



# **ems25+** **ems25 advanced**

## PRODUCT MANUAL

Firmware: U02 - n01 - ems25+  
Firmware: U03 - n02 - ems25advanced

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# 1. OVERVIEW

ems (energy management system) controllers from elstat are used in a variety of drinks coolers, optimising energy savings, without compromising on drinks serving temperature.

A range of controllers are available to suit applications such as:

- Single door coolers
- Double door coolers
- Open front coolers
- Vending machines
- Sub-zero beer coolers

## 1.1 About this reference guide

The purpose of this guide is to explain in detail all information regarding elstat controllers including the user interface, parameters, accessories and troubleshooting.

Complimentary information is also available from elstat such as accessory lists, accessory data sheets and single sheet user guides.

## 2. What is the ems25 series?

The ems25 series consists of the ems25, ems25+, and ems25advanced. The ems25 series is designed as a compact alternative the ems55 series.



The ems25 series with the suitable accessories also provide the following functionality:

Feature	Desicription
User and diagnositc information	3-digit, 7-segment display (ems25+ and ems25advanced only) and push buttons that display the product temperature and other information such as defrost or teach and alarm conditions. Also, enables end-users to cancel alarms and service technicians to run test routines.
Product temperature	An appliance sensor measures temperature of the refrigeration compartment. ems controllers use the refrigeration temperature to manage the product temperature.
Refrigeration system high temperature alarm	An optional condenser sensor measures the temperature of the refrigeration system. ems controllers use the temperature to alert to problems such as blocked condensers. ems25+ and ems25advanced only.
Motion detection	A remote motion sensor enables ems controllers to detect activity when someone moves in frontof the cooler.
Door open detection	Adoor switch enables ems controllers to detectcooler activity when someone opens the cooler doors.

The ems25 series controllers switch the following cooler components:

Feature	Desicription
Compressor	ems controllers switch the compressor to manage the temperatire of the refrigeration compartment
Evaporator fan	ems controllers switch the evaporator fan to manage the evaporator fan. ems25advanced only.
Lights	ems controllers switch the cooler lights to save energy.



## 2.1 Water ingress–advisory informationforF MEA analysis

Elstat products have been designed to minimise any risks associated with water ingress and all controllers are IPX5 certified.

The OEM or installer is responsible to ensure that local/country laws andregulatory requirements are met.

## 2.2 ems25+ andems25advanced userinterface





The user interface of the ems25+ and ems25advanced is as follows:



	Indicator	Function	Colour
1	Saving temperature disable	<b>on</b> if the saving mode temperature is disabled. The controller maintains ready mode temperature at all times	Red
2	Motion	<b>on</b> when motion is detected	Red
3	Compressor	<b>on</b> when the compressor is running	Green

The ems controller buttons access the menu to view parameter values, reset the ems controller, and to run test routines.

Push buttons:

Button	Name	Function
	defrost or teach	ems25advanced: starts a defrost cycle. ems25+: sets the ems controller to the daving mode for up to one hour.
	Set	Selects menu options and scrolls through the parameters
	Up	Increases the parameter values. ems25+: Also exits the tech saving mode
	Down	Scrolls down menus, decreases parameter values, and cancels alarms

## 2.3 Environmental ratings

The table below details the general characteristics of the ems25 series.

Characteristic	Value
IP rating	IPX5
Maximum operating temperature	55°C (131°F)
Minimum operating temperature	0°C (32°F)
Housing material	Black polycarbonate

## 2.4 ems25 series relay ratings

The table below details the relay ratings of ems25+ controllers

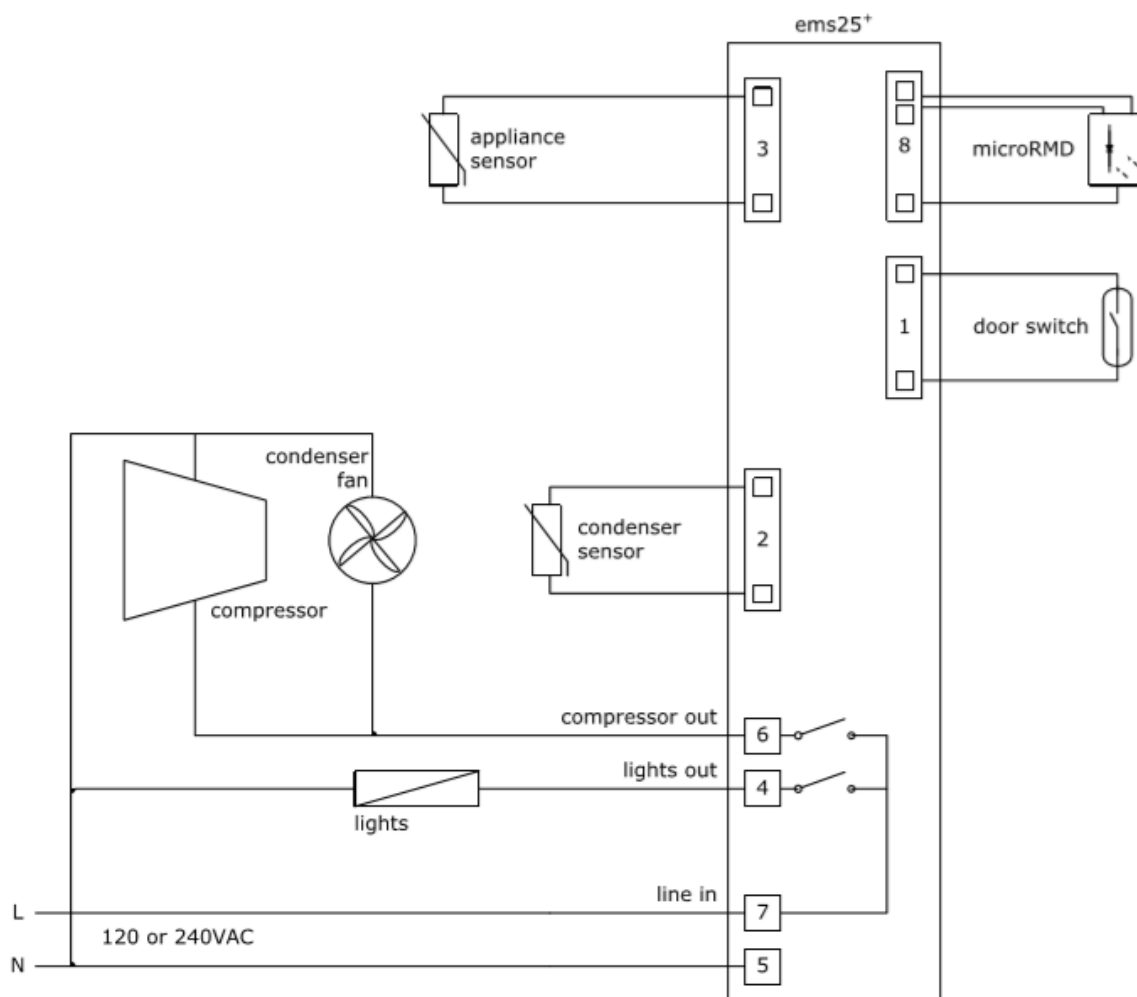
ems25+	maximum IEC rating @ 100-240VAC	maximum UL ratings @ 120VAC
Compressor	6(6)A, p.f.0.6	6 FLA, 36 LRA
Lights	2(2)A, p.f.0.6	120VAC, 60Hz, 250W florescent
Evaporator fan	not applicable	not applicable

The table below details the relay ratings of ems25advanced controllers

ems25+	maximum IEC rating @ 100-240VAC	maximum UL ratings @ 120VAC
Compressor	10(10)A, p.f.0.	not applicable
Lights	10(10)A, p.f.0.	
Evaporator fan	4(4)A, p.f.0.6	

## 2.5 ems25+ wiring diagram

The wiring diagram for the ems25+:



Drip loops must be made in all cables



### Note

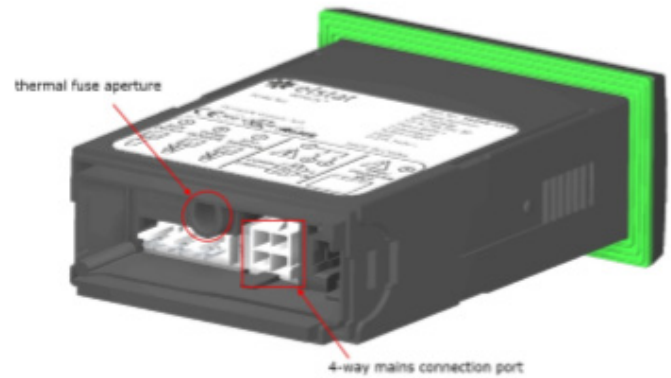
For security, once fitted, the rear cover can only be removed using a tool, such as a small, flat bladed screwdriver.

## 2.6 ems25 series thermal fuse (CQC only)

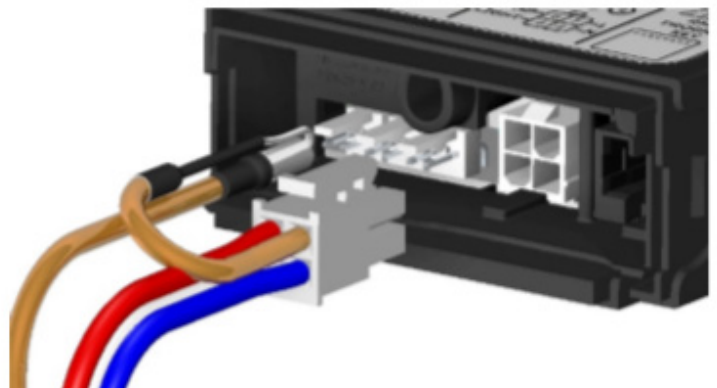
The ems25 and ems25+ housings are designed with an aperture for a thermal fuse to be located.

The thermal fuse is a part of a main harness which is supplied by elstat.

The location for the 4-way mains connector (harness) and thermal fuse are shown in the diagram to the right:



Fit the connector into the port, and the thermal fuse into the aperture, ensuring that it is fully enclosed:

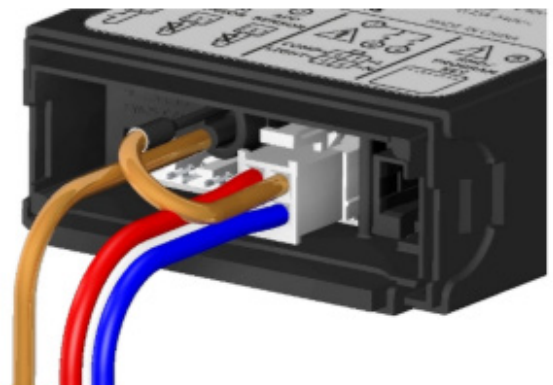


Make sure that the connector has 'clicked' into place and the connection is sound.

Check that the thermal fuse is fully protected within the aperture.

The aperture has been designed specifically for the thermal fuse supplied by elstat.

**Do not** use the aperture for any other purpose.



All cables must exit vertically, as shown in the diagram to the right

Drip loops must be made in all cables

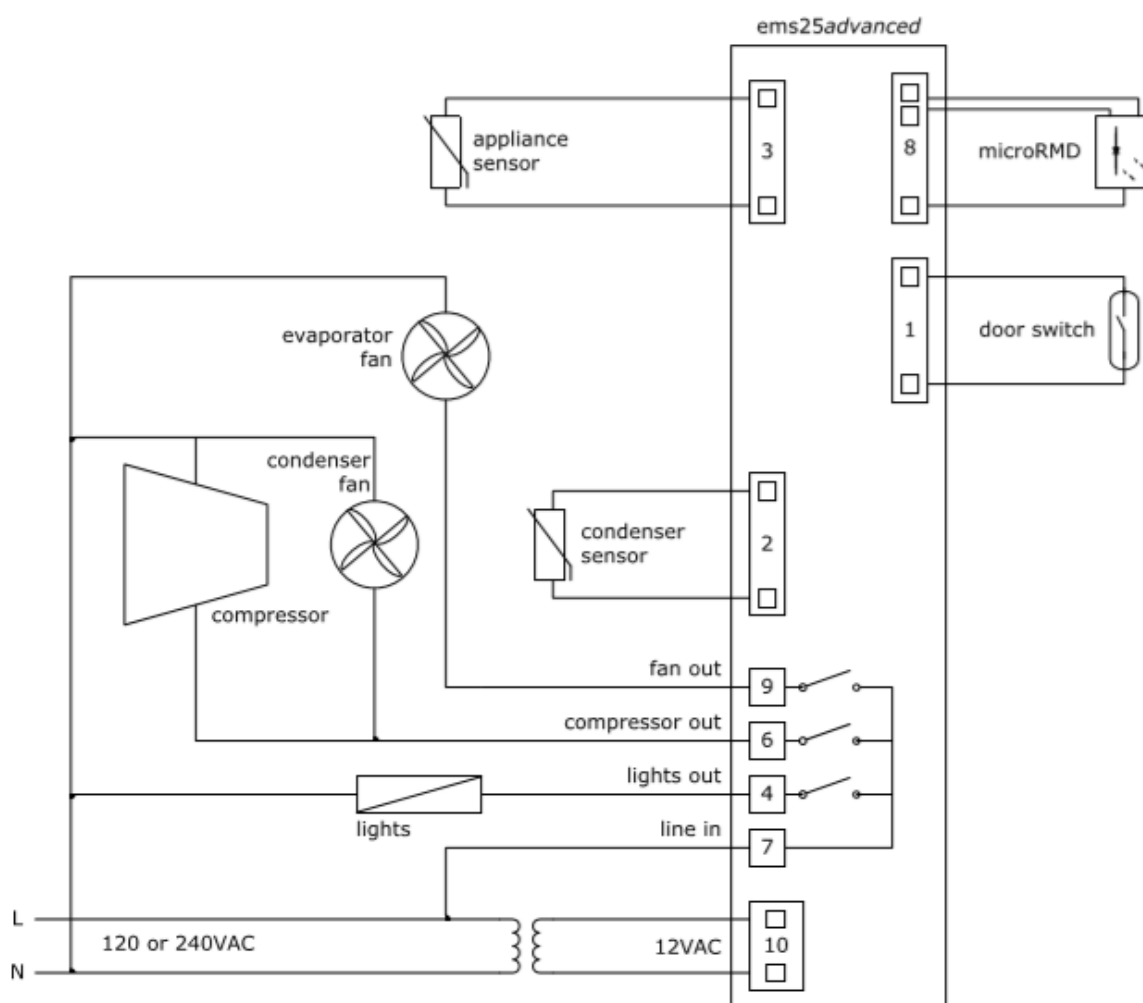


### Note

For security, once fitted, the rear cover can only be removed using a tool, such as a small, flat bladed screwdriver.

## 2.7 ems25advanced wiring diagram

The wiring diagram for the ems25advanced:



Drip loops must be made in all cables



### Note

For security, once fitted, the rear cover can only be removed using a tool, such as a small, flat bladed screwdriver.

## 2.8 How to mount ems25 series controllers

ems25 series controllers have an IP (Ingress Protection) rating of IP45. That is, the ems controller has protection against water jets. An appropriate level of protection must be given for the effects of water ingress due to water jetting, condensation, product spillage, and so on.

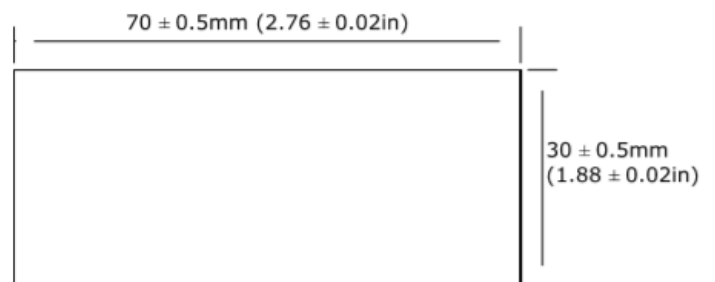
Before beginning installation, remove all protective film from between the rear seals of the controller. The seals are malleable, to ensure a water resistant seal around cables and prevent water ingress.



### Note

The ems25 series controllers must not be exposed to temperatures greater than 55°C (131°F) or lower than 0°C (32°F).

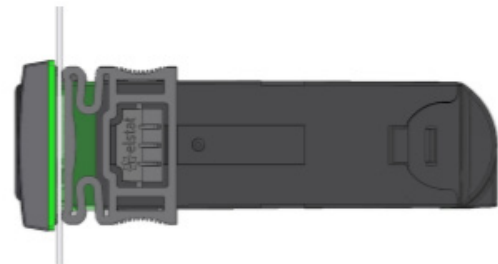
ems25 series controllers are designed for panel mounting. The panel aperture dimensions are shown to the right.



To mount an ems25 series controller, insert the ems controller into the aperture as shown in the example to the right.



Then, secure the ems controller into position using the supplied display side-clips as shown to the right.



### Note

Decorative trim kits are supplied separately. See 'ems decorative trims' on page 88 The Large decorative trim kits are screwed into place

Cable routing to the ems controller is critical as water can trace or follow the cable downwards. Therefore, immediately prior to the connection to the controller, a drip loop must be formed in all wiring as shown to the right



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**Note**

Cable routing looms must not be secured to hot pipes or vibrating components.

Secure cable routing looms with clips wherever possible.

For security, once fitted, the rear cover can only be removed using a tool, such as a small, flat bladed screwdriver.

---

### 3. Temperature input ranges

The table below shows the temperature input ranges of the ems25 series controllers for each sensor type

Sensor	Input range (°C)	Input range (°F)
Appliance sensor	-10°C to 23.3°C +/- 0.5°C	-14°F to 74°F +/- 1°F
Condenser sensor (not used with R744 coolers)	50°C to 125°C +/- 5°C	122°F to 257°F +/- 10°F



**Note**

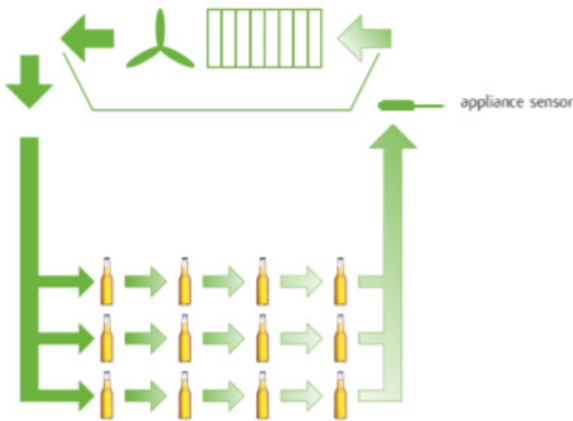
The NTC thermistor from elstat is rated at -35°C to 125°C (-31°F to 257°F).

#### 3.1 How to mount the appliance sensor

The appliance sensor measures air temperature of the refrigerated compartment by measuring the return air temperature.

The diagram to the right shows the recommended position of the appliance sensor. The appliance sensor measures the air temperature after the air has been drawn over the products.

The return air provides a close approximation of the product temperature.



To measure the return air temperature, secure the sensor to allow air to flow over the sensor head.

The sensor head should be placed at a right-angle to the air flow and secured using a P-clip.

The sensor head should not be completely covered by the P-clip or the sensor will not function correctly.



**Note**

The sensor head is fragile and can easily be damaged. Using cable ties to secure the sensor head or sensor cable is not recommended and invalidates the warranty.



**Note**

To help place the appliance sensor, the parameter calibration1 (CA1) defines an offset temperature. See “Calibration” 1 (CAT1)”.



## 3.2 How to mount the evaporator sensor

The evaporator sensor measures the temperature of the evaporator. ems controllers use the temperature of the evaporator to activate and terminate defrost cycles.

The evaporator sensor should be placed in the immediate proximity of the evaporator. Mount the sensor head inside the evaporator cooling fins, as shown below.

The sensor head must be mounted securely to prevent being dislodged due to vibration.

