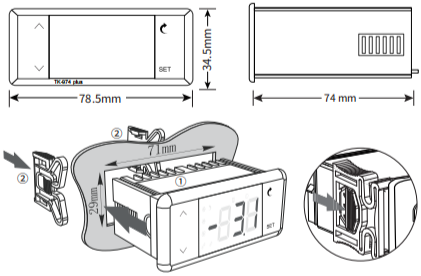
TK-974 Plus Operaton Instructions

1.Technical specifications

1.1 power supply：230 Vac ±10% (50/60 Hz)
1.2 Maximum load current： COMP:2HP/240VAC
DEFR:10A/240VAC
FAN: 5A/240VAC
1.3 operation conditions：0°C～55°C 20%～85% （not condensing）
1.4 storage conditions：-25°C～75°C

2.Specification



2.1 Product：78.5*34.5mm*74mm
2.2 Mounting size：71mm*29mm
2.3 Probe wire length：2M

3.Technical Parameters

3.1 Temperature controlling range：-49°C～119°C or -58°F～248°F
3.2 Display resolution：0.1°C 1°Cor 1°F
3.3 Accuracy：±1°C （-20°C～30°C），±2°C （51°C～70°C），others±3°C
or±2°F(-40°F～122°F),±4°F(123°F～158°F),others±6°F
3.4 Probe type：NTC（10KΩ/25°C，B value 3435K）

4.Operation and display panel

LED	State	Description
	on	access to parameters
	off	otherwise
	on	compressor on
	off	compressor off
	blinking	request
	on	defrosting or parameters
	off	defrost off
	blinking	driping
ECO	on	reduced setpoint active
	off	otherwise
	on	Fan on
	off	Fan off
°C	on	°Csetting(dro=0)
	off	otherwise

LED	State	Description
°F	on	°F setting(dro=1)
	off	otherwise
AUX	on	Aux output active
	off	otherwise
	on	alarm present
	off	otherwise
	blinking	alarm acknowledged

5.Controller parameters and operation:

5.1 Set the temperature setpoint
To access the user menu,press and quickly release the “set” key.If alarms are not present,the label “SET” appears.By using the “UP” and “DOWN” keys you can scroll through the other folders in the menu:
-Pb1:probe 1 value folder; -Pb2:probe 2 value folder; -Pb3:probe 3 value folder;
The step of setting the temperature is as below:
5.1.1 When it displays the measured temperature in the display panel,press SET key,it will display Set.
5.1.2 At this time,press Set key, you could view the current temperature setpoint.
5.1.3 Press “UP” key or “DOWN” key to modify the setpoint.
5.1.4 Press FNC key,it will display the measured temperature,and exit from the temperature setting.If alarms happens,user could inquiry alarm type through parameter folders “AL”.
5.2 Programming menu
To access the “Programming” menu, press the set key for more than 5 seconds. If specified, an access PASSWORD will be requested: “PA1” for User parameters and “PA2” for Installer parameters.
User parameters:To enable it (PS1≠0): press and hold “set” for longer than 5 seconds, scroll through the parameters using “UP” and” DOWN” until you see the label PS1 press “SET” to display the value,modify it using “up” and “DOWN” ,then save it by pressing “SET” or “FNC’ .If enabled,it will be required in order to access the User parameters.
Installer parameters: To modify it (PS2≠0): press” SET” and hold for longer than 5 seconds, scroll through the parameters using “UP” and” DOWN” until you see the label PA2,press “SET” , to display the value,modify it using “up” and “DOWN” ,then save it by pressing “SET” or “FNC’ .If enabled,it will be required in order to access the Installer parameters.
5.2.1 Table of user menu parameters

