

**Temperature and humidity controller
for seasoning-maturing cabinets**

XLH360

COOL MATE

Operating Instructions



ООО «Промхолод-Ровно»

(098) 111-73-73

(099) 111-61-63

(063) 111-64-63

COOLMATE**XLH360****INDICE**

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1. GENERAL WARNING

1.1 PLEASE READ BEFORE USING THIS MANUAL

- This manual is part of the product and should be kept near the instrument for easy and quick reference.
- The instrument shall not be used for purposes different from those described hereunder. It cannot be used as a safety device.
- Check the application limits before proceeding.

1.2 SAFETY PRECAUTIONS

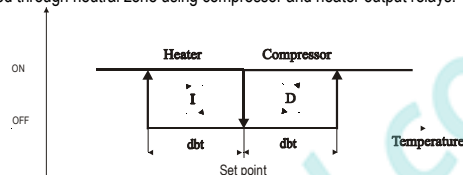
- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical connections before any kind of maintenance.
- Fit the probe where it is not accessible by the End User. The instrument must not be opened.
- In case of failure or faulty operation send the instrument back to the distributor or to "Dixell s.r.l." (see address) with a detailed description of the fault.
- Consider the maximum current which can be applied to each relay (see Technical Data).
- Ensure that the wires for probes, loads and the power supply are separated and far enough from each other, without crossing or intertwining.
- In case of applications in industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful.

2. GENERAL DESCRIPTION

The XLH360 is microprocessor controller, suitable for applications on medium or low temperature refrigerating units. It has 6 output relays to control compressor, heating elements, defrost/extractor fan, fan, de-humidifier/light and humidifier. It has 2 NTC inputs one for thermostat the other one for defrost. It's also present a 4+20mA input for humidity. There is one digital input (free contact) configurable by parameter. An output allows the user to program the parameter list with the "Hot Key".

3. TEMPERATURE REGULATION

The temperature regulation is performed through neutral zone using compressor and heater output relays.



- **Heating output:** CUT IN is "SET TEMP-dbT", CUT OUT is when the temperature reaches the set point.
- **Compressor output:** CUT IN is "SET TEMP+dbT", CUT OUT is when the temperature reaches the set point.

3.1 DEFROST

During defrost the temperature control is disabled.

If the **second relay is configured as defrost: oA2=dEF** then two defrost modes are available through the "tdF" parameter: defrost with electrical heater (tdF=rE) or hot gas (tdF= in). The defrost interval is control by means of parameter "EdF": (EdF=in) the defrost is made every "ldF" time, (EdF=Sd) the interval "ldF" is calculate through Smart Defrost algorithm (only when the compressor is ON). At the end of defrost dripping time started, set by "FdT" parameter. To **disable** the defrost set the **MdF** parameter to **zero**

If **oA2 is different from dEF, defrost is made only by stopping compressor (tdF=rE)**.
To **disable** defrosts set **MdF=0**.

Humidity regulation during defrost depends on the **Hud** parameter.
With **Hud=no** humidity regulation is disabled.
Con **Hud=yES** humidity regulation is performed also during defrost.

4. HUMIDITY REGULATION

The humidity regulation is performed through neutral zone, by humidifying dehumidifying actions.
Humidity control can be disabled setting the **SET %RH** to "nu" value. In this case only the temperature control is perform.

4.1 HUMIDIFYING ACTION

The humidifying action is done enabling the humidifier relay when the humidity is lower than the "SET %RH-dbH" value.
The relay is **switch off** when humidity reaches the set values.

4.2 DEHUMIDIFYING ACTION WITHOUT DEHUMIDIFIER RELAY, OA1 DIFFERENT FROM DEH

In this case the dehumidifying action is performed by setting the following parameters in this way:

tHu = c-H kind of dehumidifying by means of heating and compressor relays

oA1 different from dEH:

The heating and compressor outputs are activated together when humidity is higher than SET %RH+dBH value. Outputs are disabled when humidity comes back to the SET %RH value.

4.2.1 Relation between cooling, heating and dehumidifying

1. If is simultaneously present a request of cooling ($\text{temp} > \text{SET TEMP} + \text{dbt}$) and dehumidifying ($\text{RH} > \text{SET \%RH} + \text{dBH}$): the cooling action has the priority over the dehumidifying action: only the compressor relay is energised till the SET TEMP is reached at this point also the heating relay is enabled.
2. If is simultaneously present a request of heating ($\text{temp} < \text{SET TEMP} - \text{dbt}$) and dehumidifying ($\text{RH} > \text{SET \%RH} + \text{dBH}$): the dehumidifying action has the priority over the heating action: both the compressor and the heating relays are energised till the humidity set is reached at this point only the heating relay is enabled.

4.3 DEHUMIDIFYING ACTION WITH DEHUMIDIFIER RELAY, OA1 = DEH

The configurable relay is used, setting the parameter **oA1 = dEH**.

NOTE: the LIGHT button is not more available; Two kinds of de-humidifying are available:

4.3.1 Dehumidifying action with ONLY de-humidifier relay

By setting the parameter **tHu = db** the de-humidifying action is performed by enabling the de-humidifier relay when the humidity is higher than SET %RH + dBH.

The relay is switch off when humidity comes back to the SET %RH value.

4.3.2 Dehumidifying action with de-humidifier and compressor relays

By setting the parameter **tHu = cHu** the de-humidifying action is performed by enabling the de-humidifier and compressor relays together. when the humidity is higher than SET %RH + dBH. The relays are switched off when humidity comes back to the SET %RH value.

If is simultaneously present a request of cooling ($\text{temp} > \text{SET TEMP} + \text{dbt}$) and dehumidifying ($\text{RH} > \text{SET \%RH} + \text{dBH}$): the cooling action has the priority over the dehumidifying action: only the compressor relay is energised till the SET TEMP is reached at this point also the de-humidifier is enabled.

