HPAL
POLA CE
TO 400V/R3 PHASE
14 15 16
RELAYS EXTENSION
LINE NO RYA NCNO RYB NC
L N 3 4 5 6 7 8

230V LINE
Temperature alarm

HPAL DOTATION CABLE

Humidity probe connection

29 30

HALI
power supply
- 12V +

4-20mA
Humidity probe
RHP4

HD40
SL 6.5
Greenhouse controller
Handbook

EXPANSION

Ambient temperat. probe
Soil temperature probe
Limit Heat temperature probe
Luminosity LX probe
Humidity probe
4-20mA
Left anemometer
Right anemometer
N.O. contact signal
Pluviometer
N.O. contact signal

21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
in.1 in.2 in.3 in.4 in.5 in.6 in.7 in.8

CE
POLA
HD40

MICROCOMPUTER

1,5 VA
4A AC1 4A AC1 4A AC1 4A AC1 4A AC1 4A AC1

CM UA UB
41 42 43

LINE no.1 no.2 no.3 no.4 no.5 no.6
L N 3 4 5 6 7 8 9 10 11 12 13 14

230V LINE

Ridge 1 flap Close
Ridge 1 flap Open
Ridge 2 flap Close
Ridge 2 flap Open
Lateral flap Close
Lateral flap Open

N.O contacts (normally opened free to voltage) max 4AMP AC1.

CE
RELAYS EXTENSION
POLA
HDY6

1 VA
4A AC1 4A AC1 4A AC1 4A AC1 4A AC1 4A AC1

CM UB
41 43

LINE no.1 no.2 no.3 no.4 no.5 no.6
L N 3 4 5 6 7 8 9 10 11 12 13 14

230V LINE

Shading Close
Shading Open
Base heating "heat"
Base heating "cool"
Help heating "heat"
Help heating "cool"

N.O contacts (normally opened free to voltage) max 4AMP AC1.

25.3°C

RIDGE LATER SHADE HEAT BLOCK
1 2 BASE HELP NIGHT DEHUM ALARM RAIN WIND L WIND R

AMBIENT LUX HEAT NIGHT DEHUM ALARM

HD40 Green-house controller

POLA ® CE

03.12.07

POLA ®

D) During the dehumidification phase (obtained by *H.dEu* setting and can be executed under **DEHUM** key), the **DEHUM** lamp flashes in order to show the dehumidification cycle that is working (the humidity obtained inside excees the desired one) and this type of working operates:

- By day: ridge and lateral windows close completely to open then the ridges of a percentage (*PC.ri*) for a time period (*On.Co*) after that they open the ridges and after a time period (*Of.dE*) they switch on the heating of help for a certain time (*On.dE)*, after that they switch off it and wait for a certain time (*OF.dE*).

- By night: ridge and lateral windows close completely, the shading opens of a percentage (*PC.Sh*) for a time period (*On.Sh*) after that the shading closes and repeats the preceding opening cycle, after that the same dehumidification cycle is included as explained by day condition.

- The dehumidification cycle remains till when the dehumidification condition **DEHUM** is inserted. If one of the ridge or lateral windows is going to open, the dehumidification condition is not inserted.

E) The base heating working (**BASE**) can be done with three different ways (see *INSt , tYPE* function; anyway it works in a proportional way till when the limit probe operates):

tYPE=0: the base heating works with the soil probe and the limit probe is present. The limit function operates in a proportional way on the cold of the base heating (see **COSt** *bC.Li*, *0n.Li*, *OF.Li* function).

tYPE=1: the base heating works with the environmental probe and the limit probe is not present.

tYPE=2: the base heating works with the environmental probe and the limit probe is present. The limit function operates in this way: when the limit temperature is exceed (*t.Lin*) the programmed set on the base heating (programmed under **HEAT** key, *t.BAS* function) diminishes del valore *dE.Li* (see **COSt**). The heating is reduced during the night phase (**NIGHT)**.

(***1**) During these conditions if the relative ambient temperature goes under the programmed value (*t.SEt $\pm$ r.CO.1* for left windows of the ridge, *t.SEt $\pm$ r.CO.2* for right windows of the ridge, *t.SEt $\pm$ r.LAt* for Lateral windows) the relative windows can be completely closed till the temperature isn't rising again (during this phase the lamp of closing windows flashes).

