

INSTALLATION AND OPERATION MANUAL FOR THE STAGES CONTROL PANEL (CCE) FOR FISAIR EVAPORATIVE HUMIDIFIERS

MCCE-EN-17-1

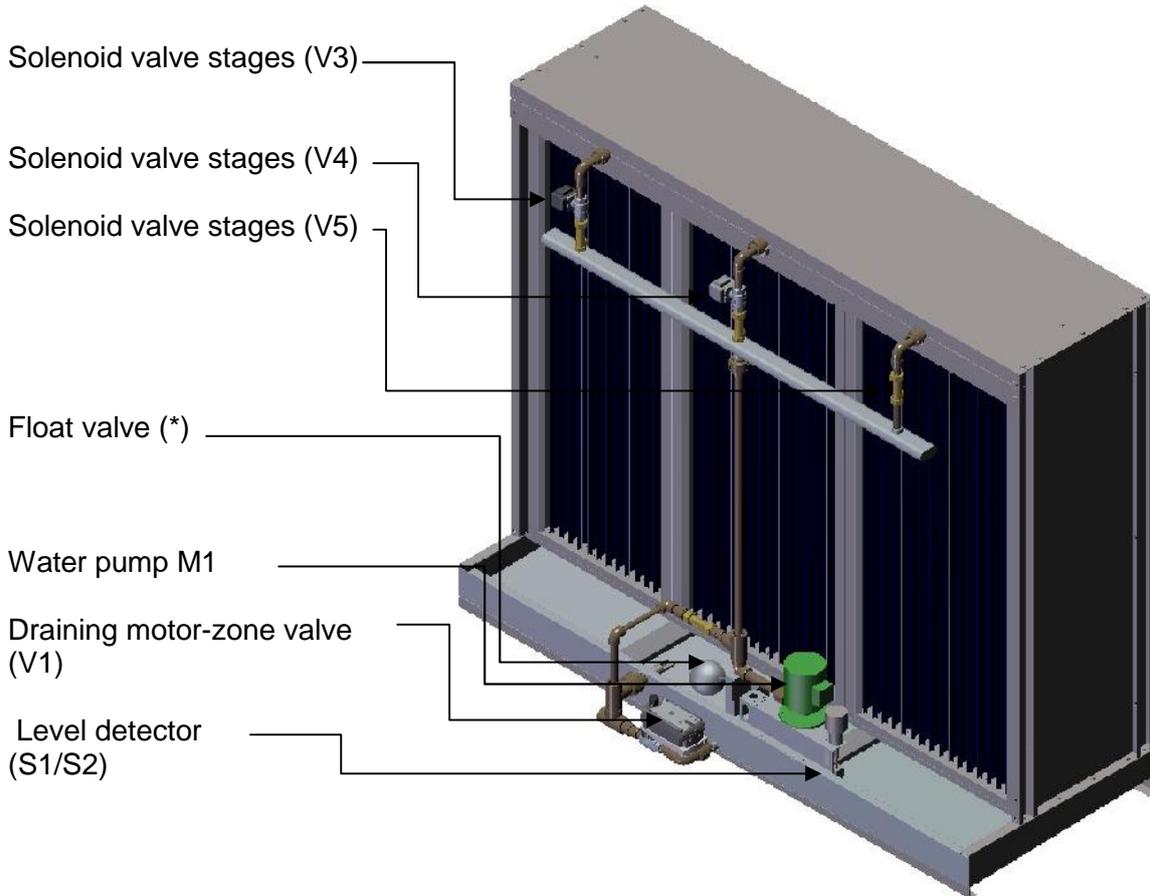
In compliance with the Rules and Standards of the European Union on Machine Safety, it is essential to read this protocol carefully before installing any equipment.

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1. Introduction.

HEF2 series FISAIR evaporative humidifiers, as mobile operating components for pumping water have one or more engine-pumps, and as adjustable static operating components have several solenoid valves for the irrigation of cassettes, flow-meters for cassettes and purging, an engine-valve for drainage, a minimum and maximum water level detector and also, a valve for the tray filling flotation device.



(*) The V2 filling solenoid valve will be installed upstream from the flotation device valve.

Integration of PLR MFD-TITAN into the humidifier's management and operational supervision makes it possible to achieve faster, simpler, and more precise and reliable operation, as well as reducing the wiring needed for the electrical board.

