

MAKING MODERN LIVING POSSIBLE



ERC 102 refrigeration controller

Reference manual

This reference manual is intended to be used primarily by OEMs for the purposes of programming ERC 102. It may also be useful for technicians. It is not intended as a user guide for end users.



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1. INTRODUCTION

The ERC 102 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 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 200 different parameters to fit all individual requirements.

ERC 102's IP rated body, advanced materials and internationally approved hardware design open it up for use in almost any climate globally, indoors as well as outdoors.

Laboratory work with ERC 102 is rendered easy and flexible. Danfoss KoolProg software with a USB-powered gateway accelerate programming; on the OEM assembly line, just one Danfoss unique Docking station can easily program up to 3,000 controllers a day – at zero inventory cost.

It uses a globally-compatible, lightweight, switch mode power supply.

All components have been carefully selected to help reduce the CO₂ footprint. The globally-compatible internal power supply uses an average of just 0.7W – 4 times less than an average controller today.

Sensors include ambient light for display brightness, which also detect shop opening hours for energy-saving routines. Door and temperature sensors provide input for controlling the compressor, the light, the fan and automatic defrosting.

2. CONTENT OF THE BOX



If delivered in a sample box the following content is shipped. The sample box is not available for other than sample purposes.

See Appendix II for code numbers and lengths.
For box lots (pcs per box), please contact your local Danfoss representative.

2.1 Main product



ERC 102 control unit without front frame.

NOTE: The front frame is included in the sample box.

2.2 Accessories



Control temperature sensor: See Appendix II for different lengths and connector types.



Defrost temperature sensor: should be mounted on the evaporator. For detailed mounting instructions, please contact your local Danfoss representative.

NOTE: Defrost sensors can also be used as condenser sensors.



Condenser temperature sensor: should be mounted on the condenser. For detailed mounting instructions, please contact your local Danfoss representative.

NOTE: This sensor is not included in the sample box .
Defrost sensors can also be used as condenser sensors.



Door sensor connector cable: please see Appendix II for lengths and code numbers.

NOTE: *Door sensor: is optional and is a connector and cable with spade terminals compatible with door contacts used in refrigeration applications.*



Light sensor: is optional and is used to measure the level of ambient light around the cabinet so that night and day (Economy / Normal) modes of operation can automatically be set, as well as the brightness of the display.



Power plug: for laboratory use, low quantity OEM production or whenever spade connectors are not available.



Clips: are used to secure the ERC 102 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 ERC 102. See Chapter 4 – Mounting – for further details.

2.3 Connections



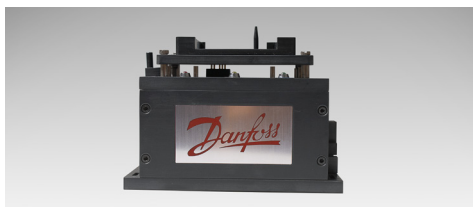
Programming an individual unit in a laboratory:

the USB gateway requires KoolProg Software running on a PC. It enables parameters to be set in real time and an array of status information to be read (bidirectional connection). This method is used to determine the correct parameters during R&D.

Once the desired settings have been determined, a KoolProg ERC specific parameter file is saved to the EKA183 USB copy key for later mass programming.



The USB Gateway is a laboratory tool, offering fast and easy programming of any ERC102 controller. KoolProg software installation is provided; the gateway is standard inventory for OEM labs.



Mass programming on an assembly line:

the docking station is used for high volume programming of ERC controllers, for example on an assembly line. The docking station is a write-only device.

See above (Programming an individual unit) for preparing the EKA183 USB copy key, which is to be inserted into the docking station. The settings are then loaded into each successive controller in a matter of seconds.

KoolProg software is not required for mass programming.

Note: please refer to the koolprog manual for more details about programming.



KoolProg: is the software from Danfoss for programming the ERC 102 via a USB cable and a PC rather than with the front panel buttons. Please refer to the KoolProg manual for details.

3. OVERVIEW OF THE PRODUCT

The ERC 102 is a state-of-the art, IP65 (front)-rated refrigeration controller for use in both Glass Door Merchandising and Commercial Fridges and Freezer applications.

With four inputs and four outputs, powerful algorithms and input from multiple sensors, the ERC 102 delivers both energy-saving routines and compressor, light, fan and defrost control.

Together with the Danfoss docking station, programming of pre-prepared parameter sets can be achieved in just five seconds. There are over 200 parameters (see Chapter 7) including innovative features such as night mode detection, store opening detection, door open alarm control and display dimming for restaurants.

The ERC 102 can also be programmed via USB using the Danfoss KoolProg software, allowing the most suitable parameter findings to be found quickly during the application development process.

It is also possible to operate and program the controller using the control buttons (only when actually installed in a refrigerator / freezer).

Overview of ERC 102 models:

Model:	Digital outputs:
ERC 102A	1 relay
ERC 102C	3 relays
ERC 102D	4 relays

3.1 Control buttons

The ERC 102 has **four buttons** (circled in image) on the front which can be programmed to perform different functions. See Chapter 6 – Configuration of inputs and outputs for detailed information.



3.2 Connector inputs

Connect up to four Danfoss original sensors according to your application needs.

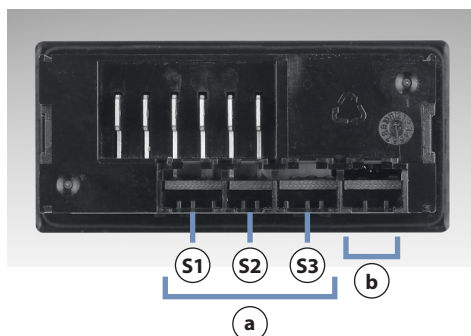
There are three **analogue inputs**: S1, S2 and S3 (a).

Supported input options:

- Ambient light - analogue data [luminens]
- Cabinet (air) temperature - analogue data [°C]
- Evaporator temperature - analogue data [°C]
- Condenser temperature - analogue data [°C]
- Digital input - binary data [on/off]

There is one **digital input**: diC (b) for PC communication being used either with a door sensor or with the USB Gateway.

The **ambient light** sensor can be used for determining shop open / closed times for economy mode switching, for determining the brightness of the LED display or both.



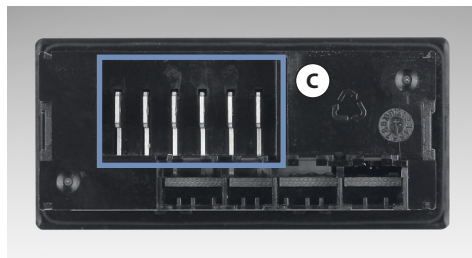
NOTE: for detailed information refer to section 6.1.

3.3 Connector outputs

All **four outputs** (C) are digitally controlled on/off relays.

Functions controlled are:

- Compressor
- Pilot Relay
- Heater
- Defrost heater / valve for hot gas
- Alarm
- Fan
- Light



3.4 Top label

The illustration shows an example of a top label affixed to an ERC 102D. The examples show what is connected:

- Output 1 is used to switch the compressor on and off.
- Outputs 2 and 3 are power – Live and Neutral.
- Output 4 is used to switch the heater on and off.
- Output 5 is used to switch the fan on and off.
- Output 6 is used to switch the light on and off.
- Input D (S1) is connected to a Cabinet Sensor to measure temperature inside the cabinet.
- Input C (di) is used for Communications – a docking station or KoolProg software running on a PC.
- Input B (S2) is connected to an Evaporator Temperature Sensor.
- Input A (S3) is connected to an Ambient Light Sensor.

NOTE: Parameters depend on the code number supplied. Please refer to the code number specific technical drawing or use the KoolProg information menu. For other applications, a condenser sensor and a door sensor may be used.

MADE IN CHINA

Type ERC 102D

No. 080G3107

100-240Vac, +/-10% 50/60Hz

OT55

DO	❄	~	🔥	✂	☀
1 (o1)	✓				
2		L			
3		N			
4 (o2)			✓		
5 (o3)				✓	
6 (o4)					✓

DO1:UL:9.BFLA 58.BLRA, IEC: 16(16)A
 DO4: UL: 8A / 2FLA 12LRA / TV1, DO5-6: 2FLA 12LRA / TV1
 DO4-6: IEC: Max total load 10A, individual 8A / 2(2)A

Input / Sensors	Cabinet Sensor	Evapor. Sensor	Conden. Sensor	Door Sensor	Light Sensor	Com.
D(S1)	✓					
C(S2)		✓				
B(S3)					✓	
A(di)						✓

1	2	3	4	5	6	DO & Input/ Sensors
			D(S1)	C(S2)	B(S3)	A(di)

4. MOUNTING

There are three options for mounting the ERC 102 in a freezer or refrigerator.

SAFETY INFO

Risk of electrocution!

For mounting: Do not connect mains power until the controller is correctly mounted.

For unmounting: Disconnect the power supply before unmounting.

4.1 Rear mounting – Option 1

1. Insert the ERC 102 into the cabinet.



2. Attach the clips to each side of the ERC 102.



3. Place the front frame on to the ERC 102 and click it into place.



4. Connect the sensors and outputs as required and then the power cable (see Chapter 6 – parameters for information about programming which inputs and outputs are applicable to your configuration).

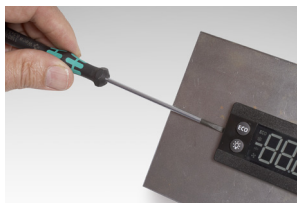


4.1.1 Unmounting

1. Disconnect the power cable and then the sensors.



2. Use a flat head screwdriver (ideally the one supplied with the ERC 102 sample package) and insert it carefully between the front frame and the controller.



3. Gently **twist** the screwdriver to remove the front frame. Do this in four places next to each clip area.



5. Reach around the side to the clips.



6. Press the centre section of each clip to release them in turn. Push the controller carefully out of the cabinet.



4.2 Front mounting – Option 2

1. Connect all the cables as required (see Chapter 6 – parameters for information about programming which inputs and outputs are applicable to your configuration).
2. Insert the ERC 102 into place in the cabinet.



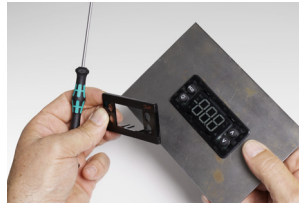
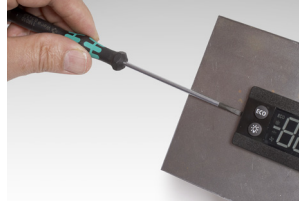
3. Press the front frame into place – this locks the ERC 102 into position.

NOTE: *there is no need to use the clips for front mounting.*



4.2.1 Unmounting

1. Use a flat head screwdriver (ideally the one supplied with the ERC 102 sample package) and insert it carefully between the front frame and the controller.
2. Gently **twist** the screwdriver to remove the front frame. Do this in four places next to each clip area.
3. Cabinet. Do not use a different type of screwdriver or a sharp item such as a knife which risks causing damage.



4.3 Fully integrated design – Option 3

An option is available for OEMs wanting to use the ERC 102 in a fully-integrated design. Please contact your local Danfoss representative for more information.

5. CONTROLLING / NAVIGATION AND ACCESS LEVELS

The ERC 102 can be controlled in three ways:
using KoolProg software, the Danfoss Docking
Station or manually by means of the buttons
on the front panel.

5.1 KoolProg/Gateway

KoolProg is licenced Danfoss software offering easy
parameter setup via a USB gateway. This software
is supplied separately; for technical literature and
further information, please contact your local
Danfoss representative.

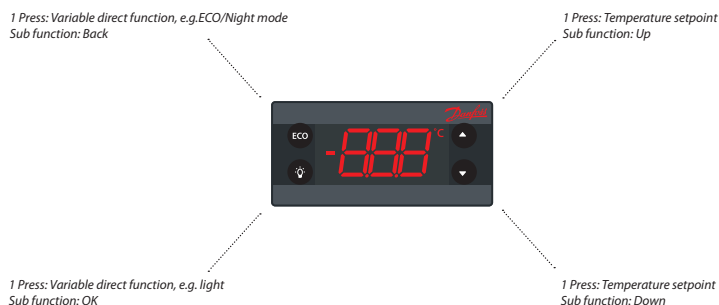
5.2 Docking station

The ERC 102 controller docking station is supplied
separately. For further information, please contact
your local Danfoss representative.

