KONVEKTA

Technical leadership starts with ideas.

Instructions for installation and service for control unit

FR4.1

12 – 24 Volt DC

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Contents

1 Technical data of control unit

Type / operating voltage:	KONVEKTA part no.:
FR4 / 12 – 24 V	H11-002-347

Housing: ..... UL 94 V0 plastic material

Dimensions: ..... frontal: 78x35 mm; depth: 64 mm

Mounting: ..... panel mounting in a 29x71 mm panel cut-out

Frontal protection: ..... IP65 with sealing

Connections: ..... Screw terminal block ≤ 2,5mm^2 wiring
Power supply: ..... 12 – 24 V AC/DC, -10%, +10%
Power consumption: ..... 3 VA max.
Display: ..... 3-digit, blue LED, height 12mm

Inputs: ..... 2 x PTC-sensor

Relay outputs:
compressor: ..... Relay NOC (normally open contact) 16 A
defrost: ..... Relay change-over contact 8 A
fans: ..... Relay NOC (normally open contact) 5 A

Data storage ..... non-volatile memory (EEPROM)

Operating temperature: ..... 0..50°C

Storage temperature: ..... -10..60°C

Humidity: ..... 10 to 95% (without condensation)

Measuring range sensor PTC (NTC): .. -50 to 150°C (-50 to 109°C)

Resolution: ..... 1°C or 1°F

Accuracy: ..... ±0,5%

2 General description of the control unit

Model **FR4.1** is an electronical control unit (78x35mm) suitable for applications on medium or low temperature refrigeration units, which has three relay outputs to control compressor, defrost and evaporator blower as well as two PTC-/NTC-sensor-inputs in order to measure the room temperature and evaporator temperature. Defrosting can be recirculation air as well as hot-gas defrosting. The blower can be activated during defrosting upon request. The sensor is suitable for refrigeration. The control unit FR4.1 is suitable for refrigeration as well as heating applications (only hot-gas heating). Supply voltage may be between 10 and 28V.

The following functions can be adjusted:

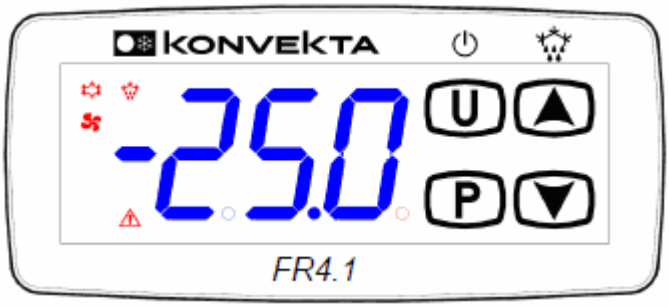
- room temperature („only refrigeration“ or „refrigeration and heating with hot gas “)
- automatic defrosting (hot gas or recirculating air)
- manual defrosting (hot gas or recirculating air)

⇒ Faults are shown in the display via flashing indication (see point 4).

This present instructions for installation and service is amended by the „operating instructions for refrigeration units“, KONVEKTA no: BBA-FR4-2AB.

2.1 LED-display

The display shows information about the current control mode via different LED.



The functions are listed as follows:

LED	STATUS	FUNCTION
	illuminated	compressor is active
	blinking	minimum off-duration of compressor is active
	illuminated	Blowers active
	illuminated	defrosting active
	blinking	Manual defrosting active
	blinking	active fault

2.2 Programming Menu

The programming menu includes all parameters of the unit **(Service level!).** For this level you need a password, see example in point 5.1.

2.3 Connecting and Safety instructions

- Please read before connecting! -

- For safety reasons the control unit **FR4.1** shall not be used for applications different from those described in this manual.
- Before use please check the limits of this control unit as well as its applications.

⚠ Safety instructions

Before connecting the unit please check wether the supply voltage is correct. Please pay attention to the prescribed ambient conditions respectively their humidity and temperature limits. Should these conditions not be followed, malfunctions can not be excluded.

