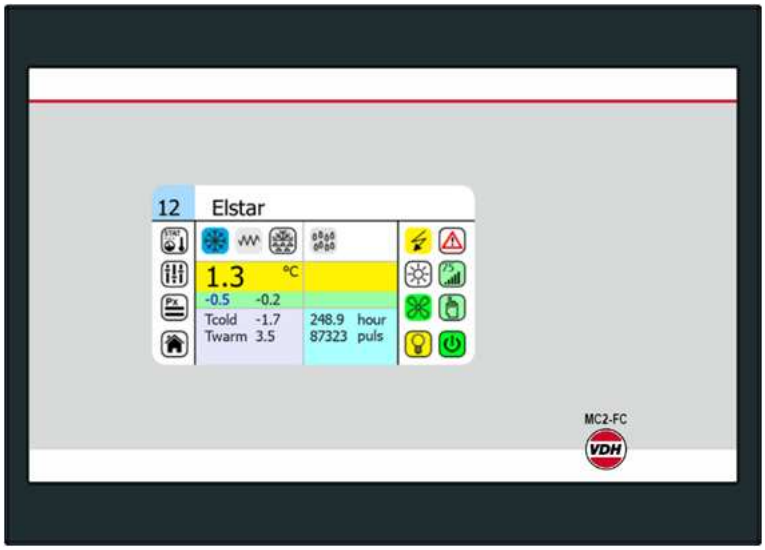
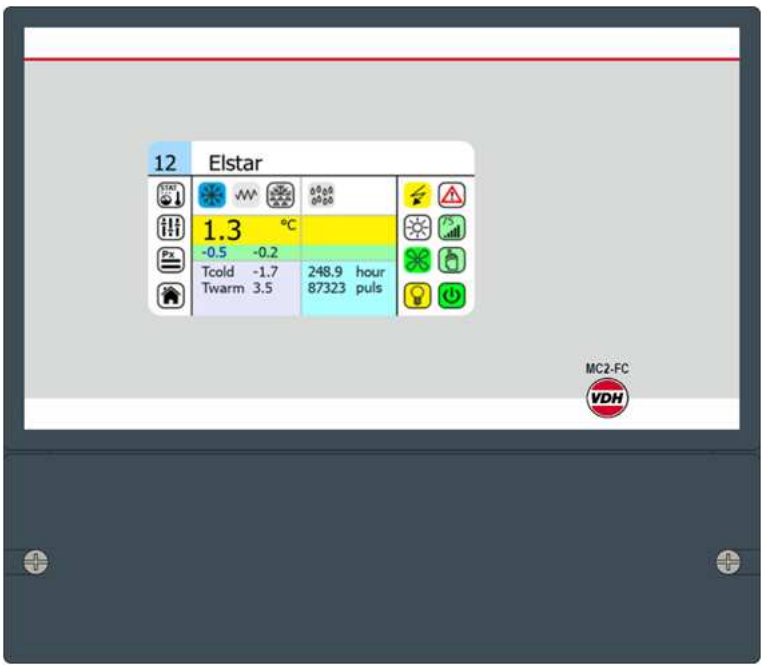
Manual

MC2-FC mode MC





Description:	MC2-FC mode MC (software 181030 v3.00)	Pages:	58	Doc. no.	200061
Type:	Manual	By:	BVDB	Version:	1.3
File:	Do200063 MC2-FC mode MC V13 EN.docx	Initials:		Date:	28-02-2020

VDH Products BV

Table of Contents

1 Functional specification

1.1 Introduction

The MC2-FC is a controller that can control, monitor and register the temperature, humidity and ventilation of cooling and storage cells. The controller is very suitable for the control of fruit storage cells, but it can also be used for many other control applications. There are 2 versions: a wall-mount version and a panel-mount version, see sections 7.1 and 8.

The controller has Pt1000 temperature sensor inputs, digital inputs and relay outputs that are freely configurable. The inputs are used to supply the controller with the measurements and external data required for the control processes. The controller uses these inputs in combination with the control settings (set points, parameters, etc.) to calculate the control values. The control values are transmitted by means of relays to the processes to be controlled.

Multiple controllers can be connected to each other through a network (RS485 or Ethernet, depending on the mode) so that they can exchange technical control data. In this way, they can be combined to create an integrated control system with mutually coordinated control actions, while retaining their autonomous operation in the event of network malfunctions.

The controller supports two modes: the mode FC (standard) and the mode MC. In the mode MC, the controller can work together with MC3-FRUIT and MC3-COOL controllers through the Ethernet. In the mode FC, the controller functions in the same way as the FC785-PC controllers and in that way can work together through the RS485 network. This mode is described in another manual. It is possible to switch between the two modes through an internal web page (see section 6.2).

The controller can be operated using the touchscreen. It can also be operated (also by remote control) using a computer on which the VDH Alfa Server Program (VASP) has been installed. VASP provides access to the advanced control functions such as registrations, alarm handling settings, etc.

The controller has 5 temperature sensor inputs (which can also be used as digital inputs) and 5 relays. If more inputs or relays are necessary, the controller can be expanded with an optional 907.100054 MC3-EM [1Do12,1Rth16] extension module. That adds 16 temperature sensor inputs and 12 relays to the controller.

1.2 Commissioning

The following must be taken into account before the controller is commissioned:

- When the Ethernet connection is used, the IP address must be checked/defined (see section 6.1).
- The correct mode (FC or MC) must be selected (see section 6.2)
- The desired controller name and input and output functions must be defined (see section 6.3).
- If the controller must work together with other controllers, the controllers must be linked to each other through the Ethernet. Then a unique cell number with a parameter (P0100[1]) must be defined on every controller.
- The parameters must be checked/defined (see section 0).

The software version number of the controller can be retrieved using parameter P7000. To ensure that multiple controllers can work together in a single network, it is recommended that controllers with similar software versions are used. Controllers with different software versions do not always work well together.

In addition, we strongly recommend that after a controller has been commissioned you carefully note down the defined parameters and store them in a safe place. Then, if a controller needs to be exchanged, that can be done much faster and more easily.

The functional operation of the controller is described in the following sections.

1.3 Phases and cooling

The controller functions in 3 phases. These phases mainly relate to the control of the mechanical cooling (fluid valve and, where relevant, suction valve).

Cool phase: In this phase the cell starts mechanical cooling if the control temperature exceeds the actual temperature set point + temperature differential. The cooling stops if the temperature set point is reached. For the cool phase, each cell is placed in a cool group. Cool groups can be formed by setting a cool group number for each cell (P0310). A maximum cooling capacity can be set for each cool group (P2100 and other parameters). The cooling is only started if that does not cause exceeding the maximum cooling capacity in the cool group. For that purpose the cooling capacity of each cell applicable for the cool phase must be programmed (P0300). Due to this maximization cells sometimes have to wait until cooling capacity becomes available. The cool group of a cell also applies to the standby phase.

[1] In this manual, parameters are indicated with P<x>, where x = the parameter number.

Store phase: For the store phase, each cell is placed in a store group. Store groups can be formed by setting a store group number for each cell (P0320). Within each store group, each cell mechanically cools only once in a store cycle time interval until the control temperature reaches the temperature set point. The time between two consecutive cycles of a store group can be configured (P2201 and other parameters). The store cycles of the different store groups are not synchronized. By default, the cells are cooled in order of ascending cell number (P0100). As many cells with cool demand will be started as the maximum cooling capacity of the store group allows. Thus, the maximum cooling capacity of each store group (P2200 and other parameters) and the cooling capacity of each cell must be programmed in the store phase (P0301). If a cell cannot be started because it is defrosting or because the remaining cooling capacity in the store group is insufficient for that cell, then a somewhat different order is used. If, however, the next cell can be started, it is started to avoid loss of cooling capacity. Instead of the default order, other cooling orders can be configured (P2202 and other parameters). These are further described in section 1.18. The store phase is very suitable to operate multiple cells with limited compressor capacity and limited compressor starts. This phase can be enabled or disabled (P0110).

Standby phase: In this phase the cell only (mechanically) cools if that is required to deliver hotgas to another cell which is waiting for a hotgas defrost action. The other functions of this cell (defrost, heating, humidify and automatic ventilation) are disabled. This phase can be enabled and disabled (P0111).

1.4 Heating

The cell heating (Heating relay function) is switched on when the control temperature drops below the current temperature set point + heating set point offset – heating differential (P0400 and P0401). The heating stops when the current temperature set point + heating set point offset is reached.

Heating with hotgas from mechanically cooling cells is also possible. That is described in section 0.

1.5 Defrost

The controller support 3 defrost methods, which are described in further detail below: A separate defrost group can be configured for each defrost method on the cell controllers (P0800..P0802). Different settings can be made for each defrost group (P2400..P2406 and other parameters), for example, the maximum number of cells that defrost at the same time, the number of cooling cells which are required for hotgas defrost.

A defrost action can be started manually, on clock time intervals, effective cooling time intervals or on real-time intervals (P0810..P0843). A defrost action only starts when the defrosting temperature is lower than the defrost release temperature (P0850).

Offcycle defrost: During the defrost time, the cooling ventilation of the evaporators is switch on and the cooling is blocked. Defrost will automatically stop if the maximum defrost time (P0851) has passed. Automatic stop at the reaching of the end of defrost temperature (P0852) can also be set (P0805). In case of multiple evaporators, the evaporators are defrosted simultaneously.

The offcycle defrost method can also be selected automatically when electrical or hotgas defrost is programmed. Automatic selection is based on the control temperature. When the control temperature rises above an adjustable value (P0803), then offcycle defrost is used instead of the defrost method programmed.

Electrical defrost: During defrost the cooling ventilation of the evaporators stays off. Defrost will automatically stop if the end of defrost temperature (P0852) is reached or the maximum defrost time (P0851) has passed. After defrost a dripoff is performed. The ventilation after electrical defrost can be released on time, defrost temperature or on a combination of both (P0872..P0874). In case of multiple evaporators, the evaporators can be configured (P0804) to defrost simultaneously or after one another.

Hotgas defrost: This defrost method requires one or more cells (within the same defrost group) which are cooling to deliver hotgas. The number of cooling cells which are required for hotgas defrosting can be programmed (P2402 and other parameters). The maximum time a cell must wait for hotgas can also be programmed. If this maximum time is exceeded or there are too many cells waiting for hotgas (P2401), then other cells are forced to start cooling to deliver hotgas. If required, forced cell cooling and order of cooling can be programmed (P2406). We distinguish the following categories of cells:

"Preference cells": These are cells that are identified as preference cell using parameter P0120.

"Highest cool demand" cells: These are cells that are not cooling (yet), but that have a cool demand. These cells are forced to start cooling in sequence of decreasing cool demand.

"Standby cells": These are cells that have been defined in the standby phase.

As many cells as required will be forced to start cooling, according to the defined sequence, until the required number of cooling cells has been reached.

During defrost the cooling ventilation of the evaporators stays off. Defrost will automatically stop if the end of defrost temperature (P0852) is reached or the maximum defrost time (P0851) has passed. Defrost will also stop if no hotgas is available anymore. After defrost a dripoff, pressure equalizing B and a pumpdown are performed. The ventilation after hotgas defrost can be released on time, defrost temperature or on a combination of both (P0872..P0874). In case of multiple evaporators, the evaporators can be programmed to defrost simultaneously or one after the other (P0804).

Section 9 includes a timing diagram in which the various times and functions of hotgas defrosting are displayed.

1.6 Ventilation functions

The controller supports 3 separate ventilation functions:

Cooling ventilation: This ventilation function is coupled to an evaporator and used during cooling and offcycle defrost. The function can be switch on and off automatically, but it can also be switched on continuously by manual control. This selection can be made using the cooling ventilation mode (see section **Fout! Verwijzingsbron niet gevonden.**). The function can also be continuously switched on using a digital input (Continuous cooling function).

An additional relay function is coupled to this ventilation function: High RPM ventilation. This relay function is active (only during cooling) if the control temperature exceeds the temperature set point + High RPM ventilation set point offset (P0360) + High RPM ventilation differential (P0361). The function stops if the control temperature reaches the temperature set point + High RPM ventilation set point offset.

Heating ventilation: This ventilation function is active during heating.

Automatic ventilation: This ventilation function is not coupled to cooling. It can be switched on at real-time periods, on pulse/pause basis or pulse/pause basis synchronized with cooling or combinations of these options (P0700..P0739). Pulse/pause synchronized with cooling means: After a cool action and the ventilation switch-off delay the automatic ventilation starts with a pause time. Five sets of pulse/pause times can be programmed for the pulse/pause basis. One of the sets can be selected at the control panel using the automatic ventilation pulse/pause mode (see section **Fout! Verwijzingsbron niet gevonden.**).

Parameters (P0411, P0701) can be set that the relays with function "Cooling ventilation" are also activated for the functions "Heating ventilation" and/or "Automatic ventilation". This can simplify the configuration of the ventilation relay functions.

The relays with function "Cooling ventilation" are also activated during offcycle defrost.

1.7 Humidification

The controller supports 3 humidification modes:

Off: The humidification control is continuously disabled.

Continuous: The humidification control is continuously active.

Automatic: The humidification control is activated on the basis of the advanced automatic humidification timing settings that include pulse/pause timing and synchronisation with cooling and ventilation (P0600..P0631).

An overruling limitation provision can be used to limit the total humidification time in a time period: A maximum humidification time in a blocking time can be defined (P0630..P0631).

1.8 Day/night mode

The day/night mode is used to determine the temperature and RH set points. It can be switched manually, automatically (P0160..P0163) or by a digital input. An automatic coupling or a coupling via a digital input can be changed manually.

The night mode can also be completely blocked (P0164). The cell controller is then always in day mode and the day-night indications/buttons and night set points are not displayed on the touchscreen.

1.9 Setpoint link

The temperature set point can be linked to another cell (P0130). The controller then uses the same temperature set point as the cell to which it is linked. In the same way, switching on/off can be linked to another cell (P0101).

1.10 External temperature set point

The normal day and night temperature set point can be changed by an external digital input, such as a switch. The digital input can be used to start, restart and stop an alternative temperature set point or an offset on the normal set point. Different timing and activation options are available (P0170..P0173). A minimum pulse time of 5 seconds is required to ensure proper starting and stopping through the digital input.

1.11 Blocking

If blocking is activated, all the control functions are stopped. Blocking can be activated during real-time periods (P1000..P1035) or with a digital input. If required, blocking can be ignored for automatic ventilation (P1040). The detection of temperature alarms during blocking can be switched off (P1042).

1.12 Lighting

If a relay function Light is configured, then a light button is displayed on the cell pages of the touch screen control panel with which the lighting can be switched. With a parameter (P0152) it can be set that the lighting also couples on the door contact. The lighting can also be switched with an external pulse switch, if it is configured as a "Light switch" on a digital input. A minimum pulse time of 5 s applies for this digital pulse input.

1.13 Water measurement

The controller supports measurement of water quantity. It can, for example, measure the defrost water from the evaporators. A water counter pulse can be sent through a digital input. The minimum pulse time required is 5 seconds. The number of litres of water corresponding to a pulse can be defined with a parameter (P1100). A free-running counter and day counter are used to keep track of the amount of water from the evaporators.

It is possible to open a water valve after a settable number of liters for a settable period of time (P1101..P1102). This can then be used, for example, to empty out a collection vessel.

Note: The water measurement function and water valve control are also active when the controller is switched off.

1.14 Hotgas heating

With the relay function Hotgas heating you can heat with hotgas that is supplied by other mechanically cooling cells. For this purpose, a hotgas defrosting group must be set (P0420) which indicates from which mechanically cooling cells hotgas can be received.

The hotgas heating is switched on if the control temperature drops below the current temperature set point + hotgas heating set point offset (P0421) - hotgas heating differential (P0422). Additional release conditions are that there are cooling cells within the set defrosting group (P0420) and that no hotgas defrost is active. The hotgas defrosting therefore has a higher priority within the defrosting group than hotgas heating.

The hotgas heating is stopped when the current temperature set point + hotgas heating set point offset is reached and the release conditions are no longer fulfilled.

