

User Manual  
English

## Portavo® 902 COND





## Return of products under warranty

Please contact our Service Team before returning a defective device.

Ship the cleaned device to the address you have been given.

If the device has been in contact with process fluids, it must be decontaminated/disinfected before shipment. In that case, please attach a corresponding certificate, for the health and safety of our service personnel.



## Disposal

Please observe the applicable local or national regulations concerning the disposal of “waste electrical and electronic equipment”.

## Registered trademarks

The following names are registered trademarks. For practical reasons they are shown without trademark symbol in this manual.

- Calimatic®
- Memosens®
- Paraly®
- Portavo®
- Sensocheck®
- Sensoface®

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Check the shipment for transport damage and completeness.

The package of the Portavo 902 COND includes:

- The Portavo 902 COND incl. 4 AA batteries and premounted quiver
- Carrying strap
- Quickstart instructions in various languages
- Specific test report
- Safety instructions
- Data carrier with detailed user manuals

## Specific Test Report

### CD-ROM

Complete documentation:

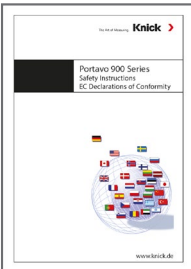
- User manuals in different languages
- Safety instructions
- Quickstart guides



### Safety Instructions

In official EU languages and others.

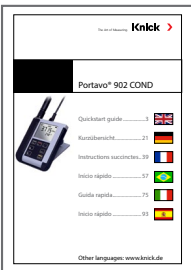
- EC Declarations of Conformity



### Quickstart Guides

Installation and first steps:

- Operation
- Menu structure
- Calibration
- Error messages and recommended actions



Various languages on CD-ROM and on our website:  
[www.knick.de](http://www.knick.de)



**The Portavo 902 COND** is a portable conductivity meter. A plain-text line on the high-contrast LCD screen makes operation virtually self-explanatory. The meter stands out by the following features:

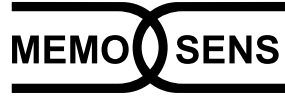
- Use of digital Memosens sensors
  - A detachable quiver protects the sensor and prevents it from drying out. Furthermore, it can be used for calibration.
  - The rugged housing is made of a high-performance polymer. It provides high impact resistance and dimensional stability even when exposed to extreme moisture.
- 
- Scratch-proof clear glass display, perfectly readable even after years
  - Very long operating times with one set of batteries (4 x AA)
  - Sensoface icons provide single-glance information on the sensor condition (page 33)
  - Real-time clock and indication of battery charging level
  - At measuring temperatures from -20 to +100 °C the temperature detector can be automatically identified.

## Value-Added Features

### Memosens

The Portavo 902 can communicate with Memosens sensors. These digital sensors are automatically identified and the meter switches to the appropriate measurement method.

When a Memosens sensor is connected to the meter, it is indicated by the logo shown on the right. Furthermore, Memosens allows the storage of calibration data, which will be available and can still be used when the sensor is connected to another Memosens-capable device.



### Sensoface

Sensoface provides quick information on the sensor condition. The three "smiley" faces as shown on the right represent the sensor condition during measurement and after a calibration. When the condition deteriorates, an "INFO ..." message gives a hint to the cause.

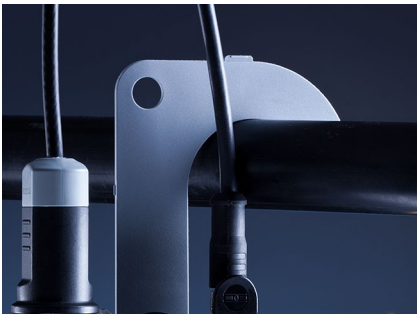






## Protective Cover

The front of the meter is protected by a cover, which can be completely flipped over and secured to the back for operation. A label on the inner side of the cover explains the control functions and device messages.



## Hook

A fold-out hook on the back allows suspending the meter. This leaves your hands free for the actual measurement. The **rating plate** is located beneath the hook.



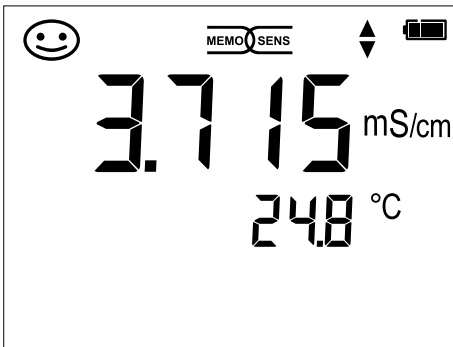
## Protective Cover and Hook Combined

Cover and hook can be joined together to form a benchtop stand allowing comfortable and fatigue-free working at a lab bench or desk.

## Display

The meter has a three-line display for representing alphanumeric information such as measurement and calibration data, temperatures and date/time.

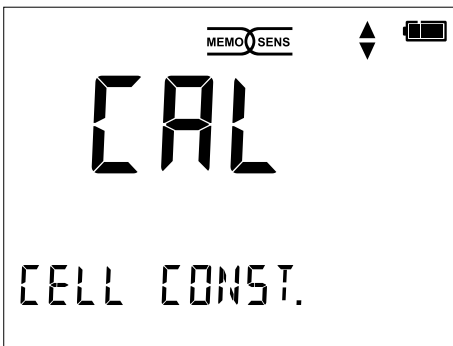
Additional information is provided by means of icons (Sensoface, battery icon, etc.). Some typical displays are shown below:



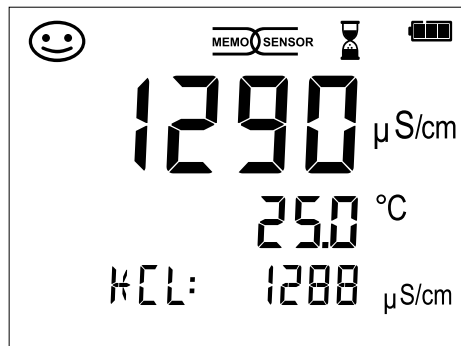
Measuring  
(display of measured value and temperature)



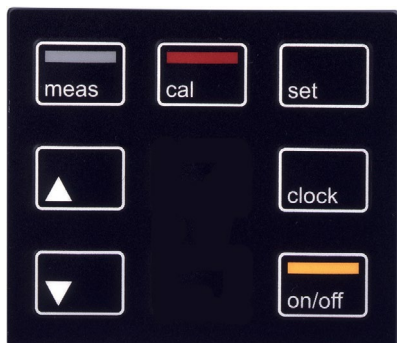
Clock  
(display of hours and minutes, seconds and date)



Calibration  
(Calibration by entry of cell constant)



Calibration  
(with KCl solution)



## Keypad

The keys of the membrane keypad have a noticeable pressure point.