Attention:

Before switching-on the unit, please check once again correct connection.
Never run this unit without housing.
Please install the sensor where it is not accessible for the end customer
Please consider the maximum current which can be applied to each relay (see technical data / point 1).
Please ensure that all sensors are installed with enough distance to under-voltage cables. By this, distorted temperature measurements can be avoided and the unit is protected from voltage interspersion by the sensor-inputs.

Installation and mounting

The control unit **FR4.1** shall be mounted on panel in a **71x29 mm** hole and fixed by the fastening frame.
For a faultless operation the ambient temperature should be between 0 und 50 °C. Please avoid intense vibration, aggressive gases, high fouling or humidity.
You have to care for enough air circulation at the air slots.

Electrical connections

The control unit **FR4.1** is provided with screw terminals for a wire diameter of ≤ 2,5mm^2. Before voltage supply is connected please make sure that the auxiliary energy complies with the instrument's requirements. Please ensure that the inlet cables are installed with enough distance to under-voltage cables.
Do not exceed the maximum voltage allowed on each relay.

Sensor connections

The sensor peak should be mounted upwards in order to avoid accumulation of liquids or condense water. We recommend to place the thermostat away from air flow in order to have a correct measurement of the average room temperature.

These instructions contain all necessary information for installation of the control unit. In case you need further information respectively explanation our technical after-sales service will be at your disposal (☏ 06691/76 –124, or 🖃 info@konvekta.com).

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Manufacturer: **KONVEKTA AG, P.O. Box 2280, 34607 Schwalmstadt, Germany**

2.4 Functions of buttons

The control unit **FR4.1** has four buttons:

▲ - Scrolls through the positions of the menu
- raises the values
- switching-on of manual defrosting

▼ - Scrolls through the positions of the menu
- lowers the values
- sampling of operating-hour counter
- sampling of service-hour counter

U - ON / OFF button
- sampling of temperatures at room sensor and evaporator sensor (PR1 – PR2)

P - access to setpoint
- access to menus
- confirmation of commands

Setting of temperature setpoint:

P Indication of temperature setpoint

Press button P The display shows alternately „SP" and the current adjusted set-point.

Change of the setpoint:

To change the setpoint you have to press button ▲ or ▼within 15 seconds until the desired setpoint is indicated. Confirm with P

Attention:

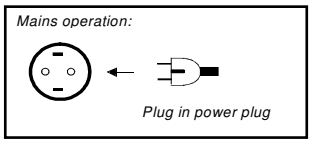
The new value will be automatically adopted and stored if it is not confirmed within 15 seconds.

2.5 Factory setting / delivery state FR4.1

Delivery state/factory setting of control unit FR4.1 will be as follows:
Refrigeration with hot-gas defrosting! (see point 7.1. on page 11)
Refer to the Konvekta set values in column „ factory setting." from the enclosed parameter list (see point 8 page 12 to 18)!

3 Switching-on the unit

(Analog to operating instructions no. BBA-FR4-2AB)

Drive operation	Stand-by operation
• start vehicle engine *(see original operating instructions of the vehicle)*	• For units with additional stand-by operation (230V/400V) you only have to plug in the power plug for stand-by refrigeration. 

3.1 Switching-on the refrigeration unit by button (U) of FR4.1

Press button (U) for 3 seconds. The display shows “Pr2” blinking, afterwards the current room temperature will be indicated.

3.2 Indication and change of setpoint

Press button (P) once, alternately blinking appear „SP“ >> setpoint.

Now you can change the setpoint using the arrow keys (-25 to +30°C)

Now press button (P) once and the new value will be stored.

Attention:
The new value will be automatically adopted and stored if it is not confirmed within 15 seconds.

compressor

evaporator/condensor

In refrigeration operation the room temperature is indicated, LED’s for compressor „ “ and fans „ “ are illuminated.

ATTENTION:
The factory setpoint is 1°C.
This setpoint has to be adapted to the storage temperature of the transport goods!

ATTENTION:
The factory minimal setpoint „S.LS" is adjusted to -25°C.
In case of use as a chilling unit the parameter „S.LS" has to be adjusted to 0!