1.15 Alarms

The controller has 2 adjustable temperature alarms. Parameters (P0900..P0966) can be used to configure how the alarms operate: in which phase, on which sensor(s), against which reference, at which alarm delay and with which actions.

Note: For the temperature alarms, an alarm can be generated when the (absolute) difference between two temperature sensors becomes too high. This can be used, for example, to issue a warning when a product temperature difference reaches a critical point.

External alarms on the controller can also be generated with digital inputs: Three non-fatal alarms and three fatal alarms. Separate alarm delays can be defined for these alarms (P0931..P0936).

1.16 Counters

The controller has the following free-running counters. These counters can be read and manually reset from the control. A time to automatically reset the free-running counters can be defined with parameters (P0165..P0166).

- Cooling actions/pulses
- Cooling time
- Measured litres of water

The controller has the following daycounters. These counters can be read through VASP and are automatically reset at midnight.

- Cooling actions/pulses
- Cooling time
- Ventilation time ("Cooling ventilation" or "Automatic ventilation" active)
- Cooling ventilation time (function "Cooling ventilation" active)
- Automatic ventilation time ("Automatic ventilation" function active)
- Humidification time
- Measured litres of water
- Heating time

1.17 Sensor offsets

The controller has a sensor offset parameter (P0200..P0234) for every sensor. This can be used to correct the measurement value indication due to the inaccuracy of the sensor and (partly) the measurement circuit of the controller. If the controller indicates too much for a temperature sensor – for example, 2°C – the offset parameter of that sensor must be lowered by 2 K.

1.18 Storage cycle order

In addition to the default store cycle order, the cell controllers also support the orders below. The order can be set per store group (P2202 and other parameters)

"Rotating" order: This order is equal to the default order, however, the cell number which starts the cycle rotates: The first cycle starts, for example, with cell number 1, the second cycle with cell number 2 and so on.

"Store start number" order: The cells (in this store group) with cool demand are cooled in ascending store start number order (P0321 and other parameters), where as many cells are started as the maximum cooling capacity of the store group allows. If a cell cannot be started because it is defrosting or because the remaining cooling capacity in the store group is insufficient for that cell, then a somewhat different order is used. If, however, the next cell can be started, it is started to avoid loss of cooling capacity.

"Per store start number" order: This order is equal to the "Store start number" order, however, a cell will only be started when there are no more cooling cells with a lower store start number. Thus, there are no simultaneously cooling cells with different store start numbers within the store group. This order can be used, for example, to prevent a series of cells requiring different suction pressures from cooling simultaneously.

"With store subgroups" order: With this order, the store group is further divided into store subgroups (P0322 and other parameters). A cycle is run for each store subgroup. The cycles in the store subgroups (in the same store group) start at the same time, but are no longer linked to each other. In a store subgroup, only one cell with cool demand is set to cooling in ascending store start number order. The set maximum cooling capacity per store group does not apply to this order.

2 Control

The controller can be operated using the touchscreen. The language can be defined with a parameter (P6300). In the following sections, the indications and buttons of the touchscreen are described using screenshots. If a function of the controller is not used (not defined), the relevant indications and buttons are not displayed on the pages. For example: If no heating has been configured, no heating indication is displayed.

2.1 Cell name

The cell name that is displayed on the cell pages can be entered on an internal web page. If no name is entered, the standard name "Cell x" is used, where x = the cell number (P0100).

2.2 Touchscreen

On the touchscreen, the symbols in the following table are used to display the status and the button functions.

Symbol	Meaning	Button function
	Cooling active Blinking = cell is waiting for the release conditions so that it can start cooling	
	Heating active	
	Defrost active Blinking = cell is waiting for the release conditions to be met so that it can start defrosting	Start or stop defrosting manually
	Drip-off after defrosting enabled	
	Humidification active	
	Blocking enabled (blocking contact/time, control delay or door open)	
	"Automatic" cooling ventilation mode enabled	Change cooling ventilation mode
	"Continuous" cooling ventilation mode enabled	Change cooling ventilation mode
	Automatic ventilation pulse/pause mode Number of lines = mode number (1 to 5) Number = corresponding pulse/pause ventilation percentage	Change automatic ventilation pulse/pause mode
	Ventilation functions enabled	
	Green = Controller switched on Grey = Controller switched off	Switch the controller on and off **The button must be pressed for 3 seconds**
	Daytime mode active	Change day/night mode **The button must be pressed for 3 seconds**
	Night-time mode active	Change day/night mode **The button must be pressed for 3 seconds**
	Blinking red = unconfirmed alarms Continuous red = active confirmed alarms Grey = no active alarms	Go to alarm pages
	Lighting switched on	Switching lighting on and off

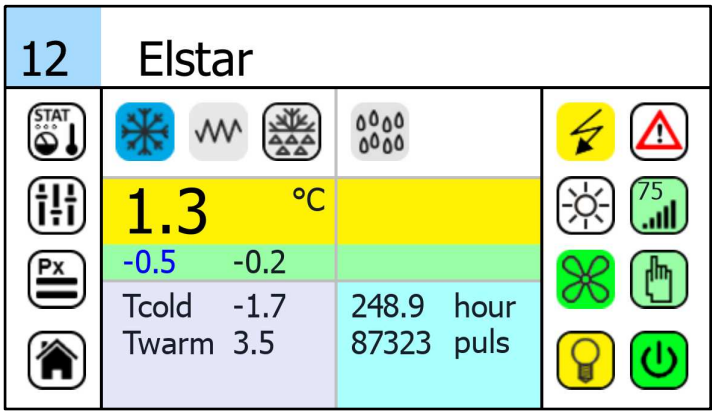
Symbol	Meaning	Button function
		Go to previous page
		Increase setting, Go to next subpage
		Decrease setting, Go to previous subpage
		Go to previous parameter group
		Go to next parameter group
STAT		Go to Status pages
		Go to Settings pages
Px		Go to parameter page

2.2.1 Power-up page

This page is displayed during power-up. The software version of the touchscreen (not of the controller) is displayed.

2.2.2 Cell page 1

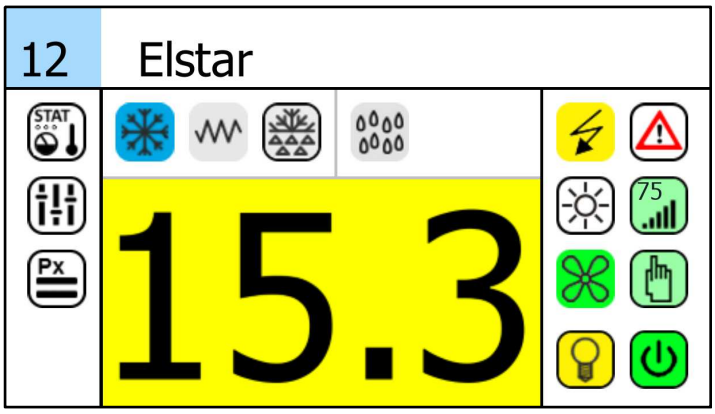
After power-up, cell page 1 main page (P0137 = 0) is automatically displayed.



The cell number (P0100) and the cell name are displayed at the top left. The background colour of the cell number shows which phase the cell is in: dark blue = Cool, light blue = Store, green = Standby. The status of the cell is displayed using symbols. The yellow area displays the current control temperature. The green area displays the day set point on the left and the night set point on the right. The text of an active set point is written in blue. In the grey area, the Tcold and Twarm temperatures (if present, see P0135, P0136). On the far right, the free-running cooling counters (hours and pulses) and water counters are displayed.

A set point is displayed in red for a set point link and an active external temperature set point (see sections 1.9 and 1.10). For a linked set point, the text ">x" displays the cell number (x) to which it is linked. For an active external temperature set point, the remaining time (where applicable) is displayed in minutes.

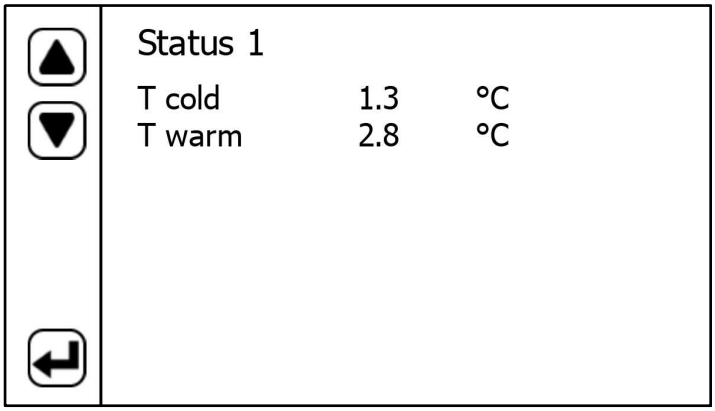
2.2.3 Cell page 2

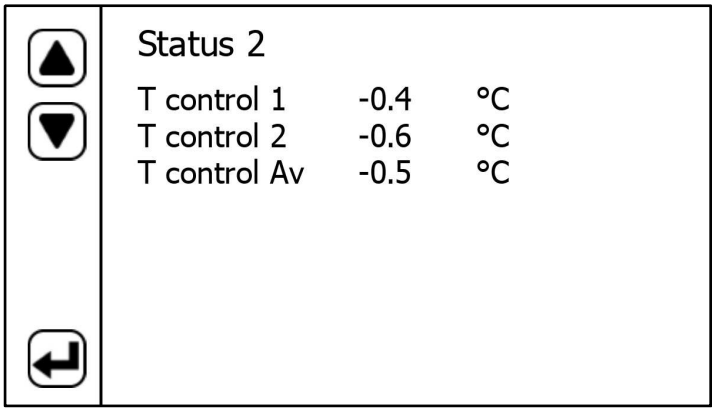


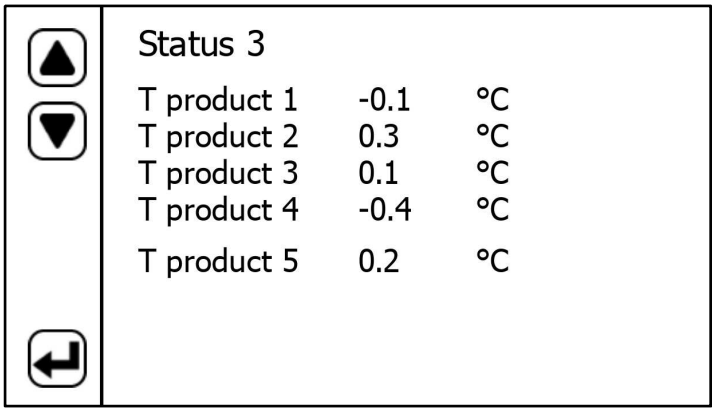
This page is the same as cell page 1 except that the control temperature is displayed in a large font with a yellow background. This page can be defined as standard (P0137 = 2). In that case, pressing the control temperature displays cell page 1. Cell page 1 can be used to view and adapt the set points and counters.

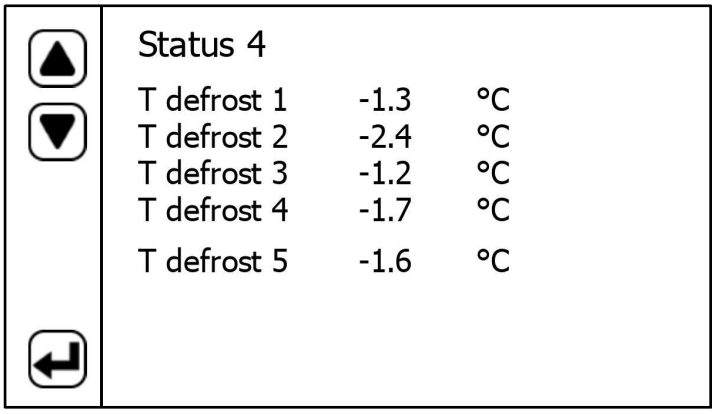
2.2.4 Status pages

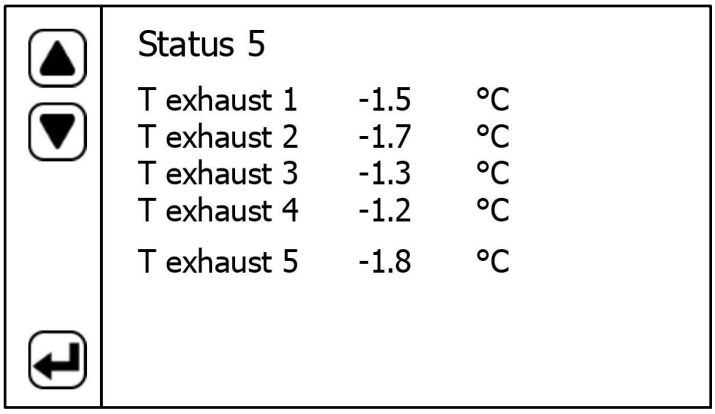
These pages are displayed when you press the status button on a cell page. There are several pages for displaying the current status (sensor measurements). You can use the arrow keys to browse through the pages.



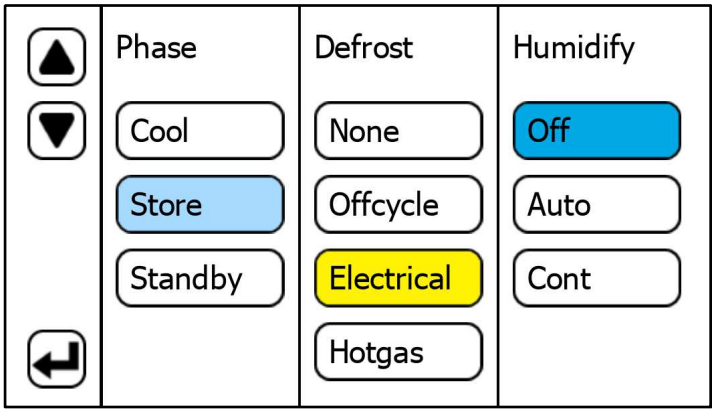






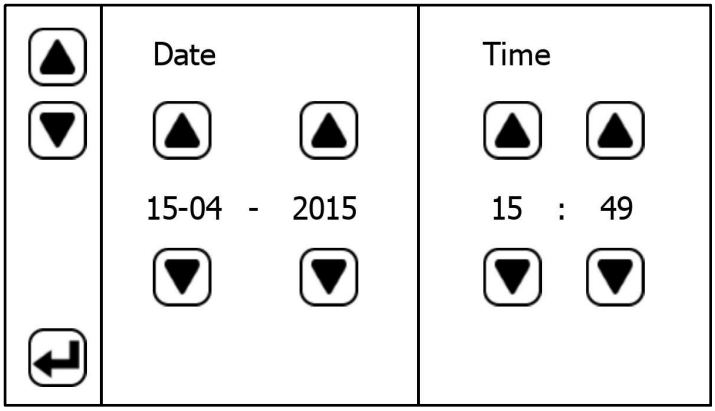


2.2.5 Settings page 1



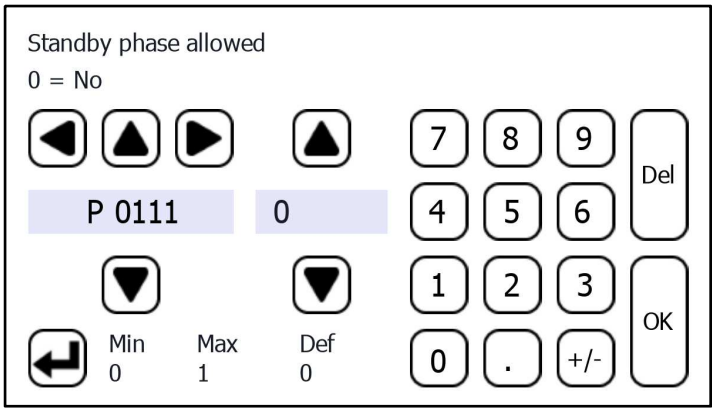
This page is displayed when you press the Settings key on a cell page. You can use the displayed buttons to select the phase, defrost method and humidification mode. You can use the arrow keys to scroll to the other Settings pages.

2.2.6 Settings page 2



The date and time can be adapted on this page.