For coolers fitted with a defrost heater, the evaporator sensor should be placed as far away as possible from the heating element, i.e. at the opposite end of the evaporator.

If the evaporator sensor measures the localized heating from the heating element, defrost cycles will terminate before the whole evaporator has had the opportunity to defrost.



### Note

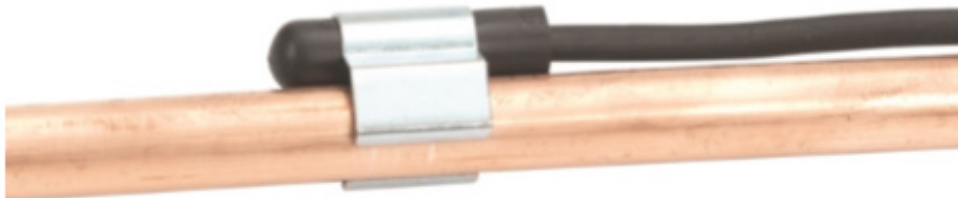
Do not use cable ties.

The head of the sensor is fragile and can be easily damaged. Using cable ties to secure the sensor head, or sensor cable, invalidates the warranty.

## 3.3 How to mount the condensor sensor

This sensor measures the temperature of the refrigeration system. Excessive condenser temperature is usually due to poor preventive maintenance, i.e. poorly cleaned condenser, or condenser fan failure.

For example, fix using a metal pipe clip or direct fitting, as shown below. Elstat can supply pipe clips for 6-8mm and 8-10mm pipes.



### Note

Do not use cable ties.

The head of the sensor is fragile and can be easily damaged. Using cable ties to secure the sensor head, or sensor cable, invalidates the warranty.

Do not attach sensor cables to hot pipes or allow the sensor cables to come into contact with hot pipes.

# 4. Door switch

Door switches are used to detect door openings. Door switches are safety extralow voltage (SELV) components that are able to create an open and closed circuit.

The enhanced door switch, and activator, are SELV components, over-moulded for strengthened physical protection and resistance to water ingress, and create an open and closed circuit.

Enhanced door switches must be used with enhanced activators.

Enhanced door switches are available from Elstat in various lengths.



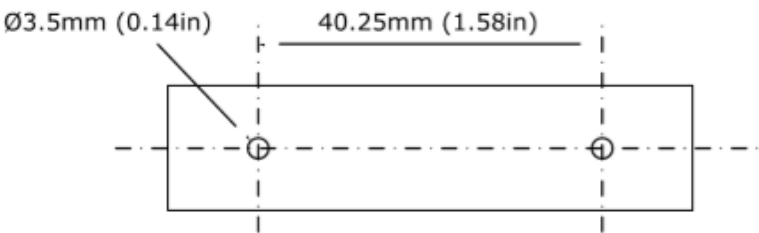
## 4.1 How to mount the door switch

Door switches are usually mounted with the door switch on the cooler and the activator on the door.

Door switches and activators must be fixed using counter sunk screws or bolts with the following characteristics:

- Head: countersunk head maximum diameter 5.0mm (0.24in)
- Thread: maximum diameter 3.0mm (0.16in)

The screws must be tightened to a maximum torque of 0.5Nm (0.37lbfft).

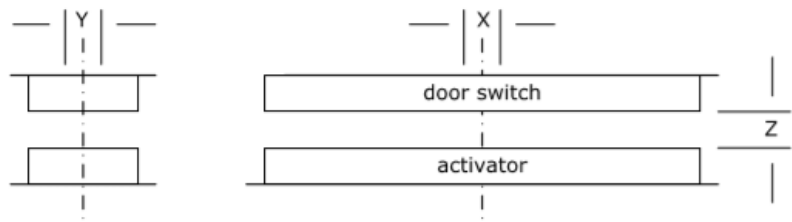


**Note**  
Door switches and activators supplied by elstat must not be installed using rivets. Using rivets invalidates the warranty.

The alignment of the door switch and activator is critical for the correct operation of the door switch. The following table details alignment tolerances.

	Alignment	Dimensions	Notes
X	Horizontal	0mm (0in) +/-20mm (0.7in)	measured when the door is closed and the gap (z-dimension) is correct
Y	Vertical	0mm (0in) +/-10mm (0.4in)	
Z	Gap	0mm (0in) to 5mm (0.2in) +/-2mm (0.07in)	

The diagram shows the horizontal, vertical, and gap alignment between the door switch and the activator for open and closed doors.

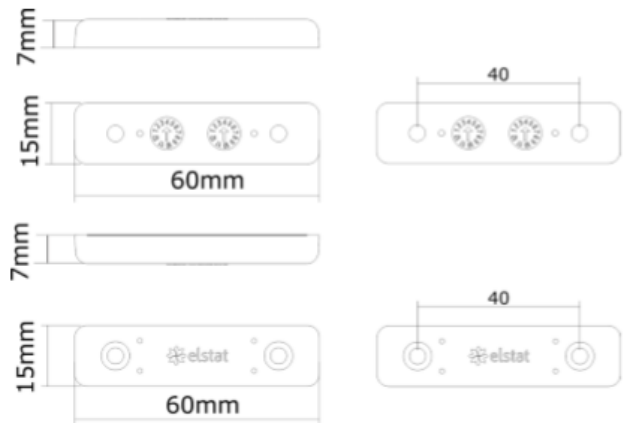


## 4.2 How to mount the enhanced door switch

Door switches are usually mounted with the door switch on the cooler and the activator on the door. Door switches and activators must be fixed using counter sunk screws or bolts with the following characteristics:

- Head: countersunk head maximum diameter 6.0mm (0.236in) and minimum diameter 5.0mm (0.196in)
- Thread: maximum diameter 3.0mm (0.118in)

The screws must be tightened to a maximum torque of 0.5Nm (0.37lbfft).



**Note**  
Door switches and activators supplied by elstat must not be installed using rivets. Using rivets invalidates the warranty.

The alignment of the door switch and activator is critical for the correct operation of the door switch. The following table details alignment tolerances.

	Alignment	Dimensions	Notes
X	Horizontal	0mm (0in) +/-20mm (0.7in)	measured when the door is closed and the gap (z-dimension) is correct
Y	Vertical	0mm (0in) +/-10mm (0.4in)	
Z	Gap	0mm (0in) to 5mm (0.2in) +/-2mm (0.07in)	

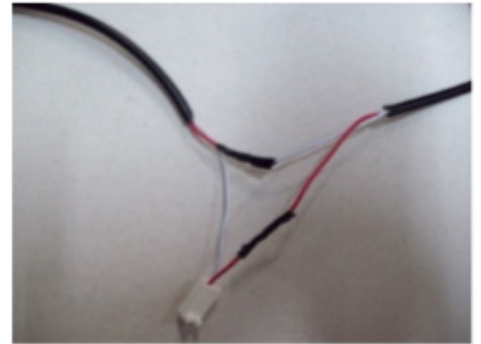
## 4.3 How to mount door switches on double-door coolers

For double-door coolers, two door switches must be connected in series.

Connect two door switches in series as follows:

1. Remove the two wires from one of the connectors. Be careful not to damage the terminals.
2. Remove the white wire from the second connector. Again, be careful not to damage the terminal.
3. Insert the white wire of the first cable into the connector of the second cable ensuring that the terminal is in the correct orientation.
4. Connect the red wire from the first cable and the white wire from the second cable together using a butt splice or similar.

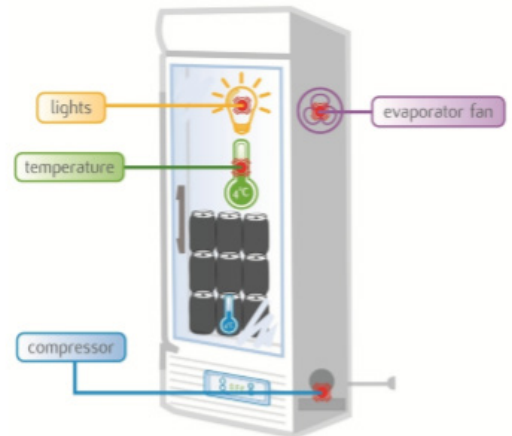
The image on the right shows two door switches connected in series.



## 5. ems controllers functionality

ems controllers have the capability to manage the following:

- **Temperature:** ems controllers measure the air temperature of the refrigeration compartment to control the temperature of the products. ems controllers ensure that products are at the optimal serving temperature.
- **Condenser:** ems controllers manage the temperature on the condenser to prevent high temperature. This is optional for ems controllers, and dependent on controller specification.
- **Compressor:** ems controllers switch the compressor to manage the performance of the compressor. evaporator fan: ems controllers switch the evaporator fan to manage the temperature of the refrigeration compartment. This is optional for ems controllers, and dependent on controller specification.
- **Lights:** ems controllers manage the cooler lights for marketing and energy saving purposes.



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### Note

Dependent on controller and sensor configuration

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### 5.1 Product temperature

ems controllers manage the product temperature.

ems controllers use an appliance sensor to measure the air temperature of the refrigeration compartment.

The location of the appliance sensor within the refrigeration compartment depends on the cooler type. However, to compensate for differences between the air temperature and the product temperature, calibration 1 (CA1) can add an offset to the temperature measured on the appliance sensor.

ems controllers can be set to use Celsius (°C) or Fahrenheit (°F) - set by the Celsius or Fahrenheit (CF) parameter.



For more information about the parameters used in ready mode:

- See "display stability (d2)"
- See "differential (dIF)"
- See "display (dIS)"
- See "delay to saving (dS)"
- See "set point (SPCorSPF)"

## 5.4 Saving mode

ems controllers run in the saving mode when retail outlets are closed. In the saving mode, the product temperature is allowed to rise to a predefined temperature. The saving mode temperature range is defined by saving set point (**SSP**) and the saving differential (**Sd**). The compressor runs until the saving set point (**SSP**) temperature is reached and then stops until the measured temperature reaches the saving set point (**SSP**) plus saving differential (**Sd**) temperature.

The saving mode temperature is set to ensure that the cooler has sufficient time to lower the product to the ready mode temperature.

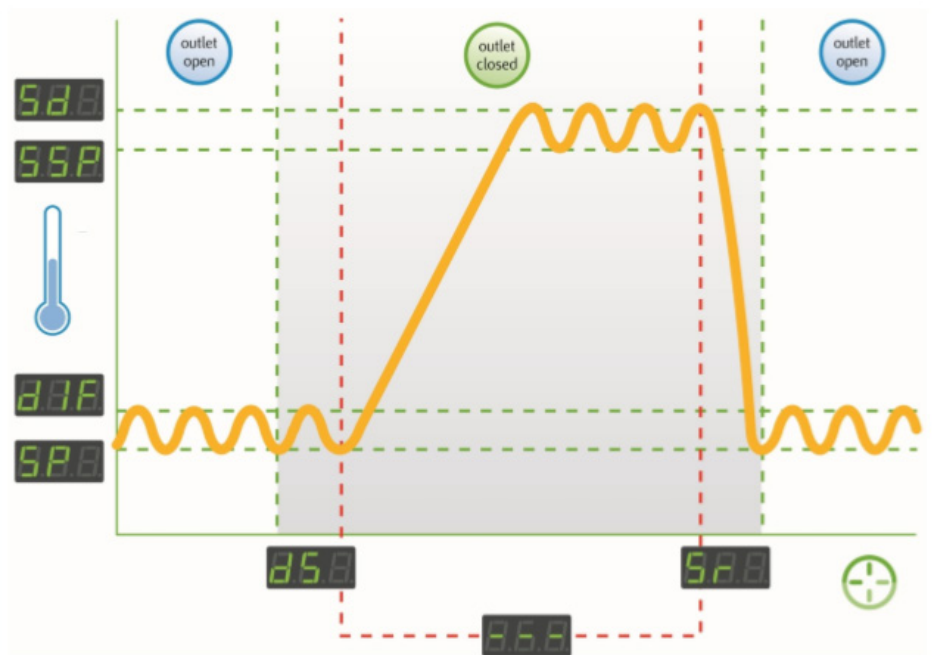
The ems controller starts lowering the product temperature by the saving restart period (**Sr**) before the ready mode starts ensuring that the cooler has sufficient time to reach the ready mode temperature from the saving mode temperature.

However, the saving temperature disable (**PEr**) can set ems controllers to maintain the ready mode temperature at all times.

During the saving mode, the controller displays three dashes, (---), and the cooler lights are usually switched off. If the cooler door is opened or the motion sensor detects activity during the saving mode, ems controllers switch on the cooler lights for the remainder of the current 30-minute period, but do not start cooling cycle.

For more information about the parameters used in saving mode:

- See "saving temperature disable (PEr)"
- See "saving differential (Sd)"
- See "saving restart period (Sr)"
- See "saving set point (SSP)"



## 5.5 Teach



### Note

ems25 and ems25+ only

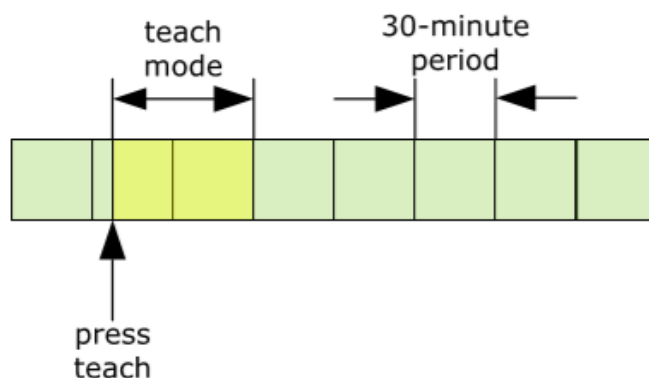
The teach function enables outlet operators to manually set the controller to the saving mode. Teach aims to stop outlet operators switching off coolers.

Teach switches ems controllers to the saving mode for up to one hour (two 30-minutes of the self-learning matrix). If teach is initiated midway through a 30-minute period, teach will be time left within the current 30-minute period plus the following 30 minute period. Therefore, the teach period ranges from approximately 31 minutes to the 60 minutes.

On entering the teach mode, ems controllers stop cooling by not running the compressor, allowing the product to start to rise towards the saving mode temperature. At the end of the one hour period, ems controllers return to the saving mode or ready mode as defined by the self-learning matrix.

During the one-hour teach period, the motion sensor input is disabled and the controller does not detect motion. Therefore, any movement in front of the cooler will not result in ems controllers switching the cooler lights on. However, opening the cooler door or pressing the up button returns the controller to the ready or saving mode as defined by the self-learning matrix.

The teach function does not directly affect the self-learning matrix. However, as the motion sensor is disabled, ems controllers will register periods without activity. Therefore, if the teach is pressed at the same time the following week, ems controllers will automatically switch to the saving mode for this period.



## 5.6 Teach



### Note

ems25 and ems25+ only

The teach function enables outlet operators to manually set the ems controller to the saving mode.

To manually set the ems controller to the saving mode, press the teach button and hold for 5 seconds.

To bring the cooler out of the saving mode during a teach period, press the up button and hold for 5 seconds.



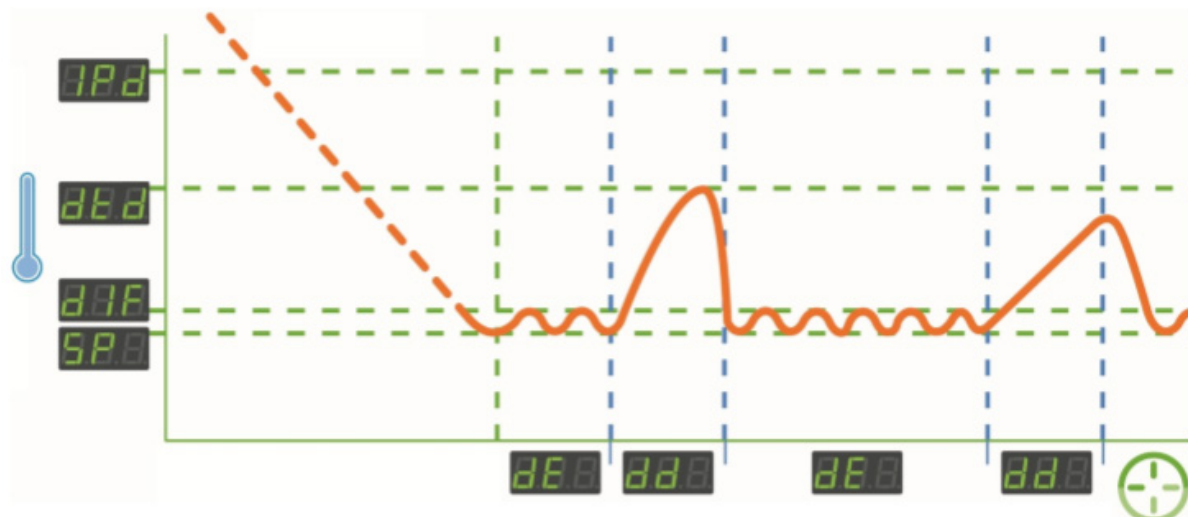
### Note

elstat recommends that outlet operators do not manually switch ems controllers to the saving mode. This functionality aims to stop outlet operators switching off coolers.



## 5.7 Defrost on glass dorr coolers (GDC)

Defrost cycles minimize the risk of the evaporator icing up. The defrost cycle occurs periodically as defined by the defrost interval (**dE**). The defrost interval starts when the ems controller is powered up or at the end of an uninterrupted pull down. Some ems controllers also enable defrost cycles to be started manually. The defrost cycle ends after the time defined by the defrost duration (**dd**) or on reaching the defrost termination temperature (**dtd**), as shown below:



For more information about the parameters used in defrost:

- See "defrost duration (**dd**)"
- See "defrost interval (**dE**)"
- See "defrost termination temperature (**dtd**)"



### Note

Manual defrosts also end after the defrost duration(**dd**) or on reaching the defrost termination temperature (**dtd**).

## 5.8 Freeze-up protection

Freeze-up protection prevents over cooling. Freeze-up protection occurs if the temperature measured on the appliance sensor falls below the freeze-up protection (**dt**) temperature. During freeze-up protection, ems controllers display "888" and stop the compressor to prevent further cooling. ems controllers then resume normal operation when the temperature rises to the freeze-up protection (**dt**) temperature plus the differential (**dIF**) temperature. For ems controllers that manage the evaporator fan, the ems controller starts the evaporator fan cycle. For more information about the parameters used in freeze-up protect

- See "differential (**dIF**)"
- See "freeze-up protection (**dt**)"

## 5.9 Compressor management

ems controllers manage the compressor to maintain the product temperature between the set point (**SP**) temperature and the set point (**SP**) plus differential (**dIF**) temperature in the ready mode or between the saving set point (**SSP**) temperature and the saving set point (**SSP**) plus the saving differential (**Sd**) temperature in the saving mode.

To ensure that the pressures within the refrigeration system have time to equalize during compressor off-cycles, the compressor rest time (**rt**) defines the minimum time that the compressor can be switched off. Compressor manufacturers usually recommend a minimum compressor rest time. The compressor rest time (**rt**) helps to avoid the following:

- Passing peak current through the windings of the compressor motor
- Switching off the refrigeration system on the thermal overload protection
- Short-cycling the refrigeration system

However, if ready mode and saving mode differential temperatures are too small or if the compressor rest time (**rt**) is too short, the ems controller cycles the compressor on the compressor rest time (**rt**) as the compressor rest time (**rt**) over-rides the differential temperatures.

