

TEMPERATURE CONTROLLER WITH 1 OUTPUT

C ← BUS

ATD 671 C1 Eng.

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



1. APPLICATION

ATD 671 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).

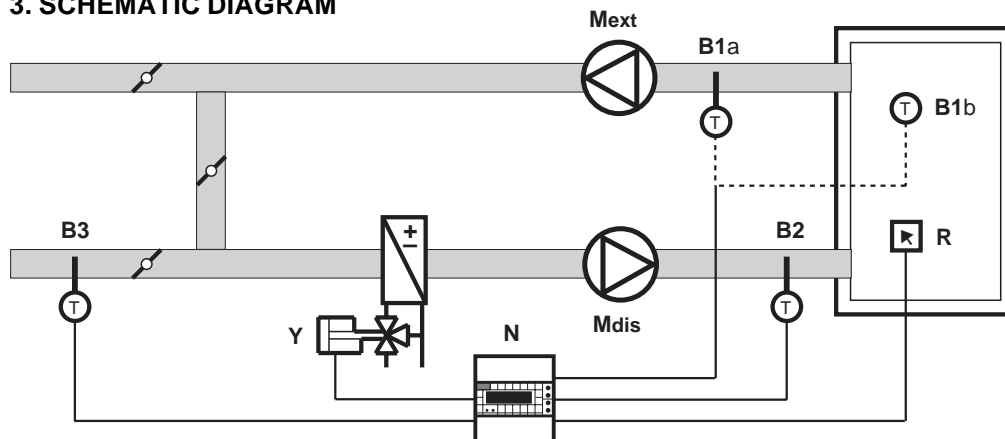
ATD 671 can control :

- 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	Use	Code	Data sheet
1	Discharge or extract air temp. detector or room temp. detector	STA 010	NTC 10 kΩ	0 to 110 °C	B1a	N 150
1	Discharge air limit temp. detector	SAB 010	NTC 10 kΩ	0 to 40 °C	B1b	N 111
1	Outside air temp. detector	STA 010	NTC 10 kΩ	0 to 110 °C	B2	N 150
1	Remote control	STA 001	NTC 1 kΩ	- 30 to +30 °C	B3	N 150
1		CDB 517	-	- 5 to + 5 °C	R	N 711

3. SCHEMATIC DIAGRAM

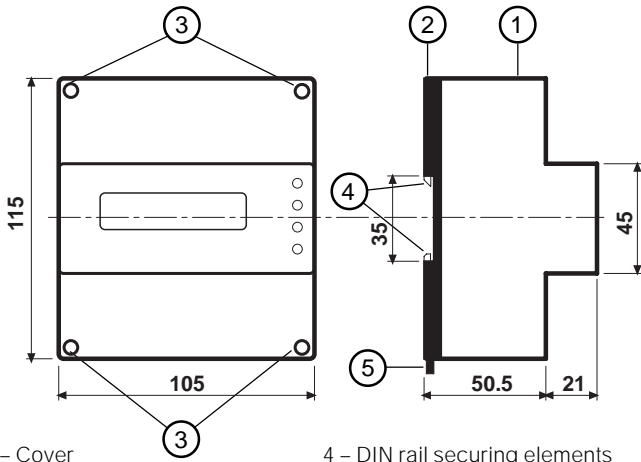


- B1a - Extract air temp. detector
- B1b - Room temp. detector
- B2 - Discharge air temp. detector
- B3 - Outside temp. detector
- Mdis - Discharge air fan
- Mext - Extract fan
- R - Remote control
- Y - Regulating valve
- N - ATD 671

