

# RELATIVE HUMIDITY CONTROLLER WITH 1 OUTPUT

**C ← BUS**

## AUD 631 C1 Eng.

- Control of relative humidity of room or of discharge air with modulating PI control or On-Off in two stages
- Control of minimum and maximum limits of relative humidity of discharge air
- C-Bus compatible
- DIN rail compatible



### 1. APPLICATION

AUD 631 is designed for relative humidity control in air handling plants :

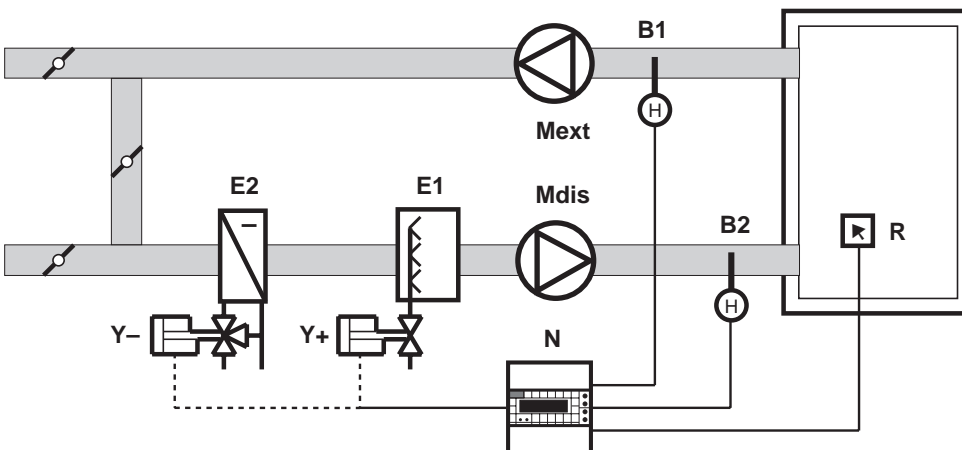
- Control of ambient relative humidity (B1) with option of minimum and maximum limits of discharge air (B2).
  - Control of relative humidity of discharge air (B2).
- AUD 631 can control :
- Reversible actuators with 3-wire electric control for regulation of :

- Valves for vapour humidifying units.
- Valves for cooling batteries with refrigerated water.
- Electrical devices with On-Off control in 1 or 2 stages :
  - Adiabatic humidifiers with pump.
  - Adiabatic humidifiers with solenoid valve.
  - Vapour humidifiers.
  - Refrigerator compressors.

### 2. ACCESSORIES

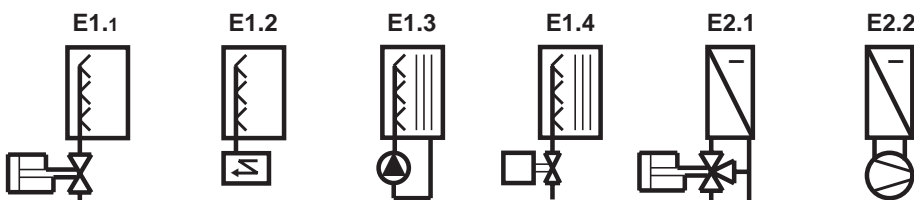
No.	Description	Type	Accuracy	Application	Code	Data sheet
1	Relative humidity detector for discharge or extract air or	<b>SUR 012</b>	5%	20 to 80 %	B1-B2	N 220
1	Remote control	<b>SUR 051</b>	3%	10 to 90 %	B1-B2	N 220
		<b>CDB 545</b>	-	- 8 to + 8 %	R	N 711

### 3. SCHEMATIC DIAGRAM



- B1 - Extract air humidity detector
- B2 - Discharge air humidity detector
- E1 - Humidifying unit
  - E1.1 - Vapour humidifier (modulating)
  - E1.2 - Vapour humidifier (On-Off)
  - E1.3 - Adiabatic humidifier with pump (On-Off)
  - E1.4 - Adiabatic humidifier with valve (On-Off)
- E2 - Dehumidifying unit
  - E2.1 - Battery with cold water (modulating)
  - E2.2 - Direct expansion battery (On-Off)
- N - AUD 631
- Mdis - Discharge air fan
- Mext - Extract air fan
- R - Remote control
- Y+ - Humidification valve
- Y- - Dehumidification valve

