

1. GENERAL WARNING

1.1 PLEASE READ BEFORE USING THIS MANUAL

- * This manual is part of the product and should be kept near the instrument for easy and quick reference.
- * The instrument shall not be used for purposes different from those described hereunder. It cannot be used as a safety device.
- * Check the application limits before proceeding.

1.2 SAFETY PRECAUTIONS

- * Check the supply voltage is correct before connecting the instrument.
- * Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- * Warning: disconnect all electrical connections before any kind of maintenance.
- * Fit the probe where it is not accessible by the End User. The instrument must not be opened.
- * In case of failure or faulty operation send the instrument back to the distributor with a detailed description of the fault.
- * Consider the maximum current which can be applied to each relay (see Technical Data).
- * Ensure that the wires for probes, loads and the power supply are separated and far enough from each other, without crossing or intertwining.

2. GENERAL DESCRIPTION

Model C1203-K, 75x38x70 mm format, is a microprocessor based controller, suitable for applications on medium or low temperature ventilated refrigerating units. It has three relay outputs to control compressor, fan, and defrost, which can be either electrical or reverse cycle (hot gas). It is also provided with two NTC probe inputs, one for temperature control, the other, to be located onto the evaporator, to control the defrost termination temperature and to managed the fan. The instrument is fully configurable through special parameters that can be easily programmed through the keyboard.

3. CONTROLLING LOADS

3.1 COMPRESSOR

The regulation is performed according to the temperature measured by the thermostat probe with a positive differential from the set point: if the temperature increases and reaches set point plus differential the compressor is started and then turned off when the temperature reaches the set point minus differential again. In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters 'Con' and 'COF'.

3.2 DEFROST

Two defrost modes are available through the 'tdF' parameter: defrost through electrica heater (tdF = 0) and hot gas defrost (tdF = 1). Other parameters are used to control the interval between defrost cycles (ldF), its maximum length (ndF) and two defrost modes: timed or controlled by the evaporator's probe (P2P). At the end of defrost dripping time is started, its length is set in the FSt parameter. With FSt=0 the dripping time is disabled.

3.3 CONTROL OF EVAPORATOR FANS

The fan control mode is selected by means of the 'FnC' parameter

- FnC = 0** fans will switch OFF continuously.
 - FnC = 1** fans will run continuously also during defrost.
 - FnC = 2** fans will run even if the compressor is off, and not run during defrost; After defrost, there is a timed fan delay allowing for drip time, set by means of the 'Fnd' parameter.
 - FnC = 3:** fans will switch ON and OFF with the compressor and not run during defrost;
 - FnC = 4** fans will switch ON and OFF with the compressor and run during defrost;
- An additional parameter 'FS' provides the setting of temperature, detected by the evaporator probe, above which the fans are always OFF. This s used to make sure circulation of air only if his temperature is lower than set in 'FS'.

3.3.1 FORCED FAN ACTIVATION

This function managed by the Fct parameter is designed to avoid short cycles of fans,that could happen when the controller is switched on or after a defrost, when the room air warms the evaporator. Functioning: if the difference of temperature between the evaporator and the room probes is more than the value of the Fct parameter, the fans are switched on. With Fct=0 the function is disabled.

4. FRONT PANEL COMMANDS



- SET:** In programming mode it selects a parameter or confirm an operation. Push the **SET** key 3 second, to display target set point(sp);
- ▲ (UP):** In programming mode it browses the parameter codes or increases the displayed value. Push the **SET** key 3 second, enter 'KEY-PRO' function.
- ▼ (DOWN):** in programming mode it browses the parameter codes or decreases the displayed value.
- DEFROST:** Push the key 3 second will have an extra defrost. Push the key will show the temperature of P2.

KEY COMBINATIONS:

- ▲ + ▼:** To lock & unlock the keyboard.
- SET + ▲:** To enter in programming mode.
- SET + ▼:** Enter the latest alarm record

4.1 USE OF LEDES

Each LED function is described in the following table.