They have the following functions:

- on/off** Switches the meter on and displays the device and calibration data (see Start-up)
- meas** Switches the meter on / Activates measuring mode
- cal** Starts calibration
- set** Activates configuration / Confirms entries
- clock** Displays time and date, allows setting the clock using **set**
- ▲▼** When this icon is displayed, you can use the arrow keys for navigation.

Check the shipment for transport damage and completeness (see Package Contents).

### NOTICE!

Do not operate the device when one of the following conditions applies:

- the device shows visible damage
- the device fails to perform the intended function
- prolonged storage at temperatures above +70 °C / +158 °F
- severe transport stresses

In this case, a professional routine test must be performed.

This test should be carried out at our factory.





## Inserting the Batteries



With four AA batteries, the Portavo has an operating time of over 1000 h.

Open the battery compartment on the rear of the device. Be sure to observe the correct polarity when inserting the batteries (see markings in the battery chamber). Close the battery compartment cover and screw it handtight.

### A battery icon in the display indicates the battery power level:

	Icon fully filled	Batteries at full capacity
	Icon partially filled	Battery capacity is sufficient
	Icon empty	Battery capacity not sufficient; calibration is possible
	Icon blinks	Max. 10 operating hours remaining, measurement is still possible <b>CAUTION!</b> It is absolutely necessary to replace the batteries.

## Connecting a Sensor

The Portavo 902 COND provides several connections so that many types of sensors can be used for measurement (see illustration below).

Note that only **one** sensor may be connected to the meter at a time.

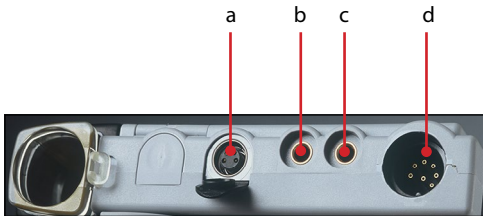
The meter automatically recognizes a connected Memosens sensor and switches accordingly. Memosens is signaled in the display.

### Separate temperature probe

**Note:** Temperature measurement using a separate temperature probe is only possible when no Memosens sensor is connected.

After power-on, a separate temperature probe is automatically recognized.

When you want to replace the temperature probe, you must switch off the meter and then switch it on again.



### Connections

- a - M8, 4 pins for Memosens sensors
- b - Temperature probe GND
- c - Temperature probe
- d - DIN socket, 8 pins for analog sensors

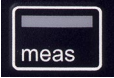
Memosens sensors have a **cable coupling**, which allows convenient replacement of sensors while the cable remains connected to the meter. The connecting cable is connected to socket **a** (M8, 4 pins for Memosens sensors).





## Switching On the Meter

When you have connected the sensor, you can switch the meter on by pressing the **on/off** or **meas** key.



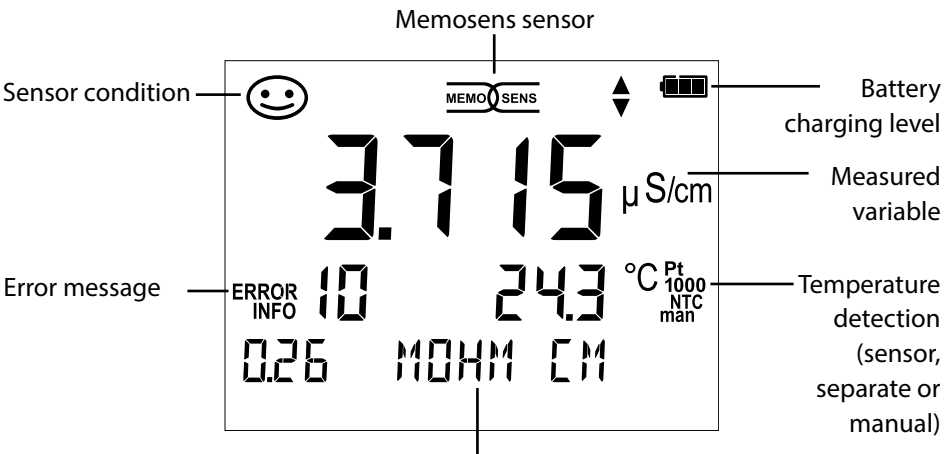
When the meter is switched on with the **on/off** key, first a self test is performed and then the calibration data and settings are displayed before the meter switches to measuring mode.

When the meter is switched on with the **meas** key, it immediately switches to measuring mode.

Depending on the connected sensor and the specific measuring task, several steps for configuration and calibration must be performed as described on the following pages.

## Icons

Important information about the state of the device



Uncompensated measured value in  $\text{M}\Omega \text{ cm}$   
**or** temperature compensation (TC)  
 Toggle by pressing **meas**.



## Conductivity Configuration

Prior to measurement, a configuration should be performed to match the connected sensor and the desired measurement performance.

Furthermore, you can select the suitable calibration method.

The following table gives you an overview.

Factory settings are shown in **bold print**.

Measurement

↓ **set**

“Setup” display

Display
MOHM cm
Cond Unit
TDS Factor
TC <sup>*)</sup>
TC LINEAR
REF. Temp.
▲ Conc. Table ▼
CAL
Auto OFF
Temp. Unit
Time Format
Date Format
TAN TEMP CAL
Default

↔ **set**

Select using arrow keys, confirm by pressing **set**.