The PLR MFD-TITAN fitted to this type of equipment is a programmable device for the real time configuration, adjustment and supervision of the various components that make up the unit and those that are connected to it. It can be operated from the onboard display or remotely.

2. General recommendations.

When using this protocol we must always have the Electrical Schematics at hand.



The automatic program has been designed, so that both its execution, and the actions and/or reactions that are produced in the machine and its surroundings, do not affect the degree of safety or functionality for which said machine has been designed, while also respecting the directive on electromagnetic compatibility.



Deleting and/or modifying the said program contained in the PLR, run from the onboard display or from an online PC, will modify the terms and conditions of the guarantee, as well as affecting compliance with the explicit directives and standards that cover its manufacture. The installer, handler or user shall therefore bear full responsibility for any repercussions arising from the unit's modified functionality.



The device programmed is not covered by the safety measures against personal injuries. For this purpose, a series of passive safety fittings are installed, such as:

- *The bars, covers, seals, etc. In the extreme event of a malfunction, the machine must be insulated from the mains power supply by I1 and the technical services department should be notified.*

3. PLR functions

3.1 Controls

- On/off control of the engine-pump(s).
- On/off control of the solenoid valves (filling and irrigation by cassettes stages)
- On/off control of the ultraviolet lamp *–if applicable–*.
- On/off control according to configuration.

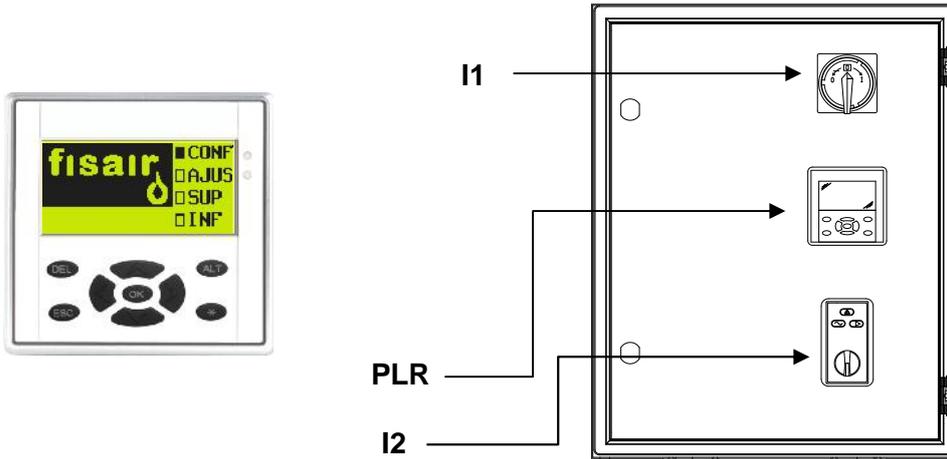
3.2 Adjustments and supervision

- Detection of the minimum and maximum water level
- Synopsis of the component operation screen.
- Supervision of the value provided by the analogue regulated input 0...10Vdc.
- Adjustment of times and frequency of basin rinsing.
- Adjustment of the schedule referring to weekly and yearly operation.
- Supervision of the pump operation time and cycles carried out for different solenoid valves.
- Supervision of valve operation (filling, emptying and irrigation)
- Detection of the minimum air flow rate (pressure switch required) or status (ON/OFF) of the fan.

3.3 Safety and alarms

- Alarm and stoppage of equipment due to any circuit breaker being tripped.
- Stoppage of the pump due to insufficient water level.
- Interlocking of operation by default in LUV *–if applicable–*.
- Alarm due to internal or communication fault of the PLR.

4. Control panel and navigation keyboard of the PLR.



I1, Cut-off switch

I2, MANual / or / AUTomatic selection switch

PLR, Programmable logic relay with LCD backlit black-and-white screen measuring 63x32mm and a navigation keyboard with the following functions:

-  **DEL** Function that will depend on the particular configuration. Where applicable, this will be explained in the relevant section.

The screen/display brightness can be increased from the start display.

-  **ESC** Escape. Pressing this returns to the previous screen.
The screen brightness can be reduced from the start display.

This allows you to return from screen to start display screen

-  Navigation keys for moving the cursor horizontally or vertically and/or change of screen.
Modify the numerical data that need to be adjusted.