LED	MODE	FUNCTION
	ON	Compressor on
	Flashing	Anti-short cycle delay enabled
	ON	Defrost on
	Flashing	Drip time in progress
	ON	Fan on
	Flashing	Fan delay enabled
	ON	An temperature alarm happened
SET	ON	Setup

5. TEMPERATURE ALARM AND ITS DURATION RECORDING (HACCP)

C1203-K signals and records temperature alarms, together with their duration and max value reached.

5.1 HOW TO SEE THE ALARM DURATION AND MAX (MIN) TEMPERATURE

If the alarm LED is on, an alarm has taken place. To see the kind of alarm, the max (min) reached temperature and alarm duration do as follows:

1. Push the SET + ▼ key.
2. You will see the following information and change its contents with ▲ or ▼:
 - HAL High Temperature alarm
 - LAL Low temperature alarm
 - nAL No temperature alarm
 - tHr alarm time(hours)
 - tin alarm time(minutes)
 - rel reset the alarm
 - end exit
3. Push the SET key. You can check the information of HAL / LAL / NaI / tHr / tin If 'rel' is displayed, alarm information will be reset. If 'end' is displayed, alarm temperature view will exit.


Note1: press 'set' to enter step2.
Note2: if an alarm is still occurring the 'thr' and the 'tin' shows the partial duration time. the alarm is recorded when the temperature come back to normal values

6. MAIN FUNCTIONS

6.1 HOW TO CHANGE THE SETPOINT

1. Push the SET key for more than 3 seconds to change the Set point value;
2. The value of the set point will be displayed and the LED starts blinking;
3. To change the Set value push, the ▲ or ▼ arrows within 10s.
4. To memorize the new set point value, push the SET key again.

6.2 HOW TO START A MANUAL DEFROST

Push the  key for more than 3 seconds and a manual defrost DEF will start.

6.3 HOW TO CHANGE A PARAMETER VALUE

To change the parameter's value operate as follows

1. Enter the Programming mode by pressing the SET button and ▲.
2. Select the required parameter.
3. Press the SET key to display its value and the value will be blinking.
4. Use ▲ or ▼ to change its value.
5. Press set to store the new value and back to step 2.

To exit: Select 'END' in step2 or wait for 15 seconds.

Note: the set value is not stored even when the procedure is exited by waiting the time-out

6.4 TO LOCK THE KEYBOARD

1. TO LOCK THE KEYBOARD:- Press the ▲ and ▼ buttons simultaneously and hold for more than 3 secs.
2. When a button is pressed for longer 3s the 'POF' message will be displayed.

6.5 TO UNLOCK THE KEYBOARD

1. TO UNLOCK THE KEYBOARD:- Press the ▲ and ▼ buttons simultaneously and hold for more than 3secs.
2. When a button is pressed for longer 3s the 'PON' message will be displayed.

7. PARAMETERS

7.1 REGULATION

- Dif:** Intervention differential for set point. Compressor Cut IN is Set Point Plus Differential (dif). Compressor Cut OUT is when the temperature reaches the set point - dif.
- Us:** Maximum set point. Sets the maximum accept probe value for the set point. range: sp - 60 ,The default is 10°C.
- LS:** Minimum set point. Sets the maximum accept probe value for the set point. range: -40 - sp ,The default is 2°C.
- Ot:** Thermostat probe calibration. allows to adjust possible offset of the thermostat probe.
- P2P:** Evaporator probe presence. 0 = not present: the defrost stops by time; 1 = present: the defrost stops by temperature.
- OE:** Evaporator probe calibration. allows to a possible offset of the evaporator probe.
- OdS:** Outputs activation delay at start up. This function is enable at the initial start up of the instrument and inhibits any output activation for the period of time set in the parameter.
- AC:** Anti-short cycle delay. minimum interval between the compressor stop and the following restart.
- Con:** Compressor ON time with faulty probe. time during which the compressor is active in case of faulty thermostat probe. With CO_n=0 compressor is always OFF.
- COF:** Compressor OFF time with faulty probe. time during which the compressor is OFF in case of faulty thermostat probe. With COF=0 compressor is always active.
- Ch:** Compressor working mode. 0 :If ilf is setted to 5,will changed the cooling(heating) with D1
1: COOLING 2 HEATING

7.2 DISPLAY

- CF:** Temperature measurement unit: 0 =Celsius; 1 =Fahrenheit.
- rES:** Resolution (0 = 1; 1 = 0.1). allows decimal point display
- Lod:** Select which probe is displayed by the instrument: 0 = Thermostat probe; 1 = Evaporator probe.