5. FANS

The fan control mode is selected by means of the "FnC" parameter:

FnC=C-n fans will switch ON and OFF with the compressor and **not run** during defrost;

FnC=O-n fans will run continuously, but not during defrost

FnC=C-y fans will switch ON and OFF with the compressor and **run** during defrost;

FnC=O-y fans will run continuously also during defrost

6. EXTRACTOR FAN**6.1 EXTRACTOR FAN CYCLES**

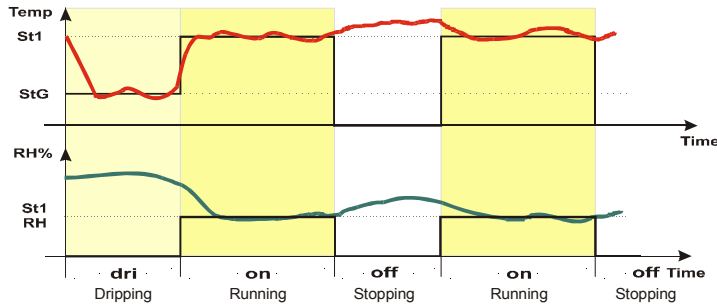
The second relay is configured as extractor fan, **oA2= EST**, then it is possible to make extraction cycles, both manually and automatically.

Extraction cycle can be activated both manually by pushing the UP key for 3s, and automatically by the internal time **rFi**. Cycle duration is set by the **rFd** parameter. The cycle can be stopped also by key.

If **rFi = 0** only manual cycle can be activated.

If **rFd = 0** the cycle is stopped only by pushing the key.

7. MATURING CYCLE WITH DRIPPING, RUNNING AND STOPPING PHASE.



The diagrams displays a typical maturing cycle with the starting dripping phase.

DRIPPING PHASE lasts for the "dri" time, without humidity control, temperature set is SETG

RUNNING PHASE lasts for the "on" time, both temperature and humidity are controlled.

STOPPING PHASE lasts for the "off" time, without any control of temperature and humidity.

The end of the stopping phase is signalled by the internal buzzer and by the "End" message on the display.

After the **STOPPING PHASE** the behaviour of the controller depends on the parameter **trc**, according to the following settings:

trc = co controller maintains the set points of the running phase

trc = in controller stop the regulation at all.

trc = cL controller performs the running and stopping phase till is stopped manually.

trc = cLE as (**trc = cL**) plus at the end of each cycle the **End** label is displayed and the buzzer is switched on.

7.1 HOW TO SET THE DURATION OF THE DRIPPING, RUNNING AND STOPPING PHASES

1. Push the **CLOCK** key, the display shows on the bottom display the "dri" message, while the "hourglass" start flashing.
2. Push again the **CLOCK** the duration of the dripping phase is shown, hh:mm.
3. To set the duration push the **UP** and **DOWN** keys.
4. Push again the **CLOCK** to confirm the time and pass to the setting of the running phase: the "on" message is displayed.
5. Push the **CLOCK** key to see its duration and use the **UP** and **DOWN** keys to set it.
6. Push again the **CLOCK** to confirm the time and pass to the setting of the stopping phase: the "off" message is displayed.
7. Push the **CLOCK** key to see its duration and use the **UP** and **DOWN** keys to set it.
8. Confirm the value by pushing again the **CLOCK** key and pass to the humidity display.



7.2 HOW TO SET THE TARGET HUMIDITY OF THE RUNNING CYCLE


1. Push the **SET %RH** key, the display shows on the bottom display the "SH1" message, while the "set" icon starts flashing.
2. Push again the **SET %RH** the humidity set point of the running phase is shown. Set it using the **UP** and **DOWN** keys. To **disable** the humidity control during the freezing phase set it to "nu".
3. Push again the **SET %RH** to confirm the value and pass to the humidity display.

7.3 HOW TO SET THE TARGET TEMPERATURE OF THE DRIPPING AND RUNNING PHASES

1. Push the **SET TEMP** key, the display shows on the upper display the "StG" message, while the "set" icon starts flashing.
2. Push again the **SET TEMP** the temperature set point of the **running** phase is shown. Set it using the **UP** and **DOWN** keys.
3. Push again the **SET TEMP** to confirm the value and pass to the setting of the **dripping** phase: the "St1" message is displayed.
4. Push the **SET TEMP** key to see its value and use the **UP** and **DOWN** keys to set it.

7.4 HOW TO START THE CYCLE

Push and release **START**  key: the led  will be turned ON.


The  led flashes during the proving phase

7.5 END OF THE CYCLE

When the timer has expired, the buzzer starts sounding and the bottom display shows the "End" message.

To mute the buzzer push a key: the display come back to show the humidity and the LED of the START key is turned off.

7.6 HOW TO STOP THE CYCLE MANUALLY

To stop the cycle manually push the **ON/OFF** key .

7.7 HOW TO MODIFY THE SETTING OF THE CURRENT CYCLE WHILE IT'S RUNNING

To modify the setting of the running cycle temperature (SET TEMP), humidity (SET %RH) or remaining time (CLOCK):

1. Push twice the correspondent key: the setting value of the current phase (dripping or running) will be displayed.
 2. Modify it using the **UP** and **DOWN** keys
 3. Confirm the value using the correspondent key: temperature (SET TEMP), humidity (SET %RH) or remaining time (CLOCK).
- NOTE: the changes made will be memorised. So the next cycle will start with the new values.**

8. THE DISPLAY



	To display and modify target temperature set point. (SET TEMP) for the running (St1) and the dripping (StG) phase.
	To display and modify target humidity set point (SET %RH) of the running (SH1) phase; in programming mode it selects a parameter or confirm an operation.
	In programming mode it browses the parameter codes or increases the displayed value. If oA2=ESt hold it pressed for 3s to start a extraction cycle
	To start a manual defrost: hold it pressed for at least 3s. In programming mode it browses the parameter codes or decreases the displayed value.
	Switch ON and OFF the light, if present (oA1=lig)
	Start: to start the cycle
	Clock: to set the duration of the dripping (dri), running (on) and stopping (off) phases
	Switch ON and OFF the instrument.

KEY COMBINATIONS

	+		To lock and unlock the keyboard
	+		To enter the programming mode.
	+		To exit the programming mode.

8.1 ICONS AND SYMBOLS

Each LED function is described in the following table.

