R/W |

| Address | Name | Meaning | Access |
|---|---|---|---|
| 802 | Unit | Engineering Units °C/°F | R/W |
| 803 | Decimal | Decimal digits | R |
| 804 | OP2-Type | Analogue OP2 out type | R/W |
| 805 | OP2-Source | Analogue OP2 signal source | R/W |
| 806 | OP3-Type | Analogue OP3 out type | R/W |
| 807 | OP3-Source | Analogue OP3 signal source | R/W |
| 808 | AL1-type | AL1 alarm type | R/W |
| 809 | AL2-type | AL2 alarm type | R/W |
| 810 | AL3-type | AL3 alarm type | R/W |
| 811 | AL4-type | AL4 alarm type | R/W |
| 812 | AL5-type | AL5 alarm type | R/W |
| 813 | AL1-reset | AL1 Reset Latching/Blocking | R/W |
| 814 | AL2-reset | AL2 Reset Latching/Blocking | R/W |
| 815 | AL3-reset | AL3 Reset Latching/Blocking | R/W |
| 816 | AL4-reset | AL4 Reset Latching/Blocking | R/W |
| 817 | AL5-reset | AL5 Reset Latching/Blocking | R/W |
| 818 | AL1-source | AL1 Source | R/W |
| 819 | AL2-source | AL2 Source | R/W |
| 820 | AL3-source | AL3 Source | R/W |
| 821 | AL4-source | AL4 Source | R/W |
| 822 | AL5-source | AL5 Source | R/W |
| 823 | AL1-out | AL1 Destination Out | R/W |
| 824 | AL2-out | AL2 Destination Out | R/W |
| 825 | AL3-out | AL3 Destination Out | R/W |
| 826 | AL4-out | AL4 Destination Out | R/W |
| 827 | AL5-out | AL5 Destination Out | R/W |
| … | … | … | … |
| 850 | RTC_func_eventlog | EVENT and LOGGER setting | R/W |
| … | … | … | … |
| 900 | SensorCal_date | Date - sensor calibration (month, day) | R/W |
| 901 | SensorCal_year | Date - sensor calibration (year) | R/W |
| 902 | SensorCal_Time | Date - sensor calibration (hour, minute) | R/W |
| 903 | Sensor_humi_adj | Humidity Offset | R/W |
| 904 | SensorCal_value_ humi_low | Humidity LO calibration setting | R/W |
| 905 | SensorCal_value_ humi_high | Humidity HI calibration setting | R/W |
| 906 | Sensor_temp_adj | Temperature Offset | R/W |
| 907 | SensorCal_value_ temp_low | Temperature LO calibration setting | R/W |
| 908 | SensorCal_value_ temp_high | Temperature HI calibration setting | R/W |
| … | … | … | … |
| 999 | CoolReset | Cool Reset (value = 298) | W |
| 1000 | diag_reg0 | Analogue Outputs calibration diagnostic values | R |
| … | … | … | … |
| 1002 | diag_reg2 | Analogue Output disgnostic | R |
| 1003 | event_log_index | Index of the log reading element | W |
| … | … | … | … |
| 2000 | event_log[0] | Event_type [i] | R |

| Address | Name | Meaning | Access |
|---|---|---|---|
| 2001 | event_log[1] | Data_RH [i] | R |
| 2002 | event_log[2] | Data_T [i] | R |
| 2003 | event_log[3] | Data_DP [i] | R |
| 2004 | event_log[4] | Data_date [i] | R |
| 2005 | event_log[5] | Data_year [i] | R |
| 2006 | event_log[6] | Data_time [i] | R |
| 2007 | event_log[7] | Event_type [i+1] | R |
| … | … | ... | … |
| 2048 | event_log[48] | Data_time [i+6] | R |
| 2049 | event_log[49] | Event_type [i+7] | R |
| 2050 | event_log[50] | Data_RH [i+7] | R |
| 2051 | event_log[51] | Data_T [i+7] | R |
| 2052 | event_log[52] | Data_DP [i+7] | R |
| 2053 | event_log[53] | Data_date [i+7] | R |
| 2054 | event_log[54] | Data_year [i+7] | R |
| 2055 | event_log[55] | Data_time [i+7] | R |

**Notes:** **1.** Registers 41, 108 and 109 (addresses 40, 107 and 108) are maintained for compliance with Ascon Tecnologic historical settings. Registers 41 and 109 are replicated at addresses 801 and 802 (addr. 800 and 801) respectively. Writing or reading one or the other of the registers produces the same effect on both.