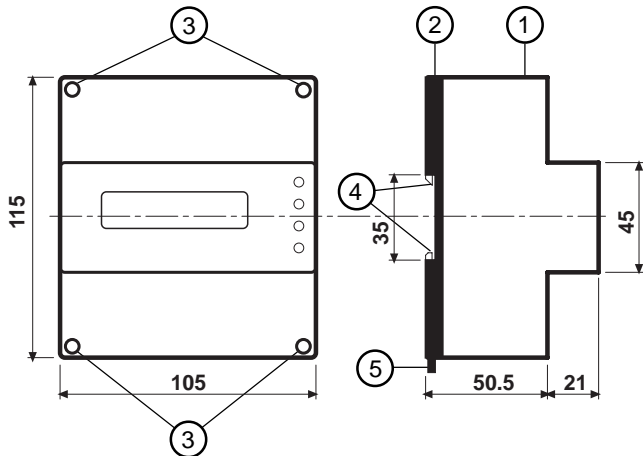
#### Types of air handling unit



**4. TECHNICAL DATA**

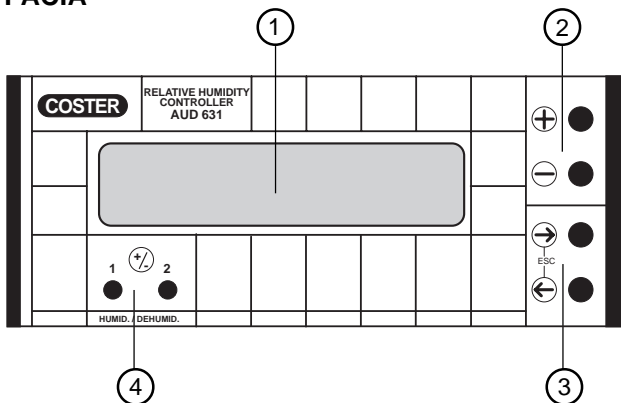
Power supply	24 V ac ± 10%
Frequency	50 to 60 Hz
Consumption	5 VA
Output humid. or dehumid.	Modulating or On-Off in 2 stages
Voltage-free output contacts:	
- maximum switched voltage	250 V ac
- maximum switched current	5 (1) A
Case	DIN 6E module
Base	NYLON
Cover	ABS
Ambient temperature:	
- operating	0 to 45 °C
- storage	- 25 to + 60 °C
Construction standards	It. Electrotech. Committee (CEI)
Electromagnetic compatibility	EEC 93/68
Ambient humidity	Class F ( DIN 40040 )
Protection	IP 40
Weight	1 Kg
Setting ranges :	
- desired humidity (ambient or discharge air)	0.1 to 99 %
- limit humidity discharge air (minimum or maximum)	0.1 to 99 %
- adjustment by remote control	± 8 %
- proportional band or differential	± 0.1 to ± 99 %
- integral time	1 to 99 min.
- actuator speed	1 to 900 s

**5. OVERALL DIMENSIONS**



- 1- Cover for protection of electronic components
- 2- Base with transformer, relay & terminal blocks
- 3- Screws for securing cover to base
- 4- DIN rail securing elements
- 5- DIN rail release lever

**6. FACIA**



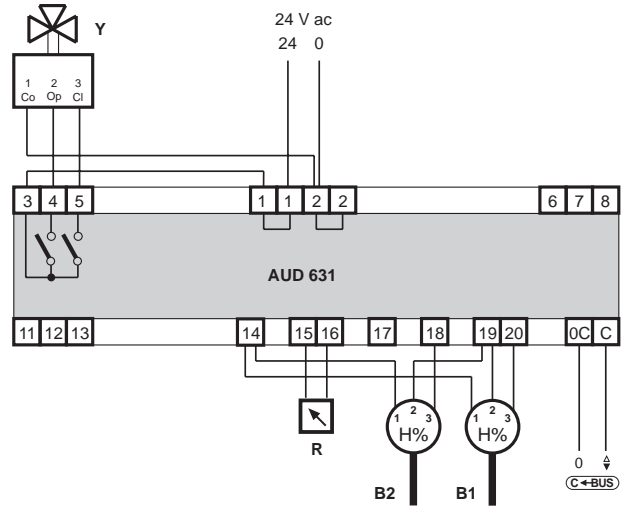
- 1 - Two-line backlighted alphanumeric display
- 2 - + and - keys for entering data
- 3 - ← and → page-scrolling keys
- 4 - Output LEDs
- Modulating : Opens - Closes
- On-Off : 1st - 2nd Stage

**7. WIRING**

It is recommended not to insert more than two cables in a single terminal of AUD 631 and if necessary to use external terminals.

