

# Temperatursensor für 384er Block Temperature sensor for the 384well block

Bedienungsanleitung · Operating Manual

**eppendorf**

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# 1 Introduction / 2 Safety precautions

## 1 Introduction

The 384-well block sensor and the temperature validation system enable validation and calibration / adjustment of the Mastercycler 384, Mastercycler pro 384 and Mastercycler ep 384.

### 1.1 How to use this manual

This operating manual for the 384-well block temperature sensor is a supplement to the user manual for the temperature validation system. It is not a replacement.

Before using the 384-well block temperature sensor for the first time, you should also read the operating manual for the temperature validation system. The current version of the operating manual is available on the internet at [www.eppendorf.com](http://www.eppendorf.com)

## 2 Safety precautions



### Risk of burns

When inserting, repositioning and removing the temperature sensor and the silicone mat during and at the end of validation and calibration, take care not to touch the heated lid.



Caution must be used when removing or repositioning the temperature sensor during and at the end of validation or calibration. The silicone mat is subjected to extreme heat by the heated lid. Allow the silicone mat to cool down with the heated lid open to around 30 °C or below (approx. 1 – 2 min).



The sensor cable should not be kinked outside the jacketed area. Should the sensor cable be damaged, the temperature sensor should no longer be used.



After cleaning the measurement positions the Mastercycler 384, Mastercycler pro 384 or the Mastercycler ep 384 should not be switched back on immediately as otherwise traces of the cleaning agent might ignite. The Mastercycler 384, Mastercycler pro 384 or the Mastercycler ep 384 should be ventilated by being left switched off with the lid open for a period of time.



The safety precautions in the operating manual of the temperature validation system and the relevant device (Mastercycler 384, Mastercycler pro 384) must be observed without fail.

## 3 Product information

### 3.1 Delivery package

- Temperature sensor for the 384well block
- Operating manual for the 384 temperature sensor (this manual)
- Silicone mat
- Personal card for use with the Mastercycler 384
- Oil (25 ml)
- Bag with 4 spacers

### 3.2 Setup

The temperature sensor is commissioned for use in the temperature validation system as described in the operating manual of the temperature validation system (Section 6).

### 3.3 Accuracy of the measuring device and the measurements

The specifications from the operating manual of the temperature validation system apply.

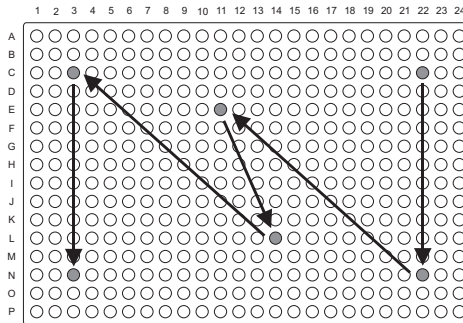
## 4 Operation

### 4.1 Operation

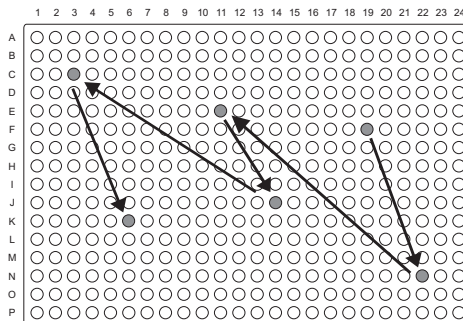
#### 4.1.1 Filling the measurement positions with oil

To ensure good heat transfer from the wall of the measurement positions to the temperature sensor, the intermediate space must be wetted with oil. For this the measurement positions of the switched-off, cold 384well block, are each filled with 5 µl oil from a pipette.

The measurement positions for the Mastercycler 384 are: C3, N3, E11, L14, C22 and N22.



The measurement positions for the Mastercycler pro 384 and Mastercycler ep 384 are: F19, N22, E11, J14, C3 and K6.



#### 4.1.2 Inserting of the spacers and inserting, repositioning and removing the temperature sensor



##### **Danger of burns**

When inserting, repositioning and removing the temperature sensor, the spacers and the silicone mat during and at the end of validation and calibration, take care not to touch the heated lid.

