

## DFRHT: relative humidity, ambient temperature and dew point combined sensor

DFRHT module detects and transmits, over the **Domino** bus, the relative humidity and the ambient temperature measured by a special sensor inside the module itself.

In addition, DFRHT module calculates the dew point. The dew point is the temperature at which, at constant pressure, the humidity contained in the air begins to condense into water. The dew point is always less than or equal to the temperature of the air.

DFRHT module also features 2 digital points that, when activated, report the following conditions:

- the dew point is greater than or equal to a configurable first value (e.g. 14°C); this is useful to activate the dehumidifier
- the dew point is greater than or equal to a configurable second value (e.g. 18°C, safety value); this is useful to switch off the cooler

These two thresholds, as said, can be freely fixed and also two separated configurable hysteresis are provided.

DFRHT module is thus particularly suitable for the management of the dehumidification and cooling of rooms. DFRHT module has been expressly developed for the wall mounting.

The module features only one 2-way terminal block for the connection to the **Domino** bus; no more connections are required: as for the majority of **Domino** modules, the power supply required for the module operation is derived from the bus itself. The housing is a plastic box and the protection degree is IP20.

A small pushbutton inside DFRHT module allows to assign the desired address and a green LED report the operating status; this green LED flashes every 2 seconds when the module is properly connected and operating. A small 3-way connector is also provided for the quick connection to DFPRO tester/programmer.

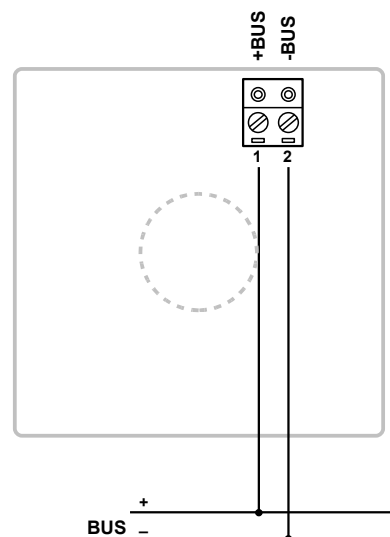
## Address programming

DFRHT module takes, inside the **Domino** bus, 4 consecutive input addresses and, if enabled by the configuration panel of BDTools or DCP Ide, 2 consecutive output addresses. However, a unique base address has to be assigned to the module to make it operating; assigning an address n, it will take the input addresses from n to n+3 and the output addresses from n to n+1 (if enabled). For the details about the address programming refer to the related documentation.



## Wiring diagram

The following schematic diagram shows the connection required between DFRHT and the **Domino** bus.



## Installation hints

The correct positioning of the sensor plays a key role for the correct measurement of humidity and temperature, therefore it is recommended to strictly observe the following principles of installation:

- do not install the module on a wall in contact with the outside or in contact with an unheated room (e.g. garage)
- do not install it on a hot wall (such as walls containing heating pipes)
- do not place it near a heat source that could distort the proper temperature reading
- avoid to place it near to household appliances that radiate heat (microwave, refrigerators, televisions, etc..)

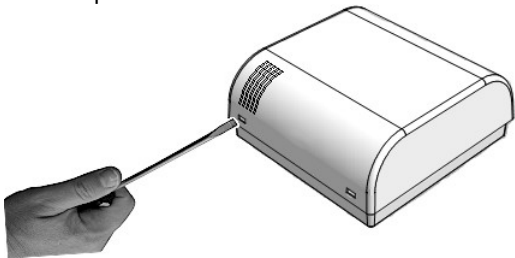
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- do not place it in dead corners, behind doors or where the air cannot freely circulate, but also avoid places subject to excessive air currents
- a possible opening for the cables on the back of DFRHT module must be sealed to prevent air currents affecting the measures
- do not install the module in a place where it can be subjected to direct sunlight from the outside
- install it at about 140/150 cm. from the floor

To install DFRHT module follow the steps described below.

