

# TEMPERATURE & HUMIDITY CONTROLLER FOR TWO-BATTERY AIR-HANDLING UNIT

OPTIONAL

**C ← BUS**

## XTU 644 C1 Eng.



- **Control of temperature & relative humidity in air handling units**
- **Power supply 24 V~; DIN rail mounting**
- **Communication systems :**

– **C-Bus : XTU 644** can be enabled for Telemangement using the **C-Bus Plug-in type ACB 460 C1 or later** (to be ordered separately).

### 1. APPLICATION

XTU 644 is designed for temperature and humidity control in air-handling units comprising:

- 2 batteries hot/refrigerated water or steam with 3-wire modulating control
  - or electric with On-Off control in 1 or 2 or 3 stages
  - or direct expansion with On-Off control in 1 or 2 stages
- 1 adiabatic humidification unit with On-Off control
  - or vapour humidifying unit with 3-wire modulating control or On-Off in 1 or 2 stages
  - or vapour humidifying with 0...10 V- control (as alternative to control dampers)
- 1 air-mixing unit with 0...10V– damper actuators
  - or 1 heat regenerator with 0...10V– control or On-Off (CSV 328 convertor) control.

By means of C-Bus connection XTU 644 can be connected to a Telemangement system.

### 2. FEATURES

The main features of XTU 644 are :

- Three 3-wire modulating outputs, or On-Off in two stages (2 equal loads) or in three stages (2 unequal loads), configurable for :
  - control of room temperature (heating and cooling) with optional summer outside compensation, minimum & maximum supply air limits to prevent cold air currents and hot air stratification and condensation in the air ducts.
  - control of supply air temperature (heating and cooling) with optional winter and summer compensation.
  - control pre-heating temperature at variable value according to room temperature and humidity.
  - control of room relative humidity for humidifying (any supply air limits as alternative to enthalpic comparison) and dehumidifying.
- One 0...10 V– progressive output configurable for :
  - control of air mixing according to temperature or according to enthalpic comparison with minimum limit outside air.
  - control of outside air for room dehumidifying with compensation of dew-point temperature and with minimum limit opening to outside air.
  - On-Off control of heat recuperator according to comparison room - outside temperatures
  - control vapour humidifier by 0...10 V– control.
- Manual or automatic switching of the controller functions.
- Remote adjustment of temperature & humidity set points.
- Alarms for short or open sensor circuits and for abnormal functioning of site and controllers.
- Pre-wired for C-Bus: transmission of data to and from local PCs or remote Telemangement PC.

**For data transmission and Telemangement use C-Bus Plug-in type ACB 460 C1 or later**  
**To communicate locally with a PC use test Plug-in type ACX 332**

### 3. ACCESSORIES

No.	Description	Model	Range	Sensor t°	Code	Data s.
1	Temp. sensor supply air – air duct	<b>STA 010</b>	0...60 °C	NTC 10 kΩ	B1	N 150
1	Temp. sensor outside air – air duct	<b>STA 001</b>	–30...+40 °C	NTC 1 kΩ	B2	N 150
	or wall	<b>SAE 001</b>	–30...+40 °C	NTC 1 kΩ	B2	N 120
1	Temp. sensor extract air – air duct	<b>STA 010</b>	0...40 °C	NTC 10 kΩ	B3	N 150
	or room	<b>SAB 010</b>	0...40 °C	NTC 10 kΩ	B3	N 111
1	Temp. sensor pre-heating – air duct	<b>STA 010</b>	0...40 °C	NTC 10 kΩ	B4	N 150
	or dew point	<b>STV 010</b>	0...40 °C	NTC 10 kΩ	B4	N 160
1	Relative Humidity & room temp. sensor	<b>SAU 914</b>	0...40 °C ; 10...90 %	NTC 10 kΩ	B3-B6	N 227
	or Relative Humidity air duct	<b>SUR 704</b>	10...90 %	–	B6-B7	N 221
	or RH air duct (swimming pools)	<b>SUT 714</b>	10...90 %	–	B6-B7	N 222
1	Convertor 0...10 V– to On-Off in 2 stages	<b>CSV 328</b>	–	–	U1	D 652
1	Convertitor from modulating to 0...10 V –	<b>CSC 328</b>	–	–	U2	D 653
1	Temperature set-point adjuster	<b>CDB 100</b>	–	–	Rt°	–
1	Relative Humidity set-point adjuster	<b>CDB 200</b>	–	–	RH	–
1	Minimum distance outside air positioner	<b>PCS 104</b>	–	–	Rs	–
	<b>Accessories for telegemangement</b>					
1	Plug-in for communication via C-Bus	<b>ACB 460 C1</b>	–	–	–	–

#### 4. TECHNICAL DATA (default values in bold type)

##### • Electrical

Power supply	24 V ~ ± 10%
Frequency	50 ... 60 Hz
Consumption	5 VA
Protection	IP40
Radio disturbances	VDE0875/0871
Vibration test	with 2g (DIN 40 046)
Voltage-free output contacts:	
maximum switched voltage	250 V ~
maximum switched current	5 (1) A
Construction standards	Italian Electrotech. Committee (CEI)
Data storage in memory	5 years
Software	Class A

##### • Mechanical

Enclosure	DIN 6E module
Installation	on DIN 35 rail
Materials:	
base	NYLON
cover	ABS
Ambient temperature:	
operating	0 ... 45 °C
storage	- 25 ... + 60 °C
Ambient humidity	Class F DIN 40040
Dimensions	105 x 115 x 71.5
Weight	0.6 kg

##### • Setting ranges

Heating & cooling temperatures:	
desired room (B3 or B1+B3)	0... <b>20 (25)</b> ...40 °C
desired supply air (B1)	0... <b>20 (25)</b> ...60 °C
minimum limit supply air (B1+B3)	1... <b>18 (8)</b> ...60 °C
maximum limit supply air (B1+B3)	1... <b>50 (25)</b> ...60 °C
supply air limit heat. – room (B1+B3)	0... <b>40</b> °C
room limit – cooling supply air (B1+B3)	0... <b>40</b> °C
design outside (B1+B2)	-30...- <b>10 (35)</b> ...40 °C
design supply air (B1+B2)	1... <b>50 (10)</b> ...60 °C
summer compensation To-Tr (B2+B3)	0... <b>6</b> ...20 °C
Pre-heating or dew point temperature (B4) :	
minimum limit	0... <b>10</b> ...40 °C
adjustment	- 9,5... <b>0</b> ...+9,5 °C
Heat pump minimum outside temperature	- <b>30</b> ... <b>0</b> ...40 °C
Proportional Band temperatures (base value) :	
room heating. (B3 or B1+B3)	1... <b>2</b> ...40 °C
supply air – heating (B1)	1... <b>10</b> ...40 °C
Multipliers Proportional Band - various temperatures :	
heating supply air (B1+B3)	PB room x 0.5... <b>5</b> ...20
cooling temperatures	PB heat x <b>0.5</b> ...20
pre-heating (B4)	PB supply air x 0.5... <b>1</b> ...20
dew point (B4)	PB room heat.. x 0.5... <b>1</b> ...20

dampers (B2+B3)	PB room heat.. x 0.5... <b>1</b> ...20
aux. heating (B3)	PB room heat.. x 0.5... <b>1</b> ...20
aux. heating (B1 o B1+B3)	PB room heat. x 0.5... <b>1...20</b>
Temp. Integral Time	0... <b>10</b> ...255 min.
Relative humidity room or supply air:	
humidification	0... <b>50</b> ...99 %
dehumidification	0... <b>60</b> ...99 %
Proportional Band – humidity	0,5... <b>6</b> ...40 %
Integral Time – humidity	0... <b>10</b> ...255 min.
Supply air humidity limits :	
minimum	<b>1</b> ...99 %
maximum	<b>1</b> ... <b>99</b> %
authority	1... <b>5</b> ...30 %
Control outputs Y1, Y2, Y3 :	<b>– modulating</b>
	– 2 stages
	– 3 stages
Control Ys output	0...10 V-
Valve run time (modulating)	30... <b>120</b> ...630 s
Season switching :	– manual from display
	– by outside control
	– automatic by outside temp
	– automatic by room temp
Outside temperatures for season switching :	
winter	0... <b>20</b> ...40 °C
summer	0... <b>25</b> ...40 °C
Delay season switching by outside temp. :	
winter	1... <b>24</b> ...60 h
summer	1... <b>4</b> ...60 h

##### • Alarm settings

Telemangement (setting from PC):	
attempts alarm calls	1... <b>5</b> ...255
interval between alarm calls	2... <b>10</b> ...255 m
Alarms (settings from PC) :	
threshold diff. temp. supply air (B1)	1... <b>5</b> ...99 °C
delay diff. temp. supply air	2... <b>30</b> ...255 min
threshold diff. room temperature (B3)	0,5... <b>1</b> ...30 °C
delay diff. temp. room	2... <b>30</b> ...255 min
threshold diff. temp. pre-heat./dew point(B4)	1... <b>5</b> ...99 °C
delay diff. temp. pre-heat./dew point (B4)	2... <b>5</b> ...255 min
threshold diff. humidity (B6)	0,5... <b>10</b> ...90 %
delay diff. humidity	2... <b>30</b> ...255 min

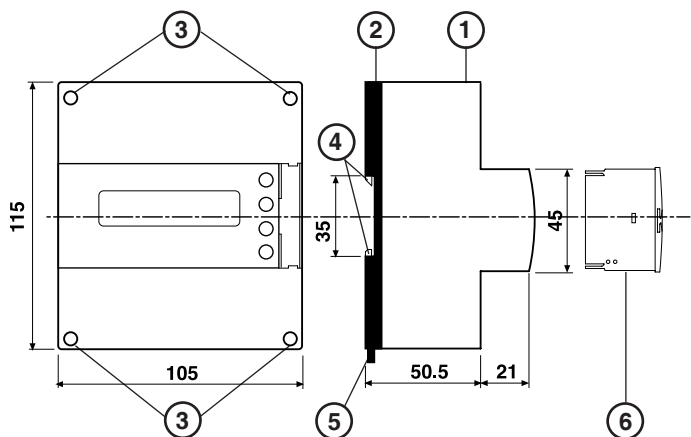
##### • Telemangement

Speed C-Bus chosen from	1200, 2400, 4800, 9600 bauds
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##### Warning :

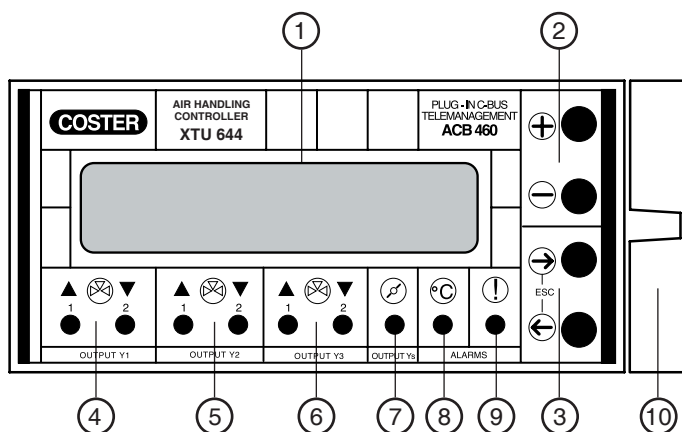
In the presence of electrical disturbances the output controls of XTU 644 may change status but they will automatically return to normal.

#### 5. OVERALL DIMENSIONS



- 1 – Protective cover for electronic components
- 2 – Base with transformer, relay and terminal boards
- 3 – Screws for securing cover to base
- 4 – DIN rail securing elements
- 5 – DIN rail release lever
- 6 – Plug-in for C-Bus communication

#### 6. FACIA



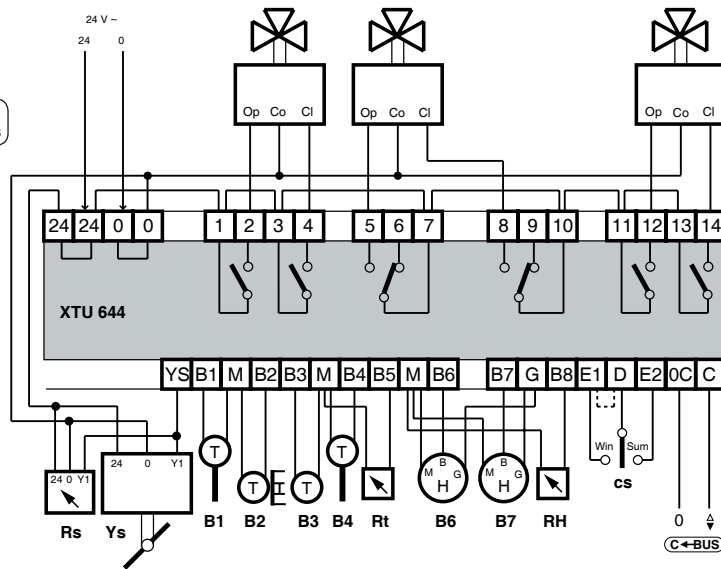
- 1 - Alphanumeric display
- 2 - + and - keys
- 3 - ← and → keys
- 4 - LEDs output Y1
- 5 - LEDs output Y2
- 6 - LEDs output Y3
- 7 - LED output Ys
- 8 - LED measurements alarm
- 9 - LED microprocessor fault
- 10-Plug-in type ACB 460 C1 for C-Bus communication

**7. WIRING DIAGRAMS**

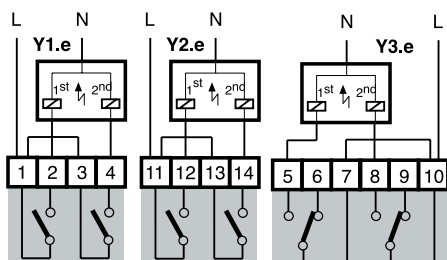
**7.1 Control 3-wire modulating valves**

- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor
- B3 – Room or extract air temp. sensor
- B4 – Pre-heating or dew-point temp. sensor
- B6 – Room humidity or extract or supply air sensor
- B7 – External humidity (enthalpy) sensor or supply air limit sensor
- cs – Season switch (remove jumper D-E1)
- Win = Winter, Sum = Summer.
- Y1-2-3 – 3-wire modulating controls
- Ys – 0...10 V- control dampers or recuperator or vapour humidifier
- Rt° – Temperature set-point adjuster
- RH – Relative Humidity adjuster
- Rs – Remote positioner for minimum outside air
- C-Bus – Data transmission by Telemangement (C-Bus is enabled using Plug-in type ACB 460 C1)

M2.6.8.10  
Y...: MODULATING  
Run time : x x x s



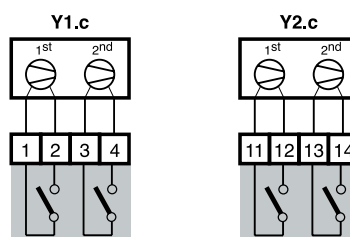
**7.2 Control electric batteries or electric humidifiers**



2 equal loads  
M2.6.8.10  
Y...: 2 STAGES

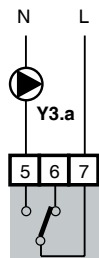
2 unequal loads  
M2.6.8.10  
Y...: 3 STAGES

**7.3 Control direct-expansion batteries**



M2.6.8.10  
Y...: 2 STAGES

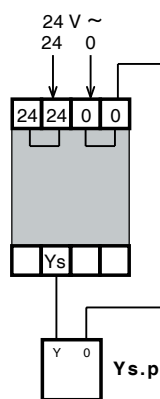
**7.4 On-Off control of adiabatic humidifiers**



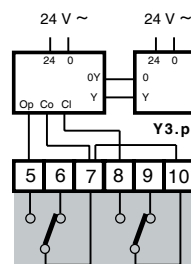
M2.10  
Y3: 2 STAGES

- Y1-2.c – Direct-expansion batteries (refrigerators or heat pumps)
- Y1-2.e – Electric batteries
- Y3.a – Adiabatic humidifier (pump or electromagnetic valve)
- Y3.e – Electric battery or electric vapour humidifier
- Y3.p – Ys.p – Vapour humidifier with 0...10 V- control
- U2 – Convertor modulating signal to 0...10 V-

**7.5 Control of vapour humidifiers (0...10 V-)**



M2.12  
Ys-Control: HUMIDIFICATION

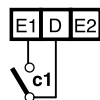


M2.10  
Y3: MODULATING  
Run time : x x x s

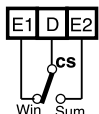
**7.6 Use of inputs D-E1-E2 - Examples**



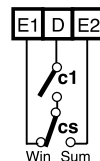
Always On (factory setting)  
Season switching (M2.2) can be :  
No ; Winter; Summer; Based Outside T ;  
Based Room T; Based Seasons.



c1 closed = On; c1 open = Off  
Season switching (M2.2) can be :  
No ; Winter; Summer; Based Outside T ;  
Based Room T; Based Seasons.



cs Win = Winter On  
cs Sum = Summer On  
Season switch (M2.2) must be :  
By cs control



cs Win & c1 closed = Winter On  
cs Sum & c1 closed = Summer On  
c1 open - Off  
Season switch (M2.2) must be :  
By cs control

cs – Season switching control (manual or centralized) or by controller (type XTU 644) with season switch.

c1 – On-Off switch by programming timer or by manual control or by fan remote switch.