LED	MODE	FUNCTION
	ON	- Instrument in stand by. - In "Pr2" indicates that the parameter is also present in "Pr1".
°C	ON	°C
°C	FLASHING	If measurement unit is °C, it flashing on programming mode
°F	ON	°F
°F	FLASHING	If measurement unit is °F, it flashing on programming mode
	ON	The compressor is running
	FLASHING	- Anti-short cycle delay enabled
	ON	The defrost is enabled
	ON	Heating enabled
set	FLASHING	Temperature Set programming phase
	ON	- ALARM signal
	ON	Fan is running
%RH	ON	RH%
	ON	Dehumidifying enabled
	ON	Humidifying enabled
set (umid)	FLASHING	Humidity Set programming phase
	ON	Running phase is in progress
	FLASHING	Dripping or stopping phase is in progress
	FLASHING	Setting of the duration of the cycle

8.2 HOW TO SEE AND MODIFY THE SET POINT (TEMPERATURE AND HUMIDITY)

1. Push and immediately release the **SET** key: the display will show the Set point value and the correspondent set icon starts flashing;
- Or
2. To change the Set value push the **▲** or **▼** arrows within 10s.
3. To memorise the new set point value push the **SET** key again or wait 10s.

8.3 TO START A MANUAL DEFROST

1. Push the **DEF** key for more than 2 seconds and a manual defrost will start.

8.4 TO START A EXTRACTION CYCLE MANUALLY

- Hold pushed the **UP** key for more than 2 sec.
To stop manually the cycle: when the cycle is running, hold pushed the **UP** key for more than 2 sec.


8.5 TO ENTER IN PARAMETERS LIST "PR1"

- To enter the parameter list "Pr1" (user accessible parameters) operate as follows:
- + 1. Enter the Programming mode by pressing the **SET %RH+ ▼** for few seconds. (°C or °F start flashing)
2. The instrument will show the first parameter present in "Pr1"

8.6 TO ENTER IN PARAMETERS LIST "PR2"

- To access parameters in "Pr2":
1. Enter the "Pr1" level.
 2. Select "Pr2" parameter and press the "**SET %RH**" key.
 3. The "PAS" flashing message is displayed, shortly followed by "0 - -" with a flashing zero.
 4. Use **▲** or **▼** to input the security code in the flashing digit; confirm the figure by pressing "**SET %RH**".
The security code is "321".
 5. If the security code is correct the access to "Pr2" is enabled by pressing "**SET %RH**" on the last digit.

Another possibility is the following: after switching ON the instrument the user can push **SET %RH + ▾** keys within 30 seconds.

NOTE: each parameter in "Pr2" can be removed or put into "Pr1" (user level) by pressing **SET %RH + ▾**. When a parameter is present in "Pr1"  icon is on.

8.7 TO CHANGE PARAMETER VALUES

1. Enter the Programming mode.
 2. Select the required parameter with **▲** or **▾**.
 3. Press the "**SET %RH**" key to display its value (°C or °F icon start blinking).
 4. Use **▲** or **▾** to change its value.
 5. Press "**SET %RH**" to store the new value and move to the following parameter.
- To exit:** Press **SET %RH + UP** or wait 15s without pressing a key.

NOTE: the new programming is stored even when the procedure is exited by waiting the time-out.

8.8 HOW TO LOCK THE KEYBOARD



1. Keep the **▲** and **▾** keys pressed together for more than 3 s the **▲** and **▾** keys.
2. The "**POF**" message will be displayed and the keyboard is locked. At this point it is only possible the viewing of the set point or the MAX o Min temperature stored and to switch ON and OFF the light, the auxiliary output and the instrument.



TO UNLOCK THE KEYBOARD

Keep the **▲** and **▾** keys pressed together for more than 3s.


8.9 ON/OFF FUNCTION



By pushing the **ON/OFF** key, the instrument shows "OFF" for 5 sec. and the ON/OFF

LED is switched ON.

During the OFF status, all the relays are switched OFF and the regulations are stopped;

N.B. During the OFF status the  icon is lighted.

9. PARAMETER LIST

REGULATION

- dbt** **half dead band width for temperature:** (0,1+25,5°C; 1+45°F) this band is place below and above the temperature set point (SET TEMP). The compressor is enabled when the temperature increases and reaches the SET TEMP + dbt value. It is turned off when it comes back to the SET TEMP. The heating output is enabled when temperature is less than SET TEMP -dbt value and disabled when the SET TEMP is reached.
- dbH** **half dead band width for humidity:** (0,5+25,5RH) this band is place below and above the humidity set point (SET %RH). The dehumidifying action is enabled when the humidity increases and reaches the SET %RH + dbH value. It is stopped when it comes back to the SET %RH. The humidifying output is enabled when humidity is less than SET %RH -dbH value and disabled when the SET %RH is reached.
- LS** **Minimum temperature set point limit:** (-50,0°C+SET; -58°F+SET) Sets the minimum acceptable value for the set point.
- US** **Maximum temperature set point limit:** (SET+110°C; SET+230°F) Set the maximum acceptable value for set point.
- Ods** **Outputs activation delay at start up:** (0+255 min) This function is enabled at the initial start up of the instrument and inhibits any output activation for the period of time set in the parameter. (Light can work)
- AC** **Anti-short cycle delay:** (0+30 min) interval between the compressor stop and the following restart.
- thU** **Kind of de-humidifying:** **db:** only with de-humidifier relay (oA1= dEH); **cHu** with de-humidifier and compressor relay (oA1= dEH); **c-H:** without de-humidifier relay, by means of compressor and heating relays (oA1≠ dEH).
- LSH** **Minimum humidity set point limit:** (Lci ÷ Set H) Sets the minimum acceptable value for the humidity set point.
- uSH** **Maximum humidity set point limit:** (Set H ÷ uci) Set the maximum acceptable value for humidity set point.

