

SPECIFICATION SHEET



FLUORIDE ION MONITORS

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

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.

Features

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



FBM-100A

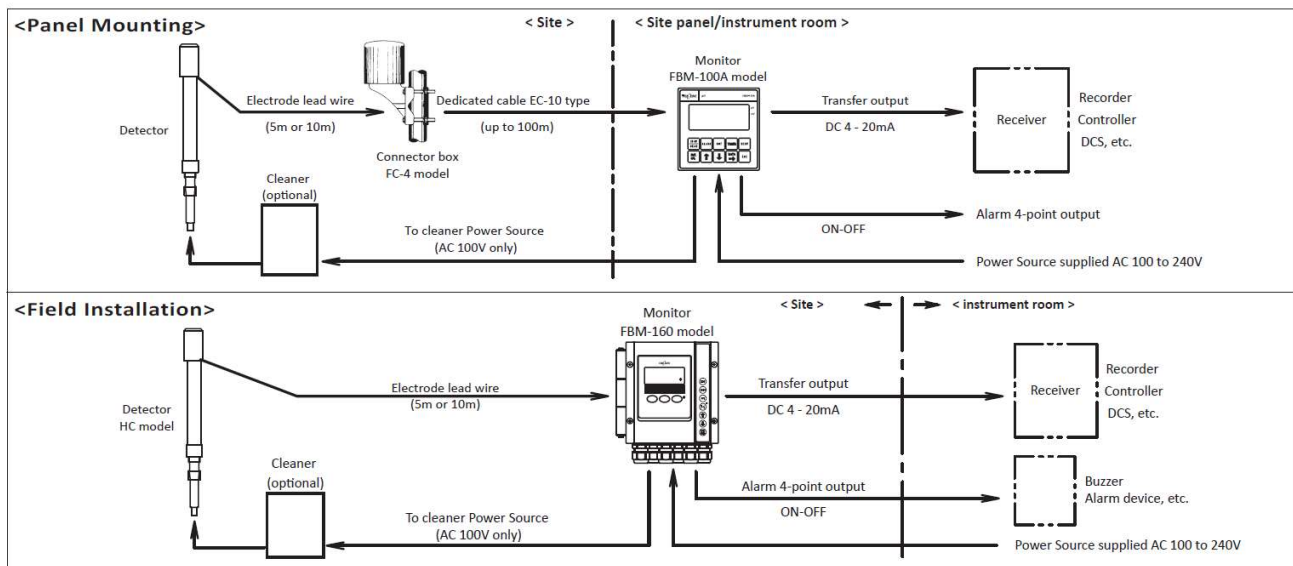


FBM-160

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

- Washer control output: circumference of water jet washer (option)
Outputs 100 VAC Power Source to be operated temporally.

Composition diagram



Common Specifications

Model Codes : FBM-100A (panel mounting)
 FBM-160 (outdoor, field mounting)

Measurement Method : Fluoride Ion Selective Electrode

Display : Digital, LCD type

Measurement Ranges : 0.0 to 99.9mg/L, 0 to 999mg/L or 0 to 9990mg/L

Output Signal : 4 to 20mA DC, isolated, 650 Ohm Load

Output Range : Adjustable within measurement range
 (minimum 1/10 F.S.).
 Factory settings: 0.0 to 20mg/L, 0 to 200mg/L, 0 to 2000mg/L.

Sample Temperature : 0 to 50 deg C

Alarm function :

And Force ... 4 circuitry: Alarm1 to 3 make contacts
 (a contact) Alarm4 transfer contact
 (c-contact)

Contact capacity ... AC 250V 3A (resistive load) or DC 30V
 3A (resistive loading)

Aircraft Efficiency ... Can be selected from upper/lower limit
 alarm, cleaning, maintenance, or
 instrument failure.
 Bandwidth and action delay time can
 be set for upper/lower limit alarms.
 *For FBM-160 type, one of the circuits
 can output a closed contact signal with
 Power Source disconnection at the
 transfer contact (contact c).

Digital Output Signal : RS232C, Asynchronous, half duplex,
 (Option) 9600 Baud. Data transmitted includes
 ion concentration, electrode signal,

Cleaner control
 output

Temp Compensation :

Performance
 Linearity

Self Diagnostics

Operating Power

Power Consumption : Approx. 10VA (FBM-100A)
 Approx. 11VA (FBM-160)

sample temperature, concentration
 alarms, under maintenance, under
 cleaning, instrument fault status etc..
 Periodically supplies a driving power
 source (AC 100V 2A or less) to the
 water-jet cleaner with an internal
 timer. Wash cycle 0.1 to 48.0 hours
 variable
 Cleaning time 1 to 999 seconds
 Variable cleaning pulse number 1 to 19
 times Variable
 Wait time after washing 0.0 to 99.9 min
 variable

Fluoride ion electrode is corrected
 using Nernst equation (within 0 to 40
 deg C of sample temperature).

: ± within 8% FS (without detector)
 (With calibration solution)
 Repeatability... electrode is used to
 measure the sample water. However,
 Repeatability is approximately ±30%.
 90% response time: Within 15 seconds
 (without detector)
 Within 60 seconds (detector
 combination)

: Calibration Error: Displays E0 to 5
 Temperature Sensor Error: Displays
 E-12 Memory Error: Displays
 E-20/21 Burn out or error signal is
 output

: 90 to 264 VAC, 50/60 Hz

Individual Specifications

| | FBM-100A | FBM-160 |
|---------------------------|---|--|
| Installation | Panel mounting (panel cut-out : 92 x 92 mm) | Outdoor, filed installation (50A pipe, wall or rack mounting) |
| External dimensions | 96(w) x 96(h) x 90(d) mm | 181(w) x 180(h) x 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 ground color Display part: light yellow | Aluminum die cast polyester resin Painting Color: Metallic Silver |
| Cable entry | - | G1/2 x 6 (with 6 to 12mm diameter cable gland) |
| Ambient Temp and humidity | -10 to 50 deg C 90% RH or less (no condensation) | -20 to 55 deg C 95% RH or less (no condensation) |
| Weight | Approx. 0.5 kg | Approx. 2 kg |
| Water Temp output signal | None | Adjustable in 10 deg C widths with 1 deg C units. Factory setting 0.0 to 50.0 deg C |

Sampling water conditioncondition

pH : 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.

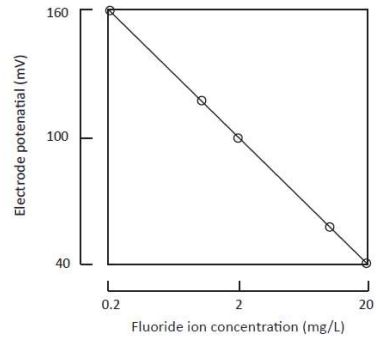
NOTE3:

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

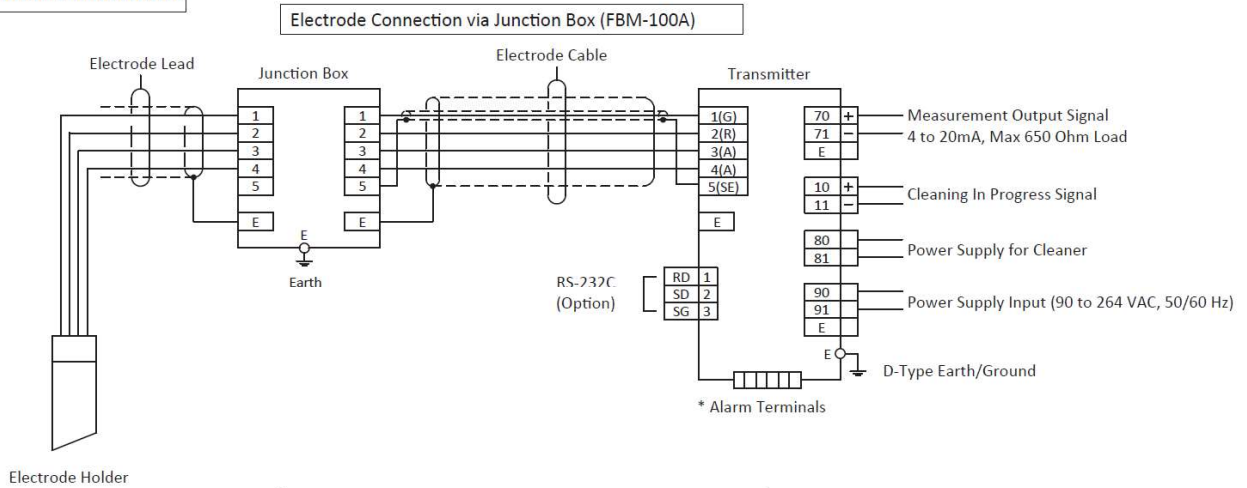
The fluoride electrode generates a constant electromotive force depending on Concentration of the fluoride ion in the solution. This relation is shown in the graph on the right. The electromotive force of the electrode is linearly related to the logarithm of the fluoride ion Concentration.

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.



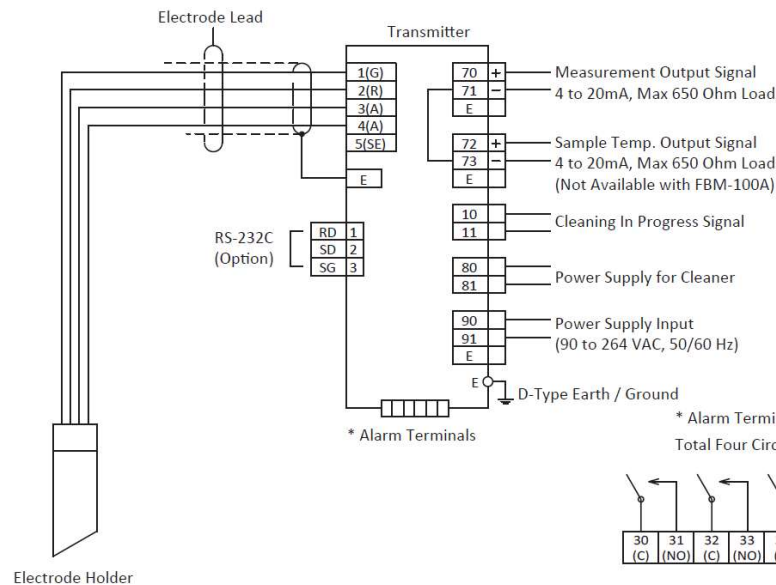
● Fluoride Ion The relation between Concentration and electromotive force of an electrode

Terminal Connections

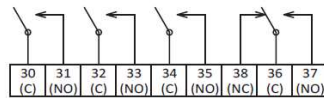


Electrode Holder

Direct Electrode Connection to Transmitter (FBM-160)



Electrode Holder



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

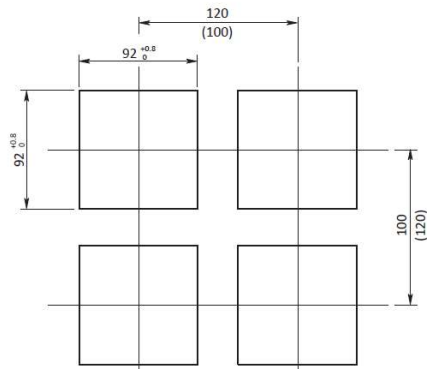
Contact rating: 250 VAC, 3A, or 30 VDC, 3A.

Available Functions: high limit, low limit, under cleaning, under maintenance, meter error.

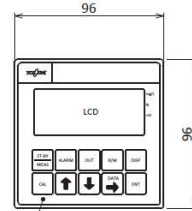
Dimensions

Unit : mm

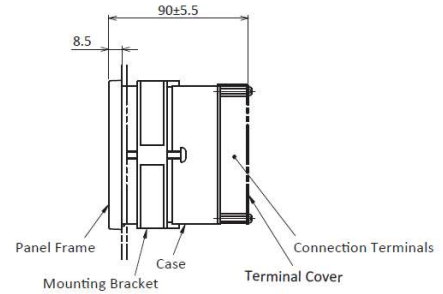
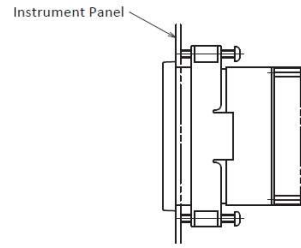
● FBM-100A Panel Mounting



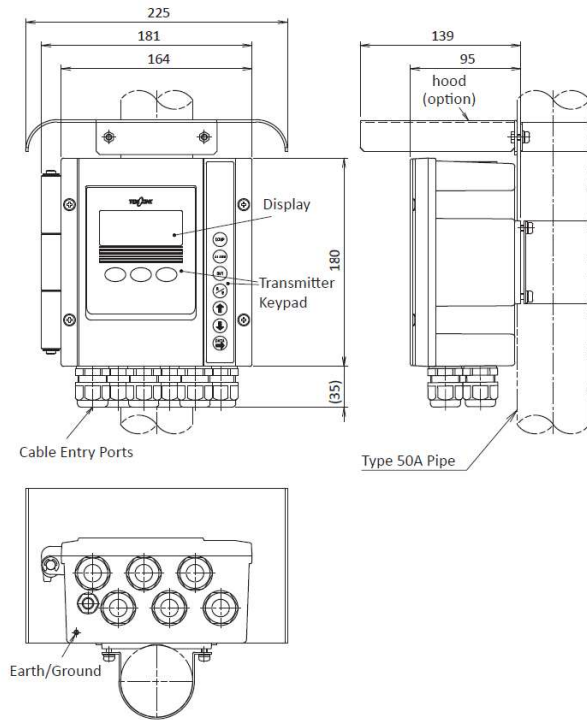
Panel Cut-out Dimensions



Transmitter Keypad

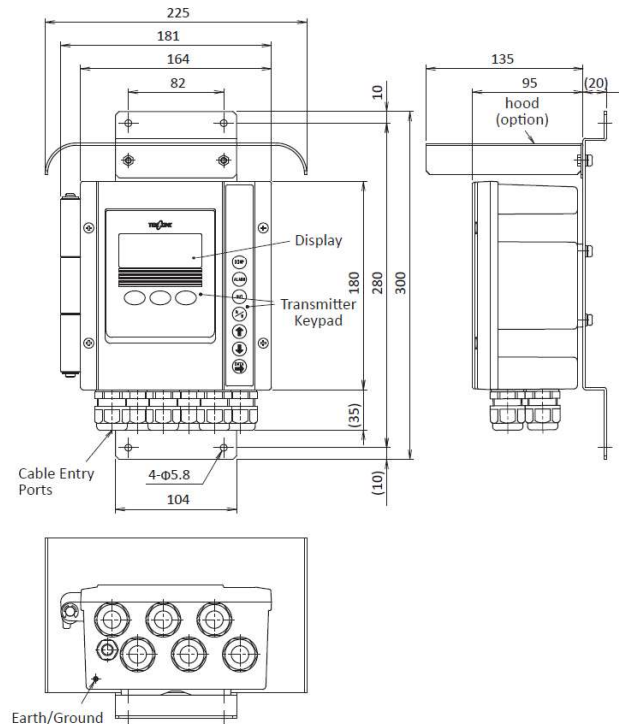


● FBM-160 Pole Mounting



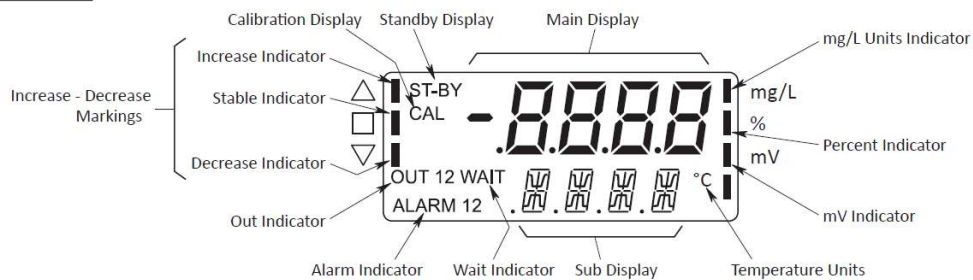
Earth/Ground

● FBM-160 Wall or Rack Mounting



Earth/Ground

Display Configuration



Options

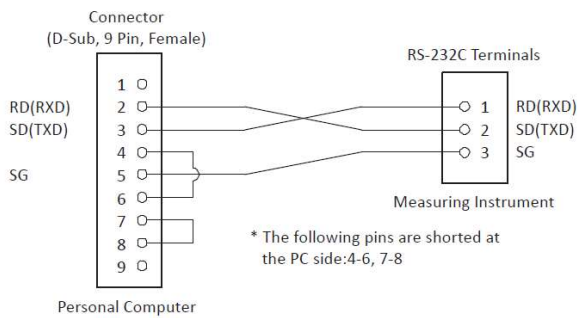
● RS-232C Output

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.

RS-232C Terminal Connections

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



Composition of dedicated communication cable*

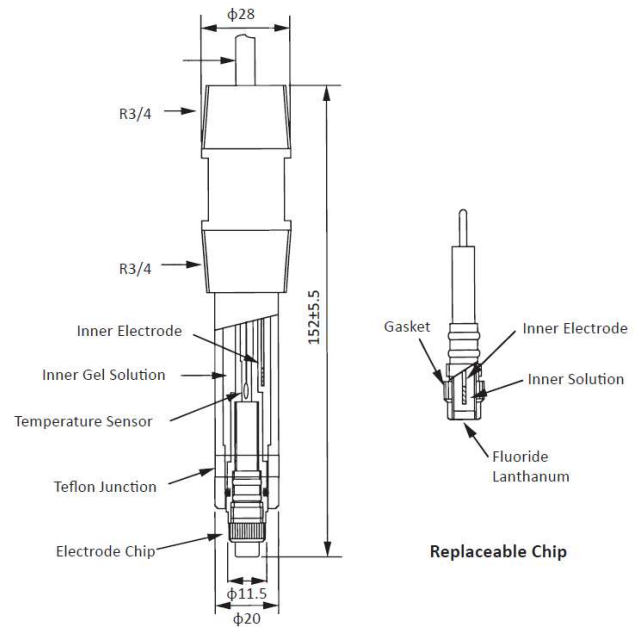
*FBM-160 type is this terminal block, but FBM-100A type is a connector.
(NOTE) The length of the communication cable is 10m or less.

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 resin, fluoride gum, Delrin |
| Replaceable Electrode Chip | EL 7208L |

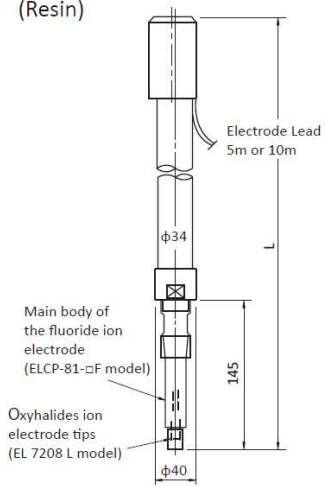


Electrode Holder Dimensions

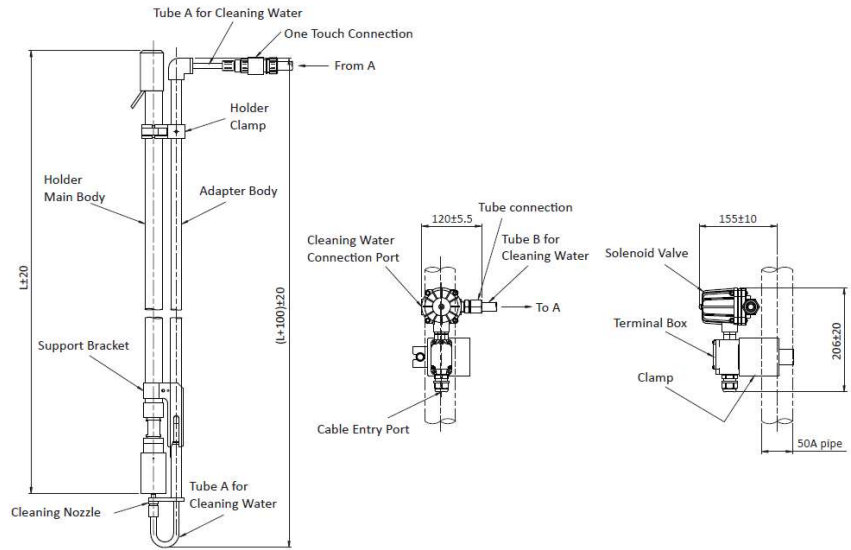
Unit : mm

● Immersion Type HC-D70C / D76

(Resin)

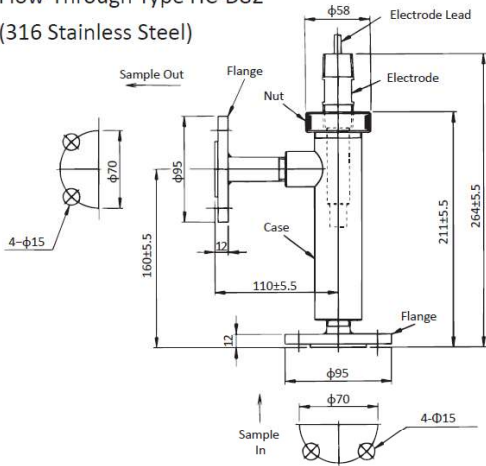


● Immersion Type with Water Jet Cleaner JHCP-7E



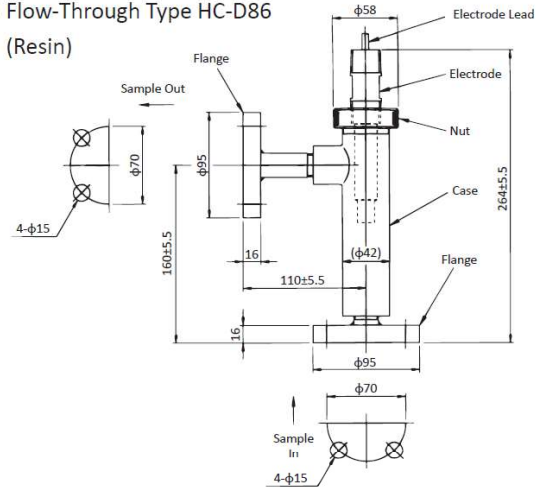
● Flow-Through Type HC-D82

(316 Stainless Steel)

