

DIGITAL CONTROLLER
FTC052-A3C

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2. GENERAL WARNING

2.1 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.
- Furison Electronics Co., Ltd. reserves the right to change the composition of its products, even without notice, ensuring the same and unchanged functionality.

2.2 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 or to Furison Electronics Co., Ltd. (see address) 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.
- In case of applications in industrial environments, the use of mains filters in parallel with inductive loads could be useful.

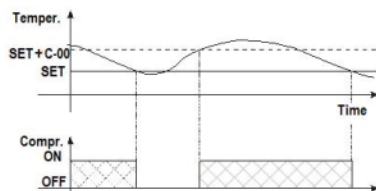
3. GENERAL DESCRIPTION

The **FTC052-A3C**, format 32 x 74 x 82 mm, is a microprocessor based controller, suitable for applications on medium or low temperature ventilated refrigerating units. It is provided with four relay outputs to control the compressor, fan, defrost, which can be either electrical or reverse cycle (hot gas) and for the alarm or auxiliary output. It is also provided with 3 NTC probe inputs configurable by the user, the first one for temperature control, the second one, to be located onto the evaporator, to control the defrost termination temperature and to managed the fan. The last one to be used as display probe. There are two digital inputs (free contact) for the door switch and configurable by parameter. A 4+20 mA output to control evaporator or condenser fans. The RS485 output allows the user to connect a ModBUS-RTU compatible monitoring system. The USB port allows the user to connect the "Hot Key" to programme the parameter list.

4. CONTROLLING LOADS

4.1 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 value again.



In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters **C-11** and **C-12**.

4.2 DEFROST

Three defrost modes are available through the **H-00** parameter: defrost through electrical heater (**H-00 = RE**), hot gas defrost (**H-00 = IN**) or thermostatic defrost (**H-00 = RT**). The defrost interval is control by means of parameter **H-01**: (**H-01=IN**) the defrost is made every **H-04** time; (**H-01=SD**) the interval **H-04** is calculate through Smart Defrost algorithm (only when the compressor is ON and the evaporator temperature is less than **H-02** parameter). At the end of defrost dripping time is started, its length is set in the **H-06** parameter. With **H-06 = 0** the dripping time is disabled.

4.3 CONTROL OF EVAPORATOR FANS

The fan control mode is selected by means of the **H-09** parameter:
H-09 = C-N: fans will switch ON and OFF with the compressor and **not run** during defrost;
H-09 = O-N: 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 **H-10** parameter.
H-09 = C-Y: fans will switch ON and OFF with the compressor and **run** during defrost;
H-09 = O-Y: fans will run continuously also during defrost

An additional parameter **H-11** provides the setting of temperature, detected by the evaporator probe, above which the fans are always OFF. This is used to make sure circulation of air only if his temperature is lower than set in **H-11**.

4.4 AUXILIARY RELAY

The auxiliary relay can be set as alarm or auxiliary output by means of the **H-22** parameter.
 If **H-22 = ALR** the auxiliary relay works as alarm relay.
 If **H-22 = AUS** the auxiliary relay works as auxiliary output.

5. FRONT PANEL COMMANDS



Set	Modify the set point; in programming mode it selects a parameter or confirm an operation.
Ret	To start a manual defrost; in programming it cancels an operation and return to the previous menu.
Power	Silence the buzzer; switch ON and OFF the instrument. (Push it for more than 3s)
▼	To see the min temperature recorded; by holding it pressed for 3s the auxiliary relay is switched ON or OFF (if it is configured); in programming mode it browses the parameter codes or decreases the displayed value.
▲	To see the max temperature recorded; by holding it pressed for 3s the continuous cycle is started; in programming mode it browses the parameter codes or increases the displayed value.

KEYS COMBINATION:

- ▲ + ▼ To lock or unlock the keyboard.
- Set + Ret Restore the factory default settings.

