RELATIVE HUMIDITYCONTROLLER WITH 2 OUTPUTS

C ←BUS

AUD 632 C1 Eng.

- **Control of relative humidity of room or of discharge air with modulating PI control or On-Off in two stages**
- **Two outputs in sequence for humidifying & dehumidifying**
- **Control of minimum or maximum limits of relative humidity of discharge air**
- **C-Bus compatible**
- **DIN rail compatible**

CE

1.APPLICATION

AUD 632 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 632 can control :
- Reversible actuators with 3-wire electric control for regulation of ;

- Valves for humidifying units using vapour.
- Valves for cooling batteries with refrigerated water.
- Progressive actuators with 0 to 10 V dc control for regulation of mixing dampers (dehumidification).
- Electrical devices with On-Off control in 1 or 2 stages :
  - Adiabatic humidifiers with pump or with solenoid valve.
  - Humidifiers using vapour.
 - Refrigerator compressors.

2. ACCESSORIES

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

3. SCHEMATIC DIAGRAM
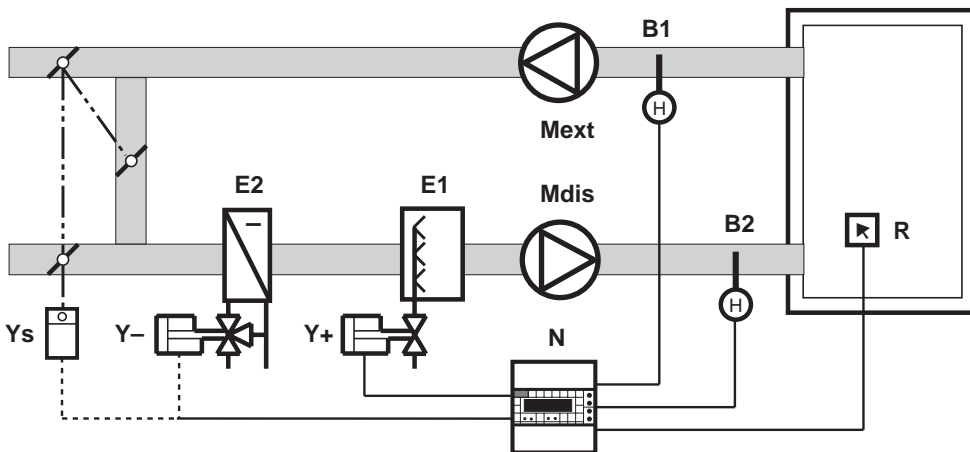
B1 – Extract air humidity detector
B2 – Discharge air humidity detector
E1 - Humidifying unit
E1.1 -Humidifier using vapour (modulating)
E1.2 - Humidifier using vapour (On-Off)
E1.3 - Adiabatic humidifier with pump (On-Off)
E1.4 - Adiabatic humidifier with valve (On-Off)
E2 - Dehumidifying unit
E2.1 - Battery with cold water (modulating)
E2.2 - Direct expansion battery (On-Off)
E2.3 - Air mixing dampers (progressive 0 to 10 V dc)
N – AUD 632
Mdis– Discharge air fan
Mext– Extract air fan
R – Remote control
Y+ – Humidifying valve
Y– – Dehumidifying valve
Ydamp– Mixing damper

Types of air handling unit

COSTER
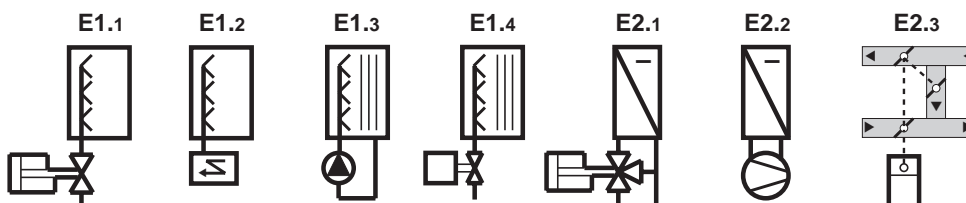
## 4. TECHNICAL DATA

Power supply	24 V ac ± 10%
Frequency	50 to 60 Hz
Consumption	5 VA
Humid. & dehumid. outputs	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
Output dampers (dehumidifying)	0 to 10 V dc
Setting rages :	
- desired humidity (ambient or discharge air)	0.1 to 99 %
- limit humidity discharge air (min. or max.)	0.1 to 99 %
- adjustment by remote control	± 8 %
- proportional band or differential	± 0.1 to ± 99 %
- Integral time	1 to 99 minutes
- actuator speed	1 to 900 sec.

