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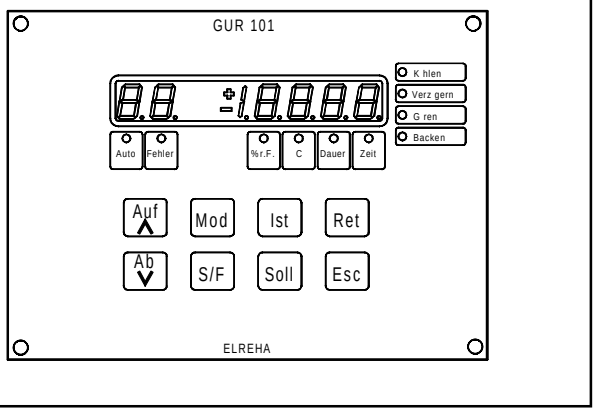
Technical Manual
Fermenter/Retarder Controller GUR 101

Nr. 5310578-00/04 E

from Softwareversion WR 960222

Contents

General 1
Technical Data 1
Control functions 2
Operating 4
  Access Code 4
  Programming 4
Parameter explanation 5
  Actual values 5
  Setpoint values 5
  Mode values 5
  How to set the 'increase'-parameters 6
Example program 6
  Program list 6
  How to enter the program 7
Installation / Run-up 8
Application example 9
Dimensions 11
Form for own programs 12
Appendix 13
  Failure Codes 13



Brief Description

The GUR 101 is microprocessor based controller for fully automatic retarding / fermenting of dough.
It controls storage of dough in 4 different phases from freezing up to the point in time to bake. Every phase works with specific setpoints for temperature and humidity.

Technical Data

Supply Voltage 230V, 50Hz
Power Consumption ..... ca. 10VA max.
Relay Rating ..... 10A / cos phi=1
4A inductive / 250VAC
Ambient temperature ..... 0...+60°C
Air humidity ..... 85% r.H. max, not condensing
Control range ..... -35...+55°C
Temperature sensor ..... TF 201 (PTC)
Humidity sensor ..... FG 80H (0-1000 Ohm)
Construction ..... The GUR 101 consists of a operating unit with keys, display and CPU and the power unit containing power supply and output relays. The operating unit is suitable for panel mounting, equipped with a foil keypad.

Functional Process

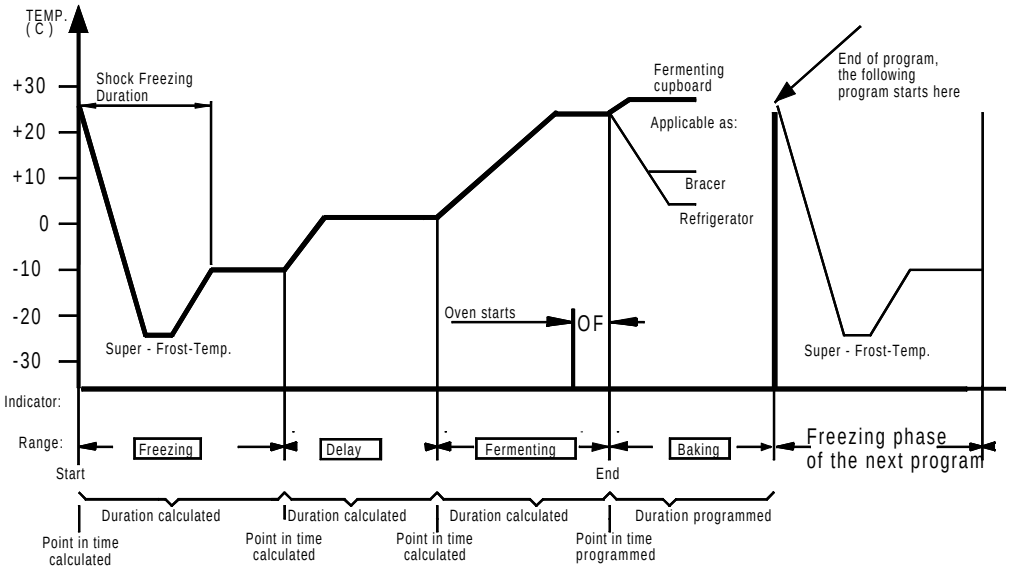
The process starts with the storage of the dough and the start of the matching program.

All times of the programming depend on the point in time to bake, this is the end of the fermenting'-phase, where the dough is ready for taking out.

The GUR works out a program subdivided in 4 phases:

- 'freezing'-phase (P 1)
- 'delay'-phase (P 2)
- 'fermenting'-phase (P 3)
- 'rest'-phase (P 4),
  sometimes also called the 'bake'-phase.

The single control phases



Each of this phases gets its own temperature- and humidity setpoints.
The points in time where the phases change will not be entered like in a time-switch. They will be entered as phase durations beginning with the 'rest'-phase (P4). The controller then calculates the points in time automatically.

Up to 10 different programs can be stored, containing times, durations and matching control setpoints. After it is rundown, each program is able to start itself or another stored program.

Additionally, every phase can be set to manual operation (Parameter AS=Operating state, Mode-list). Because the control function continues working, the walk-in/cupboard can be used as refrigerator or freezer.

1. 'freezing'-phase (P1)

The 'freezing'-phase is used for dough storage. The duration of this phase will be calculated by the unit and cannot be entered.
At the beginning of the phase, the dough can be shock-freezed for a certain time (Superfrost-Duration 'SD' and Superfrostparameter SP, Mode-list). After that the controller works with the standard setpoints (temperature setpoint P1.1 / humidity setpoint P1.2 setpoint-list).
The shock-freezing period will be started automatically at the beginning of the 'freezing'-phase (DIP-switch 02 must be in OFF-position) and can last up to 2 hours. Additionally, the shock-freezing can be initiated by an external switch.
If the DIP-switch 02 is set to its 'ON'-position, the shock-freezing can be initiated by the external switch only.

While normal operation the unit controls a compressor or solenoid valve only, but for special purposes the heater can also be used by setting DIP-switch 01.

2. 'delay'-phase (P2)

The 'delay'-phase is suitable for controlled defrost of the dough at a temperature which does not support fermenting (parameter P2.3, setpoint-list). In this phase, the air humidity can also be controlled (P2.4, setpoint-list).

The duration of the 'delay'-phase is detzermined by parameter P2.1 (setpoint-list), the poyint in time for the beginning of the phase will be calculated by the unit and cannot be entered.
The calculated point in time can be read at parameter P2.2 (setpoint-list). To ensure a gently defrost, the temperature increasing can be defined in °C per hour.
For this, you can use parameter C2 (Mode-list, see chapter 'How to preset the increasing values').

3. 'fermenting'-phase (P3)

In the 'fermenting'-phase the dough becomes fully fermented. The temperature (setpoint is P4.4, setpoints-list) can be increased (C3, mode-list) in a controlled flow.
The air humidity will be controlled by parameter P4.5 (setpoints-list). The duration of the 'fermenting'-phase is fixed by parameter P3.1 (setpoints-list), the point in time of the beginning of the phase will be calculated and can be read at parameter P3.2. At the end of this phase the dough is ready for baking.

4. 'rest'-phase (P4)

The time duration from the end of the 'fermenting'-phase up to the start of the following program is called the 'rest'-phase (sometimes also called the 'bake'-phase). The beginning of the 'rest'-phase is the point in time to bake at the same time.

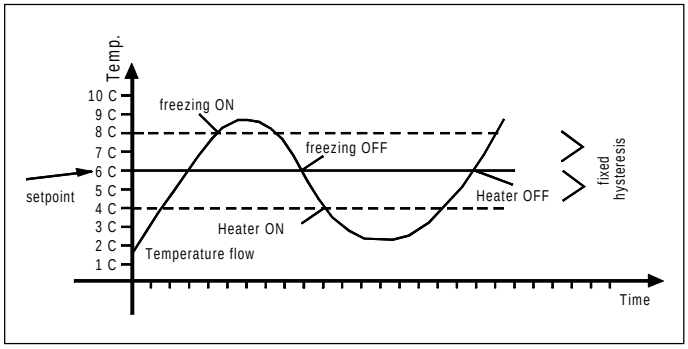
This point in time is the most important value of the program, because all other time-values depends on this value.
This point in time will be entered at parameter P4.1 (setpoint-list). The value of parameter P4.2 decides about the 'rest'-phase duration.
While the 'rest'-phase the temperature- and humidity control (parameter P4.4 and P4.5) can be enabled or disabled (parameter P4.3). By this function dough can be treated in a special way (e.g. bracing), or the walk-in/cupboard can be used as normal fermenter or freezer.

Control Functions

During the single phases the GUR controls the external components by its potential free contacts.
The control setpoints which belong to the basic settings you will find in the mode-list.

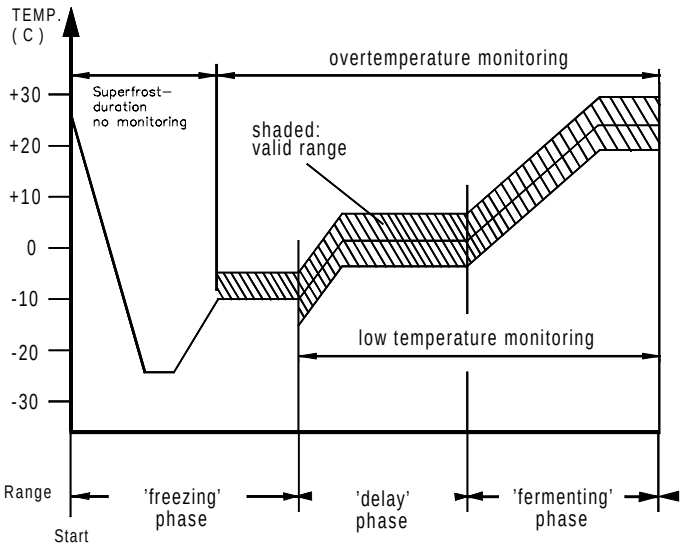
Temperature control

The sensors F1 and F2 are measuring the temperature, the unit then calculates an average value and works with it.
Freezing: The preset temperature setpoint is defined as the point where the machine/valve switches off. The hysteresis is located above the setpoint and is determined to 2K.
Heating: The preset temperature setpoint is defined as the point where the heater switches off. The hysteresis is located below the setpoint and is also determined to 2K.
During the 'freezer'-phase the heater will only be controlled if DIP-switch 01 is set to its 'ON'-position.



Temperature monitoring

The unit is able to monitor the temperatures in the phases P1, P2 and P3.
In the 'freezing'-phase only the storage temperature, but not the 'superfrost'-section will be monitored if the value is too high.
In phase P2 and P3 the unit monitors also if the temperature is too low. The alarm limits are located 5 K above resp. 5 K below the valid setpoint. An alarm (relay will be de-activated) appears with a time delay of 20 minutes. The alarm limits and the time delay cannot be adjusted. The alarm relay will be reset automatically if the temperature comes back to the valid range.
The remaining time up to an alarm (min:sec) can be read at parameter "c" in the mode-list.
During a defrost, the alarm function keeps disabled, after the end of the defrost the alarm delay timer starts again.
This monitoring function will be enabled by setting DIP-switch 07-2 to its 'ON'-position. Now relay #7 can be used as an alarm relay (de-activated at alarm).
Please Note:
In this case the standard function of this relay (changing of fan speed) is not longer available.



Humidity control

Each phase is equipped with a humidity control function. The phases P2, P3 and P4 can also control a de-humidify process. The entered setpoint is valid for both functions.
The humidity control is disabled, as long as the temperature stays below the setpoint determined with parameter 'FP' (Mode-list).

1. *Moisten*
   ON: Humidity setpoint - 1% r.H.
   OFF: Humidity setpoint + 1% r.H.
   During moisturization the fan works with full speed.

2. *De-humidifying*
   Activate: Set parameter E2, E3 or E4 to "1"
   Enabled: If the average value, calculated from the values of sensor F1 and F2, is located within a range +/- 1,0K around the temperature setpoint.
   Disabled: If the average temperature value leaves the range 'temperature setpoint +/- 2,0K'.
   Hysteresis: Adjustable by "EY"
   ON: Humidity setpoint + Hysteresis EY
   OFF: Humidity setpoint
   Function: Refrigeration and fermenting heater will be switched ON at the same time.
   During de-humidifying the fan works with slow speed.
   If the OFF-point is reached, the de-humidifying function will be disabled and a defrost event will be started automatically.
   With parameter 'AS' (Defrost switch temp., mode-list) you determine from which temperature defrost will controlled by a heater or by airflow.

Fan control

The unit controls the fan in two steps. The fan relay (relay #3) keeps activated in all phases (fan enable), except:
- during a defrost
- if parameter AS (Operating State) is set to "O"
- control functions are disabled in 'rest'-phase.

If the heater, freezing or an airflow defrost will be activated, then relay #7 (fan slow/fast) switches the fan from slow to full speed. In practice, the contacts of relay #3 and #7 will be connected in line.

With A3 (Mode-list) the fan can be switched ON time-delayed after a defrost. The maximium delay is 30 minutes.
Attention: If the temperature alarm function is active (DIP-switch 07-2), then relay #7 cannot be used for fan control.

Defrost

If the compressors (or solenoid valves) runtime reaches the value set by parameter A1 (mode-list), a defrost event will be initiated. The runtime can last up to 22 hours. The defrost will be terminated if the defrost security time set by parameter A2 (mode-list) is run down or if the temperature at the evap sensor exceeds the value set by 'AB'.

The AS-parameter in the mode-list represents a specific temperature border. Above this border the unit works with airflow-defrost, below this border the unit works with electrical defrost by activating relay #2.
Defrost can be initiated manually by setting parameter A (mode-list) to '1'.

With EA (mode-list) =1 you determine that the unit starts a defrost event at the beginning of the 'delay'-phase automatically.

Oven pre-heating

Because at the end of the 'fermenting'-phase (point in time to bake) the oven must be ready, it can be pre-heated by program control. Parameter OF (mode-list) determines how many time before the 'rest'-phase starts, relay #6 should be activated.
At the beginning of the 'rest'-phase relay #6 will be switched off again.
If a wipe-contact is required for oven pre-heating, then set DIP-switch 08-2 to its ON-position. Relay #6 will now be activated for at most 1 minute only.

Manual operation

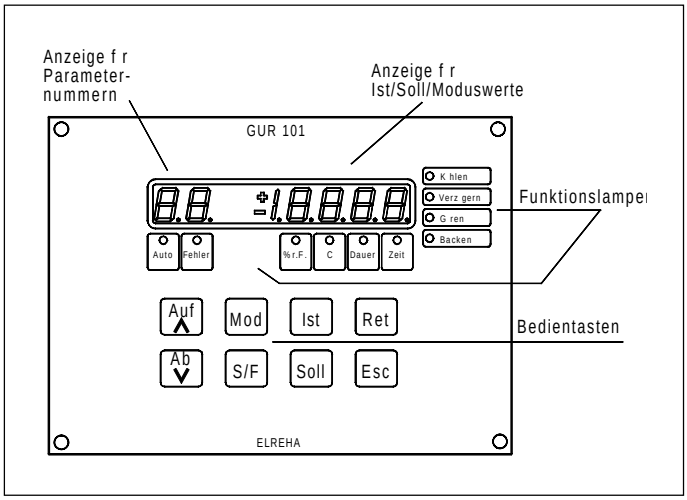
For test purposes or if you want to use the walk-in/cupboard as normal freezer it is possible to set the unit to the single phases manually.

To switch on a phase manually, set parameter "AS" (setpoint-list) to the matching value.
If you switch back to automatic operation, the unit works with the program again which was leaved before. To check this, you can read the current, running program # at parameter "L" (setpoint-list).

Special case:
If "AS"= 4, the unit starts the next program after you have switched back to automatic operation.

Operating the Controller

The controller can be operated by the keypad, service functions can be selected by internal DIP-switches for test purposes.
If no other value is demanded by keypress, the right part of the display shows the average value of the temperature sensors permanently. The left part of the display shows the parameter-name.



Operating Keys

'AUF' ..... Increase values
'AB' ..... Decrease values
'S/F' ..... Accelerates scrolling while pressed together with 'AUF' and 'AB'.
'MOD' ..... Call up and scrolling through the 'mode'-list,
'IST' ..... Calls up and scrolling through the 'actual'-list
'SOLL' ..... Calls up and scrolling through the 'setpoint'-list
'RET' ..... Start and confirm programming
'ESC' ..... Back to standard display

Indicator LED's

Auto..... Unit works in 'automatic'-mode.
Fehler..... A failure is present, explained by the flashing display value. Any keypress erases the failure display, pressing 'ESC' makes the failure display visible.
Kühlen..... Unit works in the 'freezing'-phase.
Verzögern..... Unit works in the 'delay'-phase.
Gären..... Unit works in the 'fermenting'-phase.
Backen..... The 'fermenting'-phase is run down. The doughs are ready for baking, the unit works in the 'rest'-phase now.
% r.F..... Display value is relative humidity (% r.H.).
°C..... Display value is a temperature in °C.
Dauer..... Display value is time duration in h:min.
Zeit..... Display value is a clock's time in h:min.

DIP-switches (see page 11)

Beside the unit there are 2 rows with DIP-switches. The functions selectable with this switches are important for the run-up but not very interesting for the final user.

If the switch is set to 'On'-position, the functions are:

DIP 08-1..... The values of the expanded mode list will be displayed.
DIP 07-1..... The clock runs ten times faster.
DIP 06-1..... All values can be adjusted without access code.
DIP 05-1..... The unit works in 'fermenting'-phase permanently. If the DIP-switch will be set back, the unit remains working in that phase, switching back to 'automatic'-mode must be done in the 'setpoint'-list.
DIP 04-1..... Inserts a constant phase (10° / 1 hour) into the 'fermenting'-phase.
DIP 03-1..... In the 'fermenting'- and 'rest'-phase the freezing will not switched on, even when the setpoint is exceeded.
DIP 02-1..... The 'superfrost'-parameter will not switched on automatically with the beginning of the 'freezing'-phase. 'Superfrost' will be started by an external pushbutton only.
DIP 01-1..... While the 'freezing'-phase the heater starts if the temperature fells short of the setpoint.
DIP 07-2..... Temperature alarm function is active, relay #7 work as alarm relay now.
DIP 08-2..... Relay 6 (oven pre-heating) with self-reset (wipe) contact.

Access Code

To prevent the controller unit from unauthorized operation, an access code must be entered before. This code depends on the current time and is defined as **hours + 10**.
Example: If you want to program the unit at 9:35 am, you must enter '19' as an access code. At 13:00 (01:00 pm) the access code is '23', etc.
If no key is pressed for about 1 minute, or the hours of time change while you are entering data (e.g from 13:59 to 14:00), then the access code must be entered again.

Programming

The parameters are sorted in 3 lists. Each list can be called up by an own key (IST-SOLL-MOD). Programming procedure:

- Call-up value to change by pressing the matching 'list'-key as often as necessary,
- Press 'RET'-key
- Change parameter value with keys 'AUF' (up) and 'AB' (down)
- Store new value by pressing key 'RET' or any 'list'-key.

Example: Changing the 'fermenting'-phase

1. Call-up parameter P3.1 (first P3-parameter) with key 'SOLL',
2. Press key 'RET' once,
3. Change minute value by keys 'AUF' and 'AB',
4. Press key 'RET' once more,
5. Change hour value by keys 'AUF' and 'AB',
6. Press key 'RET' or any 'list'-key = the new value is stored.

Parameter Explanation

Actual values

By using the 'IST'-key, the following values can be read:

F..... Average value of temperature control sensors 1 and 2, this is the temperature the unit works with.
FF..... Actual value of the humidity sensor
F1..... Actual value of temperature control sensor 1.
F2..... Actual value of temperature control sensor 2.
Ab..... Actual value of evaporator sensor.

Setpoints

By using the 'SOLL'-key, the following values can be read and changed:

AS..... Operating State, works like a manual switch
0 = OFF
1 = 'freezing' phase only
2 = 'delay'-phase only
3 = 'fermenting'-phase only
4 = 'rest'-phase only
A = Automatic Operation

L..... Load Parameter.
Here the current running program can be read. If 'L' is set to 'O', then a value of the running program was changed before. By entering one of the memory location # 10-19 the programs stored at this places will be called-up and started.

LC..... Load Cyclic Parameter.
If a program ends at the end of the 'rest'-phase, then the program will be started whose memory location number is entered in 'LC'.

PE..... Extension of the 'delay'-phase
(0..9 days)
Fixes how many day-changes (from 23:59 to 00:01) should be between the start of the program and the beginning of the 'rest'-phase.
Example:
A program arrives its 'rest'-phase at saturday and starts a new program whose 'rest'-phase should be started at monday. So between the start of the new program and the beginning of its 'rest'-phase there are two day changes, at 'PE' of the new program the value '2' must be entered.

P4..... Point in time to bake, beginning of the 'rest'-phase
P4..... Duration of 'rest'-phase (in hours)
P4..... Control functions during the 'rest'-phase
O=OFF 1=ON
P4..... Temperature Setpoint of the 'rest'-phase
P4..... Humidity Setpoint of the 'rest'-phase
P3..... Duration of the 'fermenting'-phase (in hours)
P3..... Beginning of the 'fermenting'-phase
(will be calculated, cannot be entered)
P3..... Temperature Setpoint of the 'fermenting'-phase
P3..... Humidity Setpoint of the 'fermenting'-phase
P2..... Duration of the 'delay'-phase (in hours)
P2..... Beginning of the 'delay'-phase.
(will be calculated, cannot be entered)
P2..... Temperature Setpoint of the 'delay'-phase
P2..... Humidity Setpoint of the 'delay'-phase
P1..... Temperature Setpoint of the 'freezing'-phase
P1..... Humidity Setpoint of the 'freezing'-phase

S..... Save Parameter,
here the entered program can be stored to the memory location numbers 10 thru 19.

Mode values

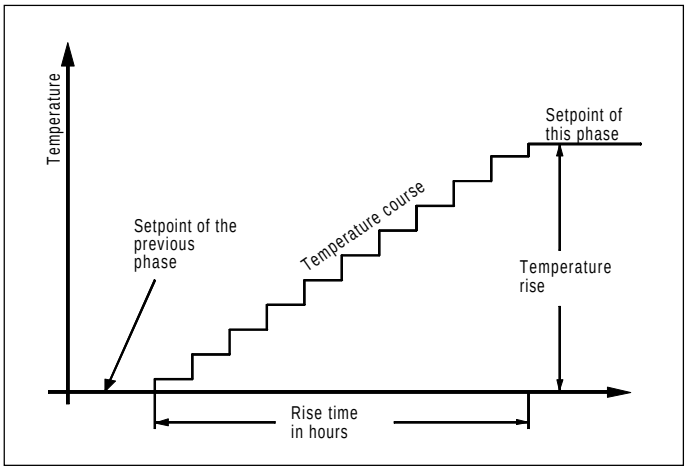
By using the 'MOD'-key, the following values can be read and changed:

Id..... Enter Access Code here to change parameters.
U..... Current Time
(can be adjusted without access code)
SP..... Superfrost-Temperature-Parameter.
At the beginning of the 'freezer'-phase the walk-in/cupboard will be chilled to this temperature to freeze doughs quickly. After this temperature is reached, the unit works with the setpoint of the 'freezer'-phase.
If the 'freezer'-phase is set manually (AS=1), the SP-parameter is not active.
Sd..... Superfrost-Duration-Parameter
This parameter determines the 'superfrost'-duration (3:00 hours maximum)
c2..... Increasing-Parameter of the 'delay'-phase
(in °C per hour)
During the 'delay'-phase the temperature-setpoint will be increased step by step in °C / hour.
(see next page -->)
E2..... Increasing-Setpoint of the 'delay'-phase
During the 'delay'-phase here the current working setpoint will be displayed which results from C2.
c3..... Increasing-Parameter of the 'fermenting'-phase
(in °C per hour)
During the 'fermenting'-phase the temperature-setpoint will be increased step by step in °C / hour.
(Siehe rechte Seite)
E3..... Increasing-Setpoint of the 'fermenting'-phase
During the 'fermenting'-phase here the current working setpoint will be displayed which results from C3.
FP..... Humidity-Parameter.
Below this room temperature the humidity control keeps disabled.
A..... Manual Defrost Start (1 = ON).
Ab..... Defrost Limitation Temperature.
AS..... Defrost Switch Temperature.
Above this temperature airflow-defrost is active, below this setpoint an electrical heater will be used.
A1..... Compressor-Runtime up to Defrost
(hours/min., 22 hours maximum)
A2..... Defrost Security Time
(hours/min., 2 hours maximum)
A3..... Fan Delay after Defrost
(30 minutes maximum)
OF..... Oven-Pre-Heating Time
0..2 hours before the 'rest'-phase starts resp. the 'fermenting'-phase ends.
c..... Remaining time
up to a temperature alarm
E2..... De-humidifying in 'delay'-phase active (ON=1, OFF=0)
E3..... De-humidifying in 'fermenting'-phase active (ON=1)
E4..... De-humidifying in 'rest'-phase active (ON=1)
EY..... Hysteresis of De-humidifying
EA..... Defrosting at the beginning of the 'delay'-phase
P1..... Calibration of humidity sensor
P3..... Calibration of temperature sensor 1.
P4..... Calibration of temperature sensor 2.
P5..... Calibration of evaporator sensor.

The calibration parameters only appear if DIP-Switch # 08-1 (on the right side of the operation panel) is set to its 'ON'-position.

How to preset the 'increasing'-parameters

To avoid quality losses because the dough products will be heated-up too fast at the beginning of the 'delay'-phase and the beginning of the 'fermenting'-phase there are 'increase'-parameters available (C2 resp. C3)



This parameter value (°C/per hours) affects, that the GUR does not use the temperature setpoint of the phase immediately. First, the GUR calculates new setpoints continually, to secure a continous increase up to the desired temperature is reached.
Please note to select the 'increase'-value not to low, because eventually the setpoint cannot be reached within the available time.
If a slow increase is not desired, the 'increase'-parameter must be set to a high value (appr. 50 °C).
The current, calculated setpoint can be read at any time in the MOD-List, parameters E2 or E3.

Please note that the DIP-Switch # 04-1 (Constant-Phase) must be set to 'OFF'-position to use the 'increase'-parameters.

Example: 'freezer'-phase setpoint = -5°C,
'delay'-phase setpoint = 15°C,
'delay'-phase duration = 5 hours
After 4 hours the 'delay'-phase setpoint should be reached, so the temperature must be increased by 20K within 4 hours.

The value for the 'increase'-parameter will be calculated as follows:

$$\text{'increase'-parameter value} = \frac{\text{Temp.Increase}}{\text{Time (hours)}} = \frac{20}{4} = 5$$

Enter value '5' now at parameter C2 (mode-list).

Adjust the 'increasing'-parameter for the 'fermenting'-phase in the same way.

Program Example

The following example shows a possible program for a week with temperature- and humidity setpoints.

DAY	PHASE	PERIOD OF TIME	TEMP.	HUMID.
Monday thru Thursday	Rest	04:00 till 16:00	-4 °C	85 % r.H.
	Freezing	16:00 till 23:00	-10 °C	
	Delay	23:00 till 02:00	+5 °C	50 % r.H.
	Fermenting	02:00 till 04:00	+25 °C	80 % r.H.
	Bake time	from 04:00		
Friday and Saturday	Rest	03:00 till 14:00	-4 °C	85 % r.H.
	Freezing	14:00 till 22:00	-10 °C	
	Delay	22:00 till 01:00	+5 °C	50 % r.H.
	Fermenting	01:00 till 03:00	+25 °C	80 % r.H.
	Bake time	from 03:00		
Sunday	Rest			
	Freezing	Sat. 14:00 till	-10 °C	
		Sunday 23:00		
	Delay	23:00 till Monday	+5 °C	
	Fermenting	see monday	+25 °C	
	Bake time	see monday		

Comment:

It is most important that the dough is ready to use at the beginning of the 'rest'-phase. Because of this the program flow depends on this point in time and the parameters will be entered beginning from there.

The 'monday'-program (the program that ends at monday), which is stored at memory location #10, determines the start of baking to monday morning 4:00am. After the 'rest'-phase is run down (12 hours) it starts the 'tuesday'-program which is stored on memory location #11.

The 'tuesday'-program starts at monday afternoon 16:00 o'clock with freezing at -10°C. The delay starts at 23:00 with the setpoints +5°C and 50% r.H. The 'fermenting'-phase starts 2:00 o'clock at night with +25°C and 80% r.H.
The time to bake will be reached tuesday morning at 4:00 o'clock. During the following 'rest'-phase the control functions are disabled. After the 'rest'-phase has been ended, the program will be started whose memory location # is determined with parameter LC (in this example LC = 12). The parameter values of the new program are the same as in the first running program, so freezing starts again at tuesday 16:00 o'clock. In this new program the LC-value is now 13, and so on.

After the end of the 'saturday'-program on memory location #15 the 'monday'-program will be started again. The 'monday'-program starts at saturday 14:00 o'clock ('Saturday' baking point + 11 hours 'baking'-phase duration) and 2 day-changes occur between the start of the program and the beginning of the 'rest'-phase.
So it is necessary to enter the value '2' at parameter 'PE' of the 'monday' program.

How to enter the program examples,
we start with the 'monday'-program :

Key	Parameter	What to do
MOD	IDENT	Enter Access Code (see page 4)
SOLL	LC	press key 'RET' and change value by the 'Auf/Ab'-keys to '11'
SOLL	PE	press key 'RET' and change value by the 'Auf/Ab'-keys to '2'
SOLL	P4	press key 'RET' and change value by the 'Auf/Ab'-keys to 4:00
SOLL	P4	press key 'RET' and change value by the 'Auf/Ab'-keys to 12:00
SOLL	P4	press key 'RET' and change value by the 'Auf/Ab'-keys to '0'
SOLL	P4	press key 'RET' and change value by the 'Auf/Ab'-keys to '-4'
SOLL	P4	press key 'RET' and change value by the 'Auf/Ab'-keys to '85'
SOLL	P3	press key 'RET' and change value by the 'Auf/Ab'-keys to 2:00
SOLL	P3	---
SOLL	P3	press key 'RET' and change value by the 'Auf/Ab'-keys to '25'
SOLL	P3	press key 'RET' and change value by the 'Auf/Ab'-keys to '80'
SOLL	P2	press key 'RET' and change value by the 'Auf/Ab'-keys to '3'
SOLL	P2	---
SOLL	P2	press key 'RET' and change value by the 'Auf/Ab'-keys to '+5'
SOLL	P2	press key 'RET' and change value by the 'Auf/Ab'-keys to '50'
SOLL	P1	press key 'RET' and change value by the 'Auf/Ab'-keys to '-10'
SOLL	P1	---
SOLL	S	press key 'RET' and change value by the 'Auf/Ab'-keys to '10'
RET		press once

Now the 'monday'-program is stored on memory location #10 and you can begin to enter the 'tuesday'-program :

Key	Parameter	What to do
SOLL	LC	press key 'RET' and change value by the 'Auf/Ab'-keys to '12'
SOLL	PE	press key 'RET' and change value by the 'Auf/Ab'-keys to '1'
SOLL	P4	press key 'RET' and change value by the 'Auf/Ab'-keys to 4:00
SOLL	P4	press key 'RET' and change value by the 'Auf/Ab'-keys to 12:00

and so on...

If all parameter values are entered, the desired program can be started, e.g. the 'wednesday'-program:

Key	Parameter	What to do
SOLL	LC	press key 'RET' and change value by the 'Auf/Ab'-keys to '12'
RET		or any 'List'-key

	MO	TUE	WED	THU	FRI	SAT	Comment
L	10	11	12	13	14	15	Memory Location # of the program
LC	11	12	13	14	15	10	This program will be started automatically after the 'rest'-phase
PE	2	1	1	1	1	1	Number of day-changes between the start of the program and the point in time to bake 1= next day 2= next but one day
P4	4:00	4:00	4:00	4:00	3:00	3:00	Start of baking
P4	12 h	12 h	12 h	12 h	11 h	11 h	Duration of 'rest'-phase
P4	0	0	0	0	0	0	Control functions during the 'rest'-phase 1= ON 0= OFF
P4	-4 °C	-4 °C	-4 °C	-4 °C	-4 °C	-4 °C	Temperature during the 'rest'-phase
P4	(85 %)	(85 %)	(85 %)	(85 %)	(85 %)	(85 %)	Humidity during the 'rest'-phase (see note)
P3	2 h	2 h	2 h	2 h	2 h	2 h	Duration of 'fermenting'-phase
P3	2:00	2:00	2:00	2:00	1:00	1:00	Start of 'fermenting'-phase (calculated automatically)
P3	25 °C	25 °C	25 °C	25 °C	25 °C	25 °C	Temperature and humidity setpoints while fermenting
P3	80 %	80 %	80 %	80 %	80 %	80 %	
P2	3 h	3 h	3 h	3 h	3 h	3 h	Duration of the 'delay'-phase
P2	23:00	23:00	23:00	23:00	22:00	22:00	Start of the 'delay'-phase (calculated automatically)
P2	+5 °C	+5 °C	+5 °C	+5 °C	+5 °C	+5 °C	Temperature and humidity setpoints while the 'delay'-phase
P2	50 %	50 %	50 %	50 %	50 %	50 %	
P1	-10 °C	-10 °C	-10 °C	-10 °C	-10 °C	-10 °C	Temperature and humidity setpoints while the 'freezing'-phase (see note)
P1	(--)	(--)	(--)	(--)	(--)	(--)	
S	10	11	12	13	14	15	Store program on memory loaction #

Note : The humidity setpoints in brackets are not controlled as long as the temperature is below the humidity parameter FP (Mode-list). Its is not suggestive to use or adjust this parameters with temperatures below 0°C.

Installation and Runup

Some little notes to runup the GUR 101:

Before applying voltage to the controller make sure that all wiring has been made in accordance with the wiring diagram in this manual.
Please pay attention to the specified ambient conditions (Temperature-/humidity limits). Outside these limits malfunctions may occur. Sensor cables should be shielded types with one end of the shielding connected to ground. This avoids irregular switching caused by electro-magnetic interference. The cross-section of the sensor cables is not critical, if it should be lenghtened, 0,5 sqmm are adequate.

Informations about the relay states in the single phases you will find in the table below.

Her are some sensor values, if you have to check them:

Temperature sensor TF 201	-40°C.....	1150 ohms
	-20°C.....	1387 ohms
	0°.....	1645 ohms
	+25°C.....	2000 ohms
	+50°C.....	2390 ohms
Humidity sensor FG 80H	0%r.F.....	0 ohms
	50%r.F.....	500 ohms
	100%r.F.....	1000 ohms

More values can be found in our current catalogue.

If the GUR is switched ON, the display must light-up after a few seconds. The display shows now either the actual temperature or a failure message. A failure message like "EE...." is a sensor failure, see chapter 'failure codes' to idendify the failed sensor. The failure message "EE..U" may only appear after the first power-on, it can be reset by pressing any 'list'-key. Now the unit is ready to program..

Set real-time clock first (Mode-list, parameter U...), because for adjusting all other parameters you need an access code which depends on time.

Causes, if a parameter cannot be adjusted:
- No access code is entered
- The access code is incorrect
- No keypress for more than 1 minute
- Real-time clock is not set correctly.

Sensor calibration: Enter correction values at parameters P1-P5 at the end of the 'mode'-list.

To prevent the unit from working while you enter data, set parameter "AS" (operating state) in the 'setpoint'-list to '0', so all automatic functions are disabled.

If the programs are entered, you can switch ON DIP-switch 07-1. This effects, that the real-time clock runs 10 times faster. This is an easy way to test the correct function of the entered programs.

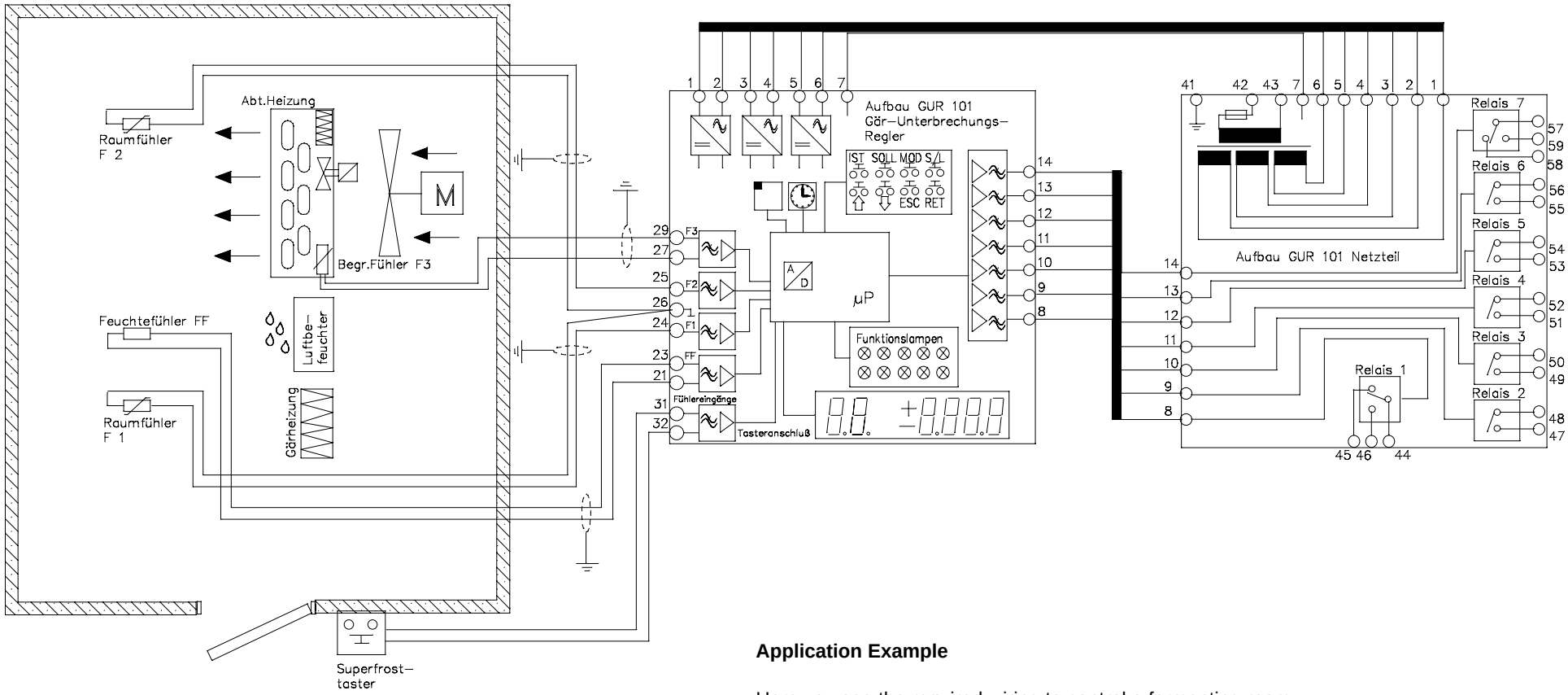
Please don't forget later, to reset DIP-switch 07-1 to its OFF-position and to reset parameter 'AS' to value 'A'.

After you have started the desired 'day'-program the GUR is ready for operation.

Relay-States

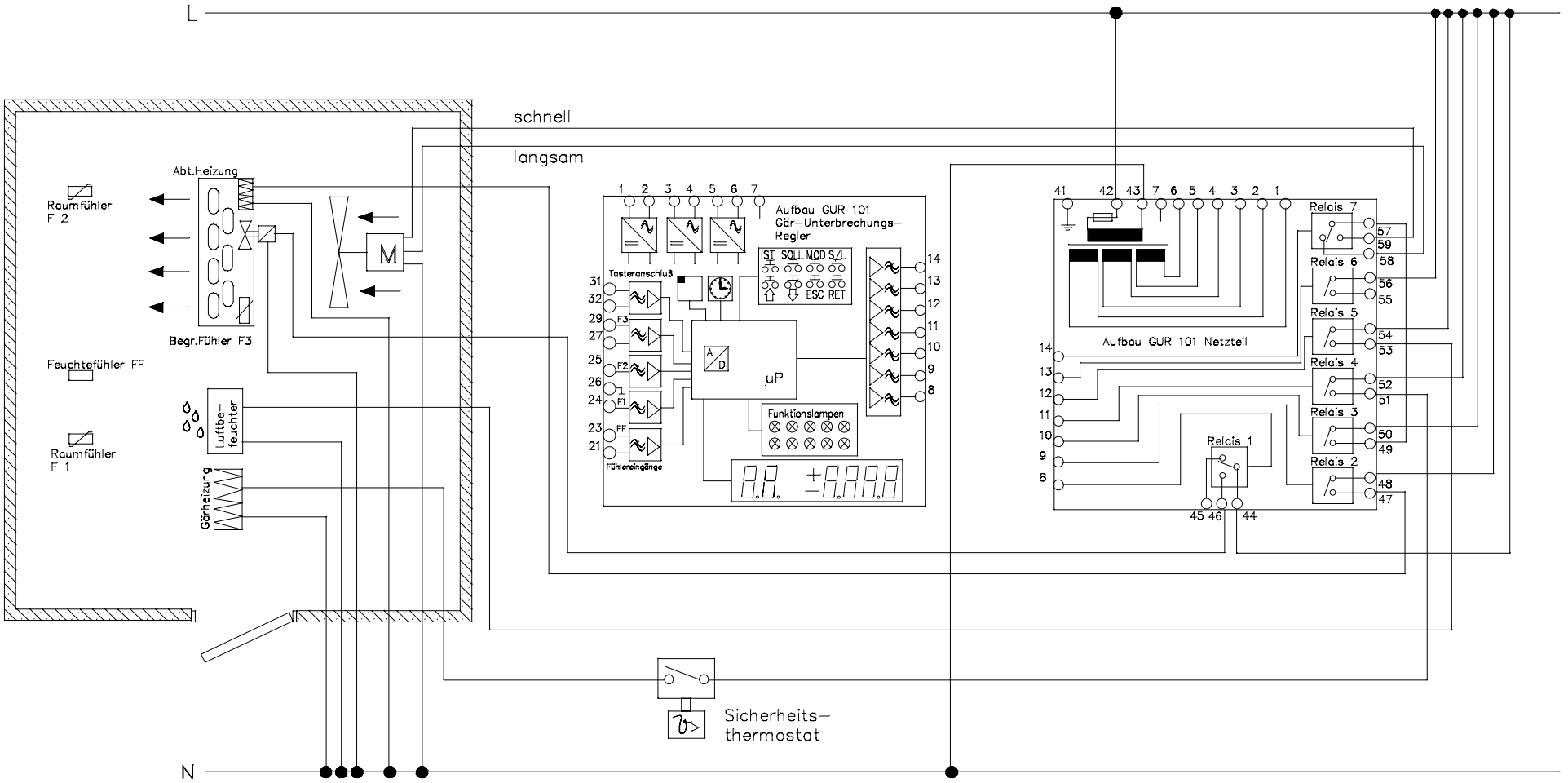
This table shows the relay states within the single phases.

GUR-Relay States	'freezing'-phase	'delay'-phase	'fermenting'-phase	'test'-phase
Relay 1 (solenoid valve, compressor)	activated up to Superfrost-parameter is reached. After that Refrigeration ON = activated Refrigeration OFF= de-avtivated	Refrigeration ON = activated Refrigeration OFF= de-avtivated	Refrigeration ON = activated Refrigeration OFF= de-avtivated No refrigeration if DIP-switch 3 is in ON-position	Refrigeration ON = activated Refrigeration OFF= de-avtivated No refrigeration if DIP-switch 3 is in ON-position
Relay 2 (defrost)	If the compressor runtime within a phase exceeds parameter A1 (Mode-list) then relay 2 will be activated. If the defrost limitation temperature is reached, relay 2 will be de-activated again.			
Relay 3 (evap fan)	Always activated, except during defrost, if "AS"= 0 or if the control functions are disabled during the 'rest'-phase.			
Relay 4 (heater)	Heating ON = activated Heating OFF = de-activated Heating only if DIP-switch 01 is in ON-position	Heating ON = activated Heating OFF = de-activated	Heating ON = activated Heating OFF = de-activated	Heating ON = activated Heating OFF = de-activated
Relay 5 (moisten)	If humidity parameter is exceeded : Moisten ON = activated Moisten OFF = de-activated	If humidity parameter is exceeded : Moisten ON = activated Moisten OFF = de-activated	If humidity parameter is exceeded : Moisten ON = activated Moisten OFF = de-activated	If humidity parameter is exceeded : Moisten ON = activated Moisten OFF = de-activated
Relay 6 (Oven)	- -	- -	Activated by the time 'OF' earlier than the beginning of the 'rest'-phase	Activated up to the 'rest'-phase ends
Relay 7 (fan slow/fast)	Always activated if cooling, heating or moisturization is demanded. De-activated if the measured values are below their setpoints			



Application Example

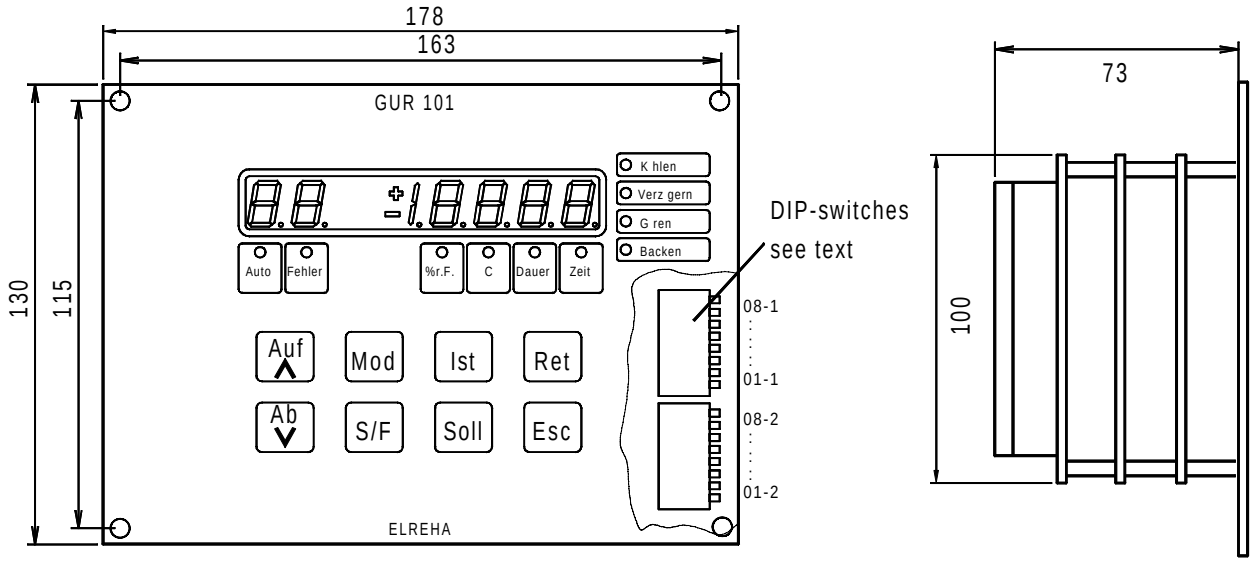
Here you see the required wiring to control a fermenting room.
For a better survey only the sensor cables and the wiring between operating unit and power unit is described.
The mains voltage wires you will find next page.



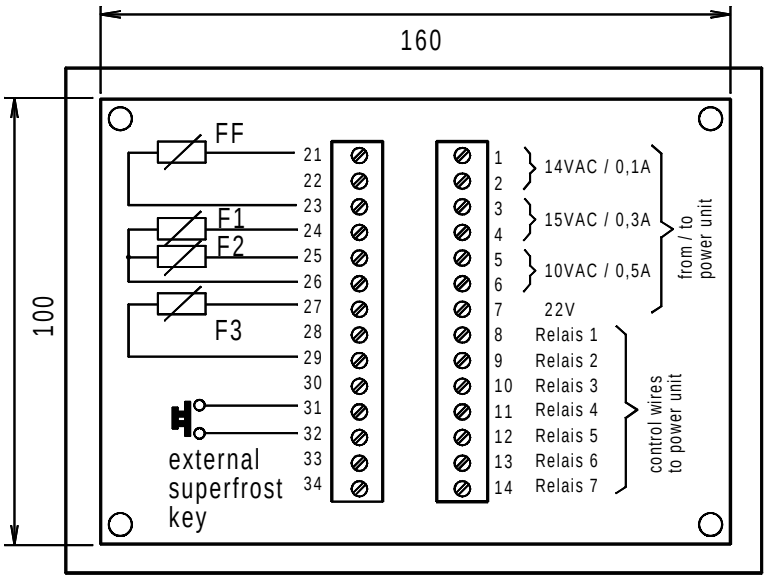
Application Example

Here you see the wiring of the mains voltage cables.
Required power relays are not displayed.
Please note that the security thermostat for the heater must be located within the load circuit.

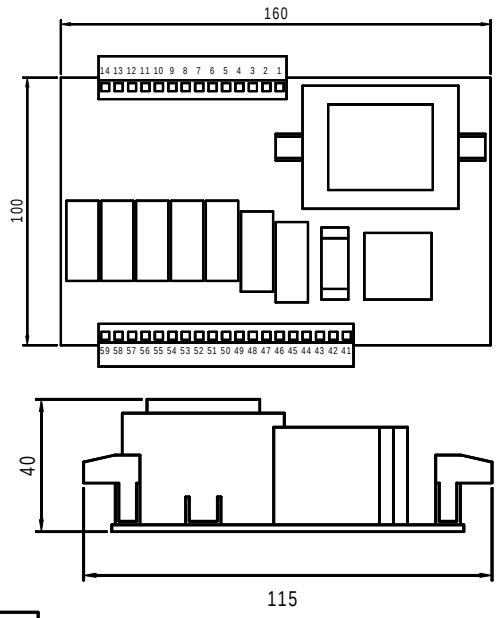
Dimensions of the Operating Unit / DIP-switches



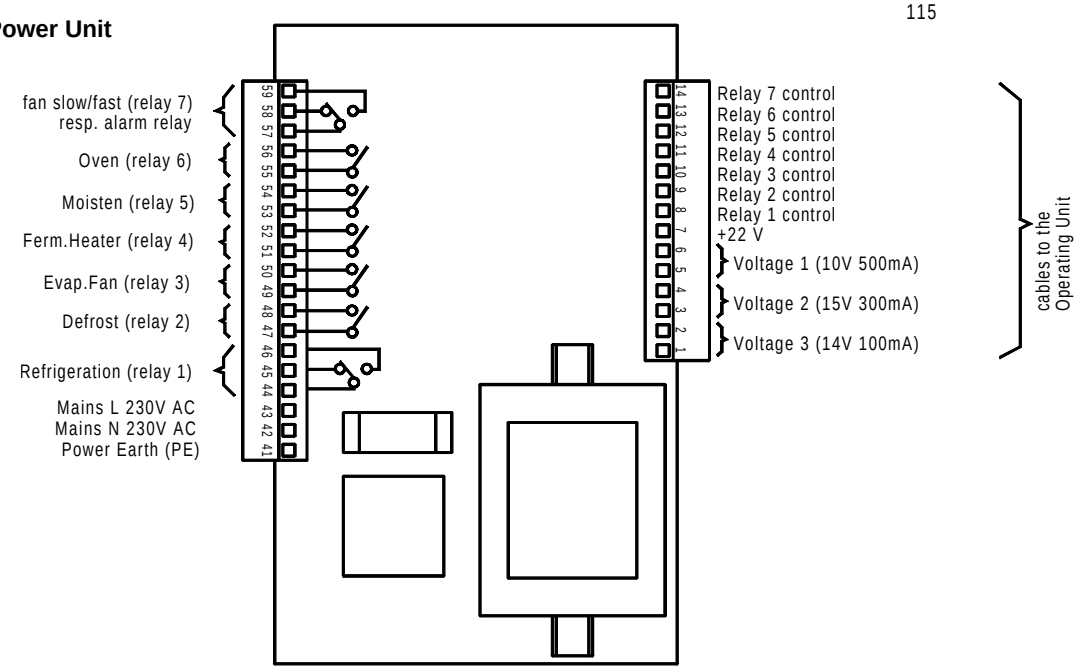
Terminals of the Operating Unit



Dimensions of Power Unit



Terminals of Power Unit



	MO	TUE	WED	THU	FRI	SAT	Comment
L							
LC							This program will be started automatically after the'rest'-phase
PE							Number of day-changes between the start of the program and the point in time to bake. 1 = next day 2 = next but one day
P4							Start of baking
P4							Duration of the 'rest'-phase
P4							Control functions during the 'rest'-phase 1 = ON 0 = OFF
P4							Temperature during 'rest'-phase
P4							Humidity during the 'rest'-phase
P3							Duration of 'fermenting'-phase
P3							Start of 'fermenting'-phase (calculated automatically)
P3							Temperature and humidity setpoints while fermenting
P3							
P2							Duration of the 'delay'-phase
P2							Start of the 'delay'-phase (calculated automatically)
P2							Temperature and humidity setpoints while the 'delay'-phase
P2							
P1							Temperature and humidity setpoints while the 'freezing'-phase
P1							
S							Store program on memory loc. #

Plant-specific parameters (e.g. mode values)

Appendix

Failure Codes

A failure will be indicated by the ‘Fehler’-LED. The display shows a failure code which can be erased by any key.
As long as the failure is present, the display flashes.
Pressing key ‘ESC’ shows the failure code again.

The failure codes:

EE b3	Temperature sensor 1 broken
EE b4	Temperature sensor 2 broken
EE b5	Evap sensor broken.
EE S1	Humidity sensor short circuit
EE S3	Temperature sensor 1 short circuit
EE S4	Temperature sensor 2 short circuit
EE S5	Evap sensor short circuit
EE ......U	General reset with data loss

Accessories (not included)

Temperature sensors	TF 201 (3 pcs. necessary)
Humidity sensor	FG 80H

set up	15.1.97	translated:	11.5.01	approved:	12.5.01
	tsd/jr				sha/mv