7.3 DEFROST

- tdF:** Defrost type. 0 = electrical heater 1 = hot gas
- tfb:** Defrost start temperature. sets the temperature measured by the evaporator probe, which causes the start of defrost.
- tfe:** Defrost termination temperature. sets the temperature measured by the evaporator probe, which causes the end of defrost.
- ldF:** Determines the time interval between the beginning of two defrost cycles.
- ndF:** length for defrost. When P2P = 0(not evaporator probe: timed defrost) it sets the defrost duration. if 'ndf' is 0,deforost is no exist.
- dF:** Temperature displayed during defrost. (0 = real temperature; 1 = temperature at defrost start; 2 = 'dEF' label ;3 = set point)
- Fdt:** Drip time. time interval between reaching defrost termination temperature and the restoring of the control's normal operation. This time allows the evaporator to eliminate water drops that might have formed due to defrost.
- dPo:** First defrost after start-up. (1 = immediately; 0 = normal)

7.4 FANS

FnC: Fans operating mode.
0 = close mode.
1 = fans **ON** during defrost;
2 = fans **OFF** during defrost;
3 = runs with the compressor, **OFF** during defrost;
4 = runs with the compressor, **ON** during defrost;
Fnd: Fans delay after defrost. Time interval between end of defrost and evaporator fans start.
Fct: Temperature differential avoiding short cycles of fans .Fct=0 functiondisabled. If the difference of temperature between the evaporator and the room probes is more than the value of the Fct parameter, the fans are switched on.
FSt: Fans stop temperature. setting of temperature, detected by evaporator probe, above which fans are always OFF.

7.5 ALARMS

ALC: Temperature alarms configuration.
0 = absolute temperature: alarm temperature is given by the ALL or ALU values.
1 = temperature alarms are referred to the set point.
ALU: Temperature alarm is enabled when the temperature exceeds the 'sp+ALU' or 'sp- ALL' values.
ALL: MAXIMUM temperature alarm. When temperature is reached the alarm is enabled, after the 'Ald' delay time.
Ald: Minimum temperature alarm. When temperature is reached the alarm is enabled, after the 'Ald' delay time.
AlD: Temperature alarm delay. time interval between the detection of an alarm condition and the alarm signalling.
dAO: Exclusion of temperature alarm at startup. Time interval between the detection of the temperature alarm condition after instrument power on and alarm signaling.

7.6 DIGITAL INPUT

i1P: Digital input polarity. 0: the digital input is activated by opening the contact; 1: the digital input is activated by closing the contact.
i1F: Digital input configuration.
0 = external alarm. 'EA' message is displayed;
1 = serious alarm 'CA' message is displayed.
2 = door switch function;
3 = pressure switch alarm, 'CA' message is displayed;
4 = activation of a defrost cycle.
5 = kind of action inversion (cooling - heating)
6 = not enabled;
did: with i1F= 0 or i1F = 1 digital input alarm delay: delay between the detection of the external alarm condition and its signaling.
with i1F= 2: door open signaling delay.
with i1F = 3: time for pressure switch function: time interval to calculate the number of the pressure switch activation.
nPS: Pressure switch number. Number of activation of the pressure switch, during the 'did' interval, before signaling the alarm event (i2F= 3). If the nPS activation in the did time is reached, switch off and on the instrument to restart normal regulation.
Odc: Compressor and fan status when open door: 0 = normal; 1 = Fan OFF; 2 = Compressor OFF; 3 = Compressor and fan OFF.

8. DIGITAL INPUT

The free contact digital input is programmable in five different configurations by the 'i1F' parameter.

8.1 DOOR SWITCH INPUT (i1F = 2)

It signals the door status and the corresponding relay output status through the 'odc' parameter:

0 = normal (any change);
1 = Fan OFF;
2 = Compressor OFF;
3 = Compressor and fan OFF.

Since the door is opened, after the delay time set through parameter 'did', the door alarm is enabled, the display shows the message 'dA' and the regulation restarts. The alarm stops as soon as the external digital input is disabled again. With the door open, the high and low temperature alarms are disabled.