DISPLAY AND KIND OF REGULATION

- CF** **Measurement unit:** °C= Celsius; °F= Fahrenheit
- rES** **Resolution (for °C):** allows decimal point display. **dE** = 0,1°C; **in** = 1 °C
- rEH** **Resolution for RH%:** **in** = integer; **Hd**= half digit.
- trC** **Kind of behaviour after the end of the cycle**
trC=co the controller goes on working, and maintains the temperature and humidity of the running phase, till the controller is stopped.
trC=in at the end of the stopping phase the controller gives the "End" message, the buzzer is turned on, and the regulation is stopped.
trC=cL at the end of the stopping phase the controller gives the "End" message, the buzzer is turned on, and the regulation restarts from the running phase

trC=cLE at the end of the stopping phase the regulation restarts from the running phase.

DEFROST

tdF	Defrost type: rE = electrical heater (Compressor OFF); in = hot gas (Compressor and defrost relays ON)
EdF	Defrost mode: in = interval mode. The defrost starts when the time "ldf" is expired; Sd=Smartfrost mode. The ldf time (interval between defrosts) is increased only when the compressor is running (even non consecutively).
SdF	Set point for SMARTFROST: (-30÷30 °C/ -22÷86 °F) evaporator temperature which allows the ldf counting (interval between defrosts) in SMARTFROST mode.
dtE	Defrost termination temperature: (-50,0÷110,0°C; -58÷230°F) (Enabled only when the evaporator probe is present) sets the temperature measured by the evaporator probe which causes the end of defrost.
ldF	Interval between defrosts: (1÷120h) Determines the time interval between the beginning of two defrost cycles.
MdF	Duration of defrost: (0÷255 min) When P2P = n , no evaporator probe, it sets the defrost duration, when P2P = y , defrost end based on temperature, it sets the maximum length for defrost.
dFd	Display during defrost: rt = real temperature; it = temperature reading at the defrost start;
Set	set point; dEF = "dEF" label; dEG = "dEG" label;
dAd	Defrost display time out: (0÷255 min) Sets the maximum time between the end of defrost and the restarting of the real room temperature display.
Fdt	Drain down time: (0÷60 min.) time interval between reaching defrost termination temperature and the restoring of the control's normal operation. This time allows the evaporator to eliminate water drops that might have formed due to defrost.
dPO	First defrost after start-up: y = Immediately; n = after the ldf time
Hud	Humidity control during defrost: no: the humidity control is stopped during the defrost; yES the humidity control works also during the defrost.

FANS

Fnc	Fan operating mode: C-n = running when a load is on, OFF during the defrost; C-y = running when a load is on, ON during the defrost; O-n = continuous mode, OFF during the defrost; O-y = continuous mode, ON during the defrost;
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EXTRACTOR FANS

rFi	Interval between 2 cycles of change of air (0÷120 ore; 0 = only manual starting)
rFd	Duration of change of air cycle (0÷250min; 0 = only manual stopping)

TEMPERATURE ALARMS

ALC	Temperature alarm configuration: rE = High and Low alarms related to Set Point; Ab = High and low alarms related to the absolute temperature.
ALL	Low temperature alarm setting: ALC = rE , 0 + 50 °C or 90°F; ALC = Ab , - 50°C or -58°F + ALU; when this temperature is reached and after the ALd delay time, the LA alarm is enabled..
ALU	High temperature alarm setting: ALC= rE, 0 + 50°C or 90°F; ALC= Ab, ALL ÷ 110°C or 230°F; when this temperature is reached and after the ALd delay time the HA alarm is enabled.
ALH	Temperature alarm recovery differential: (0,1÷25,5°C; 1÷45°F) Intervention differential for recovery of temperature alarm.
ALD	Temperature alarm delay: (0÷255 min) time interval between the detection of an alarm condition and the corresponding alarm signalling.
dAO	Delay of temperature alarm at start-up: (0min÷23h 50min) time interval between the detection of the temperature alarm condition after the instrument power on and the alarm signalling.
EdA	Alarm delay at the end of defrost: (0÷255 min) Time interval between the detection of the temperature alarm condition at the end of defrost and the alarm signalling.
dot	Delay of temperature alarm after closing the door : (0÷255 min) Time delay to signal the temperature alarm condition after closing the door.

HUMIDITY ALARMS

AHC	Humidity alarm configuration: rE = High and Low alarms related to humidity Set Point ; Ab= High and low alarms related to the "absolute" humidity.
AHL	Low humidity alarm setting: (with AHC = rE: 0 ÷ 50. With AHC = Ab: Lci ÷ AHu) when this humidity is reached and after the AHd delay time, the HLA alarm is enabled..
AHu	High humidity alarm setting: (with AHC = rE: 0÷50°C. with AHC = Ab: AHL ÷ uci) when this humidity is reached and after the AHd delay time the HHA alarm is enabled.
AHH	Humidity alarm recovery differential: (0,5÷20,0) Intervention differential for recovery of humidity alarm.
AHd	Humidity alarm delay: (0÷255 min) time interval between the detection of an alarm condition and the corresponding alarm signalling.
dHo	Delay of humidity alarm at start-up: (0min÷23h 50min) time interval between the detection of the humidity alarm condition after the instrument power on and the alarm signalling.
doH	Alarm delay at the end of defrost: (0÷255 min) Time interval between the detection of the humidity alarm condition at the end of defrost and the alarm signalling.
doA	Open door alarm delay: (0÷255 min) delay between the detection of the open door condition and its alarm signalling: the flashing message "dA" is displayed.
tbA	Alarm relay status after pushing a key: on= the relay remains on; off= the relay is switched off.
nPS	Pressure switch number: (0 ÷15) Number of activation of the pressure switch, during the "did" interval, before signalling the alarm event (1F= PAL). If the nPS activation in the "did" time is reached, switch off and on the instrument to restart normal regulation.

PROBE INPUTS

Ot	Thermostat probe calibration: (-12.0+12.0°C/ -21+21°F) allows to adjust possible offset of the thermostat probe.
OE	Evaporator probe calibration: (-12.0+12.0°C/ -21+21°F) allows to adjust possible offsets of the evaporator probe.
O3	Humidity probe calibration: (-10+10 RH) allows to adjust possible offsets of the humidity probe.
P2P	Evaporator probe presence: n= not present: the defrost stops only by time; y= present: the defrost stops by temperature and time.
P3P	Humidity probe presence: n= not present; y= present.
LCI	Readout with 4 mA : (-999 ÷ 999). Adjustment of read out corresponding to 4mA signal.
UCI	Readout with 20 mA : (-999 ÷ 999). Adjustment of read out corresponding to 20mA signal.