PAR.	DESCRIPTION	RANGE	AP1	AP2	AP3	AP4	M.U.
Set	Temperature control SEtpoint.	LSE…HSE	0.0	0.0	0.0	0.0	°C/°F
diF	diFferential. Compressor relay activation differential.	0.1-30.0	2.0	2.0	2.0	2.0	°C/°F
HSE	Higher SEt. Maximum value that can be assigned to the Setpoint.	LSE..302	99.0	99.0	99.0	99.0	°C/°F
LSE	Lower SEt. Minimum value that can be assigned to the Setpoint	-58.0..set	-50.0	-50.0	-50.0	-50.0	°C/°F
dty	Type of defrost, 0 = electrical defrost; 1 = reverse cycle defrost; 2=defrost independent of compressor	0/1/2	0	0		1	
dit	Interval between the start of two consecutive defrost cycles.	0..250	6	6	6	6	hours
dEt	Defrost timeout; determines the maximum defrost duration.	1..250	30	30	30	30	min
dSt	Defrost end temperature - determined by probe Pb2	-50.0..150	8.0	8.0	8.0	8.0	°C/°F
FSt	Fans stop temperature	-58.0..302	50.0	50.0	50.0	50.0	°C/°F
Fdt	Fan activation delay after a defrost cycle	0..250	0	0	0	0	min
dt	Coil drainage time	0..250	0	0	0	0	min
dFd	Allows evaporator fan exclusion to be selected or not selected during defrosting n (0) = no (it depends on FCO parameter); y (1) = yes (fans excluded).	n/y	y	y	y	y	
HAL	Maximum temperature alarm	LAL..150	50.0	50.0	50.0	50.0	°C/°F
LAL	Minimum temperature alarm.	-50.0..HAL	-50.0	-50.0	-50.0	-50.0	°C/°F

PAR.	DESCRIPTION	RANGE	AP1	AP2	AP3	AP4	M.U.
LOC	Basic commands modification lock. It is still possible to enter parameter programming mode and modify them. n (0) = no; y (1) = yes.	n/y	n	n	0n	n	
PS1	PAssword1: if PS1 ≠0 is the access key to User parameters.	0..250	0	0	0	0	
CA1	Calibration 1. Temperature value to be added to the Pb1 value.	-12.0..12.0	0.0	0.0	0.0	0.0	°C/°F
CA2	Calibration 2. Temperature value to be added to the Pb2 value.	-12.0..12.0	0.0	0.0	0.0	0.0	°C/°F
CA3	Calibration 3. Temperature value to be added to the Pb3 value	-12.0..12.0	0.0	0.0	0.0	0.0	°C/°F
ddL	Display mode during defrost. 0 = display the temperature recorded by Pb1; 1 = lock recorded value of Pb1 at defrost start; 2 = display the "dEF" label.	0/1/2	0	0	0	0	
Ldd	Timeout value for display unlock - dEF label.	0…255	30	30	30	30	min
H42	Evaporator probe present. n (0) = not present; y (1) = present.	n/y	y	y	y	y	
H43	Probe 3 present. n (0) = not present; y (1) = present.	n/y	n	y	n	n	
rEL	Device version. Read-only parameter.						
tAb	tAble of parameters. Reserved: read-only parameter.						
PA2	PAssword2: if PS2 ≠0 is the access key to Installer parameters.						

5.2.2 Table of installer menu parameters

PAR.	DESCRIPTION	RANGE	AP1	AP2	AP3	AP4	M.U.
Set	Temperature control SEtpoint.	LSE…HSE	0.0	0.0	0.0	0.0	°C/°F
COMPRESSOR("CP" folder)							
diF	diFferential. Compressor relay activation differential.	0.1..30.0	2.0	2.0	2.0	2.0	°C/°F
HSE	Higher SEt. Maximum value that can be assigned to the Setpoint.	LSE..302	99.0	99.0	99.0	99.0	°C/°F
LSE	Lower SEt. Minimum value that can be assigned to the Setpoint	-58.0..set	-50.0	-50.0	-50.0	-50.0	°C/°F
osp	Temperature value to be added to the Setpoint if reduced set enabled (Economy function)	-30.0..30.0	3.0	0.0	0.0	3.0	°C/°F
Hc	Control mode. C (0) = Cold; H (1) = Hot	C/H	C	C	C	C	
Ont	Controller on time for faulty probe If Ont = 1 and OFt = 0, the compressor remains on; if Ont = 1 and OFt > 0 it runs in duty cycle mode	0~250	0	0	0	0	min
OFt	Controller off time for faulty probe If OFt = 1 and Ont = 0, the controller remains off; if OFt = 1 and Ont > 0, it operates in duty cycle mode	0~250	1	1	1	1	min
dOn	Compressor relay activation delay after request.	0~250	0	0	0	0	secs
dOF	Delay after switching off and subsequent activation	0~250	0	0	0	0	min
dbi	Delay between two consecutive compressor activations	0~250	0	0	0	0	min
OdO	Delay in activating outputs after the instrument is switched on or after a power failure. 0 = not active.	0~250	0	0	0	0	min
dcS	Deep Cooling cycle Setpoint.	-58.0..302	0.0	0.0	0.0	0.0	°C/°F
tdc	Deep Cooling cycle duration.	0..255	0	0	0	0	min
dcc	Defrost activation delay after a Deep Cooling cycle	0..255	0	0	0	0	min