LCD	MODE	SIGNIFICATO
8888	On	Temperature; alarm message (while an alarm is occurring)
8888	On	Set point
°E	On	Temperature measurement unit
	On	Compressor enabled
	Flashing	Anti short cycle delay enabled; outputs activation delay at start up
	On	Defrost enabled
	Flashing	Drip time in progress
	On	Fans output enabled
	Flashing	Fans delay after defrost
	On	Continuous cycle is running
	On	Light on (Not used in this model)
	On	Energy saving enabled
AUX	On	Auxiliary relay on
(Δ)	On	An alarm is occurring

5.1 HOW TO SEE THE MIN TEMPERATURE

1. Press and release the ▼ key.
2. The "LO" message will be displayed followed by the min temperature recorded.
3. By pressing the ▼ key or by waiting 5s the normal display will be restored.

5.2 HOW TO SEE THE MAX TEMPERATURE

1. Press and release the ▲ key.
2. The "HO" message will be displayed followed by the max temperature recorded.
3. By pressing the ▲ key or by waiting 5s the normal display will be restored.

5.3 HOW TO RESET THE MAX AND MIN TEMPERATURE RECORDED

To reset the stored temperature, when the min or max temperature is displayed.

1. Press **Set** key until **RST** message start blinking.
2. By waiting 3s the normal display will be restored.

5.4 HOW TO SEE AND MODIFY THE SET POINT

How to see the set point:

At normal visualisation. The set point will be showed in the top right of the LCD.

How to modify the set point:

1. Push the **Set** key, the set point starts blinking;
2. To change the set point value push the **▲** or **▼** arrows within 15s.
3. To memorise the new set point value push the **Set** key again or wait 15s. To return without storing the new set point value push the **Ret** key.

5.5 HOW TO START A MANUAL DEFROST

At normal visualisation, push the **Ret** key for more than 2 seconds and a manual defrost will start.

5.6 HOW TO CHANGE A PARAMETER VALUE

To change the parameter's value operate as follows:

1. Enter the programming mode by pressing the **Set** key for 3s (**C-00** menu will be showed).
2. Use **▲** or **▼** arrows to change the menu and select one of the menus to enter the corresponding parameter list by pressing the **Set** key.
3. Use **▲** or **▼** to select the required parameter, press the **Set** key (parameter value starts blinking).
4. Use **▲** or **▼** to change its value.
5. Press **Set** key to move to the following parameter.

To exit: Press **Set** key for 3s or wait 15s without pressing a key and the new values will be stored.

To exit without storing the new value by pressing the **Ret** key for 3s.

NOTE: the set value is stored even when the procedure is exited by waiting the time-out to expire.

5.7 HOW TO LOCK THE KEYBOARD

1. Keep pressed for more than 3s the **▲** and **▼** keys.
2. The **"POF"** message will be displayed and the keyboard will be locked. At this point it will be possible only to switch ON and OFF the instrument by pressing the **Power** key.
3. If a key is pressed the **"POF"** message will be displayed.

5.8 HOW TO UNLOCK THE KEYBOARD

Keep pressed together for more than 3s the **▲** and **▼** keys till the **"PON"** message will be displayed.

5.9 HOW TO RESTORE THE FACTORY DEFAULT SETTINGS

Keep pressed together for more than 5s the **Set** and **Ret** keys the factory default settings will be restored.

5.10 THE CONTINUOUS CYCLE

When defrost is not in progress, it can be activated by holding the **▲** key pressed for about 3s. The compressor operates in continuous mode for the time set through the **C-10** parameter (**ON**). The cycle can be terminated before the end of the set time using the same activation key **▲**.

5.11 THE ON/OFF FUNCTION

With **F-10 = OFF**, pushing the **Power** key for more than 3s, the instrument is switched off. In this configuration, all the relays are switched off and the regulations are disabled. To switch the instrument on, push again the **Power** key for more than 3s. With **F-10 = ES**, pushing the **Power** key for more than 3s, energy saving is activated.

6. PARAMETERS

REGULATION

C-00 Differential:($1^{\circ}\text{C} \div 10^{\circ}\text{C} / 2^{\circ}\text{F} + 18^{\circ}\text{F}$) Intervention differential for set point. Compressor Cut IN is Set Point + differential (**C-00**). Compressor Cut OUT is when the temperature reaches the set point.

C-01 Minimum set point:($-40^{\circ}\text{C} + \text{SET} / -40^{\circ}\text{F} + \text{SET}$) Sets the minimum value for the set point.