DIGITAL INPUTS

i1P	Configurable digital input polarity: CL : the digital input is activated by closing the contact; OP : the digital input is activated by opening the contact;
i1P	Door switch digital input polarity: CL : the digital input is activated by closing the contact; OP : the digital input is activated by opening the contact
i1F	Digital input operating mode: configure the digital input function: EAL = generic alarm; bAL = serious alarm mode; PAL = Pressure switch; Ht = heating relay safety; dor = door switch
odc	Outputs status when open door: on = normal; Fan = Fan OFF; oFF = all the loads off
rrd	Outputs restarting after doA alarm: no = outputs not affected by the doA alarm; yES = outputs restart with the doA alarm;
did	Time interval/delay for digital input alarm: (0÷255 min.) Time interval to calculate the number of the pressure switch activation when i1F=PAL. If i1F=EAL or bAL (external alarms), "did" parameter defines the time delay between the detection and the successive signalling of alarms.

OTHER

oA1	Light relay configuration: ALr = alarm; dEH = dehumidifier; onF = on/off relay: close with instrument on, open with instrument off; Lig = light, ESt , dEF not select
oA2	Configuration of the defrost / extractor fans relay dEH = not select; onF = on/off relay: close with instrument on; open with instrument on; Lig =Light ; ESt = extractor fan; dEF = defrost relay.
Adt	RS485 serial address for temperature loads (0÷247) identifies the instrument within a control or supervising system.
AdH	RS485 serial address for humidity loads (0÷247) identifies the instrument within a control or supervising system.
Ptb	Parameter table: (read only) it shows the original code of the dixcel parameter map.
rEL	Software release: (read only) Software version of the microprocessor.
Prd	Probes display: (read only) display the temperature values of the evaporator probe Pb2.
Pr2	Access to the protected parameter list (read only).

10. DIGITAL INPUT

One digital input is present configurable by user by means of the i1F parameter according to the following descriptions.

10.1 DOOR SWITCH (i1F = dor)

It signals the door status and the corresponding relay output status through the "odc" parameter: **no** = normal (any change); **Fan** = Fan OFF; **oFF** = all the loads are switched off.

Since the door is opened, after the delay time set through parameter "doA", the alarm output is enabled and the display shows the message "dA".

The status of loads depends on the "rrd" parameter:

with **rrd=no** outputs are not affected by the doA alarm;

with **rrd=yES** = outputs restart with the doA alarm;

The alarm stops as soon as the external digital input is disabled again. During this time and then for the delay "dot" and "doH" after closing the door, the temperature and humidity alarms are disabled.

10.2 GENERIC ALARM (i1F = EAL)

As soon as the digital input is activated the unit will wait for "did" time delay before signalling the "EAL" alarm message. The outputs status don't change. The alarm stops just after the digital input is de-activated.

10.3 SERIOUS ALARM MODE (i1F = BAL)

When the digital input is activated, the unit will wait for "did" delay before signalling the "bAL" alarm message. The relay outputs are switched OFF. The alarm will stop as soon as the digital input is de-activated.

10.4 PRESSURE SWITCH (i1F = PAL)

If during the interval time set by "did" parameter, the pressure switch has reached the number of activation of the "nPS" parameter, the "PAL" pressure alarm message will be displayed. The compressor and the regulation are stopped. When the digital input is ON the compressor is always OFF.

If the nPS activation in the did time is reached, switch off and on the instrument to restart normal regulation.

10.5 HEATING RELAY SAFETY (i1F=Ht)

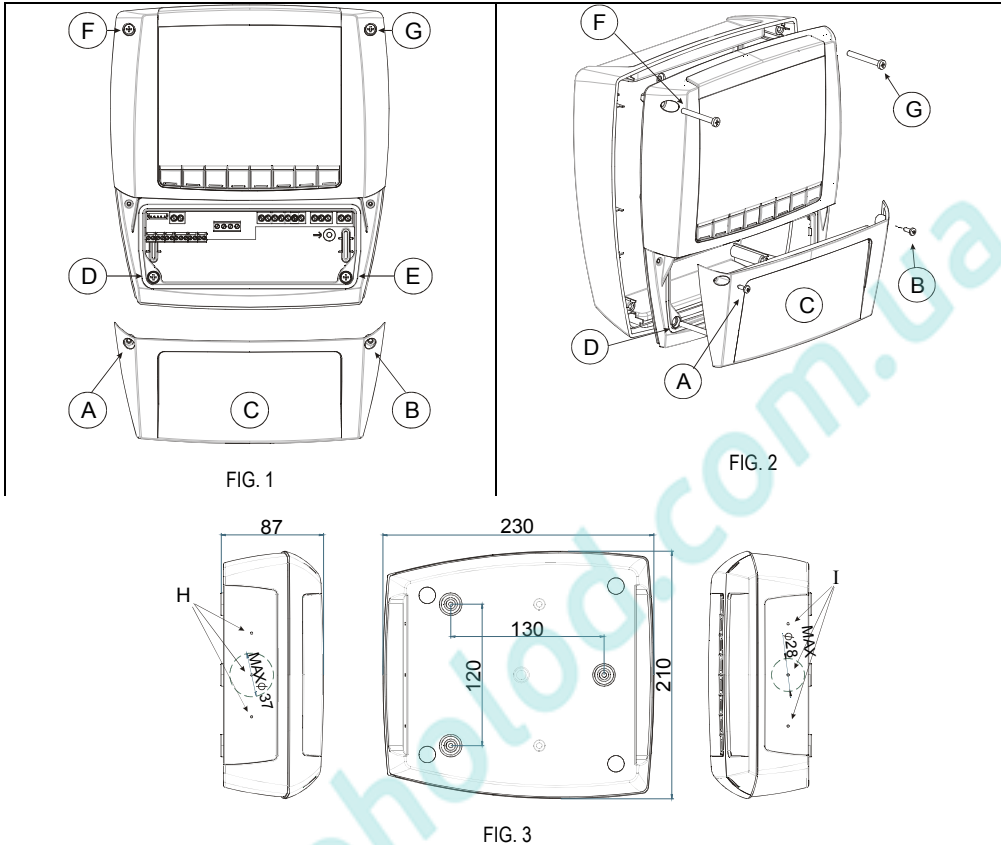
With i1F=Ht as soon as the digital input is activated for "did" time heating relay is disabled.
The alarm will stop as soon as the digital input is de-activated.

