

XRi20CH

Digital controller for variable speed drive

FW 24.3

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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.
- Dixell Srl reserves the right to change the composition of its products, even without notice, ensuring the same and unchanged functionality.

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 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 "Dixell S.r.l." (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 (our mod. FT1) in parallel with inductive loads could be useful.

2. GENERAL DESCRIPTION

Model XRi20CH, format 32x74mm, is microprocessor-based controller, suitable for applications on medium or low temperature ventilated refrigerating units with variable speed compressors. It has one relay output to control compressor, fan, defrost, which can be either electrical or reverse cycle (hot gas) and light (configurable). It is also provided with up to 2 NTC, PTC or PT1000 probe inputs and a frequency output signal to drive variable speed compressors.

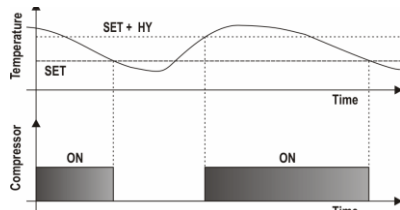
The HOTKEY I/O port allows connecting the unit, by means of the external module XJ485-CX, to a network line ModBUS-RTU compatible such as an X-WEB monitoring system. With the HOTKEY port it is possible to modify the configuration of the controller (by using the Wizmate Software).

The instrument is fully configurable, and it can be easily programmed through an external keyboard.

3. CONTROLLING LOADS

3.1 COMPRESSOR

The regulation is performed according to the temperature measured by the thermostat probe with a positive differential (HY) over the set point: if the temperature increases and reaches set point plus differential, the compressor will start. It will turn off as soon as 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 **Con** and **CoF**.

3.2 DEFROST

Two defrost modes are available through the **tdF** parameter: defrost through electrical heater (**tdF=EL**) and hot gas defrost (**tdF=in**).

Other parameters are used to control defrosting cycles: the maximum length (**MdF**) and defrosting 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 **Fdt** parameter. With **Fdt=0** the dripping time is disabled.

3.2.1 PRE-DEFROST

The par. **dAF** enable a pre-defrost phase. During this interval the regulation setpoint will be moved to the value **SET-1°C** (or **SET-1°F**). The defrost phase starts as soon as the regulation temperature reach the pre-defrost setpoint or when the **dAF** timer ends. This function is disable when **dAF=0**.

3.2.2 HOT GAS DEFROST

If **tdF=in**, the defrost phase will act as follow:

- If **dSd>0**, the compressor output will be deactivated
- At the end of **dSd** interval, the defrost output will be activated and timer **StC** will start
- At the end of **StC** interval, the compressor output will be reactivated.

If **dSd=0** or **StC=0**, the relative functions will be disabled.

3.3 RELAY CONFIGURATION (PAR. oA2)

The functioning of the configurable relay can be set by the **oA2** parameter, according to the kind of application. In the following paragraph the possible setting:

3.3.1 LIGHT RELAY

With **oA2=LiG** the relative relay operates as light output.

3.3.2 AUXILIARY RELAY

Not supported in this model.

3.3.3 ON/OFF RELAY

When **oA2=onF**, the relative relay is activated when the controller is turned on and de-activated when the controller is turned off.

3.3.4 NEUTRAL ZONE REGULATION

oA2=db is not supported in this model

3.3.5 ALARM RELAY

With **oA2=Alr** the relative relay operates as alarm relay. It is activated every time an alarm happens. Its status depends on the **tbA** parameter: if **tbA=Y**, the relay is silenced by pressing any key.

If **tbA=n**, the alarm relay stays on until the alarm condition recovers.

3.3.6 SECOND COMPRESSOR

oA2=CP2 is not supported in this model.

3.3.7 SECOND DEFROST OUTPUT

oA2=df2 is not supported in this model.

3.3.8 NIGHT BLINDS MANAGEMENT DURING ENERGY SAVING CYCLES

With **oA2=HES**, the relative relay operates to manage the night blind: the relay is energised when the energy saving cycle is activated by digital input or frontal button.

3.3.9 HEATER FOR WATER DRIPPING

If **oA2=HeT**, the relative output will work as heater for water dripping during and after any defrost.

3.3.10 REGULATION OUTPUT

If **oA2=inV**, the relative output will work as regulation output and will stay active as soon as the regulation request is running.

4. EVAPORATOR FAN CONTROL

The evaporator fan control mode is selected by means of the **FnC** parameter:

- **FnC = C_n**: fans will switch ON and OFF with the compressor and **not run** during defrost
- **FnC = 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 **Fnd** parameter.

- **FnC = C_Y**: fans will switch ON and OFF with the compressor and **run** during defrost
- **FnC = o_Y**: fans will run continuously also during defrost

The par. **FAP** is used to select which temperature probe will be used from the evaporator fan regulator. A specific setpoint (par. **FSt**) provides the temperature value, 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 **FSt-HYF**.

4.1 FORCED ACTIVATION FOR FANS

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. If the difference between the evaporator temperature and the room temperature is higher than the **Fct** value, the controller will activate the fans. This function is disabled if **Fct=0**.

4.2 CYCLIC ACTIVATION OF THE FANS WHEN THE COMPRESSOR IS SWITCHED OFF

When **FnC=C-n** or **C-Y** (fans in parallel to the compressor), the fans will be able to carry out on and off cycles even if the compressor is switched off. The on and off interval of time follow the **Fon** and **FoF** parameters. When the compressor is stopped, the fans will go on working for the **Fon** time. On the other side, with **Fon=0** the fans will stay always off when the compressor is off.

5. CONDENSER FAN CONTROL

The condenser fan control mode is selected by means of the **FCC** parameter:

- **FCC = C_n**: fans will switch ON and OFF with the compressor and **not run** during defrost
- **FCC = o_n**: fans will run even if the compressor is off, and not run during defrost
- **FCC = C_Y**: fans will switch ON and OFF with the compressor and **run** during defrost
- **FCC = o_Y**: fans will run continuously also during defrost

The par. **FAC** is used to select which temperature probe will be used from the condenser fan regulator. This regulator uses a specific setpoint (par. **St2**) and differential (par. **HY2**) to activate and deactivate the condenser fans:

- If **T>St2+HY2** the condenser fans are activated
- If **T<St2** the condenser fans are deactivated

The par. **FCo** can be used to keep the ventilators active for a period after compressor OFF.

6. DUAL MAP FEATURE

The controller is programmed with 2 different parameter maps. In this way, it is possible to choose the right map to meet both LT and NT applications. There are two different way to do this:

- If **i1F=nt**, it will be possible to change the working map by using the digital input.
- By using button if it is linked to the map changing function (for example: **d2n=Lnt**).

