ENGINEERING
TOMORROW

User Guide

Electronic Refrigeration Controller
ERC 111A

This reference manual is intended to be used primarily by OEMs for the purposes of programming ERC 111A. It may also be useful for technicians. It is not intended as a user guide for end users.

www.danfoss.com/erc

Introduction

Application

Temperature control for refrigeration appliances.
Front panel mounting.

Advantages

The latest generation CPU, plenty of memory and high-end electronic components allow for a uniquely versatile software. Three separate password-protected user levels can be used to control more than 100 different parameters to fit all individual requirements.

Approvals

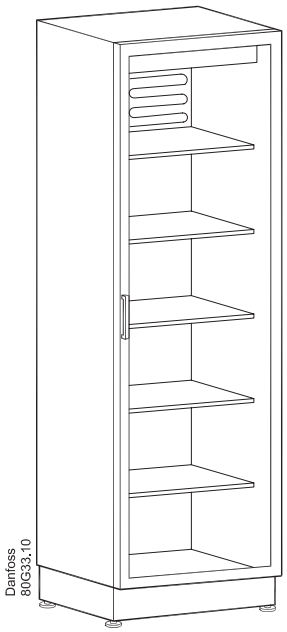
Suitable to use with flammable refrigerants, tested in accordance to EN/IEC 60335-2-24, annex CC and EN/IEC 60335-2-89, annex BB
Glow wire according to EN/IEC 60335-1
IEC/EN 60730
UL60730
NSF
CQC
EAC
UA

Password protected

The access level can be set separately for each parameter using "*KoolProg Software*".
There are three levels of access 1, 2, 3:
- level 1 is for shop access;
- level 2 for technicians;
- level 3 for OEMs.

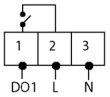
The access levels cannot be set using the buttons.
Passwords for the different levels can however be altered for the level of access you have,
e.g. a level 2 user can change the password for level 1 and level 2 but not level 3.

Typical application



Glass Door Merchandiser

Outputs*:



ERC 111A
No. 080G3230
100-240Vac +/-10% 50/60Hz
Red display

MADE IN CHINA

Inputs*:

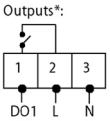
S1	S2	di
Analog /Digital		Comm.

* Other functions see instruction

Rating:

	c UL us		
DO	240Vac	120Vac	240Vac
1	10A,10FLA/60LRA,0T55	16FLA/72LRA,0T55	16(16)A,0T45;10(10)A,0T55

Outputs*:



ERC 111A
No. 080G3235
100-240Vac +/-10% 50/60Hz
Red display

MADE IN CHINA

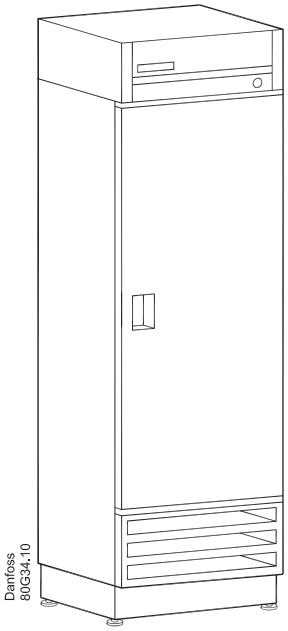
Inputs*:

S1	S2	di
Analog /Digital		Comm.

* Other functions see instruction

Rating:

	c UL us		
DO	240Vac	120Vac	240Vac
1	10A,10FLA/60LRA,0T55	16FLA/72LRA,0T55	16(16)A,0T45;10(10)A,0T55



Gastro cooler

Product overview

Display

Buttons

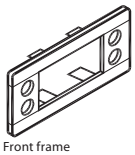
The ERC 111A is an electronic refrigeration controller with an LED display especially developed for bottle coolers and commercial fridges and freezers. It is particularly suited for OEM customers where time, easy and reliable installation and high quality need to go hand in hand with flexibility.
The display can be ordered in red or blue.
The controller is available with the upper left button as "*Defrost*".
The lower left-button can be supplied with "*Stand by*".

Clips

Are used to secure the controller in place in the case of rear mounting. They are not used with front mounting.
There are two identical clips, one placed on either side of the controller.

Front frame

Controller without front frame

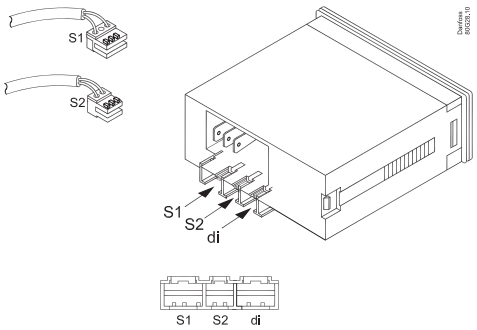


Front frame

At front mounting place the wired controller in the hole. Then press the front frame in position. The plastic lugs locks hereby the controller.

"*S1*"
Temperature sensor for cabinet

"*S2*"
Temperature sensor for defrost



The function of an input can be reprogrammed, but the connector can not be moved.
The connector is designed to only one location.
"*S1*" to "*S1*", "*S2*" to "*S2*", etc.

Control temperature sensor
There are different lengths.

Defrost temperature sensor
Should be mounted on the evaporator.

Quick programming

Software for PC

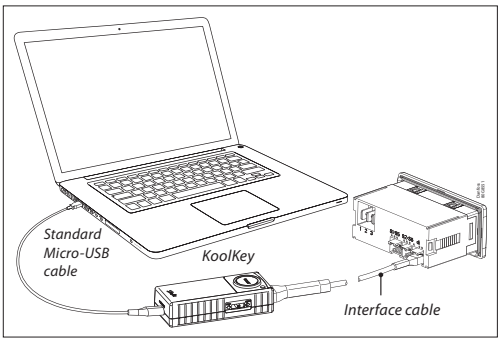
KoolProg
Software from Danfoss for programming the ERC-controller via a PC rather than with the front panel buttons.

https://www.danfoss.com/en/service-and-support/downloads/dcs/koolprog/

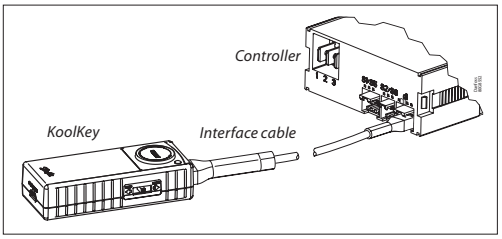
KoolKey (EKA200)

KoolKey (EKA 200)
KoolKey is a smart device that acts as a Gateway to connect ERC controller to PC software"KoolProg" as well as a Programming key for fast programming.

Refer to the KoolKey installation guide for detailed instructions.