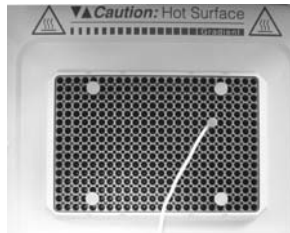


Caution must be used when removing or repositioning the temperature sensor during and at the end of validation or calibration. The silicone mat is subjected to extreme heat by the heated lid. Allow the silicone mat to cool down with the heated lid open to around 30 °C or below (approx. 1 – 2 min).

## 4 Operation

**Before insertion of the sensor, the four spacers are to be placed into positions B5, B20, O5 and O20.**

Insert the sensor into the indicated position on the thermoblock, so that the cable can be led out through the front and placed loosely over the block. If using the Mastercycler 384, make sure that the sensor cable is not placed in the area of the lid cap!



### Caution

The sensor cable may not become kinked outside the jacketed area! Should the sensor cable be damaged, the temperature sensor should no longer be used.

Place the silicone mat over the sensor and the spacers on the 384-well block, and close the heated lid.

If the Mastercycler ep 384 has a motorized lid, the lid automatically moves to the front position and is then locked.



### Caution

When removing the sensor from the measurement position, do not pull on the sensor cable!

### 4.1.3 Cleaning the measurement positions

Switch off the Mastercycler 384 / Mastercycler pro 384 / Mastercycler ep 384 and allow to cool down.

Remove the remaining oil from the measurement position with a pipette.

Flush the measurement positions 3 to 4 times with 20 µl portions of alcohol. Remove any oil on the block with a cloth soaked in alcohol.

Alcohol (80 % ethanol) is recommended as cleaning agent for the measurement positions.



### Caution

After cleaning the device should not be switched back on immediately as traces of the cleaning agent might ignite. The device should be ventilated by being left switched off with the lid open for a period of time.



### Note

The measurement positions must be thoroughly cleaned! Traces of oil can lead to changes in the heat transfer properties which could affect the samples in subsequent experiments.

## 4 Operation

### 4.2 Validation

The validation program tests the accuracy of the temperature of the block. The program procedure selects consecutive temperatures.

The temperatures on the display of the device are compared with the internal values. This cycle is carried out in six different block positions. The validation procedure for the Mastercycler 384 takes approx. one hour while for the Mastercycler pro 384 and Mastercycler ep 384 a period of approx. 30 min. is required to complete validation.

In the event of any deviation calibration / adjustment should be subsequently performed.

The accuracy of the measuring system is  $\pm 0.3$  K for the measurement range for 35 °C to 95 °C. The permitted tolerance for the Mastercycler 384 is  $\pm 0.6$  K (35 °C and 72 °C) resp.  $\pm 1.0$  K (95 °C).

The permitted tolerance for the Mastercycler pro 384 and Mastercycler ep 384 is  $\pm 0.6$  K (35°C) resp.  $\pm 1.0$  K (95 °C).



## 4 Operation

### 4.2.1 Validation of the Mastercycler 384 with software version 2.22

Validation of the Mastercycler 384 with the software version 2.22 is carried out in principle as described in the operating manual for the temperature validation system for the Mastercycler / Mastercycler gradient, software version 2.00 and below.

The programs VAL384A and VAL384B are provided on the personal card supplied. The programs must be stored in the internal memory of the Mastercycler 384, and validation can then commence when the program VAL384A is started. If necessary, the programs can be entered manually.

If the validation results are outside the permissible limit values, it is necessary to calibrate the device. Please contact your service representative.