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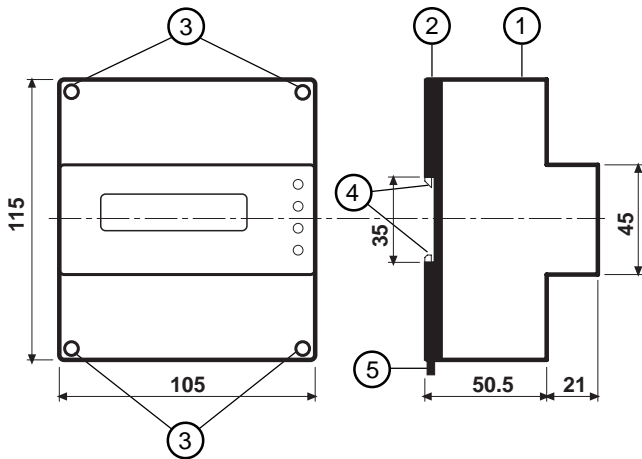
1– Cover for protection of electronic components
2– Base with transformer, relay & terminal blocks
3– Screws for securing cover to base
4– DIN rail securing elements
5– DIN rail release lever

6. FACIA
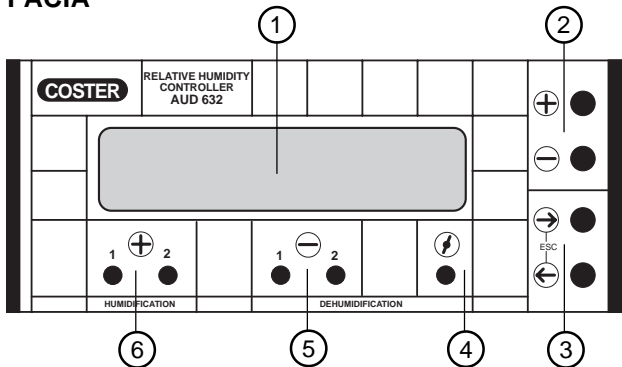
1 – Two-line backlighted alphanumeric display
2 – + and – keys for entering data
3 – ← and → page-scrolling keys
4 – Dehumid. output 0 to 10 V dc
5 – Dehumid. output modulating or On-Off
6 – Humid. output modulating or On-Off

7. WIRING

It is recomended not to insert more than two cables in a single terminal of AUD 632 and if necessary to use external terminals.
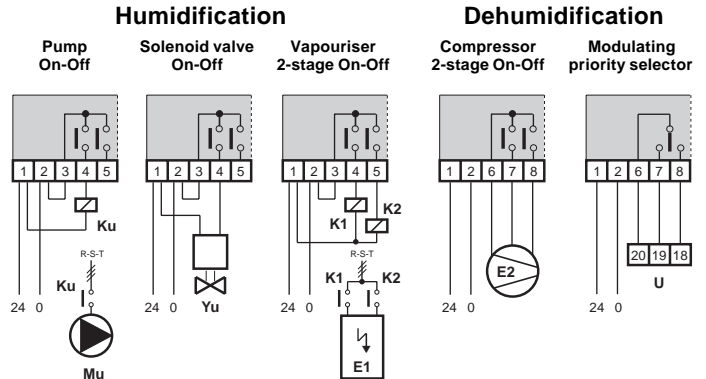• Power supply 24 V ac : Cables of 1.5 mm².
• Power supply valve actuator : Cables of 1.5 mm².
• Connections detectors & remote controls cable of 1 mm² min.
• Connections C-Bus : Telephone cables having two wires of different colours. Maximum wiring length 2 km or 4 km if closed ring. **Warning ! Pay careful attention to polarities.**

8. WIRING DIAGRAM
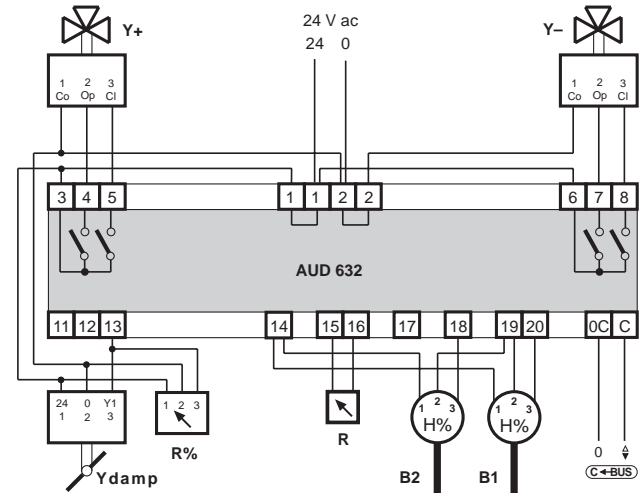
B1	– Extract air duct humidity detector SUR 012 or SUR 051
B2	– Discharge air duct humidity detector SUR 012 or SUR 051
R	– Remote control CDB 545
R%	– Positioner minimum dampers
Y+	– Valve humidifying unit
Y−	– Valve dehumidifying unit
Ydamp	– Mixing dampers

OUTPUTS

Humidification **Dehumidification**

Pump On-Off | Solenoid valve On-Off | Vapouriser 2-stage On-Off | Compressor 2-stage On-Off | Modulating priority selector

E1 – Humidifier using vapour
E2 – Refrigerator compressor
Mu – Pump
Yu – On-Off valve
U – Priority selector

9. C-BUS : TELEMANAGEMENT COMMUNICATION

AUD 632 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 **25** of display .

