

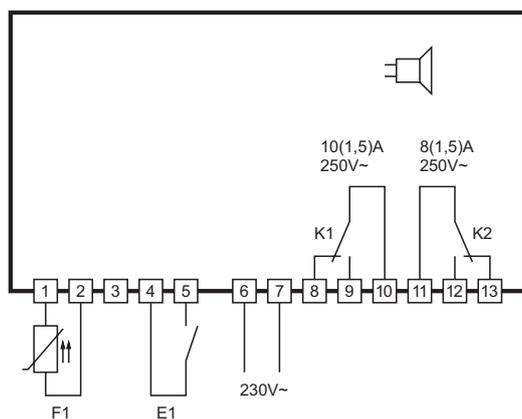
## Deep-frying controller

**Order number: 900219.049**

Stand: 28.04.2022 V1.80



## Wiring diagram



## Product description

The controller ST501-QE1TA.09 fulfils the function of a temperature controller and is cut to the use with deep-fryers. It has a 4-digit LED display, 6 keys, 2 relays and a switching input.

The different temperature setpoints and timer defaults can be parametrised directly by the keys.

|                       |                                 |
|-----------------------|---------------------------------|
| <b>Sensor:</b>        | multi-resistance input          |
| <b>Range:</b>         | dependent on the type of sensor |
| <b>Front size:</b>    | 106mm x 68mm                    |
| <b>Panel cut-out:</b> | 87,5mm x 56,5mm                 |
| <b>Tightness:</b>     | front IP64                      |
| <b>Connector:</b>     | screw terminal                  |

### General information

The unit is made of a service board and a separate power board which are linked with a ribbon cable. Both parts form a complete installation unit. All outputs and inputs are connected on the back of the power board. The unit fulfils the function of a temperature controller with timer function and is cut to the use with deep-fryers.

A four-digit display, six operating keys and eight LEDs are provided on the front of the unit. Three LEDs indicate the selected temperature setpoint ("TEMPERATURE 1, 2, 3"), three LEDs indicate the selected timer ("TIME 1, 2, 3") and two LEDs indicate the accelerated heating ("TURBO") and the current status of the control output ("HEAT").

A temperature sensor is connected to measure the actual value. By means of parameter it is possible to select among Pt100, Pt1000 and PTC as sensor type without circuitry adaptations. Two switching inputs – if available – permit the start of the timer with an external switching key and the activation of a setpoint reduction, which is indicated by a flashing point on the right side of the display. The function of the switching inputs can be deactivated with parameters.

Two changeover contacts K1 and K2 are provided as output relays. The function heating, control contact 2 or alarm can be selected for each output via the parameterisation; deactivation is also possible. Additional special functions are possible for the output relay K2.

The controller has the option of gentle heating in the event that the fryer fat is still solidified. This slowed-down heating process (melt function) is active after each switch-on and ends when a limit value is reached that can be set below the setpoint. If the fat has visibly melted, the "TURBO" key can be used to switch to accelerated heating even before the limit value is reached. When cooling down, the turbo characteristic is initially maintained; only below 50 °C is the reloading of unmelted fat assumed and the controller automatically switches back to slowed heating.

A pair of limit values that can be set in the parameterisation allows a temperature alarm related to the actual control value, whereby limit value and band alarm as well as relative and absolute limit values can be selected. In these alarm cases, the control continues to run. An internal buzzer allows an acknowledgeable warning signal.

An operating time recording monitors the fat temperature and counts the operating hours when actual values exceed a parameterisable limit value. If activated, a warning message that can be acknowledged can be output or a control block can be triggered to

force the fryer fat to be actually replaced. A reset is only possible if the value falls below another parameterisable limit value.

### Adjustment options

 **Key 1: UP**  
Pressing this key you can increase the parameter or parameter value or scroll the parameter list.

 **Key 2: DOWN**  
Pressing this key you can decrease the parameter or parameter value or scroll the parameter list. At alarm the buzzer function can be switched off with this key. Any fat alarm message can be switched off as well, however the internal alarm condition remains active and the alarm restarts at each unit start.

 **Key 3: Selection temperature setpoint („SET“)**  
With this key the temperature setpoint relevant for the regulation is selected. If previously the timer display is active the controller at first switches to temperature display with the first key pressing. With parameters you can determine if the respective setpoint is still selected after switching of the mains voltage or if one of the setpoints S1-S3 is selected.

 **Key 4: Selection time setpoint**  
This key is used to select the time setpoint for the timer run. If the temperature display was previously active, the controller first switches to the time display when the key is pressed for the first time. The selection of the time setpoint is retained even after the mains voltage is switched off.

### Key 3+4: Setpoint reduction

Simultaneously pressing these two keys activates the setpoint reduction, in addition with the UP and DOWN key it can be adjusted. Please note that the setpoint reduction is only effective in case of a closed switching input. In case of an activated setpoint reduction a point flashes on the right side of the display. Setpoint reduction is only possible with controllers with switching input(s).

 **Key 5: MELT/TURBO**  
With this toggle key one can choose between reduced and accelerated heating mode. Together with the thermostatic function the turbo-heating offers a further increase of heat supply. After switching on the controller the turbo-heating always is deactivated. The key is ineffective if the reduced heating mode is deactivated or in some temperature ranges if no PID characteristic is selected. See below for all choice options.



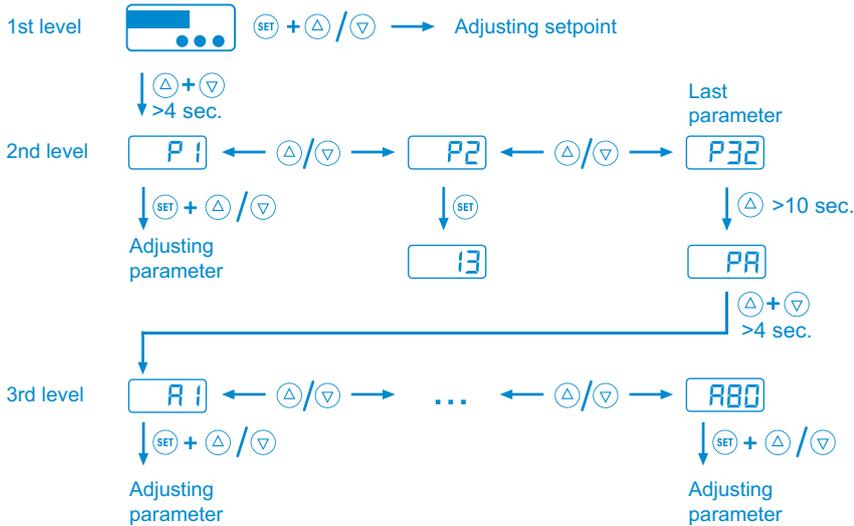
### Key 6: START/STOP

Pressing this key starts the sequence of the selected timer setpoint. The display now shows the remaining time. After the timer has run down, the buzzer sounds for 5 seconds and can be acknowledged with the DOWN key. The timer sequence has no influence on the control. If you press the key for at least 2 seconds after the start, the timer run is interrupted again. The remaining time display can be suppressed via the parameterisation. The display then jumps back from the remaining time display to the temperature display 3 seconds after the start and the LED of the timer flashes to indicate that the timer is still running. Furthermore, an additional standby function of this key can be activated via the parameterisation. In this case, the controller switches to standby if the key remains pressed for another 3 seconds after the timer run has been cancelled. The display then shows "OFF" or "RUS". When the controller is switched on again, a key delay that can be set via the parameterisation is effective.

### Key 5+6: Reset the fat time recording

Pressing these keys simultaneously resets the time recording. The warning message "OIL" is withdrawn and, if necessary, the control blocking is also cancelled. The accumulated operating time is deleted. Note that the reset is only possible if a warning status has occurred or if blocking has occurred and also only below an adjustable temperature limit. This is to prevent the user from continuing to operate the fryer without changing the fat.

**Operating levels:**



**1. control level:**

Adjustment of the main setpoints and the setpoint reduction

The main setpoint is indicated by pressing the UP together with the DOWN key, after a short release time it can be adjusted with these keys.

The setpoint reduction is indicated by pressing keys 3+4 together. By additionally pressing the UP or DOWN key it can be adjusted.

**2. control level (P parameters):**

Adjustment of control parameters

Pressing the UP and DOWN keys simultaneously for at least 4 seconds takes you to a parameter list for control parameters (starting at P 1).

The list can be scrolled up with the UP key and down again with the DOWN key.

If you press the adjacent selection key, the value of the respective parameter is displayed. By pressing the UP or DOWN key again, the value is changed. After releasing all keys, the new value is permanently stored.

The single-finger setup for the setpoint adjustment requires exactly simultaneous pressing of the UP and DOWN keys when changing to the parameter level. If the setpoint setting is accidentally unlocked, a new attempt is only possible after 5 seconds.

If the UP and DOWN keys are pressed again simultaneously for at least 4 seconds or if no key is pressed for longer than 60 seconds, the system returns from the parameter level to the basic status.

**3. control level (A parameters):**

Adjustment of control parameters

The third control level can be reached by first going to the second level and scrolling through the parameter list to the highest parameter. Then only the UP key is pressed for at least 10 seconds. The message PA appears in the display.

By subsequently pressing the UP and DOWN keys simultaneously for at least 4 seconds, the parameter list of the third control level (starting at A 1) is accessed.

The selection and setting of the A parameters is done in the same way as for the P parameters. The return to the basic status is also triggered in the same way. It is recommended to switch off the controller briefly after the changes.

**First control level:**

| Parameter        | Functional description   | Adjustment range    | Standard setting                    | Custom setting |
|------------------|--|---------------------|-------------------------------------|----------------|
| S1,<br>S2,<br>S3 | Temperature setpoints<br>(the currently selected setpoint is indicated and/or adjusted)    | P4...P5 °C          | 60.0 °C<br>70.0 °C<br>80.0 °C       |                |
| T1,<br>T2,<br>T3 | Timer setpoints<br>(the currently selected setpoint is indicated and/or adjusted)          | 0:00 ... 99:99 min. | 1:11 min.<br>2:22 min.<br>3:33 min. |                |
| S1'              | Setpoint reduction<br>(is added to the main setpoint in case of closed switching input E2) | -99...99,0 K        | -5.0 K                              |                |

**Second control level:**

| Parameter | Functional description                            | Adjustment range                    | Standard setting | Custom setting |
|-----------|---|-------------------------------------|------------------|----------------|
| P1        | Setpoint 2 or<br>Delta W                          | -99...999 °C<br>-99...99.9 K        | 10.0 °C          |                |
| P2        | Hysteresis contact K1                             | 0.1...99.9 K                        | 1.0 K            |                |
| P3        | Hysteresis contact K2                             | 0.1...99.9 K                        | 1.0 K            |                |
| P4        | Control range limitation – minimum setpoint       | -99...P5 °C                         | 0.0 °C           |                |
| P5        | Control range limitation – maximum setpoint       | P4...999 °C                         | 178 °C           |                |
| P7        | Proportional band                                 | 1.0...100 K                         | 10.0 K           |                |
| P8        | Reset time T <sub>n</sub> (I-factor)              | 0...999 sec.<br>(0 sec. = inactive) | 0 sec.           |                |
| P9        | Lead time T <sub>v</sub> (D-factor)               | 0...999 sec.<br>(0 sec. = inactive) | 0 sec.           |                |
| P10*      | Cycle time T <sub>p</sub>                         | 2...100 sec.                        | 10 sec.          |                |
| P19       | Key-lock<br>(only for setpoint setting)           | 0: no key-lock<br>1: key-lock       | 0                |                |
| P20       | Indication of actual value sensor F1              | -                                   | -                |                |
| P21       | Actual value correction sensor F1                 | -20...20.0 K                        | 0.0 K            |                |
| P25       | Limit temperature for fat operation timeout       | 0.0...999 °C                        | 160 °C           |                |
| P26       | Fat operating time until fat warning message      | 0...99 hrs (0 h = inactive)         | 30 hrs           |                |
| P27       | Fat operating time until control blocking         | 0...99 hrs (0 h = inactive)         | 40 hrs           |                |
| P28       | Display of the fat operating time                 | -                                   | -                |                |
| P29       | Limit temperature for reset of fat operating time | -99...999 °C                        | 100 °C           |                |
| P30       | Lower alarm value                                 | -99 °C/K...P31                      | -99 °C           |                |
| P31       | Upper alarm value                                 | P30...999 °C/K                      | 999 °C           |                |
| P32       | Hysteresis alarm circuit                          | 0.1...99.9 K                        | 1.0 K            |                |
| P35       | “Reduced heating” – heating on                    | 1...255 sec.                        | 60 sec.          |                |
| P36       | “Reduced heating” – heating off                   | 1...255 sec.                        | 90 sec.          |                |
| P37       | End of “reduced heating” below setpoint           | -99...0.0 K                         | -30 K            |                |

\* The PID control suppresses switch-on times below 0.1 sec.

## Third control level, (A parameters):

| Parameter | Functional description                            | Adjustment range   | Standard setting | Custom setting |
|-----------|---|--|------------------|----------------|
| R1        | Switch mode contact K1                            | 0: heating contact<br>1: cooling contact   | 0                |                |
| R2        | Switch mode contact K2                            | 0: heating contact<br>1: cooling contact   | 1                |                |
| R3        | Function of contact K1 at sensor error            | 0: relay off<br>1: relay on  | 0                |                |
| R4        | Function of contact K2 at sensor error            | 0: relay off<br>1: relay on  | 0                |                |
| R5        | Selection setpoint 2 or DeltaW                    | 0: operation with setpoint 2<br>1: operation with DeltaW   | 1                |                |
| R6        | Control characteristics contact K1                | 0: thermostatic<br>1: PID  | 1                |                |
| R8        | Display mode                                      | 0: integrals<br>1: resolution 0.5 K<br>2: resolution 0.1 K   | 2                |                |
| R9        | Remaining time display                            | 0: no remaining time indicated<br>1: remaining time is indicated   | 1                |                |
| R10       | Selection extended frying time                    | 0: fixed time<br>1...20: flexible time   | 0                |                |
| R11       | Buzzer in case of alarm message „OL“              | 0: no buzzer<br>1: buzzer  | 0                |                |
| R12       | Buzzer duration after timer ends                  | 1...60 sec.  | 3 sec.           |                |
| R19       | Parameter lock                                    | 0: no lock<br>1: A-parameters locked<br>2: A- and P-parameters locked  | 0                |                |
| R30       | Function alarm exit                               | 0: Boundary alarm, relative<br>1: Boundary alarm, absolute<br>2: Range alarm, relative<br>3: Range alarm, absolute<br>4: Boundary alarm, relative, inverted alarm contact<br>5: Boundary alarm, absolute, inverted alarm contact<br>6: Range alarm, relative, inverted alarm contact<br>7: Range alarm, absolute, inverted alarm contact | 1                |                |
| R31       | Special function at boundary alarm                | 0: no special function<br>1: flashing display<br>2: buzzer<br>3: flashing display and buzzer<br>4: like 3, buzzer can be cancelled   | 1                |                |
| R32       | Temperature display                               | 0: display shows actual value<br>1: display shows setpoint S1 (S1')  | 0                |                |
| R33       | Switching input E1 (if available)                 | 0: not active<br>1: timer start possible   | 0                |                |
| R34       | Switching input E2 (if available)                 | 0: not active<br>1: setpoint reduction possible (S1' relative to S1)   | 0                |                |
| R40       | Hysteresis mode contact K1                        | 0: symmetrically<br>1: one-sided   | 0                |                |
| R41       | Hysteresis mode contact K2                        | 0: symmetrically<br>1: one-sided   | 0                |                |
| R56       | Alarm suppression after "mains on" / "standby-on" | 0...60 min.  | 0 min.           |                |
| R60       | Sensor type                                       | 11: Pt100 2-wire<br>21: PTC<br>22: Pt1000 2-wire   | 11               |                |

| Parameter  | Functional description                                   | Adjustment range   | Standard setting | Custom setting |
|------------|--|--|------------------|----------------|
| <b>R70</b> | Software filter  | 1: not active, or else<br>2...32: average value with 2...32 measuring values   | 4                |                |
| <b>R80</b> | Temperature scale  | 0: Fahrenheit ( <b>RUS</b> )<br>1: Celsius ( <b>RUS</b> )<br>2: Fahrenheit ( <b>OFF</b> )<br>3: Celsius ( <b>OFF</b> )   | 3                |                |
| <b>R87</b> | Standby-function with key Start/Stop                     | 0: no function<br>1: standby function  | 1                |                |
| <b>R88</b> | Key delay for standby on                                 | 0...100 (x 0,1 sec.)   | 30<br>(= 3 sec.) |                |
| <b>R89</b> | Initial setpoint selection after mains on and/or standby | 0: same as before<br>1: S1<br>2: S2<br>3: S3   | 0                |                |
| <b>R90</b> | Output connection relay K1                               | 0: no connection<br>1: connection to control contact 1<br>2: connection to control contact 2<br>3: connection to alarm contact   | 1                |                |
| <b>R91</b> | Output connection relay K2                               | 0: no connection<br>1: connection to control contact 1<br>2: connection to control contact 2<br>3: connection to alarm contact<br>4: on if standby-on<br>5: on if timer runs | 2                |                |
| <b>Pro</b> | Program version  | -  | -                |                |

**Second parameter level,  
(P parameters):**

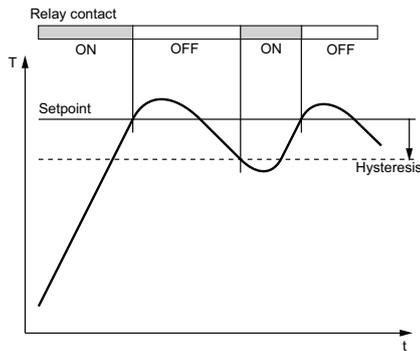
**P1: Setpoint/DeltaW for circuit 2**

Adjusting the setpoint of control circuit 2. If  $P5=1$ , the setpoints for control circuit 1 and 2 are linked with one another via switching difference DeltaW, which can be adjusted with  $P1$  (operation with DeltaW). The following applies: setpoint thermostat 2 = setpoint control circuit 1 + Delta W2. This difference can take positive or negative values. Thus, a leading or following contact can be realised.

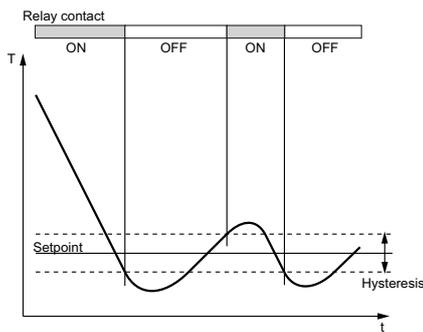
**P2: Hysteresis contact K1**

**P3: Hysteresis contact K2**

The hysteresis can be set symmetrically or one-sided at the setpoint (see  $R40, R41$ ). At one-sided setting, the hysteresis works downward with heating contact and upward with cooling contact. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point (see fig. 1 and 2).



Heating controller, one-sided hysteresis



Cooling controller, symmetrical hysteresis

The hysteresis is only effective if thermostat mode is enabled, in case of PID characteristic it is ineffective.

**P4: Control range limitation – minimum setpoint**

**P5: Control range limitation – maximum setpoint**

The adjustment range of the setpoint can be limited in both directions. This is to prevent the end user of a unit from setting inadmissible or dangerous setpoints.

**P7: Proportional band at PID regulation**

The proportional part works in such a way that with approximation of the actual value to the setpoint the variable is reduced linearly from +100% to 0%.

**P8: Reset time Tn (Integral-portion)**

The proportional controller as such has a remaining deviation of the actual value from the setpoint. The integral portion provides for a complete compensation of this offset

The reset time is a measure for the period of time needed to adjust a remaining temperature deviation of the size of the proportional range.

If a small reset time is set, a fast post-adjustment will take place. At a too small reset time, however, the system may tend to vibrate.

**P9: Lead time Tv (Differential-portion)**

The differential portion dampens temperature changes. If a long lead time Tv is set, damping is strong. At too long lead time, however, the system may tend to vibrate. At setting 0 the values are ineffective. It is therefore possible to realise a pure PI or PD regulation.

**P10: Cycle time Tp**

The cycle time is the time, in which the control output runs through one switching period, i.e. once switched out and once switched on. The smaller the cycle time, the faster the regulation. By consequence, however, there is also an increased switching frequency of the exit, which can lead to rapid wear of relay contacts. For very fast control ways with the respective high switching frequency a voltage output is therefore of advantage.

**P19: Key-lock**

The key-lock allows blocking of the control keys. In locked condition parameter adjustments with keys is not possible. At the attempt to adjust the parameters despite key-lock the message “---” appears in the display.

**P20: Actual value sensor F1**

The here indicated temperature presents the sum of actual measured value of sensor F1 and the actual value correction according to parameter  $P21$ .

**P21: Actual value correction**

This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the here adjusted value.

**P25: Temperature limit for fat operating time**

Above this temperature the internal recording of fat operating time is started. If the values of  $P26$  and  $P27$  are exceeded the

alarm message and/or regulation blocking is activated.

**P26: Fat operating time until fat alarm message**

After this time period an alarm message requests the exchange of the deep-frying fat. The display indicates flashing “ $0\text{ IL}$ ”. With  $P26=0$  this function is deactivated and no alarm message occurs. Regulation blocking is still possible. The alarm message appears each time the operating time limit is reached and with every “mains-on” or “standby-on”, it can be cancelled with the DOWN key.

A reset after an alarm message and cooled down deep-fryer is possible as well.

Then the fat is to be changed as the accumulated operating time is deleted.

**P27: Fat operating time until regulation blocking**

After this time period an regulation blocking requests the exchange of the deep-frying fat. A reset with cool down deep-fryer has to be carried out to release the blocking and delete the operating time. With  $P27=0$  this function is deactivated and no blocking occurs. Fat alarm message is still possible. With  $P26=0$  and  $P27=0$  no operating time recording takes place.

**P28: Indication of fat operating time**

The operating hours counter determines the actual operating time of the fat. The time counter runs if the fat temperature is above the value of  $P25$  (only full hours are counted). By pressing the SET key the actual operating time is indicated. The operating time counter can be set to Zero by a reset (pressing the MELT/TURBO key together with the START/STOP key for 10 seconds).

**P29: Temperature limit for reset of fat operating times**

To allow a reset of alarm message, regulation blocking and accumulated operating time the fat must be cooled down This parameter determines the temperature value the fat must be cooled down to this value. This is to prevent the user from operating the deep-fryer without replacing the fat. If a reset after warning message or blocking must be possible independently of the actual temperature  $P29$  must be set to  $999^{\circ}\text{C}$ .

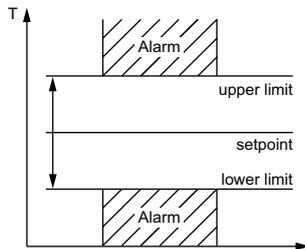
**P30: Lower alarm value**

**P31: Upper alarm value**

The exit alarm is a boundary alarm or a range alarm with one-sided or symmetrical hysteresis (see parameter  $P32$  and  $R42$ ). Both at the boundary alarm and the range alarm, limit values can be relative, i.e. going along with the setpoint, or absolute, i.e. independent of the setpoint. The operation mode is set with parameter  $R30$ . If, in case of boundary alarm and only one switching point is required the not used second switching point should be adjusted to a val-

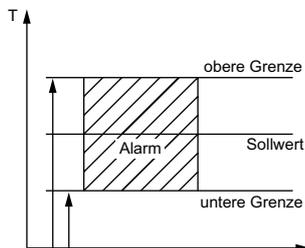
ue above or below the operating range of the controller.

Limit alarm function:



The alarm contact is closed if the process temperature is above the upper or below the lower boundary value.

Range alarm function:



Opposite switching behaviour to the boundary value alarm. The alarm contact is closed if the actual value remains between the boundary values.

**P32: Hysteresis alarm contact**

The hysteresis can be set symmetrically or one-sided at the adjusted limit values. (see R42). It becomes effective depending on alarm definition. At one-sided setting and boundary alarm the hysteresis is effective above the lower and below the upper limit value. At one-sided setting and range alarm the hysteresis is effective above the upper and below the lower limit value. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point.

**P35: "Reduced heating" – heating on**

This parameter determines the period of the "reduced heating" process where heating in enabled. The sequential switching of the output relay serves for a careful heating if the fat is not yet melted.

**P36: "Reduced heating" – heating off**

This parameter determines the period of the "reduced heating" process where heating in disabled.

**P37: End of "reduced heating" below setpoint**

This parameter provides a premature cancel of the "reduced heating" process below the setpoint (process ends at [setpoint+P37]°C). If the sequential heating is supposed to continue until the setpoint parameter P37 is to be set to 0,0K.

**Third control level, (A parameters):**

*The following values can change the equipment characteristics and are therefore to be set with utmost care:*

- R1: Switch mode contact K1**
- R2: Switch mode contact K2**

The switch mode for the relays, i.e. cooling or heating function, can be programmed independently at works. Heating function means that the contact opens as soon as the setpoint is reached, thus power interruption. At cooling function the contact closes, if the actual value is above the required setpoint.

- R3: Function of contact K1 at sensor error**
- R4: Function of contact K2 at sensor error**

At sensor error the selected relay falls back into the condition pre-set here. If there is a data-loss in parameter memory (display indicates "EP") both contacts K1 and K2 are switched off.

**R5: Selection setpoint 2 or DeltaW**

This parameter determines whether the setpoints for thermostat 1 and 2 independently adjustable (R5=0) or whether they are tied with one another via a switching offset DeltaW (R5=1). This parameter applies only to contact K2 (see parameter P1).

**R6: Control characteristics contact K1**

Independent choice of either PID or thermostatic characteristics for contact K1.

**R8: Display mode**

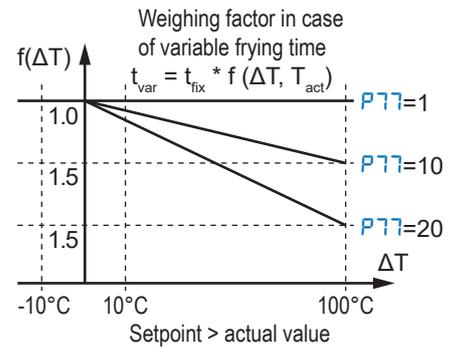
The value can be indicated in integrals or with decimals. In general, all parameter indications are presented with decimals.

**R9: Remaining time display**

This parameter is to show the remaining time of the running timer. With A9=0 the time LED of the currently activated timer flashes and the remaining time can be indicated for 3 seconds by pressing the START/STOP key for 3 seconds.

**R10: Selection extended frying time**

With R10=0 the frying time corresponds exactly to the programmed time. With R10=1...20 a weighing factor is specified to compensate a drop of temperature caused by the frying goods. The prolongation of the frying time depends on the deviation of the set point.



| Actual value | R10 | Effective frying time |
|--------------|-----|-----------------------|
| 180 °C       | 0   | 100 sec.              |
| 150 °C       | 0   | 100 sec.              |
| 180 °C       | 1   | 100 sec.              |
| 150 °C       | 1   | 120 sec.              |
| 180 °C       | 10  | 100 sec.              |
| 150 °C       | 10  | 135 sec.              |
| 180 °C       | 20  | 100 sec.              |
| 150 °C       | 20  | 150 sec.              |
| 125 °C       | 20  | 210 sec.              |
| 100 °C       | 20  | 300 sec.              |

Table: Setpoint 180 °C, frying time 100 sec.

**R11: Buzzer in case of "OL" alarm message**

This parameter determines whether the buzzer rings out in case of "OL" alarm message.

**R12: Buzzer duration if timer ends**

This parameter sets the buzzer duration after timer stop.

**R19: Parameter lock**

This parameter enables locking of each parameter level. If third level is locked, only parameter R19 may be changed.

**R30: Function alarm exit**

The alarm exit evaluates an upper and a lower limit value (see parameters P30 and P31), whereas a selection is possible as to whether the alarm is active if the temperature lies within these two limits, or whether the alarm is released if the temperature lies beyond them. In the case of sensor error, the alarm is activated independently of this adjustment. The output can be inverted to operate as a release.

**R31: Special function at boundary or alarm**

Here can be selected whether, in the case of an alarm, the indication to flash and/or the buzzer is to start. Sensor alarm (display F1L or F1H) is indicated independently thereof by flashing display and the buzzer.

### **R32: Setpoint display**

R32=0 indicates the actual value, R32=1 statically indicates the setpoint S1 or S1' in the display.

### **R33: Activation switching input E1 (if available)**

This determines the function of switching input E1.

### **R34: Activation switching input E2 (if available)**

This determines the function of switching input E2.

### **R40: Hysteresis mode contact K1**

### **R41: Hysteresis mode contact K2**

These parameters allow selection as to whether the hysteresis values which are adjustable with P2, P3 are set symmetrically or one-sided at the respective switching point. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point. The one-sided hysteresis works downward with heating contact and upward with cooling contact.

### **R56: Alarm suppression after "mains-On" and/or "Standby-On"**

This parameter allows a switching-on delay of the alarm contact after switching on the mains voltage or standby. This delay corresponds with the time set here.

### **R60: Sensor type**

These parameter permits selection of the sensor type, if the needed hardware prerequisites are available.

### **R70: Software filter**

With several measuring values, it is possible to obtain an average value. This parameter can determine by how many measured values an average value is to be formed. If a sensor with a very fast reaction to external influences is used, an average value ensures a calm signal course.

### **R80: Temperature scale**

Indication can be switched between Fahrenheit and Celsius. At conversion, the parameters and setpoints maintain their numerical value and adjustment range. (Example: A controller with the desired value of 0°C is switched to Fahrenheit. The new desired value is then interpreted as 0°F, which corresponds to a temperature of -18°C).

NOTE: Indication limits with °F can be smaller than the actual measuring range!

### **R87: Standby function with Start/Stop key**

This parameter determines whether the controller can be switched to standby by pressing the START / STOP key. Since the key serves as start and reset key for the the tim-

er, the key delay for standby-OFF is always 4 seconds.

### **R88: Key delay for Standby-ON**

This parameter is to activate a key delay for the START/STOP key to switch the controller ON from standby. Please note the 0.1 seconds scale.

### **R89: Initial setpoint selection after mains on and/or standby**

This determines what setpoint is selected after switching on the controller. In addition to the selection "as before", each of the three temperature setpoints can be selected.

### **R90: Output connection relay K1**

### **R91: Output connection relay K2**

Generally, the outputs are exchangeable with parameter adjustments, in order to achieve an optimal relation of the existing hardware with regard to contact rating, kind of contact and number of cycles. Therefore, these parameters first assign the outputs to the controller function.

### **Pro: Program version**

Indication of the program version.

| Message                                    | Cause   | Error elimination   |
|--|---|---|
| <b>F I</b>                                 | Sensor error<br>(Short or open circuit at sensor F1, the buzzer sounds)                     | Check sensor  |
| <b>EP</b>                                  | Data loss at parameter memory   | If error can not be eliminated by resetting the unit the controller must be repaired. |
| <b>"0 IL" flashing, regulation runs</b>    | Alarm message, caused by fat operation time exceeding (see <b>P26</b> )                     | Delete with DOWN key  |
| <b>"0 IL" flashing, regulation blocked</b> | Regulation blocking, caused by fat operation time exceeding (see <b>P27</b> )               | Delete with MELT + START/STOP key   |
| <b>"rES"</b>                               | Confirmation of the reset of the fat operating time   |   |
| <b>"- - -"</b>                             | Key lock<br>(see <b>P 19</b> and/or <b>R 19</b> )   | —   |
| <b>Flashing display</b>                    | Boundary or range alarm<br>(if activated, triggered by temperature monitoring at sensor F1) | —   |
| <b>Flashing point on the right</b>         | Setpoint reduction activated<br>(only with units with switching input))                     | —   |
| <b>Buzzer</b>                              | Temperature alarm (see <b>R3 I</b> )  | The buzzer can be stopped with the DOWN key.  |

Error messages are saved and indicated even if the cause is eliminated. Pressing the DOWN key deletes the error message.

## Technical data

|  |   |
|--|---|
| <b>Digital inputs<br/>(if available)</b> | <b>E1:</b> external potential-free switching contact for timer start<br>The input is intended for a push-button. Pressing the button starts the timer. Pressing it again – even if the timer not yet has elapsed – the timer restarts with the selected time.         |
|  | <b>E2:</b> external potential-free switching contact for setpoint reduction<br>The closed switching input enables the setpoint reduction. A flashing point in the right of the display indicates this condition. Each change causes an initialisation of the control. |
| <b>Measuring input</b>                   | <b>F1:</b> Resistance thermometer PTC/Pt100<br>Measuring range: PTC (KTY81-121) -50°C...+130°C<br>Pt100 -80°C...+400°C<br>Accuracy: $\pm 0,5K \pm 0,5 \%$ at 25°C, without sensor<br>$\pm 1K \pm 0,5 \%$ of scale range (0...+55°C), without sensor                   |
| <b>Outputs</b>                           | <b>K1:</b> Relay 10(1,5)A 250V~, change-over contact<br><b>K2:</b> Relay 8(1,5)A 250V~, change-over contact<br>Buzzer ca. 85dB  |
| <b>Display</b>                           | One 4-digit LED-Display, height 13 mm, colour red<br>8 LEDs for status display  |
| <b>Power supply</b>                      | 230 V 50/60 Hz, power consumption max. 6 VA   |
| <b>Connectors</b>                        | 12-pole screw terminal, spacing 5.0 mm, for cable up to 2.5 mm <sup>2</sup>   |
| <b>Ambient conditions</b>                | Storage temperature: -20...+70°C<br>Operating temperature: 0...+55°C<br>Relative humidity: max. 75% without dew   |
| <b>Weight</b>                            | ca 350 g, without sensor  |
| <b>Enclosure</b>                         | Front IP65, IP00 on the back  |
| <b>Installation data</b>                 | The unit is to be installed in an instrument panel.<br>Front size: 106 x 68 mm<br>Panel cut-out: 87.5 x 56.5 mm<br>Installation depth: ca. 60mm   |

