

ATTENTION

Read carefully these instructions before installing and using this device and keep them for future reference. Attention to installation and electrical wiring. Use this device only as described in this document and never use itself as a security device. The device must be disposed of in accordance with local standards for the collection of electrical and electronic equipment.

**DESCRIPTION**

ICE is an ideal thermostat for sprinkling ice machine. It has three NTC/PTC sensors: one is for the evaporator temperature, the second is for the ice storage in order to terminate the production when the storage is full and the third is for controlling the condenser's fan. It has 3 indication digits of temperature display with an accuracy of 0.5°C and 4 buttons. Four relays (for compressor 30A, water pump 5A, and defrost 10A, condenser's fan 5A) with NO contact, three adjustable timers in minutes for the control of the compressor/water pump and defrost relays, electrical or HOT-GAS defrost mode, wash operation, OFF mode of the device and an alarm buzzer for high or low temperature. The device is mounted on a panel hole 29x71mm and it is restrained with plastic side brackets. Through the serial input it can be connected to a Cloud IoT network on the CORTEX platform for complete local recording and monitoring of the device.

INDICATIONS AND BUTTONS FUNCTION

Display indications	
	compressor ON
	defrost ON
	water pump ON
	fan condenser ON
	timer ON
T1	evaporator temperature
T2	ice storage temperature
T3	condenser temperature

Keyboard	
	enter/exit the parameter's menu
	display the parameter's value enter parameter's value manual defrost
	up arrow toggles display between evaporator temperature T1 and evaporator condenser T2
	down arrow mute buzzer ON/OFF device (check below) display ice storage temperature T3

For more indications regarding the alarms please see the alarm's table at page 3.

DEVICE OPERATION WITH ELECTRIC DEFROST

- During start-up, the defrost relay is activated and timer t2 starts counting. The screen displays t2 time duration, which counts backwards, while the indications and turn on. If the **evaporator temperature is lower than the set point after the defrost**, all operations and relays will be deactivated automatically and the screen will display the indication "EEE". The alarm is automatically deactivated after the restart of the device using the ON/OFF button or by toggling the power supply. **Manual defrost** duration is based on timer t2 and does not end based on the defrost end temperature – parameter dE5.
- When timer t2 elapses, the defrost relay is deactivated and timer t3 starts counting while the compressor and water pump relays are activated. The display shows the current evaporator temperature and the indications , **T2** and light up. When the evaporator temperature reaches the set point, timer t1 begins counting, while the compressor and water pump relay remain activated until timer t1 elapses. The display shows time duration of timer t1, which counts backwards, while the indications , and light up. When timer t1 elapses, the compressor and water pump relays are deactivated, and afterwards the cycle starts again with the activation of defrost relay, etc.
- If a malfunction occurs in the cooling circuit and the **evaporator temperature does not decrease**, the aforesaid process will end based on timer t3. All functions and relays will be deactivated automatically and alarm "FFF" will be displayed. The alarm is automatically OFF by restarting the thermostat from the power supply or the ON / OFF button.
- When the ice storage temperature sensor reaches the SP2, the production will stop when the last production of ice drops on the storage and the cycle ends. On screen the indication "FUL" is displayed until the storage temperature reaches SP2+dF2 and the cycle resumes.
- When the condenser's sensor reaches the SP3, the relay is OFF and the condenser's symbol switches OFF on the display. Once the condenser's temperature reaches **SP3-dF3** the relay is ON again.

The aforesaid cycle repeats continuously without interruption during the smooth operation of the thermostat. **Only during the first defrost**, if the evaporator's temperature reaches defrost end temperature (parameter dE5), then the compressor is deactivated while the defrost relay remains activated till **ti2** timer elapses.

In case of **evaporator's temperature sensor failure LF1** or **OFF device state**, all thermostat functions are deactivated.

In case of **storage temperature sensor failure LF2**, the cycle continues and does not stop because of this failure.

In case of **condenser's temperature sensor failure LF3**, the relay is permanently ON, the frosting cycle continues and does not stop because of this failure.

HOT-GAS OPERATION

Parameter **dt6** set the defrost function in electric or HOT-GAS mode. Only in hot-gas defrost mode (dt6 = 1), the compressor relay works in parallel with the defrost relay, for time t2.

ADJUSTING THE ICE STORAGE SET POINT

1. Press and parameter **SP1** is displayed.
2. Press and its value is displayed while the arrows change its value.
3. Press to store the new value. Now the device is operating with the new value.

INDUSTRIAL FACTORY SETTINGS

1. Press to display **SP1**. By pressing three times the parameter **Cod** is displayed.
2. Press to display its value and press to enter one of the following programs. Press to store the value to parameter **Cod**.
3. Press again to exit the parameter menu. 'YES' is displayed on the screen. All appropriate settings are now stored in the device.