If the compressor runs continuously for too long without reaching the set point (**SP**) temperature, a refrigeration system failure (**rSF**) alarm activates alerting to possible problems with the refrigeration system.

ems controllers can monitor the refrigeration system temperature using a condenser sensor. Monitoring the refrigeration system temperature can help detect problems, such as a blocked condenser. If the temperature measured on the condenser sensor reaches the condenser high temperature (**Ct**), the ems controller disables the compressor and activates the (**Ht**) alarm. The condenser high temperature (**Ct**) is set by measuring the refrigeration system temperature when the condenser is 75% blocked.

ems controllers manage the failure of a temperature sensor as follows:

- Appliance sensor failures indicated by **PF1** alarms, ems controllers stop running the compressor and then wait 60 seconds before rebooting (switch off and then switch on). If the fault continues, the ems controller repeats and continues the cycle
- Condenser sensor failures indicated by **PF2** alarms, ems controllers continue running the compressor. ems controllers alternate the display between **PF2** and the appliance sensor temperature
- **PF2** alarms may also indicate a problem with the gas cooler high temperature sensor when the cooler is a CO2 (R744) version. An ems55 advanced CO2 controller will alternate between PF2 and the gas cooler temperature sensor temperature.
- For evaporator failures indicated by **PF3** alarms, ems controllers continue running the compressor. ems controllers alternate the display between **PF3** and the appliance sensor temperature



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### Note

**Ht** alarms **do not** apply to CO2 coolers

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For more information about the parameters used in compressor management:

- See "refrigeration system failure (**Ct**)"
- See "differential (**dIF**)"
- See "compressor rest time (**rt**)"
- See "set point (**SPC** or **SPF**)"
- See "saving set point (**SSP**)"

For trouble shooting information:

- See "how to trouble shoot refrigeration system failure (rSF) alarms"
- See "how to trouble shoot temperature sensor alarms"

## 5.10 Lights Management

In the saving mode, the cooler lights are usually off.

For marketing purposes, light delay (**Ld**) can keep the cooler lights on for a short period after the ems controller switches to the saving mode.

Marketing mode (**Ar**) can keep the lights on for the duration of the saving mode.

For more information about the parameters used in lights management

- See "differential (**dIF**)"
- See "freeze-up protection (**dt**)"

## 5.11 Alarms

For alarm conditions, the ems controller displays the appropriate alarm code and, optionally, sounds an alarm buzzer. Buzzer enable (**b0**) defines whether to sound a warning buzzer for alarm conditions. Buzzer duration (**b1**) defines the duration of the buzzer for alarm conditions.

For more information about the parameters used in alarms

- See "buzzer enable (**b0**)"
- See "buzzer duration (**b1**)"



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### Note

For door open alarms, the buzzer sounds regardless of the buzzer enable (**b0**) setting.

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## 6. Self-learning

ems controllers start self-learning the moment the ems controllers are first powered-up. ems controllers then run in the ready mode whilst the ems controllers learn the activity pattern of outlets.

During self-learning, ems controllers learn the periods that outlets are open or closed by measuring the activity. ems controllers have a self-learning matrix.

The self-learning matrix is a 7-day (7 x 24 hour) matrix.

Each 24 hour period consists of 48 30-minute periods.

ems controllers then set each 30-minute period with activity or without activity according to the outlet opening and closing pattern.

The activity frequency (**AF**) parameter determines the amount of activity required to set a 30-minute period as an **active** period.

The activity frequency (**AF**) parameter is usually set to require one door opening or one motion detected to set a 30-minute period to active.

However, for specific installations, the active frequency can be configured to require more activity to set a 30-minute period to ready.

The activity frequency (**AF**) parameter can also be set to automatically determine the optimal level of activity required to set a 30-minute period to ready.

ems controllers remain learning in the ready mode for the period defined by the learning period (**LP**). The learning period (**LP**) sets ems controllers to use a 1-day or 7-day learning period.

ems controllers build the complete 7-day self-learning matrix as follows:

- 1-day learning period: the ems controller runs in ready mode for the first day (24 hours). The ems controller then uses the self-learning matrix of day 1 for the next six days to build a complete 7-day self-learning matrix
- 7-day learning period: the ems controller runs in the ready mode for the first 7 days to build a complete 7-day self-learning matrix.

To set the activity frequency (**AF**) automatically, ems controllers run for 48 hours to determine the optimum activity frequency (**AF**).

ems controllers then start the learning period (**LP**) after the 48 hours required to set the activity frequency (**AF**).



### Note

If the activity frequency is set to automatic, ems controllers must be allowed to run (powered up) continuously for 48 hours before the ems controller starts to build the self-learning matrix.

If power is lost during this period, ems controllers start a new 48 hour learning period

The table below describes the total time that ems controllers run in the ready mode only after being powered up. This is the minimum time before ems controllers switch to the saving mode.

Learning period (LP)	Activity frequency (AF)	Minimum time in ready mode only
1 day	Pre-set	1 day (24 hours)
1 day	Automatic	3 days (72 hours)
7 days	Pre-set	7 days
7 days	Automatic	

For more information about the parameters used in self-learning:

- See "activity frequency (AF)"
- See "learning period (LP)"

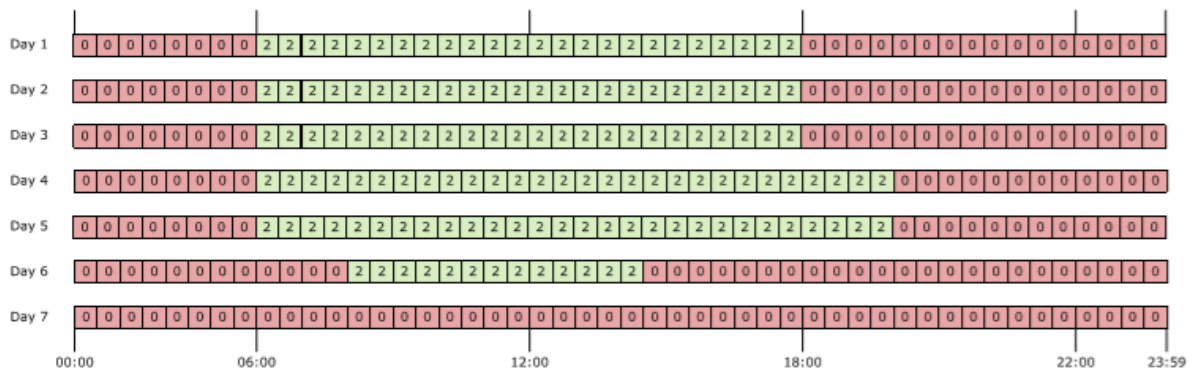
## 6.1 What is the self-learning matrix?

The self-learning matrix is a 7-day (7 x 24-hour), matrix with each 24-hour period divided into 48 30-minute periods. Each 30-minute period has a state that ems controllers use to determine the mode as follows:

- 0 indicates no activity: ems controllers normally run in the saving mode
- 1 indicates a change in activity: ems controllers run in the ready mode
- 2 indicates activity: ems controllers run in the ready mode

For example, the self-learning matrix below shows the following:

- Day 1 to day 3: the ems controller runs in the ready mode from 06:00 to 18:00
- Day 4 and day 5: the ems controller runs in the ready mode from 06:00 to 20:00
- Day 6: the ems controller runs in the ready mode from 08:00 to 14:00
- Day 7: the ems controller remains in the saving mode.



### Note

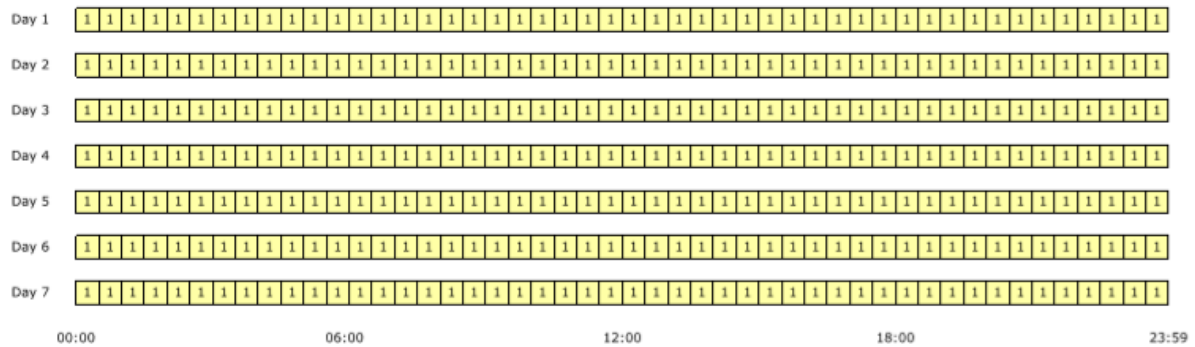
The self-learning matrix starts the moment the ems controller is first switched on and is not synchronized with calendar days. However, the diagram below starts at 00:00 on Day 1 for clarity

## 6.2 How a 7-day learning period works

ems controllers with a 7-day learning period (**LP**) set to 1, run in the ready mode for 7 days (7 x 24 hours), whilst the ems controller learns the outlet activity pattern such as opening and closing times.

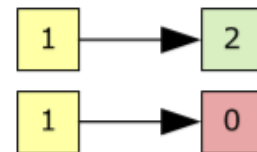
ems controllers start self-learning the moment the ems controllers are first powered-up. At power-up, all the 30 minute periods are set to monitor (1) as shown in the following example matrix.

For periods set to monitor (1), ems controllers run in the ready mode.



ems controllers then update the self-learning matrix depending on how much activity is detected in each 30-minute period as follows

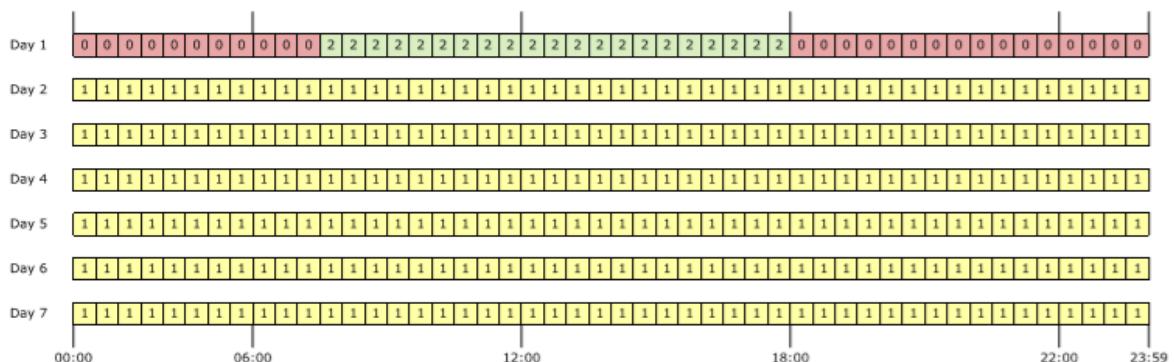
- If the ems controller detects activity during a 30-minute period, the ems controller changes the state from monitor (1) to ready (2)
- If the ems controller does not detect activity, the ems controller changes the state from monitor (1) to saving (0).



### Note

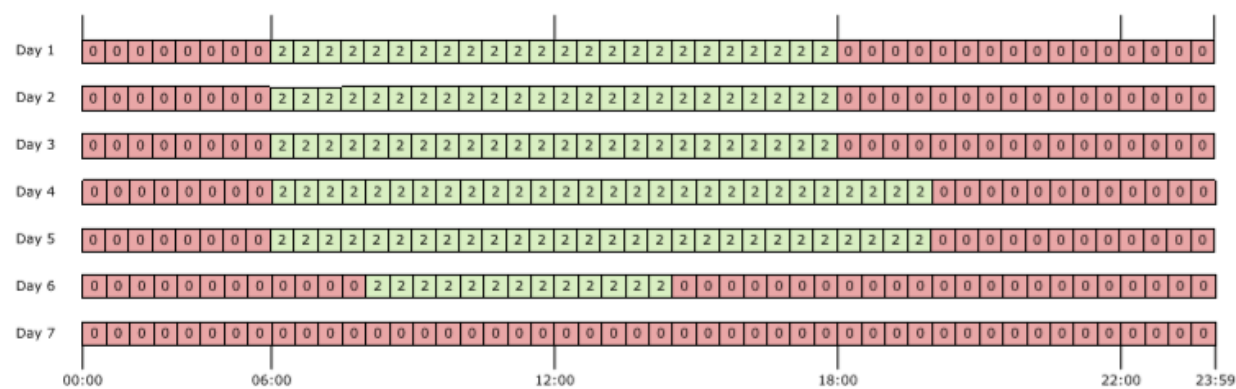
The amount of activity required to change the state from monitor (1) to ready (2) depends on the setting of the activity frequency (**AF**) parameter.

Therefore, at the end of day 1 (first 24-hours), the ems controller has set all the 30 minutes to ready (2) or saving (0) depending on the outlet activity pattern as shown in the following example matrix:



The ems controller then continues to run in the ready mode for the remainder of the 7-day learning period whilst updating the self-learning matrix.

At the end of the 7-day learning period, the ems controller has a complete self-learning matrix as shown in the following example matrix

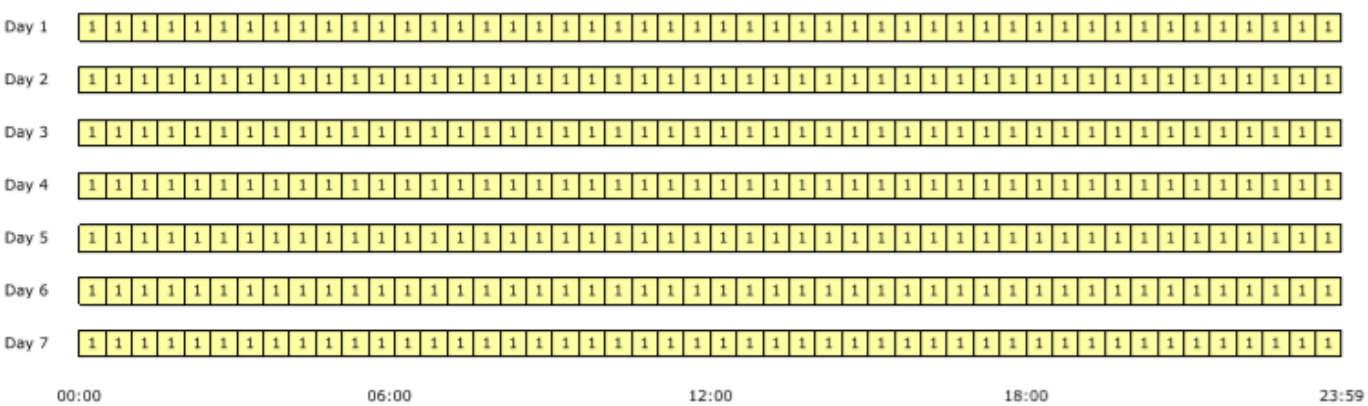


### 6.3 How a 1-day learning period works

ems controllers with a 1-day learning period, (**LP**) set to 0, run in the ready mode for 1-day, (24-hours), whilst the ems controller learns the outlet activity pattern such as opening and closing times.

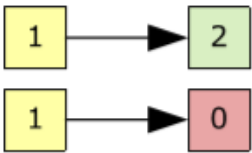
ems controllers start self-learning the moment the ems controllers are first powered-up. At power-up, all the 30-minute periods are set to monitor (1) as shown in the example matrix below.

For periods set to monitor (1), ems controllers run in the ready mode.



ems controllers then update the self-learning matrix depending on how much activity is detected in each 30-minute period as follows:

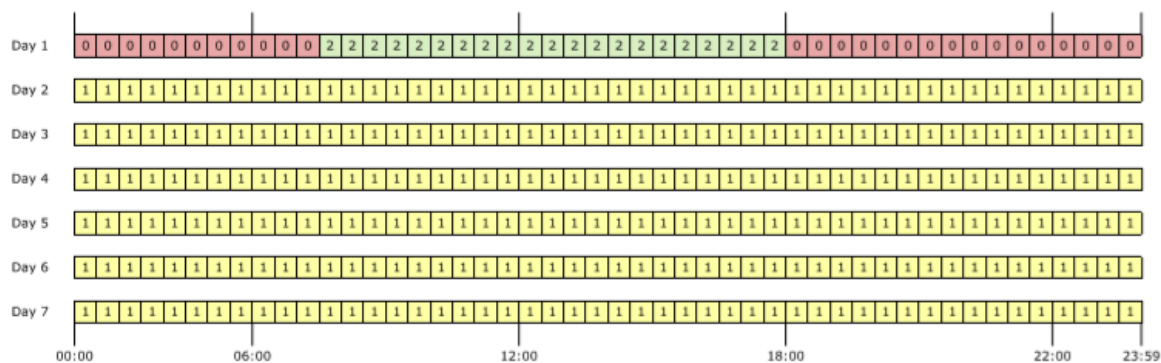
- If the ems controller detects activity during a 30-minute period, the ems controller changes the state from monitor (1) to ready (2)
- If the ems controller does not detect activity, the ems controller changes the state from monitor (1) to saving (0)



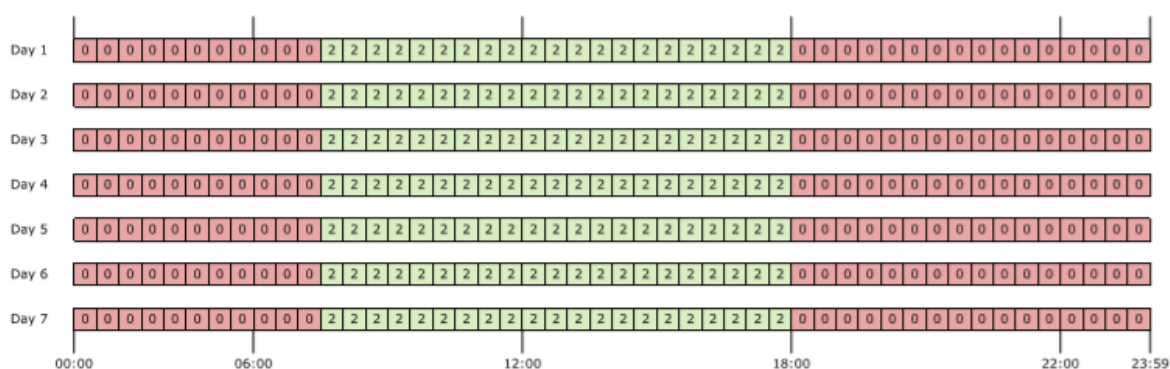
**Note**

The amount of activity required to change the state from monitor (1) to ready (2) depends on the setting of the activity frequency (**AF**) parameter.

Therefore, at the end of day 1 (first 24-hours), the ems controller has set all the 30 minutes to ready (2) or saving (0) depending on the outlet activity pattern as shown in the following example matrix:

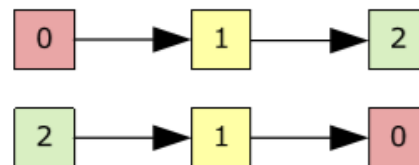


ems controllers then copy the pattern learnt from day 1 to the remaining 6-days of the self-learning matrix, as shown in the example matrix, below:

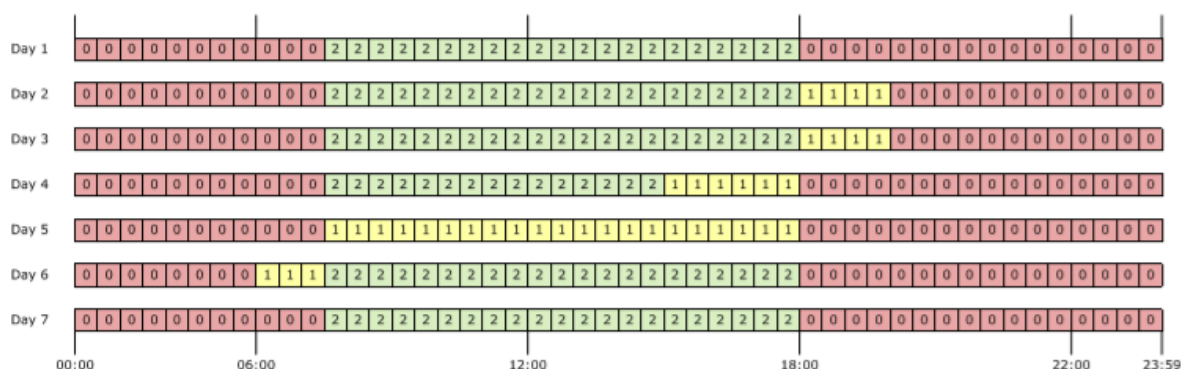


ems controllers with a 1-day learning period start switching to the saving mode on the second day, (second 24-hours), if there are sufficient saving (0) periods. ems controllers then continue to update the self-learning matrix as follows:

- For periods set to ready (2), if no activity is detected change to monitor (1). Otherwise, keep the period set to ready (2)
- For periods set to saving (0), if activity is detected change to monitor (1). Otherwise, keep the period set to monitor (0)



At the end of week 1, the ems controller has updated the self-learning matrix for the outlet activity pattern as shown below. Note that differences for activity patterns learnt on day 2 take two weeks to be implemented. Therefore, 1-day learning periods are recommended only for outlets with regular patterns every day of the week.