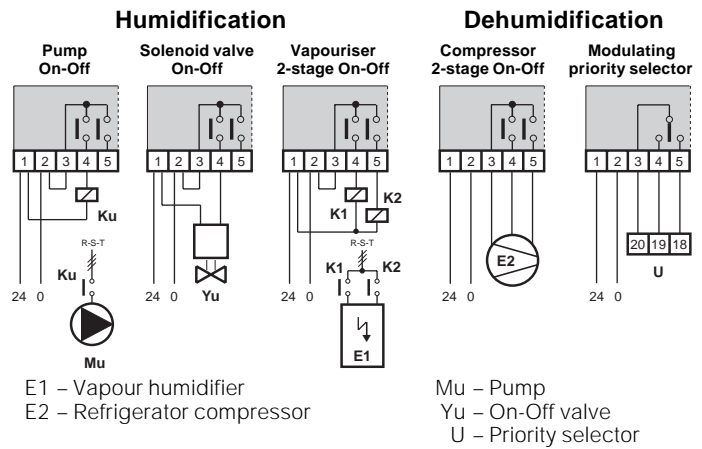
- Power supply 24 V ac : Cables of 1.5 mm<sup>2</sup>.
- Power supply valve actuator : Cables of 1.5 mm<sup>2</sup>.
- Connections detectors and remote controls : Cables of 1 mm<sup>2</sup> min.
- Connections C-Bus : Telephone cables having two wires of different colours. Maximum wiring length 2 km or 4 km if closed ring. **Warning ! Pay careful attention to polarities.**

**8. WIRING DIAGRAM**



- B1 - Extract air duct humidity detector SUR 012 or SUR 051
- B2 - Discharge air duct humidity detector SUR 012 or SUR 051
- R - Remote control CDB 545
- Y - Valve humidifying or dehumidifying unit

**OUTPUT**



- E1 - Vapour humidifier
- E2 - Refrigerator compressor

- Mu - Pump
- Yu - On-Off valve
- U - Priority selector

**9. C-BUS : TELEMANAGEMENT COMMUNICATION**

AUD 631 is provided with a C-Bus parallel output which allows two-way communication with one or more **Local computers** and/or a **Telemanagement central computer**.

It is possible to transmit :

- Programming and setting data of the controllers;
- Programming and setting data for telemanagement ;
- Operational status of all electrical devices controlled;
- Values of parameters measured by detectors.

It is possible to connect up to a maximum of **239** Coster controllers bearing the C-Bus badge; so that they can be identified by the computer they must be individually **addressed** (1 to 239) on page **21** of display .

**9.1 C-Bus wiring**

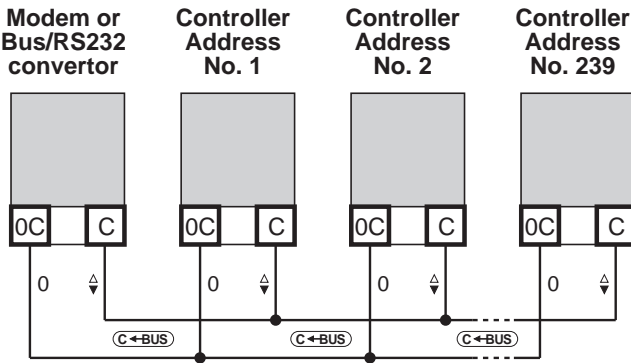
The **parallel** electrical connection between all the controllers must be carried out using **twin-wire telephone cable** (low capacity) and observing strictly the polarity OC - C.

The wiring can be:

- closed ring having a maximum wiring length of 4 km
- in line or with stubs having a maximum wiring length of 2 km.

For greater distances **signal amplifiers** can be used. Connection to local computers must be made using C-Bus-RS232 convertors and connection to the telemanagement central computer using a Coster modem with C-Bus.

**9.2 C-Bus wiring diagram**



**10. INSTALLATION**

**AUD 631 must be installed in a dry location with a temperature not above 35 °C, and away from any water leakages or sprays. If installed in locations classified as “dangerous” it must be mounted inside a cabinet for electrical appliances constructed according to the regulations in force for the type of danger involved.**

In any event, the electrical connections must be made strictly according to the wiring diagram (8) and in observance of the safety regulations in force.

**10.1 Extract air detector SUR 012 or SUR 051 (B1)**

In order to measure the relative humidity it is advisable to use a detector installed on the extract air duct because at that point the humidity undoubtedly represents the mean ambient humidity. It must be installed upstream of the extractor fan and as close as possible to the outlet vents.

