CMT MANUAL

3.1 INSTALLATION – SOFTWARE – NMC CLIMATE

NMC 64 AND NMC JUNIOR

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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3.1.0 INTRODUCTION

NB	This section of the CMT manual can be used for the software installation of both the NMC 64 and the NMC Junior. It is written as though the NMC 64 is the product software being installed. The NMC Junior uses the same software format as the NMC 64; however the software is constrained by the limitations of the NMC Junior's hardware. Where the NMC Junior differs, these limitations or differences are explained in a 'JR' box as follows beneath.

JR	This box explains the differences or limitations of the NMC Junior as they occur in the manual.

The Netafim **NMC 64** climate controller manages vents, fans, heaters, thermal screens, foggers, cooling pads and more. The controller also manages different climate processes such as humidity treatment, special ventilation, fresh air treatment and more. Prior to using the controller in your facility, you will need to complete its hardware installation (see Section 2.1 *Installation – Hardware – NMC Junior* or Section 2.2 *Installation – Hardware – NMC 64/Pro*).

NB	Once the controller is installed, configured, set-up and tested, all relevant menus will be available for use. All values indicated in this manual are in SI (metric) units.

The NMC Climate Control Software has 7 menus as laid out in Table 3. In everyday use, the user of the controller will only use the first three of these (Menus 1 to 3). However, prior to using them, the installation of the software must be complete. This software installation is handled using the second set of 4 menus (Menus 4 to 7).

NB	This section of the CMT Manual only deals with the second set of 4 menus (Menus 4 to 7). (For the first 3 menus, see section 4.1 *User Manual – NMC – Climate Control*).

3.1.0.1 GENERAL DESCRIPTION

- The Netafim NMC 64 is a top of the line climate controller.
- NMC 64 main hardware features:
    - 24VAC outputs.
    - Digital inputs: Rain sensors, wind speed.
    - Analogue inputs: Temperature & Humidity, wind direction, radiation and CO_2.
    - Local or remote communication to PC.
- The advanced large LCD graphic screen (40x16 lines) makes the NMC 64 user-friendly and easy to operate and program.

JR	Wind and radiation sensors cannot be connected to the NMC Junior.

3.1.0.2 MAIN FEATURES

TABLE 1. MAIN CLIMATE CONTROL FEATURES – NMC 64 VS. NMC JUNIOR

Main features	NMC 64	NMC Junior
Vents / curtains program – open or close	16	7
Fan groups / stages program	4	4
Heaters program – on/off	4	4
Screens program (temperature or radiation) – open (roll-up)	2	2
Screens program (temperature or radiation) – close (roll-out)	2	2
CoolNet program – active window	1	1
CoolNet program – curve points	4	4
CoolNet valves - outputs	4	4
Cooling pad program – active window	1	1
Cooling pad program – curve points	4	4
Cooling pad pump program	1	1
Misting program	40	40
Misting valves - outputs	30	15
Circulator fans program	4	4
Humidity treatment process	4	4
Special ventilation process	4	4
Fresh air treatment program	4	4
Emergency program	1	1
Alarm program	1	1
CO_2 valve program	1	1
Rain collector – digital input	1	1
Rain sensor – digital input	1	1
Wind speed – digital input	1	0
Wind direction – analogue input	1	0
Radiation sensor – Davis – analogue input	1	0
CO_2 sensor – analogue input	1	1
Temperature sensors – analogue input	8	2
Relative humidity sensors -	8	1
PC communication and HMI	yes	yes
Outputs and inputs test	yes	no

JR	The NMC Junior is limited to 15 x outputs, 6 x digital inputs and 5 analogue inputs.

3.1.0.3 NMC JUNIOR / 64 GENERIC OPERATION GUIDELINES

Operating the NMC Junior / 64 is very simple and intuitive. Use the following guideline for easy operation:

To change specific settings navigate the cursor (flashing underline mark) using the arrow keys until its' location is under the relevant setting.

According to type of field (value, list of options, etc.) change setting as follows:

- **Value** - use the numeric keys to change the value and press ENTER to confirm.
- **List of Options** - press ENTER to open the List of Options, use the arrow keys to navigate the cursor to the desired field and press ENTER again to confirm.
- **HH:MM:SS** - set hours, press the ENTER key to move to the minutes, set the minutes, press ENTER again to move to the seconds.
- **Factors** - use the left and right arrows to change the factor up and down respectively.
- To erase typing mistakes, use the DELETE key

NB	Remember to confirm changes by pressing the ENTER key. If you don't confirm, the new value will not be saved and the controller will revert to the previous value

3.1.0.4 MAIN MENU SCREEN

Press the MENU key until you reach the Main Menu screen.
The main menu screen consists of 5 sections.

- **Sensors** – this section of the screen shows individual sensors readings. Sensors shown are defined by the user on table 3.1.4.6 CUSTOMIZE MAIN SCREEN.
- **Inside** – this section shows average inside temperature and humidity.
- **Active** – this part shows active devices.
- **Status** – this section shows general information, such as time and date, and active climate processes.
- **Messages** – this section shows messages, if there are a few active messages then they appear in turn.

```
┌─────────────────────────────────────────────────────────┐
│  ┌─── SENSORS ───┐  ┌── INSIDE ──┐  ┌──── ACTIVE ────┐   │
│  │ Temp-1    24.9│  │ TEMP:  25.1│  │ ■ Vent  1 100% │   │
│  │ Temp-2    25.3│  │ HUM.:  71.1│  │ □ Fan   1      │   │
│  │ Out T.    ----│  └────────────┘  │ □ C. Fan 1     │   │
│  │ Out Hum   ----│  ┌── STATUS ──┐  │ □ Scr.  1  90% │   │
│  │ Rad.       134│  │  10:11:18  │  │ □ Heat. 1      │   │
│  │ W. Speed     0│  │ 21-Aug-06  │  │ □ Mist. 1      │   │
│  │ W. Dir.      0│  └────────────┘  │ □ Co2   1      │   │
│  │ CO2        992│                  │ □ Fogg. 1      │   │
│  │               │                  │ □ Pad   1      │   │
│  │               │                  │ □ Alarm        │   │
│  │  ┌─── 1 MESSAGES ───┐            │                │   │
│  │  │ [      ]         │            │                │   │
│  └──┴──────────────────┴───────────┴────────────────┘   │
└─────────────────────────────────────────────────────────┘
```

FIGURE 1: MAIN MENU SCREEN

3.1.0.5 USE OF THE KEYPAD

FIGURE 2: KEYPAD – NUMERIC

FIGURE 3: KEYPAD - ALPHANUMERIC

Keypad buttons usage

Key	Description
Help	Using the *Help* key you can access help screens and graphs. If not indicated otherwise press the 'Menu' key to exit the 'Help' menu.
Menu (Back)	The *Menu* key is used to exit screens and menus that you are currently in.
Delete	The *Delete* key enables to erase typing mistakes.
Arrow	The *Arrow* keys move the cursor around the menus, inside screens and in some cases can be used to change values.
'+/-'	The '+/-' key changes between positive and negative values and marks the check boxes when selecting options.
'.'	The '.' key enables to enter a decimal point.
Numbers	The *Numeric* keys enable to enter numbers and make selections in the numbered menus.
Enter	The *Enter* key acknowledges your entry or menu selection.

TABLE 2: KEYPAD BUTTONS

3.1.0.6 RESETTING NMC 64 CONTROLLER

In the unlikely event that the controller software for example "freezes" or a software setting change is not implemented, the controller could require a reset.

The NMC Pro Controller can be reset by:
- 1) Warm Reset or
- 2) Cold Start.

NB	Both the warm and cold resets are explained in *4.1.0.4 Resetting NMC 64 Controller* of the *4.1 User Manual – NMC – Climate Control*.

3.1.0.7 GETTING STARTED

Table 3 lays out the entire menu structure.

When installing the software, it would be easiest to start with **7. Configuration** (beginning with **7.1 Outputs definition,** then **7.2 Relay layout**, and so on) and then work backwards through **6. Test**, then **5. Alarm** and finish the software installation with **4. Management**.

Thus when using this manual for installing the software, go to Section 3.1.7 first and then work forwards to Section 3.1.4.