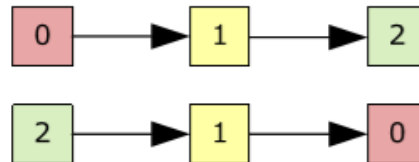


#### 6.4 How the self-learning matrix updates after the learningperiod

ems controllers continuously updates the self-learning matrix after the learning period as follows:

- If a ready period (2) does not have the minimum number of door openings or motion counts, the ems controller sets the period to monitor (1).

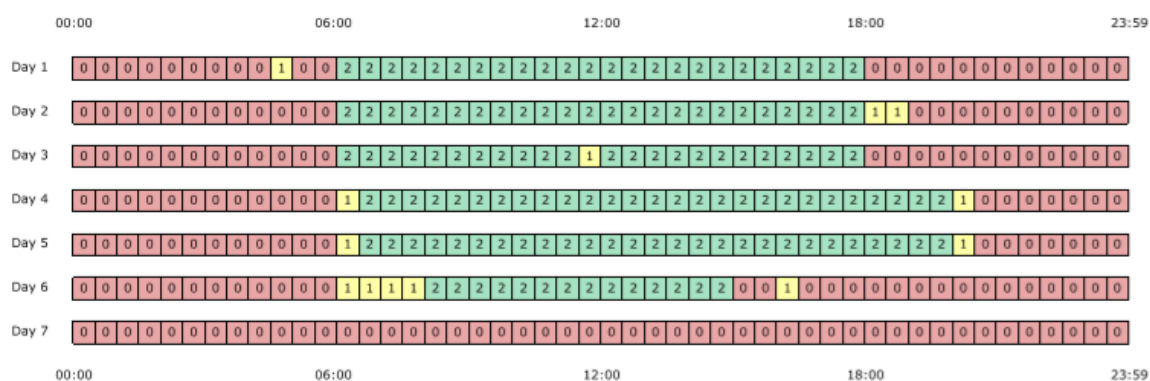
The ems controller runs in the ready mode for periods set to monitor.



- If a monitored period (1) does not have the minimum number of door openings or motion counts, the ems controller sets the period to saving (0). Otherwise, the ems controller sets the period to ready (2).

- If a saving period (0) reaches the minimum number of door openings or motion counts, the ems controller sets the period to monitor (1)

For example, the self-learning matrix below shows monitor (1) periods during periods with and without activity.



### Note

If activity occurs in a saving period (0), such as a motion detection or a door opening, the ems controller switches the cooler lights on and sets the period to monitor (1).

However, the ems controller does not start the compressor to cool the product.

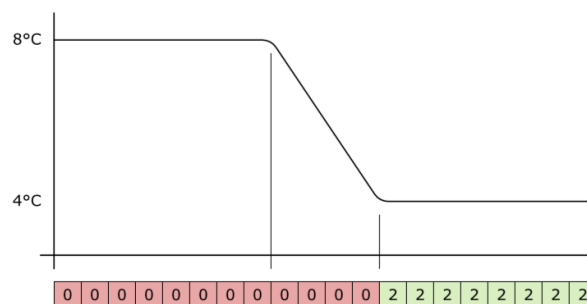
## 6.5 How ems controllers switch between the ready and saving mode

A key characteristic of an ems controller is the saving restart period.

The saving restart period is time allocated for the cooler to lower the product temperature to the *ready mode* temperature from the *saving mode* temperature.

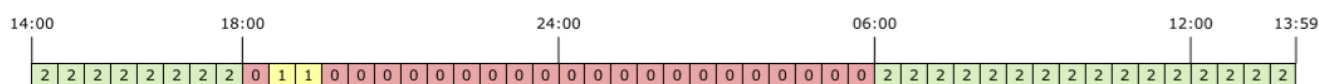
Whilst in the saving mode, the ems controller must look ahead in the self-learning matrix for a ready period by the time defined by the saving restart period (**Sr**).

For example, the ems controller looks 2-hours ahead. If the ems controller detects an ready period, the ems controller starts to lower the product temperature, as shown in the diagram to the right.



The ems controller switches to the saving mode if there are no ready periods within the next 2-hours as defined by the saving restart time (**Sr**). The ems controller ignores periods of inactivity if the time to the next active period is less than the saving restart time.

For example, the diagram below shows a period of inactivity, saving (0) at 18:00 followed by two monitor (1) periods. In this instance, the ems controller would ignore the saving (0) at 18:00 and switch to the saving mode at 19:30.



### Note

ems controllers always run in the ready mode for periods in the self-learning matrix that are set to 1 (monitor) or 2 (ready).

In the following example matrix, the ems controller will start to cool by the saving restart period before the ready period (2), run in the ready mode for 30-minutes, and then switch to the saving mode (assuming no delay to saving (**dS**) parameter is in operation).

For more information about the parameters used:

- See "delay to saving (**dS**)"
- See "saving restart period (**Sr**)"

## 7. User guide




The user guide describes the power-up sequence and how to view parameters and statistics.

The user guide also describes how to:

- Perform a half-reset to clear the self learning matrix only
- Run the test routine for all relays and inputs

### 7.1 Power-up sequence

At the power up, the ems controller displays the power-up sequence as follows:




1		8.8.8. to confirm that all segments of the display are functioning correctly
2		Platform type and firmware version. (example)
3		Checksum of the parameter set. (example)

The display then shows the appropriate display code. For example, the temperature or the word **USE**.

## 7.2 Display codes

The table below details the display codes for ems controllers.

DISPLAY	STATE	DESCRIPTION
	Ready Mode	<p>ems controllers display the appliance sensor temperature, such as 4.0, or the word <b>USE</b></p> <p>Also, the cooler lights are switched on.</p> <p>See “how to check that ems controllers are working correctly”</p>
	Saving Mode	<p>ems controllers keep products at the saving mode temperature unless the saving temperature is disabled.</p> <p>The saving temperature LED shows whether the saving mode temperature is disabled.</p> <p>The cooler lights are off unless the light delay (<b>Ld</b>) parameter keeps the lights on for a short period after the ems controller switches to the saving mode.</p> <p>The marketing mode (<b>Ar</b>) keeps the lights on for the duration of the saving mode.</p>
	Defrost Mode	<p>ems controllers switch off the compressor and switch on the fan, if applicable. The compressor LED should be off and the evaporator fan LED should be on.</p>
	Door Open	<p>ems controllers display <b>dO</b> to show that the cooler door is open.</p>
	Door Open Alarm	<p>ems controllers sound an alarm buzzer if cooler door remains open for alarm delay (<b>Ad</b>) duration. If the cooler door is still open after the time defined by the buzzer duration (<b>b1</b>) parameter, the ems controller switches off the compressor.</p>
	Freeze-up Protection	<p>ems controllers disable the compressor to prevent over cooling and run the evaporator fan, if applicable, according to the evaporator fan cycle.</p> <p>Problems may occur if the ambient temperature falls below 0°C (32°F) or if the appliance sensor fails. See “how to troubleshoot problems with freeze-up protection (<b>888</b>)”</p>
	Refrigeration System Failure	<p>See “how to troubleshoot refrigeration system failure (<b>rSF</b>) alarms”</p>
	Condenser High Temperature	<p>Not applicable to CO<sub>2</sub> (R744) coolers.</p>

DISPLAY	STATE	DESCRIPTION
	Appliance Sensor Failure	See “how to trouble shoot temperature sensor alarms”
	Condenser Sensor Failure	
	Evaporator Sensor Failure	

## 7.3 How to access the menu (example)

The password is a unique sequence of button operations.

The password is supplied to OEMs, installers, and service engineers separately.

	STEP	IMAGE
1	Press and hold the <b>set</b> button	 The image shows a control panel with a green LCD display showing 'USE' and three red dots below it. To the right is a circular button pad with four icons: a wrench, a snowflake, an up arrow, and a down arrow. The wrench icon is circled in red.
2	Release the <b>set</b> button when <b>PAS</b> appears	 The image shows the same control panel, but the display now shows 'PAS' and three red dots below it. The wrench icon is no longer highlighted.
3	Press the <b>set</b> button four times (x4)	 The image shows the control panel with 'PAS' on the display. The wrench icon in the button pad is circled in red.
4	Press the <b>up</b> button once (x1)	 The image shows the control panel with 'PAS' on the display. The up arrow icon in the button pad is circled in red.
5	Press the <b>down</b> button twice (x2)	 The image shows the control panel with 'PAS' on the display. The down arrow icon in the button pad is circled in red.
6	Press the <b>defros / teach</b> button twice (x2)	 The image shows the control panel with 'PAS' on the display. The snowflake icon in the button pad is circled in red.

## 7.4 How to access the menu

Access the ems controller menus as follows:



1. Press and hold the **set** button until **PAS** is displayed
2. Enter the button sequence of the password
3. Ensure that **PS** is displayed

The table below describes the ems controller menus. Use the down button to scroll through the menu.

MENU	DISPLAY	DESCRIPTION
Parameter List		Displays the parameters and the parameter values.
Test Routine		Enters the test routine that tests the relays, temperature sensors, door switch, and motion sensor.
Faults		Displays the last three faults (alarms). See “how to view the last three alarms (FLt)”
Half Reset		Clears the self-learning matrix. See “how to perform a half reset (Hr)”
Full reset		elstat use only.
Data Dump		elstat use only.


## 7.5 How to view the ems25+ parameter settings(PS)

View the parameter settings to check the values of the parameters as follows:

	STEP	IMAGE
1	Press and hold the <b>set</b> button until <b>PAS</b> is displayed	
2	Enter the button sequence of the password.	
3	Ensure that <b>PS</b> is displayed.	
4	Press and hold the set button to view the parameter name and value alternatively.	
5	Keep the <b>set</b> button pressed to scroll through the parameter settings.	

	See "Celsius or Fahrenheit (CF)"		See "Defrost Duration (DD)"
	See "Set Point (SPS or SPF)"		See "Display Stability (d2)"
			See "Buzzer Enable (b0)"
	See "Differential (d1F)"		See "Buzzer Duration (b1)"
	See "Calibration 1 (CA1)"		See "Alarm Delay (Ad)"
	See "Saving Set Point (SSP)"		See "Alarm Frequency (AF)"
	See "Saving Differential (Sd)"		See "Motion sensor enable (Sn)"



	See "Freeze-up protection (dtt)"		See "Saving Temperature Disable (PEr)"
	See "Defrost Termination Temperature (dtd)"		See "Learning Period (LP)"
	See "Compressor Rest Time (rt)"		See "Display (dIS)"
	See "Delay to Saving (dS)"		See "Marketing Mode (Ar)"
	See "Lights Delay (LD)"		See "Refrigeration System Failyre (Ct)"
	See "SSaving Restart Period (Sr)"		See "Defrost Interval (de)"

## 7.6 How to view the ems25advanced parameter settings(PS)

View the parameter settings to check the values of the parameters as follows:


	STEP	IMAGE	
1	Press and hold the <b>set</b> button until <b>PAS</b> is displayed		
2	Enter the button sequence of the password.		
3	Ensure that <b>PS</b> is displayed.		
4	Press and hold the set button to view the parameter name and value alternatively.		
5	Keep the <b>set</b> button pressed to scroll through the parameter settings.		
	See “Celsius or Fahrenheit (CF)”		See “Defrost Interval (de)”
	See “Set Point (SPS or SPF)”		See “Defrost Duration (DD)”
			See “Defrost Duration (DD)”
	See “Differential (dIF)”		See “Defrost Duration (DD)”
	See “Calibration 1 (CA1)”		See “Display Stability (d2)”
	See “Saving Set Point (SSP)”		See “Buzzer Enable (b0)”
	See “Saving Differential (Sd)”		See “Buzzer Duration (b1)”

	See "Freeze-up protection (dtt)"		See "Alarm Delay (Ad)"
	See "Fan Set Point (FSP)"		See "Alarm Frequency (AF)"
	See "Condenser High Temperature (HT)"		See "Motion sensor enable (Sn)"
	See "FDefrost Termination Temperature (dtd)"		See "Saving Temperature Disable (PEr)"
	See "Compressor Rest Time (rt)"		See "Learning Period (LP)"
	See "Delay to Saving (dS)"		See "Display (dIS)"
	See "Lights Delay (LD)"		See "Marketing Mode (Ar)"
	See "SSaving Restart Period (Sr)"		See "Refrigeration System Failyre (Ct)"

## 7.7 How to run the test routine (tst)

The test routine tests the following:











- All load relays
- Analogue inputs (temperature sensors and door switch)
- Motion Sensor

	STEP	IMAGE	
1	Press and hold the <b>set</b> button until <b>PAS</b> is displayed		
2	Enter the button sequence of the password.		
3	Ensure that <b>PS</b> is displayed.		
4	Press the down button once to scroll to <b>tst</b>		
5	Press the set button to display <b>888</b>		
6	Press the set button to display <b>rEL</b> for the relay tests.		
7	Press the down button to start, and test, the relays as described below:		
BUTTON	DISPLAY	TEST	CHECK
 or  or		Compresspr Relay	Compressor is running and compressor LED is <b>on</b>
		Light Relay	Cooler lights are <b>on</b>
		Evaporator Fan Relay	Evaporator fan is running



### Note




To switch off the relays that are on, press the defrost button.

	STEP	IMAGE		
8	Press the defrost and set buttons simultaneously to test the analogue inputs. The display changes to AnA.			
9	Press the up button to start, and test, the analogue inputs described in the table below:			
BUTTON		DISPLAY	TEST	CHECK
			Appliance Sensor Temperature	Displayed temperature is correct
			Door Switch	Door is open ( <b>dO</b> ) or closed ( <b>CLO</b> )
				
 or 			Condenser Sensor Temperature	Displayed temperature is correct
			Evaporator Sensor Temperature	
10	Press the defrost and set buttons simultaneously to test the motion sensor. The display changes to <b>PIr</b> .			
11	Press the defrost button and then place your hand about 300mm in front of the motion sensor. Move your hand from left to right and ensure the following: <ul style="list-style-type: none"><li>• The display count increments for each detected movement</li><li>• The motion LED flashes for each detected movement.</li></ul>			
12	Press the defrost and set buttons simultaneously to end the test routine.			

## 7.8 How to perform a half reset (Hr)

Perform a half reset to clear the self-learning matrix if the ems controller has been unable to detect activity correctly, for example, the view of the motion sensor was blocked, or if the cooler has been moved to a new location.

Perform a half reset as follows:

	STEP	IMAGE
1	Press and hold the <b>set</b> button until <b>PAS</b> is displayed	
2	Enter the button sequence of the password.	
3	Ensure that <b>PS</b> is displayed.	
4	Press the down button to scroll to the <b>Hr</b> menu	
5	Re-enter the button sequence of the menu entry password	
6	Ensure that the ems controller resets. After a reset, the ems controller starts the power-up sequence.	

# 7.9 How to view the last three alarms (Flt)

It is possible to view the last alarms and understand problems that have occurred with the ems controller.  
View the last three alarm conditions as follows:

	STEP	IMAGE	
1	Press and hold the <b>set</b> button until <b>PAS</b> is displayed		
2	Enter the button sequence of the password.		
3	Ensure that <b>PS</b> is displayed.		
4	Press the down button to scroll ro the <b>Flt</b>		
5	Press the <b>set</b> button		
6	The last three faults, or alarms, to occur are displayed. For example:		
	a condenser hight emperature alarm has occurred		a refrigeration system failure alarm has occurred
	a door open alarm has occurred		



**Note**  
The alarms may have been cleared, or cancelled, by the retail outlet operators.

## 7.10 Statistics

ems controllers start gathering statistics when first powered up.

Statistics provide information on the following:

- Temperature: lowest, highest, and average temperature measured on the appliance sensor
- Activity: average number of motion counts and door openings
- Compressor: average number of compressor cycles and total compressor runtime
- Operation: settings of the activity frequency (**AF**) parameter and the saving temperature disable (**PEr**) parameter



### Note

A full reset clears all the gathered statistics.

Not all controllers allow statistics to be viewed - the ems25+ is teach enabled and therefore does not display statistics.





## 7.11 How to view statistics

To view the statistics, press the up and down buttons simultaneously.






Statistics include door opening, average temperatures and activity counts.

The ems controller then scrolls through the statistics pausing for 20 seconds at each statistic before returning to normal operation.

The 3-digit display can show values from 000 to 999. For values of 1000 and above, the display shows the value as a rounded decimal number. For example, 1.1 represents 1100, 1.2 represents 1200, and so on.

DISPLAY	STATISTIC	DESCRIPTION PRIOR TO JULY 2012	DESCRIPTION POST JULY 2012
	Activity frequency	Value of the activity frequency <b>AF</b> parameter. Possible values are: 0, 1, 2 or 3. (0 = low, 2= high and 3 = automatic)	No change.
	Average temperature	Average temperature measured by the appliance sensor during the last 24 hours.	No change.
	Compressor cycles	Average number of compressor cycles per day (24 hour period) during the past 7-days (7 x 24 hour periods). Note that the average is a moving average.	Total number of compressor cycles since first powered up or last full reset.
	Compressor runtime	Total number of hours that the compressor has run since the ems controller was first powered up or since the last full reset.	No change.



DISPLAY	STATISTIC	DESCRIPTION PRIOR TO JULY 2012	DESCRIPTION POST JULY 2012
	Door openings	Average number of door openings per day (24 hour period) during the past 7-days (7 x 24 hour periods). Note that the average is moving average.	Total number of door openings since first powered up or last full reset.
	Highest temperature	Highest temperature measured by the appliance sensor during the past 24 hours.	No change.
	Lowest temperature	Lowest temperature measured by the appliance sensor during the last 24 hours.	No change
	Motion counts	Average number of motion counts per day (24 hour period) during the past 7-days (7 x 24 hour periods). Note that the average is moving average.	Total number of motion counts since first powered up or last full reset.
	Saving temperature disable	Value of the stand by temperature disable <b>PEr</b> parameter. Possible values are: OFF or ON. OFF= Standby temperature disable is switched off. ON = Standby temperature disable is switched on.	No change.

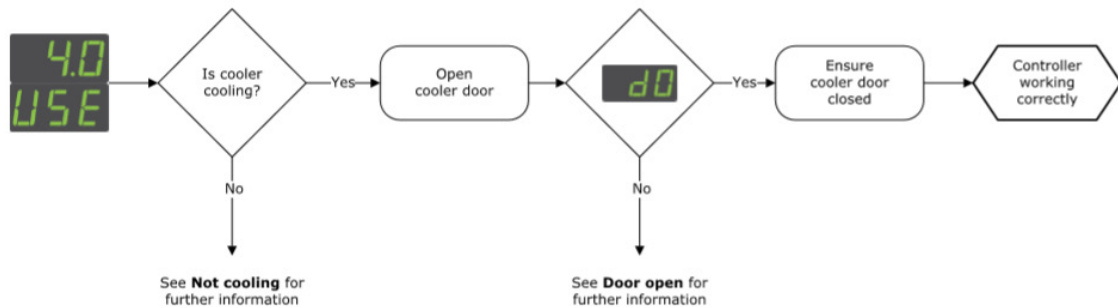
## 8. Troubleshooting

The following table shows the display for alarm conditions. EMS controllers can be programmed to sound a buzzer with alarm conditions.

