

# TEMPERATURE CONTROLLER WITH 2 OUTPUTS

**C ← BUS**

## ATD 672 C1 Eng.



- Control of room temperature or discharge air (hot or cold) with modulating PI control or On-Off in two stages
- Summer outside compensation of room temperature
- C-Bus compatible
- DIN rail compatible

### 1. APPLICATION

ATD 672 is designed for temperature control in air handling plants :

- Control of winter room temperature (B1) with option of minimum and maximum limits of discharge air (B2).
- Control of summer room temperature (B1) with option of outside compensation (B3).
- Control of winter or summer discharge air temperature (B2) with option outside compensation (B3).

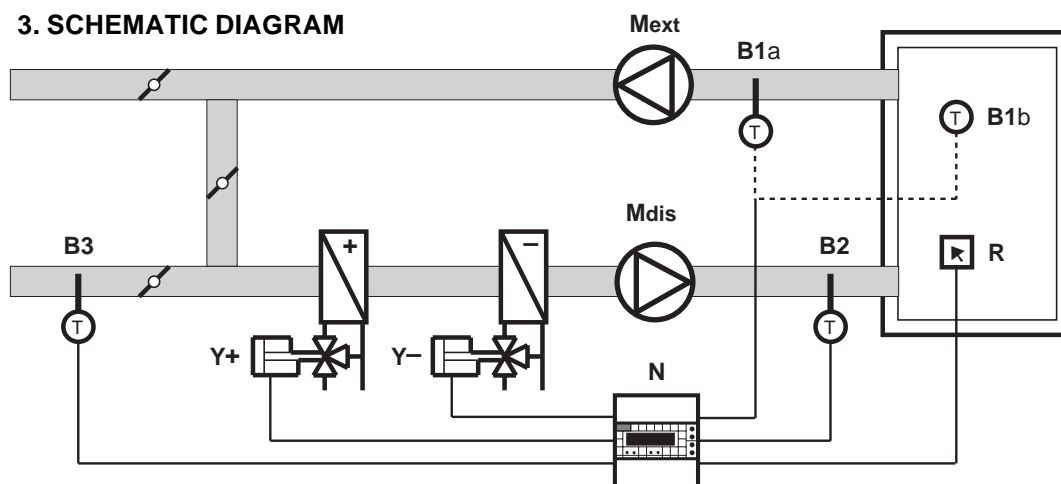
- Control of condensation temperature at fixed point (B2)
- ATD 672 can control :

- Reversible actuators with 3-wire electric control for regulation of :
  - Valves for heating batteries (hot water or vapour).
  - Valves for cooling batteries with refrigerated water.
- Electrical devices with On-Off control in 1 or 2 stages :
  - Electric batteries
  - Refrigerator compressors.

### 2. ACCESSORIES

No.	Description	Type	Sensing element	Application	Code	Data sheet
1	Discharge or extract air temp. detector or room temp. detector	<b>STA 010</b> <b>SAB 010</b>	NTC 10 kΩ	0 to 110 °C	B1a	N 150
1	Discharge air limit temp.	<b>STA 010</b>	NTC 10 kΩ	0 to 40 °C	B1b	N 111
1	Outside air temp. detector	<b>STA 001</b>	NTC 1 kΩ	0 to 110 °C	B2	N 150
1	Remote control	<b>CDB 517</b>	-	- 30 to +30 °C	B3	N 150
1				- 5 to + 5 °C	R	N 711

### 3. SCHEMATIC DIAGRAM

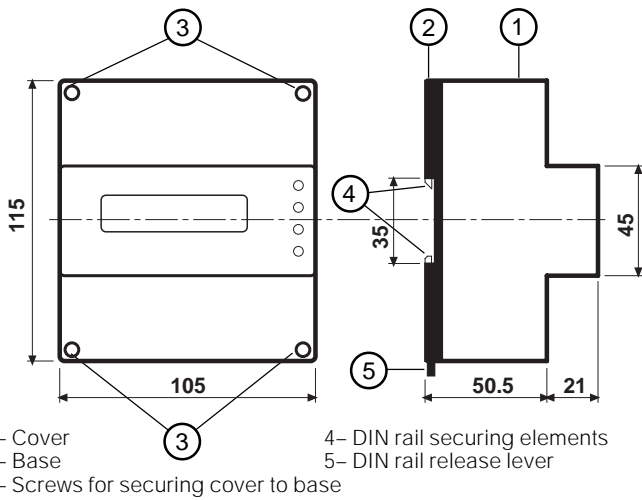


- B1a – Extract air temp. detector
- B1b – Room temp. detector
- B2 – Discharge air temp. detector
- B3 – Outside temp. detector
- Mdis – Discharge air fan
- Mext – Extract air fan
- R – Remote control
- Y+ – Hot valve
- Y- – Cold valve
- N – ATD 672