10.6 DIGITAL INPUTS POLARITY

The digital input polarity depends on the "i1P" parameters. **CL** : the digital input is activated by closing the contact; **OP** : the digital input is activated by opening the contact

11. INSTALLATION AND MOUNTING

The temperature range allowed for correct operation is 0 - 60 °C. Avoid places subject to strong vibrations, corrosive gases, excessive dirt or humidity. The same recommendations apply to probes. Let the air circulate by the cooling holes.
Thanks to the case **XLH360**. See the following instructions for details.



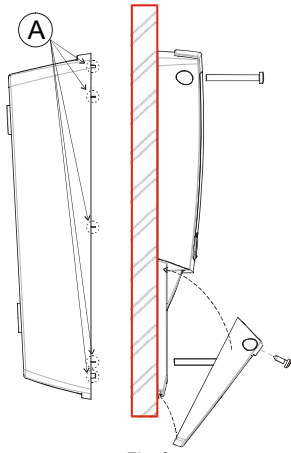


Fig. 6

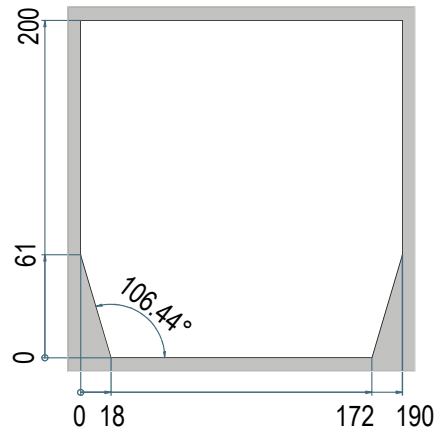


Fig. 4

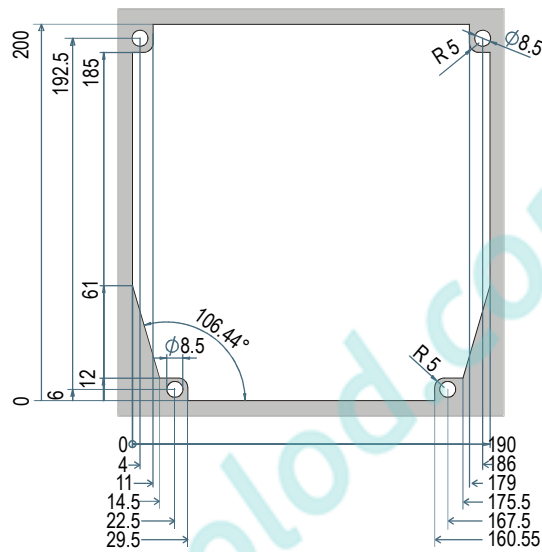


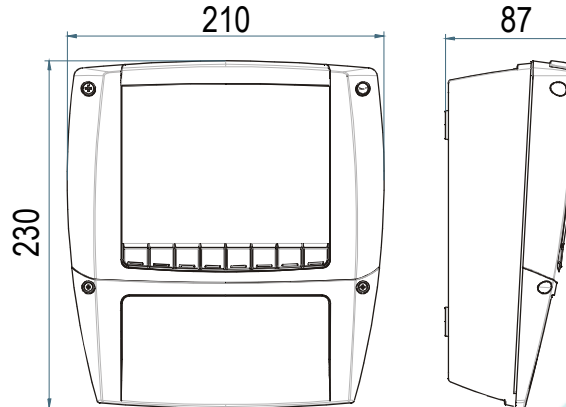
Fig. 5

11.1 WALL MOUNTING

1. Unscrew the 4 frontal screws (Fig. 1, A, B, F, G) and remove the cover (Fig. 1, C).
2. Unscrew the 2 screws (Fig. 1, D, E) that keep connected the frontal and lower parts of Cool Mate and separate the 2 parts.
3. Make the proper holes for cablepresses or pipepresses using the centres signed in the bottom cover of the Cool Mate, (Fig. 3, H, I,). Then make 3 holes in the wall, as indicated in (Fig. 3, L, M, N), to fix the Cool Mate
4. Fix the cablepresses and the pipepresses..
5. Insert the wall-nugs, contained in the kit, into the holes made in the wall. Then use the o-rings and fix the back part of the Cool Mate (Fig. 3, L, M, N) by means of the 3 screws to the wall itself.
6. Insert the wiring cables in cablepresses or in the pipepresses.
7. Mount the frontal part using the previous 4 screws Fig. 1, D, E, F, G. (do not press excessively in order to avoid plastic deformation).
8. After connecting the wires to the terminal blocks close the cover (Fig. 2, c) and fix it by the screws.

11.2 PANEL MOUNTING

1. Make a hole in the panel with dimensions described in Fig. 4 (simplified) or Fig. 5 (completed)
2. Unscrew the 4 frontal screws (Fig. 1, A, B, F, G) and remove the cover (Fig. 1, C).
3. Unscrew the 2 screws (Fig. 1, D, E) that keep connected the frontal and lower parts of Cool Mate and separate the 2 parts.
4. Cut from the back part of the Cool Mate the teeth indicated in Fig. 6, A.
5. Make the proper holes for cablepresses or pipepresses using the centres signed in the bottom cover of the Cool Mate, (Fig. 3, H, I,).
6. Fix the cablepresses and the pipepresses..
7. Insert the wiring cables in cablepresses or in the pipepresses.
8. Join the back and frontal parts, with the panel in the middle, and fix them screwing the 4 screws taken previously away (dimensions 4x35 mm), in the holes of Fig. 1, A, B, D, E. Maximum panel thickness: 6mm.
9. After connecting the wires to the terminal blocks close the cover (Fig. 2, c) and fix it by the screws.

