E 122
05.05.01

TEMPERATURE AND HUMIDITY CONTROLLER FOR TWO-BATTERY AIR HANDLING UNIT

C BUS

DTU 644 Eng. C2

- **Temperature and relative humidity control in air handling units**
- **Communication systems:**
  – telemanagement C-Bus
- **Power supply 24 V~ , DIN rail mounting**

CE

1. APPLICATION

DTU 644 is designed for temperature and humidity control in air handling units composed of:

- 2 hot/chilled water or vapor batteries with 3-wire modulating control
  or electric batteries with 1-,2-, or 3-stage On-Off control
  or direct expansion batteries with 1- or 2-stage On-Off control
- 1 adiabatic humidifying unit with On-off control
  or vapor-operated, with 3-wire modulating control, or 1- or 2-stage On-Off co
  or vapor-operated, with 0...10 V– control (alternative to air damper control)
- 1 air mixing unit with 0...10 V- air damper actuators
  or 1 heat recuperator with 0...10 V- or On-Off control (CSV 304 converter).

The equipment can be included in a Telemanagement system through the C-Bus connection.

2. FEATURES

The main features of DTU 644 are as follows:

- Three 3-wire modulating outputs or 2-stage On-off (two equal loads) or 3-stage (two unequal loads) outputs, configurable for:
  – room temperature control (heating or cooling) with summer external compensation if desired, minimum and maximum flow limits to prevent cold drafts, hot air stratification and condensing in the air ducts.
  – flow temperature control (heating or cooling) with winter and summer compensation if desired
  – pre-heating temperature control at variable values according to room temperature and humidity
  – room relative humidity control – humidifying (flow limits, alternative to enthalpic comparison, if desired) and dehumidifying
- 1 0...10 V– progressive output, configurable for:
  – air mixing control based on temperature or enthalpic comparison, with minimum external air limit
  – external air control for room dehumidification with compensation of dew temperature on glass windows and with minimum external air limit
  – heat recuperator On-Off control according to room-external temperature comparison
  – vapor-operated humidifier setting by means of a 0...10 V– control
- Manual or automatic controller function seasonal switching.
- Remote-controlled temperature and humidity setting adjustment
- Alarms for short and open detector circuits and for system and equipment malfunction.

3. ACCESSORIES

No.	Description	Type	Application range	Sensing element t°	Code	Data sheet
1	Duct flow air temperature detector	**STA 010**	0…60 °C	NTC 10 kΩ	B1	–
1	Duct outside air temperature detector	**STA 001**	–30…+40 °C	NTC 1 kΩ	B2	–
	or wall outside air temperature detector	**SAE 001**	–30…+40 °C	NTC 1 kΩ	B2	–
1	Duct extract air temperature detector	**STA 010**	0…40 °C	NTC 10 kΩ	B3	–
	or or room air temperature detector	**SAB 010**	0…40 °C	NTC 10 kΩ	B3	–
1	Duct pre-heating temperature detector	**STA 010**	0…40 °C	NTC 10 kΩ	B4	–
	or duct relative humidity detector	**STV 010**	0…40 °C	NTC 10 kΩ	B4	–
1	Room relative humidity and temperature detector	**SAU 012**	0…40 °C ; 20…80 %	NTC 10 kΩ	B3-B6	–
	or duct relative humidity detector	**SUR 012**	20…80 %	–	B6-B7	–
	or duct relative humidity detector (swimming pools)	**SUR 051**	10…90 %	–	B6-B7	–
1	0...10 V– to 2-stage On-Off Duct converter	**CSV 304**	–	–	U1	–
1	Modulating to 0...10 V– converter	**CSC 304**	–	–	U2	–
1	Temperature set-point adjuster	**CDB 100**	–	–	Rt°	–
1	Relative humidity set-point adjuster	**CDB 200**	–	–	RH	–
1	Outside air minimum distance positioner	**PCS 04**	–	–	Rs	–

4.TECHNICAL DATA (default values in bold print)

• Electrical data

Power supply	24 V ~ ± 10%
Frequency	50 … 60 Hz
Consumption	5 VA
Protection	IP40
Radiodisturbances	VDE0875/0871
Vibration test	with 2g (DIN 40 046)
Voltage-free output contacts:	
maximum switching voltage	250 V ~
maximum switching current	5 (1) A
Construction standards	CEI
Data storage period	5 years
Software	Class A

• Mechanical data

Case	DIN 6E module
Mounting	on DIN 35 rail
Materials:	
base	NYLON
cover	ABS
Room temperature:	
operation	0 … 45 °C
storage	– 25 … + 60 °C
Room Humidity	Class F DIN 40040
Dimensions	105 x 115 x 71.5
Weight	0.6 kg

• Adjustment range

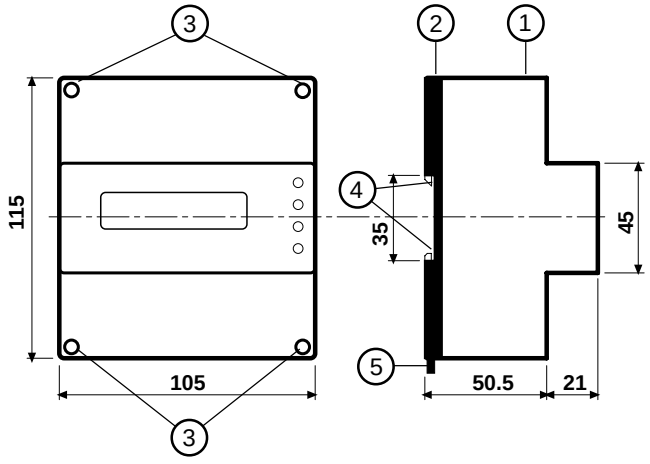
Heating (or cooling) temperatures:	
desired room temp. (B3 o B1+B3)	0…**20** (**25**)…40 °C
desired flow temp. (B1)	0…**20** (**25**)…60 °C
min. flow limit (B1+B3)	1…**18** (**8**)…60 °C
max. flow limit (B1+B3)	1…**50** (**25**)…60 °C
room heating flow limit (B1+B3)	0…**40** °C
room cooling flow limit (B1+B3)	0…**40** °C
outside default temp. (B1+B2)	–30…**–10** (**35**)…40 °C
flow default temp. (B1+B2)	1…**50** (**10**)…60 °C
summer compensation Te–Ta (B2+B3)	0…**6**…20 °C
Preheating or dewpoint temperature (B4) :	
min. limit	0…**10**…40 °C
adjustment	– 9.5…**0**…+9.5 °C
Heat pump min. outside temp.	–30…**0**…40 °C
Temp. proportional band (base value):	
Heating (room) (B3 o B1+B3)	±1…±**2** …±40 °C
Heating (flow) (B1)	±1…±**10**…±40 °C
Various temp. proportional band multipliers:	
Heating flow (B1+B3)	Pb room x 0.5…**5**…20
Cooling temperatures	Pb heat x **0.5**…20
Preheating (B4)	Pb heat disch x 0.5…**1**…20
Dewpoint (B4)	Pb room heat x 0.5…**1**…20
Air dampers (B2+B3)	Pb room heat x 0.5…**1**…20
Aux. heating (B3)	Pb room heat x 0.5…**1**…20
Aux. heating (B1 or B1+B3)	Pb flow disch x 0.5…**1**…20
Temp. integral time	0…**10**…255 min.
Room or flow relative humidity (B6) :	
humidification	0…**50**…99 %
dehumidification	0…**60**…99 %
Humidity proportional band	±0.5…±**6** …±40 %
Humidity integral time	0…**10**…255 min.
Flow humidity limits:	
min.	**1**…99 %
max.	1…**99** %
influence	1…**5**…30 %
Y1, Y2, Y3 output control :	– **modulating**
	– 2 stages
	– 3 stages
Ys output control	0…10 V–
Valve stroke time (modulating)	30…**120**…630 s
Season switching:	– manual (display)
	– external control
	– auto based on outside temp.
	– auto based on room temp.
Season switching outside temperatures:	
winter	0…**20**…40 °C
summer	0…**25**…40 °C
Season switching delay based on outside temp.:	
winter	1…**24**…60 hrs
summer	1…**4**…60 hrs

• Alarm adjustments

Telemanagement (PC-controlled adjustments)	
Alarm call attempts	1…**5**…255
Alarm call interval	2…**10**…255 m
Alarms (PC-controlled adjustments) :	
Disch.temp. diff. threshold(B1)	1…**5**…99 °C
Disch.temp. diff. threshold	2…**30**…255 min.
Room temp. diff. threshold(B3)	0.5…**1**…30 °C
Room temp. diff. delay	2…**30**…255 min.
Preheat/dew temp. diff. threshold (B4)	1…**5**…99 °C
Preheat/dew diff. delay (B4)	2…**5**…255 min.
Humidity diff. threshold(B6)	0.5…**10**…90 %
Humidity diff. delay	2…**30**…255 min.

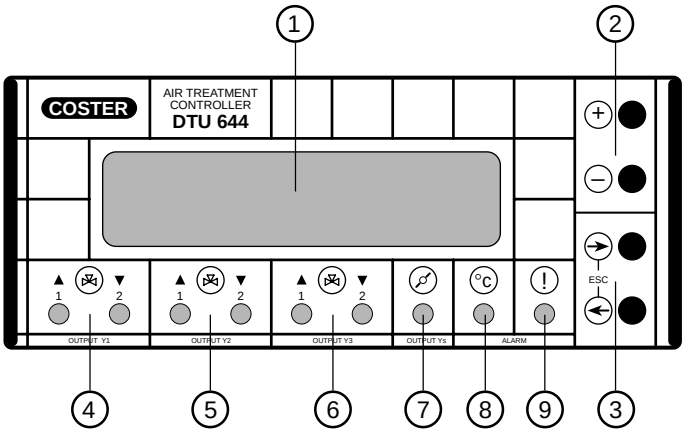
Warning:
In case of static, the equipment's output controls may change settings; original settings will be subsequently restored automatically.

5. OVERALL DIMENSIONS



1 – Electronic component protection cover
2 – Support base with transformer, relays and terminal boards
3 – Screws for securing cover to base
4 – DIN rail securing elements
5 – DIN rail release lever

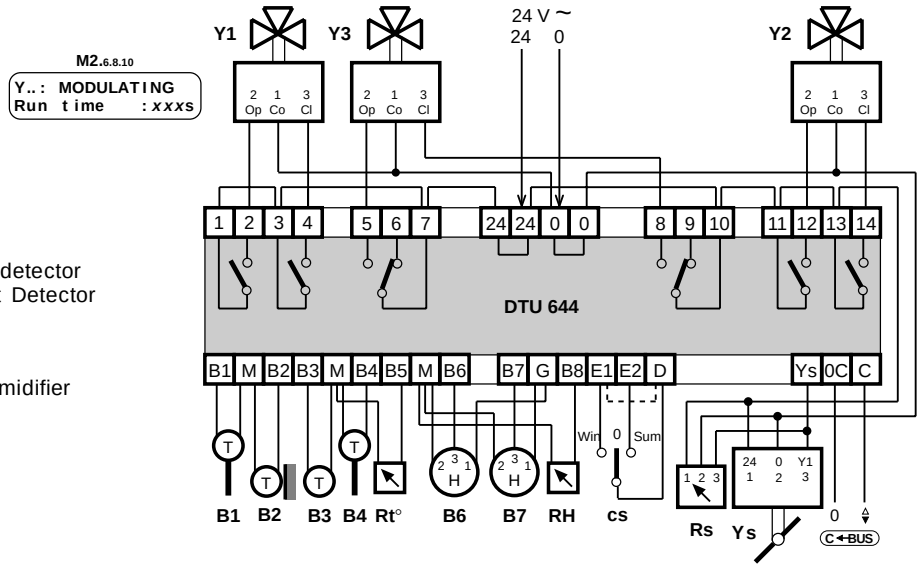
6. FACIA



1 - Alphanumeric display
2 - + and – operating keys
3 - ← and → operating keys
4 - Y1 output LED
5 - Y2 output LED
6 - Y3 output LED
7 - Ys output LED
8 - Measurement alarm LED
9 - Microprocessor malfunction LED

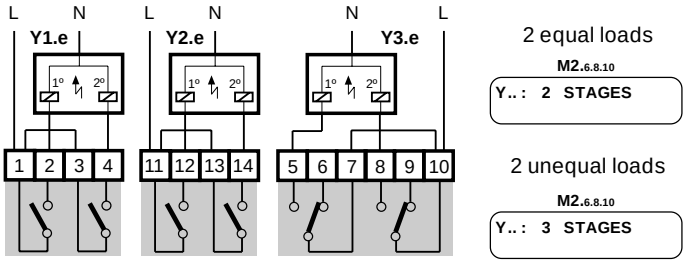
7. WIRING DIAGRAMS

7.1 3-Wire Modulating Valve Control

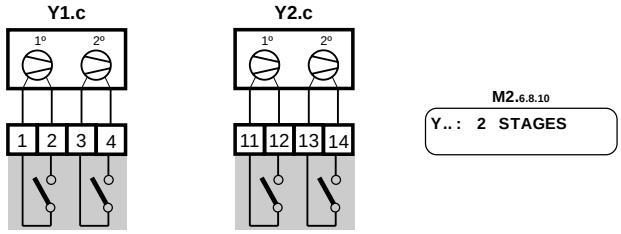


B1 – Flow air temp. detector
B2 – Outside temp. detector
B3 – Outside temp. detector
B4 – Preheating or dewpoint temp. detector
B6 – Room humidity or extract air or flow air detector
B7 – Outside humidity (enthalpy) or flow limit Detector
cs – Season switch (eliminate D-E1 link)
Win = winter Sum = summer
Y1-2-3 – 3-wire modulating controls
Ys – Air dampers or recuperator or vapor humidifier 0...10V– control
Rt° – Temp. set-point adjuster
RH – Humidity set-point adjuster
Rs – Minimum outside air remote positioner

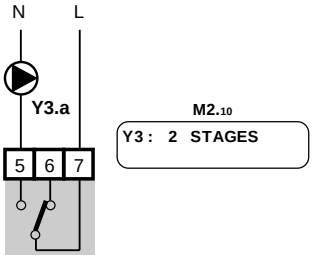
7.2 Electric Battery or Electric Humidifier Control



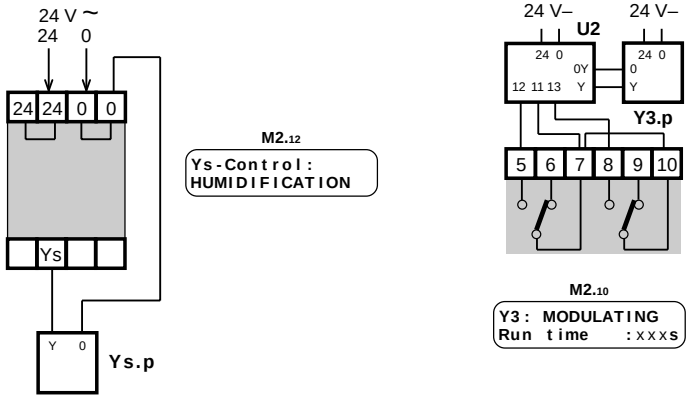
7.3 Direct Expansion Battery Control



7.4 Adiabatic Humidifier Of-Off Control



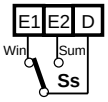
7.5 Vapor Humidifier Control (0…10 V–)



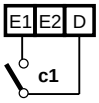
Y1-2.c – Direct expansion batteries (refrigerators or heat pumps)
Y1-2.e – Electric batteries
Y3.a – Adiabatic humidifier (pump or electro-magnetic valve)
Y3.e – Electric battery or electric vapor humidifier
Y3.p - Ys.p – 0…10 V– control vapor humidifier
U2 – Modulating signal converter to 0…10 V–

7.6 Use of D-E1-E2 Outputs – Examples

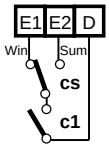
Always On (as supplied)
Possible Season switching (M2.$_2$) modes:
No ss ; Winter; Summer; Based on Outside Temp.; Based on Room Temp.; Based on Seasons



Ss Win = On – Winter
Ss Sum = On – Summer
Season switching (M2.$_2$) must be:
through ss control



Always On (as supplied)
Possible Season switching (M2.$_2$) modes:
No ss ; Winter; Summer; Based on Outside Temp.; Based on Room Temp.; Based on Seasons



Ss Win and c1 closed = On - Winter;
Ss Sum and c1 open = On – Summer
Season switching (M2.$_2$) must be:
through ss control

ss – Control through manual or centralized season switch or through DTU 614-type controller.

c1 – on-off contact through timeswitch or through manual control or through fan relay

8. WIRING

Proceed as follows:
- Separate the base from the cover
- Install the base onto the DIN rail and check that it is properly anchored by the securing elements (5.4)
- Perform the wiring connections as illustrated in the diagram, in compliance with applicable regulations and using:
  - 1.5 sq. mm^2 cables of supply voltage and relay control outputs
  - 1 sq. mm^2 cables for the detectors and remote control
  - 1 sq. mm^2 cables for the C-Bus. See sheet T 021 for length limits
- Apply power (24 V~) and make sure voltage properly reaches terminals 24 and 0.
- Remove power, re-install the cover onto the base/terminal board, and fasten it with the 4 screws included in the package (5.3).