C-02 Maximum set point:($\text{SET} + 100^{\circ}\text{C} / \text{SET} + 212^{\circ}\text{F}$) Set the maximum value for set point.

C-03 Thermostat probe calibration:($-10 + 10^{\circ}\text{C} / -18^{\circ}\text{F} + 18^{\circ}\text{F}$) Allows to adjust possible offset of the first probe.

C-04 Evaporator probe presence: **N** = not present; **Y** = the defrost stops by temperature.

C-05 Evaporator probe calibration:($-10 + 10^{\circ}\text{C} / -18^{\circ}\text{F} + 18^{\circ}\text{F}$) Allows to adjust possible offset of the second probe.

C-06 Third probe presence: **N** = not present; **Y** = present.

C-07 Third probe calibration:($-10 + 10^{\circ}\text{C} / -18^{\circ}\text{F} + 18^{\circ}\text{F}$) Allows to adjust possible offset of the third probe.

C-08 Outputs activation delay at start up:($0 + 60\text{min}$) This function is enabled at the initial start up of the instrument and inhibits any output activation for the period of time set in the parameter.

C-09 Anti-short cycle delay:($0 + 60\text{min}$) Minimum interval between the compressor stop and the following restart.

C-10 Compressor ON time during continuous cycle:($0 + 240\text{min}$) Allows to set the length of the continuous cycle: compressor stays on without interruption for the **C-10** time. Can be used, for instance, when the room is filled with new products.

C-11 Compressor ON time with faulty probe:($0 + 60\text{min}$) Time during which the compressor is active in case of faulty thermostat probe. With **C-11 = 0** compressor is always OFF.

C-12 Compressor OFF time with faulty probe:($0 + 60\text{min}$) Time during which the compressor is OFF in case of faulty thermostat probe. With **C-12 = 0** compressor is always active.

DISPLAY

C-13 Measurement unit:($^{\circ}\text{C} + ^{\circ}\text{F}$) $^{\circ}\text{C}$ = Celsius; $^{\circ}\text{F}$ = Fahrenheit. **WARNING:** When the measurement unit is changed the Set Point and the values of the parameters **C-00**, **C-01**, **C-02**, **C-03**, **C-05**, **C-07**, **H-02**, **H-03**, **H-11**, **H-13**, **H-14**, **H-15**, **F-00**, **F-01**, **F-08** have to be checked and modified if necessary.

C-14 Local display:(**P1 + P3**) **P1** = thermostat probe; **P2** = evaporator probe; **P3** = third probe. (Optional) Resolution (only for $^{\circ}\text{C}$):(**DE + IN**) **DE** = decimal between -9.9 and 9.9°C ; **IN** = integer.

DEFROST

H-00 Defrost type:(**RE, RT, IN**) **RE** = electrical heater, compressor OFF; **RT** = thermostat defrost, defrost is performed through a simple stop of the compressor; **IN** = hot gas, compressor ON.

H-01 Defrost mode: **IN** = interval mode. The defrost starts when the time **H-04** is expired. **SD** = smartfrost mode. The time **H-04** (interval between defrosts) is increased only when the compressor is running (even non consecutively) and only if the evaporator temperature is less than the value in **H-02**(set point for SMARTFROST).

H-02 Set point for SMARTFROST:($-30 + 30^{\circ}\text{C} / -22 + 86^{\circ}\text{F}$) Evaporator temperature which allows the **H-04** counting (interval between defrosts) in SMARTFROST mode.

H-03 Defrost termination temperature:($-40 + 50^{\circ}\text{C} / -40 + 122^{\circ}\text{F}$) (Enabled only when the evaporator probe is present) Sets the temperature measured by the evaporator probe, which causes the end of defrost.

H-04 Interval between defrost cycles:($0 + 120\text{h}$, with 0 no defrost) Determines the time interval between the beginning of two defrost cycles.

H-05 Maximum length for defrost:($1 + 60\text{min}$) When the evaporator probe is not present it sets the defrost duration, when the evaporator is present it sets the maximum length for defrost.

H-06 Drip time:($0 + 60\text{min}$) 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.

H-07 First defrost after start-up:(**Y+N**) **Y** = immediately; **N** = after the **H-04** time.