3.3 Sampling of operating hours

Switch-on control unit FR4.1 with button U.
Press button ▼ once. Now the total operating hours of the refrigeration unit will be indicated for approx. 5 seconds.

3.4 Sampling of operating hours since last service

Switch-on control unit FR4.1 with button U.
Press button ▼ twice. Now the operating hours of the refrigeration unit since the last service are indicated for approx. 5 seconds.

3.5 Sampling of the temperature values of room sensor and evaporator sensor

Press button U once; the display shows alternately blinking „Pr 2" and the measured evaporator temperature. By pressing button U once again, „Pr1" is indicated in the display alternately blinking with the measured room temperature.

After 15 seconds the display switches back to the current room temperature.

4 Faults – indications and signals

The display shows faults by blinking indication.
If there is a fault, no control is possible!

Indication	Description	Fault source
"E1"	Fault with room sensor	Cable rupture or sensor short-circuit
"E2"	Fault with evaporator sensor	Cable rupture or sensor short-circuit

5 Adjustment of Parameters in the menu

The single parameters are classified in groups:

a) Group]SP (parameter concerning set point)
b) Group]In (parameter concerning measuring inlets)
c) Group]rE (parameter concerning temperature control)
d) Group]dF (parameter concerning defrost process)
e) Group]Fn (parameter concerning fans/blowers)
f) Group]Pr (parameter concerning switch-on delay / evaporator protection)

You will find the explanations to the single parameters in point **8** from page **12.**

Access to menu is secured by a password!

5.1 Example for change of a parameter, here parameter defrost interval “d.dı”

For selecting the menu please press and hold button P. “SP” is blinking in the display. After 5 seconds a „0“ appears. By pressing buttons ▲ and ▼ the password „**213**“ is set. Now press button P once, in order to confirm the password.

The display now shows the term of the first group „]SP“. By pressing buttons ▲ and ▼ the other groups can be selected, by pressing button P the respective group is opened.

In order to change the defrosting intervals please browse with buttons ▲ and ▼ , until group „]dF“ appears in the display. By pressing button P you open this group. First the display showsarameter „d.dt“ blinking. By pressing buttons ▲ and ▼ you can choose paramenter „ d.dı“; parameter „ d.dı“ is now blinking in the display. By pressing button P once, the current setting is shown, “d.dı” and the adjusted value “1,30” are blinking alternately. Now the value can be changed. The new value is stored by leaving the parameter with P. You can leave the parameter with button ▲. If you press button ▼ longer, the menu switches back to the groups, afterwards you can leave the menu by pressing this button longer once again.

5.2 Conversion to cooling with recirculated air defrosting / or replace a FR1, FR2, FR3 or FR4

Contrary to the factory setting „cooling with hot-gas defrosting”, the following parameters have to be changed:

- parameter „ d.dt“ in group „]dF“ has to be changed from „in“ to „FdE“
- parameter „ d.td“ in group „]dF“ has to be changed from „1“ to „of“
- parameter „ F.Fd“ in group „]Fn“ has to be changed from „1“ to „of“
- If no evaporator sensor has been installed (e.g. **replace FR1**) the parameter „ ı.P2“ in group „]In“ has to be changed from „on“ to „of“

If you replace a FR1, FR2 or FR3 with the FR4 and the external ON-OFF-button should be used furthermore or further instruments such as temperature recorder or heating should be switched on together with the FR4.1 by an external button, you have to change parameter „ t.UF“ in group „] t.S“ from „4“ to „of“.

5.3 Conversion to cooling – heating with hotgas – defrosting with hotgas

Contrary to the factory setting, the following parameter has to be changed:

- parameter „ r.Fu“ in group „]rE“ has to be changed from „C“ to „nr“.

ATTENTION:

Parameter „ r.Fu“ should only be changed from „C“ to „nr“ if a fluid extractor is installed in the suction pipe of the refrigeration unit! Otherwise risk of damages to compressor.