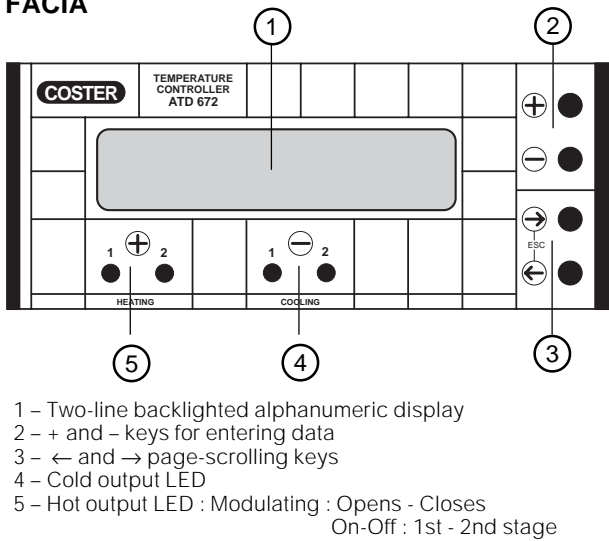
### 4. TECHNICAL DATA

Power supply	24 V ac ± 10%	Construction standards	It. Electrotechnical Committee (CEI)
Frequency	50 to 60 Hz.	Electromagnetic compatibility	CEE 93/68
Consumption	5 VA	Room humidity	Class F ( DIN 40040 )
Heating & cooling outputs	Modulating or On-Off in 2 stages	Protection	IP 40
Voltage-free output contacts:		Weight	1 Kg
- maximum switched voltage	250 V ac	Setting ranges:	
- maximum switched current	5 (1) A	- desired temp. (room or discharge air)	0.1 to 60 °C
Case	DIN 6E module	- limit temp. discharge air (minimum or maximum)	0.1 to 60 °C
Base	NYLON	- adjustment by remote control	± 5 °C
Cover	ABS	- proportional band or differential	± 0.1 to ± 60 °C
Room temperature :		- integral time	1 to 99 min.
- operating	0 to 45 °C	- summer difference	0 to 20 °C
- storage	- 25 to + 60 °C	- summer compensation	0 to 1 °C
		- actuator speed	1 to 900 s

**5. OVERALL DIMENSIONS**



**6. FACIA**

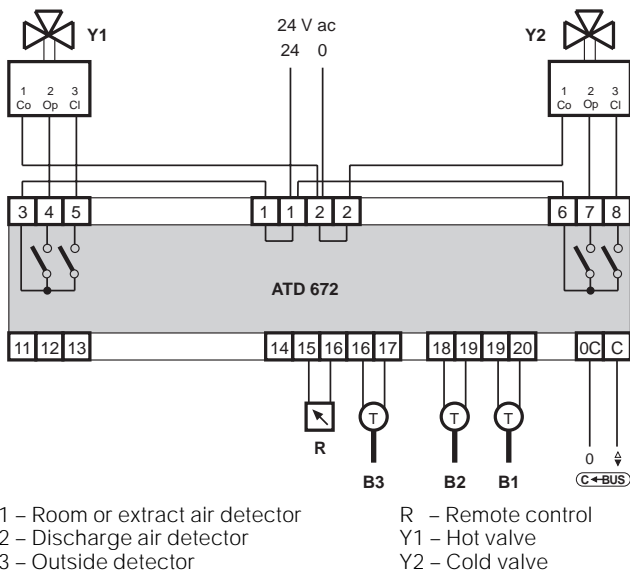


**7. WIRING**

It is recommended not to insert more than two cables in a single terminal of ATD 672 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>.
- 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**



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

ATD 672 is provided with a C-Bus parallel output which allows two-way communication with one or more **Local computers** and/or a **Telemangement central computer**. It is possible to transmit :

- Programming and setting data of the controllers;
- Programming and setting data for telemangement;
- 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 **28** of display .