9.1 C-Bus wiring
The **parallel** electrical connections between all the controllers must be made using **twin-wire telephone cable** (low capacity) and observing strictly the polarity 0C - C.

CIE

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
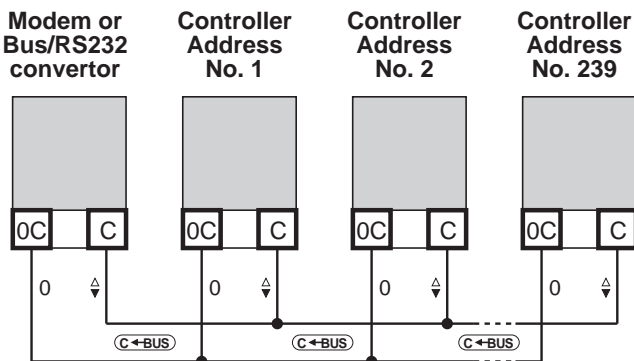
10. INSTALLATION

AUD 632 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)

If the plant configuration permits, in order to measure the relative humidity it is preferable to use a detector installed on the extract air duct because at that point the humidity undoubtedly represents the ambient mean.

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 432 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 pages 2 & 3), 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 the desired values H%hum and H%dehum are too close (below 3%), on pages 2 and 3 of the display will appear the word ERROR ; the controller will automatically shift the desired value H%dehum so as to prevent the simultaneous action of the two outputs.

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

11.2 Outputs

The output signals 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 632 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 humidification & dehumidification of room or of discharge air (detector B1 or B2)

The relative humidity to be controlled is measured by the detector B1 on extract air duct or B2 in discharge air duct.

AUD 632 compares the value of the actual relative humidity h% with the desired values of humidification H%+ (display page 2) or of dehumidification H%– (display page 3). In the event of a difference, it produces two modulating signals, for the control in sequence of valves Y+ and Y –, proportional to the differences themselves and to the proportional bands Pb set (display pages 10 and 16).

To achieve fine adjustment, at regular intervals AUD 632 corrects the position of the valves in relation to the integral timesIt set (display pages 11 and 17).

Modulating outputs   **2-stage On-Off outputs**
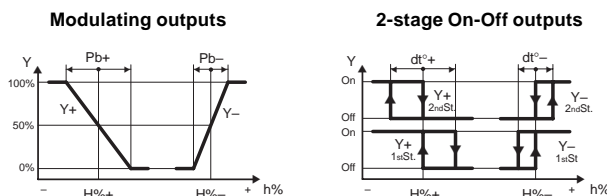
11.4 Control ambient humidity with discharge air limit (detectors B1 and B2)

The relative humidity to be controlled is measured by detector B1 in the extract air duct and the AUD 632 controls the output of humidification Y + and dehumidification Y – as previously described.

The detector B2 measures the relative humidity of the discharge air. When the value measured falls below the minimum limit H%min (display page 12) AUD 632 controls, with On-Off action, the opening of the humidification output Y +; when it rises above the maximum limit H%max (display page 13) it closes the output.These limits do not apply to the dehumidification outputs Y – and Ydamp.
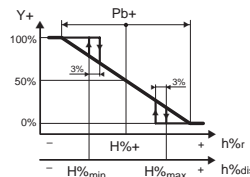
11.5 Control dehumidification of room with control mixing dampers (detector B1)

The relative humidity to be controlled is measured by detector B1. The controller compares the value of the actual relative humidity h% with the desired value H%– (display page 3). In the event of a difference it produces a progressive signal 0 to 10 V dc, proportional to the difference itself and to the proportional band Pb– (page 16) set, for the control of the dampers Ydamp.

To achieve fine tuning, the controller, at regular intervals, corrects the position of the dampers in relation to the integral time It– (display page 17) set.
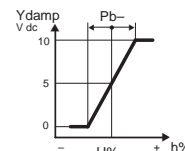
12. SETTING

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 + and – (fig. 6.2).
Whichever page is displayed, every half hour the1st page returns to the display.
To return quickly to the 1st page, press ← and → keys simultaneously.