<b>Cond</b>   Conc %   SAL g/kg   TDS mg/l   °C
<b>OFF</b>   On
<b>mS/cm</b>   S/m
0.0 ... <b>1.0</b> (if display = TDS)
<b>OFF</b>   LINEAR   NLF   NAACL   HCL   NH3   NAOH (if display = Cond)
0.0 ... 20.0 %/K   <b>2.1 %/K</b> (if TC = LINEAR)
0 ... 100 °C   <b>25 °C</b> ( 32 ... 212 °F   <b>77 °F</b> ) (if TC = LINEAR)
When display has been set to “Conc %”: -01- ... -10- (for concentration ranges, see page 39)
<b>CELL CONST.</b>   COND   0.01 MOL KCL   0.1 MOL KCL   INST. FACTOR**   ZERO POINT**   FREE CAL
<b>OFF</b>   0.1h   1h   6h   12h
°C   °F
<b>24h</b>   12h
<b>dd.mm.yy</b>   mm.dd.yy
(TAN input required, option; see page 31)
<b>NO</b>   YES (reset to factory settings)

\*) Temperature compensation \*\*) For inductive cond. measurement only

- ▲ This icon prompts you to select a menu item using the arrow keys –
- ▼ the selection is confirmed by pressing **set**.



## CELL CONST Calibration

(Calibration by entry of cell constant)

The calibration method is selected in the configuration menu.

Measurement

↓ cal

CAL  
CELL CONST.

Calibration method, the number of calibration points and the buffer set have been selected in the configuration menu.

↓

Value blinks

Use ▲▼ to select the value for the cell constant.

↓ cal

Calibration is performed. Automatic return to measuring mode.



## COND Calibration

(Calibration by entry of cell conductivity)

The calibration method is selected in the configuration menu.

Measurement

↓ cal

CAL  
COND

Dip sensor in solution.

↓

Value blinks

Use ▲▼ to adjust the temperature-corrected conductivity value. **NOTICE:** Here, the meter does not perform a temperature compensation!

↓ cal

Calibration is performed. Automatic return to measuring mode.





## 0.1 / 0.01 MOL KCL Calibration

(Automatic calibration with KCl solution)

The calibration method is selected in the configuration menu.

### NOTICE!

- Make sure that the values of the calibration solutions used correspond exactly to those specified in this manual.  
If not, the resulting cell constant will be incorrect.
- When calibrating in a liquid, make sure that the sensor, the separate temperature probe (if present) and the calibration solution have the same temperature.  
Only this ensures that the cell constant is determined correctly.

Measurement

↓ **cal**

CAL  
0.1/0.01 MOL KCL  
PRESS CAL

Dip sensor in KCl solution.

The meter automatically compensates for the temperature deviation!

↓ **cal**

Measured value  
Temperature  
Conductivity KCl  
Hourglass blinks

↓

Calibration is performed. Automatic return to measuring mode.



## INST. FACTOR Calibration

(For inductive conductivity measurement only:  
input of installation factor)

Selected in the configuration menu.

Measurement

↓ cal

CAL  
INST. FACTOR

↓ cal

Value blinks

↓ cal

In narrow installation conditions, the conductivity measurement is influenced by the sensor's distance to the wall and the wall material. This effect can be compensated for by the installation factor. The transmitter corrects the cell constant by multiplying it with the installation factor. The value of the installation factor depends on the diameter and the conductivity of the pipe as well as on the sensor's distance from the wall. If the distance from the wall is sufficient ( $> 15 \text{ mm}$  (0.59"), DN 80 or larger), it is not necessary to consider the installation factor (1.00). If the distance from the wall is smaller, the installation factor increases ( $> 1$ ) when the pipe is electrically insulating and decreases ( $< 1$ ) when the pipe is electrically conductive. Refer to sensor documentation if required.

Use ▲▼ to adjust the installation factor.

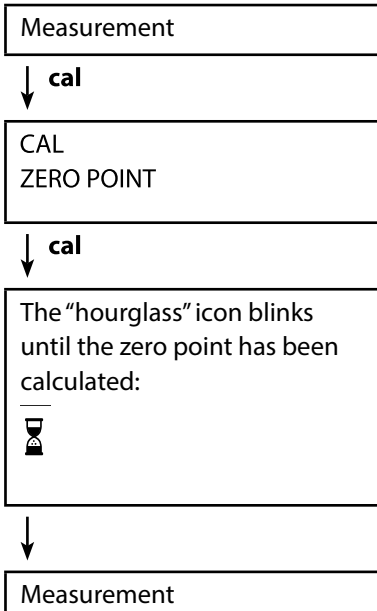
Calibration is performed. Automatic return to measuring mode.



## ZERO POINT Calibration

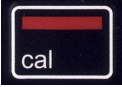
(For inductive conductivity measurement only:  
calibrating the sensor zero point)

Calibration method is selected in the configuration menu.



Remove the sensor for calibration and place it in air – then start calibration.

Calibration is performed. When the calibration is finished, the following values will be displayed: cell constant, zero point, installation factor. Then the meter automatically returns to measuring mode.



## TEMP. OFFSET Calibration (Option)

### Temperature calibration (offset)

Selected in the configuration menu.

Measurement

↓ cal

CAL  
TEMP. OFFSET

↓ cal

Temperature setpoint value  
blinks.

↓ cal

You can specify an offset for the temperature measured by the sensor.

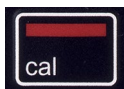
After calibration has been activated, the following values are listed in the display:

- temperature setpoint
- temperature measured by sensor
- offset (display in K)

Use ▲▼ to adjust the temperature setpoint value.

Calibration is performed, the offset value is indicated.

Automatic return to measuring mode.



## FREE CAL Calibration

(Free selection of calibration method)

FREE CAL calibration is selected in the configuration menu.

Measurement

↓ cal

CAL  
CELL CONST. blinks

↓ cal

Use ▲▼ to select the desired calibration method (CELL CONST., COND, 0.01 MOL KCL or 0.1 MOL KCL, INST. FACTOR\*, ZERO POINT\*, TEMP. OFFSET).

Perform the selected calibration as described on the previous pages.

