



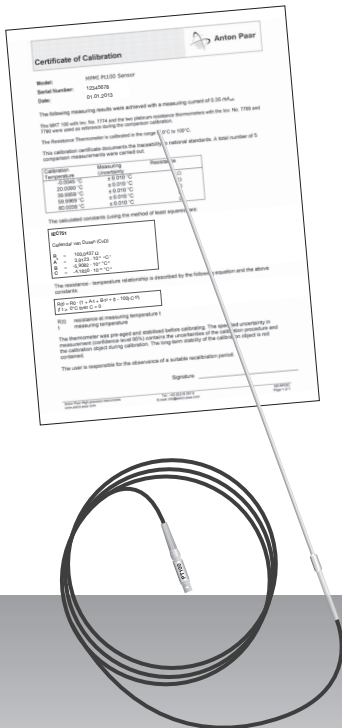
**Anton Paar**

**MKT 50**

Standard Operating Procedure

- ● ● ● Required Equipment
- ● ● ● Entering Calibration Coefficients
- ● ● ● Selecting Sensor
- ● ● ● Measurement

# Required Equipment



# Entering Calibration Coefficients



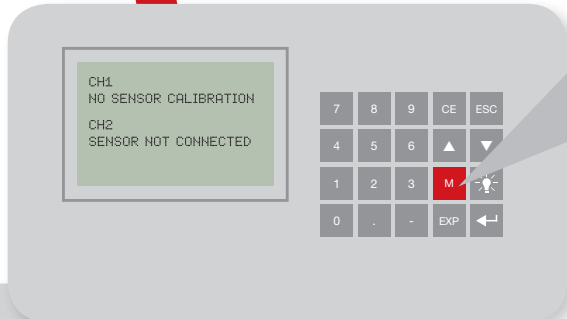
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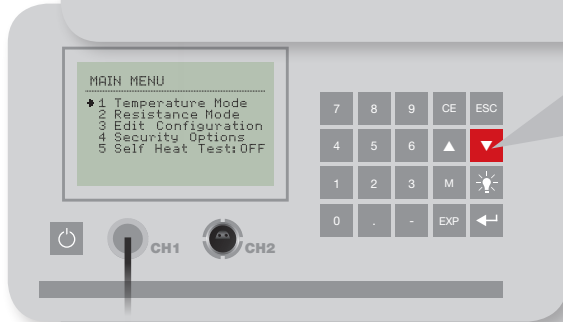
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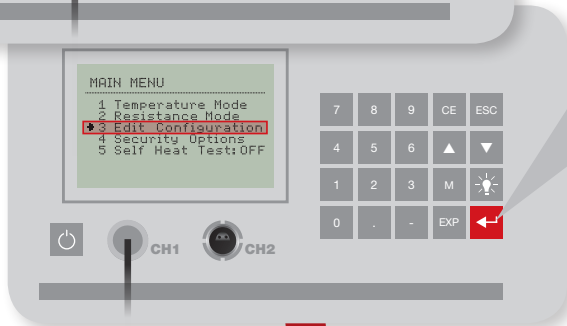
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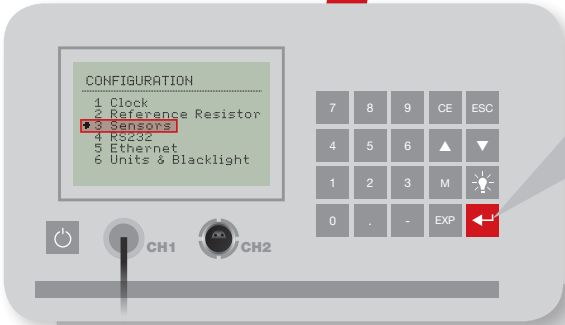
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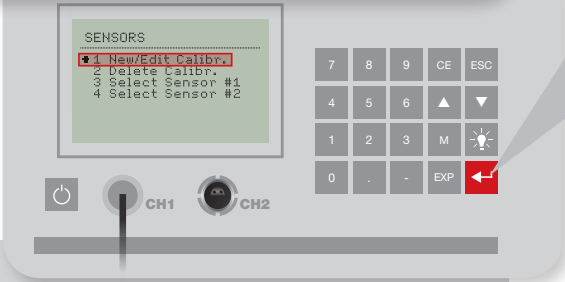
5



