General Specifications

general

Model FLXA402
4-Wire Converter

GS 12A01F01-01EN

General

The new FLXA402 4-Wire Converter is designed to combine the superior functionality and ease of use from the Yokogawa EXAxt series with the digitization of the future.

The FLXA402 is designed to accept traditional analog or SENCOM 4.0 digital Smart sensors. The FLXA402 offers the possibility of connecting to five sensor measurements at one time.

The modular-designed converter is a multi-parameter instrument offering a wide range of measurement choices; such as: pH/ORP (oxidation-reduction potential), Resistivity/Conductivity (SC), Inductive conductivity (ISC), % Concentration, Dissolved Oxygen (DO) and 4-20 mA input – with the respective sensor module. Multiple sensor measurements offer additional functionalities; calculated data function that can be customized.

The FLXA402 converter includes a color Human Machine Interface (HMI), that offers easy touch screen operation and simple instinctive menu structure in 11 languages. Start up and commission time is minimal. Menus of display, execution and setting are displayed in a selected language.

The FLXA402 offers a variety of communications, mA/HART, Modbus TCP, Modbus RTU/RS485. And FieldMate working on tablet PC can be used as a local display via Bluetooth or RS485.

Features

- Connectable to multiple sensors
- Easily viewable color LCD
- Touch screen operation
- Aluminum alloy cast with corrosion-resistant coating for wide range of industrial environments
- IP66/NEMA Type4X ½ DIN enclosure for field mounting and panel mounting.
- Simple HMI menu structure in 11 languages
- Calculated data from sensor measurements
- Connection of new SENCOM SA Smart Adapter
- Easy maintenance using SD card, Ethernet, RS485 and Bluetooth
- Indication of sensor wellness

FLXA402 Related products and documents

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System Configuration

Configuration according to module combination

<table>
<thead>
<tr>
<th>1st Input (Code)</th>
<th>System configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH/ORP, SC, ISC, DO (-P1,-C1,-C5,-D1)</td>
<td>Config. A</td>
</tr>
<tr>
<td>Digital sensor (-D5)</td>
<td></td>
</tr>
<tr>
<td>SENCOM SA (-S5)</td>
<td>Direct connection Multiple sensor measurement (*) Config. B</td>
</tr>
</tbody>
</table>

(*) : Multiple sensor connection with a junction box BA11. When FLXA402 Type (-DD) is selected, multiple sensor connection is not available.

Configurable sensors

<table>
<thead>
<tr>
<th>measurement</th>
<th>pH/ORP</th>
<th>SC</th>
<th>ISC</th>
<th>DO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog sensors *2 (-P1,-C1,-C5,-D1)</td>
<td>FU20</td>
<td>SC4A</td>
<td>ISC40G</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FU24</td>
<td>SC4C</td>
<td>ISC40J</td>
<td></td>
</tr>
<tr>
<td>Digital sensor (Optical DO Sensor) (-D5)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>DO30G</td>
</tr>
<tr>
<td>Sensor for SENCOM SA (-S5)</td>
<td>FU20-VS PH21 FU24 PH8E-P-V</td>
<td>SC4A-...VS SC42-...V SC42-...V SC4AJ-...VS SC8SG-...VS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1: Inside parenthesis explain suffix code for 1st (2nd) input
*2: means conventional sensors, not including sensors for SENCOM SA.

Config. A

- 1 sensor connects to 1st (and 2nd) input for each
  When 1st input is pH/ORP, SC, ISC, DO, SENCOM SA (-P1,-C1,-C5,-D1,-S5)
  (e.g.) 1st input: pH sensor for SENCOM SA (-S5)
  2nd input: analog ISC sensor (-C5) (Figure. A)

- 1st input connects to Digital sensor
  When Digital sensors connects to 1st input (-D5)
  (e.g.) 1st input: digital sensor (-D5)
  2nd input: analog pH sensor (-P1)

Config. B

- Multiple sensor measurement with BA11
  When 1st input connects to SENCOM SA (-S5) with BA11- multiple sensor measurement-BA11 can connect up to 4 sensors for SENCOM SA. One sensor can connect to 2nd input.
  (e.g.) 1st input: 4 pH sensors for SENCOM SA with BA11(-S5)
  2nd input: pH sensor for SENCOM SA (-S5) (Figure. B)

(Figure A) Config.A

(Figure B) Config.B an example of multiple sensor measurement
### 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 converter.

- **Types of Sensor Module**
  - Analog sensor module for analog sensors
    - PH: for analog pH/ORP
    - SC: for analog Resistivity/Conductivity
    - ISC: for analog Inductive Conductivity
    - DO: for analog Dissolved Oxygen
  - Digital sensor module
    - SENCOM SA: for SA11
    - Digital sensor: for optical DO

- **Other Modules**
  - IO: mA output, mA input, contact input
  - Relay: SPDT relay
  - Digital communication: Modbus TCP/IP(Ethernet) or Modbus RTU (RS485)

Digital sensor module
- SENCOM SA: for SA11
- Digital sensor: for optical DO

- **Combination of Sensor Module**
  
  There are two sensor module slots; up to Five sensor measurements are available in case of the combination of SENCOM SA module and BA11 junction box.