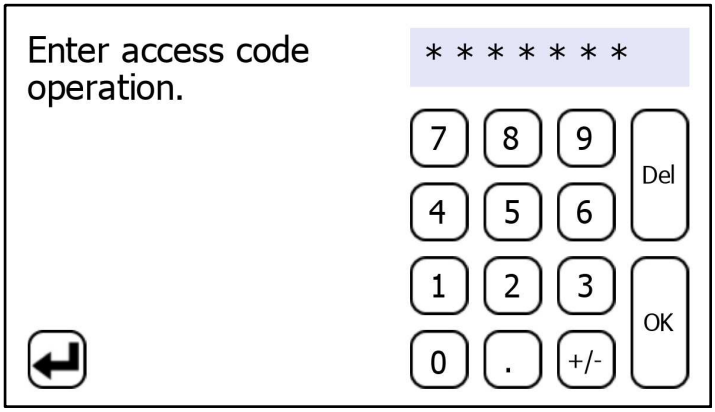
2.2.7 Parameter page



This page is displayed when you press the Parameter key  on a cell page. The parameters can be selected and adjusted using the arrow keys. You can use the left and right arrows to switch quickly between the parameter groups.

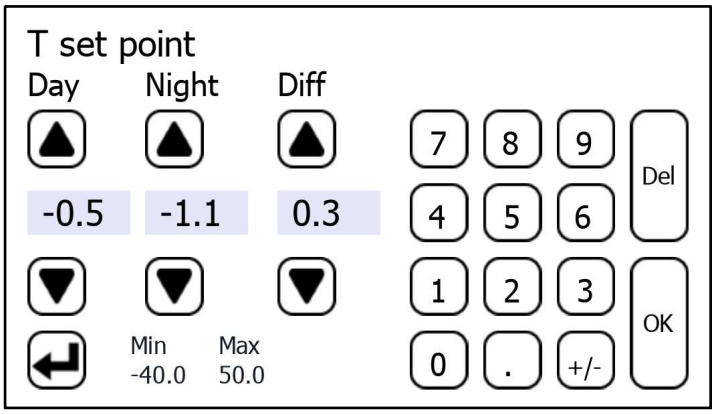
The values (number or parameter value) can also be entered numerically. To do this, you must click the appropriate field. A blue border is then displayed around the field. You can use the "Del" button and the number keys to change the value. Press the "OK" button to confirm the input. Incorrect or invalid input values are displayed in red.

2.2.8 Access code page



This page is displayed automatically if an access code is required for an operation or for a parameter change. This can be defined using parameters P6302 (Access code for operations) and P6303 (Access code for parameters). The access code in question can be entered using the numeric keys, followed by the OK button to finish.

2.2.9 Temperature set point page



This page is displayed when the control temperature is pressed on cell page 1. You can use the arrow to adjust the temperature set points and differential. The values can also be entered numerically. To do this, you must click the appropriate field. A blue border is then displayed around the field. You can use the "Del" button and the number keys to change the value. Press the "OK" button to confirm the input. Incorrect or invalid input values are displayed in red.

2.2.10 Day counters 1 page

Day counters 1 Elstar					
12	puls	hour	hour	hour	liter
Today	12	12.3	13.7	4.3	126
Sat 03-03	16	9.8	12.6	1.5	78
Sun 04-03	18	13.6	14.5	0.7	267
Mon 05-03	15	11.4	11.4	0.0	56
Tue 06-03	17	10.9	11.3	4.5	0
Wed 07-03	23	19.3	21.4	0.8	83
Thu 08-03	21	21.2	22.3	1.0	176

This page is displayed when the blue counter area is pressed on cell page 1. This page displays the following day counters from the last 7 days (from left to right):

- Cooling actions/pulses
- Cooling time
- Ventilation time ("Cooling ventilation" or "Automatic ventilation" active)
- Humidification time
- Measured litres of water

You can use the arrow keys to go to the other Counter pages.

2.2.11 Day counters 2 page

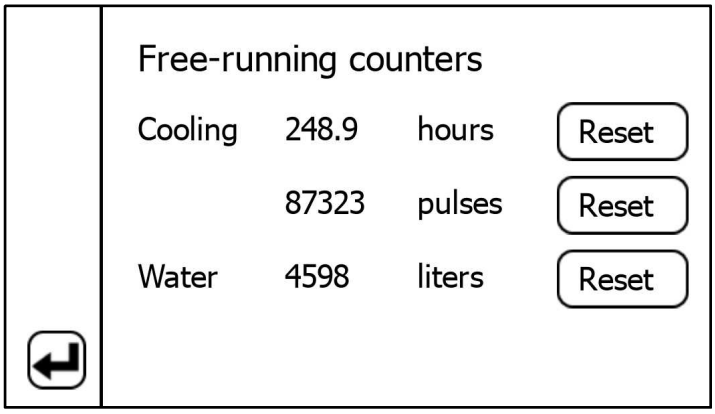
Day counter 2 Elstar					
12	hour	hour	hour		hour
Today	13.7	12.5	1.3		1.2
Sat 03-03	12.6	9.9	6.7		0.0
Sun 04-03	14.5	13.7	11.2		3.2
Mon 05-03	11.4	10.9	0.7		1.8
Tue 06-03	11.3	11.2	8.7		4.5
Wed 07-03	21.4	19.6	19.3		2.3
Thu 08-03	22.3	21.4	18.7		2.2

This page displays the following day counters from the last 7 days (from left to right):

- Ventilation time ("Cooling ventilation" or "Automatic ventilation" active)
- Cooling ventilation time (function "Cooling ventilation" active)
- Automatic ventilation time ("Automatic ventilation" function active)
- Heating time

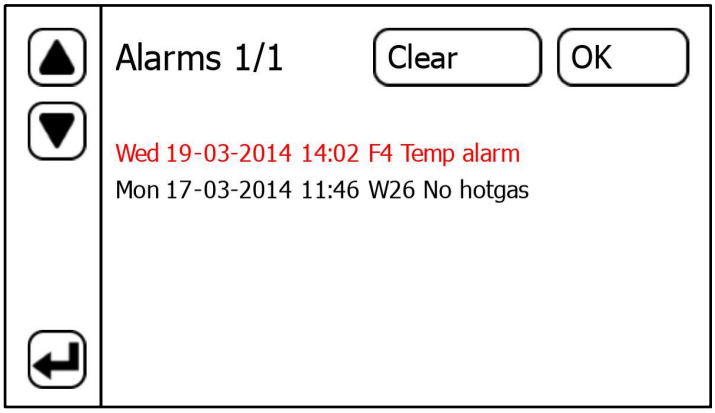
2.2.12 Free-running Counters page

This page displays the free-running counters. The individual counters can be set to zero using the "Reset" buttons.



2.2.13 Alarm pages

When there is an alarm, the touchscreen starts blinking. You can stop the blinking (and the buzzer, if defined) by touching the touchscreen. On a cell page, the alarm is displayed as a blinking alarm button.



The alarm pages are displayed when the alarm button on a cell page is pressed. The alarm pages show a list of the 100 most recent alarms. You can use the arrow keys to browse through the pages. The "OK" button blinks red if there is an unconfirmed alarm and is continuously red if there are confirmed alarms for which the cause has not yet been eliminated. The alarms can be confirmed using the "OK" button. The list can be deleted using the "Clear" button.

3 Input and output functions

The following table specifies the input and output functions of the controller.

Relay functions can be combined. For example: The same relay can be configured to be activated for output function "Cooling ventilation evaporator 1" and also for output function "Automatic ventilation".

Each digital input and relay output can be inverted by the controller if necessary.

3.1 Pt1000 Temperature sensor input functions

Description
Control temperature sensor 1..2[2]
Defrost temperature sensor evaporator 1..5
Product temperature sensor 1..5
Exhaust temperature sensor evaporator 1..5

3.2 Digital input functions

Description
Non fatal alarm 1..3
Fatal alarm 1..3 (control off)
Blocking 1..3 (control off)
Door open (control off, maximized on time)
Continuous (cooling) ventilation (not during electrical/hotgas defrost)
Continuous cooling
Night mode
External temperature set point
Water counter pulse
Light switch
On[3]
Blocking mechanical cooling 1..2

[2] With " .. "represents a summary in the function descriptions. For example, Control temperature sensor 1..2 indicates the following functions: Control temperature sensor 1 and Control temperature sensor 2.
[3] This digital input function takes over the function of the On/off button. That button will then only be an indication..

3.3 Relay output functions

Description
Solenoid valve evaporator 1..5
Suction valve evaporator 1..5
Offcycle defrost evaporator 1..5
Electrical defrost evaporator 1..5
Hotgas defrost evaporator 1..5
Collect hotgas defrost (Hotgas defrost active from one or more evaporators of this controller)
Any hotgas defrost (Hotgas defrost active from one or more controller in the network)
Pressure equalizing A
Pressure equalizing B evaporator 1..5
Cooling ventilation evaporator 1..5
High RPM ventilation
Ventilation after cooling (during pumpdown and ventilation switch-off delay P0351)
Automatic ventilation
Heating ventilation
Heating
Humidify
Alarm (non fatal or fatal)
Non fatal alarm
Fatal alarm
On
Blocking
Door open (delayed with P0149, maximised in time with P0150)
Night mode
Control delay
Cool phase
Store phase
Standby phase
Off (switching off finished)
External temperature set point
Shutter evaporator 1..5 (closed during electrical/hotgas defrost, dripoff, pressure equalizing B and pumpdown after defrost)
Water valve open
Hotgas heating
Light

4 Parameters

There are 2 types of parameters: cell parameters and network parameters. The cell parameters involve a single controller that controls one specific cell. The network parameters contain the settings for the overall coordination of the cooling and defrost actions in a network of controllers.

The parameters can be viewed and changed on the parameter page of the touchscreen with the internal parameter web page and with VASP.

4.1 Cell parameters

No.	Description	Range	Unit	Default
General				
P 0100	Cell number 0 = Not assigned, cell switches/stays off	0..100	-	0
P 0101	On/off switching linked to cell number 0 = Not linked **Warning:** The cell switches off if the referenced cell is not present or cannot be reached through the network!	0..100	-	0
P 0110	Store phase allowed 0 = No 1 = Yes	0..1	-	1
P 0111	Standby phase allowed 0 = No 1 = Yes	0..1	-	0
P 0120	Cell is preference cell (for forced cooling for hotgas supply) 0 = No 1 = Yes	0..1	-	0
P 0130	Temperature set point linked to cell number 0 = Not linked If the referenced cell is switched on, the day and night temperature set points are set to the current temperature set point of that cell.	0..100	-	0
P 0131	Min. settable temperature set point	-40.0..+50.0	°C	-40.0
P 0132	Max. settable temperature set point	-40.0..+50.0	°C	+50.0
P 0133	Display temperature in whole numbers 0 = No 1 = Yes	0..1	-	0

No.	Description	Range	Unit	Default
P 0135	Sensor for T_cold 0 = Control temperature (average of available error-free temperature control sensors) 1 = Control temperature sensor 1 2 = Control temperature sensor 2 3 = Defrost temperature sensor evaporator 1 4 = Defrost temperature sensor evaporator 2 5 = Defrost temperature sensor evaporator 3 6 = Defrost temperature sensor evaporator 4 7 = Defrost temperature sensor evaporator 5 8 = Product temperature sensor 1 (default T_cold) 9 = Product temperature sensor 2 (default T_warm) 10 = Product temperature sensor 3 11 = Product temperature sensor 4 12 = Product temperature sensor 5 13 = Exhaust temperature sensor evaporator 1 14 = Exhaust temperature sensor evaporator 2 15 = Exhaust temperature sensor evaporator 3 16 = Exhaust temperature sensor evaporator 4 17 = Exhaust temperature sensor evaporator 5	0..17	-	8
P 0136	Sensor for T_warm	0..17	-	9
P 0137	Standard cell page touch screen control panel 1 = Cell page 1, see also P0138 2 = Cell page 2 (large font control temperature)	1..2	-	1
P 0149	Door open blocking delay	0..999	s	0
P 0150	Max. door open blocking time	0..999	min	5
P 0151	Control delay at power up	10..999	s	10
P 0152	Switch light on door contact 0 = No 1 = Yes (light on door open, light off when door closes)	0..1	-	0
P 0160 P 0161	Start time night 24 = Not active (manual control or with digital input)	00..24 00..59	hour min	24 00
P 0162 P 0163	Start time day 24 = Not active (manual control or with digital input)	00..24 00..59	hour min	24 00
P 0164	Block night mode 0 = No 1 = Yes	0..1	-	0
P 0165 P 0166	Reset time free-running counters 24 = Not active (no automatic reset)	00..24 00..59	hour min	24 00

No.	Description	Range	Unit	Default
P 0170	External temperature set point timing 0 = No external temperature set point 1 = Start with pulse of digital input (no restart) 2 = Start and restart with pulse of digital input 3 = Start and stop with pulse of digital input (stop also on timer) 4 = During pulse of digital input	0..4	-	0
P 0171	Duration external temperature set point @[4] P0170 = 1..3	0..999	min	0
P 0172	External temperature set point	-40.0..+50.0	°C	+50.0
P 0173	Type external temperature set point 0 = Absolute 1 = Relative/offset in relation to normal set point	0..1	-	1
P 0180	Suction valve control (with relay) 0 = Valve open during cooling action, pumpdown after cooling and pumpdown after hotgas defrost. 1 = Valve open if controller is switched on except during hotgas defrosting (including dripoff and pressure equalisation B) Chapter 9 displays both values in a timing diagram.	0..1	-	0
Sensor offsets				
P 0200	Offset control temperature sensor 1	-10.0..+10.0	K	0.0
P 0201	Offset control temperature sensor 2	-10.0..+10.0	K	0.0
P 0210	Offset defrost temperature sensor evaporator 1	-10.0..+10.0	K	0.0
P 0211	Offset defrost temperature sensor evaporator 2	-10.0..+10.0	K	0.0
P 0212	Offset defrost temperature sensor evaporator 3	-10.0..+10.0	K	0.0
P 0213	Offset defrost temperature sensor evaporator 4	-10.0..+10.0	K	0.0
P 0214	Offset defrost temperature sensor evaporator 5	-10.0..+10.0	K	0.0
P 0220	Offset product temperature sensor 1	-10.0..+10.0	K	0.0
P 0221	Offset product temperature sensor 2	-10.0..+10.0	K	0.0
P 0222	Offset product temperature sensor 3	-10.0..+10.0	K	0.0
P 0223	Offset product temperature sensor 4	-10.0..+10.0	K	0.0
P 0224	Offset product temperature sensor 5	-10.0..+10.0	K	0.0
P 0230	Offset exhaust temperature sensor evaporator 1	-10.0..+10.0	K	0.0
P 0231	Offset exhaust temperature sensor evaporator 2	-10.0..+10.0	K	0.0
P 0232	Offset exhaust temperature sensor evaporator 3	-10.0..+10.0	K	0.0
P 0233	Offset exhaust temperature sensor evaporator 4	-10.0..+10.0	K	0.0
P 0234	Offset exhaust temperature sensor evaporator 5	-10.0..+10.0	K	0.0

[4] The @ symbol is used to indicate when a parameter is applicable.

