

# General Specifications

Model FLXA21  
2-Wire Analyzer



GS 12A01A02-01E

## ■ General

The model FLXA21<sup>®</sup> 2-Wire Analyzer, one model of FLEXA<sup>®</sup> series, offers single or dual sensor measurement. The modular-designed analyzer offers 4 kinds of measurements – pH/ORP (oxidation-reduction potential), contacting conductivity (SC), inductive conductivity (ISC) or dissolved oxygen (DO) – with the respective sensor module.

For dual sensor measurement, the combination of two same type sensor inputs – pH/ORP and pH/ORP, SC and SC, and DO and DO – are available with two sensor modules. Dual sensor measurement offers additional functionalities; calculated data function and redundant system.

Variety of calculated data from two measuring parameters is selectable for each measurement. On the redundant system built on two measuring parameters of two sensor inputs, main output parameter is automatically switched over to the second sensor output in case of the main sensor's failure condition.

In the FLXA21 Human Machine Interface (HMI), 2-wire type analyzer FLXA21 offers easy touch screen operation and simple menu structure in 12 languages. Menus of display, execution and setting are displayed in a selected language.

The analyzer FLXA21 automatically recognizes the installed sensor module and prepares the necessary menus for right configuration, even for dual sensor measurement.

For immediate measurement, the FLXA21 offers quick setup functionality. The quick setup screen appears when the analyzer is powered. Only a few setups – date/time, language, basic sensor configurations and output – will start the measurement.

The FLXA21 offers the best accuracy in measurement with temperature compensation functionality and calibration functionality. Sensor diagnostics and sensor wellness indication make measurement reliable. Logbook of events and diagnostic data is a useful information source for maintenance.

For the wide range of industrial environment, the FLXA21 is designed with the enclosure of plastic, stainless steel or stainless steel with corrosion-resistant coating. And, for hazardous location, the FLXA21 has approvals of ATEX, IECEx, FM and CSA.



## ■ Features

- 4 kinds of measurements; pH/ORP, SC, ISC and DO
- Dual sensor measurement on 2-wire type analyzer; pH/ORP and pH/ORP, SC and SC, and DO and DO
- Calculated data from dual sensor measurement
- Redundant system on dual sensor measurement
- Easy touch screen operation on 2-wire type analyzer
- Simple HMI menu structure in 12 languages
- Quick setup menu for immediate measurement
- Indication of sensor wellness
- Enclosure – plastic, stainless steel or stainless steel with corrosion-resistant coating
- Hazardous location approvals – ATEX, IECEx, FM and CSA

## ■ General Specifications

### 1. Basic

#### ■ Measurement Object

- pH/Oxidation-reduction Potential (pH/ORP)
- Conductivity (SC)
- Inductive Conductivity (ISC)
- Dissolved Oxygen (DO)

Note: The available measurement object depends on a sensor module installed on the analyzer.

#### ■ Analyzer Structure

Module structure

#### ● Composition of Analyzer

One (1) Housing assembly  
One (1) or two (2) Sensor modules

#### ● Combination of Sensor Module when two modules are installed

Combinations of two same sensor modules are available;

pH/ORP and pH/ORP  
SC and SC  
DO and DO

### 2. Measurement

#### 2-1. pH/Oxidation-reduction Potential (pH/ORP)

##### ■ Input Specification

Dual high impedance input ( $\geq 10^{12} \Omega$ )

##### ■ Input Range

pH: -2 to 16 pH (with option /K: 0 to 14 pH)  
ORP: -1500 to 1500 mV  
rH: 0 to 100 rH

Temperature:

Pt1000: -30 to 140 °C  
Pt100: -30 to 140 °C  
6k8: -30 to 140 °C  
PTC10k: -30 to 140 °C  
NTC 8k55: -10 to 120 °C  
3k Balco: -30 to 140 °C  
PTC500: -30 to 140 °C

##### ■ Output Range

pH: min. span 1 pH  
max. span 20 pH  
ORP: min. span 100 mV  
max. span 3000 mV  
rH: min. span 2 rH  
max. span 100 rH  
Temperature: min. span 25 °C  
max. span 170 °C

##### ■ Performance (Accuracy)

(The specifications are expressed with simulated inputs.)

pH

Linearity:  $\pm 0.01$  pH  
Repeatability:  $\pm 0.01$  pH  
Accuracy:  $\pm 0.01$  pH

ORP

Linearity:  $\pm 1$  mV  
Repeatability:  $\pm 1$  mV  
Accuracy:  $\pm 1$  mV

Temperature

with Pt1000, 6k8, PTC10k, NTC 8k55, 3k Balco, PTC500  
Repeatability:  $\pm 0.1$  °C  
Accuracy:  $\pm 0.3$  °C

with Pt100

Linearity:  $\pm 0.4$  °C  
Repeatability:  $\pm 0.1$  °C  
Accuracy:  $\pm 0.4$  °C

#### 2-2. Conductivity (SC)

##### ■ Input Specification

Two or four electrodes measurement with square wave excitation, using max 60m (200ft) cable (WU40/ WF10) and cell constants from 0.005 to 50.0  $\text{cm}^{-1}$

##### ■ Input Range

Conductivity:

min.: 0  $\mu\text{S}/\text{cm}$   
max.: 200  $\text{mS} \times (\text{Cell constant})$   
(over range 2000  $\text{mS}/\text{cm}$ )

Resistivity:

min.: 0.005  $\text{k}\Omega / (\text{Cell constant})$   
max.: 1000  $\text{M}\Omega \times \text{cm}$

Temperature:

Pt1000: -20 to 250 °C  
Pt100: -20 to 200 °C  
Ni100: -20 to 200 °C  
NTC 8k55: -10 to 120 °C  
Pb36(JIS NTC 6k): -20 to 120 °C

##### ■ Output Range

Conductivity:

min. 0.01  $\mu\text{S}/\text{cm}$   
max. 2000  $\text{mS}/\text{cm}$  (max 90% zero suppression)

Resistivity:

min. 0.001  $\text{k}\Omega \times \text{cm}$   
max. 1000  $\text{M}\Omega \times \text{cm}$  (max 90% zero suppression)

Temperature:

min. span 25 °C  
max. span 270 °C

##### ■ Performance (Accuracy)

(The specifications are expressed with simulated inputs.)

Conductivity

2  $\mu\text{S} \times \text{K cm}^{-1}$  to 200  $\text{mS} \times \text{K cm}^{-1}$   
Accuracy:  $\pm 0.5\%$  F.S.  
1  $\mu\text{S} \times \text{K cm}^{-1}$  to 2  $\mu\text{S} \times \text{K cm}^{-1}$   
Accuracy:  $\pm 1\%$  F.S.

Resistivity

0.005  $\text{k}\Omega / \text{K cm}^{-1}$  to 0.5  $\text{M}\Omega / \text{K cm}^{-1}$   
Accuracy:  $\pm 0.5\%$  F.S.  
0.5  $\text{M}\Omega / \text{K cm}^{-1}$  to 1  $\text{M}\Omega / \text{K cm}^{-1}$   
Accuracy:  $\pm 1\%$  F.S.

Temperature

with Pt1000, Pb36, Ni100  
Accuracy:  $\pm 0.3$  °C  
with Pt100, NTC 8k55  
Accuracy:  $\pm 0.4$  °C

Temperature compensation

NaCl table:  $\pm 1\%$   
Matrix:  $\pm 3\%$

Step response: 90 % (< 2 decades) in 7 seconds

Note: "F.S." means maximum setting value of analyzer output.

"K" means cell constant.

YOKOGAWA provides conductivity sensors of which cell constants are 0.1 to 10  $\text{cm}^{-1}$ .

## 2-3. Inductive Conductivity (ISC)

### ■ Input Specification

Compatible with the Yokogawa inductive conductivity ISC40 series with integrated temperature sensor: NTC30k or Pt1000.

### ■ Input Range

Conductivity: 0 to 2000 mS/cm at 25 °C reference temperature.  
 Temperature: -20 to 140 °C  
 Cable length:  
     max. 60 meters total length of fixed sensor cable + WF10(J) extension cable.  
 Influence of cable can be adjusted by doing an AIR CAL with the cable connected to a dry cell.

### ■ Output Range

Conductivity:  
     min. span: 100  $\mu$ S/cm  
     max. span: 2000 mS/cm (max 90% zero suppression)  
 Temperature:  
     min. span 25 °C  
     max. span 160 °C

### ■ Performance (Accuracy)

(The specifications are expressed with simulated inputs.)

(Output span is 0-100  $\mu$ S/cm or more)

Conductivity:  
     Linearity:  $\pm(0.4 \% \text{F.S.} + 0.3 \mu\text{S/cm})$   
     Repeatability:  $\pm(0.4 \% \text{F.S.} + 0.3 \mu\text{S/cm})$   
 Temperature:  $\pm 0.3 ^\circ\text{C}$   
 Step response: 90 % (< 2 decades) in 8 seconds  
 Note: "F.S." means maximum setting value of analyzer output.

## 2-4. Dissolved Oxygen (DO)

### ■ Input Specification

The FLXA21 accepts output from membrane covered Dissolved Oxygen sensors. These sensors can be Galvanic type, where the sensor generates its own driving voltage or Polarographic type, where the sensor uses external driving voltage from the converter.

The input range is 0 to 50  $\mu$ A for Galvanic sensors and 0 to 1 micro A for Polarographic sensors. For temperature compensation, the FLXA21 accepts Pt1000 (DO30 sensor) and NTC22k elements (OXYFERM and OXYGOLD sensors).

### ■ Input Range

DO30 sensor:  
     Dissolved Oxygen: 0 to 50 mg/l (ppm)  
     Temperature: -20 to 150 °C  
 Note: Process temperature for DO30 is 0 to 40 °C  
 Hamilton sensors:  
     Oxyferm:  
         Measurement range: 10 ppb to 40 ppm  
         Temperature range: 0 to 130 °C  
     Oxygold G:  
         Measurement range: 2 ppb to 40 ppm  
         Temperature range: 0 to 130 °C  
     Oxygold B:  
         Measurement range: 8 ppb to 40 ppm  
         Temperature range: 0 to 100 °C

### ■ Output Range

DO concentration:  
     mg/l (ppm):  
         min.: 1 mg/l (ppm)  
         max.: 50 mg/l (ppm)  
     ppb:  
         min.: 1 ppb  
         max.: 9999 ppb  
 % saturation:  
     min.: 10 %  
     max.: 600 %  
 Temperature:  
     min. span 25 °C  
     max. span 170 °C

### ■ Performance (Accuracy)

(The specifications are expressed with simulated inputs.)

Performance in ppm mode:

Linearity:  $\pm 0.05 \text{ ppm}$  or  $\pm 0.8 \% \text{ F.S.}$ , whichever is greater  
 Repeatability:  $\pm 0.05 \text{ ppm}$  or  $\pm 0.8 \% \text{ F.S.}$ , whichever is greater  
 Accuracy:  $\pm 0.05 \text{ ppm}$  or  $\pm 0.8 \% \text{ F.S.}$ , whichever is greater

Performance in ppb mode:

Linearity:  $\pm 1 \text{ ppb}$  or  $\pm 0.8 \% \text{ F.S.}$ , whichever is greater  
 Repeatability:  $\pm 1 \text{ ppb}$  or  $\pm 0.8 \% \text{ F.S.}$ , whichever is greater  
 Accuracy:  $\pm 1 \text{ ppb}$  or  $\pm 0.8 \% \text{ F.S.}$ , whichever is greater

Temperature

Linearity:  $\pm 0.3 ^\circ\text{C}$   
 Repeatability:  $\pm 0.1 ^\circ\text{C}$   
 Accuracy:  $\pm 0.3 ^\circ\text{C}$

Note: "F.S." means maximum setting value of analyzer output.

### 3. Electrical

#### ■ Output Signal

General: One output of 4-20 mA DC  
 Note: Tolerance:  $\pm 0.02$  mA  
 Bi-directional HART digital communication, superimposed on mA (4-20mA) signal

Output function:

Linear or Non-linear (21-step table)

Burn out function: (NAMUR 43)

Without HART/PH201G:

Down: 3.6 mA

(signal: 3.8 to 20.5 mA for pH/ORP, SC and DO)

(signal: 3.9 to 20.5 mA for ISC)

Up: 22mA

With HART/PH201G:

Down: 3.6 mA for pH/ORP, SC and DO

Down: 3.9 mA for ISC

(signal: 3.8 to 20.5 mA for pH/ORP, SC and DO)

(signal: 3.9 to 20.5 mA for ISC)

Up: 22mA

#### ■ Power Supply

Nominal 24 V DC loop powered system

One (1) Sensor module (1 input):

16 to 40V DC (for pH/ORP, SC and DO)

17 to 40V DC (for ISC)

Two (2) Sensor modules (2 inputs):

22.8 to 40V DC (for pH/ORP, SC and DO)

#### ● Maximum Load Resistance

Refer to the Figure 1.

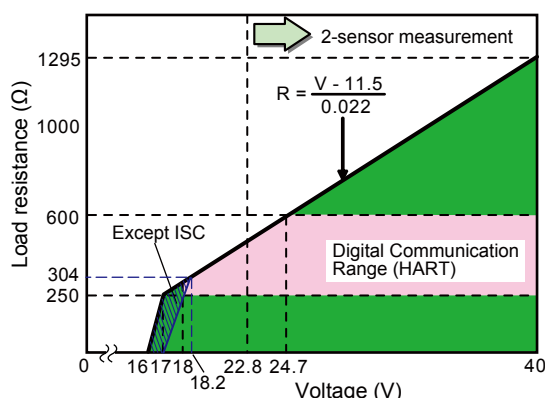


Figure 1 Supply Voltage and Load Resistance

#### ■ Display

LCD with a touch screen:

Black/White: 213 x 160 pixels

Contrast adjustment available on the touch screen

Message language:

12 (English, Chinese, Czech, French, German, Italian, Japanese, Korean, Polish, Portuguese, Russian and Spanish)  
 One analyzer has all 12 languages.

Note: Description for a selection of language and language names are written in English.

Note: Only English alphabet and numeric are available for a tag number, an additional description for each value on the display screen and passwords.

Note: Only for message language on the screen, 12 languages are provided.

### 4. Mechanical and others

#### ■ Housing

Case:

- Plastic (Polycarbonate)
- Stainless steel without painting
- Stainless steel with epoxy coating
- Stainless steel with urethane coating

Case color and finish:

Color: Silver gray (equivalent to Munsell 3.2PB7.4/1.2)  
 (for plastic case, stainless steel cases with coating)

Finish: Electropolishing (for stainless steel case without painting)

Window: Polycarbonate (flexible)

Window frame for stainless steel cases: Polycarbonate, color: silver gray (equivalent to Munsell 3.2PB7.4/1.2)

Protection: IP66 (except Canada), NEMA4X (except Canada), Type 3S/4X (Canada)

#### ■ Plate

Main name plate: inside case cover

Regulation plate:  
 on the case outside

#### ■ Cable and Terminal

Cable size:

Outer diameter:

6 to 12 mm (suitable for M20 cable gland)

3.4 to 7 mm (grounding cable for plastic case)

Terminal screw size: M4

torque of screw up: 1.2 N·m

Wire terminal:

Pin terminal, ring terminal and spade terminal can be used for analyzer's power supply terminals and sensor terminals. For the grounding terminal on the stainless steel case, ring terminal should be used. Pin terminal: pin diameter: max. 1.9 mm  
 Ring and spade terminal: width: max. 7.8 mm

#### ■ Cable Entry

Plastic case:

1-Sensor measurement:

3 holes,  
 M20 cable gland x 3 pcs,  
 Sleeve x 1 pc (for grounding cable line)  
 Close up plug x 1 pc

2-Sensor measurement:

4 holes,  
 M20 cable gland x 4 pcs,  
 Sleeve x 1 pc (for grounding cable line)  
 Close up plug x 1 pc

Stainless steel case:

7 holes,  
 M20 cable gland x 7 pcs  
 Close up plug x 5 pcs

Note: Cable gland and plug are delivered with an analyzer, but not assembled into the analyzer.

#### ■ Mounting

Mounting hardware (option):

- Universal mounting kit (Note)
- Pipe and wall mounting hardware
- Panel mounting hardware

Note: This kit contains the pipe and wall mounting hardware and the panel mounting hardware.

Hood (option):

- Stainless steel
- Stainless steel with urethane coating
- Stainless steel with epoxy coating

### ■ Stainless Steel Tag Plate

When the additional code "/SCT" with a tag number is specified, the tag plate on which the tag number is inscribed is delivered with the analyzer.  
Tag plate is hanging type.

### ■ Conduit Adapter

Using optional adapter

- G1/2 (quantity: 4)
- 1/2NPT (quantity: 4)
- M20 x 1.5 (quantity: 4)

These conduit adapters are delivered with an analyzer, but not assembled into the analyzer.

### ■ Size of Housing Case

Plastic: 144 x 144 x 151 mm (L x W x D) (without cable gland)

Stainless steel case:  
165 x 165 x 160 mm (L x W x D) (without cable gland)

### ■ Weight

Approx. 1 kg (Plastic housing)

Approx. 2 kg (Stainless steel housing)

### ■ Shipping Details

Package size:

Approx. 340 x 340 x 370 mm (L x W x H)

### ■ Ambient Operating Temperature

-20 to +55 °C

### ■ Storage Temperature

-30 to +70 °C

### ■ Humidity

10 to 95% RH (Non-condensing)

### ■ Document

Following documents are delivered with an analyzer;

Paper copy:

Start-up Manual

written in English

CD-ROM:

Start-up Manual (pdf)

written in 5 languages

User's Manual (pdf)

written in English

Safety Regulation Manual (pdf)

for European region

written in 25 languages

### ■ Regulatory Compliance

Safety: EN61010-1

UL 61010-1

CSA C22.2 No.61010-1

EMC: EN61326-1 Class A, Table 2 (For use in industrial locations)

EN61326-2-3

AS/NZS CISPR11

Korea Electromagnetic Conformity Standard

Installation altitude: 2000 m or less

Category based on IEC 61010: I (Note 1)

Pollution degree based on IEC 61010: 2 (Note 2)

Note 1: Installation category, called over-voltage category, specifies impulse withstand voltage.

Equipment with "Category I" (ex. two wire transmitter) is used for connection to circuits in which measures are taken to limit transient over-voltages to an appropriately low level.

Note 2: Pollution degree indicates the degree of existence of solid, liquid, gas or other inclusions which may reduce dielectric strength. Degree 2 is the normal indoor environment.

Explosion-proof (Intrinsically safe type and non-incentive) (for suffix code: -EA):  
ATEX Intrinsically safe approval

Applicable standard

Explosive Atmospheres

EN 60079-0:2009 General requirements

EN 60079-11:2007 Equipment protection by intrinsic safety "i"

EN 60079-26:2007 Equipment with equipment protection level (EPL) Ga

EN 60529:1992 Degrees of protection provided by enclosures (IP Code)

Type of protection

II 1G Ex ia IIC Ga

Group: II

Category: 1G

T4: for ambient temperature: -20 to 55°C

T6: for ambient temperature: -20 to 40°C

Atmosphere pressure: 80kPa

(0.8bar) to 110kPa (1.1bar)

Degree of Protection of the

Enclosure: IP66

IECEx Intrinsically safe

Applicable standard

IEC 60079-0: 2007 Part 0: General requirements

IEC 60079-11: 2006 Part 11: Equipment protection by intrinsic safety "i"

IEC 60079-26: 2006 Part 26: Construction, test and marking of Group II Zone 0 electrical apparatus

IEC 60529: 2001 Degrees of protection provided by enclosures (IP Code)

Type of protection

Ex ia IIC Ga

T4: for ambient temperature: -20 to 55°C

T6: for ambient temperature: -20 to 40°C

Atmosphere pressure: 80kPa

(0.8bar) to 110kPa (1.1bar)

Degree of Protection of the

Enclosure: IP66

FM Intrinsically safe and nonincentive approval

Applicable standard

FM-3600: 2011 Approval Standard for Electric Equipment for use in Hazardous (Classified) Locations General Requirement

FM-3610: 2010 Approval Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations

FM-3611: 2004 Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2, Hazardous (Classified) Locations

FM-3810: 2005 Electrical Equipment for Measurement, Control and Laboratory Use

NEMA 250:1991 Enclosures for Electrical Equipment (1000 Volts Maximum)

ANSI/IEC 60529:2004 Degrees of protection provided by enclosures (IP Code)



ANSI/ISA 60079-0 2009 Part 0: General Requirements

ANSI/ISA 60079-11 2011 Part 11: Equipment protection by intrinsic safety "i"

Type of protection

Class I, Division 1, Groups A, B, C and D (Intrinsically Safe)

Class I, Division 2, Groups A, B, C and D (Nonincendive)

Class I, Zone 0, in Hazardous (Classified) Locations (Intrinsically Safe)

Class I, Zone 2, Group IIC, in Hazardous (Classified) Locations (Nonincendive)

AEx ia IIC

For all protection type,

T4: for ambient temperature: -20 to 55°C

T6: for ambient temperature: -20 to 40°C

Atmosphere pressure: 80 kPa (0.8 bar) to 110 kPa (1.1 bar)

Degree of Protection of the Enclosure:

NEMA Type 4X and IP66

CSA Intrinsically safe and nonincendive approval

Applicable standard

CAN/CSA C22.2 No. 94-M1991 Special Purpose Enclosures

CAN/CSA C22.2 No. 157-92

Intrinsically Safe Equipment for Use in Hazardous Locations

C22.2 No213-M1987 Non-incendive

Electrical Equipment for Use in Class I, Division 2 Hazardous Locations

CAN/CSA-E60079-0-07 Electrical apparatus for explosive gas atmospheres - Part 0: General requirements

CAN/CSA-E60079-11-02 Electrical apparatus for explosive gas atmospheres - Part 11: Intrinsic safety "i"

IEC 60529:2001 Degrees of protection provided by enclosures (IP Code)

Type of protection (C22.2)

Class I, Division 1, Groups A, B, C and D (Intrinsically Safe)

Class I, Division 2, Groups A, B, C and D (Nonincendive)

For all protection type,

T4: for ambient temperature: -20 to 55°C

T6: for ambient temperature: -20 to 40°C

Atmosphere pressure: 80 kPa (0.8 bar) to 110 kPa (1.1 bar)

Ambient Humidity: 0 to 100% (No condensation)

Degree of Protection of the Enclosure: Type 4X

Type of protection (E60079)

Ex ia IIC

T4: for ambient temperature: -20 to 55°C

T6: for ambient temperature: -20 to 40°C

Atmosphere pressure: 80 kPa (0.8 bar) to 110 kPa (1.1 bar)

Ambient Humidity: 0 to 100% (No condensation)

Degree of Protection of the Enclosure: IP66

Electrical Parameters (Ex ia)

Each housing assembly (base module) and each sensor module are respectively certificated.

Input parameters of sensor module meet output parameters of housing assembly.

## Housing assembly

Input parameters	Supply and output circuit (terminals + and -): $U_i, V_{max} = 30\text{ V}$ $I_i, I_{max} = 100\text{ mA}$ $P_i, P_{max} = 0.75\text{ W}$ $C_i = 13\text{ nF}$ $L_i = 0\text{ mH}$ (Linear source)
Output parameters	Measuring module input circuit (CN2 or CN3 on Back board) $U_o, V_t, V_{oc} = 13.65\text{ V}$ $I_o, I_t, I_{sc} = 50\text{ mA}$ $P = 0.372\text{ W}$ $C_o, C_a = 80\text{ nF}$ $L_o, L_a = 7.7\text{ mH}$

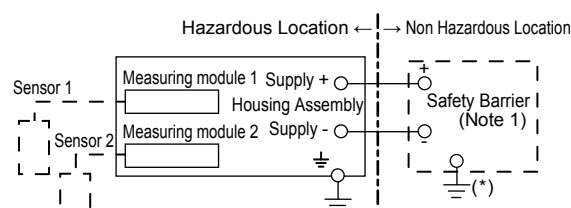
## pH/ORP module, SC module, and DO module

Input parameters	$U_i, V_{max} = 13.92\text{ V}$ $I_i, I_{max} = 50\text{ mA}$ $P_i, P_{max} = 0.374\text{ W}$ $C_i = 40\text{ nF}$ $L_i = 2.9\text{ mH}$
Output parameters	Sensor input circuit (pH: terminals 11 through 19, SC: terminals 11 through 16, DO: terminals 11 through 18) $U_o, V_t, V_{oc} = 11.76\text{ V}$ $I_o, I_t, I_{sc} = 116.5\text{ mA}$ $P = 0.3424\text{ W}$ $C_o, C_a = 100\text{ nF}$ $L_o, L_a = 1.7\text{ mH}$

## ISC module

Input parameters	$U_i, V_{max} = 13.92\text{ V}$ $I_i, I_{max} = 50\text{ mA}$ $P_i, P_{max} = 0.374\text{ W}$ $C_i = 40\text{ nF}$ $L_i = 7.7\text{ mH}$
Output parameters	Sensor input circuit (terminals 11 through 17) $U_o, V_t, V_{oc} = 11.76\text{ V}$ $I_o, I_t, I_{sc} = 60.6\text{ mA}$ $P = 0.178\text{ W}$ $C_o, C_a = 100\text{ nF}$ $L_o, L_a = 8\text{ mH}$

## Control Drawing (ATEX and IECEx types)



Electrical data are as follows;

Maximum Voltage ( $U_i$ ) = 30V

Maximum Current ( $I_i$ ) = 100mA

Maximum Power ( $P_i$ ) = 0.75W

Internal Capacitance ( $C_i$ ) = 13nF

Internal Inductance ( $L_i$ ) = 0mH

Note 1: The output current must be limited by a resistor "R" such that  $I_{maxout} = U_z/R$  (linear source).

Note 2: Safety barrier certified by a notify body in EU as ATEX should be used.

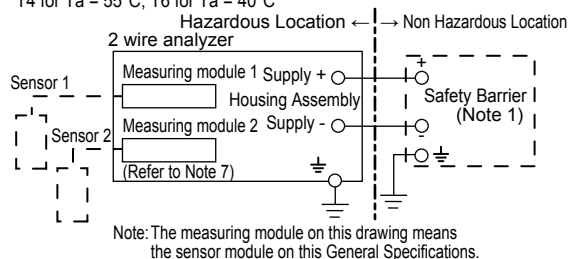
Note 3: When using non isolation barrier, connect (\*) to IS earthing system.

Note 4: Measuring module 2 is installed when required. When measuring inductive conductivity, only one module can be installed.

## Control Drawing (FM type)

Following contents refer "DOC. No. IKE039-A12"

Class I, Division 1, Groups A, B, C, and D  
Class I, Zone 0 and 1, Group IIC  
T4 for Ta = 55°C, T6 for Ta = 40°C



Electrical data are as follows;

Input Maximum Input Voltage ( $U_i$ ) = 30V  
Maximum Current ( $I_i$ ) = 100mA  
Maximum Power ( $P_i$ ) = 0.75W  
Internal Capacitance ( $C_i$ ) = 13nF  
Internal Inductance ( $L_i$ ) = 0mH

Sensor Input Circuit

Type of Measuring Module	pH, SC and DO	ISC
Maximum Voltage ( $U_o$ )	11.76 V	11.76 V
Maximum Current ( $I_o$ )	116.5mA	60.6mA
Maximum Power ( $P_o$ )	0.3424W	0.178W
External Capacitance ( $C_a$ , $C_o$ )	100nF	100nF
External Inductance ( $L_a$ , $L_o$ )	1.7mH	8mH

Note 1: In any safety barrier used, the output current must be limited by a resistor "R" such that  $I_{maxout} = U_z/R$ .

Note 2: The safety barrier shall be FM Entity-Approved associated apparatus / barrier where :

Barrier  $V_{oc}$ ,  $U_o \leq 30V$ ;  
Barrier  $I_{sc}$ ,  $I_o \leq 100$  mA;  
Barrier  $P_o \leq 0.75W$ ;  
Barrier  $C_a$ ,  $C_o \geq 13$  nF+Cable;  
Barrier  $L_a$ ,  $L_o \geq L_{cable}$

Note 3: When using non isolation barrier connect (\*1) to IS earthing system.

Note 4: pH and SC Sensor(s) are of a passive type to be regarded as 'simple apparatus' same as 06ATEX0218X, 06ATEX0219, IECEx KEM 06.0052X, FM3028779, 06ATEX0220X, 06ATEX0221, IECEx KEM 06.0053X or the one individually certified with relevant parameters.

Note 5: ISC Sensor(s) are ISC40S of 00ATEX1067X or the one individually certified with relevant parameters.

Note 6: DO Sensor(s) are of a passive type to be regarded as 'simple apparatus' or the one individually certified with relevant parameters.

Note 7: Measuring module 2 may not mounted. As for ISC module, only one can be mounted.

Note 8: Install per the National Electrical Code (NFPA 70)

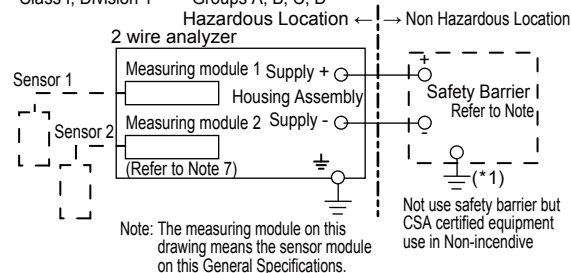
Note 9: WARNING - Potential electrostatic charging hazard  
Electrostatic charge may cause an explosion hazard. Avoid any actions that cause the generation of electrostatic charge, e.g., rubbing with a dry cloth.

Note 10: As an alternative to installing the FLXA21 in Division 2 using Class I, Division 2 wiring methods, the FLXA21 may be installed in Division 2 using nonincendive field wiring in accordance with the National Electrical Code (NFPA 70) using the same parameters identified for intrinsically safe entity installations. The Associated Nonincendive Apparatus shall have nonincendive field wiring connections which are FM Approved for use in the Class I, Division 2 location.

## Control Drawing (CSA type)

Intrinsically Safe  
Group IIC, Zone 0  
Class I, Division 1

Non-incendive  
Class I, Division 2,  
Groups A, B, C, D



Electrical parameters (Intrinsically safe)

Housing Assembly

Supply and output circuit (terminals + and -)

$U_i(V_{max})=30V$ ,  $I_i(I_{max})=100mA$ ,  
 $P_i(P_{max})=0.75W$ ,  $C_i=13nF$ ,  $L_i=0mH$

Measuring module input circuit (CN2 or CN3 on Back board)

$U_o(V_t, V_{oc})=13.65V$ ,  $I_o(I_t, I_{sc})=50mA$ ,  
 $P_o=0.372W$ ,  $C_o(C_a)=80nF$ ,  
 $L_o(L_a)=7.7mH$

pH module, SC module and DO module

$U_i(V_{max})=13.92V$ ,  $I_i(I_{max})=50mA$ ,  
 $P_i(P_{max})=0.374W$ ,  $C_i=40nF$ ,  $L_i=2.9mH$

Sensor input circuit (terminals 11 through 19)

$U_o(V_t, V_{oc})=11.76V$ ,  $I_o(I_t, I_{sc})=116.5mA$ ,  
 $P_o=0.3424W$ ,  $C_o(C_a)=100nF$ ,  
 $L_o(L_a)=1.7mH$

ISC module

$U_i(V_{max})=13.92V$ ,  $I_i(I_{max})=50mA$ ,  
 $P_i(P_{max})=0.374W$ ,  $C_i=40nF$ ,  $L_i=7.7mH$

Sensor input circuit (terminals 11 through 17)

$U_o(V_t, V_{oc})=11.76V$ ,  $I_o(I_t, I_{sc})=60.6mA$ ,  
 $P_o=0.178W$ ,  $C_o(C_a)=100nF$ ,  
 $L_o(L_a)=8mH$

Installation requirements between housing assembly and safety barrier

$U_o \leq U_i$ ,  $I_o \leq I_i$ ,  $P_o \leq P_i$ ,  $C_o \geq C_i + C_{cable}$ ,  $L_o \geq L_i + L_{cable}$   
 $V_{oc} \leq V_{max}$ ,  $I_{sc} \leq I_{max}$ ,  $C_a \geq C_i + C_{cable}$ ,  $L_a \geq L_i + L_{cable}$   
 $U_o$ ,  $I_o$ ,  $P_o$ ,  $C_o$ ,  $L_o$ ,  $V_{oc}$ ,  $I_{sc}$ ,  $C_a$  and  $L_a$  are parameters of barrier.

Electrical Parameters (Nonincendive)

Housing Assembly

Supply and output circuit (terminals + and -)

$U_i(V_{max})=30V$ ,  $C_i=13nF$ ,  $L_i=0mH$

Measuring module input circuit (CN2 or CN3 on Back board)

$U_o(V_t, V_{oc})=13.65V$ ,  $I_o(I_t, I_{sc})=50mA$ ,  
 $C_o(C_a)=80nF$ ,  $L_o(L_a)=7.7mH$

pH module, SC module and DO module

$U_i(V_{max})=13.92V$ ,  $C_i=40nF$ ,  $L_i=2.9mH$

Sensor input circuit (terminals 11 through 19)

$U_o(V_t, V_{oc})=11.76V$ ,  $I_o(I_t, I_{sc})=116.5mA$ ,  
 $C_o(C_a)=4\mu F$ ,  $L_o(L_a)=4.5mH$

ISC module

$U_i(V_{max})=13.92V$ ,  $C_i=40nF$ ,  $L_i=7.7mH$

Sensor input circuit (terminals 11 through 17)

$U_o(V_t, V_{oc})=11.76V$ ,  $I_o(I_t, I_{sc})=60.6mA$ ,  
 $C_o(C_a)=4\mu F$ ,  $L_o(L_a)=19mH$

Note for Intrinsically Safe Installation:

1: In any safety barrier used, the output current must be limited by a resistor "R" such that  $I_o = U_o/R$  or  $I_{sc} = V_{oc}/R$ .

2: The safety barrier must be CSA certified.

- 3: Input voltage of the safety barrier must be less than 250Vrms/Vdc
  - 4: When using non isolation barrier connect (\*1) to IS earthing system.
  - 5: pH and SC Sensor(s) are of a passive type to be regarded as 'simple apparatus' same as 06ATEX0218X, 06ATEX0219, IECEx KEM 06.0052X, FM3028779, 06ATEX0220X, 06ATEX0221, IECEx KEM 06.0053X or the one individually certified with relevant parameters.
  - 6: ISC Sensor(s) are ISC40S of 00ATEX1067X or the one individually certified with relevant parameters.
  - 7: DO Sensor(s) are of a passive type to be regarded as 'simple apparatus' or the one individually certified with relevant parameters.
  - 8: Measuring module 2 may not mounted. As for ISC module, only one can be mounted.
  - 9: Installation should be in accordance with Canadian Electrical Code Part I and Local Electrical Code.
  - 10: Do not alter drawing without authorization from CSA.
- Note for Nonincendive Installation:
- 1: The parameter for sensor input circuit must be taken into account when installed.
  - 2: Installation should be in accordance with Canadian Electrical Code Part I and Local Electrical Code.
  - 3: Do not alter drawing without authorization from CSA.

#### Contact output:

##### Contact rating:

250 V AC, maximum 100 VA  
220 V DC, maximum 50 VA

##### Hold contact output:

NC contact, normally energized  
Contact closes when power is off or during Hold situation.

##### Fail contact output:

NC contact, normally energized  
Contact closes when power is off or during Fail/Warning conditions.

##### Wash contact output:

NO contact  
Contact closes during wash cycles.

## 5. Digital Communication

### ■ Kind of Digital Communication

- HART or PH201G dedicated distributor

Note: Only one kind of digital communication is available for one analyzer.

### ■ Output Value Parameter (HART)

Four value parameters are available for one digital communication.

- For 1-sensor measurement, these parameters are measured values.
- For 2-sensor measurement, refer to the next item.

### ■ Digital Communication of 2-Sensor Measurement (HART)

Even when two sensor modules are installed, only one digital communication is available for 2-sensor measurement.

Four value parameters can be selected from the followings;

Measured values of two sensors  
Calculated data of 2-sensor measurement  
Redundant system output

### ■ Specific Contact Output with dedicated distributor, model PH201G (Style B)

The distributor, model PH201G, is designed to connect with the 2-Wire Analyzer.

This distributor supplies drive power to the analyzer and receives simultaneously 4-20 mA DC signal from the analyzer.

This signal is converted to 1-5 V DC signal in the distributor.

This distributor also receives digital signals superimposed on the 4-20 mA DC signal, and provides contact outputs

#### Input/Output signal:

Number of available drive/signal point: 1

Output signal: 1-5 V DC (2 points) (Note)

Load resistance: 2 kΩ or less (1-5 V DC output)

Isolation system: Loop isolation type

Note: Two output signals for one analyzer's analog output are provided. Two 1-5 V DC output signals are same.



## 6. Model & Suffix Codes

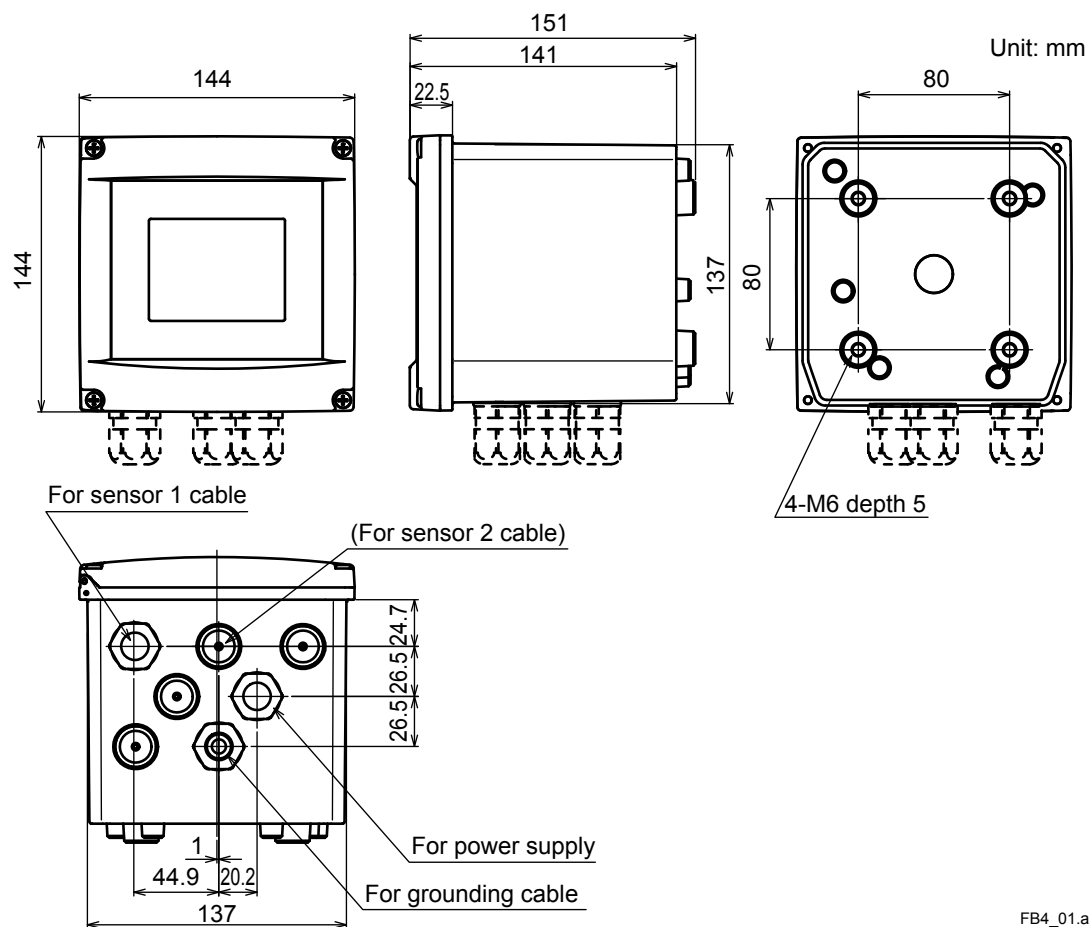
Model	Suffix code	Option code	Description
<b>FLXA21</b>	.....	.....	2-Wire Analyzer
Power supply	<b>-D</b>	.....	Always -D
Housing	<b>-P</b> <b>-S</b> <b>-U</b> <b>-E</b>	..... ..... ..... .....	Plastic Stainless steel Stainless steel + urethane coating Stainless steel + epoxy coating
Display	<b>-D</b> <b>-N</b>	..... .....	Anti-glare LCD Without display (Note 1)
Type	<b>-AA</b> <b>-EA</b>	..... .....	General purpose ATEX, IECEx, FM, CSA (Note 6)
1st input	<b>-P1</b> <b>-C1</b> <b>-C5</b> <b>-D1</b>	..... ..... ..... .....	pH/ORP Conductivity (SC) Inductive conductivity (ISC) Dissolved oxygen (DO)
2nd input (Note 2)	<b>-NN</b> <b>-P1</b> <b>-C1</b> <b>-D1</b>	..... ..... ..... .....	Without input pH/ORP Conductivity (SC) Dissolved oxygen (DO)
Output	<b>-A</b>	.....	4-20 mA + HART
—	<b>-N</b>	.....	Always -N
Language set (Note 3)	<b>-LA</b>	.....	English and 11 languages
Country (Note 4)	<b>-N</b> <b>-J</b>	..... .....	Global except Japan Japan
—	<b>-NN</b>	.....	Always -NN
Option	Mounting hardware Hood Tag plate Conduit adapter Measurement law	<b>/UM</b> <b>/U</b> <b>/PM</b> <b>/H6</b> <b>/H7</b> <b>/H8</b> <b>/SCT</b> <b>/CB4</b> <b>/CD4</b> <b>/CF4</b> <b>/K</b>	Universal mounting kit (Note 5) Pipe and wall mounting hardware Panel mounting hardware Hood, stainless steel Hood, stainless steel + urethane coating Hood, stainless steel + epoxy coating Stainless steel tag plate Conduit adapter (G1/2 x 4 pcs) Conduit adapter (1/2NPT x 4 pcs) Conduit adapter (M20 x 1.5 x 4 pcs) With Measurement Law certificate (Note 7)

### Notes:

- 1: HMI (Human Machine Interface) is not available on the analyzer. HART communication is to be used.  
(To enable HART communication, a setup tool is to be provided.)
- 2: When a 2nd input is selected, only the same kind of the 1st input is available.  
For example, when a 1st input is "-P1", the 2nd input must be the same "-P1".  
The combination of ISC and ISC is not available.
- 3: These languages are message languages on the analyzer's display.  
One analyzer has English and 11 languages.  
All languages are as follows; English, Chinese, Czech, French, German, Italian, Japanese, Korean, Polish, Portuguese, Russian and Spanish.
- 4: When an analyzer is used in Japan, it must meet the Japanese Measurement Law.  
Only SI units must be used on the analyzer and its documents in Japan.
- 5: The universal mounting kit contains the pipe and wall mounting hardware (/U) and the panel mounting hardware (/PM).
- 6: The type "-EA" is intrinsically safe type of ATEX, IECEx, FM and CSA, and non-incendive of FM and CSA.
- 7: The analyzer with Japanese Measurement Law certificate is available only for the following model;  
FLXA21-D-[Housing code]-D-AA-P1-NN-A-N-LA-J-NN/[option code except /K]/K  
Only one pH measurement is certified. The output signal of 4 - 20 mA is certified. HART communication is not certified.

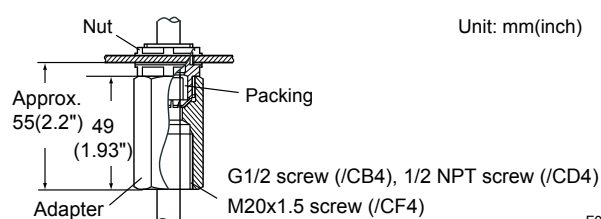
## ■ Dimensions and Mounting

### Plastic Housing



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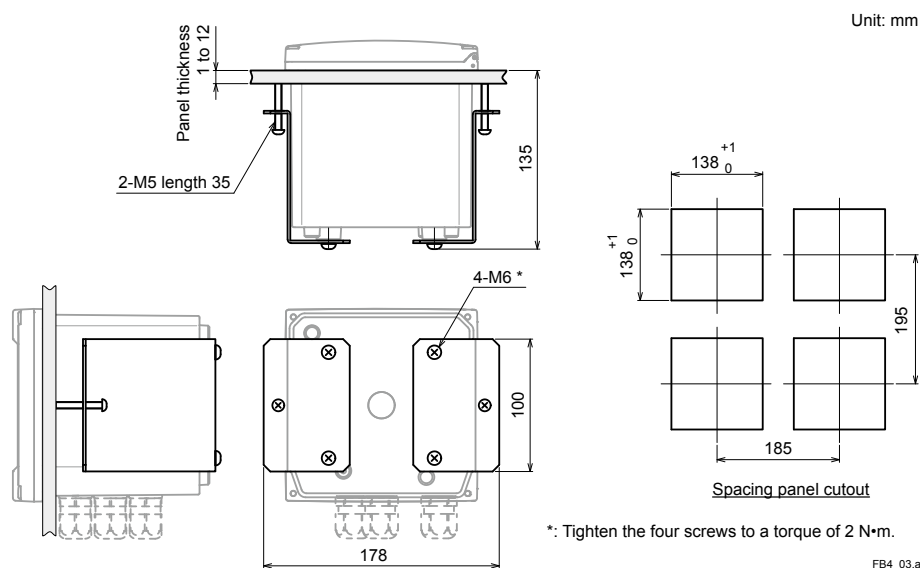
### Conduit Adapter (Option code: □/CB4, □/CD4, □/CF4)



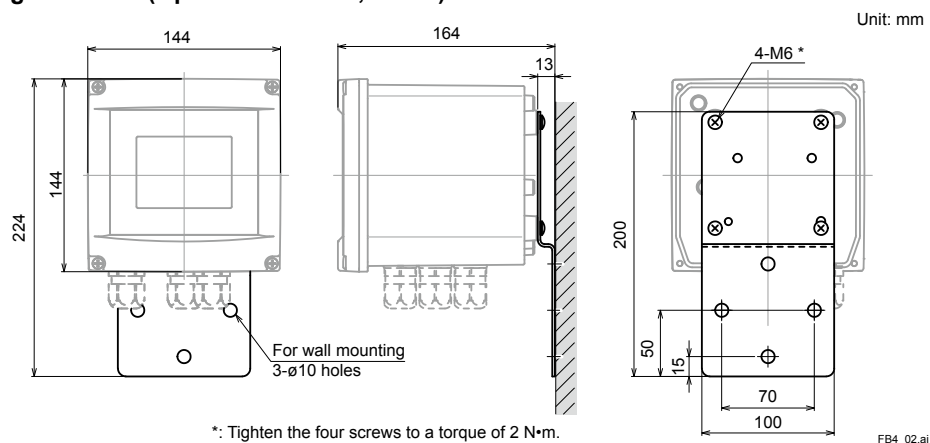
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(Note) The universal mounting kit (/UM) contains the pipe and wall mounting hardware (/U) and the panel mounting hardware (/PM).

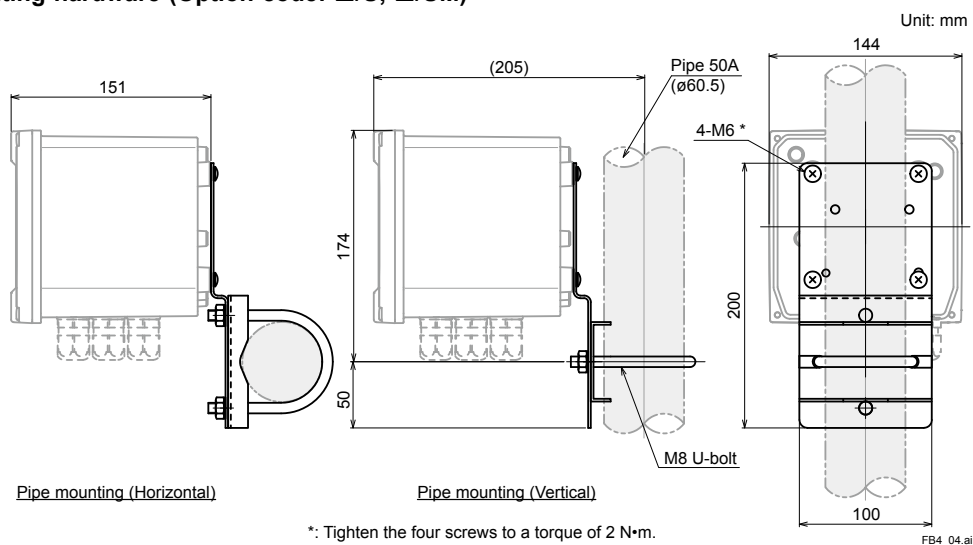
### Panel mounting hardware (Option code: □/PM, □/UM)

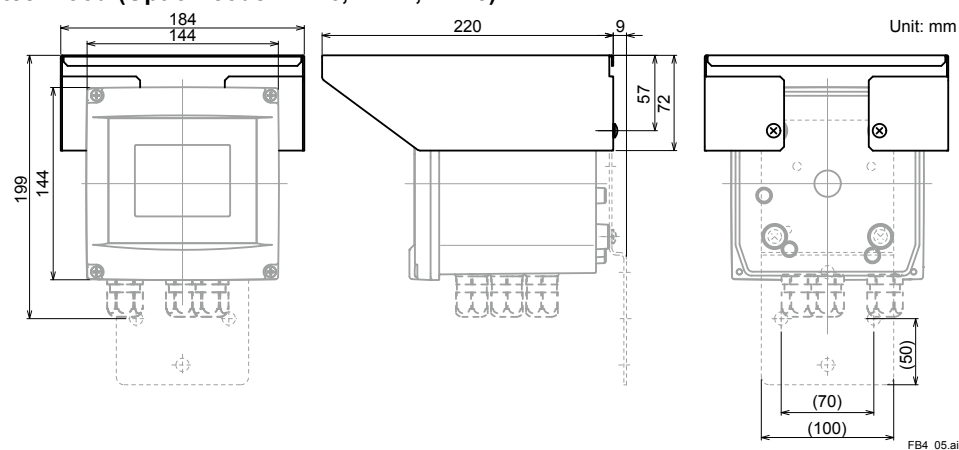
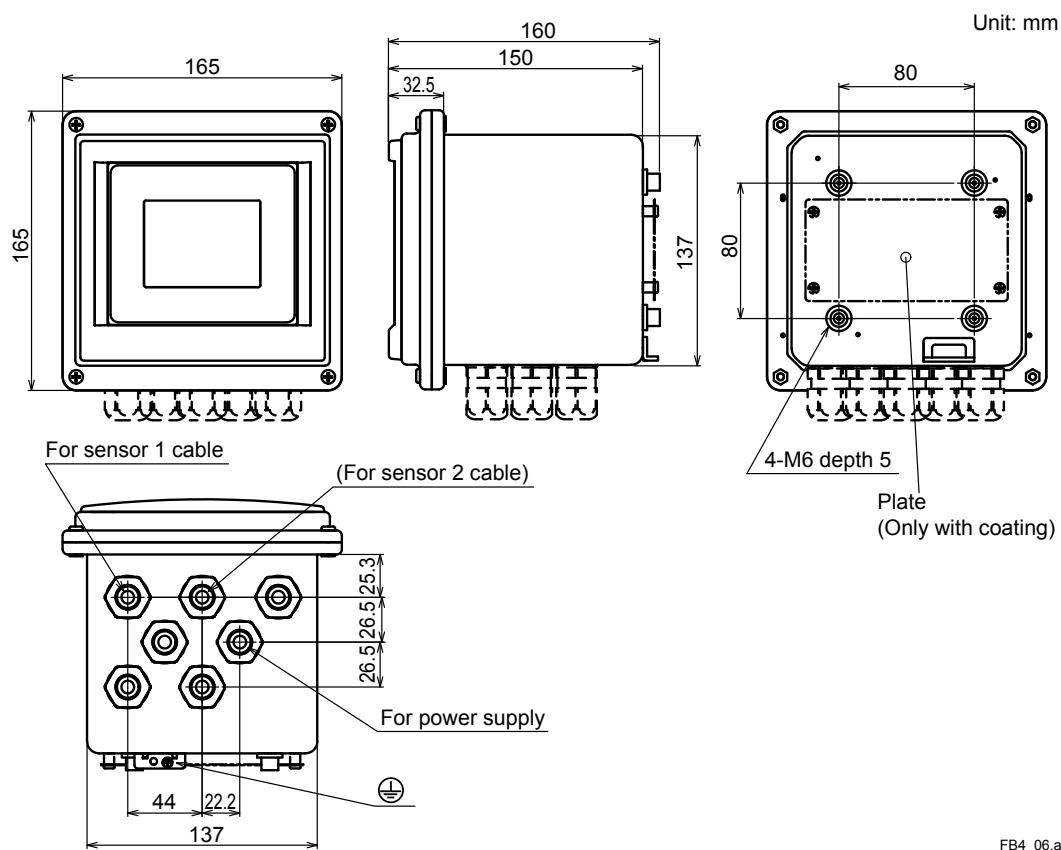
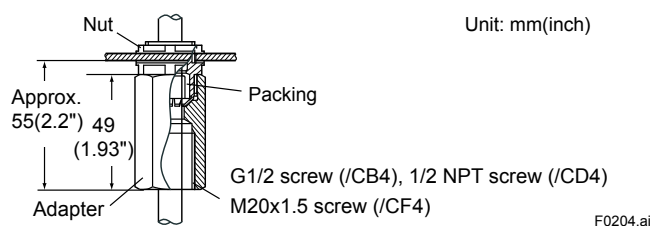


### Wall mounting hardware (Option code: □/U, □/UM)



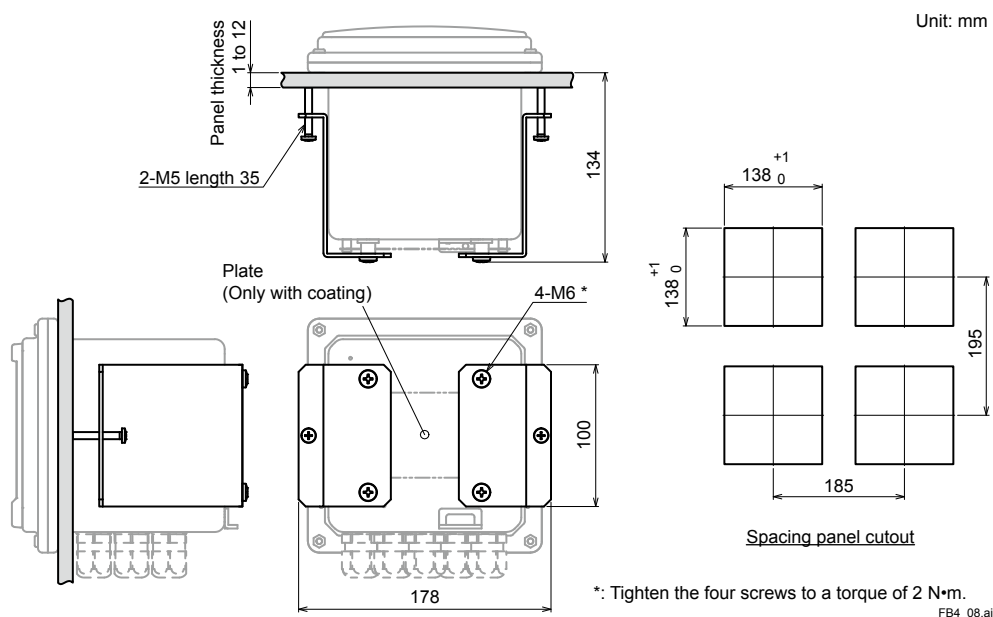
### Pipe mounting hardware (Option code: □/U, □/UM)



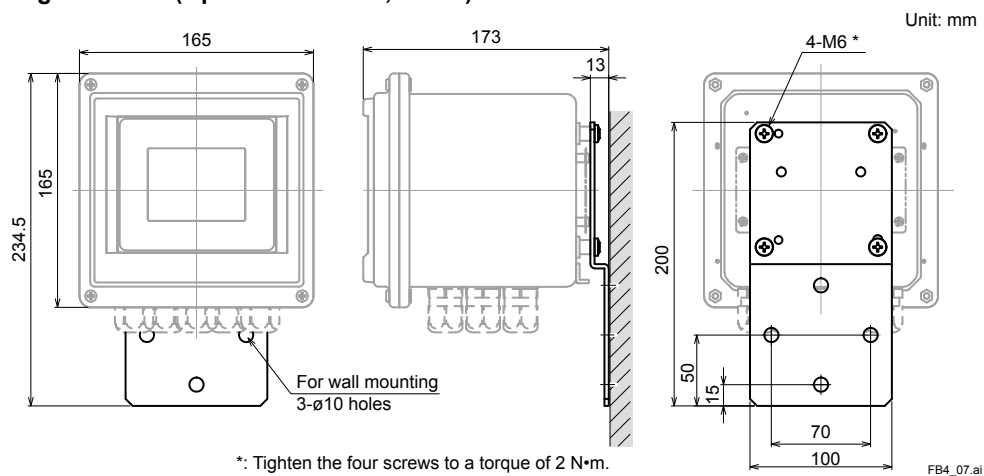
**Stainless steel hood (Option code: □/H6, □/H7, □/H8)**

**Stainless Steel Housing**

**Conduit Adapter (Option code: □/CB4, □/CD4, □/CF4)**


(Note) The universal mounting kit (/UM) contains the pipe and wall mounting hardware (/U) and the panel mounting hardware (/PM).

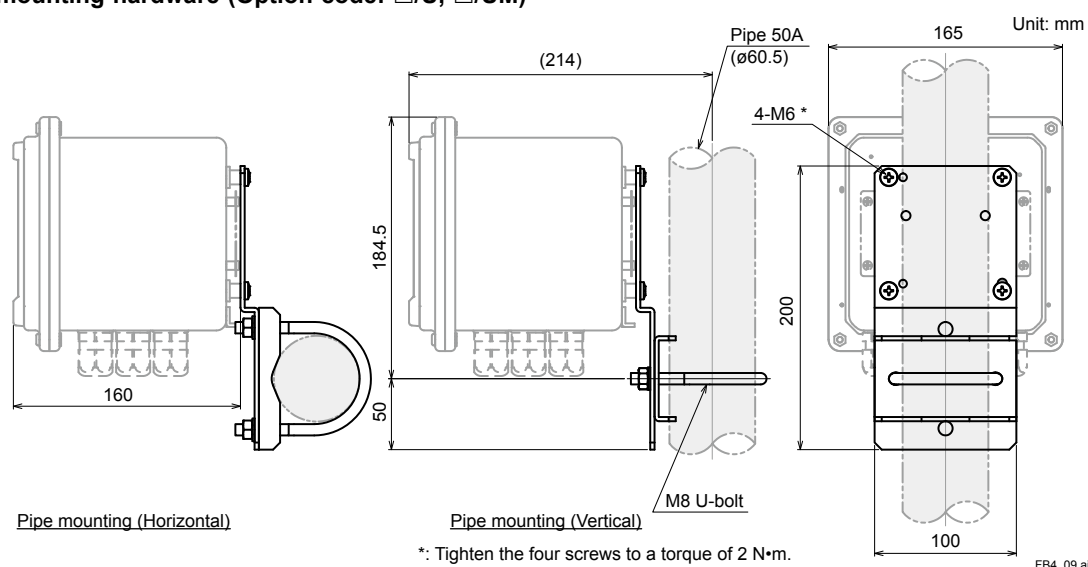
**Panel mounting hardware (Option code: □/PM, □/UM)**



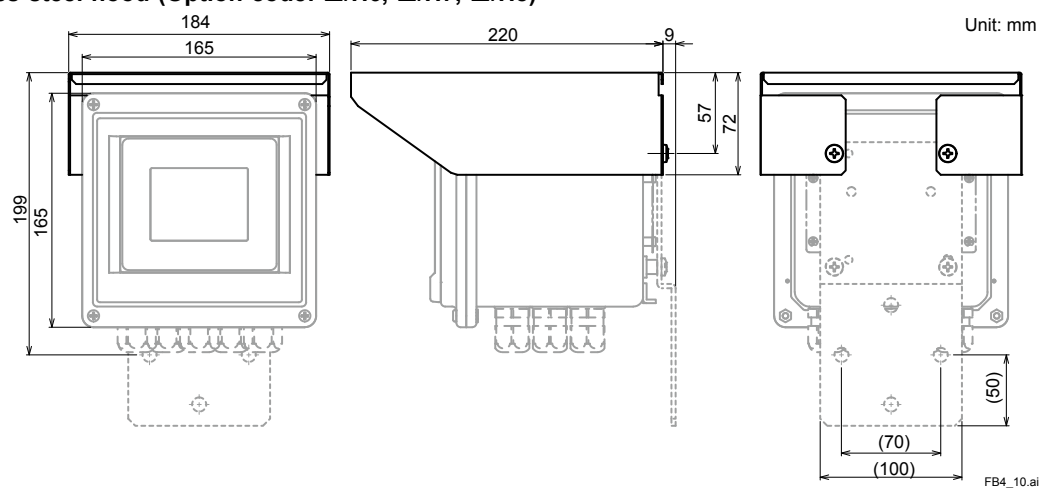
**Wall mounting hardware (Option code: □/U, □/UM)**



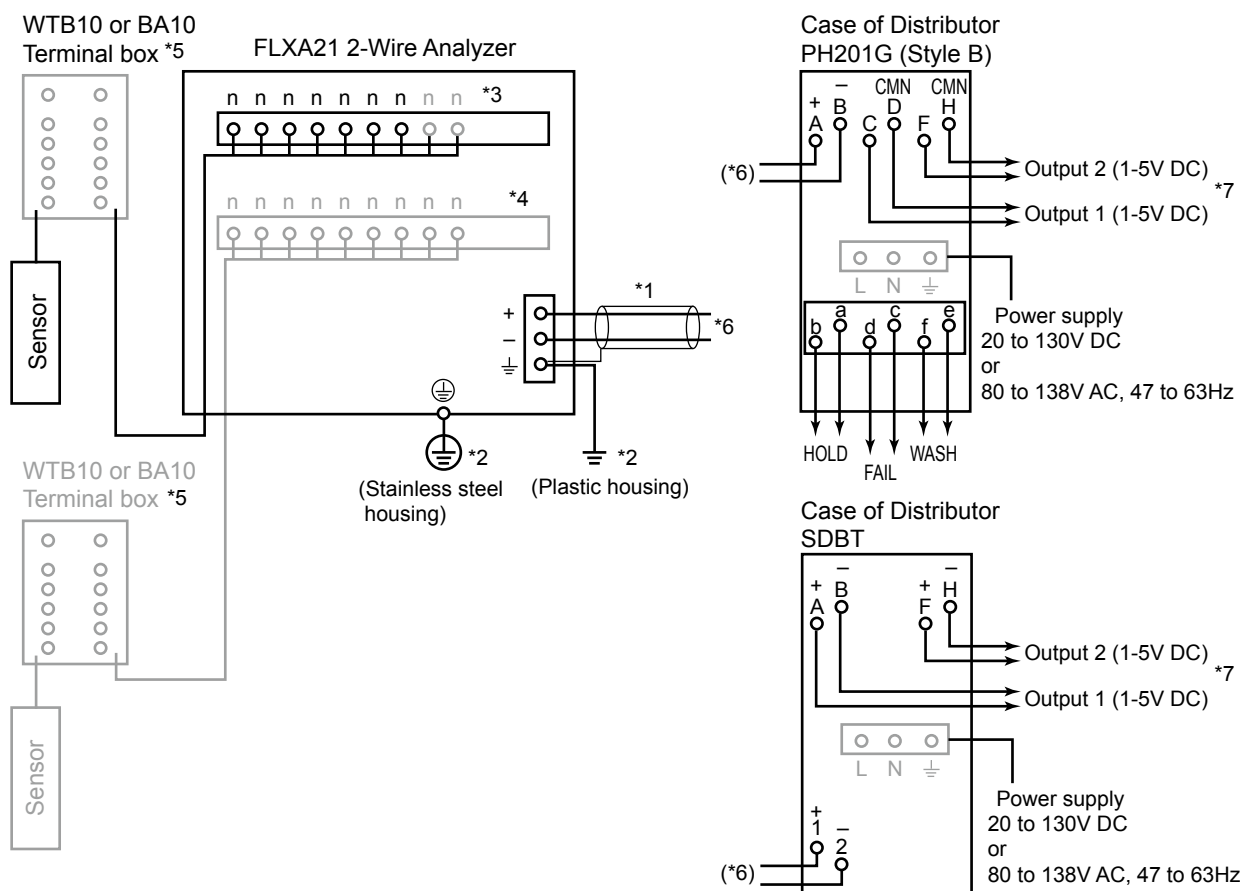


**Pipe mounting hardware (Option code: □/U, □/UM)**


\*: Tighten the four screws to a torque of 2 N·m.