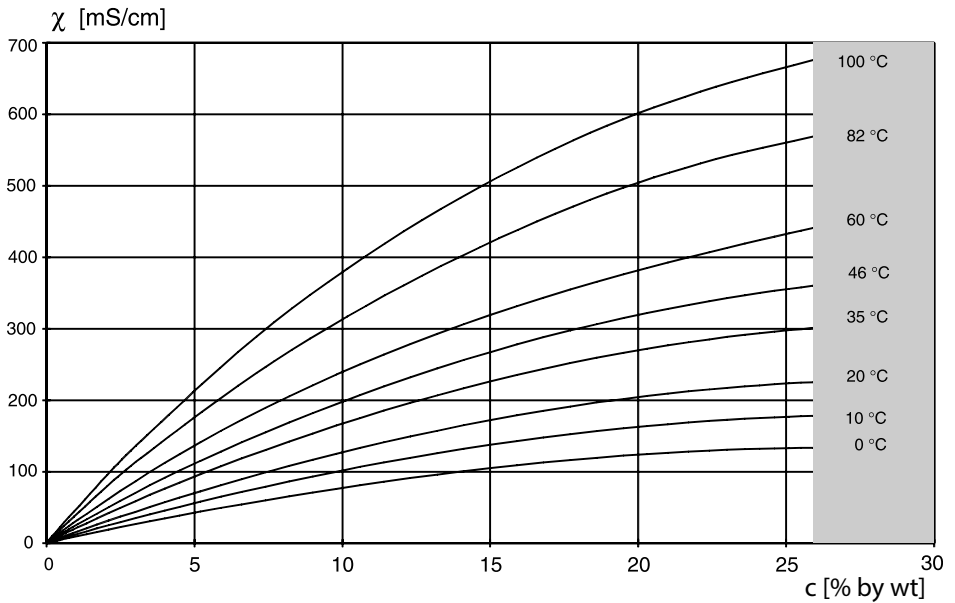
\* For inductive conductivity measurement only

## Measuring Ranges

Substance	Concentration ranges		
NaCl	0-26 wt% (0 °C) 0-26 wt% (100 °C)		
Configuration	<b>-01-</b>		
HCl	0-18 wt% (-20 °C) 0-18 wt% (50 °C)	22-39% wt% (-20 °C) 22-39% wt% (50 °C)	
Configuration	<b>-02-</b>	<b>-07-</b>	
NaOH	0-13 wt% (0 °C) 0-24 wt% (100 °C)	15-50 wt% (0 °C) 35-50 wt% (100 °C)	
Configuration	<b>-03-</b>	<b>-10-</b>	
H <sub>2</sub> SO <sub>4</sub>	0-26 wt% (-17 °C) 0-37 wt% (110°C)	28-77 wt% (-17 °C) 39-88 wt% (115 °C)	94-99 wt% (-17 °C) 89-99 wt% (115°C)
Configuration	<b>-04-</b>	<b>-09-</b>	<b>-06-</b>
HNO <sub>3</sub>	0-30 wt% (-20 °C) 0-30 wt% (50 °C)	35-96 wt% (-20 °C) 35-96 wt% (50 °C)	
Configuration	<b>-05-</b>	<b>-08-</b>	

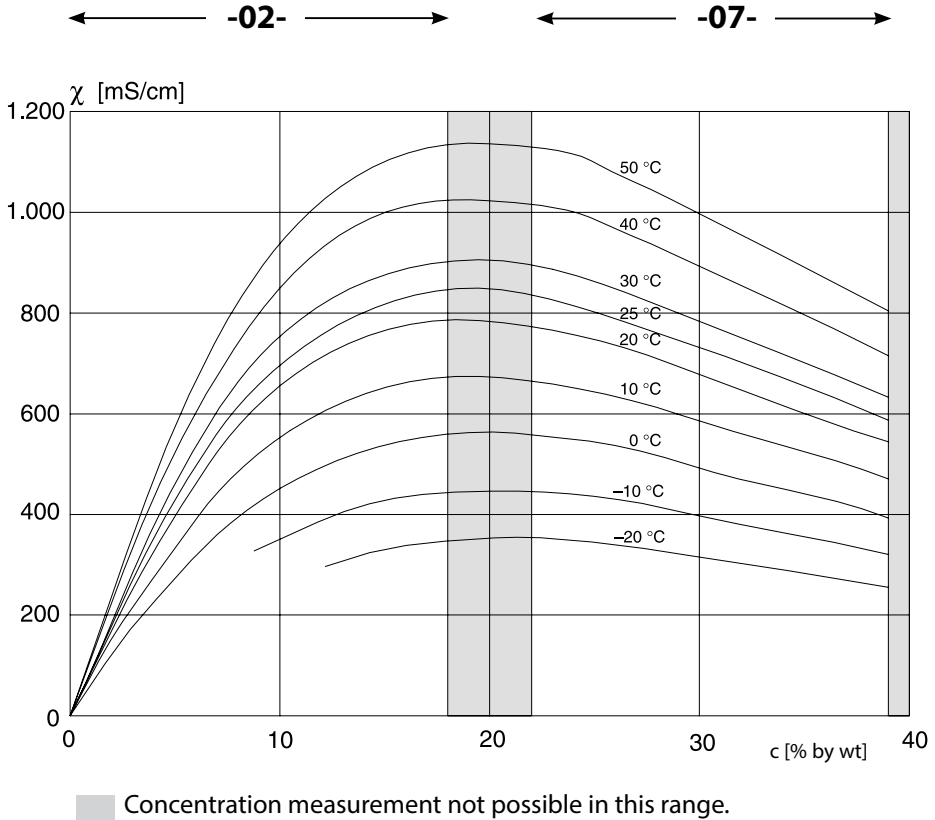
For the solutions listed above, the device can determine the substance concentration from the measured conductivity and temperature values in % by weight. The measurement error is made up of the sum of measurements errors during conductivity and temperature measurement and the accuracy of the concentration curves stored in the device. We recommend calibrating the device together with the sensor, e.g., directly to concentration using the CELL CONST. method. For exact temperature measurement, you should perform a temperature probe adjustment.

## -01- Sodium chloride solution NaCl



■ Concentration measurement not possible in this range.

Conductivity versus substance concentration and process temperature for sodium chloride solution (NaCl)

**-02- Hydrochloric acid HCl****-07-**

Conductivity versus substance concentration and process temperature for hydrochloric acid (HCl)

