SPECIFICATION SHEET

FLUORIDE ION MONITORS

FBM-100A (Panel Mounting) FBM-160 (Field Mounting)

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The Models FBM-100A and FBM-160 provide fast and continuous detection of free fluoride ion concentration in water. They are widely used for monitoring water treatment processes and effluent from wastewater plants. They are also used in the semiconductor industry to monitor washed-water from plants that use hydrogen fluoride. The Model FBM-100A is suitable for panel mounting while the Model FBM-160 is designed for outdoor, field mounting. These instruments also feature an optional water jet cleaner for the ion electrode.

The measurement method differs from the more complex distillation method. It has the advantage of being a much simpler method. However, this measurement method can be influenced by wide pH and temperature variations of the sample. Please refer to the paragraph describing Sample Conditions to decide on suitability for your particular application. *The description regarding UL certification applies

only to the FBM-100A type.

Features

- ○Rapid response: If the sample is low in impurities, it detects Concentration as low as 2mg/L in about 60 seconds (90% response).
- OTypical Range is low, medium, and high (0 to 20, 200, and 2000mg/L). You can specify from three ranges.
- O4-point alarms: In addition to the upper and upper limits of Concentration, instrument failure and Power Source





Contacts for interruption (FMB-160 type only), cleaning, maintenance, etc. can be outputted. Concentration alarms can be set to any sensitivity and delay time. (UL certified products only have 2-point alarms)

OWasher control output: circumference of water jet washer (option)

Outputs 100 VAC Power Source to be operated temporally.



Common Specifications		Digital Output Signa	al: RS-232C (compliant with JIS X5103)
Model Codes	FBM-100A (panel mounting) FBM-160 (outdoor, field mounting)	(Option)	(OL certified products cannot be selected), Asynchronous, half duplex, 9600 Baud. Data transmitted includes
Measurement Meth	od : Fluoride Ion Selective Electrode		ion concentration, electrode signal.
Display	: Digital, LCD type		sample temperature, concentration
Measurement Ranges : 0.0 to 99.9mg/L, 0 to 9990mg/L or 0 to 9990mg/L			alarms, under maintenance, under
Output Signal	: 4 to 20mA DC, isolated, 650 Ohm Load		cleaning, instrument fault status etc
Output Range	Adjustable within measurement range	Cleaner control	: Periodically supplies a driving power
	(minimum 1/10 F.S.).	output	source (AC 100V 2A or less) to the water-
	Factory settings; 0.0 to 20mg/L, 0 to		jet cleaner with an internal timer.
	200mg/L, 0 to 2000mg/L.		Wash cycle 0.1 to 48.0 hours variable
Sample Temperatu	rre : $0 ext{ to } 50 ext{ deg C}$		Cleaning time 1 to 999 seconds
Alarm function	:		Variable cleaning pulse number 1 to 19
And Force	FBM-100A: ALARM1 to 4 make		times Variable
	contact (a contact) *1		Wait time after washing 0.0 to 99.9 min
	FBM-160: ALARM1 to 3 make contact		variable
	(a contact), ALARM4 transfer	Temp Compensatio	n: Fluoride ion electrode is corrected
	contact (c contact) *2		using Nernst equation (within 0 to 40
Contact capacity	AC 250V 3A (resistive load) or DC 30V		deg C of sample temperature).
	3A (resistive loading)	Performance	\pm within 8% FS (without detector)
	<pre><ul certified="" product=""> Pilot duty:</pre>	Linearity	(With calibration solution)
A in	C300, D300, R300 (inductive load)		Repeatability electrode is used to
Aircraft Efficiency	Can be selected from upper/lower limit		measure the sample water. However,
	alarm, cleaning, maintenance, or		Repeatability is approximately $\pm 30\%$.
	Dendwidth and action dolow time con		90% response time. Within 15 seconds
	bandwidth and action delay time can		Within 60 seconds (detector
	*1 III cortified products have only 2		combination)
	lines of ALARM1 and 2 make contacts	Self Diagnostics	Calibration Error: Displays E0 to 5
	(a contacts)	Sen Diagnostics	Temperature Sensor Error: Displays
	*2. Transfer contact (C contact) can		E-12 Memory Error: Displays
	output a closed contact signal when		E-20/21Burn out or error signal is output
	the power is cut off.	Operating Power	: 100 to 240 VAC, 50/60 Hz
	· · · · · · · ·	Power Consumptio	n : Approx. 10VA (FBM-100A)
Individual Specifications			Approx. 11VA (FBM-160)