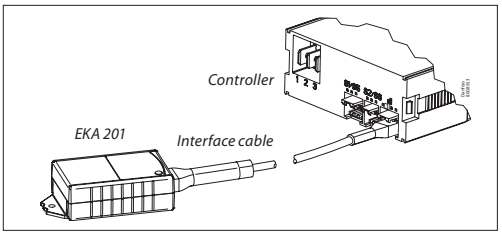


KoolKey as a Gateway
KoolKey in Gateway mode connects the ERC controller to PC to work online with PC software "KoolProg".



KoolKey as a Programming key is used for transferring parameter settings files from the KoolKey to the controller and vice versa (bidirectional setting file transfer)

Mass programming Key (EKA 201)



Mass Programming Key (EKA 201)
Mass Programming Key is a simple programming key for programming the controller in production assembly line. This is write only device and requires KoolProg software to load the setting file in to the device.

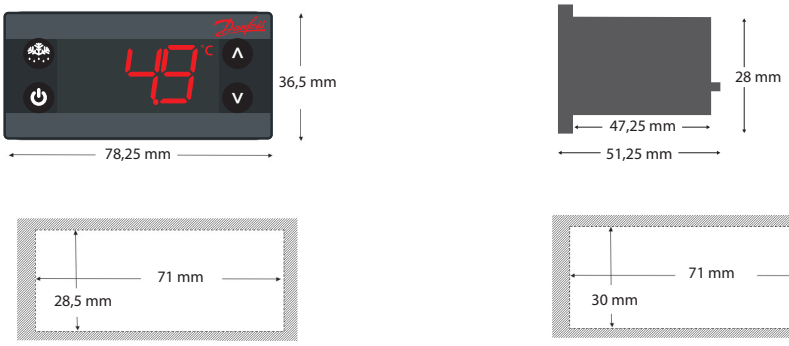
Refer to the EKA 201 installation guide for detailed instructions.

Technical specs

Power Supply	**100 - 240 V AC Switch mode power supply. Average 0.7 W**		
Input	Inputs: 2 analogue (digital), user specific assignment		
	• Air/evaporator/condenser		
Purpose of Control	To control commercial Refrigeration Applications		
Construction of Control	Electronic control for incorporation for use in Class I and Class II appliance		
Automatic Action	Micro-disconnection on operation type 1.B		
Output		UL60730	EN60730
	"DO1" (Compressor relay)	120 V AC: 16 A resistive, 16FLA/72LRA 240 V AC: 10 A resistive, 10FLA/60LRA	16(16) A
Probes	Danfoss NTC sensors and Danfoss ERC accessories		
Connectors	Modular connector system for OEM customers, with optional output screw terminal adapter; Input connector type: Rast2 5 Edge connectors; output connector type: RAST 5 standard		
Programming	Programming with Danfoss KoolProg PC software and Programming key		
Assembly	Front mounting; brackets; fully integrated solution (requires OEM specific design of mounting hole)		
Display	LED display, 3 digit, decimal point and multi functionality icons; °C/°F scale		
Keypad	4 buttons (integrated IP65 design), 2 left, 2 right; user programmable		
Operating Conditions	0 – 55 °C, 93% RH, non-condensing		
Storage Conditions	-40 – +85 °C, 93% RH		
Range of Measurement	-40 – +85 °C		
Ingress Protection	Front: IP65 Rear: water and dust protection corresponds to IP31, accessibility of connectors limit rear part rating to IP00		
Environmental	Pollution degree II, non-condensing		
Resistance to heat & fire	UL94-V0		
EMC category	IEC/EN 61000-6-2, IEC/EN 61000-6-3		
Over voltage category	Category II (IEC 60664-1)		
Operating Cycles	Compressor relay: more than 100,000 at full load (16A(16A))		
Approvals	Suitable to use with flammable refrigerants, tested in accordance to EN/IEC 60335-2-24, annex CC and EN/IEC 60335-2-89, annex BB. Glow wire according to EN/IEC 60335-1 IEC/EN 60730 UL60730 NSF CQC EAC Ukraine	These approvals are only valid when using the accessories listed in this document	

IMPORTANT NOTE
The inputs are not galvanic separated and are connected directly to the mains supply!
For that reason, door-switches, sensors as well as the cables must fulfil the reinforced insulation requirements.

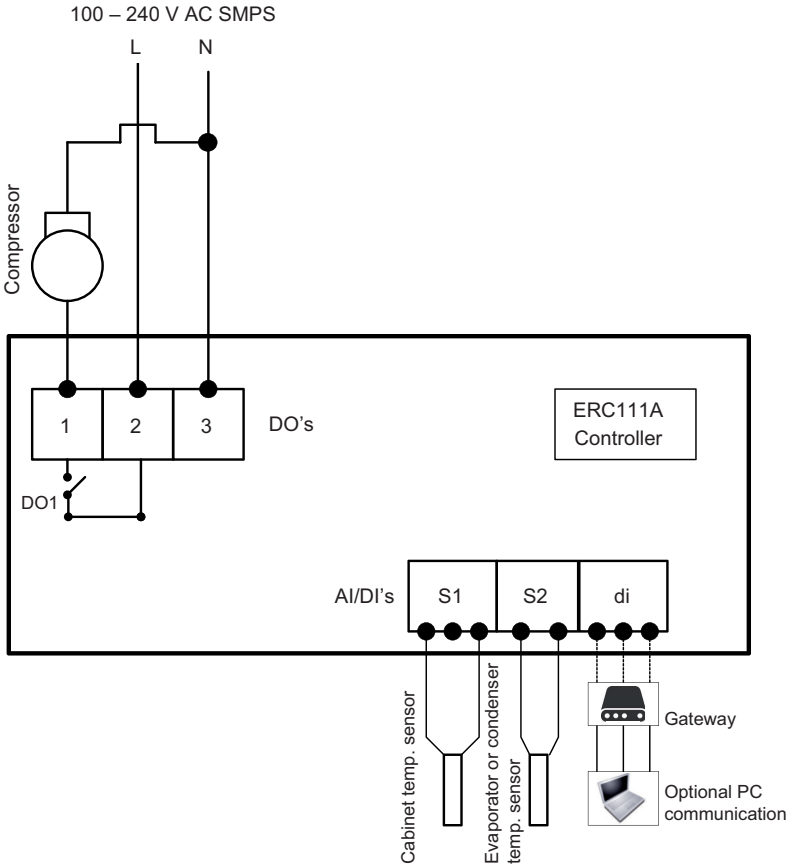
Dimensions



Front mounting
(Lock with frame)

Rear mounting
(Lock with clips)

