

Multifunctional controller MS8132

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1. GENERAL RECOMMENDATIONS

1.1. READ BEFORE USAGE

- This manual is a part of the product and must be near the device for fast check up.
- The device must not be used for applications, different from the mentioned below. It can not be used as protecting device.
- Check the limits for application before you continue

1.2. PRECAUTIONS

- Check of the power supplying voltage before connection of the device.
- Do not expose to humidity or moisture: use it in conformity with the recommended limitations, avoiding sudden temperature changes at high humidity because of danger of condensation.
- ATTENTION: At service and repair switch off all electric connections.
- The sensors must be mounted so that they are not accessible for the final user. The device must not be open.
- At damage or incorrect operation the device must be sent back to the distributor or the producer with detailed description of the problem.
- Judgement of the maximum current through every relay (see Technical data)
- Separation and enough distance of the cables for teh sensors, power supply and the loads.
- At industrial usage of filters in parallel with the inductive loads may be useful.

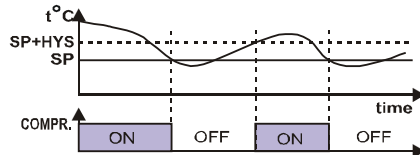
2. DESCRIPTION

The device is a microprocessor-based controller, suitable for average or low temperature ventilated refrigeratory systems. It has 3 relay outputs for control of compressor, fan and defrost (electrical or hot gas). It is offered in a set with two NTC sensors – one for control of the temperature of the chamber and one, designed for installation in the evaporator, controlling the defrost and the fan. It is configured by parameters, easy programmable by the buttons on the front panel.

3. CONTROL OF THE OUTPUTS

3.1 COMPRESSOR

It is being controlled according to the measured temperature by the thermostat sensor with positive hysteresis according the set-point: if the temperature exceeds the set-point plus the hysteresis, the compressor switches on and it switches off at reaching of the set-point.



When the thermostat sensor is damaged, teh control is realized by time by the parameters **Con** and **COF**.

3.2 DEFROST

By the parameter **tdF** you can determine the mode of defrosting: by electric heater (**tdf=EL**) or hot gas (**tdf=HG**). Other parameters can be used at set-pointing of the interval between the cycles of defrosting (**idf**), the maximum duration (**UdF**), time for keeping of set-pointed temperature at electric defrosting (**LdF**), two modes – by time and by temperature of the evaporator (**P2P**).

3.3 VENTILATION OF EVAPORATOR

The mode of control can be selected mainly by the parameter **Fnc**:

VENTILATION	AT DEFROSTING	
	OFF	ON
IT WORKS WITH THE COMPRESSOR	Fnc=C_n	Fnc=C_Y
IT WORKS CONSTANTLY	Fnc=o_n	Fnc=o_Y

The parameter **Fst** gives a possibility for set-point of temperature, over which the ventilation is always switched off.

3.4 VENTILATION AND DIGITAL INPUT

When the digital input is used as button 'DOOR' (**ilF=bAL**, **nPS=0**), the status of the fan depends on the parameter **odc** as it follows:

- odc=no**: normal operating mode;
- odc=FAn**: Fan switches off;
- odc=CPr**: Compressor switches off;
- odc=F C**: The two of them switch off;

4. BUTTONS AND INDICATION



	Shows the set-point (SP). It confirms change. Selects parameter, by holding – exit from menu 'PARAMETERS'. Passes to the temperature of the chamber.
	By holding it starts defrosting.
	Shows the maximum reached temperature. For increasing of the value of SP or parameter. By holding it starts/stops uninterrupted cycle.
	Shows the minimum reached temperature. For decreasing of the value of SP or parameter.

+	By holding it activates menu 'PARAMETERS'.
+	Shows the temperature of the evaporator.

4.1 LED INDICATION

LED	mode	FUNCTION
	ON	Compressor ON
	flashes	In time AC – minimum time on-off compressor
	ON	Activated defrosting
	flashes	In time for drainage Fdt
	ON	Ventilation ON
	flashes	Time after defrosting Fnd

4.2 MINIMUM TEMPERATURE

1. Press and release the button
2. Message **Lo** appears, changing with the minimum registered temperature.
3. After 7s. or by pressing of you can see --- and t chamber appears.

4.3 MAXIMUM TEMPERATURE

1. Press and release the button
2. Message **Hi** appears, changing with the maximum registered temperature
3. After 7s or by pressing of you can see --- and the current temperature appears.

4.4 RESET OF THE MINIMUM AND THE MAXIMUM TEMPERATURES

While the min/max temperature is on the display, hold for 3s till mesage **rSt**.

