

**FLXA402T Liquid Analyzer
for Turbidity and Chlorine
Installation and Wiring**
(Introduction and General Description)

IM 12A01G01-02EN

◆ Introduction

Thank you for purchasing the FLXA™ 402T Liquid Analyzer for Turbidity and Chlorine.

This User's Manual contains all essential information for the user to make full use of FLXA402T.

Please read the following respective documents before installing and using the FLXA402T.
The related documents are listed as follows.

General Specifications

Contents	Document number	Note
FC800D Non-reagent Type Free Available Chlorine Analyzer	GS 12F05B10-01EN	Online manual
RC800D Reagent Type Residual Chlorine Analyzer	GS 12F04B10-01EN	Online manual
TB820D Right Angle Scattered Light Turbidity Analyzer	GS 12E01B30-01EN	Online manual
TB830D Surface Scattering Light Turbidity Analyzer	GS 12E04B40-01EN	Online manual

"EN" in the document number is the language code.

User's Manual

Contents	Document number	Note
FLXA402T Liquid Analyzer for Turbidity and Chlorine Start-up and Safety Precautions	IM 12A01G01-01EN	Attached to the product (printed manual)
FLXA402T Liquid Analyzer for Turbidity and Chlorine Installation and Wiring	IM 12A01G01-02EN	Online manual (This manual)
FLXA402T Liquid Analyzer for Turbidity and Chlorine Operation of Converter	IM 12A01G01-03EN	Online manual
FLXA402T Liquid Analyzer for Turbidity and Chlorine Operation of pH	IM 12A01G02-01EN	Online manual
FLXA402T Liquid Analyzer for Turbidity and Chlorine Operation of SC	IM 12A01G03-01EN	Online manual

"EN" in the document number is the language code.

An exclusive User's Manual might be attached to the products whose suffix codes or option codes contain the code "Z" (made to customers' specifications). Please read it along with this manual.

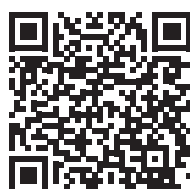
Technical Information

Contents	Document number	Note
FLXA402T Liquid Analyzer for Turbidity and Chlorine MODBUS communication	TI 12A01G01-62EN	Online manual

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You can download the latest documents from our website. Scan QR code.

<http://www.yokogawa.com/an/flxa402t/download/>



Please read the individual user's manuals for sensors/detectors and other related products.

■ Notes on Handling User's Manuals

- Please provide the user's manuals to your end users so that they can keep the user's manuals for convenient reference.
- Please read the information thoroughly before using the product.
- The purpose of these user's manuals is not to warrant that the product is well suited to any particular purpose but rather to describe the functional details of the product.
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■ Drawing Conventions

Some drawings may be partially emphasized, simplified, or omitted, for the convenience of description.

Some screen images depicted in the user's manual may have different display positions or character types (e.g., the upper / lower case). Also note that some of the images contained in this user's manual are display examples.

■ Composition of this User's Manual

FLXA402T Liquid Analyzer for Turbidity and Chlorine provides converter function to realize the following measurement according to user's specification.

FC (Free chlorine analyzer), RC (Residual chlorine analyzer),
TB (Turbidity Analyzer), pH, Conductivity (SC).

This manual describes the outline, installation, and wiring of the product that you should read first among the common parts of the converter. For operations (equipment settings, calibration) that differ depending on the specifications, refer to the other user's manuals, that are separated as shown in the table below.

Contents	FC800D	RC800D	TB820D	TB830D	pH	Conductivity (SC)
Introduction and general description	IM 12A01G01-02EN (This manual)					
Wiring and installation						
Converter operation (Setting, Maintenance, Troubleshooting)	IM 12A01G01-03EN					
Sensor operation (Setting, Calibration)	IM 12F05B10-02EN	IM 12F04B10-02EN	IM 12E01B30-02EN	IM 12E04B40-02EN	IM 12A01G02-01EN	IM 12A01G03-01EN

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FLXA402T**Liquid Analyzer for Turbidity and Chlorine****Installation and Wiring (Introduction and General Description)**

IM 12A01G01-02EN 6th Edition

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1. INTRODUCTION AND GENERAL DESCRIPTION

The FLXA402T works with pH, conductivity sensors in addition to turbidity or residual chlorine sensors.

For the transfer of diagnostic data and other device information to a host system, the FLXA402T supports MODBUS RTU/RS485 protocols. The FLXA402T also provides local display using RS-485 or Ethernet. For further information, see the general specifications of as below.

Document title	Document number
FC800D Non-reagent Type Free Available Chlorine Analyzer	GS 12F05B10-01EN
RC800D Reagent Type Residual Chlorine Analyzer	GS 12F04B10-01EN
TB820D Right Angle Scattered Light Turbidity Analyzer	GS 12E01B30-01EN
TB830D Surface Scattering Light Turbidity Analyzer	GS 12E04B40-01EN

This manual describes how to use the FLXA402T with Yokogawa's sensors. Please read carefully this manual and other manuals relevant to those sensors you use before using this instrument.

1.1 Instrument check

Upon delivery, unpack the instrument carefully and inspect it to ensure that it was not damaged during shipment. If damage is found, retain the original packing materials (including the outer box) and then immediately notify the carrier and the relevant Yokogawa sales office.

■ Checking the model and suffix code

Make sure the model and suffix code on the nameplate affixed to the left side of the housing. Refer to 1.4 Model & Suffix Codes

Apply correct power identified on the nameplate to the unit.

