MAKING MODERN LIVING POSSIBLE

ERC 101 controller
Reference manual

This reference manual is intended to be used primarily by OEMs for the purpose of programming ERC 101. It may also be useful for technicians. It is not intended as a user guide for end users.

www.danfoss.com/erc

Table of Content

1. INTRODUCTION

The ERC 101 is a multi-purpose electronic parametric controller dedicated to a broad range of applications. ERC 101 meets OEM requirements for timesaving and flexible production setup.

The latest generation CPU, plenty of memory and high-end electronic components allow for uniquely versatile application use. Three separate password-protected user levels can be used to control more than 100 different parameters to accommodate any individual customer's requirements.

The IP-rated body, advanced materials and internationally approved hardware design make the ERC 101 ideal for use in almost any climate around the world, indoors as well as outdoors. Laboratory work is easy and flexible with the ERC 101. With a USB-powered gateway, Danfoss KoolProg software reduces time spent programming. On the OEM assembly line, just one docking station can easily program up to 1,000 controllers a day – at zero inventory cost.

One relay control features three inputs and is powered by a globally compatible, lightweight, switch mode power supply. All components have been carefully selected to help reduce the CO2 footprint. The power supply uses on average just 0.4W – 50% less than today's average controller.

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 101 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.

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 .*

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

Clips: are used to secure the ERC 101 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 101. 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 ERC 101 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 EKA183A USB copy key (code no. 080G9740), 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™

KoolProg: is the software from Danfoss for programming the ERC 101 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 101 is a state-of-the-art, IP65 (front)-rated, multi-purpose electronic parametric controller for use in a variety of applications.

A single power relay (16A-rated) ERC 101 controls up to 2.5 HP compressors without auxiliary relay (230V). The controller features unique algorithm for defrost control and compressor protection and is particularly well suited for use in areas with unreliable power supply and/or unstable voltage.

Together with the Danfoss docking station, programming of predetermined parameter sets can be achieved in just 10 seconds. There are over 100 parameters (see Section 7).

The ERC 101 can also be programmed via USB using the Danfoss KoolProg software, which means that the most suitable parameter findings can be located 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).

3.1 Control buttons

The ERC 101 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 three Danfoss original sensors according to your application needs.

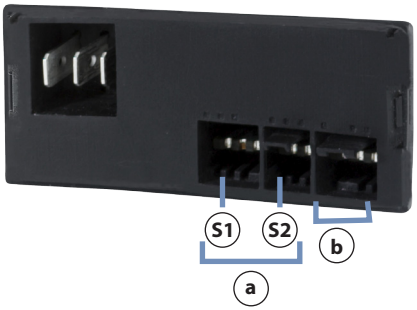
There are two **analogue inputs**: S1and S2 (ⓐ).

Supported input options:
- 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 (ⓑ) for PC communication being used either with a door sensor or with the USB Gateway.

NOTE: *for detailed information refer to section 6.1.*

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.



3.3 Connector outputs

One digitally controlled on/off relay.

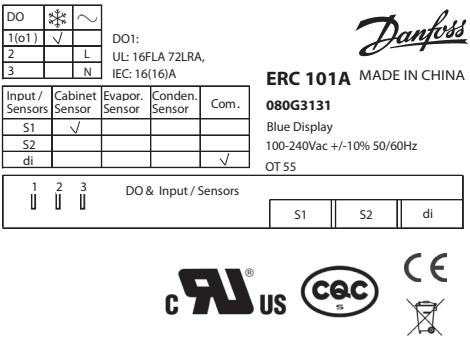
Functions controlled are:
Compressor or heater.

3.4 Top label

The illustration shows an example of a top label affixed to an ERC 101. 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.
- Input D (a) is connected to a e.g. Control Sensor to measure temperature inside the cabinet.
- Input D (b) is used for Communications KoolProg software running on a PC.
- Input D(a) is connected to an e.g. Evaporator Temperature 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 may be used.*



4. MOUNTING

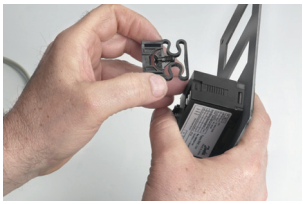
There are three options for mounting the ERC 101 in a freezer or refrigerator.

⚠ 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

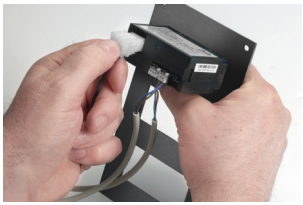
1. Insert the ERC 101 into the cabinet.