H-08 Defrost delay after continuous cycle:($0 + 240\text{min}$) Time interval between the end of the fast freezing cycle and the following defrost related to it.

FANS

H-09 Fans operating mode:(**C-N, O-N, C-Y, O-Y**) **C-N** = in runs with the compressor, OFF during defrost; **O-N** = continuous mode, OFF during defrost; **C-Y** = runs with the compressor, ON during defrost; **O-Y** = continuous mode, ON during defrost.

H-10 Fans delay after defrost:($0 + 60\text{min}$) Interval between end of defrost and evaporator fans start.

H-11 Fans stop temperature:($-40 + 50^{\circ}\text{C} / -40^{\circ}\text{F} + 122^{\circ}\text{F}$) Setting of temperature, detected by evaporator probe, above which fans are always OFF.

ALARMS

H-12 Temperature alarms configuration: **AB** = absolute temperature: alarm temperature is given by the **H-13** or **H-14** values. **RE** = temperature alarms are referred to the set point. Temperature alarm is enabled when the temperature exceeds the **"SET+H-13"** or **"SET-H-14"** values.

H-13 Maximum temperature alarm:(If **H-12 = AB**: $\text{H-14} + 100^{\circ}\text{C} / \text{H-14} + 212^{\circ}\text{F}$; If **H-12 = RE**: $0 + 50^{\circ}\text{C} / 0 + 90^{\circ}\text{F}$) When this temperature is reached the alarm is enabled, after the **H-16** delay time.

H-14 Minimum temperature alarm:(If **H-12 = AB**: $-40 + \text{H-13}^{\circ}\text{C} / -40 + \text{H-13}^{\circ}\text{F}$; If **H-12 = RE**: $0 + 50^{\circ}\text{C} / 0 + 90^{\circ}\text{F}$) When this temperature is reached the alarm is enabled, after the **H-16** delay time.

H-15 Differential for temperature alarm and fan recovery:($1^{\circ}\text{C} + 10^{\circ}\text{C} / 2^{\circ}\text{F} + 18^{\circ}\text{F}$) Intervention differential for recovery of temperature alarm. It's also used for the restart of the fan when the **H-11** temperature is reached.

H-16 Temperature alarm delay:($0 + 60\text{min}$) Time interval between the detection of an alarm condition and alarm signalling.

H-17 Exclusion of temperature alarm at start up:($0 + 60\text{min}$) Time interval between the detection of the temperature alarm condition after instrument power on and alarm signalling.

H-18 Alarm delay at the end of defrost:($0 + 60\text{min}$) Time interval between the detection of the temperature alarm condition at the end of defrost and alarm signalling.

H-19 Delay of temperature alarm after closing the door:($0 + 60\text{min}$) Time delay to signal the temperature alarm condition after closing the door.

H-20 Door open alarm delay:($0 + 60\text{min}$) Delay between the detection of the open door condition and its alarm signalling: the flashing message **"DA"** is displayed.

H-21 Alarm relay silencing: **N** = silencing disabled: alarm relay stays on till alarm condition lasts; **Y** = silencing enabled: alarm relay is switched OFF by pressing the **Power** key during an alarm.

H-22 Auxiliary relay configuration(AUX): **ALR**: alarm relay; **AUS**: auxiliary relay.

H-23 Number of pressure switch activation:($0 + 15$) Number of activation of the pressure switch, during the **F-06** interval, before signalling an alarm event (**F-05=PAL**).

ANALOGUE OUTPUT 4+20mA

F-00 Analogue output start point:($-40 + 100^{\circ}\text{C}; -40 + 212^{\circ}\text{F}$) Sets the temperature at which the analogue output begins.

F-01 Analogue output band width:($-40 + 100^{\circ}\text{C}; -40 + 212^{\circ}\text{F}$) Sets the width of the regulation band for the analogue output. If **F-01** is **positive** then it is above the start point and the kind of action is direct (condenser application). If **F-01** is **negative** then it is below the start point and the kind of action is inverse (evaporator application).

F-02 Input type for the analogue output:(**P1+P3**) Three input types can be selected: **P1** = room probe temperature; **P2** = evaporator probe temperature; **P3** = third probe temperature.