DEFROST("def" folder)							
dty	Type of defrost. 0 = electrical defrost; 1 = reverse cycle defrost; 2 = defrost independent of compressor.	0/1/2	0	0	0	1	/
dit	Interval between the start of two consecutive defrost cycles.	0~250	6	6	6	6	Hours
dCt	Selection of count mode for the defrost interval. 0 = compressor running time; 1 = appliance running time; 2 = A defrost cycle is run at each compressor stop.	0/1/2	1	1	1	1	/
dOH	Delay for start of first defrost after request.	0~59	0	0	0	0	min
dEt	Defrost timeout; determines the maximum defrost duration.	1~250	30	30	30	30	min
dSt	Defrost end temperature - determined by probe Pb2	-50.0~150	8.0	8.0	8.0	50.0	°C/°F
dPO	Determines whether the instrument must enter defrost mode at start-up. n (0) = no; y (1) = yes.	n/y	n	n	n	n	/

FAN("FAn" folder)							
FSt	Fans stop temperature.	-50.0~150	2.0	50.0	50.0	50.0	°C/°F
FAd	Fan activation differential.	1.0~50.0	2.0	2.0	2.0	2.0	°C/°F
Fdt	Fan activation delay after a defrost cycle.	0~250	0	0	0	0	min
dt	Coil drainage time.	0~250	0	0	0	0	min
dFd	ALLows evaporator fan exclusion to be selected or not selected during defrosting n (0) = no (it depends on FCO parameter); y (1) = yes (fans excluded).	n/y	y	y	y	y	/
FCO	Selects or deselects fan deactivation at compressor OFF. 0= fans off; 1 = fans active; 2 = duty cycle	0..2	0	0	0	0	/
FOn	Fans ON time in day duty cycle	0..99	0	0	0	0	min
FOF	Fans OFF time in day duty cycle.	0..99	0	0	0	0	min
Fnn	Fans ON time in night duty cycle.	0..99	0	0	0	0	min
FnF	Fans OFF time in night duty cycle.	0..99	0	0	0	0	min
ESF	Night mode activation. n (0) = no; y (1) = yes.	n/y	n	n	n	n	

ALARMS("AL" folder)							
Att	Can be used to select absolute (Att=0) or relative (Att=1) values for HAL and LAL parameters	-0..1	0	0	0	0	
AFd	Alarm differential	1.0~50.0	2.0	2.0	2.0	2.0	°C/°F
HAL	Maximum temperature alarm.	LAL~150.0	50.0	50.0	50.0	50.0	°C/°F
LAL	Minimum temperature alarm.	-50.0~HAL	-50.0	-50.0	-50.0	-50.0	°C/°F
PAO	Alarm exclusion time after re-activation following a power failure	0~10	0	0	0	0	Hours
dAO	Temperature alarm exclusion time after defrost	0~999	0	0	0	0	min
tdO	Delay in door open alarm activation.	0~250	0	0	0	0	min
tAO	Time delay for temperature alarm indication.	0~250	0	0	0	0	min
dAt	Alarm signalling end of defrost due to timeout. n (0) = no; y (1) = yes.	n/y	n	n	n	n	
rLO	External alarm locks controllers. n (0) = does not lock; y (1) = locks.	n/y	n	n	n	n	
SA3	Probe 3 alarm Setpoint.	-58.0..302	0.0	0.0	0.0	0.0	°C/°F
dA3	Probe 3 alarm differential.	1.0..50.0	1.0	1.0	1.0	1.0	°C/°F