N.B. If it happens that at the same time tha anenometer and the pluviometer intervene, priority will be given to wind condition (anemometric intervention)

INSTALLATION

How to connect the sensors
Connect the sensor provided as shown in the diagram. For remote connections use a standard 0.5-square millimeter two-pole wire , taking great care over the connections, by insulating and sealing the joins carefully. *-O.C.-* is displayed when the temperature sensor wiring is open, *-S.C.-* is displayed when the temperature sensor wiring is short circuit.

How to connect the line
Connect line on terminals **L-N**. Protect supply with adequate fuse.

How to connect the contacts
Output **3-4......13-14** contacts are N.O. (Normally Opened free of voltage) on wich is apliable a 4AMP AC1 maximum load.

PARTICULAR CONDITIONS OF WORKING.

With conditions of normal working the window of ridge and lateral, the base heating and of help are actioned in floating - proportional (see *Operative Diagrams*) way according to the temperature obtained from its temperature probe, the shading can be regulated according to the survey of the luminosity probe; with the conditions under explained the normal working is left.

A) When the pluviometer intervenes (inserted **RAIN** condition) this type of working operates:

- The ridge window s (**RIDGE**) close completely (see **InSt**, *t.ri.1* and *t.ri.2* function) to open then of a percentage (see **COSt** *P.ri.r* function) and can stay in this position (***1**) till the pluviometer intervention remains.

- The lateral windows (**LATER**) close completely (see **InSt**, *t.LAt* function) to open then of a percentage (see **COSt**, *P.r.LA* function) and can stay in this position till the pluviometer intervention remains.

The working of lateral window can be programmed in a way *(P.r.LA = 100)* that cannot undergo any changes when the anemometer intervenes, but they can still go on working according to the servey of the environment temperature.

B) When the anemometer intervenes (**WIND L or WIND R**) this type of working operates:

- The ridge left windows (**RIDGE 1**) closes completely till the wind left signal remains.

- The ridge right windows (**RIDGE 2**) closes completely till the wind right signal remains.

- The lateral windows (**LATER**) close completely to open then of a percentage (see **InSt** *t.LAt* function) and can stay in this position (***1**) till the anemometer intervention remains.

The working of lateral window can be programmed in a way *(P.u.LA = 100)* that cannot undergo any changes when the anemometer intervenes, but they can still go on working according to the servey of the environment temperature.

C) During the night phase (obtained by *L.niG* setting and it can be executed under **NIGHT** key and in any case by another timr limit of inserction ,see **InSt** *S.Nig* function) this type of working operates:

- The heating night reduction is connected (see **COSt** , *rEd.H* function).

- The shading (**SHADE**) closes completely (night thermal shade).

- When the night condition ends (determined from the statement *L.dAy* praticable under the **NIGHT** key and in any case from a limit yime of inserction, see **InSt** , *E.Nig* function) the heating night reduction is not connected, while the shading **SHADE** waits for a time (see **Inst** ,*d.nig* function) to open then at impulses (see **COSt** , *On.Lu* and *OF.Lu* function).

During the day the closing can work without impulses and can have a limit in percentage (see COSt , *PC.Lu* function) if it is required by the luminosity probe.

The opening and closing working according to the daily luminosity change has a delay of a certain time (see **COSt** , *OP.Lu* and *CL.Lu* function).

MAIN SETTINGS *(Run Mode)*
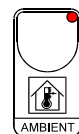
TEMPERATURE SETTING.
Press **AMBIENT** for least 1/2 second:(key lamp flashes): This message will be displayed instead of the *°Set ambient temperature value*.
Press **+** or **-** to modify, press **AMB** to exit.
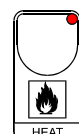
LUMINOSITY SETTINGS:
Press **LUX** for least 1/2 second:(key lamp flashes): This message will be displayed instead of the *KLux Set Luminosity*.
Press **+** or **-** to modify, press **LUX** to exit.

HEAT TEMPERATURE SETTING.
Press **HEAT** for least 1/2 second:(key lamp flashes): This message will be displayed instead of the *Set Base-heat temperature value*.
Press **+** or **-** to modify, press **HEAT** to confirm.

At this point this messagge will be displayed instead of the *Set Help-heat temperature value*.
Press **+** or **-** to modify, press **HEAT** to exit.