DIGITAL INPUT

F-03 Door switch input polarity:(OP + CL) **OP** = activated by opening the contact; **CL** = activated by closing the contact.

F-04 Digital input polarity:(OP + CL) **OP** = activated by opening the contact; **CL** = activated by closing the contact.

F-05 Digital input configuration: **EAL** = generic alarm: **"EA"** message is displayed; **BAL** = serious alarm: **"CA"** message is displayed; **PAL** = pressure switch alarm: **"PA"** message is displayed; **DEF** = activation of a defrost cycle; **AUS** = relay **AUX** actuation; **ONF** = switch on and off the controller; **ES** = Energy saving.

F-06 Time interval/delay for digital input alarm:($0 + 60\text{min}$) Time interval to calculate the number of the pressure switch activation when **F-05 = PAL**. If **F-05 = EAL** or **BAL**, **F-06** parameter defines the time delay between the detection of the external alarm condition and its signalling.

F-07 Compressor and fan status when open door:(NO/FAN/CPR/F-C) **NO** = normal; **FAN** = fans OFF; **CPR** = Compressor OFF; **F-C** = compressor and fans OFF.

F-08 Temperature increase during the Energy Saving cycle:($-30 + 30^{\circ}\text{C} / -22 + 86^{\circ}\text{F}$) It sets the increasing value of the set point during the Energy Saving cycle.

OTHER

F-09 RS485 Serial address:($1 + 247$) Identifies the instrument address when connected to a ModBUS compatible monitoring system.

F-10 Power key enabling:(OFF,ES) OFF = enabled; ES = Energy saving.

F-11 Real Set Point: SET+F-08 (read only).

(Optional) Type of probe: It allows to set the kind of probe used by the instrument: NTC probe; PT1000 probe.

(Optional) Software release

7. DIGITAL INPUTS

This product can support up to 2 free contact digital inputs. One is always configured as door switch, The second is programmable by the **F-05** parameter.

7.1 DOOR SWITCH INPUT

It signals the door status and the corresponding relay output status through the **F-07** parameter: **NO**=normal (any change); **FAN**=fans OFF; **CPR**=compressor OFF; **F-C**=compressor and fans OFF. Since the door is opened, after the delay time set through parameter **H-20**, the door alarm is enabled, the display shows the message "DA". The alarm stops as soon as the external digital input is disabled again. During this time and then for the delay **H-19** after closing the door, the high and low temperature alarms are disabled.

7.2 GENERIC ALARM (F-05 = EAL)

As soon as the digital input is activated the unit will wait for **F-06** time delay before signalling the "EA" alarm message. The outputs status don't change. The alarm stops just after the digital input is de-activated.

7.3 SERIOUS ALARM (F-05 = BAL)

When the digital input is activated, the unit will wait for **F-06** delay before signalling the "CA" alarm message. The relay outputs are switched OFF. The alarm will stop as soon as the digital input is de-activated.

7.4 PRESSURE SWITCH (F-05 = PAL)

If during the interval time set by **F-06** parameter, the pressure switch has reached the number of activation of the **H-23** parameter; the **PA** 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 **H-23** activation in the **F-06** time is reached, switch off and on the instrument to restart normal regulation.

7.5 START DEFROST (F-05 = DEF)

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 **H-05** safety time is expired.

7.6 RELAY AUX ACTUATION (F-05 = AUS)

This function allows to turn ON and OFF the auxiliary relay by using the digital input as external switch.

7.7 ENERGY SAVING (F-05 = ES)

The Energy Saving function allows to change the set point value as the result of the SET+ **F-08** (parameter) sum. This function is enabled until the digital input is activated.

7.8 ON OFF FUNCTION (F-05 = ONF)

To switch the controller on and off.

7.9 DIGITAL INPUTS POLARITY

The digital input polarity depends on the **F-04** parameters.

F-04 = CL: the digital input is activated by closing the contact.

F-04 = OP: the digital input is activated by opening the contact.

8. ANALOGUE OUTPUT 4÷20mA

The analogue output is obtained through a 4÷20mA signal proportional to the input selected in parameter **F-02**. Through the analogue output the speed of fans can be regulated according to the input variable.