No.	Description	Range	Unit	Default
Cooling				
P 0300	Cell cooling capacity in cool phase (and standby phase)	0.0..200.0	kW	0
P 0301	Cell cooling capacity in store phase	0.0..200.0	kW	1.0
P 0310	Cool group	1..5	-	1
P 0320	Store group	1..5	-	1
P 0321	Store start number	1..100	-	1
P 0322	Store subgroup	1..5	-	1
P 0323	Store link number 0 = Not linked If another cell (in the same store group) with the same storage link number starts cooling, this cell will also start cooling (if possible/necessary). **Note:** The maximum cooling capacity of the relevant store group is not taken into account for starting this cell.	0..100	-	0
P 0330	Min. cooling time	0..99	min	1
P 0331	Min. time between 2 cooling actions	0..99	min	0
P 0332	Max. cooling time in store phase	0..99	min	30
P 0340	Max. temperature below set point after this cooling is forced switched off, provided that min. cooling time has elapsed)	0.0..90.0	K	0.5
P 0341	Max. temperature above set point (after which the cooling is forced to switch on) **Note:** The maximum cooling capacity of the relevant store or cool group is not taken into account. However, if it needs to be taken into account, P0341 must be set to the max. value.	0.0..90.0	K	90.0
P 0349	Cooling time counters active during pumpdown after cooling 0 = No 1 = Yes	0..1	-	0
P 0350	Pumpdown time after cool action	0..999	s	0
Cooling ventilation				
P 0351	Ventilation switch-off delay after cooling action (relay functions Cooling ventilation) (time starts after pumpdown = close suction valve)	0..99	min	0
P 0360	High RPM ventilation set point offset	0.0..15.0	K	2.0
P 0361	High RPM ventilation differential	0.1..15.0	K	0.5

No.	Description	Range	Unit	Default
Heating				
P 0400	Heating set point offset	-10.0..0.0	K	0.0
P 0401	Heating differential	0.1..15.0	K	0.5
P 0410	Ventilation while heating 0 = No 1 = Yes (relay function "Ventilation while heating")	0..1	-	1
P 0411	Activate relays "Cooling ventilation" for function "Heating ventilation" 0 = No 1 = Yes This parameter simplifies assigning "Heating ventilation" if there are multiple evaporators.	0..1	-	0
P 0420	Hotgas heating 0 = Do not heat with hotgas[5]	0..5	-	0
P 0421	Hotgas heating set point offset	-10.0..0	K	0.0
P 0422	Hotgas heating differential	0.1..15.0	K	0.5
Humidify				
P 0600	Automatic humidify timing 0 = During cooling 1 = During automatic ventilation 2 = During cooling <u>and</u> automatic ventilation 3 = Pulse/pause 4 = Pulse/pause <u>and</u> during cooling 5 = Pulse/pause during "cooling ventilation" 6 = Pulse/pause during automatic ventilation 7 = Pulse/pause during "cooling ventilation" and automatic ventilation	0..7	-	0
P 0610	Humidify switch-off delay after cooling @ P0600 = 0 or 2	0..9999	s	0
P 0611	Humidify switch-off delay after automatic ventilation @ P0600 = 1 or 2	0..9999	s	0
P 0615	"Cooling ventilation" switch-off delay after humidify @ P0600 = 5 or 7	0..99	s	0
P 0616	Automatic ventilation switch-off delay after humidify @ P0600 = 6 or 7	0..99	s	0
P 0620	Pulse time humidify @ P0600 = 3..7	0..9999	s	60
P 0621	Pause time humidify @ P0600 = 3..7	0..9999	s	60
P 0630	Max. humidification time in humidification blocking time	1..999	min	60
P 0631	Humidification blocking time	1..999	min	60

[5] It is possible to heat with hotgas if a cell in the network is mechanically cooling in the defrost group. Heating no longer takes place with hotgas if a cell in the defrost group is defrosting with hotgas.

No.	Description	Range	Unit	Default
Automatic ventilation				
P 0700	Automatic ventilation timing 0 = No automatic ventilation 1 = During real-time periods (P0710..P0725) 2 = Pulse/pause 3 = Pulse/pause synchronised with cooling 4 = Pulse/pause synchronised with cooling during real-time periods (P0710..P0725)	0..4	-	0
P 0701	Activate relays "Cooling ventilation" for function "Automatic ventilation" 0 = No 1 = Yes This parameter simplifies assigning "Automatic ventilation" in case of multiple evaporators.	0..1	-	0
P 0710 P 0711	Automatic ventilation start time 1 24 = Not active @ P0700 = 1	00..24 00..59	hour min	24 00
P 0712 P 0713	Automatic ventilation stop time 1 @ P0700 = 1	00..24 00..59	hour min	24 00
P 0714 P 0715	Automatic ventilation start time 2	00..24 00..59	hour min	24 00
P 0716 P 0717	Automatic ventilation stop time 2	00..24 00..59	hour min	24 00
P 0718 P 0719	Automatic ventilation start time 3	00..24 00..59	hour min	24 00
P 0720 P 0721	Automatic ventilation stop time 3	00..24 00..59	hour min	24 00
P 0722 P 0723	Automatic ventilation start time 4	00..24 00..59	hour min	24 00
P 0724 P 0725	Automatic ventilation stop time 4	00..24 00..59	hour min	24 00
P 0730	Automatic ventilation pulse time 1 @ P0700 > 1	0..999	min	4
P 0731	Automatic ventilation pause time 1 @ P0700 > 1	0..999	min	12
P 0732	Automatic ventilation pulse time 2	0..999	min	5
P 0733	Automatic ventilation pause time 2	0..999	min	10
P 0734	Automatic ventilation pulse time 3	0..999	min	5
P 0735	Automatic ventilation pause time 3	0..999	min	5
P 0736	Automatic ventilation pulse time 4	0..999	min	10
P 0737	Automatic ventilation pause time 4	0..999	min	5
P 0738	Automatic ventilation pulse time 5	0..999	min	12
P 0739	Automatic ventilation pause time 5	0..999	min	4

No.	Description	Range	Unit	Default
Defrost				
P 0800	Defrost group for off-cycle defrost	1..5	-	1
P 0801	Defrost group for electric defrost	1..5	-	1
P 0802	Defrost group for hotgas defrost/supply 0 = No hotgas defrost and supply	0..5	-	0
P 0803	Min. control temperature for automatic off-cycle defrost (instead of electric/hotgas defrost)	-10.0..+50.0	°C	+50.0
P 0804	Start (electric/hotgas) defrost evaporators together 0 = No (evaporators defrost after each other) 1 = Yes (evaporators start together with defrost and stop independent from each other)	0..1	-	0
P 0805	Stop off-cycle defrosting on temperature 0 = No 1 = Yes	0..1	-	0
P 0810	Defrost timing 0 = Clock time interval 1 = Effective cooling time interval 2 = Real-time	0..2	-	0
P 0811	Defrost interval time @ P0810 = 0 or 1	1..48	hour	6
P 0812 P 0813	Defrost interval restart time 24 = Not active @ P0810 = 0 or 1	00..24 00..59	hour min	24 00
P 0814	Defrost interval time delay at power up 0 = Not active @ P0810 = 0	0..999	min	0
P 0815	Start defrost interval after defrost 0 = No (interval runs from <u>start</u> defrost action until start next defrost action) 1 = Yes (interval runs from <u>end</u> defrost action until start next defrost action)	0..1	-	0
P 0820 P 0821	Defrost start time 1 24 = Not active @ P0810 = 2	00..24 00..59	hour min	24 00
P 0822 P 0823	Defrost start time 2	00..24 00..59	hour min	24 00
P 0824 P 0825	Defrost start time 3	00..24 00..59	hour min	24 00
P 0826 P 0827	Defrost start time 4	00..24 00..59	hour min	24 00
P 0828 P 0829	Defrost start time 5	00..24 00..59	hour min	24 00
P 0830 P 0831	Defrost start time 6	00..24 00..59	hour min	24 00
P 0832 P 0833	Defrost start time 7	00..24 00..59	hour min	24 00
P 0834 P 0835	Defrost start time 8	00..24 00..59	hour min	24 00
P 0836 P 0837	Defrost start time 9	00..24 00..59	hour min	24 00
P 0838 P 0839	Defrost start time 10	00..24 00..59	hour min	24 00
P 0840 P 0841	Defrost start time 11	00..24 00..59	hour min	24 00
P 0842 P 0843	Defrost start time 12	00..24 00..59	hour min	24 00

No.	Description	Range	Unit	Default
P 0850	Defrost release temperature (defrost temperature)	-10.0..+40.0	°C	0.0
P 0851	Max. defrost time per evaporator	0..99	min	10
P 0852	End-defrost temperature (defrost temperature)	-10.0..+40.0	°C	0.0
P 0870	Dripoff time after electric/hotgas defrost (time starts after stopping electric/hotgas defrost)	0..99	min	0
P 0871	Pumpdown time after hotgas defrost (time starts after dripoff time)	0..999	s	0
P 0872	Ventilation release after defrost on 0 = Time (P0873) 1 = Defrost temperature (P0874) 2 = Defrost temperature (P0873) and maximised based on time (P0874) (relay functions cooling ventilation and automatic ventilation)	0..2	-	0
P 0873	Ventilation delay after defrost (relay functions cooling ventilation) (time start after pumpdown) @ P0872 = 0 or 2 (With a negative value the cooling ventilation is switched on during this delay before the first cool action)	-10..+99	min	0
P 0874	Ventilation release temperature after defrost (defrost temperature) @ P0872 = 1 or 2	-40.0..+50.0	°C	+10.0
P 0875	Directly cooling after defrost in cool phase[6] 0 = No 1 = Yes	0..1	-	0
P 0876	Directly cooling after defrost in store phase[7] 0 = No 1 = Yes	0..1	-	0
P 0877	Pressure equalisation A time <u>before</u> cooling action (relay function pressure equalisation A) The function is activated this time before the first cool action after a hotgas defrost and released when a hotgas defrost is requested	0 to 500	s	180
P 0878	Pressure equalisation B time <u>after</u> hotgas defrost (relay functions pressure equalisation B evaporator 1..5) Pressure equalisation B is performed after dripoff.	0 to 500	s	0

[6] If this option is configured, a cooling action will start immediately after defrost regardless of the then-remaining cooling capacity in the cool group. This should be taken into account when setting the cooling capacity in the relevant cool group.
[7] If this option is configured, a cooling action will start immediately after defrost regardless of the then-remaining cooling capacity in the store group. This should be taken into account when setting the cooling capacity in the relevant store group.

No.	Description	Range	Unit	Default
Alarms 1				
P 0900	Type temperature alarm 1 0 = Absolute minimum sensor A[8] 1 = Absolute maximum sensor A[9] 2 = Relative minimum sensor A in relation to set point[10] 3 = Relative maximum sensor A in relation to set point[11] 4 = Maximum (absolute) difference between sensor A and B[12] 5 = Relative minimum sensor A in relation to sensor B[13] 6 = Relative maximum sensor A in relation to sensor B[14] Sensors A and B are defined with P0902 and P0906.	0 to 6	-	0
P 0901	Alarm temperature 1	-100.0..+100.0	°C	-40.0
P 0902	Sensor A for temperature alarm 1 Values conform P0135.	0..17	-	0
P 0903	Delay temperature alarm 1	0..99	min	0
P 0904	Detection temperature alarm 1 0 = Never 1 = During cool phase 2 = During cool and store phase 3 = During store phase	0..3		0
P 0905	Action at temperature alarm 1 0 = None (non-fatal alarm) 1 = All off (fatal alarm)	0..1	-	0
P 0906	Sensor B for temperature alarm 1 Values conform P0135. @ P0900 > 3	0..17	-	0
P 0930	Delay No hotgas alarm	0..99	min	0
P 0931	Delay External non fatal alarm 1	0..9999	s	0
P 0932	Delay External non fatal alarm 2	0..9999	s	0
P 0933	Delay External non fatal alarm 3	0..9999	s	0
P 0934	Delay External fatal alarm 1	0..9999	s	0
P 0935	Delay External fatal alarm 2	0..9999	s	0
P 0936	Delay External fatal alarm 3	0..9999	s	0

[8] Alarm condition: Temp_A < P0901
[9] Alarm condition: Temp_A > P0901
[10] Alarm condition: (Temp_A - Temp_setpoint) < P0901
[11] Alarm condition: (Temp_A - Temp_setpoint) > P0901
[12] Alarm condition: |Temp_A - Temp_B| > P0901
[13] Alarm condition: (Temp_A - Temp_B) < P0901
[14] Alarm condition: (Temp_A - Temp_B) > P0901

No.	Description	Range	Unit	Default
Alarms 2				
P 0960	Type temperature alarm 2 0 = Absolute minimum sensor A 1 = Absolute maximum sensor A 2 = Relative minimum sensor A in relation to set point 3 = Relative maximum sensor A in relation to set point 4 = Maximum (absolute) difference between sensor A and B 5 = Relative minimum sensor A in relation to sensor B 6 = Relative maximum sensor A in relation to sensor B Sensor A and B are defined with P0962 and P0966.	0 to 6	-	0
P 0961	Alarm temperature 2	-100.0..+100.0	°C	-40.0
P 0962	Sensor A for temperature alarm 2 Values conform P0135.	0..17	-	0
P 0963	Delay temperature alarm 2	0..99	min	0
P 0964	Detection temperature alarm 2 0 = Never 1 = During cool phase 2 = During cool and store phase 3 = During store phase	0..3		0
P 0965	Action at temperature alarm 2 0 = None (non-fatal alarm) 1 = All off (fatal alarm)	0..1	-	0
P 0966	Sensor B for temperature alarm 2 Values according to P0135. @ P0960 > 3	0 to 26	-	0
Blocking				
P 1000 P 1001	Blocking Monday..Friday start time 1 24 = Not active	00..24 00..59	hour min	24 00
P 1002 P 1003	Blocking Monday..Friday stop time 1	00..24 00..59	hour min	24 00
P 1004 P 1005	Blocking Monday..Friday start time 2	00..24 00..59	hour min	24 00
P 1006 P 1007	Blocking Monday..Friday stop time 2	00..24 00..59	hour min	24 00
P 1008 P 1009	Blocking Monday..Friday start time 3	00..24 00..59	hour min	24 00
P 1010 P 1011	Blocking Monday..Friday stop time 3	00..24 00..59	hour min	24 00
P 1012 P 1013	Blocking Monday..Friday start time 4	00..24 00..59	hour min	24 00
P 1014 P 1015	Blocking Monday..Friday stop time 4	00..24 00..59	hour min	24 00

No.	Description	Range	Unit	Default
P 1020 P 1021	Blocking Saturday..Sunday start time 1	00..24 00..59	hour min	24 00
P 1022 P 1023	Blocking Saturday..Sunday stop time 1	00..24 00..59	hour min	24 00
P 1024 P 1025	Blocking Saturday..Sunday start time 2	00..24 00..59	hour min	24 00
P 1026 P 1027	Blocking Saturday..Sunday stop time 2	00..24 00..59	hour min	24 00
P 1028 P 1029	Blocking Saturday..Sunday start time 3	00..24 00..59	hour min	24 00
P 1030 P 1031	Blocking Saturday..Sunday stop time 3	00..24 00..59	hour min	24 00
P 1032 P 1033	Blocking Saturday..Sunday start time 4	00..24 00..59	hour min	24 00
P 1034 P 1035	Blocking Saturday..Sunday stop time 4	00..24 00..59	hour min	24 00
P 1040	Ignore blocking for automatic ventilation 0 = No 1 = Yes	0..1	-	0
P 1041	Pause defrost time during blocking[15] 0 = No 1 = Yes (if number of evaporators = 1 or P0804 = 1)	0..1	-	0
P 1042	Alarms during blocking 0 = Normal detection 1 = No temperature and RH alarms	0..1	-	0
P 1043	Ignore blocking for (relay function) ventilate during cooling[16] 0 = No 1 = Yes	0..1	-	0
Water measurement				
P 1100	Amount per water counter pulse	1..100	litre	1
P 1101	Open water valve after	1..1000	litre	1
P 1102	Activation time water valve	0..999	s	5
Other				
P 6300	Language control panel 0 = Dutch 1 = English 2 = German	0..2	-	1
P 6301	Alarm buzzer time (after new alarm detection) 0 = Buzzer never on 999 = Buzzer on until alarm is confirmed	0..999	s	0
P 6302	Control access code 0 = No code required for operation	0..9999	-	0
P 6303	Parameter access code 0 = Code for parameters is same as code for operation	0..9999	-	0
P 7000	Software version	-	-	-
P 7001	Serial number	-	-	-
P 7002	Production date	-	year.week	-

[15] A blocking condition stops an ongoing defrost action. The defrost action will restart after the blocking condition has expired. P1041 determines whether the defrost time starts again after the blocking condition or is only paused during the blocking condition. It is only possible to the defrost time with one evaporator or with the simultaneous start of several evaporators (P0804 = 1).

[16] A blocking condition stops a cooling action. This parameter can be used to realise post-ventilation (relay function ventilation during cooling) despite the blocking condition.