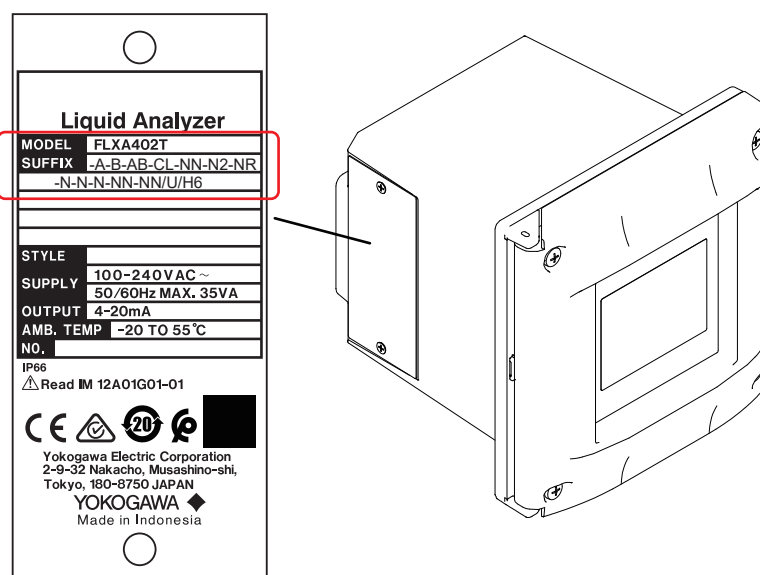


Figure 1.1 Example of nameplate (FLXA402T)

You find the model, style, and serial number of the product inside of the front panel, but no description of the power supply.

■ Spare parts

Spare parts are supplied by Yokogawa with the product. Make sure items in Table 1.1 are included.

Table 1.1 Spare parts

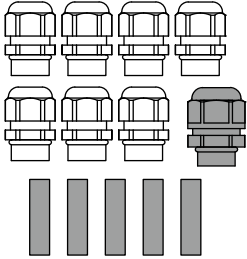
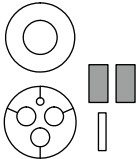
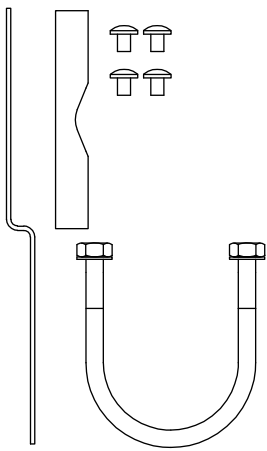
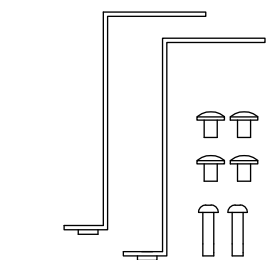
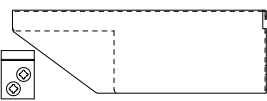
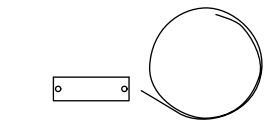
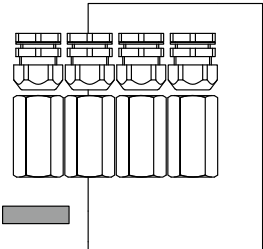
Product Name	Model and suffix code	Quantity	Remark
Cable glands 	All others except the one below	Cable gland (M20x1.5): 8 pcs Rubber plug attachment : 5 pcs	
	Digital communication: -E (Modbus TCP/IP)	Cable gland (M20x1.5): 7 pcs Ethernet cable gland (black): 1 piece Rubber plug attachment (black): 5 pcs	
Grommet set 	2nd input: -P1(pH)	1 set	
Grommet 	1st input: -CL or -TB (SENCOM)	1 piece	
	2nd input: -CL or -TB (SENCOM)	1 piece	
Jumper 	2nd input: -P1(pH)	2 pcs	
	Digital communication: -R (Modbus RTU(RS-485))	1 piece	For terminating resistor
Start-up Manual IM 12A01G01-01EN	All	1 book	

Table 1.2 Options (option code)

Product Name	Model and suffix code	Quantity	Remark
Pipe and wall mounting hardware 	Option code: /UM, /U	1 set	For /UM, bracket for /U and /PM, one of each, are supplied.
Panel mounting hardware 	Option code: /UM, /PM	1 set	
Hood 	Option code: /H6, /H7	1 set	
Stainless steel tag plate 	Option code: /SCT	1 set Stainless steel tag plate wire	User-specified tag number is printed.
Tag plate 	when other than /SCT is specified with a print order of tag plate number.	1 piece	User-specified tag number is printed.

Product Name	Model and suffix code	Quantity	Remark
Conduit adapter 	Option code: /CB4, /CD4, /CF4	Adapter: 4 pcs Cable gland for adapter: 4 pcs Rubber plug attachment : 1 piece	
	/CB6, /CD6, /CF6	Adapter: 3 pcs Cable gland for adapter: 3 pcs Ethernet adapter: 1 piece Ethernet cable gland (black): 1 piece Rubber plug attachment 1 piece	

Parts to be purchased separately are not listed here. For information on accessories to be purchased separately, see 1-8 ● Conduit adapter (need to be purchased additionally)