It is recommended not to insert more than two cables in a single controller terminal. Use external terminals if necessary.

9. WHERE TO PLACE DEVICES

9.1 Controller

The controller should be placed in a dry environment, in compliance with acceptable environment conditions as described under "Technical Data". If located in environments classified as "hazardous" it should be installed within switchboards built in accordance with applicable regulations depending on hazard class. The controller may be installed on the board's bottom on a DIN rail, or in DIN modular boards

9.2 Flow temperature detector B1

B1 must be installed downstream with respect to the flow fan.

9.3 Outside temperature detector B2

STA 001 : It may be used in systems with constant outside air inflow. It must be installed upstream with respect to the outside air dampers near the air intake.
SAE 001 : It should be used in systems where outside air flow is not constant. It must be installed outside the building, on the north or northwest side, at a height of at least 3 m. above the ground, protected from sunshine and away from windows, doors, chimneys or other direct thermal interference.

9.4 Room temperature or extract air detector B3 or room temperature and humidity detector B3 + B6

SAB 010 or SAU 012 environment : It must be installed in a spot that reflects the average temperature and/or humidity of a significant room (e.g. living room) at a height of 1.5...1.6 m. above the floor, on an inside wall away from windows, doors and sources of heat (no alcoves, scaffolds or hangings).
STA 010 extract air: It should be installed upstream with respect to the extract fan.

9.5 Duct mounting humidity detector B6

Extract air: It must be installed upstream with respect to the extract fan.
Discharge air: It should be installed downstream with respect to the discharge fan.

9.6 Preheating or swimming pool dew point temperature detector B4

Preheating: It must be installed downstream with respect to the humidifying unit, preferably downstream of the drop separator.
Dew point: It should be installed next to windows facing north.

9.7 Outside duct mounting or flow limit humidity detector B7

Outside : It must be installed upstream with respect to outside air dampers, close to the air intake.
Flow limit: It must be installed downstream with respect to the discharge fan.

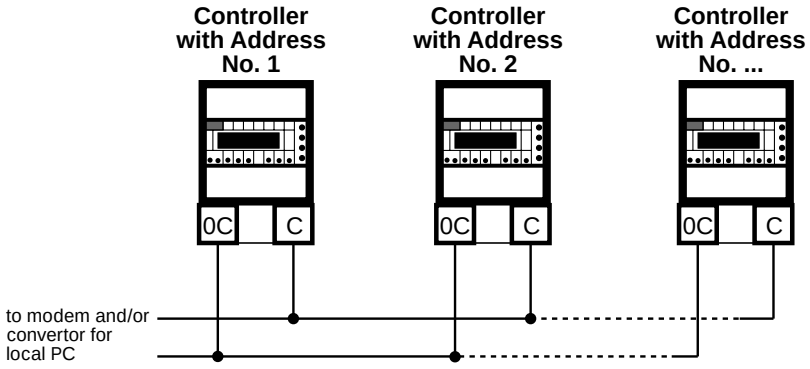
10. COMMUNICATION

10.1 C-Bus Telemanagement Communication **(for more detailed information please see Technical Sheet T 021)**

Through the C-Bus output, DTU 644 can be managed remotely (two-way data communication) by means of one or more local PC(s) and/or a remote central computer via telephone network.
From the PC(s) it is possible to view and/or change the following:

- data and value settings on the controller display pages, and configuration data dedicated to telemanagement only (see "Technical Data")
- system component's operating status (pumps, accessory in general)
- acquire system-generated alarms
- view detector readings (temperatures: outside, room, flow, etc.)

10.2 C-Bus wiring



10.3 Telemanagement Address

M2.14

```
Address  :  –
Group    :  –
```

In telemanagement mode, controllers must have an address sequence number to be identified by the central computer or by the local PC(s),.
Additionally, controllers can be subdivided into groups.

Note

When in non-telemanagement mode, the address should be saved *(–).*
To cancel values, press + and – keys simultaneously.

10.4 Sending Alarms

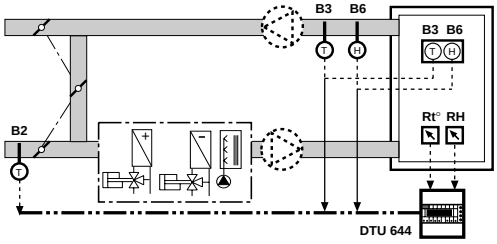
M2.13

```
SendingAlarms:NO
PassWTeleman :NO
```

- **Sending alarms** : NO= No alarms are sent
  YES = Alarms are sent to the central computer and are signaled by the word "ALARM" appearing on the display
- **Teleman Passw**: : NO = Password disabled
  YES = Password enabled

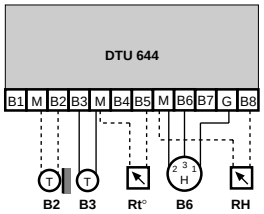
11. TEMPERATURE AND HUMIDITY CONTROL – EXAMPLES

11.1 Room temperature and humidity control

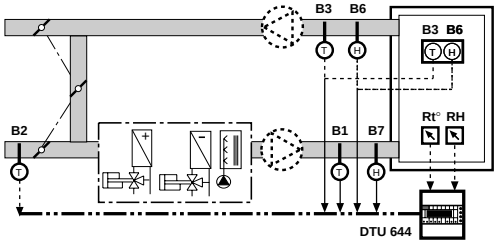


B2 – Flow temp. detector
B3 – Room or extract temp. detector
B6 – Room or extract humidity detector
Rt° – Temperature set point adjuster (optional)
RH – Humidity set point adjuster (optional)

M2.1
Detector layout
– 2 3 – 5 6 – 8

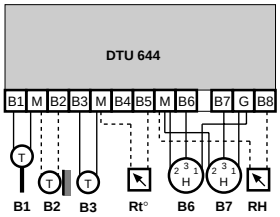


11.2 Room temperature and humidity control with flow temperature and humidity limits

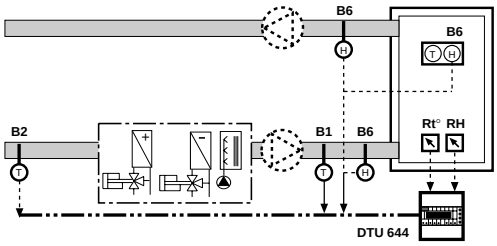


B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation only)
B3 – Room or extract temperature detector
B6 – Room or extract humidity detector
B7 – Flow humidity detector (alternative to outside humidity detector)
Rt° – Temperature set point adjuster (optional)
RH – Humidity set point adjuster (optional)

M2.1
Detector layout
1 2 3 – 5 6 7 8

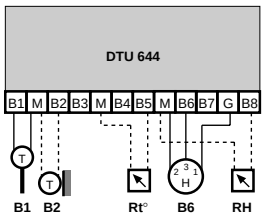


11.3 Flow temperature and room or flow humidity control



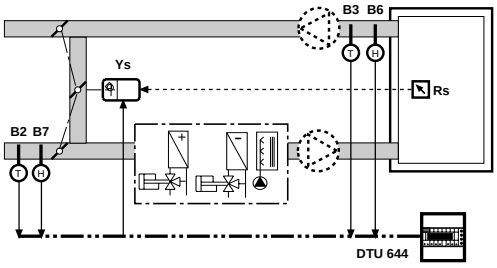
B1 – Flow temp. detector
B2 – Outside temperature detector (for compensation only)
B6 – Room or extract humidity detector
Rt° – Temperature set point adjuster (optional)
RH – Humidity set point adjuster (optional)

M2.1
Detector layout
1 2 – – 5 6 – 8



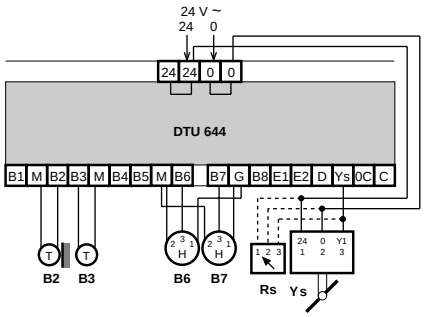
12. USE OF Ys OUTPUT– EXAMPLES

12.1 Enthalpic comparison air damper optimization

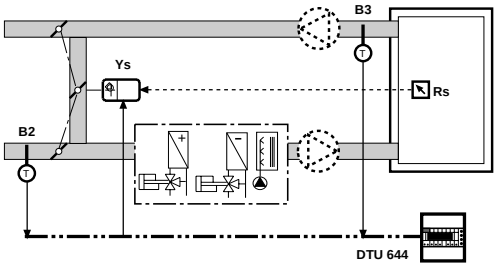


B2 – Outside temp. detector
B3 – Room or extract temp. detector
B6 – Room or extract humidity detector
B7 – Outside humidity detector (alternative to flow)
Ys – Progressive air damper control
Rs – Outside air min. distance positioner (optional)

M2.1	M2.5	M2.12
Detector layout – 2 3 – – 6 7 –	Use detector B7 OUTSIDE HUMIDITY	Ys-Control: DAMP. ENTHALPY

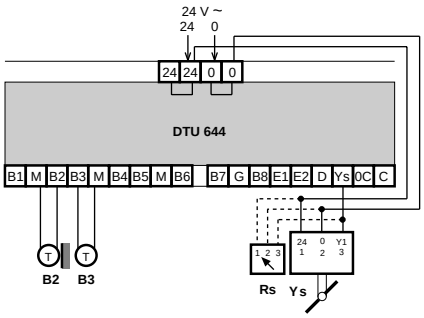


12.2 Temperature comparison air damper optimization

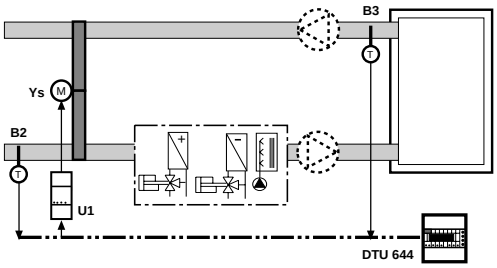


B2 – Outside temp. detector
B3 – Room or extract temp. detector
Ys – Progressive air damper control
Rs – Outside air min. distance positioner (optional)

M2.1	M2.12
Detector layout – 2 3 – – – – –	Ys-Control: DAMP. TEMPERATURE

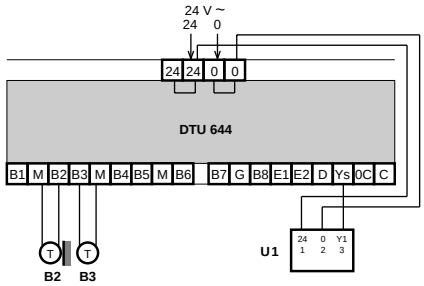


12.3 Heat recuperator On-Off control

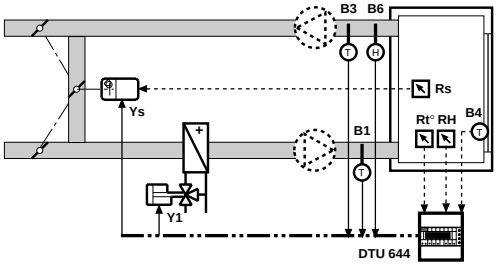


B2 – Outside temp. detector
B3 – Room or extract temp. detector
Ys – Recuperator
U1 – 0…10 V– into On-Off signal converter

M2.1	M2.12
Detector layout – 2 3 – – – – –	Ys-Control: RECUPERATOR

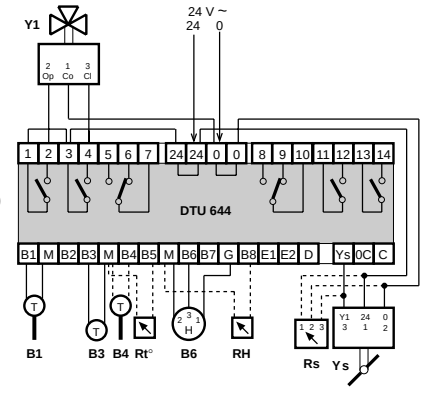


12.4 – Outside air control for room dehumidification (swimming pools) with dew point control (optional) – 1 Heating modulating battery

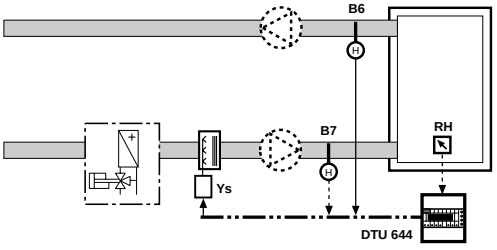


B1 – Flow temp. detector
B3 – Room or extract temp. detector
B4 – Dew point temp. detector (optional)
B6 – Room or extract humidity detector
Rt° – Temperature set point adjuster (optional)
RH – Humidity set point adjuster (optional)
Rs – Outside air min. distance positioner (optional)
Y1 – Heating modulating control
Ys – Progressive air damper control (dehumidification)

M2.1	M2.4	M2.6	M2.7	M2.12
Detector layout 1 – 3 4 5 6 – 8	Use detector B4 DEW POINT	Y1: MODULATING Run time :xxxs	Y1: HEATING	Ys-Control: DEHUMIDIFICATION