**2.** Impulse type commands. Writing 1 in the register, the indicated command is executed; when exiting the operation, the register value is automatically reset to zero (0).

# *Appendix B*
# *Characteristics*

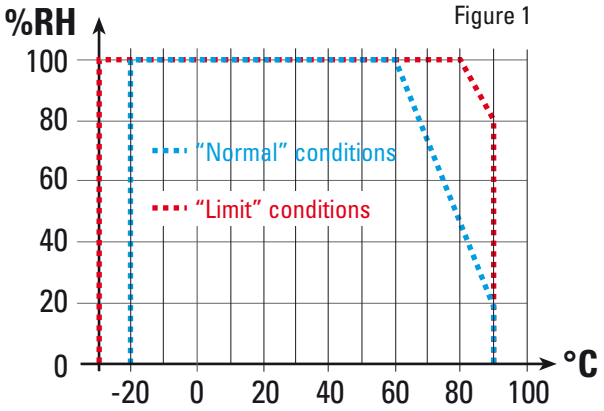
## B-1 Technical characteristics

| Charactertistics at 25°C environmental temperature | | |
|---|---|---|
| Relative Humidity (RH) | Range | 0.0…100.0% RH |
| | Resolution | 12 bit |
| | Sampling time | 1/s |
| | Temperature limits | -30... +90°C (figure 1) |
| | Accuracy (figure 2) | 1.8% between 10... 90% RH, non-linearity, hysteresis and repeatability included |
| | Typical long-term drift | < 0.5 RH% per year |
| Temperature (T) | Available ranges | -30.0… +70.0°C (-22... 158°F) |
| | | -20.0… +30.0°C (-4... 86°F) |
| | | 0.0… +50.0°C (32... 122°F) |
| | | 0.0…+100.0°C (32... 212°F) |
| | | Other ranges on request in range -40.0... 128.0°C (-40... 262.4°F) |
| | Resolution | 14 bit |
| | Accuracy (figure 3) | <0.5°C between 0… +50°C (32... 122°F) |
| | RTD output - alternative to mA or V output | (PT100 IEC 751) Tolerance: Class B (1/2 DIN) - 3 wire connection (figure 3) |
| Dew Point (DP) | Available ranges | -30.0… +70.0°C (-22... 158°F) |
| | | 0.0…+100.0°C (32... 212°F) |
| | | Other ranges on request in °C or °F selectable using the RS485 |
| | Accuracy (figure 4) | <1°C between 30... 100%RH and -20... +90°C (-4... +164°F) |
| ΔT = T - TDP | Range | 0.0... 50.0°C (32... 122°F) |
| Analogue outputs 1 and 2 | Output type | 4… 20 mA; 500W max. |
| | | 0… 10 V; 20 mA max. |
| | | 0… 1 V; 20 mA max. |
| | | 0... 20 mA and 0... 5 V can be set through the serial port |
| | Isolation | Galvanic isolation of each output: 500 Vdc/1 min |
| | Retransmitted measurement | Typically analogue output 1 transmits RH, analogue output 2 transmits T (H5 can transmit also DP or DT) |
| Serial communications | Type | Isolated 3 wires RS485, with protocol Modbus RTU Slave |
| | Baud Rate | Selectable up to 19200 Baud |
| Alarms | Number | 5, combinable with each measurement (RH, T, DP, DT) or Humi-chip failure |
| | Type | Min./Max., delayed and/or stored |
| | Output type | 1 Relay SPST, max. 1 A at 30 Vdc/1A at 120 Vac, directly activated by each alarm or with AND/OR logic |