## 8. ELECTRICAL CONNECTIONS

Proceed as follows :

- Separate base and cover
- Mount base on DIN rail and check that securing elements (5.4) hold it firmly in place.
- Carry out wiring according to the diagram and in observance of the relevant regulations in force, and using cables of :
  - 1.5 mm<sup>2</sup> for power and relay control outputs
  - 1 mm<sup>2</sup> for sensors and remote control
  - 1 mm<sup>2</sup> for C-Bus and C-Ring. For wire length limits please see technical data sheets T 021 and T 022
- Reposition the cover on the base / terminal block and fasten with the 4 screws supplied (5.3).
- Check that voltage is correct and supplied by the dedicated auxiliary line, measuring it upstream of the protection (circuit breaker, fuse....).
- Power up the device.

You are advised not to insert more than two cables in a single terminal of the controller and if necessary to use external junction boxes.

## 9. SITING

### 9.1 Controllor

The controller must be sited in a dry environment which meets the relevant conditions given under 4. TECHNICAL DATA , If installed in a location classified as “Hazardous” it must be installed in a cabinet for electrical equipment constructed according to the regulations in force for the class of danger concerned.

The controller can be mounted on a DIN rail and housed in a standard DIN enclosure..

### 9.2 Supply air temperature sensor B1

STA 001: Must be installed downstream of the supply air fan.

### 9.3 Outside temperature sensor B2

STA 001 : Can be used on sites with constant emission of outside air. It must be installed upstream of the outside air dampers near to the air inlet.

SAE 001 : It must be used on sites where the intake of outside air is not constant. It must be installed outside the building on the north or north-west side, at a height of at least three metres from the ground, protected from direct sunlight and as far as possible from windows, doors, fireplaces and other direct thermal influences.

### 9.4 Room temperature or extract air sensor B3 or room temperature & humidity sensor B3 + B6

Room SAB 010 or SAU 914 : Must be installed at a point in the room which represents the average temperature and/or humidity of a representative space (e.g. living room), at a height of 1.5 ... 1.6 metres from the floor, on an internal wall and as far as possible from windows, doors and sources of heat, and corners, shelving and curtains must be avoided.

Extract air STA 010 : This must be installed upstream of the extract air fan

### 9.5 Air duct humidity sensor B6

Extract air SUR 704 or SUT 714: Must be installed upstream of extract air fan.

Supply air SUR 012 or SUR 051: Must be installed downstream of supply air fan.

### 9.6 Pre-heating or dew point temperature sensor B4

Pre-heating STA 010: Must be installed downstream of humidifier unit, and preferably downstream of droplet separator.

Dew-point STV 010: Must be installed in contact with the glass most exposed to north.

### 9.7 Outside humidity sensor for air duct or for limit supply air B7

External SUR 704: Must be installed upstream of the outside air dampers near to the air intake.

Supply air limit SUR 704 or SUR 714: must be installed downstream of supply air fan.

**10. COMMUNICATION**

**10.1 C-Bus communication for Telemangement** (for detailed information see Tech. Data Sheet T 021)

XTU 644 provides :

- Telemangement by means of **C-Bus Plug-in type ACB 460 C1**
- local communication (e.g. setting via PC) using **Test Plug ACX 232**

Telemangement is bidirectional, using one of more local PCs and/or from a remote central computer via public telephone network.

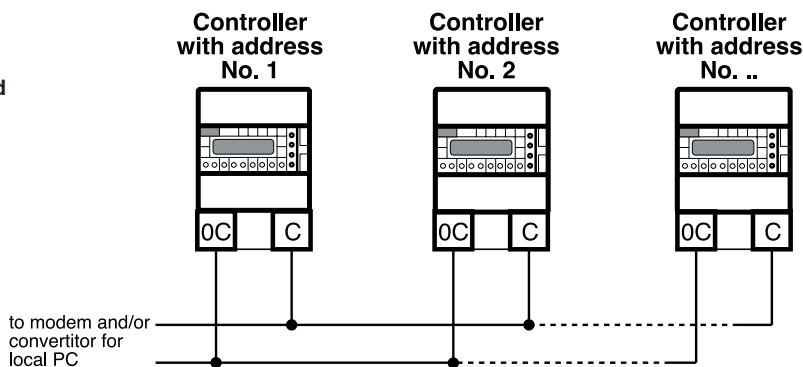
Local communication is via a portable PC connected directly to XTU 644.

From the PC or PCs you can do the following :

- see and/or adjust the data and values set on the display pages of the controller and configuration data dedicated exclusively to Telemangement (see 4. TECHNICAL DATA)
- see the operational status of the site components (pumps, auxiliaries in general)
- receive alarms coming from the site
- read the sensor measurements (temperatures: outside, supply air, boiler, etc)

**10.2 C-Bus wiring for local or remote Telemangement**

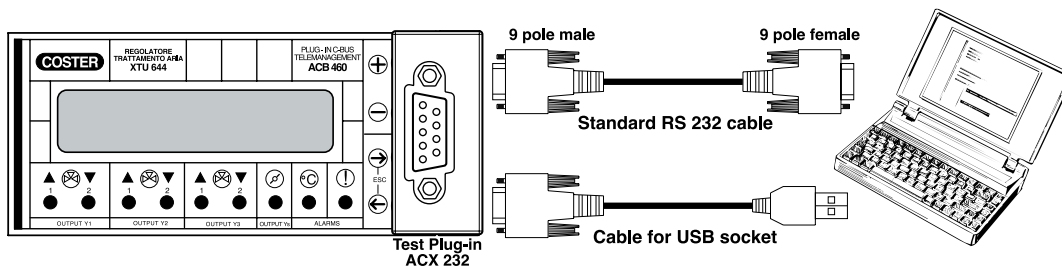
Each controller must be fitted with the C-Bus Plug-in of the correct type



**10.3 Connection to PC for local communication via test Plug-in ACX 232**

Extract the C-Bus Plug-in and insert the test Plug-in ACX 232; use a standard cable to connect the RS232 plug to the PC (the cables are included in the "HANDY KIT").

If the PC has only USB inputs use a standard RS232 to USB conversion cable.



**ACCESSORIES :**

- Test Plug in = **ACX 232**
- Handy kit = **KIT RS 232**

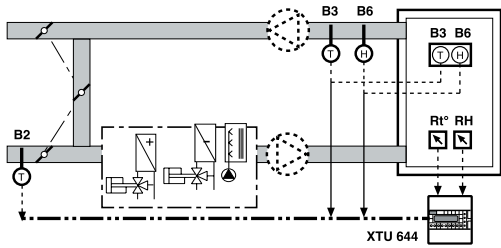
The "Handy kit" contains the 2 cables & other useful accessories..

**Observation :** - Before communicating, ensure that the address entered in the controller is the address you wish to communicate with via PC..

- It is advisable to use a battery-powered portable PC with the connection to 230 volts unplugged, since the earth (0 volts) of the controller is connected to that of the RS 232 and so to that of the PC. By connecting the two earths together there could be dispersal of currents, if the earths have not been well made and if the PC has its 0 volt connected directly to the central pole of the plug (as is usual).
- The transmission speed can be adjusted (1200, 2400, 4800, 9600 bps). A speed suitable for all the devices connected in C-Bus must be chosen.

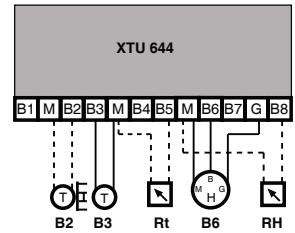
**11. EXAMPLES OF TEMPERATURE & HUMIDITY CONTROL**

**11.1 Control of room temperature & humidity**

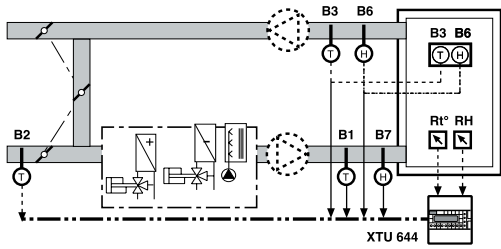


B2 – Outside temp. sensor (only for compensation)  
 B3 – Room or extract air temp. sensor  
 B6 – Room or extract air humidity sensor  
 Rt° – Temperature set-point adjuster (optional)  
 RH – Humidity set-point adjuster (optional)

M2.1  
 Config sensors  
 - 2 3 - 5 6 - 8

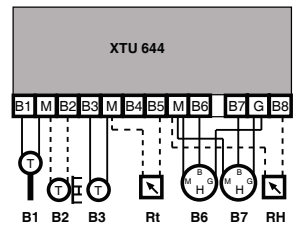


**11.2 Control of room temperature & humidity with limits supply air temperature & humidity**

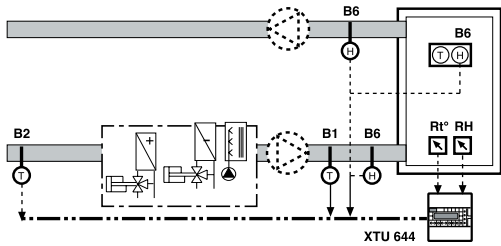


B1 – Supply air temp. sensor  
 B2 – Outside temp. sensor (only for compensations)  
 B3 – Room or extract air temp. sensor  
 B6 – Room or extract air humidity sensor  
 B7 – Supply air humidity sensor (as alternative to outside)  
 Rt° – Temperature set-point adjuster (optional)  
 RH – Humidity set-point adjuster (optional)

M2.1  
 Config sensors  
 1 2 3 - 5 6 7 8

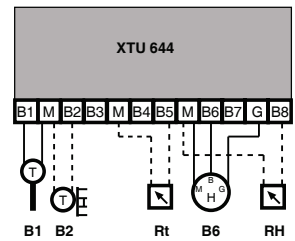


**11.3 Control of supply air temperature & room or supply air humidity**



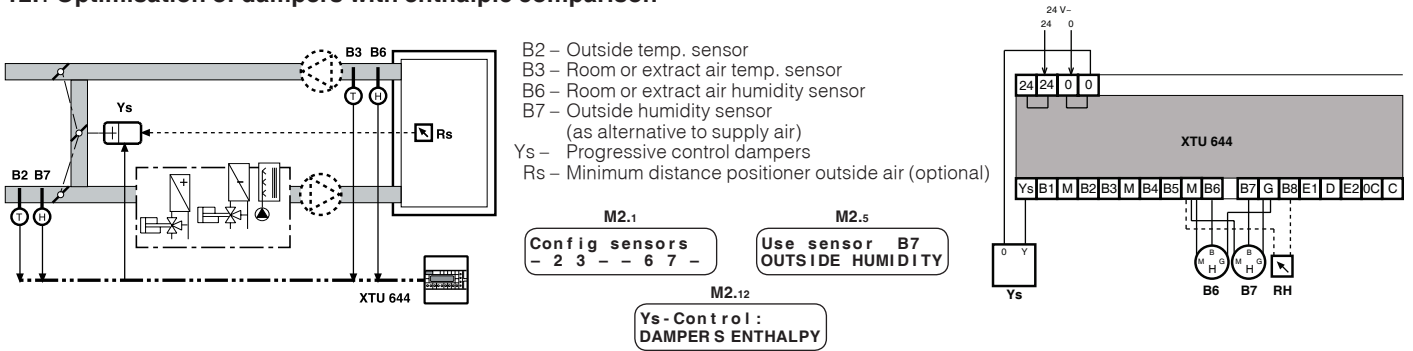
B1 – Supply air temp. sensor  
 B2 – Outside temp. sensor (only for compensations)  
 B6 – Sensor for humidity of supply air, room or extract air  
 Rt° – Temperature set-point adjuster (optional)  
 RH – Humidity set-point adjuster (optional)

M2.1  
 Config sensors  
 1 2 - - 5 6 - 8

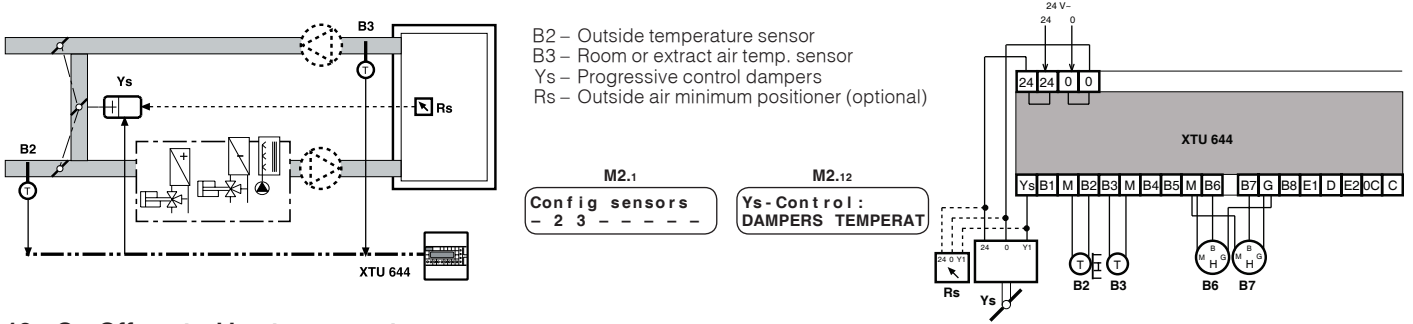


**12. EXAMPLES OF USE OF Ys OUTPUT**

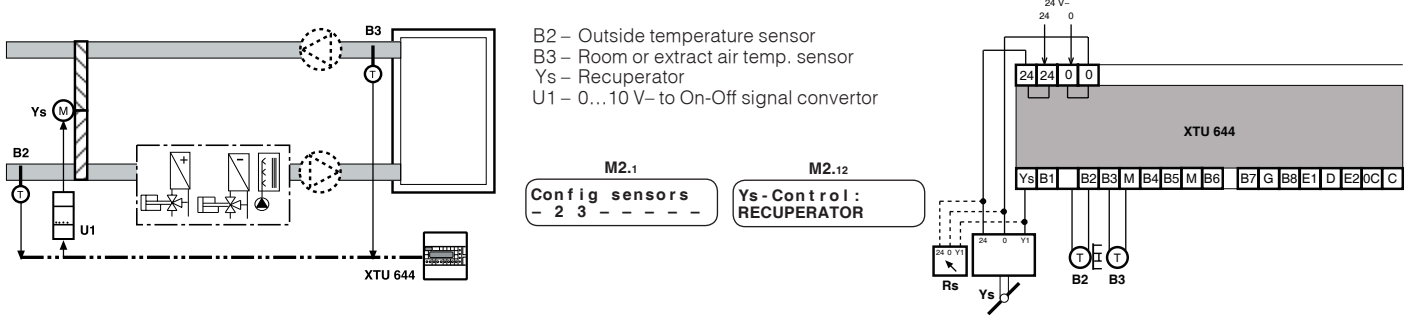
**12.1 Optimisation of dampers with enthalpic comparison**