NIGHT REDUCTION SETTINGS.
Press **NIGHT** for least 1/2 second:(key lamp flashes): This message will be displayed instead of the *Klux Set daily condition value*.
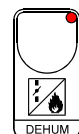Press **+** or **-** to modify, press **NIGHT** to confirm.

At this point this message will be displayed instead of the *Klux Set night condition value*.
Press **+** or **-** to modify, press **NIGHT** to exit.

DEHUMIDIFICATION SETTINGS.
Press **DEHUM** for least 1/2 second:(key lamp flashes): This message will be displayed instead of the *%Rh set ambient dehumidification value*.
Press **+** or **-** to modify, press **DEHUM** to exit.

ALARM SETTINGS.

Press **ALARM** for least 1/2 second:(key lamp flashes):
This message will be displayed instead of the
°*Set Minimum Alarm temperature value*.
Press **+** or **-** to modify, press **ALARM** to confirm.

At this point this message will be displayed instead of the
°*Set Maximum Alarm temperature value*.

Press **+** or **-** to modify, press **ALARM** to exit.

VIEWING TEMPERATURE S (AND HUMIDITY)

Pressing the relative key for at lest 1/2 second (otherwise the function starts to operate in programming) on display will appear (when the key isn't pressed) the obtained temperature of the ambient probe (led of relative key on).
In the case of circuit opening of relative temperature probe on display will appear ***-O.C.-*** message, for short cirucit ***-S.C.-*** message.
The **RIDGE** windows, the **LATERAL** windows and the temperature **ALARM** work with the data of ambient probe, the **SHADE** works with the data of luminosity probe, the **HEAT-HELP** work with the data of Ambient probe (if the Limit probe is connected, to view it press more than 2 seconds the **HEAT** key).
If the Humidity probe is connected, pressing **DEHUM** key for less than 1/2 second (otherwise the function starts to operate in programming) on display will appear (when the key isn't pressed) the obtained humidity of the probe (led **HUM** key on).

VIEWING TEMPERATURE RECORDING

Press **+** : will be displayed followed by
°*Maximum Temperature Recording.*
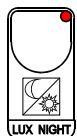Press **-** : will be displayed followed by
°*Minimum Temperature Recording.*
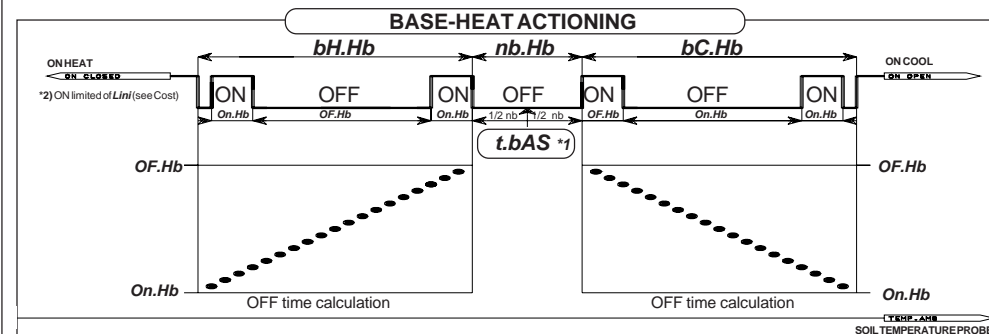Values recorder are memory permanent stored: for memory clear keep pushed **+** keys for more than 3 seconds:
***CLEA*** message will be composed on display before clearing operation.

CLOCK SETTING.

Press together **+** **-** **NIGHT** for AT least 1 second;
on display will appear *the current Hour and minutes* (release now keys).
Press **+** or **-** to program ,
press **NIGHT** to exit.

BASE-HEAT ACTIONING

Note: during the **NIGHT** phase the Heating set changes (see **COSt** , **rEd.h** function).
The Max. temperature of the water is limited by **t.Lin** setting (see **Cost**), that is obtained with Limit probe.