Programm: VAL384A				Programm: VAL384B			
	CNTRL	BLOCK		CNTRL	BLOCK		CNTRL
	LID 105°			LID 105°			LID 105°
	WAIT	AUTO		WAIT	AUTO		WAIT
1	PAUSE	INSERT <b>C22</b>		1	PAUSE	INSERT <b>L14</b>	
2	T=95°	0:02:00		2	T=95°	0:02:00	
3	SOUND	1		3	SOUND	1	
4	PAUSE	READ TEMP		4	PAUSE	READ TEMP	
5	T=72.0°	0:02:00		5	T=72.0°	0:02:00	
6	SOUND	1		6	SOUND	1	
7	PAUSE	READ TEMP		7	PAUSE	READ TEMP	
8	T=35°	0:02:00		8	T=35°	0:02:00	
9	SOUND	1		9	SOUND	1	
10	PAUSE	READ TEMP		10	PAUSE	READ TEMP	
11	PAUSE	INSERT <b>N22</b>		11	PAUSE	INSERT <b>C3</b>	
12	T=95°	0:02:00		12	T=95°	0:02:00	
13	SOUND	1		13	SOUND	1	
14	PAUSE	READ TEMP		14	PAUSE	READ TEMP	
15	T=72.0°	0:02:00		15	T=72.0°	0:02:00	
16	SOUND	1		16	SOUND	1	
17	PAUSE	READ TEMP		17	PAUSE	READ TEMP	
18	T=35°	0:02:00		18	T=35°	0:02:00	
19	SOUND	1		19	SOUND	1	
20	PAUSE	READ TEMP		20	PAUSE	READ TEMP	
21	PAUSE	INSERT <b>E11</b>		21	PAUSE	INSERT <b>N3</b>	
22	T=95°	0:02:00		22	T=95°	0:02:00	
23	SOUND	1		23	SOUND	1	
24	PAUSE	READ TEMP		24	PAUSE	READ TEMP	
25	T=72.0°	0:02:00		25	T=72.0°	0:02:00	
26	SOUND	1		26	SOUND	1	
27	PAUSE	READ TEMP		27	PAUSE	READ TEMP	
28	T=35°	0:02:00		28	T=35°	0:02:00	
29	SOUND	1		29	SOUND	1	
30	PAUSE	READ TEMP		30	PAUSE	READ TEMP	
31	LINK	VAL384B		31	HOLD	22°ENTER	
	end				end		

## 4 Operation

### Protocol sheet for temperature validation (template)

Mastercycler type:  Device no:

Temp.	Position Mastercycler 384	Measured on Mastercycler (printer or display)	Measured on temperature measuring device	Valid range  [°C]	Date	Time
-------	------------------------------	---	--	-------------------------	------	------

<b>95 °C</b>	C22	°C	°C	93.7 – 96.3		
	N22	°C	°C	93.7 – 96.3		
	E11	°C	°C	93.7 – 96.3		
	L14	°C	°C	93.7 – 96.3		
	C3	°C	°C	93.7 – 96.3		
	N3	°C	°C	93.7 – 96.3		

<b>72 °C</b>	C22	°C	°C	71.1 – 72.9		
	N22	°C	°C	71.1 – 72.9		
	E11	°C	°C	71.1 – 72.9		
	L14	°C	°C	71.1 – 72.9		
	C3	°C	°C	71.1 – 72.9		
	N3	°C	°C	71.1 – 72.9		

<b>35 °C</b>	C22	°C	°C	34.1 – 35.9		
	N22	°C	°C	34.1 – 35.9		
	E11	°C	°C	34.1 – 35.9		
	L14	°C	°C	34.1 – 35.9		
	C3	°C	°C	34.1 – 35.9		
	N3	°C	°C	34.1 – 35.9		

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
(Signature)

## 4 Operation

### 4.2.2 Validation of the Mastercycler 384 with software version 2.30 and above

Validate the Mastercycler 384 as described in the operating manual for the temperature validation system in the chapter Performance of validation Mastercycler, Mastercycler gradient and Mastercycler personal with software version 2.10 and higher.

### 4.2.3 Validation of the Mastercycler pro 384 and Mastercycler ep 384 with Control Panel

Validate the Mastercycler pro 384 and the Mastercycler ep 384 as described in the operating manual for the temperature validation system in the chapter Validation of Mastercycler pro and Mastercycler ep with Control Panel.