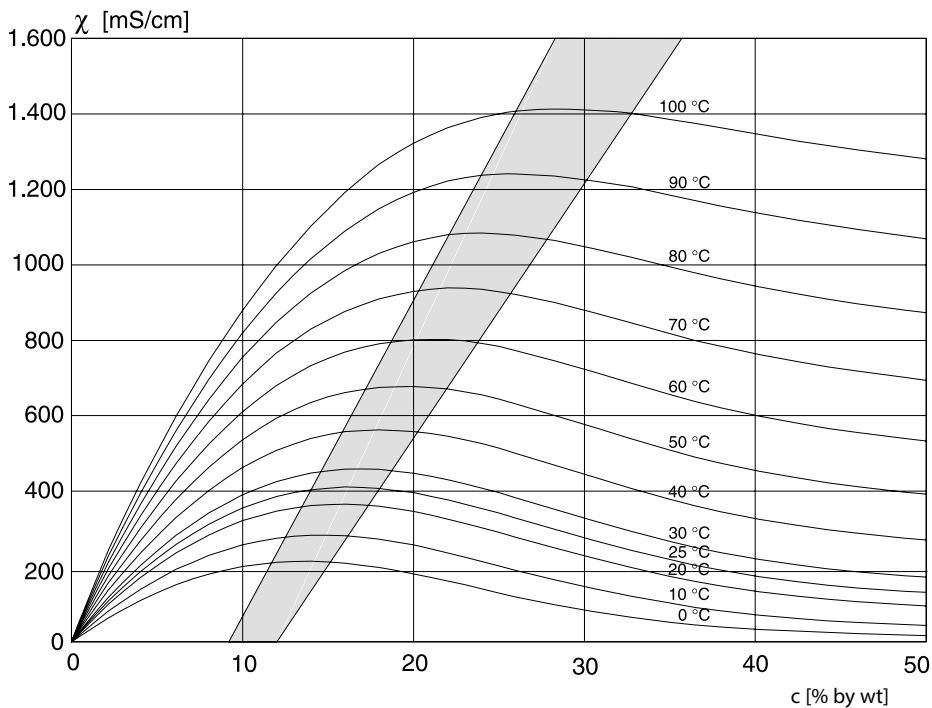
Source: Haase/Sauermann/Dücker; Z. phys. Chem. New Edition, Vol. 47 (1965)



## -03- Sodium hydroxide solution NaOH

-10-

← -03- → ← -10- →

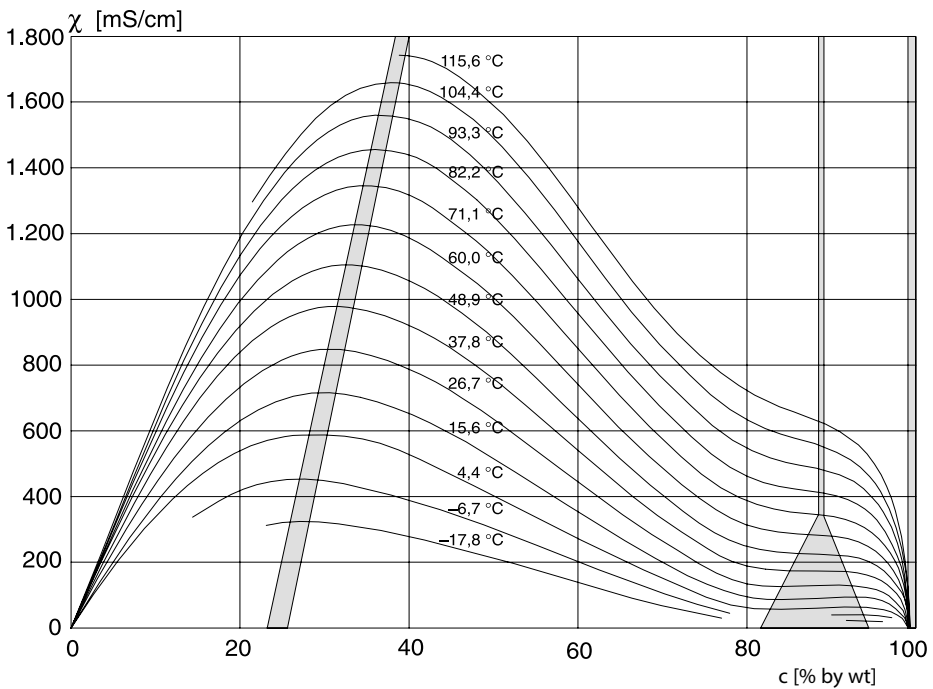


■ Concentration measurement not possible in this range.

Conductivity versus substance concentration and process temperature for sodium hydroxide solution (NaOH)

**-04- Sulfuric acid H<sub>2</sub>SO<sub>4</sub>****-06-****-09-**

← **-04-** → ← **-09-** → **-06-**



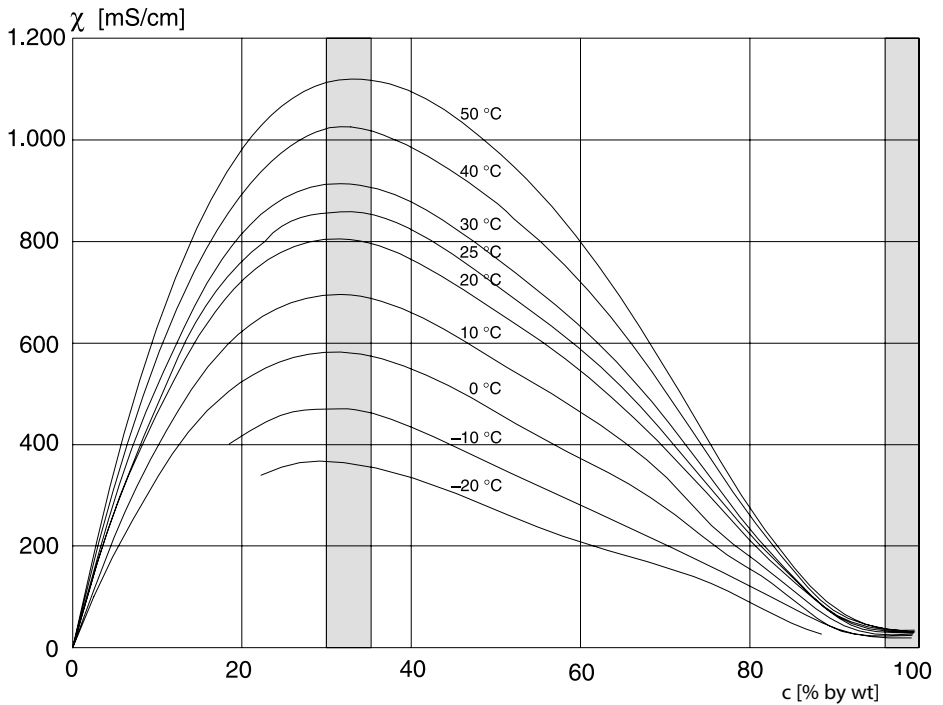
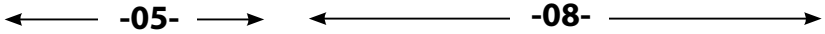
■ Concentration measurement not possible in this range.