1.2 Name and description

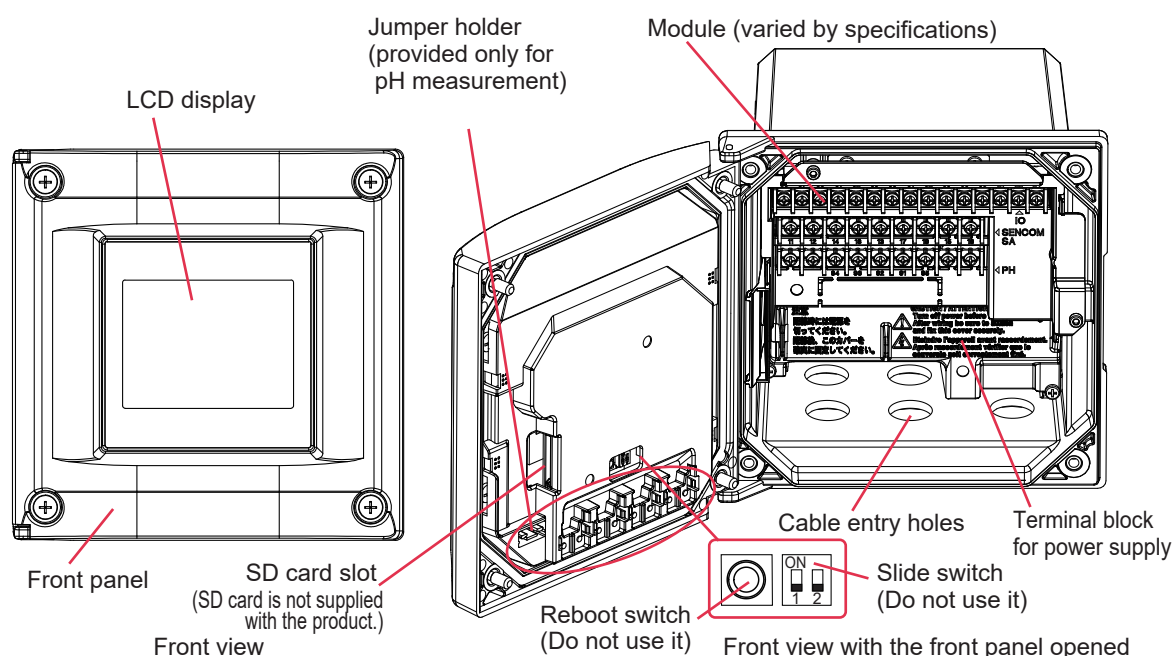
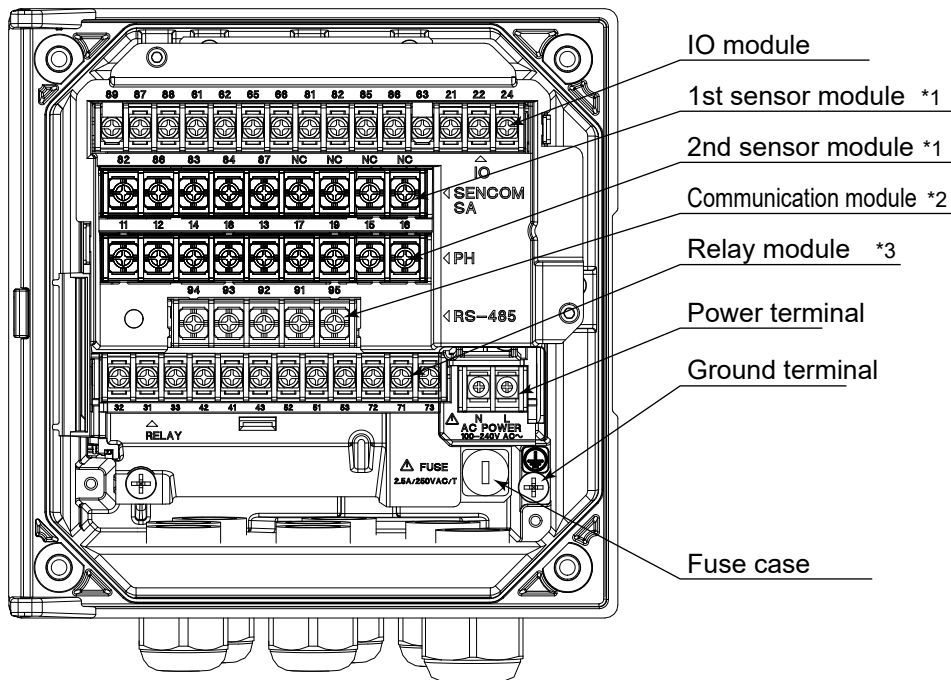


Figure 1.2 FLXA402T Parts names and descriptions

CAUTION

Do not switch ON the Slide switch 1 or 2. Do not press reboot switch, either.

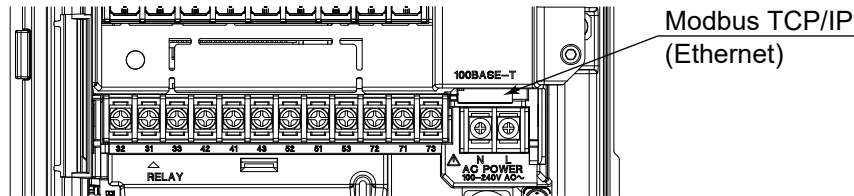
FLXA402T is a module-designed converter, assigning each function to respective module. The figure below shows how modules are installed, although modules to use are different according to specification.



*1: 1st/2nd input in Model and Suffix code defines what is printed on the mold, the side of the sensor module. It shows an example of selecting -CL/-TB and -P1. The following list shows what is printed according to the code.

- CL, -TB: SENCOM SA
- P1: PH
- C1: SC
- NN: No print (selectable for only 2nd input. No 2nd sensor module.)

*2: An example when -R (Modbus RTU(RS-485)) is specified.
The next figure shows an example when -E (Ethernet) is specified.



*3: An example when -WR (Contact outputs) for Contact Outputs is specified.

Figure 1.3 FLXA402T Module installation (example, without shield cover)

- **Jumper and Jumper holder**

When you don't need the jumpers, store them in the jumper holders located inside of the front panel, to prevent them from being lost.

You can put jumpers anywhere among 5 holders (1A and 4Bs) as Figure 1.4.

A has a guide hole. B has clicks on both side of each holder.

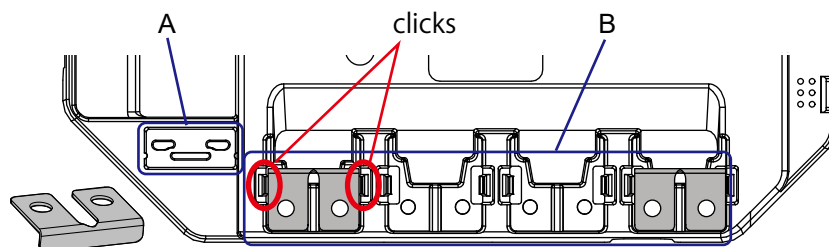


Figure 1.4 Jumper holders

1.3 Specification

See the latest general specifications.