2. Attach the clips to each side of the ERC 101.



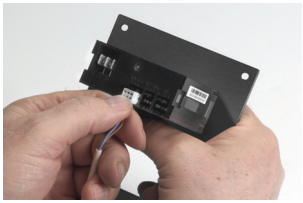
3. Place the front frame on to the ERC 101 and click it into place.

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).

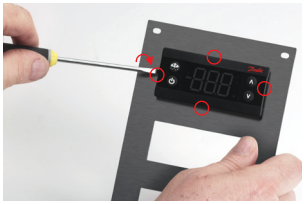


4.1.1 Unmounting

1. Disconnect the power cable and then the sensors.



2. Use a flat head screwdriver 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.

4. Reach around the side to the clips.

   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 101 into place in the cabinet.

3. Press the front frame into place – this locks the ERC 101 into position.

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

4.2.1 Unmounting

1. Use a flat head screwdriver and insert it carefully between the front frame and the controller.

NOTE: *Do not use a different type of screwdriver or a sharp item such as a knife which risks causing damage to your cabinet.*

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

3. Remove the front frame.

4. Push the controller carefully out of the cabinet.

4.3 Fully integrated design – Option 3

An option is available for OEMs wanting to use the ERC 101 in a fully-integrated design. Please contact your local Danfoss representative for more information.

5. CONTROLLING / NAVIGATION AND ACCESS LEVELS

The ERC 101 can be programmed 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.

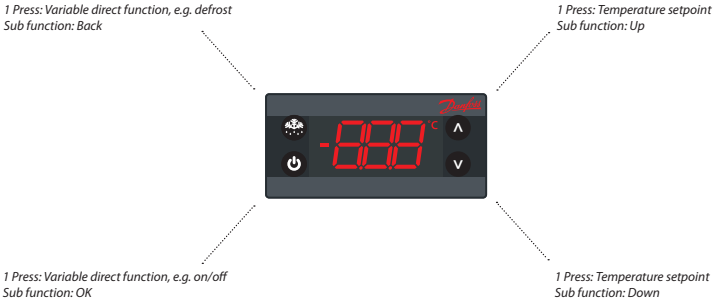
5.2 Docking station

The ERC 101 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 Functionallity



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 defrost Function:

1.)

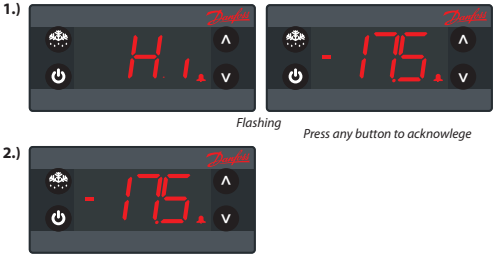
Press briefly to enter def mode

2.)

The green def symbol is lit when in defrost mode

Turn ON/Off ERC

Acknowledging Alarms:

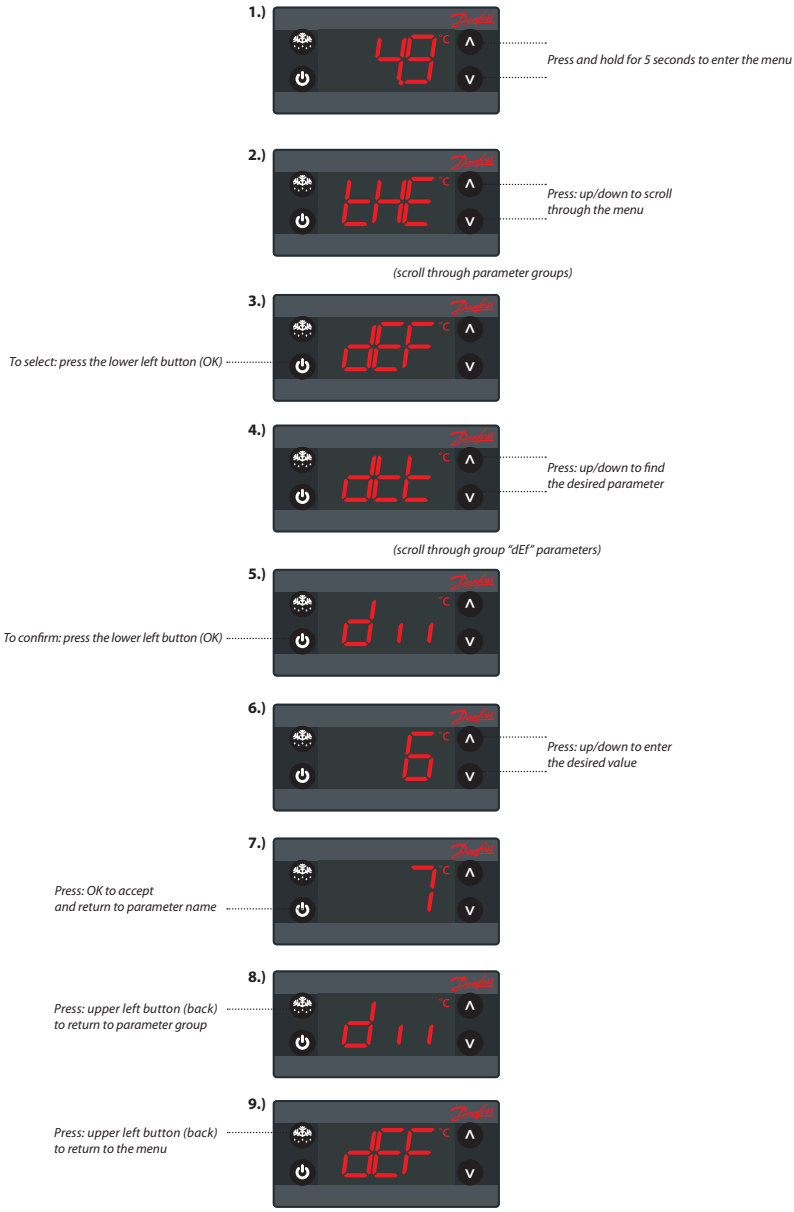


5.3.3 Operating the menu

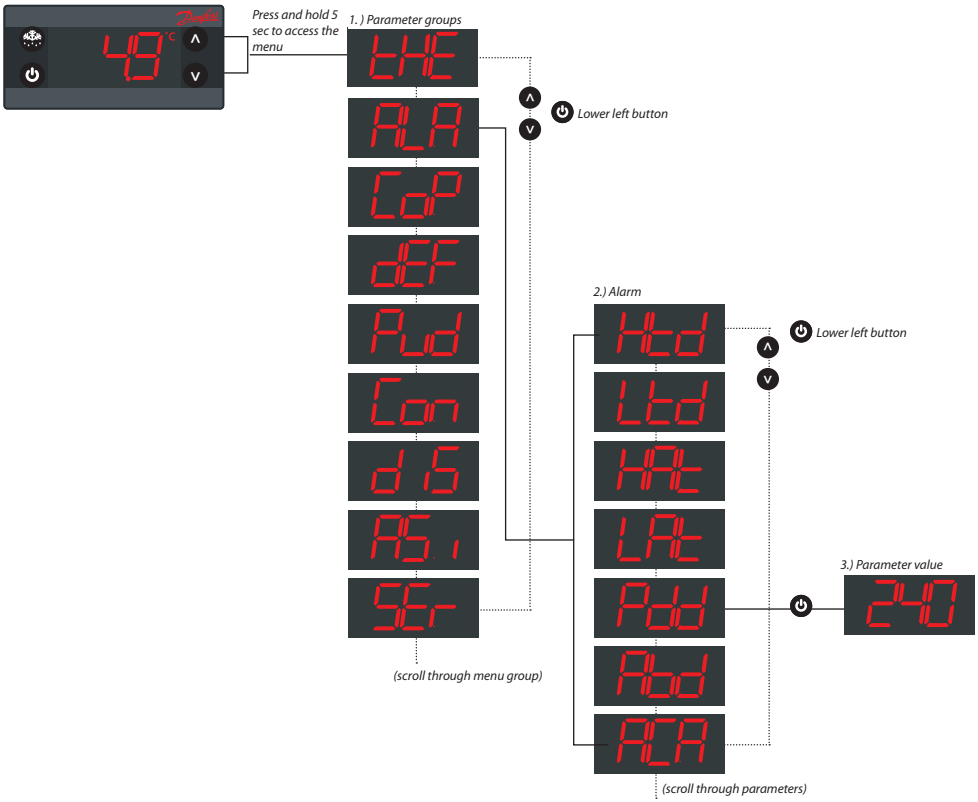
Button assignments in this manual refer to the Glass Door Merchandiser default ERC 101. For customised controls you may assign different shortcuts (ASI menu --> button configuration). Use this feature only when the ERC 101 is supplied without button prints.

