The Model FBM-300 provides fast and continuous detection of free fluoride ion concentration in water. It is widely used for monitoring water treatment processes and effluent from wastewater plants. It is also used in the semiconductor industry to monitor washed-water from plants that use hydrogen fluoride.

**FEATURES**

- Simple weather-proof construction suitable for field installation with pole or wall mounting. Wiring access and operation can be carried out from the front of the monitor.
- The use of I.S.E. (ion selective electrode) method provides excellent selectivity.
- Simple combination type sensor, immersed into the sample detects only fluoride ions. The lead-less type electrode is easily mounted on or removed from the sensor holder.
- The sensor features a “non-supplying” type reference electrode. The liquid junction of the reference electrode is made of a porous fluorocarbon resin, thus it is not subject to any fouling.
- With a sample containing 2mg/L fluoride ion, an alarm will be generated within 30 seconds at 90% response.
- Automatic check of electrode characteristics and accessing of calibration archives.

During calibration, the electrode characteristics such as voltage potential of electrode and its potential slope are automatically checked and if any failures are detected, error messages will be displayed accordingly. Since the past twelve calibration records including time and date of calibration can be accessed at anytime, the deterioration of electrode is easily detected.

- Self-diagonistics of sensors including a temperature probe is automatically carried out during measurement and if any failures are found, an alarm output contact is energized.
- Two control signal outputs are available for high and low limits with adjustable delay time and band gap.
- Calibration using standard liquid is activated by one-touch action.
- Control outputs are provided for external electrode cleaners such as chemical cleaner, water-jet cleaner and brush cleaner. Setting times of cleaning duration, cleaning interval and extended hold output signal are adjustable.

**STANDARD SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Fluoride Ion monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>FBM-300</td>
</tr>
<tr>
<td>Measurement Object</td>
<td>Free fluoride ion concentration in water</td>
</tr>
<tr>
<td>Measurement Method</td>
<td>Fluoride ion selective electrode method</td>
</tr>
<tr>
<td>Measurement Ranges</td>
<td>0–99.9 mg/L</td>
</tr>
<tr>
<td></td>
<td>0–999 mg/L</td>
</tr>
<tr>
<td>Transmitter Performance</td>
<td></td>
</tr>
<tr>
<td>Linearity</td>
<td>±1.0%FS</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±0.7%FS</td>
</tr>
<tr>
<td>Sample Conditions</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>to be stable within pH4–9</td>
</tr>
<tr>
<td>Temperature</td>
<td>0–40°C</td>
</tr>
<tr>
<td>Conductivity</td>
<td>min. 500μS/cm</td>
</tr>
<tr>
<td>Flow rate</td>
<td>1–20cm/s</td>
</tr>
</tbody>
</table>

**SYSTEM CONFIGURATION**
**Outputs (Linear Output)**

- Power supply to automatic cleaner is controlled by following control settings.
  - Output capacity: 0.1-2A (resistive load)
  - Cleaning interval: Adjustable from 0.1-24 hours
  - Cleaning duration: Adjustable from 0-999 seconds
  - Start of cleaning: activated by internal clock, manual or remote input (closed contact over 0.1 sec.)

**Power Requirements**

- 90-132V AC or 180-264V AC, 50/60Hz
- Power Consumption: 10VA

**Ambient Conditions**

- Temperature: -10 to 55°C
- Humidity: max. 95% RH (non-condensing)
- Construction: Outdoor installation, rainproof construction (JIS C0920), Sunshade, available as an option.
- Mounting: 2 inch pipe, wall or rack mounting.

**Materials**

- Enclosure: Aluminum die casting
- Window: Glass
- Surface Colour: Munsell 5PB/1
- Cable Ports: Six G½ for conduit, with cable glands for O.D. 6-12 mm cable
- Weight: 5kg

**IMPORTANT NOTES**

1. This monitor can detect only free fluoride ions in water, not total fluoride.
2. Sample must be within the range of pH 4-9. Minus error for a sample below pH 4 and a plus error for a sample above pH 9 will be detected. Samples below pH 2 may cause damage to electrode sensor membrane.
3. For process control use, Model FMS-3 on-line fluoride ion analyser is recommended, which has capability for automatic calibration and automatic cleaning.

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**DIMENSIONS**

[Diagrams showing dimensions and parts of the monitor]

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**PRINCIPLE OF OPERATION**

The fluoride ion selective electrode generates an electromotive force corresponding to the fluoride ion concentration in water. The relationship between the concentration and the electromotive force is logarithmically linear as shown in the diagram below.

The instrument calibrated with standard solution can determine the fluoride ion concentration of the sample by just immersing the electrode into the sample.

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**ELECTRODE CONSTRUCTION**

The electrode comprises of the main body, junction section, electrode chip and protection guard.

This modular construction allows easy replacement of just the electrode chip when the electrode membrane quality is reduced.

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- Electrode holder: HC-D70C, HC-D76

- JHCP-7E

Model: FBM-300 - Fluoride Ion Monitor - Issue: FBM-300-0401-R1
TERMINAL CONNECTIONS

With use of exclusive cable

Flood ◀ Instrument Room
Receiver

Electrode lead wire
Fluoride ion selective electrode

For chemical or water jet cleaning, please use terminals 80 & 81
For ultrasonic cleaning, please use terminate 61 & 62

MOUNTING ACCESSORIES

Type B + NH-7 type
D-Type
Open Flange type
### PRODUCT CODES

**FBM-300 (Standard fluoride ion monitor)**

- **Power supply** *(1)*
  - AC 90V–132V 50/60Hz
  - AC 180V–264V 50/60Hz
- **Output** *(linear output)*
  - DC 4–20mA (standard)
  - DC 1–5V
- **pH**
  - mg/L (standard)
  - ppm
- **Indication range (output range)** *(2)*
  - 0–100 (factory setting 0–99.9)
  - 0–1000 (factory setting 0–9999)
- **Custom spec.** *(3)*
  - Mounting bracket
  - For wall mounting
  - Cable entry *4
- **JHC**
  - Standard (Japanese)
- **English**
  - Alphabet: Z
  - Numeric digit: 9

**Product Code notes for FBM-300**

*1. The instrument can operate on either 90–132V AC or 180–264V AC power supply. If using a cleaning system in combination with this instrument, please ensure that the cleaning system is compatible with the incoming power supply to this instrument. A step-down transformer may be required for power to the cleaning system.