The measuring positions for the 384-well block are displayed on the control panel.

### 4.2.4 Validation of the Mastercycler pro und Mastercycler ep 384

using the CycleManager pro / pro<sup>XL</sup> or ep CycleManager

Validate the Mastercycler pro 384 and Mastercycler ep 384 as described in the operating manual for the temperature validation system in the chapter Validation of Mastercycler pro / ep using CycleManager pro / pro<sup>XL</sup> or ep CycleManager.

The measuring positions for the 384-well block are displayed on the screen

## 4.3 Calibration / adjustment

The calibration program tests and adjusts the accuracy of the temperature of the block. This is done by selecting the temperature of the block for two different temperatures (95 °C and 35 °C). Then the program compares the measured values from the measuring device with the internal values. This cycle is carried out in six different block positions. The newly determined temperatures are used for the temperature calibration of the device. The calibration procedure for the Mastercycler 384 takes approx. one hour while for the Mastercycler pro 384 and Mastercycler ep 384 a period of approx. 30 min. is required to complete calibration.

### 4.3.1 Calibration / adjustment of the Mastercycler 384 with software version 2.30 and above

Calibrate / adjust the Mastercycler 384 as described in the operating manual for the temperature validation system in the chapter Performance of calibration / adjustment Mastercycler, Mastercycler gradient and Mastercycler personal with software version 2.10 and higher.

### 4.3.2 Calibration / adjustment of the pro 384 and Mastercycler ep 384

Calibrate / adjust the Mastercycler pro 384 and Mastercycler ep 384 as described in the operating manual for the temperature validation system in the chapter Calibration / adjustment of Mastercycler pro / ep using CycleManager pro / pro<sup>XL</sup> or ep CycleManager.

The measuring positions for the 384-well block are displayed on the screen.

## 4 Operation

### 4.3.3 Calibration / adjustment of the Mastercycler pro and Mastercycler ep 384 using the CycleManager pro / pro<sup>XL</sup> or ep CycleManager

Calibrate / adjust the Mastercycler pro 384 and Mastercycler ep 384 as described in the operating manual for the temperature validation system in the chapter Calibration / adjustment of Mastercycler pro / ep using CycleManager pro / pro<sup>XL</sup> or ep CycleManager.

The measuring positions for the 384-well block are displayed on the screen..

## 5 Maintenance

The temperature sensor does not require regular maintenance. Soiling can be carefully wiped off with a damp cloth. The oil film on the temperature sensor can be wiped off with a cloth soaked in alcohol.

Information on the maintenance of the measuring device is included in the separate operating manual.

## 6 Error messages

The error messages are included in the operating manual of the temperature validation system.

## 7 Disposal

In case the product is to be disposed of, the relevant legal regulations are to be observed.

### **Information on the disposal of electrical and electronic devices in the European Community**

The disposal of electrical devices is regulated within the European Community by national regulations based on EU Directive 2002/96/EC on waste electrical and electronic equipment (WEEE).

According to these regulations, any devices supplied after 13.08.05 in the business-to-business sphere, to which this product is assigned, may no longer be disposed of in municipal or domestic waste. They are marked with the following symbol to indicate this.



As disposal regulations within the EU may vary from country to country, please contact your supplier if necessary.

## 8 Technical data / 9 Ordering information

### 8 Technical data

Sensor: Temperature sensor for the 384well block

The operating conditions and the storage and transport conditions are included in the operating manual of the temperature validation system.

The temperature sensor is adjusted. In order to guarantee that the measurement is in compliance with international standards (NIST, PTB), the temperature sensor must be calibrated with the supplied measuring device.

### 9 Ordering information

Description	Order no.
Temperature sensor for the 384well block, incl. personal card, silicone mat, spacers, and operating manual	5331 233.007
Temperature validation system for Mastercycler, Mastercycler ep and Mastercycler pro	0055 000.298
Personal card for the temperature validation system (384)	5331 235.000
Silicone mat	5331 234.003
Spacers for 384well block (set of 4)	5331 872.000
Operating manual	5331 232.140

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