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:



5.3.4 Menu structure



5.3.5 Password protection

6. CONFIGURATION OF INPUTS AND OUTPUTS

The ERC 101 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 S2 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

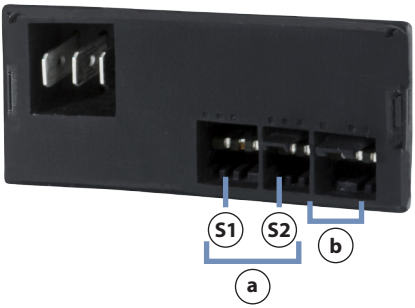
6.1 Changing input and output configuration settings

Two steps are needed to configure inputs:

1. Define the type of sensor attached to the input:
- Temperature / digital

2. Define the application for the sensor:
- Temperature: control / condenser / evaporator
- Display / both

Input S1 can be attached to a temperature sensor. The sensor measures cabinet temperature.
Input S2 is attached a attached to a temperature sensor. The sensor measures evaporator temperature.



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

Connector outputs (ⓒ)

	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
S1 Application	S1A	SCo	nC	doo	no			-- -- RW
S2 Application	S2A	nC	nC	doo	no			-- -- RW
DI Config	diC	dio	doC	dio	no			-- -- RW
DO1 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

S1 Config / S1C
S2 Config / S2C
Available options are:
Stn for a temperature sensor (values given in Celsius)
Dig for a digital sensor with simple on/off indication

S1 Application / S1A
S2 Application / S2A
Available options are:
nC: Not connected
SCo: Temperature control
EuA: Evaporator temperature
Con: Condenser temperature (Condenser cleaning)

DI Config / diC
This is the digital input used for a digital sensor or bus communications.
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.

6.2 Program the buttons

Every button can be operated in 2 modes:
long press
short press

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

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.*

7. PARAMETERS

This chapter details all user-accessible parameters in ERC 101 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 101 can handle both Celsius and Fahrenheit. Changing from C to F and vice-versa is done in the Display menu and is shown in the display. 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 ERC 101; 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.

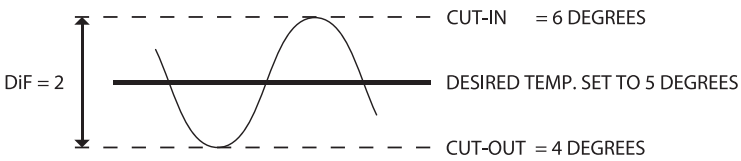
Differential / diF
This defines the difference between the cut-out and the cut-in. The desired temperature is determined by SPr and diF.

High Set Point / HSE
Low Set Point / LSE
These parameters define the temperature range limit of the controller. Once set, the desired temperatue (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 bybuttons 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
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

** Requires ERC 101 with integrated buzzer*

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.

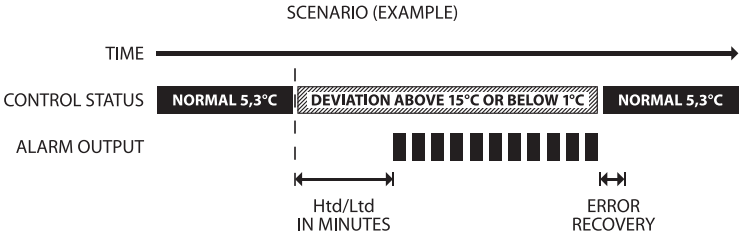
Pulldown Delay / Pdd
Normally, it is not necessary or desirable to sound an alarm during a pull down (the initial phase of reaching the desired temperature). This parameter prevents the High Temp Alarm HAt sounding during pull down and after a defrost for the number of minutes set for the parameter.

NOTE: *It does not apply to the Low Temp Alarm LAt.*

Alarm Buzzer Duration / Abd
The ERC 101 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 Cutin 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
Power-on temperature	Pot	-50.0/-58.0	-50.0/-58.0	50.0/122.0	C/F a	°C/°F	.1	-- -- 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 ERC 101 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.

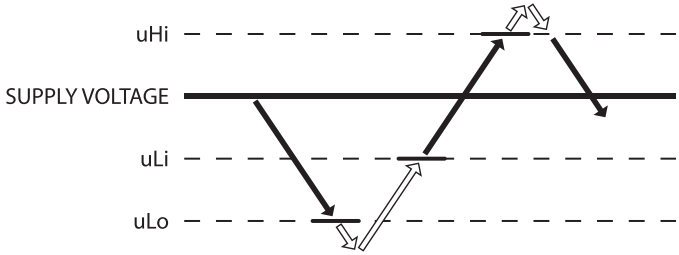
Ert and ESt values are based on OEM experience and are by default inactive.
Ert and ESt define the duration the compressor will run (Ert) and be idle (ESt).
Example: Ert = 4 [min] and ESt = 16 [min] will provide an average cooling system activity of 20%.