PROBLEM OR ALARM	MEANING	ACTION
	Door open	<ul style="list-style-type: none"> <li>• See “how to troubleshoot door alarms (door switch fitted)”</li> <li>• See “how to troubleshoot door alarms (no door switch fitted)”</li> </ul>
	Refrigeration system failure	<ul style="list-style-type: none"> <li>• See “how to troubleshoot refrigeration system failure (rSF) alarms</li> </ul>
	Condenser high temperature	<ul style="list-style-type: none"> <li>• Not applicable for CO2 coolers</li> </ul>
	Sensor failures	<ul style="list-style-type: none"> <li>• Appliance sensor (PF1)</li> <li>• Condenser sensor (PF2): display alternates between PF2 and the appliance sensor temperature</li> <li>• Evaporator sensor (PF3): display alternates between PF3 and the appliance sensor temperature.</li> <li>• See “how to troubleshoot temperature sensor alarms”</li> </ul>
		
		
Flashes for 3 seconds then static	CO2 alarm gas cooler high temperature	
Continuous flashing	CO2 alarm lock out	
Motion detection LED flashing continuously	Motion sensor problem	<ul style="list-style-type: none"> <li>• See “how to troubleshoot motion sensor alarms”</li> </ul>
Cooler not cooling		<ul style="list-style-type: none"> <li>• See “how to troubleshoot not cooling problems”</li> </ul>
Cooler lights do not switch on		If the EMS controller is in the ready mode, check the lights switch inside the cooler. Note that EMS controllers normally switch the cooler lights off in the saving mode.

## 8.1 How to check that ems controllers are working correctly

During the ready mode, the ems controller displays the appliance sensor temperature, such as **4.0**, or the word **USE** as shown below. The option to display the temperature or the word USE is set by the display (**dis**) parameter. Follow the chart to ensure that the ems controller is working correctly in the ready mode for coolers with door switches fitted.



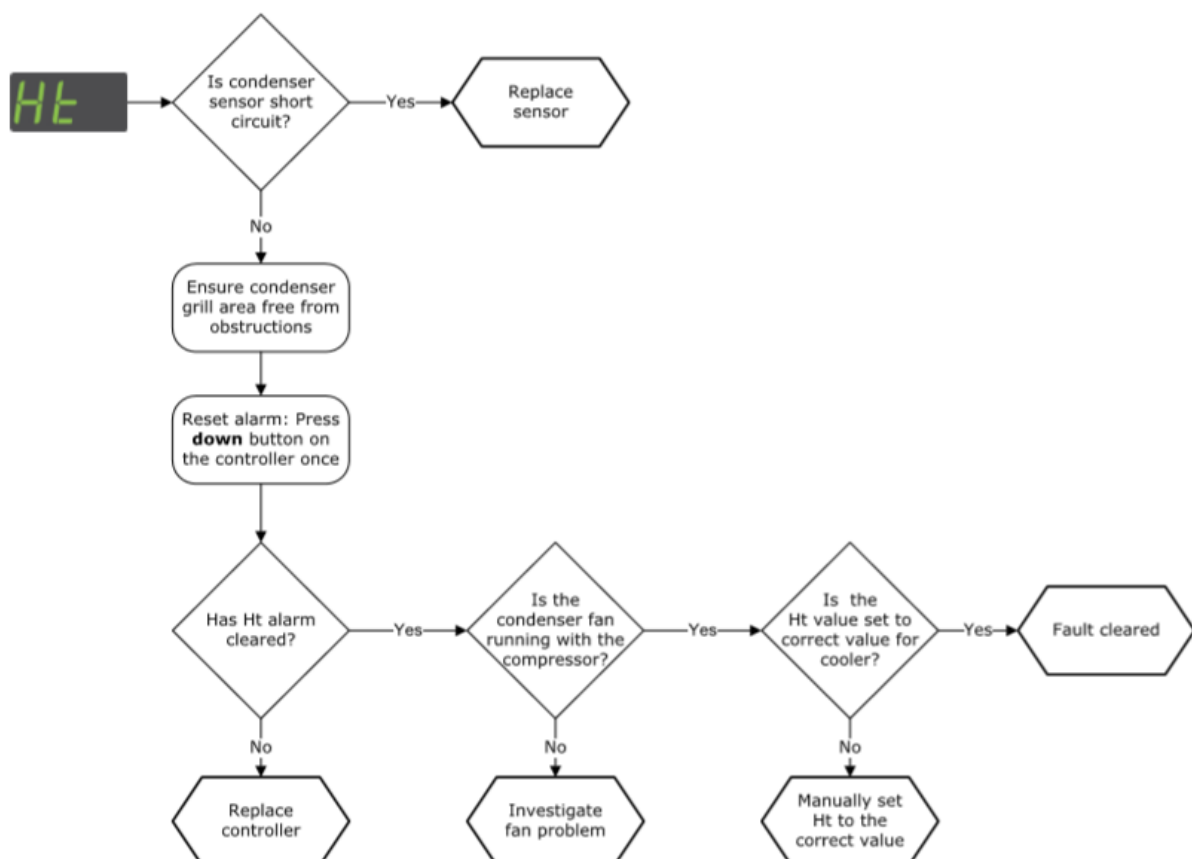
For information about the display (**dis**) parameter, see "display (**dis**)"

## 8.2 How to troubleshoot condenser hightemperature (Ht) alarms

Condenser hightemperature (**Ht**) alert to problems with the refrigeration system such as a blocked condenser or faulty condenser fan.

For information about the condenser hightemperature (**Ht**) parameter, see "condenser high temperature (**Ht**)"

Follow the chart below to troubleshoot condenser high temperature (**Ht**) alarms.

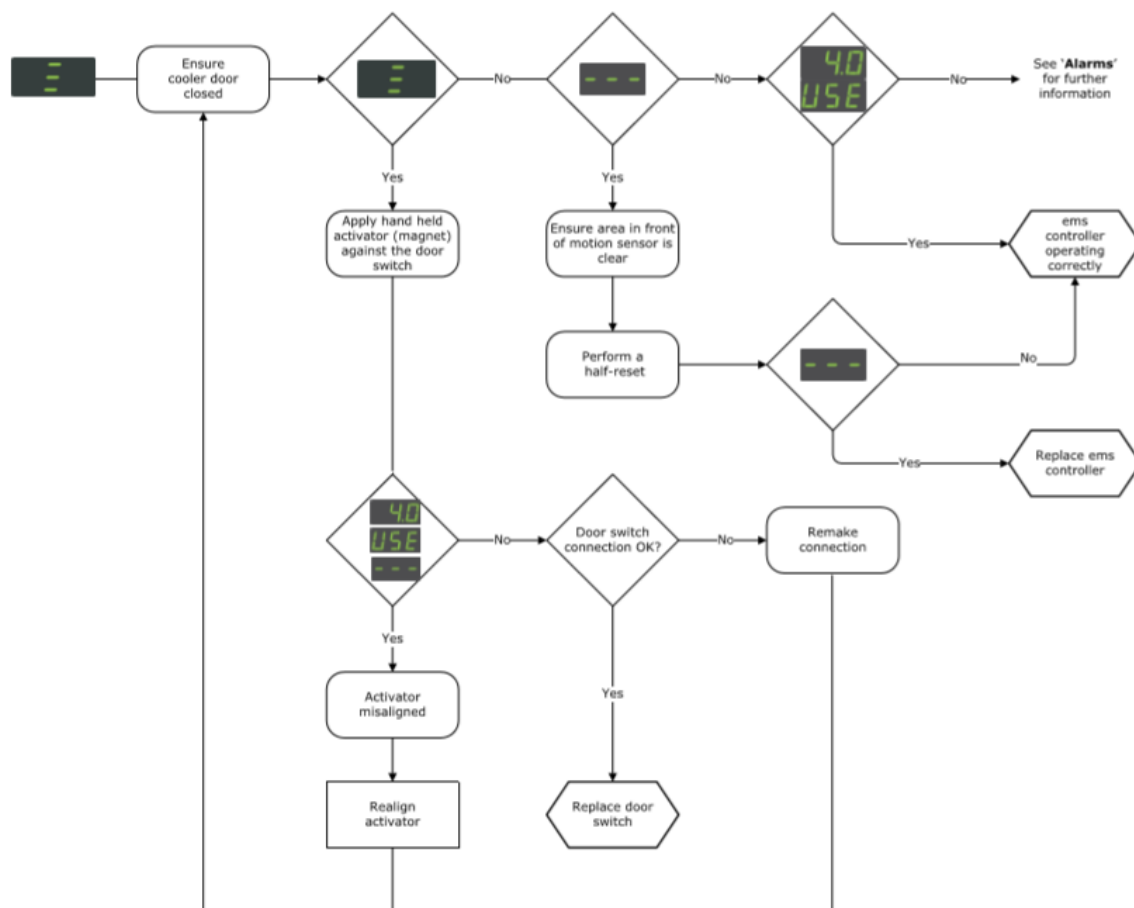


## 8.3 How to troubleshoot door alarms (door switch fitted)

Door open alarms are triggered if the cooler door is left open for longer than the time defined by the alarm delay (**Ad**) parameter. If the door is closed, and a door open alarm is registered, this may indicate problems with the cooler door or the door switch.

For information about the alarm delay (**Ad**) parameter see "alarm delay (**Ad**)"

Follow the chart below to troubleshoot door open alarms on coolers with a door switch.

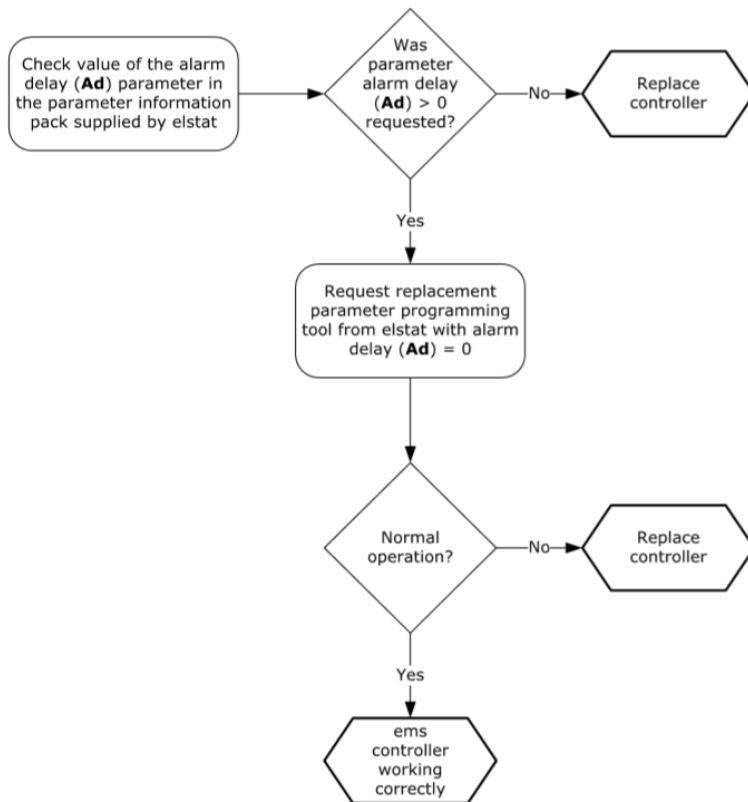


## 8.4 How to troubleshoot door alarms (no door switch fitted)

Door alarms with coolers without a door switch fitted usually indicate that the ems controller has an incorrect parameter set.

For information about the alarm delay (**Ad**) parameter see "alarm delay (**Ad**)"

Follow the chart below to troubleshoot door open alarms on coolers without a door switch fitted.



## 8.5 How to troubleshoot motion sensor alarms

The motion detection LED flashes to indicate that movement has been detected. However, a motion sensor LED flashing continuously may indicate that the motion sensor is faulty or, if a motion sensor is not fitted, that the parameter settings are incorrect.

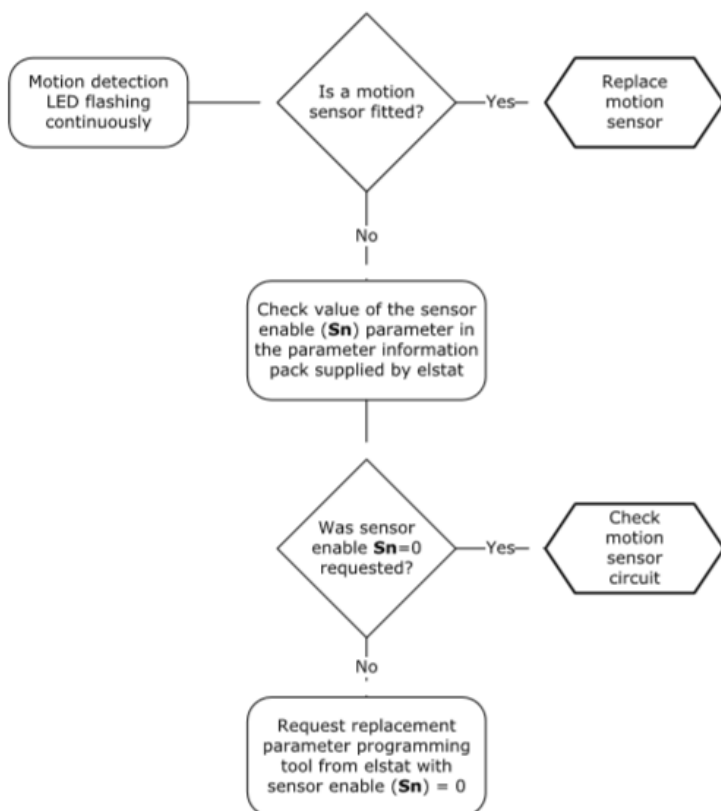


### Note

The ems controller stays in the ready mode if the motion detection LED is flashing continuously.

For information about the motion sensor enable (**Sn**) parameter, see "motion sensor enable (**Sn**)"

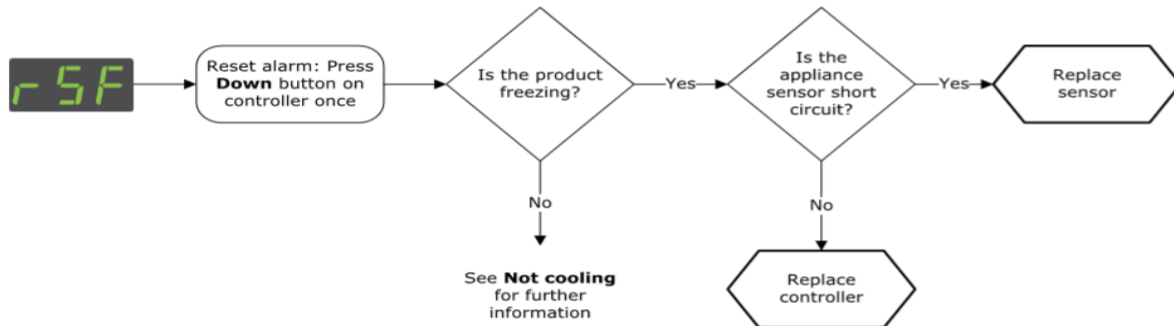
Follow the chart below to troubleshoot problems with the motion sensor.



## 8.6 How to troubleshoot refrigeration system failure (rSF) alarms

Refrigeration system failure (rSF) alarms trigger if the set point (SP) temperature is not reached within the time defined by the compressor runtime (Ct) parameter. For information about the setpoint and compressor runtime parameters see "refrigeration system failure (Ct)" and "set point (SPC or SPF)".

Follow the chart below to troubleshoot refrigeration system failures.



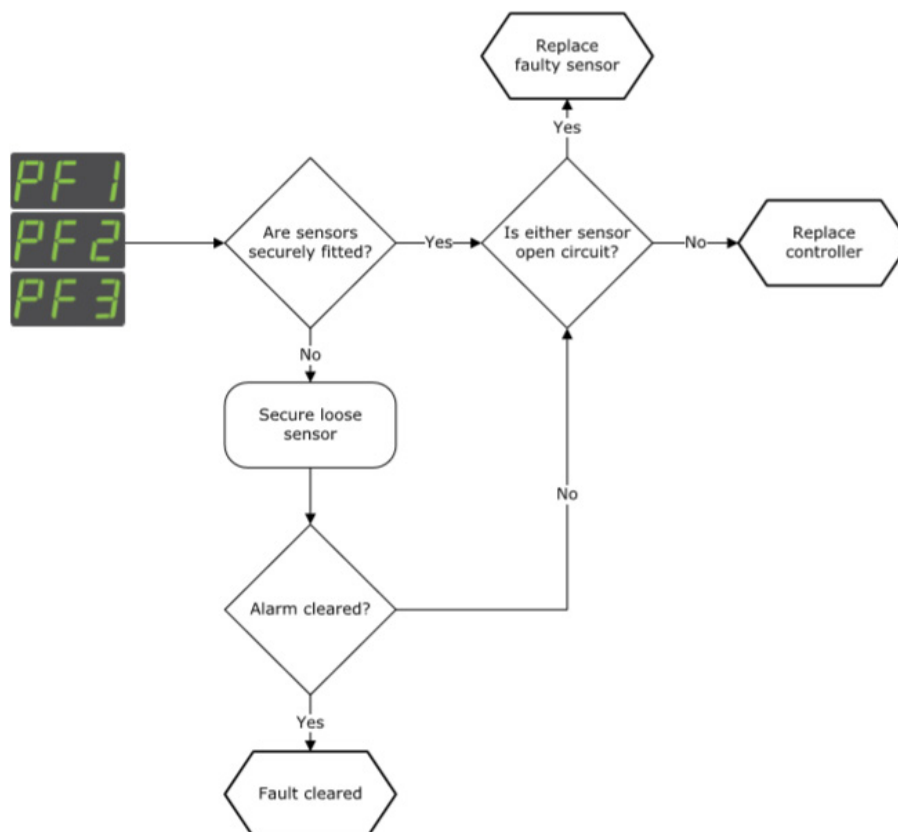
## 8.7 How to troubleshoot temperature sensor alarms

ems controllers manage sensor failures as follows:

- **PF1** alarms: ems controllers stop running the compressor and then wait 60 seconds before re-starting (switch off and then switch on). If the fault continues, the ems controller repeats and continues the cycle until the fault is corrected
- **PF2** alarms: ems controllers continue running the compressor. ems controllers alternate the display between **PF2** and the appliance sensor temperature indicating a fault
- **PF2** alarms: ems55advanced CO2 controllers continue to run the compressor normally and alternate the display **PF2** and the gas cooler sensor temperature indicating a fault
- **PF3** alarms: ems controllers continue to run the compressor normally and alternate the display **PF3** and the appliance sensor temperature.

Sensor faults may also be identified by using the input test within the test routine, see "how to run the test routine (tst)".

Follow the chart below to troubleshoot problems with the appliance sensor, condenser sensor, evaporator sensor or gas cooler sensor.