Page	Display	Description
1	**H% ROOM**[1] **ACTUAL : 53.0 %**	Indicates principal humidity measured
2	**H% HUMID. ROOM**[1] **DESIRED**[2] **: 50.0 %**	Desired relative humidity. Range : 0.1 to 99 %.
3	**H% DEHUM. ROOM**[1] **DESIRED**[2] **: 60.0 %**	Desired relative humidity. Range : 0.1 to 99 %.

(1) Room : if detector B1 connected;
Disch. air : if only detector B2 connected.
(2) Error : if the difference between H% humidification and H% dehumidification is not above 3%.

| 4 | **ADJUSTMENT H % BY R. CONTR: 0.5 %** | Appears only if remote control R connected. Indicates increase or |

decrease in desired humidity by means of remote control.

5	**H% DISCHAR. AIR ACTUAL : 53.0 %**	Appears only if detectors B1-B2 connected.
6	**AUD 632 c1 Eng. Version. . . .**	Identity card of controller
7	**TO CONTINUE KEEP + PRESSED**	By pressing + key for 3 seconds pages for technical setting of controller will appear.
8	**TYPE OF OUTPUT HUMID. : MODULAT** [3]	Type of output

(3) MODULATING: for electric actuators with 3-wire control;
IN 2-STAGES : for electrical devices with 1 or 2 stages.

| 9 | **TIME ACTUATOR HUMID. : sec. 60** | Appears only if on page 8 MODULATING has been chosen. |

Run time of actuator. Range : 1 to 900 sec.

| 10 | **PROPORT. BAND HUMID. : +/– 4.0 %** | Appears if on page 8 MODULATING has been chosen. |

Proportional Band in ±%. Range : ± 0.1 to ± 99 %.

| | **DIFFERENTIAL HUMID. : +/– 4.0 %** | Appears if on page 8 "IN 2 STAGES" has been chosen : |

Differential in ± %. Range : ± 0.1 to ± 99 %.

| 11 | **INTEGRAL TIME HUMID. : MIN. 10.0** | Integral time Range : 1 to 99 minutes |

| 12 | **DIS. AIR LIMIT MINIMUM : 0.1 %** | Appears only if detector B2 connected and applies only to |

humidification. Minimum limit of humidity of discharge air.
Range : 0.1 to 99 %.

| 13 | **DIS. AIR LIMIT MAXIMUM : 99.0 %** | Appears only if detector B2 connected and applies only to |

humidification. Maximum limit humidity of discharge air.
Range : 0.1 to 99 %.

| 14 | **TYPE OF OUTPUT DEHUMID. : MODUL.** [5] | Type of output for dehumidification. |

(5) MODULATING: for electric actuators with 3-wire control
IN 2 STAGES : for electrical devices with 1or 2 stages

| 15 | **ACTUATOR TIME DEHUMID. : SEC. 60** | Appears only if on page 14 MODULATING has been chosen |

Actuator run time. Range : 1 to 900 sec.

| 16 | **PROPORT. BAND DEHUMID. : +/– 2.0 %** | Appears if on page 14 MODULATING has been chosen |

Proportional band in ± %. Range : ± 0.1 to ± 99 %.

| | **DIFFERENTIAL DEHUMID. : +/– 2.0 %** | Appears if on page 14 IN 2 STAGES has been chosen |

Differential in ± %. Range : ± 0.1 to ± 99 %.

| 17 | **INTEGRAL TIME DEHUMID. : MIN. 10.0** | Integral time Range : 1 to 99 min. |
| 18 | **TO CONTINUE KEEP + PRESSED** | By pressing + key for 3 seconds the pages appear for testing |

output electrical connections and for setting telemanagement data.

19	**OUTPUT HUMID ALWAYS OPEN**	Modulating output : Valve open. IN 2 STAGES output : 1st stage On.
20	**OUTPUT HUMID ALWAYS CLOSED**	Modulating output : Valve closed. IN 2 STAGES output : 2nd stage On.
21	**OUTPUT DEHUMID. ALWAYS OPEN**	Modulating output : Valve open. IN 2 STAGES output : 1st stage On.
22	**OUTPUT DEHUMID. SEMPRE CHIUSA**	Modulating output : Valve closed. IN 2 STAGES output : 2nd stage On.
23	**DAMPERS ALWAYS OPEN**	Progressive output : 10 V dc.
24	**DAMPERS ALWAYS CLOSED**	Progressive output : 0 V dc.
25	**ADDRESS CONTROLLER : 01**	Address for C-Bus connection. Range : 1 to 239.
26	**CONTROLLER GROUP : 1**	Group to which AUD 632 belongs. Range : 1 to 9.