6




7



8



**Certificate of Calibration**



Model: MPMS P100 Sensor  
 Serial Number: 12345678  
 Date: 01.01.2013

The following measuring results were achieved with a measuring current of 0.35 mA<sub>DC</sub>.  
 The MPT 100 with Inv. No. 7774 and the two platinum resistance thermometers with the Inv. No. 7789 and 7790 were used as reference during the comparison calibration.

The Resistance Thermometer is calibrated in the range of 0°C to 100°C.

This calibration certificate documents the traceability to national standards. A total number of 5 comparison points were used.

Resistance	Temperature
100,0437 Ω	0 °C
100,0437 Ω	100 °C

**IEC751**

Callendar van Dusen (CvD)

$R_0 = 100,0437 \Omega$   
 $A = 3,9123 \cdot 10^{-3} \text{ } ^\circ\text{C}^{-1}$   
 $B = -5,9082 \cdot 10^{-7} \text{ } ^\circ\text{C}^{-2}$   
 $C = -4,1830 \cdot 10^{-12} \text{ } ^\circ\text{C}^{-4}$

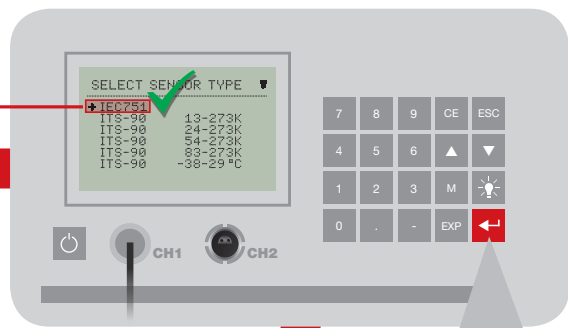
$R(t) = R_0 \cdot (1 + A \cdot t + B \cdot t^2 + (t - 100) \cdot C)$   
 If  $t \geq 0^\circ\text{C}$  then  $C = 0$

...ing equation and the above

The user is responsible for the observation of a suitable recalibration period.


Signature \_\_\_\_\_

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ANAP003  
Page 1 of 1




SELECT SENSOR TYPE

<input checked="" type="checkbox"/> IEC751	13-273K				
<input type="checkbox"/> ITS-90	24-273K				
<input type="checkbox"/> ITS-90	54-273K				
<input type="checkbox"/> ITS-90	83-273K				
<input type="checkbox"/> ITS-90	-38-29 °C				




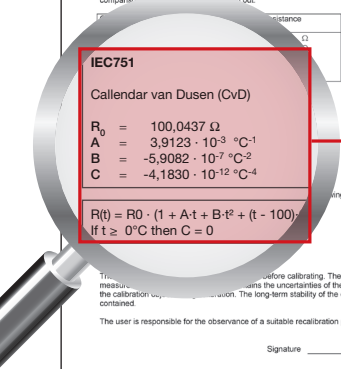
CH1



CH2

7	8	9	CE	ESC
4	5	6	▲	▼
1	2	3	M	💡
0	.	-	EXP	←





## Certificate of Calibration

**Model:** MPMI Pt100 Sensor  
**Serial Number:** 12345678 **SN**  
**Date:** 01.01.2013

The following measuring results were achieved with a measuring current of 0.35 mA<sub>exc</sub>.

The MKT 100 with Inv. No. 7774 and the two platinum resistance thermometers with the Inv. No. 7789 and 7790 were used as reference during the comparison calibration.

The Resistance Thermometer is calibrated in the range of 0°C to 100°C.

This calibration certificate documents the traceability to national standards. A total number of 5 comparison measurements were carried out.