HELP - HEAT ACTIONING
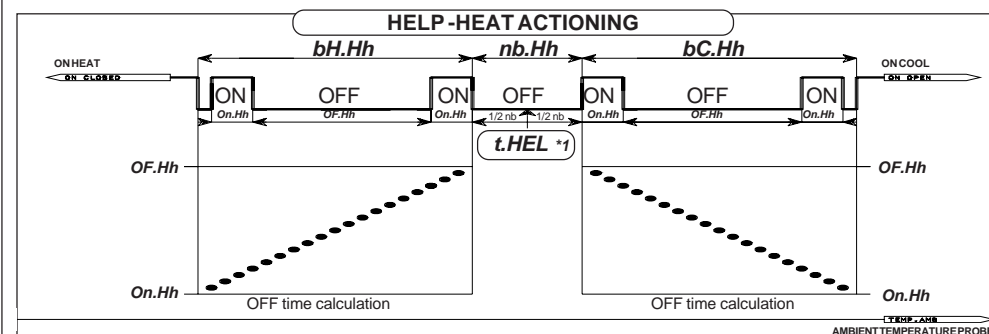
Note: with ***0n.Hh=0.0"*** and ***OF.Hh =0.0"*** the actioning of Heating can be obtained in on/off mode (for convectors, etc.).

*1) During **NIGHT** phase this set is substracted of the night reduction value that is programmed in **COSt** , **rEd.h** function.
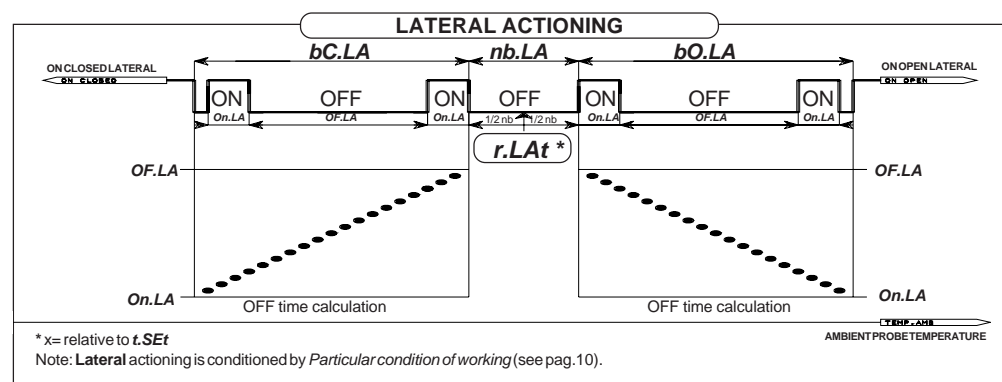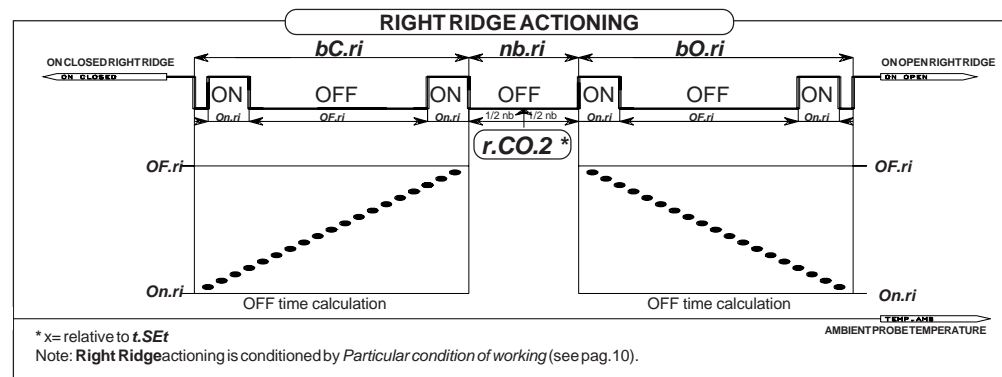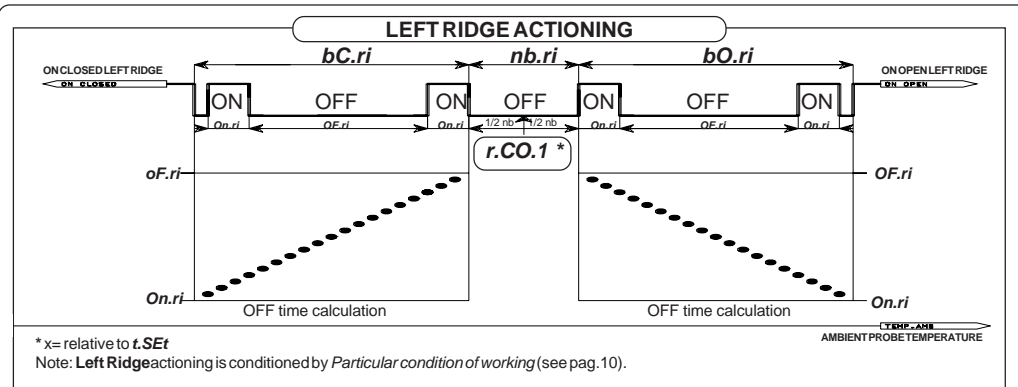
*2) When the obtained temperature of Limit probe exeeds the programmed **t.Lin** value (see **Cost**) you have to operate in this way:

  tYPE=0: the base heating works with the soil probe and the limit probe is present. The limit function operates in a proportional way on the cold of the base heating (see COSt , function **bC.Li**, **0n.Li**, **OF.Li**).

  tYPE=1: the base heating works with the environmental probe and the limit probe is not present.

  tYPE=2: the base heating works with the environmental probe and the limit probe is present. The limit function operates in this way: when the **t.Lin** limit temperature is exceed the programmed set on the base heating diminishes (set under **HEAT** key, **t.BAS** function) of **bC.Li** value (see **COSt**).

LEFT RIDGE ACTIONING

ON CLOSED LEFT RIDGE — ON CLOSED

bC.ri | nb.ri | bO.ri

ON OPEN LEFT RIDGE — ON OPEN

ON | OFF | ON | OFF | ON | OFF | ON

On.ri | OF.ri | On.ri | 1/2 nb ↑ 1/2 nb | On.ri | OF.ri | On.ri

r.CO.1 *

oF.ri — OF.ri

On.ri — On.ri

OFF time calculation | OFF time calculation

AMBIENT PROBE TEMPERATURE — TEMP.-AMB

* x= relative to *t.SEt*
Note: **Left Ridge** actioning is conditioned by *Particular condition of working* (see pag.10).

RIGHT RIDGE ACTIONING

ON CLOSED RIGHT RIDGE — ON CLOSED

bC.ri | nb.ri | bO.ri

ON OPEN RIGHT RIDGE — ON OPEN

ON | OFF | ON | OFF | ON | OFF | ON

On.ri | OF.ri | On.ri | 1/2 nb ↑ 1/2 nb | On.ri | OF.ri | On.ri

r.CO.2 *

OF.ri — OF.ri

On.ri — On.ri

OFF time calculation | OFF time calculation

AMBIENT PROBE TEMPERATURE — TEMP.-AMB

* x= relative to *t.SEt*
Note: **Right Ridge** actioning is conditioned by *Particular condition of working* (see pag.10).

LATERAL ACTIONING

ON CLOSED LATERAL — ON CLOSED

bC.LA | nb.LA | bO.LA

ON OPEN LATERAL — ON OPEN

ON | OFF | ON | OFF | ON | OFF | ON

On.LA | OF.LA | On.LA | 1/2 nb ↑ 1/2 nb | On.LA | OF.LA | On.LA

r.LAt *

OF.LA — OF.LA

On.LA — On.LA

OFF time calculation | OFF time calculation

AMBIENT PROBE TEMPERATURE — TEMP.-AMB

* x= relative to *t.SEt*
Note: **Lateral** actioning is conditioned by *Particular condition of working* (see pag.10).

INSt PROGRAMMING *(Installation constants)*

These settings refer to the mode of operation of the system and must be made on initial start-up.

Press together **- / + / LUX** for at least one second: **INSt** message will be displayed. The **INSt** messages are displayed in sequence if you press **+** to go forward or **-** to go back.

When you reach the messagge required (see table below) press **+** or **-** to set a new value and then **ALARM** to confirm.

The next system constant will then appear.

You can press **LUX** to escape and return to the *Run Mode*.

Mess.	Value	Meaning	
t.ri.1	60"	Seconds total actioning time Ridge 1 window	*1)
t.ri.2	60"	Seconds total actioning time Ridge 2 window	*1)
t.LAt	60"	Seconds total actioning time Lateral window	*1)
t.SHA	60"	Seconds total actioning time Shadow window	*1)
S.nig	20.00	Time (hours and minutes) of certain Night start condit.	*2)
E.nig	05.00	Time (hours and minutes) of certain Night end condit.	*2)
d.nig	00.00	Hours and minutes of morning shading delay	*3)
tYPE	=0	Heating type	*4)
A.in.1	0.0°	°C correction Environmental temperature probe	*5)
A.in.2	0.0°	°C correction Soil temperature probe	*5)
A.in.3	0.0°	°C correction Limit temperature probe	*5)
A.in.4	1.00N	Multlipicative factor of humidity probe correction	*5)
A.in.5	0%	Klux correction Luminosity probe	*5)

*1) This time can be used to obtain the sure closing of the different windows, the different percentages of opening and closing of the windows programmed in **COSt** referred to these times.

