

# Combined dF ISE



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Sensor leaflet

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# Combined dF ISE

Sensor leaflet

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# 1 Overview

## 1.1 Combined dF ISE – Product description

The Combined dF ISE is a fluoride-selective combined crystal membrane electrode for titration, direct measurement and standard addition.

The Combined dF ISE is a dTrobe (digital electrode) which can be connected to OMNIS instruments via a Measuring Module Digital.

## 1.2 Combined dF ISE – Overview

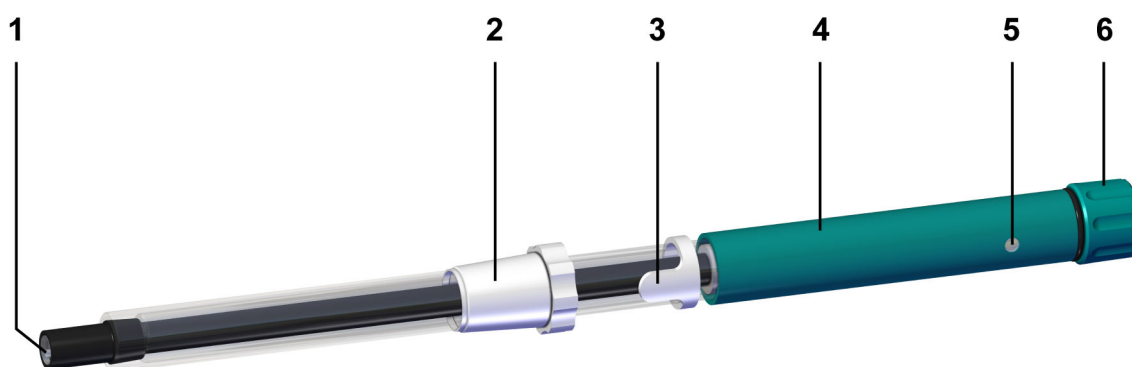


Figure 1 Combined dF ISE

<b>1</b>	<b>Sensor surface</b>	<b>2</b>	<b>SGJ sleeve SGJ 14/15, movable</b>
<b>3</b>	<b>Filler opening (with stopper)</b>	<b>4</b>	<b>Electrode head</b>
<b>5</b>	<b>Status display</b>	<b>6</b>	<b>Protective cap</b>

## 2 Functional description

## 2.1 Ion-selective electrode – Functional description

An ion-selective electrode only responds to a specific ion in the solution and, ideally, it does not show any change in potential with other ions present.

The measuring ions of the sample solution reach the membrane surface of the ion-selective electrode, after a certain amount of time an equilibrium is established. An electrochemical potential is created between the measuring solution and the membrane.



## 3 Delivery and packaging

### 3.1 Delivery

Inspect the delivery immediately upon receipt:

- Check the delivery against the delivery note to ensure completeness.
- Check the product for damage.
- If the delivery is incomplete or damaged, contact your regional Metrohm representative.


### 3.2 Packaging

The product and accessories are supplied in protective special packaging. Keep this packaging to ensure safe transportation of the product. If a transport locking device is present, keep this as well for future reuse.

### 3.3 Unpacking and assessing the sensor

#### NOTICE

**Avoid applying excess pressure to the tool. Otherwise, the sensor could be released too abruptly.**

-  Defective sensors must be sent back for warranty processing within two months (starting from the day of delivery).

#### Required accessories:

- Tool for fixed sensors (included)

#### 1 Unpacking the sensor

Remove the sensor with storage vessel from the packaging.

## 2 Removing the storage vessel

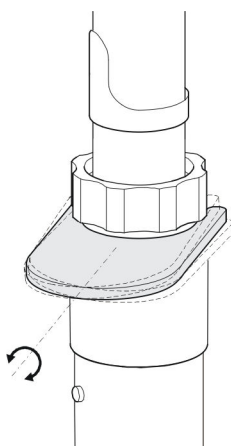


Figure 2 Loosening the sensor from the storage vessel

- Hold the sensor and storage vessel firmly in your hand so that the sensor cannot slip away.
- Position the tool between the storage vessel and the ground-joint sleeve.
- **Carefully** push the tool to the side to release the sensor.  
**Do not tip the tool forwards!**


### 3 Checking the sensor for proper function

- **Preparing the sensor:**  
(see "Preparing the Combined dF ISE", chapter 4.1, page 5)
- **Checking the electrode:**  
(see "Checking the Combined dF ISE", chapter 6.3, page 11)

### 3.4 Storing the Combined dF ISE

### 1 For short periods

- Screw the protective cap (1-6) onto the electrode head (1-4).
- Store the electrode in the storage vessel. When doing so, ensure that the sensor surface (1-1) is immersed in the storage solution.