Calibration Temperature	Measuring Uncertainty	Resistance
-0.0045 °C	± 0.010 °C	Ω
20.0090 °C	± 0.010 °C	Ω
39.9958 °C	± 0.010 °C	Ω
59.9969 °C	± 0.010 °C	Ω
80.0038 °C	± 0.010 °C	Ω

The calculated constants (using the method of least squares) are:

**IEC751**

Callendar van Dusen (CvD)

$R_0 = 100,0437 \Omega$   
 $A = 3,9123 \cdot 10^{-4} \text{ } ^\circ\text{C}^{-1}$   
 $B = -5,9082 \cdot 10^{-7} \text{ } ^\circ\text{C}^2$   
 $C = -4,1830 \cdot 10^{-12} \text{ } ^\circ\text{C}^3$

The resistance - temperature relationship is described by the following equation and the above constants.

$$R(t) = R_0 \cdot (1 + A \cdot t + B \cdot t^2 + (t - 100) \cdot C \cdot t^3)$$

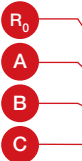
If  $t \geq 0^\circ\text{C}$  then  $C = 0$

$R(t)$  resistance at measuring temperature  $t$   
 $t$  measuring temperature

The thermometer was pre-aged and stabilised before calibrating. The specified uncertainty in measurement (confidence level 95%) contains the uncertainties of the calibration procedure and the calibration object during calibration. The long-term stability of the calibration object is not contained.

The user is responsible for the observance of a suitable recalibration period.

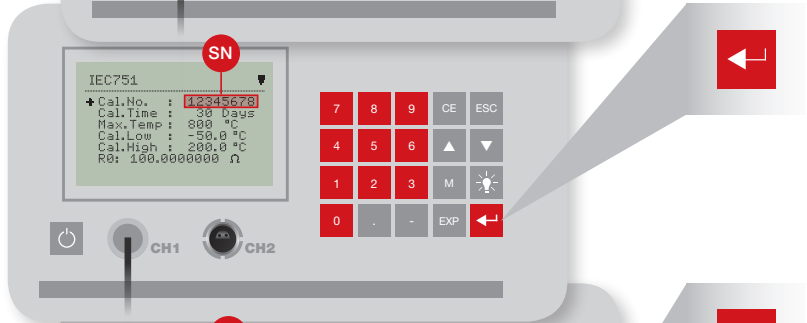
Signature \_\_\_\_\_



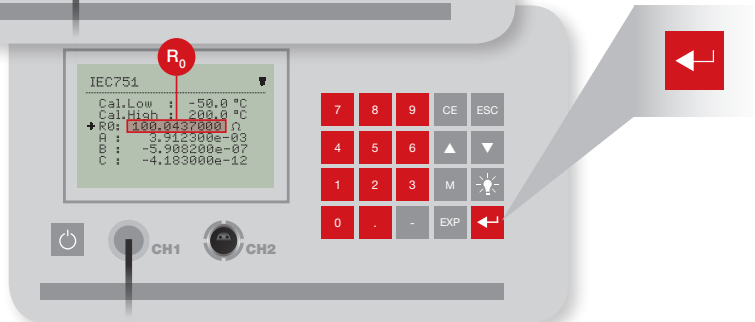
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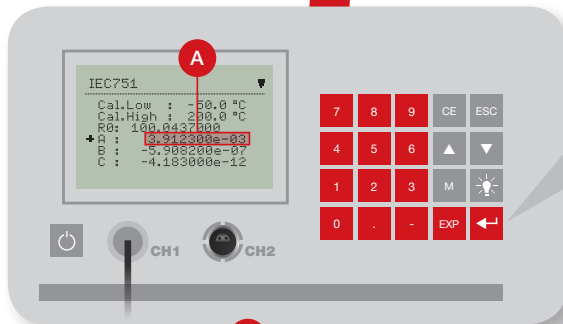
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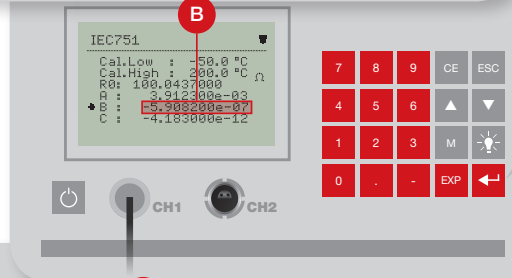
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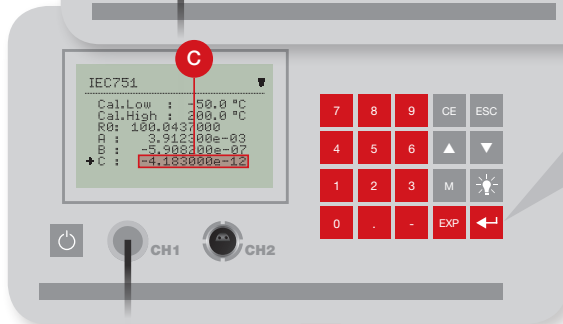
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14



