ID 974 DCC

electronic controllers for "forced air" refrigeration units
with deep cooling cycle

Eliwell Electronic controller for 'forced air' refrigeration units: the ID974 DCC is also suitable for "mixed" refrigeration systems that perform a blast chilling cycle and subsequent storage of foodstuffs. At the end of the blast chilling cycle the controller automatically switches to storage mode.
• 2 NTC/PTC probes • 3 relays • TTL serial • 230V

• Deep Cooling Cycle (Blast Chiller) Function **(DCC)**
• The instrument automatically inhibits defrosting and manages alarms during the blast chilling function.
• The blast chilling cycle can be activated by pressing the 'fnc' key

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BUTTONS AND LEDS

UP
• Scrolls through the menu items
• Increases the values
• Activates manual defrost function

DOWN
• Scrolls through the menu items
• Decreases the values

fnc (press once)
• ESC function (quit)
  (hold down)
• Enable manually DCC function (par. H33)

set (press once)
• Accesses the setpoint
• Displays the alarms (if active)
• Displays Pb1 and Pb2 (see)
(hold down) Accesses the parameter programming menus

❄ **Compressor**
• ON when the compressor is started up;
• blinking in case of delay, protection or blocked enabling

❄ **Defrost**
• ON when defrosting;
• blinking in case of manual enabling

((•)) **Alarm**
• ON when the alarm is enabled;
• blinking when the alarm is silenced

❀ **Fans**
• ON when the fan is working

SETTING THE SET POINT - MACHINE STATUS MENU

a) Press the 'set' button and release it to access the machine status menu. In normal conditions, the labels for the Set point value is found in the menu. Once the 'SEt' label has been displayed, press the "set" button to display the Setpoint value. The Setpoint value appears on the display.
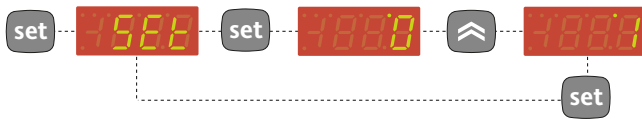
To change the Set point value, use the "UP" and "DOWN" buttons within 15 seconds. If you press the "set" button again, when the fnc button is pressed or 15 seconds elapse, the last value displayed will be stored and the "SEt" label will reappear on the display.
b) If alarms are present, the "AL" label appears. By using the "UP" and "DOWN" buttons, you can scroll through all the folders in the menu:

-AL: alarm folder (if alarms present, except for faulty probes/probe errors;
-SEt: Set point setting folder see pt. **a)**
-Pb1: probe 1 value folder;
-Pb2: probe 2 value folder - if present -

c) If an alarm condition exists when the Machine Status menu is accessed, the "AL" folder label appears.

(example: when maximum and minimum temperature alarms are present)

Use the UP and DOWN buttons to scroll through the list of active alarms and press 'set' to display the selected alarm.

PROGRAMMING MENU

The menu is divided into 2 levels once users have pressed the 'set' button for 5 seconds, they can access the user level folders (1)
Navigation at user level(1):

• By using the 'UP' / 'DOWN' buttons you can scroll through all the folders in the programming menu that only contain user level parameters (1)

How to access the installer level (2):

• By using the 'UP' / 'DOWN' buttons, scroll through the user level folders (1) until the folder with the "CnF" label is displayed. Then press 'set' to access the parameters contained in it.

• By using the 'UP' / 'DOWN' all the parameters in the user level (1) in 'CnF' are displayed, continue until the 'PA2' label is not longer displayed and press 'set'.

• By pressing the 'set' button next to 'PA2' the first folder containing installer level parameters will be displayed and then the 'CP folder.

Navigation at installer level(2):

• By using the 'UP' / 'DOWN' buttons you can scroll through all the folders in the programming menu that only contain installer level parameters (2)

How to modify the parameter value (on both levels):

• When the 'set' button is pressed, the first folder in the menu is displayed. (e.g.: "CP" folder)

• By using the 'UP' / 'DOWN' buttons you can scroll through all the folders in current level.

• By pressing the 'set' button next to the selected folder (in this case "AL") the first parameter in the current level will be displayed. Select the desired parameter using the 'UP' / 'DOWN' keys.
• By pressing the 'set' button the value of the selected parameter is displayed and by using the 'UP' and 'DOWN' buttons, it can be modified.