5.3 Manual operation with buttons (Direct Access)

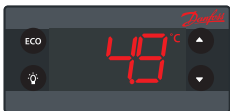
Explained as follows:

5.3.1 ERC Front and Button Functionality



5.3.2 Direct functions for access

Changing the Desired Temperature Setpoint (applies similarly when using Fahrenheit scale):

- 1.) 

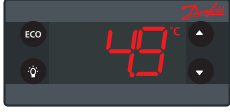
The display shows the current temperature.

(Current temperature)
- 2.) 

Press: up/down to adjust setpoint

(Flashing: temperature setpoint)
- 3.) 

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

(Flashing: temperature setpoint)
- 4.) 

Turning On/Off the ECO Function:

- 1.) 

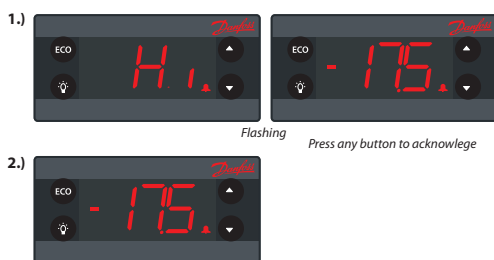
Press briefly to enter ECO mode
- 2.) 

The green ECO symbol is lit when in ECO mode

Turn ON/Off the Light



Acknowledging Alarms:



5.3.3 Operating the menu

Button assignments in this manual refer to the Glass Door Merchandiser default ERC 102. For customised controls you may assign different shortcuts (ASi menu --> button configuration). Use this feature only when the ERC 102 is supplied without button prints.

INFO: 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.

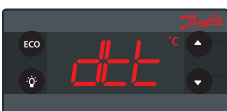
Example of Changing a Parameter:

- 1.) 

Press and hold for 5 seconds to enter the menu
- 2.) 

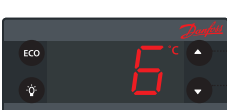
Press: up/down to scroll through the menu

(scroll through parameter groups)
- 3.) 

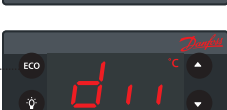
To select: press the lower left button (OK)
- 4.) 

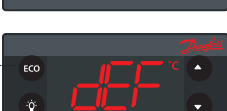
Press: up/down to find the desired parameter

(scroll through group "dEF" parameters)
- 5.) 

To confirm: press the lower left button (OK)
- 6.) 

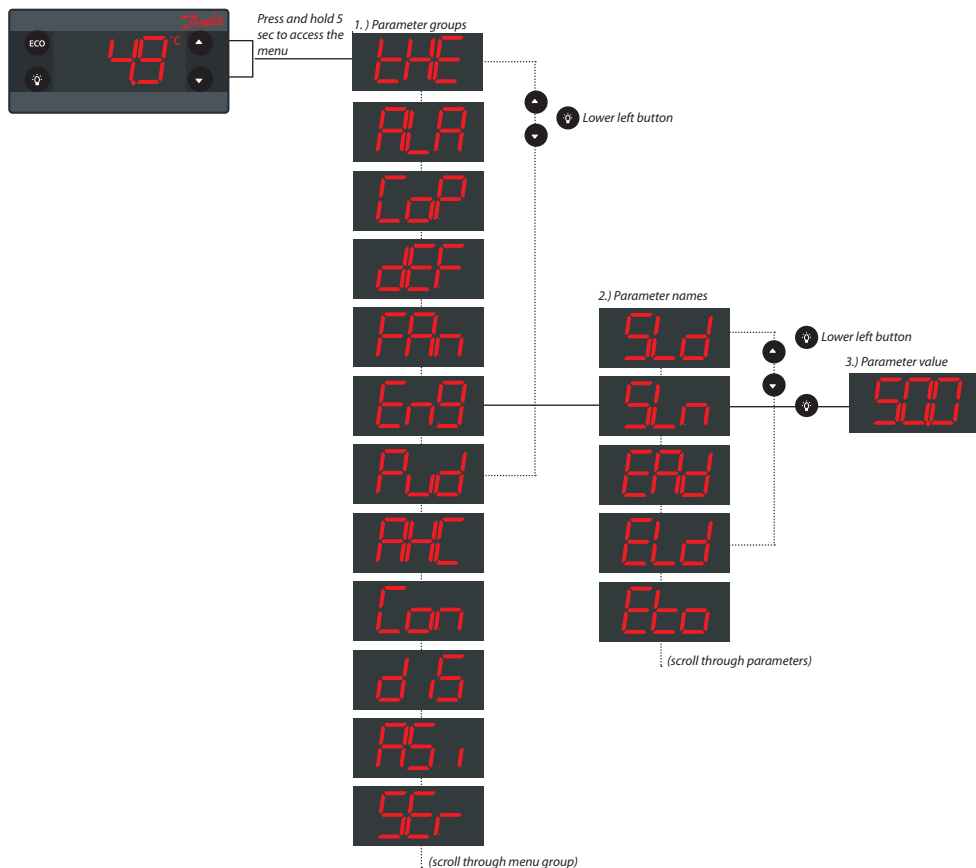
Press: up/down to enter the desired value
- 7.) 

Press: OK to accept and return to parameter name
- 8.) 

Press: upper left button (back) to return to parameter group
- 9.) 

Press: upper left button (back) to return to the menu

5.3.4 Menu structure



5.3.5 Password protection



6. CONFIGURATION OF INPUTS AND OUTPUTS

The ERC 102 inputs and outputs are configurable by the customer. Before getting started it is a good idea to check if all inputs are configured correctly and match the sensors attached.

Input and output configuration settings are part of the assignment menu (ASi).

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.

Please contact your local Danfoss representative for information about default settings.



Assignments / ASi

6.1 Changing input and output configuration settings

There are two steps to inputting the configuration:

1. Define the type of sensor attached to the input:

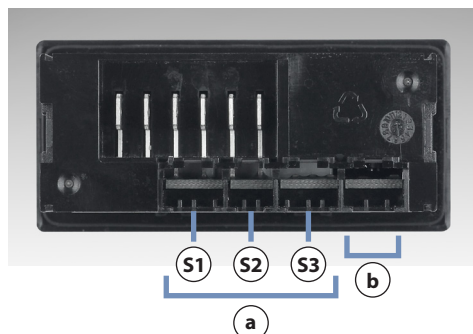
- Temperature / light / digital

2. Define the application for the sensor:

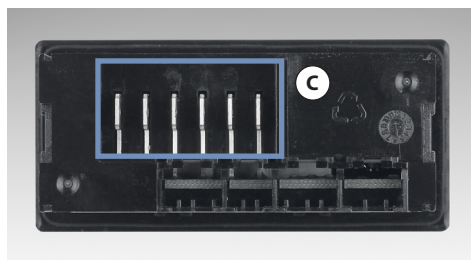
- Temperature: control / condenser / evaporator
- Light: ECO / display / both
- Digital: door sensor

Example: Input S1 is attached to a temperature sensor. The sensor measures cabinet temperature.

Example: Input S2 is attached a digital on/off sensor which is a door open / closed switch.



Connector inputs: analogue ((a)), digital ((b))



Connector outputs ((c))

	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Assignments	ASi							
S1 Config	S1C	Stn	Stn	dig	no			-- -- RW
S2 Config	S2C	Stn	Stn	dig	no			-- -- RW
S3 Config	S3C	Stn	Stn	dig	no			-- -- RW
S1 Application	S1A	SCo	nC	doo	no			-- -- RW
S2 Application	S2A	nC	nC	doo	no			-- -- RW
S3 Application	S3A	nC	nC	doo	no			-- -- RW
DI Config	diC	dio	doC	dio	no			-- -- RW
DO1 Config	01C	CoP	CoP	HEt	no			-- -- RW
DO2 Config	o2C	dEF	0	Lig	no			-- -- RW
DO3 Config	o3C	FAn	0	Lig	no			-- -- RW
DO4 Config	o4C	dEF	0	Lig	no			-- -- RW
Button 1 Short Config	b1C	noP	tP	noP	no			-- -- RW
Button 1 Long Config	b1L	PoF	tP	PoF	no			-- -- RW
Button 2 Short Config	b2C	dEF	tP	noP	no			-- -- RW
Button 3 Short Config	b3C	tP	tP	noP	no			-- -- RW
Button 3 Long Config	b3L	ECo	tP	PoF	no			-- -- RW
Button 4 Short Config	b4C	tn	tP	noP	no			-- -- RW
Button 4 Long Config	b4L	Lig	tP	PoF	no			-- -- RW
Password level1	PS1	0	0	999	no			RW RW RW
Password level2	PS2	0	0	999	no			-- -- RW
Password level3	PS3	0	0	999	no			-- -- RW
Cabinet Light Control Source	CLC	Lig	Lig	LEC	no			-- -- RW
Light off delay	Lod	0	0	300	no	Sec	1	-- -- RW



S1 Config / S1C



S2 Config / S2C



S3 Config / S3C

Available options are:

Stn for a temperature sensor (values given in Celsius)

Ldr for a light sensor (values given in Luminens)

Dig for a digital sensor with simple on/off indication



S1 Application / S1A



S2 Application / S2A



S3 Application / S3A

Available options are:

nC: Not connected

SCo: Temperature control

EuA: Evaporator temperature

Con: Condenser temperature (Condenser cleaning)

LS1: Light sensor (Ldr), Luminens, dedicated to Eco mode switching detection

LS2: Light sensor (Ldr), Luminens, dedicated to determining LED intensity

LS3: Light sensor(Ldr), Luminens, used for both Eco mode detection and determining LED intensity

doC: Door contact, contact closed when door closed

doo: Door contact, contact open when door closed



dI Config / diC

This is the digital input used for a digital sensor or bus communications.

doC: Door contact, contact closed when door closed

doo: Door contact, contact open when door closed

bus: Modbus communication (used only for KoolProg)

diO: One Wire Communication



D01 Config / D1C

CoP: Direct compressor control

Pil: 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.



D02 Config / o2C
D03 Config / o3C
D04 Config / o4C



nO: not used
dEF: Electric Defrost Heater / Valve for hot gas
ALA: Alarm Output
Fan: Fan control
LIG: Light control



6.2 Program the buttons



Button 1 Config (short press) / b1C

Lower left button



Button 1 config (long press) / b1L

Lower left button



Button 2 Config (short press) / b2C

Upper left button



Button 3 Config (short press) / b3C

Upper right button



Button 3 config (long press) / b3L

Upper right button



Button 4 Config (short press) / b4C

Lower right button



Button 4 Config (long press) / b4L

Lower right button

The buttons can be programmed as follows:

Short press function	Long Press function
tP: Increase Setpoint	tP: Increase Setpoint
tn: Decrease setpoint	tn: Decrease setpoint
ECo: Toggle Eco mode	ECo: Toggle Eco mode
Lig: Toggle light	Lig: Toggle light
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
	Not operating
	ERC power ON/OFF

NOTE: Buttons 1, 3 and 4 can be assigned to operate with 2 functions (short press or long press).

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.

6.3 Set passwords



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.

6.4 Set lighting function



Cabinet Light Source Control / CLC

This parameter can be set to one of these alternatives to control the light in the cabinet:

Lig: button only – the light will only come on when the light button on the ERC 102 is pressed (toggle functionality).

Ldo: door (and button if defined) only

LEC: economy (and button if defined) only



Light off delay / Lod

Number of seconds the light will stay on after the door has been closed.

7. PARAMETERS

This chapter details all user-accessible parameters in ERC 102 software 5.05.

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.*

INFO! *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.*

The access level can be set separately for each parameter using KoolProg software. There are three levels of access – 1, 2 and 3. Level 1 is for shop access, level 2 for technicians and 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 – for example a level 2 user can change the password for level 1 and level 2 but not level 3.

7.1 Thermostat / tHE



ERC 102 can handle both Celsius and Fahrenheit. Changing from C to F and vice-versa is done in the Display menu. When the change is made, all temperature values are automatically re-calculated and updated in all other parameters accordingly.