LIGHTS&DIGITAL INPUTS("Lit" folder)							
dOd	Digital input for switching off utilities. 0=disabled; 1=disables fans; 2=disables the compressor; 3=disables fans and compressor.	0..3	0	0	0	0	
dAd	Activation delay for digital input.	0..255	0	0	0	0	min
dCO	Compressor deactivation delay after door opened.	0..255	0	0	0	0	min
AuP	Aux output activation when door opened. n (0) = not linked; y (1) = linked.	n/y	n	n	y	n	

COMMUNICATON("Add" folder)							
dEA	Index of the device inside the family	0..127	0	0	0	0	
FAA	Device family (valid values from 0 to 14).	0..14	0	0	0	0	
Pty	Modbus parity bit. n (0) = none; E (1) = even; o (2) = odd.	n/E/o	n	n	n	n	
StP	Modbus stop bit. 1b (0) = 1 bit; 2b (1) = 2 bit.	1b/2b	1b	1b	1b	1b	

DISPLAY(“dis” folder)							
LOC	Basic commands modification lock. It is still possible to enter parameter programming mode and modify them. n (0) = no; y (1) = yes	n/y	n	n	n	n	
ndt	Display with decimal point. n (0) = no; y (1) = yes	n/y	y	y	y	y	
CA1	Calibration 1. Temperature value to be added to the Pb1 value.	-12.0..12.0	0.0	0.0	0.0	0.0	°C/°F
CA2	Calibration 2. Temperature value to be added to the Pb2 value	-12.0..12.0	0.0	0.0	0.0	0.0	°C/°F
CA3	Calibration 3. Temperature value to be added to the Pb2 value	-12.0..12.0	0.0	0.0	0.0	0.0	°C/°F
ddL	Display mode during defrost. 0 = display the temperature recorded by Pb1; 1 = lock recorded value of Pb1 at defrost start; 2 = display the “dEF” label.	0..2	0	0	0	0	
Ldd	Timeout value for display unlock - dEF label.	0…255	30	30	30	30	min
dro	Select the unit of measurement used when displaying the temperature recorded by the probes. (0=°C, 1=°F).	0..1	0	0	0	0	
ddd	Selects the type of value to display. 0 = Setpoint; 1 = probe Pb1; 2= probe Pb2; 3 = probe Pb3.	0..3	1	1	1	1	

CONFIGURATION(“CnF”)							
H00	Probe type selection. 0 = PTC; 1 = NTC	0..1	1	1	1	1	
H11	Configuration of digital input 1/polarity. 0 = disabled; ± 1 = defrost; ± 2 = economy Setpoint; ± 3= AUX; ± 4= door switch; ± 5 = external alarm; ± 6= Standby; ± 7= pressure switch; ± 8= Deep Cooling; ± 9= disable HACCP alarm logging. NOTE: • the “+” sign indicates that the input is active if the contact is closed. • the “-” sign indicates that the input is active if the contact is open	-9..9	0	0	4	0	
H12	Configuration of digital input 2/polarity. Same as H11	-9..9	0	0	4	0	
H21	Configurability of digital output 1 0 = disabled; 1 = compressor; 2 = defrost; 3 = fans; 4 = alarm; 5 = AUX; 6 = Standby.	0..6	1	1	1	1	
H22	Configurability of digital output 2 Same as H21.	0..6	2	2	5	2	
H23	Configurability of digital output 3 Same as H21	0..6	3	3	3	3	
H25	Enable/Disable buzzer. = Disabled; 1=Enabled;	0..1	0	0	0	0	
H31	Configurability of UP key. 0 = disabled; 1 = defrost; 2 = AUX; 3 = economy Setpoint; 4 = Standby; 5 = reset HACCP alarms; 6 = disable HACCP alarms; 7 = Deep Cooling.	0..7	1	1	1	1	
H32	Configurability of DOWN key. Same as H31	0..7	0	0	0	0	
H42	Evaporator probe present. n (0) = not present; y (1) = present.	n/y	y	y	y	y	
H43	Probe 3 present. n (0) = not present; y (1) = present.	n/y	n	y	n	n	
rEL	Device version. Read-only parameter.	/	/	/	/	/	/
tAb	tAble of parameters. Reserved: read-only parameter.	/	/	/	/	/	/