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PASSWORD

Access to parameter handling both at user level and installer level can be limited by using passwords. The passwords can be enabled by setting the PA1 (user password) and PA2 (installer password) in the 'dIS' folder. The passwords are enabled if the value of the 2 parameters PA1 and PA2 is not 0.

set `-PA1`
• To access the "Programming" menu hold down the "set" button for more than 5 seconds.
If specified, the user level(1) access PASS-

set `-18.0`
WORD will be requested
• If password 1 is enabled (not 0) you will be asked to enter it. Perform the operation by selected the correct value using the 'UP' e 'DOWN' keys and press the 'set' button to confirm.

Installer level (2) parameters

In the programming menu scroll through the folders containing the user level parameters using the UP' and 'DOWN' buttons until

`-CnF` the CnF folder is displayed.
• Press the 'set' button to enter the 'CnF' folder where the'PA2' label is present.
• Scroll through the folder parameters and press the 'set' button next to the 'PA2' label, '0' will appear on the display.

`-PA2`

`-255`
• Use the 'UP' / 'DOWN' buttons to select the correct value of the installer password and then press the 'set' button to access the installer level parameters (2).

If the password is not entered correctly, the device will display the 'PA2' label again and the operation will have to be repeated.

COPY CARD

The Copy Card is an accessory connected to the TTL serial port used for quick programming of the unit parameters (upload and download parameter map to one or more units of the same type). upload (UL label), download (dL label) and copy card formatting (Fr label) operations are performed in the following way:

set `-FPr`
• The 'FPr' folder contains the commands necessary for use of the Copy Card. Press 'set' to access the functions.

`-UL`
• Use the 'UP' / 'DOWN' buttons to display the required function. Press the 'set' and uploading (or downloading) will be performed.

set `-y` `-n`
• If the operation is successful 'y' will be displayed, if it is not successful, 'n' will be displayed.

Download from reset

Connect the copy card when the instrument is OFF. The programming parameters are downloaded when the device is switched on. At the end of the lamp test, the following messages are displayed for about 5 seconds:
• dLY label if copy operation is successful
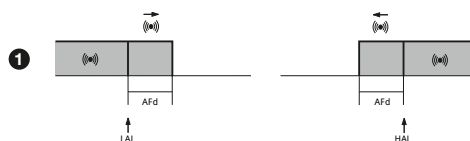• DLn label if operation fails
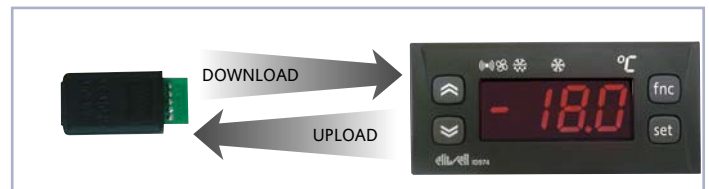
NOTE:
• after the parameters have been downloaded, the device uses the downloaded parameter map settings.
• **see** "FPr folder" in Parameter Table and Description of parameters

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At each level in both menus, when the "fnc" button is pressed or the 15 second time out elapses, you are taken back to the higher display level and the last value on the display is stored.
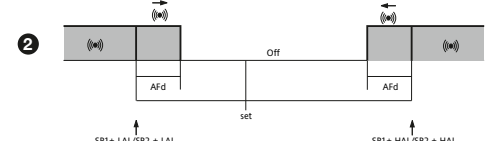

MAX-MIN ALARMS

	Temperature expressed as an absolute value (par "Att"=0) Abs(olute)	Temperature in relation to set point (par "Att"=1) rEL(ative)
Minimum temperature alarm	Temperature lower than or equal to LAL (LAL with sign)	Temperature lower than or equal to set point +LAL (LAL positive only)
Maximum temperature alarm	Temperature greater than or equal to HAL (HAL with sign)	Temperature greater than or equal to set point +HAL (HAL positive only)
Minimum temperature alarm back swing	Temperature higher than or equal to LAL+AFd	Temperature greater than or equal to set point + LAL + AFd set point -|LAL|+AFd
Maximum temperature alarm back swing	Temperature lower than or equal to HAL-AFd	Temperature lower than or equal to set point+HAL-AFd