4.2 Network parameters

Note: The network parameters are synchronised with each other between controllers on the same network: If a network parameter on a controller is changed, that change is automatically implemented on all other controllers on the same network. And if a controller is connected to a network or is powered up, it automatically copies the network parameters from the controllers that were already active on the same network.

No.	Description	Range	Unit	Default
Cool groups				
P 2100	Cool group 1, Max. cooling capacity	0..5000	kW	500
P 2110	Cool group 2, Max. cooling capacity	0..5000	kW	500
P 2120	Cool group 3, Max. cooling capacity	0..5000	kW	500
P 2130	Cool group 4, Max. cooling capacity	0..5000	kW	500
P 2140	Cool group 5, Max. cooling capacity	0..5000	kW	500
Store group 1				
P 2200	Store group 1, Max. cooling capacity	0..5000	kW	1
P 2201	Store group 1, Cycle time	10..240	min	90
P 2202	Store group 1, Order[17] 0 = Standard 1 = Rotating 2 = Store start number 3 = For each store start number 4 = With store subgroups	0..4	-	0
P 2204	Storage group 1, Cooling switch-off delay[18]	0..120	s	0
Store group 2				
P 2210	Store group 2, Max. cooling capacity	0..5000	kW	1
P 2211	Store group 2, Cycle time	10..240	min	90
P 2212	Store group 2, Order	0..4	-	0
P 2213	Store group 2, Cooling switch-off delay	0..120	s	0
Store group 3				
P 2220	Store group 3, Max. cooling capacity	0..5000	kW	1
P 2221	Store group 3, Cycle time	10..240	min	90
P 2222	Store group 3, Order	0..4	-	0
P 2223	Store group 3, Cooling switch-off delay	0..120	s	0
Store group 4				
P 2230	Store group 4, Max. cooling capacity	0..5000	kW	1
P 2231	Store group 4, Cycle time	10..240	min	90
P 2232	Store group 4, Order	0..4	-	0
P 2233	Store group 4, Cooling switch-off delay	0..120	s	0
Store group 5				
P 2240	Store group 5, Max. cooling capacity	0..5000	kW	1
P 2241	Store group 5, Cycle time	10..240	min	90
P 2242	Store group 5, Order	0..4	-	0
P 2243	Store group 5, Cooling switch-off delay	0..120	s	0

[17] When this parameter is changed, it only comes into effect when a new storage cycle is started. The sequence of the ongoing storage cycle will not be adjusted. See section 1.18 for a description of the non-standard sequences.
[18] A mechanically cooling cell that will be switched off while another cell is started briefly continues to cool during this time. This can be used, for example, so that compressors are less affected by switches between cells.

No.	Description	Range	Unit	Default
Defrost group 1				
P 2400	Defrost group 1, Max. number of cells defrost at same time	1..100	-	1
P 2401	Defrost group 1, Max. number of cells waiting for hotgas	1..20	-	1
P 2402	Defrost group 1, Min. number of cooling cells for hotgas defrost	1..100	-	1
P 2403	Defrost group 1, Max. waiting time for hotgas	0..120	min	15
P 2405	Defrost group 1, Min. cool demand for start forced cooling (of "Highest cool demand" cells)	0.1..5.0	K	0.2
P 2406	Defrost group 1, Forced cooling order 0 = None 1 = Preference cells, Highest cool demand, Standby cells 2 = Preference cells, Standby cells, Highest cool demand 3 = Standby cells, Preference cells, Largest cool demand	0..3	-	0
Defrost group 2				
P 2410	Defrost group 2, Max. number of cells defrost at same time	1..100	-	1
P 2411	Defrost group 2, Max. number of cells waiting for hotgas	1..20	-	1
P 2412	Defrost group 2, Min. number of cooling cells for hotgas defrost	1..100	-	1
P 2413	Defrost group 2, Max. waiting time for hotgas	0..120	min	15
P 2415	Defrost group 2, Min. cool demand for start forced cooling (of "Highest cool demand" cells)	0.1..5.0	K	0.2
P 2416	Defrost group 2, Forced cooling order	0..3	-	0
Defrost group 3				
P 2420	Defrost group 3, Max. number of cells defrost at same time	1..100	-	1
P 2421	Defrost group 3, Max. number of cells waiting for hotgas	1..20	-	1
P 2422	Defrost group 3, Min. number of cooling cells for hotgas defrost	1..100	-	1
P 2423	Defrost group 3, Max. waiting time for hotgas	0..120	min	15
P 2425	Defrost group 3, Min. cool demand for start forced cooling (of "Highest cool demand" cells)	0.1..5.0	K	0.2
P 2426	Defrost group 3, Forced cooling order	0..3	-	0
Defrost group 4				
P 2430	Defrost group 4, Max. number of cells defrost at same time	1..100	-	1
P 2431	Defrost group 4, Max. number of cells waiting for hotgas	1..20	-	1
P 2432	Defrost group 4, Min. number of cooling cells for hotgas defrost	1..100	-	1
P 2433	Defrost group 4, Max. waiting time for hotgas	0..120	min	15
P 2435	Defrost group 4, Min. cool demand for start forced cooling (of "Highest cool demand" cells)	0.1..5.0	K	0.2
P 2436	Defrost group 4, Forced cooling order	0..3	-	0
Defrost group 5				
P 2440	Defrost group 5, Max. number of cells defrost at same time	1..100	-	1
P 2441	Defrost group 5, Max. number of cells waiting for hotgas	1..20	-	1
P 2442	Defrost group 5, Min. number of cooling cells for hotgas defrost	1..100	-	1
P 2443	Defrost group 5, Max. waiting time for hotgas	0..120	min	15
P 2445	Defrost group 5, Min. cool demand for start forced cooling (of "Highest cool demand" cells)	0.1..5.0	K	0.2
P 2446	Defrost group 5, Forced cooling order	0..3	-	0

5 Alarms

The controller can generate the alarms in the following table.

Non-fatal alarms are indicated with a "W" (warning) code, fatal alarms (all control stops) are indicated with an "F" (Fatal) code.

Code	Description
W01	Control temperature sensor 1 error
W02	Control temperature sensor 2 error
W03	Defrost temperature sensor evaporator 1 error
W04	Defrost temperature sensor evaporator 2 error
W05	Defrost temperature sensor evaporator 3 error
W06	Defrost temperature sensor evaporator 4 error
W07	Defrost temperature sensor evaporator 5 error
W08	Product temperature sensor 1 error
W09	Product temperature sensor 2 error
W10	Product temperature sensor 3 error
W11	Product temperature sensor 4 error
W12	Product temperature sensor 5 error
W13	Exhaust temperature sensor evaporator 1 error
W14	Exhaust temperature sensor evaporator 2 error
W15	Exhaust temperature sensor evaporator 3 error
W16	Exhaust temperature sensor evaporator 4 error
W17	Exhaust temperature sensor evaporator 5 error
W25	External non-fatal alarm 1
W26	No hotgas (available)
W28	Temperature alarm 1
W30	No temperature alarm 1 sensor(s)
W32	External non-fatal alarm 2
W33	External non-fatal alarm 3
W34	Temperature alarm 2
W35	No temperature alarm 2 sensor(s)
F01	External fatal alarm 1
F02	No control temperature sensor
F04	Temperature alarm 1
F06	Double cell number
F07	External fatal alarm 2
F08	External fatal alarm 3
F09	Temperature alarm 2
F12	Error in temperature measurement circuit (controller or extension module)
F16	Error in relay circuit (controller or extension module)

6 Ethernet

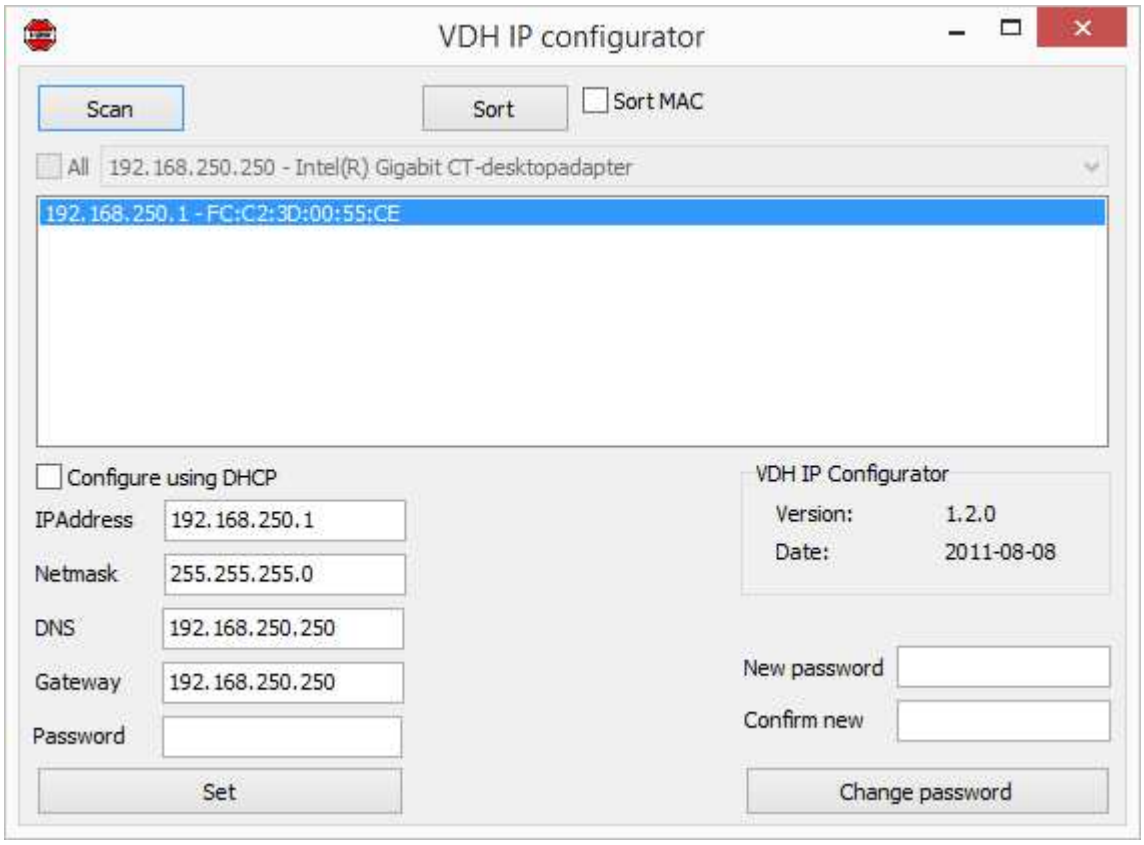
With the Ethernet connection, the internal web pages can be used and the controller can be linked to other controllers and VASP. In order to use the Ethernet connection, an IP address must be assigned to the controller. This IP address must be unique on the Ethernet to which the controller is connected. The standard IP address for the controller is 192.168.250.1.

6.1 Define IP address

The IP address can be changed using "VDH IP configurator" (VDH_Conf), which is available on the VDH website: www.vdhproducts.nl

This program can search for connected MC2 and MC3 controllers. The MAC address can be used to find the MC2 controller.

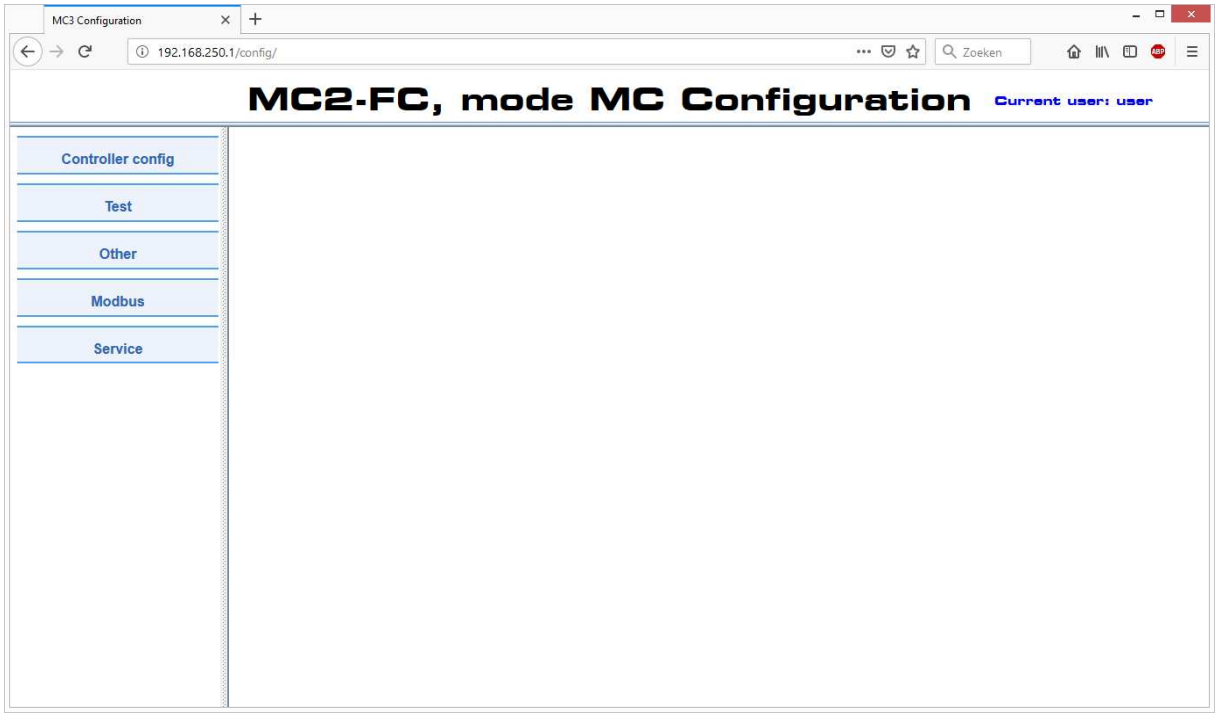
Start the program and select the relevant Ethernet interface. Press **Scan** to search for the available MC2 and MC3 controllers. All MC2 and MC3 controllers that are found are displayed in a list. Both the MAC address and the IP address are displayed.



The MAC address of the controller is printed on a sticker on the connecting terminals. The MAC address can be used to select the controller from the list.

Select the controller and define the desired network settings. Enter the password and press ***Set*** to change the network settings of the selected controller.

Use a web browser to connect to the controller by entering http://<ip.address>/config in the address bar of the browser. The following webpage is displayed:

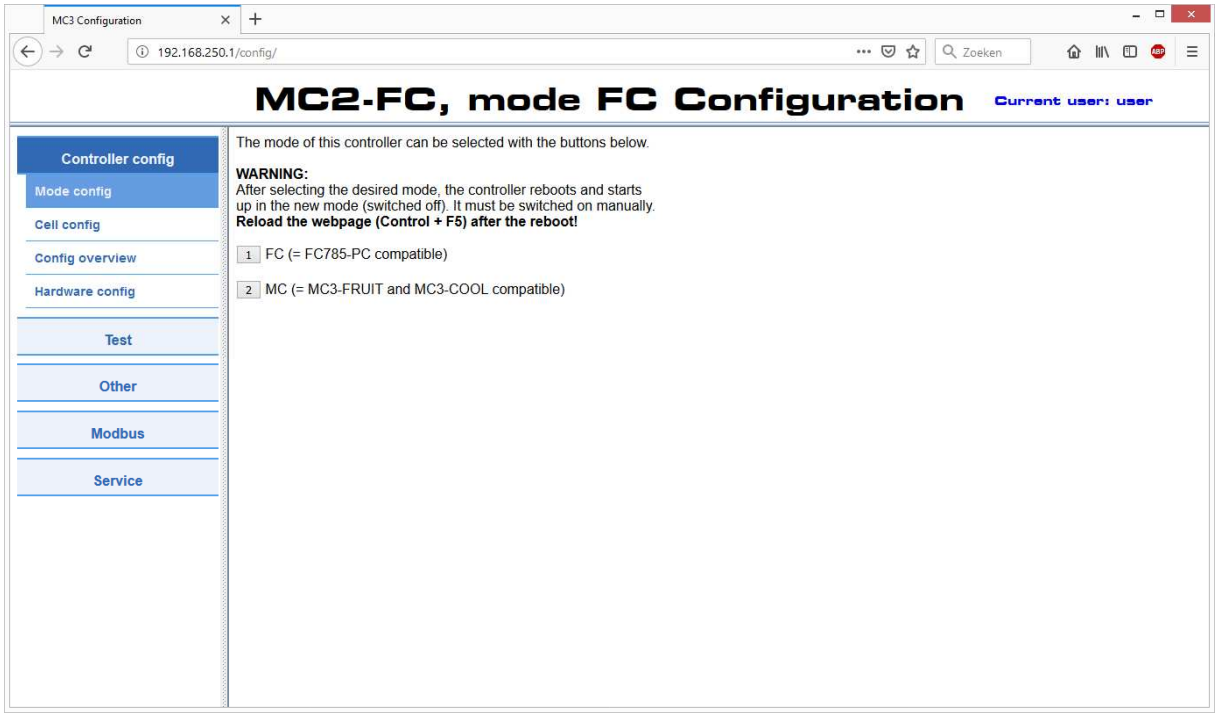


All access to these pages is password-protected to avoid accidental changes. You must log on with the user name "user" and the corresponding password.