3.1.0.8 NMC CLIMATE CONTROL MENU STRUCTURE

TABLE 3. NMC CLIMATE MENU STRUCTURE

1. CLIMATE PROGRAM	2. CLIMATE PROCESS	3. HISTORY	4. MANAGEMENT	5. ALARM	6. TEST	7. CONFIGURATION (NMC 64)	7. CONFIGURATION (NMC JUNIOR)*
1.1 Vents	2.1 Humidity Treatment	3.1 Events	4.1 Clock	5.1 Alarm / Fault Reset	6.1 Output	7.1 Outputs Definition	7.1 Outputs Definition
1.2 Fans Operation	2.2 Special Ventilation	3.2 Alarm History	4.2 Calibration	5.2 Faults Setting	6.2 Digital Input	7.2 Relay Layout	7.2 Relay Layout
1.3 Heating	2.3 CO_2	3.3 Sensors History	4.2.1 Temperature Sensors		6.3 Analogue Input	7.3 Input Setting	7.3 Digital Input
1.4 Screen	2.4 Emergency	3.4 History Set-up	4.2.2 RH Sensors		6.4 Sensors	7.3.1 Socket Setting	7.4 Analogue Input
1.5 Fogging	2.5 Fresh Air Treatment	3.5 Sensors History Erase	4.2.3 CO_2 Sensors		6.4.1 Temperature Sensors	7.3.2 Socket 1	7.5 Temperature Setting
1.6 Cooling Pad		3.6 Rain Collect History	4.2.4 Weather Sensors		6.4.2 RH Sensors	7.3.3 Socket 2	7.6 Wind Program
1.7 Misting			4.3 Language			7.3.4 Socket 3	7.7 Vents Operation
1.8 Circulation			4.4 Save to Data Plug			7.4 Temperature Setting	7.8 General Setting
			4.5 Read from Data Plug			7.5 Wind program	7.8.1 Set Parameters
			4.6 Custom. Main Screen			7.6 Vents	7.8.2 Circulators
			4.6.1 Sensors			7.7 General Setting	7.8.3 Weather Sensor Set
			4.6.2 Active			7.7.1 Set Parameters	
						7.7.2 Circulators	
JR	* There are no input card sockets in the NMC Junior. It has fixed digital and analogue inputs. As a result, Menu 7 in the NMC Junior has different sub-menus and sub-menu index numbers.					7.7.3 Weather sensor set	

3.1.0.9 ANALOGUE INPUTS

Analogue inputs are received from an analogue sensor as either a voltage or a current. However a computer cannot read such a value without it being converted to a digital number. The analogue inputs in several of the NMC software's screens such as 'Status' and 'Test' screens are displayed in values which are labelled as 'A/D'.

'A/D' = Analogue-to-digital converter

This simply means analogue-to-digital converter and the values displayed in these screens are numbers that can be read by a computer: in this case the NMC Controller. The numbers themselves have no unit of measurement. They are more like a code, which the controller is pre-programmed to read.

3.1.4 MANAGEMENT

This menu contains items primarily related to proper management of your greenhouse. You can manage temperature units, and set basic functions such as time and date. You can also customize active and sensor windows.

The management menu screen shows the following options:

```
              MAIN MENU
     1.   CLIMATE PROGRAM          >
     2.   CLIMATE PROCESS          >
     3.   HISTORY                  >
     4.   MANAGEMENT               >
     5.   ALARM                    >
     6.   TEST                     >
     7.   CONFIGURATON             >


              MANAGEMENT
     1.   CLOCK
     2.   CALIBRATION              >
     3.   LANGUAGE
     4.   SAVE TO DATA PLUG
     5.   READ FROM DATA PLUG
     6.   CUSTOM. MAIN SCREEN      >
```
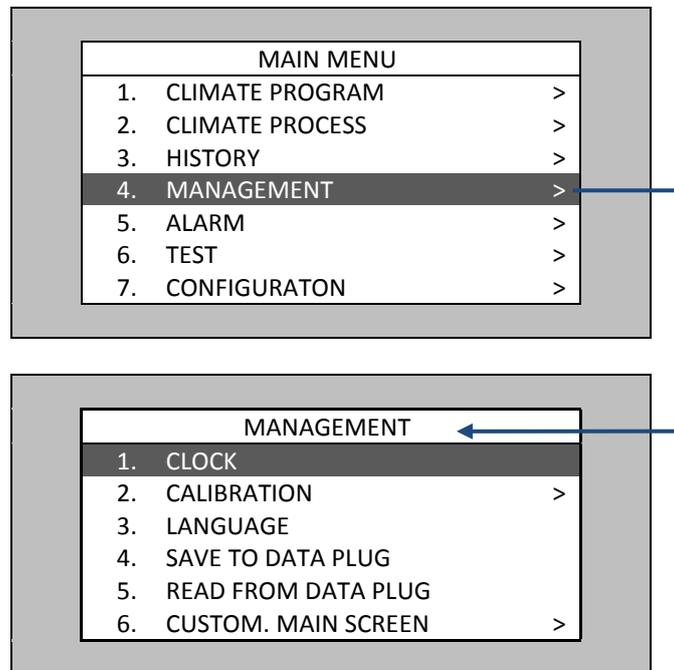
FIGURE 4: MANAGEMENT MENU SCREENSHOT

3.1.4.1 CLOCK

This option (see FIGURE 5) allows the user to adjust both the date and time. Moreover, it allows the user to define day and night times according to the following:

- To adjust the **time** and **date** simply place the cursor on the row you want to change, change the numbers using the number keys and press enter to move and save your changes.
- **BEGIN DAY/NIGHT -** Define day and night times according to season, or any other suitable setting. Default day time is from 06:00 to 18:00 and night time is from 18:00 to 06:00.

```
                   CLOCK
     TIME                    10:16:48
     DATE                    21/08/06
     BEGIN DAY               06:00
     BEGIN NIGHT             18:00
```
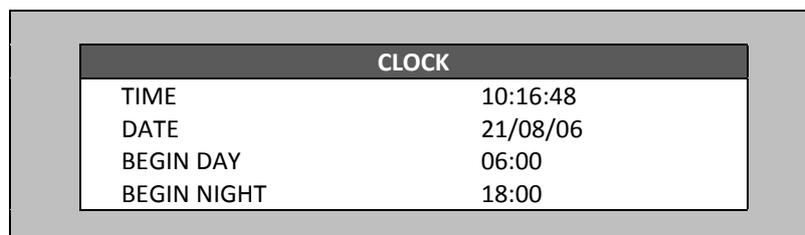
FIGURE 5: CLOCK SCREENSHOT

This menu contains items that deal with calibration of the sensors connected to the NMC Junior / 64 Climate and with the controller itself. Make sure that both the sensors and the controller are giving precise measurements.

The calibration menu consists of the following options:

```
                 CALIBRATION
    1.   TEMPERATURE SENSORS
    2.   RH SENSORS
    3.   CO2 SENSOR
    4.   WEATHER SENSORS
```
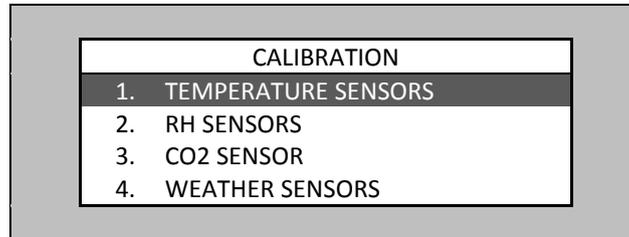
FIGURE 6: CALIBRATION MENU SCREENSHOT

3.1.**4.2.1** CALIBRATION - TEMPERATURE SENSORS

NB	When using genuine NMC temperature sensors, calibration should not be required.

TEMPERATURE CALIBRATION
- **Sensor** – Temperature sensor number.
- **Temperature (°C)** – Temperature sensor reading.
- **Factor [Value in range -5.0 to +5.0]** – Calibration factor.