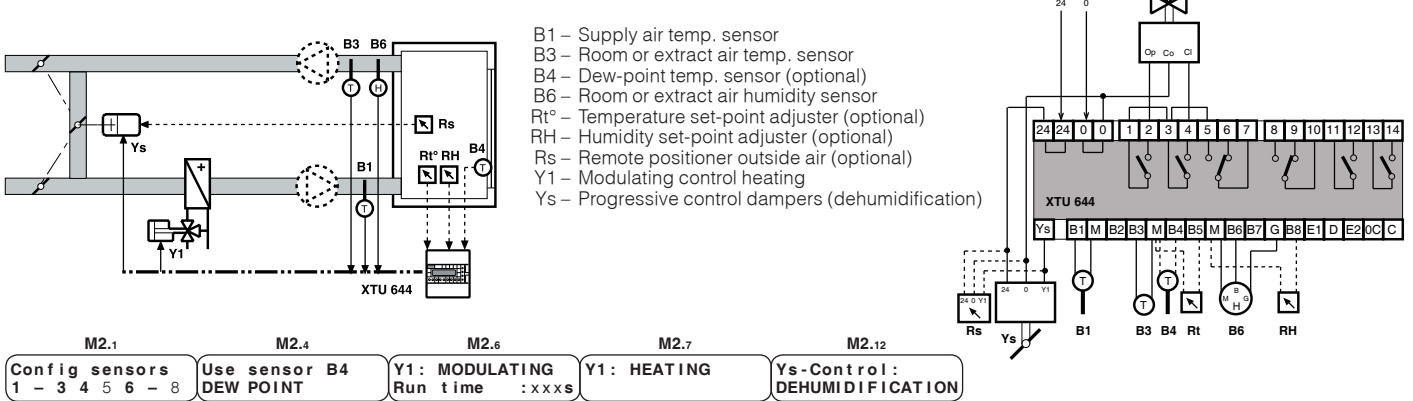
**12.2 Optimisation dampers according to temperature**



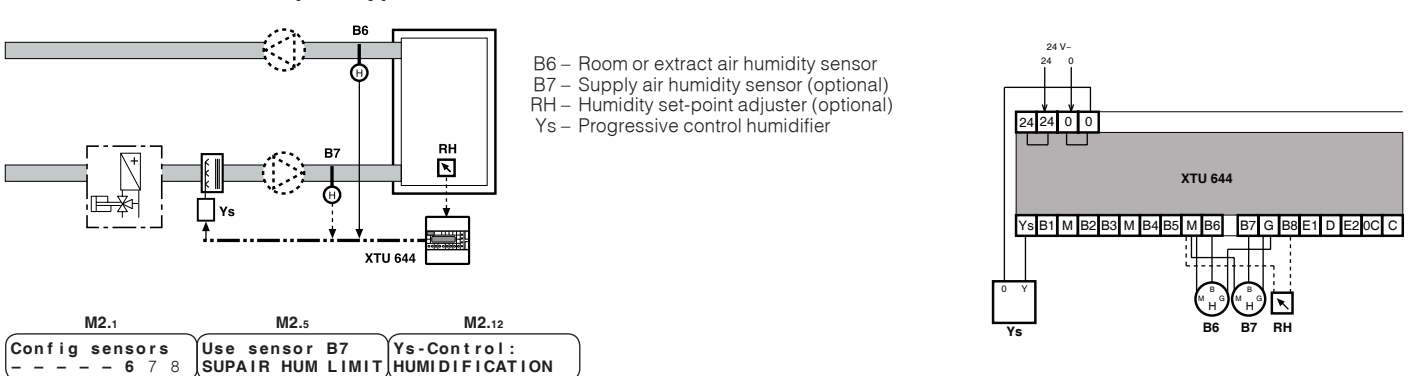
**12.3 On-Off control heat recuperator**



**12.4 – Control outside air for room dehumidification (swimming pools) with control dew-point (optional) – 1 modulating heating battery**

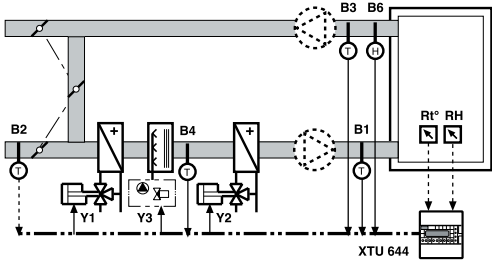


**12.5 – 0...10 V- control vapour-type humidification unit**

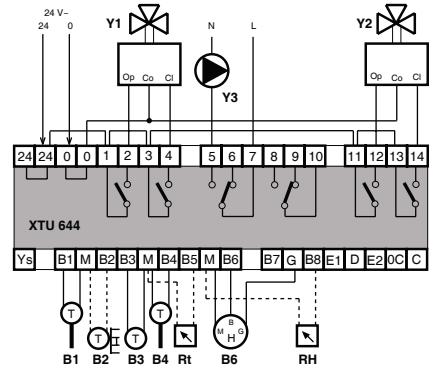


**13. EXAMPLES OF USE OUTPUTS Y1, Y2, Y3**

**13.1 – 1 pre-heating modulating battery  
– 1 post-heating modulating battery  
– 1 On-Off humidification unit**

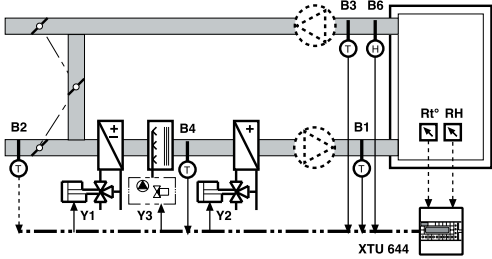


- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B4 – Pre-heating temp. sensor
- B6 – Room or extract air humidity sensor
- Rt° – Temperature set-point adjuster (optional)
- RH – Humidity set-point adjuster (optional)
- Y1 – Modulating control pre-heating
- Y2 – Modulating control post-heating
- Y3 – On-Off control humidifier

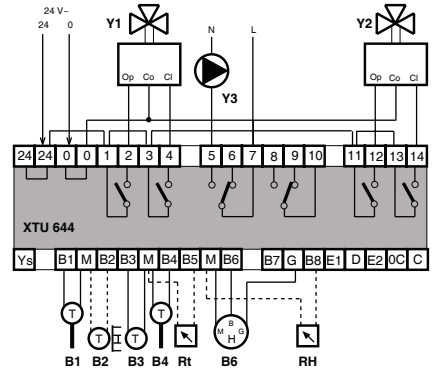


M2.1 Config sensor 1 2 3 4 5 6 - 8		M2.2 Season Switching NO		M2.4 Use sensor B4 PREHEATING	
M2.6 Y1: MODULATING Run time : xxxs		M2.7 Y1: PREHEATING		M2.8 Y2: MODULATING Run time : xxxs	
M2.9 Y2: HEATING		M2.10 Y3: 2 STAGES		M2.11 Y3: HUMIDIF	

**13.2 – 1 winter pre-heating, summer cooling/dehumidifying modulating battery  
– 1 post-heating modulating battery  
– 1 On-Off humidifying unit**

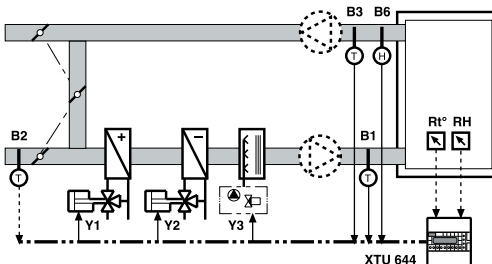


- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B4 – Pre-heating temp. sensor
- B6 – Room or extract air humidity sensor
- Rt° – Temperature set-point adjuster (optional)
- RH – Humidity set-point adjuster (optional)
- Y1 – Modulating control winter pre-heating & summer cooling/dehumidifying
- Y2 – Post-heating modulating control
- Y3 – On-Off control humidifier

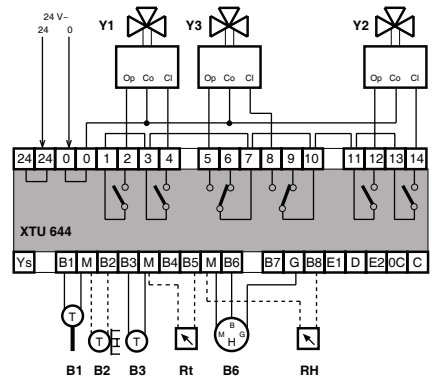


M2.1 Config sensor 1 2 3 4 5 6 - 8		M2.2 Season Switching XXXXXXXXXX		M2.4 Use sensor B4 PREHEATING	
M2.6 Y1: MODULATING Run time : xxxs		M2.7 Y1-Win: PREHEAT Y1-Sum: COOL+DHU		M2.8 Y2: MODULATING Run time : xxxs	
M2.9 Y2-Win: HEATING Y2-Sum: HEATING		M2.10 Y3: 2 STAGES		M2.11 Y3-Win: HUMID Y3-Sum: OFF	

**13.3 – 1 Modulating heating battery  
– 1 Modulating cooling battery  
– 1 Modulating humidifying unit**



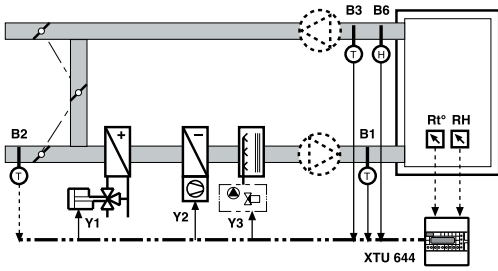
- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B6 – Room or extract air humidity sensor
- Rt° – Temperature set-point adjuster (optional)
- RH – Humidity set-point adjuster (optional)
- Y1 – Modulating control heating
- Y2 – Modulating control cooling
- Y3 – Modulating control humidifier



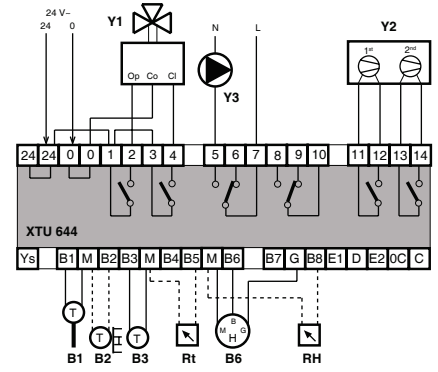
M2.1 Config sensor 1 2 3 - 5 6 - 8		M2.2 Season Switching NO		M2.3 Output 8-9-10: CONTROL	
M2.6 Y1: MODULATING Run time : xxxs		M2.7 Y1: HEATING		M2.8 Y2: MODULATING Run time : xxxs	
M2.9 Y2: COOLING		M2.10 Y3: MODULATING Run time : xxxs		M2.11 Y3: HUMID	



**13.4 – 1 Modulating heating battery**  
 – 1 On-Off direct-expansion cooling battery  
 – 1 On-Off humidifying unit

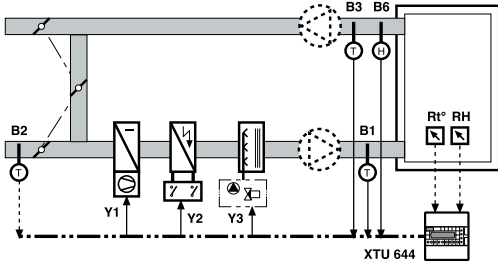


- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B6 – Room or extract air humidity sensor
- Rt – Temperature set-point adjuster (optional)
- RH – Humidity set-point adjuster (optional)
- Y1 – Modulating control heating
- Y2 – On-Off control cooling
- Y3 – On-Off control humidifier

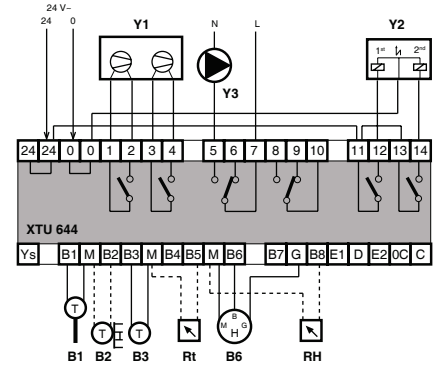


M2.1		M2.2		M2.6		M2.7		M2.8		M2.9		M2.10		M2.11	
Config sensors 1 2 3 - 5 6 - 8		Season Switching NO		Y1: MODULATING Run time :xxxs		Y1:HEATING		Y2: 2 STAGES		Y2:COOLING		Y3: 2 STAGES		Y3 : HUMID	

**13.5 – 1 summer cooling/dehumidifying direct expansion On-Off battery**  
 – 1 On-Off heating battery  
 – 1 On-Off humidifying unit

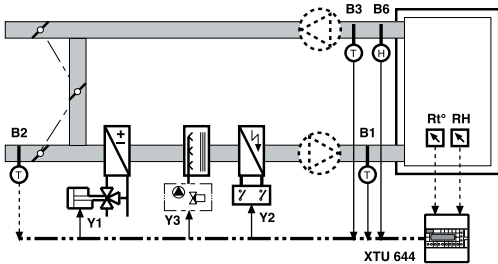


- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B6 – Room or extract air humidity sensor
- Rt – Temperature set-point adjuster (optional)
- RH – Humidity set-point adjuster (optional)
- Y1 – On-Off control summer cooling/dehumidifying
- Y2 – On-Off control heating
- Y3 – On-Off control humidifier

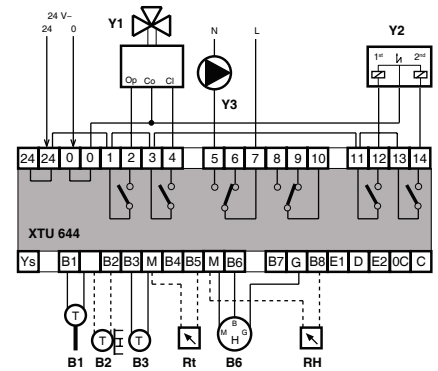


M2.1		M2.2		M2.6		M2.7		M2.8		M2.9		M2.10		M2.11	
Config sensors 1 2 3 - 5 6 - 8		Season Switching XXXXXXXXXX		Y1: 2 STAGES		Y1 -Win:OFF Y1 -Sum: COOL+DHU		Y2: 2 STAGES		Y2 -Win:HEATING Y2 -Sum: HEATING		Y3: 2 STAGES		Y3 -Win:HUMID Y3 -Sum: OFF	

**13.6 – 1 winter heating, summer cooling/ dehumidifying modulating battery**  
 – 1 summer post-heating On-Off battery  
 – 1 On-Off humidifying unit



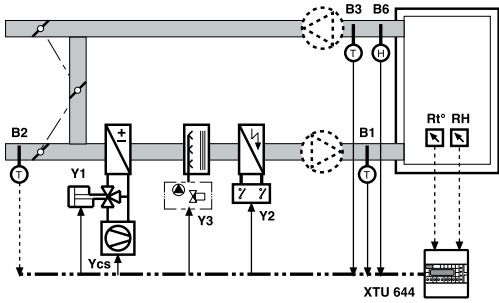
- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B6 – Room or extract air humidity sensor
- Rt – Temperature set-point adjuster (optional)
- RH – Humidity set-point adjuster (optional)
- Y1 – Modulating control winter heating & summer cooling/dehumidifying
- Y2 – On-Off control summer post-heating
- Y3 – On-Off control humidifier



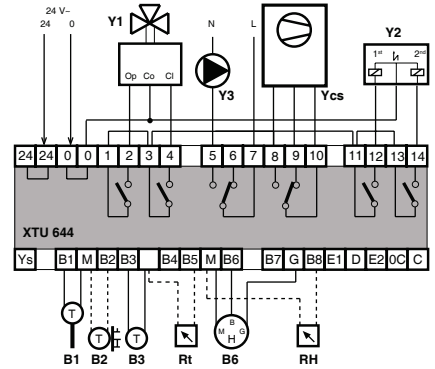
M2.1		M2.2		M2.6		M2.7		M2.8		M2.9		M2.10		M2.11	
Config sensors 1 2 3 - 5 6 - 8		Season Switching XXXXXXXXXX		Y1: MODULATING Run time : xxxs		Y1 -Win:HEATING Y1 -Sum: COOL+DHU		Y2: 2 STAGES		Y2 -Win:OFF Y2 -Sum: HEATING		Y3: 2 STAGES		Y3 -Win:HUMID Y3 -Sum: OFF	