  When FLXA402 (-DD) is selected, multiple sensor measurements are not available.

  The combination of two same sensor modules or different type of sensor modules is possible except in the case of Optical DO sensor. Please reference the following combination chart.

<table>
<thead>
<tr>
<th>1st sensor module (1st input)</th>
<th>2nd sensor module (2nd input)</th>
<th># of Total Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog pH/ORP (-P1)</td>
<td>Analog pH/ORP (-P1)</td>
<td>2</td>
</tr>
<tr>
<td>Analog SC (-C1)</td>
<td>Analog SC (-C1)</td>
<td>2</td>
</tr>
<tr>
<td>Analog ISC (-C5)</td>
<td>Analog ISC (-C5)</td>
<td>2</td>
</tr>
<tr>
<td>Analog DO (-D1)</td>
<td>Analog DO (-D1)</td>
<td>2</td>
</tr>
<tr>
<td>SENCOM SA (-S5)</td>
<td>SENCOM SA (-S5)</td>
<td>2</td>
</tr>
<tr>
<td>Analog SC (-C1)</td>
<td>Analog pH/ORP (-P1)</td>
<td>2</td>
</tr>
<tr>
<td>Analog ISC (-C5)</td>
<td>Analog SC (-C1)</td>
<td>2</td>
</tr>
<tr>
<td>Analog DO (-D1)</td>
<td>Analog ISC (-C5)</td>
<td>2</td>
</tr>
<tr>
<td>SENCOM SA (-S5)</td>
<td>Analog DO (-D1)</td>
<td>2</td>
</tr>
<tr>
<td>Digital sensor for Optical DO (-D5)</td>
<td>Analog pH/ORP (-P1)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Analog SC (-C1)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Analog ISC (-C5)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Analog DO (-D1)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>SENCOM SA (-S5)</td>
<td>2</td>
</tr>
</tbody>
</table>

Digital sensor module (for optical DO): Combination of two Digital sensor modules isn’t available. Digital sensor module should be in 1st sensor module (1st input).
2. Measurement

2-1. pH/ORP (PH)

When 1st or 2nd input is -P1 (PH)

Input Specification

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

Input Range

\begin{itemize}
  \item pH: -2 to 16 pH (with option /K: 0 to 14 pH)
  \item ORP: -1500 to 1500 mV
  \item rH: 0 to 100 rH
  \item Temperature:
    \begin{itemize}
      \item Pt1000: -30 to 140 °C
      \item Pt100: -30 to 140 °C
      \item 6k8: -30 to 140 °C
      \item NTC 8k55: -10 to 120 °C
      \item 3k Balco: -30 to 140 °C
      \item PTC500: -30 to 140 °C
    \end{itemize}
\end{itemize}

Output Range

\begin{itemize}
  \item pH: min. span 1 pH
  \item ORP: min. span 100 mV
  \item rH: min. span 2 rH
  \item Temperature:
    \begin{itemize}
      \item Pt1000: -30 to 140 °C
      \item Pt100: -30 to 140 °C
      \item 6k8: -30 to 140 °C
      \item PTC10k: -30 to 140 °C
      \item NTC 8k55: -10 to 120 °C
      \item 3k Balco: -30 to 140 °C
      \item PTC500: -30 to 140 °C
    \end{itemize}
\end{itemize}

Performance (Accuracy)

(The specifications are expressed with simulated inputs.)

\begin{itemize}
  \item pH
    \begin{itemize}
      \item Linearity: ±0.01 pH
      \item Repeatability: ±0.01 pH
      \item Accuracy ±0.01 pH
    \end{itemize}
  \item ORP
    \begin{itemize}
      \item Linearity: ±1 mV
      \item Repeatability: ±1 mV
      \item Accuracy ±1 mV
    \end{itemize}
  \item Temperature
    \begin{itemize}
      \item with Pt1000, 6k8, PTC10k, NTC 8k55, 3k Balco, PTC500
        \begin{itemize}
          \item Linearity: ±0.3 °C
          \item Repeatability: ±0.1 °C
          \item Accuracy ±0.3 °C
        \end{itemize}
      \item with Pt100
        \begin{itemize}
          \item Linearity: ±0.4 °C
          \item Repeatability: ±0.1 °C
          \item Accuracy ±0.4 °C
        \end{itemize}
    \end{itemize}
\end{itemize}

Temperature compensation Function:

Automatic or manual. Compensation to Nernst equation. Process compensation by configurable temperature coefficient, NEN6411 for water or strong acids/bases or programmable matrix.