The following input types can be selected through the **F-02** parameter:

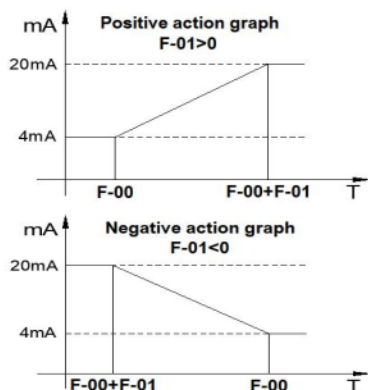
P1 = room probe temperature; **P2** = evaporator probe temperature; **P3** = third probe temperature.

To adjust the analogue output the following parameters are available:

F-00 = Start point for analogue output;

F-01 = Band width for analogue output can be either positive (direct action) and negative (inverse action).

Named **T** the input, the relationship input-output is given by the following charts:



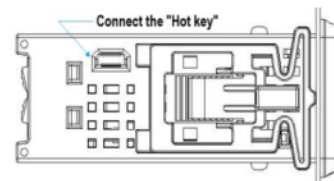
NOTE: When the defrost is in progress, the analogue output is set to the minimum value (4 mA). This condition lasts until the defrost terminates.

9. RS485 SERIAL

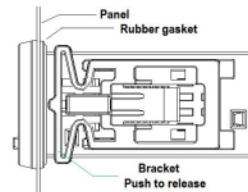
RS485 serial output allows the user to connect a ModBUS-RTU compatible monitoring system and use for remote display.

10. USB PORT

The USB port allows the user to connect the "Hot Key" to programme the parameter list.

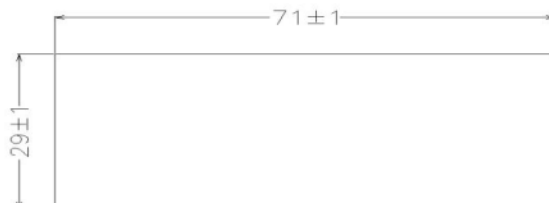


11. INSTALLATION AND MOUNTING



Instrument **FTC052-A3C** shall be mounted on vertical panel, in a 29x71 mm hole, and fixed using the special bracket supplied. The temperature range allowed for correct operation is 0÷60 °C. Avoid places subject to strong vibrations, corrosive gases, excessive dirt or humidity. The same recommendations apply to probes. Let air circulate by the cooling holes.

11.1 CUT OUT



12. ELECTRICAL CONNECTIONS

The instrument is provided with screw terminal block to connect cables with a cross section up to 2.5 mm². Before connecting cables make sure the power supply complies with the instrument's requirements. Separate the probe cables from the power supply cables, from the outputs and the power connections. Do not exceed the maximum current allowed on each relay, in case of heavier loads use a suitable external relay.

12.1 PROBE CONNECTION

The probes shall be mounted with the bulb upwards to prevent damages due to casual liquid infiltration. It is recommended to place the thermostat probe away from air streams to correctly measure the average room temperature. Place the defrost termination probe among the evaporator fins in the coldest place, where most ice is formed, far from heaters or from the warmest place during defrost, to prevent premature defrost termination.

13. HOW TO USE THE HOT KEY

13.1 HOW TO PROGRAM A HOT KEY FROM THE INSTRUMENT (UPLOAD)

Program the "Hot key" with the "Hot key" button:

1. When the controller is ON, insert the "Hot key", the "UP" message appears followed a by flashing "HOT".
2. Push the upload button on the "Hot key", the "ED" message appears.
3. Remove the "Hot key".

Program the "Hot key" with the front keypad:

1. When the controller is ON, insert the "Hot key", the "UP" message appears followed a by flashing "HOT".
2. Push the Set key, the "ED" message appears.
3. Remove the "Hot key".

NOTE: the "ER" message is displayed for failed programming. In this case push the upload button or Set key again if you want to restart the upload again or remove the "Hot key" to abort the operation.