Document title	Document number
FC800D Non-reagent Type Free Available Chlorine Analyzer	GS 12F05B10-01EN
RC800D Reagent Type Residual Chlorine Analyzer	GS 12F04B10-01EN
TB820D Right Angle Scattered Light Turbidity Detector	GS 12E01B30-01EN
TB830D Surface Scattering Light Turbidity Analyzer	GS 12E04B40-01EN

1.4 Model & Suffix Codes

Model	Suffix code	Option code	Description
FLXA402T	.....	.....	Liquid Analyzer for Turbidity and Chlorine
Power supply	-A	.....	AC version
Housing (*1)	-B -D	..... .....	Aluminum alloy cast + urethane coating Aluminum alloy cast + high anti-corrosion coating
Type (*2)	-AB -AD -AG -AJ	..... ..... ..... .....	General purpose for CE, RCM, China standard General purpose for CSA General purpose for KC General purpose
1st input	-CL -TB	..... .....	SENCOM for Chlorine SENCOM for Turbidity
2nd input (*3)	-NN -P1 -C1 -CL -TB	..... ..... ..... ..... .....	Without input pH (*4) Conductivity (SC) SENCOM for Chlorine SENCOM for Turbidity (*5)
mA Output/Input	-N2 -N4	..... .....	2 x 4-20 mA Output + 1 x Contact Input (without HART) 4 x 4-20 mA Output + 2 x Contact Input + 1 x 4-20 mA Input (without HART)
Contact Outputs	-WR -NR	..... .....	Contact outputs (Wash, range, Fail contact outputs) Without Contact outputs (without Wash and Fail contact outputs)
—	-N	.....	Always -N
Digital Communication	-N -E -R	..... ..... .....	Without Digital communication Modbus TCP/IP Modbus RTU (RS-485)
Country (*6)	-N -J	..... .....	Global except Japan Japan
Stanchion	-NN -ST	..... .....	Not assembled in stanchion Assembled in stanchion (*11)
—	-NN	.....	Always -NN
Option	Mounting hardware (*7) Hood Tag plate Conduit adapter (*9)	/UM /U /PM /H6 /H7 /SCT /CB4 /CD4 /CF4 /CB6 /CD6 /CF6	Universal mounting kit (*8) Pipe and wall mounting hardware Panel mounting hardware Hood, stainless steel Hood, stainless steel + urethane 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 Conduit adapter G1/2 x 3 pcs + G1/2 for Ethernet x 1 pcs (*10) Conduit adapter 1/2NPT x 3 pcs + 1/2NPT for Ethernet x 1 pcs (*10) Conduit adapter M20 x 1.5 x 3 pcs + M20 for Ethernet x 1 pcs (*10)

*1: Urethane coating is acid resistant. Heavy duty coating is acid/alkali resistant.

*2: Select same code as sensor's.

*3: To detectors connected to 2nd Input, none of the following is available: auto washing, auto zero calibration, wiper cleaning. For RC800D, select "-NN" only.

If you want to select FC800D and turbidimeter (TB820D or TB830D), select FC800D (-CL: SENCOR for Chlorine) on the first input. Select "-TB" on the second input of FLXA402T in FC800D (GS 12F05B10-01EN).

*4: Available for pH compensation of FC800D

*5: SENCOR Turbidity is for TB820D (GS 12E01B30-01EN) or TB830D (GS 12E04B40-01EN).

*6: Select only "-J" if you use the converter in Japan. Only SI unit (International System of Units) applies. For TB820D, "-J" is not available.

*7: See "● Mounting Hardware (Option)" in the GS (General Specifications) of each product.

*8: Universal mounting kit contains pipe, wall mounting hardware (/U) and panel mounting hardware (/PM).

*9: See "● Required Number of Conduit Adapters" in the GS (General Specifications) of each product.

*10: Available only when "-E" (Modbus TCP/IP) to Digital communication is selected.

*11: When "-ST" is specified, neither Mounting hardware (/UM, /U, /PM) nor Hood (/H6, /H7) can be selected.

For FC800D, be sure to specify "-ST" when option "/ST" (Assembled in stanchion) is specified. And for 2nd Input, "-C1" (Conductivity (SC)), "-CL" (SENCOR for Chlorine), "-TB" (SENCOR for Turbidity) are not selectable.

For RC800D, always select "-ST".

For TB820D, select "-NN" instead of "-ST".

For TB830D, when a Sampling system "-A□" (with sampling system) is selected, always select "-ST". For the second input, always select "-NN" (Without input). However, when "/PH□2" is selected, select "-P1" (pH) for the second input.

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

Type	Parts number	Quantity	Remark
G1/2 (Cable gland for adapter + adapter)	K9703WF	4 set	for Option code /CB□
1/2NPT (Cable gland for adapter + adapter)	K9703WG	4 set	for Option code /CD□
M20 x 1.5 (Cable gland for adapter + adapter)	K9703WH	4 set	for Option code /CF□

- **Optional parts**

Name		Parts number	Quantity	Remark
Mounting hardware	for pipe, wall mounting (stainless)	K9703SS	1 set	same as Option code /U
	for panel mounting (stainless)	K9703ZD	1 set	same as Option code /PM
Sun shade hood	Stainless	K9698WK	1 set	same as Option code /H6
	stainless + urethane	K9698WL	1 set	same as Option code /H7
Rubber plug attachment		K9334CN	1 pcs	for Cable gland
Fuse		A1633EF	1 pcs	250V/2.5A (minimum 5 pcs)
SD card		A1019NL	1 pcs	2 GB industrial SD card Customers can provide the cards with spec. Storage capacity: 128 MB or greater Type: SD, SDHC with power failure recovery

NOTE

SD cards are supplied by users if necessary. For further information, see 5.1 in IM 12A01G01-03EN.

1.5 Dimensions

See the latest general specifications.

Document title	Document number
FC800D Non-reagent Type Free Available Chlorine Analyzer	GS 12F05B10-01EN
RC800D Reagent Type Residual Chlorine Analyzer	GS 12F04B10-01EN
TB820D Right Angle Scattered Light Turbidity Detector	GS 12E01B30-01EN
TB830D Surface Scattering Light Turbidity Analyzer	GS 12E04B40-01EN

2. WIRING AND INSTALLATION

Install the cable glands on FLXA402T before wiring. The cable glands are included inside the product package.

2.1 Installation site

The FLXA402T is weatherproof and can be installed both indoors and outdoors. It should, however, be installed as close as possible to the sensor to avoid long cable runs between the instrument and sensor.

Select an installation site where the ambient temperature and humidity are within the limits of the instrument specifications as below. If the instrument is installed outdoors and exposed to direct sunlight, a sun shade hood should be used.