12. DIMENSIONS**13. ELECTRICAL CONNECTIONS**

The instruments are provided with screw terminal block to connect cables with a cross section up to 2,5 mm². Heat-resistant cables have to be used. Before connecting cables make sure the power supply complies with the instrument's requirements. Separate the probe cables from the power supply cables, from the outputs and the power connections. Do not exceed the maximum current allowed on each relay, in case of heavier loads use a suitable external relay.

13.1 PROBE CONNECTIONS

The probes shall be mounted with the bulb upwards to prevent damages due to casual liquid infiltration. It is recommended to place the thermostat probe away from air streams to correctly measure the average room temperature.

14. HOW TO USE THE HOT KEY**14.1 HOW TO PROGRAM A HOT KEY FROM THE INSTRUMENT (UPLOAD)**

1. Program one controller with the front keypad.
2. When the controller is **ON**, insert the "Hot key" and push **▲** key; the "uPL" message appears followed a by flashing "End"
3. Push "SET" key and the End will stop flashing.
4. Turn OFF the instrument remove the "Hot Key", then turn it ON again.

NOTE: the "Err" message is displayed for failed programming. In this case push again **▲** key if you want to restart the upload again or remove the "Hot key" to abort the operation.

14.2 HOW TO PROGRAM AN INSTRUMENT USING A HOT KEY (DOWNLOAD)

1. Turn OFF the instrument.
2. Insert a programmed "Hot Key" into the 5 PIN receptacle and then turn the Controller ON.
3. Automatically the parameter list of the "Hot Key" is downloaded into the Controller memory, the "doL" message is blinking followed a by flashing "End".
4. After 10 seconds the instrument will restart working with the new parameters.
5. Remove the "Hot Key"..

NOTE the message "Err" is displayed for failed programming. In this case turn the unit off and then on if you want to restart the download again or remove the "Hot key" to abort the operation.

15. ALARM SIGNALLING

Message	Cause	Outputs
"P1"	Thermostat probe failure	Compressor and heating outputs off
"P2"	Evaporator probe failure	Defrost and by time
"P3"	Humidity probe failure	Humidity regulation off
"HA"	High temperature alarm	Outputs unchanged
"LA"	Low temperature alarm	Outputs unchanged
"HHA"	High humidity alarm	Outputs unchanged
"HLA"	Low humidity alarm	Outputs unchanged
"dA"	Door switch alarm	Outputs depending on the odC parameter
"EAL"	External alarm	Other outputs unchanged
"BAL"	Serious external alarm	Outputs OFF
"PAL"	Pressure switch alarm	Outputs OFF

The alarm message is displayed until the alarm condition recovers.

All the alarm messages are showed alternating with the room temperature except for the "P1" which is flashing. To reset the "EE" alarm and restart the normal functioning press any key, the "rSt" message is displayed for about 3s.

15.1 SILENCING BUZZER

Once the alarm signal is detected the buzzer, if present, can be silenced by pressing any key.

15.2 ALARM RECOVERY

Probe alarms : "P1" (probe1 faulty), "P2", "P3"; they automatically stop 10s after the probe restarts normal operation. Check connections before replacing the probe.

Temperature alarms "HA" and "LA" automatically stop as soon as the thermostat temperature returns to normal values or when the defrost starts.

Humidity alarms "HHA" and "LHA" automatically stop as soon as the humidity returns to normal values.

Door switch alarm "dA" stop as soon as the door is closed.

External alarms "EAL", "BAL" stop as soon as the external digital input is disabled

Pressure switch alarm "PAL" alarm is recovered by switching OFF the instrument.

10. TECHNICAL DATA

Housing: self extinguishing ABS; **Case:** frontal 210x230 mm; depth 87mm; **Mounting:** See par. 11; **Protection:** IP65

Connections: Screw terminal block ≤ 2.5 mm² wiring.

Power supply: 230Vac 50/60Hz $\pm 10\%$ or 110Vac 50/60Hz $\pm 10\%$; **Power absorption:** 10VA max.

Display: 3 digits, red LED, 30.5 mm high. 3 digits, yellow LED low.

Inputs: 2 NTC, 1 input 4 \div 20mA;

Digital inputs : Door switch and configurable, free voltage. Max. distance 10m;

Relay outputs:

compressor: relay SPST 20(8) A, 250Vac;

defrost or extraction fans: relay SPDT 16(3) A, 250Vac

fans: relay SPST 8(3) A, 250Vac;

heater control: relay SPDT 20 A, 250Vac;

Humidifying: relay SPST 8 A, 250Vac

Light / De- humidifying: relay SPST 16 A, 250Vac

Other output :

Alarm buzzer (Standard)

Direct RS485 (optional)

Serial output : TTL standard

Communication protocol: Modbus - RTU

Data storing: on the non-volatile memory (EEPROM).

Internal clock back-up: 24 hours

Kind of action: 1B; **Pollution grade:** normal; **Software class:** A.

Operating temperature: 0+60 °C.

Storage temperature: -25+60 °C.

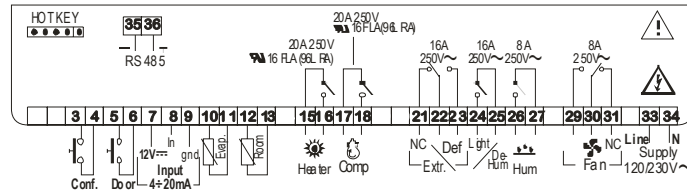
Relative humidity: 20-85% (no condensing)

Measuring and regulation range: NTC probe: -40+110°C (-58+230°F)

Resolution: 0,1 °C or 1°C or 1 °F (selectable).