-  **OK** Numerical and/or selection validation function.

-  ***** Function that will depend on the particular configuration. Where applicable, this will be explained in the relevant section.

On the main screen this enables you to enter the active connections status (point 11). To exit this status, press this key  again.

-  **ALT** Function that will depend on the particular configuration. Where applicable, this will be explained in the relevant section.

5. PLC Stages.

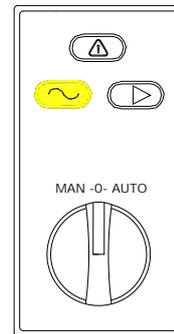
After meeting the installation prerequisites, and checking that the network values coincide with those required by the machine, the following operations can be supervised, configured and adjusted, thereby obtaining the described actions. The operational sequences will be described using icons.

5.1 Initial state.

Once the CCE is connected to the electrical network and the cut-off switch and circuit breakers armed, the following start-up screen is shown on the PLR display. On the signalling card SEF-008 lights up yellow the indication for "low voltage".



INITIAL STATE



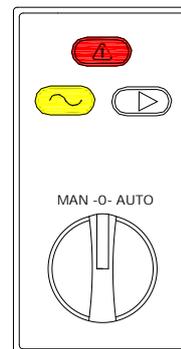
SEF-008

5.2 Initial status with fault/alarm.

Before accessing another screen (configuration, adjustments or supervision), if the word FAULT flashes on the PLR start-up screen, the following is displayed:

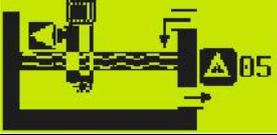


Fault / Defect / Alarm



SEF-008

If the word FAULT disappears from the start-up display, this does not mean that the equipment is operating correctly. You must always access the supervision status (SUP) to ensure that it is operating correctly.

FAULT / ALARM	CAUSE	DISPLAY
Δ 05	The U1 circuit breaker or F1 protection is disarmed	
Δ 15	Error of the UV lamp connection	

FAULT / ALARM	CAUSE	ACTION
Δ 114	Defect in communication and/or connection among the PLR modules	Check the part and connection pins among the modules Check the power to modules.
Δ 115	Short-circuit or overload in a PLR Q outlet.	Check the components connected to the outlet or replace the unit.
Δ 116	Short-circuit or overload in a PLR Q outlet.	Check the components connected to the outlet or replace the unit.

5.3 Status of the connections

Pressing the full-stop key  we can see the real-time status of (I,R) inputs PLR, date, day and time.

```
I 1.3.56.....
RE  I      DC P
VI 09:16
Q ..3.....  RUN
```

```
R 1.....
RS  I      DC P
VI 09:16
S .2.....  RUN
```

<pre> I 12...6...10.. RE I DC P VI 13:15 Q ...4.... RUN R ..34.67..... RS I DC P VI 13:15 S 123..... RUN </pre>	<p>If the equipment only has one control unit, recognised in the electric schematic as ID1:</p> <p>Clicking on  from any screen we can access the menu "Connections status", which shows the status of the intakes I, R and outlets Q, S in real time, the day of the week and time, and the program status (RUN or STOP)</p> <p>To leave the menu and return to the screens, click on </p>
<pre> I 12.....10.. RE I NT1 GW P MI 13:20 Q .234.... RUN ZR..... RS I NT2 GW MI 13:20 ZS..... RUN </pre>	<p>If the equipment only has two control units, recognised in the electric schematic as ID1 and ID2:</p> <p>Clicking on  from any screen we can access the menu "Connections status", which shows the status of the intakes I, and outlets Q of the control unit ID1 = NT1, in real time, the day of the week and time, and the program status (RUN or STOP)</p> <p>Clicking on  we access the status of the connections of unit ID2 = NT2.</p> <p>To leave the menu and return to the screens, click on </p>