TEMPERATURE CALIBRATION		
Sensor	Temp	Factor
1	24.9	0.8
2	25.3	1.5
3	N/A	---
4	N/A	---
5	N/A	---
6	N/A	---
7	N/A	---
8	N/A	---

Press <-> Arrows to Increase/Decrease
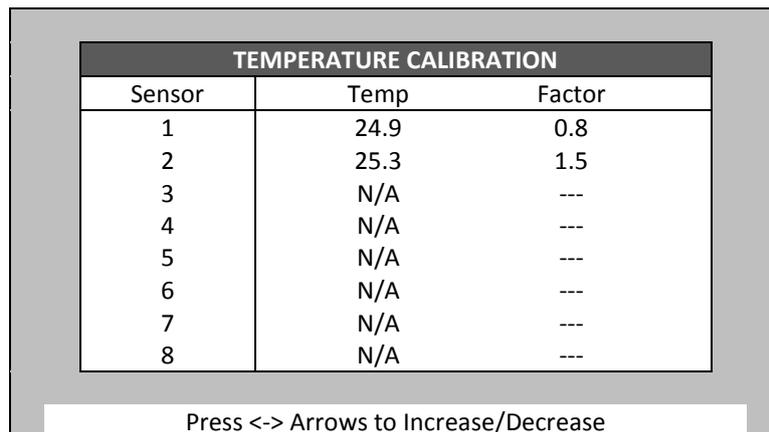
FIGURE 7: TEMPERATURE CALIBRATION SCREENSHOT

JR	The NMC Junior is limited to 2 x temperature sensors.

NB	When using genuine NMC humidity sensors, calibration should not be required.
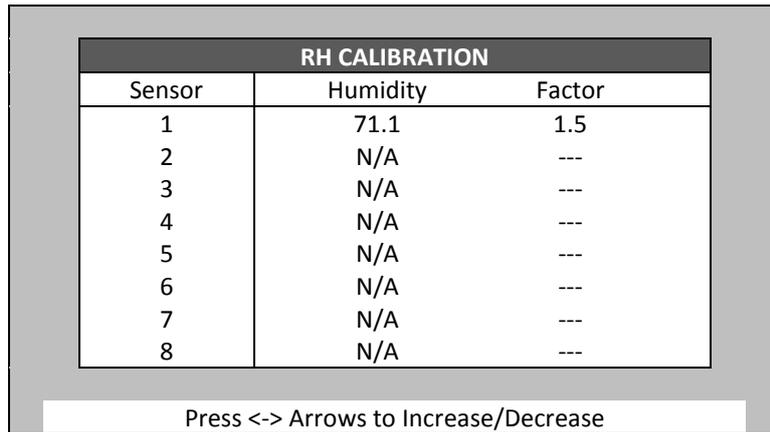
RH CALIBRATION		
Sensor	Humidity	Factor
1	71.1	1.5
2	N/A	---
3	N/A	---
4	N/A	---
5	N/A	---
6	N/A	---
7	N/A	---
8	N/A	---

Press <-> Arrows to Increase/Decrease

FIGURE 8: RH CALIBRATION SCREENSHOT

JR	The NMC Junior is limited to 1 humidity sensor.

HUMIDITY CALIBRATION
- **Sensor** – Humidity sensor number.
- **Humidity (%)** – Humidity sensor reading.
- **Factor [Value in range -25.0 to +25.0]** – Calibration factor.

3.1.4.2.3 CALIBRATION - CO$_2$ SENSOR

This selection enables the user to calibrate the CO2 sensor (see FIGURE 9). The parameters are explained below.

- **ppm at 4 - 20 mA** - Parts per million for 4 mA and 20 mA.
- **CO2 (ppm) -** Current CO2 readings.
- **Factor (ppm)** - (-/+) ppm from the current reading.

CO2 SENSOR CALIBRATION	
	Value
ppm at 4 mA	26
ppm at 20 mA	3000
CO2 (ppm)	992
Factor (ppm)	22

FIGURE 9: CO2 SENSOR CALIBRATION SCREENSHOT

This selection allows the user to calibrate the weather sensor (see FIGURE 10). Its parameters are as follows:

- **Radiation Type** – Select DAVIS or NETAFIM radiation sensor as the case may be.
- **Radiation factor**:
  o When using DAVIS radiation sensor set this value to 1.67.
  o When using NETAFIM radiation sensor set this value to the value indicated on the calibration sticker supplied with the sensor.
- **Radiation offset** should be set to 17 unless specified otherwise.
- **Wind direction** sensor should be calibrated so that the value indicated by the NMC 64 fits the actual direction pointed by the wind direction sensor (north = 0°, use compass).
- **Speed Unit** – Select kilometres per hour.
- **Rain Unit** – Select millimetres.
- **Qty**. **per pulse** – Set the quantity of rainfall to be regarded as a pulse. You can increase or decrease this set quantity to calibrate your system, according to an outside independent rainfall measurement instrument.
- **RH% 0.00 Factor** – Set the relative humidity factor according to the reading of an *outside humidity sensor.* When using a genuine NMC humidity sensor, calibration should not be required and this value would be 0.00.

WEATHER SENSOR

------RADIATION-------		
Radiation Type		NETAFIM
Radiation factor		1.67
Radiation offset		17.00
----------WIND----------		
Direction factor		0
Speed unit	Km/H	
-----------RAIN-----------		
Rain unit		mm
Qty. per pulse		0.254
---------RH Out----------		
RH% -----	Factor	0.00

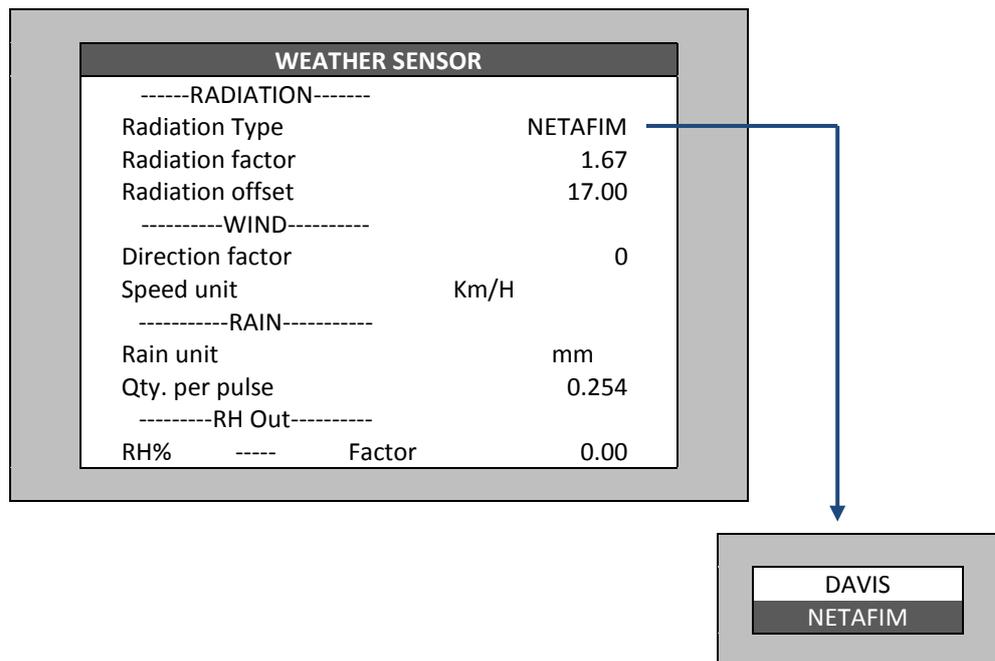| |
|---|
| DAVIS |
| NETAFIM |

FIGURE 10: WEATHER SENSORS SCREENSHOT

3.1.4.3 LANGUAGE

This selection enables the user to select a desired language (see FIGURE 11). Press Enter for the language selection to appear, select a language using the arrow keys and Enter to save your selection.