13.2 HOW TO PROGRAM AN INSTRUMENT USING A HOT KEY (DOWNLOAD)

Program the instrument with the "Hot key" button:

1. When the controller is ON, insert the "Hot key", the "UP" message appears followed a by flashing "HOT".
2. Push the download button on the "Hot key". Automatically the parameter list of the "Hot Key" is downloaded into the controller memory, the "ED" message appears.
3. Remove the "Hot key".

Program the instrument with the front keypad:

1. When the controller is ON, insert the "Hot key", the "UP" message appears followed a by flashing "HOT".
2. Push the ▼ key, the "DP" message appears.
3. Push the Set key. Automatically the parameter list of the "Hot Key" is downloaded into the controller memory, the "ED" message appears.
4. Remove the "Hot Key".

NOTE: the "ER" message is displayed for failed programming. In this case push the download button or Set key again if you want to restart the download again or remove the "Hot key" to abort the operation.

14. ALARM SIGNALS

Mess.	Cause	Outputs
P1	Thermostat probe failure	Compressor output according to C-11 and C-12
P2	Evaporator probe failure	Defrost end is timed
P3	Third probe failure	Outputs unchanged
HA	Maximum temperature alarm	Outputs unchanged
LA	Minimum temperature alarm	Outputs unchanged
EA	Generic external alarm	Outputs unchanged
CA	Serious external alarm	All outputs OFF
DA	Door Open	Compressor and fans restarts
PA	Pressure switch alarm (F-05 = PAL)	All outputs OFF

14.1 SILENCING BUZZER

Once an alarm signalling, the buzzer is silenced by pressing the Power key.

14.2 ALARM RECOVERY

Probe alarm "P1", "P2" and "P3" start some seconds after the fault in the related probe; they automatically stop some seconds after the probe restarts normal operation. Check connections before replacing the probe. Temperature alarms "HA" and "LA" automatically stop as soon as the temperature returns to normal values.

Alarms "EA" (F-05=EAL) and "CA" (F-05=BAL) recover as soon as the digital input is disabled.

Alarm "PA" (with F-05=PAL) recovers only by switching off and on the instrument.

14.3 OTHER MESSAGES

PON	Keyboard unlocked.
POF	Keyboard locked.
NOP	The evaporator probe is not present.
NP3	The third probe is not present.

15. TECHNICAL DATA

Housing: self extinguishing PC

Case: facia 32x74 mm; depth 82mm

Mounting: panel mounting in a 71x29 mm panel cut-out

Protection: IP20; Frontal protection: IP65

Connections: Screw terminal block ≤ 2,5 mm² heat-resistant wiring

Power supply: 110-240Vac ± 10%, 50/60Hz

Power absorption: 3.5VA max

Display: PV: 4 digits, white LCD, 15,0 mm high; SV: 4 digits, yellow LCD, 7,5 mm high

Inputs: 3 NTC probe

Digital input: 2 free voltage contact

Relay outputs: compressor: relay SPST 12(8)A, 250Vac defrost: relay SPST 10(6) A, 250Vac

fans: relay SPST 8(3)A, 250Vac AUX: relay SPST 10(6) A, 250Vac

Analogue output: 4+20 mA

Other output : buzzer (optional)

Hot key: USB

Serial output: RS485; Communication protocol: Modbus - RTU

Data storing: on the non-volatile memory (EEPROM)

Kind of action: 1B; Pollution grade: 2; Software class: A

Rated impulsive voltage: 2500V; Over voltage Category: II

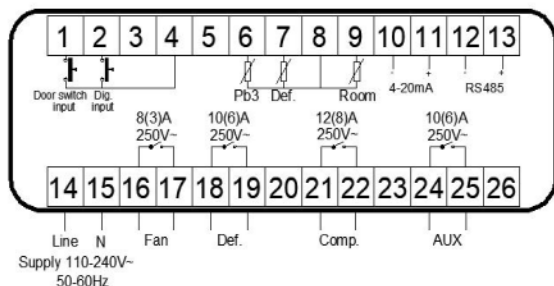
Operating temperature: 0+60 °C; Storage temperature: -25+60°C

Relative humidity: 20+85% (no condensing)

Measuring and regulation range: NTC probe: -40+100°C (-40+212°F)

Resolution: 1°C or 1°F (selectable); Accuracy (ambient temp. 25°C): ±0,1 °C ±1 digit