6. Launching

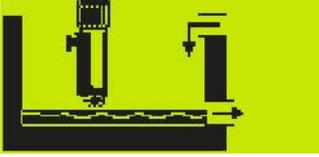
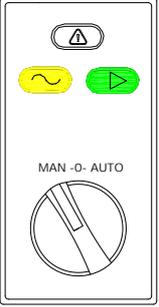
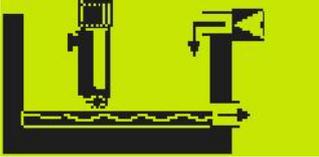
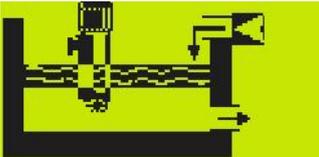
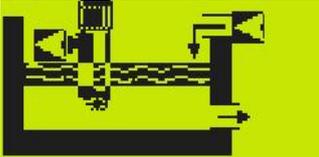
6.1 Manual Mode –MAN-

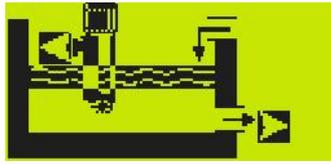
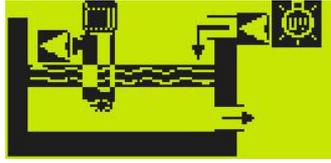
In manual mode, the CCE does not operate in stages, all irrigation values of the evaporative cassettes of the HEF humidifier operate at the same time.

In this operating mode, in real-time, by pressing the corresponding buttons, we must manually activate the operations for:

- ❖ Filling solenoid valve (V2).
- ❖ Ultraviolet lamp (LUV).
- ❖ Draining motor-zone valve (V1).
- ❖ Solenoid valve stages (V3 to Vn)

The initial status in manual mode is as follows:

 <p>Main screen</p>	<p>This is the main screen on which the HEF2 basin, recirculation pump, water level, and water input and output are represented.</p> <p>The green LED of card SEF-008 lights up when the pump starts to operate, which is when the water level reaches a minimum.</p>	 <p>SEF-008</p>
	<p>Opening of the filling valve</p> <p></p> <p>The key must be pressed once.</p> <p>Only on the main screen (it is not valid on any other screen)</p> <p>A flashing arrow appears indicating that the basin is being filled with water.</p> <p>To close the valve (for filling)  we must press the key once more</p>	
	<p>Minimum water level reached.</p> <p>After 30 seconds, the pump starts up to avoid discontinuous operation.</p>	
	<p>A flashing arrow beside the pump indicates that it is in operation, and also the green LED of card SEF-008 lights up.</p> <p>To open or activate the stages solenoid valves press the key </p> <p>To close press this key once again.</p>	

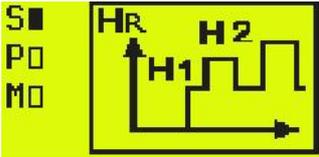
	<p>Opening of the draining solenoid valve</p> <p>The key must be  pressed once</p> <p>Only on the main screen (it is not valid on any other screen)</p> <p>A flashing arrow appears indicating that the basin is being emptied. Once the valve is fully opened (approx. 120 sec)</p> <p>To close the vale (stop emptying) the key must be pressed once more (*)</p>
	<p>Turning on the Ultraviolet Light</p> <p>(Optional, subject to  special order)</p> <p>The key must be pressed once.</p> <p>Its operation must have previously been activated in the CONF (configuration) menu</p> <p>A flashing light bulb appears to indicate its operation.</p> <p>The UV lamp must have an NA auxiliary contact that must be connected between terminals X1, 11 and 21.</p>

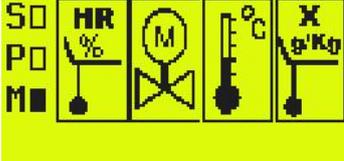
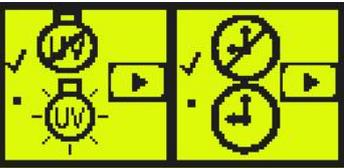
For further information on the remaining screens see the supervision (SUP) menu.