7. VARIABLE SPEED COMPRESSOR CONTROL

7.1 FREQUENCY MODE

The controller can drive variable speed compressors with frequency control input. The frequency output port can issue a frequency signal from 30 to 200Hz, duty cycle=50%. A special cable must be used to connect the frequency output of the controller to the frequency input of the specific inverter.

- CAB/EM1: cable **DD900002 20** for Embraco models
- CAB/SE1: cable **DD900002 22** for SECOP NLV models

NOTE:

- An inverter compressor can be completely controlled from the frequency output only.
- Only one compressor can be connected when frequency mode is used

1.1 PARAMETERS

The regulation band is from **SET** to **SET+HY+HY1**. When the regulation is running, the compressor speed is continuously calculated and updated by the PI regulator.

In case of regulation probe error, the compressor speed will be set to the value of par. **SPi**.

It is possible to enable a cyclic or a continuous mode operation both during normal mode and energy saving mode:

- **CMn, CME = Y**: after reaching the SETPOINT the VSC will keep on running
- **CMn, CME = n**: after reaching the SETPOINT the VSC will be stopped

1.2 HOT GAS DEFROST

If hot gas defrost is selected, it will be possible to set the compressor speed by using par. **Aod**.

1.3 PULL DOWN

An automatic function named PULL DOWN is implemented. This function forces the controller to work at **FMA** until reaching a specific SETPOINT (par. **CCS**) for a maximum interval of time (par. **CCT**). The PULL-DOWN function is activated:

- At start-up if the temperature measured from the regulation probe is higher than the **SET+HY+HY1**
- After any defrost
- If the temperature measured from regulation probe go over the **SET+HY+HY1+oHt** value.

If one of the above conditions happens, the controller will maintain the maximum compressor speed (**FMA**) until reaching the **CCS** setpoint. The maximum interval of time for any PULL DOWN is defined from par. **CCT**.

7.2 OIL MIGRATION CONTROL (VALID ONLY FOR VSC)

To avoid oil migration during variable speed compressor operation, a lubrication control is implemented. If the compressor works with a speed lower than the **MnP** threshold for **tMi** time, then the compressor speed will be increased to **FMA** for **tMA** time.

NOTES:

- **MnP= Fmi to FMA, nu, OFF**
- If **MnP=nu**, then this function is disabled
- If **MnP=OFF**, then the compressor will be stopped for **tMA** if it works continuously for **tMi**.

7.3 PI ALGORITHM

The VSC regulator implements a PI (Proportional-Integral) algorithm to guarantee temperature stability always near the setpoint. Here below there are some advises for parameter settings in some applications.

	Low Temperature Applications	Normal Temperature Applications
HY	0.3	2
HY1	0.7	1
tSt	1 to 3 min	1 to 3 min
iSt	10 to 20 min	5 to 10 min
rSr	20 to 60	90 to 180
Str	40 to 80 sec	10 to 20 sec
voS	1 to 3	3 to 5
vo2	3 to 7	5 to 10
vo3	5 to 10	5 to 10
tHv	90 to 120 sec	20 to 30 sec
tLv	30 to 60 sec	5 to 10 sec
dPt	2 to 4	1 or 2
SAt	5 to 10 min	1 to 3 min

NOTE:

- Every application needs specific tuning tests to find the optimal values.
- Use **HY < HY1** (better if **2*HY <= HY1**) in Low Temp Applications
- Use **HY > HY1** (better if **HY >= 2*HY1**) in Normal Temp Applications

8. FRONT PANEL AND COMMANDS



SET	To display target set point; in programming mode it selects a parameter or confirm an operation.
	(DEF) To start a manual defrost.
	(UP) To see the used parameter map. When in programming mode, it browses the parameter codes or increases the displayed value.
	(DOWN) To see the used parameter map. When in programming mode, it browses the parameter codes or decreases the displayed value. Keep it pressed 5 sec to change parameter map from "nt" to "Lt" and vice-versa (valid when button properly configured).
	To switch the instrument on and off (when onF=oFF).
	To switch on and off the light (when oA2=LiG).

KEY COMBINATIONS:

	To lock & unlock the keyboard
SET +	To enter in programming mode
SET +	To exit the programming mode

8.1 USE OF LEDS

Icon functions are described in the following table:

LED	MODE	FUNCTION
	ON	Compressor enabled
	Flashing	Anti-short cycle delay enabled
	ON	Defrost enabled
	Flashing	Drip time in progress
	ON	Fans enabled
	Flashing	Fans delay activation (for example after any defrost)
	ON	An alarm is occurring
	ON	A PULL DOWN is running
ECO	ON	Energy saving enabled
	ON	Light on
AUX	ON	Auxiliary relay on
°C/°F	ON	Measurement unit
°C/°F	Flashing	Programming phase

9. MAX & MIN TEMPERATURE MEMORIZATION

9.1 HOW TO SEE THE MIN TEMPERATURE

1. Press and release the **DOWN** button (if properly configured).
2. The "Lo" message will be displayed followed by the minimum temperature recorded.
3. By pressing the **DOWN** button again or waiting for 5 sec the normal display will be restored.

9.2 HOW TO SEE THE MAX TEMPERATURE

1. Press and release the **UP** button (if properly configured).
2. The "Hi" message will be displayed followed by the maximum temperature recorded.
3. By pressing the **UP** button again or waiting for 5 sec the normal display will be restored.

9.3 HOW TO RESET THE MAX AND MIN TEMPERATURE RECORDED

1. Keep **SET** button pressed for more than 3 sec while the max or min temperature is displayed. ("rSt" message will be displayed)
2. After confirming the operation, the "rSt" message will start blinking and then the normal temperature will be displayed.

10. MAIN FUNCTIONS

10.1 HOW TO SEE THE SET POINT

1. Push and immediately release the **SET** key: the display will show the Set point value
2. Push and immediately release the **SET** key or wait for 5 sec to display the probe value again

10.2 HOW TO CHANGE THE SET POINT

1. Push the **SET** button for 3 sec to change the Set point value.
2. The value of the set point will be displayed and the °C or °F icon will start blinking
3. Use the **UP** or **DOWN** buttons to modify the current value
4. Use the **SET** button to store the new value into memory

10.3 HOW TO START A MANUAL DEFROST

Keep the DEF button pressed for 3 sec to start a manual defrost.

10.4 HOW TO ENTER PARAMETER PROGRAMMING MENU "PR1"

Follow these steps:

1. Enter the Programming mode by pressing the **SET+DOWN** buttons for 3 sec (the °C or °F LED will start blinking)
2. Browse to the required parameter and then press the **SET** button to display its current value
3. Use **UP** or **DOWN** buttons to change its value

4. Press **SET** button to store the new value and move to the following parameter

To exit: press **SET+UP** buttons or wait for 15 sec without pressing any key.