4. TECHNICAL DATA

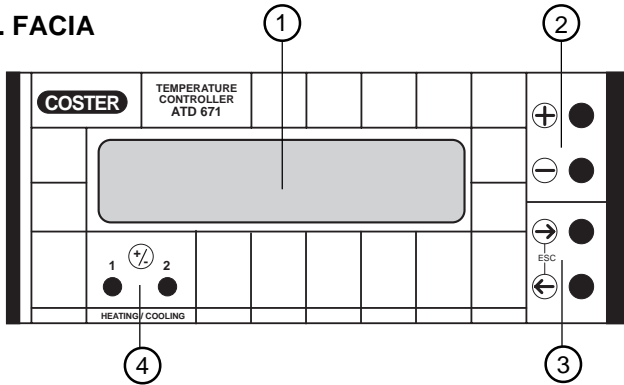
Power supply	24 V ac ± 10%	Electromagnetic compatibility	EEC 93/68
Frequency	50 to 60 Hz.	Room humidity	Class F (DIN 40040)
Consumption	5 VA	Protection	IP 40
Output heating or cooling	Modulating or On-Off in 2 stages	Weight	1 Kg
Voltage-free output contacts:		Setting ranges:	
- maximum switched voltage	250 V ac	- desired temp. (room or discharge air)	0.1 to 60 °C
- maximum switched current	5 (1) A	- limit temp. discharge air (minimum or maximum)	0.1 to 60 °C
Case	DIN 6E module	- adjustment by remote control	± 5 °C
Base	NYLON	- proportional band or differential	± 0.1 to ± 60 °C
Cover :	ABS	- integral time	1 to 99 minutes
Room temperature :		- winter compensation	0 to 9,9 °C
- operating	0 to 45 °C	- summer difference	0 to 20 °C
- storage	- 25 to + 60 °C	- summer compensation	0 to 1 °C
Construction standards	It. Electrotechnical Committee (CEI)	- actuator speed	1 to 900 s

5. OVERALL DIMENSIONS



- 1 - Cover
- 2 - Base
- 3 - Screws for securing cover to base
- 4 - DIN rail securing elements
- 5 - DIN rail release lever

6. FACIA



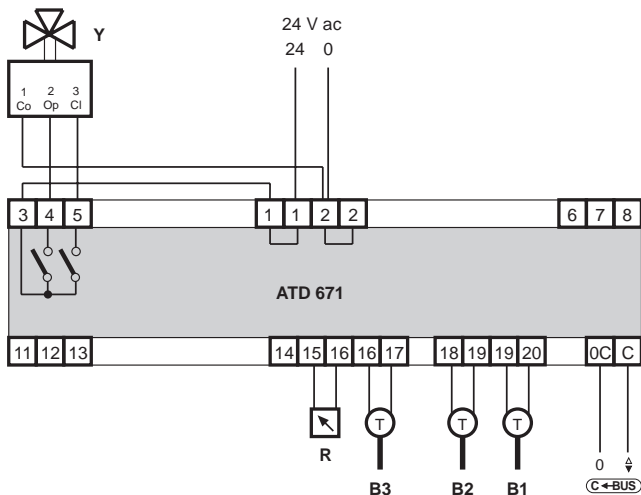
- 1 - Two-line backlighted alphanumeric display
- 2 - + and - keys for entering data
- 3 - ← and → page-scrolling keys
- 4 - Output LEDs :
Modulating : Opens - Closes
On-Off : 1st - 2nd stage

7. WIRING

It is recommended not to insert more than two cables in a single terminal of ATD 671 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 and remote controls : Cables 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 - Room or extract air detector
- B2 - Discharge air detector
- B3 - Outside detector
- R - Remote control
- Y - Hot or cold valve

9. C-BUS : TELEMANAGEMENT COMMUNICATION

ATD 671 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 the 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 **27** of display .

9.1 C-Bus wiring

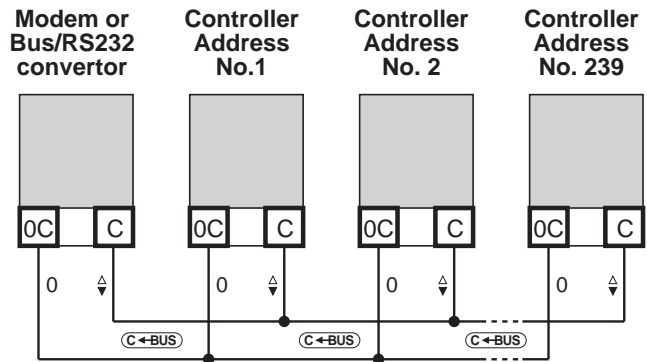
The **parallel** electrical connections between all the controllers must be made using **twin-wire telephone cable** (low capacity) and observing strictly the polarity 0C - C.

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 input.

9.2 C-Bus wiring diagram



10. INSTALLATION

ATD 671 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 air 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 671 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 23) : operational setting data for the controller modifiable by the engineer during the commissioning stage of the plant.
- 3rd part (from page 24 to page 28) : pages for testing the output connections and identifying data of the controller for linking to telemanagement system.

The desired value T° (display page 2), the proportional band Pb (display pages 11 and 19) and the integral time It (display pages 12 and 20) can be set separately, for the Heating stage and the Cooling stage, so as to avoid having to adjust the data at each seasonal switching (display page 6).

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 9 and 17):

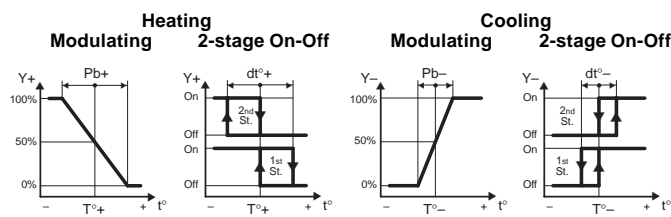
- Modulating with PI control action for the operation of a reversible actuator with 3-wire electric control (Common, Opens, Closes) or a priority selector.
With this type of operation it is indispensable to set the run time of the actuator (display pages 10 and 18) so as to permit the controller to know 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 in 1 or 2 stages (electric batteries, refrigerator compressors). The proportional band Pb is converted automatically into a temperature differential dt° .

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 671 compares the value of the actual temperature t° with the desired value T° (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 11 and 19).

To achieve fine adjustment, at regular intervals ADT 671 corrects the position of the valve in relation to the integral time It set (display pages 12 and 20).



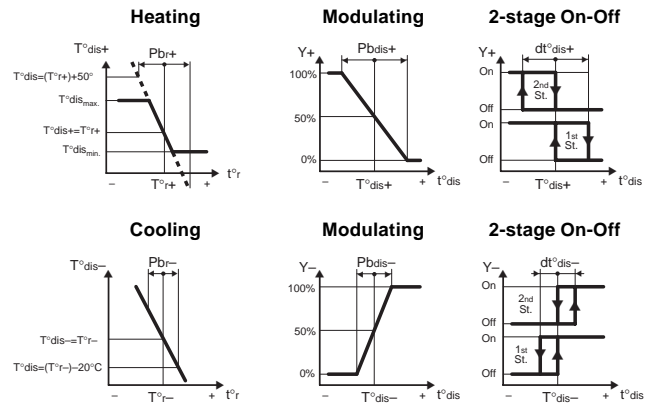
11.4 Control room temperature with reference to discharge air (detectors B1 and B2)

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 671 compares the value of the actual room temperature t°_r with the desired value T°_r (display page 2) and establishes the value for the desired discharge air temperature T°_{dis} in relation to the difference measured, to the Pbr (display pages 11 and 19) and It_r (display pages 12 and 20) set. In the event of a difference between the actual discharge air temperature t°_{dis} and that desired T°_{dis} , ATD 671 produces a modulating signal, for the positioning of valve Y , proportional to the difference itself and to the proportional band Pb_{dis} set (display pages 15 and 21).