6 Control of defrosting

Factory setting of control unit FR4.1 is hot-gas defrosting. In case of use in refrigeration units with recirculated air defrosting the following parameters have to be changed:

- parameter „d.dt“ in group „]dF“ has to be changed from „in“ to „FdE“
- parameter „d.td“ in group „]dF“ has to be changed from „1“ to „of“
- parameter „F.Fd“ in group „]Fn“ has to be changed from „1“ to „of“
- If no evaporator sensor has been installed (e.g. **replace FR1**) the parameter „PR 2“ in group „]I.P2 “ has to be changed from „on“ to „of“

Recommended defrosting intervals:
Fresh meat and cheese: 1:00 hours
Dairy product: 2:00 hours
Deep freezing products: 3:00 hours

Pre-adjustment: 1:30 hours

☞ The preadjusted maximum defrosting duration is 15 minutes.

During defrosting process „dEF” is indicated and the LEDs and are illuminated.
After the end of defrosting there is 1 minute drip-off time. Display shows „ PdF“.
The LEDs and are blinking.

7 Configuration of the parameters with “FR 4 copy-key”

FR4 copy-key: Konvekta part no. H11-001-396-C for FR4, FR4.1 and FR4 Pharma

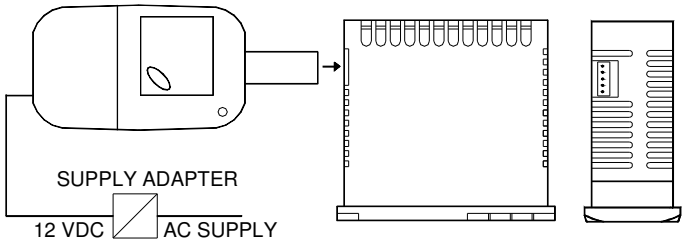
The unit has a plug socket. Via this plug socket the operating parameters are transmitted from and to the unit. For this the FR4 copy-key with 5-pole plug is used. The FR4 copy-key is used for factory programming of units that should have the same parameter configuration, or for a backup of the programming of a unit so that this can be reconstructed quickly if required.

For transmission of a configuration from a FR4 to the FR4 copy-key (UPLOAD), please proceed as follows:

1) Adjust both dip switches of the FR4 copy-key to OFF.
2) Connect the FR4 copy-key with the FR4; use the designated plug.
3) Make sure that the FR4 copy-key is connected with current supply.
4) Check the LED signal of the FR4 copy-key: In case of green LED, a configuration has already been loaded; in case of green blinking or red blinking LED there is no valid configuration.
5) Press button on FR4 copy-key.
6) Check the LED signal: After pressing the button, the LED will be red and after successful data transmission the LED will be green.
7) Now FR4 copy-key can be plugged-off.

If this configuration which has been loaded to the FR4 copy-key should now be transmitted to another FR4 unit (DOWNLOAD), please proceed as follows:

1) Adjust both dip switches of the FR4 copy-key to ON.
2) Connect the FR4 copy-key with the FR4 that should be programmed; use the designated plug.
3) Make sure that the FR4 copy-key is connected with current supply.
4) Check the LED signal of the FR4 copy-key: The LED should be green; if LED is blinking green or red, no valid configuration has been loaded and it doesn’t make sense to go on.
5) In case of green LED press button on FR4 copy-key.
6) Check the LED signal: After pressing the button, the LED will be red and after successful data transmission the LED will be green.
7) Now FR4 copy-key can be plugged-off.



8 Logic >> Explanations for the functions of the control conditions

8.1 Cooling and defrosting with hot gas >> delivery state FR4.1

Cooling:
COMP active (compressor on) FAN active (fan on) DEF inactive (magnetic valve off)

Hot gas defrosting:
COMP active (compressor on) FAN inactive (fan off) DEF active (magnetic valve on)

8.2 Cooling and defrosting with recirculated air >> see changes in parameters point 5.2.

Cooling:
COMP active (compressor on) FAN active (fan on) DEF inactive (magnetic valve on)

Recirculated-air defrosting:
COMP inactive (compressor off) FAN active (fan on) DEF inactive (magnetic valve off)