NOTE: the set value is stored even when the procedure exits by waiting for the time-out

10.5 HOW TO ENTER PARAMETER PROGRAMMING MENU "PR2"

The manufacturer menu (Pr2) includes all the parameters of the instrument.

10.5.1 ENTERING THE PARAMETER PROGRAMMING MENU "PR2"

1. Enter the Programming mode by pressing the **SET+DOWN** buttons for 3 sec (the °C or °F icon will start blinking).
2. Released the buttons and then push again the **SET+DOWN** buttons for more than 7 sec. The Pr2 label will be displayed immediately followed from the HY parameter.

NOW THE PARAMETER MENU "PR2" IS AVAILABLE FOR ANY MODIFICATION

3. Browse to the required parameter.
4. Press the **SET** button to display its value.
5. Use **UP** or **DOWN** to change its value.
6. Press **SET** to store the new value and move to the following parameter.

To exit: press **SET+DOWN** or wait for 15 sec without pressing any key.

NOTE1: if no parameter is present in Pr1 menu, after 3 sec the "noP" message will be displayed. Keep the buttons pushed till the Pr2 message will be displayed.

NOTE2: the set value is stored even when the procedure ends by waiting for the time-out

10.5.2 HOW TO MOVE A PARAMETER FROM "PR2" MENU TO "PR1" MENU AND VICE-VERSA

Each parameter present in the hidden menu (Pr2) can be moved into the user level (Pr1) by pressing both **SET+DOWN** buttons. If a parameter is part of the user level, when showed in the hidden menu the decimal point will be lit.

10.6 HOW TO LOCK THE KEYBOARD

1. Keep both **UP** and **DOWN** buttons pressed more than 3 sec.
2. The "PoF" message will be displayed, and the keyboard will be locked. At this point it will be possible only to see the set point or the MAX o Min temperature stored
3. If a button is pressed more than 3 sec the "PoF" message will be displayed.

10.7 HOW TO: UNLOCK THE KEYBOARD

Keep both **UP** and **DOWN** pressed more than 3 sec till the "Pon" message will be displayed.

10.8 THE ON/OFF FUNCTION



By pushing the **ON/OFF** key, the instrument will go in stand-by.

During the stand-by status, all the relays are switched OFF and the regulations are stopped; if a monitoring system is connected, it does not record the instrument data and alarms.

WARNING: loads connected to the normally closed contacts of the relays are always supplied and under voltage, even if the instrument is in stand-by mode.

11. PARAMETERS

REGULATION

LS	Minimum Set Point: (-100.0°C to SET; -148°F to SET) fix the minimum value for the set point.
US	Maximum Set Point: (SET to 150.0°C; SET to 392°F) fix the maximum value for the set point.
HY	Compressor regulation differential in normal mode: (0.1 to 25.0°C; 1 to 45°F) set point differential. Compressor Cut-IN is $T > SET + HY$. Compressor Cut-OUT is $T < SET$.
HY1	Variable Speed Compressor Differential in normal mode: 0.1 to 25.5°C; 1 to 45°F
odS	Output activation delay at start-up: (0 to 255 min) this function is enabled after the instrument power-on and delays the output activations.
AC	Anti-short cycle delay: (0 to 999 sec) minimum interval between a compressor stop and the following restart.
MCo	Maximum time with compressor ON: (0 to 255min) maximum time with ONOFF compressor active. With MCo=0 this function is disabled.
rtr	Regulation percentage=F(P1; P2): (0 to 100; 100=P1, 0=P2) it allows to set the regulation according to the percentage of the first and second probe, as for the following formula $(rtr(P1-P2)/100 + P2)$.
CCt	Maximum duration for Pull Down: (0.0 to 23h50min, res. 10min) after elapsing this time interval, the super cooling function is immediately stopped.
CCS	Pull Down phase differential (SET+CCS or SET+HES+CCS): (-12.0 to 12.0°C; -21 to 21°F) during any super cooling phase the regulation SETPOINT is moved to SET+CCS (in normal mode) or to SET+HES+CCS (in energy saving mode)
oHt	Threshold for automatic activation of Pull Down in normal mode (SET+HY+oHt): (0.1 to 25.5°C; 1 to 45°F) this is the upper limit used to activate the super cooling function.
Con	Compressor ON time with faulty probe: (0 to 255 min) time during which the compressor is active in case of faulty thermostat probe. With Con=0 compressor is always OFF.
CoF	Compressor OFF time with faulty probe: (0 to 255 min) time during which the compressor is OFF in case of faulty thermostat probe. With CoF=0 compressor is always active.

PROBE MENU

PbC	Probe selection: (ntC; PtC; Pt1) ntC=NTC type; PtC=PTC type; Pt1=PT1000 type
ot	Probe P1 calibration: (-12.0 to 12.0°C; -21 to 21°F) allows to adjust any possible offset of the first probe.
P2P	Probe P2 presence: n = not present; Y = present.

oE	Probe P2 calibration: -12.0 to 12.0°C; -21 to 21°F allows to adjust any possible offset of the second probe.
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VARIABLE SPEED COMPRESSOR

FMi	Minimum value for Variable Speed Compressor (RPM * 10): (0 to FMA) select according to the VSC in use
FMA	Maximum value for Variable Speed Compressor (RPM * 10): (FMi to 500) select according to the VSC in use
Fr0	Value when Variable Speed Compressor is shut down (RPM * 10): (0 to 200) select according to the VSC in use
tSt	PI regulator, temperature sampling time: (00:00 to 42min:30sec)
iSt	PI regulator, integral sampling time: (00:00 to 42min:30sec)
vdC	Type of Variable Speed Drive: (nu; FrE) nu = no VSC in use; FrE = VSC with frequency control mode is used
voS	Signal output variation for Variable Speed Compressor: (1 to 255 RPM*30) VSC variation when $SET-HY \leq T \leq SET+HY$
vo2	Signal output variation for Variable Speed Compressor: (1 to 255 RPM*30) VSC variation when $SET-HY-HY1 \leq T < SET-HY$ and $SET+HY < T \leq SET+HY+HY1$
vo3	Signal output variation for Variable Speed Compressor: (1 to 255 RPM*30) VSC variation when $SET-HY-HY1 < T$ and $T > SET+HY+HY1$
PdP	Variable Speed Compressor (in %) during any Pull Down: (0 to 100%)
SPi	Compressor speed (in %) in case of any probe error during Con interval: (0 to 100%)
Aod	Compressor speed (in %) during any defrost cycle (valid if tdf=in): (0 to 100%)
AoF	Compressor speed (in%) during a pre-defrost phase (valid if tdf=in): (0 to 100%)
thV	PI regulator, max interval for output variation: (tLv to 255 sec)
tLv	PI regulator, min interval for output variation: (1 sec to thV)
rSr	PI regulator, range for output value calculation (RPM * 10): (0=disabled; 1 to 255 RPM*10)
Str	PI regulator, delay before range drift: (0 to 255 sec)
dPt	PI regulator, divisor for PI response time reduction (acts on both par. tSt and iSt): (1 to 10)
CMn	Continuous control ON in normal mode: (n;Y) Y = VSC is never stopped during regulation
CME	Continuous control ON in energy saving mode: (n;Y) Y = VSC is never stopped during regulation
MnP	Compressor speed threshold to activate lubrication (valid for variable speed compressors only, 0=disabled): (nu; 1 to 100%; OFF) nu = not used; 1 to 100% = select the percentage to activate function; OFF = compressor is stopped when the condition is reached
tMi	Time range with compressor speed below MnP to activate lubrication cycle: (00:00 to 24h00min) time before activating the lubrication function
tMA	Time range with compressor speed at 100% to activate lubrication cycle: (0 to 255 min) VSC will be forced to 100%, for tMA, after activating the lubrication function. NOTE: if MnP=OFF , VSC will be stopped for tMA