LANGUAGE	
LANGUAGE	ENGLISH

FIGURE 11: LANGUAGE SCREENSHOT

3.1.4.4 SAVE TO DATA PLUG

This option allows the user to save the information to a data plug. Place the plug in its socket and save the current data from the controller (see FIGURE 12). The new data will overwrite the old data on the plug.

```
                    NOTE

            Action will overwrite
            existing data plug!

               Are You sure?

          Yes            No
```
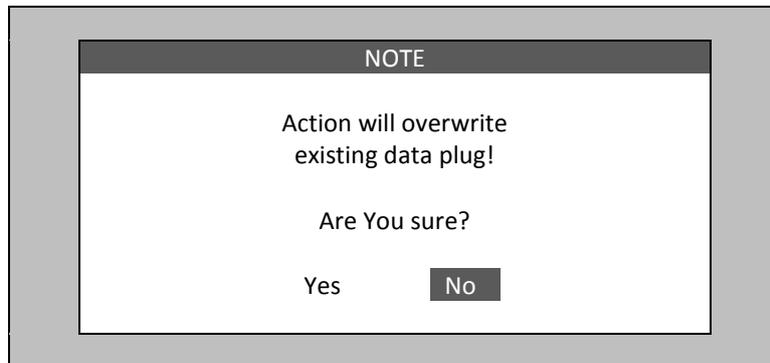
FIGURE 12: SAVE TO DATA PLUG SCREENSHOT

3.1.4.5 READ FROM DATA PLUG

This selection allows the user to read information from data plug. Place the plug in its socket and download data from the plug to the controller (see FIGURE 13). The new data will overwrite the existing data on the controller.
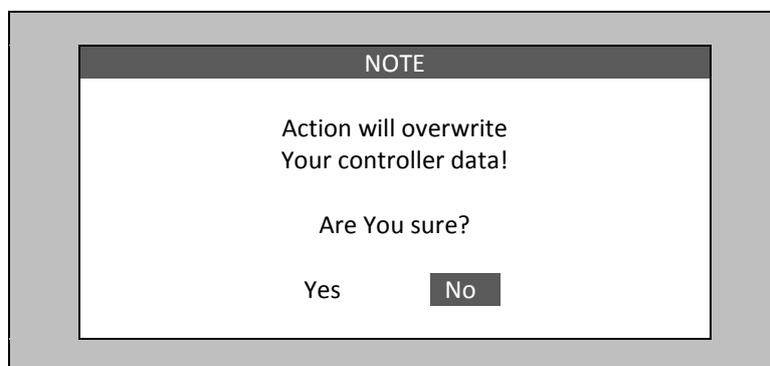
```
                    NOTE

            Action will overwrite
            Your controller data!

               Are You sure?

          Yes            No
```

FIGURE 13: READ FROM DATA PLUG SCREENSHOT

	This function does not have an 'undo' feature. Make sure that the correct action is chosen.
NB	Remove the data plug from its socket when not in use. It may be corrupted if left in the socket.

3.1.4.6 CUSTOMIZE MAIN SCREEN

The Customize main screen option enables the user to select the information that is shown on the main screen (see FIGURE 14). The sensors option refers to the sensors part of the main screen (see Main screen). The active option refers to the active part of the main screen.

CUSTOMIZE MAIN SCREEN
1. SENSORS
2. ACTIVE
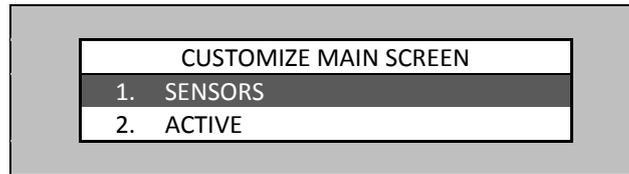
FIGURE 14: CUSTOMIZE MAIN SCREEN MENU SCREENSHOT

3.1.4.6.1 CUSTOMISE SCREEN - SENSORS

Press 'Enter' when entering the Customize Sensor Window and a small table with all of the sensors' names will pop up. Then select the desired instrument and press Enter again to save your choice. Go to any line and select a required sensor to be shown on the main screen the same way. If many sensors have been selected, and you do not see them right away on the main screen, wait a while until the other sensors show (see FIGURE 15).

SENSORS SHOWING	
LINE	SENSOR
1	Temp-1
2	Temp-8
3	Hum-8
4	Temp Av
5	Out T.
6	Hum Av.
7	Out Hum
8	Rad.
9	W. Speed
10	W. Dir.
11	CO2

FIGURE 15: SENSORS SHOWING SCREENSHOT

3.1.4.6.2 CUSTOMISE SCREEN - ACTIVE

Press 'Enter' when entering the Customize Active Window and a small table with the instruments names will pop up. Then select the desired instrument and press Enter again. There up to 14 spaces and the order of appearance on the main screen will be identical to the one in here (see FIGURE 16).

ACTIVE		
LINE	PROCESS	
1	Vent	
2	Fan	1
3	C. Fan	
4	Scr.	
5	Heat.	
6	Mist.	1
7	Co2	
8	Fogg.	
9	Pad	
10	Alarm	
11	-----	
12	-----	
13	-----	
14	-----	

FIGURE 16: ACTIVE SCREENSHOT

3.1.5 ALARM

To reach the Alarm Menu from the Main Menu screen choose one of the following options; either press numeric key 5 or navigate to line number 5 and press Enter. The following options are displayed (see FIGURE 17):

MAIN MENU	
1. CLIMATE PROGRAM	>
2. CLIMATE PROCESS	>
3. HISTORY	>
4. MANAGEMENT	>
5. ALARM	>
6. TEST	>
7. CONFIGURATON	>

ALARM
1.   ALARM/FAULT RESET
2.   FAULTS SETTING
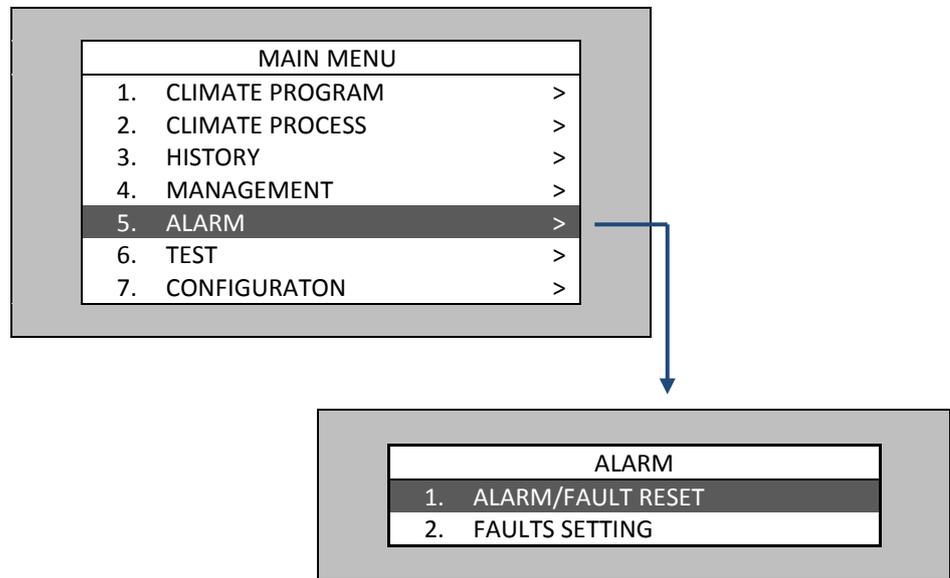
FIGURE 17: ALARM MENU SCREENSHOT

3.1.5.1 ALARM/FAULT RESET

This table shows active alarms and faults. The bottom part allows the user to cancel faults and reset the alarms (see FIGURE 18).

ALARM/FAULT RESET			
HIGH t°	ON	HIGH %RH	OFF
LOW t°	OFF	LOW %RH	OFF
CO2 HIGH	OFF	HIGH WIND	OFF
CANCEL FAULT ?			YES
RESET ALARM ?			YES

FIGURE 18: ALARM/FAULT RESET SCREENSHOT

3.1.5.2 FAULTS SETTING

This table shows fault setting alarms (see FIGURE 19). Its parameters are as follows:

ITEM

- **HIGH T^o** - Define high temperature alarm. If temperature exceeds high t^o definition, alarm will activate.
- **LOW T^o** - Define low temperature alarm. If temperature drops below low t^o definition, alarm will activate.
- **HIGH %RH** – Define high humidity alarm. If humidity exceeds high %RH definition, alarm will activate.
- **LOW %RH** – Define low humidity alarm. If humidity drops below low %RH definition, alarm will activate.
- **HIGH WIND** – Define high wind speed. If wind speed exceeds high wind definition alarm will activate.
- **CO2 HIGH** – Define high CO_2 alarm. If gas exceeds high CO_2 definition, alarm will activate.

DELAY – The duration in seconds of one of the faults above, prior to alarm activation

ALARM

- **YES** – Alarm is active.
- **NO** – Alarm has been deactivated. Select 'NO' if the alarm is not required.