Individual Specifications

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	FBM-100A	FBM-160
Installation	Panel mounting	Outdoor, filed installation
	(panel cut-out : $92 \times 92 \text{ mm}$)	(50A pipe, wall or rack mounting)
External dimensions	$96(w) \times 96(h) \times 90(d) mm$	$181(w) \times 180(h) \times 95(d) mm$
Enclosure Rating	Indoor installation type (IP-30)	Outdoor installation type, dust and splash proof (IP-65)
Material and Finish	Main unit: Aluminum Display Part: Polyester-resin	Aluminum die cast polyester resin
	Aluminum ground color Display part: light yellow	Painting Color: Metallic Silver
Cable entry	-	G1/2 x 6 (with 6 to 12mm diameter cable gland)
Ambient Temp and	-10 to 50 deg C	-20 to 55 deg C
humidity	90% RH or less (no condensation)	95% RH or less (no condensation)
Weight	Approx. 0.5 kg	Approx. 2 kg
Water Temp output	NT	Adjustable in 10 deg C widths with 1 deg C
signal	None	units. Factory setting 0.0 to 50.0 deg C
Products subject to UL certification	Exist	None (no plans to acquire)

Sampling water conditioncondition

рН	: Less variable at pH4 to 9 Note 1
Temperature:	: Less variable at 0 to 40 °C Note 2
Electrical conductivity	: 50 mS/m (500µS/cm) or more
Flow rate	: 0.01 to 0.2m/s
Co-existing	: No large amounts of calcium,
ingredients	aluminum, iron, etc. are contained
	Note 3

Note 1.

Fluorine is present as a HF-molecule (not ionized) at pH4 or below, so this monitor cannot be detected. Above pH9, the OH-ion will have a greater effect, resulting in a higher indication. In addition, if the pH fluctuates greatly, the state of the fluorine compound may change and the fluoride ion may be liberated, or conversely, it may change to a compound that cannot be detected, so we recommend using it in a place where the pH fluctuates as little as possible.

NOTE 2: Fluorine, which is precipitated in the form of calcium

fluoride, is partially dissolved due to the change in the sample water temperature, and becomes fluoride ion. This may cause a change in the indicator value. Therefore, it is recommended to measure at a constant Temperature at 40°C or below as much as possible.

NOTE3:

Calcium, aluminum, iron, etc. combine with fluorine to form a compound different from fluoride ion. Since such compounds cannot be detected by this monitor, they are lower than JIS method (by distilling and measuring the total fluorine by decomposing the above compounds).

Measurement Principle

The fluoride electrode generates a constant electromotive force depending on Concentration of the fluoride ion in the solution. This relation is shown in the graph on the right. The electromotive force of the electrode is linearly related to the logarithm of the fluoride ion Concentration.

If the instrument is calibrated using a reference solution in advance, the fluoride-ion Concentration can be measured simply by immersing the sensor in the sample.





 <UL certified product> Pilot duty: C300, D300, R300 (inductive load)
Available Functions: high limit, low limit, under cleaning, under maintenance, meter error.

NOTE: Terminal 38 (NC) is only available with FBM-160 transmitter.







- *1. If specified otherwise, please let us know about 1/10FS or more of each of the three types of measured Display Range
- < Example > 0 to 10 mg/L 0 to 50 mg/L 0 to 100 mg/L 0 to 5000 mg/L *2. The RS232C output includes the following as well as ion concentration and water temperature: high limit alarm, high-high limit alarm, under maintenance, under cleaning, instrument malfunction etc..(UL certified products cannot be selected)
- *3. UL certified products are limited to the following specifications: alarm (adjustment) contact output: 2 points (2 circuits A contact), digital output: None, and description form: English. Also, special specifications cannot be accommodated.

Options

RS-232C Output

(UL certified products cannot be selected)

When RS-232C output is "present", it is RS-232C to the terminal part.

The communication terminal is added, and the digital data of measurement values and various alarms can be captured to a computer.

Terminal No	Signal Symbol	Description	Direction
1	RD (RXD)	Receive	Input
2	SD (SXD)	Transmit	Output
3	SG	Ground	



Composition of dedicated communication cable*

*FBM-160 type is this terminal block, but FBM-100A type is a connector. (NOTE) The length of the communication cable is 10m or less.