Connections



Code numbers

Type	I-Pack	
	Qty.	Code no.
ERC 111A, Red LED, GDM without buzzer	27	**080G3230**
ERC 111A, Blue LED, GDM without buzzer	27	**080G3231**
ERC 111A, Red LED, CFF with buzzer	27	**080G3235**
ERC 111A, Blue LED, CFF with buzzer	27	**080G3236**
Version with buzzer is available only on demand		
Temperature sensors		
-40 – 85 °C, PVC Standard, NTC 5 K		
S1, 470 mm, 3-pole	120	**077F8751**
S1, 1000 mm, 3-pole	120	**077F8757**
S1, 1500 mm, 3-pole	120	**077F8761**
S1, 2000 mm, 3-pole	120	**077F8765**
S1, 2200 mm, 3-pole	120	**077F8767**
S1, 3000 mm, 3-pole	60	**077F8769**
S1, 3500 mm, 3-pole	60	**077F8723**
S1, 6000 mm, 3-pole	27	**080G2019**
-40 – 120 °C, TPE precision NTC 5 K, Santroprene		
S1, 1500 mm, 3-pole	120	**077F8726**
S1, 2000 mm, 3-pole		**077F8727**
S1, 3000 mm, 3-pole		**077F8729**
-20 – 175 °C, Silicone rubber cable, NTC 100 K		
S1/S3, 1000 mm, 3-pole		**080G2041**
S1/S3, 2000 mm, 3-pole	108	**080G2043**
S1/S3, 3000 mm, 3-pole		**080G2045**
-40 – 85 °C, PVC Standard, NTC 5 K		
S2, 1000 mm, 2-pole	120	**077F8786**
S2, 1500 mm, 2-pole	120	**077F8790**
S2, 2000 mm, 2-pole	120	**077F8794**
S2, 3000 mm, 2-pole	60	**077F8798**
S2, 6000 mm, 2-pole	27	**080G2029**

Type	I-Pack	
	Qty.	Code no.
Clips		
Black (2 needed per controller)		**080G3308**
Programming tools and other accessories		
KoolKey (EKA 200)	1	**080N0020**
Mass Programming Key (EKA 201)	1	**080N0021**
Interface cable, ERC11x (to connect with EKA 200 and EKA 201)	1	**080N0328**
Interface cable to connect EKA 201 in gateway mode	1	**080N0324**
Power Plug*		
3-pole with screw		**080G3356**
*available optional plugs with screw connection are limited to 16A		

Note: For more information about temperature sensor types and connectors, please refer to Danfoss' technical brochure "*NTC type temperature sensors for ETC & ERC controllers*".

Sx (di)= connector position.
Inputs are configurable.

Operation

Programming tools

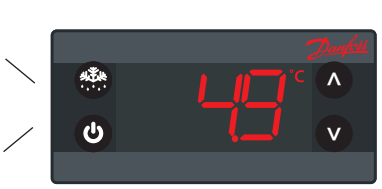
The controller can be configured in four ways:
- KoolProg software using KoolKey as a Gateway
- KoolKey as Copy key
- Mass programming Key (MPK)
- Buttons on the front panel of the controller

All these tools are supplied separately.
For technical literature and further information, please contact your local Danfoss representative.

Manual operation with buttons (Direct Access)

1 Press: variable direct function, e.g. defrost
Sub function: "*back*"

1 Press: variable direct function, e.g. ON/OFF
Sub function: "*OK*"



1 Press: temperature set point
Sub function: "*up*"

1 Press: temperature set point
Sub function: "*down*"

Examples

Changing the Desired Temperature Set point:
1. The display shows the current temperature.
2. Press "*up/down*" to access set point.
3. Press "*up/down*" to adjust set point.

After 30 seconds, the display automatically reverts to showing the current temperature

Acknowledging Alarms:
1. Display Flashing the alarm message.
2. Press any button to acknowlege.

Password protection:
1. Press "*up/down*" and hold 5 seconds to access the menu.
2. The display shows "*PAS*".
3. Press "*OK*".
4. Press "*Up/Down*" to the code.
5. Press "*OK*".

Password protection on three levels:
1. Level 1: "*shop*" (daily use by shop personnel).
2. Level 2: "*ser*" (service technician).
3. Level 3: "*OEM*" (OEM programming).

Info Menu:
The Info Menu feature provides the user with key information about the controller, allowing them to quickly access critical data points. Here are the informations that can be viewed through the Info Menu button (based on the button configuration on page 17):

Highest Cab Air Temperature: Displays the highest cab air temperature since the last power on.

Lowest Cab Air Temperature: Displays the lowest cab air temperature since the last power on.

Average Cab Air Temperature: Displays the average cab air temperature since the last power on.

Active Alarms: Displays any active alarms currently being triggered in the system.

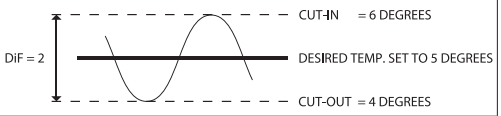
Resetting Temperature Values:
You can reset the highest, lowest, and average temperature values by pressing the Info Menu button for 5 seconds after entering the menu. This will clear the data collected since the last power on and start fresh.

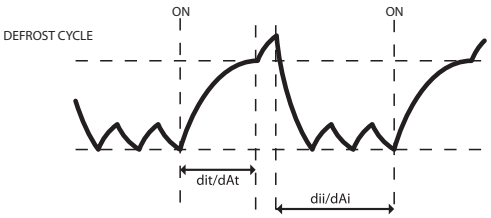
Changing a Parameter
Some parameters may be hidden to you.
When scrolling through menus, the parameters available will have been pre-determined using "*KoolProg Software*".
Your access level will determine which parameters you can view and edit:
1. Press "*up/down*" and hold 5 seconds to access the menu.
2. First parameter group is shown "*tHE*".
3. Press "*up/down*" to find the desired group.
4. Press "*OK*".
5. First parameter is shown.
6. Press "*up/down*" to find the desired parameter.
7. Press "*OK*".
8. Press "*up/down*" to find the desired setting.
9. Press "*OK*".

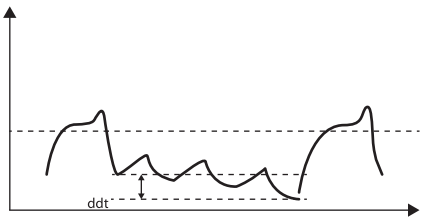
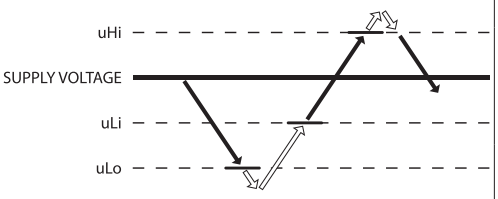
After 30 seconds, the display automatically reverts to showing the current temperature.
Or Press 2 x "*Back*".