Calibration

Semi-automatic 1, 2 or 3 point calibration using pre-configured NIST, US, DIN buffer tables 4, 7 & 9, or with user defined buffer tables, with automatic stability check. Manual adjustment.

2-2. Conductivity (SC)

When 1st or 2nd input is -C1 (SC)

Input Specification

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

Input Range

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductivity</td>
<td>0 µS/cm</td>
<td>2000 mS/cm</td>
</tr>
<tr>
<td>Resistivity</td>
<td>0.005 kΩ / (Cell constant)</td>
<td>1000 MΩ x cm</td>
</tr>
<tr>
<td>Temperature</td>
<td>min. span 25 °C</td>
<td>max. span 170 °C</td>
</tr>
</tbody>
</table>

Output Range

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductivity</td>
<td>0.01 µS/cm</td>
<td>2000 mS/cm</td>
</tr>
<tr>
<td>Resistivity</td>
<td>0.001 kΩ x cm</td>
<td>1000 MΩ x cm</td>
</tr>
<tr>
<td>Temperature</td>
<td>min. span 25 °C</td>
<td>max. span 170 °C</td>
</tr>
</tbody>
</table>

Performance (Accuracy)

(The specifications are expressed with simulated inputs.)

\begin{itemize}
  \item Conductivity
    \begin{itemize}
      \item 2 µS x K cm^{-1} to 200 mS x K cm^{-1} Accuracy: ±0.5%F.S.
      \item 1 µS x K cm^{-1} to 2 µS x K cm^{-1} Accuracy: ±1%F.S.
    \end{itemize}
  \item Resistivity
    \begin{itemize}
      \item 0.005kΩ / K cm^{-1} to 0.5MΩ /K cm^{-1} Accuracy: ±0.5%F.S.
      \item 0.5MΩ / K cm^{-1} to 1MΩ /K cm^{-1} Accuracy: ±1%F.S.
    \end{itemize}
  \item Temperature
    \begin{itemize}
      \item with Pt1000, Pb36, Ni100
        \begin{itemize}
          \item Accuracy: ±0.3 °C
        \end{itemize}
      \item with Pt100, NTC 8k55
        \begin{itemize}
          \item Accuracy: ±0.4 °C
        \end{itemize}
    \end{itemize}
\end{itemize}

Temperature compensation

NaCl table: ±1 %

Matrix: ±3 %

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

Note: “F.S.” means maximum setting value of converter output.

“K” means cell constant.

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

2-3. Inductive Conductivity (ISC)

When 1st or 2nd input is -C5 (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 µS/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 µS/cm or more)
Conductivity:
Linearity: ±(0.4 %F.S. + 0.3 µS/cm)
Repeatability: ±(0.4 %F.S. + 0.3 µS/cm)
Temperature: ±0.3 °C
Step response: 90 % (< 2 decades) in 8 seconds
Note: "F.S." means maximum setting value of converter output.

2-4. Dissolved Oxygen (DO)
When 1st or 2nd input is -D1 (DO)
When 1st input is -D5 (Digital sensor), see 2-5.
Digital Sensor:
Note: When Type is -DO (NI for FM), -D1 (DO) cannot be selected.

■ Input Specification
The FLXA402 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 µA for Galvanic sensors and 0 to 1 µA for Polarographic sensors.
For temperature compensation, the FLXA402 accepts Pt1000 (DO30 sensor) and NTC22k elements (OXYFERM and OXYGOLD sensors).

■ Input Range
Dissolved Oxygen: 0 to 50 mg/l (ppm)
Temperature: -20 to 150 °C
DO30G sensor:
Measurement range: 0 to 20 mg/l (ppm)
Temperature: 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: ±0.05 ppm or ±0.8% F.S., whichever is greater
Repeatability: ±0.05 ppm or ±0.8% F.S., whichever is greater
Accuracy: ±0.05 ppm or ±0.8% F.S., whichever is greater
Performance in ppb mode:
Linearity: ±1 ppb or ±0.8% F.S., whichever is greater
Repeatability: ±1 ppb or ±0.8% F.S., whichever is greater
Accuracy: ±1 ppb or ±0.8% F.S., whichever is greater
Temperature
Linearity: ±0.3 °C
Repeatability: ±0.1 °C
Accuracy: ±0.3 °C
Note: "F.S." means maximum setting value of converter output.

2-5. Digital Sensor
When 1st input is -D5 (Digital sensor)
Measurement with the digital sensor DO70G Optical Dissolved Oxygen Sensor.
See GS 12J05D04-01E for information on DO70G.
Note: When Type is --DD (NI for FM), -D5 (Digital Sensor) cannot be selected.

2-6. SENCOM SA Smart Adapter
When 1st or 2nd input is -S5 (SENCOM SA)
Measurement with digital adapter SA11 SENCOM Smart Adapter.
See GS 12A01F00-01E for information on SA11.
Note: When Type is --DD (NI for FM), -S5 (SENCOM SA) cannot be selected.

2-7. Common Function
■ Logbook
Software record of important events and diagnostic data readily available in the display.
■ Arithmetic by multiple sensors
The arithmetic is carried out by processing the corresponding value of limited two sensors.
Differential: Sensor 1 - Sensor 2
Average: (sensor 1 + Sensor 2) / 2
Ratio: Sensor 1 / Sensor 2
Passage (%): Sensor 2 / Sensor 1 x 100
Refection (%): (Sensor 1 - Sensor 2) / Sensor 1 x 100
Deviation (%): (Sensor 2 - Sensor 1) / Sensor 1 x 100
pH calb. (VGB): pH = 8.6 + log (Sensor 1 / Sensor 2)
(1) When the measuring object is conductivity, the arithmetic is performed.
(2) Only when SC sensors are connected, pH calb. (VGB) is carried out.
3. Electrical

■ Transmission Signals

General:
- Isolated outputs: 4-20 mA DC
- Accuracy: +/− 0.02 mA
- Repeatability: +/− 0.02 mA
- Linearity: +/− 0.02 mA
- Maximum load: 600 ohm
- Bi-directional HART digital communication (HART 7 protocol) superimposed on mA1 (4-20mA) signal
- Number of outputs: selectable by suffix code.
  - 2 isolated outputs: -A2
  - 4 isolated outputs: -A4

Output function:
- Linear or Non-linear (21-step table) for available signals
- Signal: 3.8 to 20.5 mA

Burn out function:
- Burn up (22.0 mA) or burn down (2.2 mA) to signal failure according to NAMUR NE43.

Hold:
- The mA-outputs are frozen to the last/fixed value during calibration/commissioning.

■ Analog Input (mA Output type: –A4)
- It is used for pressure compensation (only DO) and temperature compensation (pH, SC, ISC, DO).

General:
- Isolated input: 4-20 mA DC
- Accuracy: +/− 0.02 mA
- Number of input: 1

■ Contact Outputs
- Note: When selecting Type -DD (NI for FM), check the condition of Control Drawing.

General:
- Four SPDT relay contacts with display indicators.
- Contacts are dry, not powered.
- Switch capacity:
  - Maximum values: 100 VA, 250 VAC, 5 Amps.
  - Maximum values: 50 Watts, 24 VDC, 5 Amps.
- Note: When contact output current is more than 4 Amps, ambient temperature should be less than 40 ºC.

Status:
- High/Low process alarms, selected from available signals.
- Configurable delay time and hysteresis.
- Warning/Failure annunciation
- Fail
- Contact S4 is programmed as fail-safe contact.
- Control function:
  - On/Off
  - Wash: Contact can be used to start manual or interval time wash cycles.
  - Hold: Contact can be used to signal the Hold situation.

■ Contact Inputs
- Contact input controls starting WASH CYCLE or changing RANGE of 4-20 mA output (programmable) each for pH/ORP, SC, ISC and DO.

General:
- Isolated input
  - Close: less than 200Ω
  - Open: more than 100kΩ
  - Voltage-free contact (do not apply voltage)

■ Digital communication (Option)
- Ethernet (Modbus TCP):
  - 10/100Mbps
  - Cable length: Max. 100m
- RS-485 (Modbus RTU):
  - 115200bps: Max 600m
  - 38400bps, 9600bps: Max 1200m

■ Bluetooth
- Communication distance:
  - Approx. 10 m (depends on the operating environment.) (Class2)

■ Display
- QVGA color LCD with a touch screen.
- Message language: 11 (English, Chinese, Czech, French, German, Italian, Japanese, Korean, Portuguese, Russian, Spanish)

■ Refresh interval of data
- 0.5 s: number of measurement = 1
- 1 s: number of measurement ≥ 2

■ Power supply
- Note: When selecting Type -DD (NI for FM), check the condition of Control Drawing.
  - FLXA402-A
    - Ratings: 100-240 V AC
    - Acceptable range: 90 to 264 V AC
    - Ratings: 50/60 Hz
    - Acceptable range: 50 Hz ±5%, 60 Hz ±5%
    - Power Consumption: 35 VA
  - FLXA402-D
    - Ratings: 12-24 V DC
    - Acceptable range: 10.8 to 26.4 V DC
    - Power Consumption: 15 W

4. Mechanical and others

■ Housing
- Case color and finish
  - Color: Silver gray
  - Finish: chemically resistant coating or high anti-corrosion coating
- Window
  - Polycarbonate (flexible)
- Protection
  - NEMA Type4X (USA), Type4X (Canada), IP66

■ Cable and Terminal
- Cable size:
  - Outer diameter: 6 to 12 mm (suitable for M20 cable gland)
- Terminal screw size: M3 (Power/Earth terminal: M4)

■ Cable Entry
- 8 holes
- M20 cable gland x 8 pcs
- Note: Cable gland and plug are delivered with an converter, but not assembled into the converter.