Adjustment	Program
S	31
B	32
M	33

DISPLAY EVAPORATOR – STORAGE – CONDENSER TEMPERATURES

By pressing for 3 seconds the , the evaporator's temperature **T1** is displayed for 3 seconds and afterwards storage's temperature **T2**. Also the corresponding symbols are displayed **T1** or **T2**.

By pressing once , the condenser's temperature is displayed among with **T3** symbol.

SWITCHING ON / OFF THE DEVICE

By pressing for 3 seconds , the device switches ON/OFF.

WASH OPERATION

Turn off the device by pressing for 3 seconds .

By pressing for 3 seconds the button, defrost relay is activated. Press again for 3 seconds to deactivate it.

By pressing for 3 seconds the button, pump relay is activated. Press again for 3 seconds to deactivate it.

MANUAL DEFROST

By pressing for 3 seconds the manual defrost starts and ends when timer **ti2** elapses.

PROGRAMMING A PARAMETER

ATTENTION: to gain full access to the parameter's menu, the 4th parameter **Cod** must be adjusted to **22** (see parameter table page 2).

1. Press to enter the parameter menu.
2. Choose the parameter you want to adjust by pressing or and press to display its value.
3. Press or to change its value and then press to store the new value.
4. Press to exit the parameter menu.

TECHNICAL SPECIFICATIONS

Model **ICE** power supply: 230VAC 50/60Hz / Maximum power consumption: 3W. Model **ICEW** switching supply: 100-264VAC 50/60Hz 5W.

It is recommended using a power supply safety fuse: 0.5A (not included)

Evaporator and ice storage temperature sensors NTC 10K 1% 25°C IP68 and temperature range -50÷+110°C (-58÷+230°F) (or PTC 1K 250C with temperature range -50 ÷ +150°C (-58÷+302°F) not included) / Accuracy: ±0.5°C

Alarm buzzer / Serial input with 5pin connector

Compressor relay 30A res. 250VAC normally open contact / Pump and defrost relays 10A res. 250VAC normally open contact / Max current load 16A

Connections: cable cross section 2.5 mm² for all relays / cable cross section from 0.25 to 1.0 mm² for the sensors

Connections with terminal blocks 18A using cable with cable cross section up to 2.5 mm² / It is recommended using a torque wrench with maximum torque 0.4Nm

Operating temperature: -15÷+55°C / Storage temperature: -20÷+80°C

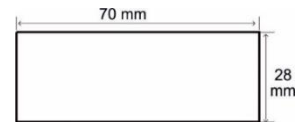
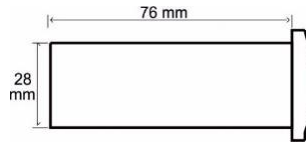
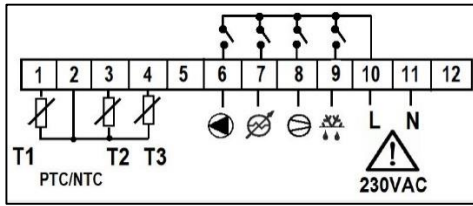
Dimensions 37x79x81mm / The device is mounted on panel hole 29x71mm and restrained with plastic side brackets / Protection IP65 front

Firmware: V4.0.3

ELECTRICAL DIAGRAM - DIMENSIONS

ATTENTION: according to safety standards, the device must be properly positioned and protected from any contact with electrical parts. The device must be fastened in such a way that it cannot be removed without the use of tools. Disconnect the main safety switch of the installation before proceeding to any maintenance. Disconnect the power supply of the device before proceeding to any maintenance. Do not place the device near heat sources, equipment containing strong magnets, in areas affected by direct sunlight or rain. Prevent electrostatic discharges and sharp objects from being inserted to the device. Separate signal cables from power supply cables to prevent electromagnetic disorders. Signal cables must never be in the same pipe with the power supply cables. **ATTENTION:** Read carefully the technical specifications and make sure that the working conditions are appropriate. According to safety standards, the device must be fastened in such a way that it cannot be removed without the use of tools.

Dimensions are in mm. The device is mounted on panel hole with cut 29x71mm and restrained with plastic side brackets.