**13.7 – 1 winter heating, summer cooling/ dehumidifying modulating battery with season switching heat pump**

- 1 On-Off summer post-heating battery
- 1 On-Off humidifying unit



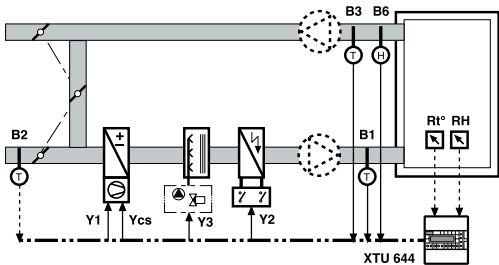
- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B6 – Room or extract air humidity sensor
- Rt° – Temperature set-point adjuster (optional)
- RH – Humidity set-point adjuster (optional)
- Y1 – Modulating control winter heating & summer cooling/dehumidifying
- Y2 – On-Off control summer post-heating
- Y3 – On-Off control humidifier
- Ycs – Season control heat pump



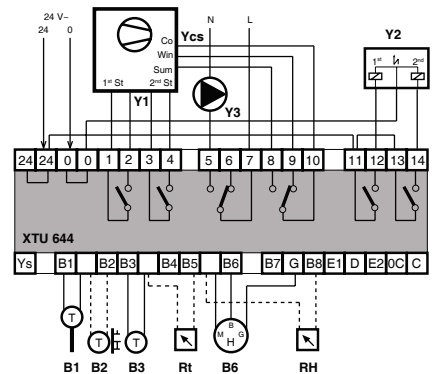
<b>M2.1</b> Config sensors 1 2 3 - 5 6 - 8	<b>M2.2</b> Season Switching XXXXXXXXX	<b>M2.3</b> Output 8-9-10: SEASON CONTROL
<b>M2.6</b> Y1: MODULATING Run time :xxx s	<b>M2.7</b> Y1-Win: HEATING Y1-Sum: COOL+DHU	<b>M2.8</b> Y2: 2 STAGES
<b>M2.9</b> Y2-Win: OFF Y2-Sum: HEATING	<b>M2.11</b> Y3-Win: HUMID Y3-Sum: OFF	

**13.8 – 1 winter heating, summer cooling/ dehumidifying direct expansion On-Off battery with season switching heat pump**

- 1 summer post-heating On-Off battery
- 1 On-Off humidifying unit



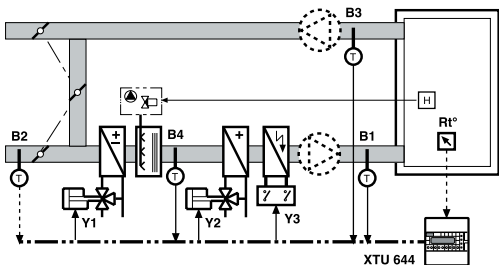
- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B6 – Room or extract air humidity sensor
- Rt° – Temperature set-point adjuster (optional)
- RH – Humidity set-point adjuster (optional)
- Y1 – On-Off control winter heating & summer cooling/dehumidifying
- Y2 – On-Off control summer post-heating
- Y3 – On-Off control humidifier
- Ycs – Season control heat pump



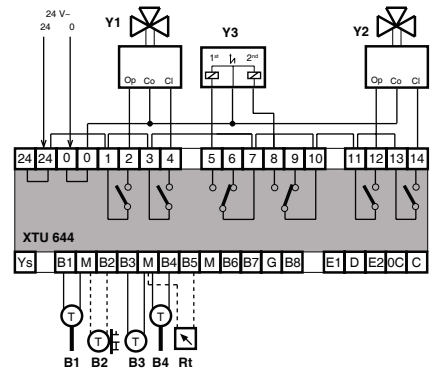
<b>M2.1</b> Config sensors 1 2 3 - 5 6 - 8	<b>M2.2</b> Season Switching XXXXXXXXX	<b>M2.3</b> Output 8-9-10: SEASON CONTROL
<b>M2.6</b> Y1: 2 STAGES	<b>M2.7</b> Y1-Win: HEATING Y1-Sum: COOL+DHU	<b>M2.8</b> Y2: 2 STAGES
<b>M2.9</b> Y2-Win: OFF Y2-Sum: HEATING	<b>M2.11</b> Y3-Win: HUMID Y3-Sum: OFF	

**13.9 – 1 winter pre-heating, summer cooling/ dehumidifying modulating battery**

- 1 winter post-heating modulating battery
- 1 summer post-heating On-Off battery
- 1 On-Off humidifying unit controlled by humidostat



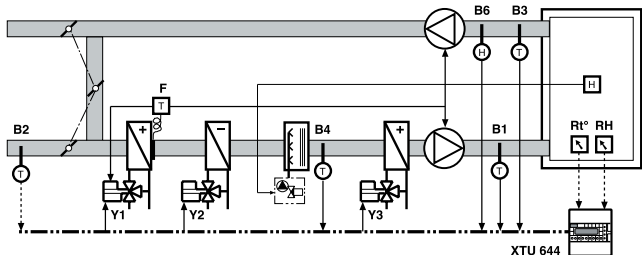
- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B4 – Pre-heating temp. sensor
- Rt° – Temperature set-point adjuster (optional)
- Y1 – Modulating control winter pre-heating & summer cooling/dehumidifying
- Y2 – Modulating control winter post-heating
- Y3 – On-Off control summer post-heating



<b>M2.1</b> Config sensors 1 2 3 - 5 6 - 8	<b>M2.2</b> Season Switching XXXXXXXXX	<b>M2.3</b> Output 8-9-10: CONTROL	<b>M2.4</b> Use sensor B4 PREHEATING
<b>M2.6</b> Y1: MODULATING Run time :xxx s	<b>M2.7</b> Y1-Win: PREHEAT. Y1-Sum: COOL+DHU	<b>M2.8</b> Y2: MODULATING Run time :xxx s	<b>M2.9</b> Y2-Win: HEATING Y2-Sum: OFF
<b>M2.10</b> Y3: 2 STAGES	<b>M2.11</b> Y3-Win: OFF Y3-Sum: HEATING		

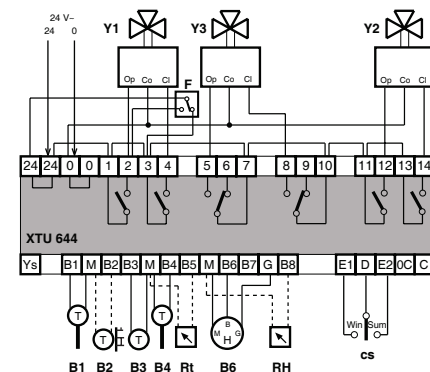
**14. EXAMPLES OF CONTROL 3- or 4-BATTERY UNITS**

- 14.1 – 1 Winter pre-heating modulating battery
- 1 Summer cooling/dehumidifying modulating battery
- 1 Winter & summer post-heating modulating battery
- 1 On-Off humidifying unit with humidistat

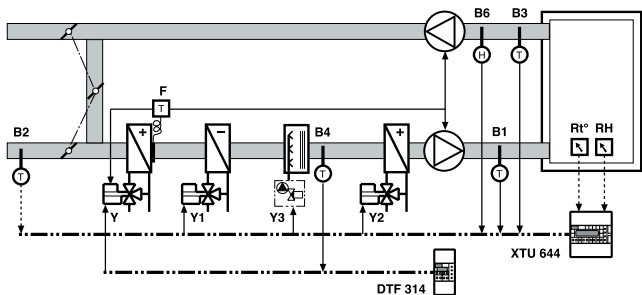


- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B4 – Pre-heating temp. sensor
- B6 – Room or extract air humidity sensor
- F – Battery frost protection thermostat
- Y1 – Modulating control winter pre-heating
- Y2 – Modulating control summer cooling/dehumidifying
- Y3 – Modulating control post-heating
- Rt° – Temperature set-point adjuster (optional)
- RH – Humidity set-point adjuster (optional)

M2.1 Config sensors 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	

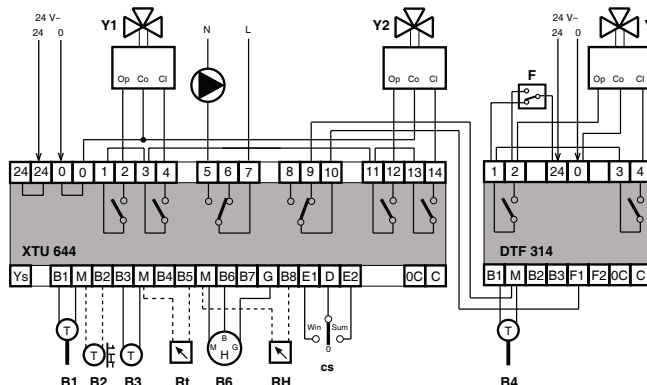


- 14.2 – 1 Winter pre-heating modulating battery
- 1 Summer cooling /dehumidifying modulating battery
- 1 Winter & summer post-heating modulating battery
- 1 On-Off humidifying unit



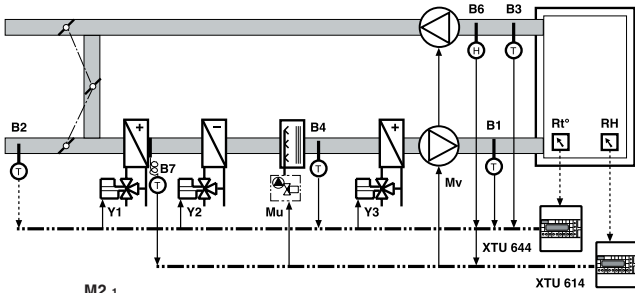
- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B4 – Pre-heating temp. sensor
- B6 – Room or extract air humidity sensor
- F – Battery frost protection thermostat
- Y – Winter pre-heating modulating control
- Y1 – Summer cooling /dehumidifying modulating control
- Y2 – Post-heating modulating control
- Y3 – On-Off control humidifier
- Rt° – Temperature set-point adjuster (optional)
- RH – Humidity set-point adjuster (optional)

M2.1 Config sensors 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		

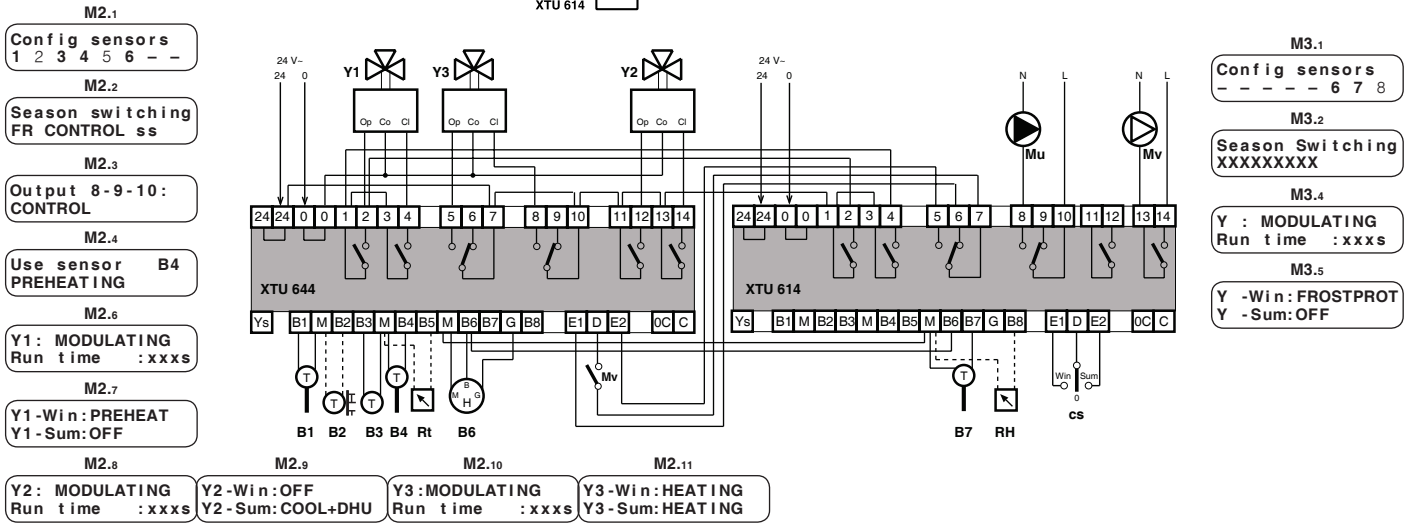


**14.3 – 1 Winter pre-heating modulating battery with frost protection control**

- 1 Summer cooling/dehumidifying modulating battery
- 1 Winter & summer post-heating modulating battery
- 1 On-Off humidifying unit

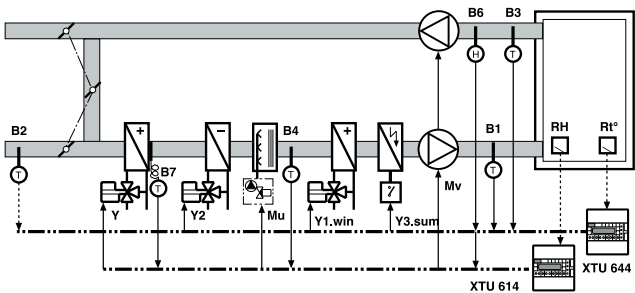


- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B4 – Pre-heating temp. sensor
- B6 – Room or extract air humidity sensor
- B7 – Frost protection battery sensor
- Mv – On-Off control fans
- Y1 – Modulating control winter pre-heating
- Y2 – Modulating control summer cooling/dehumidifying
- Y3 – Modulating control post-heating
- Mu – Comando On-Off umidificatore
- Rt° – Temperature set-point adjuster (optional)
- RH – Humidity set-point adjuster (optional)

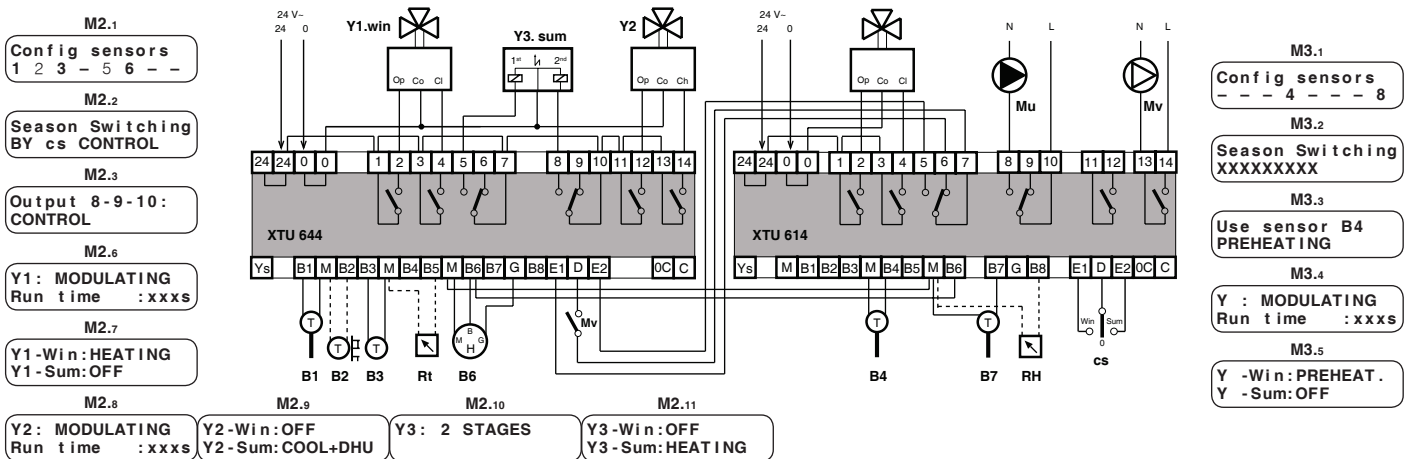


**14.4 – 1 Winter pre-heating modulating battery with frost protection control**

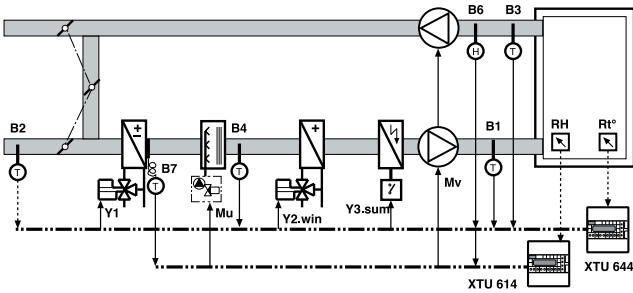
- 1 Summer cooling/dehumidifying modulating battery
- 1 Winter post-heating modulating battery
- 1 Summer On-Off post-heating battery
- 1 On-Off humidifying unit



