

**SenTix<sup>®</sup> 51, 52**

**SenTix<sup>®</sup> 60, 61, 62**

**SenTix<sup>®</sup> 81, 82**

**SenTix<sup>®</sup> 91, 92**

**SenTix<sup>®</sup> Mic, Mic-B, Mic-D**

**SenTix<sup>®</sup> L**

pH combination electrodes  
with refillable liquid reference system

**Accuracy when  
going to press**

The use of advanced technology and the high quality standard of our instruments are the result of continuous development. This may result in differences between this operating manual and your combination electrode. Also, we cannot guarantee that there are absolutely no errors in this manual. Therefore, we are sure you will understand that we cannot accept any legal claims resulting from the data, figures or descriptions.

**Note**

The latest version of the present operating manual can be found on the Internet under [www.WTW.com](http://www.WTW.com).

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## Technical data

### General data

WTW model	Reference electrolyte	Junction	NTC	Special features
SenTix <sup>®</sup> 51	KCl 3 mol/L, Ag <sup>+</sup> free	Ceramic	Yes	Plastic shaft
SenTix <sup>®</sup> 52	KCl 3 mol/L, Ag <sup>+</sup> free	Ceramic	Yes	Plastic shaft
SenTix <sup>®</sup> 60	KCl 3 mol/L, Ag <sup>+</sup> free	Platinum	No	
SenTix <sup>®</sup> 61	KCl 3 mol/L, Ag <sup>+</sup> free	Platinum	No	
SenTix <sup>®</sup> 62	KCl 3 mol/L, Ag <sup>+</sup> free	Platinum	No	
SenTix <sup>®</sup> 81	KCl 3 mol/L, Ag <sup>+</sup> free	Platinum	Yes	
SenTix <sup>®</sup> 82	KCl 3 mol/L, Ag <sup>+</sup> free	Platinum	Yes	
SenTix <sup>®</sup> 91	KCl 3 mol/L, Ag <sup>+</sup> free	Platinum	Yes	Longer shaft
SenTix <sup>®</sup> 92	KCl 3 mol/L, Ag <sup>+</sup> free	Platinum	Yes	Longer shaft
SenTix <sup>®</sup> L	KCl 3 mol/L, Ag <sup>+</sup> free	Platinum	Yes	Extra long shaft
SenTix <sup>®</sup> Mic	KCl 3 mol/L, Ag <sup>+</sup> free	Ceramic	No	Half micro combination electrode
SenTix <sup>®</sup> MIC-B	KCl 3 mol/L, Ag <sup>+</sup> free	Platinum	No	Micro combination electrode
SenTix <sup>®</sup> MIC-D	KCl 3 mol/L, Ag <sup>+</sup> free	Platinum	No	Micro combination electrode

### Measurement and application characteristics

WTW model	pH measuring range	Allowed temperature range	Membrane resistance at 25 °C	Typical application
SenTix <sup>®</sup> 51	0 ... 14	0 ... 80 °C	< 1 GOhm	Field
SenTix <sup>®</sup> 52	0 ... 14	0 ... 80 °C	< 1 GOhm	Field
SenTix <sup>®</sup> 60	0 ... 14	0 ... 100 °C	< 600 MOhm	Laboratory
SenTix <sup>®</sup> 61	0 ... 14	0 ... 100 °C	< 600 MOhm	Laboratory
SenTix <sup>®</sup> 62	0 ... 14	0 ... 100 °C	< 600 MOhm	Laboratory
SenTix <sup>®</sup> 81	0 ... 14	0 ... 100 °C	< 600 MOhm	Laboratory
SenTix <sup>®</sup> 82	0 ... 14	0 ... 100 °C	< 600 MOhm	Laboratory
SenTix <sup>®</sup> 91	0 ... 14	0 ... 100 °C	< 600 MOhm	Laboratory
SenTix <sup>®</sup> 92	0 ... 14	0 ... 100 °C	< 600 MOhm	Laboratory
SenTix <sup>®</sup> L	0 ... 14	10 ... 100 °C	< 600 MOhm	Laboratory
SenTix <sup>®</sup> Mic	0 ... 14	0 ... 100 °C	< 700 MOhm	Laboratory
SenTix <sup>®</sup> MIC-B	0 ... 14	-5 ... 100 °C	< 1 GOhm	Laboratory
SenTix <sup>®</sup> MIC-D	0 ... 14	-5 ... 100 °C	< 1 GOhm	Laboratory