if Att=reL(ative) LAL must be negative: therefore set point+LAL<set point because set point+(-|LAL|)=set-|LAL|
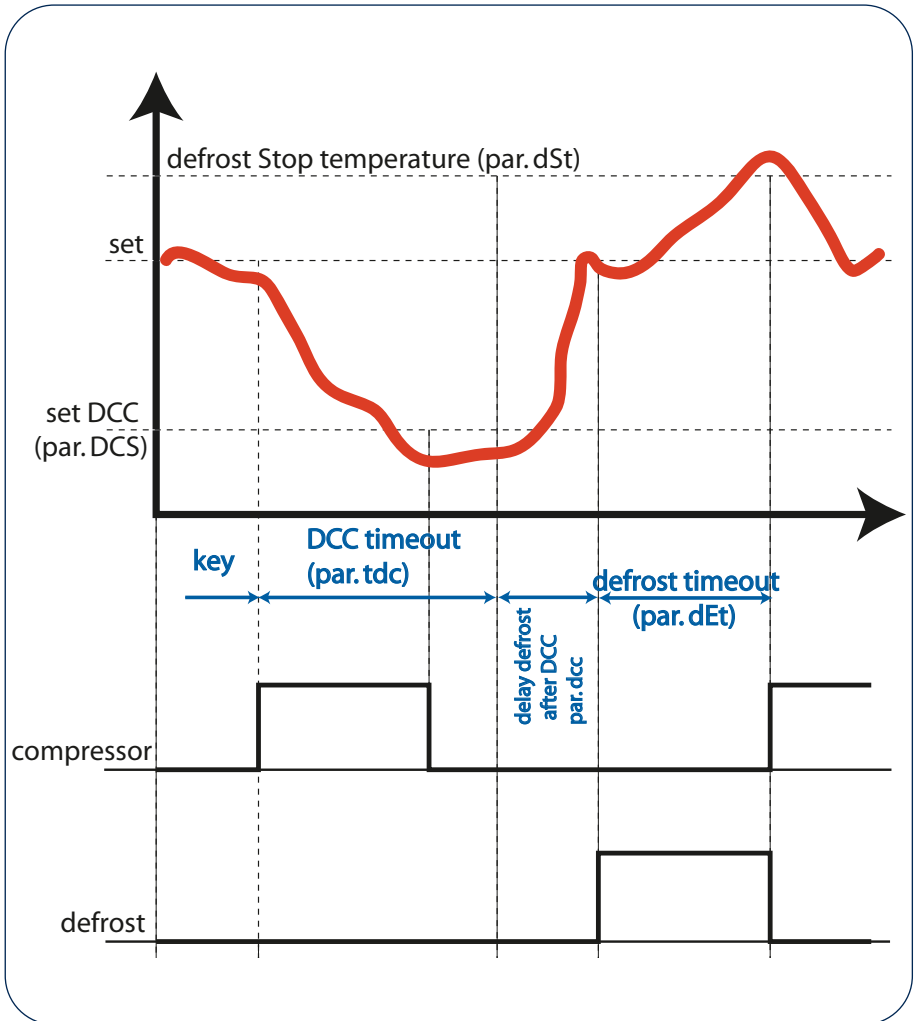
The Deep Cooling Cycle Function (**DCC**) is enabled by H01 parameter.

When **DCC** is activated the compressor works on **dCS** setpoint with **diF** differential: time is set by tdc parameter (blast chiller cycle).

At DCC activation interval between two defrost is reset, and defrost is disabled. After **DCC** cycle and after a time set by **dcc** a defrost is forced - delay between defrosts is re-enabled (see **dit**).

Temperature Alarms are disabled during **DCC** cycle - except for LAL if Att=1 (relative to setpoint).
After **DCC** cycle Alarms management is restored.

In case of faulty probe and/or blackout **DCC** cycle stops.
If **dcS**, **tdc** and **dcc** parameters are changed by the user during the **DCC** cycle this will be re-calculate with new parameters settings.