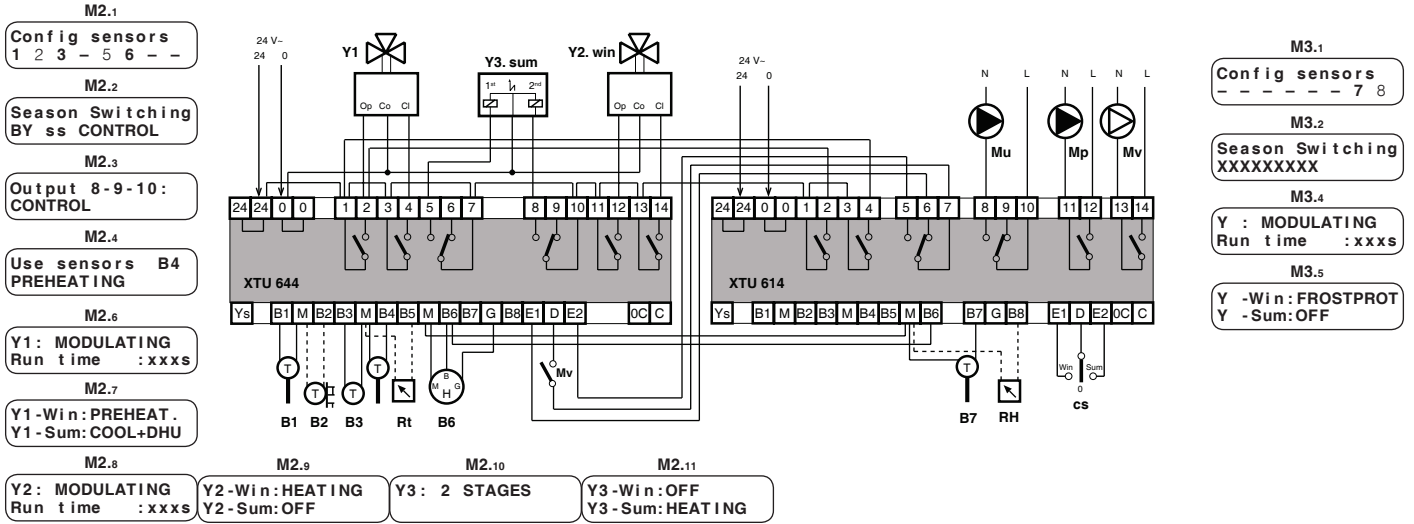
- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B4 – Pre-heating temp. sensor
- B6 – Room or extract air humidity sensor
- B7 – Frost protection battery sensor
- Mu – On-Off control humidifier
- Mv – On-Off control fans
- Y – Winter modulating control pre-heating
- 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 – Humidity set-point adjuster (optional only for humidifying)



- 14.5 – 1 Winter pre-heating modulating battery with frost protection control & summer cooling/dehumidifying
- 1 Winter post-heating modulating battery
- 1 Summer post-heating On-Off battery
- 1 On-Off humidifying unit



- B1 – Supply air temp. sensor
- B2 – Outside temp. sensor (for compensations)
- B3 – Room or extract air temp. sensor
- B4 – Pre-heating temp. sensor
- B6 – Room or extract air humidity sensor
- B7 – Battery frost protection sensor
- Mu – On-Off control humidifier
- Mv – On-Off control fans
- Y – Winter pre-heating control
- Y1Win – Winter post-heating control
- Y2 – Summer cooling/dehumidifying control
- Y3Sum – Summer post-heating control
- Rt° – Temperature set-point adjuster (optional)
- RH – Humidity set-point adjuster (optional only for humidifying)



**15. OPERATION**

XTU 644 is a microprocessor-based digital controller for the control of temperature and relative humidity in air-handling units comprising:

- 2 units with 3-wire modulating or On-Off control in 1, 2, or 3 stages which can be: Pre-heating; Heating; auxiliary Heating; Cooling and Dehumidifying;
- 1 humidification unit adiabatic On-Off
  - or vapour type with 3-wire modulating control
  - or vapour type with 0...10 V- control (as alternative to air mixing unit or heat recovery unit)
- 1 air mixing or recovery unit with by 0...10 V- (alternative to vapour humidifier)

To adapt the controller to the site requirements, do as follows :

- configure in relation to sensors & controls connected.

M2.1

Config sensors  
- - - - -

M2...

Y.. : HEATING

- assign to control outputs Y1, Y2 and Y3 their respective actions also in relation to any season switching.

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

**16. TEMPERATURE CONTROL**

M2.1

Config sensors  
- - 3 - - - - -

Config sensors  
1 - - - - -

Config sensors  
1 - 3 - - - - -

The control of temperature can be :

- Room or extract air sensor **B3** only :  
Fixed point control of Heating and Cooling room temp.
- Supply air sensor **B1** only :  
Fixed point control of Heating and Cooling supply air temp.
- Room or extract air temp. **B3** and Supply air sensor **B1**:  
Control of Heating & Cooling Supply air temp. in relation to deviation from room temperature.

**16.1 Desired temperatures**

The 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 & B3** are connected  
or in 

M0.3
Heat T SupplyAir Desir : 20.0c±0.0

 and 

M0.5
Cool T SupplyAir Desir : 25.0c±0.0

 if only **B1** is connected

M2.1

Config sensors  
- - - 5 - - - - -

If the set-point adjuster **Rt°** is connected, these values can be adjusted remotely. The value of the adjustment made is shown, in ± °C next to the values set. .

**16.2 Proportional Band and Integral Time**

M1.1

Temp Room  
Prop band: ± 2.0c

The basic temperature control parameters, **Proportional Band** and **Integral Time**, apply to heating control (Room: if only **B3** or **B1 + B3** connected or Supply air: if **B1** only s connected) and can be adjusted in the SETTING menu.

M1.2

Temp Room  
Integ time: 10m

The Proportional Band parameter (in ± °C) is used for other temperature controls by means of adjustable **multipliers** which adapt it to the different types of control (Cooling; Pre-Heating; auxiliary Heating; Dew Point; Dampers)

M1.1

Temp Room  
Prop Band: 2.0c

Example of PB multipliers with

PB Supply air (heating) = PB Room (heating) x **5.0** (= ±10°C)

M2.20

PB Suppy Air =  
PB Room x 5.0

M2.21

PB Cooling =  
PB Heating x 0.5

PB Cooling (room) = PB Heating (room) x **0.5** (= ± 1°C)  
PB Cooling (supply air) = PB Heating (supply air) x **0.5** (= ±5°C)

M2.22

PB Preheating =  
PB SupAHeat x1.0  
PB Dew point =  
PB Room Heat x1.0

PB Pre-heating = PB Supply air Heating x **1.0** (= ±10°C)

PB Dew Point = PB Room Heating x **1.0** (= ±2°C))

**M2.23**

PB Dampers =  
PB HeatRoom x 1.0  
dt Recuperator =  
PB HeatRoom x 1.0

PB Dampers = PB Room Heating x **1.0** (= ±2°C)  
dt PB Room Heating x **1.0** (= ±2°C)

**M2.24**

PB Aux heating =  
PB HeatRoom x 1.0  
PB Aux heating=  
PB SupAHeat x 1.0

With **B3** only :  
PB auxiliary Heating = PB Room Heating x **1.0** (= ±2°C)  
With **B1 & B3** :  
PB auxiliary Heating = PB Supply air Heating x **1.0** (= ±10°C)

**M1.3**

Supply Air temp  
Integr Time: 10m

When sensors **B1** and **B3** are connected, the Integral Time parameter of the supply air temperature (B1) is shown on a display page to allow for it to be adjusted separately from the room temperature parameter..

**16.3 Control with only room sensor (B3) or with only supply air sensor (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
------	----------------------------------

 if **B3** used  
or 

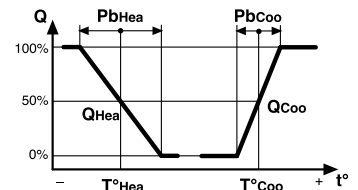
M0.3	Heat T SupplyAir Desir : 20.0c±0.0
------	---------------------------------------

 and 

M0.5	Heat T SupplyAir Desir : 25.0c±0.0
------	---------------------------------------

 if **B1** used

with the temperature measured by sensor B1 or B3 and calculates the load values for Heating **QHea** and for Cooling **QCoo** in relation to the deviation measured.



**16.4 Control with room sensor (B3) and supply air sensor (B1)**

The controller compares the values 

M0.3	Heat T Room Desir : 20.0c±0.0
------	----------------------------------

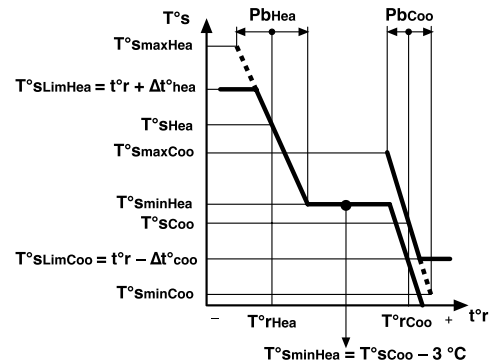
 and 

M0.5	Cool T Room Desir : 25.0c±0.0
------	----------------------------------

with the temperature measured by the B3 sensor and calculates the desired supply air temperatures for Heating **T°sHea** and for Cooling **T°sCoo** according to the differences measured and the values set :

**M1.4**  
Heating SupAir  
Min: 18c Max: 50c

- Min: -- c Max: -- c = min. & max. values of Heating supply air temp.; they establish field of Proportional B and **PbHea**. The min. value **T°sminHea** permits avoiding annoying **cold drafts** in the room. To avoid simultaneous heating & cooling, the minimum value **T°sminHea** is always 3°C below the Cooling supply air temp. **T°sCoo**.

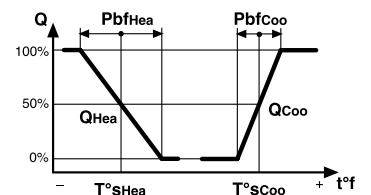


**M1.6**  
Cooling Flow  
Min: 8c Max: 25c

- Min: -- c Max: -- c = minimum & maximum values of Cooling supply air temp.; these establish the field of the Proportional and **PbCoo**

**M1.6 bis**  
Ambient authority  
MinFlowheat : 0.0c

The controller compares the desired supply air temperatures for Heating **T°sHea** and for Cooling **T°sCoo** with the temperature measured by the supply air sensor B1 and derives the load values for Heating **QHea** and for Cooling **QCoo** according to the differences measured.



When the manipulation of air dampers (**M2.12**) is foreseen the operation is optimised.

**M2.12**  
Ys-Control :  
DAMPERS TEMPERAT

If under **Ambient Authority** (**M1.6 bis**) a value other than zero has been set, the controller re-calculates the desired minimum heating flow temperature (**T°sminHea**) at the moment in which the measured room temperature is between **T°sminHea**) at the moment in which the measured room temperature is between **T°Hea** and **T°Coo**

**M1.6 bis**  
Ambient Authority  
MinFlowHeat : 0.0c

Example: values set **T°sminHea**: 18°C, **T°Hea**: 20°C, **T°Coo**: 25°C, **Ambient Authority**: 2°C.

Operation: for each degree of increase in room temperature between 20°C (**T°Hea**) and 25°C (**T°Coo**), the desired value of minimum flow heating will be decreased by 2°C (**T°sminHea**).

If Ambient Authority: 0°C the function is excluded

M1.5

HeatingLimit Max  
SupAir Room: +10c

To avoid **stratification of warm** air in the Heating phase it is possible to set the Heating supply air temp. **T°sHea** so it never exceeds a determined room temp. value.

M1.7

CoolingLimit Max  
SupAir Room: - 7c

To avoid **condensation in the supply air duct** in the Cooling phase it is possible to set the Cooling supply air temp. **T°sCoo** so it is never below a determined room temp. value.

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 defined according to setting in

M2.2

Season Switching  
XXXXXXXXXX

(see section 24.)

- Status of season switch cs and/or c1 control (terminals D-E1-E2)

Examples :

- With <sup>M2.2</sup> Season Switching NO is : <sup>M0.2</sup> Current mode : ON - When switch c1 (D-E1) is closed.  
<sup>M0.2</sup> Current mode : OFF - When switch c1 (D-E1) is open.

- With <sup>M2.2</sup> Season Switching WINTER
  - or <sup>M2.2</sup> Season Switching BY OUTSIDE T. and outside temp. imposes winter operating mode
  - or <sup>M2.2</sup> Season Switching BY ROOM T. and room temp. imposes winter operating mode
  - or <sup>M2.2</sup> Season Switching BY SEASONS and season periods impose winter operating mode

- mode is : <sup>M0.2</sup> Current mode : ON Winter - When switch c1 (D-E1) is closed.  
<sup>M0.2</sup> Current mode : OFF Winter - When switch c1 (D-E1) is open.

- With <sup>M2.2</sup> Season Switching SUMMER
  - or <sup>M2.2</sup> Season Switching BY OUTSIDE T. and outside temp. imposes summer operation
  - or <sup>M2.2</sup> Season Switching BY ROOM T. and room temp. imposes summer operation
  - or <sup>M2.2</sup> Season Switching BY SEASONS and season periods impose summer operation

- mode is : <sup>M0.2</sup> Current mode : ON Summer - When switch c1 (D-E1) is closed.  
<sup>M0.2</sup> Current mode : OFF Summer - When switch c1 (D-E1) is open.

- With <sup>M2.2</sup> Season Switching BY cs CONTROL with cs switch on Winter (D-E1 closed)

- mode is : <sup>M0.2</sup> Current mode : ON Winter - When switch c1 (D-E1) is closed.  
<sup>M0.2</sup> Current mode : OFF Winter - When switch c1 (D-E1) is open.

- With <sup>M2.2</sup> Season Switching BY cs CONTROL with cs switch on Summer (closed D-E2)

- mode is : <sup>M0.2</sup> Current mode : ON Summer - When switch c1 (D-E2) is closed.  
<sup>M0.2</sup> Current mode : OFF Summer - When switch c1 (D-E2) is open



**17. OUTSIDE TEMPERATURE COMPENSATION**

Compensation functions are enabled only if external sensor B2 is connected. They can be :

- Compensation of supply air temperatures required by Heating & Cooling;
- Summer compensation of desired room temperature required by Cooling.

M0.4	M0.6
Heat T SupplyAir Compensat. : ±00.0	Cool T SupplyAir Compensat. : ±00.0
M0.6	M0.6
Heat T SupplyAir Compensat. : ±00.0	Cool T SupplyAir Compensat. : ±00.0

**17.1 Climatic compensation of supply air temperatures desired by Heating & Cooling**

The function can be used only if sensors B1 and B5 are connected and sensor B3 is not connected. It is useful when the primary air plant, besides ensuring change of air, has to provide for its dispersion in the room.