DISPLAY

CF	Temperature measurement unit: (°C; °F) °C = Celsius; °F = Fahrenheit.
rES	Temperature resolution (°C only): (dE; in) dE = decimal; in = integer.
Lod	Local probe displayed: (P1; P2; P3; P4; Set; dtr) Px = probe "x"; SET = set point; dtr = percentage selected by par. dtr.
dLY	Temperature display delay: (0.0 to 20min00sec, res. 10 sec) when the temperature increases, the display is updated of 1°C or 1°F after this time.
dtr	Probe visualization percentage, F(P1; P2): (0 to 100) with dtr=1 the display will show this value $VALUE=0.01*P1+0.99*P2$

DEFROST

tdF	Defrost type: EL=electrical heaters; in=hot gas
dFP	Probe selection for defrost control: (nP; P1; P2; P3; P4) nP=no probe; Px=probe "x". Note: P4=Probe on Hot Key plug.
dtE	End defrost temperature: (-100 to 150°C; -148 to 302°F) sets the temperature measured by the evaporator probe (dFP), which causes the end of defrost cycle.
idF	Interval between two consecutive defrost cycles: (0 to 120 hours) determines the time interval between the beginning of two defrosting cycles.
MdF	Maximum length of defrost cycle: (0 to 255 min; 0 means no defrost) when P2P=n (no evaporator probe presence) it sets the defrost duration, when P2P=Y (defrost end based on evaporator temperature) it sets the maximum length for the defrost cycle.
dSd	Start defrost delay: (0 to 255 sec) delay in defrost activation.
StC	Compressor stop before starting any defrost: (0 to 255 sec) interval with compressor OFF before activating hot gas cycle
dFd	Displaying during any defrost: (rt; it; SET; dEF) rt = real temperature; it = start defrost temperature; SET = set point; dEF = label "dEF"
dAd	Temperature display delay after any defrost cycle: (0 to 255 min) delay before updating the temperature on the display after the end of any defrost.
Fdt	Draining time: (0 to 255 min) regulation delay after finishing a defrost phase
Hon	Drain heater enabled after draining time (par. Fdt): (0.0 to 24h00min, res. 10 min) the relative output will stay on after draining time.
dPo	Defrost cycle enabled at stat-up: (n; Y) enables defrost at power on.
dAF	Pre-defrost time: (0 to 255 min) it is used to sub freeze the goods before activating any defrost. The regulation setpoint is modified to SET-1°C or SET-2°F during this interval. If dAF=0 this function is disabled.

FANS

FAP	Probe selection for evaporator fan: (nP; P1; P2; P3; P4) nP=no probe; Px=probe "x". Note: P4=Probe on Hot Key plug.
FSst	Evaporator fan stop temperature: (-100 to 150°C; -148 to 302°F) setting of temperature, detected by evaporator probe. Above this temperature value fans are always OFF. NOTE: it works only for the evaporator fan. NOT for the condenser fan.
HYF	Evaporator fan regulator differential: (0.1 to 25.5°C; 1 to 45°F) evaporator fan will stop when the measured temperature (from FAP) is T<FSst-HYF.

FnC	Evaporator fan operating mode: (Cn; on; CY; oY)
	- Cn = runs with the compressor, duty-cycle when compressor is OFF (see FoF, Fon, FF1 and Fo1 parameters) and OFF during defrost - on = continuous mode, OFF during defrost - CY = runs with the compressor, duty-cycle when compressor is OFF (see FoF, Fon, FF1 and Fo1 parameters) and ON during defrost - oY = continuous mode, ON during defrost
	Fnd Evaporator fan delay after defrost cycle: (0 to 255 min) delay before fan activation after any defrosts.
	FCt Differential for cyclic activation of evaporator fans: (0 to 50°C)
Ft	Evaporator fan controlled during any defrost: (n;Y)
Fon	Evaporator fan ON time in normal mode (with compressor OFF): (0 to 15 min) used when energy saving status is not active.
FoF	Evaporator fan OFF time in normal mode (with compressor OFF): (0 to 15 min) used when energy saving status is not active.
FAC	Probe selection for condenser fan: (nP; P1; P2; P3; P4) nP=no probe; Px=probe "x". Note: P4=Probe on Hot Key plug.
St2	Set Point 2 regulation (for condenser fan): (-100 to 150°C; -148 to 302°F) setting of temperature detected by evaporator probe. Above this value of temperature fans are always OFF.
HY2	Set Point 2 differential (for condenser fan): (0.1 to 25.5°C; 1 to 45°F) differential for evaporator ventilator regulator
FCC	Condenser fan operating mode: (Cn; on; CY; oY)
	- Cn = runs with the compressor and OFF during defrost - on = continuous mode, OFF during defrost - CY = runs with the compressor and ON during defrost - oY = continuous mode, ON during defrost
	Fd4 Condenser fan activated when compressor off: (0 to 999 sec) interval with condenser fan on after stopping compressor and when FCC=C-n or C-Y

AUXILIARY

ACH	Type of control for auxiliary regulator: (Ht; CL) Ht = heating; CL = cooling.
SAA	Set Point for auxiliary regulator: (-100.0 to 150.0°C; -148 to 302°F) it defines the room temperature set point to switch auxiliary relay.
SHY	Auxiliary regulator differential: (0.1 to 25.5°C; 1 to 45°F) differential for auxiliary output set point.
	- ACH=CL, AUX Cut in is [SAA+SHY]; AUX Cut out is SAA. - ACH=Ht, AUX Cut in is [SAA-SHY]; AUX Cut out is SAA.
ArP	Probe selection for auxiliary regulator: (nP; P1; P2; P3; P4) nP = no probe, the auxiliary relay is switched only by the digital input; Px=probe "x". Note: P4=Probe on Hot Key plug.
Sdd	Auxiliary regulator disabled during any defrost cycle: (n; Y) n = the auxiliary relay operates during defrost. Y = the auxiliary relay is switched off during defrost.