| Charactertistics at 25°C environmental temperature | | |
|---|---|---|
| Process auditing | Recording method | FIFO buffer in non volatile memory (1024 records).<br>Data cannot be altered.<br>Record format:<br>event type, RH, T, DP, ΔT and date/time.<br>5 recording methods available |
| | Event logging | When an alarm occurs, the system starts storing the event records at a rate different from the data logging rate |
| | Data logging | The measured values are cyclically recorded.<br>Recording timing: 1... 59 min |
| Power supply | 18... 27 Vac or<br>20... 30 Vdc | Power consumption 2W max. |
| General characteristics | Housing material | Epoxy painted aluminum (RAL 7038) |
| | | Protection: IP66 |
| | Probe material | PVDF - probe for duct mounting version |
| | Safety | Compliance to EN 61010-1, double isolation, pollution class 2, installation class II |
| | Electromagnetic compatibility | Compliance to CE standards EN 50081-2, EN 50082-2 |
| | Environmental temperature housing | -25... +70°C standard |
| | Electrical connections | Standard: spring terminal strip, AWG28-16 wire |
| | Dimensions | Consult paragraph "*2.2 - Dimensions*" for details |

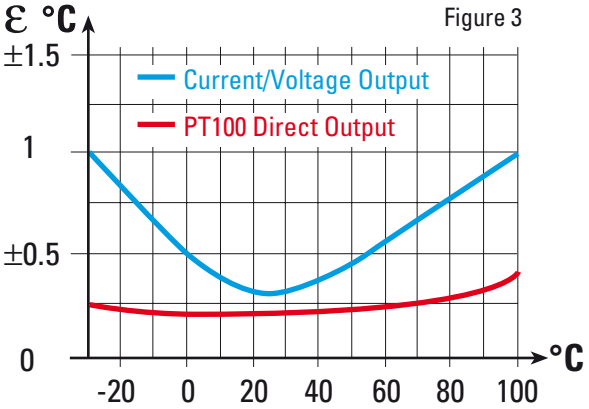
**Working limits of Humi-Chip module**

Figure 1




**Temperature Tolerance**

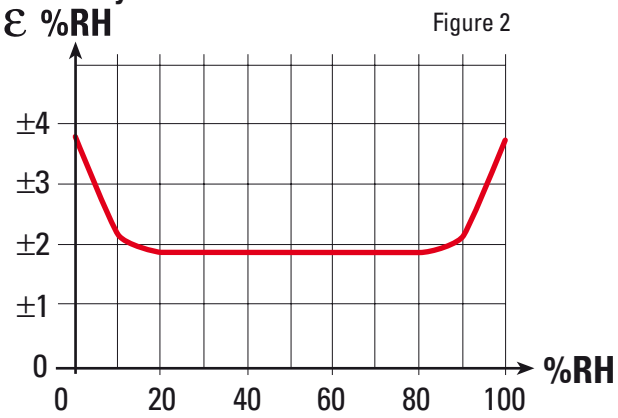
Figure 3




**Note:** The measured reading tolerance is guaranteed through the "**Normal**" working conditions. A long-time period, at "**Limit**" conditions may generate a permanent drift up to +2% RH.

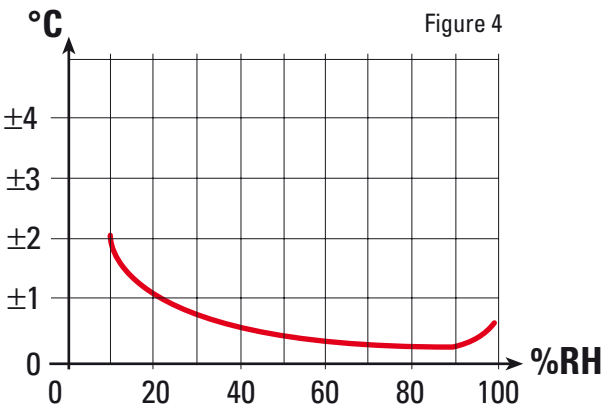
**Humidity tolerance**

Figure 2




**Dew Point Calculation Tolerance**

Figure 4



# *Appendix C*
# *Troubleshooting*

# *Appendix D*
# *Warranty*

## D-1 Warranty and repairs

The instrument is under warranty against manufacturing flaws or faulty material, that are found within 18 months from delivery date. The warranty is limited to repairs or to the replacement of the instrument.

The eventual opening of the housing, the violation of the instrument or the improper use and installation of the product will bring about the immediate withdrawal of the warranty effects.

In the event of a faulty instrument, either within the period of warranty, or further to its expiry, please contact our sales department to obtain authorisation for sending the instrument to our company.

The faulty product must be shipped to Ascon Tecnologic with a detailed description of the faults found, without any fees or charge for Ascon Tecnologic, except in the event of alternative agreements.