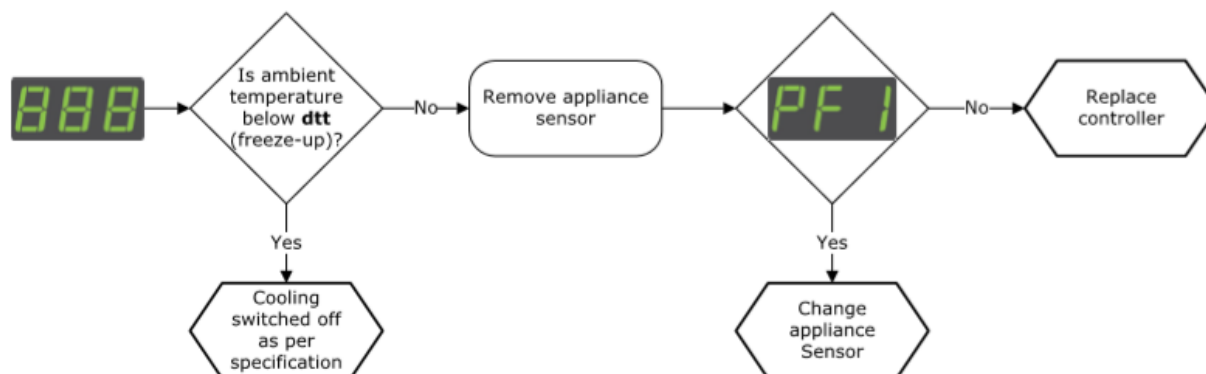




## 8.8 How to troubleshoot problems with freeze-up protection (888)

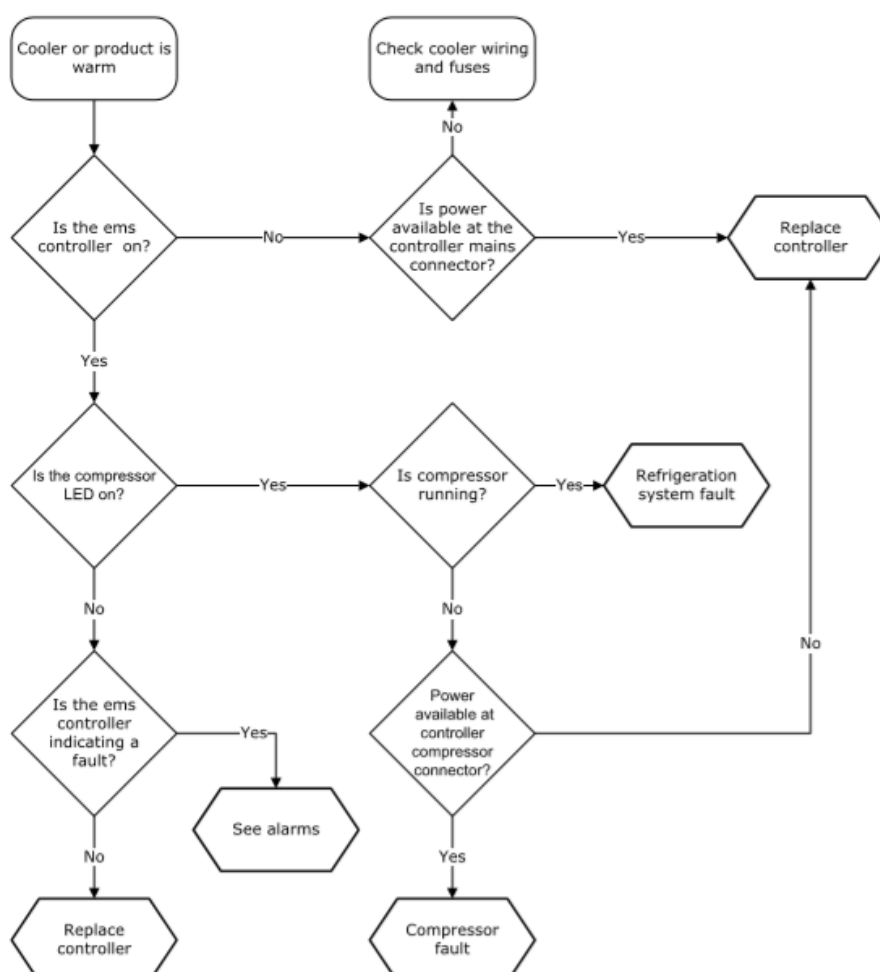
Problems with freeze-up protection may occur if the ambient temperature falls below 0°C(32°F) or if the appliance sensor fails.

For information about the freeze-up protection (**dt**) parameter, see "freeze-up protection (**dt**)".



## 8.9 How to troubleshoot not cooling problems

Follow the chart below to troubleshoot problems of the cooler not cooling, i.e.the cooler or product is warm.



## 9. elstat parameter loader

The elstat parameter loader loads the parameter settings, defined in XML files, to the parameter programming tool (dongle).

The parameter programming tool (dongle) connects to the parameter loader using a USB docking cradle and COM port on a host computer.

The following specification of computer is required for operation:

- Windows XP, Windows Vista, or Windows 7
- 2 MB of disk space



### 9.1 What are the XML files?

The XML files are supplied from elstat and include parameter information about each XML file

The XML files contain the parameter settings to be downloaded to the ems controller, and the checksum values. Parameters and their values determine how the ems controller operates the cooler.

XML files **cannot** be manually edited. If an operator or engineer tries to edit an XML file, the parameter loader displays a message stating the XML file is not valid.

The table below details the naming conventions of the XML file names for ems controllers.

EMS CONTROLLER	XML FILE NAME
ems25	EMS25BAS-CCCC-NNNNN-XXXXX
ems25+	EMS25PLUS-CCCC-NNNNN-XXXXX
ems25advanced	EMS25ADV-CCCC-NNNNN-XXXXX
ems55advanced	EMS55ADV-CCCC-NNNNN-XXXX
ems75vr and ems75vri	EMS75VR-CCCC-NNNNN-XXXXX
ems75sz	EMS75SZ-CCCC-NNNNN-XXXXX

Where:

- CCCC is the cooler type.  
The cooler types are Glass Door Cooler (GDC), Open Frint Cooler (OFC), and vending machine (VEND)
- NNNNN is a unique five-digit identification number
- XXXXX is information supplied on the completed parameter request form  
For example, the cooler type, manufacturer, region, and so on.  
This is specific to individual coolers.

## 9.2 What are checksums?

Checksums identify the firmware and parameter set of ems controllers. ems controllers display the checksum in the power on sequence and after areboot.

The parameter information pack details the expected checksum for the specified ems controller and parameter set. After loading the parameter settings from an XML file, the parameter loader also displays the checksums.

The checksums displayed on the parameter loader are as follows:

CRC- A	Checksum of the XMLfile.For elstatreference purposes only.
CRC-B	Checksum displayed on an ems55advanced with firmware version E52 F07. Displayed when rebooting the ems controller following download of the parameter settings with the parameter programming tool (dongle).
CRC-C	Checksum displayed on an ems55advanced with firmware version E52 F07. Displayed after manually scrolling through the parameter list, following download of the parameter settings with the parameter programming tool (dongle).
CRC-D	Checksum displayed on all other ems controllers following download of the parameter settings with the parameter programming tool (dongle).

## 9.3 Parameter programming accessories

The items required to program the parameter programming tool (dongle) are as follows:

USB docking cradle	
Parameter programming tool (dongle) - yellow	
elstat files supplied with parameter programming tool	ZIP files containing the following: <ul style="list-style-type: none"><li>• elstat parameter loader</li><li>• Set up program</li><li>• Drivers for Windows XP</li></ul>
elstat files supplied on completion of the parameter request form	ZIP files containing the following: <ul style="list-style-type: none"><li>• Parameter information (<b>PI</b>), which is a PDF file that details the parameter settings</li><li>• XML file with parameter settings</li></ul>

## 9.4 How to install the drivers on Windows XP



### Note

Windows 7 and Windows Vista: Drivers install automatically by connecting the USB docking cradle.

For Windows XP, install the drivers as follows:

1. Extract the ZIP file CDM20808.zip- from the files supplied by elstat which contain the Windows drivers for Windows XP - and save into a suitable location. For example, C:\Program Files\elstat\drivers
2. Insert the USB docking cradle into a spare USB port and ensure that the Windows New Hardware Found wizard starts automatically
3. Select No, not this time as shown below



4. Select Install from a list or specific location (Advanced) and then click Next.



- Click Browse and select the folder where the drivers were saved. For example, C:\Program Files\elstat\drivers. Click Next and wait while the wizard searches and downloads the drivers



- Once completed, click Finish to close the wizard.



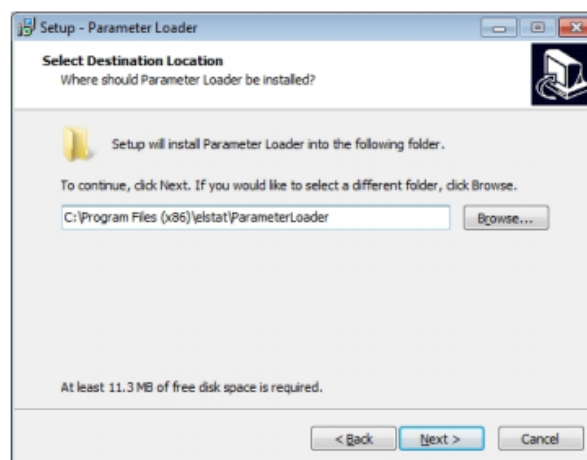
## 9.5 How to install the parameter loader

Install the parameter loader as follows:

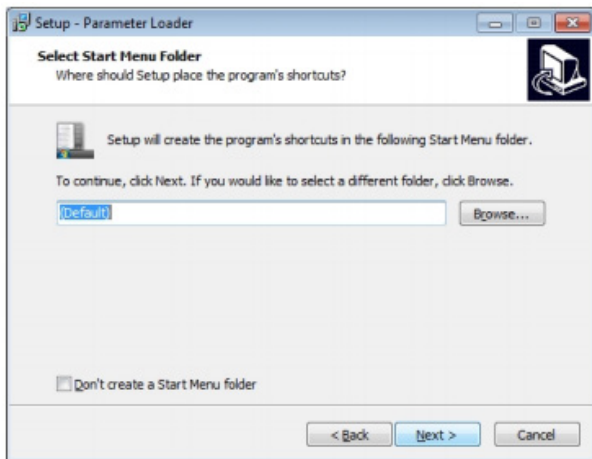
1. Copy the file Setup\_ParameterLoader\_Rx.x.exe, from the file - where Rx.x is the parameterloader version -to a suitable location on the local computer. Double-click the file Setup\_ParameterLoader\_Rx.x.exe to start in the setup wizard
2. Click Next to start the installation wizard.



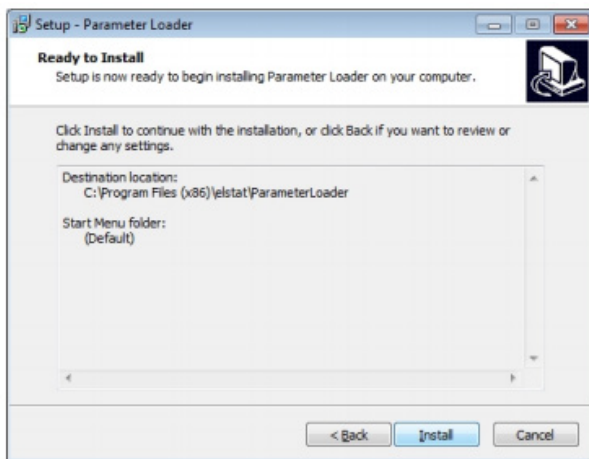
3. Select the destination location. Click Next to use the default location or click Browse to define a different location and then click Next.



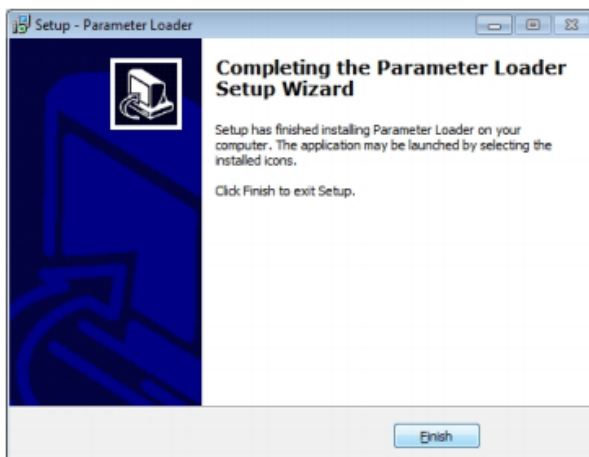
4. Select the Start menu folder. Click Next to use the default folder or click Browse to define a different folder and then click Next



5. Confirm that the setup information is correct. Click Install



6. Click Finish to complete the installation of the parameter loader



## 9.6 How to start the parameter loader

Start the parameter loader as follows:

1. Click Parameter Loader in the Start menu.
2. Double-click the file ParameterLoader.exe located in, for example, the folder C:\elstat\ParameterLoader

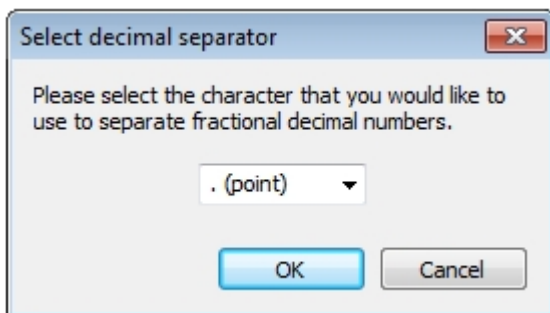


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**Note**

On starting the parameter loader for the first time, the dialog box below appears prompting for the fractional separator. Select .(point) or ,(comma) according to the decimal format in your region.

---



## 9.7 How to connect the docking cradle

To set up the docking cradle, extract the drivers from the file.

1. Insert the docking cradle into a spare USB port to install the Windows drivers.



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**Note**

Windows Vista and Windows 7 locate and install the drivers automatically. However, on Windows XP, install the drivers manually as described. See "how to install Windows XP."

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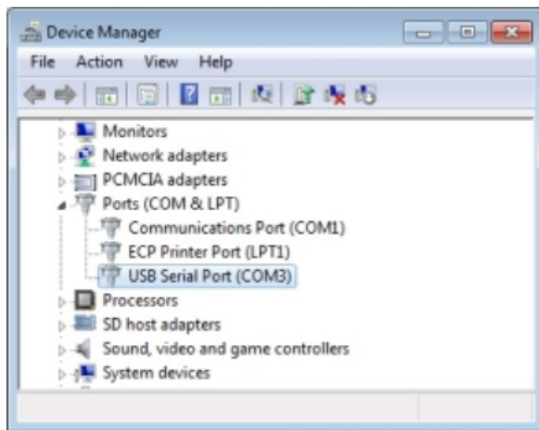
2. Finally, define the COM port of the docking cradle



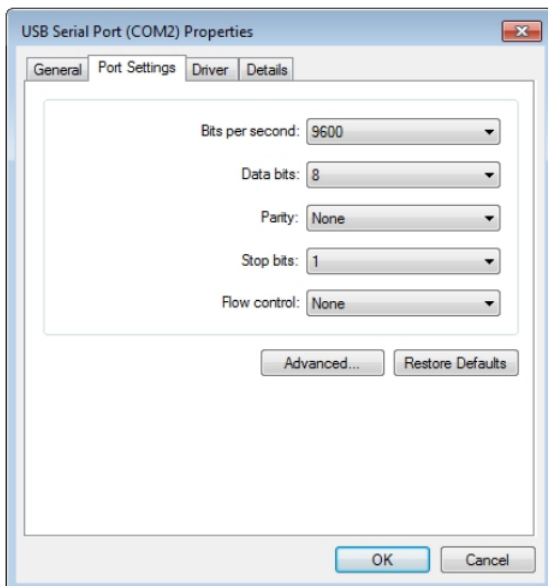
## 9.8 How to configure the COM port

Configure the COM port as follows:

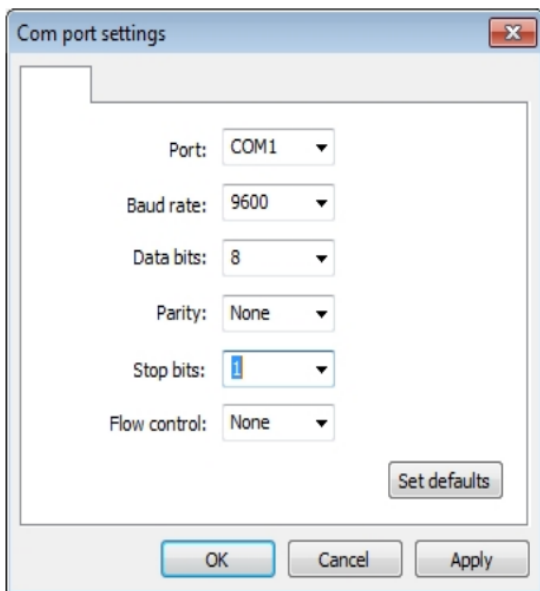
1. Start the parameterloader as follows:
2. Click Parameter Loader in the Start menu.
3. Double-click the file ParameterLoader.exe.
4. Click the Start menu, select Control panel > System Device Manager > Ports (COM & LPT) as shown below



5. Check the COM port allocated to the USB docking cradle (USB Serial Port). For example, in the diagram above, COM3 has been allocated
6. Double-click the USB serial port and make a note of the port settings, as shown below.



7. On the parameter loader, click the Edit Com port settings to display the dialog box below



8. Set the parameters to the values of the USB serial port of the local computer. For example:

PARAMETER	VALUE
COM port	COM port allocated to the cradle, For example, 3.
Baud rate	9600
Data bits	8
Parity	None
Stop bits	1
Flow control	None

9. Click OK

## 9.9 How to load the parameter settings

Use the parameter loader to load the parameter settings to the parameter programming tool (dongle) as follows:

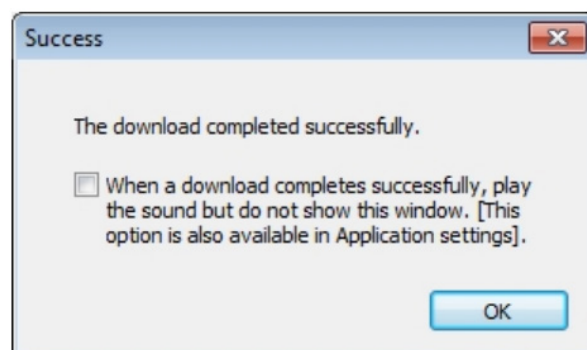
1. Extract the ZIP file from the folder which contains the parameter information pack and the parameter settings to a suitable location. For example, C:\Program Files\elstat.
2. Start the parameter loader as follows: Click Parameter Loader in the Start menu. Double-click the file ParameterLoader.exe.
3. Insert the parameter programming tool into the docking cradle, as shown below.



4. Click Load XML and browse to the location of the extracted file and then select the XML file with the parameter settings. For example, select the XML file C:\Program Files\elstat\EMS25PLUS-GDC-12312-NNNN.xml.
5. Ensure that the parameter values displayed on the parameter loader are correct, as stated in the parameter information pack. The parameter loader also displays the name of the XML name.
6. Make a note of the appropriate checksums on the parameter loader as detailed in the following table. To help service engineers, mark the appropriate checksum on the identification tag of the parameter programming tool (dongle).

<b>CRC-A</b>	Checksum of the XML file. For elstat reference purposes only.
<b>CRC-B</b>	Checksum displayed on an ems55advanced with firmware version E52 F07. Displayed when rebooting the ems controller following download of the parameter settings with the parameter programming tool (dongle).
<b>CRC-C</b>	8 Checksum displayed on an ems55advanced with firmware version E52 F07. Displayed after manually scrolling through the parameter list, following download of the parameter settings with the parameter programming tool (dongle).
<b>CRC-D</b>	Checksum displayed on all other ems controllers following download of the parameter settings with the parameter programming tool (dongle).