**10.2 Discharge air detector SUR 012 or SUR 051 (B2)**

This must be installed downstream of the discharge fan and as near as possible to the air emission vents.

**11. OPERATION**

**11.1 Setting data**

All the parameters controlled and the setting data for AUD 431 can be read on the alphanumeric display and modified by means of the + and - keys.

- The “pages” of the display are divided into three parts:
- 1st part (from page 1 to page 6) : parameters controlled and setting data modifiable by the user.
- 2nd part (from page 7 to page 17) : operational setting data for the controller modifiable by the engineer during the commissioning stage of the plant.
- 3rd part (from page 18 to page 22) : testing the output connections and the controller identification data to be used when it is connected to a telemanagement system.

The desired value H% (display page 2), the proportional band Pb (display pages 10 and 16) and the integral time It (display pages 11 and 17) can be set separately, for the humidification stage and for the dehumidification stage.

When It is set to the maximum value (99 minutes), the integral control action is eliminated.

**11.2 Output**

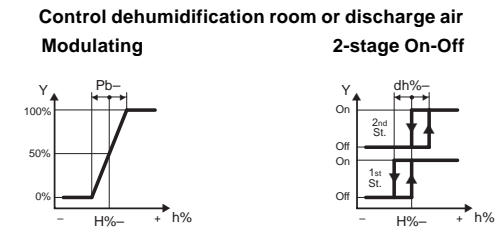
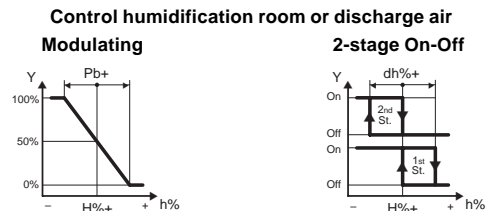
The output signal can be used in two different ways (display pages 8 and 14):

- Modulating with PI control action for the operation of a reversible actuator with 3-wire electric control (Common, Opens, Closes) or a priority selector. With this type of operation it is indispensable to set the run time of the actuator (display pages 9 and 15) so as to permit AUD 631 to know the position of the valve in relation to the signals sent ; in this way the modulating system assumes the same characteristics as the progressive system.
- On-Off for the control of electrical devices with 1 or 2 stages (adiabatic humidifiers, refrigerator compressors). The proportional band Pb is converted automatically into a differential.

**11.3 Control of ambient or discharge air (detector B1 or B2)**

The relative humidity to be controlled is measured by the detector B1 in the extract air duct or by detector B2 in discharge air duct. AUD 631 compares the value of actual relative humidity H% with the desired humidification value H%+ or dehumidification value H%- (display page 2). In the event of a difference, it produces a modulating signal, for the positioning of valve Y, proportional to the difference itself and to the proportional band Pb set (display pages 10 and 16).

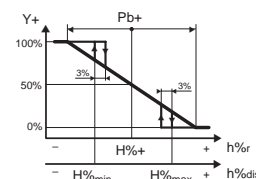
To achieve fine adjustment, at regular intervals AUD 631 corrects the position of the valve in relation to the integral time It set (display pages 11 and 17).



**11.4 Control ambient humidity with discharge air limit (detectors B1 and B2)**

The relative humidity to be controlled is measured by detector B1 in the extract air duct and the controller regulates the output as previously described.

The detector B2 measures the humidity of the discharge air. When the value measured falls below the minimum limit H%<sub>min</sub> (display page 12) AUD 631 regulates, with On-Off action, the opening of the output ; when the value rises above the maximum limit H%<sub>max</sub> (display page 13) it closes the output. These limits apply only in the humidification stage.



**12. SETTING**

All the data are displayed in a system of pages which can be scrolled on the two-line backlighted alphanumeric display (fig. 6.1) by means of the ← and → keys (fig. 6.3).

The data are preset and can be adjusted using the + and - keys (fig. 6.2).

Whichever page is displayed, every half hour the 1st page returns to the display.

To return quickly to the 1st page, press ← and → keys simultaneously.