PARAMETER TABLE

No		description	min	max	ICE	UOM
1	SP1	SET POINT: evaporator temperature setting	LSP	HSP	-14.0	°C/°F
2	SP2	SET POINT: storage temperature setting	-50	150	2.0	°C/°F
3	SP3	SET POINT: condenser temperature setting	-50	150	30.0	°C/°F
4	Cod	Enter password code Cod = 22 and press to enter the other parameters	0	255	0	-
ANALOG INPUTS - TEMPERATURE						
5	dF2	Differential of storage temperature SP2 (thermostat delay)	0.1	25.0	4.0	°C/°F
6	dF3	Differential of condenser temperature SP3 (thermostat delay)	0.1	25.0	0.5	°C/°F
7	LSP	Lower setting limit of SP1	-50.0	HSP	-20.0	°C/°F
8	HSP	Maximum setting limit of SP1	LSP	+110	8.0	°C/°F
9	dEC	Temperature indication as integer or decimal, where 0 = integer / 1 = decimal	0	1	1=decimal	-
10	Sen	Sensor type NTC/PTC 0 = PTC / 1 = NTC	0	1	1=NTC	-
11	SE1	Evaporator sensor offset	-9.9	+15.5	0.0	°C/°F
12	SE2	Storage sensor offset	-9.9	+15.5	0.0	°C/°F
13	SE3	Condenser sensor offset	-9.9	+15.5	0.0	°C/°F
14	C_F	Temperature measurement unit: toggling between °C/°F do not adjust the SPo automatically, it must be changed by the user: 0 = °C / 1 = °F	0	1	0=°C	°C/°F
ALARMS						
15	ALo	lower alarm limit temperature of the evaporator	-50.0	+110	-30.0	°C/°F
16	AHi	higher alarm limit temperature of the evaporator	-50.0	+110	+35.0	°C/°F
17	dHL	Time delay in activating "AHi", "ALo" and the buzzer among them. This setting does not apply to all remaining alarms.	0	99	0	minutes
18	ACo	higher alarm limit temperature of the condenser's evaporator, where all functions and relays are deactivated automatically. The alarm is automatically deactivated by restarting the device.	-50.0	+150	+90.0	°C/°F
DEFROST						
19	dt6	Type of defrost 0 = electrical: compressor OFF, resistance ON 1 = hot gas: compressor ON, resistance ON	0	1	1=hot-gas	-
20	ti2	Countdown timer where the defrost relay remains ON	1	255	3	minutes
COMPRESSOR						
21	CP2	Compressor's minimum time OFF	0	4	0	minutes
22	dE5	Defrost end temperature – evaporator temperature - sensor EVAP T1 In case of evaporator's sensor malfunction (LF1), there is no check of defrost end temperature and defrosting is completed after timer ti2 elapses.	0.0	100	27	°C/°F
23	ti1	Once the evaporator reaches the SP1, the compressor's relay remains ON until timer ti1 elapses.	1	255	9	minutes
24	ti3	Maximum compressor operating time until it reaches the desired set point. Once timer ti3 elapses, all functions and thermostat relays are deactivated and "FFF" indication is displayed. The alarm is deactivated automatically by restarting the device.	0	255	30	minutes
NETWORK - GENERAL SETTINGS						
25	Add	Device address on network	0	255	1	-
26	trE	Response time of the device on network	5	100	40	msec
27	baU	Baud rate: 0 = 2400 / 1 = 4800 / 2 = 9600 / 3 = 19200	0	3	3	-
28	Pro	Cabinet's program (factory settings) is displayed – no access	-	-	1	-
29	tPE	Unique product number – no access	-	-	204	-
30	UEr	Firmware version - no access	-	-	4.X.X	-

ALARM TABLE

1	LF1	Evaporator's temperature sensor failure. In this case all functions and relays are automatically deactivated.
2	LF2	Ice storage's temperature sensor failure where the cycle continues without any interruption
3	LF3	Condenser's temperature sensor failure where the relay remains activated until the malfunction is restored.
4	ALo	Low evaporator temperature alarm
5	AHi	High evaporator temperature alarm
6	FFF	Cooling failure. All functions and relays are deactivated automatically after the end of time t3. The alarm is automatically deactivated by restarting the device.
7	EEE	Upon completion of the defrosting procedure, the evaporator temperature remains less than the SPo. All functions and relays are deactivated automatically. The alarm is automatically deactivated by restarting the device.
8	CCC	Condenser failure. All functions and relays are deactivated automatically. The alarm is automatically deactivated by restarting the device.
9	FUL	The storage is full with ice. The ice production stops until the storage sensor reaches SP2+dF2 temperature. Buzzer will sound for 3 sec.
10	EEr	Error in RAM memory: rewrite the first parameter SP2 (check page 1 – adjusting the Set Point)
The alarms LF1, LF2, LF3, ALo, AHi are deactivated automatically when the cause of their activation is no longer present		

Made in Greece.



The device is under two year's guarantee. The guarantee is valid only if the manual instructions have been applied. The control and service of the device must be done by an authorized technician. The guarantee covers only the replacement or the service of the device. KIOUR PC implements a Quality Management System according to EN ISO 9001:2015 Standard with registration number 01013192. KIOUR preserves the right to adjust its products without further notice.