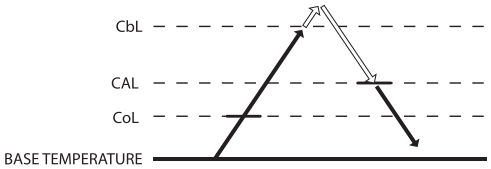
Note:
Incorrect parameter settings can lead to inadequate cooling, excessive energy consumption, unnecessary alarms and in the case of temperature-sensitive food storage, breaches in food hygiene principles and regulations.
Only a trained operator should make changes to parameters.

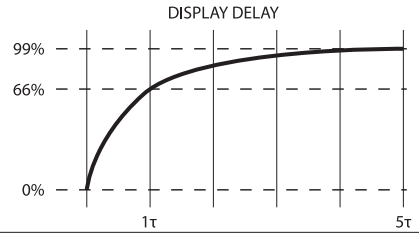
Menu/functions

ERC menu code		Description
"tHE		**Thermostat settings**
	"*SEt*" Min. -100.0°C Max. 200.0°C Default 2.0°C	**Set point** This parameter defines desired temperature to be maintained in the cabinet or storage area. The set point can be locked to a range within "HSE" and "LSE" settings. The set point can be changed quickly by simply pressing the "temperature up/down" buttons.
	"*SPr*" Min. 0.0 Max. 1.0 Default 0.5	**Current set point adjustment value diF * SPr** The default value is set to 0.5 and the parameter is hidden by default. "*Spr*" defines the position of the set point in relation to cut-in and cut-out "*Spr=0,5*" sets the set point mid between cut-in and cut-out. "Spr=0" sets the set point at the cutout. "*Spr=1*" sets the set point at cut-in
	"*diF*" Min. 0.0 K Max. 20.0 K Default 2.0 K	**Thermostat differential** This defines the difference between the cut-out and the cut-in The desired temperature is determined by "*SPr*" and "*diF*" 
	"*HSE*" Min. -100.0°C Max. 200.0°C Default 50.0°C	**Upper limit of thermostat set point** Define the temperature range limit of the controller Once set, the desired temperatue (set point) can not go above "*HSE*"
	"*LSE*" Min. -100.0°C Max. 200°C Default -35.0°C	**Lower limit of thermostat set point** Define the temperature range limit of the controller Once set, the desired temperatue (set point) can not go below "*LSE*"
	"*iCi*" Min. no Max. yes Default no	**Initial cut in** Comp relay action when Tair is between cut-in and cut-out at power-up: "*yES*": cut in the compressor "*no*": cut out the compressor
Pud		**Pull Down settings**
		Pull down (sometimes known as Super Cool) is a procedure for improving cooling performance, accelerating the time used to reach the desired temperature. Pull down settings overrule all other settings.
	"*PCy*" Min. 0 min Max. 360 min Default 30 min	**Pull Down Cycling** This is the duration in minutes of the compressor cycling at the reduced set point temperature. Once the desired pull down limit temperature "*PLt*" has been reached during pull down, the compressor will continue to cycle ON/OFF for the duration of "*PCy*". At the end of the period defined by "*PCy*", the set point temperature will return to normal and pull down will cease.
	"*Pdi*" Min. 0 hour Max. 48 hour Default 15 hour	**Pull Down Defrost Interval** Even though most applications do not need Defrost during pull down, an extended defrost during pull down can be applied. This is the time between defrost cycles during pull down. It is measured in hours and can be up to 48 hours. During pull down, this setting overrides the defrost interval and defrost time settings (see the defrost section).
	"*Pdd*" Min. 0 hour Max. 48 hour Default 24 hour	**Pull Down Duration** You can choose to limit the maximum pull down time. Once this time value (max. 48 hours) is reached, pull down will stop regardless of whether the desired pull-down temperature has been reached.
	"*PLt*" Min. -55.0°C Max. 55.0°C Default 0.0°C	**Pull Down Limit Temperature** This parameter sets the cut out temperature during pull-down. In order to protect valuable contents you must always specify this parameter value greater than or equal to the absolute minimum temperature allowed in your application. For glass door merchandisers 0 °C / 32 °F protects bottles from freezing; for commercial fridges you may opt for a slightly higher temperature (e.g. 2 °C)

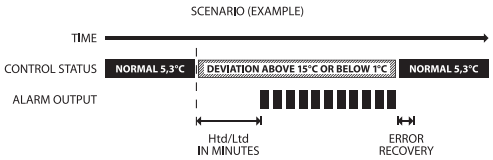
dEF		Defrost settings
	"*dFt*" Default no	**Defrost Type** "*no*": defrost function is disabled. "*nat*": OFF-cycle defrost (natural defrost).
	"*Add*" Min. no Max. yes Default no	**Adaptive defrost** "*no*": defrost controlled by time. "*yES*": automatic defrost control activated.
	"*dtt*" Min. 0.0°C Max. 25.0°C Default 6.0°C	**Terminate Temperature** This parameter defines at what temperature the defrost cycle will stop. The temperature is given by the evaporator sensor or by the cabinet temperature sensor if no evaporator sensor is used.
	"*drt*" Min. 0.0°C Max. 200.0°C Default 5.0°C	**Defrost reset temperature** The defrost counter is saved and restored at power-up, but if the temperature sensor, used for defrost, is higher than this value at power-up, it is assumed that the evaporator is free of ice and the defrost counter will be cleared.
	"*dii*" Min. 1 hour Max. 96 hour Default 6 hour	**Defrost minimum Interval/dii** Defines the minimum time period between the start of two defrost cycles. Once the minimum interval has expired, the defrost cycle will start at the following cut-out or once the maximum interval "*dAi*" has been reached. 
	"*dAi*" Min. 1 hour Max. 96 hour Default 7 hour	**Maximum Interval** Defines the maximum time period between the start of two defrost cycles.
	"*dit*" Min. 0 min Max. 240 min Default 5 min	**Minimum Time** Defines the minimum duration of a defrost cycle. During this period, the controller will not check the temperature. Once the minimum time has expired, the temperature will be checked and if the terminate temperature "*dtt*" has been reached, the defrost cycle will end. If dtt has not been reached, defrost will continue until either dtt is reached or the maximum time "*dAt*" reached, whichever occurs first.
	"*dAt*" Min. 0 min Max. 480 min Default 30 min	**Maximum Time** Defines the maximum duration of a defrost cycle. The controller will not allow a maximum time to be entered which is less than the minimum time, or a minimum time which is more than the maximum time.
	"*dCt*" Min. no Max. yes Default no	**Defrost ON Compressor Time** If this parameter is set to "*yES*", then defrost cycles are based on the total time the compressor has been running. If this parameter is set to no, then defrost cycles are related to elapsed time, regardless of how long and how often the compressor has been on.
	"*doC*" Min. 0 hour Max. 24 hour Default 0 hour	**Defrost by Comp. running time** Continuous compressor running can cause defrost. "*0*" = deactived
	"*dEt*" Min. -50.0°C Max. 0.0°C Default -50.0°C	**Defrost start evaporator temp** Defrost start trigger for adaptive defrost.