**9.1 C-Bus wiring**

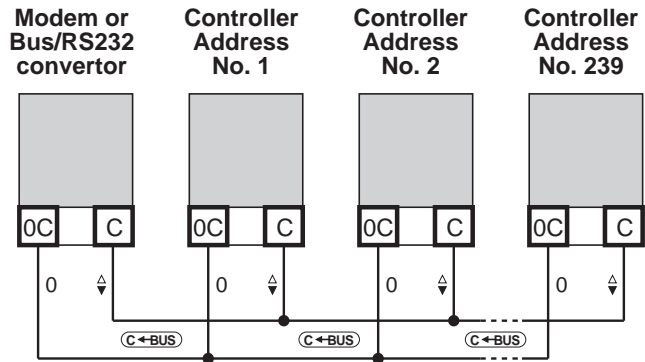
The **parallel** electrical connection between all the controllers must be made using **twin-wire telephone cable** (low capacity) and observing strictly the polarity 0C - C.

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 telemangement central computer using a Coster modem with C-Bus.

**9.2 C-Bus wiring diagram**



**10. INSTALLATION**

**ATD 672 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 Room detector SAB 010 (B1b)**

This must be installed at a point which represents the average temperature of the room, at a height of 1.5 to 1.6 meters from the floor, on an internal wall, and, if possible, opposite the air emission vents. It should be as far as possible from windows, doors and sources of heat, and corners, shelving and curtains should be avoided. In particularly large rooms it is advisable to use two SAB 020 detectors connected in parallel or four SAB 010 detectors connected in series-parallel in order to measure the average temperature of the room.

**10.2 Extract air detector STA 010 (B1a)**

If the configuration of the plant allows, to measure room temperature it is preferable to use a detector installed in the extract air duct because at that point the temperature undoubtedly represents the room average. It must be installed upstream of the extractor fan and as near as possible to the extract air vents.

**10.3 Discharge air detector STA 010 (B2)**

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

**10.4 Outside air detector STA 001 (B3)**

This must be installed upstream of the outside air damper and as near as possible to the air intake.

**11. OPERATION**

**11.1 Setting data**

All the parameters controlled and the setting data of ATD 672 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 7) : display of parameters controlled and setting data modifiable by the user.
- 2nd part (from page 8 to page 22) : operational setting data for the controller modifiable by the engineer during the commissioning stage of the plant.
- 3rd part (from page 23 to page 29) : pages for testing the output connections and the identifying data of the controller for linking to a telemanagement system.

The desired value  $T^{\circ}$  (display pages 2 and 3), the proportional band  $Pb$  (display pages 11 and 18) and the integral time  $It$  (display pages 12 and 19) can be set separately for the Heating stage and the Cooling stage.

When the desired values  $T^{\circ}_{Heat}$  and  $T^{\circ}_{Cool}$  are too close (below 1°C) on pages 2 and 3 of the display will appear the word ERROR; the controller will shift automatically the desired value  $T^{\circ}_{Cool}$  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 9 and 16):

- 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 10 and 17) so as to permit the controller 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.

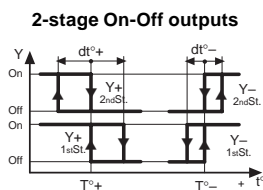
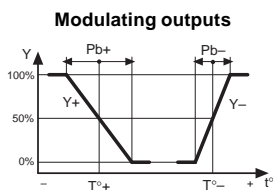
- On-Off for control of electrical devices with 1 or 2 stages (electric batteries, refrigerator compressors). The proportional bands  $Pb$  are converted into temperature differentials  $dt^{\circ}$ .

**11.3 Control room or discharge air temperature (detector B1 or B2)**

The temperature to be controlled is measured by the room detector (B1a in extract air duct or B1b in room) or by discharge air duct detector B2.

ADT 672 compares the value of the actual temperature  $t^{\circ}$  with the desired value  $T^{\circ}+$  (display page 2) and  $T^{\circ}-$  (display page 3). In the event of a difference, it produces two modulating signals for the sequencing of the valves  $Y+$  and  $Y-$  proportional to the differences themselves and to the proportional bands  $Pb+$  and  $Pb-$  set (display pages 11 and 18).

To achieve fine adjustment, at regular intervals ADT 672 corrects the position of the valves in relation to the integral times  $It+$  and  $It-$  set (display pages 12 and 19).



**11.4 Control room temperature with reference to discharge air (detectors B1 and B2)**

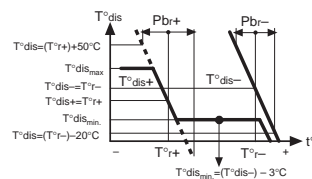
The temperature to be controlled is measured by room detector B1a (in extract air duct) or B1b (in room) and the reference temperature by the discharge air duct detector B2.