- *1. Measurement of Concentration and liquid temperature, respectively, when "Other designation" is specified. Notify us of the constant Display Range of 1/10FS or more. <Example> 0 to 10mg/L 0 to 50 mg/L
 - 0 to 100mg/L 0 to 30deg C
- *2. The RS232C output includes the following as well as ion concentration and water temperature:
- high limit alarm, high-high limit alarm, under maintenance, under cleaning, instrument malfunction etc.
- *3. Standard coat: Undercoat and topcoat is melamine resin . The average film thickness 30µm or more. The degree of brilliance is G40.
 - Thick anticorrosion coat: Undercoat and middlecoat is epoxy resin. Topcoat is Polyurethane resin. The average film thickness 100µm or more. The degree of brilliance is G80.
- *4. Arrester (easy type) is attached to the power line and the transmission line.
- *5. Wiring port is six ports with φ 6 to 12 cablegland. If you remove this cablegrand, the screw for conduit pipe is G1/2.

Fluoride Ion Electrode

Construction and Specifications

The electrode comprises a main body made from epoxy resin with a fluoride resin junction and a replaceable electrode chip. The electrode chip includes a sensor membrane (fluoride Lanthanum) and body (epoxy resin). The sensor has a polyethylene guard. This design allows the electrode chip to be easily replaced (for example when membrane quality degrades) without having to change the complete sensor assembly.

Product Name	ELCP-81- [] F
Sensor Membrane	Fluoride Lanthanum
Measurement Range	0.1 to 10000 mg/LF
Allowable Temp. Range	-10 to 50 deg C
Operating Temperatures	-5 to 40 deg C
Operating Pressures	0 to 0.2 Mpa
Inner Electrode	Silver/ Silver Chloride
Reference Inner Solution	Gel KCL (non supply type)
Junction Materials	Epoxy resin, 4 fluoride ethylene
JUNCTION MATCHINE	resin, fluoride gum, Delrin
Replaceable Electrode Chip	EL 7208L





Electrode Holder Product Codes



HC-D82 Flow Through Type (316 Stainless Steel)

HCD82-0-🗆 🖵	
L-	Process Connections
1	Rc 1/2
2	15A JIS10K RF
3	25A JIS10K RF
9	Custom Specification
r	Varkings
A	Japanese Language (Standard)
В	English Language
Ζ	Custom Specification

Please arrange separately for combination electrode ELCP81-0- $\square F$ MOP :0 to 0.2 MPa

HC-D86 Flow Through Type (Resin)



Please arrange separately for combination electrode. ELCP81-0-□F Operating pressure :0 to 0.15 MPa

*1. Holder length of HC-D76 type is up to 3m (due to large deflection). *2. Required when combining with ZN-7 type and indicating mounting

- bracket.
- *3. With the holder guide assay ensure that you select holder guide assay and protective tube for the same washer.
- NOTE: With the holder guide assay ensure that you select holder guide assay and protective tube for the same washer.

Model	Temperature Rang	je
HC-D70C	-5 to 60 deg C	
HC-D70F	$^{-5}$ to 95 deg C	
HC-D76	-5 to 80 deg C	
Model	Replaceable Chip	Temperature Rang
ELCP-81	7208L	-5 to 40 deg C

<Standard solution for calibration>

- · Ionic Strength Adjuster added reference solution
- (Use as the calibration solution. Correct value upon dilution. You cannot get it.)

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- Fluoride Ion Standard Solution F² mg/ L 500mL (Code No.6507970K)
- Fluoride Ion Standard Solution F²0mg/L 500mL (Code No.6507980K)
- Fluoride Ion Standard Solution F²00mg/L 500mL (Code No.6511190K)
- Fluoride Ion Standard Solution F 2000mg/L 500mL (Code No.6511200K)
- Fluoride Ion Standard Solution F 3000mg/L 500mL (Code No.6511220K)

<Calibration solution preparation stock solution>

- (Add Ionic Strength Adjuster to the fluoride-ion standard solution according to Manual and dilute with water to adjust the calibration solution of the specified Concentration.)
- Fluoride Ion Standard Solution F 1000mg/L 500mL (Code No.143F077)
- Ion strength preparation pH5-AB 500 mL (Code No.143A053)



*. Power Source fed to the detector via an FBM-type monitor. For Power Source greater than or equal to AC 100V, an antihypertensive trans (ZP:35VA) is required between the FBMtype and the detector. (Separately installed)

JHCP-7E Immersion Type with Water Jet Cleaning System



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