M2.1

**Config sensors**  
1 2 - - - - -

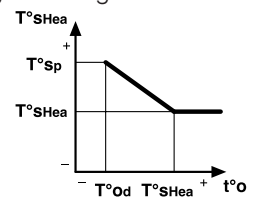
Desired supply air Heating temperature

M0.3

**Cool T SupplyAir**  
Desir. : 20.0c±0.0

The controller increases the desired temp. as outside temp. falls according to settings:

- Heating Comp.: NO = function disabled  
YES =function enabled
- DOT : xx c = winter design outside temp
- DST : xx c = winter design supply air temperature



M1.8

**Heating Comp. : NO**  
DOT: -10c DST: 50c

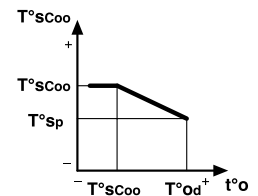
Desired temperature Cooling supply air

M0.5

**Cool T SupplyAir**  
Desir : 25.0c±0.0

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

- Heating Comp. : NO = function disabled  
YES =function enabled
- DOT : xx c = design outside temp.: summer
- DST : xx c = design supply air temp. : summer



M1.9

**Cooling Comp. : NO**  
DOT: +35c DST: 10c

**17.2 Summer compensation of desired Cooling room temperature**

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

M2.1

**Config sensors**  
1 2 3 - - - - -

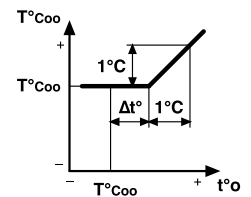
The controller maintains temp. at constant level.

M0.5

**Cool T Room**  
Desir : 25.0c±0.0

until outside temp. exceeds the value  $T^{\circ}Coo + \Delta t^{\circ}$ , above which  $T^{\circ}Coo$  is increased by 1°C for each °C increase in outside temperature..

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



M1.10

**SummerCompens : NO**  
Diff OT - RT: 6c

**18. CONTROL OF RELATIVE HUMIDITY**

M2.1

**Config sensors**  
- - - - 6 - 8

The function is enabled only if sensor B6 is connected.

M0.7

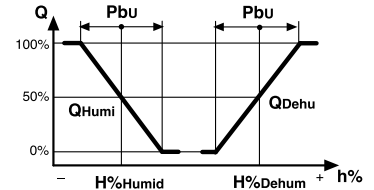
M0.9

Desired Humidifying & Dehumidifying values are to be entered in **Humidification Desird: 50.0%±0.0** and **Dehumidification Desird: 60.0%±0.0**

If set-point adjuster **R%** is connected, these values can be adjusted remotely. The value of the adjustment is displayed, in ±% next to the values entered.

The controller compares the desired values with the relative humidity as measured by sensor B6 and calculates the load values for Humidification **QHumi** and for Dehumidification **QDehu** according to differences measured:

- Prop Band:  $x \times x \times x \% = \text{Humidity Proportional Band } \pm \%$ .
- Integr Time:  $x \times x \text{ m} = \text{Humidity Integral Time in minutes.}$



M1.11

**RelativeHumidity Prop Band: ± 6.0%**

M1.12

**RelativeHumidity Integr Time: 10m**

If the Humidification control output is to be **modulating** it must be set as

M2.3

**Output 8-9-10: CONTROL**

**18.1 Humidifying limits of supply air**

M2.5

**Use sensor B7 SUPAIR HUM LIMIT**

If sensor B7 is not used for control of dampers with enthalpic comparison, when the humidity control is through sensor B6 (room or extract air duct), it can be used as Humidification supply air limit.

- Min : -- %      Max : -- % = minimum & maximum values of Humidification supply air humidity.

M1.13

**SupAir humidity Min: 1% Max: 99%**

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

M1.14

**SupAir humidity Authority : 5%**

The adjustment value is displayed in

M0.8

**Humidification Compensat. : ±00**

**18.2 Priority Cooling – Dehumidification**

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

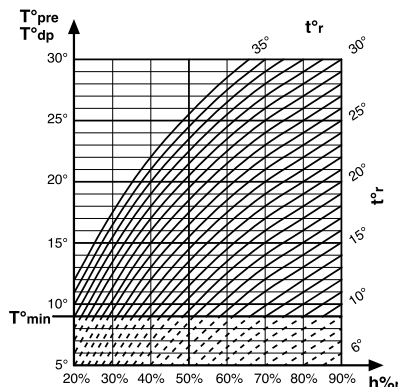
**19. CONTROL PRE-HEATING OR DEW POINT**

M2.1

Config sensors  
- - - 4 - - - -

The function is enabled only if sensor B4 is connected.  
It can be used for :

- PRE-HEATING = control of pre-heating battery according to humidification condensation temperature by air duct sensor B4 installed downstream of the humidification unit.
- DEW POINT = compensation of Dehumidification value to limit formation of condensation on swimming pool windows; sensor B4 should be in contact with the glass.



M2.4

Use sensor B4  
PREHEATING  
Use sensor B4  
DEW POINT

**19.1 Control of Pre-heating temperature**

M2.4

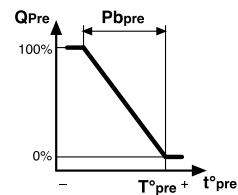
Use sensor B4  
PREHEATING

If sensor B3 or B1 and B3 connected, the controller calculates the pre-heating temp. **T°pre** according to :

- condensation curve calculated from actual values of room temperature **t°r** and of room humidity **h%r**

- minimum value M0.11  
Preheating T  
Minimum : 10.0c

- any manual adjustment in M0.12  
Preheating T  
Calc : 16.0c±0.0



If only sensor B1 connected, the controller calculates pre-heating temp. **T°pre** according to:

- minimum value M0.11  
Preheating T  
Minimum : 10.0c

- any manual adjustment in M0.12  
Preheating T  
Calc : 16.0c±0.0

The controller compares the condensation temp. **T°pre** with temp. measured by sensor B4 & calculates the load for Pre-Heating **QPre** according to the difference measured

**19.2 Control of dew-point temperature for swimming pool windows**

M2.4

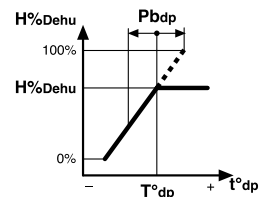
Use sensor B4  
DEW POINT

The controller calculates the temp. of the dew-point **T°rv** according to :

- condensation curve calculated from actual values of room temp. **t°r** and of room humidity **h%r**.

- minimum value M0.11  
Dew Point T  
Minimum : 10.0c

- any manual adjustment in M0.12  
Dew Point T  
Calc : 16.0c±0.0



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

M0.10  
Dehumidification  
Compensat. : ±0.0

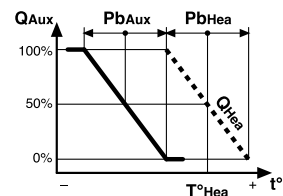
**20. SPECIAL CONTROLS**

**20.1 Control auxiliary heating battery**

M2.7.9.11

Y..-Win : AUXHEAT  
Y..-Sum : AUXHEAT

If system includes an auxiliary heating battery to supplement the Heating load to one of the outputs Y1, Y2 or Y3 can be assigned the AUX.HEA. function.  
Load **QAux** is in sequence to load **QHea**.



**20.2 Control heat pump**

M2.7.9

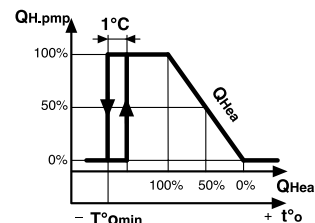
Y..-Win : HT.P.HEA  
Y..-Sum : COOLING

If the air-handling unit comprises a direct-exchange heat pump it is possible to assign to one of outputs Y1 or Y2 the winter function HT.P.HEA..

M1.19

Minim.Outside T.  
Heat Pump : --c

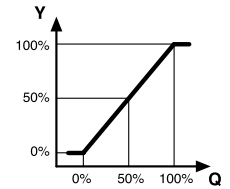
The load **QH.pmp** replicates load **QHea** exactly , the only difference being that when outside temp. falls below value **T°Omin** the load **QH.pmp** is cancelled.



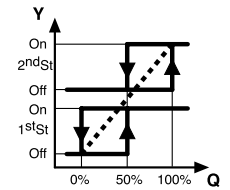
**21. OUTPUTS Y1, Y2, Y3**

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

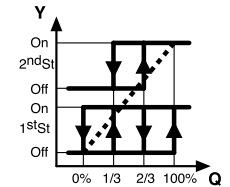
- **Y.. - MODULATING** = modulating control for 3-wire valves or signal converters from 3 points to 0...10 V- or step controllers.



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



- 3 STAGES = On-Off control in 3 stages (1; 2; 1+2) for electric batteries with 2 unequal loads.



- Run time: xxx s: = run time of actuator valve. Appears only if MODULATING

Each output can be assigned a different action (load). e.g. Y1: Heating.

If in **M2.2** Season Switching is enabled a different action can be assigned for each season. e.g. Y1 – Win: Pre-heating; Y2 – Sum: Cooling.

**M2.6.8.10**  
**Y.. - MODULATING**  
 Run time : 120s

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

- Y1 - .....: PREHEAT = Pre-heating  
 HEATING. = Heating  
 AUX. HEAT. = Heating from auxiliary battery  
 HT. P. HEA = Heating by heat pump  
 COOLING. = Cooling  
 COOL...+ DEHU = Cooling & Dehumidification  
 OFF = In season period unused

**M2.9**  
**Y2 : COOLING**  
**Y2 -Win : COOLING**  
**Y2 -Sum : COOLING**

- Y2 - .....: PREHEAT = Pre-heating  
 HEATING. = Heating  
 AUX HEAT = Heating from auxiliary battery  
 HT PU HEA = Heating by heat pump  
 COOLING = Cooling  
 COOL.+ DHU = Cooling & Dehumidification  
 OFF = In season period unused

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

- Y3 - .....: HUMIDIF = Humidifying  
 HEATING. = Heating  
 AUX HEAT = Heating from auxiliary battery  
 OFF = In season period unused

If **M2.3** the output 5-6-7 can be used for On-Off 1 stage control of humidification and output 8-9-10 for Season Control

**M2.3**  
 Output 8-9-10 CONTROL SEASON

**22. OUTPUT Ys**

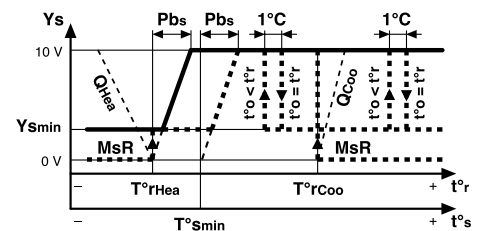
The output **Ys** with 0...10V- control signal can be used for :

- TEMP DAMPERS = Control dampers according to temperature.
- ENTHALPY DAMPERS = Control dampers by enthalpic comparison.
- HUMIDIFICATION = Control vapour humidifiers by 0...10 V-.
- DEHUMIDIFICATION = Control dampers for dehumidifying room (swimming pool).
- RECUPERATOR = Control heat recuperator

**22.1 Control dampers according to temperature**

**M2.1**  
 Config sensors  
 - 2 3 - - - - -

When actual room temp. **t°r** exceeds desired value **T°rHea**, the controller, with P characteristic, progressively opens to the outside air.  
 When outside temp. **t°o** exceeds value of actual room temp. **t°r**, the controller, using On-Off control, sets the outside air to position **Ysmin**.



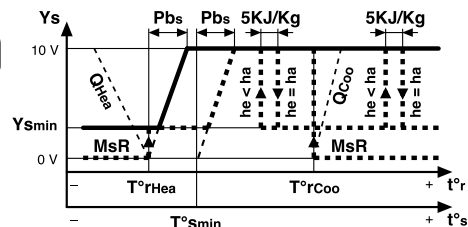
**M2.12**  
**Ys - Control :**  
**DAMPERS TEMPERAT**

**22.2 Control dampers by enthalpic**

M2.1 M2.5  
 Config sensors - 2 3 - - 6 7 -  
 Use sensor B7 OUTSIDE HUMIDITY

M2.12  
**Ys-Control :**  
**DAMP. ENTALPHY**

When actual room temp.  $t^{\circ}r$  exceeds desired value  $T^{\circ}rHea$ , the controller, with P characteristic, starts progressive opening to the outside air.  
 When the outside enthalpy has exceeded the room enthalpic value, the controller, with On-Off control, moves the outside air to position  $Ysmin$ .

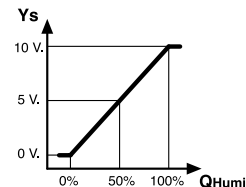


**22.3 0...10V- control of vapour humidifiers**

M2.1  
 Config sensors - - - - 6 - -

M2.12  
**Ys-Control :**  
**HUMIDIFICATION**

The controller converts the Humidification load signal  $QHumi$  to a 0...10 V- signal at  $Ys$  output to control vapour humidifiers.

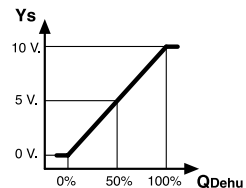


**22.4 Control of dampers for room (swimming pool) dehumidification**

M2.1  
 Config sensors - - - - 6 - -

M2.12  
**Ys-Control :**  
**DEHUMIDIFICATION**

The controller converts Dehumidifying load signal  $QDehu$  to a 0...10 V- signal at  $Ys$  output to control mixing dampers and use outside air to dehumidify the room.

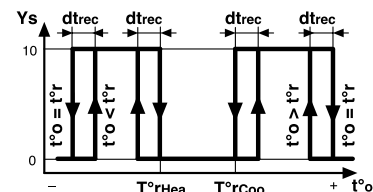


**22.5 Control of heat recuperator**

M2.1  
 Config sensors - 2 3 - - - -

M2.12  
**Ys-Control :**  
**RECUPERATOR**

The recuperator is Off (signal  $Ys = 0 V$ -) when :  
 - Outside temp.  $t^{\circ}o$  has a value between  $T^{\circ}rHea$  and  $T^{\circ}rCoo$ .  
 The recuperator is On (signal  $Ys = 10 V$ -) when:  
 - Outside temp.  $t^{\circ}o$  is below actual room temp.  $t^{\circ}r$  and below required value  $T^{\circ}rHea$   
 - Outside temp.  $t^{\circ}o$  is above actual room temp.  $t^{\circ}r$  and above desired value  $T^{\circ}rCoo$ .



A signal convertor is necessary to convert 0...10 V- signal to On-Off control.

**22.6 Minimum limit temperature supply air**

M2.12 M2.12  
**Ys-Control :** DAMPERS TEMPERAT **Ys-Control :** DAMPERS ENTALPHY

M2.12  
**Ys-Control :**  
**DAMPERS TEMPERAT**

When actual supply air temp.  $t^{\circ}s$  falls below minimum supply air value  $T^{\circ}smin$  controller closes outside air with modulating action.

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

**22.7 Minimum outside air**

M2.12 M2.12 M2.12  
**Ys-Control :** DAMPERS TEMPERAT **Ys-Control :** DAMPERS ENTALPHY **Ys-Control :** DEHUMIDIFICATION

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

The minimum quantity of outside air necessary to ensure change of air can be obtained in two different ways :  
 - directly through controller display  
 - using minimum positioner  $Rs$  connected directly to the damper actuator.

**22.8 Rapid functions**

M2.12 M2.12 M2.12  
**Ys-Control :** DAMPERS TEMPERAT **Ys-Control :** DAMPERS ENTALPHY **Ys-Control :** DEHUMIDIFICATION

M1.16  
**Ys-RapidWarm-up**  
**function : YES**

If Rapid Warm-up function is enabled, when controller is switched on (closure E1-D or E2-D), the dampers remain closed 0% until room temp. re-enters turns within range desired values  $T^{\circ}rHea$  and  $T^{\circ}rCoo$ .

Rapid Warm-up function eliminates value **Ys-Outside air Minimum : xxx%** but not the setting of the minimum positioner  $Rs$ .

**23. SEASON SWITCHING**

M2.3

Output 8-9-10  
SEASON CONTROL

The controller switches the action of outputs **Y1, Y2, Y3** and if also the position of season switch **Ycs** depending on selection :

- Season switching : NO ;  
WINTER ;  
SUMMER ;  
BY cs CONTROL ;  
AUT BY OUTSIDE T ;  
AUT BY SEASONS ;

M2.2

Season Switching  
NO

- Without season switching :  
– action of outputs **Y1, Y2, Y3** are according setting in  
  
– input 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** and **Ys** closing

M2.7.9.11

Y... :XXXXXXX

M2.2

Season Switching  
WINTER

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

M2.7.9.11

Y..-Win:XXXXXXX  
Y..-Sum:

M2.2

Season Switching  
SUMMER

- Summer : – azione delle uscite **Y1, Y2, Y3** sono secondo impostazione in  
– season control **Ycs** is on Summer: 10-9 = open; 10-8 = closed.