Page	Display	Description
1	<b>H% ROOM</b> <sup>(1)</sup> <b>ACTUAL : 53.0 %</b>	Indicates principal humidity measured
2	<b>H% HUMID.</b> <sup>(2)</sup> <b>ROOM</b> <sup>(1)</sup> <b>DESIRED : 50.0 %</b>	Desired relative humidity. Range : 0.1 to 99 %.
	(1) Room : if detector B1 connected; Mandata : if only detector B2 connected.	
	(2) HUMID. : when on page 5 appears : HUMIDIFICATION; DEHUMID. : when on page 5 appears : DEHUMIDIFICATION.	
3	<b>ADJUSTMENT H %</b> <b>BY R. CONTROL : 0.0 %</b>	Appears only if remote control R connected. Indicates increase or decrease of desired humidity by means of remote control. Range : - 8 to + 8 %.
4	<b>H% DISCHAR. AIR</b> <b>ACTUAL : 53.0 %</b>	Appears only if detectors B1-B2 connected.
5	<b>Type operation</b> <b>HUMIDIFICATION</b> <sup>(3)</sup>	Seasonal switching. Inverts output operation.
	(3) HUMIDIFICATION : humidification operation; DEHUMIDIFICATION : dehumidification operation.	
6	<b>AUD 631 C1 Eng</b> <b>Version. . . .</b>	Identity card of controller
7	<b>TO CONTINUE</b> <b>KEEP + PRESSED</b>	By pressing + key for 3 seconds pages for technical setting of AUD 631 appear.
8	<b>TYPE OF OUTPUT</b> <b>HUMID. : MODULTAT</b> <sup>(4)</sup>	Type of output.
	(4) MODULAT. : for electric actuators with 3-wire control; IN 2-STAGE : for electrical devices with 1 or 2 stages.	
9	<b>TIME ACTUATOR</b> <b>HUMID. : SEC. 60</b>	Appears only if on page 8 MODULATING has been chosen: Run time of actuator. Range : 1 to 900 seconds.
10	<b>PROPORT. BAND</b> <b>HUMID. : +/- 4.0 %</b>	Appears if on page 8 MODULATING has been chosen: Proportional band in ± %. Range : ± 0.1 to ± 99 %.
	<b>DIFFERENTIAL</b> <b>HUMID. : +/- 4.0 %</b>	Appears if on page 8 IN 2 STAGES has been chosen : Differential in ± %. Range : ± 0.1 to ± 99 %.

Page	Display	Description
11	<b>INTEGRAL TIME</b> <b>HUMID. : min. 10.0</b>	Integral time Range : 1 to 99 min.
12	<b>DIS. AIR LIMIT</b> <b>MINIMUM : 0.1 %</b>	Appears only if detector B2 connected and applies only to humidification. Minimum limit humidity of discharge air. Range : 0.1 to 99 %.
13	<b>DIS. AIR LIMIT.</b> <b>MAXIMUM : 99.0 %</b>	Appears only if detector B2 connected and applies only to humidification. Maximum limit humidity of discharge air. Range : 0.1 to 99 %.
14	<b>TYPE OF OUTPUT</b> <b>DEHUMID. : MODUL.</b> <sup>(5)</sup>	Type of outlet for dehumidification.
	(5) MODULATING: for electric actuators with 3-wire control IN 2 STAGES : for electrical devices with 1 or 2 stages	
15	<b>ACTUATOR TIME</b> <b>DEHUMID : SEC. 60</b>	Appears only if on page 14 MODULATING has been chosen: Actuator run time Range : 1 to 900 seconds
16	<b>PROPORT. BAND</b> <b>DEHUMID. : +/- 2.0 %</b>	Appears if on page 14 MODULATING has been chosen: Proportional band in ± %. Range : ± 0.1 to ± 99 %.
	<b>DIFFERENTIAL</b> <b>DEHUMID. : +/- 2.0 %</b>	Appears if on page 14 IN 2 STAGES has been chosen: Differential in ± %. Range : ± 0.1 to ± 99 %.
17	<b>INTEGRAL TIME</b> <b>DEHUMID. : MIN. 10.0</b>	Integral time Range : 1 to 99 min.
18	<b>TO CONTINUE</b> <b>KEEP + PRESSED</b>	By pressing + key for 3 seconds the pages appear for testing output electrical connections and for setting telemanagement data.
19	<b>OUTPUT</b> <b>ALWAYS OPEN</b>	Modulating output : Valve open. IN 2 STAGES output : 1st stage On.
20	<b>OUTPUT</b> <b>ALWAYS CLOSED</b>	Modulating output : Valve closed. IN 2 STAGES output : 2nd stage On.
21	<b>ADDRESS</b> <b>CONTROLLER : 01</b>	Address for C-Bus connection. Range : 1 to 239
22	<b>CONTROLLER</b> <b>GROUP : 1</b>	Group to which AUD 631 belongs. Range : 1 to 9