ALARMS

LABEL	ALARM	CAUSE	EFFECTS	Resolving problems	NOTES
E1	Probe 1(control) faulty	• measuring of values outside the nominal reading range • control probe faulty/shorted/open probe	"E1" label appears on display; Controller enabled as indicated by the On1 and OF1 parameters if programmed for the Duty Cycle	• check the probe wiring • replace the probe	
E2	Probe 2 (evaprator) faulty	• measuring of values outside the nominal reading range • control probe faulty/shorted/open probe	"E2" label appears on display;	• check the probe wiring • replace the probe	
AH1	High temperature alarm	• value read by probe 1 > HAL after time equal to "tAO". (see " MIN MAX ALARMS" and description of "HAL", "Att" and "tAO" parameters)	Alarms created in the "AL" folder with the AH1/AH2 label	• Wait for temperature value read by probe 1 to fall below HAL	
AL1	Low temperature alarm	• value read by probe 1 < LAL after time equal to "tAO". (see " MIN MAX ALARMS" and description of "LAL", "Att" and "tAO" parameters)	Alarms created in the "AL" folder with the AL1/AL2 label	• Wait for temperature value read by probe 1 to go above LAL	
Ad2	End of defrost due to time-out	• If defrost ends because of a time-out (instead of being caused by a defrost end temperature detected by the defrosting probe), an alarm is generated an the icon is turned on consequently.	Alarms created in the "AL" folder with the "Ad2" label	• Automatic back swing occurs when the next defrost starts • By pressing any key during the alarm condition, the signal light disappears. In order to really erase the alarm you must wait the next defrost.	
			ALL see Alarm LED	**ALL** • Manual silencing by pressing button	ALL – If there are alarm exclusion times (see parameter table "AL" folder) the alarm will not be signalled.

KEYBOARD LOCKING

The instrument includes a facility for disabling the keyboard:
• using the keys (pressing **UP+DOWN simultaneously** for 2 seconds; see KEYS AND LEDS)
• by programming the "Loc" parameter (see folder with "diS" label).

If the keyboard is locked, you can access the "Programming" Menu by pressing the "set" key.

The Setpoint can also be viewed.

PARAMETERS TABLE

	PAR.	RANGE	ELIWELL DEFAULT/	U.M.	LEVEL		PAR.	RANGE	ELIWELL DEFAULT/	U.M.	LEVEL
			SETPOINT						**AL Folder**		
	SEt	LSE...HSE	-22	°C/°F	1		Att	0/1	1	flag	**0**
							AFd	1.0...50.0	2.0	°C/°F	**2**
			CP FOLDER				HAL	LAL...150.0	50.0	°C/°F	**2**
							LAL	-50.0...HAL	-50.0	°C/°F	**2**
	diF	0.1...30	3.0	°C/°F	1		PAO	0...10	0	h	**2**
	HSE	LSE...302	99.0	°C/°F	**2**		dAO	0...999	0	min	**2**
	LSE	-55.0...HSE	-25.0	°C/°F	**2**		tAO	0...250	0	min	**2**
*	**dCS**	-58.0...320	-38.0	°C/°F	**2**						
*	**tdc**	0...60	13	min*10	**2**				**dIS Folder**		
*	**dcc**	0...255	10	min	**2**		LOC	n/y	n	flag	**2**
	Ont	0...250	10	min	**2**		PA1	0...250	0	num	**2**
	OFt	0...250	10	min	**2**		**PA2**	0...250	0	num	**2**
	dOn	0...250	15	sec	**2**		ndt	n/y	y	flag	**2**
	dOF	0...250	0	sec	**2**		CA1	-12.0...12.0	0	°C/°F	**2**
	dbi	0...250	1	sec	**2**		CA2	-12.0...12.0	0	°C/°F	**2**
	OdO	0...250	0	sec	**2**		ddL	0/1/2	1	num	**2**
							dro	0/1	0	flag	**2**
			DEF Folder								
	dty	0/1/2	0	num	**2**				**CnF Folder**		
	dit	0...250	8	h	1	**	H00	0/1	1	flag	**2**
	dCt	0/1/2	1	num	**2**	*	**H01**	n/y	y	flag	**2**
	dOH	0...59	0	min	**2**		H33	0...4	4	num	**2**
	dEt	1...250	30	min	1		H42	n/y	y	flag	**2**
	dSt	-50.0...150	20.0	°C/°F	1		reL	/	/	/	/
	dPO	n/y	0	°C/°F	**2**		tAb	/	/	/	/
			FAn Folder						**Fpr Folder**		
	FSt	-50.0...150	-5.0	°C/°F	1		UL	/	/	/	/
	FAd	1.0...50.0	2.0	°C/°F	**2**		dL	/	/	/	/
	Fdt	0...250	5	min	**2**		Fr	/	/	/	/
	dt	0...250	1	min	**2**						
	dFd	n/y	y	flag	**2**						
	FCO	n/y/dc	y	num	**2**						

