7650 / 7660 series
pH / Redox (ORP) electrode systems
Measurement made easy
Accurate and stable measurement in critical conditions

Designed specifically for power and potable water industry applications
• where pH and REDOX (ORP) measurements are critical

Optical stainless steel flowcell
• essential for high purity water applications

Economical option for applications where the conductivity is above 20 μS/cm
• utilizing a polypropylene flowcell

Flowing reference junction option
• provides a very stable junction potential in high purity water or high suspended solids applications

Replaceable reference junction
• simple to replace for reliable, low-cost maintenance

Separate detachable-lead electrodes
• provides versatility and low-cost electrode replacement

Low resistance electrode option
• for fast response in low temperature applications
Target applications

pH and Redox (ORP) measurement for the power industry
The measurement of pH and Redox (ORP) in high purity water applications specifically in power plants requires a number of essential elements to achieve accurate and stable readings. These include: a stainless steel flowcell to minimize static effects, reservoir-fed reference junction that overcomes KCl depletion and blockage ensuring a stable junction potential and simple reference junction replacement for low-cost maintenance.

The 7660 system meets all these requirements in samples below 20 µS/cm providing accurate measurement, vital for boiler chemistry control. For applications up to 100 µS/cm the 7651 with polypropylene flowcell and the 7653 with a reservoir-fed reference electrode option are an ideal economical option.

pH measurement in potable water treatment
Accurate and stable pH measurement is required for optimum control at the coagulation stage of the process to minimize coagulation costs and treated water quality. Coagulation is a particularly difficult application due the high level of suspended solids and significant precipitation that frequently blocks the reference junction. The essential elements for such pH systems include: optional flowing reference junction that overcomes KCl depletion and blockage, simple reference junction replacement to provide a low-cost maintenance in samples that contain high levels of particulates and low resistance glass electrode option provides fast response in low temperature applications.

The 7600 Series meets all these requirements with the 7651 with polypropylene flowcell and the 7653 with a reservoir-fed reference electrode are an ideal low-cost option. Both systems are highly-suited throughout the potable water treatment process.

Sensors

A pH system is only as good as the sensors used to make the primary measurement. To satisfy the target applications, and to meet the demands of these critical processes, ABB have produced a range of electrodes to satisfy most requirements.

pH electrodes
There are two pH electrodes, for both polypropylene and stainless steel systems.

General purpose electrode
The general purpose electrode operates over 0 to 14 pH, 0 to 100 °C (32 to 212 °F) suitable for both boiler cycle and potable water applications.

Low resistance electrode
This unique low resistance glass membrane electrode is recommended for low-temperature applications. It is used extensively throughout the water industry, where its speed of response is important as the temperature drops below 10 °C (50 °F).

It can also be beneficial on low-conductivity potable water or (thin) waters less than 100 µS/cm.

Its operating range is 0 to 10 pH, 0 to 70 °C (32 to 158 °F).

Reference electrodes
The key to success in many applications is the reference electrode. ABB have devised a unique approach to providing a choice of sealed or reservoir-fed reference electrodes using the same reference element. This is achieved by making the outer junction part of the electrode system, enabling the replaceable reference electrode to be reduced significantly in price and minimizing stock holding, as the same electrode is used for all three versions.

Temperature compensation
A three-wire PT100 temperature compensator is required to ensure high accuracy, especially where the sample temperature fluctuates widely.

Platinum electrode for Redox (ORP)
The platinum electrode enables Redox (ORP) measurements to be made using all these electrode systems.
**...Sensors**

- **Model 1720-000 general purpose electrode**
- **Model 1722-000 low resistance electrode**
- **Model 1730-000 reference electrode**
- **Model 1740-000 platinum metal electrode**
- **Model 1750-000 temperature compensation**

* Fitted to all systems
* Fitted to all systems except when model 1740 (Redox – ORP) is used or if manual temperature compensation is used

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**Connection cable**

The connection cable used with this system comprises a multi-core cable with three IP67 plug connectors at one end and tag connectors at the other end. There are standard cables of 3, 5, 10 and 20 m (10, 16, 32 and 65 ft.) lengths. Non-standard length cables can be made up to a maximum of 100 m (325 ft.).