	"*ddt*" Min. 0.0 K Max. 30.0 K Default 5.0 K	**Defrost Δt** Defrost Δt compare with evaporator temperature of first cut out after defrost to trigger defrost start. The defrost start if evaporator temperature has decreased more than "ddt" 
	"*idi*" Min. 0 hour Max. 96 hour Default 3 hour	**Initial Defrost Interval** The initial defrost interval determines the time for first defrost after power-up. The initial defrost is mainly intended for factory testing of the defrost functionality and can be set to expire after a number compressor cycles according to the setting of parameter idd. During normal operation, the defrost counter will be saved in memory and restored after power loss, making the initial defrost unnecessary.
	"*idd*" Min. 0 Max. 999 Default 100	**Initial Defrost Duration** The initial defrost duration is the number of compressor cycles before the initial defrost is deactivated. "*0*": "*idi*" No initial defrost. "*1-998*": number of compressor cycles before deactivation. "*999*": initial defrost always active.
CoP		**Compressor settings**
	"*uPt*" Min. no Max. yes Default no	**Voltage protection** "*no*": no voltage protection. "*yES*": voltage protection activated based on voltage related settings.
	"*uLi*" Min. 0 V AC Max. 270 V AC Default 0 V	**Minimum cut-in voltage/uLi. Minimum cut-out voltage/uLo. Maximum voltage/uHi** These three parameters provide voltage protection to the compressor. Start by setting "*uHi*", followed by "*uLo*" and "*uLi*". "*uLi*": when the compressor is due to start, the voltage of the power supply will be checked and the compressor will only be allowed to start if it is at least the value given in this parameter. "*uLo*": when the compressor is running, it will be switched OFF if the voltage goes below that given in this parameter. "*uHi*": when the compressor is running, it will be switched OFF if the voltage exceeds that given in this parameter. If the compressor is already stopped, it will remain switched OFF. 
	"*uLo*" Min. 0 V AC Max. 270 V AC Default 0 V	
	"*uHi*" Min. 0 V AC Max. 270 V AC Default 270 V	
	"*EHd*" Default no	**Sensor Error Type** "*no*": no sensor error handling. "*SEt*": in case of control sensor error, follow error run/stop time. "*Aut*": automatical sensor error handling.
	"*Ert*" Min. 0 min Max. 60 min Default 0 min	**Error Run Time** The parameter only become active in the unlikely event of a broken temperature sensor. It is used to run the application in safety mode. At the same time the sensor error will be shown in the display. "*Ert*" define the duration the compressor will run. Example: "*Ert=4*" [min] and "*ESt=16*" [min] will provide an average cooling system activity of 20%. Ert and "*ESt*" values are based on OEM experience and are by default inactive.
	"*ESt*" Min. 0 min Max. 60 min Default 1 min	**Error Stop Time** The parameter only become active in the unlikely event of a broken temperature sensor. It is used to run the application in safety mode. At the same time the sensor error will be shown in the display. "*ESt*" define the duration the compressor will be "*idle*".

	"*CSt*" Min. 0 min Max. 30 min Default 2 min	**Minimum Stop Time** It determines the minimum number of minutes the compressor must remain idle before a Temperature cut-in can take effect. For example, if the temperature sensor indicates that the cut-in temperature has been reached, but the number of minutes set in this parameter have not elapsed since the compressor last stopped, then the compressor will stay OFF. It will only start once the duration given by "*CSt*" has been reached provided the temperature is still high enough. "*CSt*" thus overrides the cut-in.
	"*Crt*" Min. 0 min Max. 30 min Default 0 min	**Minimum Run Time** It determines the minimum number of minutes the compressor must run before a Temperature cut-out can take effect. For example, if the temperature sensor indicated that the cut-out temperature has been reached, but the number of minutes set in this parameter have not elapsed since the compressor last started, then the compressor will continue. It will only stop once the duration given by "*Crt*" has been reached – provided the temperature is still low enough. "*Crt*" thus overrides the cut-out.
	"*Cot*" Min. 0 min Max. 480 min Default 0 min	**Maximum OFF Time** This is the maximum time in minutes the compressor is allowed to "*idle*" – up to 480 minutes. Cot is set to zero by default (inactive). If the controller is used on a draft beer (ice bank) application, this parameter can be used to control the ice thickness.
	"*Pod*" Min. 0 s Max. 300 s Default 300 s	**Power ON Delay** This is the delay in seconds between power-on and the compressor being activated. Depends on the power ON temperature setting.
	"*Pot*" Min. -100.0°C Max. 200.0°C Default -100.0°C	**Power ON Temperature** This parameter is used to accelerate the first application test on the OEM assembly line; if the cabinet temperature is higher than this parameter the power ON Delay is overruled and the outputs are activated without delay.
Con		**Condenser Protection settings**
		NOTE: A condensor temperature sensor is required to use these parameters. Condenser protection is generally used in dusty environments where the condenser may accumulate a layer of dust or dirt and therefore be at risk of overheating.
	"*CAL*" Min. 0°C Max. 200°C Default 80°C	**Condenser Alarm Limit/CAL** This parameter sets the temperature for the condenser at which an alarm will be generated. 
	"*CbL*" Min. 0°C Max. 200°C Default 85°C	**Condenser Block Limit/CbL** This parameter sets the temperature which if reached will cause the compressor to switch OFF.
	"*CoL*" Min. 0°C Max. 200°C Default 60°C	**Condenser OK Limit/CoL** This parameter sets the temperature at which the compressor is allowed to start again after the temperature set in "*CbL*" above has been exceeded and the compressor stopped.
	"*CLL*" Min. -100°C Max. 20°C Default -5°C	**Condenser Low Limit/CLL** This parameter sets the lowest (condenser) temperature at which the compressor is allowed to start.

diS		Display settings
		NOTE: some display parameters can be set in such as way that they may be illegal in some jurisdictions. Please check local legislation.
	"*din*" Min. 2 Max. 10 Default 10	**Display Intensity** The controller can have its display intensity (brightness) set in one of two ways: A) With a Danfoss ambient light sensor attached, the brightness of the display is adjusted automatically according to the ambient light level (see the assignments section). B) When no ambient light sensor is attached, the display intensity can be set to a fixed intensity. Both options are on a scale of 1 to 10, where 10 is the brightest.
	"*CFu*" Min. °C Max. °F Default °C	**Display Unit** This parameter sets the display to Fahrenheit or Celsius. Switching from one to the other will cause all temperature settings to be automatically updated accordingly.
	"*trS*" Default SCo	**Temp sensor to display** "*SCo*": temperature control. "*EuA*": evaporator temperture. "*Con*": condenser temperature (condenser cleaning). "AuS": only for showing on display.
	"*rES*" Min. 0.1 Max. 1 Default 0.1	**Display Resolution** This parameter can be set to 0.1, 0.5 or 1 and affects the way the temperature is displayed. With the parameter set to 1, the display will only ever show temperatures rounded to the nearest whole degree. At 0.5, it will round the temperature to the nearest half degree for display. For example, 3.3 degrees will be shown in the display as 3.5 degrees and 3.9 as 4.0. With the parameter set to 0.1, no rounding occurs. This parameter does **not** affect the temperature itself, merely the display.
	"*rLt*" Min. no Max. yes Default no	**Display Range Limit** In some point of sales applications you may want to show the desired instead of the real temperature. This parameter sets whether the displayed temperature is the actual temperature or whether it is restricted to the cut-in / cut-out limits. Set to "*nO*" means that the actual temperature will de displayed. The parameter is set to "*nO*" by default.
	"*ddL*" Min. 0 s Max. 10 min Default 0 min	**Display Delay** In order to provide a realistic temperature appearance for an application, a display delay can be set. The parameter sets the time constant τ (tau) of the moving average filter for the display. Physically, one time constant represents the time it takes the system's step-response to reach 66% of its final value and five time-constants the time it takes to reach 99% of its final value. 
	"*doF*" Min. -10.0 K Max. 10.0 K Default 0.0 K	**Display Offset** This parameter is a relative value and allows the temperature displayed to be different to the temperature measured. For instance, at a measured temperature of 7°C and "*doF*" set to -2K, the displayed temperature will be 5°C instead.
	"*dLt*" Min. 0 min Max. 60 min Default 15 min	**Lock Time After Defrost** In order not to show a rising temperature during defrosting, the displayed temperature is locked at the temperature shown at the start of the defrost cycle for the number of minutes set in this parameter. "*0*": no lock.
	"*SSC*" Min. no Max. yes Default no	**Show Pull down state** If set to "*yES*", this parameter causes the display to show SC when the system is in pull down mode. If set to "*nO*", the temperature continues to be displayed.

	"*SHo*" Min. no Max. yes Default no	**Show Holiday** "*no*": display will show temperature or ECO mode during holiday mode. "*yES*": display will show "*HoL*" during holiday mode.
	"*SdF*" Min. no Max. yes Default yes	**Show Defrost** If set to "*yES*", this parameter causes the display to show DEF when the system is in defrost mode. If set to "*nO*", the temperature continues to be displayed.
	"*SCS*" Min. no Max. yes Default yes	**Show compressor symbol** "*no*": compressor symbol will not show on display. "*yES*": show compressor symbol on display.
	"*SdS*" Min. no Max. yes Default yes	**Show Defrost symbol** "*no*": defrost symbol will not show on display. "*yES*": show defrost symbol on display.
	"*idp*" Min. 0 Max. 15 Default 15	**Info Menu Display Item** Switch of display items in Info menu. Visible on "*KoolProg Software*" ONLY. Data structure: 0,0,0,0, (alarm item), (average item), (low temp), (high temp)".
ALA		**Alarm settings**
	"*HAt*" Min. -100.0°C Max. 200°C Default 15.0°C	**High Temp Alarm** Absolute value. By setting "*HAt*" to the maximum alarms will be deactivated.
	"*LAt*" Min. -100.0°C Max. 200°C Default -50.0°C	**Low Temp Alarm** Absolute value. By setting "*LAt*" to the minimum value, alarms will be deactivated. In most situations, the low alarm delay will be set to 0 to warn about too low a temperature immediately.
	"*Htd*" Min. 0 min Max. 240 min Default 30 min	**Alarm delay on high temperature alarm** The number of minutes to wait before sounding an alarm once the high temperature alarm temperature is reached.
	"*Ltd*" Min. 0 min Max. 240 min Default 0 min	**Alarm delay on low temperature alarm** The number of minutes to wait before sounding an alarm once the low temperature alarm temperature is reached.
	"*Pdd*" Min. 0 min Max. 960 min Default 240 min	**Pull down delay** Normally, it is not necessary or desirable to sound an alarm during a pull down (the initial phase of reaching the desired temperature). This parameter prevents the high temperature alarm "*HAt*" sounding during pull down and after a defrost for the number of minutes set for the parameter. NOTE: it does not apply to the low temperature alarm "*LAt*".
	"*uAL*" Min. no Max. yes Default no	**Voltage alarm** "*no*": no voltage alarm. "*yES*": voltage alarm activated.
	"*LEA*" Min. 0 hour Max. 96 hour Default 0 hour	**Leakage alarm** Leakage detection for compressor protection. "*0*": disable

	"*Abd*" Min. 0 min Max. 999 min Default 0 min	**Alarm Buzzer Duration** The alarm sounds for 10 seconds, followed by silence for 50 seconds. One alarm sequence therefore lasts 60 seconds. These values cannot be changed. This parameter determines how long in minutes an audible alarm will continue while there is still a reason to have an alarm. If set to 999, the alarm will continue to sound until the reason for the alarm is cleared – for example the temperature has dropped enough or the door closed. In some cases, it may be necessary for a user or technician to take action in order to clear the alarm. If set to 0, the alarm will never sound.
	"*ACA*" Min. no Max. yes Default yes	**Auto Clear of Alarm/Error/ACA** If this parameter is set to "*nO*": The alarm status will not disappear automatically even if the condition which caused the alarm is no longer valid or present. If set to "*yES*": As soon as the condition which caused the alarm is no longer valid or present, the alarm status will automatically change back to inactive. There will be no trace of the alarm having occurred. In general, glass door merchandise applications will be set to "*yES*" and commercial fridges and freezers set to "*nO*". For example, if the temperature goes too high for a period there may be food safety considerations in a freezer containing food but not in a fridge with cold drinks. 
ECS		**ECO strategy**
	"*tto*" Min. 0 hour Max. 168 hour Default 0 hour	**Time to pull down** Time which ERC stay in holiday mode to decide to enter pull down or serving mode.
ECA		**ECO management**
	"*Hto*" Min. -25.0 K Max. 25.0 K Default 6.0 K	**Holiday Temperature Offset** Increase or decrease of temperature with respect to normal mode during holiday mode.
ASi		**Assignments settings**
	"*uSA*" Min. no Max. yes Default no	**MODBUS Safety** "*on*": MODBUS auto detection is enabled. "*yES*": MODBUS communication is deactivaed.
	"*t1A*" Min. -20.0 K Max. 20.0 K Default 0.0 K	**Air Temperature Adjustment** **(applies to non-Danfoss temperature sensors only)** This parameter is a relative value and allows adjustment of the control sensor temperature. For instance, at a measured temperature of 7*C and "*tAd*" set to -2 K, the input from the control sensor will be 5*C instead.
	"*t2A*"	
		Inputs and outputs are configurable There are two steps: 1. Define the type of sensor attached to the input: - **temperature**: light/digital. 2. Define the application for the sensor: - **temperature**: control/condenser/evaporator. - **light**: ECO/display/both. **- motion** - **digital**: door sensor. Please contact your local Danfoss representative for information about default settings. NOTE: coded sensors will impact on the number of possible configurations. For instance: Danfoss supplies only 2-pole defrost sensors, so input "*S3*" will most likely be used as a defrost/evaporator temperature sensor input.