FAULTS			
ITEM	VALUE	DELAY (sec)	ALARM
HIGH t°	10.0	10	YES
LOW t°	10.0	10	YES
HIGH %RH	80.0	10	YES
LOW %RH	20.0	10	YES
HIGH WIND	60.0	10	YES
CO2 HIGH	2000	60	YES

FIGURE 19: FAULTS SCREENSHOT

3.1.6 TEST

Go to the Test menu by either pressing number 6 on the numeric keypad or navigate to line number six using the up/down arrow keys and press enter. The following screen appears:
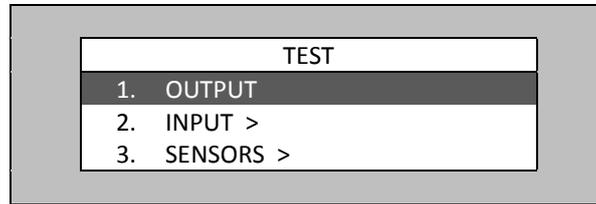
```
                    TEST
    1.   OUTPUT
    2.   INPUT  >
    3.   SENSORS  >
```

FIGURE 20: TEST MENU SCREENSHOT

3.1.6.1 OUTPUT

To test relays function, mark the relays you wish to test and use the right arrow keys to change the mark to 'M'. Now the function should initiate activity in the same way that it would have been activated by a certain program. To stop testing, press the left arrow key. Use the test feature to make sure all connections have been made properly (see FIGURE 21). '*' signifies that the relay was activated by a program.

RELAY			
NUMBER	FUNCTION	1	STATUS
1	VENT OPEN	1	-
2	VENT CLOSE	1	*
3	VENT OPEN	2	M
4	VENT CLOSE	2	M
5	FANS	1	-
6	FANS	2	-
7	CIRCUL. FAN	1	-
8	CIRCUL. FAN	2	-
9	SCR. ROLL U	1	-
10	SCR. SPREAD	1	-
11	HEATER	1	-
12	MISTING	1	-
13	CO2	1	-
14	FOGGER	1	-
15	COOL. PAD	1	-
16	FREE OUT.	1	-
...	---	0	-
64	ALARM	0	-

FIGURE 21: OUTPUT SCREENSHOT

3.1.6.2 INPUT

Use this menu in order to test sockets manually. In order to test the socket, create a short circuit in one of the terminals. If the socket is functioning well, the input number will change from 0 to 1 (see FIGURE 22). All sockets connected to the system should be configured as either analogue or digital intput sockets. If no input socket has been defined, the menu will not be active.

*Sockets 4 and 5 in the Input Screen cannot be used.
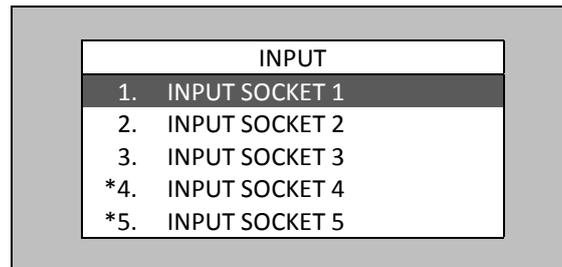
INPUT
1. INPUT SOCKET 1
2. INPUT SOCKET 2
3. INPUT SOCKET 3
*4. INPUT SOCKET 4
*5. INPUT SOCKET 5

FIGURE 22: INPUT SCREENSHOT

3.1.6.2.1 INPUT SOCKET 1

FIGURE 23 shows an example of Socket 1 that is configured as a digital input. The screen shows the status of digital inputs according to the digital sensors that are operating.
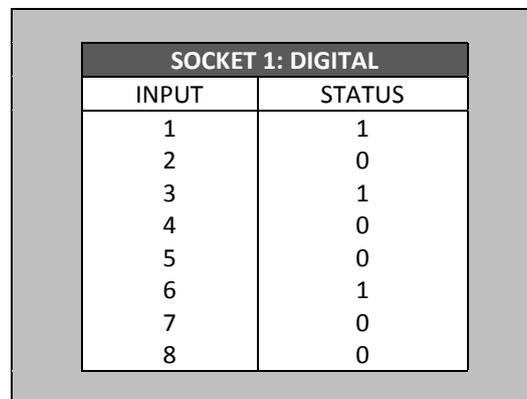
SOCKET 1: DIGITAL	
INPUT	STATUS
1	1
2	0
3	1
4	0
5	0
6	1
7	0
8	0

FIGURE 23: DIGITAL INPUT SCREENSHOT

3.1.6.2.2 INPUT SOCKET 2

FIGURE 24 shows an example of Socket 2 that is configured as an analogue input. The screen shows the status of analogue inputs according to the analogue sensors that are operating.

SOCKET 2: ANALOG	
INPUT	STATUS
1	399
2	1023
3	37
4	12
5	442
6	1023
7	760
8	1
9	0
10	590
11	604

FIGURE 24: SENSORS MENU SCREENSHOT

The values in the Status column are 'A/D' and are explained in *3.1.0.9 Analogue Inputs*.

3.1.6.2.3 INPUT SOCKET 3

The NMC 64 is in practice limited to 3 input sockets. If this third socket is used, it would be by an analogue input card.

3.1.6.3 SENSORS

Use this menu to test sensors (see FIGURE 25).

SENSORS	
1.	TEMPERATURE SENSORS
2.	RH SENSORS

3.1.6.3.1 TEMPERATURE SENSORS

Readings from each temperature sensor are displayed in FIGURE 26.
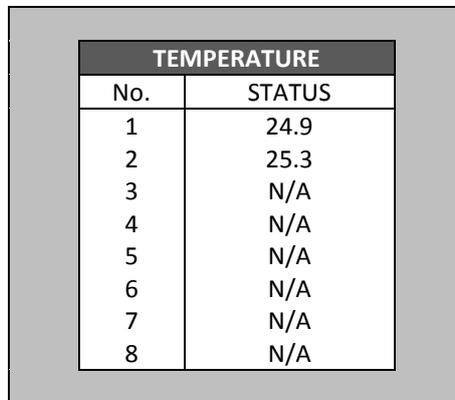
TEMPERATURE	
No.	STATUS
1	24.9
2	25.3
3	N/A
4	N/A
5	N/A
6	N/A
7	N/A
8	N/A

JR	This is indexed as 6.4.1 in the NMC Junior and is limited to two temperature sensors.

3.1.**6.3.2** RH SENSORS

Readings from each humidity sensor are displayed in FIGURE 27.

HUMIDITY	
No.	STATUS
1	71.15
2	N/A
3	N/A
4	N/A
5	N/A
6	N/A
7	N/A
8	N/A

FIGURE 27: RH SENSORS SCREENSHOT

JR	This is indexed as 6.4.2 in the NMC Junior and is limited to one humidity sensor.

3.1.7 CONFIGURATION

Go to the configuration menu by either pressing number 7 on the numeric keypad or by navigating to the line number (seven) by using the up/down arrow keys and pressing Enter (see FIGURE 28). The configuration menu is primarily a setup menu for the NMC Junior / 64 Climate. That's why in the beginning of the software chapter it is recommended to start with this menu. Besides settings and definitions, the configuration menu includes the wind program and vents operation program.

```
                  CONFIGURATON
        1.   OUTPUTS DEFINITION
        2.   RELAY LAYOUT
        3.   INPUT SETTING              >
        4.   TEMPERATURE SETTING
        5.   WIND PROGRAM
        6.   VENTS OPERATION
        7.   GENERAL SETTING            >
```
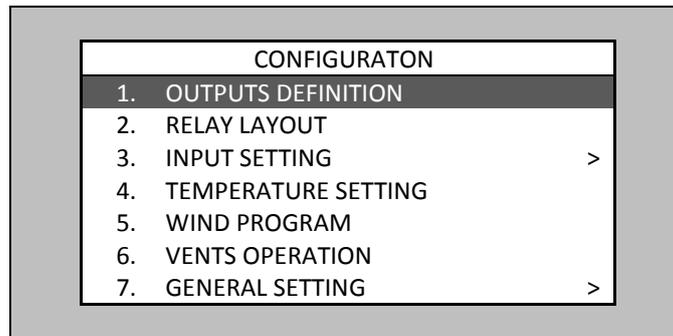
FIGURE 28: CONFIGURATION MENU SCREENSHOT

3.1.7.1 OUTPUTS DEFINITION

Enter the number of relays you currently have on the system and press ENTER. FIGURE 29 will appear. Fill out the definitions according to the equipment you have connected to the NMC 64 Climate**.** The equipment that is being used can be controlled if connected to the NMC 64 Climate outputs. An output is a relay. For example, if there are 2 fans functioning, the number of functions on fans outputs can be set on 2.

NB	The satellite line represents the amount of relays not in use. Any configuration will deduct the initial amount chosen.