*2. Range Selection Summary:
   - If choice 1 is selected, the range will be 0–(10–99.9) mg/L (ppm) and the units will be 0.1 mg/L (ppm).
   - If choice 2 is selected, the range will be 0–(100–9999) mg/L (ppm) and the units will be 1 mg/L (ppm).
   - If choice 3 is selected, the range will be 0–1000–9990 mg/L (ppm) and the units will be 10 mg/L (ppm).

*3. Please specify the required range.

*4. Standard cable glands are provided even if other cable entry options are selected. Cable entry ports that are not used should be left with the standard cable glands fitted, which will provide a seal function.

*5. If the instrument is to be installed in hot climates (greater than 45°C ambient temperatures) or in locations exposed to direct sunlight, please select the hood.

**Spare Parts**

- Fluoride ion standard solution (p/n 143F077)
- Ion strength adjustment tablet, pH5–A8500 mL (p/n 143A053)

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**Product Code notes for HC-D76C, HC-D76F, HC-D76**

**<Immiscible type>**

<table>
<thead>
<tr>
<th>HC-D76C (PVC)</th>
<th>HC-D76F (PVDF)</th>
<th>HC-D76 (PP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of holder <em>(1)</em></td>
<td>1.5m</td>
<td>1.5m</td>
</tr>
<tr>
<td>0.5m</td>
<td>1.0m</td>
<td>2.0m</td>
</tr>
</tbody>
</table>

**Applicable Electrode**

- No electrode
- pH, general use, ELCP-11
- pH, fluorosilicic acid resistant, ELCP-21
- pH, low impedance, ELCP-31
- pH, high alkali, ELCP-41
- ORP, platinum, ELCP-41 *
- ORP, metal alloy, ELCP-21 *
- Fluoridation, ELCP-81 *
- Others to be specified

**Electrode lead length**

- 5m (holder length max. 2.5m)
- 10m

**Custom spec.**

- Japan (for general use)
- Custom spec.
- Protection pipe *(3)*
- Nil (for general use)
- For JHCP-7B, JHCP-7A, JHCP-7E, RHCP-7E
- For RHCP-7B
- For BHCP-7B
- For general use
- Custom spec.

**Official approval not applicable**

*1. Recommendable max. holder length for HC-D76 is 3m.
*2. Required when combining with cleaner and/or mounting bracket for Zn-7.
*3. Make sure to select holder guide essay and protection pipe for some type of cleaner.

Note: Operating temperatures for each holder are indicated in the table below. However, please note that it varies with maximum temperature of each combined electrode.

<table>
<thead>
<tr>
<th>Model</th>
<th>Temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC-D76C</td>
<td>5°C–60°C</td>
</tr>
<tr>
<td>HC-D76F</td>
<td>5°C–95°C</td>
</tr>
<tr>
<td>HC-D76</td>
<td>5°C–80°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Model of exchange chip</th>
<th>Temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELCP-11</td>
<td>5098L</td>
<td>5°C–80°C</td>
</tr>
<tr>
<td>ELCP-21</td>
<td>5090L</td>
<td>5°C–80°C</td>
</tr>
<tr>
<td>ELCP-31</td>
<td>5080L</td>
<td>5°C–80°C</td>
</tr>
<tr>
<td>ELCP-41</td>
<td>5093L</td>
<td>5°C–80°C</td>
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<td>ELCP-51</td>
<td>2154L</td>
<td>5°C–80°C</td>
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<td>ELCP-71</td>
<td>2157L</td>
<td>5°C–80°C</td>
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<tr>
<td>ELCP-81</td>
<td>7208L</td>
<td>5°C–40°C</td>
</tr>
</tbody>
</table>
HC-D82 (Flow-through type electrode holder)

HC-D82-0:

- Connection port standard: RC1/2
- 15A JIS10K RF
- 25A JIS10K RF
- Markings: A — Japanese (Standard), B — English

- Custom spec. code: 9
- Numeric digit: 9
- Alphabet: Z

Combined electrode needs to be ordered separately. Select from the table below.
Applicable pressure: 0–0.45MPa

HC-D86 (Flow-through type electrode holder)

HC-D86-1:

- Materials of wetted parts: Polypropylene (PP)
- PVC
- Connection port standard: RC1/2
- 15A JIS10K FF
- 25A JIS10K FF
- Markings: A — Japanese (Standard), B — English

- Custom spec. code: 9
- Numeric digit: 9
- Alphabet: Z

Combined electrode needs to be ordered separately. Select from the table below.
Applicable pressure: 0–0.15MPa

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**Note 1.** This sensor is combined with transmitter HBM-310, which has a power supply output for the control of a cleaner, hence the sensor has no control box (timer function).

**Note 2.** Max. sample temperature is 80°C for PP holder (HC-D76) and 60°C for PVC holder (HC-D70C).

**Note 3.** Please separately order a bracket (ZC-1 or ZC-2) and a flange (ZPK-1 or ZPK-2) if mounting is required.

**Note 4.** Specify code “0” for both combined holder and applicable electrode when combining them with a pressureized type holder.

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