8.3 Neutral zone (cooling + heating with hot gas) and defrosting with hot gas >> see changes in parameters point 5.3.

Cooling (valid if SP > HI):
COMP active (compressor on) FAN active (fan on) DEF inactive (magnetic valve off)

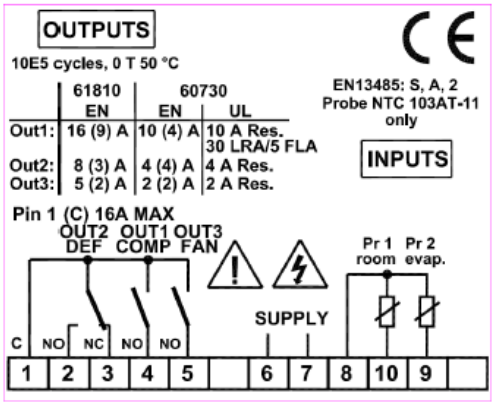
Heating (valid if SP < LO):
COMP active (compressor on) FAN active (fan on) DEF active (magnetic valve on)

Neutral zone (ON/OFF at SP):
COMP inactive (compressor off) FAN active (fan on) DEF inactive (magnetic valve off)

Defrosting with hot gas:
COMP active (compressor on) FAN inactive (fan off) DEF active (magnetic valve on)

9 Connection diagram and parameter chart

9.1 Connection diagram



9.2 Parameter chart

Group [SP (parameter of the setpoint)
[refers to Pr1]

Par.		Description	Range	factory setting
	S.SA	Active setpoint	1 ÷ 2	1
	SP	Setpoint 1	S.LS ÷ S.HS	1.0
	SP2	Setpoint 2	S.LS ÷ S.HS	0.0
	S.LS	Minimum setpoint	-58 ÷ S.HS	-25.0
	S.HS	Maximum setpoint	S.LS ÷ 302	+30.0

Group]In (parameter concerning measurement inlets)

Par.	Description	Range	factory setting
ı.SE	Sensor type	Pt - nt	Pt
ı.C1	Calibration sensor Pr1 (cell)	-30 ÷ 30 °C / °F	-1.5
ı.C2	Calibration sensor Pr2 (evaporator)	-30 ÷ 30 °C / °F	-1.5
ı.P2	Sensor exists Pr2 (evaporator)	on - of	on
ı.Un	Unit of measurement	°C - °F	°C
ı.dP	Decimal point	on – of	on
ı.Ft	Measurement filter	of ÷ 20.0 sec	2.0
ı.dS	Variable which is normally indicated in display: OFF=display off Pr1=measurement sensor Pr1 Pr2=measurement sensor Pr2 SP= active setpoint	of - P1 - P2 - SP	P1

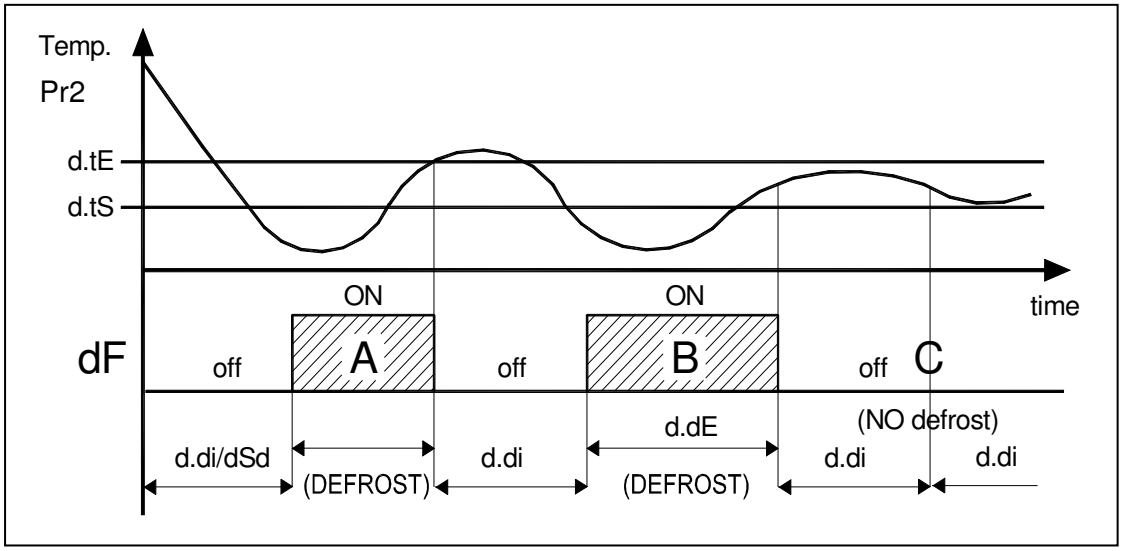
Group]rE (parameter of temperature control)
[refers to Pr1]