■ 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 chemically resistant coating
■ Stainless Steel Tag Plate (option)
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 converter. Tag plate is hanging type.

■ Conduit adapter (option)
Using optional adapter
- G1/2 (quantity: 8)
- 1/2NPT (quantity: 8)
- M20 x 1.5 (quantity: 8)
These conduit adapters are delivered with an converter, but not assembled into the converter.

■ Size of Housing Case
165 x 165 x 168.5 mm (W x H x D) (without cable gland)

■ Weight
Max. 3.0 kg

■ Warm up time
Approx. 30 min.

■ Ambient Operating Temperature
-20 to +55 ºC

■ Storage Temperature
-30 to +70 ºC

■ Humidity
10 to 90% RH at 40ºC (Non-condensing)

■ Document
Following documents are delivered with a converter;
- Paper copy: Start-up Manual and Safety Precautions
- Other documents are to be downloaded from website:
  - User’s Manual
  - Safety Regulations Manual
  - General Specifications
  - User Setting Table of measurement / sensor type

■ Regulatory Compliance
Safety:
- EN 61010-1
- EN 61010-2-030
- UL 61010-1
- UL 61010-2-030
- CAN/CSA-C22.2 No.61010-1
- CAN/CSA-C22.2 No.61010-2-030
- GB30439

Installation altitude: 2000 m or less
Category based on IEC 61010: I (DC model)
Category based on IEC 61010: II (AC model) (Note1)
Pollution degree based on IEC 61010: 2 (Note2)

Note1: Installation category, called over-voltage category, specifies impulse withstand voltage.
Equipment with “Category I” is used for connection to circuit in which measures are taken to limit transient over-voltage to an appropriately low level.
Category II is energy-consuming equipment to be supplied from the fixed installation.

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.

EMC:
- EN61326-1 Class A, Table 2
  (For use in industrial locations)
- EN61326-2-3
- EN61000-3-2
- EN61000-3-3
- RCM: EN 55011 Class A, Group 1
- Korea Electromagnetic Conformity Standard
  Class A

Bluetooth
Compliant standard: Bluetooth Ver 3.0
Applicable countries / regions: (regulations)
- Japan, EU, USA, Canada, Australia, New Zealand, Singapore
- EN 301 489-1
- EN 301 489-17
- EN 300 328
- EN 62479
- FCC15C
- ICES-003
- AS/NZS4628, AS/NZS2772.2
- IMDA TS SRD

Environmental regulation:
- RoHS: EN50581
- REACH: Regulation EC 1907/2006

Information of the WEEE Directive
This product is purposely designed to be used in a large scale fixed installations only and, therefore, is out of scope of the WEEE Directive. The WEEE Directive does not apply.
The WEEE Directive is only valid in the EU.

NAMUR: NE43, 107

FM nonincendive approval (suffix code Type : -DD)
Applicable Standard
- FM Class 3600
- FM Class 3611
- FM Class 3810
- ANSI/UL 112120
- ANSI/UL 61010-1
- ANSI/UL 61010-2-030
- ANSI/NEMA 250

Certificate No.
- FM18US0281

Marking/Rating: Nonincendive for Class I, Division 2, Groups A, B, C and D.
T6: for ambient temperature: -20°C to +40°C
T4: for ambient temperature: -20°C to +55°C
Enclosure: Type 4X
Control drawing: NF038-A81 (refer to next page)
Yokogawa Electric Corporation  |  Model  |  FLXA-002  
---|---|---
**Title:** Control drawing  
**No.:** NPM038-A01  
**Page:** 01  
**Revision:** 0  
**Date:** 2018-06-29

**Non-hazardous Location**

<table>
<thead>
<tr>
<th>Measuring Module 1, 2</th>
<th>NFW parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Measuring Module</strong></td>
<td>PH</td>
</tr>
<tr>
<td>U₀</td>
<td>11.76V</td>
</tr>
<tr>
<td>I₀</td>
<td>116.5mA</td>
</tr>
<tr>
<td>P₀</td>
<td>0.424W</td>
</tr>
<tr>
<td>C₀</td>
<td>4pF</td>
</tr>
<tr>
<td>L₀</td>
<td>4.5mH</td>
</tr>
</tbody>
</table>