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.



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.**

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 immediatly (yes) or wait for cut-in temperature to start (no).

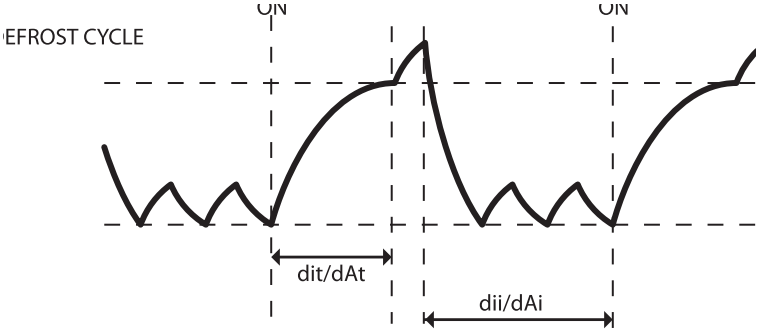
Power on Temperature / PoT
This parameter is used to accelerate the first application test on the OEM assembly line; if the cabinet temperature is higher than this parameter the Power On Delay is overruled and the outputs are activated without delay.

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 terminate temp	dtt	6.0/42.8	0.0/32.0	25.0/77.0	C/F a	°C/°F	.1	-- RW RW
Def reset temp	drt	5	0	80	no	°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
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.

Tadd defrost reset temp / 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 hours and defines the minimum duration of a defrost cycle. During this period, the ERC 101 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 101 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.

Initial Defrost Interval / idi
This parameter defines defrost behaviour after power-on. It can be set to between 0 and 96 hours and determines when the first defrost cycle will start after power-up. Setting this parameter to a low value will force a defrost cycle to start earlier, for example for testing purposes. The timer monitoring the defrost interval will not be reset by a subsequent loss of power, but it will continue to count once power is restored.

Initial defrost duration / idd
The "initial defrost" functionality is being used for factory testing for acceleration measures. This featured may not be desired under normal operation, you may decide to deactivate this function by setting a maximum number of compressor cycles (0 - 999).

0: idi always off
1-998:number of cycles before deactivation 999: idi always on

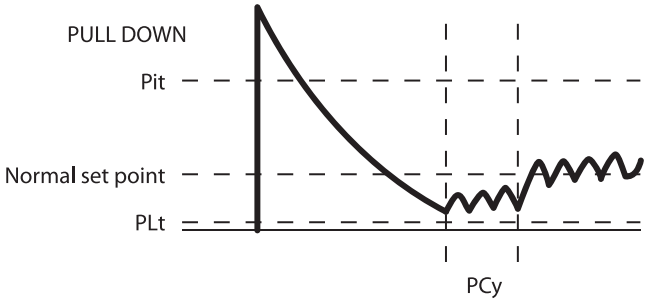
Defrost On Compressor Time / dCt
If this parameter is set to yES, then defrost cycles are based on the total time the compressor has been running.

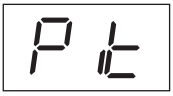
If this parameter is set to nO, then defrost cycles are related to elapsed time, regardless of how long and how often the compressor has been on.

7.5 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	Prt	0.1/0.2	0,0	10.0/16.0	C/F r	K/°R	.1	-- -- RW





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.

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.

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).

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.

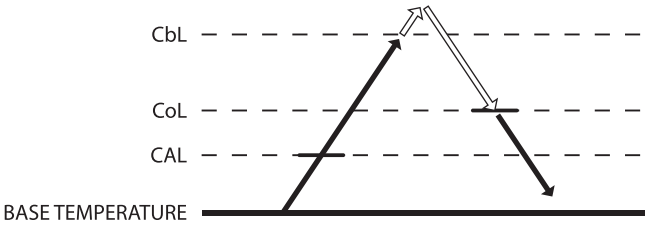
Pull Down Limit Temperature / PLt
This parameter sets the minimum allowed temperature during pull-down,
In order to protect valuable contents you must always specify the absolute minimum temperature allowed in your application.
For Glass Door Merchandisers 0°C/32°F protects bottles from freezing;
for Commercial Fridges you may opt for a slightly higher temperature (e.g. 2°C)

Pull Down Reduction Temperature Δt / Prt
ERC 101 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.