Accuracy (ambient temp. 25°C): ± 0.5 °C ± 1 digit

16. XLH360 WIRING CONNECTIONS



110 Vac Power Supply: connect to 33-34 terminals

17. DEFAULT SETTING VALUES

	Set temperature	Set humidity	Duration
Dripping Phase	5.0 °C	-	5.00 h
Running Phase	5.0 °C	50.0 RH%	5.00 h
Stopping Phase	-	-	5.00 h

Label	Value	Menu	Description	Range
dbt	2.0	Pr1	Half dead band width for temperature	0.1°C o 1°F + 25°C o 77°F
dbH	5.0	Pr1	Half dead band width for humidity	0.5 ÷ 50
LS	-40.0	Pr2	Minimum temperature set point limit	-50.0°C o -58°F + Set T
uS	110	Pr2	Maximum temperature set point limit	Set T + 110°C o 230°F
odS	1	Pr2	Outputs activation delay at start up	0 ÷ 250 min
Ac	1	Pr1	Anti-short cycle delay	0 ÷ 30 min
tHu	c-H	Pr2	Humidity regulation	db = dehumidifier relay.; cHu = dehum+ compr.; c-H= without dehum. relay
LSH	0.0	Pr2	Minimum humidity set point limit	Lci - Set H
uSH	100	Pr2	Maximum humidity set point limit	Set H + uci
cF	°C	Pr2	Measurement unit	°C ÷ °F
rES	dE	Pr2	Resolution (for °C):	in = integer / dE = decimal
rEH	Hd	Pr2	Resolution for RH%:	in = integer / Hd = half digit
trC	co	Pr2	Instrument behaviour at the end of the cycle	co=start holding, in=stop regulation, cL=restart the first phase+End message; cLE = restart the first phase
tdF	rE	Pr2	Defrost type	rE, rT, in
EdF	in	Pr2	Defrost mode	In, Sd
SdF	0.0	Pr2	Set point for SMART DEFROST	-30 ÷ +30°C / -22 ÷ +86°F
dtE	8.0	Pr2	Defrost termination temperature	-50,0+110°C / -58+230°F
idF	6	Pr1	Interval between defrosts	1 ÷ 120 h
MdF	20	Pr1	Duration of defrost	0 ÷ 250 min
dFd	it	Pr2	Display during defrost	rt / it / SET / dEF / dEG
dAd	30	Pr2	Defrost display time out	0 ÷ 250 min
Fdt	0	Pr2	Draining time	0+60 min.
dPo	no	Pr2	First defrost after start up	n ÷ y
Hud	no	Pr2	Humidity control during defrost	no; yES
Fnc	c-n	Pr2	Fan operating mode	c-n / c-Y / o-n / o-Y
rFi	0	Pr2	Interval between 2 cycles of change of air	1 ÷ 120 h (0 = manual start)
rFd	0	Pr2	Duration of cycle of change of air	1 ÷ 250 min (0 = manual stop)
ALc	Ab	Pr2	Temperature alarm configuration	rE = relative / Ab = absolute
ALL	-40.0	Pr1	Low temperature alarm setting	0°C ÷ 50.0°C / -50.0°C ÷ ALu
ALu	110	Pr1	High temperature alarm setting	0°C ÷ 50.0°C / ALL ÷ 110°C
ALH	1.0	Pr2	Temperature alarm recovery differential	0.1°C o 1°F + 25°C o 77°F
ALd	15	Pr2	Temperature alarm delay	0 ÷ 250 min
dAo	1.3	Pr2	Delay of temperature alarm at start-up	0.0 ÷ 23.5 h
EdA	20	Pr2	Alarm delay at the end of defrost	0 ÷ 250 min

Label	Value	Menu	Description	Range
dot	20	Pr2	Delay of temperature alarm after closing the door	0 ÷ 250 min
AHc	Ab	Pr2	Humidity alarm configuration	rE = relative / Ab = absolute
AHL	0.0	Pr1	Low humidity alarm setting	0 ÷ 50 / Lci ÷ AHu
AHu	100	Pr1	High humidity alarm setting	0 ÷ 50 / AHL ÷ uci
AHH	2.0	Pr2	Humidity alarm recovery differential	0.5 ÷ 25
AHd	15	Pr2	Humidity alarm delay	0 ÷ 250 min
dHo	1.3	Pr2	Delay of humidity alarm at start-up	0.0 ÷ 23.5 h
doH	20	Pr2	Alarm delay at the end of defrost	0 ÷ 250 min
doA	20	Pr2	Open door alarm delay	0 ÷ 250 min (250 = nu)
tbA	oFF	Pr2	Relay status after pushing a key	on+oFF
nPS	15	Pr2	Pressure switch number	0+15
ot	0.0	Pr1	Thermostat probe calibration	-12.0 ÷ 12.0
oE	0.0	Pr2	Evaporator probe calibration	-12.0 ÷ 12.0
o3	0.0	Pr1	Humidity probe calibration	-10 ÷ 10
P2P	YES	Pr2	Evaporator probe presence	no = absent / YES = present
P3P	YES	Pr2	Humidity probe presence	no = absent / YES = present
Lci	0.0	Pr2	Readout with 4 mA	-999 ÷ 999
uci	100	Pr2	Readout with 20 mA	-999 ÷ 999
i1P	cL	Pr2	Configurable digital input polarity	cL = open / oP = close
i2P	cL	Pr2	Door switch digital input polarity	cL = open / oP = close
i1F	dor	Pr2	Digital input configuration	dor / PAL / EAL / bAL / Ht
odc	FAn	Pr2	Outputs status when open door	on / Fan / oFF
rrd	YES	Pr2	Outputs restarting after doA alarm	no = no / YES = yes
did	0	Pr2	Digital input alarm delay	0=255 min.
oA1	LiG	Pr2	Light relay configuration 1	ALr = alarm; dEH = dehumidifier; onF = on/off; Lig = light, Est, dEF not select
oA2	ESt	Pr2	Light relay configuration 2	ALr = alarm; dEH = not use; onF = on/off; Lig = light, ESt= extractor, dEF =defrost
Adt	1	Pr2	Serial address for temperature	0+247 num
AdH	1	Pr2	Serial address for humidity	0+247 num
Ptb	---	Pr2	Parameter table	---
rEL	---	Pr2	Software release	---
Prd	---	Pr2	Probes display	Pb1+Pb3
Pr2	---	Pr1	Access to the protected parameter list	---