**Check the NTC/PTC default probe type installed (see label)
LEVEL column: indicates the visibility level of parameters accessed using a PASSWORD (see relevant paragraph).
If one or more parameters are modified, it is suggested to the switch off the controller after the modification and then switched back on.

* DCC parameters

MECHANICAL ASSEMBLY

The unit has been designed for panel-mounting: Drill a 29x71 mm hole, insert a tool and fix it in place with the brackets provided. Do not assemble the instrument in excessively humid or dirty locations since it is designed to be used in locations with normal pollution levels. Always make sure that the area next to the cooling openings of the tool is adequately ventilated.

ELECTRICAL CONNECTIONS

Warning! Always switch off machine before working on electrical connections. The instrument has screw terminals for connecting electrical cables with a maximum diameter of 2.5 mm² (only one conductor per terminal for power connections): for terminal capacity, see instrument label.The relay contacts are voltage-free. Do not exceed the maximum current allowed. For higher loads, use a suitable contactor. Make sure that the power voltage complies with the device voltage. The sensor has no connection polarity and can be extended using an ordinary bipolar cable (note that extending the probe may affect the electromagnetic compatibility (EMC) of the instrument: special care must be used when wiring). Probe cables, power supply cables and the TTL serial cable should be kept separate from power cables.

COMPRESSOR CONTROL (folders with label "CP")

diF Compressor relay activation differential: the compressor stops on reaching the Setpoint value (as indicated by the adjustment probe) and restarts at a temperature value equal to the Setpoint plus the value of the differential.
Note: the value 0 cannot be assumed.

HSE Maximum possible setpoint value.

LSE Minimum possible setpoint value.
NOTE: The two sets are interdependent: HSE (maximum set) cannot be less than LSE (minimum set) and vice versa

*dcS **Deep Cooling Setpoint**
*tdc **Time Out Deep Cooling Cycle**
*dcc **Delay Defrost after Deep Cooling Cycle**
*see DCC description and diagram page 3

Ont Compressor activation time in the event of a faulty probe. If set to "1" with Oft set to "0", the compressor is always on, while with OFt >0 it operates in duty cycle mode.

OFt Compressor off time in the event of a faulty probe. If set to "1" with Ont at "0", the compressor is always off, while with Ont>0 it operates in duty cycle mode.

dOn Starting delay. The parameter indicates that a protection is active on the relay actuations of the generic compressor. Between the request and effective activation of the compressor relay, at least the specified time must elapse.

dOF Delay after switching off. The parameter indicates that the protection is active on compressor relay actuations. At least the indicated time must elapse between switch-off of the compressor relay and the successive switch-on.

dbi Delay between switch-ons. The indicated time must elapse between two subsequent switch-ons of the compressor.

OdO Delay time in activating the outputs after switch-on of the instrument or after a power failure. 0= not active.

DEFROSTING CONTROL (folders with labels "dEF")

> **DEFROSTING CONDITIONS**
> The instrument allows defrosting to be performed in the following conditions:
> - the evaporator temperature is lower than the defrost end temperature set by the dSt parameter;
> - manual defrosting is not already activated (see); in this case the request for automatic defrosting will be cancelled.