6.2 Automatic Mode –AUTO-

- 1^o) Choose the configuration that best suits our needs in the configuration menu (CONF)
- 2^o) Carry out the necessary connections according to the chosen configuration.
- 3^o) Enter the desired parameters in the adjustments menu (ADJ)
- 4^o) Set switch I2 to the AUTO position

6.2.1 Configuration menu

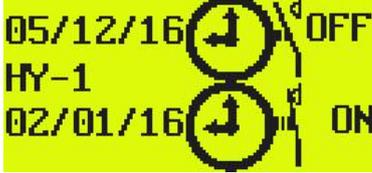
	<p>Accessing the configuration status (clicking on OK) we can choose from three working modes using the vertical arrows or .</p> <p>ALWAYS WHEN WE CHOOSE TO OPERATE IN AUTOMATIC MODE (AUTO)</p>															
	<p>Configuration by steps "S" (Steps) (Only valid for 2 stages/cassettes)</p> <p>These are controlled remotely with the H1 connections for the first stage and H2 for the second stage.</p> <p><u>Essential to carry out H1 and H2 connections</u></p>															
	<p>Proportional configuration "P" (Proportional) The stages are controlled with a regulated analogue signal 0...10Vdc (0A-A1 connection in SCP). The operation of each stage is proportional to the number of cassettes.</p> <p>Example for HEF2 of 4 cassettes:</p> <table border="1" data-bbox="639 1104 1334 1312"> <thead> <tr> <th>Analogue signal</th> <th>Stage</th> <th>Irrigation</th> </tr> </thead> <tbody> <tr> <td>0...2,5Vdc</td> <td>E1</td> <td>1 cassette</td> </tr> <tr> <td>2,5...5Vdc</td> <td>E1+E2</td> <td>2 cassettes</td> </tr> <tr> <td>5...7,5Vdc</td> <td>E1+E2+E3</td> <td>3 cassettes</td> </tr> <tr> <td>7,5...10Vdc</td> <td>E1+E2+E3+E4</td> <td>4 cassettes</td> </tr> </tbody> </table> <p><u>Essential to connect the analogue signal 0-10Vdc</u></p> <p>*The signal must have a value greater than 0 so that the equipment starts to operate with this configuration.</p>	Analogue signal	Stage	Irrigation	0...2,5Vdc	E1	1 cassette	2,5...5Vdc	E1+E2	2 cassettes	5...7,5Vdc	E1+E2+E3	3 cassettes	7,5...10Vdc	E1+E2+E3+E4	4 cassettes
Analogue signal	Stage	Irrigation														
0...2,5Vdc	E1	1 cassette														
2,5...5Vdc	E1+E2	2 cassettes														
5...7,5Vdc	E1+E2+E3	3 cassettes														
7,5...10Vdc	E1+E2+E3+E4	4 cassettes														

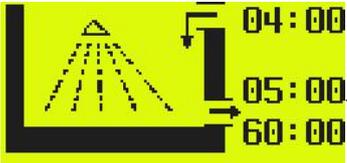
	<p>Configuration for the “M” (Measured) signal – Only in the case of customer requests-</p> <p>Requires the connection of a Relative Humidity probe RH% (0A-A2 connection) and the entry of the required RH% set point in the ADJ menu (Adjustments)</p> <p>Signals that must be provided to probes must be 0...10Vdc without the need for a regulator.</p> <p>The PLC activates the corresponding stages to adjust the relative humidity.</p> <p><u>It is essential to connect the probe and adjust the RH set point</u></p>
	<p>On the Settings election screen, press key  and using the password (PASSWORD 05555) we can access the following screen.</p>
	<p>On this screen, operation of the Ultraviolet Lamp can be activated (If it is activated and does not light up, the PLF displays alarm 15).</p> <p>Also the Timetable operation can be activated. Timetable operation requires the entry of operating times in the ADJ menu (Adjustments)</p> <p>Both operations, UV lamp and timetable are deactivated in the factory default settings.</p>

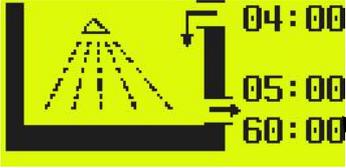
6.2.2 Adjustments Menu (ADJ)

	<p>The adjustments menu is divided into <u>5 screens</u> which by order of appearance will be:</p> <p>Weekly timetable (HW) Yearly timetable 1 (HY1) Yearly timetable 2 (HY2) Rinse cycle Rinse cycle and emptying timer:</p> <ul style="list-style-type: none"> ❖ Rinsing is carried out with the equipment in operation (Filling + Drainage) ❖ 4 hours after the equipment ceases to operate, via I2 or H1 connection, the basin is emptied according to the programmed time.
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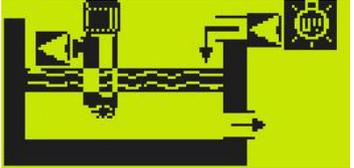
There are two different yearly schedule, to provide the option of having two different operating intervals throughout the year.