8.2 GENERIC ALARM (i1F = 0)

As soon as the digital input is activated the unit will wait for 'did' time delay before signaling the 'EAL' alarm message. The outputs status don't change. The alarm stops just after the digital input is de-activated.

8.3 SERIOUS ALARM MODE (i1F = 1)

When the digital input is activated, the unit will wait for 'did' delay before signaling the 'CA' alarm message. The relay outputs are switched OFF. The alarm will stop as soon as the digital input is de-activated.

8.4 PRESSURE SWITCH (i1F = 3)

If during the interval time set by 'did' parameter, the pressure switch has reached the number of activation of the 'nPS' parameter, the 'CA' pressure alarm message will be displayed. The compressor and the regulation are stopped. When the digital input is ON the compressor is always OFF. If the nPS activation in the did time is reached, switch off and on the instrument to restart normal regulation.

8.5 START DEFROST (i1F = 4)

It starts a defrost if there are the right conditions. After the defrost is finished, the normal regulation will restart only if the digital input is disabled otherwise the instrument will wait until the 'ndF' safety time is expire.

8.6 INVERSION OF THE KIND OF ACTION: HEATING-COOLING (i1F = 5)

This function allows to invert the regulation of the controller: from cooling to heating and vice versa.

Note: 'ch' is reset to 0.

8.7 DIGITAL INPUTS POLARITY

The digital input polarity depends on the 'i1P' parameter

i1P=CL: the input is activated by closing the contact.
i1P=OP: the input is activated by opening the contact

9. HOW TO USE THE HOT KEY

1. Connect HOT KEY with the controller
2. Keep pressing 3 seconds, the following information will be displayed:
NIn: There is no correct connection between HOT KEY and the controller
Don: Download data from HOT KEY
Pro: Program HOT KEY
End: Skip to normal mode

Select functions through ▲ and ▼.

3. Press SET to download (dol) or program (pro) from HOT KEY, the following information will be displayed:
Pre Incorrect HOT KEY programming
Pri: Successful HOT KEY programming
Prn: Not programming due to incorrect parameter
Doe: Unsuccessful download
Dol: Successful download
4. Press SET to back to step 2
5. Select END for menu exit.

10. ALARM SIGNALS

Message	Cause	Outputs
P1	Room probe failure	Compressor output according to par.Con and Cof
P2	Evaporator probe failure	Defrost end is timed
HA	Maximum temperature alarm	Outputs unchanged
LA	Minimum temperature alarm	Outputs unchanged
dA	Door open	Compressor and fans restart
EA	External alarm	Outputs unchanged
CA	Serious external alarm (i1F=1)	All outputs OFF
CA	Pressure switch alarm(i1F=3)	All outputs OFF
PRE	Incorrect parameter	All outputs OFF

10.1 ALARM RECOVERY

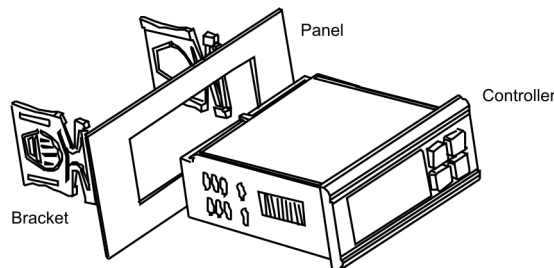
Probe alarms "P1" and "P2" start some seconds after the fault in the related probe; Check connections before replacing the probe. Temperature alarms "HA" and "LA" automatically stop as soon as the thermostat temperature returns to normal values. Alarms "EA" and "CA"(with i1F=1)recover as soon as the digital input is disabled. Alarm "CA" (with i1F=3) recovers only by switching off and on the instrument.