> **Automatic defrosting**
> In this case, defrosting takes place at time intervals set by parameter dit (=0 defrosting will not take place at all).
> As mentioned above, if the parameter dit> 0 and defrosting conditions apply (see parameter dSt), defrosting will take place at fixed intervals and according to the parameter dCt

dty Type of defrost.
0 = electrical defrosting;
1 = cycle inversion defrosting (hot gas);
2 = Free mode defrost (independent of compressor).

dit Interval between the start of two subsequent defrosting operations.
0= the function is disabled (defrosting is NEVER performed)

dCt Selection of count mode for the defrosting interval.
0 = compressor hours of operation (DIGIFROST® method);
Defrosting active ONLY with the compressor on.
NOTE: compressor time of operation is counted regardless of the evaporator probe (counting is active if evaporator probe is absent or faulty).
1 = hours of appliance operation. Defrost counting is always active when the machine is on and starts at each power-on.
2 = compressor stop. Every time the compressor stops, a defrosting cycle is performed according to parameter dty

dOH Defrost start delay time from start up of instrument.

dSt Defrosting end temperature (determined by the evaporator probe).

dEt Defrost time-out: determines the maximum duration of defrosting.

dPO Determines whether the instrument must enter **defrosting at start-up** (if the temperature measured by the evaporator allows this operation).
y = yes, starts defrosting at start-up; n = no, does not start defrosting at start-up.

FAN CONTROL (folder with "FAn" label)

FSt Fan lock temperature: if the evaporator probe reads a higher value than the set value, the fans are stopped. The value is positive or negative and, depending on parameter FPt, can represent the temperature as an absolute value or relative to the Setpoint.

FAd Fan activation intervention differential (see par. "FSt").

Fdt Delay time at fan activation after a defrosting cycle.

dt Dripping time.

dFd Allows exclusion of the evaporator fans to be selected or not selected during defrosting. y = yes (fans excluded); n = no.

FCO It allows the fan lock to be selected or not when the compressor is OFF.
y = fans active (with thermostat; depending on the value read by the defrosting probe, see "FSt" parameter);
n = fans off;
dc = duty cycle.

FOd Allows fan lock to be selected when the door is open and fan restart when the door is shut (if they were active).
n=fan lock;   y=fans unchanged

ALARMS (folder with "AL" label)

Att Parameter "HAL" and "LAL" modes, as temperature absolute value or as differential relative to the Setpoint.
0 = absolute value; 1 = relative value.

AFt Alarm differential.

HAL Maximum temperature alarm. Temperature value (understood as distance from the Setpoint or as an absolute value based on Att) which if exceeded in an upward direction triggers the activation of the alarm signal.
See Max/Min. Alarm Diagram.

LAL Minimum temperature alarm. Temperature value (understood as distance from the Setpoint or as an absolute value based on Att) which if exceeded in a downward direction triggers the activation of the alarm signal.
See Max/Min. Alarm Diagram.

PAO Alarm exclusion time after instrument is switched on following a power failure.

dAO Alarm exclusion time after defrost.

tAO Temperature alarm signal delay time.

DISPLAY (folder with "diS" label)

LOC Keyboard locking. It is still possible to enter parameter programming and modify the parameters, including the status of this parameter, in order to allow keyboard unlocking. y = yes (keyboard locked); n = no.

PA1 When enabled (value other than 0), it constitutes the access key for level 1 parameters.

ndt View with decimal point.
y = yes (view with decimal point); n = no (only integers).

CA1/CA2 Calibration 1/2. Positive or negative temperature value added to the value read by probe 1/2.

ddL Viewing mode during defrosting.
0 = shows the temperature read by the thermostat probe;
1 = locks the reading at the temperature value read by thermostat probe when defrosting starts and until the next time the Setpoint value is reached;
2 = displays the label "deF" during defrosting and until the next time the Setpoint value is reached.

dro Select °C or °F for displaying the temperature read by the probe.
0 = °C, 1 = °F. **PLEASE NOTE: switching between °C and °F or vice versa DOES NOT modify the setpoint, differential, etc. (for example set=10°C become 10°F).**

CONFIGURATION (folder with "CnF" label)

H00 Selection of probe type. 0 = PTC; 1 = NTC.

H01 **Enable Deep Cooling Cycle Function (y= yes, n= no)**

H33 Configurability FNC key (ESC function)
0 = disabled; 1 = defrost; 2 = auxiliary;
3 = reduced set (economy); 4 = DCC function

H42 Evaporator probe presence. n= not present; y= present.

rEL Device version: read only parameter.

tAb Reserved: read-only parameter.

COPY CARD (folder with label "Fpr") - (see "Copy Card" section)

UL Upload. Programming parameter transfer from instrument to Copy Card.

dL Download. Programming parameter transfer from Copy Card to instrument.