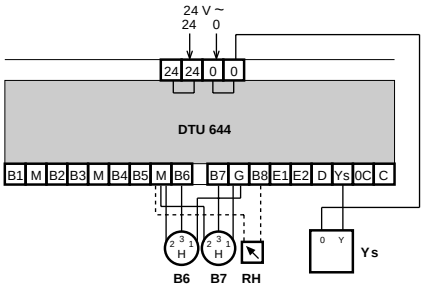


12.5 – Vapor humidifying unit control 0…10 V–



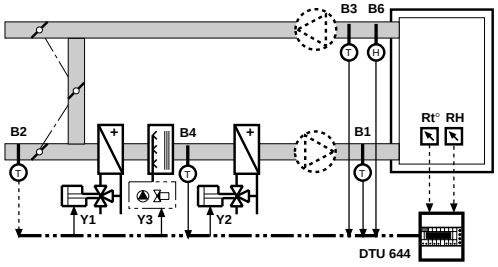
B6 – Room or extract humidity detector
B7 – Flow humidity detector (optional)
RH – Humidity set point adjuster (optional)
Ys – Progressive humidifier control

M2.1	M2.5	M2.12
Detector layout – – – – – 6 7 8	Use detector B7 FLOW HUM . LIMIT	Ys-Control: HUMIDIFICATION

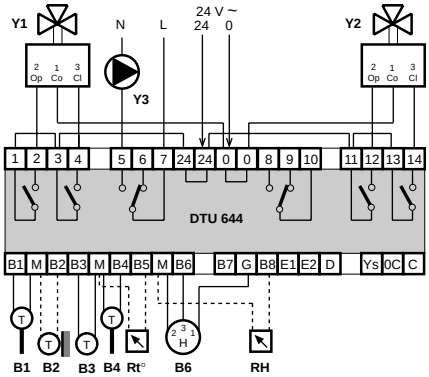


13. USE OF Y1, Y2, Y3 OUTPUT– EXAMPLES

13.1 – 1 Preheating modulating battery
– 1 Post-heating modulating battery
– 1 Humidifying On-Off unit



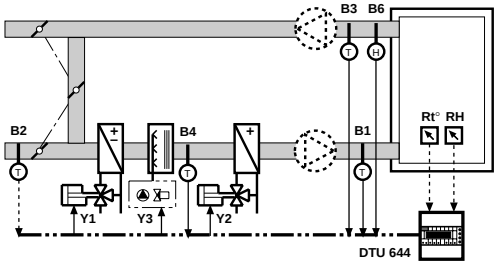
B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B4 – Preheating temperature detector
B6 – Room or extract humidity detector
Rt° – Temperature set point adjuster (optional)
RH – Humidity set point adjuster (optional)
Y1 – Preheating modulating control
Y2 – Post-heating modulating control
Y3 – Humidifier On-Off control



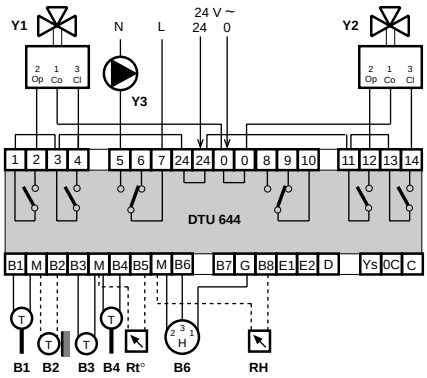
M2.1	M2.2	M2.4
Detectors Layout 1 2 3 4 5 6 – 8	Season Switching NO	Use detector B4 PREHEATING

M2.6	M2.7	M2.8	M2.9	M2.10	M2.11
Y1: MODULATING Run time :xxxs	Y1:PREHEATING	Y2: MODULATING Run time :xxxs	Y2:HEATING	Y3: 2 STAGES	Y3:HUMIDIF.

13.2 – 1 Winter preheating, summer cooling/dehumidifying modulating battery
– 1 Post-heating modulating battery
– 1 Humidifying On-Off unit



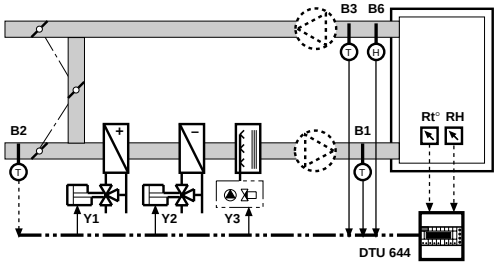
B1 – Flow temperature detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B4 – Preheating temperature detector
B6 – Room or extract humidity detector
Rt° – Temperature set point adjuster (optional)
RH – Humidity set point adjuster (optional)
Y1 – Winter preheating summer cooling/dehumidifying modulating control
Y2 – Post-heating modulating control
Y3 – Humidifier On-Off control



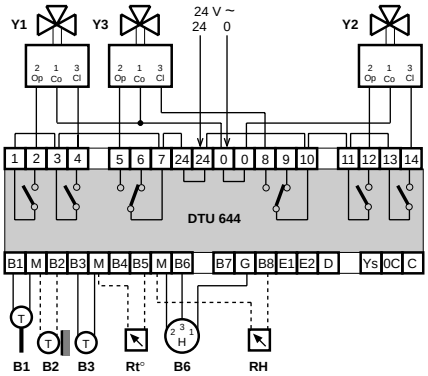
M2.1	M2.2	M2.4
Detectors Layout 1 2 3 4 5 6 – 8	Season Switching XXXXXXXXX	Use detector B4 PREHEATING

M2.6	M2.7	M2.8	M2.9	M2.10	M2.11
Y1: MODULATING Run time :xxxs	Y1-Win:PREHEAT. Y1-Sum:COOL+DHU	Y2: MODULATING Run time :xxxs	Y2-Win:HEATING Y2-Sum:HEATING	Y3: 2 STAGES	Y3-Win:HUMIDIF. Y3-Sum:OFF

13.3 – 1 Heating modulating battery
– 1 Cooling modulating battery
– 1 Humidifying On-Off unit



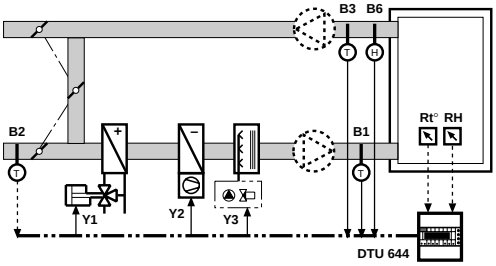
B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B6 – Room or extract humidity detector
Rt° – Temperature set point adjuster (optional)
RH – Humidity set point adjuster (optional)
Y1 – Heating modulating control
Y2 – Cooling modulating control
Y3 – Humidifier modulating control



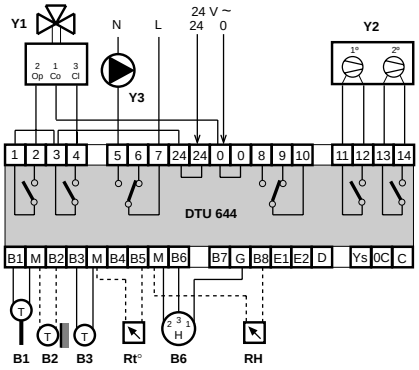
M2.1	M2.2	M2.3
Detectors Layout 1 2 3 – 5 6 – 8	Season Switching NO	Output 8-9-10: CONTROL

M2.6	M2.7	M2.8	M2.9	M2.10	M2.11
Y1: MODULATING Run time :xxxs	Y1:HEATING	Y2: MODULATING Run time :xxxs	Y2:COOLING	Y3: MODULATING Run time :xxxs	Y3:HUMIDIF.

13.4 – 1 Heating modulating battery
– 1 Cooling direct expansion On-Off battery
– 1 Humidifying On-Off unit



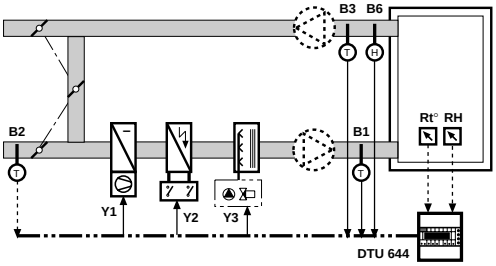
B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B6 – Room or extract humidity detector
Rt° – Temperature set point adjuster (optional)
RH – Humidity set point adjuster (optional)
Y1 – Heating modulating control
Y2 – Cooling On-Off control
Y3 – Humidifier On-Off control



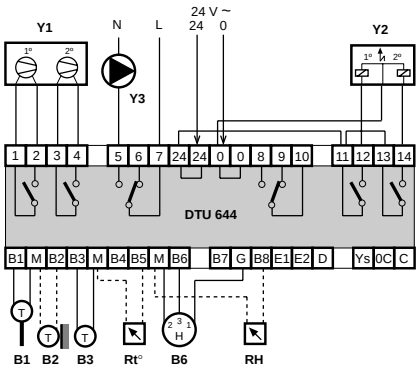
M2.1	M2.2
Detector Layout 1 2 3 – 5 6 – 8	Season Switching NO

M2.6	M2.7	M2.8	M2.9	M2.10	M2.11
Y1: MODULATING Run time :xxxs	Y1:HEATING	Y2: 2 STAGES	Y2:COOLING	Y3: 2 STAGES	Y3:HUMIDIF.

13.5 – 1 Summer cooling/dehumidifying direct expansion On-Off battery
– 1 Heating On-Off battery
– 1 Humidifying On-Off unit



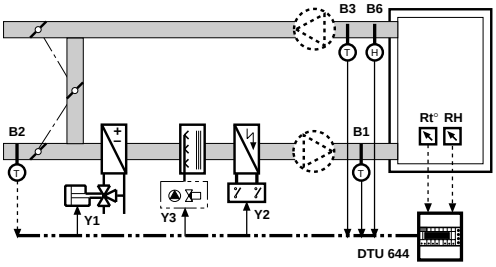
B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B6 – Room or extract humidity detector
Rt° – Temperature set point adjuster (optional)
RH – Humidity set point adjuster (optional)
Y1 – Summer cooling/dehumidifying On/Off control
Y2 – Heating On-Off control
Y3 – Humidifier On-Off control



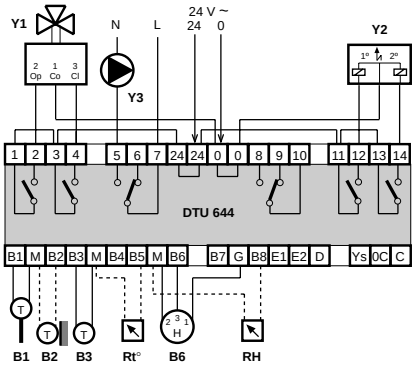
M2.1	M2.2
Detector Layout 1 2 3 – 5 6 – 8	Season Switching XXXXXXXXX

M2.6	M2.7	M2.8	M2.9	M2.10	M2.11
Y1: 2 STAGES	Y1-Win:OFF Y1-Sum:COOL+DHU	Y2: 2 STAGES	Y2-Win:HEATING Y2-Sum:HEATING	Y3: 2 STAGES	Y3-Win:HUMIDIF. Y3-Sum:OFF

13.6 – 1 Winter heating, summer cooling/dehumidifying modulating battery
– 1 Summer post-heating On-Off battery
– 1 Humidifying On-Off unit



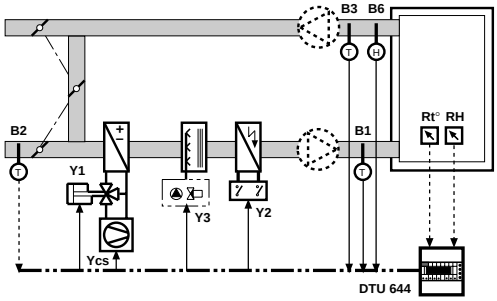
B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B6 – Room or extract humidity detector
Rt° – Temperature set point adjuster (optional)
RH – Humidity set point adjuster (optional)
Y1 – Winter heating, summer cooling/dehumidifying modulating control
Y2 – Summer post-heating On-Off control
Y3 – Humidifier On-Off control



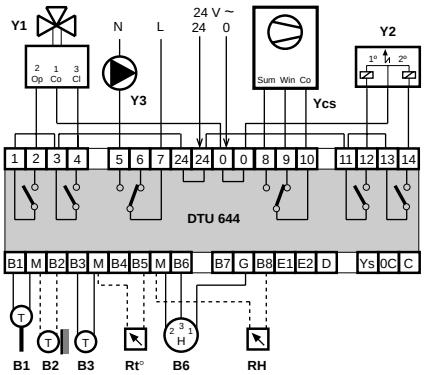
M2.1	M2.2
Detector Layout 1 2 3 – 5 6 – 8	Season Switching XXXXXXXXX

M2.6	M2.7	M2.8	M2.9	M2.10	M2.11
Y1: MODULATING Run time :xxxs	Y1-Win:HEATING Y1-Sum:COOL+DHU	Y2: 2 STAGES	Y2-Win:OFF Y2-Sum:HEATING	Y3: 2 STAGES	Y3-Win:HUMIDIF. Y3-Sum:OFF

13.7 – 1 Winter heating, summer cooling/dehumidifying modulating battery with heat pump season switching
– 1 Summer post-heating On-Off battery
– 1 Humidifying On-Off unit



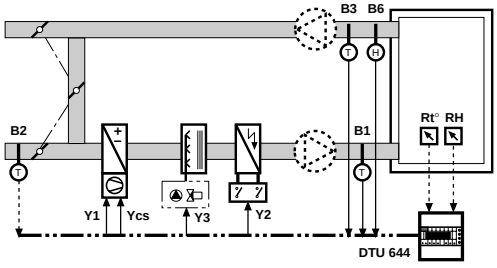
B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B6 – Room or extract humidity detector
Rt° – Temperature set point adjuster (optional)
RH – Humidity set point adjuster (optional)
Y1 – Winter heating, summer cooling/dehumidifying modulating control
Y2 – Summer post-heating On-Off control
Y3 – Humidifier On-Off control
Ycs – Heat pump season control



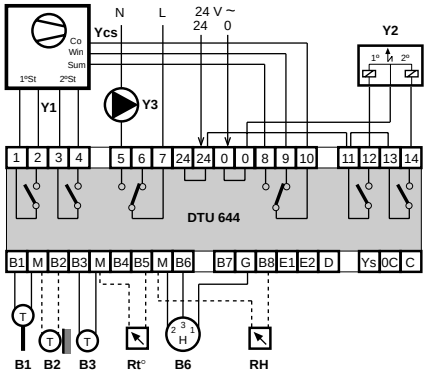
M2.1	M2.2	M2.3
Detectors Layout 1 2 3 – 5 6 – 8	Season Switching XXXXXXXXX	Output 8-9-10: CONTROL SEASON

M2.6	M2.7	M2.8	M2.9	M2.11
Y1: MODULATING Run time :xxxs	Y1-Win:HEATING Y1-Sum:COOL+DHU	Y2: 2 STAGES	Y2-Win:OFF Y2-Sum:HEATING	Y3-Win:HUMIDIF. Y3-Sum:OFF

13.8 – 1 Winter heating, summer cooling/dehumidifying direct expansion On/Off battery with heat pump season switching
– 1 Summer post-heating On-Off battery
– 1 Humidifying On-Off unit