	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Thermostat	tHE							
Set point adjustment ratio	SPr	0.5	0.0	1.0	no		.1	-- -- RW
Differential	diF	2.0	0.0	20.0	C/F r	K	.1	-- RW RW
High Set Point	HSE	50.0/122.0	-50.0/122.0	80.0/176.0	C/F a	°C/°F	.1	-- RW RW
Low Set Point	LSE	-35.0/-31.0	-35.0/-31.0	80.0/176.0	C/F a	°C/°F	.1	-- RW RW
Air Temp Adj.	tAd	0.0/0.0	0.0/0.0	20.0/36.0	C/F r	K/°R	.1	-- -- RW



Set point / StP

StP is visible with KoolProg software only. This parameter defines the desired temperature (set point). In standard operation the set point is changed by simply pressing the "temperature up / down" buttons on ERC102; for laboratory and assembly line you may opt for software controlled set point adjustment (speed improvement)



Set point adjustment ratio / SPr

The default value is set to 0.5 and the parameter is hidden by default. SPr defines the position of the setpoint in relation to cut-in and cut-out. SPr = 0,5 sets the setpoint mid between cut-in and cut-out. SPr = 0 sets the setpoint at the cutout. SPr = 1 sets the setpoint at cut-in.



Differential / diF

This defines the difference between the cut-out and the cut-in. The desired temperature is determined by SPr and diF.



High Set Point / HSE

Low Set Point / LSE

These parameters define the temperature range limit of the controller. Once set, the desired temperature (setpoint) can not go above HSE or below LSE.

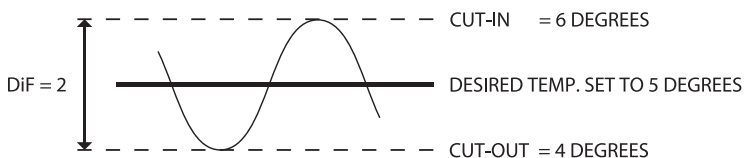


LSE Sets the minimum value for the set point

HSE Sets the maximum value for the set point

Cut-in and cut-out are automatically calculated from the desired setpoint (set by buttons on the control) and the differential. By default, cut-out and cut-in are 0,5*DiF above or below the desired temperature.

Example: The desired average temperature in the cabinet is 5 degrees, and the differential is set to 2 degrees:



Air Temperature Adjustment / tAd

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 -2K, the input from the control sensor will be 5°C instead.

7.2 Alarms / ALA



	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Alarm	ALA							
High Alarm delay	Htd	30	0	240	no	min	1	-- RW RW
Low Alarm delay	Ltd	0	0	240	no	min	1	-- RW RW
High Temp Alarm	HAt	15.0/59.0	-50.0/-58.0	80.0/176.0	C/Fa	°C/°F	.1	-- RW RW
Low Temp Alarm	LAt	-50.0/-58.0	-50.0/-58.0	80.0/176.0	C/F a	°C/°F	.1	-- RW RW
Pulldown delay	Pdd	240	0	960	no	min	1	-- RW RW
Door Open delay	dod	2	0	60	no	min	1	-- RW RW
Alarm Buzzer Duration	Abd	0	0	999	no	min	1	-- RW RW
Auto Clearance of Alarm/Error	ACA	yES	no	yES	no		1	-- RW RW



High Temp Alarm / HAt

Low Temp Alarm / Lat

High temperature alarm and low temperature alarm allow for individual alarm setpoints. Both are absolute values. By setting HAt to the maximum value and LAT to the minimum value, alarms will be deactivated.




High Alarm Delay / Htd

Low Alarm Delay / Ltd

These parameters express the number of minutes to wait before sounding an alarm once the High/Low Temp Alarm temperature is reached. Immediately prior to the alarm sounding, another check of the temperature is made to see if the temperature is still in the alarm zone; if it is not, the then the alarm is not sounded. In most situations, the Low Alarm Delay will be set to 0 to warn about too low a temperature immediately.




Pulldown Delay / Pdd

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 Temp 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 Temp Alarm LAT.



Door Open Delay / dod

It is possible to indicate to customers that a door has accidentally been left open. This parameter sets the delay in minutes before the alarm sounds. This is useful in environments where customers / users may hold the door open while making their selection. If the door is closed again before the set number of minutes is reached, the alarm does not sound.

NOTE: A door sensor is required if this parameter is to be activated.



Alarm Buzzer Duration / Abd

The ERC 102 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.



Auto Clear of Alarm / Error / ACA

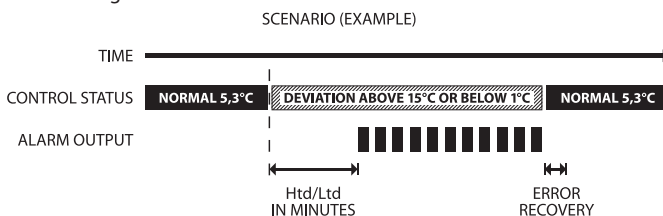
If this parameter is set to nO:

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.

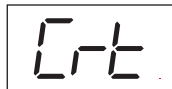
In general, Glass Door Merchandise applications will be set to yES and Commercial Fridges and Freezers set to nO. For example, if the temperature goes too high for a period there may be food safety considerations in a freezer containing food but not in a fridge with cold drinks.



7.3 Compressor / CoP



	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Compressor	CoP							
Min run time	Crt	0	0	30	no	min	1	-- RW RW
Min Stop time	CSt	0	0	30	no	min	1	-- RW RW
Max Off time	Cot	0	0	480	no	min	1	-- -- RW
Error run time	Ert	0	0	60	no	min	1	-- -- RW
Error stop time	ESt	1	0	60	no	min	1	-- -- RW
Minimum cut-in voltage	uLi	0	0	270	no	Vac	1	-- -- RW
Minimum cut-out voltage	uLo	0	0	270	no	Vac	1	-- -- RW
Maximum voltage	uHi	270	0	270	no	Vac	1	-- -- RW
Power On Delay	Pod	300	0	300	no	Sec	1	-- RW RW
Power Factor	PFA	0	-90	90	no	Degree	1	-- -- RW
Initial cut in	iCi	no	no	yes	no		1	-- R- RW
Compressor door open delay	Cdd	0	0	15	no	min	1	-- RO RW



Minimum Run Time / Crt

This parameter is a number of minutes from 0 to 30.

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.



Minimum Stop Time / CSt

This parameter is a number of minutes from 0 to 30.

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.



Maximum Off Time/ Cot

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 ERC102 is to be used on a draft beer (ice bank) application, this parameter can be used to control the ice thickness.



Error Run Time / Ert

Error Stop Time / ESt

These two parameters only become active in the unlikely event of a broken temperature sensor. They are then used to run the application in safety mode. At the same time the sensor error will be shown in the display.



Ert and ESt values are based on OEM experience and are by default inactive.

Ert and ESt define the duration the compressor will run (Ert) and be idle (ESt).

Example: Ert = 4 [min] and ESt = 16 [min] will provide an average cooling system activity of 20%.

uLi

uLo

uHi

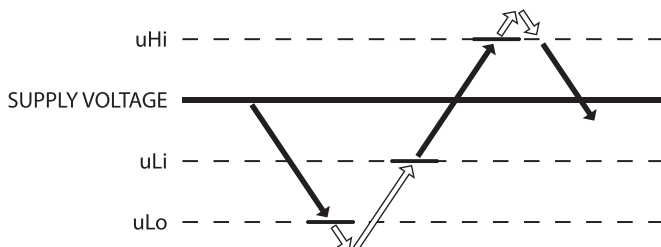
Minimum cut-in voltage / uLi Minimum cut-out voltage / uLo Maximum voltage / uHi

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.



Pod

PFA

Power On Delay / Pod

This is the delay in seconds between power-on and the compressor being activated. Depends on the Power on Temperature setting as explained below.

Power Factor / PFA

This value is hidden by default. The parameter is used by the Zero Cross function to optimize the switching position of the relay contact.

⚠ Warning: Do not change without first consulting your local Danfoss representative.

iCi

PoT

Cdd

Initial Cut-in / iCi

if the control temperature is between cut-in and cut-out at power up customers can determine if the compressor shall start immediately (yes) or wait for cut-in temperature to start (no).

Power on Temperature / PoT

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.

Compressor Door Open Delay / Cdd

This parameter sets the delay in minutes before the compressor stops when the door is opened. If set to zero, the function is disabled.

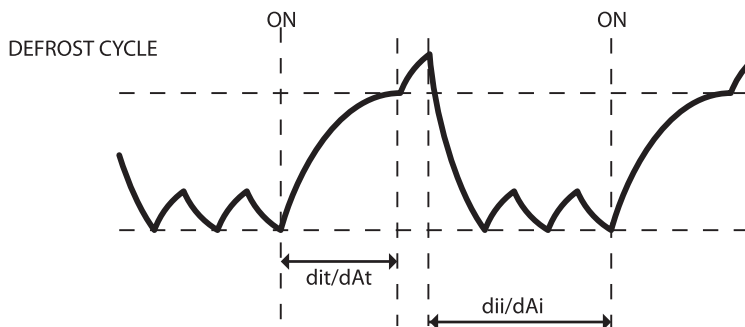
7.4 Defrost / dEF



Note: ERC controllers feature Safe Defrost functionality (patents pending) by default. This function ensures proper defrost under poor power conditions.

For more details please contact Danfoss.

	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Defrost	dEF							
Def type	dFt	no	no	Hgd	no			-- RW RW
Def reset temp	drt	5	0	80	C/F a	°C	1	-- RW RW
Def Min Interval	dii	6	0	96	no	hour	1	-- RW RW
Def Max Interval	dAi	7	0	96	no	hour	1	-- RW RW
Def Min Time	dit	5	0	240	no	min	1	-- RW RW
Def Max time	dAt	30	0	480	no	min	1	-- RW RW
Drip off time	dot	0	0	60	no	min	1	-- -- RW
Fan delay after Defrost	Fdd	0	0	60	no	min	1	-- -- RW
Fan start Temp	Ftd	25.0/77.0	-25.0/13.0	25.0/77.0	C/F a	°C/°F	.1	-- -- RW
Defrost Fan on	dFA	no	no	yES	no		1	-- -- RW
Initial Defrost Interval	idi	3	0	96	no	hour	1	-- -- RW
Initial Defrost Duration	idd	100	0	999	no		1	-- RW RW
Defrost on compressor time	dCt	no	no	yES	no		1	-- -- RW





Defrost Type / dFt

When set to nO, the defrost function is disabled and no automatic defrosting will occur.

When set to EL or nAt, electrical, natural or off-cycle defrosting is used. An additional setting of Hgd (hot gas defrosting) is available.



Terminate Temperature / dtt

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.



Defrost reset temperature / drt

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.



Minimum Interval / dii

This parameter can be set to between 0 and 96 hours and 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.



Maximum Interval / dAi

This parameter can be set to between 0 and 96 hours and defines the maximum time period between the start of two defrost cycles.



Minimum Time / dit

This parameter can be set to between 0 and 240 minutes and defines the minimum duration of a defrost cycle. During this period, the ERC 102 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.



Maximum Time / dAt

This parameter can be set to between 0 and 240 minutes and defines the maximum duration of a defrost cycle.

The ERC 102 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.



Drip Off Time / dot

This is only used with an electrical heater. This parameter can be set to between 0 and 60 minutes and defines how long the delay is between the heater being switched off and the compressor starting again.



Fan Delay after Defrost / Fdd

This parameter can be set to between 0 and 60 seconds and defines how long the delay is between the start of the compressor after defrost and the fan starting again.



Fan Start Temperature / Ftd

This only applies if an evaporator temperature sensor is fitted. This parameter determines at what evaporator temperature the fan will start after a defrost cycle is complete.

If the time set in Fdd occurs before the temperature set in Ftd, the fan will start in line with Fdd. If the temperature set in Ftd occurs first, then the fan will start in line with Ftd. It is therefore a case of whichever parameter's setting is reached first which determines when the fan starts.



Defrost Fan On / dFA

Set to yES, the fan will constantly run during defrost cycles.

Set to nO, the fan will not run during defrost cycles.



Initial Defrost Interval / idi

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.



Initial Defrost Duration / idd

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.



Defrost On Compressor Time / dCt

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.

7.5 Fan / FAn



The fan parameters are all related to energy saving, and to redistribution of air within the cabinet to reduce the amount of energy spent on cooling.

	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Fan	FAn							
Fan always On	FAo	yES	no	yES	no		1	-- RW
Fan stop time on door open	Fdt	999	0	999	no	Sec	1	-- RW
Fan On Delay	Fod	0	0	240	no	Sec	1	-- RW
Fan Stop delay	FSd	0	0	240	no	Sec	1	-- RW
Fan On Cycle	FoC	0	0	960	no	Sec	1	-- RW
Fan Stop Cycle	FSC	0	0	960	no	Sec	1	-- RW



Fan Always On / FAo

If this parameter is set to yES, all other parameters in this section about the fan are deactivated.