16. CONNECTIONS



17. DEFAULT SETTING VALUES

Label	Name	Range	°C/°F
C-00	Differential	1°C + 10°C / 2°F + 18°F	2°C
C-01	Minimum set point	-40°C+SET/-40°F+SET	-35°C
C-02	Maximum set point	SET+100°C/ SET+212°F	50°C
C-03	Thermostat probe calibration	-10+10°C / -18°F + 18°F	0°C
C-04	Evaporator probe presence	N,Y	Y
C-05	Evaporator probe calibration	-10+10°C / -18°F + 18°F	0°C
C-06	Third probe presence	N,Y	Y
C-07	Third probe calibration	-10+10°C / -18°F + 18°F	0°C
C-08	Outputs delay at start up	0 + 60min	0min
C-09	Anti-short cycle delay	0 + 60min	1min
C-10	Continuous cycle duration	0+240min	0min
C-11	Compressor ON time with faulty probe	0 + 60min	15min
C-12	Compressor OFF time with faulty probe	0 + 60min	30min
C-13	Temperature measurement unit	°C+°F	°C
C-14	Local display	P1 + P3	P1

Label	Name	Range	°C/°F
H-00	Defrost type	RE,RT,IN	RE
H-01	Defrost mode	IN,SD	IN
H-02	Set point for SMART defrost	(-30 + 30°C) (-22 + 86°F)	0°C
H-03	Defrost termination temperature	(-40 + 50°C) (-40 + 122°F)	8°C
H-04	Interval between defrost cycles	0 + 120h	6h
H-05	Maximum length for defrost	1 + 60min	30min
H-06	Draining time	0 + 60min	0min
H-07	First defrost after start up	Y,N	N
H-08	Defrost delay after continuous cycle	0+240min	0min
H-09	Fans operating mode	C-N,O-N,C-Y,O-Y	O-N
H-10	Fans delay after defrost	0 + 60min	10min
H-11	Fans stop temperature	-40+50°C / -40+122°F	2°C
H-12	Temperature alarms configuration	RE,AB	AB
H-13	Maximum temperature alarm	AB:H-14+100°C/H-14+212°F; RE: 0+50°C/0+90°F	100°C
H-14	Minimum temperature alarm	AB: -40+H-13°C/-40+H-13°F; RE: 0+50°C/0+90°F	-40°C
H-15	Differential for temperat. alarm and fan recovery	1°C + 10°C / 2°F + 18°F	2°C
H-16	Temperature alarm delay	0 + 60min	15min
H-17	Delay of temperature alarm at start up	0 + 60min	15min
H-18	Alarm delay at the end of defrost	0 + 60min	30min
H-19	Delay of temperat. alarm after closing the door	0 + 60min	15min
H-20	Open door alarm delay	0 + 60min	15min
H-21	Alarm relay silencing	N,Y	Y
H-22	Auxiliary relay configuration	ALR,AUS	ALR
H-23	Number of activation of pressure switch	0 + 15	0
F-00	Analogue output start point	(-40+100°C) (-40+212°F)	0°C
F-01	Analogue output band width	(-40+100°C) (-40+212°F)	16°C
F-02	Input type for the analogue output	P1 + P3	P1
F-03	Door switch input polarity	CL,OP	CL
F-04	Digital input polarity	CL,OP	CL
F-05	Digital input configuration	EAL,BAL,PAL,DEF,AUS,ES,ONF	EAL
F-06	Digital input alarm delay	0 + 60min	5min
F-07	Compress and fan status when open door	NO,FAN,CPR,F-C	FAN
F-08	Differential for Energy Saving	-30+30°C/-22+86°F	0°C
F-09	RS485 address	1+247	1
F-10	Power key configuration	OFF,ES	OFF
F-11	Real Set point	Read only	-

18. APPENDIX

A	b	C	d	E	F	G	H	I	J	K	L	M
A	B	C	D	E	F	G	H	I	J	K	L	M
n	o	P	q	r	S	t	U	u	y	z		
N	O	P	Q	R	S	T	U	V	W	X	Y	Z



- Power Semiconductors
- Electrical Measurement
- Process Control

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