Conductivity versus substance concentration and process temperature  
for sulfuric acid (H<sub>2</sub>SO<sub>4</sub>)

Source: Darling; Journal of Chemical and Engineering Data; Vol.9 No.3, July 1964

## -05- Nitric acid $\text{HNO}_3$

-08-



Concentration measurement not possible in this range.

Conductivity versus substance concentration and process temperature for nitric acid ( $\text{HNO}_3$ )

Source: Haase/Sauermann/Dücker; Z. phys. Chem. New Edition, Vol. 47 (1965)

Once you have completed all preparations, you can start with the actual measurement.

### Keys for measurement

- 1) Connect the desired sensor to the meter. Some sensors require a special preparation. Please proceed according to the operating instructions for the sensor.
- 2) Switch the meter on using the **on/off** or **meas** key.
- 3) Depending on the measurement method and the sensor used, immerse the sensing part of the sensor in the medium to be measured.
- 4) Watch the display and wait for the reading to stabilize.



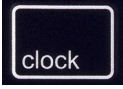
## Toggling between Compensated and Uncompensated Measured Values

With temperature compensation (TC) activated, you can press the **meas** key during measurement to toggle between display of **compensated** and **uncompensated** values.

## Adjusting the Temperature

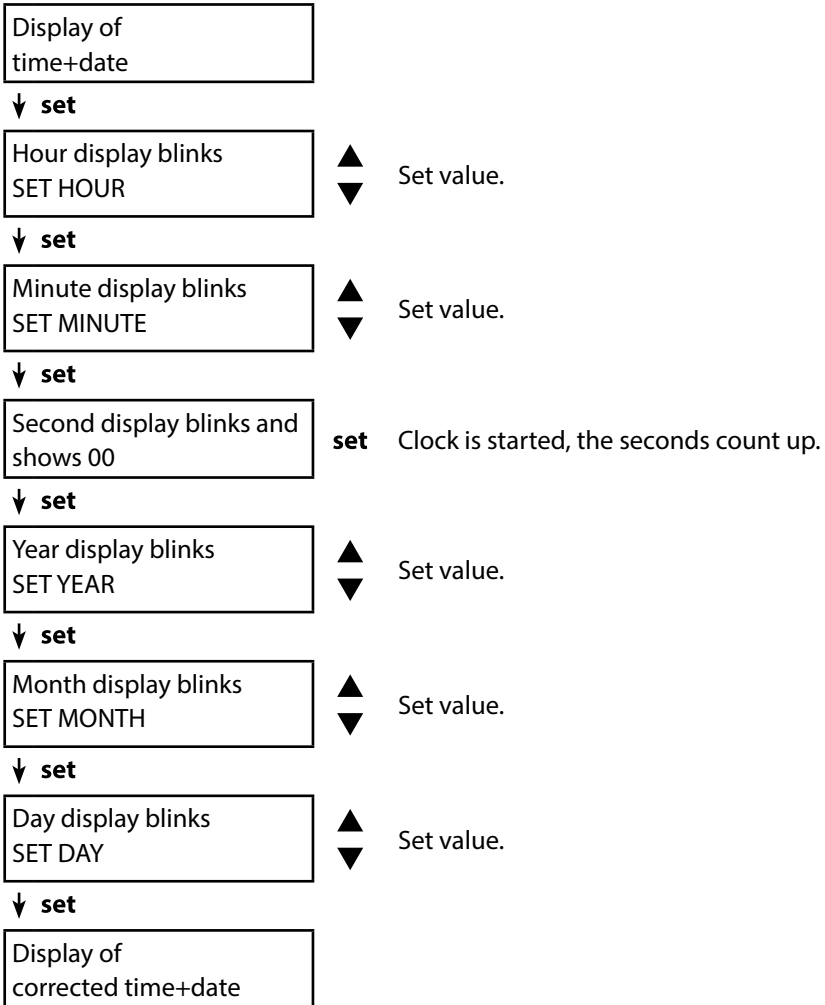
When you connect a sensor without temperature detector, you can manually adjust the temperature for measurement or calibration:

- 1) Press **meas** to access measuring mode.  
The adjusted temperature will be displayed.
- 2) Set the desired temperature value using the ▼ or ▲ arrow.  
Holding the key depressed changes the temperature value at high speed.

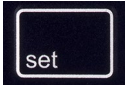


Press the **clock** key to access the clock mode. Date and time will be displayed in the format as set in the configuration menu.

To set the clock, proceed as follows:



## Enabling Options / TAN Input



When you have bought “Option 002 Temperature Calibration”, you receive a document with a code (TAN) for enabling this option on your device.

Press the **set** key to access the configuration mode.

Use the arrow keys to select the “TAN TEMP CAL” function where you can enter the TAN for enabling the option.

↓ **set**

TAN TEMP CAL

**set** Press the **set** key.

↓ **set**



Enter the TAN code.

First digit blinks.



Set value.

↓ **set**

Next digit blinks.



Set value.

↓ **set**

...



Set value, press **set** to save the TAN.

After correct input of the TAN, the device signals “PASS” – The option is now available.

## Option 002 Temperature Calibration

### Selecting the temperature calibration (TEMP. OFFSET)

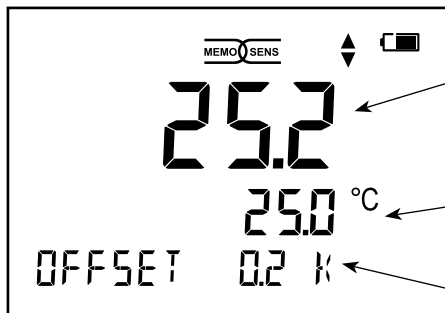
In measuring mode, press the **set** key.

- 1) Select **CAL** (calibration) and confirm by pressing **set**.
- 2) Select the **TEMP. OFFSET** calibration mode and confirm by pressing **set**.

### Performing the temperature calibration (TEMP. OFFSET)

In measuring mode, press the **cal** key.