**Shaft dimensions, shaft material, electrical connection**

WTW model	Shaft			Electrical connection		
	Length [mm]	Ø [mm]	Material	Combination electrode connection	Meter connection	Cable length
SenTix <sup>®</sup> 51	120	12	Polyamide	Fixed cable	DIN*+banana	1 m
SenTix <sup>®</sup> 52	120	12	Polyamide	Fixed cable	BNC+banana	1 m
SenTix <sup>®</sup> 60	120	12	Glass	S7 plug-in connector	depending on S7 cable****	
SenTix <sup>®</sup> 61	120	12	Glass	Fixed cable	DIN*	1 m
SenTix <sup>®</sup> 62	120	12	Glass	Fixed cable	BNC	1 m
SenTix <sup>®</sup> 81	120	12	Glass	Fixed cable	DIN*+banana	1 m
SenTix <sup>®</sup> 82	120	12	Glass	Fixed cable	BNC+banana	1 m
SenTix <sup>®</sup> 91	170	12	Glass	Fixed cable	DIN*+banana	1 m
SenTix <sup>®</sup> 92	170	12	Glass	Fixed cable	BNC+banana	1 m
SenTix <sup>®</sup> L	425	12	Glass	SMEK head	depending on SMEK cable****	
SenTix <sup>®</sup> Mic	40/80**	12/5**	Glass	S7 plug-in connector	depending on S7 cable****	
SenTix <sup>®</sup> MIC-B	96***	3	Glass	Fixed cable	BNC	1 m
SenTix <sup>®</sup> MIC-D	96***	3	Glass	Fixed cable	DIN*	1 m

\* Coaxial plug according to DIN 19262

\*\* Stage geometry

\*\*\* Measured from upper level of built-in grinding (standard grinding NS 7,5)

\*\*\*\* Connection cable not included in the scope of delivery of the combination electrode (see WEAR PARTS AND ACCESSORIES)

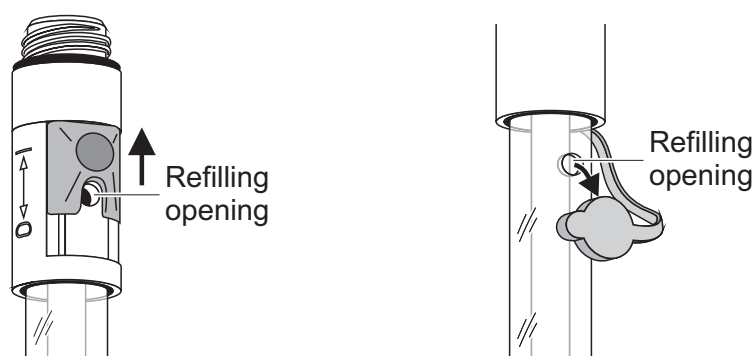
## Commissioning, measuring, calibration

### Commissioning

The combination electrode is filled with reference electrolyte solution in the factory. Prepare the combination electrode for measuring as follows:

- Open the refilling opening for the reference electrolyte solution. Depending on the model, the stopper of the refilling opening is an elastomer stopper or a slider.

**The refilling opening must always be open during calibration and measurement!**



- Remove the watering cap from the electrode tip. Possible salt deposits in the area of the watering cap do not affect the measuring characteristics and can easily be removed with deionized water.



#### Note

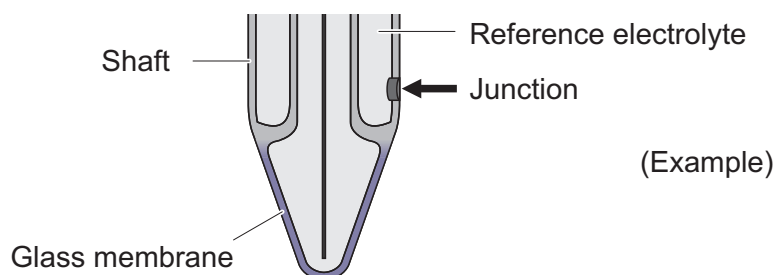
Please keep the watering cap. It is required for the combination electrode to be stored. Always keep the watering cap clean.

- SenTix<sup>®</sup> 51, SenTix<sup>®</sup> 52, and SenTix<sup>®</sup> Mic: Remove any gas bubbles behind the pH membrane by shaking. With all other combination electrodes, gas bubbles behind the pH membrane are not a problem.
- Connect the combination electrode to the meter.
- Calibrate the combination electrode according to the operating manual of the meter and observe the following rules while doing so:

### Calibration and measurement: General rules

- Make sure the refilling opening for the reference electrolyte solution is open.
- Avoid the displacement of any solution (sample or buffer solution) from one measurement to the next by taking the following measures:
  - Shortly rinse the calibration and sample beakers with the solution the beakers are to be filled with next.
  - Between measurements, rinse the combination electrode with the solution that follows. Alternatively, you can also rinse the combination electrode with deionized water and then carefully dab it dry.
- Immerse the combination electrode in the solution in a vertical or slightly tilted position.
- Make sure the immersion depth is correct. The junction must be completely submerged in the solution. The junction is in the area of the bottom end

of the shaft (see figure). At the same time, the level of the reference electrolyte must be at least 2 cm above the level of the solution.



- Provide approximately the same stirring conditions for measuring as for calibrating.



