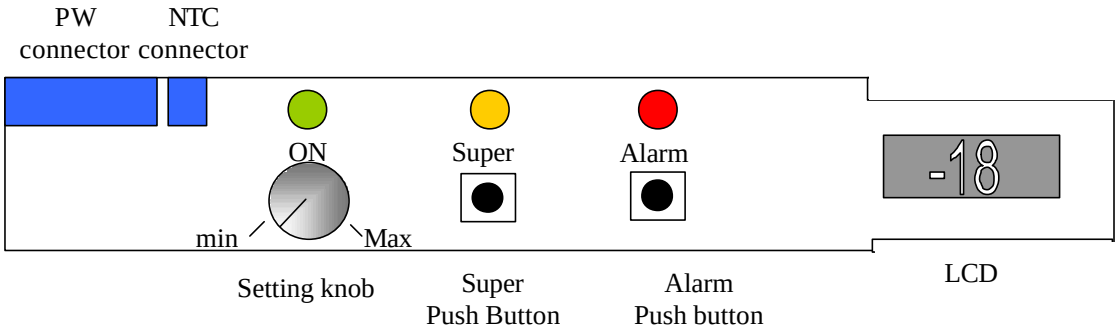
NEW ELECTRONIC (ERF1020 MAGNETEK) IN THE CHEST FREEZERS, NTC SENSOR FOAMED IN THE LID

GENERAL DESCRIPTION

As part of the quality improvement program, a new electronic board (from the group supplier: Magnetek) introduced in all chest freezers which are produced with electronics in the handle.

Introduction: May 2003 (from week19)

User interface and power board are made on the same electronic board. (P/N: 291 400 100/9)



Visualisation board

(symbolic representation)

a) LED green to indicate ON OFF freezer
b) LED red to indicate alarm situation
c) LED yellow to indicate super freezing function
d) Setting knob : temperature regulation
e) Super freezing push button
f) Alarm push button
g) LCD display
h) PW connector
i) NTC connector

USER INTERFACE DEVICE:

Name	Description
TEMPERATURE KNOB	Turn knob to activate/deactivate freezer functionality and regulate the temperature level
ALARM_BUTTON	Push button to silent the alarm buzzer
SUPER_FZ_BUTTON	Push button to activate/deactivate super freezing functionality with safety activation delay of 1 sec

Comparison of the previous (Videoton or Vellinge) and the current (Magnetek) PCB:

Characteristics	**Videoton, Vellinge**	**Magnetek**
Switch on/off	No possibility	to turn the thermostat knob into the OFF zone
Temperature regulation	by thermostat knob	by thermostat knob
Fast freeze function	press the Super button, temperature on the display	press the Super button for 1 sec, "SP" mark pops up on the display showing that the product is in the function of fast freezing mode
Fast freezing for 5 hours after power-cut and 1st activation	not available	available
High temperature alarm	if the temperature rises over -11 oC, red led and buzzer starts to alarm	if the temperature rises over -12 oC red led and buzzer starts to alarm
Signal of sensor problem	one signal	two different signals for short circuit and disconnection
Compressor running if there is sensor problem	continuous	compressor runs for 30 minutes and stops for 45 minutes
Self testing	one for after-sales	two different self-tests: one for the factory and one for after-sales
Reliability of displayed temperature	16 samples during 80 min.	256 samples during 5 sec.
Light is moved from handle to lid (quality reason)	light in the handle	light in the lid
Sensor position	on the evaporator tube	in the lid

Consumer benefits:

- re-assurance for safe and reliable freezer operation
- your freezer is under continuous control by this panel
- ease of use
- better lighting due to the position of light moved to the lid
- better energy consumption due to sensor position in the lid
- clear display and indication on the led about the freezer operation

GENERAL INFORMATION

ON / OFF AND TEMPERATURE REGULATION

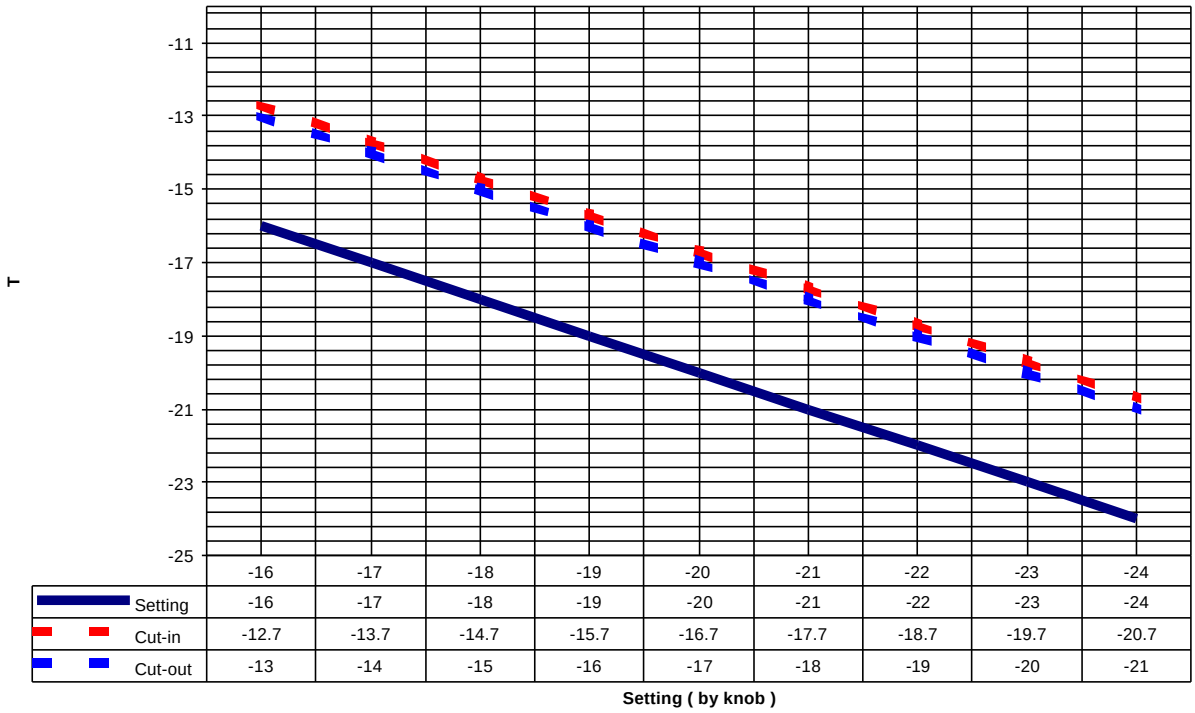
ON OFF and temperature regulation are made with single potentiometer where

- the first 30° are reserved for OFF zone (logical off: the power board is always supplied) and leds are OFF,
- the rest 240° is reserved to regulate the temperature from -24°C to -16°C in five steps of 2 degree each one (-24, -22, -20, -18, -16)°C ; in this case the green led is ON.

The temperature regulation law is linear as explained in the following graph. .

THERMOSTAT CHARACTERISTIC

Cut-in /Cut-out characteristic



	-16	-17	-18	-19	-20	-21	-22	-23	-24
Setting	-16	-17	-18	-19	-20	-21	-22	-23	-24
Cut-in	-12.7	-13.7	-14.7	-15.7	-16.7	-17.7	-18.7	-19.7	-20.7
Cut-out	-13	-14	-15	-16	-17	-18	-19	-20	-21

FIRST ACTIVATION (or power failure):

In case of first activation (or power failure) the freezer wants to cool down the food as soon as possible. It means the followings:

- the yellow led become ON,
- **the display shown : SP**
- the compressor remains on continuously for (PW_FAIL_SUPER_ON) **5 HOURS** ; after this period it will come back to go normally in thermostatic condition
-

SUPER FREEZING FUNCTION :

Activation : push and keep the super push button pressed for more than 1 sec :

- the super freezing function starts
- the yellow led become ON,
- **the display shown : SP**
- the compressor remains on continuously for **48 HOURS** ; after this period it will come back to go normally in thermostatic condition

Deactivation : it is possible to interrupt this function by pushing the super freezing push button again for more than 1 sec.

Power failure : in case of power failure the super freezing has to be set ON for 5 hours

HIGH TEMPERATURE ALARM:

When temperature goes up over the range (>-12°C), the red led became on;
- if compressor is on it will remain on
- if compressor is off it will has to be turn on, working in thermostatic condition
- buzzer procedure is activated .

MAIN BOARD

- Main board is located in the handle of the appliance
- The PCB material has to support discharge about 300V.
- The supply circuit uses a capacitor pump with capacitor class X2.
- The compressor actuator has to drive 300000 cycles of compressor.
- Max consumption 15W/h in 24 hours (compressor activate 30% total time)

MAIN CARASTERISTIC DATA

1	FZ_PAUSE_COMPRESSOR	minutes	32	Minimum time, which elapsed since latest freezer compressor deactivation
2	FZ_ON_COMPRESSOR	minutes	8	Minimum time, which elapsed since latest freezer compressor activation
3	FZ_MAX_PAUSE_COMPRESSOR	minutes	600	Maximum time, which elapsed since latest freezer compressor deactivation
4	PW_FAIL_SUPER_ON	**h**	**5**	Define the imposed compressor working time after a power failure
5	NTC_FAIL_CMP_ON_TIME	**min**	**30**	Define the compressor working time in case of NTC failure
6	NTC_FAIL_CMP_OFF_TIME	**min**	**45**	Define the compressor rest time in case of NTC failure
7	MAX_TIME_SUPER	**h**	**48**	Define the imposed compressor working time in case of super function activation
8	FZ_PERIOD_UP	Min	15	Updating time for FZ_VIS_TEMP when increasing Min0.5/max 40/ step 0.5
9	FZ_PERIOD_DOWN	Min	5	Updating time for FZ_VIS_TEMP when decreasing Min0.5/max 40/ step 0.5

- **Compressor activation is allowed only if from the latest deactivation, at least FZ_PAUSE_COMPRESSOR (32) minutes are elapsed**
- **Compressor deactivation is allowed only if from latest activation, at least FZ_ON_COMPRESSOR (8) minutes are elapsed.**
- **Compressor has to start if FZ_MAX_PAUSE_COMP (600) minutes are elapsed from the latest deactivation.**

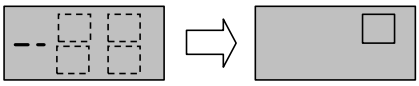
SENSOR CORRECTIONS
- Sensor reading has to be elaborated according with average of 256 samples about every 5 seconds: a reading every 20ms, average every 256 readings.

PROBE MALFUNCTIONING

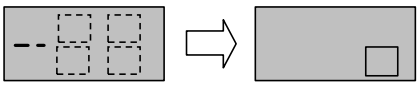
- **Description**: If the signal coming from the sensor temperature is out of forecasted measurement range, the control decide that the sensor is defective and compressor is activated and deactivated basing on a time cycle: NTC_FAIL_CMP_ON_TIME minutes ON and NTC_FAIL_CMP_OFF_TIME min OFF.

- **Alarm activation**: start a procedure in which red LED is alternatively ON for 1 sec and OFF for 1 sec.

- **LCD display** :
- - it will show a square symbol on the upper part of the digit on the right in case of the resistance is too big (NTC probably disconnected)



- it will show a square symbol on the lower part of the digit on the right in case of the resistance is too low (NTC probably short circuited)



- **Alarm condition end**: if AIRFZ_TEMP values come back into the measurement range (see section 2.1) alarm condition ends.

SERVICE SELF TEST ROUTINE

The self test routine is thought to allow the service to test the basic board functionality and is focused on the HW. The self test routine will stop in any case after **5** minutes.

To entry in the self test modality, **turn the potentiometer anticlockwise till the mechanic stop and than press the SF push button for 5 sec.**

To exit the routine press again the SF push button for other 5 sec

There are three routines. The activation is performed keeping pressed the super push button and than pressing the alarm one once. Repeating the procedure the routines will be switched from one to the next, following the sequence below :

GENERAL : push and keep pushed the super push button and than push the alarm one (refer to visualisation board page 1).
- All the leds are on
- there will be a long beep : 1 sec
- all the LCD segments will be turned on for 0.5 sec and off for 0.5 sec.
- Any push button pressure, will be followed by a beep of 0.5 sec

COMPRESSOR TEST : push and keep pushed the super push button and than push ones the alarm one.
- The GREEN led will turn on

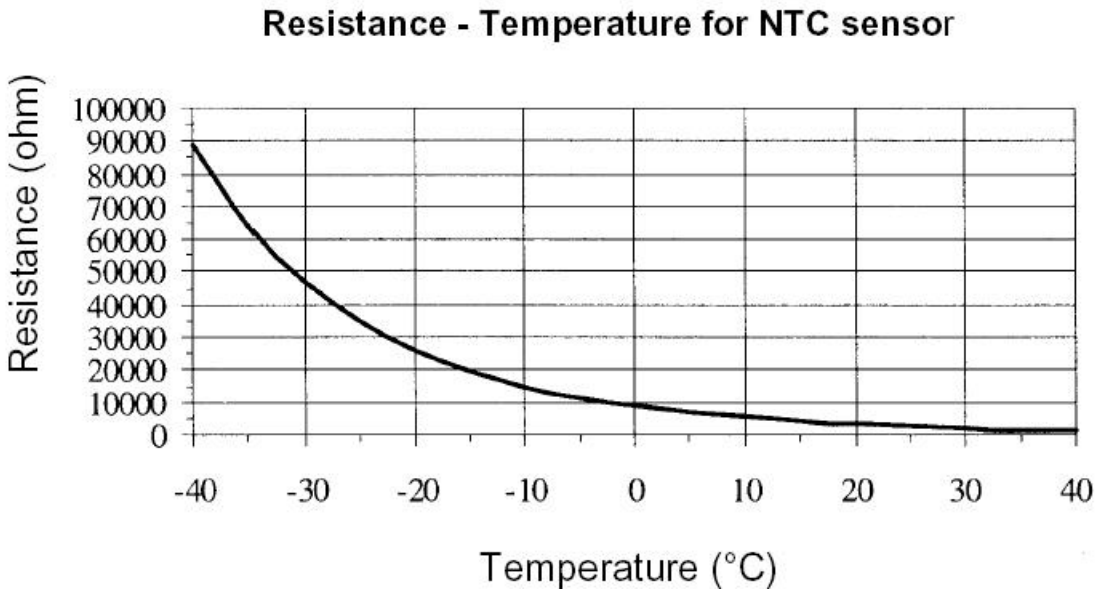
At any pressure on the push buttons will be activated, in sequence, the following :
- the compressor will be turned on, and the GREEN led will start blinking: 0.5 on, 0.5 off.
- (available only with RSD compressors) the compressor speed will increase and the GREEN led will increase the blinking frequency : 0.25 on, 0.25 off.
- the compressor will be switched off.

POTENTIOMETER TEST : push and keep pushed the super push button and than push ones the alarm one.
- The YELLOW led will turn on
- Turn the potentiometer clockwise till the mechanical stop : the GREEN led will start blink (0.5 sec on, 0.5 sec off) until the potentiometer will stay in the position.
- Turn the potentiometer anticlockwise till the mechanical stop : the RED led will start blink (0.5 sec on, 0.5 sec off) until the potentiometer will stay in the position.

NTC TEST : push and keep pushed the super push button and than push ones the alarm one.
- The RED led will turn on
- If the resistance measured is out of the foreseen range the display shows the the sensor fault symbols

IMPORTANT:

- The sensor is foamed in the handle, not interchangeable! In case of sensor fault the complete lid must be changed!
- In case of disconnection fault symbol please check first the quick connectors on the sensor cable.



INVOLVED MODELLS

PNC	Production date	Model
92059403200	20030501	ECM3057
92059403300	20030501	BMA300E
92059403600	20040301	ACM3054
92059404200	20040222	ECM3051
92059507900	20031020	792.143-0/40329
92059508000	20030501	A2685-4GT
92059508100	20030520	A2685-6GT
92059508200	20030501	A2686GT1
92059508300	20031101	A2696GT1
92060203800	20030501	ECM3857
92060204000	20040301	ACM3854
92060204600	20040222	ECM3851
92060307100	20030912	525.336-4/40161
92060307200	20030501	A3385-4GT
92060307300	20030520	A3385-6GT
92060307400	20030501	A3386GT1
92060307500	20030501	A3384-2GT
92060307600	20030501	A3385-4GT
92060307700	20031101	A3396GT1

PNC	Production date	Model
92066404500	20030501	CBN21SI
92066404600	20030501	BMA220E
92066404700	20030501	RSP235A
92066404900	20030501	ECM2257
92066405800	20040222	ECM2251
92066507000	20030520	A2072-6GT
92066507100	20030501	A2085-4GT
92068102600	20030501	BMA200E
92068102800	20030501	ECM1957
92068103400	20040222	ECM1951
92068204100	20030912	882.249-6/40183
92072003900	20030501	RSP280A
92072004100	20030501	CBN31SI
92072004200	20030501	BMA260E
92072004800	20031215	ACM2653
92072004900	20031215	ACM2654
92072106000	20030501	A2386GT1
92072106100	20030912	732.815-6/40160
92072106200	20030501	A2385-4GT
92072106400	20030520	A2385-6GT
92072106600	20040119	ECS2346
92072106700	20040115	ECS2346