Ambient Operating Temperature: -20 to +55 °C

Storage Temperature: -30 to +70 °C

Humidity: 10 to 90% RH at 40°C (Non-condensing)

Select an installation site that meets the following conditions.

- Mechanical vibrations and shocks are negligible.
- No relay switch and power switch are installed close to the converter.
- There is space for cable connection beneath the cable glands.
- Not exposed to direct sunlight or severe weather conditions.
- Maintenance is possible.
- No corrosive atmosphere.

2.2 Mounting methods

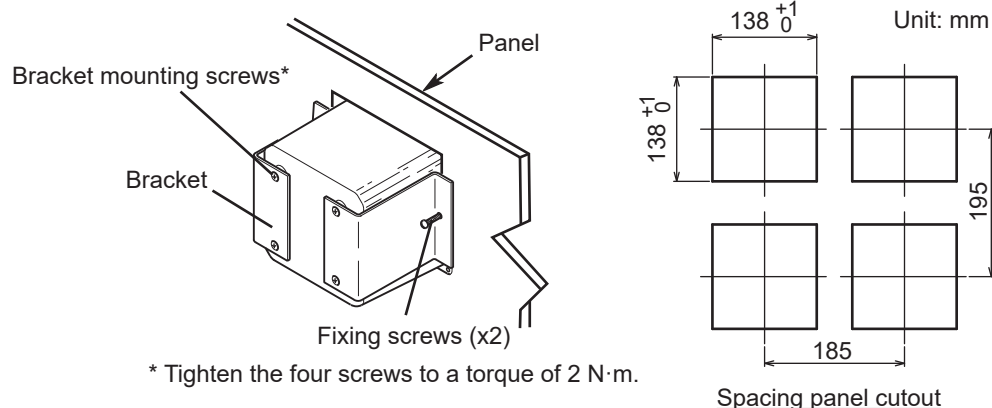
See 1.5Dimensions for information on the hardware for mounting.

The FLXA402T has various mounting possibilities.(Figure.2.1)

- Panel mounting using optional mounting hardware (/PM or /UM)
- Wall mounting using optional mounting hardware (/U or /UM)
- Pipe mounting using optional mounting hardware (/U or /UM) on a horizontal or vertical pipes (Nominal diameter size: 50A)

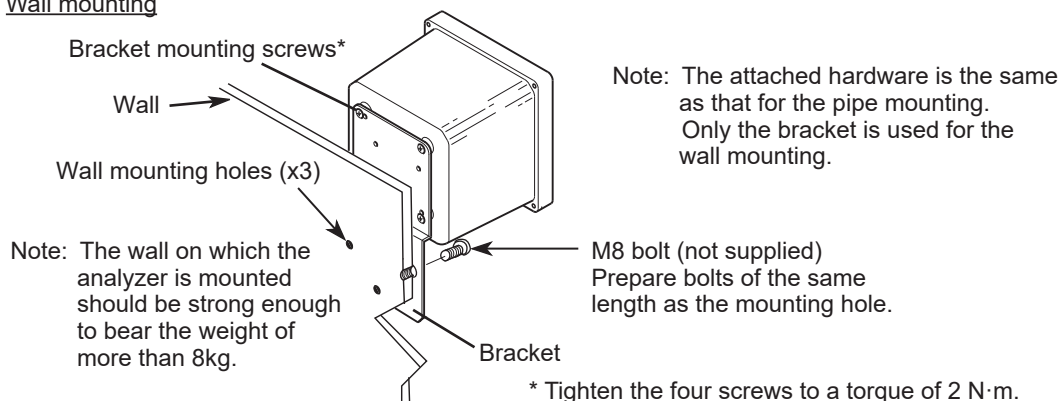
The universal mounting kit (/UM) contains the pipe and wall mounting hardware (/U) and the panel mounting hardware (/PM). Some can be left unused.

Panel mounting



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

Wall mounting



Pipe mounting

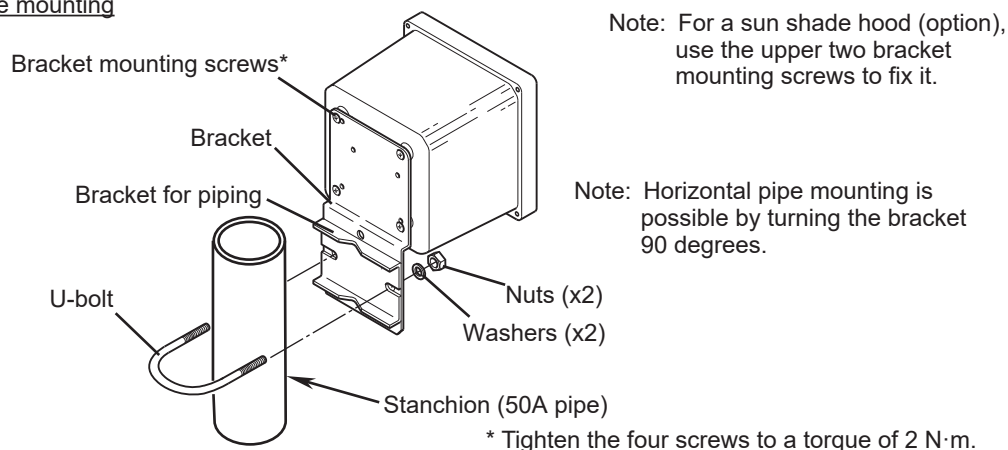


Figure 2.1 Three types of mounting with the optional mounting hardware

When you change the mounting type, you can order mounting hardware optionally. For further information see ● Optional parts

2.3 Removing the shield cover

The shield cover covers high-voltage power supply terminals and relay modules.

CAUTION

To ensure your safety, be sure to shut down the power supply before you remove the shield cover.

Open the front panel and remove the shield cover. After removing the shield cover, install the cable glands.

To remove the shield cover, loosen the 2 screws at Δ (triangle). Pull out the shield cover by holding the marked point :○ (circle) (Figure 2.2).

NOTE

Be careful not to lose the shield cover screws.