11. DEFAULT SETTING VALUES

LABEL	NAME	RANGE(C/F)	DEFAULT(C/F)
Sp	Set point	LS – US	4.0/39.2
US	Maximum set point	Sp – 60.0/Sp – 140	10.0/50.0
LS	Minimum set point	-40.0 – Sp/-40.0 – Sp	2.0/35.6
tfe	Defrost stop temperature	-40.0 – 60.0/-40.0 – 140	8.0/46.4
fst	Fan stop temperature	-40.0 – 60.0/-40.0 – 140	10.0/50.0
alu	Maximum temperature alarm	All – 60.0/All – 140	15.0/59.0
all	Minimum temperature alarm	-40.0 – Alu/-40.0 – Alu	-10.0/14.0
fct	Differential of temperature for forced activation of fans	0 – 60.0/0 – 140	10.0/50.0
ot	Thermostat probe calibration	0 – 10.0/0 – 50.0	0/0
oE	Evaporator probe calibration	0 – 10.0/0 – 50.0	0/0
dif	Differential	0 – 20.0/0 – 68.0	2.0/3.6
ods	Outputs delay at start up	0 – 255 min	2
idf	Interval between defrost cycles	1 – 255 hours	8
ndf	Lenth for defrost	0 – 255 min	20
fdt	Draining time	0 – 255 min	0
con	Compressor ON time with fault probe	0 – 255 min	8
cof	Compressor OFF time with fault probe	0 – 255 min	15
ac	Anti_short cycle delay	0 – 255 min	1
fnd	Fan delay after defrost	0 – 255 min	10
ald	Temperature alarm delay	0 – 255 min	15
did	Digital input alarm delay	0 – 255 min	30
dao	Delay of temperature alarm at start up	0 – 255 min	60
cf	Temperature measurement unit	0 = C; 1 =F	0
P2P	Evaporator probe presence	0 =not present; 1 =pres.	1
rEs	resolution	0 = integer; 1=dec.point	1
Lod	Probe displayed	0 = P1(room tem.); 1 = P2(evaporator tem.)	0
tdf	Defrost type	0 = el.heater; 1= hot gas	0
dpo	First defrost after startup	0= normal; 1=immed.	0
alc	Temperat. Alarms configuration	0= absolute; 1=related to set;	0
odc	Compressor and fan status when open door	0=normal; 1=fan OFF; 2=Compr.OFF; 3=Compr&Fan OFF	3
i1p	Digital input polarity	0=opening; 1=closing	1
i1f	Digital input configuration	0=extern.alarm; 1=serious.alarm; 2=door.switch; 3=press.switch; 4=defrost; 5=cooling-heating 6=disabled	5
dfd	Displaying during defrost	0=normal; 1=temperature at defrost start; 2=def; 3=sp	2
fnc	Fan operating mode	0=OFF; 1=On; 2=On but defrost; 3=On with compr. 4=On with compr. and defrost	3
nps	Number of activation of pressure switch	0 – 15	15
ch	Heating and cooling selected	0=cooling but if 'i1f' is 5 , it will base on D1; 1= cooling; 2 = heating	0
dfu	Back to the state out of factory		
End	Exit the program parameter setting		

12. INSTALLATION AND MOUNTING

Instruments shall be mounted on vertical panel, in a 71x30 mm hole, and fixed using the special bracket supplied. To obtain an IP54 protection grade use the front panel rubber gasket as shown in fig.3. The temperature range allowed for correct operation is 0–60 °C. Avoid places subject to strong vibrati ons, corrosive gases, excessive dirt or humidity. The same recommendations apply to probes. Let air circulate by the cooling holes.



7. Technical Data:

Case Material :	Fire resistance black ABS
Case Size:	75×38×70
Mounting:	Mounting size 71×30
Protective classification:	Front, IP54
Connection:	Screw terminal
Working Condition:	-10℃~55℃, RH<85%, no condensing
Storage Condition:	-10℃~70℃, RH<85%, no condensing
Measure Range:	-40℃~60℃/-40-140F
Resolution:	0.1 ℃/F
Power Supply:	220VAC,±10%,50/60Hz
Power Consumption:	no more than 2W
External Fuse:	0.5A
Shockproof:	qualified to the demands of I and II instruments
Heat Insulation and Fire Resistance:	D
Relay Connection:	K1 220v, 16A K2 220v, 7A/5A K3 220v, 8A
Input :	2 NTC , Four keys
Output:	3 normal opened contact
Display:	three-bit LED nixie tube display of the integer temperature between -40and 60℃/-40-140F,

CONNECTION:

