B 225
Eng. 09.92

DIGITAL WEATHER COMPENSATOR WITH ON-OFF CONTROL OF AUXILIARY TEMPERATURE

RTE 954

DISCONTINUED PRODUCT

TO SEE A SUITABLE REPLACEMENT PRODUCT

- Power supply 220 / 240 Volt ac. Battery back up for 10 years
- Digital programming with four operating keys and data read out on 2-line backlight alphanumeric display
- Weather compensation with one PI modulating output for control of valve or On-Off for control of boiler
- Possibility of adjusting flow temperature in relation to room temperature or of controlling minimum value of a limit temperature (eg. return to boiler or priority boiler)
- Control of a fixed point auxiliary temperature with On-Off output (eg: production DHW)
- Four time programs each with three On-Off periods and one 7-day program available
- One On-Off output for control of pump or boiler in relation to program times and of thermal demand of heating system
- Voltage-free output contacts: capacity: 250 V, 5 (1) A
- Adjustment of heating curve to compensate for weather variations during intermediate seasons
- Control of minimum value of a limit temperature (return to boiler or calorifier)
- Control of minimum and maximum limits of flow temperature

APPLICATION

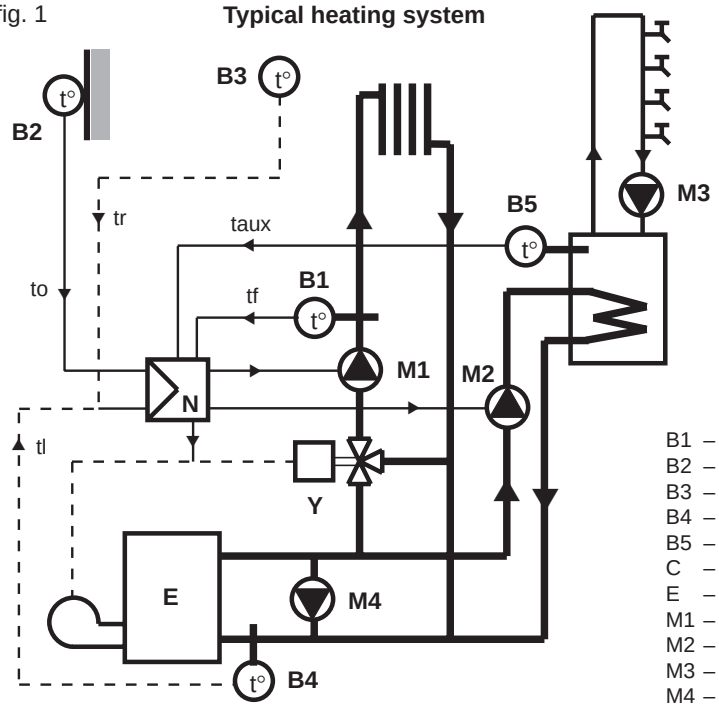
RTE 954 is designed for weather compensation in centralised heating systems and for On-Off control of an auxiliary temperature (eg : DHW or swimming pool) in non-industrial buildings, for example:

- Apartment blocks
- Schools and public buildings
- Commercial and administrative buildings

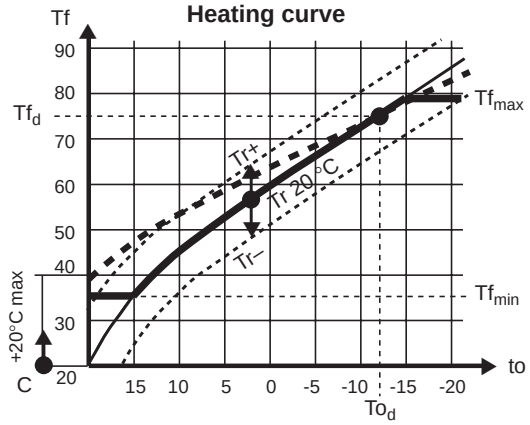
RTE 954 is suitable for all climatic zones and for any type of heating media: panels, radiators, fan coils.
It controls mixing or diverting valves operated by reversible electric actuators with three-wire control and with running times of from 2 to 60 minutes, or the boiler directly.

SCHEMATIC DIAGRAMS

fig. 1 **Typical heating system**



Heating curve



B1 – Flow detector
B2 – Outside detector
B3 – Room detector
B4 – Limit detector
B5 – Auxiliary detector
C – Adjustment at Tf 20°C
E – Boiler
M1 – Heating system pump
M2 – Primary pump
M3 – Secondary pump
M4 – Anti-condensing pump
N – RTE 954
Y – Heating valve
Tr – Desired room temperature
tr – Actual room temperature
taux – Auxiliary temperature
tl – Limit temperature
to – Actual outside temperature
Tod – Design outside temperature
tm – Actual flow temperature
Tfd – Design flow temperature
Tf – Desired flow temperature
Tfmin – Minimum flow temperature
Tfmax – Maximum flow temperature

ACCESSORIES

N	Description	Model	Sens. element	Code	Data Sheet
	Essential accessories:				
1	Surface flow temperature detector	**SCH 010**	NTC 10 kΩ	B1	N 130
	or immersion detector	**SIH 010**	NTC 10 kΩ	B1	N 140
1	Outside temperature detector	**SAE 001**	NTC 1 kΩ	B2	N 120
	Optional accessories:				
1	Immersion auxiliary temperature detector	**SIH 010**	NTC 10 kΩ	B5	N 140
1	Room temperature detector	**SDA 010**	NTC 10 kΩ	B3	N 110
	or immersion limit temperature detector	**SIH 010**	NTC 10 kΩ	B4	N 140

OPERATION

Regulates flow temperature in relation to outside temperature so as to provide a constant room temperature throughout the building.
Maintains temperature of an auxiliary circuit at a constant value.
All the electronic functions of RTE 954 are processed by an HMOS microcontroller.

POWER SUPPLY

RTE 954 is energised by 220 / 240 V ac and is provided with a lithium battery which, should the mains supply fail, ensures the correct time of day and memorisation of data set for about ten years. The controller is supplied with battery inserted and correct time of day.

SECURITY JACK PLUG

On RTE 954 facia is a jack plug (fig. 2. 4) which, if extracted, puts out of action the + and – keys thereby preventing any modification of the data. In case of need, the technician responsible can utilise an internal link to restore the use of the keys even without the jack plug (fig. 3).

WEATHER COMPENSATION

Detector B1 monitors flow temperature tf and detector B2 monitors outside temperature to.
RTE 954 modulates flow temperature Tf in relation to outside temperature to and heating curve (fig. 1) as set by the design parameters (display pages 45, 46, 48):
– Type of heating media: panels, radiators, fan coils.
– Design outside temperature To_d.
– Design flow temperature Tf_d.
The heating curve set in this manner refers to a desired room temperature of 20 °C and can be adjusted by means of a parallel shift using the DAY (display page 2) and NIGHT (display page 3) values.
If these values are set at – – . – heating is excluded.
In the event of a difference between actual temperature tf and desired temperature Tf, RTE 954 produces a modulating signal with PI action for control of valve Y, or an On-Off signal for control of boiler (fig. 4).
The control parameters, Proportional Band and Neutral Zone, are automatically pre-set by RTE 954.
The point of origin of heating curve To = 20 °C can be modified by setting an increase in flow temperature (display page 47) to compensate for weather variations in intermediate seasons due to reduced periods of heating.

LIMITS OF FLOW TEMPERATURE

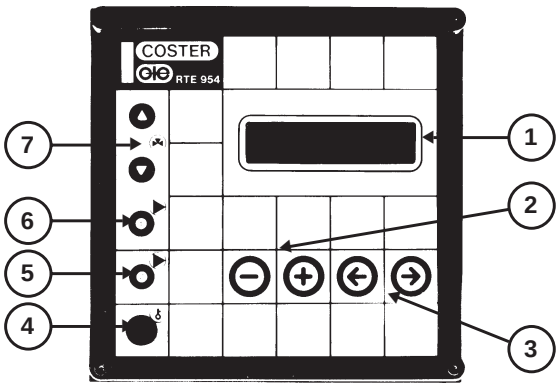
Minimum (display page 50) and maximum (display page 49) limits of flow temperature can be set.
- Minimum limit - Used in fan coil systems to avoid emission of cold air into room. Functions only in periods with Day room temperature.
- Maximum limit - Used in panel systems to avoid dangerous overheating. Functions in any situation.

ROOM AUTHORITY

When room sensor B3 is connected (as an alternative to B4), RTE 954 compares the actual room temperature with the desired DAY, NIGHT, or FROST PR. values, according to the current mode. In the event of a difference, it brings about an increase or decrease in the Tf value calculated by the weather compensation function. This variation depends on the room authority set: from 0 to 30 °C of flow temperature variation for each °C of variation in room temperature (display pag. 47).

FACIA

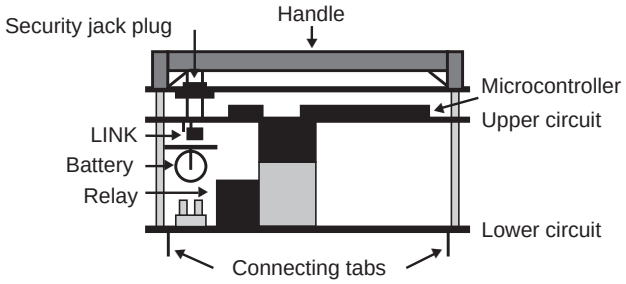
fig. 2



1 – Alphanumeric display
2 – Opening keys + and –
3 – Page scrolling keys ← and →
4 – Security jack plug
5 – Auxiliary control LED
6 – Control pump LED
7 – Valve LEDs

INTERNAL LINK

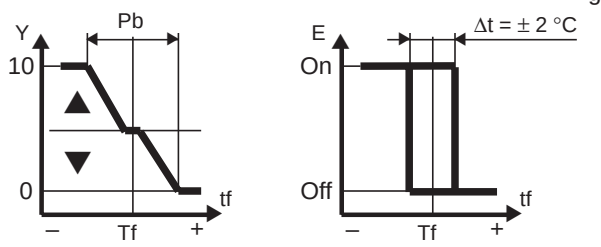
fig. 3



Without link : Data adjustable only with jack plug
With link : Data adjustable even without jack plug

WEATHER COMPENSATION OUTPUT

fig. 4



Y – Valve
0 – Valve closed
10 – Valve open
Bp – Proportional band
Δt – Differential

E – Boiler
On – On
Off – Off
tf – Actual flow temperature
Tf – Desired flow temperature

CONTROL OF MINIMUM VALUE OF A LIMIT TEMPERATURE

By connecting detector B4 (as alternative to B3) it is possible to control the minimum limit of a temperature other than flow temperature. On reaching limit temperature (display page 50), Tf is reduced by 8 °C for each 1 °C of difference. It can be used for controlling anticondensing temperature of boiler or to give precedence for production of DHW.

CONTROL WITH PROGRAMMED TIMES

Besides controlling valve, RTE 954 can also control an On-Off output which operates with program times used and according to thermal demand of heating system. It can be used to control heating system circulation pump.

– Switched on (contact closed) : In Day periods
– Switched off (contact open) : In Night and Frost Protection periods RTE 954 comes into action only when, for any reason whatsoever, it decides to re-open the valve, and remains in operation for at least 15 minutes.

CONTROL OF AUXILIARY TEMPERATURE

By connecting detector B5, RTE 954 can maintain an auxiliary temperature (eg: DHW, swimming pool) at a fixed point by On-Off control action. This control is completely independent of the weather compensation function, and uses, in an autonomous manner, one of the programs P1 to 4 or Week (display page 7.(1)).

In the Day periods RTE 954 controls according to desired temperature (display page 8) and differential set (display page 9).
In Night period heating system is switched off.
If detector B4 is not connected, output contact can be used as a normal On-Off switch which respects the program times selected.

PROGRAMS

The choice of program for weather compensation is made, with the + and – keys, on 1st page of display; for auxiliary control on page 7.(1).

Eight operating programs can be used:

– 4 programs with daily times : P.1, P.2 ,P.3, P.4
– 1 continuous DAY program: P.D.
– 1 continuous NIGHT program : P.N.
– 1 Frost Protection program : P.F. (only for weather compensation)
– 1 7-day program : WEEK

• Daily programs: **P.1** to **4** (display pages 14 to 37).

By assigning one of these programs the same operating times are applied to all days of the week.
Each program can contain:

– from 1 to 3 On times:
  Weather compensation : start DAY mode with operation at desired Day temperature (display page 2)
  Auxiliary control : start DAY mode with operation at desired temperature (display page 8).
– from 1 to 3 Off times :
  Weather compensation : start NIGHT mode with operation at desired Night temperature (display page 3).
  If it is desired to have heating system switched off, set TR NIGHT – –.– –
  Auxiliary control : start NIGHT mode with heating system switched off.

The following program times are pre-set and memorised by RTE 954 :

	P1	P2	P3	P4
On 1	**07.00**	**08.00**	**06.00**	**06.00**
Off 1	**22.00**	**23.00**	**08.00**	**08.00**
On 2	**– –.– –**	**– –.– –**	**17.00**	**11.00**
Off 2	**– –.– –**	**– –.– –**	**22.00**	**14.00**
On 3	**– –.– –**	**– –.– –**	**– –.– –**	**17.00**
Off 3	**– –.– –**	**– –.– –**	**– –.– –**	**22.00**

These times can be adjusted by 15 minutes at a time with the + and – keys.
When a pair of times, On and Off, is not used, both times must be cancelled by pressing the – key until – –. – – appears.

• Continuous DAY program: **P.D.**
Weather compensation : Allows continuous operation at desired Day room temperature
Auxiliary control: Allows continuous operation at desired temperature

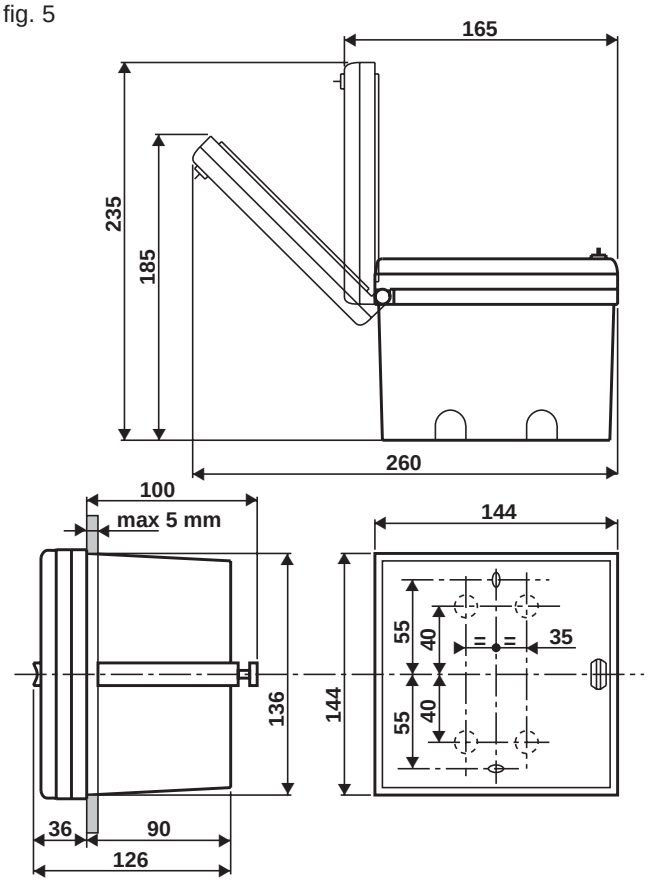
• Continuous NIGHT program: **P.N.**
Weather compensation : Allows continuous operation at desired Night room temperature
Auxiliary control: Keeps heating system always Off.

• Frost Protection program: **P.F.** (only for Weather Compensation)
For prolonged periods of non-occupation, allows continuous operation at a desired room temperature of 5 °C.

• 7-day program : **WEEK**
Set (display pages 38 to 44) by assigning to each day of the week one of programs with daily times P.1 to P.4 or continuous Day P.D. or continuous Night P.N. or Frost Protection P.F.

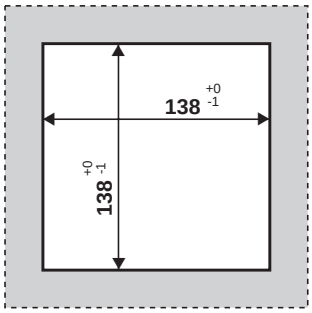
OVERALL DIMENSIONS

fig. 5



CUT-OUT FOR PANEL MOUNTING

fig. 6



CONSTRUCTION

RTE 954 is constructed in a DIN 43700 standard 144 x 144 casing (fig. 5). This is made from shock-proof plastic and contains, on the base, the two terminal blocks into which the connecting tabs of the printed circuit are inserted.
The electronic unit, which is fitted into the casing by means of slight pressure, **is constructed according to Italian Electrotechnical Committee (CEI) standards** as a single unit comprising the printed circuit and the controls facia.
The cover, in transparent plastic, is hinged on the left of the casing and is provided with a mechanical closure. RTE 954 is suitable for wall and panel mounting (fig. 6).

INSTALLATION

CONTROLLER RTE 954
This must be installed in a dry location with a temperature not above 35 °C, and away from water leakage 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 diagrams (fig. 7) and in observance of the safety regulations in force.

FLOW DETECTOR SCH 010 OR SIH 010
If circulation pump is on the flow pipe, the detector must be installed downstream of the pump. If pump is on the return pipe, the detector must be installed downstream of the control valve at a minimum distance of 1.5 meters so that it is not subject to indirect heat and also because, before reaching this point, the water is not sufficiently well mixed.

OUTSIDE DETECTOR SAE 001
This must be installed outside the building on the north or northwest side, at a height from the ground of not less than three meters in order to prevent tampering and to allow better monitoring of changes in weather.
It must be protected from the sun's rays and be as far as possible from windows, doors, chimneys or other possible sources of thermal disturbances.

ROOM DETECTOR SDA 010 (as an alternative to limit detector)
This must be installed at a point from which it can monitor the average temperature in a representative room of the building, at a height of 1.5 to 1.6 metres from the floor, on an internal wall as far as possible from windows, doors, and other possible sources of thermal disturbance, avoiding corners, shelving and curtains.

LIMIT DETECTOR SIH 010 (as an alternative to room sensor)
- Control of anticondensing temperature of boiler.
  It must be installed on return pipe to boiler between boiler and the T-junction of anticondensing pump.
- Precedence production DHW
  It must be installed on DHW distribution circuit or by immersion in calorifier.

AUXILIARY DETECTOR SIH 010
- Control of DHW temperature by control of primary circuit pump.
  It must be installed on secondary circuit flow, or by immersion in calorifier.
- Control of swimming pool water temperature by control of primary circuit pump. It must be installed on the return of swimming pool circuit.

SETTING

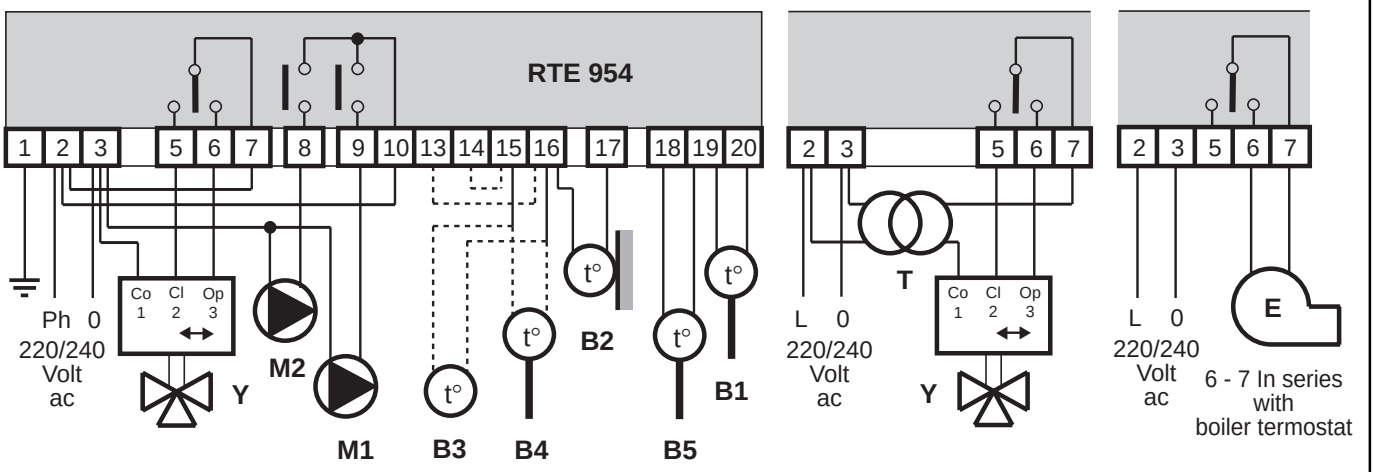
Programs are set in a system of pages which can be scrolled on the backlight alphanumeric display by means of ← and → keys (fig. 2.3).
The data are pre-set and can be adjusted, if the jack plug is inserted, by the + and – keys (fig. 2.2). Whichever page is displayed, at the end of each hour the 1st page returns to display. To return rapidly to 1st page, press keys ← and → simultaneously.

Page	Display	Description
1	**12.18 TUESDAY**(1) **Prg. P.1**(2) **Mode D**(3)	(1) Current day and time (2) Desired program for weather compensation : – P.1 to 4 : with daily times – P.D. : Continuous Day – P.N. : Continuous Night – P.F. : Frost Protection – WEEK : 7-Day (3) Current temperature mode D : Day ; N : Night ; F : Frost Protection
2	**TR desired** **DAY : 20.0**	Desired room temperature in Day mode.
3	**TR desired** **NIGHT : 16.0**	Desired room temperature in Night mode. If heating system desired off, set – –.–.
4	**T. flow : 65.0** **T. outside : 05.0**	Flow and outside temperatures measured by detectors.
5	**T. room** **measured : 19.8**	Actual room temp. Appears only if detector B3 connected
6	**T. room des : 20.0** (1) **T. flow cal : 68.5**(2)	(1) Room temperature desired by current mode (2) Flow temperature calculated by weather compensation
7	**AUX. Control** **Prg. P.1**(1) **Mode D**(2)	(1) Desired program for auxiliary control : – P 1 to 4 : with daily times – DAY : continuous Day – NIGHT : continuous Night (off) – WEEK : 7-Day (2) Current mode : D : Day ; N : Night.
8	**AUX. Control** **T. desired : 50.0**	Desired temperature for auxiliary control
9	**AUX. Control** **Diff. : 05.0**	Desired On-Off differential for auxiliary contol
10	**AUX. Control** **T. meas.d : 49.5**	Temperature measured by detector B4 If not connected – – – appears
11	**Current HOUR** **12**	Adjustment of hour
12	**Current MINUTES** **18**	Adjustment of minutes
13	**Current DAY** **TUESDAY**	Adjustment of day
14	**PROGRAM P.1** **TIME ON 1 07.00**	Times of program P1 : ON – start of period with
15	**PROGRAM P.1** **TIME OFF 1 22.00**	desired Day temperature. OFF – start of period with
16	**PROGRAM P.1** **TIME ON 2 - -.- -**	desired Night temperature Times adjustable 15 minutes at
17	**PROGRAM P.1** **TIME OFF 2 - -.- -**	a time with + and – keys. When a time is not used
18	**PROGRAM P.1** **TIME ON 3 - -.- -**	it must be cancelled by pressing the – key until – –.– – appears
19	**PROGRAM P.1** **TIME OFF 3 - -.- -**	Times must always be cancelled in pairs On and Off

A further 18 pages follow with programs P.2, P.3 and P.4

WIRING DIAGRAMS

fig. 7



With B4 detector – Links: 14 – 15 and 13 –16
With B3 detector – Without links

L – Line
0 – Neutral
Y – Valve
E – Boiler

B1 – Flow detector
B2 – Outside detector
B3 – Room detector
B4 – Limit detector

B5 – Auxiliary detector
M1 – Heating system pump
M2 – Secondary pump
T – Transformer

38 **7-DAY PROGRAM MONDAY P.1** — Program assigned to 1st day of week :
– P.1 to 4 : with daily times
– P.D. : continuous Day
– P.N. : continuous Night
– P.F. : Frost Protection

A further 6 pages follow for the other days of the week

45 **DESIGN T. outside – 05.0** — Design outside temperature

46 **DESIGN T. flow 80.0** — Design flow temperature

47 **Adjust. TF 20 20.0** — Adjustment of flow temperature with outside temperature of 20 °C.

48 **HEATING SYSTEM RADIATORS** — Type of heating media :
Panels, radiators, fan coils

49 **T. MAX. FLOW 99.0** — Maximum limit flow

50 **T. MIN FLOW 01.0** — Minimum limit flow
Only in Day mode

51 **T. LIMIT T. min. des.d : 50.0** — Desired minimum limit temperature

52 **T. LIMIT T.measured : 49.5** — Minimum limit temperature measured by detector B4

53 **ACTUATOR 10.30** — Type of output:
On - Off: Press key until BOILER appears
Modulating : Set actuator running time

54 **Authority T.R. 05.0** — Variation in °C of flow temp. for each °C of variation in room temperature
Appears only if B3 connected

55 **COSTER – RTE 954 Vers. 01** — Identity card of controller

TECHNICAL DATA

Power supply	220/240 Volt ac
Frequency	50 to 60 Hz.
Consumption	5 VA
Output contacts:	
– maximum voltage applicable	250 Volt ac
– maximum capacity	5 (1) Amp
Setting range	
– temp. room Day and Night	excluded to 30 °C
– temp. outside design	– 30 to + 10 °C
– temp. flow design	1 to 99 °C
– temp. maximum and minimum flow	1 to 99 °C
– adjustment flow temp. at To 20 °C	20 to 40 °C
– limit temperature	1 to 99 °C
– auxiliary temperature	1 to 99 °C
– differential auxiliary temperature	1 to 50 °C
– speed actuator	2 to 60 min.
– room authority	0 to 30 °C
Frost Protection room temperature	5 °C
Minimum interval between program times	15 minutes
Room temperature:	
– operating	0 to +45 °C
– storage	– 25 to +60 °C
Humidity room	class F (DIN 40040)
Protection	IP 40
Weight	1.1 kg

COSTER
CONTROLS TEMPERATURE ENERGY

20132 Milan
via San G.B. De La Salle 4/a

Head Office & Sales
Tel. 02/2593641 - 2 - 3 - 4
Telefax. 02/2593645
email : coster@costerte.it
www.costerte.it

25048 Edolo (BS)
via Gen. Treboldi 190/192

Factory
Tel. 0364/71480
Telefax. 0364/72615

UK SALES & SERVICE
COSTER ENVIRONMENTAL CONTROLS LTD
5 Shaftesbury Street South
Sir Francis Ley Industrial Park
Derby
DE23 8YH
Telephone : 01332 200555
Fax : 01332 204181

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