	<p>Weekly timetable (HW)</p> <p>Days of the week interval when the equipment will operate (in the example, from Tuesday to Sunday both inclusive).</p> <p>Timetable during which it will operate each day (in the example, from 3:10 pm to 9:00 pm each day from Tuesday to Sunday).</p> <p>Monday (MON) Tuesday (TUES) Wednesday (WED) Thursday (THURS) Friday (FRI) Saturday (SAT) Sunday (SUN)</p>
	<p>Yearly timetable 1 (HY1)</p> <p>ON date for the equipment start up (in the example 02/01/16)</p> <p>OFF date for the equipment shut down (in the example 05/02/2016)</p>

	<p>Yearly timetable 2 (HY2)</p> <p>ON date for the equipment start up (in the example 06/02/2016)</p> <p>OFF date for the equipment shut down (in the example 11/04/16)</p>
	<p>Rinse Cycle (Only in AUTO mode)</p> <p><u>ESSENTIAL TO ENTER THIS TIME FOR THE EQUIPMENT'S CORRECT OPERATION</u>, otherwise the rinse would be carried out continuously, without the basin ever becoming completely full.</p> <p>In Automatic operating mode, the basin is rinsed every X operating hours of the machine.</p> <p>It is recommended that this time should be 48 or 72 hours</p> <p>The minimum adjustable time is 1 hour and the maximum time 200 hours</p> <p>The time between rinses is remained and it is stopped while the team is shut down using the switch I1.</p>
	<p>Rinse and Emptying Cycle Timer The times are assigned 00min:00sec</p> <p>Rinse = Filling + Drainage</p> <p>Filling (Example 04:00) this time must be adjusted according to the size of the basin of the HEF2.</p> <p>Drainage (Example 05:00) This time must always be greater than the filling time</p>

	<p>Emptying</p> <p>4 hours (non-configurable) after the equipment is shut down using switch I2 or H1, and once the minimum water level is reached, the emptying/drainage valve will remain open (Example 60:00) for the adjusted time, to complete the emptying of the basin.</p> <p>A time of 30-60 min is recommended depending on the size of the basin.</p>
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6.2.3 Supervision Menu (SUP)

	<p>The Supervision menu visualises the real-time status and operation of control components of the HEF2, as well as the meters for valve manoeuvres.</p>
	<p>This is the main screen on which the HEF2 basin, recirculation pump, water level, water input and output, and UV lamp are represented.</p> <p>In the event of any defect/alarm arising it would appear on this screen. See list of defects/alarms.</p> <p>AUTO mode operating sequence: The equipment starts to fill the basin with water. Once minimum level is reached, and after a few seconds, the recirculation pump starts up. The irrigation of cassettes will depend on the chosen configuration.</p>
	<p>The operating time of the pump M1 can be seen in hours.</p> <p>To restart this time, the key must be pressed continuously for 5 seconds.</p>

<p>V1 1 n V2 0 n</p>	<p>The operating status and opening/closing cycles of the drainage/emptying (V1) and filling (V2) valves can be observed</p> <p>These meters will automatically restart when they reach 20×10^6 cycles.</p>
<p>V3 1 n V4 1 n V5 1 n V6 0 n</p>	<p>The operating status and opening/closing cycles of the irrigation valves can be observed (the equipment will have as many valves as cassettes)</p> <p>V3, Evaporative cassettes stages solenoid valve V4, Evaporative cassettes stages solenoid valve V5, Evaporative cassettes stages solenoid valve V6, Evaporative cassettes stages solenoid valve</p> <p>These meters will automatically restart when they reach 20×10^6 cycles.</p>
<p>0Hr5</p>	<p>Ultraviolet lamp operating meter (if applicable).</p> <p>To restart this time, the button must be pressed continuously for 5 seconds.</p>
<p>H1 H2 A1 6.5V HR</p>	<p>Visualisation of the status of connections H1, H2, of the external analogue signal A1 0...10Vcc (CONF "P") and measurement of the relative humidity probe RH (CONF "M") –If applicable-</p>