Press **cal** once more to activate the function:



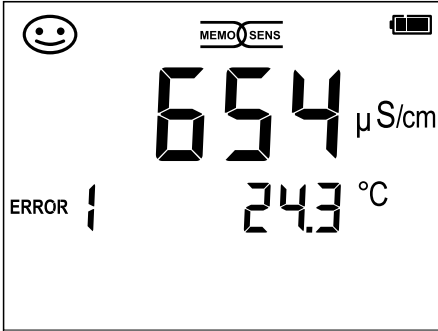
Use the ▲▼ keys to enter the reference value.

Temperature value currently measured by the sensor

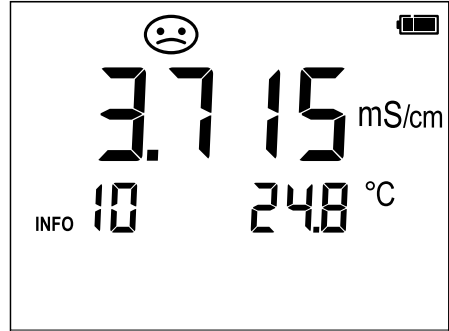
Indication of currently adjusted offset value.

Press **cal** to save the reference value.

Error messages are indicated as "ERROR ..." on the display. Information on the sensor condition is indicated by the "Sensoface" icon (friendly, neutral, sad) possibly accompanied by an info message ("INFO ...").



Example of an error message:  
ERROR 1 (value out of range)



Example of a "Sensoface" message:  
INFO 10 (polarization)

Sensoface (the "smiley" icon) provides information on the sensor condition (maintenance request). Measurement can still be performed. After a calibration, the corresponding Sensoface icon (friendly, neutral, sad) is shown together with the calibration data. Otherwise, Sensoface is only visible in measuring mode.

The most important error messages and "Sensoface" info messages are shown on the inside of the protective cover. A complete list of messages and their meanings is provided in the following tables.





## “Sensoface” Messages

The “Sensoface” icon provides information on the sensor condition:

### Sensoface Meaning



Sensor is okay



Calibrate the sensor soon



Calibrate or replace the sensor

The “neutral” and “sad” Sensoface icons are accompanied by an “INFO ...” message to give a hint to the cause of deterioration.

### Sensoface



### Message


INFO 6  
INFO 10

### Cause

Response time  
Polarization

## Error Messages

The following error messages can be shown in the display.

Message	Cause	Remedy
 blinks	Battery empty	Replace batteries
ERROR 1	Value out of range	Check whether the measurement conditions correspond to the adjusted measuring range.
ERROR 3	Temperature value out of range	
ERROR 6	Cell constant too high/low	Enter nominal cell constant or calibrate the sensor using a known solution.
ERROR 11	Measured value unstable Drift too high	Leave the sensor in the liquid until the temperature is stable. If this does not help, replace the sensor.
ERROR 14	Time and date invalid	Set time and date
ERROR 18	Configuration invalid	Restart, reset to factory settings (Setup: DEFAULT YES), configure and calibrate. If this does not help, send in the device for repair.
ERROR 19	Factory settings error	Device defective, send it in.
ERROR 21	Sensor error (Memosens)	Connect operational Memosens sensor.

## Conductivity Sensors

Please visit our website for more information on our product range: [www.knick.de](http://www.knick.de)

### Temperature detectors

**Note:** When a Memosens sensor is connected, the temperature detector of the Memosens sensor is used. When no Memosens sensor is connected, the Portavo 902 COND can be used as a temperature meter.

Pt1000 temperature detector

ZU 6959

Memosens sensors have a **cable coupling**, which allows convenient replacement of sensors while the cable remains connected to the meter.



## Conductivity Standards

### for determining a cell constant

Ready-to-use solutions	Quantity	Order No.
15 $\mu\text{S}/\text{cm}$ , (0.0001 mol/l KCl)	300 ml	ZU 0350
147 $\mu\text{S}/\text{cm}$ , (0.001 mol/l KCl)	500 ml	ZU 0702
1413 $\mu\text{S}/\text{cm}$ , (0.01 mol/l KCl)	250 ml	ZU 0349
12.88 $\mu\text{S}/\text{cm}$ , (0.1 mol/l KCl)	250 ml	ZU 0348

### Solutions for preparation

For preparation of 1000 ml 0.1 mol/l NaCl solution (12.88 mS/cm)	1 ampoule	ZU 6945
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## Accessories

Item	Order No.
Robust field case (for meter, sensor, various small parts and user manual)	ZU 0934
Replacement quiver (5 units)	ZU 0929
Memosens lab cable, M8, 4 pins	CA/MS-001XFA-L
Measuring cable for digital toroidal conductivity sensors with Memosens protocol, M8, 4 pins	CA/M12-001M8-L
KPG® tube for ZU 6985 4-electrode sensor, incl. O-ring	ZU 0180
Replacement flow cell for SE 202 2-electrode sensor	ZU 0284
Adapter for connecting a conductivity sensor with 2 banana plugs to the Portavo 902 COND	ZU 0289
Adapter for connecting the ZU 6985 4-electrode sensor to the Portavo 902 COND	ZU 0290

Please visit our website for more information on our product range: [www.knick.de](http://www.knick.de).

<b>Conductivity input, analog</b>	Multi-contact for 2-/4-el. sensors with integrated temp detector	
Measuring ranges	SE 202 sensor:	0.01 ... 200 $\mu\text{S}/\text{cm}$
	SE 204 sensor:	0.05 to 500 $\text{mS}/\text{cm}$
	2-electrode sensors:	0.1 $\mu\text{S} * \text{c} \dots 200 \text{mS} * \text{c}^4$
	4-electrode sensors:	0.1 $\mu\text{S} * \text{c} \dots 1000 \text{mS} * \text{c}^4$
Measurement error <sup>1,2,3)</sup>	< 0.5 % meas.val. + 0.4 $\mu\text{S} * \text{c}^4$	
Measuring cycle	Approx. 1 s	
Temperature compensation	Linear 0 ... 20 %/K, reference temperature adjustable	
Concentration measurement	See page 39	
Display resolution <sup>1)</sup> (autoranging)	Conductivity	0.001 $\mu\text{S}/\text{cm}$ ( $\text{c} < 0.05 \text{cm}^{-1}$ )
		0.01 $\mu\text{S}/\text{cm}$ ( $\text{c} = 0.05 \dots 0.2 \text{cm}^{-1}$ )
		0.1 $\mu\text{S}/\text{cm}$ ( $\text{c} > 0.2 \text{cm}^{-1}$ )
	Resistivity	00.00 ... 99.99 $\text{M}\Omega \text{cm}$
	Salinity	0.0 ... 45.0 $\text{g}/\text{kg}$ (0 ... 30 °C)
TDS	0 ... 1999 $\text{mg}/\text{l}$ (10 ... 40 °C)	
<b>Temperature input</b>	Multicontact for sensors with integrated temperature detector or 2 x 4 mm dia. for separate temperature detector	
Measuring ranges	NTC30 temp detector	-20 ... +120 °C
	Pt1000 temp detector	-40 ... +250 °C
Measuring cycle	Approx. 1 s	
Measurement error <sup>1,2,3)</sup>	< 0.2 K ( $T_{\text{amb}} = 23 \text{ }^\circ\text{C}$ ); TC < 25 ppm/K	
<b>Sensor standardization</b>	CELL CONST	Input of cell constant with simultaneous display of conductivity value and temperature
	COND	Input of conductivity of the calibration solution with simultaneous display of cell constant and temperature
	0.01 MOL KCL	Automatic determination of the cell constant with KCl solution (0.01 mol/l or 0.1 mol/l)
	0.1 MOL KCL	
Permissible cell constant	0.005 ... 200.0 $\text{cm}^{-1}$ (adjustable)	