Par.	Description	Range	factory setting	CooL Cooling	nr Cooling Neutral zone Heating
r.Fu	Operating mode outlet OUT (control mode) H = heating C = cooling Nr = neutral zone	H – C – nr	C	C	nr
r.HI	Limit value at high temperature (relative on SP) (switching-on „cooling“)	0 ÷ 30 °C/°F	2.0	----	2.0
r.LO	Limit value at low temperature (relative on SP) (switching-on „heating“)	0 ÷ 30 °C/°F	2.0	----	2.0
r.SL	Limit temperature switching-on „heating“ depending on setpoint (if the setpoint is under the current value r.sl, then no „heating“ but „neutral zone“ or „cooling“)	S.LS ÷ S.HS	-15	----	-15
r.d	Hysteresis for compressor OUT Only visible, if control mode is r.Fu = „H“ o. „C“ If control mode is r.Fu = nr, then it is hidden	0 ÷ 30 °C / °F	2.0	2.0	----
r.t1	On-time outlet OUT with defective sensor Pr1	oF ÷ 99.5 min.sec	oF	oF	----
r.t2	Off-time outlet OUT with defective sensor Pr1	oF ÷ 99.5 min.sec	oF	oF	----
r.CC	Continuous operation	oF ÷ 99.5 hrs.min	oF	oF	----
Parameter for realization of control „neutral zone“ only visible, if control mode is r.Fu = nr					

Group]dF (parameter of defrosting control)
[refers to Pr2]
[defrost cycle „disables“ Pr1]

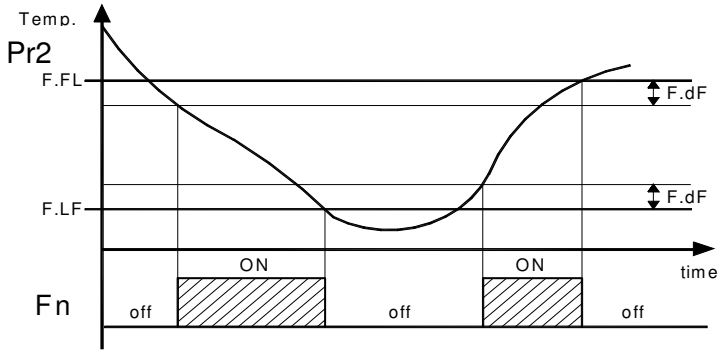
Par.	Description	Range	factory setting	cooling hot-gas defrosting	cooling recirculated air defrosting	cooling neutral zone heating hot-gas defrosting	cooling neutral zone heating recirculated air defrosting
d.dt	Defrosting mode: EL = electrical defrost cycle if defrost cycle is released and starts, then defrosting (dEF) on / compressor (OUT) off (compressor can not be activated via Pr1) ın = defrost cycles by hot air/cycle reversal if defrost cycle is released and starts, then defrosting (dEF) on / compressor (OUT) on FdE = defrost cycle by recirculated air (fans) if defrost cycle is released and stars, then defrosting (dEF) off / compressor (OUT) off fan always on	EL – ın – FdE	ın	ın	FdE	ın	FdE
d.dı	Defrost interval Minimum duration between two defrost cycles (dEF off) of = Switching-off the defrosting	oF ÷ 99.5 hrs.min	1.30	1.30	1.30	1.30	1.30
d.dE	Maximum duration of a defrost cycle (dEF on) (duration of defrosting, if not interrupted by Pr2 [d.tE, d.tS])	0.01 ÷ 99.5 min.sec	15.0	15.00	15.00	15.00	15.00
d.tE	Defrost limit temperature (if the temperature Pr2 is higher than the adjusted value d.tE, then dEF will be switched off)	- 58 ÷ 302 °C/°F	8.0	8.0	8.0	8.0	8.0
d.tS	Defrost switch-on temperature (temperature Pr2 must fall below d.tS, before d.tE engages again)	- 58 ÷ 302 °C/°F	2.0	2.0	2.0	2.0	2.0
d.dC	Timer mode defrost intervals („timer for d.dı, dEF off) rt = total “unit on“ – time counts ct = „OUT on“ – time counts cS = defrost cycle after evaporator off (dEF on / d.dE-time, consider d.dı = oF)	rt - ct - cS	rt	rt	rt	rt	rt
d.td	Compressor delays after defrost cycle (dripping-off) compressor remains switched-off, LED OUT is blinking until time d.td is running out.	oF ÷ 99.5 min.sec	1	1	oF	1	oF
d.Sd	Defrost cycle when switching-on	on - oF	of	of	of	of	of
d.dL	Display lock during defrost cycle oF = no lock on = lock on temperature measurement Lb = lock, in display appears “dEF” (in defrost cycle, dEF = on) “PdF” (after defrost cycle, dEF = off,)	on - oF - Lb	Lb	Lb	Lb	Lb	Lb