Once you've defined the outputs press the menu key to exit, choose one of the following options:
- Select the **Auto** option if you want the NMC Junior / 64 Climate to lay out the relays according to the equipment plugged in automatically.
- Select the **Manual** option if you want the lay out the relays manually.
- Select the **Cancel** option if you want to go back to the output definition table.
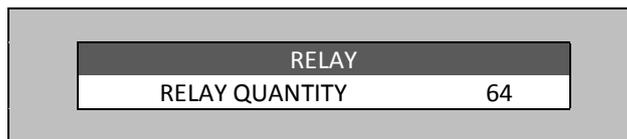
RELAY	
RELAY QUANTITY	64

FIGURE 29: OUTPUT (RELAY) QUANTITY SCREENSHOT
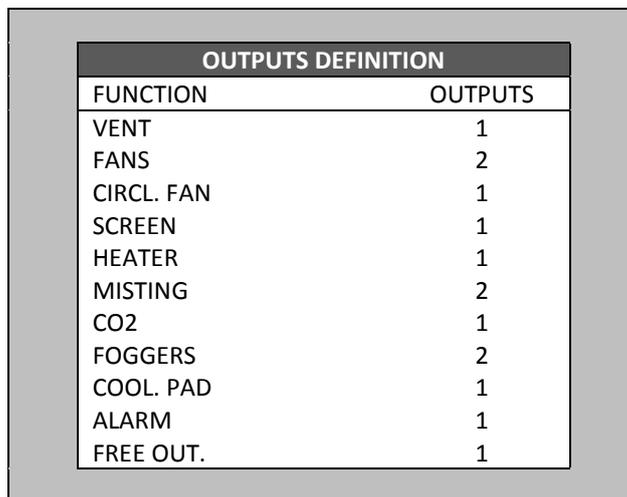
OUTPUTS DEFINITION	
FUNCTION	OUTPUTS
VENT	1
FANS	2
CIRCL. FAN	1
SCREEN	1
HEATER	1
MISTING	2
CO2	1
FOGGERS	2
COOL. PAD	1
ALARM	1
FREE OUT.	1

FIGURE 30: OUTPUTS DEFINITION SCREENSHOT

3.1.7.2 RELAY LAYOUT

After setting the output definition, go to the relay layout window. Attach a function to a relay. If you selected the auto option as mentioned earlier the relay layout will be set automatically, but it can also be changed manually:

RELAY LAYOUT		
OUT	FUNCTION	NUM.
1	VENT OPEN	1
2	VENT CLOSE	1
3	VENT OPEN	2
4	VENT CLOSE	2
5	FANS	1
6	FANS	2
7	CIRCL. FAN	1
8	CIRCL. FAN	2
9	SCR. ROLL UP	1
10	SCR. SPREAD	1
11	HEATER	1
12	MISTING	1
13	CO2	1
14	FOGGER	1
15	COOL. PAD	1
16	FREE OUT.	1
...	...	...
64	----	0

FIGURE 31: RELAY LAYOUT SCREENSHOT – PART 2

3.1.7.3 INPUT SETTING

Mark socket 1 on the sockets table and press ENTER and FIGURE 32 appears. Mark a function and press ENTER. The cursor will shift to the next row. To confirm your change select 'yes' in the save changes screen that appears afterwards.

SOCKET		
1.	SOCKET	SETTING
2.	SOCKET	1
3.	SOCKET	2
4.	SOCKET	3
5.	SOCKET	4
6.	SOCKET	5

FIGURE 32: INPUT SETTING SCREENSHOT

3.1.7.3.1 SOCKET SETTING

In SOCKET SETTING, define each socket according to its input card as either DIGITAL or ANALOGUE. Use '---' for empty sockets (see FIGURE 33). Sockets 4 and 5 will always be '---'.

SOCKET SETTING	
NUM.	TYPE
1	DIGITAL
2	ANALOG IN
3	---
4	---
5	---

FIGURE 33: ANALOG INPUT SCREENSHOT

JR	Input Setting and Socket Setting are not applicable to the NMC Junior.

3.1.7.3.2 SOCKET 1

After selecting the socket type in 7.3.1, the selection is seen in this screen. In this instance in FIGURE 34, Socket 1 was selected as digital. Select the sensor from the dropdown screen

SOCKET 1: DIGITAL INPUT	
IN.	INPUT FUNCTION
1	WIND SPEED
2	----
3	RAIN COLLECTOR
4	RAIN SENSOR
5	----
6	----
7	----
8	----

WIND SPEED
RAIN COLLECTOR
RAIN SENSOR
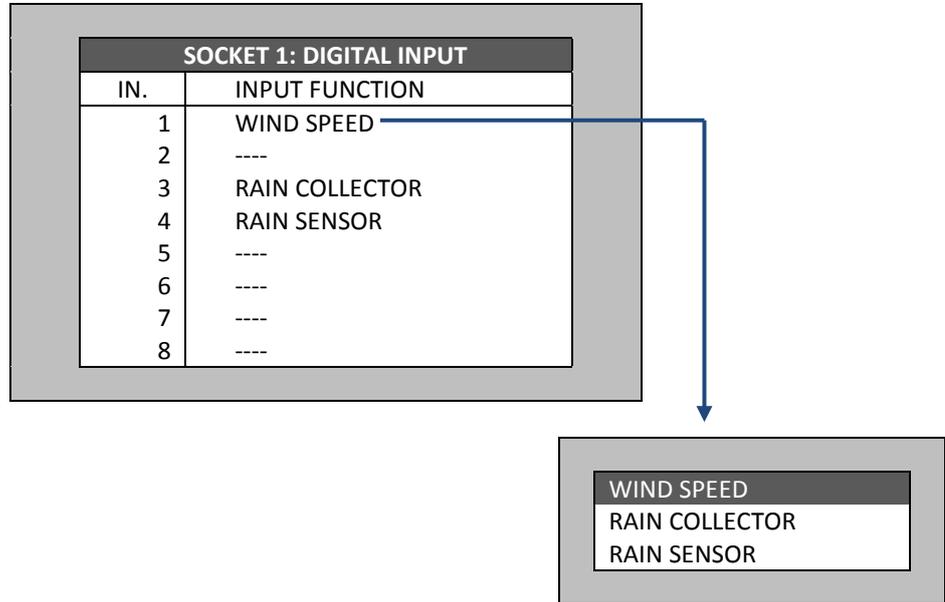
FIGURE 34: SOCKET 1 SCREENSHOT - DIGITAL

JR	The NMC Junior is limited to Inputs 1 - 6.

3.1.7.3.3 SOCKET 2

After selecting the socket type in 7.3.1, the selection is seen in this screen. In this instance in FIGURE 35, Socket 2 was selected as analogue. Select the sensor from the dropdown screen

SOCKET 2: ANALOG INPUT		
IN.	INPUT FUNCTION	In. No.
1	TEMP. SENSOR	1
2	TEMP. SENSOR	2
3	----	0
4	----	0
5	----	0
6	----	0
7	RADIATION	1
8	%RH INSIDE	1
9	%RH INSIDE	2
10	----	0
11	WIND DIRECT.	1