 Use 0.1 mol/L of sodium fluoride as the storage solution.

## 2 For longer periods

Screw the protective cap (1-6) onto the electrode head (1-4) and store the electrode in a reference electrolyte.

 Use 3 mol/L of potassium chloride as the reference electrolyte.

## 4 Installation

### 4.1 Preparing the Combined dF ISE

Ion-selective electrodes must be prepared before the first usage, after longer breaks and between precipitation titrations.



#### CAUTION

##### Incorrect handling

The electrode will only work properly if you handle it correctly. Proceed in accordance with the following instructions:

- Do not touch the sensor surface with your fingers.
- Do not leave the electrode in distilled water for prolonged periods.
- Do not rub the electrode dry after rinsing.

#### 1 Cleaning the sensor surface

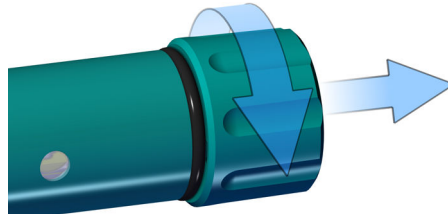
Clean the sensor surface (1-1) with a strongly alkaline detergent such as Deconex universal or with toothpaste.



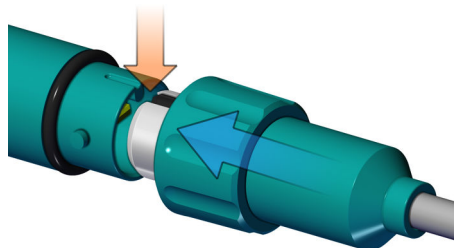
Do not clean the electrode with the 6.2802.000 polishing set!

#### 2 Connecting the electrode

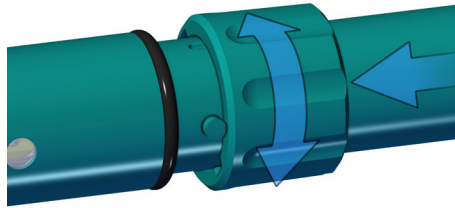
- Unscrew the protective cap (1-6).



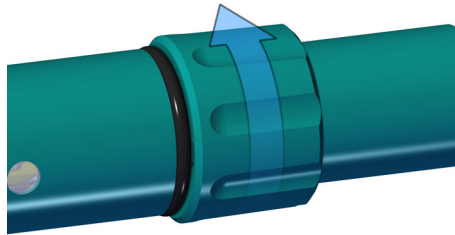
- Position the cable connection on the electrode head such that the slot in the cable connection is on the guide lug of the electrode head.



- Push the electrode cable into the electrode head. Rotate the sleeve of the electrode cable until the sleeve grooves slide over the guide lugs of the electrode head.



- Slide the electrode cable as far as it will go.
- Rotate the sleeve clockwise until it engages.



### Removing the cable

1. Loosen the sleeve.
2. Hold the electrode cable by the sleeve and carefully pull it out of the electrode head.

Do not pull on the cable.

## 4.2 Mounting the electrode



The electrode must sit securely in the titration head.

**i** For automatic procedures, ensure that the cables have enough room to move.

During the titration, it is important that the solution is mixed well. The stirring rate should be high enough to form a small vortex. If the stirring rate is too high, then air bubbles will be aspirated. These may result in incorrect measured values. If the stirring rate is too low, then the solution is only mixed slowly and the reaction time or titration time increases accordingly.

In order for the measurement to be taken in a well-mixed solution after the addition of the titrant, the titration tip should be positioned where turbulence is high. Furthermore, the distance between the addition of the titrant and the electrode should be as large as possible. Therefore, take into account the stirring direction (counterclockwise or clockwise) when positioning the electrode and titration tip.