7.6 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.

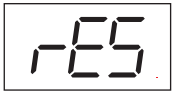
7.7 Display / diS

	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 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 as 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.

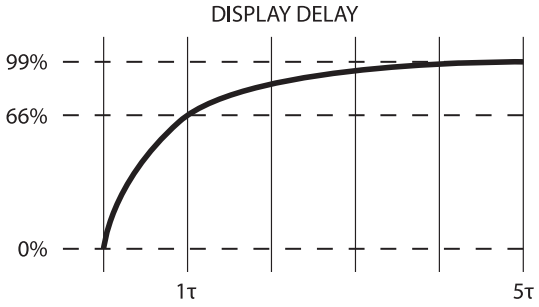


Display Resolution / rES
This parameter can be set to 0.1, 0.5 or 1 and affects the way the temperature is displayed. With the parameter set to 1, the display will only ever show temperatures rounded to the nearest whole degree. At 0.5, it will round the temperature to the nearest half degree for display.
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 de 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 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 101 can have its display intensity (brightness) set. This requires that buttons are configured accordingly.

7.8 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
S1 Application	S1A	SCo	nC	doo	no			-- -- RW
S2 Application	S2A	nC	nC	doo	no			-- -- RW
DI Config	diC	dio	doC	dio	no			-- -- RW
DO1 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

7.9 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.

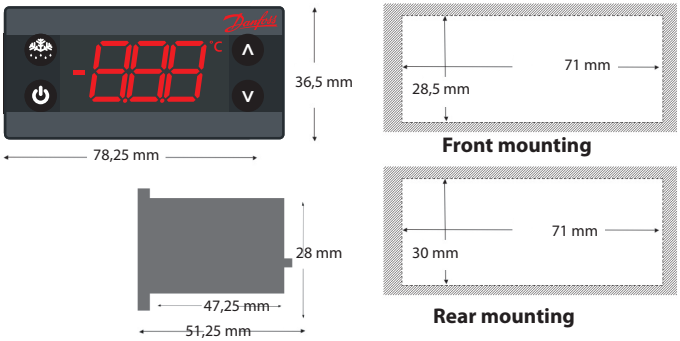
	ERC menu code	Default	Min	Max	Unit Conv	Unit	Scale	Default Access Shop Ser OEM
Service	**SEr**							
DI	Sdi	---	oFF	on	no			-- R- R-
Voltage value	uAC	---	0	270	no	Vac	1	-- R- R-
DOs Status	ouS	---	IIII	IIII	no			-- R- R-
Relay 1 counter	rL1	---	0	999	no	1000	1000	-- R- R-
interval Counter	int	---	0	999	no	min	1	-- R- R-
Defrost time counter	dnt	---	0	999	no	min	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			-- -- --
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 SPECIFICATIONS

Power Supply	100 - 240 VAC (±10%), 50-60 Hertz, switch mode power supply	
Rated Power	Less than 0.5 W	
Input	3 Inputs: 2 Analogue & Digital, 1 Digital; user specific assignment	
	• Air / Evaporator / Condenser	• Door sensor: All types, user specific
	• DP for remote communication	• Danfoss NTC cabinet temperature probes
	• Danfoss NTC evaporator temperature probes	• Danfoss NTC condenser temperature probes
	• Danfoss ambient light sensor	• Danfoss PIR sensor*
Output	UL60730	EN60730
Compressor	120Vac: 16A resistive/ FLA16 / LRA72. 240Vac: 10A resistive /FLA10 /LRA60.	16(16)A
Probes	Danfoss NTC sensors and Danfoss ERC accessories	
Connectors	Modular connector system for OEM customers, with optional output screw terminal adapter. Input connector type: Rast 2.5 Edge connectors. Output connector type: RAST 5 Standard	
Programming	Lab programming: Danfoss USB Gateway with KoolProg Software. Assembly line programming: Danfoss ERC docking station. Offline programming: 4 push buttons	
Assembly	3 types (all ERC 101 controls): front mounting (patents pending); brackets; fully integrated solution (requires "OEM specific" design of mounting hole)	
Display	LED 7 inch display, 3 digits, decimal point and "multi functionality" icons; °C/F scale. Available in various colours	
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	
Measurement Range	-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 III (can be mounted inside a refrigerated cabinet), 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 (16A))	
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	

IMPORTANT NOTE

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



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	LAt	Alarm is activated below this temperature (Celsius)
Pulldown delay	Pdd	Alarm delay during pulldown (0-960 minutes) (high temperature only)
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