**Spec. restriction**

<table>
<thead>
<tr>
<th>Temp. class</th>
<th>Power supply</th>
<th>Number of mA Output</th>
<th>Ambient Temperature (°C)</th>
<th>Switch capacity of Contact Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4</td>
<td>AC version</td>
<td>2</td>
<td>-30 to +55°C</td>
<td>MAX. 5A</td>
</tr>
<tr>
<td></td>
<td>DC version</td>
<td>4</td>
<td>-30 to +40°C</td>
<td>MAX. 4A</td>
</tr>
<tr>
<td>T6</td>
<td>AC version</td>
<td>2</td>
<td>MAX. 5A</td>
<td>MAX. 4A</td>
</tr>
<tr>
<td></td>
<td>DC version</td>
<td>4</td>
<td>MAX. 4A</td>
<td>MAX. 4A</td>
</tr>
</tbody>
</table>

**Notes:**
1. No revision to this drawing without prior approval of FM.
2. Installation must be in accordance with the National Electrical Codes (NFPA 70, ANSI/IEEE RP12.06.01 and relevant local codes.
3. When installed in Division 2, Sensor 1 and Sensor 2 may be simple apparatus or nonincendive field wiring apparatus meeting the conditions below, or alternatively, they may be equipment suitable for Division 2 respectively, if a suitable wiring method other than nonincendive field wiring is employed.
   - Uᵢ ≥ U₀
   - Iᵢ ≥ I₀
   - Pᵢ ≥ P₀
   - Cᵢ ≤ C₀ – Cable
   - Lᵢ ≤ L₀ – Leachable
4. WARNING—EXPLOSION HAZAERD. DO NOT OPEN WHILE THE EQUIPMENT IS ENERGIZED OR WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT.
5. WARNING—EXPLOSION HAZAERD. DO NOT REMOVE OR REPLACE THE FUSE WHILE THE EQUIPMENT IS ENERGIZED OR WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT.
6. WARNING—SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR DIVISION 2.
### Model & Suffix Codes

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLXA402</td>
<td></td>
<td></td>
<td>4-Wire Converter</td>
</tr>
<tr>
<td>Power supply</td>
<td>-A</td>
<td>-D</td>
<td>AC version</td>
</tr>
<tr>
<td></td>
<td>-B</td>
<td></td>
<td>DC version</td>
</tr>
<tr>
<td>Housing (*1)</td>
<td>-AB</td>
<td>-D</td>
<td>Aluminum alloy cast + urethane coating</td>
</tr>
<tr>
<td></td>
<td>-AD</td>
<td></td>
<td>Aluminum alloy cast + high anti-corrosion coating</td>
</tr>
<tr>
<td>Type</td>
<td>-P1</td>
<td>-D</td>
<td>pH/ORP (PH)</td>
</tr>
<tr>
<td>1st input</td>
<td>-C1</td>
<td>-D</td>
<td>Conductivity (SC)</td>
</tr>
<tr>
<td></td>
<td>-C5</td>
<td></td>
<td>Inductive conductivity (ISC)</td>
</tr>
<tr>
<td></td>
<td>-D1</td>
<td></td>
<td>Dissolved oxygen (DO)</td>
</tr>
<tr>
<td></td>
<td>-D5</td>
<td></td>
<td>Digital sensor (DO70G)</td>
</tr>
<tr>
<td></td>
<td>-S5</td>
<td></td>
<td>SENCOM SA (*2)</td>
</tr>
<tr>
<td>2nd input</td>
<td>-PN</td>
<td>-D</td>
<td>Without input</td>
</tr>
<tr>
<td></td>
<td>-P1</td>
<td>-D</td>
<td>pH/ORP (PH)</td>
</tr>
<tr>
<td></td>
<td>-C1</td>
<td>-D</td>
<td>Conductivity (SC)</td>
</tr>
<tr>
<td></td>
<td>-C5</td>
<td></td>
<td>Inductive conductivity (ISC)</td>
</tr>
<tr>
<td></td>
<td>-D1</td>
<td></td>
<td>Dissolved oxygen (DO)</td>
</tr>
<tr>
<td></td>
<td>-D5</td>
<td></td>
<td>SENCOM SA (*3)</td>
</tr>
<tr>
<td>mA Output/Input</td>
<td>-A2</td>
<td>-D</td>
<td>2 x 4-20 mA Output + 1 x Contact Input (mA1 output: with HART)</td>
</tr>
<tr>
<td></td>
<td>-A4</td>
<td></td>
<td>4 x 4-20 mA Output + 2 x Contact Input + 1 x 4-20 mA Input (mA1 output: with HART)</td>
</tr>
<tr>
<td>Contact Outputs</td>
<td>-WR</td>
<td>-D</td>
<td>Contact outputs (Wash and Fail contact outputs)</td>
</tr>
<tr>
<td></td>
<td>-NR</td>
<td></td>
<td>Without Contact outputs (without Wash and Fail contact outputs)</td>
</tr>
<tr>
<td>Bluetooth</td>
<td>-N</td>
<td>-D</td>
<td>Without Bluetooth</td>
</tr>
<tr>
<td></td>
<td>-B</td>
<td></td>
<td>Bluetooth</td>
</tr>
<tr>
<td>Digital Communication</td>
<td>-N</td>
<td>-D</td>
<td>Without Digital communication</td>
</tr>
<tr>
<td></td>
<td>-E</td>
<td></td>
<td>Modbus TCP/IP</td>
</tr>
<tr>
<td></td>
<td>-R</td>
<td></td>
<td>Modbus RTU (RS-485)</td>
</tr>
<tr>
<td>Country (*4)</td>
<td>-N</td>
<td>-D</td>
<td>Global except Japan</td>
</tr>
<tr>
<td></td>
<td>-J</td>
<td></td>
<td>Japan</td>
</tr>
<tr>
<td>—</td>
<td>-NN</td>
<td>-D</td>
<td>Always -NN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Option</th>
<th>Mounting hardware</th>
<th>Hood</th>
<th>Tag plate</th>
<th>Conduit adapter (*7)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>/UM</td>
<td>/H6</td>
<td>/SCT</td>
<td>/CB4</td>
</tr>
<tr>
<td></td>
<td>/U</td>
<td>/H7</td>
<td>/CB4</td>
<td>/CD4 /CB4</td>
</tr>
<tr>
<td></td>
<td>/PM</td>
<td>/SCT</td>
<td>/CB4</td>
<td>/CD4 /CB4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>/CB4</td>
<td>/CD4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>/CB4</td>
<td>/CD4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>/CB4</td>
<td>/CD4</td>
</tr>
</tbody>
</table>