**Stainless steel hood (Option code: □/H6, □/H7, □/H8)**


## ■ Wiring Diagrams



\*1: Use a 2-conductor shielded cable with an outside diameter of 6 to 12 mm.

\*2: Ground FLXA21 ( Class D ground: 100 ohm or less)

The way of connecting the grounding cable varies depending on the plastic housing and stainless steel housing.

In the case of the plastic housing, connect the grounding cable to the  $\perp$  terminal of the power module inside, and in the case of the stainless steel housing, connect the grounding cable to the  $\oplus$  terminal of the housing.

Use a cable with an outside diameter of 3.4 to 7 mm for the grounding line of the plastic housing.

The minimum cross sectional area of the protective grounding cable should be 0.75 mm<sup>2</sup>.

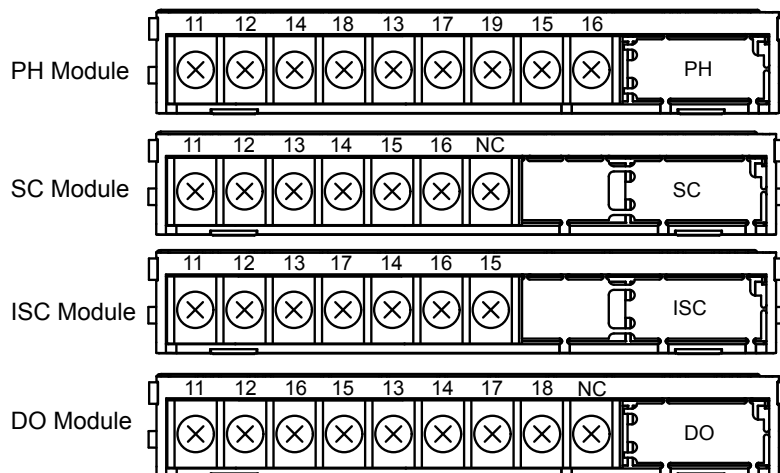
\*3: Refer to module

\*4: Two modules can be connected to the same object. When measuring inductive conductivity, only one module can be connected.

\*5: The terminal box may need to be connected depending on the object under test or the sensor selected.

\*6: This line is connected to a distributor or 24V DC power supply.

\*7: Two outputs of PH201G or SDBT are same.



## 1. General Information

## 2. Measurement Conditions

- ### 3. Installation Site

- ## 4. Requirements

- #### 4.1 pH/ORP

☐ 1st Input

- (1) Measuring range; ☐ pH 0 to 14   ☐ ORP \_\_\_\_\_ to \_\_\_\_\_ mV ☐ \_\_\_\_\_
- (2) Transmission output; ☐ 4 to 20 mA DC   ☐ pH   ☐ ORP   ☐ Temperature
- (3) System configuration selection; ☐ Electrode, ☐ Holder, ☐ pH Converter, ☐ Cleaning system, ☐ Terminal box,  
☐ Accessories
- (4) Electrode cable length;   ☐ 3m, ☐ 5m, ☐ 7m, ☐ 10m, ☐ 15m, ☐ 20m, ☐ \_\_\_\_\_m
- (5) Electrode operating pressure;   ☐ 10 kPa or less, ☐ Greater than 10 kPa
- (6) Type of holder;   ☐ Guide pipe, ☐ Submersion, ☐ Flow-through, ☐ Suspension, ☐ Angled floating ball,  
☐ Vertical floating ball
- (7) Cleaning method; ☐ No cleaning, ☐ Ultrasonic cleaning, ☐ Jet cleaning, ☐ Brush cleaning
- (8) Sample temperature; ☐ -5 to 105°C, ☐ -5 to 100°C, ☐ -5 to 80°C
- (9) Others:

☐ **2nd Input**

- (1) Measuring range; ☐ pH 0 to 14   ☐ ORP \_\_\_\_\_ to \_\_\_\_\_ mV ☐ \_\_\_\_\_
- (2) Transmission output; ☐ 4 to 20 mA DC   ☐ pH   ☐ ORP   ☐ Temperature
- (3) System configuration selection; ☐ Electrode, ☐ Holder, ☐ pH Converter, ☐ Cleaning system, ☐ Terminal box,  
☐ Accessories
- (4) Electrode cable length;   ☐ 3m, ☐ 5m, ☐ 7m, ☐ 10m, ☐ 15m, ☐ 20m, ☐ \_\_\_\_\_m
- (5) Electrode operating pressure;   ☐ 10 kPa or less, ☐ Greater than 10 kPa
- (6) Type of holder;   ☐ Guide pipe, ☐ Submersion, ☐ Flow-through, ☐ Suspension, ☐ Angled floating ball,  
☐ Vertical floating ball
- (7) Cleaning method; ☐ No cleaning, ☐ Ultrasonic cleaning, ☐ Jet cleaning, ☐ Brush cleaning
- (8) Sample temperature; ☐ -5 to 105°C, ☐ -5 to 100°C, ☐ -5 to 80°C
- (9) Others:

## 4.2 Conductivity

### ☐ 1st Input

- (1) Measuring range; \_\_\_\_\_
- (2) Transmission output; 4 to 20 mA DC
- (3) Detector/sensor; SC4AJ ☐ Two electrode system (0.02 cm<sup>-1</sup>) ☐ Two electrode system (0.1 cm<sup>-1</sup>)  
 SC8SG ☐ Two electrode system (0.01 cm<sup>-1</sup>) ☐ Two electrode system (10 cm<sup>-1</sup>),  
☐ Four electrode system (10 cm<sup>-1</sup>)  
 SC210G ☐ Two electrode system (0.05 cm<sup>-1</sup>) ☐ Two electrode system (5 cm<sup>-1</sup>)
- (4) Detector/sensor mounting method;  
 SC4AJ ☐ Adapter mounting, ☐ Welding socket, ☐ Welding clamp  
 SC8SG ☐ Screw-in, ☐ Flow-through  
 SC210G ☐ Screw-in, ☐ Flange, ☐ Flow-through, ☐ Screw-in with gate valve
- (5) Electrode cable length; SC4AJ ☐ 3m, ☐ 5m, ☐ 10m, ☐ 20m  
 SC8SG ☐ 5.5m, ☐ 10m, ☐ 20m  
 SC210G ☐ 3m, ☐ 5m, ☐ 10m, ☐ 15m, ☐ 20m
- (6) Others;

### ☐ 2nd Input

- (1) Measuring range; \_\_\_\_\_
- (2) Transmission output; 4 to 20 mA DC
- (3) Detector/sensor; SC4AJ ☐ Two electrode system (0.02 cm<sup>-1</sup>) ☐ Two electrode system (0.1 cm<sup>-1</sup>)  
 SC8SG ☐ Two electrode system (0.01 cm<sup>-1</sup>) ☐ Two electrode system (10 cm<sup>-1</sup>),  
☐ Four electrode system (10 cm<sup>-1</sup>)  
 SC210G ☐ Two electrode system (0.05 cm<sup>-1</sup>) ☐ Two electrode system (5 cm<sup>-1</sup>)
- (4) Detector/sensor mounting method;  
 SC4AJ ☐ Adapter mounting, ☐ Welding socket, ☐ Welding clamp  
 SC8SG ☐ Screw-in, ☐ Flow-through  
 SC210G ☐ Screw-in, ☐ Flange, ☐ Flow-through, ☐ Screw-in with gate valve
- (5) Electrode cable length; SC4AJ ☐ 3m, ☐ 5m, ☐ 10m, ☐ 20m  
 SC8SG ☐ 5.5m, ☐ 10m, ☐ 20m  
 SC210G ☐ 3m, ☐ 5m, ☐ 10m, ☐ 15m, ☐ 20m
- (6) Others;

## 4.3 Inductive conductivity

- (1) Measuring range; \_\_\_\_\_
- (2) Transmission output; 4 to 20 mA DC
- (3) System configuration selection; ☐ ISC40GJ Sensor, ☐ Holder, ☐ Converter, ☐ BA20 Terminal box,  
☐ WF10J Extension cable
- (4) Sensor mounting method; ☐ ISC40FDJ Immersion holder, ☐ ISC40FFJ Flow-through holder,  
☐ ISC40FSJ Direct insertion adapter
- (5) ISC40GJ Sensor cable length; ☐ 5m, ☐ 10m, ☐ 15m, ☐ 20m
- (6) WF10J Extension cable length; ☐ 5m, ☐ 10m, ☐ 20m, ☐ 30m, ☐ 40m
- (7) Others;

## 4.4 Dissolved oxygen

### ☐ 1st Input

- (1) Measuring range; ☐ 0 to 50 mg/L ☐ \_\_\_\_\_
- (2) Transmission output; 4 to 20 mA DC
- (3) System configuration selection; ☐ Electrode, ☐ Holder, ☐ Converter, ☐ Cleaning system,  
☐ Terminal box, ☐ Maintenance parts set, ☐ Calibration set
- (4) Electrode cable length; ☐ 3m, ☐ 5m, ☐ 10m, ☐ 15m, ☐ 20m
- (5) Type of holder; ☐ Guide pipe, ☐ Submersion, ☐ Flow-through, ☐ Suspension,  
☐ Angled floating ball, ☐ Vertical floating ball
- (6) Cleaning method; ☐ No cleaning, ☐ Jet cleaning
- (7) Others;

- GS 12A01A02-01E Jul. 11, 2012-00