*2) Inside of these two times the **NIGHT** condition is certainly inserted, thet normally can be obtained by the luminosity programmed with the **NIGHT** key.

*3) At the end of **NIGHT** condition (see ***2**) the reduction of night heating is immediately connected (see **COSt** , *red.n* function), while the programmed opening of shading (see **COSt** , *On.Lu* and *OF.Lu* function) is delayed of this time.

*4) *tYPE=0*: the base heating works with the soil probe and the limit probe is present. The limit function operates in a proportional way on the cold of the base heating (see COSt , function *bC.Li*, *0n.Li*, *OF.Li*).
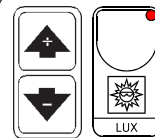
tYPE=1: the base heating works with the environmental probe and the limit probe is not present.

tYPE=2: the base heating works with the environmental probe and the limit probe is present. The limit function operates in this way: when the *t.Lin* limit temperature is exceed the programmed set on the base heating diminishes (setted under **HEAT** key, *t.BAS* function) of *dE.Li* value (see **COSt**).

*5) You can correct the readings on the sensor (**+** or **-**).

COST PROGRAMMING (System constants)
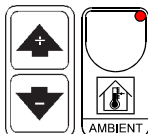
These settings refer to the mode of operation of the system and must be made on initial start-up. Press together **- / + / AMBIENT** for at least one second: the message **C.O.S.t.** will be displayed. The COST messages are displayed in sequence if you press **+** to go forward or **-** to go back. When you reach the messagge required (see table below) press **ALARM** to confirm: set value of this variable will be displayed. Press **+** or **-** to set a new value and then **ALARM** to confirm: the next system constant will then appear.

You can press **AMBIENT** to escape and return to the *Run Mode*.

Mess.	Value	Meaning	Nota
r.CO.1	0.0°	°C shift set Ridge 1 referred to t.SEt	*1)
r.CO.2	0.0°	°C shift set Ridge 2 referred to t.SEt	*1)
r.LAt	0.0°	°C shift set Lateral referred to t.SEt	*1)
nb.ri	0.2°	°C neutral band Ridge 1 and Ridge 2	*2)
bC.ri	5.0°	°C modulation band of closing Ridge 1 and Ridge 2	*2)
bO.ri	5.0°	°C modulation band of opening Ridge 1 and Ridge 2	*2)
On.ri	1.0"	Seconds actioning time in On Ridge 1 and Ridge 2	*2)
OF.ri	60.0"	Seconds actioning time in Off Ridge 1 and Ridge 2	*2)
nb.LA	0.2°	°C Lateral neutral band	*2)
bC.LA	5.0°	°C modulation band of closing Lateral	*2)
bO.LA	5.0°	°C modulation band of opening Lateral	*2)
On.LA	1.0"	Seconds actioning time in On Lateral	*2)
OF.LA	60.0"	Seconds actioning time in Off Lateral	*2)
P.u.LA	0%	% of opening Lateral with WIND intervention (100=excluded)	*3)
P.r.LA	0%	% of opening Lateral with RAIN intervention (100=excluded)	*3)
nb.Lu	5.0	KLux shading neutral band	*3)
On.Lu	1.0"	Seconds on time morning opening	*3)
OF.Lu	60.0"	Seconds off time morning openig	*3)
OP.Lu	0.0"	Seconds delay time opening luminosity probe intervention	*3)
CL.Lu	0.0"	Seconds delay time closing luminosity probe intervention	*3)
PC.Lu	0%	Percentage of shading daily opening	*3)
rEd.H	0.0°	°C temperature of Heat night reduction (0.0=excluded)	*2)
nb.Hb	0.2°	°C neutral band Base heating	*2)
bH.Hb	5.0°	°C modulation band "Heat" Base heating	*2)
bC.Hb	5.0°	°C modulation band "Cool" Base heating	*2)
On.Hb	1.0"	Seconds actioning time in on Base heating	*2)
OF.Hb	60.0"	Seconds actioning time in off Base heating	*2)
nb.Hh	0.2°	°C neutral band Help	*2)
bH.Hh	5.0°	°C modulation band "Heat" Help heating	*2)
bC.Hh	5.0°	°C modulation band "Cool" Help heating	*2)
On.Hh	1.0"	Seconds actioning time in on Help heating	*2)
OF.Hh	60.0"	Seconds actioning time in off Help heating	*2)
t.Lin	50.0°	°C Limit temperature set of soil heating	*3)
bC.Li	5.0°	°C modulation band Limit	*2)
On.Li	1.0"	Seconds actioning time in on Limit	*2)
OF.Li	60.0"	Seconds actioning time in off Limit	*2)
dE.Li	0.0°	°C set decrement Heating Base with present Limit	*3)
P.ri.r	0%	Percentage ridge opening with present RAIN condition	*3)
t.dE.1	0.0"	Seconds of delay time anemometer / pluviometer intervention	*3)
t.dE.2	0.0"	Seconds of delay time anemometer and pluviometer intervention	*3)
On.dE	60"	Seconds of on Heating time in dehumidification	*3)
OF.dE	60"	Seconds of stop Heat/Flap time in dehumidification	*3)
On.CO	60"	Seconds of ridge opening time in dehumidification	*3)
PC.CO	20%	Percentage ridge opening in dehumidification	*3)
On.Sh	60"	Seconds of shade opening time in dehumidification	*3)
PC.Sh	20%	Percentage shade opening in dehumidification	*3)