ALARMS

ALP	Probe selection for temperature alarms: (nP; P1; P2; P3; P4) nP=no probe; Px=probe "x". Note: P4=Probe on Hot Key plug.
ALC	Temperature alarm configuration: (Ab; rE) Ab = absolute; rE = relative.
ALU	High temperature alarm: when this temperature is reached, the alarm is enabled after the Ad delay time.
	- If ALC=Ab → ALL to 150.0°C or ALL to 302°F. - If ALC=rE → 0.0 to 50.0°C or 0 to 90°F.
ALL	Low temperature alarm: when this temperature is reached, the alarm is enabled after the Ad delay time.
	- If ALC=Ab → -100.0°C to ALU or -148°F to ALU. - If ALC=rE → 0.0 to 50.0°C or 0 to 90°F.
AFH	Temperature alarm differential: (0.1 to 25.0°C; 1 to 45°F) alarm differential.
ALd	Temperature alarm delay: (0 to 255 min) delay time between the detection of an alarm condition and the relative alarm signalling.
dAo	Temperature alarm delay at start-up: (0.0 to 24h00min, res. 10 min) delay time between the detection of a temperature alarm condition and the relative alarm signalling, after starting up the instrument.

SECOND TEMPERATURE ALARM

AP2	Probe selection for second temperature alarm: (nP; P1; P2; P3; P4) nP=no probe; Px=probe "x". Note: P4=Probe on Hot Key plug.
AL2	Second low temperature alarm: (-100.0 to 150.0°C; -148 to 302°F)
Au2	Second high temperature alarm: (-100.0 to 150.0°C; -148 to 302°F)
AH2	Second temperature alarm differential: (0.1 to 25.0°C; 1 to 45°F)
Ad2	Second temperature alarm delay: (0 to 255 min; 255 = not used) delay time between the detection of a condenser alarm condition and the relative alarm signalling.
dA2	Second temperature alarm delay at start-up: (0.0 to 24h00min, res. 10 min)
bLL	Compressor OFF due to second low temperature alarm: (n; Y) n = no, the compressor continues to work; Y = yes, the compressor is switched off while the alarm is ON; in any case, the regulation restarts after AC time at minimum.
AC2	Compressor OFF due to second high temperature alarm: (n; Y) n = no, the compressor continues to work; Y = yes, the compressor is switched off while the alarm is ON; in any case, the regulation restarts after AC time at minimum.
SAF	Differential for anti-freezing control: (-12.0 to 12.0°C; -21.0 to 21.0°F) the regulation stops if T<SET+SAF.

CONFIGURABLE RELAYS

oA2	Relay output oAx configuration:
	- nu = not used - onF = always on with instrument on - dEF = defrost - Fan = evaporator Fan - Alr = alarm - LiG = light - AUS = auxiliary output - db = neutral zone - CP1 = ONOFF compressor - CP2 = second ONOFF compressor - dF2 = second defrost - HES = energy saving - HEt = heater output control - inV = inverter output - Cnd = condenser fan.
	oAn Analogue output configuration: (n;Y) n = 5-pin port is used as HOT-KEY only; Y = 5-pin port is used as frequency output.
	AoP Alarm relay polarity: (oP; CL) oP = alarm activated by closing the contact; CL = alarm activated by opening the contact.

DIGITAL INPUTS

ibt	Base time for digital inputs: (SEC; Min) SEC = seconds; Min = minutes. Delay in activating the function linked to the digital inputs.
i1P	Digital input 1 polarity: (oP; CL) oP = activated by closing the contact; CL = activated by opening the contact.
i1F	Digital input 1 configuration:
	- EAL = external warning alarm - bAL = external lock alarm - PAL = external pressure alarm - dor = door switch function - dEF = defrost activation - AUS = auxiliary output - Htr = type of inverting action (cooling or heating) - ES = energy saving mode activation - HdF = holiday defrost - onF = ON/OFF status change - Lnt = change configuration (between Lt and nt)
	did Digital input 1 alarm delay: (0 to 255) delay between the detection of an external event and the activation of the relative function.
	nPS Number of external pressure switch alarms before stopping the regulation: (0 to 15) after reaching nPS events in the digital input alarm delay (par. dxd), the regulation will be stopped and a manual restart (ON/OFF, power OFF and power ON) will be required
odC	Compressor and fan status after door opening: (no; FAn; CPn; F-C): no = normal; FAn = Fans OFF; CPn = Compressor OFF; F-C = Compressor and fans OFF.
rrd	Regulation restart after door alarm: (n; Y) n = no regulation if the door is open; Y = when the rrd timer elapses, the regulation restarts even if a door open alarm is ON.

ENERGY SAVING

HES	Energy saving mode temperature differential: (-30 to 30°C; -54 to 54°F) sets the increasing value of the set point during the Energy Saving cycle.
LdE	Energy saving controls the lights (lights OFF when energy saving is active): (n; Y) lights off when energy saving mode is active

OTHER

Adr	Serial address: (1 to 247) device address for Modbus communication
bAU	Baudrate: (9.6; 19.2) select the correct baudrate for serial communication
onC	ONOFF button configuration:
	- nU = not used - oFF = to switch on and off the device - ES = energy saving mode
on2	ONOFF button timed configuration (3 sec):
	- nU = disabled - oFF = to switch on and off the device - ES = energy saving mode
LGC	Light button (left upper side) configuration:
	- nu = not used - LiG = to activate and deactivate light output - AUS = to activate and deactivate the auxiliary output - Lnt = configuration map change
LG2	Light button (left upper side) timed configuration (3 sec):
	- nu = not used - LiG = to activate and deactivate light output - AUS = to activate and deactivate the auxiliary output - Lnt = configuration map change
dFC	DEF button (left middle side) configuration:
	- nu = not used - Pb2 = show current Probe Pb2 value - AUS = to activate and deactivate the auxiliary output
dF2	DEF button (left middle side) timed configuration (3 sec):
	- nu = not used - dEF = defrost activation - AUS = to activate and deactivate the auxiliary output

dnC	Down button configuration: - nU = not used - Std = lower temperature value - Lnt = configuration map change - Pdn = force Pull Down mode
dn2	Down button timed configuration (3 sec): - nU = not used - Std = lower temperature value - Lnt = configuration map change - Pdn = force Pull Down mode
dP1	Probe P1 value visualization
dP2	Probe P2 value visualization
SPd	Real regulation Speed
rSE	Real set point: it shows the set point used during the energy saving cycle or during the continuous cycle.
rEL	Firmware release for internal use.
Ptb	Parameter table code: readable only.