TEMP. SENSOR
%RH INSIDE
%RH OUTSIDE
RADIATION
WIND DIRECT.
RAIN SENSOR
C02 SENSOR

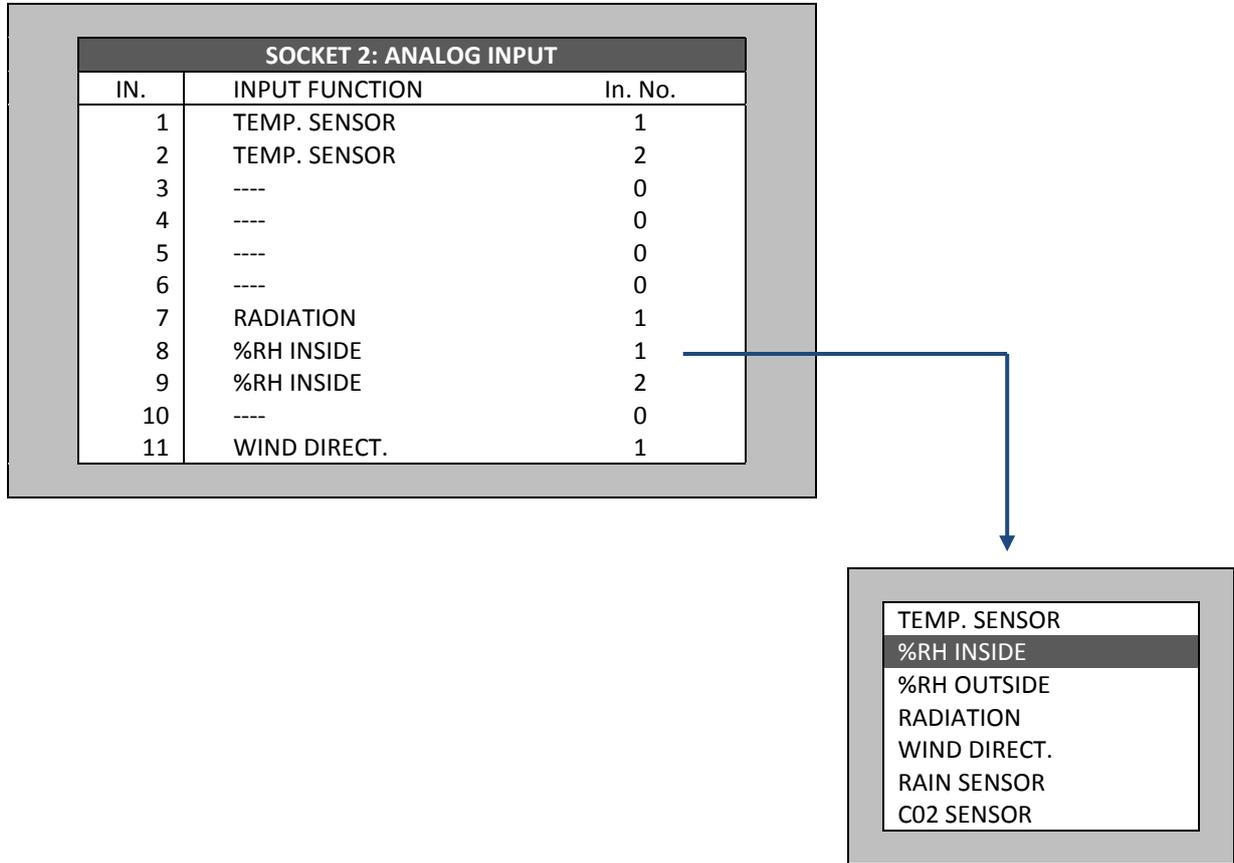**FIGURE 35: SOCKET 2 SCREENSHOT - ANALOGUE**

JR   The NMC Junior is limited to Inputs 1 - 5.

3.1.**7.4** TEMPERATURE SETTING

Configure temperature sensors to devices (see FIGURE 36). Select a temperature sensor for each of the functions. The function uses the average temperature reading from the sensors defined in this screen throughout the different climate programs and processes.

- **FUNCTION** - – equipment that has been defined up until this point through the configuration process.
- **INSIDE/OUTSIDE** – select temperature sensors for inside and outside average temperature calculation.
- **TEMPERATURE SENSORS** – Every process and equipment operates with their sensor's number. If two numbers exist, the average will be calculated. If no number exists, it operates according to its average inside.

TEMPERATURE SETTING							
FUNCTION		Temperature sensors					
INSIDE		1	2	0	0	0	0
OUTSIDE		0	0	0	0	0	0
VENT	1	1	2	0	0	0	0
FANS	1	1	2	0	0	0	0
FANS	2	1	2	0	0	0	0
CIRCL. F	1	1	2	0	0	0	0
SCREEN	1	1	2	0	0	0	0
HEATER	1	1	0	0	0	0	0
CO2	1	0	0	0	0	0	0
FOGGERS	1	0	0	0	0	0	0
COOL. PA	1	0	0	0	0	0	0

FIGURE 36: TEMPERATURE SETTING SCREENSHOT

JR	The NMC Junior is limited to INSIDE, OUTSIDE, VENTS and HEATER.

3.1.7.5 WIND/RAIN PROGRAM

This table allows you to control the vents operation according to wind speed and direction. To operate this feature, the system must have a weather station (see FIGURE 37).

The program default settings are automatically filled with all the available options except for the wind speed and opening % in the Position (P1...4) column. For every option fill in low and high wind speed values. The controller will calculate a curve between the high and low values. Options with wind direction set to "yes" will operate according to wind direction of each of the vents set in the vents setting menu. When set OFF ("no") the wind direction will not play a roll in the program activation. For each wind/rain status there are 4 program options. On each program select opening % of the vents. The curve applies to the opening % in high and low speeds as well. When the table is full, it is time to appoint each vent to a desirable program in the vent operation menu. In case of rain, the wind speed and position automatically turn 0 and the vents close without delay.

WIND/RAIN PROGRAM							
WIND/RAIN STATUS				PROGRAM			
RAIN	WIND DIR	WIND	SPEED	P1	P2	P3	P4
NO	NO	LOW	20	100%	100%	100%	100%
NO	NO	HIGH	50	10%	10%	10%	10%
NO	YES	LOW	10	100%	100%	100%	100%
NO	YES	HIGH	40	0%	0%	0%	0%
YES	NO	LOW	0	0%	0%	0%	0%
YES	NO	HIGH	0	0%	0%	0%	0%
YES	YES	LOW	0	0%	0%	0%	0%
YES	YES	HIGH	0	0%	0%	0%	0%

FIGURE 37: WIND/RAIN PROGRAM SCREENSHOT

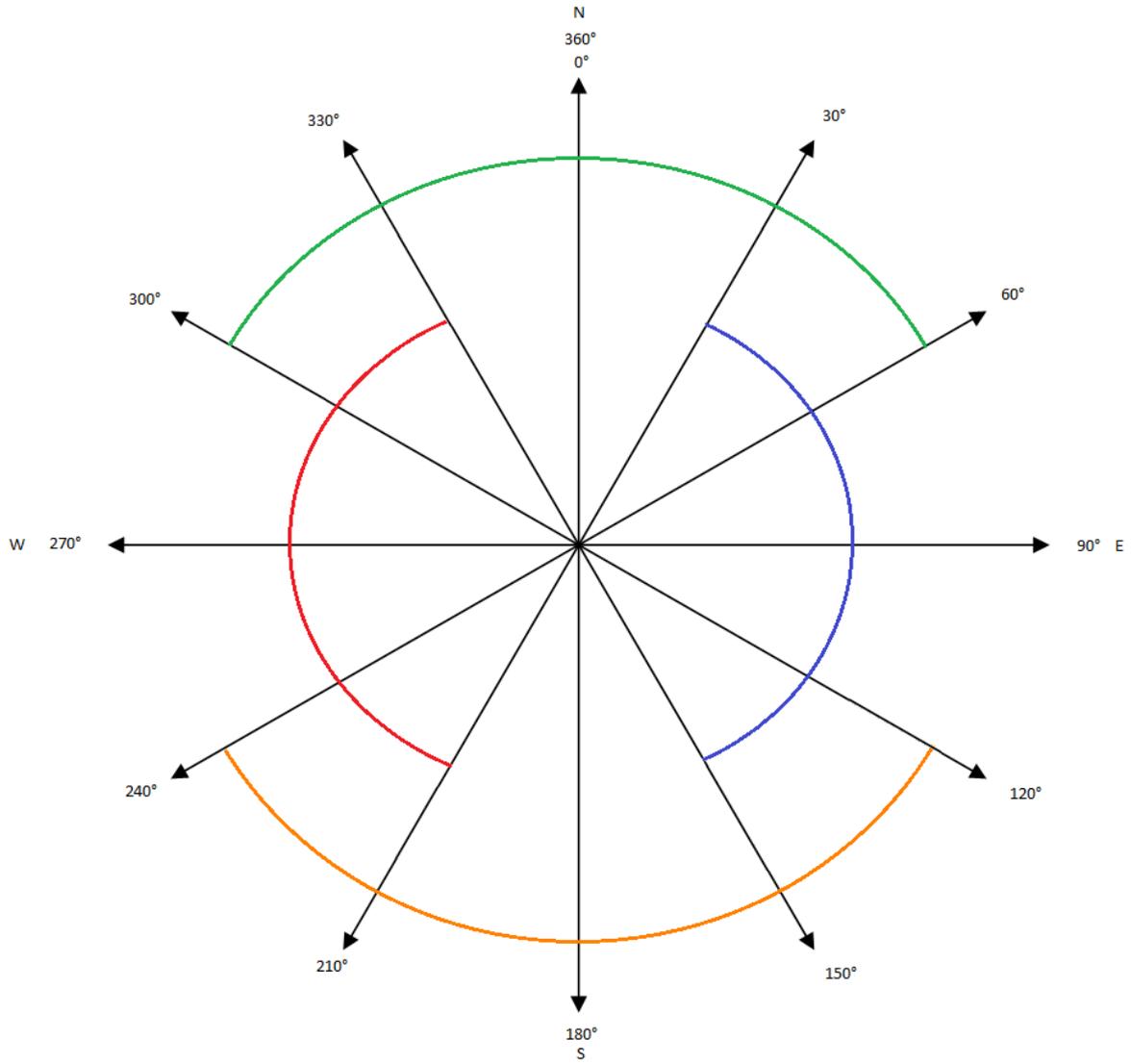| JR	The Wind Program in the NMC Junior is dependent on it being networked to an NMC 64/Pro that is wired to a weather station.

FIGURE 38: WIND DIRECTION DIAGRAM

3.1.7.6 VENTS OPERATION

Set the following parameters for each vent (see FIGURE 39). The vents activity throughout the different climate programs and processes, functions according to these configurations.

- **OPENING TIME** – Enter how long it takes the vent to fully open from a fully closed position. The time value is in seconds.
- **CLOSING TIME** – Enter how long it takes the vent to fully close from a fully open position. The time value is in seconds.
- **% PER STEP** – Define opening percentage per step.
- **DELAY TIME (sec.)** – Set the delay time you want between each of the vents' steps.
- **% DURING FAN** – Define the opening percentage during fan operation.
- **% MIN. DURING RH** – Set minimum opening percentage during humidity treatment.
- **% MIN. DURING PAD** – Set the minimum opening percentage during cooling pad operation.
- **WIND PROGRAM NUMBER** – Define a vent to one of the four wind programs according to the wind direction diagram in FIGURE 38. Choose one of the 4 wind programs in the wind program table. You can program up to 4 programs and here can see which one is operating.
- **WIND DIRECTION FROM/TO** – Configure the range of degrees the vent is facing. The 0 degree factor is set in the weather sensors table. (See FIGURE 38).
- **WAIT WIND SPEED RISE/DROP (sec.)** – Set vents opening delay time in seconds when the wind speed rises or drops.
- **NUM. STAGES WIND SPEED** - The NMC Junior / 64 Climate forms a curve between wind speed and vents opening percentage in the Wind Program and here you decide in how many stages you want for the vents to open/close during wind program activity.

VENTS OPERATION							
VENT	1	2	3	4	5	...	16
OPENING TIME (SEC)	60	60	60	60	60	...	60
CLOSE TIME (SEC)	60	60	60	60	60	...	60
% PER STEP	50	50	50	50	50	...	50
DELAY TIME (SEC)	60	60	60	60	60	...	60
% DURING FAN	100	100	100	100	100	...	100
% MIN. DURING %RH	100	100	100	100	100	...	100
% MIN. DURING PAD	100	100	100	100	100	...	100
WIND PROGRAM NUMBER	1	1	1	1	1	...	1
WIND DIRECTION FROM	90	90	90	90	90	...	90
WIND DIRECTION TO	150	150	150	150	150	...	150
WAIT W.S. RISE (SEC)	60	60	60	60	60	...	60
WAIT W.S. DROP (SEC)	60	60	60	60	60	...	60
NUM. STAGES W.S.	1	1	1	1	1	...	1

FIGURE 39: VENTS OPERATION SCREENSHOT

3.1.7.7 GENERAL SETTING

This menu is shown in FIGURE 40.

```
                GENERAL SETTINGS
    1.   SET PARAMETERS
    2.   CIRCULATORS
    3.   WEATHER SENSOR SET
```
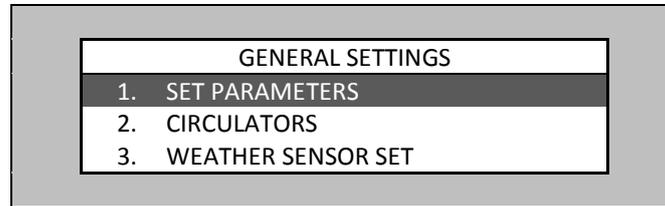
FIGURE 40: GENERAL SETTING MENU SCREENSHOT

3.1.7.7.1 SETTING - SET PARAMETERS

This selection enables the user to set parameters (see FIGURE 41 and FIGURE 42). They are explained below.

- **MAX ACTIVE MIST -** Maximum misting to operate at the same time.
- **HISTORY RESOLUTION -** History collection cycle time.
- **RAIN SENSOR DELAY -** Delay time between rain detection and alerting. This feature is meant to avoid false alarms if the sensor got wet with humidity or as a result of a mistake etc.
- **RAIN SENSOR LEVEL (A/D) -** This parameter relates to analogue rain sensors with analogue outputs. (For example: 0V-No rain, 3V-Rain) that can be connected to the NMC Junior / 64 Climate analogue input. The A/D level determines above which point there is rain and below which point there is no rain.
- **BAUDRATE -** Communication BAUDRATE that must be correspondent to the BAUDRATE in the communication software.
- **CONTROLLER NUMBER** - Must be correspondent to the number in the communication software.
- **CONTROLLER FUNC. (WEATHER ST.) –** Set the controller with weather station sensors plugged in, to **master** – that operates with the NMC Junior / 64, and to **slave** – that operates with the greenhouse. Note that the **local** option enables the controller to operate with no connection to the master. Moreover, it can not transmit (note the difference between **Figures 71** and **72**).
- **TEMPERATURE UNIT -** Select between Celsius and Fahrenheit.
- **MAX WAIT ALARM FOG/MIST (MIN) –** Delay time for the controller before turning the alarm on. When a slave receives a permission to fog/mist for the specified time it turns on its alarm. Maximum value is 1440.

```
                        SET PARAMETERS
        MAX. ACTIVE MIST                              1
        HISTORY RESOLUTION                           15 min
        RAIN SENSOR DELAY (SEC.)                     30
        RAIN SENSOR LEVEL (A/D)                      80
        BAUD RATE                                    9600
        CONTROLLER NUMBER                            1
        TEMPERATURE UNIT                             C°
        CONT. FUNC. - WEATHER STATION                LOCAL
        CONTROLLER FUNCTION - MISSING                LOCAL
        CONTROLLER FUNCTION - FOGGING                SLAVE
        MAX WAIT ALARM FOG/MIST (MIN)                10
```

SLAVE
MASTER
LOCAL

FIGURE 41: SET PARAMETERS 'LOCAL/SLAVE' SCREENSHOT

```
                        SET PARAMETERS
        MAX. ACTIVE MIST                              1
        HISTORY RESOLUTION                           15 min
        RAIN SENSOR DELAY (SEC.)                     30
        RAIN SENSOR LEVEL (A/D)                      80
        BAUD RATE                                    9600
        CONTROLLER NUMBER                            1
        TEMPERATURE UNIT                             C°
        CONT. FUNC. - WEATHER STATION                MASTER
        CONTROLLER FUNCTION - MISTING                MASTER
        CONTROLLER FUNCTION - FOGGING                MASTER
        MAX WAIT ALARM FOG/MIST (MIN)                10
        MAX CONTROLLERS MIST PARALLEL                1
        MAX CONTROLLERS FOG PARALLEL                 1
        MAX CONTROLLERS IN THE NET                   1
```

FIGURE 42: SET PARAMETERS 'MASTER' SCREENSHOT

3.1.7.7.2 SETTING - CIRCULATORS

Select Circulators operation (yes/no) status during heating and cooling processes:

CIRCULATORS	
OPER. DURING HEATING	YES
OPER. DURING COOLING	YES

FIGURE 43: CIRCULATORS SCREENSHOT

3.1.7.7.3 SETTING - WEATHER SENSOR SET

In the case of 'Slave' choice: Mark a 'V' near the information you want the NMC 64 to receive from the master (see FIGURE 44).
In case of 'Master' and 'Local' choices is displayed. (see FIGURE 45)

WEATHER SENSOR SET	
Data To Collect	
Temp. Out.	√
PH% Out.	√
Wind speed	√
Wind Direction	√
Rain	√
Rain Collector	√
Barometric Pressure	•
Radiation	√

FIGURE 44: WEATHER SENSOR SET SCREENSHOT

WEATHER SENSOR SET
The controller is not a slave

FIGURE 45: WEATHER SENSOR SET SCREENSHOT – IF 'SLAVE' IS NOT DEFINED