7. Press and hold the button  $\wedge$  on the USB docking cradle and then check that the message below appears after a short delay and click OK.  
If the transfer was unsuccessful, check all connections and settings and repeat the procedure.  
If the error persists, this indicates a malfunction of the equipment
8. Remove the parameter programming tool from the USB docking cradle



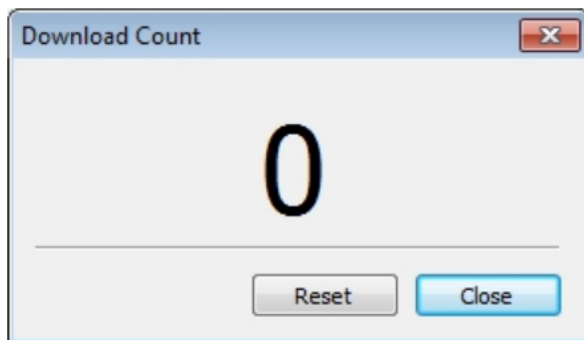
## 9.10 How to view the download counter

When programming a large quantity of parameter programming tools (dongles), a display counter can be viewed. To view the download counter, click Tools > Download counter



### Note

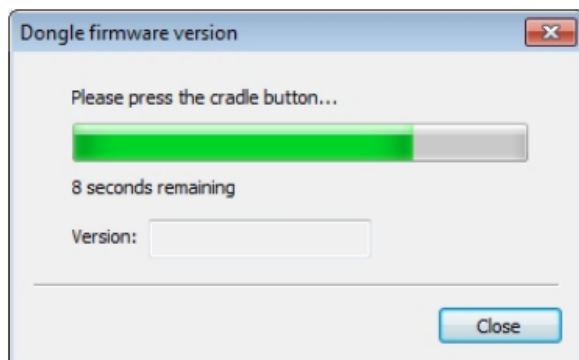
The download counter window must be displayed to count.



## 9.11 How to view the version of the parameter programming tool (dongle)





View the version of a parameter programming tool (dongle) as follows:

1. Insert the parameter programming tool (dongle) into the USB docking cradle.
2. Click Tools, Get dongle version to display the dialog below.



## 9.12 Display codes for parameter downloads

The table below shows the display when downloading parameters to the controller.

DISPLAY	DESCRIPTION
	The parameter programming tool (dongle) is connected.
	The parameter download is in progress
	The parameters were download but are out of range.
	The parameters were not downloaded

The ems controller will reboot and display the checksum following successful parameter downloads.

# 10. parameter reference

The parameter reference lists all the parameters alphabetically and describes each parameter in full.

The parameters are also listed in the following groups:

- Function: groups the parameters by functionality such as product temperature, defrost, and so on.
- Owners: groups the parameters by organization, such as OEM, responsible for defining the parameter values.

The parameter values vary between different cooler types, cooler characteristics, operating environments, brand requirements, and operational preferences.

Parameter settings are defined by customers - OEMs, Bottlers and Brands - using an XML request form, and supplied in the relevant parameter information (PI) provided by elstat.

## 10.1 Parameters by function

The table below details the parameters grouped by function

TEMPERATURE	Celsius or Fahrenheit ( <b>CF</b> ) Set point (SP) and differential ( <b>dIF</b> ) Saving set point (SSP) and saving differential (Sd) saving temperature disable ( <b>PEr</b> ) Appliance sensor: calibration 1 ( <b>CA1</b> )
OPERATION	Saving restart ( <b>Sr</b> ) Delay to saving mode ( <b>dS</b> ) Freeze-up protection ( <b>dt</b> ) Compressor rest time ( <b>rt</b> )
DEFROST	Defrost method (dF) and defrost termination method ( <b>dtF</b> ) Defrost interval (dE) and defrost duration ( <b>dd</b> ) Defrost activation temperature (ddt) and defrost termination temperature ( <b>dt</b> ) Defrost heater ( <b>dHr</b> ) Evaporator sensor: calibration 2 ( <b>CA2</b> )
SELF-LEARNING	Learning period ( <b>LP</b> ) and activity frequency ( <b>AF</b> )
DISPLAY	Display ( <b>dIS</b> ) and display stability ( <b>d2</b> )
LIGHTS	Light delay ( <b>Ld</b> ) and marketing mode ( <b>Ar</b> )
EVAPORATOR FAN	Fan set point ( <b>FSP</b> ) Fan cycle on ( <b>FCO</b> ) and fan cycle off ( <b>FCF</b> )
ALARMS	Alarm delay ( <b>Ad</b> ) Buzzer enable (b0) and buzzer duration ( <b>b1</b> ) Refrigeration system failure ( <b>Ct</b> ) Condenser high temperature ( <b>Ht</b> ) Not used on CO2 ( <b>R744</b> ) coolers



### Note

Some parameters are **not** included with certain controllers. Please refer to the User Guide to confirm which parameter set the controller has available.

## 10.2 Parameters by owners

The parameter owners are usually defined as performance, design, and operational parameters with different organizations being responsible for each set.

<b>PERFORMANCE (BRAND)</b>	Set point ( <b>SP</b> ) and differential ( <b>dIF</b> ) Saving set point ( <b>SSP</b> ) and saving differential ( <b>Sd</b> ) Saving restart ( <b>Sr</b> )
<b>DESIGN (OEMs)</b>	Defrost method ( <b>dF</b> ) and defrost termination method ( <b>dtF</b> ) Defrost interval ( <b>dE</b> ) and defrost duration ( <b>dd</b> ) defrost activation temperature ( <b>ddt</b> ) and defrost termination temperature ( <b>dtd</b> ) defrost heater ( <b>dHr</b> ) compressor rest time ( <b>rt</b> ) fan cycle on ( <b>FCO</b> ) and fan cycle off ( <b>FCF</b> ) calibration 1 ( <b>CA1</b> ) and calibration 2 ( <b>CA2</b> )
<b>OPERATION (OPERATORS)</b>	Celsius or Fahrenheit ( <b>CF</b> ) Saving temperature disable ( <b>PEr</b> ) Freeze-up protection ( <b>dtT</b> ) Delay to saving mode ( <b>dS</b> ) Learning period ( <b>LP</b> ) and activity frequency ( <b>AF</b> ) Display ( <b>dIS</b> ) and display stability ( <b>d2</b> ) Light delay ( <b>Ld</b> ) and marketing mode ( <b>Ar</b> ) Fan set point ( <b>FSP</b> ) Alarm delay ( <b>Ad</b> ), buzzer enable ( <b>b0</b> ) and buzzer duration ( <b>b1</b> ) Refrigeration system failure ( <b>Ct</b> ) Condenser high temperature ( <b>Ht</b> )


## 10.3 Temperature setting rules

For correct operation, the parameters that define the temperatures must not create conflicting conditions. For example, as the ems controller aims to keep the ready mode temperature between the set point (**SP**) temperature and the set point (**SP**) plus differential (**dIF**) temperature, the freeze-up protection (**dtT**) temperature must be lower than the set point (**SP**) temperature. Otherwise, the ems controller would activate freeze-up protection under normal operating conditions. Rules for the temperature settings:

- **IPd** must be higher than **SSP + Sd**
- **IPd** must be higher than **dtT**
- **dtT** must be higher than **SP + dIF**
- **SSP** must be higher than **SP + dIF**
- **dtT** must be lower than **SP**


## 10.4 Alarm delay (Ad)

The table below details the alarm delay (**Ad**) parameter

DISPLAY	
DESCRIPTION	Defines the maximum time the cooler door can be open before sounding the alarm buzzer.
CONSIDERATOINS	<p>If disabled, the door switch is also disabled. The ems controller does not detect door openings, therefore, the ems controller does not:</p> <ul style="list-style-type: none"><li>• Update the self-learning matrix for door activity.</li><li>• Manage the evaporatorfan management for door activity.</li><li>• Sound door alarms if the dooris left open.</li></ul>
RANGE	00 to 30 minutes
GLOBAL DEFAULT	00 (disabled)

## 10.5 Activity frequency (AF)

The table below details the activity frequency (**AF**) parameter

DISPLAY	
DESCRIPTION	Defines the minimum number of door openings or motion counts to indicate an active 30 minute period in the self-learning matrix, as described below. The activity frequency applies across all 30 minute periods within the self-learning matrix, not to individual 30 minute periods.
CONSIDERATOINS	See below
RANGE	See below
GLOBAL DEFAULT	00 (low frequency)



The table below details the activity frequency (**AF**) parameter

VALUE	NAME	DESCRIPTION
00	Low frequency	1 door opening or 1 motion count
01	Medium frequency	1 door opening or 3 motion counts
02	High frequency	2 door openings or 6 motion counts
03	Automatic	The ems controller runs continuously for 48 hours in the ready mode. After 48 hours, the ems controller sets the value of the activity frequency to 0, 1, or 2.



#### Note


If AF is set to 3, the ems controller must run continuously for 48 hours to set the value of the activity frequency.

If power is lost during the 48 hour period, the ems controller restarts the 48 hour period.

The ems controller must complete the 48 hour period to determine the activity frequency before starting the 1-day or 7-day learning period


## 10.6 Marketing mode (Ar)

The table below details the marketing mode (**Ar**) parameter

DISPLAY	
DESCRIPTION	Sets the cooler lights to remain on at all times for display purposes. The cooler lights will remain on during saving mode
CONSIDERATIONS	Does not affect saving temperature. Made available to ems55 advanced GDC firmware from June 2012. Not used with OFC firmware.
RANGE	00 (off) or 01 (on)
GLOBAL DEFAULT	00 (off)


## 10.7 Buzzer enable (b0)

The table below details the buzzer enable (**b0**) parameter

DISPLAY	
DESCRIPTION	Enables or disables a warning buzzer for alarm conditions. Door open alarms always sound the warning buzzer.
CONSIDERATIONS	Following alarm conditions trigger the buzzer: <ul style="list-style-type: none"><li>• Refrigeration system failure (rS F)</li><li>• Sensor failure (PF1, PF2, and PF3).</li><li>• Gas cooler high temperature alarm</li><li>• CO2 lock out alarm</li></ul> Door alarms sound the buzzer as standard.
RANGE	00 (disabled) or 01 (enabled)
GLOBAL DEFAULT	01 (enabled)


## 10.8 Buzzer duration (b1)

The table below details the buzzer duration (**b1**) parameter

DISPLAY	
DESCRIPTION	Defines the duration of the buzzer for door open alarm conditions. If the door remains open after the buzzer duration (b1), the ems controller switches off the compressor.
CONSIDERATIONS	The ems controller switches off the compressor after the duration defined by alarm delay ( <b>Ad</b> ) + buzzer duration ( <b>b1</b> ).
RANGE	1 to 254 seconds
GLOBAL DEFAULT	60 seconds


## 10.9 Calibration 1 (CA1)

The table below details the calibration 1(CA1) parameter

DISPLAY	
DESCRIPTION	Calibrates or adds an offset to temperatures measured by the appliance sensor.
CONSIDERATOINS	Applied to all temperatures measured on the appliance sensor.
RANGE	-9.9 to 9.9°C (-18 to 18°F)
GLOBAL DEFAULT	0.0°C (0°F)


## 10.10 Celsius or Fahrenheit (CF)

The table below details the Celsius or Fahrenheit (CF) parameter

DISPLAY	
DESCRIPTION	Option to set the ems controller to Celsius (°C) or Fahrenheit (°F)
CONSIDERATOINS	<ul style="list-style-type: none"><li>• A global reset sets ems controllers using Fahrenheit (°F) to Celsius (°C)</li><li>• Applies to alltemperature settings and values.</li></ul>
RANGE	00 (°C) or 01 (°F)
GLOBAL DEFAULT	00 (°C)


## 10.11 Refrigeration system failure (Ct)

The table below details the refrigeration system failure (**Ct**) parameter

DISPLAY	
DESCRIPTION	Defines the maximum continuous runtime of the compressor without reaching the set point ( <b>SP</b> ) temperature. If the set point ( <b>SP</b> ) temperature is not reached within this time, the ems controller switches off the compressor and activates the refrigeration system ( <b>rSF</b> ) alarm.
CONSIDERATOINS	None
RANGE	00 to 100 hours
GLOBAL DEFAULT	72 hours


## 10.12 Display stability (d2)

The table below details the display stability (**d2**) parameter

DISPLAY	
DESCRIPTION	Defines the rate of change of the displayed temperature. Limiting the rate of change provides a dampening effect so as not to concern users should the air temperature rise quickly due to a door opening. Increasing the value for the display stability ( <b>d2</b> ) slows the rate of change of the displayed temperature.
CONSIDERATOINS	Use the global default value for normal operation
RANGE	1 to 254
GLOBAL DEFAULT	2


## 10.13 Defrost duration (dd)

The table below details the refrigeration system failure (**Ct**) parameter

DISPLAY	
DESCRIPTION	Defines the maximum time of a defrost cycle.
CONSIDERATOINS	If icing up occurs, review the values of the defrost parameters.
RANGE	1 to 199 minutes
GLOBAL DEFAULT	15 minutes


## 10.14 Defrost interval (dE)

The table below details the defrost interval (**dE**) parameter

DISPLAY	
DESCRIPTION	Defines the period between the end of defrost cycle and beginning of the next defrost cycle. A timebased defrost cycle helps improve evaporator efficiency.
CONSIDERATOINS	<ul style="list-style-type: none"><li>• In the event of powerloss,the defrost duration (dE) is not maintained. The defrost interval is reset.</li><li>• If icing up occurs,review the values of the defrost parameters.</li></ul>
RANGE	0 to 199 hours
GLOBAL DEFAULT	06 hours


## 10.15 Differential (dIF)

The table below details the differential (**diF**) parameter

DISPLAY	
DESCRIPTION	Defines the compressor cut-in temperature when added to the set point ( <b>SPC</b> or <b>SPF</b> ) temperature during the ready mode.
CONSIDERATIONS	If the differential ( <b>diF</b> ) is set too low, for example, less than 2.0°C the compressor may cycle on the minimum compressor rest time ( <b>rt</b> ).
RANGE	0.0 to 9.9°C (0 to 18°F)
GLOBAL DEFAULT	4.0°C (7°F) ems75sz: 3.0°C (5°F)


## 10.16 Display (diS)

The table below details the display (**diS**) parameter

DISPLAY	
DESCRIPTION	Defines whether the ems controller displays the temperature 3.0, or the word USE during the ready mode. ems controllers always display alarms.
CONSIDERATIONS	None
RANGE	00 (USE) or 01 (temperature)
GLOBAL DEFAULT	01 (temperature)


## 10.17 Delay to saving (dS)

The table below details the delay to saving (**dS**) parameter

DISPLAY	
DESCRIPTION	Defines the delay in switching to the saving mode from ready mode. The delay starts at the end of the last active 30 minute period of the ready mode.
CONSIDERATOINS	Must be set in multiples of 30 minutes.
RANGE	0 to 120 minutes (in multiples of 30 minutes)
GLOBAL DEFAULT	00 (no delay)


## 10.18 Defrost termination temperature (dtd)

The table below details the defrost termination temperature (**dtd**) parameter

DISPLAY	
DESCRIPTION	Defines the temperature to end the defrost cycle. Ending defrost cycles on temperature minimizes the duration of defrost cycles. The temperature is measured as follows: <ul style="list-style-type: none"><li>• OFC and sub-zero coolers: the temperature is measured on the evaporator sensor.</li><li>• GDC coolers: the temperature is measured on the appliance sensor.</li></ul>
CONSIDERATOINS	<ul style="list-style-type: none"><li>• Must be set above the set point (SP) plus differential (dIF) temperature.</li><li>• Must be set below IPd.</li><li>• If icing up occurs, review the values of the defrost parameters.</li></ul>
RANGE	1 to 30°C (33 to 86°F) ems75sz: -5 to 22°C (23 to 71°F)
GLOBAL DEFAULT	9.0°C (48°F) ems75sz: 15.0°C (59°F)


## 10.19 Freeze-up protection (dtt)

The table below details the freeze-up protection (**dtt**) parameter

DISPLAY	
DESCRIPTION	Defines the temperature to stop further cooling to prevent freeze-up due to low temperature.
CONSIDERATOINS	Must be set below the set point ( <b>SP</b> ) temperature
RANGE	-15 to 10°C (5 to 50°F)
GLOBAL DEFAULT	0.0°C (32°F) ems75sz: -6.0°C (21°F)

## 10.20 Fan cycle off (FCF)


The table below details the fan cycle off (**FCF**) parameter

DISPLAY	
DESCRIPTION	Defines the inactive period of the evaporator fan while the compressor is switched off
CONSIDERATOINS	Fan cycle is the fan cycle on (FCO) time + the fan cycle off (FC F) time. Not used on the ems25+
RANGE	1 to 30 minutes
GLOBAL DEFAULT	1 minute ems75sz: 20 minutes




## 10.21 Fan cycle on (FCO)

The table below details the fan cycle on (**FCO**) parameter

DISPLAY	
DESCRIPTION	Defines the active period of the evaporator fan while the compressor is switched off.
CONSIDERATOINS	Fan cycle is the fan cycle on (FCO) time + the fan cycle off (FC F) time. Not used on the ems25+
RANGE	1 to 30 minutes
GLOBAL DEFAULT	30 minutes ems75sz: 5 minutes


## 10.22 Fan set point (FSP)

The table below details the fan set point (**FSP**) parameter

DISPLAY	
DESCRIPTION	Prevents excessive condensation on the evaporator in environments where warm, and presumed humid, air is present by operating the evaporator fan. If the fan set point ( <b>FSP</b> ) temperature is exceeded, the evaporator fan running continuously even if the door is opened. On reaching set point ( <b>SP</b> ) temperature, the evaporator fan switches off during door openings.
CONSIDERATOINS	Not related to fan cycle on ( <b>FCO</b> ) or fan cycle off ( <b>FCF</b> ). Not used with OFC firmware or the ems25+
RANGE	01 to 30°C (33 to 86°F)
GLOBAL DEFAULT	15°C (59°F)


## 10.23 Condenser high temperature (Ht)

The table below details the condenser high temperature (**Ht**) parameter

DISPLAY	
DESCRIPTION	Defines the maximum temperature measured in the refrigeration system by monitoring the condenser sensor. On reaching the condenser high temperature (Ht), the ems controller disables the compressor and activates an alarm.
CONSIDERATOINS	<ol style="list-style-type: none"><li>1. Is not used with CO2 (R744) coolers.</li><li>2. Requires a condenser sensor.</li><li>3. To set the condenser high temperature (Ht), measure the refrigeration system temperature when the condenser is 75% blocked.</li><li>4. To disable, set below 50°C or 122°F.</li></ol>
RANGE	0.0 to 125°C (32 to 257°F)
GLOBAL DEFAULT	0.0°C (32°F) - disabled.