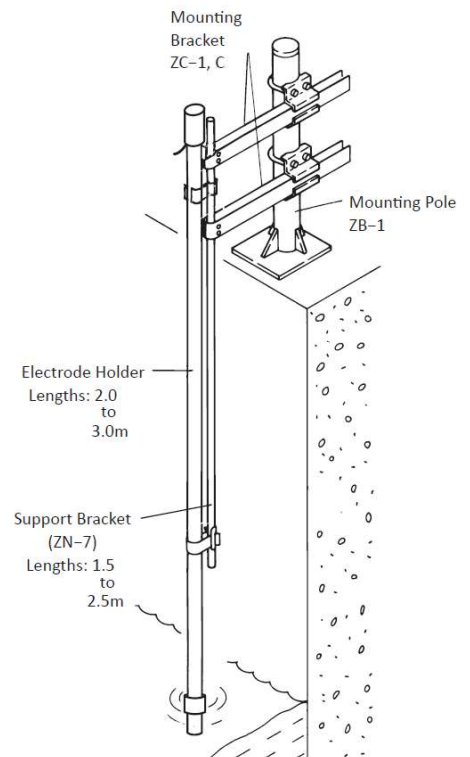
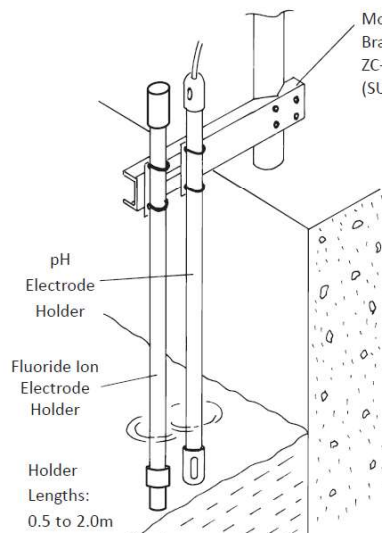
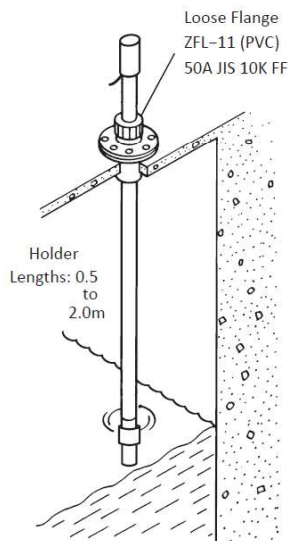
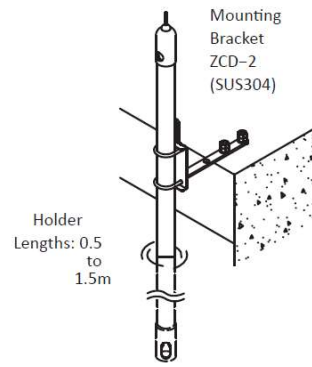
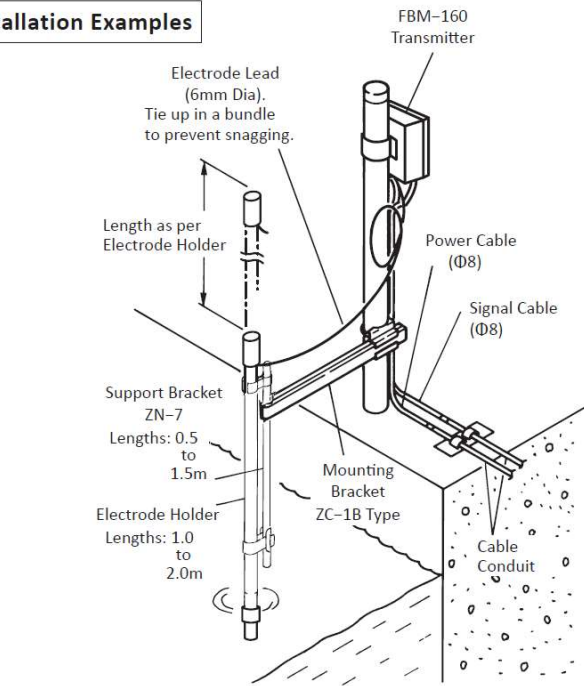


● Flow-Through Type HC-D86

(Resin)



Installation Examples



DKK-TOA CORPORATION

CAUTION

Please read the operation manual carefully before using products.

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Information and specifications are subject to change without notice.