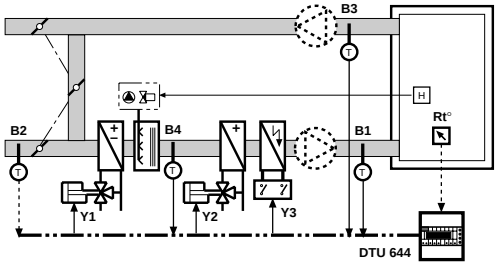
B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B6 – Room or extract humidity detector
Rt° – Temperature set point adjuster (optional)
RH – Humidity set point adjuster (optional)
Y1 – Winter heating,summercooling/dehumidifying On/Off control
Y2 – Summer post-heating On-Off control
Y3 – Humidifier On-Off control
Ycs – Heat pump season control



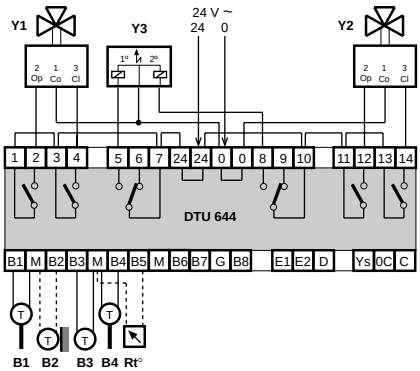
M2.1	M2.2	M2.3
Detectors Layout 1 2 3 – 5 6 – 8	Season Switching XXXXXXXXX	Output 8-9-10: CONTROL SEASON

M2.6	M2.7	M2.8	M2.9	M2.11
Y1: 2 STAGES	Y1-Win:HEATING Y1-Sum:COOL+DHU	Y2: 2 STAGES	Y2-Win:OFF Y2-Sum:HEATING	Y3-Win:HUMIDIF. Y3-Sum:OFF

13.9 – 1 Winter preheating, summer cooling/dehumidifying modulating battery
– 1 Winter post-heating On-Off battery
– 1 Summer post-heating On-Off battery
– 1 Humidifying On-Off unit



B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B4 – Preheating temperature detector
Rt° – Temperature set point adjuster (optional)
Y1 – Winter preheating,summercooling/dehumidifying modulating control
Y2 – Winter post-heating modulating control
Y3 – Summer post-heating On/Off control

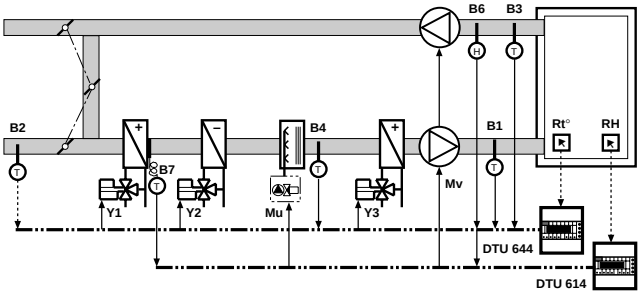


M2.1	M2.2	M2.3	M2.4
Detectors Layout 1 2 3 – 5 6 – 8	Season Switching XXXXXXXXX	Output 8-9-10: CONTROL	Use detector B4 PREHEATING

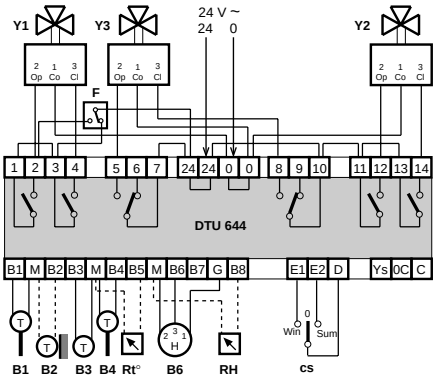
M2.6	M2.7	M2.8	M2.9	M2.10	M2.11
Y1: MODULATING Run time :xxxs	Y1-Win:PREHEAT. Y1-Sum:COOL+DHU	Y2: MODULATING Run time :xxxs	Y2-Win:HEATING Y2-Sum:OFF	Y3: 2 STAGES	Y3-Win:OFF Y3-Sum:HEATING

14. 3 OR 4 BATTERY SYSTEM CONTROL– EXAMPLES

14.1 – 1 Winter preheating modulating battery
– 1 Summer cooling/dehumidifying modulating battery
– 1 Winter and summer post-heating modulating battery
– 1 Humidifying On-Off unit with humidostat



B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B4 – Preheating temperature detector
B6 – Room or extract humidity detector
F – Battery frost protection thermostat
Y1 – Winter preheating modulating control
Y2 – Summer cooling/dehumidifying modulating control
Y3 – Post-heating modulating control
Rt° – Temperature set point adjuster (optional)
RH – Dehumidification set point adjuster (optional)



M2.1
Detector Layout
1 2 3 4 5 6 – 8

M2.2
Season Switching
FR CONTROL ss

M2.3
Output 8-9-10:
CONTROL

M2.6
Y1: MODULATING
Run time :xxxs

M2.7
Y1-Win:PREHEAT.
Y1-Sum:OFF

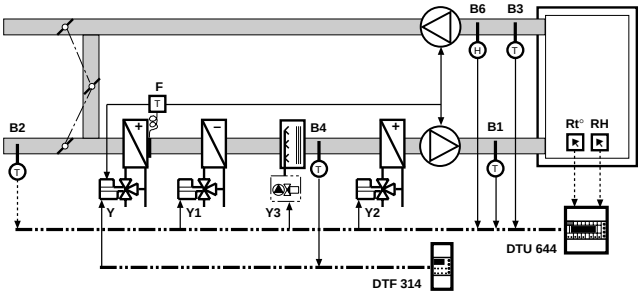
M2.8
Y2: MODULATING
Run time :xxxs

M2.9
Y2-Win:OFF
Y2-Sum:COOL+DHU

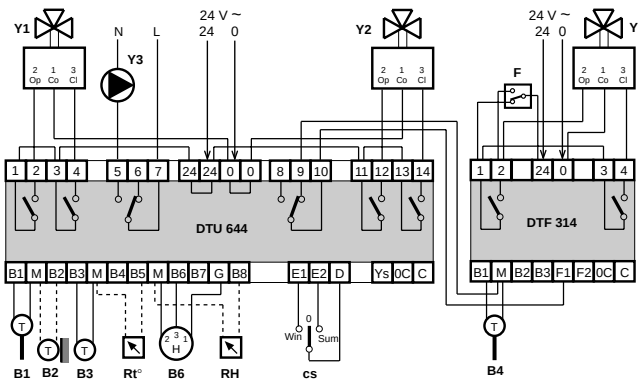
M2.10
Y3: MODULATING
Run time :xxxs

M2.11
Y3-Win:HEATING
Y3-Sum:HEATING

14.2 – 1 Winter preheating modulating battery
– 1 Summer cooling/dehumidifying modulating battery
– 1 Winter and summer post-heating modulating battery
– 1 Humidifying On-Off unit



B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B4 – Preheating temperature detector
B6 – Room or extract humidity detector
F – Battery frost protection thermostat
Y – Winter preheating modulating control
Y1 – Summer cooling/dehumidifying modulating control
Y2 – Post-heating modulating control
Y3 – Humidifier On-Off control
Rt° – Temperature set point adjuster (optional)
RH – Dehumidification set point adjuster (optional)



M2.1
Detector Layout
1 2 3 – 5 6 – 8

M2.2
Season Switching
FR CONTROL ss

M2.3
Output 8-9-10:
CONTROL

M2.6
Y1: MODULATING
Run time :xxxs

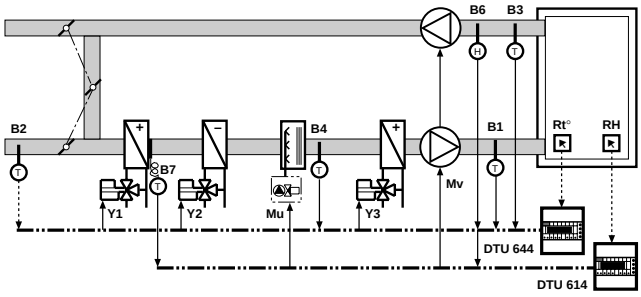
M2.7
Y1-Win:OFF
Y1-Sum:COOL+DHU

M2.8
Y2: MODULATING
Run time :xxxs

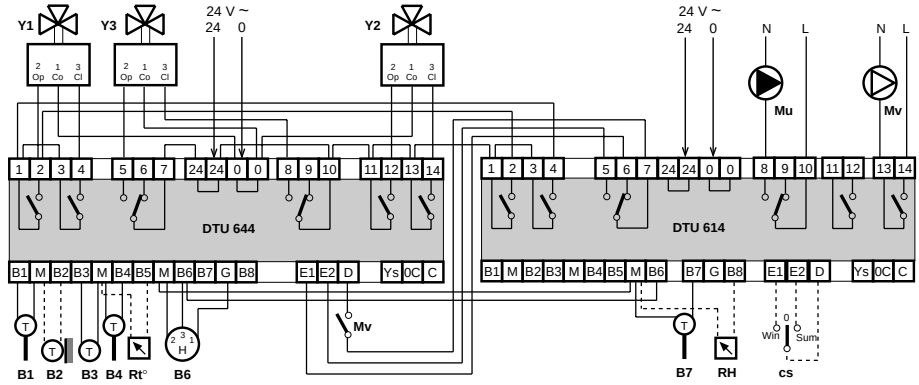
M2.9
Y2-Win:HEATING
Y2-Sum:HEATING

M2.11
Y3-Win:HUMIDIF.
Y3-Sum:OFF

14.3 – 1 Winter preheating modulating battery with frost protection control
– 1 Summer cooling/dehumidifying modulating battery
– 1 Winter and summer post-heating modulating battery
– 1 Humidifying On-Off unit



B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B4 – Preheating temperature detector
B6 – Room or extract humidity detector
B7 – Battery frost protection detector
Mv – Fan On-Off control
Y1 – Winter preheating modulating control
Y2 – Summer cooling/dehumidifying modulating control
Y3 – Post-heating modulating control
Mu – Humidifier On-Off control
Rt° – Temperature set point adjuster (optional)
RH – Dehumidification set point adjuster (optional)



M2.1 Detectors Layout 1 2 3 4 5 6 – –

M2.2 Season Switching FR CONTROL ss

M2.3 Output 8-9-10: CONTROL

M2.4 Use detector B4 PREHEATING

M2.6 Y1: MODULATING Run time :xxxs

M2.7 Y1-Win:PREHEAT. Y1-Sum:OFF

M2.8 Y2: MODULATING Run time :xxxs

M2.9 Y2-Win:OFF Y2-Sum:COOL+DHU

M2.10 Y3:MODULATING Run time :xxxs

M2.11 Y3-Win:HEATING Y3-Sum:HEATING

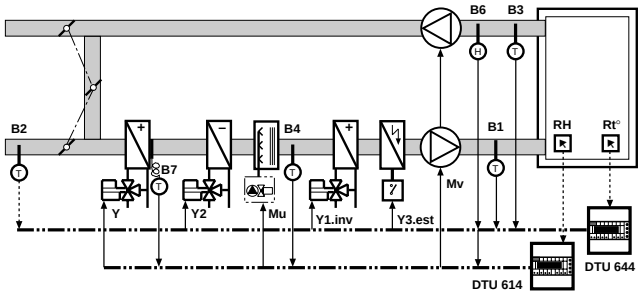
M3.1 Detectors Layout – – – – – 6 7 8

M3.2 Season Switching XXXXXXXXX

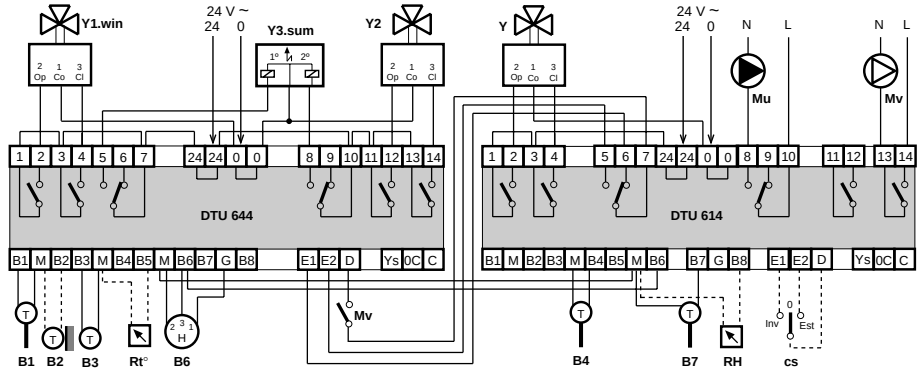
M3.4 Y : MODULATING Run time :xxxs

M3.5 Y -Win:FROSTPROT Y -Sum:OFF

14.4 – 1 Winter preheating modulating battery with frost protection control
– 1 Summer cooling/dehumidifying modulating battery
– 1 Winter post-heating modulating battery
– 1 Summer post-heating On-Off battery
– 1 Humidifying On-Off unit



B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B4 – Preheating temperature detector
B6 – Room or extract humidity detector
B7 – Battery frost protection detector
Mu – Humidifier On-Off control
Mv – Fan On-Off control
Y – Winter preheating modulating control
Y1Win – Winter post-heating modulating control
Y2 – Summer cooling/dehumidifying modulating control
Y3Sum – Summer post-heating On-Off control
Rt° – Temperature set point adjuster (optional)
RH – Dehumidification set point adjuster (optional)



M2.1 Detectors Layout 1 2 3 – 5 6 – –

M2.2 Season Switching DA COMANDO cs

M2.3 Output 8-9-10: CONTROL

M2.6 Y1: MODULATING Run time :xxxs

M2.7 Y1-Win:HEATING Y1-Sum:OFF

M2.8 Y2: MODULATING Run time :xxxs

M2.9 Y2-Win:OFF Y2-Sum:COOL+DHU

M2.10 Y3: 2 STAGES

M2.11 Y3-Win:OFF Y3-Sum:HEATING

M3.1 Detectors Layout – – – 4 – – – 8

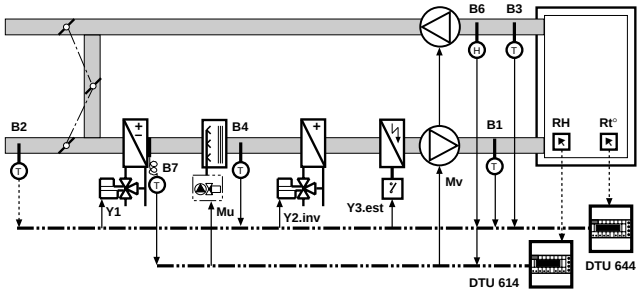
M3.2 Season Switching XXXXXXXXX

M3.3 Use detector B4 PREHEATING

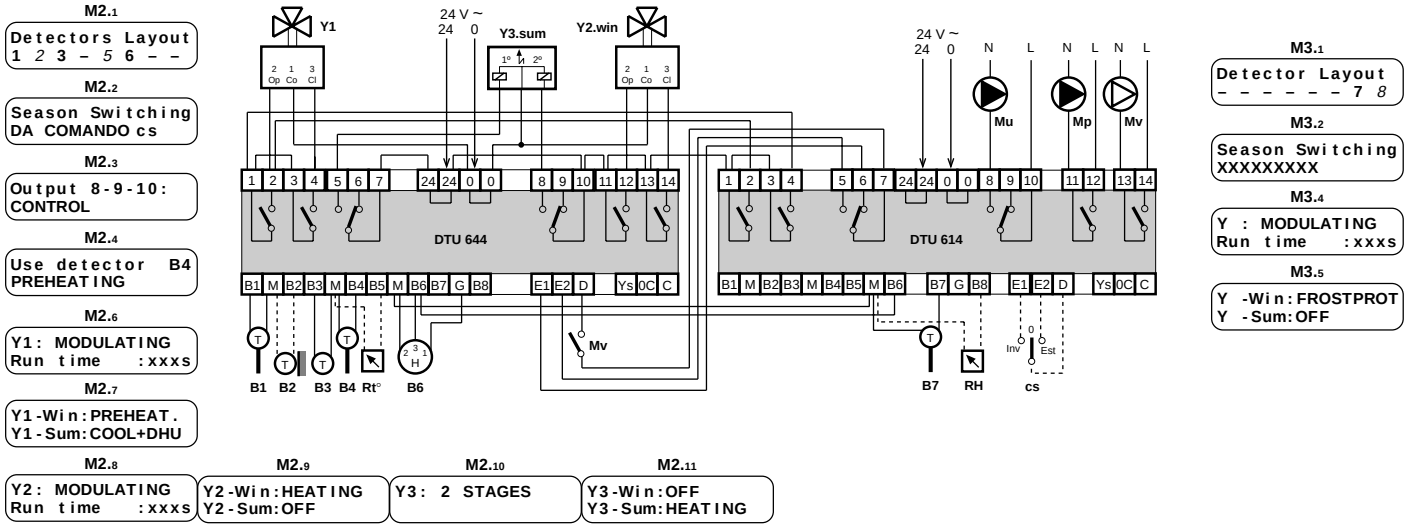
M3.4 Y : MODULATING Run time :xxxs

M3.5 Y -Win:PREHEAT. Y -Sum:OFF

14.5 – 1 Winter preheating modulating battery with frost protection control and summer cooling/dehumidifying modulating battery
– 1 Winter post-heating modulating battery
– 1 Summer post-heating On-Off battery
– 1 Humidifying On-Off unit