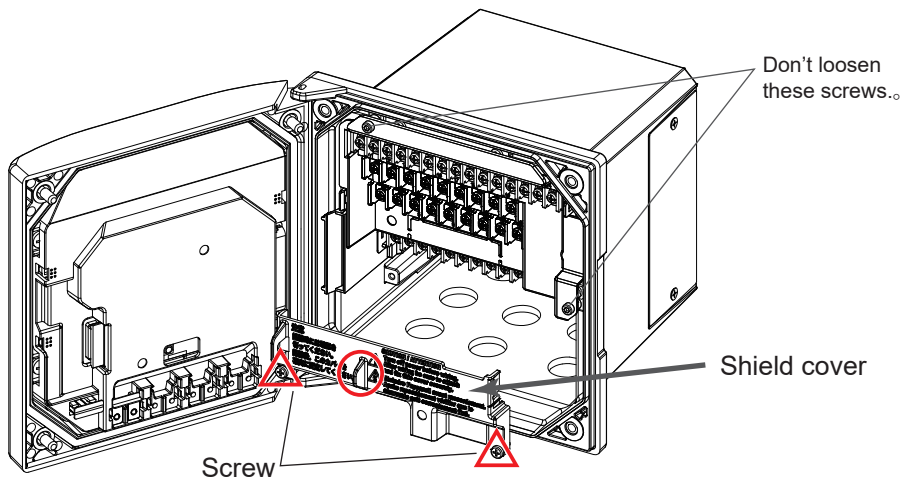


Figure 2.2 Shield cover

2.4 Installing the cable glands

The supplied cable glands are for cables with an outside diameter of 6 to 12 mm (0.24 to 0.47 inches). Unused cable entry holes must be sealed with cable glands including the supplied rubber close up plugs.

When the suffix code for Digital Communication code is -E (Modbus TCP/IP), apply cable glands (black) for Ethernet to the holes on the modules for communication.

For installing conduit adapters, apply Conduit adapter set ● Conduit adapter (need to be purchased additionally) and follow the instruction shown on Figure 2.5.

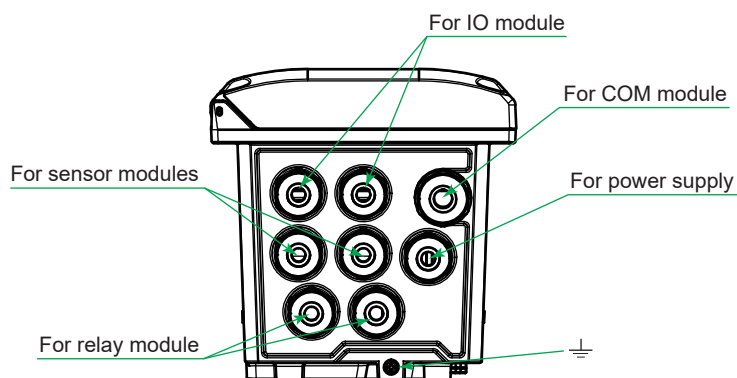


Figure 2.3 Cable gland configuration

CAUTION

Be careful not to be injured by the sharp hole edges on the housing.

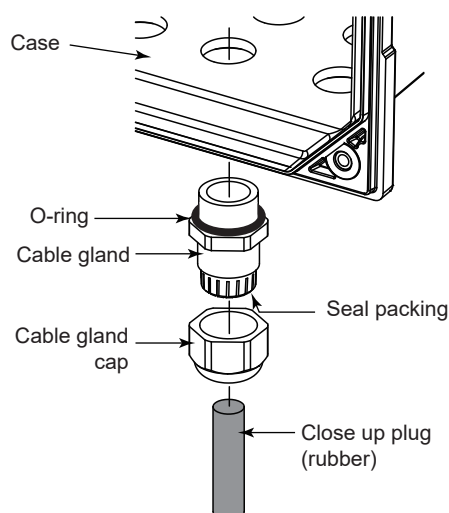


Figure 2.4 Cable glands

CAUTION

To install cable glands, tighten it with torque of 2 N•m.

● Conduit adapter

When protecting the cable with a conduit, use an adapter. (option codes: /CB4, /CD4, /CF4, /CB6, /CD6, /CF6)

CAUTION

There are 8 holes for cable connection. Apply the cable gland of supplied accessories (dark-grayed cable glands) to the holes which no conduit adapters connect to.

Apply the supplied cable gland for adapter (white) to the holes which conduit adapters connect to instead of using supplied-accessory cable gland (dark gray). (Figure 2.5)

Caps of cable glands are not used.

For Ethernet wiring, use Cable gland for Ethernet (black) and Conduit adapter for Ethernet (punched with a letter "E").

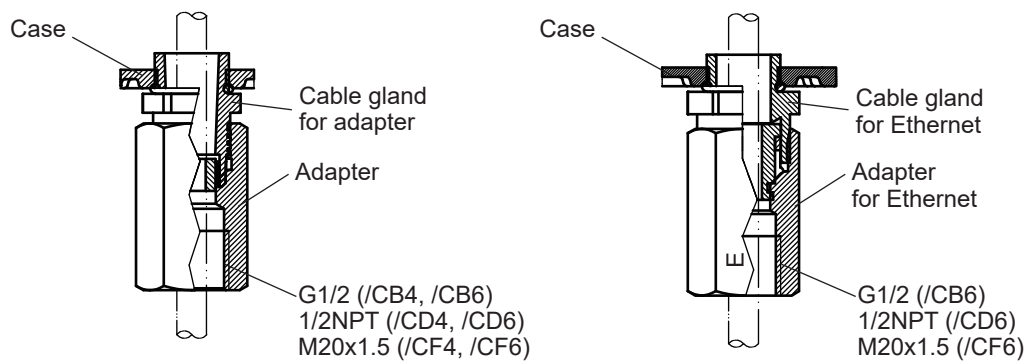


Figure 2.5 Conduit adapter (option)

CAUTION

When using a cable conduit, use a flexible conduit to avoid stress on the conduit adapter. The excessive stress on the conduit adapter may damage the housing.

2.5 Wiring

Wire in the following steps (1) to (6). (See Figure 1.3) (Each parenthesis shows the section number to see.) (1), (4), (5) are wiring between FLXA402T and sensors. For these wirings, use the cables which are included with the product. Refer to the user's manuals for the sensors you use.