11.5 Limits of discharge air temperature (detector B2)

When detector B2 (discharge air duct) is connected, a limit of minimum temperature T°_{min} (display page 13) and a limit of maximum temperature T°_{max} (display page 14) of the air discharged into the room can be set. These limits act on the value of the desired discharge air temperature T°_{dis+} only in the heating stage.

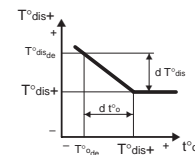


11.6 Outside winter compensation of discharge air temperature (detectors B1 and B2)

This function is to be used only when the temperature controlled is that of the discharge air (detector B2). If the plant has also to provide for outside dispersions, the desired temperature $T^{\circ}_{dis,Heat}$ (display page 2) must increase as the outside temperature t°_o decreases (detector B3). The setting value "Winter compensation" (display page 16) establishes the increase in T°_{dis} in $^{\circ}C$ for each $^{\circ}C$ decrease of t°_o in respect of $t^{\circ}_o = T^{\circ}_{dis}$.

Example of calculation:

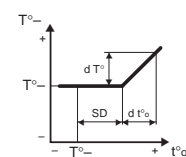
Desired discharge air temperature $T^{\circ}_{dis} = 20^{\circ}C$
 Design outside temperature $T^{\circ}_{o,de} = -5^{\circ}C$
 Design discharge air temperature $T^{\circ}_{dis,de} = 50^{\circ}C$
 Winter compensation:
 $d T^{\circ}_{dis} / d t^{\circ}_o = (T^{\circ}_{dis,de} - T^{\circ}_{dis}) / (T^{\circ}_{dis} - T^{\circ}_{o,de}) = 30 / 25 = 1.2^{\circ}C$



11.7 Outside summer compensation of desired temperature

To avoid excessive differences between room and outside temperatures, during summer cooling it is possible to compensate the desired temperature T°_{Cool} in relation to the outside temperature t°_o . The temperature T°_{Cool} remains constant at the desired value (display page 2) until t°_o exceeds the value $T^{\circ} + SD$ (Summer Difference, display page 22). When t°_o exceeds the value $T^{\circ} + SD$, the temperature T°_{Cool} has to increase as the outside temperature t°_o increases.