12. DIGITAL INPUTS

The first digital input (terminals 18-20) is enabled with **P3P=n**.
The free voltage digital inputs are programmable by the **i1F** parameter.

12.1 GENERIC ALARM (i1F = EAL)

As soon as the digital input is activated the unit will wait for **did** time delay before signalling the "EAL" alarm message. The outputs status doesn't change. The alarm stops just after the digital input is deactivated.

12.2 SERIOUS ALARM MODE (i1F = bAL)

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

12.3 EXTERNAL PRESSURE ALARM (i1F = PAL)

It is used to detect any pressure external alarm. This signal locks the regulation after detecting **nPS** events in the interval **dxs**.

12.4 DOOR SWITCH INPUT (i1F = dor)

It signals the door status and the corresponding relay output status through the **odC** parameter:
no = normal (any change); **FAn** = Fan OFF; **CPr** = Compressor OFF; **F_C** = Compressor and fan OFF.
Since the door is opened, after the delay time set through parameter **doA**, the door alarm is enabled, the display shows the message **dA** and the regulation restarts in **rtr=Y**. 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.

12.5 START DEFROST (i1F = 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 **MdF** safety time is expired.

12.6 SWITCH THE AUXILIARY RELAY (i1F = AUS)

With **oAx=AUS** the digital input switched the status of the auxiliary relay.

12.7 INVERSION OF THE KIND OF ACTION: HEATING-COOLING (i1F = Htr)

This function allows inverting the regulation of the controller: from cooling to heating and viceversa.

12.8 ENERGY SAVING (i1F = ES)

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

12.9 ON OFF FUNCTION (i1F = onF)

To switch the controller on and off.

12.10 CHANGE PARAMETER MAP (i1F = Lnt)

To move from LT to NT parameter map.

12.11 DIGITAL INPUTS POLARITY

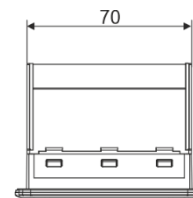
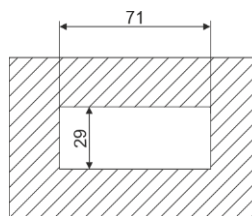
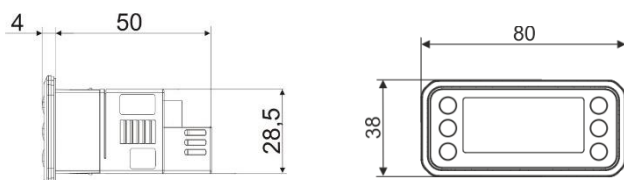
The digital input polarity depends on the **i1P** parameter.

- i1P=CL**, the input is activated by closing the contact.
- i1P=OP**, the input is activated by opening the contact.

13. SERVICE SERIAL PORT

A specific serial tool (XJ485CX) can be connected to the HOTKEY port to change parameter configuration. To do this, set par **oAn=n**: the frequency output must be disabled to use the service serial port.

14. INSTALLATION AND MOUNTING



Instrument **XRi20CH** 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 to 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.

15. ELECTRICAL CONNECTIONS

The instrument is provided with screw terminal block to connect cables with a cross section up to 2.5mm². 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.

15.1 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.

16. HOW TO USE THE HOT KEY

To enable the HOT-KEY port (5-pin connector), set the par. **oAn=n**.

16.1 PROGRAM A HOT KEY FROM AN INSTRUMENT (UPLOAD)

- Program one controller with the front keypad.
- When the controller is **ON**, insert the "HOT-KEY" and push **UP** button; the "uPL" message appears followed by a flashing "End" label.
- Push **SET** button and the "End" will stop flashing.
- Turn OFF** the instrument, remove the "HOT-KEY" and then turn it ON again.

NOTE: the "Err" message appears in case of a failed programming operation. In this case push again button if you want to restart the upload again or remove the "HOT-KEY" to abort the operation.

16.2 PROGRAM AN INSTRUMENT BY USING A HOT KEY (DOWNLOAD)

- Turn OFF the instrument.
- Insert a **pre-programmed "HOT-KEY"** into the **5-PIN connector** and then turn the Controller ON.
- The parameter list of the "HOT-KEY" will be automatically downloaded into the Controller memory. The "doL" message will blink followed by a flashing "End" label.
- After 10 seconds the instrument will restart working with the new parameters.
- Remove the "HOT-KEY".

NOTE: the message "Err" is displayed for failed programming. In this case turn the unit off and then on if you want to restart the download again or remove the "HOT-KEY" to abort the operation.

17. ALARM SIGNALING

Message	Cause	Outputs
P1	Room probe failure	Compressor output works with Con and CoF
P2	Evaporator probe failure	Defrost end is timed
HA	Maximum temperature alarm	Outputs unchanged
LA	Minimum temperature alarm	Outputs unchanged
HA2	Condenser high temperature	It depends on the AC2 parameter
LA2	Condenser low temperature	It depends on the bLL parameter
dA	Door open	Compressor restarts
EA	Warning	Output unchanged
CA	Lock alarm (ixF=bAL, PAL)	All outputs OFF

17.1 BUZZER MUTING OR ALARM RELAY OUTPUT DEACTIVATION

If **tbA=Y**, the buzzer and the relay are silenced by pressing any key.
If **tbA=n**, only the buzzer is silenced while the alarm relay is on until the alarm condition recovers.

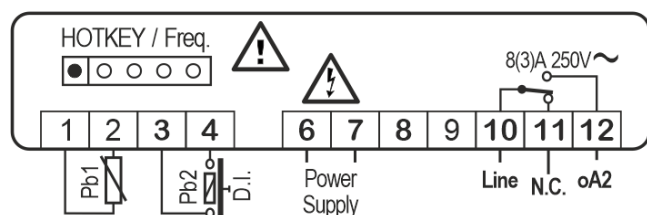
17.2 ALARM RECOVERY

Probe alarms "P1", "P2", "P3" and "P4" 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" and "CA" (with **ixF=bAL, PAL**) recover as soon as the digital input is disabled.

17.3 OTHER MESSAGES

Pon	Keyboard unlocked.
PoF	Keyboard locked
noP	In programming mode: no parameter in Pr1. On the display or in dP2, dP3, dP4: the selected probe is not enabled.