	d.Et	Display unlock difference after finished defrost cycle During defrost cycle it is possible that the temperature measured by the cell sensor (Pr1) rises excessively (this depends on the position of the sensor Pr1 to the evaporator). In order to not indicate this rise, the functions contained in the parameters “d.dL” (display lock during defrost cycle) and “d.Et” (display unlock difference after finished defrost cycle) are used. The parameter “d.dL” = Lb causes the indication dEF during a defrost cycle. Completion of defrost cycle the indication PdF is suppressed, as the temperature Pr1 is always under the value [”SP” + “d.Et”].	0 ÷ 30 °C/°F	30.0	30.0	30.0	30.0	30.0



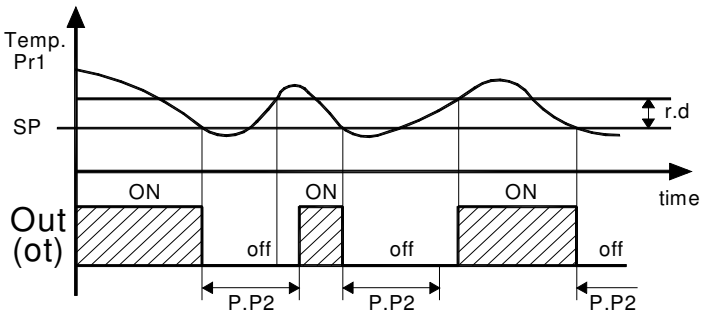
Group]Fn (parameter concerning control of cooling fans)
[refers to Pr2]

Par.	Description	Range	factory setting	COOL cooling hot-gas defrosting	COOL cooling recirculated air defrosting	nr cooling neutral zone heating hot-gas defrosting	nr cooling neutral zone heating recirculated air defrosting
F.FC	Fan state concerning to **control cycle** - temperature Pr2 beyond „fan line“ fans (Fan) always off - temperature within “fan line” on = fan always on of = fan / compressor connected (compressor on / fan on) (compressor off / fan off)	on - oF	on	on	on	on	on
F.FE	Fan state concerning to **defrost cycle** - temperature Pr2 beyond „fan line“ fan (Fan) always off - temperature within „fan line“ on = Fn / dF connected (dEF on / fan on) (dEF off / fan off) of = fan (FAn) always off Only visible if defrosting mode d.dt = „EL“ or „in“ If defrosting mode is d.dt = FdE, then it is hidden and fan (Fan) always on	on - oF	oF	oF	----	oF	----
F.FL	Top limit temperature fan (if temperature Pr2 is higher than adjusted value FLt, then fan is off) (upper limit „fan line“, consider F.FL > F.LF)	- 58 ÷ 302 °C/°F	50.0	50.0	50.0	50.0	50.0
F.LF	Lower limit temperature fan (if temperature Pr2 is lower than the adjusted value Fct, then fan is off) (lower limit „fan line“, consider F.LF < F.FL)	- 58 ÷ 302 °C/°F	-50.0	-50.0	-50.0	-50.0	-50.0
F.dF	Switch difference fan lock (hysteresis for outlet FAn)	0 ÷ 30 °C/°F	2.0	2.0	2.0	2.0	2.0
F.Fd	Fan delay after defrost cycle (switch-on delay outlet Fan after defrosting)	of ÷ 99.5 min.sec	1	1	of	1	of