B1 – Flow temp. detector
B2 – Outside temp. detector (for compensation)
B3 – Room or extract temp. detector
B4 – Preheating temperature detector
B6 – Room or extract humidity detector
B7 – Battery frost protection detector
Mu – Comando On-Off umidificatore
Mv – Fan On-Off control
Y – Winter preheating modulating control
Y1Win – Winter post-heating modulating control
Y2 – Summer cooling/dehumidifying modulating control
Y3Sum – Summer post-heating On-Off control
Rt° – Temperature set point adjuster (optional)
RH – Dehumidification set point adjuster (optional)



15. OPERATION

DTU 644 is a microprocessor-operated digital controller for temperature and relative humidity control in air handling units composed of:

– 2 units with 3-wire or 1, 2 or 3-stage On-Off modulating control. The units can have the following functions:
Preheating; Heating; Auxiliary heating; Cooling and dehumidification;
– 1 adiabatic humidification On-Off unit
or vapor humidification unit with 3-wire modulating control
or vapor humidification unit with 0...10 V- control (alternative to air mixing or heat recuperatingunit)
– 1 air mixing or heat recuperating unit with 0...10 V- (alternative to vapor humidifier)

To adjust the controller to system requirements, proceed as follows:

M2.1
```
Detector Layout
– – – – – – – –
```

– configure system according to connected detectors and controls

M2...
```
Y..     : HEATING
```
```
Y..-Win: HEATING
Y..-Sum: COOLING
```

– assign control outputs Y1, Y2 and Y3 the action they are to perform also according to season switching, if applicable.

16. TEMPERATURE CONTROL

Temperature control can operate in alternative to:

M2.1
```
Detector Layout
– – 3 – – – – –
```
```
Detector Layout
1 – – – – – – –
```
```
Detector Layout
1 – 3 – – – – –
```

- Room or extract air detector **B3** only:
  Fixed point room Heating and Cooling temperature control
- Discharge air detector **B1** only:
  Fixed point flow Heating and Cooling temperature control
- Room or extract air detector **B3** and discharge air detector **B1** :
  Flow Heating and Cooling temperature control according to room temperature deviation

16.1 Desired temperatures

Desired temperatures for heating and cooling

Can be set in M0.3 `Heat.T. Room Desir.:20.0c±0.0` and M0.5 `Cool.T. Room Desir.:25.0c±0.0` if **B3** or **B1** and **B3** connected

or in `Heat.T. Flow Desir.:20.0c±0.0` and `Cool.T. Flow Desir.:25.0c±0.0` if only **B1**connected

M2.1
```
Detector Layout
– – – – 5 – – –
```

If the set point adjuster Rt° is connected, these values can be changed remotely.
The value of the change is displayed , in ± °C, next to the set values.

16.2 Proportional band and Integral Time

Basic temperature control parameters, **Proportional Band** and **Integral Time**, apply to **heating** control (Room*:* if B3 only or B1 + B3 are connected, or Flow*:* if B1 only is connected) and can be changed in the ADJUSTMENT menu.

M1.1
```
Temper. Room
Prop band:± 2.0c
```
M1.2
```
Temper. Room
Integ time: 10m
```

The *Proportional Band* parameter (in ± °C) is used for other temperature settings through modifiable **multipliers** that adapt it to the different types of controls (Cooling; Preheating; Auxiliary heating; Dew point; Air Damper).

Examples of PB multipliers with M1.1 `Temper. Room Prop.Band: 2.0c`

M2.19
```
Pb Flow      =
Pb Room   x 5.0
```

Pb Flow (heating) = PB Room (heating) x **5.0** (= ±10 °C)

M2.20
```
Pb Cooling   =
Pb Heating x 0.5
```

Pb Cooling (room) = PB heating (room) x **0.5** (= ±1 °C)
Pb Cooling (flow) = PB heating (flow) x **0.5** (= ±5 °C)

M2.21
```
Pb Preheating  =
Pb HeatRoom x1.0
```

Pb Preheating = PB flow heating x **1.0** (= ±10 °C)

```
Pb Dew point   =
Pb HeatFlow x1.0
```

Pb Dew point = PB room heating x **1.0** (= ±2 °C)

M2.22

Pb Dampers =
Pb HeatRoom x1.0

Pb Air damper = PB room heating x **1.0** (= ±2 °C)

dt Recuperator =
Pb HeatRoom x1.0

dt recuperator = PB room heating x **1.0** (= 2 °C)

M2.23

Pb Aux heating =
Pb HeatRoom x1.0

With B3 only :
Pb auxiliary heating = PB Room Heatingx **1,0** (= ±2 °C)
With B1 and B3 :
Pb Auxiliary Heating = Pb Flow Heating x **1.0** (= ±10 °C)

Pb Aux heating=
Pb HeatFlow x1.0

M1.3

Flow Temperature
Integr.Time: 10m

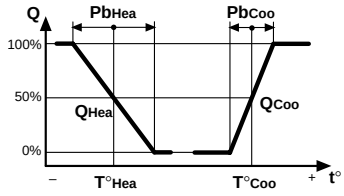
When detectors **B1** and **B3**, are connected, the flow temperature (B1) *Integral Time* parameter is displayed on a display page to allow for changes to be made separately from the room temperature parameter.

16.3 Control through room detector (B3) only or discharge air detector (B1) only

The controller compares the values M0.3 [Heat. T. Room Desir.:20.0c±0.0] and M0.5 [Cool. T. Room Desir.:25.0c±0.0] if B3 is used

or [Heat. T. Flow Desir.:20.0c±0.0] and [Heat. T. Flow Desir.:25.0c±0.0] if B1 is used

against the temperature measured by detector B1 or B3, and calculates the load values for Heating **QHea** and for Cooling **QCoo** according to the deviation measured.



16.4 Control through room detector (B3) and discharge air detector (B1)

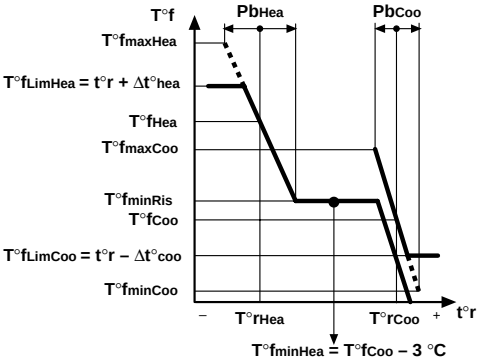
The controller compares the values M0.3 [Heat. T. Room Desir.:20.0c±0.0] and M0.5 [Cool. T. Room Desir.:25.0c±0.0]

against the temperature measured by detector B3, and calculates the load values for desired flow *temperatures* for Heating **T°fHea** and for Cooling **T°fCoo** according to the deviation measured and values set:

M1.4

Heating Flow
Min:18c Max:50c

- *Min : – – c Max : – – c* = Heating flow temp. min and max values determine the **PbHea** proportional band's range.
  The minimum value **T°fminHea** helps eliminate annoying **cold drafts** in the room. To prevent heating and cooling simultaneousness, the minimum value **T°fminHea** is always 3°C lower than Cooling flow temperature **T°fCoo.**

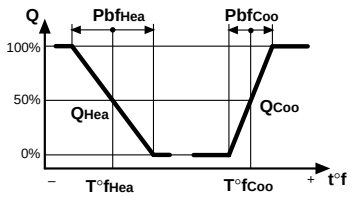


M1.6

Cooling Flow
Min: 8c Max:25c

- *Min : – – c Max : – – c* = Cooling flow temp. min and max values determine the **PbCoo** proportional band's range.

The controller compares *desired* flow temperatures for Heating **T°fHea** and for Cooling **T°fCoo** and for Cooling **T°fCoo** against the temperature measured by the discharge air detector B1and derives the load values for Heating **Qhea** and for Cooling **Qcoo** according to the deviations detected.



To prevent **hot air stratification** during the Heating stage it is possible to prevent the heating flow temp. **T°fHea** from exceeding actual room temperature by more than a certain value.

M1.5

HeatingLimit Max
Flow–Room :+10c

To prevent **condensation in the air duct** during the Cooling stage it is possible to prevent the cooling flow temp. **T°fCoo** from dropping below actual room temperature by more than a certain value.

M1.7

CoolingLimit Max
Room–Flow :– 7c

16.5 Operating modes

M0.2
Current mode :
ON Winter

The controller can operate in the following modes:
- ON Winter; OFF Winter
- ON Summer; OFF Summer
- ON ; OFF

depending on :
- current season according to setting in M2.2 Season Switching XXXXXXXXX (see paragraph 24)
- status of season switching **ss** e/o and/or the control **c1** (terminals D-E1-E2)

Examples :

• With M2.2 Season Switching NO is : M0.2 Current mode : ON – when contact c1 (D-E1) is closed
M0.2 Current mode : OFF – when contact c1 (D-E1) is open

• With M2.2 Season Switching WINTER
or Season Switching FR OUTSIDE T. and outside temp. imposes winter operating mode
or Season Switching FR ROOM T. and room temp. imposes winter operating mode
or Season Switching FR SEASONS and season periods impose winter operating mode

mode is: M0.2 Current mode : ON Winter – when contact c1 (D-E1) is closed
Current mode : OFF Winter – when contact c1 (D-E1) is open

• With M2.2 Season Switching SUMMER
or Season Switching FR OUTSIDE T. and outside temp. imposes summer operating mode
or Season Switching FR ROOM T. and room temp. imposes summer operating mode
or Season Switching FR SEASONS and season periods impose summer operating mode

mode is: M0.2 Current mode : ON Summer – when contact c1 (D-E1) is closed
Current mode : OFF Summer – when contact c1 (D-E1) is open

• With M2.2 Season Switching FR CONTROL ss with contact ss in winter (D-E1 closed)

mode is: M0.2 Current mode : ON Winter – when contact c1 (D-E1) is closed
Current mode : OFF Winter – when contact c1 (D-E1) is open

• With M2.2 Season Switching FR CONTROL ss with contact ss in summer (D-E2 closed)

mode is: M0.2 Current mode : ON Summer – when contact c1 (D-E2) is closed
Current mode : OFF Summer – when contact c1 (D-E2) is open

17. OUTSIDE COMPENSATION OF TEMPERATURE

Compensation functions are only enabled if the outside detector B2 is connected. Such functions can be as follows:

- Compensation of desired flow Heating and Cooling temperatures;
- Summer compensation of desired room or flow Cooling temperatures;

M0.4
Flow Heat T.
Compensat.:±00.0

M0.6
Cool. T. Flow
Compensat.:±00.0

M0.6
Flow Heat T.
Compensat.:±00.0

M0.6
Cool. T. Flow
Compensat.:±00.0

17.1 Compensation of desired flow Heating and Cooling temperatures

M2.1
Detectors Layout
1 2 – – – – – –

This function can be only used if detectors B1 and B2 are connected, and Detector B3 is not connected. It is useful when the primary air system, in addition to ensuring air circulation, is also intended to make up for ambient dispersion.

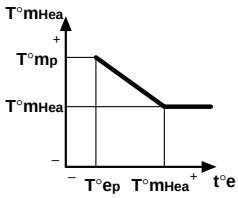
Desired flow Heating temperature

M0.3
Flow Heat T.
Desir.:20.0c±0.0

The controller increases desired temp. when outside temperature drops, according to settings

M1.8
Cooling Comp.:NO
Opt:–10c Fpt:50c

- Heating Comp. :NO = function disabled
  YES = function enabled
- Opt : xx *c* = default outside temp. : winter
- Fpt : xx *c* = default flow temp. : winter



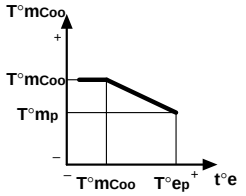
Desired flow Cooling temperature

M0.5
Cool. T. Flow
Desir.:25.0c±0.0

The controller decreases desired temp. when outside temperature increases, according to settings:

M1.9
Cooling Comp.:NO
Opt:+35c Fpt:10c

- Heating Comp. :NO =function disabled
  YES = function enabled
- Opt : xx *c* = default outside temp. : summer
- Fpt : xx *c* = default flow temp. : summer



17.2 Summer compensation of desired room Cooling temperature

M2.1
Detectors Layout
1 2 3 – – – – –

This function can be only used if detectors B2 and B3 or B1, B2 and B3 are connected. It is useful to prevent excessive temp. differences between room and outside.

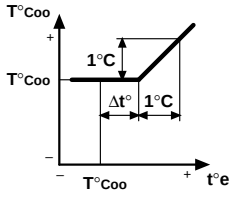
The controller maintains temp. at a constant level

M0.5
Cool. T. Room
Desir.:25.0c±0.0

until outside temp. exceeds the value T°Coo+ Δt°, when this occurs T°Coo is increased by 1°C per each °C increase in outside temp.

M1.10
Summer Compen:NO
Diff.O.-R.-T: 6c

- Heating Comp : *NO* = function disabled
  YES = function enabled
- Diff. O.- R. -T: xx *c* = maximum allowed difference between outside and room temp.



18. RELATIVE HUMIDITY CONTROL

M2.1
Detectors Layout
– – – – – 6 – *8*

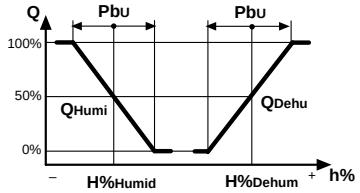
The function is only enabled if detector B6 is connected.

Desired Humidification and Dehumidification values can be set as shown M0.7 Humidification Desir.:50.0%±0.0 and M0.9 Dehumidification Desir.:60.0%±0.0

If set point adjuster **R%**, is connected, such values can be changed remotely.
The value of the change is displayed in ±% next to the set values.