NOTE: If FAo is set to nO, then the following parameters will be applied.



Fan stop time on door open: Fdt

The maximum time the fan will be stopped after the door has been opened.

0: fan will not stop under opening

1-998: number of seconds fan will be stopped during door opening

999: fan will be stopped as long as the door is open



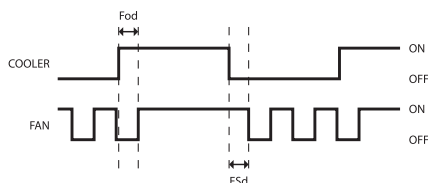
Fan On Delay / Fod

Fan Stop Delay / FSd

If this parameter and FSd are both set to zero then the fan runs whenever the compressor runs.

Fod defines the fan delay (in seconds) after a compressor cut-in.

FSd defines the fan delay after a compressor cut-out.



Fan On Cycle / FoC

Fan Stop Cycle / FSC

When the compressor is off, and FoC or FSC are not zero, the fan runs in cycles according to FoC and FSC.

Example: FoC = 120 [sec] and FSC = 120 [sec] means that the fan runs for half the time when the compressor is off. When the compressor is on, the fan is always on (according to FAo and Fod).



7.6 Energy Management / Eng



	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Energy management	Eng							
Shop Light Day	SLd	50	0	100	no	%	1	RW RW RW
Shop Light Night	SLn	50	0	100	no	%	1	RW RW RW
Eco Activity delay	EAd	0	0	360	no	min	1	RW RW RW
Eco Light delay	ELd	5	0	10	no	min	1	-- RW RW
Light Blocking delay	Lbd	0	0	360	no	min	1	-- RW RW
Eco Temperature Offset	Eto	4.0/7.2	0,0	10.0/18.0	C/F r	K/°R	.1	-- RW RW

NOTE: Some of these parameters require the installation of the Danfoss Ambient Light Sensor.

The Danfoss USB Gateway in combination with KoolProg software allows for real time measurement of the current light intensity. Danfoss recommends testing and adjusting SLd and SLn values according to customers' specific needs.



Shop Light Day / SLd Shop Light Night / SLn

These parameters are set as the percentage of the maximum light and determine when the device moves into or out of Eco mode for power-saving purposes.



SLd is the amount of ambient light which will cause the device to move to normal / serving mode from Eco mode (normally occurs in the morning).

SLn is the amount of ambient light which will cause the device to move to Eco mode from normal / serving mode (normally occurs in the evening).



Eco Door Delay / EAd

The transition from Eco to normal mode and vice versa occurs on a change in light level or door activity.

NOTE: A door sensor is required.



Eco Light Delay / ELd

This parameter causes a delay to the switch from Normal to Eco mode when the shop lights are switched on or off. The ambient light sensor detects the change in light level and causes a switch mode. With this parameter set to zero, the switch off mode occurs immediately. If not set to zero (max: 10 minutes), then the change will be delayed by the number of minutes set.



Light Blocking delay / Lbd

If the cooler is placed where the ambient light is unstable, the ambient light sensor can cause the cooler to toggle between ECO and normal mode.

The light blocking delay disables the light-sensor for a given time after ambient light change from bright to dark, so that the cooler stays in ECO mode for at least this time. When the cooler is in serving or pull-down mode, the light sensor is de-activated and a change to ECO mode will be determined by the door-sensor.

0: No blocking of the ambient light sensor.



Eco Temperature Offset / Eto

This parameter gives a relative temperature in degrees. It is the difference in temperature for Eco mode operation compared to Normal mode.

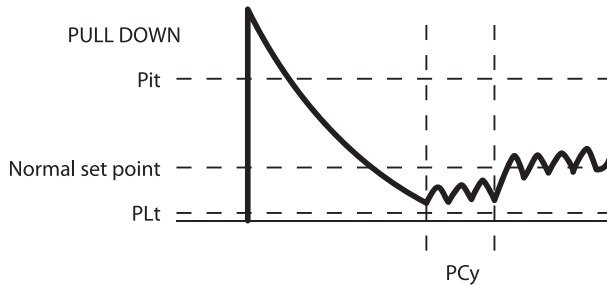
NOTE: Setting a temperature offset may be illegal in some jurisdictions.

7.7 Pull Down / Pud



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.

	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Pull Down	Pud							
Pull-down Initiate Temperature	Pit	50.0/122.0	-40.0/-40.0	50.0/122.0	C/F a	°C/°F	.1	-- -- RW
Pull-down Cycling	PCy	30	0	360	no	min	1	-- -- RW
Pull-down defrost Interval	Pdi	15	0	48	no	hour	1	-- -- RW
Pull-down duration	Pdd	24	0	48	no	hour	1	-- -- RW
Pull-down limit temp	PLt	0.0/32.0	-55.0/-67.0	55.0/131.0	C/F a	°C/°F	.1	-- -- RW
Pull-down reduction temp t	Prt	0.1/0.2	0,0	10.0/16.0	C/F r	K/°R	.1	-- -- RW



Pit

Pull Down Initiate Temperature / Pit

This parameter indicates the temperature which causes a pull down to start. If the temperature measured inside the cabinet exceeds this value for longer than one hour, then pull down will start. The compressor will have already cut-in, so the only effect is to stop defrost cycles until the desired temperature is reached. The period of one hour is fixed and cannot be altered.

PCy

Pull Down Cycling / PCy

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 Pulldown, 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 Pulldown will cease.

Pdi

Pull Down Defrost Interval / Pdi

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

Pull Down Duration / Pdd

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

Pull Down Limit Temperature / PLt

This parameter sets the minimum allowed temperature during pull-down, In order to protect valuable contents you must always specify 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)

Prt

Pull Down Reduction Temperature Δt / Prt

ERC 102 calculates a lower set-point during Pull Down mode to increase the cooling capacity of your appliance. For each hour the cabinet temperature is above the Pull down initiate temperature, the set-point is reduced with the value of Prt.

7.8 Automatic Heater Control / AHC

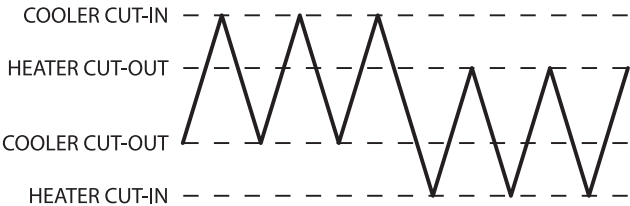


Automatic Heater Control applies reverse cooling mode (heating) to your refrigeration appliance. This feature requires:

A) that your appliance is exposed to ambient temperatures below the desired temperature in your cabinet (e.g. very cold climates and outdoor use)

B) a special heater (for example a large defrost heater) built in to your appliance.

	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Auto-Heater Control	AHC							
Automatic heater mode enable	AuH	no	no	yES	no			-- RW
Energy mode delay	End	60	0	360	no	min	1	-- RW
Heater displacement temperature	Hdi	2.0/3.0	0.0/0.0	50.0/90.0	C/F r	K/°R	.1	-- RW



Automatic Heater Mode Enable / AuH

This setting is normally set to nO.
When set to yES, parameters End and Hdi apply.



Energy Mode Delay / End

This is the delay in minutes between the heater and the compressor operation. The heater is not allowed to start until this number of minutes has expired after the compressor has cut out and vice versa.



Heater Displacement Temperature / Hdi

This is the temperature relative to (below) the desired temperature.

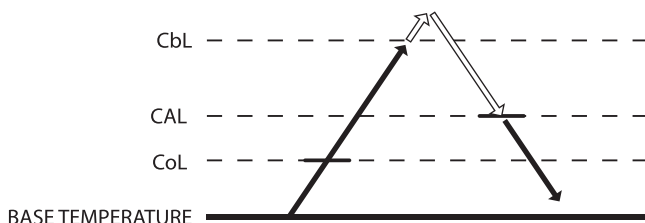
7.9 Condenser Protection / Con



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.

	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Condenser Protection	Con							
Condenser Alarm Limit	CAL	80/176	0/32	85/185	C/F a	°C/°F	1	-- RW
Condenser Block Limit	CbL	85/185	0/32	85/185	C/F a	°C/°F	1	-- RW
Condenser OK limit	CoL	60/140	0/32	85/185	C/F a	°C/°F	1	-- RW
Condenser Low Limit	CLL	5	-20/-4	20/68	C/F a	°C/°F	1	-- RW



Condenser Alarm Limit / CAL

This parameter sets the temperature for the condenser at which an alarm will be generated.



Condenser Block Limit / CbL

This parameter sets the temperature which if reached will cause the compressor to switch off.



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.



Condenser Low Limit / CLL

This parameter sets the lowest (condenser) temperature at which the compressor is allowed to start.

7.10 Display / diS



	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Display	diS							
Display Unit	CFu	-C	-C	-F	no			RW RW RW
Display Resolution	rES	0.1	0.1	1	no			-- -- RW
Display Range Limit	rlt	no	no	yES	no			-- -- RW
Display Delay	ddl	0	0	10	no	Sec	1	-- -- RW
Display Offset	doF	0.0/0.0	-10.0/-18.0	10.0/18.0	C/F r	K/°R		-- -- RW
Lock-time After defrost	dLt	15	0	60	no	min	1	-- -- RW
Show Economy state	SEC	no	no	yES	no			-- -- RW
Show Pull Down state	SSC	no	no	yES	no			-- -- RW
Show Defrost	SdF	yES	no	yES	no			-- -- RW
Display Intensity	din	10	1	10	no		1	RW RW RW

This section deals with parameters for the display.

NOTE: Some display parameters can be set in such a way that they may be illegal in some jurisdictions. Please check local legislation.



Display Unit / CFu

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.



Display Resolution / rES

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.



Display Range Limit / rLT

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 be displayed.

The parameter is set to nO by default.



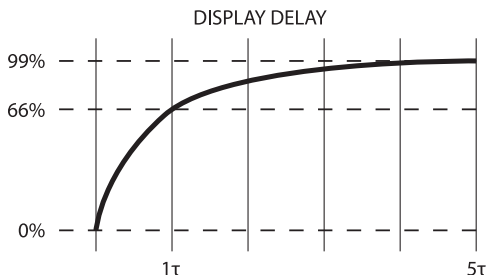
Display Delay/ ddL

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.

The parameter can be set from 0 to 10 minutes.



Display Offset / doF

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.



Lock Time After Defrost / dLt

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.



Show Economy State / SEC

If set to yES, this parameter causes the display to show ECO when the system is in ECO mode.

If set to nO, the temperature continues to be displayed.



Show Pull down state / SSC

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.



Show Defrost / SdF

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.



Display Intensity / din

ERC 102 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.

7.11 Assignments / ASI

For more details on how to set parameters

- see chapter 6.

	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Assignments	ASI							
S1 Config	S1C	Stn	Stn	dig	no			-- RW
S2 Config	S2C	Stn	Stn	dig	no			-- RW
S3 Config	S3C	Stn	Stn	dig	no			-- RW
S1 Application	S1A	SCo	nC	doo	no			-- RW
S2 Application	S2A	nC	nC	doo	no			-- RW
S3 Application	S3A	nC	nC	doo	no			-- RW
DI Config	diC	dio	doC	dio	no			-- RW
DO1 Config	o1C	CoP	CoP	HEt	no			-- RW
DO2 Config	o2C	dEF	0	Lig	no			-- RW
DO3 Config	o3C	FAn	0	Lig	no			-- RW
DO4 Config	o4C	Lig	0	Lig	no			-- RW
Button 1 Short Config	b1C	noP	tP	noP	no			-- RW
Button 1 Long Config	b1L	PoF	tP	PoF	no			-- RW
Button 2 Short Config	b2C	dEF	tP	noP	no			-- RW
Button 3 Short Config	b3C	tP	tP	noP	no			-- RW
Button 3 Long Config	b3L	ECo	tP	PoF	no			-- RW
Button 4 Short Config	b4C	tn	tP	noP	no			-- RW
Button 4 Long Config	b4L	Lig	tP	PoF	no			-- RW
Pass-word level1	PS1	0	0	999	no			RW RW RW
Pass-word level2	PS2	0	0	999	no			-- RW RW
Pass-word level3	PS3	0	0	999	no			-- RW
Cabinet Light Control Source	CLC	Lig	Lig	LEC	no			-- RW
Door close delay	dCd	0	0	300	no	Sec	1	-- RW
Light off delay	Lod	0	0	300	no	Sec	1	-- RW

7.12 Service Information / Ser



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.