6.2 Define mode

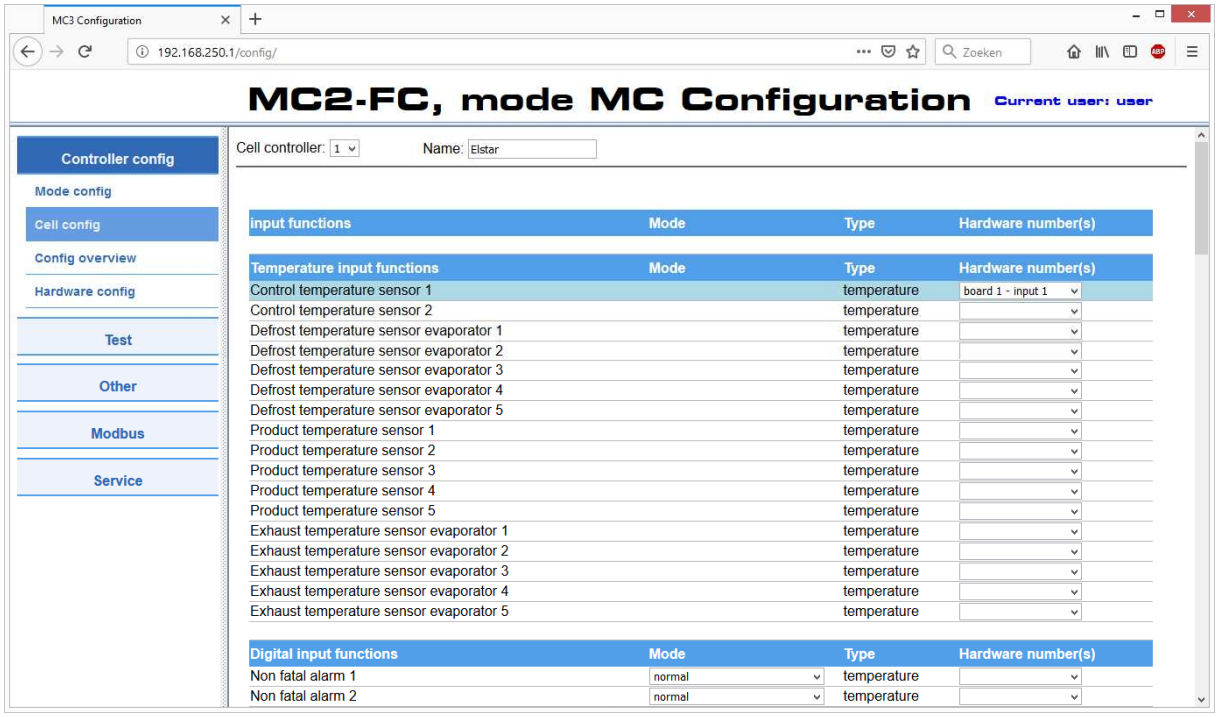
As specified above, the controller can operate in 2 modes: mode FC and mode MC. The current mode is displayed at the top of the internal web pages. When you select ***Controller config*** / ***Mode config***, a web page is displayed on which the mode can be changed.

Note: The standard mode in which the controller is delivered is mode FC. In order to use the controller in mode MC (as described in this manual). the mode MC must first be defined using this web page!



6.3 Defining the name and inputs and outputs

When you select ***Controller config*** / ***Mode config***, a web page is displayed on which you can change the name and the inputs and outputs of the cell.



You can enter the name of the cell in the field after Name. The name you enter is used on the touchscreen.

Every input and output function can be defined by selecting a hardware number from the selection list:

Type	Hardware number(s)	Re
temperature	board 1 - input 1..5	Pt1000 temperature sensor input 1..5 of the controller
temperature	board 3 - input 1..16	Pt1000 temperature sensor input 1..16 of the optional extension module 907.100054 MC3-EM [1Do12,1Rth16]
relay	board 1 - output 1..5	relay 1..5 of the controller
relay	board 2 - output 1..12	relay 1..12 of the of the optional extension module 907.100054 MC3-EM [1Do12,1Rth16]

It is possible to assign multiple relay output functions to the same relay (OR function). For example: When both relay output functions "Cooling ventilation evaporator 1" (Cooling ventilation evaporator 1) and "Automatic ventilation" are assigned to relays with hardware number "board 1 – output 3", the relay is activated when evaporator 1 is being cooled and also during automatic ventilation.

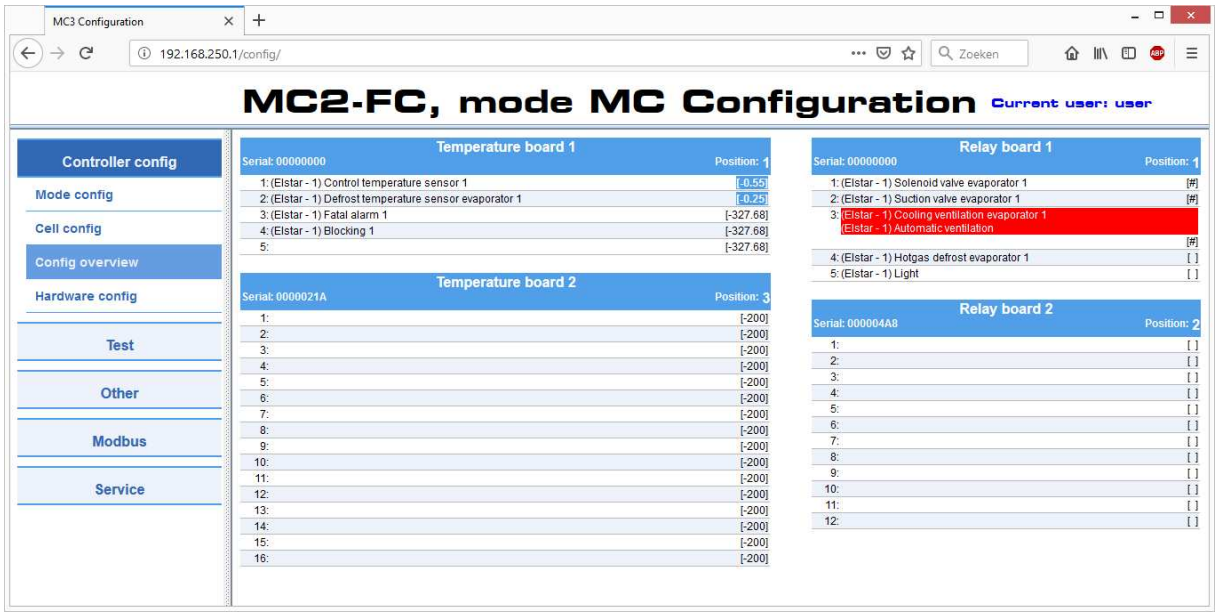
In the same way, it is also possible to assign multiple input functions to the same input.

For the digital input and relay output functions, a Mode setting "normal" and "inverted" is displayed. The "inverted" setting inverts the normal operation. For example: An inverted digital input function "Blocking" becomes a digital input "Release" and an inverted relay output function "Alarm" becomes a relay output function "Watch alarm" (activated when no alarms are active).

After making changes on a web page, send the changes to the controller by pressing the ***Submit*** button at the bottom of the page. When all the changes have been made, the controller must be reset to activate the changes. To do this, press ***Restart the application***. This button is available on the web page on the tab ***Other***, subtab ***Restart application***.

6.4 Displaying status inputs and outputs

When you select ***Controller config*** / ***Mode config***, a web page is displayed on which the status of the inputs and outputs is displayed. The name of the defined inputs and outputs functions is also displayed. Outputs to which multiple functions have been allocated are marked red.



The circuit boards displayed above (Temperature board 1 and Relay board 1) are the inputs and outputs on the controller itself. The circuit boards displayed underneath (Temperature board 2 and Relay board 2) are the inputs and outputs of the optional extension module 907.100054 MC3-EM [1Do12,1Rth16].

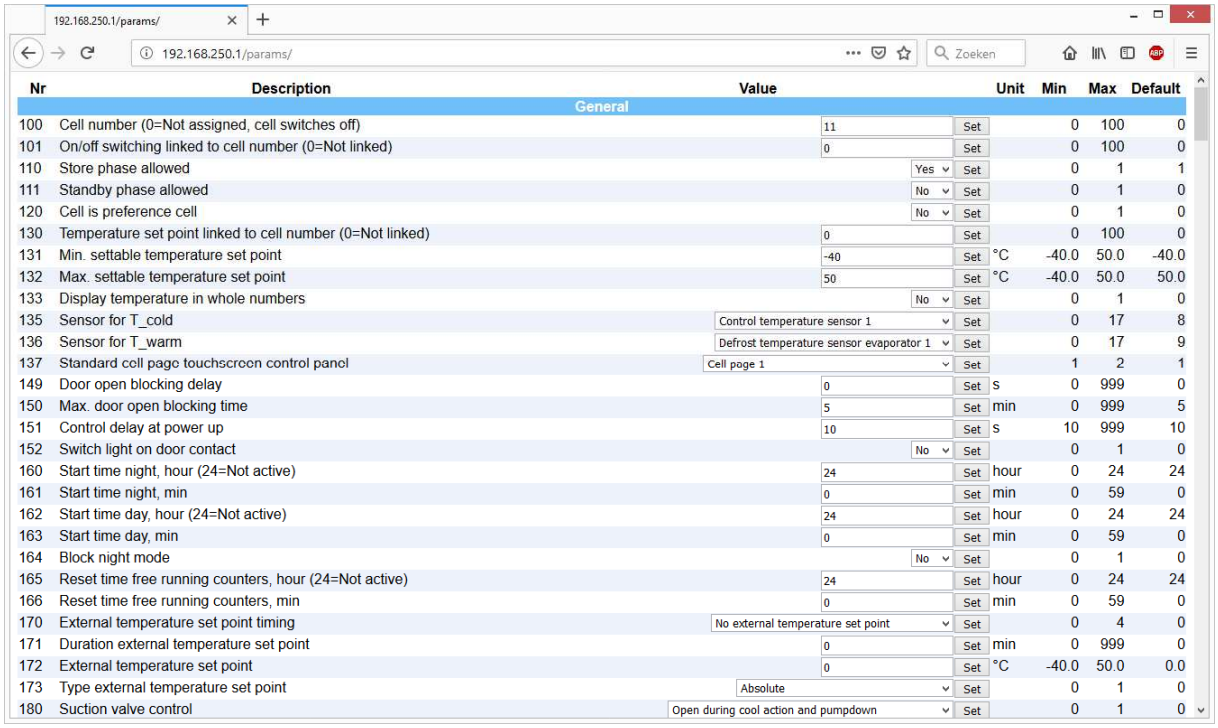
The measured temperatures are displayed in degrees Celsius <u>without</u> calculating the offsets (P0200..P0234). Open digital inputs (temperature inputs on which a digital input function is defined) are displayed as -327.68 or 327.67, and closed digital inputs are displayed with a value of around -245. Enabled relays are indicated with a [#], relays in rest with a [ ].

6.5 Parameter web page

The parameters of the cell controllers can be viewed and adapted on the parameter web page. To do this, a computer must be connected to the controller through the Ethernet.

Use a web browser to connect to the controller by entering http://<ip.address>/params on the browser address bar.

Then log in with username "user" and associated password. A web page opens in which you can view and change the parameters.



Nr	Description	Value		Unit	Min	Max	Default
	General						
100	Cell number (0=Not assigned, cell switches off)	11	Set		0	100	0
101	On/off switching linked to cell number (0=Not linked)	0	Set		0	100	0
110	Store phase allowed	Yes	Set		0	1	1
111	Standby phase allowed	No	Set		0	1	0
120	Cell is preference cell	No	Set		0	1	0
130	Temperature set point linked to cell number (0=Not linked)	0	Set		0	100	0
131	Min. settable temperature set point	-40	Set	°C	-40.0	50.0	-40.0
132	Max. settable temperature set point	50	Set	°C	-40.0	50.0	50.0
133	Display temperature in whole numbers	No	Set		0	1	0
135	Sensor for T_cold	Control temperature sensor 1	Set		0	17	8
136	Sensor for T_warm	Defrost temperature sensor evaporator 1	Set		0	17	9
137	Standard cell page touchscreen control panel	Cell page 1	Set		1	2	1
149	Door open blocking delay	0	Set	s	0	999	0
150	Max. door open blocking time	5	Set	min	0	999	5
151	Control delay at power up	10	Set	s	10	999	10
152	Switch light on door contact	No	Set		0	1	0
160	Start time night, hour (24=Not active)	24	Set	hour	0	24	24
161	Start time night, min	0	Set	min	0	59	0
162	Start time day, hour (24=Not active)	24	Set	hour	0	24	24
163	Start time day, min	0	Set	min	0	59	0
164	Block night mode	No	Set		0	1	0
165	Reset time free running counters, hour (24=Not active)	24	Set	hour	0	24	24
166	Reset time free running counters, min	0	Set	min	0	59	0
170	External temperature set point timing	No external temperature set point	Set		0	4	0
171	Duration external temperature set point	0	Set	min	0	999	0
172	External temperature set point	0	Set	°C	-40.0	50.0	0.0
173	Type external temperature set point	Absolute	Set		0	1	0
180	Suction valve control	Open during cool action and pumpdown	Set		0	1	0

Note: The displayed parameter values are a snapshot of the moment the page was retrieved. To view the current parameters of the web page, refresh the page. This can be done in most web browsers by pressing Ctrl + F5.