M1.11
RelativeHumidity
Prop Band:± 6.0%
M1.12
RelativeHumidity
Integr.Time: 10m

The controller compares the desired values against relative humidity as measured by detector B6, and calculates the load values for Humidification **Qhumi** and for Dehumidification **Qdehu** according to deviations detected:



- Prop. Band*:* ± x x . x % = Humidity proportional band in ±%.
- Integral Time: x x m = Humidity integral time in minutes

If the humidification control output is intended to be **modulating**, it should be set as shown: M2.3 Output 8-9-10: CONTROL

18.1 Flow humidification limits

M2.5
Utilizzo SondaB7
LIM.UMIDITA'MAND

When humidity is controlled through detector B6 (room or extract air duct), if detector B7 is not being used for enthalpic-comparison air damper control, such detector can be employed as Humidification flow limit.

M1.13
Flow humidity
Min: 1% Max:99%

- *Min : – – %* *Max : – – %* = Min. and max value of Humidification flow humidity

M1.14
Flow humidity
Influence : 5%

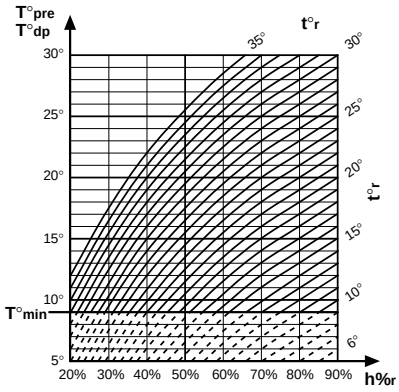
When the value of flow humidity exceeds one of the limit values, the desired Humidification value is increased or decreased by the set Influence value, for each deviation %.

The adjustment value is displayed in M0.8 Humidification Compensat.:±00

18.2 Cooling – Dehumidification priority

When a single output is concurrently serving for Cooling and Dehumidification functions (COOL + DEHU mode), the controller compares the two load values and operates according to the higher one.

19. PREHEATING OR DEW POINT CONTROL



M2.1
Detectors Layout
– – – 4 – – – –

The function is only enabled if detector B4 is connected.
It can be used for the following purposes:

- PREHEATING = preheater battery unit control according to humidification condensation temperature through duct mounting detector B4, installed downstream of the humidification unit.

M2.4
Use detector B4
PREHEATING
Use detector B4
DEWPOINT

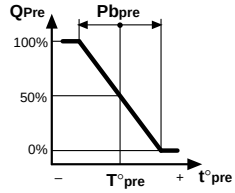
- DEW POINT= Dehumification value compensation to limit dew buildup on swimming pool windows – detector B4 should be placed so that it adheres to the glass

19.1 Preheating temperature control

M2.4
Use detector B4
PREHEATING

If detector B3 or detectors B1 and B3 are connected, the controller calculates preheating temp. **T°pre** according to the following:

– Condensation curve calculated on the basis of room temp.(**t°r**) and room humidity (**h%a**) actual values



– Minimum value M0.11 Preheating T. Minimum : 10.0c M0.12

– Manual adjustment in Preheating T. Calc. :16.0c±0.0 if applicable

The controller calculates the dew point temp. **T°dp** according to the following:

– Minimum value M0.11 Preheating T. Minimum : 10.0c M0.12

– Manual adjustment in Preheating T. Calc. :16.0c±0.0 if applicable

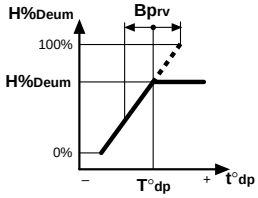
The controller compares preheating temp. **T°pre** with the temp. measured by detector B4, and calculates the load value for Preheating **Qpre** according to deviation detected.

19.2 Swimming pool windows dew point temperature control

M2.4
Use detector B4
DEWPOINT

The controller calculates the dew point temp. **T°dp** according to the following:

– Condensation curve calculated on the basis of room temp.(**t°r**) and room humidity (**h%a**) actual values



– Minimum value M0.11 Dewpoint T. Minimum : 10.0c M0.12

– Manual adjustment in Dewpoint T. Calc. :16.0c±0.0 if appliable

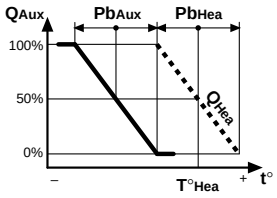
M0.10
Dehumidification Compensat.:±0.0

The controller compares dew point temp. **T°dp** with the temp. measured by detector B4, and calculates the reduction of the value requested for Dehumidification **H%Dehu** according to deviation detected.

20. SPECIAL CONTROL

20.1 Auxiliary heater battery unit control

M2.7.9.11
Y..-Win: AUX.HEA.
Y..-Sum: AUX.HEA.

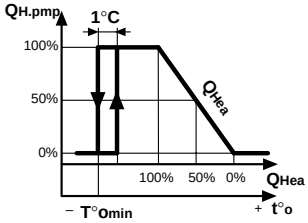


If the system includes an auxiliary heater battery unit to supplement the Heating load, one of the outputs Y1, Y2 or Y3 can be assigned the AUX. HEA. function.
Load **Qaux** cascades from load **Qhea.**

20.2 Heat pump control

M2.7.9
Y..-Win:HT.P.HEA
Y..-Sum:COOLING

M1.19
Minim.Outside T.
Heat Pump : --c

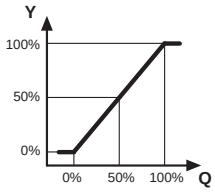


If the Air Handling Unit is composed of a direct-exchange, one of the outputs Y1 or Y2 can be assigned the HT.P.HEA. winter function.

Load **QH.pmp** replicates load **Qhea** exactly, the only difference being that when outside temp. drops below the value **T°omin**, load **QH.pmp** is cancelled.

21.OUTPUTS Y1, Y2, Y3

Outputs **Y1**, **Y2** and **Y3** can be configured as:

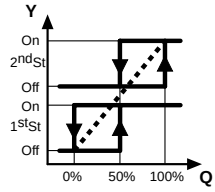


- Y.. - MODULATING = modulating control for 3-wire valves or 3-wire signal converters into 0...10 V – or step controllers.

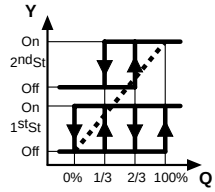
M2.6.8.10

```
Y.. - MODULATING
Run time    :120s
```

2 STAGES = 2-stage On-Off control (1 ; 1+2) for solenoid valves, pumps, humidifiers, burners, refrigerators, 2 equal-load electric batteries, etc.



3 STAGES = 2-stage On-Off control (1 ; 2; 1+2) for 2 unequal-load electric batteries.



- Stroke time: xxx *s* = valve actuator stroke time. It only appears if control is MODULATING.

Each output can be assigned a different action (load). E.g.: Y1: Heating.
If Season Switching is enabled in **M2.2** a different action can be assigned for each season.
E.g.: Y1 – Win: Heating; Y1 – Sum: Cooling.

M2.7

```
Y1: HEATING
```

```
Y1-Win: HEATING
Y1-Sum: HEATING
```

- Y1 - .....: PREHEAT. = Preheating
  HEATING = Heating
  AUX. HEAT = Heating through auxiliary battery
  HT.P.HEA. = Heating through heat pump
  COOLING = Cooling
  COOL+DEHU = Cooling and dehumidification
  OFF = Not used in current season

M2.9

```
Y2: COOLING
```

```
Y2-Win: COOLING
Y2-Sum: COOLING
```

- Y2 - .....: PREHEAT. = Preheating
  HEATING = Heating
  AUX HEAT = Heating through auxiliary battery
  HT.P.HEA. = Heating through heat pump
  COOLING = Cooling
  COOL+DEHU = Cooling and dehumidification
  OFF = Not used in current season

M2.11

```
Y3: HUMIDIF.
```

```
Y3-Win: HUMIDIF.
Y3-Sum: OFF
```

- Y3 - .....: HUMIDIF. = Humidification
  HEATING = Heating
  AUX HEAT = Cooling and dehumidification
  OFF = Not used in current season

If M2.3

```
Output 8-9-10
CONTROL SEASON
```

output 5-6-7 can be used for 1-stage On-Off humidification control, and output 8-9-10 for *Season Control.*

22. OUTPUT Ys

Output **Ys** with 0...10V– control signal can be used for:

- AIR DAMPER TEMP. = Temp. comparison air damper control
  AIR DAMPER ENTHALPY = Enthalpic comparison air damper control .
  HUMIDIFICATION = 0...10 V– vapor humidifier control.
  DEHUMIDIFICATION = Air damper control for room dehumidification (swimming pool)
  RECUPERATOR = Heat recuperator control

22.1 Air damper control through temperature comparison

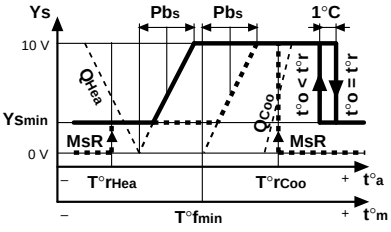
M2.1

```
Detector Layout
– 2 3 – – – – –
```

M2.12

```
Ys-Control:
DAMP. TEMPERATURE
```

Whenever actual outside temperature t°r exceeds the target T°rHea value, the controller starts the progressive opening of outside air through the PI feature.
Whenever actual outside temperature t°r exceeds the target T°rCoo value, and outside temperature t°o exceeds actual room temperature t°r, the controller shuts outside air through the On-Off control.



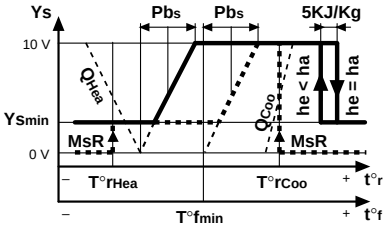
22.2 Air damper control through enthalpic comparison

M2.1: Detectors Layout – 2 3 – – 6 7 –

M2.5: Use detector B7 OUTSIDE HUMIDITY

M2.12: Ys-Control : DAMP. ENTALPHY

Whenever actual outside temperature t°r exceeds the target T°rHea value, the controller starts the progressive opening of outside air through the PI feature.
Whenever actual outside temperature t°r exceeds the target T°rCoo value, and outside enthalpy t°o exceeds actual room enthalpy t°r, the controller shuts outside air through the On-Off control.

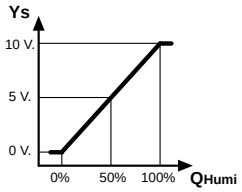


22.3 0…10 V– vapor humidifier control

M2.1: Detectors Layout – – – – – 6 – –

M2.12: Ys-Control : HUMIDIFICATION

The controller transforms the Humidification load signal **QHumi** into the **Ys** output 0...10V- signal to control vapor humidifiers.

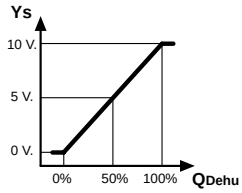


22.4 Air damper control for room dehumidification (swimming pools)

M2.1: Detectors Layout – – – – – 6 – –

M2.12: Ys-Control : DEHUMIDIFICATION

The controller transforms the Dehumidification load signal **QDehu** into the **Ys** output 0...10V– signal to control air dampers and use outside air to dehumidify the room.



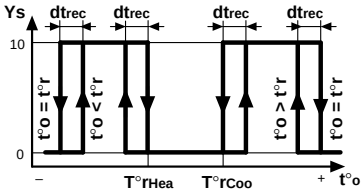
22.5 Heat recuperator control

M2.1: Detectors Layout – 2 3 – – – – –

M2.12: Ys-Control : RECUPERATOR

The recuperator is off (Ys signal = 0 V–) when:
– The outside temperature value t°o is comprised between T°rhea and T°rCoo.

The recuperator is on (Ys signal = 10 V-) when:
– The outside temperature value t°o is lower than actual room temperature T°r and lower than the target T°rHea value.
– The outside temperature value t°o is higher than actual room temperature T°r and higher than the target T°rCoo value.



A signal converter is required to transform the 0...10V– signal into an On-Off control.

22.6 Minimum flow temperature limit

In the cases shown:

M2.12: Ys-Control : DAMP. TEMPERATURE

M2.12: Ys-Control : DAMP. ENTALPHY

When actual flow temperature t°f drops below the minimum flow value **T°fmin** the controller shuts outside air with a modulating action.

M1.4: Heating. Flow Min:18c Max:50c

22.7 Minimum outside air

In the cases shown:

M2.12: Ys-Control : DAMP. TEMPERATURE

M2.12: Ys-Control : DAMP. ENTALPHY

M2.12: Ys-Control : DEHUMIDIFICATION

M1.15: Ys-Outside air Minimum : *xxx*%

The minimum amount of outside air required to ensure air circulation can be controlled in two different ways:
– directly through the controller display, or
– using a minimum air positioner **Rs** directly connected to the air damper actuator.

22.8 Rapid function

In the cases shown:

M2.12: Ys-Control : DAMP. TEMPERATURE

M2.12: Ys-Control : DAMP. ENTALPHY

M2.12: Ys-Control : DEHUMIDIFICATION

M1.16: Ys-RapidFunction Start : YES

If the Rapid Function is enabled, when the controller is switched on (E1-D or E2-D closed) the air dampers remain shut 0% until room temp. returns within the T°rHea and T°rCoo target value range.

Rapid Function deletes the value M1.15: Ys-Outside air Minimum : xxx% mabut not the setting for the minimum positioner **Rs.**

23. SEASON SWITCHING

M2.3
Output 8-9-10
CONTROL SEASON

The controller switches the action of outputs **Y1**, **Y2**, **Y3** it also switches the position of the season control **Ysc** depending on selection:

- Season switching : NO ;
  WINTER ;
  SUMMER ;
  HROUGH ss CONTROL;
  AUTOM. BASED ON OUTSIDE TEMP.
  AUTOM. BASED ON SEASON;

M2.2
Season Switching
NO

- Without season switching :
  – the action of outputs **Y1**, **Y2**, **Y3** are according to setting in

M2.7.9.11
Y.. - :XXXXXXXX

  – output D-E1 can be used for Remote Control On – Off:
  with D-E1 closed: outputs **Y1**, **Y2**, **Y3** and **Ys** controlling
  with D-E1 open: outputs **Y1**, **Y2**, **Y3** and **Ys** closing

M2.2
Season Switching
WINTER

- Manual season switching through display:

M2.7.9.11
Y.. -Win :XXXXXXXX
Y.. - Sum:

  Winter : –the action of outputs **Y1**, **Y2**, **Y3** are according to setting in
  – season control **Ycs** is on *Winter* : 10-9 = closed ; 10-8 = open.

M2.2
Season Switching
SUMMER

M2.7.9.11
Y.. -Win :
Y.. - Sum:XXXXXXXX

  Summer :– the action of outputs **Y1**, **Y2**, **Y3** are according to setting in
  – season control **Ysc** is on *Summer:* 10-9 = closed; 10-8 = open.

M2.2
Season Switching
FR. CONTROLS ss

- Season switching according to position of *season switch* **ss** (D-E1-E2).
  – with D-E1 closed and D-E2 open: action of outputs **Y1**, **Y2**, **Y3** and season control **Ysc** in *Winter*
  – with D-E1 open and D-E2 closed: action of outputs **Y1**, **Y2**, **Y3** and season control **Ysc** in *Summer*

M2.2
Season Switching
FR. OUTSIDE T.