M2.7.9.11

Y..-Win :  
Y..-Sum:XXXXXXX

M2.2

Season Switching  
SUMMER

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

M2.2

Season Switching  
BY cs CONTROL

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

M1.17

When outside temp. remains below temp. for more than  
OutWinter T.:20c  
Delay : 24hrs

The controller switches the action of outputs **Y1, Y2, Y3** & switches season control **Ycs** to winter.

M1.18

When outside temp. remains above temp. for more than  
OutWinter T.:25c  
Delay : 4hrs

The controller switches the action of outputs **Y1, Y2, Y3** & switches season control **Ycs** to summer.

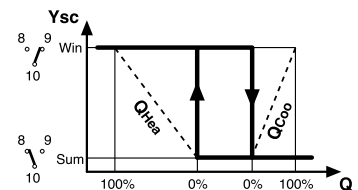
M2.2

Season Switching  
BY ROOM T

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

When Heating load value **QHea** is above 0% & Cooling load value **QCoo** is 0%, the season control **Ycs** changes to Winter.

When Heating load value **QHea** is 0% & Cooling load value **QCoo** is below 0% the, season control **Ycs** changes to Summer.



**23.1 Season switch**

M2.3

Output 8-9-10  
SEASON CONTROL

If output 8-9-10 is not required for modulating control or 2<sup>nd</sup> stage of **Y3**, it is possible to use it as Season Switch which replicates the Season Switching position.

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

**24. COMPLEMENTARY FUNCTIONS**

M2.17

Choice keynumber  
----

The speed of the communication bus (C-Bus) can be chosen from: 1200, 2400, 4800, 9600 bouds. The speed must be chosen above all on the basis of the other devices on the site and on the type of modem use.

**24.2 Access keynumber**

M2.17

Choice keynumber  
----

Choice and enabling of access keynumber. This disables use of + and – keys thereby preventing any modification of data. Enter the number (1900 ... 1999) using + and – keys. To delete keynumber, press + and – keys at the same time until dashes reappear.

Access Keynumber  
----

When keynumber is enabled, if + or – keys pressed, the display shows a request to enter the key-number. Only after entering the correct keynumber is it possible to use + and – keys. If for 15 minutes no key is pressed the keynumber is automatically re-enabled.

**24.3 Denomination of site**

M2.18

Site Name  
-----

Name of site to be entered on first page of the display. Using + and – keys, each dash can be replaced by a letter of the alphabet (A...Z) or by a number (0...9). The → key serves to position the cursor.

**24.4 Display of measurements and operational data**

The controller displays all the values measured by the sensors and all data necessary for understanding the operational status of the site:

M0.1

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

- actual room temperature RT (if **B3** connected) or supply air temperature ST (if only **B1** connected).
- actual humidity (if **B6** connected).

M0.13

Heat T SupplyAir  
Heating T.: 22.0c

- supply air temperature calculated by Heating control (if **B3** and **B1** connected).

M0.14

Cool T SupplyAir  
Calculated: 35.0c

- supply air temperature calculated by Cooling control (if **B3** and **B1** connected).

M0.15

SupplyAir temp  
Actual: 20.0c

- actual temperature measured by sensor **B3** (only if **B3** and **B1** connected).

M0.16

OutsideT.: - 2.0c  
SupAirHumi: 50%

- actual outside temperature (only if **B2** connected).
- actual outside humidity (only if **B7** connected and if **M2.5** is OUTSIDE HUMIDITY). actual supply air (only if **B7** connected and if **M2.5** is DIS. HUM. LIMIT).

M0.17

Room h: 65Kj/Kg  
Outs h: 65Kj/Kg

- actual room & outside enthalpy (only if **B2, B3, B6 & B7** connected and if **M2.12** is DAMPERS ENTHALPY).

M0.18

Des Prehea: 15.0c  
Act Prehea: 15.0c

- desired & actual temperature of Pre-heating, only if B4 connected and

M2.4  
Use sensor B4  
PREHEATING

Des DewP : 15.0c  
Act DewP : 15.0c

- desired & actual temperature of Dew Point, only if B4 connected and

M2.4  
Use sensor B4  
DEW POINT

M0.19

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

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

M0.20

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

- Output Y3 load value: Humidif or Heating or AuxHea.
- Output Ys: load value or DampTemp or Damp Ent or Humidif or Dehumid or Recuper.

**24.5 Data recorder**

Every hour and with each mode change the controller records a series of data indicating the operational status of the site :

- Current time, day and type of recording (change of mode or expiry time).
- Current program: On or Off; current season; Winter or Summer..
- Values required and calculated by controller.
- Values measured by sensors connected.
- Value of loads at outputs Y1, Y2, Y3 and Ys.

The controller can store 32 complete recordings and the latest recording causes the oldest to be deleted.

If the display does not showing the first page, the controller makes the recording at the end of each hour but not that at the change of mode because it assumes changes are being made to the setting data. The recordings can be seen only by the Telemanagement computer.

## 25. ALARMS

The controller processes two types of alarm :

- alarms for abnormal functioning of the controller (LED 6.9) and of the zones controlled (LED 6.8)
- alarms for short or open sensor circuits (LED 6.8)

The alarm status is signalled by LEDs on the controller facia and by the word ALARM appearing on the display when the alarm is transmitted to the PC. On the configuration page, alarms are identified by the letter "A" flashing alternatively with the number of the alarm concerned.

With C-Bus connection alarms can be transmitted to a local PC and/or to the Telemangement PC.

### 25.1 Functional alarms

M2.15

**Functional Alarms**  
- - - - 8

The functional alarms occur when there is a continuing difference between actual and desired values.

These alarms do not affect the normal operation of the controller

Factory setting: all alarms disabled except the clock alarm (8)

Use + and - keys to enable required alarms by replacing dashes with numbers

When the number flashes = alarm active

The limit values and delay times for sending alarms can be adjusted only by PC.

Types of alarm and reason :

- 1** = temperature difference supply air (if only B1 connected)
  - transmitted for actual temp. below **T°sHea** when Y..: Heating
  - or above **T°sCoo** when Y...: Cooling
- 3** = difference room temp. (if B3 connected)
  - transmitted for actual temp. below **T°rHea** when Y..: Heating
  - or above **T°rCoo** when Y...: Cooling
- 4** = temperature difference pre-heating or dew point (if B4 connected)
  - transmitted for actual temp. below desired value.
- 6** = difference humidity (B6)
  - transmitted for actual humidity less than **H%Humi** when Y..: Humidification
  - or greater than **H%Dehu** when Y...: Dehumidification
- 8** = internal clock cannot be disabled
  - transmitted when clock assumes incoherent values.

### 25.2 Sensor alarms

M2.16

**Sensor alarms**  
- - - -

Sensor alarms are triggered in the event of short or open sensor circuits.

The triggering of the alarm is delayed by one minute.

Factory setting: all disabled.

Use + and - keys to enable desired alarms by replacing dashes by numbers.

Type of alarm and effect :

- 1** = supply air sensor (B1): valve stops where it is.
- 2** = outside sensor (B2): valve stops where it is.
- 3** = room sensor (B3) : valve stops where it is.
- 4** = pre-heating sensor (B4): valve stops where it is.
- dew point sensor (B4): action annulled.

## 26. TESTING AT SITE START-UP

Testing to be carried out when installation concluded and wiring and configuration have been executed and checked.

M3.1

**Output: Y1 MODUL**  
**Status: IDLE**

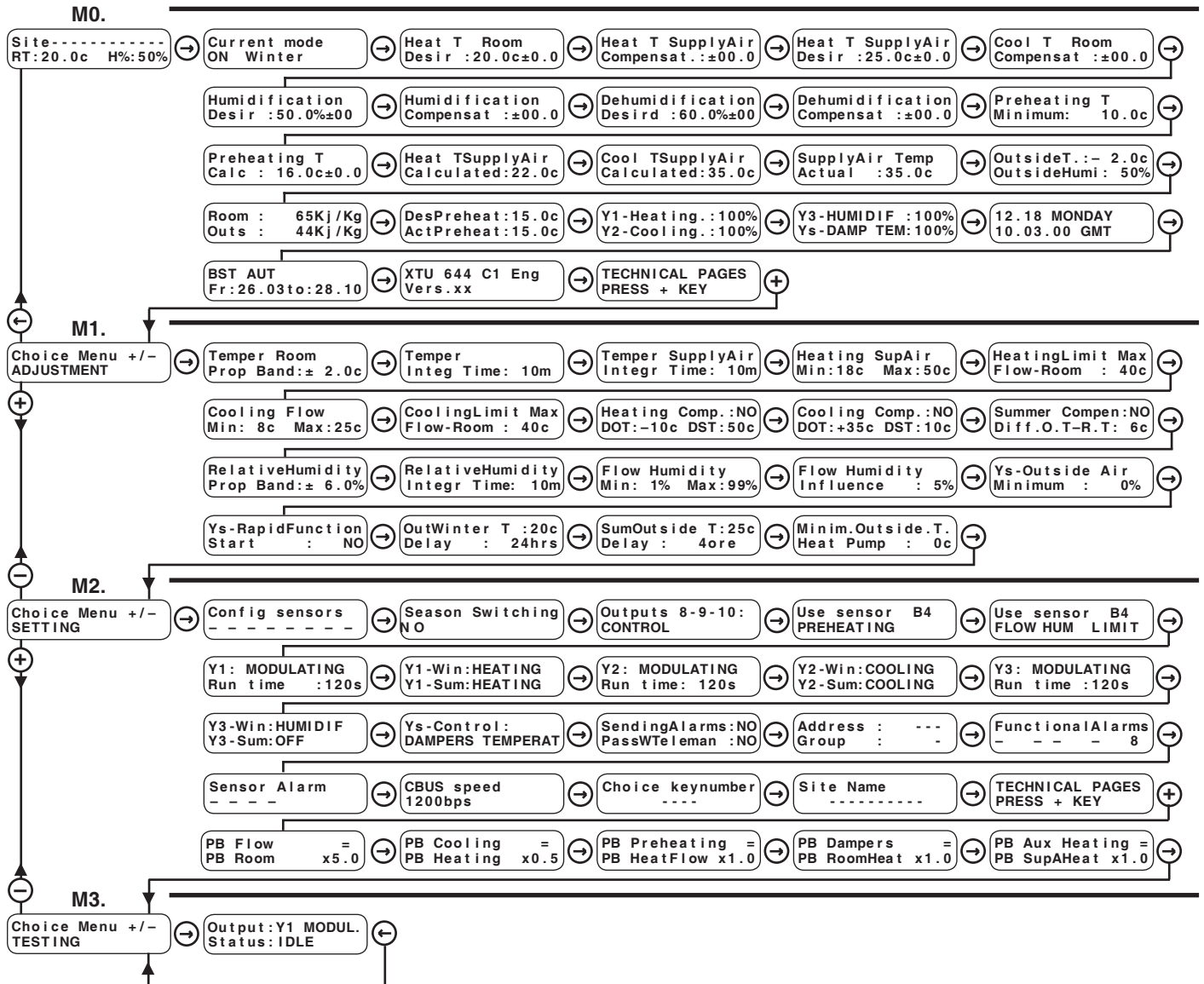
With + and - keys select :

- output to be tested :
  - Y1 MODUL or Y1 2 STAGES or Y1 3 STAGES: depending on setting in **M2.6**.
  - Y2 MODUL or Y2 2 STAGES or Y2 3 STAGES: depending on setting in **M2.8**.
  - Y3 MODUL or Y3 2 STAGES or Y3 3 STAGES: depending on setting in **M2.10**, or Y3 ON-OFF : if **M2.3** is SEASON CONTROL.
  - Ycs ; appears if **M2.3** is SEASON CONTROL..
  - Ys ;
- status :
  - with Y...MODUL. : IDLE; CLOSES; OPENS
  - 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 the result.



**27. SEQUENCE OF DISPLAY PAGES (the data and functions are those in memory at delivery)**



↔ Use these keys to scroll the pages on the display and to position the cursor █ on adjustable data on the pages. In the list of display pages below, adjustable data are highlighted by:

In the list of display pages below, adjustable data are highlighted by █

By pressing these keys at the same time, or in any case after 15 minutes, the display returns to first page Site: RT:20.0c H%:50%

⊕ Use these keys to: – adjust values indicated by the cursor █

– view options for configuring a function 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	Description	Notes	Sect.
M0.1	Site----- RT: 20.0c H%: 50%	Name site Actual temp. & humidity	Entered in <b>M2.18</b> RT : if <b>B3</b> or <b>B1</b> & <b>B3</b> connected ST : if <b>B1</b> only connected H% : if <b>B6</b> connected	24.3
M0.2	Current mode : ON Winter	Current mode : – ON ; OFF. – ON Winter; OFF Winter. – ON Summer; OFF Summer.	Mode is established by Season Switching ( <b>M2.2</b> ) & by input D-E1-E2	16.5
M0.3	Heat T Room Desir : 20.0c±0.0 Heat T Flow Desir : 20.0c±0.0	Desired heating temp. & adjustment by set-point adjuster Rt° (only if configured).	Appears if <b>B3</b> or <b>B1</b> & <b>B3</b> connected  Appears if only <b>B1</b> connected	16.1
M0.4	Heat T SupplyAir Compensat : ±00.0	Compensation of supply air heating temp. calculated by controller.	Appears if <b>B1</b> & <b>B2</b> connected & <b>B3</b> not connected	17.
M0.5	Cool T Room Desir : 25.0c±0.0 Cool T Flow Desir : 25.0c±0.0	Desired cooling temp. & adjustment by set-point adjuster Rt° (only if configured).	Appears if <b>B3</b> or <b>B1</b> & <b>B3</b> connected  Appears if <b>B2</b> connected with only <b>B1</b>	16.1
M0.6	Cool T Room Compensat : ±00.0 Cool T SupplyAir Compensat : ±00.0	Compensation of cooling temp. as calculated by controller	Appears if connected <b>B2</b> & <b>B3</b> or <b>B1</b> , <b>B2</b> & <b>B3</b> connected  Appears if <b>B2</b> connected with only <b>B1</b>	17.
M0.7	Humidification Desird: 50.0%±0.0	Value of desired humidification and adjustment by set-point adjuster R% (only if configured)	Appears if <b>B6</b> connected	18.
M0.8	Humidification Compensat : ±00	Compensation humidification calculated by controller for intervention supply air limits.	Appears if <b>B6</b> & <b>B7</b> connected & if <b>M2.5</b> is LIM HUMID SUP	18.1
M0.9	Dehumidification Desird: 60.0%±0.0	Value of desired humidification & adjustment by set-point adjuster R% (only if configured).	Appears if <b>B6</b> connected	18.
M0.10	Dehumidification Compensat : ±00	Compensation of dehumidification calculated by controller.	Appears if <b>B4</b> & <b>B6</b> connected and if <b>M2.4</b> is DEW POINT	19.2
M0.11	Preheating T Minimum: 10.0c Dewpoint T Minimum: 10.0c	Minimum temp. Pre-heating or Dew Point.	Appears if <b>B4</b> connected & if <b>M2.4</b> is PREHEATING Appears if <b>B4</b> connected & if <b>M2.4</b> is DEW POINT	19.1.2
M0.12	Preheating T Calc : 16.0c±0.0 Dew Point T Calc : 16.0c±0.0	Calculated temp. of Pre-heating or of Dew Point. Manual adjustment of calculated value.	Appears if <b>B4</b> connected & if <b>B4</b> & if <b>M2.4</b> is PREHEATING Appears if <b>B4</b> connected and if <b>M2.4</b> is DEW POINT	19.1.2
M0.13	Heat T SupplyAir Calculated: 22.0c	Supply air temp. calculated by Heating control.	Appears if <b>B1</b> & <b>B3</b> connected	24.3
M0.14	Cool T SupplyAir Calculated: 35.0c	Supply air temp. calculated by Cooling control.	Appears if <b>B1</b> & <b>B3</b> connected	24.3
M0.15	SupplyAir temp Actual : 22.0c	Actual supply air temp. measured by B1.	Appears if <b>B1</b> & <b>B3</b> connected	24.3
M0.16	Outside T: -2.0c OutsideHum : 50% OutsideT: -2.0c SupAirHumi : 50%	Actual outside temp. Actual outside humidity.	Outside T: Appears if <b>B2</b> connected Outside hum: Appears if <b>B7</b> connected & if <b>M2.5</b> is OUTSIDE HUMIDITY SupAirHumi.: Appears if <b>B7</b> connected & if <b>M2.5</b> is SUPAIR HUMID LIM	24.3
M0.17	Room h: 65Kj/Kg Outs h: 44Kj/Kg	Actual room enthalpy. Actual outside enthalpy.	Appears if <b>B2</b> , <b>B3</b> , <b>B6</b> & <b>B7</b> connected and if <b>M2.12</b> is DAMP. ENTHALPY	24.3
M0.18	Des PreHea: 15.0c Act PreHea: 15.0 Des DewP : 15.0c Act DewP : 15.0c	Pre-heating or Dew Point Des. = calculated temp. + adjustment Act. = temp. measured by sensor B4.	Appears if <b>B4</b> connected & if <b>M2.4</b> is PREHEATING Appears if <b>B4</b> connected & if <b>M2.4</b> is DEW POINT	24.3
M0.19	Y1-Heating : 100% Y2-Cooling : 100%	Load value assigned to output Y1 Load value assigned to output Y2	Y1 - Y2 : PREHEAT ; HEATING ; AUXHEAT ; ; COOLING; COOL+DEHUM	24.3
M0.20	Y3-HUMIDIF: 100% Ys-DAMP TEM: 100%	Load value assigned to output Y3 Load value 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	Settings: Time; Day of week; Date Current time period; GMT or BST	For data recording only. BST entered in <b>M0.21</b>	
M0.22	BST AUT Fr: 26.03 to: 28.10	Dates of start and end of BST period.	For data recording only.	
M0.23	XTU 644 C1 Eng. Vers.xx	Identity data of controller		