	"*S1C*" Default Stn	**S1 Config/S1C** **S2 Config/S2C** Available options are: "*Stn*": for a standard temperature sensor NTC 5 K @ 25°C and TPE precision. "*Htn*": for a high temperature sensor NTC 100 K @ 25°C.
	"*S2C*" Default Stn	
	"*S1A*" Default SCo	**S1 Application/S1A** **S2 Application/S2A** Available options are: "*nC*": not connected. "*SCo*": temperature control. "*EuA*": evaporator temperature. "*Con*": condenser temperature (Condenser cleaning). "*AuS*": only for showing temperature on display.
	"*S2A*" Default nC	
	"*o1C*" Default CoP	**D01 Config** "*CoP*": direct compressor control. "*PiC*": pilot Relay (no zero cross) – if using pilot relay to control a compressor, this option must be used instead of "*CoP*". "*HEt*": heating application, inverse output. "PiH": pilot heat relay (no zero cross).
	"*b1C*" Default noP	Lower left button: **Button 1 Config (short press)/b1C** **Button 1 Config (long press)/b1L** Upper left button: **Button 2 Config (short press)/b2C** **Button 2 Config (long press)/b2L** Upper right button: **Button 3 Config (short press)/b3C** **Button 3 config (long press)/b3L** Lower right button: **Button 4 Config (short press)/b4C** **Button 4 Config (long press)/b4L** The buttons can be programmed as follows:
	"*b1L*" Default PoF	
	"*b2C*" Default dEF	
	"*b2L*" Default inF	
	"*b3C*" Default tP	
	"*b3L*" Default ECo	
	"*b4C*" Default tn	
	"*b4L*" Default Lig	
	"*PS1*" Min. 0 Max. 999 Default 0	**Password level 1 / PS1** **Password Level 2 / PS2** **Password Level 3 / PS3** These assign passwords to the three levels of access. The password is a three-digit number. Access levels are Shop, Service and OEM. You may not therefore have access to change all the passwords. Passwords are entered by using the up and down arrow buttons. Danfoss advises against using passwords which are easy to remember or enter, for example 111, 222, 123 etc. **NOTE**: When accessing the controller with 3 wrong password in a sequence ERC will automatically block access for 15 minutes.
	"*PS2*" Min. 0 Max. 999 Default 0	
	"*PS3*" Min. 0 Max. 999 Default 0	

Short press function	Long press function
"*noP*": not operating	"*noP*": not operating
"*tP*": increase set point	"*tP*": increase set point
"tn": decrease set point	"*tn*": decrease set point
"*dEF*": toggle defrost	"*dEF*": toggle defrost
"*SuP*": toggle super-cool/pull down	"*SuP*": toggle super-cool/pull down
"*diP*" : increase display intensity	"*diP*": increase display intensity
"*din*" : decrease display intensity	"*din*": decrease display intensity
"*CFA*": toggle °C and °F	"*CFA*": toggle °C and °F
	"*PoF*": ERC power ON/OFF
	"*HoL*": enter holiday mode
	"*inF*": enter info menu

NOTE: Your assignments may not be shown on the printed buttons. We advice to use this functionality together with the fully integrated mounting model only.

Ser		Service information settings
		The parameters in the following section are READ ONLY and cannot be changed by the user. They provide information for technicians and OEM users. **NOTE**: the only parameters that can be configured are: "*oEL*", "*oEn*", "*oEH*". These parameters allow OEMs to enter their own product code.
	"*ACt*"	**Accumulated Comp. run time**
	"*AEt*"	**Accumulated ERC up time**
	"*uAC*"	**Voltage value** Current main power supply voltage.
	"*ouS*"	**DOs Status** Current relay open closed status.
	"*rL1*"	**Relay 1 counter** Thousands of cycles of compressor relay since manufacture.
	"*int*"	**Interval Counter** Compressor run time since last defrost.
	"*dnt*"	**Defrost time counter** Duration of last defrost cycle [min].
	"*Snu*"	**Serial number** Serial number given at manufacturing.
	"*Fir*"	**SW version** Danfoss software version number.
	"*HAr*"	**HW version** Danfoss hardware version number.
	"*onL*"	**OrderNoLow** Danfoss order code number.
	"*onH*"	**OrderNoHigh** Danfoss order code number.
	"*oEL*"	**OEM code Low**
	"*oEn*"	**OEM code Middle**
	"*oEH*"	**OEM code High**
	"*PAr*"	**Parameter version** OEM parameter version number [requires EKA copy key update].
	"*CHd*"	**Manufacturing date** Programme date WWY: week number and year number (2010-19).
	"*SFC*"	**Set as Default** Resets all parameters to last good OEM settings.
	"*Ctt*"	**Condenser Temp** Temperature of the condensor sensor.
	"*Et1*"	**Evaporator1 Temp** Temperature of the evaporator sensor1.
	"*AuS*"	**AUX Temp.** Temperature of the AUX sensor. invisible.
	"*att*"	**Raw Sair Temp**

		Display messages
	"*unP*"	**Device is unprogrammed (relay output is lockt)**
	"*Prg*"	**Device has not finished programming (relay output is lockt)**
	"*SC*"	**Device is in pull-down mode (super-chill)**
	"*dEF*"	**Device is defrosting**