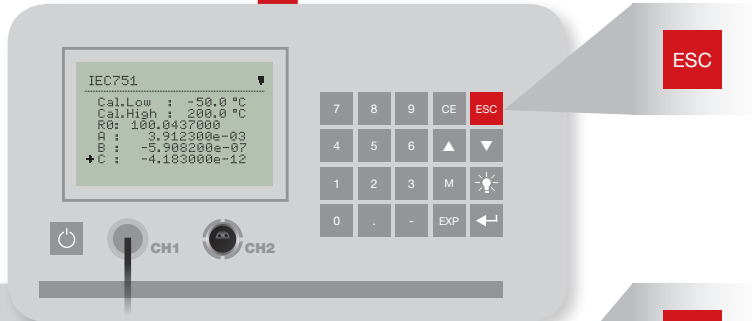
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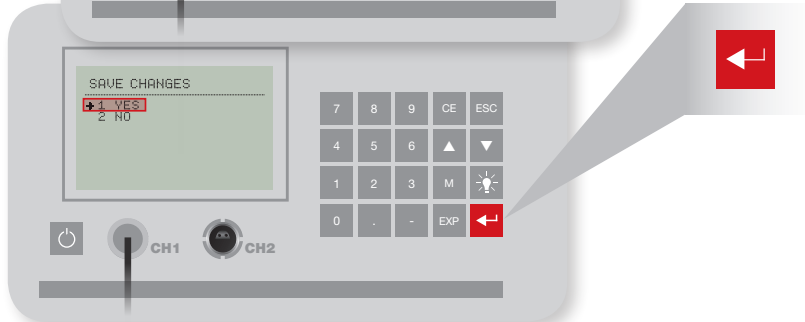
Example

$$3.9083 \times 10^{-3} \text{ } ^\circ\text{C}^{-1}$$
$$=$$
$$3.908300 + \text{EXP}$$
$$+ \text{ } + 03$$