ADT 672 compares the value of the actual room temperature  $t^{\circ}_r$  with the desired values  $T^{\circ}_{r+}$  and  $T^{\circ}_{r-}$  (display pages 2 and 3) and establishes two values for the desired discharge air temperature  $T^{\circ}_{dis+}$  and  $T^{\circ}_{dis-}$  in relation to the differences measured, to the  $Pbr$  (display pages 11 and 18) and  $lbr$  (display pages 12 and 19) set. In the event of a difference between the actual discharge air temperature  $t^{\circ}_{dis}$  and those desired  $T^{\circ}_{dis+}$  and  $T^{\circ}_{dis-}$ , ATD 672 produces two modulating signals, for the sequencing of valves  $Y+$  and  $Y-$ , proportional to the differences themselves and to the proportional band  $Pb_{dis+}$  and  $Pb_{dis-}$  set (display pages 15 and 20).

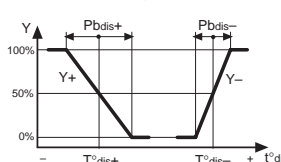
**11.5 Limits of discharge air temperature (detector B2)**

When detector B2 (discharge air duct) is connected, it is possible to set a minimum limit temperature  $T^{\circ}_{min}$  (display page 13) and a maximum limit temperature  $T^{\circ}_{max}$  (display page 14) of the air discharged into the room. These limits act on the value of the desired discharge air temperature  $T^{\circ}_{dis+}$  only in the heating stage. When the desired discharge air temperature for cooling  $T^{\circ}_{dis-}$ , calculated by the controller, falls below the minimum limit  $T^{\circ}_{min}$ , this is automatically reduced by 3°C so as to prevent simultaneous heating and cooling. If the request for cooling derives from an external controller (dehumidification), ATD 672 maintains, by means of the control of post-heating, the discharge air temperature at the value  $T^{\circ}_{min}$  in order to limit the cooling of the room and to help the dehumidification effect.

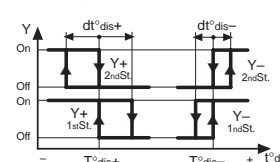
Control room with reference to discharge air



Modulating outputs



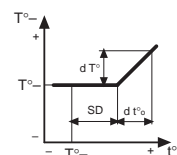
2-stage On-Off outputs



**11.6 Outside summer compensation of desired temperature (detectors B1 or B2 and B3)**

To avoid excessive differences between room and outside temperatures, during summer cooling it is possible to compensate the desired temperature  $T^{\circ}_{cool}$  in relation to the outside temperature  $t^{\circ}_o$ . The temperature remains constant at the desired value (display page 3) until  $t^{\circ}_o$  exceeds the value  $T^{\circ}_{cool} + SD$  (Summer Difference, display page 21). When  $t^{\circ}_o$  exceeds the value  $T^{\circ}_{cool} + SD$  the temperature  $T^{\circ}_{cool}$  has to increase as the outside temperature  $t^{\circ}_o$  increases.

The setting value for SC (Summer Compensation, display page 22) establishes the increase of  $T^{\circ}_{cool}$  in  $^{\circ}C$ , for each  $^{\circ}C$  increase in  $t^{\circ}_o$ .



## 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 keys ← and → simultaneously.

Page	Display	Description
1	<b>ROOM</b> <sup>(1)</sup> <b>TEMP. ACTUAL : 21.0°</b>	Indicates principal temperature measured.
2	<b>T. HEATING ROOM</b> <sup>(1)</sup> <b>DESIRED</b> <sup>(2)</sup> : <b>20.0°</b>	Desired temperature. Range : 0.1 to 60 °C.
3	<b>T. COOLING ROOM</b> <sup>(1)</sup> <b>DESIRED</b> <sup>(2)</sup> : <b>25.0°</b>	Desired temperature. Range : 0.1 to 60 °C.
	(1) Room : if detector B1 connected; Disch. air : if only detector B2 connected.	
	(2) Error : if difference between T. Heating and T. Cooling not above 1 °C.	
4	<b>ADJUSTMENT T. R CONTROL : 0.0°</b>	Appears only if remote control R connected. Indicates increase or decrease in desired temperature by means of remote control. Range : - 5 to + 5 °C.
5	<b>T. DISCHARGE AIR ACTUAL : 30.0°</b>	Appears only if detectors B1-B2 connected
6	<b>OUTSIDE TEMP. ACTUAL : 12.0°</b>	Appears only if detector B3 connected
7	<b>ATD 672 c1 Eng. Version. . . . .</b>	Identity card of controller
8	<b>TO CONTINUE KEEP + PRESSED</b>	By pressing + key for 3 seconds pages for technical setting of ADT 972 appear.
9	<b>TYPE OF OUTPUT HEATING : <span style="border: 1px solid black; padding: 0 2px;">  </span></b> <sup>(3)</sup>	Type of output
	(3) MODULATING : for electric actuators with 3-wire control IN 2 STAGES : for electrical devices with 1 or 2 stages.	
10	<b>TIME ACTUATOR HEATING : SEC. 60</b>	Appears only if on page 9 "MODULATING" has been chosen. Run time of actuator. Range : 1 to 900 seconds.
11	<b>PROPORT. BAND HEATING : +- 4.0°</b>	Appears if on page 9 "MODULATING" has been chosen. Proportional band in ± °C. Range : ± 0.1 to ± 60 °C.
	<b>DIFFERENTIAL HEATING : +- 4.0°</b>	Appears if on page 9 "IN2STAGES" has been chosen : Differential in ± °C. Range : ± 0.1 to ± 60 °C.
12	<b>INTEGRAL TIME HEATING : MIN 10.0</b>	Integral time. Range : 1 to 99 min.
13	<b>DIS. AIR LIMIT T. MINIMO : 0.1°</b>	Appears only if detector B2 connected and valid only for HEATING. Minimum limit temperature of discharge air. Range : 0.1 to 60 °C.