4.5 CHANGE OF THE SET-POINT SP

Press and release . Message **SP** appears and after that the operating set-point for 10s. If correction of the value is necessary, use and . Confirm by or wait for 10 s., - - - appears on the display, after that the measured temperature.

4.6 MANUAL START OF DEFROSTING

Hold the button for 3s. And so you will start the defrosting.

4.7 CHANGE OF THE PARAMETERS

1. Hold the buttons for 3s. till **tun**.
2. Select the desired parameter by the pointers.
3. By you can pass to the value of the parameter.
4. You can edit by and .
5. The button - confirmation of the change and passing to the next parameter.
6. Exit – at displayed name of a parameter hold the button till message **End**. Returns to display of the temperature of the chambe.

Note: Exit from correction of parameter to the name of the next one (automatic confirmation) can be done 2 min. after pressing of a button. Automatic exit from menu PARAMETERS can be done 5 min. after pressing of a button.

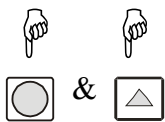
4.8 HIDDEN MENU OF PARAMETERS

& Hold the buttons for 8s. - at the 3-rd sec. You can see **tun**, and after that **Pr2**, activating the hidden menu of parameters. In this menu there are all parameters in the device. For selection and change of a parameter see p. 4.7

4.9 ADDITION AND SUBTRACTION OF PARAMETERS IN THE UNSECRET MENU

Large part of the parameters can be configured as unsecret. This can be done in the secret menu by the selection of the respective parameter and simultaneous pressing of the buttons + with advantage of the first one. If the parameter is in the unsecret menu, its name **flashes at equal intervals of time 1s**. In the other case (the parameter is only in the hidden menu) its name emits light constantly. To take out a parameter from the unsecret menu, use the same combination +

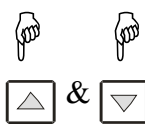
4.10 TEMPERATURE OF THE EVAPORATOR



At displaying of the temperature, measured in the chamber (normal operating display). By the shown combination of buttons you

can see the temperature of the evaporator with a flashing inscription **P_2** for 2 min. For fast returning to normal operating display (t of chamber) use

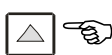
4.11 LOCK/UNLOCK THE KEYBOARD



At displaying of the temperature of the chamber hold the buttons for 3 s. You can see - - -, after that **Loc** – locking or **UnL** – un-

locking. In locked status you can see only min/max measured values, and the temperature in the evaporator. At other actions with the keyboard message **Loc** appears on the display.

4.12 START/STOP OF UNINTERRUPTED CYCLE



At displaying of $t_{chamber}$ hold the button for 3 s. till message 'on' (the command is valid, if it is

not in defrosting). The compressor switches on constantly for time **CCt**. The cycle can be stopped before the running out of this time by holding of the same button for 3 s. till message 'oF'

5. PARAMETERS

Note: the parameters, marked with * are only in the secret menu. Times in format hh.m are presented by flashing min.

CONTROL

- HYS**(1÷255°C; 1÷255°F) Hysteresis at switching on of the compressor. $t_{chamber} > SP + HYS$ – ON; $t_{chamber} < SP$ – OFF;
- LSP** (-50÷110°C; -58÷230°F) Lower limit of the * set-point SP
- HSP** (-50÷110°C; -58÷230°F) Higher limit of the * set-point SP
- Ot** (-128÷127x0,5°C; -128÷127x0,5°F) Calibration (offset) of the thermostat sensor.
- P2P** Availability of sensor in the evaporator: **YES** – yes; **no** – no
- OE*** (-128÷127x0,5°C; -128÷127x0,5°F) Calibration (offset) of the sensor of the evaporator.
- OdS** (0÷255min) Delay of activation of the * outputs after switching on of the device.
- AC** (0÷120min) **Minimum interval** between the stopping of the compressor and the next start.
- CCt** (0.0÷25.4h) Duration of uninterrupted cycle.

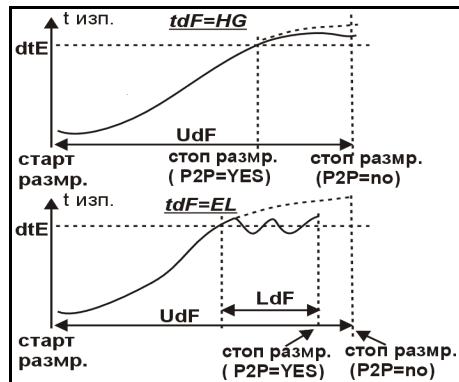
- * (For example, during supplying with new products)
- Con** (0÷255min) **Duration of ON status** of the * compressor when the thermostat sensor is damaged.
- CO** (0÷255min) **Duration of OFF status** of the **F*** compressor when the thermostat sensor is damaged.