| Required No. of cable entry holes | 1 | 1 | 0 | 1 | 1 | 2 | 2 | 0 | 0 | 1* | 1 |

Notes:
*1. Urethane coating is acid resistant.
*2. On 1st input, with a connection to BA11 Junction Box, up to 4 sensors equipped with SA11 can be connected.
*3. On 2nd input, only 1 sensor equipped with SA11 can be connected.
*4. Select only "-J" if you use the converter in Japan. Only SI unit (International System of Units) applies.
*5. Universal mounting kit contains pipe, wall mounting hardware (/U) and panel mounting hardware (/PM).
*6. Available only when "-E" (Modbus TCP/IP) via digital communication is selected.
*7. There are 8 cable entry holes. Check the table below. If you need, purchase the adapters additionally to comply with requirements in the specification.
*8. When selecting Type "-DD" (Nonincendive for FM), "-D1" "-D5" "-S5" on 1st/2nd input are not available. Please check Control Drawing about the other conditions.
Following is the specification restriction by combination

- **Conduit adapter** (need to be purchased additionally)

<table>
<thead>
<tr>
<th>Type</th>
<th>Parts number</th>
<th>Quantity</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>G 1/2 (Cable gland for adapter + adapter)</td>
<td>K9703WF</td>
<td>4 set</td>
<td>for Option code /CB</td>
</tr>
<tr>
<td>1/2 NPT (Cable gland for adapter + adapter)</td>
<td>K9703WG</td>
<td>4 set</td>
<td>for Option code /CD</td>
</tr>
<tr>
<td>M 20 x 1.5 (Cable gland for adapter + adapter)</td>
<td>K9703WH</td>
<td>4 set</td>
<td>for Option code /CF</td>
</tr>
</tbody>
</table>

- **Optional parts**

<table>
<thead>
<tr>
<th>Name</th>
<th>Parts number</th>
<th>Quantity</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting hardware for pipe, wall mounting (stainless)</td>
<td>K9703SS</td>
<td>1 set</td>
<td>same as Option code /U</td>
</tr>
<tr>
<td>for panel mounting (stainless)</td>
<td>K9703ZD</td>
<td>1 set</td>
<td>same as Option code /PM</td>
</tr>
<tr>
<td>Sun shade hood Stainless</td>
<td>K9698WK</td>
<td>1 set</td>
<td>same as Option code /H6</td>
</tr>
<tr>
<td>stainless + urethane</td>
<td>K9698WL</td>
<td>1 set</td>
<td>same as Option code /H7</td>
</tr>
<tr>
<td>Rubber plug attachment</td>
<td>K9334CN</td>
<td>1 pcs</td>
<td>for Cable gland</td>
</tr>
<tr>
<td>Fuse</td>
<td>A1633EF</td>
<td>1 pcs</td>
<td>250V/2.5A (minimum 5 pcs)</td>
</tr>
<tr>
<td>SD card</td>
<td>A1005NL</td>
<td>1 pcs</td>
<td>2 GB industrial SD card (with power failure recovery) Customers can provide the cards with spec: Storage capacity: 128 MB or greater Type: SD, SDHC</td>
</tr>
</tbody>
</table>
## Dimensions