14	<b>DIS. AIR LIMIT T. MAXIMUM : 60.0°</b>	Appears only if detector B2 connected and valid only for HEATING. Maximum limit temperature of discharge air. Range : 0.1 to 60 °C.
15	<b>PB DIS. AIR T. RISC. : +- 10.0°</b>	Appears only if detectors B1-B2 connected. Proportional band related to reference temperature of discharge air in ± °C. Range : ± 0.1 to ± 60 °C.
16	<b>TYPE OF OUTPUT COOLING : <span style="border: 1px solid black; padding: 0 2px;">  </span></b> <sup>(4)</sup>	Type of output
	(4) MODULATING : for electric actuators with 3-wire control; IN 2 STAGES : for electrical devices with 1 or 2 stages.	
17	<b>ACTUATOR TIME COOLING : SEC. 60</b>	Appears only if on page 16 has been chosen "MODULATING". Run time of actuator. Range : 1 to 900 seconds.
18	<b>PROPORT. BAND COOLING : +- 2.0°</b>	Appears if on page 16 has been chosen "IN 2 STAGES" : Proportional band in ± °C. Range : ± 0.1 to ± 60 °C.
	<b>DIFFERENTIAL COOLING : +- 2.0°</b>	Appears if on page 16 has been chosen "MODULATING". Differential in ± °C. Range : ± 0.1 to ± 60 °C.
19	<b>INTEGRAL TIME COOLING : MIN. 10.0</b>	Integral time Range : 1 to 99 min.
20	<b>PB T. DISCH. AIR COOLING : +- 5.0°</b>	Appears only if detectors B1-B2 Proportional band related to reference temperature of discharge air in ± °C. Range : ± 0.1 to ± 60 °C.
21	<b>SUMMER DIFF. To - Tr<sup>(5)</sup> Max : 6.0°</b>	Appears only if detectors B1-B3 or B2-B3 connected. Maximum desired difference between outside temperature and desired temperature (room or discharge air), beyond which desired temperature is increased as outside temp. increases according to "Summer Compensation" on page 22. Range: 0 to 20 °C.
22	<b>SUMMER COMPENS. dTr<sup>(5)</sup> / dTo : 0.00°</b>	Appears only if detectors B1-B3 B2-B3 connected. Increase in desired temperature (room or discharge air) in relation to increase in outside temperature. Range : 0 to 1.
	(5) T <sup>°r</sup> : room temperature when B1 connected. T <sup>°dis.</sup> : temperature discharge air when B2 connected.	
23	<b>TO CONTINUE KEEP + PRESSED</b>	By pressing + key for 3 seconds the pages for checking electrical connections of outputs and for setting telemanagement data appear.
24	<b>HEATING OUTPUT ALWAYS OPEN</b>	Modulating : Heating valve open. In 2 stages : 1st heating stage On.
25	<b>HEATING OUTPUT ALWAYS CLOSED</b>	Modulating : Heating valve closed. In 2 stages : 2nd heating stage On.
26	<b>COOLING OUTPUT ALWAYS OPEN</b>	Modulating : Cooling valve open. In 2 stages : 1st cooling stage On.
27	<b>COOLING OUTPUT ALWAYS CLOSED</b>	Modulating : Cooling valve closed. In 2 stages : 2nd stage cooling On.
28	<b>ADDRESS CONTROLLER : 01</b>	Address for C-Bus connection. Range : 1 to 239.
29	<b>CONTROLLER GROUP : 1</b>	Group to which ADT 972 belongs. Range : 1 to 9.