The setting value for SC (Summer Compensation, display page 23) establishes the increase of T° in $^{\circ}C$ for each $^{\circ}C$ increase in t°_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	ROOM TEMP. ⁽¹⁾ ACTUAL : 21.0°	Indicates principal temperature measured
2	T. HEATING. ⁽²⁾ ROOM ⁽¹⁾ DESIRED : 20.0°	Desired temperature. Range : 0.1 to 60 °C.
	(1) Room : if detector B1 connected; Disch. air : if only detector B2 connected.	
	(2) HEAT. : when on page 6 appears : HEATING COOL. : when on page 6 appears : COOLING	
3	ADJUSTMENT T. REM. CONTROL : 0.0°	Appears only if remote control connected. Indicates increase or decrease in desired temperature by means of remote control Range : - 5 to + 5 °C.
4	T. DISCHARGE AIR Actual : 30.0°	Appears only if detectors B1-B2 connected.
5	OUTSIDE TEMP. Actual : 12.0°	Appears only if detector B3 connected.
6	TYPE OPERATION HEATING ⁽³⁾	Seasonal switching. Inverts output operation.
	(3) HEATING : heating operation; COOLING : cooling operation.	
7	ATD 671 c1 Eng Version	Identity card of controller
8	TO CONTINUE KEEP + PRESSED	By pressing + key for 3 seconds pages for technical setting of ADT 671 appear.
9	TYPE OF OUTPUT HEAT : MODULAT ⁽⁴⁾	Type of output for Heating operation.
	(4) MODULATING: for electric actuators with 3-wire control IN 2 STAGES : for electrical devices with 1 or 2 stages.	
10	TIME ACTUATOR HEATING. : sec. 60	Appears only if on page 9 "MODULATING" has been chosen. Actuator run time. Range : 1 to 900 seconds.
11	PROPORT.BAND HEATING. : +- 4.0°	Appears if on page 9 "MODULATING" has been chosen Proportional Band ±°C. Range : ± 0.1 to ± 60 °C.
	DIFFERENTIAL HEATING : +- 4.0°	Appears if on page 9 "IN 2 STAGES" has been chosen Differential in ± °C. Range ± 0.1 to ± 60 °C.
12	INTEGRAL TIME HEATING : min. 10.0	Integral time Range : 1 to 99 min.
13	DIS. AIR LIMIT T. MINIMUM : 0.1°	Appears only if detector B2 connected and valid only for HEATING. Minimum limit temperature of discharge air. Range : 0.1 to 60 °C.
14	DIS. AIR LIMIT T. MAXIMUM : 60.0°	Appears only if detector B2 connected and valid only for HEATING. Maximum limit temperature of discharge air. Range : ± 0.1 to ± 60 °C.
15	PB DIS. AIR T. HEATING : +- 10.0°	Appears only if detectors B1-B2 connected. Proportional band related to reference temperature of discharge air in ± °C. temperature of discharge air. Range : ± 0.1 to ± 60 °C.
16	WINTER COMPENSAT. dTm/dTe : 0.00°	Appears only if detectors B2-B3 connected. Winter compensation: increase in discharge air temperature as outside temperature decreases. Range : 0 to 9.9.
17	TYPE OF OUTPUT COOLING. : MODUL. ⁽⁵⁾	Type of output for Cooling operation. (5) MODULATING: for electric actuators with 3-wire control; A 2 STAGES : for electrical devices with 1 or 2 stages.
18	ACTUATOR TIME COOLING : sec. 60	Appears only if on page 17 "MODULATING" has been chosen. Run time of actuator. Range : 1 to 900 seconds.
19	PROPORT. BAND COOLING : +- 2.0°	Appears only if on page 17 "MODULATING" has been chosen Proportional band in ± °C. Range : ± 0.1 to ± 60 °C.
	DIFFERENTIAL COOLING : +- 2.0°	Appears if on page 17 "IN 2 STAGES" has been chosen. Differential in ± °C. Range : ± 0.1 to ± 60 °C.
20	INTEGRAL TIME COOLING : Min. 10.0	Integral time. Range : 0.1 to 99 min.
21	PB T. DISCH. AIR COOLING : +- 5.0°	Appears only if detectors B1-B3 connected. Proportional band related to reference temperature of discharge air in ± °C. Range : ± 0.1 to ± 60 °C.
22	SUMMER DIFF To - Tr ⁽⁶⁾ Max : 6.0°	Appears only if detectors B1-B3 connected. Maximum desired difference between outside temperature and desired temperature (room or discharge air), beyond which desired temperature is increased as outside temperature increases according to "Summer Compensation" on page 23. Range : 0 to 20 °C.
23	SUMMER COMPENS. dTr ⁽⁶⁾ / dTo : 0.00°	Appears only if detectors B1-B3 or B2-B3 connected. Increase in desired temperature (room or discharge air) in relation to increase in outside temperature. Range 0 to 1. (6) T _r : room temperature, when B1 connected. T _{dis} : temperature discharge air, when B2 connected.
24	TO CONTINUE KEEP + PRESSED	By pressing + key for 3 seconds there will appear pages for checking electrical output connections and for setting telemanagement data.
25	OUTPUT ALWAYS OPEN	Modulating : Valve open. In 2 stages : 1st stage On.
26	OUTPUT ALWAYS CLOSED	Modulating : Valve closed. In 2 stages : 2nd stage On.
27	ADDRESS CONTROLLER : 01	Address for C-Bus connection. Range : 1 to 239.
28	CONTROLLER GROUP : 1	Group to which ADT 971 belongs. Range : 1 to 9.