**Opening the module**

Find the two fissures where the small dull teeth of the rear panel are housed (normally on the bottom side). Insert the tip of a small screwdriver in one of these fissures so that the rear panel releases towards the outside. Then insert the screwdriver in the other fissure so to extract completely the rear panel.



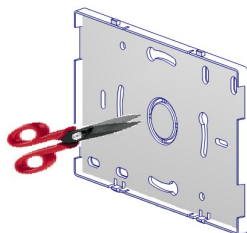
**Address assignment**

Insert the proper connector of DFPRO programmer (or other systems suitable for the address assignment, see the related system documentation) in the 3-way connector on the rear side of the electronic card; then assign the base address following the normal procedure of all **Domino** modules.



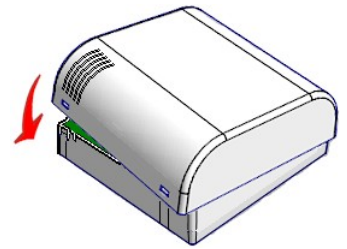
**Connection**

Open the hole on the rear panel helping yourself with a small pincers or a pair of scissors. Insert the wires of the bus in the hole of the rear panel; fix the rear panel to the wall, placing attention to its orientation (see the UP label on the rear panel itself). Be sure that no voltage is present on the wires. Connect the wires to the terminal blocks of the electronic card according to schematic diagram.



**Closing the module**

Place the top side of the cover on the rear panel fixed to the wall, so that the two teeth on the top side of the rear panel itself fit in the related fissures and, at the same time, the connector of the electronic card fits into the terminal block. At this point, delicately push the bottom side of the cover towards the rear panel, until the two dull teeth on the rear panel fit in the related fissures of the cover.



**Information reported on the bus**

**Input section**

As said above, DFRHT module takes, inside **Domino** bus, 4 input addresses and, if enabled, 2 output addresses. Said n the assigned base address, the information mapped on the input section are the following:

Point	n	n+1	n+2	n+3
1				DP ≥ thresh.1
2				DP ≥ thresh.2
3				-
4				-
5				-
6				-
7	Value of the relative humidity (%)	Value of the ambient temperature in tenth of °K (Kelvin degrees multiplied by 10)	Value of the dew point in tenth of °K (Kelvin degrees multiplied by 10)	-
8				-
9				-
10				-
11				-
12				-
13				-
14				-
15				-
16				-

In details, the input addresses n, n+1 and n+2 respectively report:

- measurement of the relative humidity in %; value in the range 0 to 100%
- measurement of the ambient temperature in °K multiplied by 10; called X the value reported by the address n+1, to convert it to °C use the formula  $(X-2730)/10$ . The temperature in BDTools or DCP Visio will be instead directly displayed in °C
- calculated value for the dew point in °K multiplied by 10; called Y the value reported by the address n+2, to convert it to °C use the formula  $(Y-2730)/10$ . The temperature in BDTools or DCP Visio will be instead directly displayed in °C

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The address n+3 reports two digital points that, when activated, signals the presence of the following conditions:

- DP ≥ thresh.1: the dew point is greater than or equal to a first threshold value specified by the content of the output section of the module itself at address n, or by a value in the memory of the module (see in the following of this manual)
- DP ≥ thresh.2: the dew point is greater than or equal to a second threshold value specified by the content of the output section of the module itself at address n+1, or by a value in the memory of the module (see in the following of this manual)

### Output section

The module can feature, as said above, 2 output addresses for setting the two dew point thresholds via bus; these addresses have to be enabled, if required, by the DFRHT configuration panel provided by BDTools or DCP Ide, as described in the following.