1) According to EN 60746-1, at nominal operating conditions

2)  $\pm 1$  count

3) Plus sensor error

4) c = cell constant

<b>Conductivity input, Memosens</b>	M8 socket, 4 pins, for Memosens lab cable	
Measuring range	SE 215 MS sensor:	10 $\mu\text{S}/\text{cm}$ ... 20 $\text{mS}/\text{cm}$
Measuring cycle	Approx. 1 s	
Temperature compensation	Linear 0 ... 20 %/K, reference temperature adjustable	
Concentration measurement	See page 39	
Display resolution <sup>1)</sup> (autoranging)	Conductivity	0.001 $\mu\text{S}/\text{cm}$ ( $c < 0.05 \text{ cm}^{-1}$ ) 0.01 $\mu\text{S}/\text{cm}$ ( $c = 0.05 \dots 0.2 \text{ cm}^{-1}$ ) 0.1 $\mu\text{S}/\text{cm}$ ( $c > 0.2 \text{ cm}^{-1}$ )
	Resistivity	00.00 ... 99.99 $\text{M}\Omega \text{ cm}$
	Salinity	0.0 ... 45.0 g/kg (0 ... 30 °C)
	TDS	0 ... 1999 mg/l (10 ... 40 °C)
	Temperature	-50 ... +250 °C
<b>Sensor standardization</b>	CELL CONST	Input of cell constant with simultaneous display of conductivity value and temperature
	COND	Input of conductivity of the calibration solution with simultaneous display of cell constant and temperature
	CONDI	Installation factor and zero point
	0.01 MOL KCL	Automatic determination of the cell constant with KCl solution (0.01 mol/l or 0.1 mol/l)
	0.1 MOL KCL	
<b>Connections</b>	1 x DIN socket, 8 pins for analog sensors 2 x 4-mm socket for separate temperature detector 1 x M8 socket, 4 pins, for Memosens lab cable	
<b>Display</b>	LCD STN 7-segment display with 3 lines and icons	
Sensoface	Status indication (friendly, neutral, sad)	
Status indicators	for battery power level	
Notices	Hourglass	
Keypad	[on/off], [cal], [meas], [set], [▲], [▼], [clock]	
<b>Diagnostics functions</b>		
Sensor data (Memosens only)	Manufacturer, sensor type, serial number, operating time	
Calibration data	Calibration date; cell constant	
Device self-test	Automatic memory test (FLASH, EEPROM, RAM)	
Device data	Device type, software version, hardware version	
<b>Data retention</b>	Parameters, calibration data > 10 years	
<b>EMC</b>	EN 61326-1 (General Requirements)	
Emitted interference	Class B (residential area)	
Immunity to interference	Industry EN 61326-2-3 (Particular Requirements for Transmitters)	

1) Ranges depending on Memosens sensor

<b>RoHS conformity</b>	According to directive 2011/65/EU
<b>Power supply</b>	
Portavo 902	4 x AA alkaline batteries
Operating time	Approx. 1000 h (alkaline)
<b>Nominal operating conditions</b>	
Ambient temperature	-10 °C ...+55 °C
Transport/ Storage temperature	-25 °C ... +70 °C
Relative humidity	0 ... 95 %, short-term condensing allowed
<b>Housing</b>	
Material	PA12 GF30 (silver gray RAL 7001) + TPE (black)
Protection	IP 66/67 with pressure compensation
Dimensions	Approx. (132 x 156 x 30) mm
Weight	Approx. 500 g

<b>Concentration measurement</b>	-01- NaCl 0 – 26 wt% (0 °C / +32 °F) ... 0 – 28 wt% (+100 °C / +212 °F)
	-02- HCl 0 – 18 wt% (-20 °C / -4 °F) ... 0 – 18 wt% (+50 °C / +122 °F)
	-03- NaOH 0 – 13 wt% (0 °C / +32 °F) ... 0 – 24 wt% (+100 °C / +212 °F)
	-04- H <sub>2</sub> SO <sub>4</sub> 0 – 26 wt% (-17 °C / -1.4 °F) ... 0 – 37 wt% (+110 °C / +230 °F)
	-05- HNO <sub>3</sub> 0 – 30 wt% (-20 °C / -4 °F) ... 0 – 30 wt% (+50 °C / +122 °F)
	-06- H <sub>2</sub> SO <sub>4</sub> 94 – 99 wt% (-17 °C / -1.4 °F) ... 89 – 99 wt% (+115 °C / +239 °F)
	-07- HCl 22 – 39 wt% (-20 °C / -4 °F) ... 22 – 39 wt% (+50 °C / +122 °F)
	-08- HNO <sub>3</sub> 35 – 96 wt% (-20 °C / -4 °F) ... 35 – 96 wt% (+50 °C / +122 °F)
	-09- H <sub>2</sub> SO <sub>4</sub> 28 – 88 wt% (-17 °C / -1.4 °F) ... 39 – 88 wt% (+115 °C / +239 °F)
	-10- NaOH 15 – 50 wt% (0 °C / +32 °F) ... 35 – 50 wt% (+100 °C / +212 °F)

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