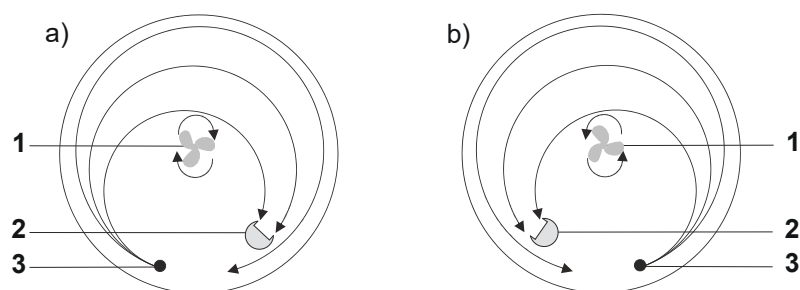


Figure 3 Diagrams showing rod stirrer, electrode and titration tip during a titration. a) clockwise stirring direction, b) counterclockwise stirring direction.

**1** Rod stirrer

**2** Electrode

**3** Titration tip



In the standard subtraction method, a solution that eliminates the ion to be determined is added (complexation or precipitation). Apart from that, the same conditions apply as for standard addition. However, this method is rarely used.

## 6 Maintenance


## 6.1 Combined dF ISE – Changing/refilling the electrolyte

### Required accessories:

- Electrolyte solution
- Plastic pipettes, collection tray

- 1 Open the filler opening (1-3).
- 2 Use a plastic pipette to empty the electrode.
- 3 Rinse the inside of the electrode with the new electrolyte.
- 4 Fill the electrode with electrolyte up to the filler opening.
- 5 Close the filler opening (1-3).

## 6.2 Cleaning an ion-selective electrode

- 1 Rinse the electrode with distilled water after each measurement or titration.
-  Never clean the electrode in an ultrasonic bath. The electrode could become damaged.

The surface must be kept clean at all times before the measurement.




## 6.3 Checking the Combined dF ISE

**1** Measure  $c(\text{F}^-) = 10^{-4}$  mol/L standard solution and write down the potential.

**2** Measure  $c(\text{F}^-) = 10^{-3}$  mol/L standard solution and write down the potential.

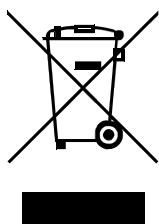
**3** Calculate the change of potentials with the 2 previously measured potentials:

The value must be **at least 47.3 mV** (at 25 °C) (80% of the theoretical slope).

 If the minimum value cannot be reached, the electrode needs to be replaced.



## 8 Electrode – Disposal



This product is covered by European Directive, WEEE – Waste Electrical and Electronic Equipment.

The correct disposal of your old instrument will help to prevent negative effects on the environment and public health.

Proceed as follows to dispose of the electrode:

### 1 Draining the electrolyte

Use a plastic pipette to remove the electrolyte from the electrode.

### 2 Disposing of the electrolyte

Dispose of the electrolyte in accordance with the legal provisions.

### 3 Disposing of the electrode

Put the electrode in electronic waste recycling.

More details about the disposal of your old product can be obtained from your local authorities, from waste disposal companies or from your local dealer.








<i>Ambient temperature</i>	+25 °C (±3 °C)	
<i>Instrument status</i>		min. 30 minutes in operation

**Measuring accuracy**

applies for all measuring ranges without sensor error, under reference conditions, measuring interval 100 ms

 Valid for the measurement contacts of the analog measurement connection installed in the sensor. These connections are not accessible after installation.

## 10 Additional information

### ISA/TISAB solutions

Table 1 ISA/TISAB solutions

Measuring ion	ISA/TISAB	For 100 mL of solution	Remarks
F <sup>-</sup>	NaCl	5.84 g	With c(NaOH) = 8 mol/L, set to pH 5.5 (AB-082).
	Glacial acetic acid	5.75 mL	
	Trans-1, 2-diaminocyclohexane-N, N, N', N'-tetraacetic acid monohydrate (CDTA, Komplexon IV)	0.45 g	

### Interfering ions

The concentrations in mol/L of the interfering ions, which generate an analysis error of approximately 10%, are specified in the following table.

Table 2 Interfering ions

Measuring ion	Interferences
F <sup>-</sup>	c(OH <sup>-</sup> ) < 10 <sup>-4</sup>