- (1) Power supply terminals (See 2.5.1)
- (2) Relay module (2.5.2)
- (3) Communication module (2.5.3)
- (4) 2nd sensor module (2.6)
- (5) 1st sensor module (2.6)
- (6) IO module (2.5.4)

1st and 2nd order shown above are reversible. Remove the shield cover and do wiring. After the wiring, screw up the shield cover.



WARNING

Use wiring cables with heat tolerance above 75 °C, waterproof rating IP66 or higher.
Four front panel screws should be tightened to the following torque; 1.5 to 1.6 N·m.
For power supply, wire cables with a flammability rating of UL 2556 VW-1 or equivalent.



WARNING

Always place the shield cover over the power supply and contact terminals for interference avoidance and safety reasons.

CAUTION

Turn off power supply to FLXA402T before wiring cables.

CAUTION

After wiring of power supply or contact output is completed, put on the shield cover. (see section 2.3)

NOTE

Grounding of shielded cable

The shielded cables are very effective for noise-rejection, but the grounding of the shielded cables varies depending on the conditions of use.

One side grounding, which grounds only one end of the shield to FLXA402T, requires longer cables and is effective for noise reduction when there is a potential difference of grounds between the FLXA402T and the connected device on the other side.

If there is no potential difference between the FLXA402T and the device on the other side, it may be more effective to connect to the ground on both sides.

It may also be effective to connect a capacitor in series to one ground while both sides being grounded.

However, it is assumed that sensors are used with one side grounding. Therefore, be careful not to use those sensors with both sides grounded.

2.5.1 Wiring the power supply terminal unit

CAUTION

Make sure the power supply is switched off before wiring. Power rating must comply with FLXA402T specification. Power voltage must match with the one indicated on the name plate.



WARNING

- You must install external power supply switch or circuit breaker for power supply.
- The external power supply switch or a circuit breaker must comply with a current rating of 5A or IEC60947-1 or IEC60947-3
- Yokogawa recommend installing the external power supply switch, circuit breaker and FLXA402T converter all in the same location.
- Install the external power supply switch or circuit breaker to the place where operators access easily. To alert users, put a label on the external power switch.
- Fix wire cables of power supply or contact outputs securely with cable rack, conduit and vinyl band. Unplugged cables are dangerous and may cause an electric shock.

You should check local safety regulation to see if you shall install external circuit breaker. Follow the local regulation and install if necessary.

FLXA402T is protected by fuse which provides overcurrent protection of inner circuit.

Specific current and voltage ratings of fuse vary depending on power system. Use always a time-delay fuse for 250 VAC fuse in accordance with IEC60127.

To prepare for wiring cables, open the front cover and remove the shield cover so that you can access terminals easily.

The cable size of terminals is 2.5 mm² in cross-sectional area or AWG14. Use the solderless terminals.

■ Wiring power supply

Connect AC power supply according to the code (-A).

● AC power supply

Connect the power supply cord to L and N on the AC power supply. See Figure 2.8 for power supply grounding. Use power cables rated 300V AC or above. Use M3 screws for power supply terminals.

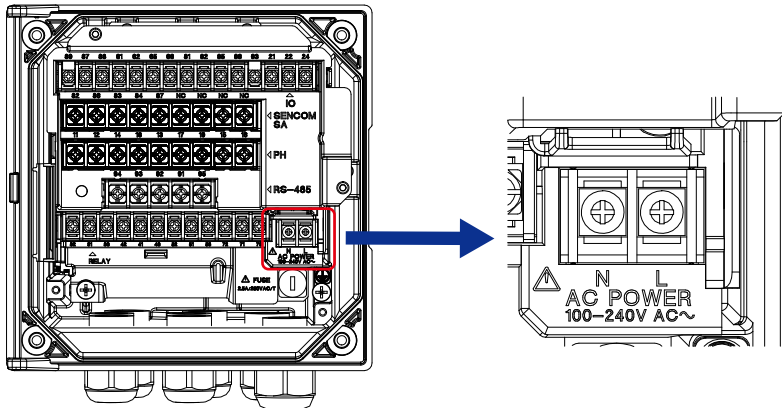


Figure 2.6 Connecting AC power supply

■ Grounding

CAUTION

Connect FLXA402T to ground. (Class D ground: 100 ohm or less) for interference avoidance and safety reasons.

Use ground cables with larger cross - sectional area. Connect the grounding cable to the terminal of the power module inside. See Figure 2.8.

Use ring terminals for wiring terminals.

⚠ WARNING

Use the protective earth conductors whose minimum size of the cross-sectional area is 0.75 mm². For CSA compliance (Type: -AD), use ones with cross-section area of 0.75 mm² to 2.1 mm².

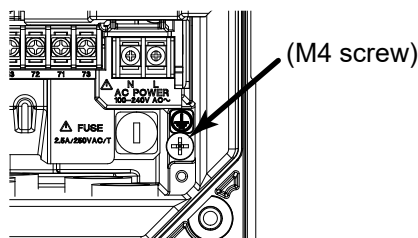


Figure 2.8 External grounding (rear side), internal grounding

CAUTION

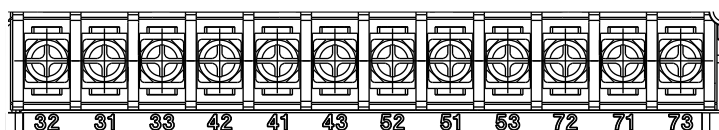
Put the shield cover back in place after the wiring of power supply terminal and contact output terminals, if the converter has a relay module, are completed.

2.5.2 Wiring relay module (Contact outputs)

Contact configuration of FLXA402T is the Single Pole Double Throw SPDT relay, which allows signals to be used as digital output to controller or PLC etc.

Use multi-core cables for contact output signals.

Those screws of contact terminals are all M3 with washer.