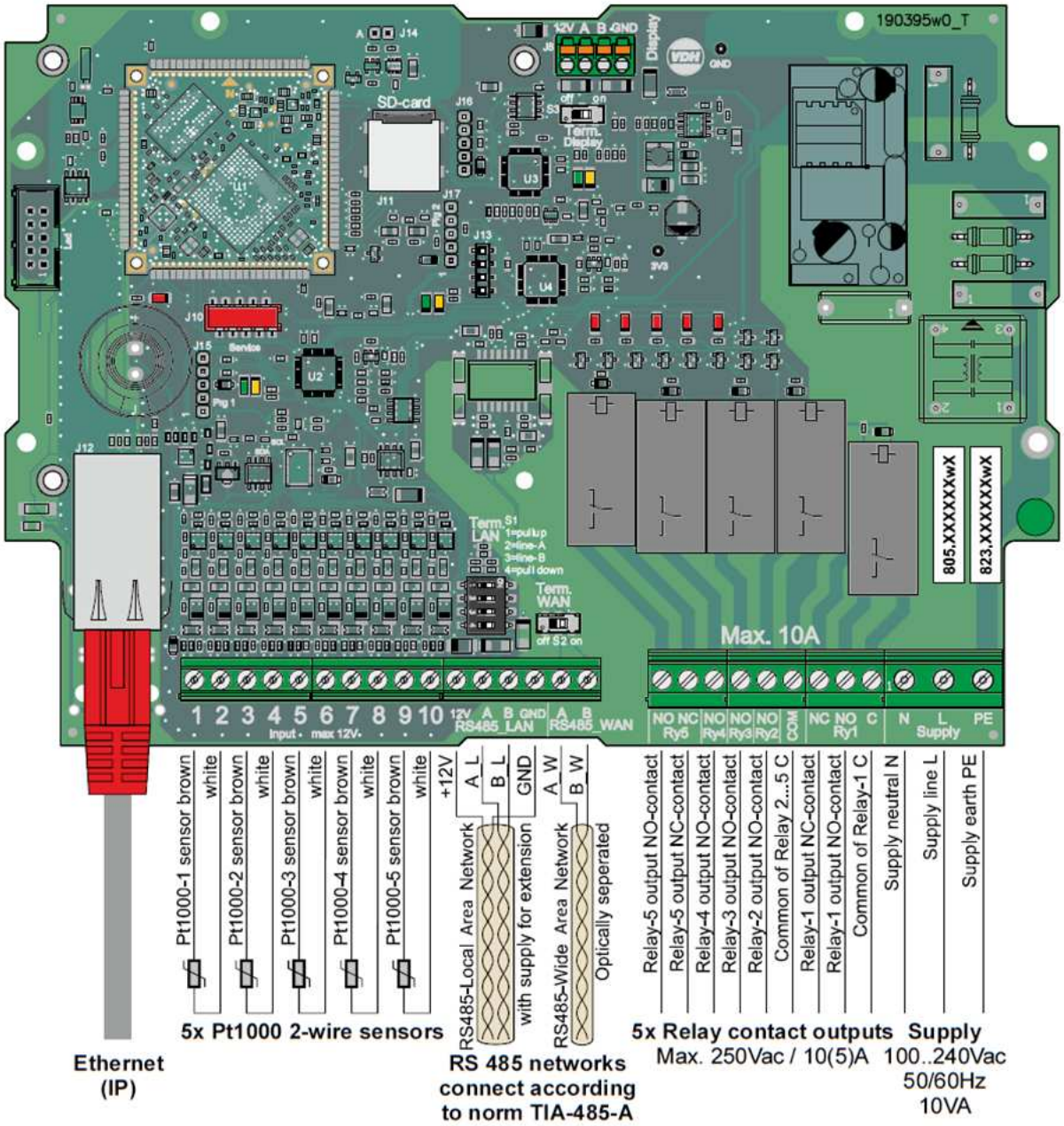
7 Connections

7.1 Controller

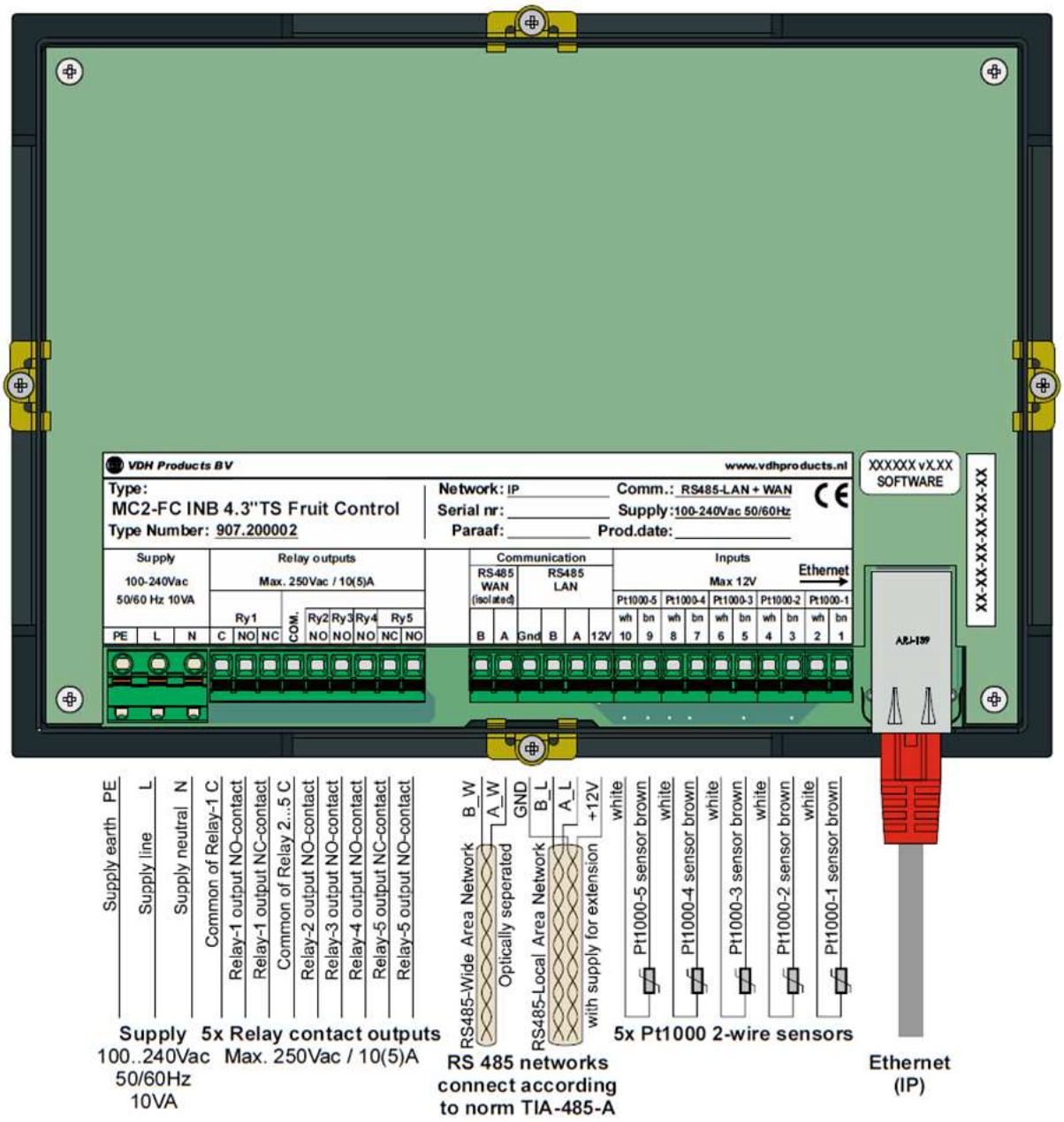
The functions of the external connections are stated in the following table.

Connection	Fuction
RJ45	Ethernet connection for the use of the internal web pages, VASP and mutual cooperation between MC2-FC controllers (in mode MC), MC3-FRUIT and MC3-COOL controllers
Input 1	Pt1000 temperature sensor input 1
Input 2	
Input 3	Pt1000 temperature sensor input 2
Input 4	
Input 5	Pt1000 temperature sensor input 3
Input 6	
Input 7	Pt1000 temperature sensor input 4
Input 8	
Input 9	Pt1000 temperature sensor input 5
Input 10	
RS485_LAN 12V	RS485 LAN connection with power supply for an optional extension module 907.100054 MC3-EM [1Do12,1Rth12] **Note:** The extension module can be powered from the controller.
RS485_LAN A	
RS485_LAN B	
RS485_LAN GND	
RS485_WAN A	Not used for mode MC
RS485_WAN B	
Ry5 NO	Normally Open (NO), Normally Closed (CO) contacts of relays Ry2 to Ry5 with one shared Common (COM)
Ry5 NC	
Ry4 NO	
Ry3 NO	
Ry2 NO	
COM	
Ry1 NC	Normally Open (NO), Normally Closed (CO) and Common (C) contacts of relay Ry1
Ry1 NO	
Ry1 C	
Supply N	230 Vac supply voltage
Supply L	
Supply PE	

7.1.1 Wall-mount version



7.1.2 Panel-mount version



7.1.3 RS485 connections

The RS485 LAN connection is used to connect the optional extension module 907.100054 MC3-EM [1Do12,1Rth12].

The RS485 WAN connection is not used for mode MC.

With RS485 networks, it is important that the network is shut off electrically at the beginning and at the end.

The RS485 LAN connection can be terminated electrically on the main circuit board by shifting the switches Term. LAN 2 and 3 to the right (ON-position). That activates a resistance of 120 ohm between A and B. By the Term switches. By shifting the switches Term. LAN 1 and 4 to the right (ON-position), pull-up and pull-down resistors of 500 ohm are activated for signal improvement. **Note**: This should only be done at one position in the network.

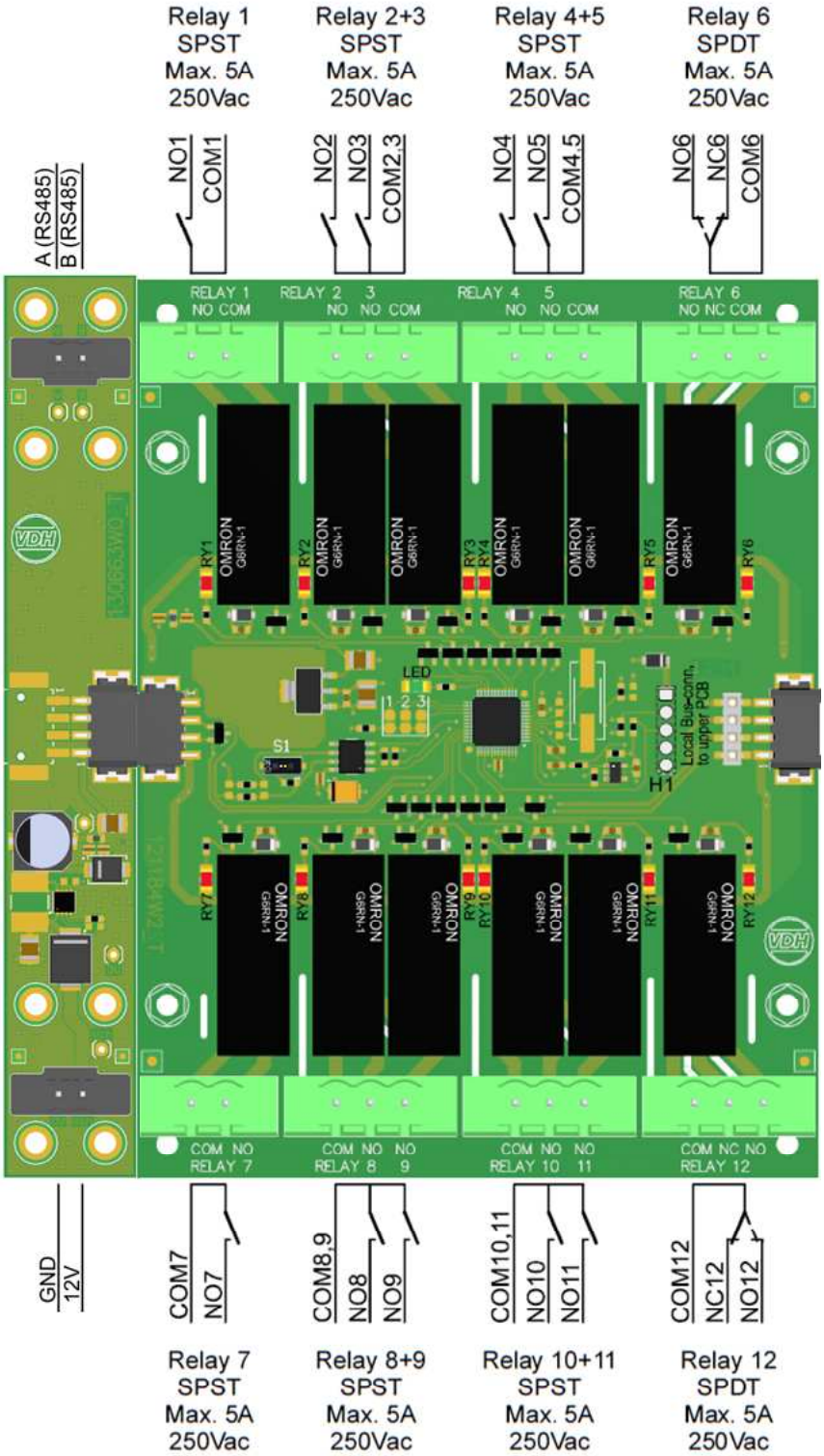
For detailed information about RS485 networks, we refer you to the RS485 standard:

- TIA-485-A, Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems (Reaffirmed: December 7, 2012)
- TSB-89-A, Application Guidelines for TIA/EIA-485-A (January 2000)

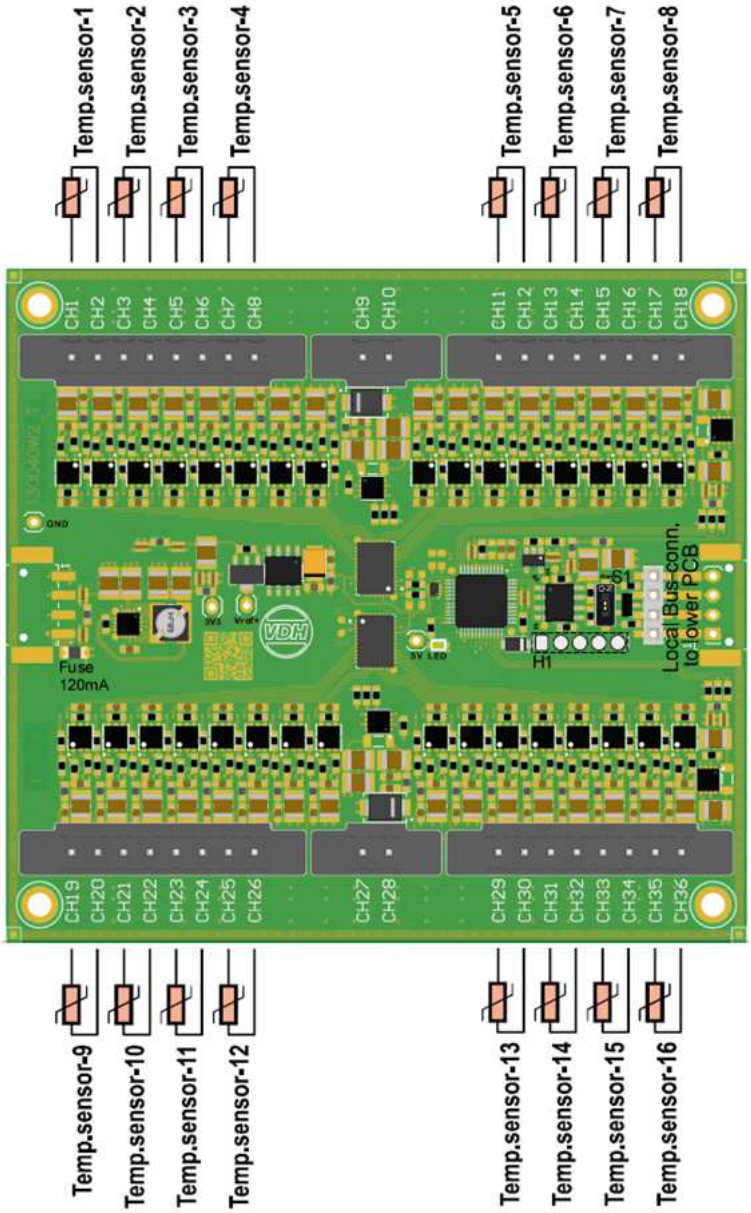
7.2 Extension module 907.100054 MC3-EM [1Do12,1Rth16]

Using the RS485 LAN connection, the controller can be expanded with an optional extension module 907.100054 MC3-EM [1Do12,1Rth16].

The bottom circuit boards of the module are displayed in the following illustration.