DISPLAY
CF* C =Centigrade; F =Farrenheight
 Determines the units, in which the measured temperature is. **After that you have to inspect all temperature parameters and the to transfer them in the new unit!**

DEFROSTING
tdF **Type of defrosting:** **EL** = electric heater; **HG**= hot gas.
dtE (-50÷50°C; -58÷122°F) **Temperature of defrosting.** Sets temperature, measured in the evaporator, at which the defrosting of the type 'Hot gas' is interrupted or which is being kept in time **LdF** at electric heater.

IdF (0÷120h) **Interval between 2 starts** of defr.
UdF(0÷255min) (**Maximum**) **duration of defrosting.** When there is no sensor in the evaporator (P2P=n) or the sensor is damaged, time for defrosting is set. At availability of a sensor in the evaporator - max. duration of defrosting.

LdF(0÷255min)**Time of keeping of dtE** at defrosting with el. heater. With hot gas it has no sense.



- dFd** **Temperature, displayed during * defrosting:** (rt= real temperature; it= the temperature, measured at the start of defrost.; Set= set-point; **dEF**= mess **dEF**)
- dAd**(0÷255min)**Time after the end of the * draining,** in which the display is determined by the upper parameter **dFd**
- Fdt** (0÷120min)**Time for draining.** Interval * between the end of the defrosting and the restoring of the normal control. It allows elimination of the water drops.
- dPo** **Start of defrosting at switching on** of the * device. **YES**-yes; **no**- after time **IdF**.
- dAF**(0.0÷25.4h) Time after the end of * uninterrupted cycle for start of the defrosting.

VENTILATION OF THE EVAPORATOR
Fnc **Operating mode of the evaporator**
 C_n =works with compr., OFF at defrost.
 o_n =works constantly., OFF at defrost.
 C_Y =works with compr.,ON at defrost.
 o_Y =works constantly, ON at defrost.

- Fnd**(0÷255min) **Interval between the end of the defrosting and the start of the fan**
- FSt** (-50÷50°C; -58÷122°F) **Temperature of switching off of the fan.** At unchanged other conditions the fan switches off, if the temperature of the evaporator is $> FSt+2$ and switches on if $t_{evaporator} < FSt$.

- ALARMS**
- Alc*** **Parameter for configuration** of temperature alarm, forbid./permit. messages **dE1,2** (see p.8 **ALARM SIGNALS**) **Ab**=absolute temperature alarm, permitted indication of messages **dE1, dE2** (timeout at defrosting). **rE**=relative temperature alarm, permitted messages **dE1, dE2**. **Ab1**=absolute temperature alarm, forbidden messages **dE1, dE2**. **rE1**=relative temperature alarm, forbidden messages **dE1, dE2**. **Absolute alarm** - message **ALU** when $t_{chamber} > ALU$ or message **ALL** at $t_{chamber} < ALL$. **Relative alarm** - message **ALU** when $t_{chamber} > SP+ALU$ or mess. **ALL** at $t_{chamber} < SP-ALL$.
 - ALU** (-50÷110°C; -58÷230°F) At increasing of this temperature, message **ALU** appears, after that - message **ALd**
 - ALL** (-50÷110°C; -58÷230°F) At $t_{chamber}$ under this temperature, message **ALL** appears, after that - message **ALd**
 - Ald*** (0÷255min) **Interval between the registering of alarm by $t_{chamber}$ and message ALL/ALU**
 - dAo***(0.0÷25.4h) **Time after switching on of the power supply,** in which the temperature alarm is forbidden.

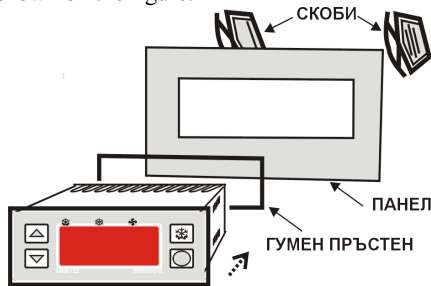
- DIGITAL INPUT**
- i1P** **Polarity of the input:** **oP:** the input activates at opening of the contact; **CL:** the input activates at closing of the contact
 - i1F** **Configuration of the digital input EAL= eternal alarm:** message **EA bAL**= the reaction depends on **NpS**
dEF= starts defrosting **OFF**= the input is not permitted
 - did** (0÷255min) **Interval between the accepting of active digital input and the respective reaction.** (at **i1F=EAL** **i1F=bAL**)
 - nPS** (0÷15) **Reaction at **i1F=bAL**; **nPS=0:** * switch 'DOOR' – when the input is active, the compressor and the ventilation switch off (see par. **Odc**) and message **dor** appears. It does not wait for **did**. **NPS=1: switching off alarm** – at activation of the input all outputs switch off (after **did** interval) – message **CA**; **nPS=2÷15 function pressure-switch** – when the input is activated all outputs switch off. When the input is activated **nPS** times for time **did**, the outputs switch off permanently. To restart the device, you must switch off and on the power supplying voltage**
 - Odc*** **Status of the compressor and the ventilation** at open door: **no**=normal, no reaction;
Fan = Fan OFF; **Cpr** = compressor OFF;
F_C = Fan and compressor OFF

OTHERS

- FLt*** (1÷100) Filter for analog inputs. Smaller value = Heavier filter
- JnP*** (0÷255) Zone of functioning of the filter. Out of this zone the measured value is accepted after time JPt
- JPt*** (1÷255 x 0,5s) Time for accepting of teh measured value out of the zone JnP

6. INSTALLATION

The device must be mounted on a panel with a whole 29x71 mm and fixed by the special cramps, designed for that. To reach protection of the class IP65, use a rubber ring for the front panel, as it is shown on the figure.



The operating temperature range is 0÷60 °C. Avoid places with strong vibrations, aggressive gases, excessive humidity or contamination. The same recommendations are valid for the sensors, too. Provide air circulation through the ventilation wholes in the case.

7. WIRING

The terminals allow usage of cables with section up to 2,5 mm². Before the connection you must be sure that the power supplying voltage corresponds to the that, indicated for the device. The cables for the sensors must be separated from the power supplying and the output cables. Do not exceed the maximum current, accessible for each relay. If the load are more powerful, use suitable outer relays.

7.1 CONNECTION OF THE SENSORS

Put the sensors so, that this side, from which the cable goes out, must be located lower. The thermostat sensor must be mounted far from eventual air draughts, for to measure correctly the average temperature of the chamber. The sensor of teh evaporator must be mounted between the gills, where it is very cold, where more ice is packed, far from the heaters or the places, which are hot during defrosting, to avoid the premature discontinuance of the defrosting.

8. ALARM SIGNALS

8.1 MESSAGES dE1 and dE2

The appearing of these messages may be forbidden by the parameter Alc. If they are permitted, they indicate discontinuance of the defrosting by maximum time UdF, without reaching of the desired temperature dtE, or without being kept for the desired time LdF. They orientate to damaged heater or incorrectly set-pointed times. If the sensor of teh evaporator is damaged (Er2) these messages do not appear. The message dE2 is possible only at defrosting by electric heater.

8.2 MESSAGE EE

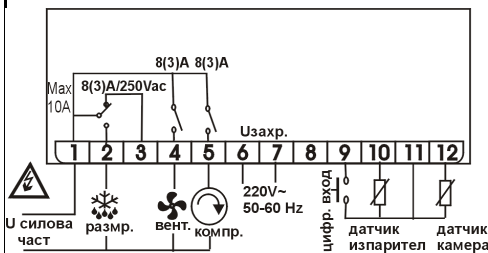
The device is checked and its memory is restored. If there are incorrigible errors - message EE. The intervention of a service specialist is necessary.

8.3 RESTORING AFTER ALARM

The messages Er1 and Er2 stop automatically after restoring of the correct operation of the sensors. With this aim – check of the connection. The temperature alarm (messages ALL,ALU) stops automatically at reading of temperature in the normal limits ALU, ALL. The messages EA and dor stop in case of fault of the active level of the digital input. The message CA depends on the parameter nPS: nPS=1 – swithes off in case of fault of the active level of the digital input. nPS>1 – if the input is activated nPS times for time did, the restoring of the normal operation can be done by switching off and on of the device. Otherwise the message CA stops in case of fault of the active level of the digital input. The messages dE1 and dE2 appear till the pressing of the button

Mess.	Reason	Outputs
EE	Error memory	No change
Er1	The sensor in the chamber is damaged	The compressor is controlled by time Con/CoF
Er2	The sensor in the evaporator is damaged	Defrosting by time UdF
ALU ALL	Temperature alarm	No change
EA	Eternal alarm	No change
CA	Serious eternal alarm	All are OFF
dor	Open door	see p. 5, 'DIGITAL INPUT'
dE1	At defrosting t dtE is not reached	No change
dE2	At defrosting t dtE is not kept for time LdF	No change