- Automatic season switching according to outside temp. (only if B2 is connected).

M1.17
OutWinter T.:20c
Delay : 24hrs

  When outside temp. remains lower than
  For a period exceeding
  The controller switches the action of outputs **Y1, Y2, Y3** and season control **Ysc** to *Winter*

M1.18
OutWinter T.:25c
Delay : 4hrs

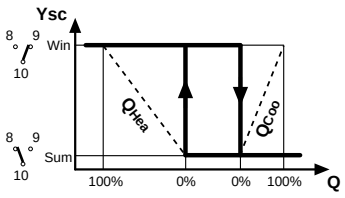
  When outside temp. remains lower than
  For a period exceeding
  The controller switches the action of outputs **Y1, Y2, Y3** and season control **Ysc** to *Summer*

M2.2
Season Switching
FR. ROOM T.

- Automatic season switching according to room temp. (only if B3 is connected).

  When *Heating* load value **Qhea** is higher than 0% and the *Cooling* load value **Qcoo** is 0%, the season control **Ysc** switches to *Winter.*

  When *Heating* load value **Qhea** is 0% and the *Cooling* load value **Qcoo** is higher than 0%, the season control **Ysc** switches to *Summer.*



23.1 Season control

M2.3
Output 8-9-10
CONTROL SEASON

If output 8-9-10 is not to be used for **Y3** modulating or 2nd stage control, it can be used as *Season Control,* which replicates the *season Switching* position.

  – Winter : 10-8 = open ; 10-9 = closed.
  – Summer : 10-8 = closed ; 10-9 = open.

24. COMPLEMENTARY FUNCTIONS

24.1 Password

M2.17

```
Password choice
      ----
```

Password selection and enabling. The command disables the use of keys + and –, so that data cannot be modified. Enter the number (1900... 1999) using the + and – keys. To delete password press + and – simultaneously until the dashes reappear.

```
Access Keynumber
      ----
```

If the + or – key is pressed when the password is enabled, the display will show a request to enter the password. The + and – keys can only be used after entering the proper password. If no key is pressed in the next 15 minutes, the password will be automatically re-enabled.

24.2 Site name

M2.18

```
Site Name
  ----------
```

Site name as it appears on the first display page.
Each dash can be replaced with a letter (A...Z) or a number (0...9), using the + and – keys. The → key is used to position the cursor.

24.3 Display of values and operating data

The controller displays all values measured by the detectors as well as all data that help understand the system's operating status:

M0.1

```
Site----------
Rt:20.0c  H%:50%
```

- Actual room temperature – Rt (if **B3** is connected) or flow temperature – Ft (if only **B1** is connected).
- Actual humidity (if **B6** is connected)

M0.13

```
Calculated Flow
Heating T.:22.0c
```

- Calculated flow temperature based on Heating setting (if **B3** and **B1** are connected).

M0.14

```
Calculated Flow
Cooling T.:35.0c
```

- Calculated flow temperature based on Cooling setting (if **B3** and **B1** are connected).

M0.15

```
Actual Flow
Temperat.: 20.0c
```

- Actual temperature measured by detector **B3** (only if **B3** and **B1** are connected).

M0.16

```
OutsideT.:– 2.0c
FlowHumidit: 50%
```

- Actual outside temperature *(*only if **B2** is connected).
- Actual outside humidity (only if **B7** is connected and **M2.5** reads OUTSIDE HUMIDITY)
  actual flow humidity (only if **B7** is connected and **M2.5** reads FLOW HUM. LIMIT).

M0.17

```
Room h:   65Kj/Kg
Out  h:   65Kj/Kg
```

- Actual room and outside enthalpy (only if **B2, B3, B6** and **B7** are connected and **M2.12** reads DAMP ENTHALPY)

M0.18

```
Des.Prheat:15.0c
Act.Prheat:15.0c
```

- Preheating *desired and actual* temperature, only if **B4** is connected and

M2.4

```
Use Detector  B4
PREHEATING
```

```
Des.Dewpnt:15.0c
Des.Dewpnt:15.0c
```

- Dew point *desired and actual* temperature, only if **B4** is connected and

```
Use Detector  B4
DEWPOINT
```

M0.19

```
Y1-HEATING :100%
Y2-COOLING :100%
```

- Output Y1 load value: Preheat. or Heat. or AuxHea. or Ht.P.Hea. or Cool. or Cool+Dehu
- Output Y2 load value: Preheat. or Heat. or AuxHea. or Ht.P.Hea. or Cool. or Cool+Dehu

M0.20

```
Y3-HUMIDIF.:100%
Ys-DAMP.TEM:100%
```

- Output Y3 load value: Humid. or Heat. or AuxHea.
- Output Ys load value: DampTemp. or Damp.Ent. or Humid. or Dehumid. or Recuper.

24.4 Data recording

Every hour and with every mode change the controller stores a set of data indicating operating status:

– Current date and time, type of recording (new hour or mode change)
– Current mode: On or Off; current season: Winter or Summer.
– Controller desired and calculated values
– Values measured by the detectors connected
– Outputs Y1, Y2, Y3, Ys load value.

The controller is able to store 32 complete recordings, and the latest recording causes the oldest to be deleted. If the display is not on page 1, the controller will perform the new hour recordings, but not the mode change recordings, as it assumes that changes are being made on adjustment data.

Recordings can only be viewed from the Telemanagement computer.

25. ALARMS

The controller processes two types of alarms:
– alarms related to functional irregularities affecting the controller (LED 6.9) and the controlled systems (LED 6.8)
– alarms related to short and open detector circuits (LED 6.8)

Alarms are signaled by LEDs located on the controller's front panel and by the word ALARM appearing on the display when the alarm is transmitted to the PC. On the display page alarms are identified by a letter "A" flashing alternately to the number corresponding to the relevant alarm.

Alarms can be transmitted to a local and/or a central telemanagement computer through the C-Bus connection.

25.1 Functional alarms

M2.15

```
Alarm Functions
–  – –  –  8
```

Functional alarms occur when there is a continuing deviation between actual and desired measures. These alarms do not affect the controller's proper operation.
Non pregiudicano il regolare funzionamento del regolatore
By default" all alarms are disabled except clock alarm (8)
Use the + and – keys to enable desired alarms, entering numbers in place of the dashes.
Number flashing = the alarm is on
Alarm limit values and delays can only be changed via computer.

Types and reasons of alarms:
1 = *flow* temperature difference (if only B1 is connected)
– for actual temp. lower than **T°fHea** when Y..: Heating
or higher than **T°fCoo** when Y..: Cooling
3 = *room* temperature difference (if B3 is connected)
– for actual temp. lower than **T°rHea** when Y..: Heating
or higher than **T°rCoo** when Y..: Cooling
4 = *preheating or dew point* temperature difference (if B4 is connected)
– for actual temp. lower than desired value
6 = *humidity* difference (B6)
– for actual humidity lower than **H%Humi** when Y..: Humidification
or higher than **H%Hehu** when Y..: Dehumidification
8 = internal clock *cannot be disabled*
– when the clock assumes inconsistent values

25.2 Detector alarms

M2.16

```
Alarms Detector
– – – –
```

Detector alarms occur when there is a **short circuit** or **open circuit** affecting the connected detectors.
The effect of alarm situations is delayed by one minute.
"By default" all alarms are disabled.
Use the + and – keys to enable desired alarms, entering numbers in place of the dashes.

Types and effects of alarms:
1 = *flow* temp. detector (B1): valve stops where it is
2 = *outside* temp. detector (B2): valve stops where it is
3 = *room* temp. detector (B3): valve stops where it is
4 = *preheating* temp. detector (B4): valve stops where it is
dew point detector (B4): action cancelled

26. SYSTEM STARTUP TEST

The test must be carried out once installation is completed and the wiring and configuration have been executed and checked.

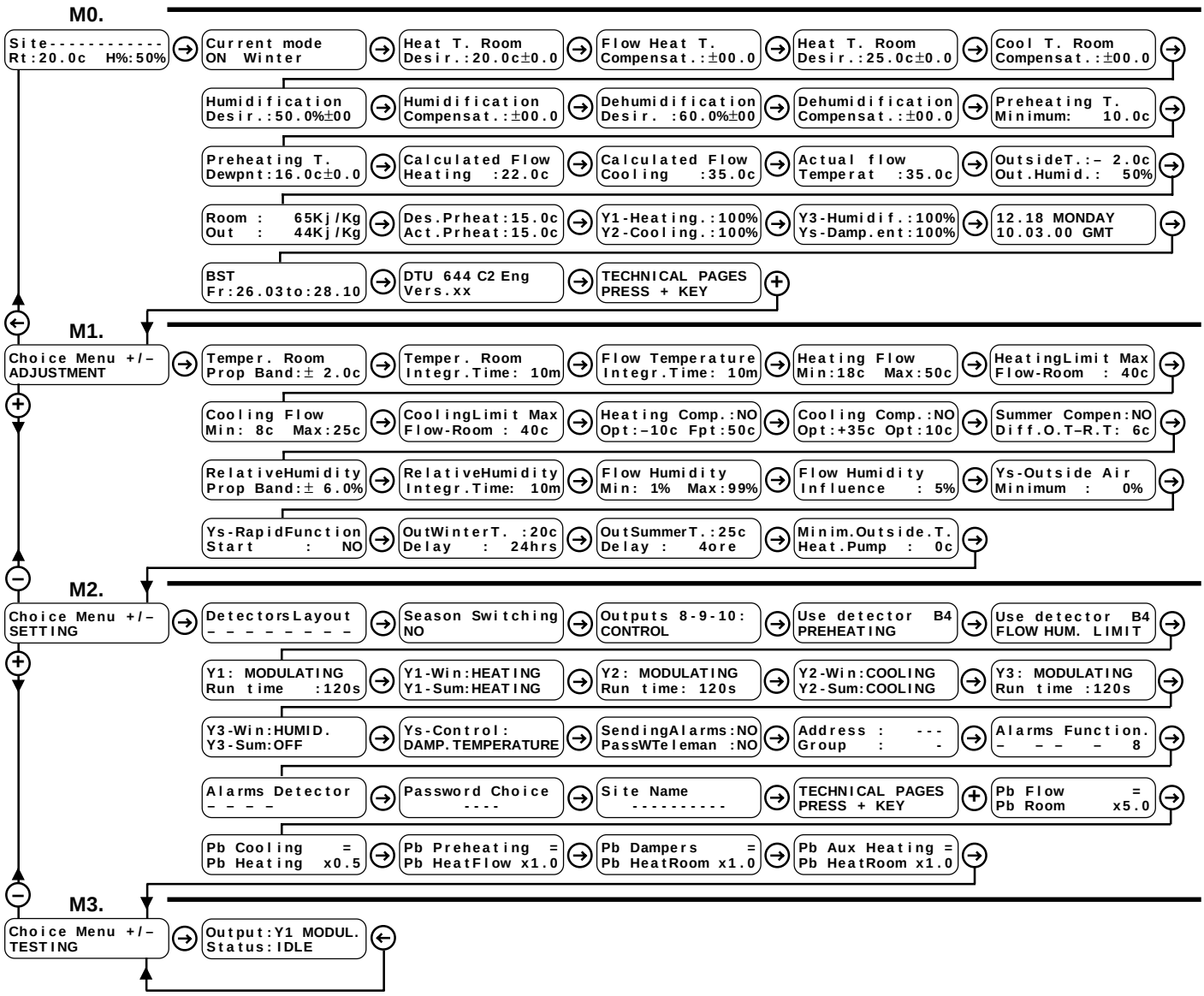
M3.1

```
Output:Y1 MODUL.
Status:IDLE
```

Using the + and – keys, select:
• output to be tested:
– *Y1 MODUL.* or *Y1 2 STADGES* or *Y1 3 STADGES* : depending on **M2.6** setting .
– *Y2 MODUL.* or *Y2 2 STADGES* or *Y2 3 STADGES* : depending on **M2.8** setting .
– *Y3 MODUL.* or *Y3 2 STADGES* or *Y3 3 STADGES* : depending on **M2.10**, setting, or *Y3 ON-OFF* : if in **M2.3** setting is SEASON CONTROL
– *Ycs* ; appears if **M2.3** setting is SEASON CONTROL
– *Ys* ;
• status :
– with Y...MODUL. : *STOPS; OPENS; CLOSES*
– with Y.. 2 STAGES*: ON 1; ON 1+2; OFF*
– with Y.. 3 STAGES*: ON 1; ON 2; ON 1+2; OFF*
– with Y3 ON-OFF : *ON* ; *OFF*.
– with Ycs : *WINTER; SUMMER*
– with Ys : *0 VOLT* ; *5 VOLT* ; *10 VOLT*.

Check results.

27. SEQUENCE OF DISPLAY PAGES (data and functions as stored at delivery)



⊖ ⊕ Use these keys to scroll pages on the display and to position the cursor ▮ on modifiable data in the pages.

In the list of display pages below, modifiable data are highlighted as shown:

Pressing these keys simultaneously, or in any case after 15 minutes, the display goes back to page 1

Site----------
Rt:20.0c H%:50%

⊖ ⊕ Use these keys to:

– modify values indicated by the cursor ▮

– view a given function's configuration options, e.g.:

Use detector B4
PREHEATING

or

Use detector B4
DEWPOINT

– pass directly from one menu (block of pages) to another

M0. NORMAL USE

Ref.	Display	Descriprtion	Notes	Sect.
M0.1	Site---------- Rt:20.0c H%:50%	Site name Actual temperature and humidity	Set in **M2.18** Rt : if **B3** or **B1** and **B3** are connected Ft : only if **B1** is connected H% : if **B6** is connected	24.3
M0.2	Current mode : ON Winter	Current mode: : –ON ; OFF. – ON Winter ; OFF Winter – ON Summer ; OFF Summer.	Mode is determined by Season Switching(**M2.2**) and output D-E1-E2	16.5
M0.3	Heat.T. Room Desir.:20.0c±0.0	Required heating temperature and adjustment through set point adjuster Ht° (only if configured)	Displayed if **B3** or **B1** and **B3** are connected	16.1
	Heat.T. Flow Desir.:20.0c±0.0		Displayed if only **B1**is connected	
M0.4	Flow Heat. T. Compensat.:±00.0	Compensation of heating flow temperature as calculated by the controller	Displayed if **B1** and **B2** re connected, and **B3** is not connected	17.
M0.5	Cool T. Room Desir.:25.0c±0.0	Required cooling temperature and adjustment through set point adjuster Ht° (only if configured)	Displayed if **B3** or **B1** and **B3** are connected	16.1
	Cool T. Flow Desir.:25.0c±0.0		Displayed if only **B1**is connected	
M0.6	Cool T. Room Compensat.:±00.0	Compensation of cooling temperature as calculated by the controller	Displayed if **B2** and **B3** or **B1**, **B2** and **B3** are connected	17.
	Cool T. Flow Compensat.:±00.0		Displayed if **B2** with **B1**only is connected	
M0.7	Humidification Desir.:50.0%±0.0	Required humidifying temperature and adjustment through set point adjuster Ht° (only if configured)	Displayed if **B6** is connected	18.
M0.8	Humidification Compensat.:±00	Compensation of dehumidification as calculated by the controller	Displayed if **B6** e **B7** Are connected, and if **M2.5** setting is FLOW HUM. LIMIT	18.1
M0.9	Dehumidification Desir.:60.0%±0.0	Required dehumidification value and adjustment through set point adjuster R% (only if configured)	Displayed if **B6** is connected	18.
M0.10	Dehumidification Compensat.:±00	Compensation of dehumidification as calculated by the controller	Displayed if **B4** and **B6** are connected, and if **M2.4** setting is DEWPOINT	19.2
M0.11	Preheating T. Minimum: 10.0c	Minimum Preheating or Dew Point temperature	Displayed if **B4** is connected, and if **M2.4** setting is PREHEATING	19.1.2
	Dewpoint T. Minimum: 10.0c		Displayed if **B4** is connected, and if **M2.4** setting is DEWPOINT	
M0.12	Preheating T. Calc. :16.0c±0.0	Preheating or Dew Point temperature calculated temp. Manual adjustment of calculated value	Displayed if **B4** is connected, and if **M2.4** setting is PREHEATING	19.1.2
	Dewpoint T. Calc. :16.0c±0.0		Displayed if **B4** is connected, and if **M2.4** setting is DEWPOINT	
M0.13	Calculated Flow Heating T.:22.0c	Calculated flow temperature based on Heating control	Displayed if **B1** and **B3** are connected	24.3
M0.14	Calculated Flow Cooling : 35.0c	Calculated flow temperature based on Cooling control	Displayed if **B1** and **B3** are connected	24.3
M0.15	Actual Flow Temperat : 22.0c	Actual flow temp. as measured by B1	Displayed if **B1** and **B3** are connected	24.3
M0.16	OutsideT.:– 2.0c Out.Humid.: 50%	Actual outside temp. Actual outside humidityt	Outside t.: Displayed if **B2** Outside h.: Displayed if **B7** is connected, and if **M2.5** setting is OUTSIDE HUMIDITY	24.3
	OutsideT.:– 2.0c FlowHumidit: 50%		Flow humid.: Displayed if **B7** is connected, and if **M2.5** setting is FLOW HUM. LIMIT	
M0.17	hamb.: 65Kj/Kg hest.: 44Kj/Kg	Actual room enthalpy. Actual outside enthalpy.	Displayed if **B2**, **B3**, **B6** are connected, and **B7** and if **M2.12** setting is DAMP.ENTHALPY	24.3
M0.18	Des.Prheat:15.0c Act.Prheat:15.0c	Preheating or Dew Point Des .= calculated temp. + adjustment Act. = temp. measured by detector B4.	Displayed if **B4** is connected, and if **M2.4** setting is PREHEATING. Displayed if **B4** is connected, and if **M2.4** setting is DEW POINT	24.3
	Des.Dewpnt:15.0c Act.Dewpnt:15.0c			
M0.19	Y1-Heating :100% Y2-Cooling :100%	Value of load assigned to output Y1 Value of load assigned to output Y2	Y1 - Y2 : PREHEAT; HEATING; AUXHEAT; HEATPUMP; COOLING;	24.3
M0.20	Y3-Humidif.:100% Ys-Damp.Tem:100%	Value of load assigned to output Y3 Value of load assigned to output Ys	Y3 : HUMIDIF; HEATING; AUXHEAT; Ys : DAMP.TEM.; DAMP.ENT.; HUMIDIF.; DEHUMID.; RECUPER	24.3
M0.21	12.18 MONDAY 10.03.00 GMT	Setting: time of day, day of week and date Current time: GMT, BST	For data recording only. Dates for BST (daylight saving time) to be set in **M0.21**	
M0.22	Summer Time Fr:26.03to:28.10	BST (daylight saving time) start and end dates	For data recording only.	
M0.23	DTU 644 C2 Eng. Vers.xx	Identifying data of controller		

M1. ADJUSTMENT

Ref.	Display	Description	Notes	Sect.
M1.1	Temper. Room Prop Band:± 2.0c	Heating proportional band in ± °C. If **B3** or **B1** and **B3** are connected	Based on this value the controller derives other functions' proportional bands using the multipliers set in the EQUIPMENT CONFIGURATION menu	16.2
	Temper. Flow Prop Band:±10.0c	If only **B1** is connected		
M1.2	Temper. Room Integr.Time: 10m	Heating and cooling integral time, in minutes	Displayed if **B3** or **B1** and **B3** are connected	16.2
	Temper. Flow Integr.Time: 10m		Displayed if only **B1**is connected	
M1.3	Flow Temperature Integr.Time: 10m	Heating and cooling flow temperature integral time.	Displayed if **B1** and **B3** are connected	16.2
M1.4	Heating Flow Min:18c Max:50c	Heating flow temp. limits Field of room heating Pb.	Displayed if **B1** and **B3** are connected	16.4
M1.5	HeatingLimit Max Flow - Room: 40c	Flow temp. max. limit based on difference between calculated flow temp. and actual room temp., to prevent air stratification	Displayed if **B1** and **B3** are connected	16.4
M1.6	Cooling Flow Min: 8c Max:25c	Cooling flow temp. limits Field of room cooling Pb.	Displayed if **B1** and **B3** are connected	16.4
M1.7	CoolingLimit Max Room - Flow: 40c	Flow temp. min. limit based on difference between calculated flow temp. and actual room temp., to prevent air condensation	Displayed if **B1** and **B3** are connected	16.4
M1.8	Heating Comp.:NO Opt:–10c Fpt:50c	Climatic variation of winter flow temp. Opt = Outside project temp. Fpt = flow project temp.	Displayed if **B1** and **B2** are connected, and **B3** is not connected	17.1
M1.9	Cooling Coom.:NO Opt:+35c Fpt:10c	Climatic variation of summer flow temp. Opt = Outside project temp. Fpt = flow project temp.	Displayed if **B1** and **B2** are connected, and **B3** is not connected	17.1
M1.10	Summer Compen:NO Diff.O.T-R.T: 6c	Summer compensation : *NO* ; *YES.* Differ.. O.T – R.T. = maximum allowed difference between summer outside temp. and desired temp., above which desired temp. is increased by 1°C for each °C increase in outside temp.	Displayed if **B2** and **B3** or **B1**, **B2** and **B3** are connected	17.2
M1.11	RelativeHumidity PropBand:± 6.0%	Humidification and dehumidification proportional band, in %	Displayed if **B6**is connected	18.
M1.12	RelativeHumidity Integr.Time: 10m	Humidification, dehumidification and dew point integral time, in min.	Displayed if **B6**is connected	18.
M1.13	Flow Humidity Min: 1% Max:99%	Flow humidity limits	Displayed if **B7** is connected, and if **M2.5** setting is FLOW HUM. LIMIT	18.1
M1.14	Flow Humidity Influence : 5%	Flow humidity limit influence on desired humidification value	Displayed if**B7** is connected, and if **M2.5** setting is FLOW HUM. LIMIT	18.1
M1.15	Ys-Outside Air Minimum : 0%	Outside air damper opening minimum percentage	Displayed only if **M2.12** setting is DAMP.TEMPERATURE or DAMP ENTHALPY or DEHUMIDIFICATION	22.6
M1.16	Ys-RapidFunction Start : NO	Close outside air during system startup rapid function: *YES; NO*	Displayed only if **M2.12** setting is DAMP.TEMPERATURE or DAMP ENTHALPY or DEHUMIDIFICATION	22.7
M1.17	OutWinter T.:20c Delay : 24hrs	Outside temp. for winter switching. Period during which outside temp. must remain higher than the set value before switching to Summer	Displayed only if **M2.2** setting is FR.OUTSIDE T.	23.
M1.18	OutSummer T.:25c Delay : 4ore	Outside temp. for heat pump switch-off Period during which outside temp. must remain higher than the set value before switching to Summer	Displayed only **M2.2** setting is FR.OUTSIDE T.	23.
M1.19	Minim.Outside.T. Heat. Pump :+ 0c	Outside temp. for heat pump switch-off HEATPUMP function	Displayed only if output Y1 o Y2 has been assigned	20.2

M2. EQUIPMENT CONFIGURAION

Ref.	Display	Description	Notes	Sect.
M2.1	Detectors Layout – – – – – – – –	Configuration of connected detectors (outputs B-M) – = detector not connected; number = detector connected. Default config.: no detectors connected	1 : Flow temp. detector B1 2 : Outside temp. detector B2 3 : Room or extract air temp. detector B3 4 : Preheating or dew point temp. detector B4 5 : Temperature set point adjuster t°R 6 : Room humidity detector B6 7 : Outside humidity or flow limit detector B7 8 : Humidity set point adjuster HR	15.
M2.2	Season switching NO	Season switching: NO; WINTER; SUMMER; FR CONTROL ss; FR OUTSIDE T.; FR ROOM T.	.	23.
M2.3	Output 8-9-10: CONTROL	Use of output 8-9-10 : CONTROL: used for control output Y3 SEASON: used to switch the system's season operation	Not displayed if **M2.2** setting is NO; in this case the output is automatically used for Y3 control	18. 23.1
M2.4	Use detector B4 PREHEATING	Use of detector B4 : PREHEATING; DEW POINT	Displayed if **B4** is connected	19.
M2.5	Use detector B7 OUTSIDE HUMIDITY	Use of detector B7 : OUTSIDE HUMIDITY; FLOW HUM.LIMIT	Displayed if **B7** is connected	18.1 22.2
M2.6	Y1:MODULATING Run Time :120s	Output Y1 : MODULATING; 2 STAGES; 3 STAGES; Actuator stroke time in seconds	Stroke time: displayed only if MODULATING	21.
M2.7	Y1:HEATING	Output Y1 action. Displayed if **M2.2** setting is NO	Select action : PREHEAT; HEATING; AUXHEAT; HEATPUMP; COOLING; COOL+DHU; OFF	21.
	Y1-Win:HEATING Y1-Sum:HEATING	Action of output Y1 in season switching Displayed if **M2.2** setting is not NO		
M2.8	Y2:MODULATING Run Time :120s	Output Y2 : MODULATING; 2 STAGES; 3 STAGES; Actuator stroke time in seconds	Stroke time: displayed only if MODULATING	21.
M2.9	Y2:COOLING	Output Y2 action. Displayed if **M2.2** setting is NO	Select action PREHEAT; HEATING; AUXHEAT; HEATPUMP; COOLING; COOL+DHU; OFF	21.
	Y2-Win:COOLING Y2-Sum:COOLING	Action of output Y2 in season switching Displayed if **M2.2** setting is not NO		
M2.10	Y3:MODULATING Tempo Corsa:120s	Output Y3 : MODULATING; 2 STAGES; 3 STAGES; Actuator stroke time in seconds	Displayed only if **M2.3** setting is CONTROL Stroke time: displayed only if MODULATING	21.
M2.11	Y3:HUMIDIF.	Output Y3 action. Displayed if **M2.2** setting is NO	Select action if **M2.3** setting is CONTROL: HUMIDIF; HEATING; AUXHEAT; OFF if **M2.3** setting is SEASON: HUMIDIF; OFF	21.
	Y3-Win:HUMIDIF. Y3-Sum:OFF	Action of output Y3 in season switching Displayed if **M2.2** setting is not NO		
M2.12	Ys-Control: DAMP.TEMPERATURE	Select Ys action: DAMP.TEM.; DAMP.ENT.; HUMIDIF.; DEHUMID.; RECUPER	DAMP.ENT displayed only if **M2.5** is OUTSIDE HUMIDITY	22.
M2.13	SendingAlarms:NO PassWTeleman :NO	Alarm transmission enabled. Telemanagement password enabled	Required only if connected through C-Bus.	10.4
M2.14	Address : --- Group : –	Equipment Web address Equipment group	Required only if connected through C-Bus	10.3
M2.15	FunctionalAlarms – – – – 8	Functional alarms enabled. Default config.: Only alarm enabled (cannot be disabled)	1 : flow temperature difference **B1** 3 : room temperature difference **B3** 4 : preheating or dew point temperature difference **B4** 6 : humidity difference **B6**. 8 : internal clock alarm	25.1
M2.16	Alarms Detector – – – –	Detector alarms enabled. Default config.: all disabled	1 : flow temp. detector **B1** malfunction 2 : outside temp. detector **B2**outside temp. detector 3 : room temp. detector **B3** malfunction 4 : preheating or dew point detector **B4** malfunction.	25.2
M2.17	Password choice ----	Select password to disable + and – keys: *1901 ... 1999*	To delete key press + and – simultaneously	24.1
M2.18	Site Name ----------	Set site name	Use + and – to enter letters or numbers Use ← and → to change positions	24.2

M2. EQUIPMENT CONFIGURAION

Ref.	Display	Description	Notes	Sect.
	TECHNICAL DATA PRESS + KEY			
M2.19	Pb Flow = Pb Room x5.0	Multiplier to obtain Pbs of flow temp. from room Pbs.	Displayed if **B1** and **B3** are connected	16.2
M2.20	Pb Cooling = Pb Heating x0.5	Multiplier to obtain Pbs of cooling temp. from heating Pbs.	Displayed if either output has been assigned the function COOLING or COOL+DHU	16.2
M2.21	Pb Preheating = Pb HeatFlow x1.0	Multiplier to obtain Pb of Preheating temp. from heating flow Pb.	Displayed if **B4** is connected, and if **M2.4** setting is PREHEATING	16.2
	Pb Rugiada Vet.= Pb HeatRoom x1.0	Multiplier to obtain Pb of Dew Point temp. from room heating Pb.	Displayed if **B4** is connected, and if **M2.4** setting is DEWPOINT	
M2.22	Pb Dampers = Pb HeatRoom x1.0	Multiplier to obtain Pb of Air Damper Control from room heating Pb.	Displayed if **B2** and **B3** are connected, and if **M2.12** setting is DAMP.TEMPERATUREor DAMP.ENTHALPY	16.2
	dt Recuperator = Pb HeatRoom x1.0	Multiplier to obtain Pb of recuperator Control from room heating Pb.	Displayed if **B2** and **B3** are connected, and if **M2.12** setting is RECUPERATOR	
M2.23	Pb Aux Heating = Pb Amb. Ris x1.0	Multiplier to obtain Pb of Auxiliary Heating Control from room heating Pb	Displayed if one of the outputs has been assigned the function AUXHEAT and only **B3** is connected .	16.2
	Pb Aux Heating = Pb HeatFlow x1.0	Multiplier to obtain Pb of Auxiliary Heating Control from flow heating Pb	Displayed if one of the outputs has been assigned the function AUXHEAT and **B1** or **B1** and **B3** are connected .	

M3. TESTING

Ref.	Display	Description	Notes	Sect.
M3.1	Output: Y1 MODUL. Status: IDLE	Select outputs to be tested Select output status	Output selection: *Y1 MODUL.* or *Y1 2 STAGES* or *Y1 3 STAGES*; *Y2 MODUL.* or *Y2 2 STAGES* or *Y2 3 STAGES*; *Y3 MODUL.* or *Y3 2 STAGES* or *Y3 3 STAGES*; *Ycs* ; *Ys* ; Status selection: With Y.. MODUL. : *IDLE* ; *CLOSE* ; *OPEN*. With Y.. 2 STAGES : *ON 1* ; *ON 1+2* ; *OFF*. With Y.. 3 STAGES : *ON 1* ; *ON 2* ; *ON 1+2* ; *OFF*. With Ycs : *WINTER*; *SUMMER*. With Ys : *0 VOLT* ; *5 VOLT* ; *10 VOLT*	26.

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