16



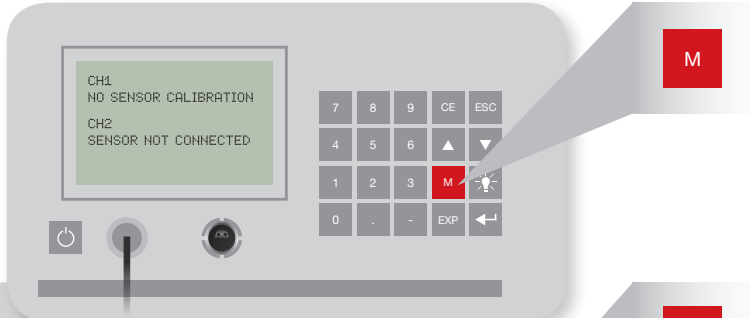
17



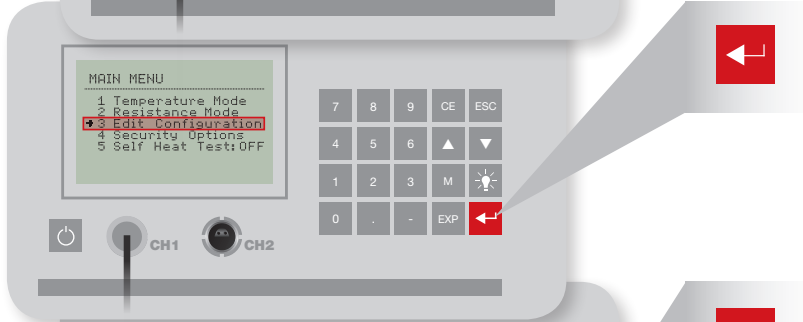
# Selecting Sensor



1



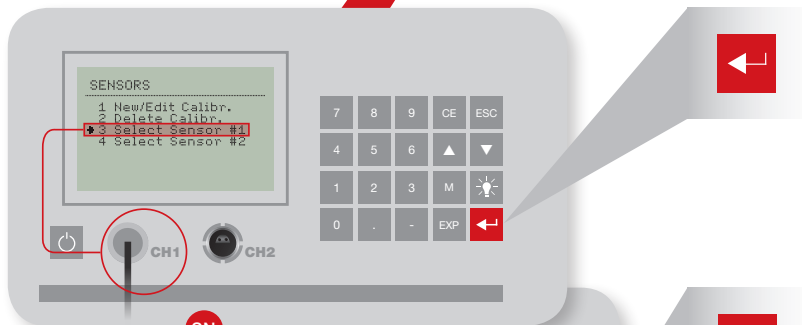
2



3



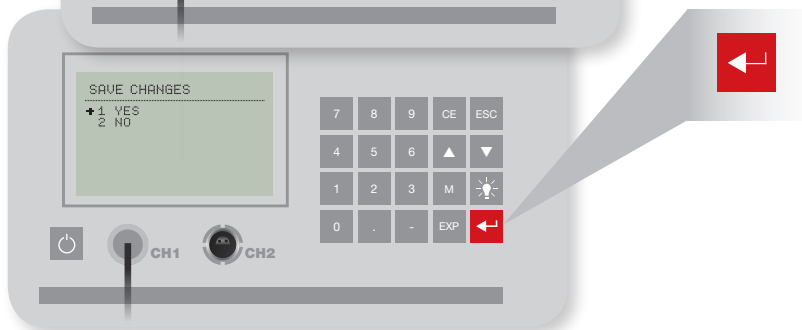
4



5



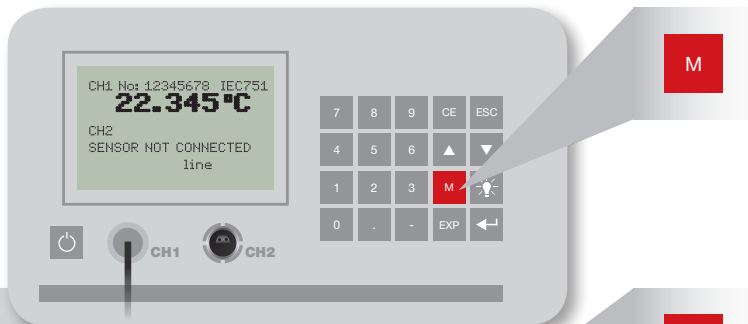
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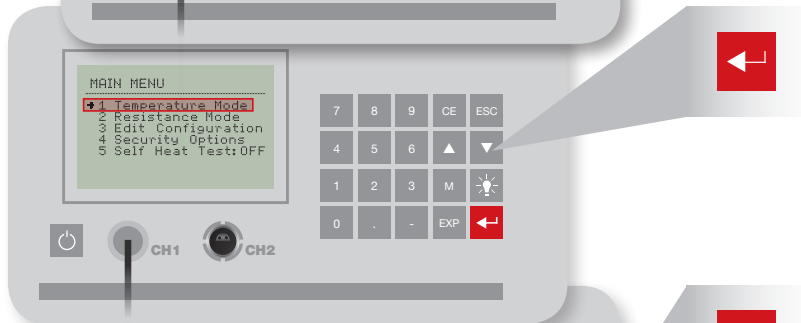
# Measurement



1



2



3



4





# Anton Paar

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## **Instruments for:**

Density & concentration  
measurement

Rheometry

Viscometry

Sample preparation

Microwave synthesis

Colloid science

X-ray structure analysis

Refractometry

Polarimetry

High-precision temperature measurement