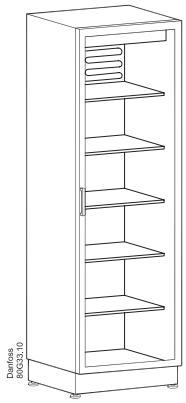
Troubleshooting

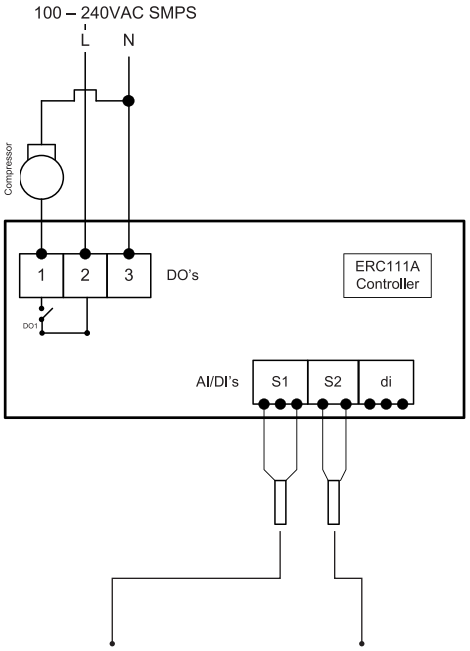
Problem	Probable cause	Remedy
Compressor does not start	Waiting for compressor delay timer Defrost in progress Line voltage to compressor too low or too high	Check CoP->CSt Check CoP ->Pot /Pod Check dEF ->dit, dot Check CoP->uLi, uLo, uHi
Defrost does not start	Controller in pull down mode	Defrost might be delayed during pull down Check parameter Pud->Pdi
Alarm does not sound	Alarm delayed	Check ALA->Htd, Abd Check Pud->Pdd
Display alternates between condenser and temperature	Condenser too hot	Clean condenser Check Con ->CAL, CbL
Display alternates between high and temperature	Temperature too high	Check ALA->HAt
Display alternates between low and temperature	Temperature too low	Check ALA -> LAt
Display shows "*dEf*"	Defrost in progress	Check diS ->SdF

Alarm code	Trigger	Automatic clearance	Outputs	Comments
"*Hi*"	Air temperature is higher than "*ALA->Hat*" for "*ALA->Htd*"	User configured	Blink "*Hi*" with the highest temperature; If configured: cut in alarm relay, beep the buzzer	High temperature alarm
"*Lo*"	Air temperature is lower than "*LAt*" for "*Ltd*"	User configured	Blink "*Lo*" with the lowest temperature. If configured: cut in alarm relay, beep the buzzer	Low temperature alarm
"*Con*"	Condenser temperature is too high or too low	User configured	Blink "*Con*". If configured: cut in alarm relay, beep the buzzer	Condenser alarm
"*uHi*"	Line voltage is higher than "*Cop->uHi*"	Always	Blink "*uHi*". If configured: cut in alarm relay, beep the buzzer	High voltage alarm
"*uLi*"	Line voltage is lower than "*Cop->uLi*"	Always	Blink "*uLo*". If configured: cut in alarm relay, beep the buzzer.	Low voltage alarm
"*LEA*"	Compressor continuous running for more than "*ALA->LEA*"	Always	Blink "*LEA*". If configured: cut in alarm relay, beep the buzzer	Leakage alarm
"*E01*"	"*S1*" error	Always	Blink "*E01*". If configured: cut in alarm relay, beep the buzzer	"*S1*" sensor failure (short or open)
"*E02*"	"*S2*" error	Always	Blink "*E02*". If configured: cut in alarm relay, beep the buzzer	"*S2*" sensor failure (short or open)

Typical applications

Glass Door Merchandiser, No-frost freezer/sub-zero cooler





ERC 111A	
ERC 111A, Red LED, without buzzer	**080G3230**
ERC 111A, Blue LED, without buzzer	**080G3231**

Temperature Sensor for Cabinet Temperature Control	
PVC Standard Connector type 3-pole	
470 mm	**077F8751**
1000 mm	**077F8757**
1500 mm	**077F8761**
2000 mm	**077F8765**
2200 mm	**077F8767**
3000 mm	**077F8769**
3500 mm	**077F8723**
6000 mm	**077F2019**

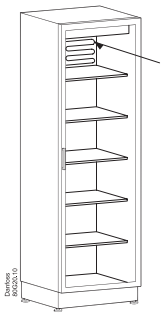
Temperature Sensor for Condenser Temperature Control	
PVC Standard Connector type 2-pole	
1000 mm	**077F8786**
1500 mm	**077F8790**
2000 mm	**077F8794**
3000 mm	**077F8798**
6000 mm	**077F2029**

Sensor placement

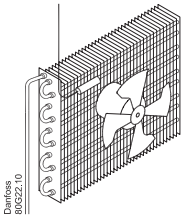
Control sensor

The control sensor must always be connected and is used for controlling the cut-in and cut-out of the compressor according to the set point.
The sensor is also used for the displayed temperature.

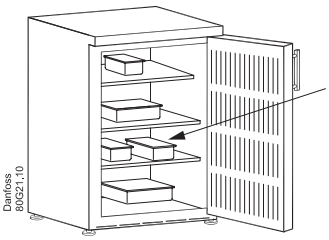
Control sensor



Vertical coolers with fan
Most common placement is in the return air to the evaporator. The sensor can be placed close to the fan – even when the fan is pulsed during compressor OFF periods: the updating of the temperature is blocked when the fan is stopped and only updated when the fan has been running for a while, so that the heat from the fan does not affect the temperature reading.
For applications sensitive to sub-zero temperatures, sensor placement in the evaporator outlet air can be considered.

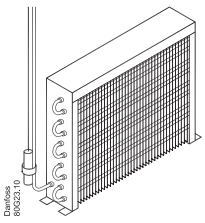


Vertical freezers with fan
Placement in the return air or in the freezer compartment.



Coolers without fan
The best results are normally obtained when the sensor is placed at the side-wall, 10 cm from the back and approximately at 1/3 from the bottom or where the evaporator ends.
The control sensor must always be connected and is used for controlling the cut-in and cut-out of the compressor according to the set point.
The sensor is also used for the displayed temperature.

Condenser sensor



The condenser sensor is used to protect the compressor against high pressure when the condenser is blocked or the condenser fan fails.

Placement of sensor
Place the sensor at the liquid side of the condenser. Use a metal bracket or metal tape to ensure good thermal conductivity. Be sure that the cable does not pass hot spots at the compressor or condenser that exceeds 80°C.

Application Matrix

ERC 111A		Output	Input		
Application	**Type**	**DO1**	**S1**	**S2**	**Di**
Standard beverage cooler	ERC 111A	Comp	Control	Defrost or condenser	-
Out-door beverage cooler	ERC 111A	Comp	Control	Defrost or condenser	-
CFF refrigerator	ERC 111A	Comp	Control	Defrost or condenser	-
CFF freezer static evaporator	ERC 111A	Comp	Control	Condenser	-

NOTE:
- Select only one function per input, e.g. defrost or condenser sensor.
- Make sure that the accessory you select has a matching connector to the input, e.g. a sensor for input "*S2*" must have "*S2*" connector.
- Condenser sensor are optional and can be omitted.

Danfoss A/S
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