18. WIRING DIAGRAM



1.4 PIN DESCRIPTION

I/O	DESCRIPTION
oA2	Relay outputs
P1 to P2	Temperature probes
D.I.	Digital input 1
Hot Key / Freq	Hotkey connector and Frequency output for VSC
Line	Relay Power Supply "Line"
Terminal 6	Neutral for high and low voltage power supply
Terminal 7	Line for high and low voltage power supply

19. DEFAULT SETTING VALUES

Label	Description	LT	NT	Level	Unit
SEt	Set Point	-20.0	3.0		°C
LS	Minimum Set point	-50.0	-50.0	Pr2	°C
US	Maximum Set point	50.0	50.0	Pr2	°C
HY	Compressor regulation differential in normal mode	0.3	2.0	Pr1	°C
HY1	Variable Speed Compressor Differential in normal mode	0.7	1.0	Pr1	°C
odS	Output activation delay at start-up	1	1	Pr1	min
AC	Anti-short cycle delay	30	1	Pr1	sec
MCo	Maximum time with compressor on (0=disabled)	0	0	Pr2	min
rtr	Regulation percentage=F(P1; P2) (100=P1; 0=P2)	100	0	Pr2	
CCt	Maximum duration for Pull Down	00:00	01:00	Pr2	hh:mm
CCS	Pull Down phase differential (SET+CCS or SET+HES+CCS)	0.0	0.0	Pr2	°C
oHt	Threshold for automatic activation of Pull Down in normal mode (SET+HY+oHt)	0.0	0.0	Pr2	°C
Con	Compressor ON time with faulty probe	20	20	Pr2	min
CoF	Compressor OFF time with faulty probe	5	5	Pr2	min
PbC	Probe selection	ntC	ntC	Pr2	
ot	Probe P1 calibration	0.0	0.0	Pr1	°C
P2P	Probe P2 presence	no	no	Pr2	
oE	Probe P2 calibration	0.0	0.0	Pr2	°C
FMi	Minimum value for Variable Speed Compressor (RPM * 10)	200	200	Pr2	RPM*10
FMA	Maximum value for Variable Speed Compressor (RPM * 10)	450	450	Pr2	RPM*10
Fr0	Output value when Variable Speed Compressor is OFF	0	0	Pr2	RPM*10
tSt	PI regulator: temperature sampling time	01:00	01:00	Pr2	sec
iSt	PI regulator: integral sampling time	10.00	05:00	Pr2	sec
voS	Signal output variation for Variable Speed Compressor (SET-HY≤T≤SET+HY)	2	3	Pr2	RPM*30
vo2	Signal output variation for Variable Speed Compressor (SET-HY-HY1≤T≤SET-HY e SET+HY<T≤SET+HY+HY1)	5	7	Pr2	RPM*30
vo3	Signal output variation for Variable Speed Compressor (SET-HY-HY1<T e T>SET+HY+HY1)	7	10	Pr2	RPM*30
PdP	Variable Speed Compressor (in percentage) during any Pull Down	90	nU	Pr2	%
tIF	Time with Variable Speed Compressor at minimum before stopping it	0	0	Pr2	min
SPi	Compressor speed (in %) in case of any probe error during Con interval	30	80	Pr2	%
Aod	Compressor speed (in %) during any defrost cycle (valid if tdf=in)	70	0	Pr2	%
AoF	Compressor speed during any pre-defrost phase (valid if tdf=in)	50	0	Pr2	%
thv	PI regulator: max interval for output variation	90	30	Pr2	sec
tlv	PI regulator: min interval for output variation	30	10	Pr2	sec
rSr	PI regulator: range for output value calculation (RPM * 10)	40	120	Pr2	RPM*10
Str	PI regulator: delay before range drift	60	20	Pr2	sec
dPt	PI regulator: divisor for PI response time reduction (acts on both par. tSt and iSt)	2	1	Pr2	
SAt	Sampling time to calculate the average compressor speed before any desfrost cycle	8	1	Pr2	min

CMn	Continuous control ON in normal mode	yes	no	Pr2	
CME	Continuous control ON in energy saving	yes	no	Pr2	
MnP	Compressor speed threshold to activate lubrication (valid only for variable speed compressors, 0=disabled)	nu	nu	Pr2	%
tMi	Time range with compressor speed below MnP to activate lubrication cycle	00:00	00:00	Pr2	hh:mm
tMA	Time range with compressor speed at 100% to activate lubrication cycle	0	0	Pr2	min
CF	Temperature measurement unit: Celsius; Fahrenheit	°C	°C	Pr2	
rES	Temperature resolution: decimal, integer	dE	dE	Pr2	
Lod	Probe default displayed	P1	P1	Pr2	
dLy	Temperature display delay (resolution 10 sec)	00:00	00:00	Pr2	min
dtr	Probe visualization percentage=F(P1;P2) (ex: dtr=1 means VALUE=0.01*P1+0.99*P2)	99	99	Pr2	
tdF	Defrost type: electric heating, hot gas	in	in	Pr2	
dFP	Probe selection for defrost control	nP	nP	Pr2	
dtE	End defrost temperature	8.0	12.0	Pr1	°C
idf	Interval between two successive defrost cycles	12	12	Pr2	hh
MdF	Maximum length of defrost cycle	30	30	Pr1	min
dSd	Start defrost delay	0	0	Pr1	sec
StC	Compressor off-cycle before starting any defrost	0	0	Pr2	sec
dFd	Displaying during defrost	dEF	dEF	Pr2	
dAd	Temperature display delay after any defrost cycle	0	0	Pr2	min
Fdt	Draining time	5	5	Pr2	min
Hon	Drain heater enabled after draining time (par. Fdt)	00:00	00:00	Pr2	hh:mm
dPo	Defrost cycle enabled at stat-up	no	no	Pr2	
Pd2	Defrost output deactivation delay	0	0	Pr2	sec
dAF	Pre-defrost time	0	0	Pr2	min
FAP	Probe selection for evaporator fan	nP	nP	Pr2	
FSt	Evaporator fan stop temperature	0.0	10.0	Pr2	°C
HyF	Evaporator fan regulator differential	1.0	2.0	Pr2	°C
FnC	Evaporator fan operating mode	C_n	C_n	Pr2	
Fnd	Evaporator fan delay after defrost cycle	5	0	Pr2	min
FCt	Differential temperature for cyclic activation of evaporator fans (0=disabled)	1	0	Pr2	°C
Ft	Evaporator fan controlled during defrost	no	no	Pr2	
Fon	Evaporator fan ON time in normal mode (with compressor OFF)	0	0	Pr2	min
FoF	Evaporator fan OFF time in normal mode (with compressor OFF)	0	0	Pr2	min
FAC	Probe selection for condenser fan	nP	nP	Pr2	
St2	Set Point 2 Regulation (for condenser fan)	0.0	15.0	Pr2	°C
Hy2	Set Point 2 differential (for condenser fan)	1.0	10.0	Pr2	°C
FCC	Condenser fan operating mode	O_n	C_n	Pr2	
Fd4	Condenser fan deactivation delay	0	0	Pr2	sec
ALP	Probe selection for temperature alarms	P1	P1	Pr2	
ALC	Temperature alarms configuration: relative, absolute	Ab	Ab	Pr1	
ALU	High temperature alarm	150.0	150.0	Pr1	°C
ALL	Low temperature alarm	-100.0	-100.0	Pr1	°C
AFH	Temperature alarm differential	2.0	2.0	Pr1	°C
ALd	Temperature alarm delay	0	0	Pr1	min
dAo	Temperature alarm delay at start-up	00:00	00:00	Pr1	hh:mm
AP2	Probe selection for 2nd temperature alarm	nP	nP	Pr1	
AL2	2nd low temperature alarm	-20.0	0.0	Pr2	°C
AU2	2nd high temperature alarm	20.0	0.0	Pr2	°C
AH2	2nd temperature alarm differential	2.0	0.1	Pr2	°C
Ad2	2nd temperature alarm delay	0	0	Pr2	min
dA2	2nd temperature alarm delay at start-up	00:00	00:00	Pr2	hh:mm
bLL	Compressor OFF due to 2nd low temperature alarm	no	no	Pr2	
AC2	Compressor OFF due to 2nd high temperature alarm	no	no	Pr2	
SAF	Differential for anti-freezing control	0.0	0.0	Pr2	°C
tbA	Alarm relay deactivation	yes	yes	Pr2	
oA2	Relay output oA2 configuration	LiG	LiG	Pr2	
AOP	Alarm relay polarity	CL	CL	Pr2	
1Ao	Analogue output 1 configuration	FrE	FrE	Pr2	