** Requires ERC 101 with integrated buzzer*

	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	ESt	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
Initial cut in	iCi	Control temperature is between cut-in and cut-out at power up. YES: Compressor cuts in No: Compressor off until cut-in temperature reached.
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 reset temp	drt	Temperature determines if defrost timer is reset or continued at power up. Evaporator sensor has higher priority than control sensor 0-79: temp value upon which timer is reset 80: Disable drt function
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
Initial Defrost Interval	idi	The number of hours after power-up before the first defrost cycle starts
Initial Defrost Duration	idd	Number of cycles after which initial defrost functionality will be disabled. 0: idi always off 1-998: number of cycles before deactivation 999: idi always on
Defrost on compressor time	dCt	Whether the defrost cycles are measured by elapsed time (nO) or compressor run time (yES)

	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-rules 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
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 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
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) doC: Door contact, Contact closed when door closed doo: Door contact, Contact open when door closed
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
DO4 Config	o4C	nO: Not used; ALA: Alarm output; Lig: Light control

	ERC menu code	Description
Assignments	**ASi**	**Assignment of inputs and outputs**
Button 1 Short Config	b1C	Config of key 1 short, lower left tP:Increase Setpoint tn: Decrease setpoint ECo: Toggle Eco mode Lig: Toggle light dEF: Toggle defrost SuP: Toggle Super-Cool /Pull-down diP : Increase display intensity din : Decrease display intensity noP: Not operating
Button 1 Long Config	b1L	Config of key 1 long, lower left tP:Increase Setpoint tn: Decrease setpoint ECo: Toggle Eco mode Lig: Toggle light dEF: Toggle defrost SuP: Toggle Super-Cool /Pull-down diP : Increase display intensity din : Decrease display intensity noP: Not operating PoF: ERC power ON/OFF
Button 2 Short Config	b2C	Config of key 2 short, upper left, as key 1 short
Button 3 Short Config	b3C	Config of key 3 short, upper right, as key 1 short
Button 3 Long Config	b3L	Config of key 3 long, upper right, as key 1 long
Button 4 Short Config	b4C	Config of key 4 short. lower right, as key 1 short
Button 4 Long Config	b4L	Config of key 4 long. lower right, as key 1 long
Pass-word level1	PS1	Shop owner Most common parameters for instance real time clock, day/night mode etc. (0 means disabled)"
Pass-word level2	PS2	Service technician all parameters with read permission and possibility to change a number of parameters like defrost, fan etc(0 means disabled)
Pass-word level3	PS3	"OEM Customer All parameters read and write permission, but with some restriction to, for instance, reset statictical information. (0 means disabled)

	ERC menu code	Description
Service	**SEr**	**Service**
DI	Sdi	DI: physcial 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
interval Counter	int	Compressor run time since last defrost
Defrost time counter	dnt	Duration of last defrost cycle [min]
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

Type	Code no. I-Pack Approvals 230V, CQC/UL/CE
Controller	
ERC 101 RED LED, CQC only	**080G3030**
ERC 101 RED LED, UL, CE and CQC	**080G3130**
ERC 101 BLUE LED, UL, CE and CQC	**080G3131**

Evaporator/Defrost sensor	
PVC Standard (C2), 1500 mm, 2-pole	**077F8790**
PVC Standard (C2), 2000 mm, 2-pole	**077F8794**
PVC Standard (C2), 3000 mm, 2-pole	**077F8798**
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**

(C): Connector type

* Defrost sensors can also be used as condenser sensors.

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

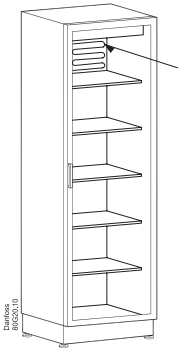
Type	Code no. I-Pack Approvals 230V, CQC/UL/CE
Programming	
OEM Docking station, production line	**080G9701**
Copy stick EKA 103A	**080G9740**
Gateway including USB Cable for R&D	**080G9711**
Mounting Clamps	
Black (2 needed per controller)	**080G3308**
Power-plug	
Lumberg,3 pole	**080G3364**