Group]Pr (parameter of the compressor protection and switch-on delay)

Par.		Description	Range	factory setting
	P.SC	Compressor protection mode: 1 = switch-on delay 2 = delay after switching-off 3 = delay between switching-on	1 - 2 - 3	2
	P.tC	Time compressor protection	oF ÷ 99.5 min.sec	02.00
	P.tL	Minimum compressor switch-on duration	oF ÷ 99.5 min.sec	oF
	P.od	Activation delay of the outlets when switching-on the units	oF ÷ 99.5 min.sec	oF



Group]Ou (parameter of the configuration of the outlets)

Par.		Description	Range	factory setting
	o.o1	Operating configuration outlet OUT1 Ot = temperature control (compressor) - Refers to Pr1 [SP, r.HI, r.LO] dF = defrost instrument Fn = fans Au = auxiliary outlet At = confirmable alarm (pressing of any button always resets the alarm AL = standard alarm An = stored alarm (alarm remains in the background, also if alarm does not exist any more, reset with any button only if alarm condition is not existing any more. oF = no function	ot/dF/ Fn/Au/At/ AL/An/ -t/ -L/ -n/oF	ot
	o.o2	Operating configuration outlet OUT2 dF = defrost instrument - Refers to Pr2 at “cooling” [d.tE, d.tS] - Refers to time [d.dı, d.dE] - Refers to Pr1 at „heating“ { r.LO --> an / nr --> off / r.HO --> after prog.}	oF/ot/dF/ Fn/Au/At/ AL/An/ -t/ -L/ -n	dF
	o.o3	Operating configuration outlet OUT3 Fn = fan - refers to Pr2 [[F.FL, F.LF] - F.FC, F.FE	oF/ot/dF/ Fn/Au/At/ AL/An/ -t/ -L/ -n	Fn

Group]ts (parameter of keyboard configuration)

Par.		Description	Range	factory setting
	t.Fb	Operating mode button DOWN oF = no function 1 = control auxiliary outlet 2 = manual defrost cycle 3 = activate setpoint 4 = switching-on/-off (stand-by) **indication of** - **Operating hours** - **Service hours** **Example:** **Service-hours counter** **if 200 was programmed** **then 200 x 10 = 2000**	oF / 1 / 2 / 3 / 4 **0…999 h x 10** **0…999 h x 10**	oF
	t.UF	Operating mode button U 4= switching on/-off (stand-by)	oF / 1 / 2 / 3 / 4	4
	t.PP	Password for access to operating parameter	oF ÷ 999	213
	t.Sr	**Service-hours counter** **If the programmed value is exceeded, „SEr“ will be indicated in the display for approx. 5 seconds** **This will be indicated with every switching-on of the FR4, as long as the current value is > than the programmed value** **Example:** **if 200 was programmed** **then 200 x 10 = 2000**	**oF ÷ 999 x 10**	**2000**
	t.rS	**Reset service-hours counter** **By enter of „password „–181“ (minus 181)“ the service-hours counter is reset to „0“.** **If you enter the wrong password, the display returns to normal indication and the current value of the service-hours counter is conserved.** **REMARK:** **The password „-181“ is hard-coded.**	**-999 ÷ 999**	**0**

version	date	name	comment	file