- **Red** (measuring electrode)
- **Blue** (temperature compensation)
- **Black** (reference electrode)

Quick-disconnect cable

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**Range of electrodes**
**7651 and 7653 polypropylene system**

The 7651 features a specially-designed flowcell that permits operation in a wide variety of process installations. Its small cell volume ensures that representative readings are obtained at low flow rates, while the straight-through design minimizes silting or blocking from sample deposition. Process connections are 1 in. BSPT and ½ in. BSPT.

The 7653 includes a reservoir-fed reference electrode. The reference chamber needs topping-up only once every 2 months.

**Specification**

**Body material**  
Coupled glass-reinforced polypropylene

**pH range**  
0 to 14

**Operating temperature range**  
–5 to 100 °C (23 to 212 °F)

**Maximum operating temperature**
- 7651 – 100 °C at 2.1 bar (212 °F at 30 lbf/in²)  
  see graph for details  
- 7653 – 100 °C at atmospheric pressure

**Maximum operating pressure**
- 7651 – 10.6 bar (150 lbf/in²) at 25 °C (77 °F)  
  see graph for details  
- 7653 – atmospheric

**Process connections standard**  
1 in. BSPP female with ½ in. BSPT female adaptors (provided)

**Mounting arrangements**  
Panel- or wall-mounting, bracket supplied

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7651 polypropylene system

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**7651 flow system operating pressure v temperature**

1 kgf/cm² = 0.981 bar  
1 kPa = 1 kN/m² = 0.01 bar
7660 stainless steel flow system

The 7660 stainless steel flow system, with reservoir-fed reference electrode, has been designed to achieve reliable and accurate results in low-conductivity waters (less than 20 µS/cm) at atmospheric pressure. The reservoir provides a simple approach to refilling the reference chamber by topping-up every 2 months.

Ease of maintenance is a major feature. The system is available with ½ in. NPT process connections.

The system has been evaluated extensively on low-conductivity waters and ammonia-dosed boiled feed water. When used with ABB transmitters it provides accurate results, referenced to 25 °C (77 °F).

Specification

Body material
- Coupled glass-reinforced polypropylene
- Stainless steel flow cell

Operating temperature range
0 to 100 °C (32 to 212 °F) – with appropriate electrodes

Maximum operating temperature
Reservoir-fed reference electrode – atmospheric

Process connections
½ in. NPT female

Mounting arrangements
Panel- or wall-mounting, brackets supplied

7660 stainless steel system
Overall dimensions

Dimensions in mm (in.)

7651 polypropylene system

- Top cover: 70 (2.75)
- 1/2 in. BSPT or NPT female thread: 232 (8.75)
- Bosses M10 x 1.5 internal thread: 44 (1.75)
- 93 (3.66)
- 160 (6.29)
- 174 (6.85)

7653 polypropylene system

- 353 (13.8) approx.
- 2 x bosses M10 x 1.5 internal thread: 44 (1.75)
- 65 (2.56) approx.
- 112 (4.41)

7660 stainless steel system

- 222 (8.75)
- 377 (15.0) approx.
- Bosses M10 x 1.5 internal thread: 44 (1.75)
- 93 (3.66)
- 160 (6.29)
- 174 (6.85)

Note. Mounting bracket supplied as standard, complete with 2 x M10 bolts.
## Ordering information

### 7600 Series pH/Redox electrode system

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### Connection cable length and type

#### With automatic temperature compensation for pH

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#### For Redox / ORP

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### Sensor types

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<td>1750-000 PT100 temperature compensator</td>
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**Recommended for general purpose applications**

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<td>1750-000 PT100 temperature compensator</td>
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**Recommended for low temperature applications <10 °C (50 °F)**

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<td>1740-017 platinum electrode (Redox/ORP)</td>
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For Redox/ORP applications
Notes
...Notes
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