Fr Format. Erasing all parameters in the key.
PLEASE NOTE: using the "Fr" parameter (key formatting) results in permanent loss of data inserted in key. The operation cannot be cancelled.

CONDITIONS OF USE

PERMITTED USE
For safety reasons the instrument must be installed and used in accordance with the instructions supplied. Users must not be able to access parts with dangerous voltage levels under normal operating conditions. The device must be suitably protected from water and dust according to the specific application and only be accessible using special tools (except for the front keypad). The device can be fitted to equipment for household use and/or similar use in the refrigeration sector and has been tested with regard to safety in accordance with the European harmonized reference standards: It is classified as follows:
• as an automatic electronic control device to be integrated as regards its construction;
• as a 1 B type operated control device as regards its automatic operating features;
• as a Class A device in relation to the category and structure of the software.

UNPERMITTED USE
The use of the unit for applications other than those described above is forbidden. It should be noted that the relay contacts supplied with the device are functional and therefore exposed to potential faults. Any protection devices required to comply with product requirements or dictated by common sense due to obvious safety reasons should be installed externally.

Front protection	IP65
Casing	PC+ABS UL94 V-0 resin plastic body, polycarbonate front, thermoplastic resin buttons.
Dimensions	front panel 74x32 mm, depth 59 mm (terminals excluded).
Assembly	on panel, with drilling template 71x29 mm (+0.2/-0.1 mm).
Operating temperature	-5...55 °C.
Storage temperature	-30...85 °C.
Ambient operating and storage humidity	10...90 % RH (non-condensing).
Display range	• NTC probe: –50.0...110.0°C (–58...230°F); • PTC probe: –55.0...140.0°C (–67...284°F) on display 3 1/2 digits + sign.
Analogue input	2 PTC or NTC input (parameter selectable).
Serial	TTL for connection to Copy Card
Digital outputs (configurable)	3 outputs on relays: • (A) 1 output on SPDT relay 8(3)A 1/2 hp 250V~, • (B) 1 output on SPST relay 8(3)A 1/2 hp 250V~, • (C) 1 output on SPST relay 5(2)A 1/4 hp 250V~ (for relay capacity, see instrument label).
Buzzer	if present
Measurement range	from -55 a 140 °C.
Accuracy	better than 0.5% of bottom scale + 1 digit.
Resolution	0.1°C (0.1°F up to +199.9°F; 1°F above).
Power consumption	3 VA max
Power supply	230V~ ±10% 50/60 Hz PLEASE NOTE: please refer to label on the instrument for relay capacity, power supply and terminals layout.

TERMINALS

1	Common relay contact
2	N.O. defrost relay (A)
3	N.C. defrost relay (A)
4	Compressor relay output (B)
5	Fan relay output (C)
6 - 7	Power supply
8 - 9	Probe 2 input (evaporator)
8 - 10	Probe 1 input (thermostat)
A	TTL input for Copy Card

ID 974 - 230 V
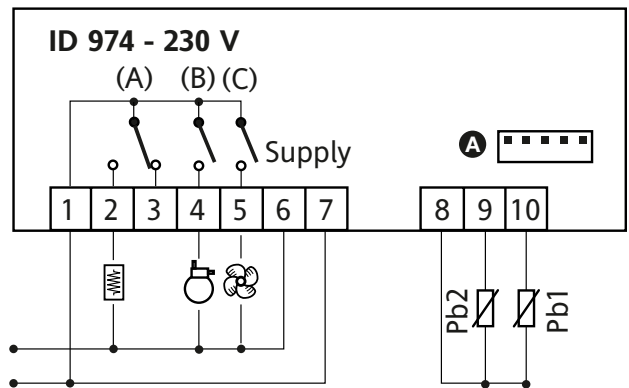
The technical characteristics in this document concerning measurements (range, accuracy, resolution, etc.) refer to the instrument in the strictest sense and not to any accessories provided such as probes, for example. This means, for example, that an error introduced by the probe is added to any error that is typical of the instrument.

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- use on boards which do not guarantee proper protection against electric shock, water or dust when assembled;
- use on boards which allow dangerous parts to be accessed without the use of tools;
- tampering with and/or alteration of the product;
- installation/use on boards that do not comply with the standards and regulations in force.

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