Said n the assigned base address, the information mapped on the output section are the following:

Point	n	n+1
1		
2		
3		
4		
5		
6		
7	Value of threshold 1 for dew point, in tenth of °K	Value of threshold 2 for dew point, in tenth of °K
8	(Kelvin degrees multiplied by 10)	(Kelvin degrees multiplied by 10)
9		
10		
11		
12		
13		
14		
15		
16		

In details, the output addresses n and n+1 respectively report:

- Threshold 1 to be compared to the the current dew point value, in °K multiplied by 10; called X the desired value in °C, to convert it to °K multiplied by 10 use the formula  $(X+273) \times 10$ . The threshold in BDTools and DCP Visio will be instead directly set in °C.
- Threshold 2 to be compared to the the current dew point value, in °K multiplied by 10; called Y the desired value in °C, to convert it to °K multiplied by 10 use the formula  $(Y+273) \times 10$ . The threshold in BDTools and DCP Visio will be instead directly set in °C.

If the output address has been enabled, the module will execute the comparison between the current dew point and the two just described values; in this way, a supervisor, touch screen terminal or other master device can easily set the thresholds because it is enough to write the desired values to the output addresses.

If instead the two threshold are fixed and it is not to modify them, it is possible to save the output addresses disabling them by DFRHT configuration panel provided by BDTools or DCP Ide; in this case, the comparison will be made with the two values written in the non volatile memory of the module. In this case too, the two values in the memory can be changed by DFRHT configuration panel.

Anyway, the result of the comparison between the dew point and the two thresholds will affect the point 1 and 2 of the input section at address n+3.

### Using the digital points of DFRHT

As said before, DFRHT module provides, at input address n+3, two digital points that will be activated when the following conditions occur:

- the dew point is greater than or equal to a first configurable threshold value
- the dew point is greater than or equal to a second configurable threshold value

The first point is normally used to activate the dehumidifier when the dew point exceeds a given value (e.g. 14°C)

The point 2 can be instead used to switch off the cooling unit when the dew point exceeds another given value (e.g. 18°C, also said safety value).

The availability of these digital points allows to implement the dehumidifier management without using the DFCP controller, or anyway this allows to simplify the programming of the controller itself.

### DFRHT configuration panel

The configuration panel, available in BDTools and DCP Ide, allows to set DFRHT module.

The details will be described in the following. From the main menu of BDTools or MCP Ide select Programming and then DFRHT Configuration; the following windows will be shown:

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**Module Address:** it is the base address of DFRHT module to be set or read.

**Output Address:** when checked, this option enables the 2 output addresses of DFRHT module (the base address will be the same assigned to the input section).

**Read:** read the current settings of the selected DFRHT module.

**Program:** send the settings displayed in the window to the memory of the selected DFRHT module.

**ID & Ver.:** ask the current firmware version to the selected DFRHT module.

**Default:** restore the default values in the configuration panel; these one are the following:

- x Address: 1
- x Output address: disabled
- x Threshold 1: 14.0°C
- x Hysteresis 1: 1.0°C
- x Threshold 2: 18.0°C
- x Hysteresis 2: 1.0°C
- x Temperature offset: 0.0°C

**Close:** quit the configuration panel.

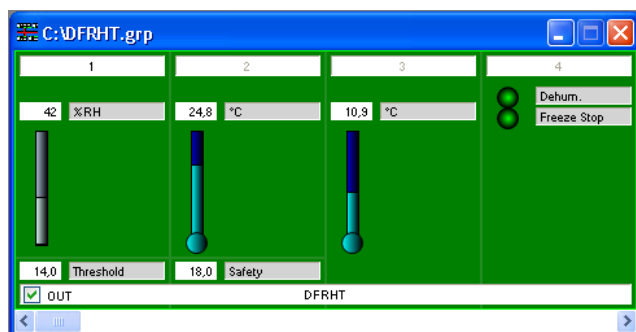
**Threshold 1 and Threshold 2:** these are the threshold values 1 and 2 in the non volatile memory of the module, that will be used when the output address is disabled; allowed resolution for these values is 0.1°C.

**Hysteresis 1 and Hysteresis 2:** these are the hysteresis values applied to the threshold 1 and 2 respectively; these hysteresis will be applied both to the thresholds in the module memory and to the thresholds specified by the data field of the 2 output addresses (if enabled).

**Offset:** this is a value to be added to the temperature value read by the sensor, in order to compensate possible reading errors due to external factors; this value, called offset, can be both a positive and negative value and its resolution is 0.1°C.

