

**SenTix<sup>®</sup> 20, 21, 21-3, 22**

**SenTix<sup>®</sup> 41, 41-3, 42**

**SenTix<sup>®</sup> RJS**

**SenTix<sup>®</sup> Sp**

**SenTix<sup>®</sup> Sur**

**SenTix<sup>®</sup> F, F-3**

pH combination electrodes with polymer and gel electrolyte

**Accuracy when  
going to press**

The use of advanced technology and the high quality standard of our instruments are the result of a 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.

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## Technical data

### General data

WTW model	Reference electrolyte	Junction	NTC	Special features
SenTix <sup>®</sup> 20	Gel	Fiber	No	Plastic shaft
SenTix <sup>®</sup> 21	Gel	Fiber	No	Plastic shaft
SenTix <sup>®</sup> 21-3	Gel	Fiber	No	Plastic shaft
SenTix <sup>®</sup> 22	Gel	Fiber	No	Plastic shaft
SenTix <sup>®</sup> 41	Gel	Fiber	Yes	Plastic shaft
SenTix <sup>®</sup> 41-3	Gel	Fiber	Yes	Plastic shaft
SenTix <sup>®</sup> 42	Gel	Fiber	Yes	Plastic shaft
SenTix <sup>®</sup> F	Gel	Fiber	Yes	Low temperature sensitivity, iodine/iodide reference system
SenTix <sup>®</sup> F-3	Gel	Fiber	Yes	Low temperature sensitivity, iodine/iodide reference system
SenTix <sup>®</sup> RJS	Polymer	Split ring	Yes	Glass shaft
SenTix <sup>®</sup> Sp	Polymer	Hole	No	Combination electrode for cut-in measurements
SenTix <sup>®</sup> Sur	Polymer	Split ring	No	Combination electrode for surface measurements

### Measurement and application characteristics

WTW model	pH measuring range	Allowed temperature range	Membrane resistance at 25 °C	Typical application
SenTix <sup>®</sup> 20	0 ... 14	0 ... 80 °C	< 1 GOhm	Field
SenTix <sup>®</sup> 21-1	0 ... 14	0 ... 80 °C	< 1 GOhm	Field
SenTix <sup>®</sup> 21-3	0 ... 14	0 ... 80 °C	< 1 GOhm	Field
SenTix <sup>®</sup> 22	0 ... 14	0 ... 80 °C	< 1 GOhm	Field
SenTix <sup>®</sup> 41	0 ... 14	0 ... 80 °C	< 1 GOhm	Field
SenTix <sup>®</sup> 41-3	0 ... 14	0 ... 80 °C	< 1 GOhm	Field
SenTix <sup>®</sup> 42	0 ... 14	0 ... 80 °C	< 1 GOhm	Field
SenTix <sup>®</sup> F	0 ... 14	0 ... 80 °C	< 1 GOhm	Field
SenTix <sup>®</sup> F-3	0 ... 14	0 ... 80 °C	< 1 GOhm	Field
SenTix <sup>®</sup> RJS	2 ... 13	0 ... 80 °C	< 600 MOhm	Laboratory
SenTix <sup>®</sup> Sp	2 ... 13	0 ... 80 °C	< 400 MOhm	Laboratory / foods
SenTix <sup>®</sup> Sur	2 ... 13	0 ... 50 °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> 20	120	12	PPE/PS	S7 plug-in connector	depending on S7 cable <sup>***</sup>	
SenTix <sup>®</sup> 21-1	120	12	PPE/PS	Fixed cable	DIN*	1 m
SenTix <sup>®</sup> 21-3	120	12	PPE/PS	Fixed cable	DIN*	3 m
SenTix <sup>®</sup> 22	120	12	PPE/PS	Fixed cable	BNC	1 m
SenTix <sup>®</sup> 41	120	12	PPE/PS	Fixed cable	DIN*+banana	1 m
SenTix <sup>®</sup> 41-3	120	12	PPE/PS	Fixed cable	DIN*+banana	3 m
SenTix <sup>®</sup> 42	120	12	PPE/PS	Fixed cable	BNC+banana	1 m
SenTix <sup>®</sup> F	120	12	COC	Fixed cable	DIN*+banana	1 m
SenTix <sup>®</sup> F-3	120	12	COC	Fixed cable	DIN*+banana	3 m
SenTix <sup>®</sup> RJS	120	12	Glass	SMEK head	depending on SMEK cable <sup>***</sup>	
SenTix <sup>®</sup> Sp	65/25 <sup>**</sup>	15/5 <sup>**</sup>	PPE/PS	S7 plug-in connector	depending on S7 cable <sup>***</sup>	
SenTix <sup>®</sup> Sur	120	12	Glass	S7 plug-in connector	depending on S7 cable <sup>***</sup>	

\* Coaxial plug according to DIN 19262

\*\* Stage geometry

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

**Commissioning, measuring, calibration****Commissioning**

Prepare the combination electrode for measuring as follows:

- 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.

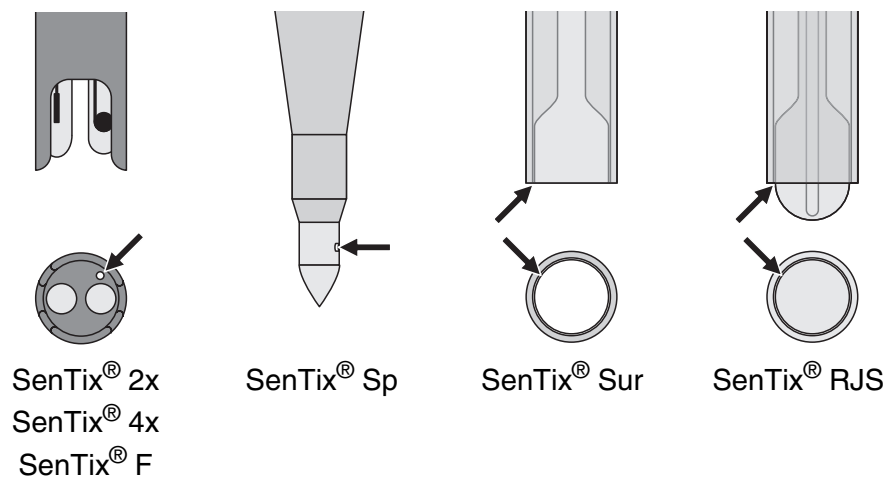
**Note**

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

- SenTix<sup>®</sup> 2x, SenTix<sup>®</sup> 4x, SenTix<sup>®</sup> F and SenTix<sup>®</sup> Sp: 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

- 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.
- To measure in aqueous solutions, it is recommended to immerse the combination electrode in a vertical or slightly tilted position.
- Observe the correct depth of immersion and make sure the contact between the junction and test sample is thorough. The junction is in the area of the bottom end of the shaft (see arrow).



#### Caution:

**Only the shaft part of the combination electrode may be immersed!**

- For measurements in aqueous solutions, provide approximately the same stirring conditions for measuring as for calibrating.

### Subsequent calibrations

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

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.



#### Note

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

### Overnight or longer

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



#### 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 (except for SenTix<sup>®</sup> F), 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

### Cleaning

Remove water-soluble contamination by rinsing with deionized water. Other types of contamination have to be removed as follows while the contact time with the detergents should be kept as short as possible:

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)



#### 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)	KCI-250	109 705
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".