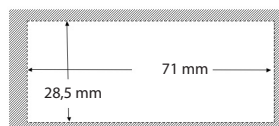
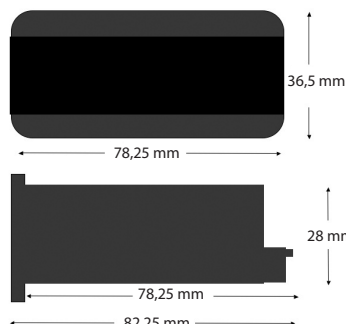
These parameters allow OEMs to enter their own product code.

	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Service	SER							
DI	Sdi	---	oFF	on	no			-- R- R-
Voltage value	uAC	---	0	270	no	Vac	1	-- R- R-
DOs Status	ouS	---	IIII	IIII	no			-- R- R-
Relay 1 counter	rL1	---	0	999	no	1000	1000	-- R- R-
Relay 2 counter	rL2	---	0	999	no	1000	1000	-- R- R-
Relay 3 counter	rL3	---	0	999	no	1000	1000	-- R- R-
Relay 4 counter	rL4	---	0	999	no	1000	1000	-- R- R-
interval Counter	int	---	0	999	no	min	1	-- R- R-
Defrost time counter	dnt	---	0	999	no	min	1	-- R- R-
Door open counter	ont	---	0	999	no	1	1	-- R- R-
SW version	Fir	SWVER	-32768	32767	no			R- R- R-
HW version	HAr	HWVER	-32768	32767	no			R- R- R-
OrderNoLow	OnL	ORNOL	-32768	32767	no			--- --
OrderNoHigh	OnH	ORNOH	-32768	32767	no			--- --
OEM code Low	oEL	0	0	999	no			R- R- R-
OEM code Middle	oEn	0	0	999	no			R- R- R-
OEM code High	oEH	0	0	999	no			R- R- R-
Parameter version	PAr	PARVER	-32768	32767	no			R- R- R-
Last change	CHA	0	0	999	no		1	--- --
Manufacturing date	CHd	0	0	999	no		1	-- R- R-
Copy Key ID	Cid	0	0	999	no		1	--- R-
Set as Default	SFC	no	no	yES	no			RW RW RW

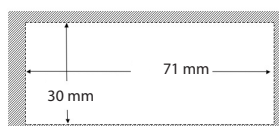
8. TECHNICAL SPECS

Power Supply	100 V AC - 240 V AC, switch mode power supply		
Rated Power	Average 0.7 W		
	4 Inputs: 3 Analogue & Digital, 1 Digital; user specific assignment		
Input	• Air / Evaporator / Condenser		• Door sensor: All types, user specific
	• Light sensor: Danfoss ECO light sensor		• DP for remote communication
Output		UL60730	EN60730
	DO1 (Compressor relay):	120 V ac: 16A resistive/ FLA16 / LRA72. 240 V ac: 10A resistive /FLA10 /LRA60.	16(16)A
	DO4	8 A resistive, FLA2/ LRA12, TV-1	8 A resistive, 2(2) A
	DO5	FLA2/ LRA12, TV-1	8 A resistive, 2(2) A
	DO6	FLA2/ LRA12, TV-1	8 A resistive, 2(2) A
			Max 10 A total DO4-6
Probes	Danfoss NTC sensors and Danfoss ECO accessories (300 - 3,000 mm)		
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 ERC docking station, integrated system		
Assembly	3 types for all controls: Front mounting (patents pending); 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 °C to 55 °C, 93% rH		
Storage Conditions	-40 °C to 85 °C, 93% rH		
Range of Measurement	-40 °C to 85 °C		
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	Category D (UL94-V0)		
EMC category	Category I		
Operating Cycles	Compressor relay: more than 175,000 at full load (16A(96A))		
Approvals	R290/R600a : EN/IEC 60079-15:2005 Glow wire according to EN/IEC 60335-1 IEC/EN 60730 UL60730 NSF CQC GOST R 60730		
Note: These approvals are only valid when using the accessories listed in this document			

Dimensions:



Front mounting



Rear mounting

APPENDIX I: PARAMETER QUICK LIST

	ERC menu code	Description
Thermostat	tHE	Thermostat settings
Set point adjustment ratio	SPr	Current setpoint adjustment value diF * SPr
Differential	diF	Thermostat differential
High Set Point	HSE	Upper limit of thermostat set point
Low Set Point	LSE	Lower limit of thermostat set point
Air Temp Adj.	tAd	Applies to non-Danfoss temperature sensors only

	ERC menu code	Description
Alarm	ALA	Alarm settings
High Alarm delay	Htd	Alarm delay on high temperature
Low Alarm delay	Ltd	Alarm delay on low temperature
High Temp Alarm	HAt	Alarm is activated above this temperature (Celsius)
Low Temp Alarm	LAAt	Alarm is activated below this temperature (Celsius)
Pulldown delay	Pdd	Alarm delay during pulldown (0-960 minutes) (high temperature only)
Door Open delay	dod	Alarm delay for door open (0-60 minutes)
Alarm Buzzer Duration	Abd	Alarm buzzer duration in minutes (0=no buzzer)
Auto Clearance of Alarm/Error	ACA	yES: alarm auto-clears if system returns to normal; nO : alarm state maintained regardless

	ERC menu code	Description
Compressor	CoP	Compressor settings
Min run time	Crt	Minimum time compressor must run 0-30 minutes
Min Stop time	CSt	Min time compressor must idle 0-30 minutes
Max Off time	Cot	Max time compressor must idle 0-480 minutes
Compressor door open delay	Cdd	Minutes before compressor stops when door opened
Error run time	Ert	Compressor run time if temperature sensor is not working (0-60 minutes)
Error stop time	ESAt	Compressor stop time if temperature sensor is not working (0-60 minutes)
Minimum Cutin voltage	uLi	When compressor is off: Lowest compressor start voltage (0-270 V)
Minimum cut-out voltage	uLo	When compressor is on: Lowest operation voltage (0-270 V)
Maximum voltage	uHi	When compressor is on: Highest operation voltage (0-270 V)
Power On Delay	Pod	Delay in seconds after power-on before outputs active (change with care)
Power Factor	PFA	Phasic angle in degrees. Changing this may give decreased relay lifetime
Power-on temperature	Pot	If the temperature of compressor at power-on exceeds this then Power On Delay does not apply

	ERC menu code	Description
Defrost	dEF	Defrost Settings
Def. type	dFt	no: Defrost function is disabled EL: Electrical or time defrost Hgd: Hot gas defrost (contact Danfoss for details) nat: Off-cycle defrost (natural defrost)
Def terminate temp	dtT	Temperature at which defrost cycle will stop
Def Min Interval	dii	The minimum time in hours between the start of each defrost cycle
Def Max Interval	dAi	The maximum time in hours between the start of each defrost cycle
Def Min Time	dit	The minimum duration of a defrost cycle in minutes
Def Max time	dAt	The maximum duration of a defrost cycle in minutes
Drip off time	dot	The duration in minutes of the drip-off time at the end of a defrost cycle
Fan delay after Defrost	Fdd	The duration in minutes before the fan starts after a defrost cycle
Fan start Temp	Ftd	The temperature at which the fan will start after a defrost
Defrost Fan on	dFA	Whether the fan will run during a defrost cycle
Initial Defrost Interval	idi	The number of hours after power-up before the first defrost cycle starts
Defrost on compressor time	dCt	Whether the defrost cycles are measured by elapsed time (nO) or compressor run time (yES)

	ERC menu code	Description
Fan	FAn	Fan settings
Fan always On	FAo	nO: fan parameters below active. yES: Fan is always on
Fan On Delay	Fod	Delay in seconds before fan starts after compressor starts
Fan Stop delay	FSd	Delay in seconds before fan stops after compressor stops
Fan On Cycle	FoC	The number of seconds the fan runs when the compressor is off
Fan Stop Cycle	FSC	The number of seconds the fan does not run when the compressor is off

	ERC menu code	Description
Energy management	Eng	Energy Management
Shop Light Day	SLd	When ambient light is above this level, Eco mode is cancelled. Requires light sensor
Shop Light Night	SLn	When ambient light is below this level, Eco mode is enabled. Requires light sensor
Eco Activity delay	EAd	Minutes delay after last door opening until ECO mode is enabled; 0: disable
Eco Light delay	ELd	Delay [min] between detection of shop light on/off and ECO mode activation / suspension
Eco Temperature Offset	Eto	Temperature increase for Eco mode relative to normal mode

	ERC menu code	Description
Pull Down	Pud	Pull down settings
Pull-down Initiate Temperature	Pit	If the cabinet temperature is above this temperature for >1h, pull-down mode is activated
Pull-down Cycling	PCy	Minimum duration [min] of the pull-down mode, starting at PIT
Pull-down defrost Interval	Pdi	Defrost interval during pull-down. Over-rides the defrost interval in normal mode.
Pull-down duration	Pdd	Maximum duration [min] of the pull-down mode, starting at PIT
Pull-down limit temp	PLt	A safety feature; the lowest temperature allowed during pull-down.
Pull-down reduction temp Δt	Prt	A calculation value for pull-down performance improvement. Instructions: See manual

	ERC menu code	Description
Auto-Heater Control	AHC	Auto-Heater settings (only if heater fitted for outdoor use in cold climates)
Automatic heater mode enable	AuH	yES: Activate heater if ambient temperature is below desired cabinet temperature
Energy mode delay	End	Delay in minutes between heater and compressor operation
Heater displacement temperature	Hdi	Heater displacement or OFFSET temperature relative to desired temperature.

	ERC menu code	Description
Condenser Protection	Con	Condenser protection settings
Condenser Alarm Limit	CAL	If condenser sensor exceeds this temperature, alarm is activated
Condenser Block Limit	CbL	If this temperature is exceeded, compressor will be stopped.
Condenser OK limit	CoL	Temperature at which compressor may start after a stop due to exceeding CbL
Condenser Low Temp. Limit	CLL	Temperature below which the compressor is not allowed to start

	ERC menu code	Description
Display	diS	Display settings
Display Unit	CFu	F: Fahrenheit; C: Celsius
Display Resolution	rES	Display resolution for temp: 0.1, 0.5 or 1.0 C/F
Display Range Limit	rlt	Limits displayed temperature to actual setpoint +/- differential; may be illegal in some countries
Display Delay	ddL	Time period for moving average temperature display
Display Offset	doF	Display a different temperature relative to measured temperature
Lock-time After defrost	dLt	Display lock time after defrost [0-60 min]
Show Economy state	SEC	yES: display will show "Eco" when in Eco mode. nO: temperature will be shown
Show Pull Down state	SSC	yES: "SC" will be displayed during Pull down; nO: "SC" will not be displayed.
Show Defrost	SdF	yES: display will show deF during defrost ; no: Display will show temp
Display Intensity	din	Display intensity when no ambient sensor; min intensity with sensor

	ERC menu code	Description
Assignments	ASi	Assignment of inputs and outputs
S1 Config	S1C	Sensor type input 1 :Stn: Standard NTC 5k @25°C (EKS211); Ldr: Light sensor; dig: binary input
S2 Config	S2C	Sensor type input 2 :Stn: Standard NTC 5k @25°C (EKS211); Ldr: Light sensor; dig: binary input
S3 Config	S3C	Sensor type input 3 :Stn: Standard NTC 5k @25°C (EKS211); Ldr: Light sensor; dig: binary input
S1 Application	S1A	Application to be controlled with Sensor D. nC: Not connected SCo: Temperature control EuA: Evaporator temperture Con: Condenser temperature (Condenser cleaning) LS1: Light sensor(Ldr), Luminens, delicated for Economy detection LS2: Light sensor(Ldr), Luminens, delicated for LED intensity scope LS3: Light sensor(Ldr), Luminens, delicated for both Economy detection and LED intensity scope doC: Door contact, Contact closed when door closed doo: Door contact, Contact open when door closed
S2 Application	S2A	Application to be controlled with Sensor C. nC: Not connected SCo: Temperature control EuA: Evaporator temperture Con: Condenser temperature (Condenser cleaning) LS1: Light sensor(LDR), Luminens, delicated for Economy detection LS2: Light sensor(LDR), Luminens, delicated for LED intensity scope LS3: Light sensor(LDR), Luminens, delicated for both Economy detection and LED intensity scope doC: Door contact, Contact closed when door closed doo: Door contact, Contact open when door closed
S3 Application	S3A	Application to be controled with Sensor B. nC: Not connected SCo: Temperature control EuA: Evaporator temperture Con: Condenser temperature (Condenser cleaning) LS1: Light sensor(LDR), Luminens, delicated for Economy detection LS2: Light
DI Config	diC	Sensor A (digital) doC: Door contact, Contact closed when door closed doo: Door contact, Contact open when door closed dio: One wire digital communication buS: MODBUS communication
DO1 Config	o1C	CoP: Compressor; PiL: Pilot Relay (No zero-cross); HET: Inverse output, Heating application
DO2 Config	o2C	no:Not used; dEF: Elec defr heater/hot gas valve; ALA:Alarm output;FAN:Fan control;Lig:Light control
DO3 Config	o3C	nO: Not used; ALA: Alarm output; FAN: Fan control; Lig: Light control
DO4 Config	o4C	nO: Not used; ALA: Alarm output; Lig: Light control
Button 1 Config	b1C	Lower left button configuration. tP:Increase Setpoint tn: Decrease setpoint ECo: Toggle Eco mode Lig: Toggle light dEF: Toggle defrost SuP: Activate Super-Cool /Pull-down diP : Increase display intensity din : Decrease display intensity noP: Not operating

	ERC menu code	Description
Assignments	ASi	Assignment of inputs and outputs
Button 2 Config	b2C	Upper left button configuration. tP: Increase Setpoint tn: Decrease setpoint ECo: Toggle Eco mode Lig: Toggle light dEF: Toggle defrost SuP: Activate Super-Cool / Pull-down diP : Increase display intensity din : Decrease display intensity noP: Not operating
Button 3 Config	b3C	Upper right button configuration. tP: Increase Setpoint tn: Decrease setpoint ECo: Toggle Eco mode Lig: Toggle light dEF: Toggle defrost SuP: Activate Super-Cool / Pull-down diP : Increase display intensity din : Decrease display intensity noP: Not operating
Button 4 Config	b4C	Lower right button configuration. tP: Increase Setpoint tn: Decrease setpoint ECo: Toggle Eco mode Lig: Toggle light dEF: Toggle defrost SuP: Activate Super-Cool / Pull-down diP : Increase display intensity din : Decrease display intensity noP: Not operating
Pass-word level1	PS1	Level 1 Password (End user, shop owner), 0= disabled
Pass-word level2	PS2	Level 2 Password (Technical field service), 0= disabled
Pass-word level3	PS3	Level 3 Password (OEM), 0= disabled; choose a secure number, e.g. 735
Cabinet Light Control Source	CLC	Cabinet light management Lig: button only Ldo: door (and button if defined) only LEC: Economy (and button if defined) only
Light off delay	Lod	Light off delay [sec] after door has been closed

	ERC menu code	Description
Service	SEr	Service
DI	Sdi	DI: physical DI pin state (ON; OFF)
Voltage value	uAC	Current main power supply voltage
DOs Status	ouS	Current relay open / closed status. IIII = All Relay on (Upper bar for on, Lower bar for off) II = DO1 On, DO2 Off, DO3 & DO4 NA (No bar if relay not mounted) IIII = All Relay off (Upper bar for on, Lower bar for off)
Relay 1 counter	rL1	Thousands of cycles of compressor relay since manufacture
Relay 2 counter	rL2	Thousands of cycles of no.2 relay since manufacture
Relay 3 counter	rL3	Thousands of cycles of no. 3 relay since manufacture
Relay 4 counter	rL4	Thousands of cycles of no. 4 relay since manufacture
interval Counter	int	Compressor run time since last defrost
Defrost time counter	dnt	Duration of last defrost cycle [min]
Door open counter	ont	ont/100 = Number of door openings since last reset
Serial numbe	Snu	Serial number given at manufacturing
SW version	Fir	Danfoss software version number
HW version	HAr	Danfoss hardware version number
OrderNoLow	OnL	Danfoss order code number
OrderNoHigh	OnH	Danfoss order code number
Parameter version	PAr	OEM parameter version number [requires EKA copy key update]
Last change	CHA	Not used
Manufacturing date	CHd	Programme date WWY: week number and year number (2010-19)
Copy Key ID	Cid	Copy key used for last program
Set as Default	SFC	Resets all parameters to last good OEM settings

APPENDIX II: CODE NUMBERS AND LENGHTS

Type	Code no. I-Pack Approvals 230V, CQC/UL/CE
GDM-front	
ERC 102C RED LED without buzzer	080G3102
ERC 102D RED LED without buzzer	080G3103
ERC 102C BLUE LED without buzzer	080G3106
ERC 102D BLUE LED without buzzer	080G3107
CFF-front	
ERC 102C RED LED with buzzer	080G3113
ERC 102D RED LED with buzzer	080G3112
ERC 102C BLUE LED with buzzer	080G3116
ERC 102D BLUE LED with buzzer	080G3117
Light-sensors	
Light sensor, 1000 mm (C3), 3-pole	080G3311
Light sensor, 2000 mm (C3), 3-pole	080G3313
Light sensor, 3000 mm (C3), 3-pole	080G3315
Door-sensors	
Door-sensor, 1000 mm (C4), 3-pole	080G3332
Door-sensor, 2000 mm (C4), 3-pole	080G3334
Door-sensor, 3000 mm (C4), 3-pole	080G3336
Temperature sensors	
PVC Standard (C1), 470 mm, 3-pole	077F8751
PVC Standard (C1), 1000 mm, 3-pole	077F8757
PVC Standard (C1), 1500 mm, 3-pole	077F8761
PVC Standard (C1), 2000 mm, 3-pole	077F8765
PVC Standard (C1), 2200 mm, 3-pole	077F8767
PVC Standard (C1), 3000 mm, 3-pole	077F8769

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

Type	Code no. I-Pack Approvals 230V, CQC/UL/CE
Defrost sensors*	
PVC Standard (C2), 470 mm, 2-pole	077F8780
PVC Standard (C2), 1000 mm, 2-pole	077F8786
PVC Standard (C2), 1500 mm, 2-pole	077F8790
PVC Standard (C2), 2000 mm, 2-pole	077F8794
PVC Standard (C2), 3000 mm, 2-pole	077F8798
PVC Standard (C3), 470 mm, 3-pole	077F8750
PVC Standard (C3), 1000 mm, 3-pole	077F8756
PVC Standard (C3), 1500 mm, 3-pole	077F8760
PVC Standard (C3), 2000 mm, 3-pole	077F8764
PVC Standard (C3), 2200 mm, 3-pole	077F8766
PVC Standard (C3), 3000 mm, 3-pole	077F8768
Other sensors	
TPFE low temp (C1), 1000 mm, 3-pole	077F8657
TPFE low temp (C1), 2000 mm, 3-pole	077F8665
TPE precision (C1), 500 mm, 3-pole	077F8724
TPE precision (C1), 1000 mm, 3-pole	077F8725
TPE precision (C1), 1500 mm, 3-pole	077F8726
TPE precision (C1), 2000 mm, 3-pole	077F8727
TPE precision (C1), 2500 mm, 3-pole	077F8728
TPE precision (C1), 3000 mm, 3-pole	077F8729
Clamps	
Black (2 needed per controller)	080G3308
Programming	
OEM Docking station, production line	080G9701
Gateway incl USB Cable, R&D	080G9711
Copy Stick EKA-183A	080G9740

C: connector type

* Defrost sensors can also be used as condenser sensors. .

APPENDIX III: TROUBLESHOOTING

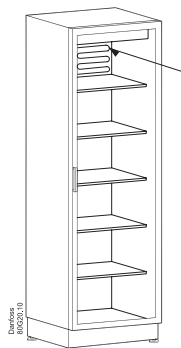
Problem	Probable cause	Remedy
Compressor does not start	Waiting for compressor delay timer Defrost in progress Line voltage to compressor too low or too high	Check CoP->CSt Check CoP ->Pot /Pod Check dEF ->dit, dot Check CoP->uLi, uLo, uHi
Fan does not start	Door is open or door contact is defective	Fan stops when door is opened Check that door contact is ok
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 brightness is weak	Ambient light sensor broken	Replace sensor
Shift between Eco and Normal mode does not happen on ambient light change	Ambient light sensor broken or light level not set properly	Check Eng->SLd, SLn
E01, E02 or E03 is shown on display	E01: Sensor S1 defective E02: Sensor S2 defective E03: Sensor S3 defective	Replace sensor
Display alternates between Con and temperature	Condenser too hot	Clean condenser Check Con ->CAL, CbL
Display alternates between Hi and temperature	Temperature too high	Check ALA->HAt
Display alternates between Lo and temperature	Temperature too low	Check ALA -> LAT
Display shows dEf	Defrost in progress	Check diS ->SdF

APPENDIX IV: TYPICAL APPLICATIONS – WIRING DIAGRAMS

IV.1 ERC 102D

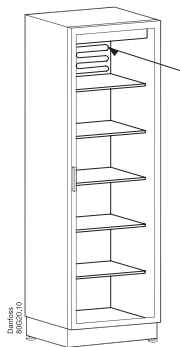
Glass Door Merchandiser

No-frost freezer / sub-zero cooler

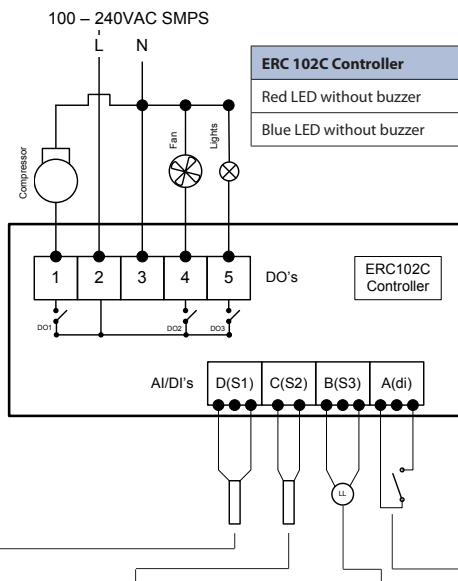


DO	DO1	DO2	DO3	DO4	DO5-DO8	DO9	DO10	DO11	DO12	DO13	DO14	DO15	DO16	DO17	DO18	DO19	DO20	DO21	DO22	DO23	DO24	DO25	DO26	DO27	DO28	DO29	DO30	DO31	DO32	DO33	DO34	DO35	DO36	DO37	DO38	DO39	DO40	DO41	DO42	DO43	DO44	DO45	DO46	DO47	DO48	DO49	DO50	DO51	DO52	DO53	DO54	DO55	DO56	DO57	DO58	DO59	DO60	DO61	DO62	DO63	DO64	DO65	DO66	DO67	DO68	DO69	DO70	DO71	DO72	DO73	DO74	DO75	DO76	DO77	DO78	DO79	DO80	DO81	DO82	DO83	DO84	DO85	DO86	DO87	DO88	DO89	DO90	DO91	DO92	DO93	DO94	DO95	DO96	DO97	DO98	DO99	DO100	DO101	DO102	DO103	DO104	DO105	DO106	DO107	DO108	DO109	DO110	DO111	DO112	DO113	DO114	DO115	DO116	DO117	DO118	DO119	DO120	DO121	DO122	DO123	DO124	DO125	DO126	DO127	DO128	DO129	DO130	DO131	DO132	DO133	DO134	DO135	DO136	DO137	DO138	DO139	DO140	DO141	DO142	DO143	DO144	DO145	DO146	DO147	DO148	DO149	DO150	DO151	DO152	DO153	DO154	DO155	DO156	DO157	DO158	DO159	DO160	DO161	DO162	DO163	DO164	DO165	DO166	DO167	DO168	DO169	DO170	DO171	DO172	DO173	DO174	DO175	DO176	DO177	DO178	DO179	DO180	DO181	DO182	DO183	DO184	DO185	DO186	DO187	DO188	DO189	DO190	DO191	DO192	DO193	DO194	DO195	DO196	DO197	DO198	DO199	DO200	DO201	DO202	DO203	DO204	DO205	DO206	DO207	DO208	DO209	DO210	DO211	DO212	DO213	DO214	DO215	DO216	DO217	DO218	DO219	DO220	DO221	DO222	DO223	DO224	DO225	DO226	DO227	DO228	DO229	DO230	DO231	DO232	DO233	DO234	DO235	DO236	DO237	DO238	DO239	DO240	DO241	DO242	DO243	DO244	DO245	DO246	DO247	DO248	DO249	DO250	DO251	DO252	DO253	DO254	DO255	DO256	DO257	DO258	DO259	DO260	DO261	DO262	DO263	DO264	DO265	DO266	DO267	DO268	DO269	DO270	DO271	DO272	DO273	DO274	DO275	DO276	DO277	DO278	DO279	DO280	DO281	DO282	DO283	DO284	DO285	DO286	DO287	DO288	DO289	DO290	DO291	DO292	DO293	DO294	DO295	DO296	DO297	DO298	DO299	DO300	DO301	DO302	DO303	DO304	DO305	DO306	DO307	DO308	DO309	DO310	DO311	DO312	DO313	DO314	DO315	DO316	DO317	DO318	DO319	DO320	DO321	DO322	DO323	DO324	DO325	DO326	DO327	DO328	DO329	DO330	DO331	DO332	DO333	DO334	DO335	DO336	DO337	DO338	DO339	DO340	DO341	DO342	DO343	DO344	DO345	DO346	DO347	DO348	DO349	DO350	DO351	DO352	DO353	DO354	DO355	DO356	DO357	DO358	DO359	DO360	DO361	DO362	DO363	DO364	DO365	DO366	DO367	DO368	DO369	DO370	DO371	DO372	DO373	DO374	DO375	DO376	DO377	DO378	DO379	DO380	DO381	DO382	DO383	DO384	DO385	DO386	DO387	DO388	DO389	DO390	DO391	DO392	DO393	DO394	DO395	DO396	DO397	DO398	DO399	DO400	DO401	DO402	DO403	DO404	DO405	DO406	DO407	DO408	DO409	DO410	DO411	DO412	DO413	DO414	DO415	DO416	DO417	DO418	DO419	DO420	DO421	DO422	DO423	DO424	DO425	DO426	DO427	DO428	DO429	DO430	DO431	DO432	DO433	DO434	DO435	DO436	DO437	DO438	DO439	DO440	DO441	DO442	DO443	DO444	DO445	DO446	DO447	DO448	DO449	DO450	DO451	DO452	DO453	DO454	DO455	DO456	DO457	DO458	DO459	DO460	DO461	DO462	DO463	DO464	DO465	DO466	DO467	DO468	DO469	DO470	DO471	DO472	DO473	DO474	DO475	DO476	DO477	DO478	DO479	DO480	DO481	DO482	DO483	DO484	DO485	DO486	DO487	DO488	DO489	DO490	DO491	DO492	DO493	DO494	DO495	DO496	DO497	DO498	DO499	DO500	DO501	DO502	DO503	DO504	DO505	DO506	DO507	DO508	DO509	DO510	DO511	DO512	DO513	DO514	DO515	DO516	DO517	DO518	DO519	DO520	DO521	DO522	DO523	DO524	DO525	DO526	DO527	DO528	DO529	DO530	DO531	DO532	DO533	DO534	DO535	DO536	DO537	DO538	DO539	DO540	DO541	DO542	DO543	DO544	DO545	DO546	DO547	DO548	DO549	DO550	DO551	DO552	DO553	DO554	DO555	DO556	DO557	DO558	DO559	DO560	DO561	DO562	DO563	DO564	DO565	DO566	DO567	DO568	DO569	DO570	DO571	DO572	DO573	DO574	DO575	DO576	DO577	DO578	DO579	DO580	DO581	DO582	DO583	DO584	DO585	DO586	DO587	DO588	DO589	DO590	DO591	DO592	DO593	DO594	DO595	DO596	DO597	DO598	DO599	DO600	DO601	DO602	DO603	DO604	DO605	DO606	DO607	DO608	DO609	DO610	DO611	DO612	DO613	DO614	DO615	DO616	DO617	DO618	DO619	DO620	DO621	DO622	DO623	DO624	DO625	DO626	DO627	DO628	DO629	DO630	DO631	DO632	DO633	DO634	DO635	DO636	DO637	DO638	DO639	DO640	DO641	DO642	DO643	DO644	DO645	DO646	DO647	DO648	DO649	DO650	DO651	DO652	DO653	DO654	DO655	DO656	DO657	DO658	DO659	DO660	DO661	DO662	DO663	DO664	DO665	DO666	DO667	DO668	DO669	DO670	DO671	DO672	DO673	DO674	DO675	DO676	DO677	DO678	DO679	DO680	DO681	DO682	DO683	DO684	DO685	DO686	DO687	DO688	DO689	DO690	DO691	DO692	DO693	DO694	DO695	DO696	DO697	DO698	DO699	DO700	DO701	DO702	DO703	DO704	DO705	DO706	DO707	DO708	DO709	DO710	DO711	DO712	DO713	DO714	DO715	DO716	DO717	DO718	DO719	DO720	DO721	DO722	DO723	DO724	DO725	DO726	DO727	DO728	DO729	DO730	DO731	DO732	DO733	DO734	DO735	DO736	DO737	DO738	DO739	DO740	DO741	DO742	DO743	DO744	DO745	DO746	DO747	DO748	DO749	DO750	DO751	DO752	DO753	DO754	DO755	DO756	DO757	DO758	DO759	DO760	DO761	DO762	DO763	DO764	DO765	DO766	DO767	DO768	DO769	DO770	DO771	DO772	DO773	DO774	DO775	DO776	DO777	DO778	DO779	DO780	DO781	DO782	DO783	DO784	DO785	DO786	DO787	DO788	DO789	DO790	DO791	DO792	DO793	DO794	DO795	DO796	DO797	DO798	DO799	DO800	DO801	DO802	DO803	DO804	DO805	DO806	DO807	DO808	DO809	DO810	DO811	DO812	DO813	DO814	DO815	DO816	DO817	DO818	DO819	DO820	DO821	DO822	DO823	DO824	DO825	DO826	DO827	DO828	DO829	DO830	DO831	DO832	DO833	DO834	DO835	DO836	DO837	DO838	DO839	DO840	DO841	DO842	DO843	DO844	DO845	DO846	DO847	DO848	DO849	DO850	DO851	DO852	DO853	DO854	DO855	DO856	DO857	DO858	DO859	DO860	DO861	DO862	DO863	DO864	DO865	DO866	DO867	DO868	DO869	DO870	DO871	DO872	DO873	DO874	DO875	DO876	DO877	DO878	DO879	DO880	DO881	DO882	DO883	DO884	DO885	DO886	DO887	DO888	DO889	DO890	DO891	DO892	DO893	DO894	DO895	DO896	DO897	DO898	DO899	DO900	DO901	DO902	DO903	DO904	DO905	DO906	DO907	DO908	DO909	DO910	DO911	DO912	DO913	DO914	DO915	DO916	DO917	DO918	DO919	DO920	DO921	DO922	DO923	DO924	DO925	DO926	DO927	DO928	DO929	DO930	DO931	DO932	DO933	DO934	DO935	DO936	DO937	DO938	DO939	DO940	DO941	DO942	DO943	DO944	DO945	DO946	DO947	DO948	DO949	DO950	DO951	DO952	DO953	DO954	DO955	DO956	DO957	DO958	DO959	DO960	DO961	DO962	DO963	DO964	DO965	DO966	DO967	DO968	DO969	DO970	DO971	DO972	DO973	DO974	DO975	DO976	DO977	DO978	DO979	DO980	DO981	DO982	DO983	DO984	DO985	DO986	DO987	DO988	DO989	DO990	DO991	DO992	DO993	DO994	DO995	DO996	DO997	DO998	DO999	DO1000	DO1001	DO1002	DO1003	DO1004	DO1005	DO1006	DO1007	DO1008	DO1009	DO1010	DO1011	DO1012	DO1013	DO1014	DO1015	DO1016	DO1017	DO1018	DO1019	DO1020	DO1021	DO1022	DO1023	DO1024	DO1025	DO1026	DO1027	DO1028	DO1029	DO1030	DO1031	DO1032	DO1033	DO1034	DO1035	DO1036	DO1037	DO1038	DO1039	DO1040	DO1041	DO1042	DO1043	DO1044	DO1045	DO1046	DO1047	DO1048	DO1049	DO1050	DO1051	DO1052	DO1053	DO1054	DO1055	DO1056	DO1057	DO1058	DO1059	DO1060	DO1061	DO1062	DO1063	DO1064	DO1065	DO1066	DO1067	DO1068	DO1069	DO1070	DO1071	DO1072	DO1073	DO1074	DO1075	DO1076	DO1077	DO1078	DO1079	DO1080	DO1081	DO1082	DO1083	DO1084	DO1085	DO1086	DO1087	DO1088	DO1089	DO1090	DO1091	DO1092	DO1093	DO1094	DO1095	DO1096	DO1097	DO1098	DO1099	DO1100	DO1101	DO1102	DO1103	DO1104	DO1105	DO1106	DO1107	DO1108	DO1109	DO1110	DO1111	DO1112	DO1113	DO1114	DO1115	DO1116	DO1117	DO1118	DO1119	DO1120	DO1121	DO1122	DO1123	DO1124	DO1125	DO1126	DO1127	DO1128	DO1129	DO1130	DO1131	DO1132	DO1133	DO1134	DO1135	DO1136	DO1137	DO1138	DO1139	DO1140	DO1141	DO1142	DO1143	DO1144	DO1145	DO1146	DO1147	DO1148	DO1149	DO1150	DO1151	DO1152	DO1153	DO1154	DO1155	DO1156	DO1157	DO1158	DO1159	DO1160	DO1161	DO1162	DO1163	DO1164	DO1165	DO1166	DO1167	DO1168	DO1169	DO1170	DO1171	DO1172	DO1173	DO1174	DO1175	DO1176	DO1177	DO1178	DO1179	DO1180	DO1181	DO1182	DO1183	DO1184	DO1185	DO1186	DO1187	DO1188	DO1189	DO1190	DO1191	DO1192	DO1193	DO1194	DO1195	DO1196	DO1197	DO1198	DO1199	DO1200	DO1201	DO1202	DO1203	DO1204	DO1205	DO1206	DO1207	DO1208	DO1209	DO1210	DO1211	DO1212	DO1213	DO1214	DO1215	DO1216	DO1217	DO1218	DO1219	DO1220	DO1221	DO1222	DO1223	DO1224	DO1225	DO1226	DO1227	DO1228	DO1229	DO1230	DO1231	DO1232	DO1233	DO1234	DO1235	DO1236	DO1237	DO1238	DO1239	DO1240	DO1241	DO1242	DO1243	DO1244	DO1245	DO1246	DO1247	DO1248	DO1249	DO1250	DO1251	DO1252	DO1253	DO1254	DO1255	DO1256	DO1257	DO1258	DO1259	DO1260	DO1261	DO1262	DO1263	DO1264	DO1265	DO1266	DO1267	DO1268	DO1269	DO1270	DO1271	DO1272	DO1273	DO1274	DO1275	DO1276	DO1277	DO1278	DO1279	DO1280	DO1281	DO1282	DO1283	DO1284	DO1285	DO1286	DO1287	DO1288	DO1289	DO1290	DO1291	DO1292	DO1293	DO1294	DO1295	DO1296	DO1297	DO1298	DO1299	DO1300	DO1301	DO1302	DO1303	DO1304	DO1305	DO1306	DO1307	DO1308	DO1309	DO1310	DO1311	DO1312	DO1313	DO1314	DO1315	DO1316	DO1317	DO1318	
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IV.2 ERC 102C Glass Door Merchandiser



ERC 102C		Danfoss					
080G3102		MADE IN CHINA					
Red display		100-240Vac ±10% 50/60Hz					
075							
Outputs:		C R U S					
DO1	18A, 240Vac	16(18)A, 240V					
DO4	18A, 240Vac, 2FLA/12LBA, 240Vac, TV-1, 120Vac	18A, 240Vac					
DO5	2A, 240Vac, 2FLA/12LBA, 240Vac, TV-1, 120Vac	2A, 240Vac					
Max 10A total (DO4+DO5)							
Input /	Cabinet	Evaporator	Condenser	Door	Motor	Light	Com.
DO1	✓	✓	✓	✓	✓	✓	✓
DO4	✓	✓	✓	✓	✓	✓	✓
DO5	✓	✓	✓	✓	✓	✓	✓
DO6	✓	✓	✓	✓	✓	✓	✓
DO7	✓	✓	✓	✓	✓	✓	✓
DO8	✓	✓	✓	✓	✓	✓	✓
L N		Not Used		DO & Input / Sensors			
				DO1 DO2 DO3 DO4 DO5 DO6 DO7 DO8			
Intertek		UL US		NSF		CEC	