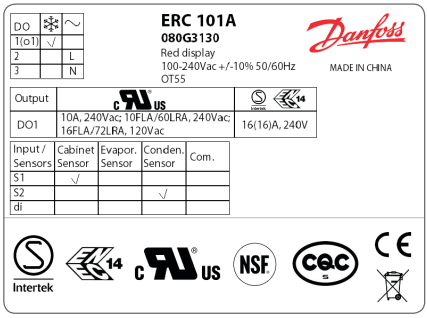
APPENDIX III: TROUBLESHOOTING

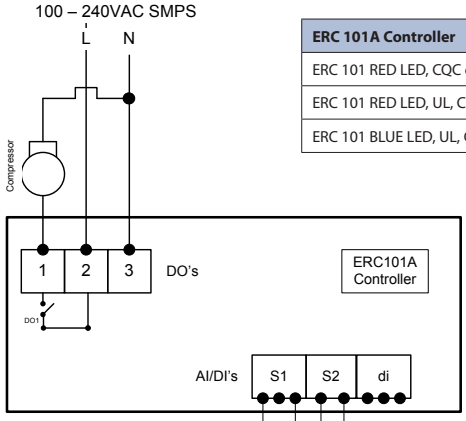
Problem	Probable cause	Remedy
Compressor does not start	Waiting for compressor delay timer Defrost in progress Line voltage to compressor too low or too high	Check CoP->CSt Check CoP->Pot /Pod Check dEF->dit, dot Check CoP->uLi, uLo, uHi
Defrost does not start I	The temperature has been higher than the defrost reset temperature, which will cause the defrost counter to reset. Note: If no evaporator sensor is attached, the air temperature in the cabinet will be used for defrost.	Check parameter dEF-> drt
Defrost does not start II	Controller in pull-down mode	Defrost might be delayed during pull-down Check parameter Pud->Pdi
Alarm does not sound	Alarm delayed or buzzer is not enabled.	Check ALA->Htd, Abd Check Pud->Pdd Check ALA-> Abd
E01 or E02 is shown on display	E01: Sensor S1 defective E02: Sensor S2 defective	Replace sensor
Display alternates between Con and temperature	Condenser temperature exceeds the temperature set in condenser settings menu	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

ERC 101A
Glass Door Merchandiser







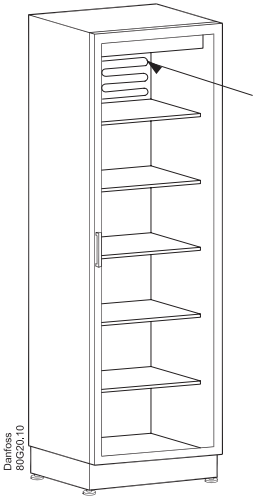
ERC 101A Controller	Code nr.
ERC 101 RED LED, CQC only	**080G3030**
ERC 101 RED LED, UL, CE and CQC	**080G3130**
ERC 101 BLUE LED, UL, CE and CQC	**080G3131**

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

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

APPENDIX V: APPLICATION SPECIFICATON

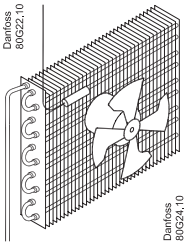
V.1 Control sensor



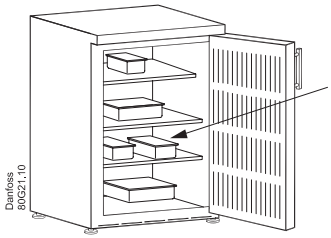
The control sensor must always be connected and is used for controlling the cut-in and cut-out of the compressor according to the set-point. The sensor is also used for the displayed temperature.

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.

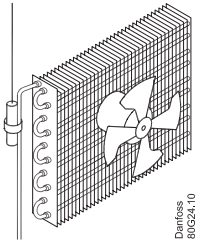


Vertical freezers with fan
Placement in the return air or in the freezer compartment



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.

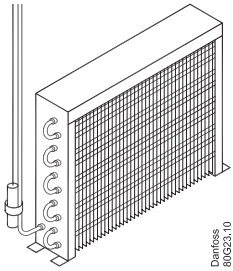
V.2 Evaporator sensor



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 finns 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.

ERC 101 Application Matrix

Application	Type	Output	Input		
		DO1	S1 (C1)	S2 (C2)	Di (C4)
Standard Beverage cooler	ERC101A	Comp	Control	Defrost or Condenser	-
Out-door beverage cooler	ERC101A	Comp	Control	Defrost or Condenser	-
CFF Refrigerator	ERC101A	Comp	Control	Defrost or Condenser	-
CFF Freezer Static evaporator	ERC101A	Comp	Control	Condenser	-

NOTE:

- *Select only one function per input, e.g. condenser sensor or defrost 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 defrost sensor are optional and can be omitted*