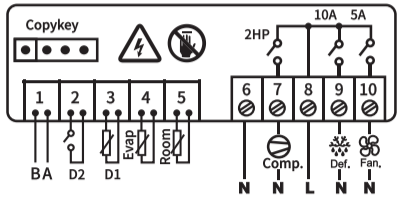
COPY CARD(“FPr” folder)							
UL	Programming parameter transfer from instrument to Copy Card	/	/	/	/	/	/
FR	Format Copy Card. Erase all data contained in the Copy Card.	/	/	/	/	/	/

FUNCTIONS(“FnC” folder)							
rAP	Reset pressure switch alarms	/	/	/	/	/	/
rES	Reset HACCP alarms	/	/	/	/	/	/

6、ALARMS:

Label	Fault	Cause	Effects	Remedy
E1	Cold room probe1 faulty	measured values are outside operating range Probe faulty / short-circuited / open	- Display label E1 - Alarm icon permanently on - Disable max/min alarm controller - Compressor operation based on parameters “Ont” and “OFt”	- check probe type (par. H00) - check probe wiring - replace probe
E2	Defrost probe2 faulty	measured values are outside operating range Probe faulty / short-circuited / open	- Display label E2 - Alarm icon permanently on - The Defrost will end due to Timeout (dEt) - The evaporator fans will be: on if the compressor is ON, or running in accordance with the FCO parameter if the compressor is OFF	- check probe type (par. H00) - check probe wiring - replace probe
E3	Probe3 faulty	measured values are outside operating range Probe faulty / short-circuited / open	- Display label E3 - Alarm icon permanently on	- check probe type (par. H00) - check probe wiring - replace probe
AH1	Alarm for HIGH Pb1 temperature	value read by Pb1 > HAL after timeof “tAO” (see “MAX/MIN TEMP. ALARMS)	- Recording of label AH1 in folder AL - No effect on regulation	- Wait until value read by Pb1 returns below HAL
AL1	Alarm for LOW Pb1 temperature	value read by Pb1 < LAL after timeof “tAO” (see “MAX/MIN TEMP. ALARMS)	- Recording of label AL1 in folder AL - No effect on regulation	- Wait until value read by Pb1 returns above LAL
EA	Door open alarm	digital input activation (H11 = ± 4) (for longer than tdO)	- Recording of label Opd in folder AL - Alarm icon permanently on - Regulation locked if tO=y	- check and remove the external cause which triggered the alarm on the D.I.
Opd	Door open alarm	digital input activation (H11 = ± 4) (for longer than tdO)	- Recording of label Opd in folder AL - Alarm icon permanently on - Controller locked	- close the door
Ad2	Defrost due to timeout	end of defrost cycle due to timeout rather than due to defrost end temperature being recorded by Pb2	- Recording of label Ad2 in folder AL - Alarm icon permanently on	- wait for the next defrost cycle for automatic return
COH	Over Heating alarm	Pb3 value set by parameter SA3 exceeded	- Recording of label COH in folder AL - Alarm icon permanently on - Regulation locked (Compressor)	- wait for the temperature to return to a value of SA3 (Setpoint) minus dA3 (differential)
nPA	General pressure switch alarm	Activation of pressure alarm by general pressure switch	If the number N of pressure switch activations is: N < PEn: - Recording of folder nPA in folder AL, with the number of pressure switch activations - Regulation locked (Compressor and Fans)	- check and remove the cause which triggered the alarm on the D.I. (Automatic Reset)
PAL	General pressure switch alarm	Activation of pressure alarm by general pressure switch	If the number N of pressure switch activations is: N = PEn: - Display label PAL - Recording of label PA in folder AL - Alarm LED steady - Regulation locked (Compressor and Fans)	- Switch the device off and back on again - Reset alarms by entering the functions folder and selecting the rAP function (Manual Reset)

7.Wiring Diagram



Appendix 1 Character Set: