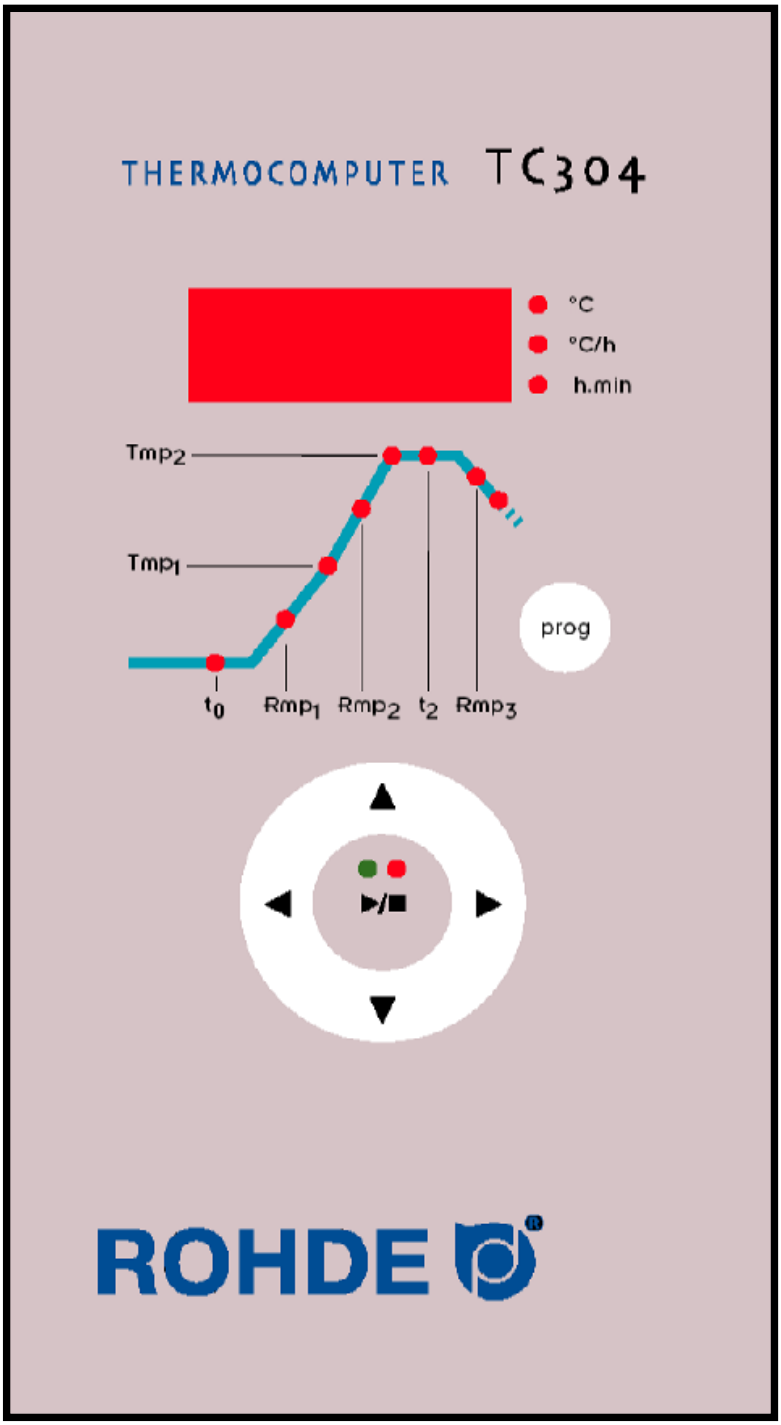
ROHDE®

TC 304



Operating Instructions

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General Information

The control unit TC 304 is the leader of its class, due to the high-end technology used in this outstanding controller series.

Read these instructions to familiarise yourself with all features of the TC 304. Read through them carefully and pay attention to the safety instructions of the kiln manufacturer.

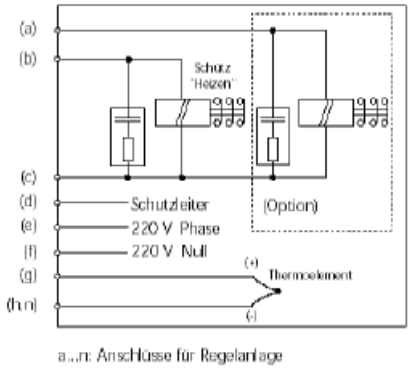
Please make sure that the controller is installed at an adequate distance from the kiln. It should never be exposed to heat generated by exhaust fumes or radiation emitted by the kiln.

Appendix B Electrical Connection

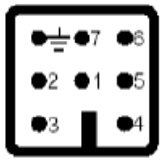
Simplified circuit diagram of a kiln

Important Note:

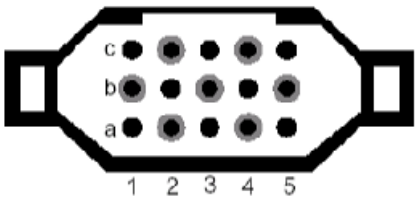
The specifications given here are exemplary only. Theelectrical connections are determined by the customer and often deviate from the specifications given in this example. Please check the documentation provided by the kiln manufacturer. If the controller layout is suitable for more than ne zone or if it is equipped with more than two outlets, please use the HAN15DX connection (see additional description).



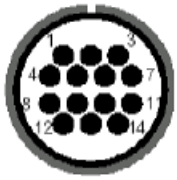
Plug Assignment HAN7D a



Plug Assignment HAN15D a



Plug Assignment CPC14 a



Connection	Function	HAN7D a	HAN15D a	CPC14a
a	Additional control outlet	7	C3	12
b	Control outlet connector (phase)	6	A3	14
c	Control outlet connector (zero)	1	B3	13
d	Ground wire *		Endclamp	11
e	Power supply phase	5	A1	8
f	Power supply zero	2	B1	9
g	Thermocouple +	3	B5	1
h	Thermocouple - (Pt Rh Pt)	4	C5	2
n	Thermocouple - (NiCrNi)	4	A5	3

* The ground wire **must** be connected!

Important Note:

Please compare the type of the thermocouple with the type specification that is stated on the back of the controller. Otherwise you might cause damage to the kiln and the kiln content!
The manufacturer of kiln and control unit does not assume liability in such cases!

Design and specifications subject to change without notice. Instruction manual TC 304 V1.1
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Event B3

Firing has been interrupted after power failure

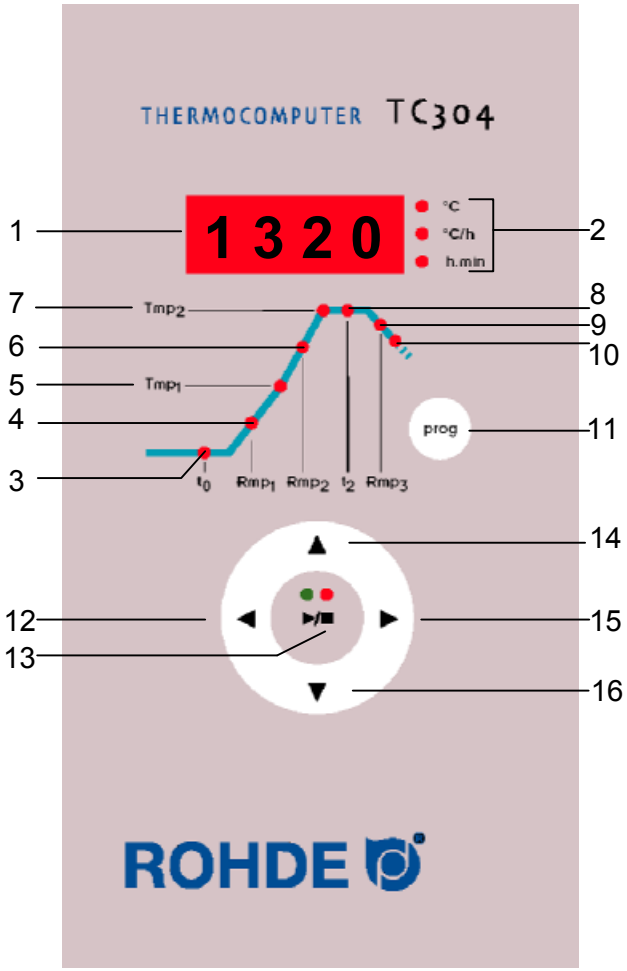
After the power has retured after power failure the firing process has been aborted as e.g. the kiln temperature has dropped too far in the meantime.

Further information about the event might be displayed by adding a decimal number **(e.g. B3.4 = temperature has dropped too far)**.

If this message appears immediately after you switched on the controller you can ignore it. In this case it only signifies that the controller had been switched off at the last firing while the programme was still running.

Just start with the programme input.

Operating elements



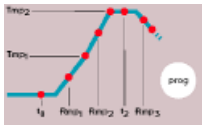
1	Actual value display
2	Display of units/values
3	Checking/ Entering delay time
4	Checking/ Entering 1. warming-up time
5	Checking/ Entering dwell time point
6	Checking/ Entering 2. warming-up time
7	Checking/ Entering final temperature
8	Checking/ Entering dwell time at final temperature
9	Checking/ Entering cooling-down temperature
10	Display for programme end
11	Key for selecting programmes 1-5
12	Key "go to previous" ◀
13	Key to "Start/Stop" programme “
14	Change current value **+**
15	key "go to next" ▶
16	Change current value **-**

Quick instructions

Starting the programme:

1.	O I	Power on. Red display of actual temperature. The power switch is located at the bottom of the controller housing.
2.		Programmes can be called up by shortly pressing this key until you reach the required programme. The red display first shows the programme number, then the final temperature.
3.		Starting or stopping the selected programme.

Changing the programme:

1.-2.		see above!
3.		Select the firing curve values you wish to change using the ◂ or ▸ arrows.
4.		Change the selected values using the ▲ or ▼ arrows. The values are stored automatically.
5.		Starting or stopping the selected programme.

Storing programmes

The TC 304 automatically stores all changeable values of the firing curve.

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Event A4

Temperature increase too small despite heating on full load
This error message always indicates a problem at the kiln. Possible causes:

- Mains supply fuse / phase, heating element defect
- Heating elements too old (at high temperatures)
- Thermocouple or supply short-circuit
- Power relay defect (often occurs during firing)

Event A5

Kiln does not follow the required temperature increase
In contrast to Event A4 here the cause can also be that the programmed temperature increase has been chosen too high for the kiln to follow. This message will only be activated if it has been set during configuration.

Event A8

Increase contiued automatically
If the kiln cannot follow the temperature increase the ramp is stopped (see section on „kiln cannot follow ramp“). If the controller continues the programme after the halt period has passed without success this message will be displayed for 1 minute.

Event A9

SKIP ramp forcefully terminated
If the controller has tried unsuccessfully to heat the kiln to final temperature in an uncontrolled ramp the controller switches to the next segment (see section „uncontrolled ramps (SKIP)“). For the information of the operator this message will be displayed for 1 minute.

Appendix A
TC304 Error and Event messages

Error and event archive

Special events (power failure, broken sensor, kiln problems, etc.) are detected by the control unit and treated accordingly.

The event codes are classified as follows:
E-CODE A = operating and controller problems
E-CODE B = power failure problems
E-CODE C = internal problems
E-CODE D = hardware problems

The possible event messages and their meanings are listed and explained below.

Event A1

Error at signal input
Control switched off due to error at signal input (e.g. exceeding measure range):
The error will be reset after restarting the programme. Possible causes:

- Thermocouple or supply interrupted
- Maximal temperature of controller exceeded
- Thermocouple connected to wrong poles (Temperature display „under“)

Event A3

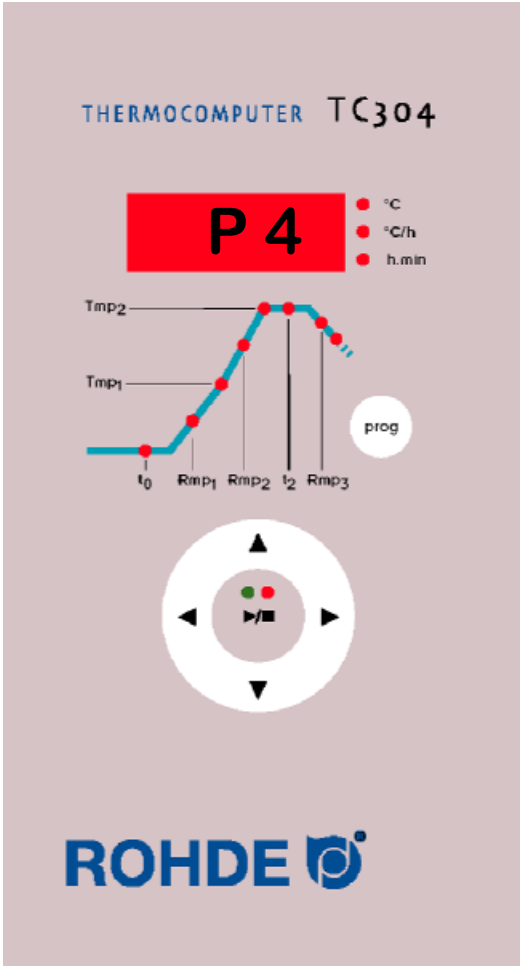
Safety circuit activated
If the maximum programme temperature is exceeded by more than 20°C the safety circuit is activated and the safety power relay switches the kiln off (only if installed and configurated). This prevents the kiln from overheating. Possible causes for overheating:

- Kiln power relay stuck in „ON“ position
- Contact of kiln power relay closed permanently

Calling up a programme

The TC 304 can store 5 firing curves (i.e. programmes). The manufacturer has preset the programmes to standard firing curves, which you can modify. The preset programmes are suggestions and have to be adjusted to the materials you are using:

Prog.Nr.	Bezeichnung	t0(min)	rmp.1(°C/h)	tmp.1(°C)	rmp2(°C/h)	tmp.2(°C)	t2(min)	rmp3 (°C/h)
01	Trocknen 150°C	0	50	150	skip	150	10	skip
02	Schrühbrand 850°C	0	80	600	100	850	5	skip
03	Irdenware 1050°C	0	100	300	130	1050	20	skip
04	Steingut 1150°C	0	100	300	130	1150	20	skip
05	Steinzeug 1250°C	0	100	300	130	1250	20	skip



In the following example we will call up the firing curve programme No. 4 and start the firing process.

After switching on the TC 304 the red display shows the current temperature.

Briefly press the Prog key until programme No. 4 is displayed. The display now switches to the final temperature of the selected programme.

Starting the firing process

In order to start the programme, please press the Start key.

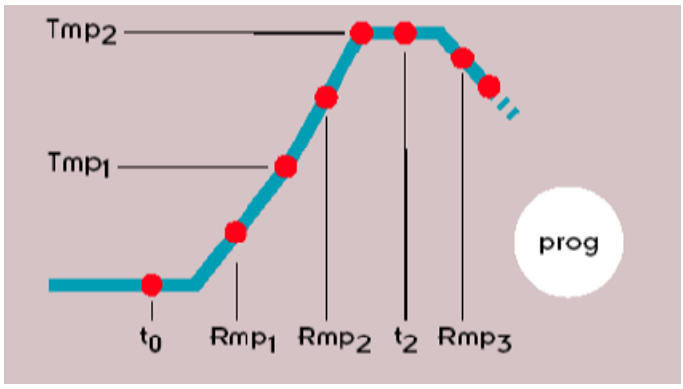
The green LED light in the Start/Stop key is now on.

The red display shows the current kiln temperature.

Note:
The green LED light in the Start/Stop indicates a running firing process.

Insert Firing Curve / Programme

The micro-processor control unit TC 304 allows you to achieve high-precission control and reproducible results with your kiln. The firing curve of the TC 304 is displayed in the following diagram. It consists of a number of segments:



First, choose the programme slot on which you wish to store the new programme. Press the "prog" key until the desired programme slot (1 to 5) appears.

t0

Delay time / Delay of Programme Start:
The controller waits for the preset period of time until it starts the actual firing process. With this function the firing process can be started automatically, e.g. at night.

Press the ▶ key, in order to reach the input field "to“ (delay time). zu gelangen. Enter a value between 0.00 (no delay time) and 9.59 (hours.minutes) by using the ▲ or ▼ keys.

rmp1

Heating up to 1. dwell temperature
The kiln is heated up in the preset speed, input in degree Celsius per hour.

Press the ▶ key, to reach the input field "rmp1“ (1 heating ramp). Enter a value between 1 and 999°C/h, or select SKIP (full load heating) by using the ▲ or ▼keys.

tmp1

Temperature for 1. dwell time
The kiln is heated at the speed set above until it reaches the 1. dwell temperature, input in degree Celsius.

Press the ▶ key, to reach the input field "tmp1“ (1 dwell emperature). Enter a value between 20 and 1320°C by using the ▲ or ▼ keys.

rmp2

Heating up to final temperature:
The kiln is heated up to the final temperature at the preset speed, input in degree Celsius per hour.

Press the ▶ key to reach the input field "rmp2" (2. heating ramp). Enter a value between 1 and 999°C/h, or select SKIP (full load heating) by using the ▲ or ▼ keys.

tmp2

Temperature for final temperature:
The kiln is heated up to the final temperature at the preset speed, input in degree Celsius per hour.

The kiln is heated at the speed set above until it reaches the final temperature. Press the ▶ key, to reach the input field "tmp2" (final temperature). Enter a value between 20 and 1320°C by using the ▲ or ▼ keys.

t2

Dwell time at final temperature:
The kiln maintains the final temperature for the preset time. The dwell time ensures that the goods are heated thoroughly and evenly.

Press the ▶ key to reach the input field "t2" (dwell time at final temperature). Enter a value between 0.00 and 9.59 (hours.minutes) by using the ▲ or ▼ keys.

rmp3

Cooling down / End of programme:
After the dwell time has timed out the kiln will cool down; this can either be carried out ontrolled (e.g. 200° C/h) or uncontrolled (=SKIP). At 150°C the controller will end the temperature contol and display "End" in the display, which indicates the end of the firing process.

Press the ▶ key in order to reach the input field "rmp3" (cooling down time or end of programme). Enter a value between 1 and 999°C/h by using the ▲ or ▼ key, or select SKIP (uncontrolled cooling down).

Storing of programmes

The TC 504 automatically stores all changeable values of the firing curve.