## 10.24 uninterrupted pull down (IPd)

The table below details the uninterrupted pull down (**IPd**) parameter

DISPLAY	
DESCRIPTION	Defines the temperature that if exceeded starts an uninterrupted pull down, i.e. the ems controller switches on the compressor and runs the compressor continuously until the product reaches the set point (SP) temperature. During this time, defrost cycles do not occur.
CONSIDERATOINS	Must be set as follows: <ul style="list-style-type: none"><li>• Above the saving set point (<b>SSP</b>) plus saving differential (<b>Sd</b>) temperature.</li><li>• Above the defrost termination (dtd) temperature.</li></ul>
RANGE	0.0 to 30°C (32 to 86°F)
GLOBAL DEFAULT	20°C (68°F)


## 10.25 light delay (Ld)

The table below details the lights delay (**Ld**) parameter

DISPLAY	
DESCRIPTION	Defines the delay to switch off the cooler lights after the ems controller switches to the saving mode
CONSIDERATOINS	Must be set in multiples of 30
RANGE	0 to 120 minutes
GLOBAL DEFAULT	00 (no delay)


## 10.26 learning period (LP)

The table below details the learning period (**LP**) parameter

DISPLAY	
DESCRIPTION	Defines whether the ems controller uses a 1-day or a 7-day learning period.
CONSIDERATOINS	None
RANGE	00 (1 day) or 01 (7 days)
GLOBAL DEFAULT	00 (1 day)


## 10.27 Saving temperature disable (PEr)

The table below details the saving temperature disable (**PEr**) parameter

DISPLAY	
DESCRIPTION	Disables the saving mode temperature so that the ems controller maintains the ready mode temperature at all times. Disabling the saving mode temperature does not affect the light functionality
CONSIDERATOINS	None
RANGE	00 (off) or 01 (on)
GLOBAL DEFAULT	00 (off)


## 10.28 Compressor rest time (rt)

The table below details the compressor rest time (**rt**) parameter

DISPLAY	
DESCRIPTION	Defines the minimum time between compressor cycles. The compressor rest time ensures that the pressures in the refrigeration system have time to equalize during compressor off-cycles. The compressor rest time ( <b>rt</b> ) helps to avoid the following: <ul style="list-style-type: none"><li>• passing peak current through the windings of the compressor motor</li><li>• switching off the system on the thermal overload protection</li><li>• short cycling of the system</li></ul>
CONSIDERATOINS	If set too low, the compressor rest time may cycle on the set point ( <b>SP</b> ) and differential ( <b>dIF</b> ) temperatures or the saving set point ( <b>SSP</b> ) and saving differential ( <b>Sd</b> ) temperatures.
RANGE	1 to 30 minutes
GLOBAL DEFAULT	3 minutes


## 10.29 Saving differential (Sd)

The table below details the saving differential (**Sd**) parameter

DISPLAY	
DESCRIPTION	Defines the compressor cut-in temperature, when added to the saving set point ( <b>SSP</b> ) temperature, during the saving mode.
CONSIDERATOINS	If the saving differential ( <b>Sd</b> ) is set too low, for example less than 2.0°C, the compressor may cycle on the minimum compressor rest time ( <b>rt</b> ).
RANGE	0.0 to 9.9°C (0 to 18°F)
GLOBAL DEFAULT	4.0°C (7°F) ems75sz: 3.0°C (5°F)


## 10.30 Motion sensor enable (Sn)

The table below details the motion sensor enable (**Sn**) parameter

DISPLAY	
DESCRIPTION	Enables the input from the motion sensor.
CONSIDERATOINS	Must be disabled if a motion sensor is not fitted.
RANGE	00 (disabled) or 01 (enabled)
GLOBAL DEFAULT	01 (enabled)


## 10.31 Set point (SPC or SPF)

The table below details the set point (**SPC** or **SPF**) parameter

DISPLAY	
DESCRIPTION	Defines the compressor cut-out temperature during the ready mode. The set point ( <b>SP</b> ) temperature is the lowest measured temperature under normal operating conditions. The set point is displayed as <b>SPC</b> (set point Celsius) or <b>SPF</b> (set point Fahrenheit) depending on whether the ems controller is set to use Celsius or Fahrenheit.
CONSIDERATOINS	Must be above the freeze-up protection ( <b>dt</b> ) temperature.
RANGE	-9.9 to 9.9°C (14 to 50°F)
GLOBAL DEFAULT	3.0°C (37°F) ems75sz: -3.0°C (27°F)


## 10.32 Saving restart period (Sr)

The table below details the saving restart period (**Sr**) parameter

DISPLAY	
DESCRIPTION	Defines the maximum time allocated to reach the set point ( <b>SP</b> ) temperature from the saving mode temperature.
CONSIDERATOINS	<ul style="list-style-type: none"><li>• Set and verified by OEMs through the test protocol to ensure that product temperatures are within specification when outlets open.</li><li>• Must be set in multiples of 30 minutes.</li></ul>
RANGE	0 to 240 minutes (in multiples of 30 minutes)
GLOBAL DEFAULT	120 minutes

# 10.33 Saving set point (SSP)

The table below details the saving set point (**SSP**) parameter

DISPLAY	
DESCRIPTION	Defines the compressor cut-out temperature during the saving mode.
CONSIDERATOINS	Must be set above the set point (SP) plus differential (dIF) temperature.
RANGE	0.0 to 9.9°C (32 to 50°F) ems75sz: -9.9 to 9.9°C (14 to 50°F)
GLOBAL DEFAULT	all except ems75sz: 7.0°C (45°F) ems75sz: 3.0°C (37°F)

# 11. Annexe | UL information



**Note**  
This annexe applies to ems25+ controllers, 120VAC only

ELECTRICAL RATINGS					
INPUTS					
SUPPLY	120VAC, 3VA, 50/60Hz			(L) line in (7)	(N) neutral (5)
TEMPERATURE SENSOR INPUT	5Vdc, Limited Energy Circuit, 15W or less (class 2)			appliance sensor (3)	
DOOR/SENSOR INPUT	5Vdc, Limited Energy Circuit, 15W or less (class 2)			condenser sensor (2)	
AUXILIARY INPUT	5Vdc, Limited Energy Circuit, 15W or less (class 2)			door switch (1)	

OUTPUTS					
MODEL	TYPE	RATING	LOAD TYPE	CYCLES	TERMINAL
All models	Compressor relay (K3)	6FLA/36LEA 120VAC	Motor	100K	(L) line in (7) compressor (6)
All models	Lights relay (K2)	120VAC 250W	Ballast	6K	(L) line in (7) lights (4)

## 11.1 ems25+ rear view (input reference)

1. Door switch
2. Condenser sensor
3. Appliance sensor
4. Lights out
5. Neutral
6. Compressor out
7. Line in
8. Micro RMD and parameter programming port



## 11.2 Additional information

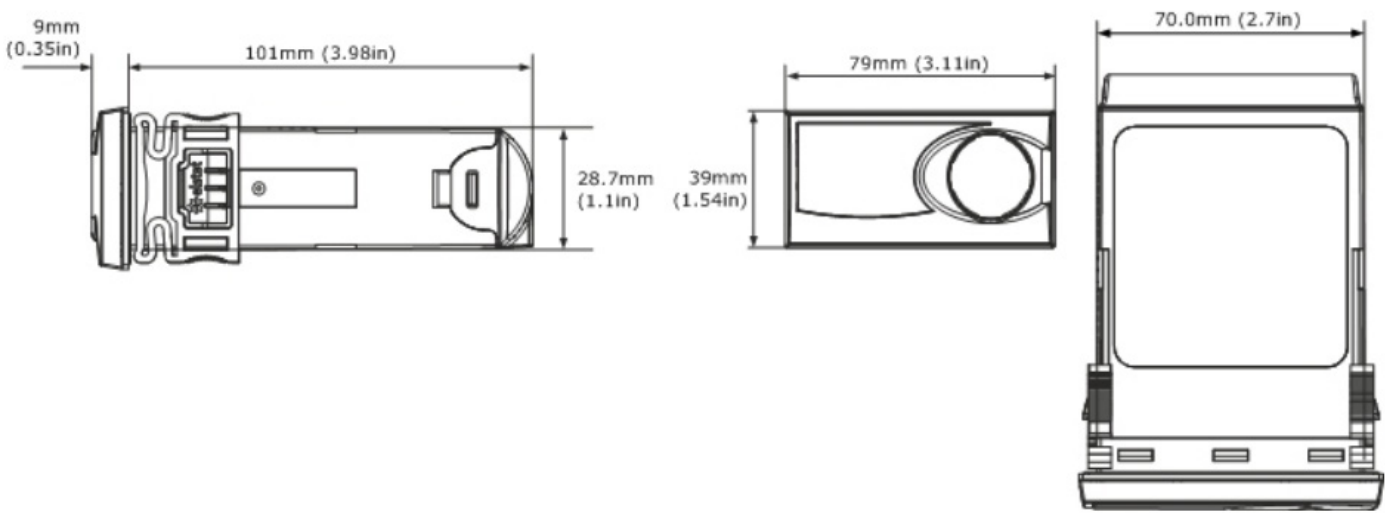
The purpose of this control is classified as: Operational Control

The type of construction is: Integrated Control

Maximum ambient operating temperature	55oC (131oF)
Overvoltage category	II
Pollution degree	2
Software class	A
Type 1 action	
Rated impulse	1500V
elstat UL approvals	
UL 60730-1	CSA E 60730-1
UL 60730-2-9	CSA E 60730-2-9
UL reference: E325501	<a href="http://www.ul.com">www.ul.com</a>

# 12. technical data ems25+

## 12.1 Dimensional drawings



Decorative trim kits must be ordered with ems25+ controllers.

## 12.2 Controller relays

ems25+	MAXIMUM IEC RATINGS @100-240VAC	MAXIMUM UL RATINGS @ 120VAC
Compressor	6(6)A, p.f. 0.6	6 FLA, 36 LRA
Lights	2(2)A, p.f. 0.6	120VAC, 60Hz, 250W florescent
Evaporator fan	not applicable	not applicable

## 12.3 Temperature sensors

SENSOR	INPUT RANGE (°C)	INPUT RANGE (°F)
Appliance sensor	-10°C to 23.3°C (+/- 0.5°C)	14°F to 74°F (+/- 1°C)
Gas cooler sensor	-10°C to 23.3°C (+/- 5°C)	122°F to 257°F (+/- 10°F)

## 12.4 Environmental ratings

CHARACTERISTIC	VALUE
IP (Ingress protection)	
Controller	IPX5
Maximum ambient temperature	55°C (131°F)

## 12. Product approvals

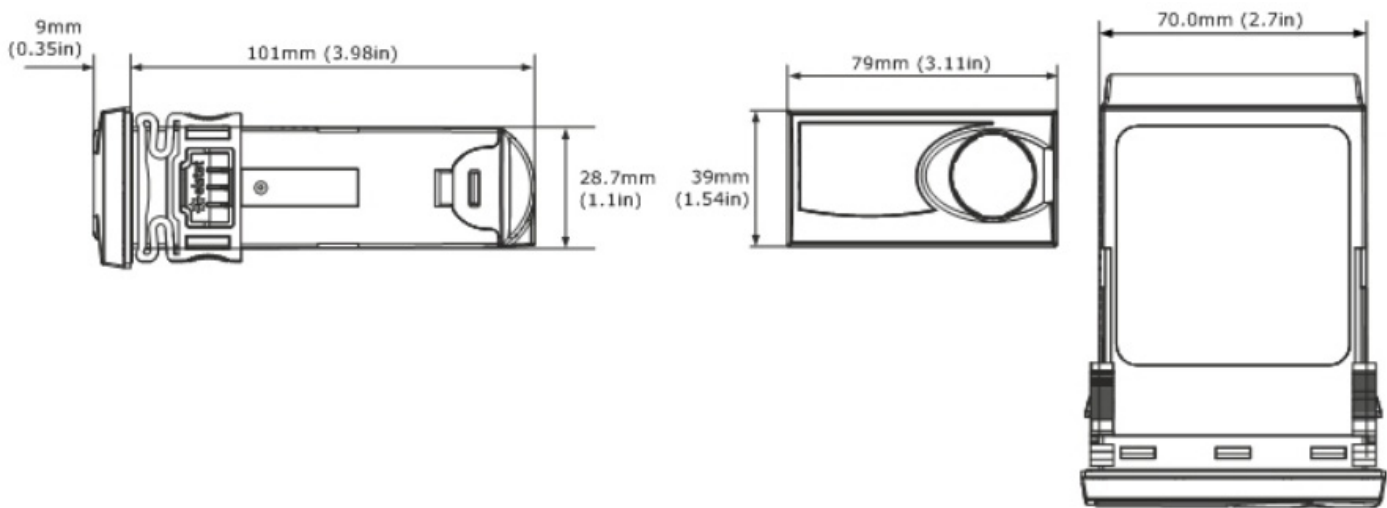
	European Norms Electrical Certification	EN60730-1 EN60730-2-9
	International Electrotechnical Commission	IEC60730-1 IEC60730-2-9 Glow wire: IEC60335-1
	North America (including Canada) only - UL mark. Component recognition mark	UL 60730-1 / CSA E60730-1 UL 60730-2-9 / CSA E60730-2-9
	China Quality Certification	GB14536.1-2008 GB14536.10-2008

Please note that, on controller labelling, as of January 2013

	CE (Conformité Européene / European Conformity)
replaces:	
	RoHS (Restriction of Hazardous Substances)

# 13. technical data *ems25advanced*

## Dimensional drawings



Decorative trim kits must be ordered with *ems25advanced* controllers.

## Controller relays

RELAY	IEC 60730 RATING @ 100-120VAC AND 220-240VAC 50/60Hz
Compressor	10 (10) A, p.f. 0.6
Lights	4 (4) A, p.f. 0.6
Evaporator fan	4 (4) A, p.f. 0.6

## Temperature sensors

SENSOR	INPUT RANGE (°C)	INPUT RANGE (°F)
Appliance sensor	-10°C to 23.3°C (+/- 0.5°C)	14°F to 74°F (+/- 1°C)
Gas cooler sensor	-10°C to 23.3°C (+/- 5 °C)	122°F to 257°F (+/- 10°F)

## Environmental ratings

CHARACTERISTIC	VALUE
IP (Ingress protection)	
Controller	IPX5
Maximum ambient temperature	55°C (131°F)

## Product approvals

	European Norms Electrical Certification	EN60730-1 EN60730-2-9
	International Electrotechnical Commission	IEC60730-1 IEC60730-2-9 Glow wire: IEC60335-1

Please note that, on controller labelling, as of January 2013	
	CE (Conformité Européene / European Conformity)
replaces:	
	RoHS (Restriction of Hazardous Substances)

## 14. ems decorative trims

Decorative trim kits are supplied separately from ems25 series controllers in order to allow for custom installation. Two kit sizes are available - small and large - in three varieties as described in this section



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**Note**

Ensure that a matching quantity of decorative trims are ordered with controllers.

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### 14.1 Small decorative trim kit

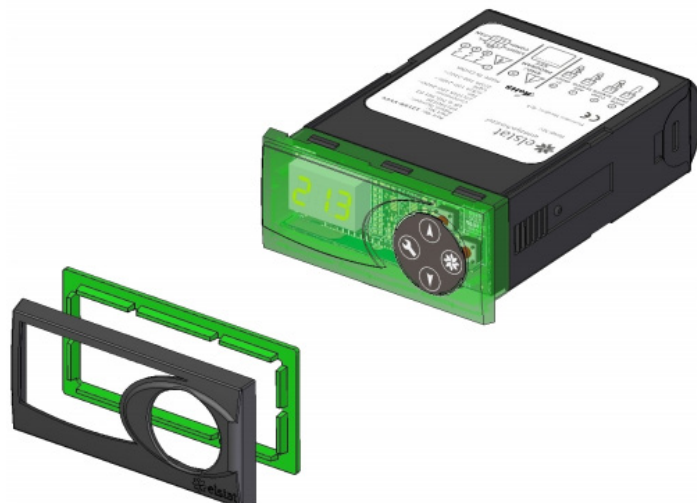
Available in black and black with 'The Coca-Cola Company' branding.

The small decorative trim kit consists of a small decorative trim, a green gasket and two side clips, as illustrated:

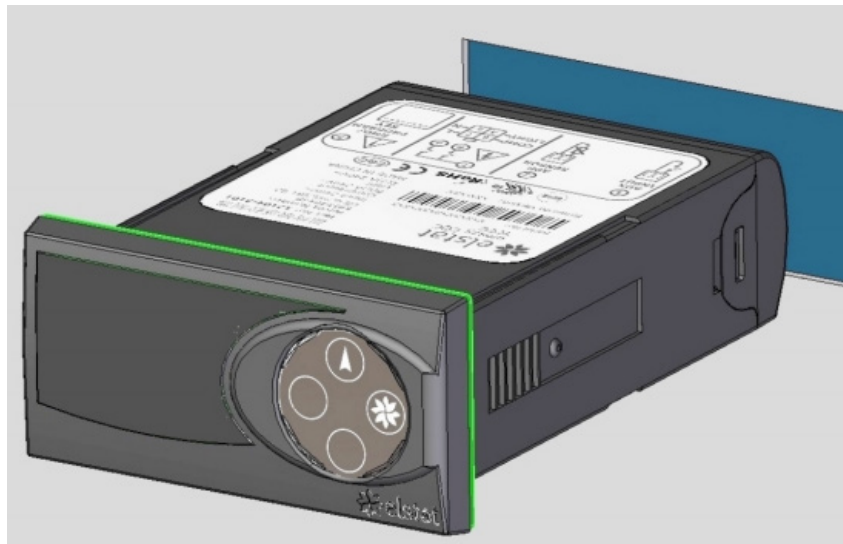


### 14.2 Fitting the small decorative trim kit

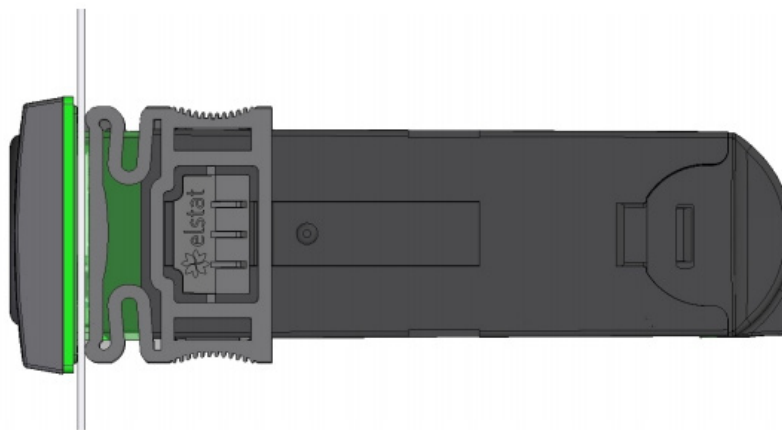
1. Fit the small decorative trim and gasket to the controller as shown:



2. Insert the controller into the cooler aperture as shown in the example:



3. Use the supplied side clips to secure the controller into position as shown:



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**Note**

The side clips hold the controller in position, make sure that the fit is not loose.

---

## 14.3 Large decorative trim kits

Available in black and black with 'The Coca-Cola Company' branding.

There are two large decorative trim styles available:

A large decorative trim with a motion sensor- no requirement for a remote motion sensor kit



A large decorative trim without a motion sensor-for use with a remote motion sensor kit



These kits allow the ems25 series to be installed into an aperture for an ems55 series controller. Once fitted, the decorative trim kit can be screwed into place.



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### Note

No side clips are supplied with large decorative trim kits.

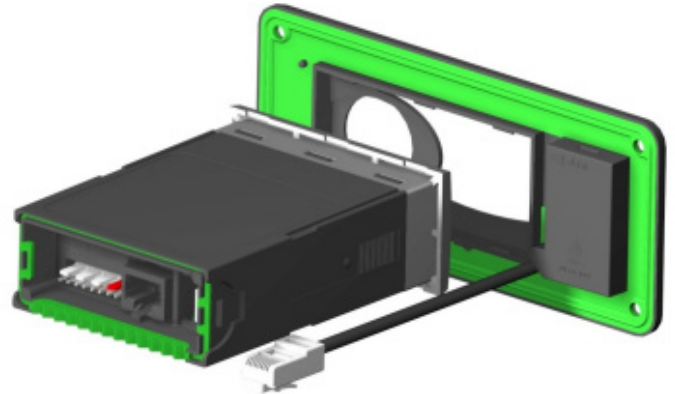
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## 14.4 fitting the large decorative trim - with remote motion sensor

Push the controller into the rear of the decorative trim until the controller locks securely into place:

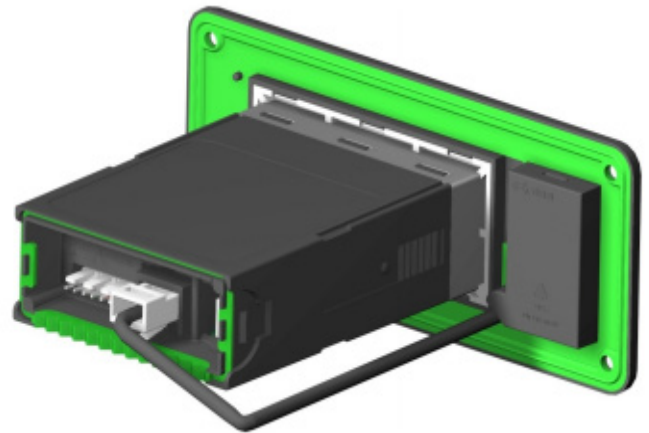
*The rear cover of the controller must be removed to access the RJ45 connection port.*



Connect the motion sensor cable -RJ45 connector- to the rear of the controller:

*The motion sensor cable is a short length, please take care not damage the motion sensor housing while fitting.*

Fit the controller and make the electrical connections.



## 14.5 fitting the large decorative trim - without remote motion sensor

Push the controller into the rear of the decorative trim until the controller locks securely into place:



Fit the controller and make the electrical connections.



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