## Mapping

BDTools and DCP Visio allow to display the map of DFRHT module as in the following figure.



The values of relative humidity, temperature and dew point are shown in the 3 text boxes on top side; a graphical representation (bar graph) is also provided. The two boxes on the bottom side show the value related to the two output addresses (if enabled). Double-clicking with the mouse in these boxes, the desired value can be entered.

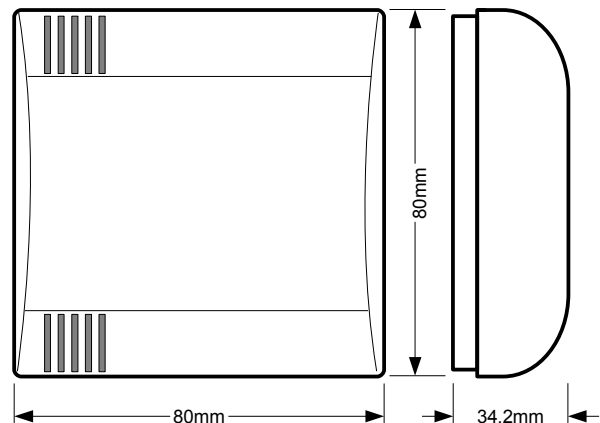
By default the output section is shown as disabled, but if the output address has been activated, check the option OUT at the bottom left (OUT).

As usual, the background of the represented module is displayed in green color when it is connected and properly operating, otherwise the background will be in red color. The status of the two digital points is represented by a green "dot" if the point is not active or red if the point is active.

## Technical characteristics

Supply voltage	By specific centralized power supply mod. DFPW2
Current consumption	Equivalent to 2 standard <b>Domino</b> modules
Humidity measurement Range: Resolution: Accuracy:	0 ÷ 100% 0.1 points % ±2 points % in the range 10÷90% ±4 points % outside
Temperature measurement Range: Resolution: Accuracy:	-5 ÷ +50°C 0.1°C ±0.5°C
Calculated Dew Point resolution	0.1°C
Operating temperature	-5 ÷ +50 °C
Storage temperature	-20 ÷ +70 °C
Protection degree	IP20

## Outline dimensions



**Correct disposal of this product**

(Waste Electrical & Electronic Equipment)  
(Applicable in the European Union and other European countries with separate collection systems). This marking on the product, accessories or literature indicates that the product should not be disposed of with other household waste at the end of their working life. To prevent possible harm to

the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources. Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

**Installation and use restrictions****Standards and regulations**

The design and the setting up of electrical systems must be performed according to the relevant standards, guidelines, specifications and regulations of the relevant country. The installation, configuration and programming of the devices must be carried out by trained personnel.

The installation and the wiring of the bus line and the related devices must be performed according to the recommendations of the manufacturers (reported on the specific data sheet of the product) and according to the applicable standards.

All the relevant safety regulations, e.g. accident prevention regulations, law on technical work equipment, must also be observed.

**Safety instructions**

Protect the unit against moisture, dirt and any kind of damage during transport, storage and operation. Do not operate the unit outside the specified technical data.

Never open the housing. If not otherwise specified, install in closed housing (e.g. distribution cabinet). Earth the unit at the terminals provided, if existing, for this purpose. Do not obstruct cooling of the units. Keep out of the reach of children.

**Setting up**

The physical address assignment and the setting of parameters (if any) must be performed by the specific softwares provided together the device or by the specific programmer. For the first installation of the device proceed according to the following guidelines:

- Check that any voltage supplying the plant has been removed
- Assign the address to module (if any)
- Install and wire the device according to the schematic diagrams on the specific data sheet of the product
- Only then switch on the 230Vac supplying the bus power supply and the other related circuits

**Applied standards**

This device complies with the essential requirements of the following directives:

2004/108/CE (EMC)  
2006/95/CE (Low Voltage)  
2002/95/CE (RoHS)

**Note**

Technical characteristics and this data sheet are subject to change without notice.