ERC 102C Controller

Red LED without buzzer	080G3102
Blue LED without buzzer	080G3106

Temperature Sensor for Cabinet Temperature Control

PVC Standard Connector type (C1) 3-pole

470 mm	077F8751
1000 mm	077F8757
1500 mm	077F8761
2000 mm	077F8765
2200 mm	077F8767
3000 mm	077F8769

Temperature Sensor for Evaporator Temperature Control

PVC Standard Connector type (C2) 2-pole

470 mm	077F8780
1000 mm	077F8786
1500 mm	077F8790
2000 mm	077F8794
3000 mm	077F8798

Ambient Light

Light sensor Connector type (C3) 3-pole

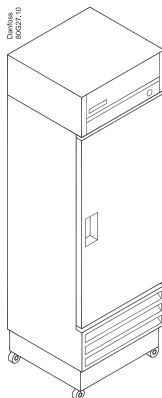
1000 mm	080G3311
2000 mm	080G3313
3000 mm	080G3315

Door input

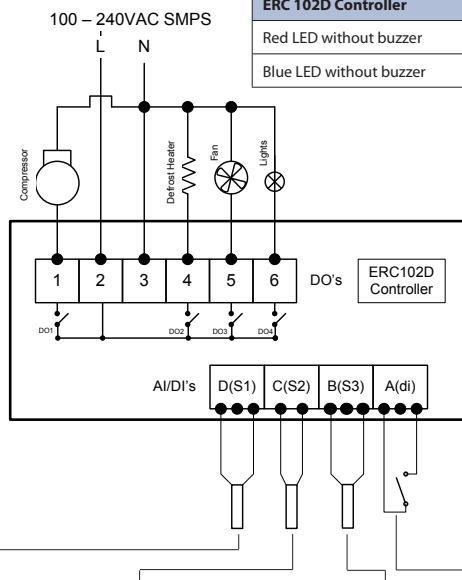
Door-sensor cable Connector type (C4) 3-pole

1000 mm	080G3332
2000 mm	080G3334
3000 mm	080G3336

IV.3 ERC 102D Gastro No-frost freezer



				ERC 102D <i>Danfoss</i> 08060163 Red led display 100-240Vac ~ 50/60Hz 0755	
Output 				MADE IN CHINA 	
D01	10A, 240Vac			H016A, 240V	
D04	100A, 0.016A, 240Vac			30FA, 7218A, 120Vac	
D05	1A, 240Vac, 10A, 0.016A, 240Vac			D02A, 240Vac	
D05-D06	2A, 240Vac, 10A, 0.016A, 240Vac			D03, 120Vac	
Input /	Control	Encoder	Encoder	Decoder	Light
Sensor	Service	Service	Service	Service	Service
D011					
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D031					
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D051					
D061					
Addr					
D01 D02 D03 D04 D05 D06					
D011 D021 D031 D041 D051 D061					
D012 D022 D032 D042 D052 D062					
D013 D023 D033 D043 D053 D063					
D014 D024 D034 D044 D054 D064					
D015 D025 D035 D045 D055 D065					
D016 D026 D036 D046 D056 D066					
D017 D027 D037 D047 D057 D067					
D018 D028 D038 D048 D058 D068					
D019 D029 D039 D049 D059 D069					
D020 D030 D040 D050 D060					
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D022 D032 D042 D052 D062					
D023 D033 D043 D053 D063					
D024 D034 D044 D054 D064					
D025 D035 D045 D055 D065					
D026 D036 D046 D056 D066					
D027 D037 D047 D057 D067					
D028 D038 D048 D058 D068					
D029 D039 D049 D059 D069					
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D031 D041 D051 D061					
D032 D042 D052 D062					
D033 D043 D053 D063					
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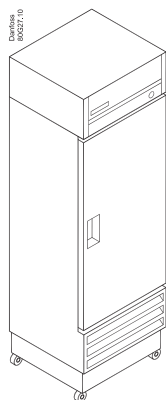
Temperature Sensor for Cabinet Temperature Control	
PVC Standard Connector type (C1) 3-pole	
470 mm	077F8751
1000 mm	077F8752
1500 mm	077F8761
2000 mm	077F8765
2200 mm	077F8767
3000 mm	077F8769

Temperature Sensor for Evaporator Temperature Control	
PVC Standard Connector type (C2) 2-pole	
470 mm	077F8780
1000 mm	077F8786
1500 mm	077F8790
2000 mm	077F8794
3000 mm	077F8798

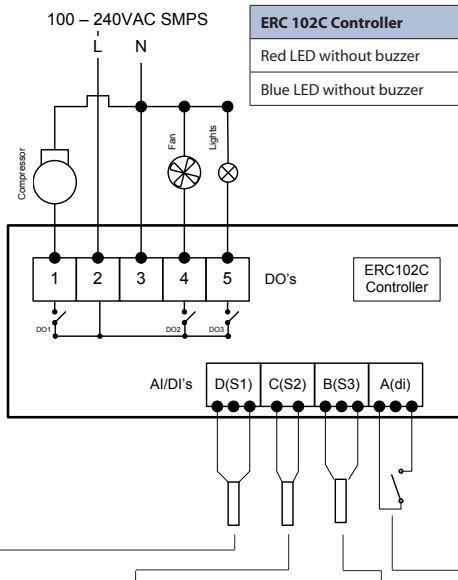
Temperature Sensor for Condenser Temperature Control	
PVC Standard Connector type (C3) 3-pole	
470 mm	077F8750
1000 mm	077F8756
1500 mm	077F8760
2000 mm	077F8764
2200 mm	077F8766
3000 mm	077F8768

Door input	
Door-sensor cable Connector type (C4) 3-pole	
1000 mm	080G3332
2000 mm	080G3334
3000 mm	080G3336

IV.4 ERC 102C Gastro Cooler



ERC 102C 080G3102 Red display 100-240Vac 47-10Hz 50/60Hz 075		Danfoss MADE IN CHINA	
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ERC 102C Controller

Red LED without buzzer

080G3102

Blue LED without buzzer

080G3106

Temperature Sensor for Cabinet Temperature Control	
PVC Standard Connector type (C1) 3-pole	
470 mm	077F8751
1000 mm	077F8757
1500 mm	077F8761
2000 mm	077F8765
2200 mm	077F8767
3000 mm	077F8769

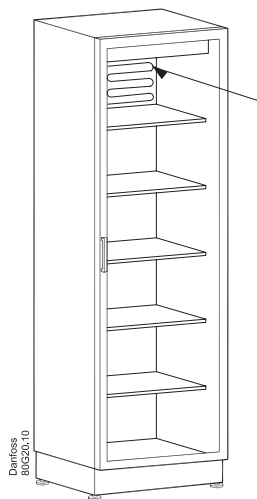
Temperature Sensor for Evaporator Temperature Control	
PVC Standard Connector type (C2) 2-pole	
470 mm	077F8780
1000 mm	077F8786
1500 mm	077F8790
2000 mm	077F8794
3000 mm	077F8798

Temperature Sensor for Condenser Temperature Control	
PVC Standard Connector type (C3) 3-pole	
470 mm	077F8750
1000 mm	077F8756
1500 mm	077F8760
2000 mm	077F8764
2200 mm	077F8766
3000 mm	077F8768

Door input	
Door-sensor cable Connector type (C4) 3-pole	
1000 mm	080G3332
2000 mm	080G3334
3000 mm	080G3336

APPENDIX V: APPLICATION SPECIFICATION

V.1 Control sensor



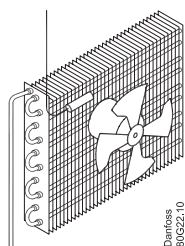
The control sensor must always be connected and is used for controlling the cut-in and cut-out of the compressor according to the set-point. The sensor is also used for the displayed temperature.

Placement of sensor:

Vertical coolers with fan

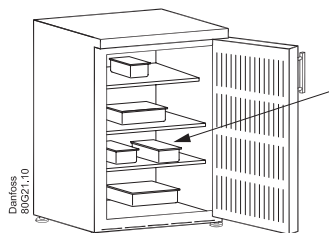
Most common placement is in the return air to the evaporator. The sensor can be placed close to the fan – even when the fan is pulsed during compressor off periods: The updating of the temperature is blocked when the fan is stopped and only updated when the fan has been running for a while, so that the 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

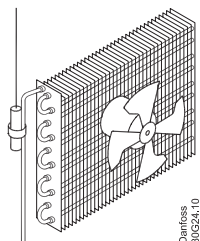


Coolers without fan

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.

V.2 Evaporator sensor

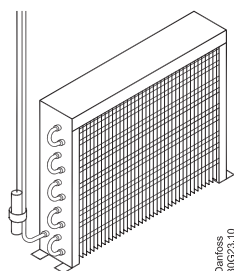


The evaporator sensor is only used for de-icing of the evaporator and has no control purpose.

Placement of sensor:

Place the sensor where the ice melts last. Please be aware of that sharp fins can damage the cable.

V.3 Condenser sensor

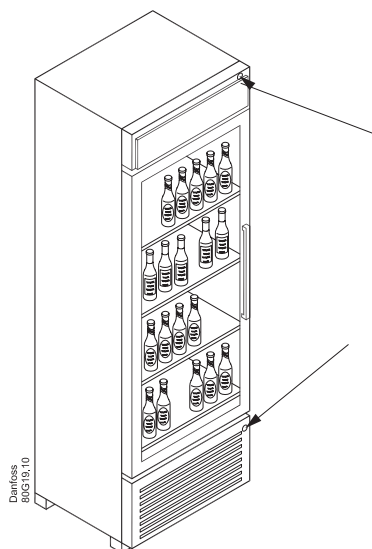


The condenser sensor is used to protect the compressor against high pressure when the condenser is blocked or the condenser fan fails.

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.

V.4 Ambient light sensor



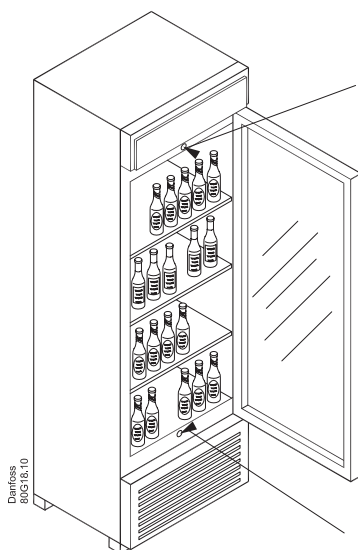
The ambient light sensor is used to detect opening hours of the shop.

Placement of sensor:

The sensor must be placed so that the interior light does not affect the sensor.

Possible placement could be in the front of the cooler or at the top.

V.5 Door sensor



The door sensor is used to detect buying activity and to stop the fan when the door is opened.

Danfoss does not supply the door-switch. Use the door-switch you have and connect it to the cable supplied by Danfoss.

ERC102 Application Matrix

Application	ERC type	Output				Input			
		DO1	DO2	DO3	DO4	S1 (C1)	S2 (C2)	S3 (C3)	Di (C4)
Standard Beverage cooler	ERC102C	Comp	Fan	Lamp		Control	Defrost	Condenser or Ambient Light	Door
Sub-zero beverage cooler	ERC102D	Comp	Heater	Fan	Lamp	Control	Defrost	Condenser or Ambient Light	Door
Out-door beverage cooler	ERC102D	Comp	Heater	Fan	Lamp	Control	Condenser	Ambient Light	Door
Nofrost freezer w. glassdoor	ERC102D	Comp	Heater	Fan	Lamp	Control	Evaporator	Condenser or Ambient Light	Door
CFF Refrigerator	ERC102C	Comp	Fan	Lamp		Control	Defrost	Condenser	Door
CFF Freezer	ERC102D	Comp	Heater	Fan	Lamp	Control	Defrost	Condenser	Door

C: connector type

NOTE:

- Select only one function per input, e.g. condenser sensor or ambient light sensor.
- Make sure that the accessory you select has a matching connector to the input, e.g. a sensor for input S2 must have C2 connector.
- Condenser sensor or light sensor are optional and can be omitted.
- Defrost sensor is mandatory when electrical heater is used for defrost. For natural defrost it can be omitted.