#### Subsequent calibrations

##### Note

Prevent contact of the pH membrane to the beaker bottom to avoid scratches on the pH membrane.

The frequency of subsequent calibrations depends on the application. Many meters provide an option where you can enter a calibration interval. After the calibration interval has expired, the meter will automatically remind you of the due calibration.

## Storage

#### During short measuring breaks

With the refilling opening open, immerse the combination electrode in reference electrolyte (KCl 3 mol/L, Ag<sup>+</sup> free). Prior to the next measurement, shortly rinse the combination electrode with the test sample or deionized water.



#### Overnight or longer

##### Note

Prevent contact of the pH membrane to the beaker bottom to avoid scratches on the pH membrane.

Put the clean combination electrode in the watering cap that is filled with reference electrolyte (KCl 3 mol/L, Ag<sup>+</sup> free) and close the refilling opening.



##### Note

pH combination electrodes must not be stored dry or in deionized water. The combination electrode could be permanently damaged by this. If the liquid in the watering cap has dried up, condition the combination electrode in reference electrolyte (KCl 3 mol/L, Ag<sup>+</sup> free) for at least 24 hours.



##### Note

During longer storing periods, salt sediments may develop on the watering cap. They do not affect the measuring characteristics and can easily be removed with deionized water when the combination electrode is put into operation again.

## Aging

Every pH combination electrode undergoes a natural aging process. With aging, the responding behavior becomes slower and the electrode slope and asymmetry change. Moreover, extreme operating conditions can considerably shorten the lifetime of the combination electrode. These are:

- Strong acids or lyes, hydrofluoric acid, organic solvents, oils, fats, bromides, sulfides, iodides, proteins
- High temperatures
- High changes in pH and temperature.

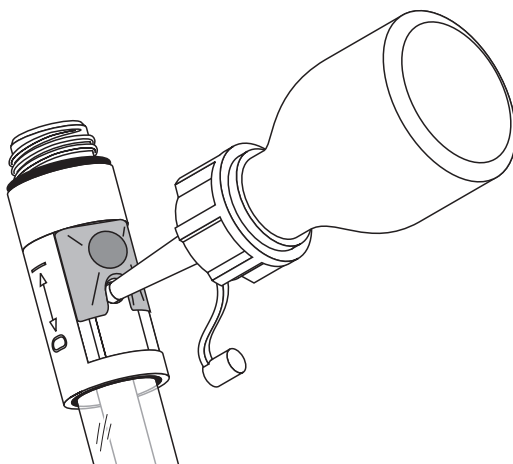
The warranty does not cover failure caused by measuring conditions and mechanical damage.

## Maintenance and cleaning

### Refilling the reference electrolyte

During operation, a small amount of reference electrolyte leaks through the junction from the combination electrode into the test sample. If the level of reference electrolyte becomes too low with time, refill it through the refilling opening. Refilling is very easy with the enclosed dropping bottle. Proceed as follows:

- Cut off the tip of the dropping bottle at a right angle until the opening in the tip can be seen
- Open the refilling opening of the combination electrode
- Press the tip of the dropping bottle into the refilling opening while turning it slightly
- Pump the reference electrolyte in the shaft using the dropping bottle
- Pull the dropping bottle out of the refilling opening while turning it slightly if necessary.



**Cleaning** Remove water-soluble contamination by rinsing with deionized water. Remove other contamination as follows:

Contamination	Cleaning procedure
Fat and oil	Rinse with water containing household washing-up liquid
Lime and hydroxide deposits	Rinse with citric acid (10 % by weight)
Proteins	Immerse in pepsin cleaning solution PEP/pH for approx. 1 hour. <u>Note:</u> Make sure the level of the reference electrolyte is above that of the cleaning solution.



**Note**

Hydrofluoric acid, hot phosphoric acid and strong alkaline solutions destroy the glass membrane.

**After cleaning**

Rinse the combination electrode with deionized water and condition it in reference electrolyte solution for at least 1 hour. Then recalibrate the combination electrode.

## Wear parts and accessories

Description	Model	Order no.
Reference electrolyte solution 250 mL (KCl 3 mol/L, Ag <sup>+</sup> free)	KCl-250	109 705
Pepsin cleaning solution 3 x 250 ml	PEP/pH	109 648
Connection cable S7 plug-in connector/DIN, 1 m	AS/DIN	108 110
Connection cable S7 plug-in connector/DIN, 3 m	AS/DIN-3	108 112
Connection cable S7 plug-in connector/BNC, 1 m	AS/BNC	108 114
Connection cable SMEK head/DIN, 1 m	AS S/D1	108 120
Connection cable SMEK head/DIN, 3 m	AS S/D3	108 122
Connection cable SMEK head/BNC, 1 m	AS S/B1	108 125
Connection cable SMEK head/BNC, 3 m	AS S/B3	108 126



**Note**

Detailed information on our wide range of buffer solutions and more accessories is given in the price list of the WTW catalog "Laboratory and field instrumentation".