*1) These sets are relative sets referred to the temperature set on **AMBIENT** key (**t.SEt** function).
For example if you set **r.CO.1=-2.0** , Ridge 1 set = -2.0°C reffered to **t.SEt** setting.
*2) See See pag.**8** *Operative Diagrams.*
*3) See pag.**10** *Operative Diagrams.*

PRESET PROGRAMS (Bootstrap).

At delivery this processor is just programmed with the following (variable) settings.
To return to these settings at any time: press together **+ / - / ALARM** keys for at least one second:
boot message will be displayed.

t.SEt=25.0°   **L.SEt**=50.0L   **t.bAS**=20.0°   **t.HEL**=18.0°   **L.nlg**=0.1L   **L.dAY**=0.5L
H.dEu=90%   **AL._ _=**15.0°   **AL- -=**40.0°
INSt and **COST** value are shown in relative paragraph.

"HAND MODE".

In some start-up conditions may be useful to work in "hand" mode.
Press together **+ / - / HEAT** keys for at least one second:
HAnd messagge will be displayed (release now **+** key).
Push **+** until is displayed number required to be handed (see table relays "**N° Relay**") and push **ALARM** for activing relay.
Pushing again **+** to increase relay number previous relay is disactivated.
You can press **HEAT** to escape and return to the *Run Mode.*

STATUS INDICATION LAMPS.

The lights situated at the bottom of the display show the state of the various relays as set out below.

Led	Azionamento	N° Relay	ContaCTS
RIDGE LEFT	Led flashing : Ridge left closed on	HD40-1	HD40 3-4
"	Led continuous : Ridge left open on	HD40-2	HD40 5-6
RIDGE RIGHT	Led flashing : Ridge right closed on	HD40-3	HD40 7-8
"	Led continuous : Ridge right open on	HD40-4	HD40 9-10
LATER	Led flashing : Lateral closed on	HD40-5	HD40 11-12
"	Led continuous : Lateral left open on	HD40-6	HD40 13-14
SHADE	Led flashing : Shade closed on	HDY6-1	HDY6 3-4
"	Led continuous : Shade left open on	HDY6-2	HDY6 5-6
HEAT BASE	Led flashing : HEAT Base-Heating on	HDY6-3	HDY6 7-8
"	Led continuous : COOL Base-Heating on	HDY6-4	HDY6 9-10
HEAT HELP	Led flashing : HEAT Help-Heating on	HDY6-5	HDY6 11-12
"	Led continuous : COOL Help-Heating on	HDY6-6	HDY6 13-14
ALARM	Temperature alarm on	HPAL-2	HPAL 7-8
NIGHT	Night condition on		
RAIN	Pluviometer signal on		
WIND L	Wind 1 signal on		
WIND R	Wind 2 signal on		