ibt	Base times for digital inputs	SEC	SEC	Pr2	
i1P	Digital input 1 polarity	CL	CL	Pr1	
i1F	Digital input 1 configuration	nu	EAL	Pr1	
d1d	Digital inputs 1 alarm delay (base time depends on par. ibt)	0	0	Pr1	sec
nPS	Number of external pressure switch alarms before stopping the regulation	15	0	Pr1	
OdC	Compressor and fan status after door opening	F-C	no	Pr2	
rrd	Regulation restart after door alarm	no	no	Pr2	
HES	Temperature differential in energy saving	0.0	0.0	Pr2	°C
LdE	ErA controls the lights in energy saving (lights OFF when energy saving goes active)	yes	no	Pr1	
Adr	Serial address	1	1	Pr1	
bAU	Baudrate	9.6	9.6	Pr2	
onC	ONOFF button configuration (left upper side)	nU	nU	Pr2	
on2	ONOFF button timed (3sec) configuration (left upper side)	oFF	oFF	Pr2	
LGC	Light button configuration (left upper side)	LiG	LiG	Pr2	
dF2	DEF button timed (3sec) configuration (left upper side)	dEF	dEF	Pr2	
dn2	Down button timed (3sec) configuration	nU	nU	Pr2	
dP1	Probe P1 value visualization			Pr2	°C
dP2	Probe P2 value visualization			Pr1	°C
SPd	Instantaneous compressor speed (RPM * 10)			Pr1	Hz
rSE	Real regulation Set Point (SET + HES + SETd)			Pr1	°C
FdY	Firmware release date: day			Pr1	
FMn	Firmware release date: month			Pr1	
FYr	Firmware release date: year			Pr1	
rEL	Firmware release			Pr1	
Ptb	Parameter map version			Pr1	

20. TECHNICAL DATA

FEATURES	DESCRIPTION			
Housing	Self-extinguishing PC/PC+ABS			
Dimensions	Frontal 38x80 mm; depth 50mm			
Mounting	Panel mounting device in a 71x29mm panel cut-out			
Degree of Protection	NEMA (UL 50e)	Indoor use only, type 1 enclosure (on request)		
	IP (IEC/EN 60529)	Front panel: IP65; Rear housing: IP00		
Power Supply	According to the model: 12VAC/DC, ±10%; 24VAC/DC, ±10%; 110VAC ±10%, 50/60Hz; 230VAC ±10%, 50/60Hz			
Overvoltage Category	II			
Rated Power	12VAC/DC: 3VA max; 24VAC/DC: 3VA max; 110VAC or 230VAC: 3.5VA			
Rated Impulse Voltage	2500V			
Software Class	A			
Terminal blocks / Terminal Connections	Plug-in or screw terminal block, wire section between 1 and 2,5 mm2 Max tightening force: 0.5 N*m for 5,0mm pitch			
Data Storing	Other parameters: internal EEPROM.			
Type of Action	1.B			
Pollution Degree	2, non-condensing humidity			
Ambient Operating Temperature and Humidity	IEC/EN	0T60°C; 20-85 rH% (non-condensing humidity)		
	UL-CAN/CSA	-10T60°C; 20-85 rH% (non-condensing humidity)		
Shipping and storage temperature	-25T60°C; 20-85 rH% (non-condensing humidity)			
Resistance to Heat	UL 94 V-0			
Measurement range	NTC: -40T110°C, resolution 0.1°C or 1°C (selectable) PT1000: -100T150°C, resolution 0.1°C or 1°C (selectable) PTC: -50T150°C, resolution 0.1°C or 1°C (selectable)			
Accuracy	±0.7°C ±1 digit and relative to the full scale			
Inputs	2 NTC, PTC or PT1000 (configurable); 1 voltage free contacts			
I/O port	HOT-KEY: MAX voltage allowed is 5 VDC. DO NOT CONNECT ANY EXTERNAL POWER SUPPLY.			
Buzzer	Optional			
Serial Outputs	TTL standard available on 5-pin port (HOT-KEY connector); Maximum cable length = 2m.			
Relay Outputs (standard)	Ref	Nominal	UL	IEC
	oA2	SPDT 8A, 250VAC	Resistive load 10A, 120/240Vac, 30K cycles Motor load 1/4HP, 120Vac, 30K cycles Motor load 1/2HP, 240Vac, 30K cycles Resistive load 8A, 30Vdc, 30K cycles	8(3)A, 230Vac, 30K cycles
Maximum ampacity (common terminal 10)	8A			
Analogue Outputs	Freq	Frequency output; Supply max voltage = 12Vdc; Max supply current = 10mA; Duty cycle = 50%; Range = 0 to 166 Hz; Maximum cable length = 10m		
Purpose of control	Operating control			
Construction of control	Incorporated control, intended to be used in Class I or Class II equipment			
Approvals	R290/R600a: relays tested according to IEC EN60079:0 and IEC EN60079:15 IEC/EN 60730-1; IEC/EN 60730-2-9 UL 873 CAN/CSA C22.2 No. 24-15			

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