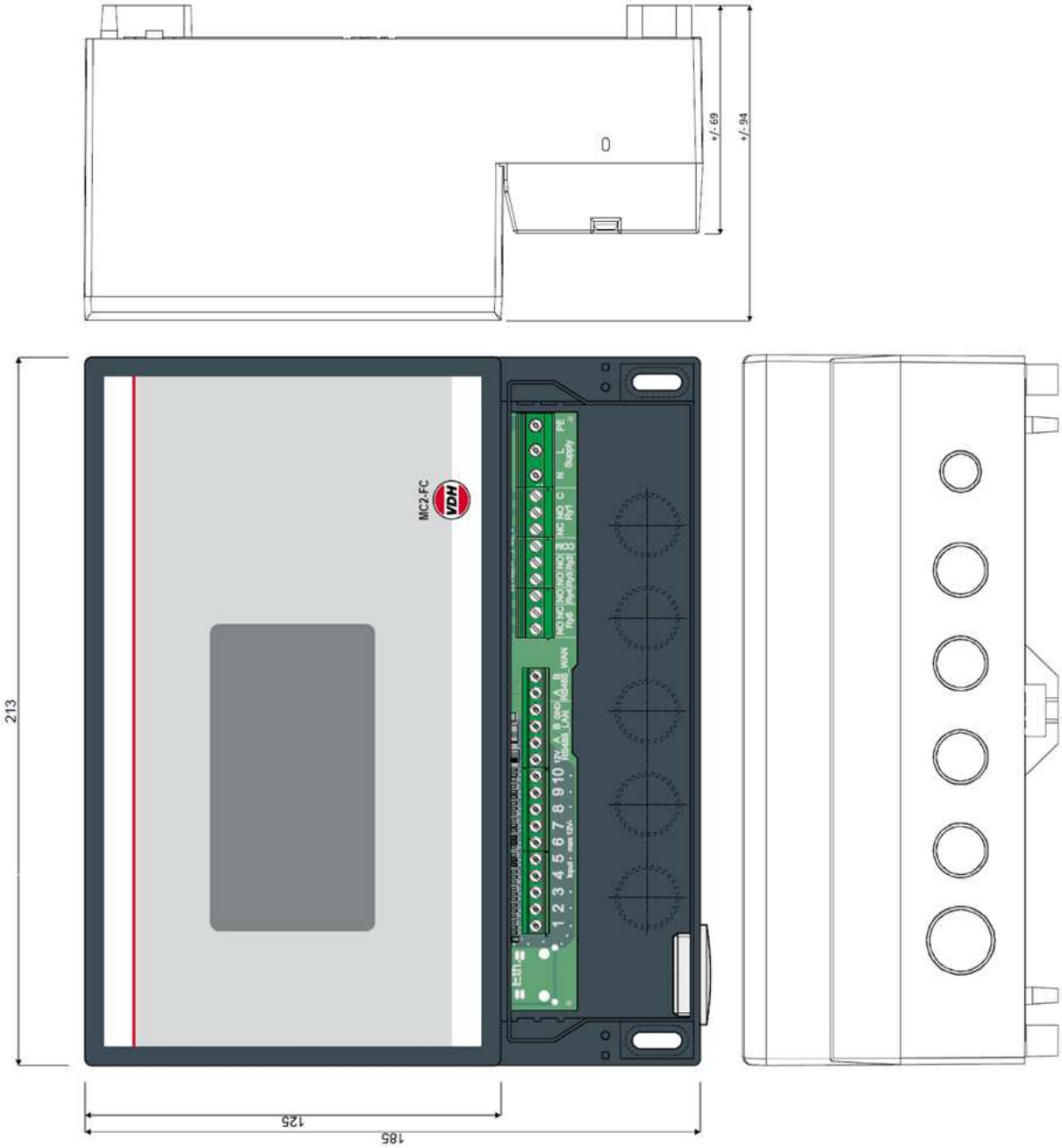


The top circuit board of the module is displayed in the following illustration.



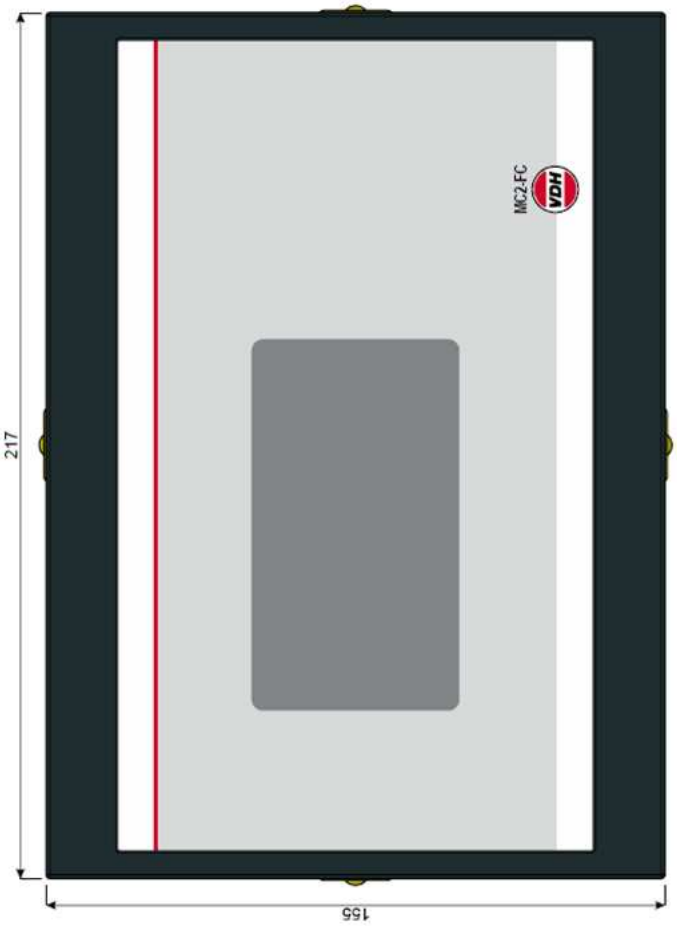
8 Dimensions

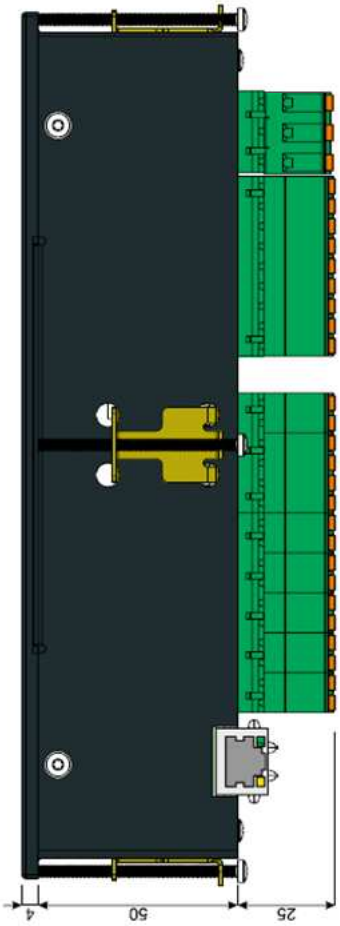
8.1 Controller wall-mount version

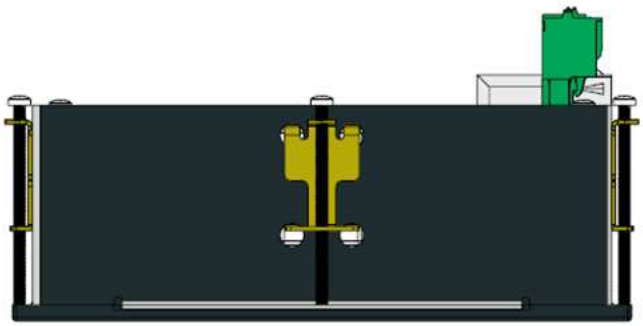


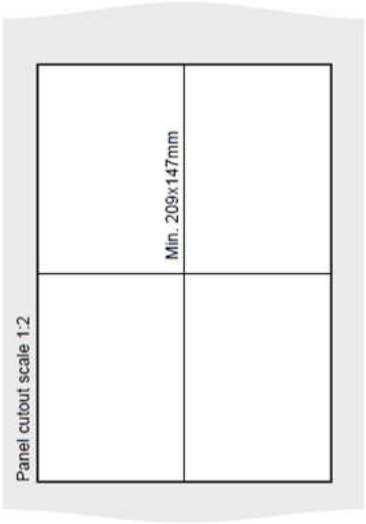
Note: At the bottom left of the controller, a cable gland can been mounted through which an Ethernet cable with a standard RJ45 connector fits. The cable gland has a special rubber ring (with a slice) that can be wrapped around the Ethernet cable when the RJ45 connector has already been mounted.

8.2 Controller panel-mount version

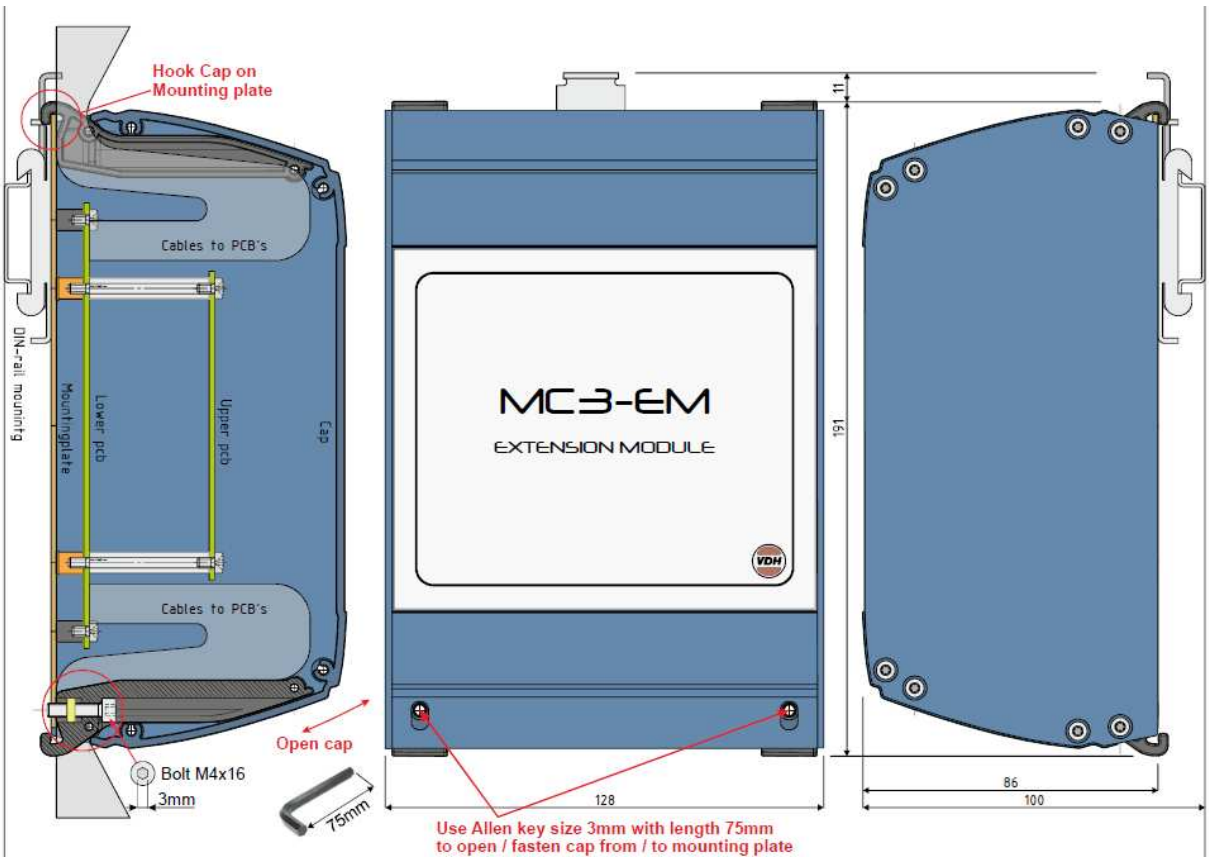


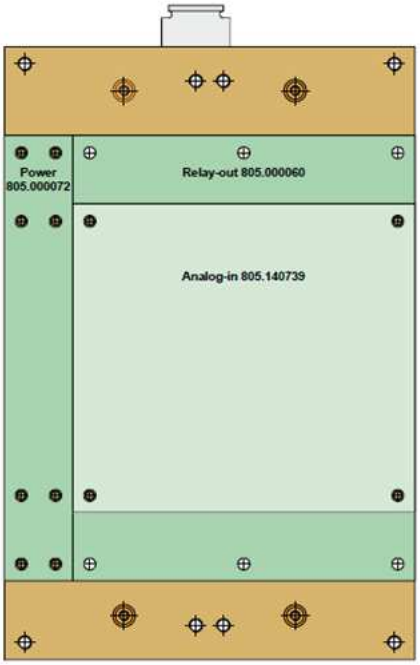




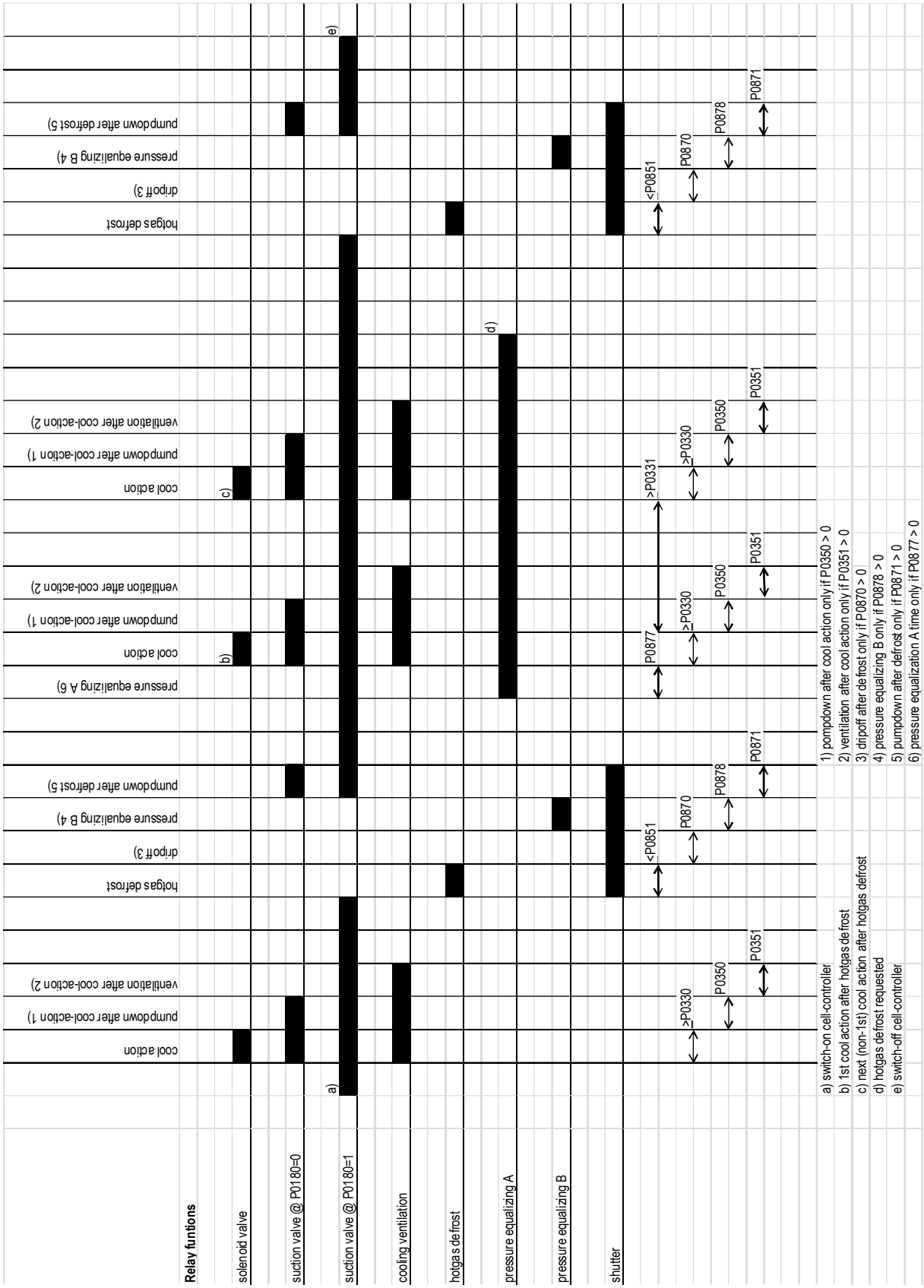


8.3 Extension module 907.100054 MC3-EM [1Do12,1Rth16]





9 Timing diagram hotgas defrost



10 Aantekeningen