<b>M1. SETTING</b>				
Ref.	Display	Description	Notes	Sect.
M1.1	Temper : Room Prop Band : ± 2.0c Temper : Supply Air Prop Band : ± 10.0c	Proportional Band Heating in °C. If <b>B3</b> or <b>B1 &amp; B3</b> connected If only <b>B1</b> connected	This is the base value from which the controller, using the multipliers entered in the CONFIGURATION CONTROLLER menu, derives the Proportional Bands of the other functions.	16.2
M1.2	Temper Integ Time : 10m Temp: Supply Air Integ Time : 10m	Heating & Cooling Integral Time in minutes.	Appears if <b>B3</b> or <b>B1 &amp; B3</b> connected  Appears if only <b>B1</b> is connected	16.2
M1.3	Temper : Supply Air Integ Time : 10m	Integral Time of heating & cooling supply air temperature.	Appears if <b>B1 &amp; B3</b> connected	16.2
M1.4	Heating SupAir Min: 18c Max: 50c	Limits of heating supply air temperature. Range of PB room heating..	Appears if <b>B1 &amp; B3</b> connected	16.4
M1.5	Max Heating Limit SupAir Room: 40c	Maximum temp. limit of supply air in relation to difference between calculated supply air temp. and actual room temp. to prevent air stratification.	Appears if <b>B1 &amp; B3</b> connected	16.4
M1.6	Cooling SupAir Min: 8c Max: 25c	Cooling supply air temp. limits Range of PB room cooling.	Appears if <b>B1 &amp; B3</b> connected	16.4
M1.6 Bis	Ambient Authority MinFlowHeat: 0.0c	Ambient Authority on minimum heating flow temperature		16.4
M1.7	Max Cooling Limit SupAir Room: 40c	Minimum limit temp. supply air in relation to difference between calculated supply air temp. and actual room temp. in order to avoid air condensation.	Appears if <b>B1 &amp; B3</b> connected	16.4
M1.8	Heating Comp. : NO DOT: -10c DST: 50c	Climatic variation of winter supply air. temp. DOT = Design Outside d temp. DST = Design Supply air temp.	Appears if <b>B1 &amp; B2</b> connected & <b>B3</b> not connected.	17.1
M1.9	Cooling Coom. : NO DOT: +35c DST: 10c	Climatic variation of summer supply air temp. DOT = Design Outside d temp. DST = Design Supply air temp.	Appears if <b>B1 &amp; B2</b> connected & <b>B3</b> not connected.	17.1
M1.10	Summer Compen: NO Diff. O.T - R.T: 6c	Summer compensation: NO; YES. Difference O.T. - R.T. = maximum difference permitted between outside temp. and desired summer room temp. above which desired temp. is increased by 1°C for each °C increase in outside temperature.	Appears if <b>B2 &amp; B3</b> or <b>B1, B2</b> and <b>B3</b> connected	17.2
M1.11	Relative Humidity PropBand: ± 6.0%	Proportional Band for humidification and dehumidification as %.	Appears if <b>B6</b> connected	18.
M1.12	Relative Humidity Integr Time: 10m	Integral Time for Humidification, for Dehumidification and for Dew Point in minutesti	Appears if <b>B6</b> connected	18.
M1.13	Flow Humidity Min: 1% Max: 99%	Supply air humidity limits.	Appears if <b>B7</b> connected and if <b>M2.5</b> is FLOW HUM. LIMIT.	18.1
M1.14	SupAir Humidity Influence : 5%	Authority supply air humidity limits over desired humidification value.	Appears if <b>B7</b> connected and if <b>M2.5</b> is FLOW HUM. LIMIT.	18.1
M1.15	Ys - Outside Air Minimum : 0%	Minimum percentage opening outside air damp-er.	Appears only if <b>M2.12</b> is DAMP. TEMPERATURE or DAMP ENTHALPY or DEHUMIDIFICATION.	22.6
M1.16	Ys - Rapid Warm-up function : NO	Closure outside air in period on switching on site: YES; NO.	Appears only if <b>M2.12</b> is DAMP TEMPERATURE or DAMP ENTHAL or DEHUMIDIFYING.	22.7
M1.17	WinOutside T: 20c Delay : 24hrs	Outside temp. for switching to Winter. Time for witch outside temp. must remain below value set before switching to Winter.	Appears only if <b>M2.2</b> is FR. OUTSIDE T.	23.
M1.18	SumOutside T: 25c Delay : 4ore	Outside temp. for switching to Summer. Time for which outside temp. must remain above value set before changing to Summer..	Appears only if <b>M2.2</b> is FR. OUTSIDE T.	23.
M1.19	Minim Outside T Heat Pump : + 0c	Outside temp. for switching off Heat Pump.	Appears only if to one of outputs Y1 or Y2 has been assigned function HEATPUMP	20.2

M2. CONFIGURATION CONTROLLER				
Ref.	Display	Description	Notes	Sect.
M2.1	<b>Config sensors</b> - - - - - - - -	Configuration sensors connected (inputs B-M).. - = sensor not connected; Number = sensor connected. Factory setting: no sensor configured.	1 : Supply air temp. sensor <b>B1</b> . 2 : Outside temp. sensor <b>B2</b> . 3 : Room or extract air sensor <b>B3</b> . 4 : Pre-heating or dew-point sensor <b>B4</b> . 5 : Set-point adjuster <b>Rt°</b> . 6 : Room humidity sensor <b>B6</b> . 7 : Outside humidity or supply air limit <b>B7</b> sensor 8 : Humidity set-point adjuster <b>RH</b> .	15.
M2.2	<b>Season switching</b> NO	Season switching : NO; WINTER; SUMMER; BY cs CONTROL; BY OUTSIDE T; BY ROOM T.	.	23.
M2.3	<b>Output 8-9-10:</b> <b>CONTROL</b>	Type of use 8-9-10 : CONTROL: used for control output Y3. SEASON CONTROL: used for changing site season functioning.	Does not appear if <b>M2.2</b> is NO; in this event the output is automatically used for control Y3.	18. 23.1
M2.4	<b>Use sensor B4</b> <b>PREHEATING</b>	Use of sensor B4 : PREHEATING; DEW POINT	Appears if <b>B4</b> connected	19.
M2.5	<b>Use sensor B7</b> <b>OUTSIDE HUMIDITY</b>	Use of sensor B7 : OUTSIDE HUMIDITY; FLOW HUM. LIMIT	Appears if <b>B7</b> connected	18.1 22.2
M2.6	<b>Y1 : MODULATING</b> <b>Run Time : 120s</b>	Output Y1: MODULATING; 2 STAGES; 3 STAGES Actuator run time in seconds.	Run time: Appears only if MODULATING	21.
M2.7	<b>Y1 : HEATING</b> <b>Y1 - Win : HEATING</b> <b>Y1 - Sum : HEATING</b>	Action of output Y1. Appears if <b>M2.2</b> is NO Action of output Y1 in season periods. Appears if <b>M2.2</b> is not NO	Choice type of action : PREHEAT; HEATING; AUXHEAT; HEATPUMP; COOLING; COOL + DEHU; OFF.	21.
M2.8	<b>Y2 : MODULATING</b> <b>Run Time : 120s</b>	Output Y2 : MODULATING; 2 STAGES; 3 STAGES. Actuator run time in seconds.	Run time: Appears only if MODULATING	21.
M2.9	<b>Y2 : COOLING</b> <b>Y2 - Win : COOLING</b> <b>Y2 - Sum : COOLING</b>	Action of output Y2. Appears if <b>M2.2</b> is NO Action of output Y2 in season periods. Appears if <b>M2.2</b> is not NO	Choice type of action: PREHEAT; HEATING; AUXHEAT; HEATPUMP; COOLING; COOL + DHU; OFF..	21.
M2.10	<b>Y3 : MODULATING</b> <b>Run Time : 120s</b>	Output Y3 : MODULATING; 2 STAGES; 3 STAGES Actuator run time in seconds.	Appears only if <b>M2.3</b> is CONTROL Run Time: Appears only if MODULATING	21.
M2.11	<b>Y3 : HUMIDIF</b> <b>Y3 - Win : HUMIDIF</b> <b>Y3 - Sum : OFF</b>	Action of output Y3. Appears if <b>M2.2</b> is NO Action of output Y3 in season periods. Appears if <b>M2.2</b> is not NO	Choice type of action : if <b>M2.3</b> is CONTROL: HUMIDIF; HEATING; AUX- HEAT; OFF.. if <b>M2.3</b> is CONTROL SEASON: HUMIDIF; OFF.	21.
M2.12	<b>Ys - Control :</b> <b>DAMPERS TEMPERAT</b>	Choice type action output Ys : DAMPERS TEMPERAT; DAMPERS ENTHALPY; HUMIDIFICATION; DEHUMIDIFICATION; RECU- PERATOR	DAMPERS ENTHALPY appears: only if <b>M2.5</b> is OUTSIDE HUMIDITY	22.
M2.13	<b>Sending Alarms : NO</b> <b>PassWTeleman : NO</b>	Alarm transmission enabled. Telemangement password enabled.	Required only if C-Bus connections	10.4
M2.14	<b>Address : ---</b> <b>Group : -</b>	Telemangement address of controller Group to which controller assigned	Required only if C-Bus connections	10.3
M2.15	<b>Functional Alarms</b> - - - - 8	Enabling functional alarms. Factory setting: only 8 enabled (cannot be dis- abled)	1 : Difference temp. supply air <b>B1</b> 3 : Difference temp. room <b>B3</b> 4 : Difference temp. pre-heating or Dew Point <b>B4</b> 6 : Difference humidity <b>B6</b> . 8 : Internal alarm clock	25.1
M2.16	<b>Sensor alarms</b> - - - -	Enabling sensors alarms. Factory setting: all disabled)	1 : Fault sensor supply air temp <b>B1</b> 2 : Fault sensor outside temp <b>B2</b> . 3 : Fault sensor room temp <b>B3</b> 4 : Fault sensor pre-heating or dew point <b>B4</b> .	25.2
M2.17	<b>CBUS speed</b> <b>1200bps</b>	The speed of the communication bus (C-Bus) can be chosen from: 1200, 2400, 4800, 9600 bouds.	The speed must be chosen above all on the basis of the other devices on the site and on the type of modem use	24.1
M2.18	<b>Choice keynumber</b> - - - -	Choice keynumber for disabling use + and - keys 1901 ... 1999	To eliminate keynumber press + and - together.	24.1
M2.19	<b>Site Name</b> - - - - - - - -	Entering site name.	Use + and - to enter letters or numbers. Use ← and → to change position.	24.2

<b>M2. CONFIGURATION CONTROLLER</b>				
Ref.	Display	Description	Notes	Sect.
	<b>TECHNICAL PAGES PRESS + KEY</b>			
M2.20	<b>PB Supply Air - PB Room x5.0</b>	Multiplier to derive PBs of supply air temperatures from room PBs.	Appears if <b>B1</b> and <b>B3</b> connected	<b>16.2</b>
M2.21	<b>PB Cooling = PB Heating x0.5</b>	Multiplier to derive Pbs of cooling temperatures from heating Pbs.	Appears if to one of outputs has been assigned the function COOL or COO + DEHU.	<b>16.2</b>
M2.22	<b>PB Preheating = PB SupAHeat x1.0</b>	Multiplier to derive PB of Preheating temperature from PB of heating supply air..	Appears if <b>B4</b> connected and if <b>M2.4</b> is PREHEATING.	<b>16.2</b>
	<b>PB Dew Point = PB HeatRoom x1.0</b>	Multiplier to derive PB of Dew Point temp. from PB room heating.	Appears if <b>B4</b> connected and if <b>M2.4</b> is DEW POINT.	
M2.23	<b>PB Dampers = PB HeatRoom x1.0</b>	Multiplier to derive PB damper control from PB room heating.	Appears if <b>B2</b> and <b>B3</b> connected and if <b>M2.12</b> is DAMPERS TEMPERAT or DAMPERS ENTHALPY	<b>16.2</b>
	<b>dt Recuperator = PB RoomHeat x1.0</b>	Multiplier to derive PB of recuperator control from PB room Heating.	Appears if <b>B2</b> and <b>B3</b> connected and if <b>M2.12</b> is RECUPERATOR	
M2.24	<b>PB Aux Heating = PB RoomHeat x1.0</b>	Multiplier to derive PB of auxiliary heating control from PB room heating.	Appears if one of outputs has been assigned the function AUXHEATING and only <b>B3</b> is connected.	<b>16.2</b>
	<b>PB Aux Heating = PB SupAHeat x1.0</b>	Multiplier to derive PB auxiliary heating control from PB heating supply air.	Appears if one of outputs has been assigned the function AUXHEATING and <b>B1</b> or <b>B1</b> and <b>B3</b> connected.	
<b>M3. TESTING</b>				
Ref.	Display	Description	Notes	Sect.
M3.1	<b>Output :Y1 MODUL. Status :IDLE</b>	Choice outputs to test. Choice output status.	Choice output : 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 ; Choice status: With Y.. MODUL. : IDLE ; CLOSES ; OPENS. 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	<b>26.</b>





**Amendments to data sheet**

Data	Revisione No.	Page	Section	Details of amendments	Firmware version	Software version
18.01.06 AM		3	7.6 Examples use inputs D-E1-E2	In last diagram bottom right switches c1 & cs have been reversed		
17.05.06 AM		12	14. Example control sites	Correction to wiring diagram section 14.3		
30.10.06 AM		various	Examples of sites	Corrected all wiring diagrams by reversing terminals E2 - D		
08.01.08 AM	<b>01</b>	various	7. Wiring diagrams 11. Examples of temperature & .... 12. Examples of use Ys output	The numbers of the terminals shown in the actuators have been eliminated	14	≥ 098.2185
01.09.09 VM	<b>02</b>	various 26 23 15 - 27	various M.0 Normal use 24.1 transmission speed 16.4 Control with room sensor....	Change to version C1. Modified display M0.22 automatic change GMT/BST Added C-Bus speed display, Added Ambient Authority display (M1.6 Bis)	1	≥ 098.2650
22.11.10 VM	<b>03</b>	4	8. Wiring	Wiring procedure modified	1	≥ 098.2650

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