**Weight:** max. 3.0 kg

**Conduit adaptor** (/CB4, /CD4, /CF4/, /CB6, /CD6, /CF6)

- **Case**
  - **Approx. 55 (2.17)**
  - **45 (1.77)**
- **Adapter**
  - G1/2 (/CB4, /CB6)
  - 1/2NPT (/CD4, /CD6)
  - M20x1.5 (/CF4, /CF6)
- **Cable gland for adapter**
- **Case**
  - **Approx. 55 (2.17)**
  - **45 (1.77)**
- **Adapter for Ethernet**
  - G1/2 (/CB6)
  - 1/2NPT (/CD6)
  - M20x1.5 (/CF6)

**Unit:** mm (inch)
Note: Universal Mounting kit (/UM) contains pipe, wall mounting hardware (/U) and panel mounting hardware (/PM).

**Panel mounting hardware (/PM, /UM)**

Panel thickness 1 to 12

- 2-M5 length 35

Unit: mm

Spacing panel cutout

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

**Wall mounting hardware (/U, /UM)**

For wall mounting 3-ø10 holes

Unit: mm

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

Note: For wall mounting, the wall should be strong enough to bear the weight of 8 kg or more.
Pipe mounting hardware (U, UM)

Pipe mounting (Horizontal)

Pipe mounting (Vertical)

*: Tighten the four screws to a torque of 2 Nm.

Hood Stainless steel (/H6, /H7)

Unit: mm

* All Rights Reserved. Copyright © 2018, Yokogawa Electric Corporation
**Wiring**

![Diagram of FLXA402 wiring connections]

- **Sensor**
- **Contact output (-WR)**
  - 32(NC) 31(C) 33(NO) S1
  - 42(NC) 41(C) 43(NO) S2
  - 52(NC) 51(C) 53(NO) S3
  - 72(NO) 71(C) 73(NC) S4

- **Power (-A, -D)**
  - 1(L, +)
  - 2(N, -)

- **Analog output (-A2, -A4)**
  - mA1 61(+)
  - HART 62(-)
  - mA2 65(+)
  - 66(-)
  - mA3 81(+)
  - 82(-)
  - mA4 85(+)
  - 86(-)
  - 63(SHLD)

- **Contact input (-A2, -A4)**
  - 21 22 24

- **Analog input (-A4)**
  - 87(+)
  - 88(-)
  - 89(SHLD)

- **RS485 (-R)**
  - 95(termination)
  - 91(A+)
  - 92(B-)
  - 93(GND)
  - 94(SHLD)

- **Ethernet (-E)**
  - 372(–)
  - 371(+)

- **Analog output (-A2, -A4)**

- **Contact input**
  - 1(L, +)
  - 2(N, -)

- **Sensor**
Inquiry Specifications Sheet for FLXA402 4-Wire Converter

Make inquiries by placing checkmarks (✓) in the pertinent boxes and filling in the blanks.

1. General Information
   - Company name: ____________________________
   - Contact Person: __________________________
   - Department: ______________________________
   - Plant name: ______________________________
   - Measurement location: ______________________
   - Purpose of use: □ Indication, □ Recording, □ Alarm, □ Control

2. Measurement Conditions
   (1) Process temperature; ________ to ________
      Normally ________ [°C]
   (2) Process pressure; ________ to ________
      Normally ________ [kPa]
   (3) Flow rate; ________ to ________
      Normally ________ [l/min]
   (4) Flow speed; ________ to ________
      Normally ________ [m/s]
   (5) Slurry or contaminants; □ No, □ Yes
   (6) Name of process fluid; __________________
   (7) Components of process fluid; ____________
   (8) Others;

3. Installation Site
   (1) Ambient temperature; ________ to ________ [°C]
   (2) Location; □ Outdoors, □ Indoors
   (3) Others;

4. Requirements
   1st Input; □ pH/ORP (PH)
      □ Conductivity (SC) □ Inductive conductivity (ISC)
      □ Dissolved oxygen (DO) □
      Digital sensor □ SENCOM SA (pH/ORP)
   2nd Input; □ Without input □ pH/ORP (PH)
      □ Conductivity (SC) □ Inductive conductivity (ISC) □
      Dissolved oxygen (DO) □ SENCOM SA (pH/ORP)
   mA output; □ 2 x 4-20 mA Output + 1 x Contact Input
      □ 4 x 4-20 mA Output + 2 x Contact Input + 1 x 4-20 mA Input)
   Contact Outputs; □ Contact outputs □ Without Contact outputs
   □ Bluetooth □ Without Bluetooth
   □ Modbus TCP/IP (Ethernet) □ Modbus RTU (RS-485)
   □ Bluetooth □ Without Bluetooth
   □ Modbus TCP/IP (Ethernet) □ Modbus RTU (RS-485)