9. SCHEME OF CONNECTION



10. TECHNICAL DATA

- Overall dimensions:** 77x35x62 mm
- Installation:** panel in a hole 71x29 mm
- Protection:** IP20
- Front protection:** IP65 at usage of rubber ring
- Connection:** cab. Ø≤2,5mm², screw terminals
- Power supply:** 230Vac±10%, 50/60 Hz
- Consumed power:** 3VA max
- Display:** 3 digits, red LED, 14 mm
- Inputs:** 2 NTC sensors, 1 digital input
- Relay outputs:** compressor: 8(3)A, 250Vac
defrosting: 8(3)A, 250Vac
fan: 8(3)A, 250Vac
- Operating temperature:** 0÷60°C
- Operating relative humidity:** 0÷80%
- Storage temperature:** -10÷70°C
- Storage relative humidity:** 0÷95%
- Range:** -40÷110°C; -40÷230°F
- Accuracy (sur. temp. 25°C):** ±0,7°C±0,5LSB

SERVICE MODES

ATTENTION! Must be used only by a service specialist! The incompetent intervention may disorganize the operation of the device completely!

1. Calibration of the analog inputs: Press & & and supply power. Message CA1 appears. Standard resistance must be connected to input 1 (thermostat), respectively at -15°C (53,41 kΩ). Press , ADC code appears on the display. After its settling, confirm by . Message CA2 appears. Standard resistance must be connected to input 1, respectively at +65°C (2,588 kΩ). Press , ADC code appears on the display. After its settling, confirm by . Message CB1 appears on teh display. Repeat the described actions for input 2 (sensor evaporator) After CB2 the device passes to normal operating mode. The procedure is unaparatable, i.e. After the confirmation of the first ADC code, it must be done completely (or at least for a certain input)

2. Factory test Press & and supply power. Message rS= appears. In a few seconds the device automatically passes to normal operating mode.

11. VALUES OF THE PARAMETERS

name	meaning	limits	°C/°F
SP	Set-point	LSP÷USP	-5 / 0
HYS	Hysteresis	1=255°C, F	2/4
LSP	Min. SP	-50÷110°C; -58÷230°F	-50/-58
HSP	Max. SP	-50÷110°C; -58÷230°F	110/230
Ot	Calib. chamber.	-128÷127 x0,5 °C, °F	0
P2P	Sensor evaporator.	no-no; YES=yes	YES
OE	Calib. evaporator	-128÷127 x0,5 °C, °F	0
OdS	OFF at start	0=255min	0
AC	Min. interval stop-start compressor	0=120min	1
CCt	Uninterrupt. cycle	0.0=25.4h	00. 0
Con	ON compressor at damaged sensor	0=255min	15
CoF	OFF compressor at damaged sensor	0=255min	30
CF	Meas. unit	°C=°F	°C/°F
tdF	Type of defrosting	EL-el. heater. HG-hot gas	EL
dtE	T° of defrosting	-50÷50°C; -58÷122°F	8/46
IdF	Int. between defr.	0=120h	6
UdF	(Max) time of defr	0=255min	30
LdF	Time for keeping of dtE (tdF=EL)	0=255min	0
dFd	Display defrosting	rit;it;Set;dEF	it
dAd	dFd after defrost.	0=255min	30
Fdt	Time of draining	0=120min	0
dPo	Defrosting at ON	no-after IdF; YES=yes	no
dAF	Defrost. after uninterrupt. cycle	0.0=25.4h	00. 0
Fnc	Fan mode	C_n; o_n; C_Y; o_Y	o_n
Fnd	Fan OFF after defr.	0=255min	10
FSt	Fan stop T°	-50÷50°C; -58÷122°F	2/35
ALc	Config. alarm	Ab;rE;Ab1;rE1	Ab
ALU	Max.T° alarm	-50÷110°C; -58÷230°F	110/230
ALL	Min.T° alarm	-50÷110°C; -58÷230°F	-50/-58
ALd	Delay of alarm	0=255min	15
dAO	Del. of alarm atON	0.0=25.4h	01.3
iIP	Digital input polar.	oP=open.; CL=closed	CL
iIF	Digital input configuration	EAL-etern. alarm; bAL-stop control; dEF-start defrost.; OFF- not active	bAL
did	Delay of dig. input	0=255min	5
nPS	Function at iIF=bAL	0=door; 1=stop control; 2=15= pressure switch	0
odc	Status of compr. And fan at open door	no=normal; FAn=fanOFF; Cpr= compr. OFF; F_C=fan and compressor OFF	F_C
FLt	Filter of the an. in.	1=100	15
JnP	Filter zone	0=255	20
JPt	Time zone	1=255 x 0,5 c	2

the marked parameters are from the secret menu
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