Terminal number	Contact terminals	Description
32	S1(NC)	Contact S1 Normally Close
31	S1(C)	Contact S1 Common
33	S1(NO)	Contact S1 Normally Open
42	S2(NC)	Contact S2 Normally Close
41	S2(C)	Contact S2 Common
43	S2(NO)	Contact S2 Normally Open
52	S3(NC)	Contact S3 Normally Close
51	S3(C)	Contact S3 Common
53	S3(NO)	Contact S3 Normally Open
72	S4(NO)	Contact S4 Normally Open
71	S4(C)	Contact S4 Common
73	S4(NC)	Contact S4 Normally Close

Figure 2.9 Relay module contacts

FLXA402T has 4 contact outputs, which allows configuration to adjust to operation. Contact S4 is fail safe contact. See IM-Converter operation “IM 12A01G01-03EN” Section 4.4.

There are 2 cable inlets. Take a suitable one to run wiring with good structure. Be sure to plug unused cable gland with a supplied rubber close up plug.

● Alarm (Process Alarm monitoring)

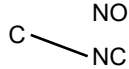
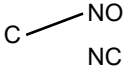
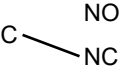
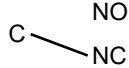
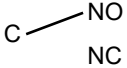
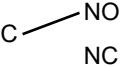
Contact outputs an alarm when a measurement exceeds or falls below the permissible range.

● Error

Contact outputs Error, “Fault” or “Warning”. Internal function of electric circuit alerts some errors automatically. You can define “Fault” or “Warning” for general errors. See IM-Converter operation “IM 12A01G01-03EN” Section 4.8

Contact for Error must connect to alarm related components including alarm lamp, alarm bell, indicators.

The table below shows the relay operation. Go to Main screen and tap  to display contact status. See “IM 12A01G01-03EN” 2.2 Main screen.

Contact terminals	Normal operation when power on	Alarm on when power on	Power off
S1, S2, S3			
S4			

2.5.3 Wiring network cables

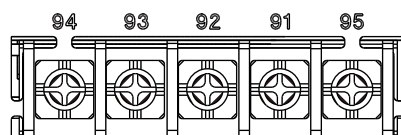
FLXA402T provides two types of wired digital network, Ethernet (Modbus TCP/IP) or RS-485 (Modbus RTU).

Use shielded cable to avoid deteriorated performance caused by EMI disturbance or radiation effects on electric devices.

■ RS-485 cabling

Suffix code -R is specified, i.e. (Modbus RTU (RS-485)) of digital communication.

All screws for the network module terminals are M3 with washers.



Terminal number	terminal name	Application
94	SHILD	Shield
93	GND	Signal ground
92	B-	data-negative
91	A+	data-positive
95	Term	terminal for termination resistor (110 Ω)

Figure 2.10 Network module terminal

Use multi-core shielded cable whose core wire is twisted pair. Connect them to terminal 94.

According to your network environment, terminate the network by using the built-in termination resistors with a value of 110 Ω .

Connect the terminals 91 and 95 with each other with a supplied jumper. (Figure 2.11) The jumper terminates signals inside the module. In this case, the signal cable and the jumper are tightened all together at the terminal 91.

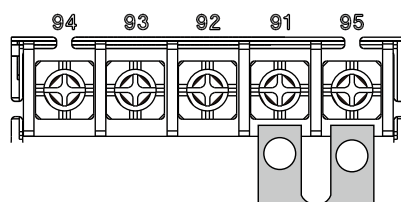


Figure 2.11 How to terminate RS-485 connection

NOTE

If you don't need the termination, keep the jumper in the jumper holder attached to the back of the front panel to avoid losing it. (Figure 1.4)

Ethernet cabling

Suffix code-E is specified. (Modbus TCP/IP) Figure 2.12 shows the positions of RJ45. Use STP shield cable of category 5 or greater to the RJ45 connector. You can apply both straight and crossover cable for Ethernet cabling.

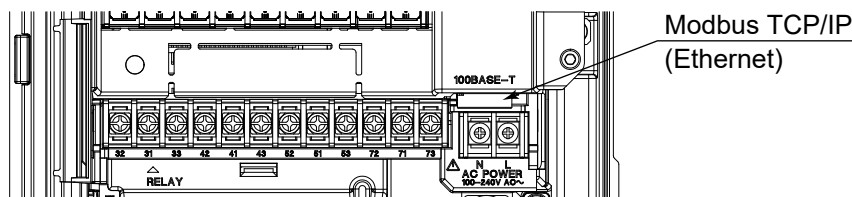


Figure 2.12 Network module (Ethernet) connector

NOTE

Use cable gland or adapters (option) for Ethernet.

2.5.4 Wiring IO module

First complete the sensor wiring. (Read 2.6)

Wire for mA input, mA output, contact input. Wiring for mA input may not be necessary according to the specification.

Wiring mA output

FLXA402T transmits 4-20 mA analog signals with maximum load of 600 Ω to peripherals including a control system or recorders. IO module has mA output function.

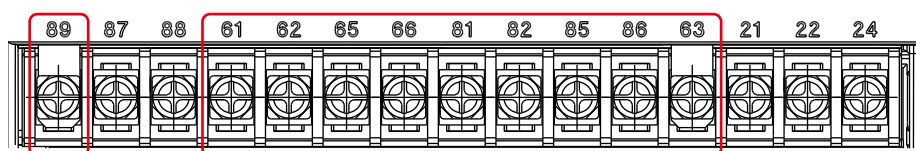
Be sure to use shielded cables for output signal cables, and connect shield to terminal 63 (or 89*).

*: When mA I/O is "-A4", the terminal 89 is used for mA input and cannot be used for output.

Use cables of rating 30 V AC or greater.

For wiring, use shielded multi-core cables.

Screws for IO module are all M3 with washers.



Terminal number	Contact terminals	Description
61	mA1+	4-20 mA output 1
62	mA1-	4-20 mA output 1-
65	mA2+	4-20 mA output 2+
66	mA2-	4-20 mA output 2-
81	mA3+	4-20 mA output 3+ *1
82	mA3-	4-20 mA output 3- *1
85	mA4+	4-20 mA output 4+ *1
86	mA4-	4-20 mA output 4- *1
63	SHILD	Shield
89	SHILD	Shield

*1 only when mA output is -A4 in the Suffix Codes.

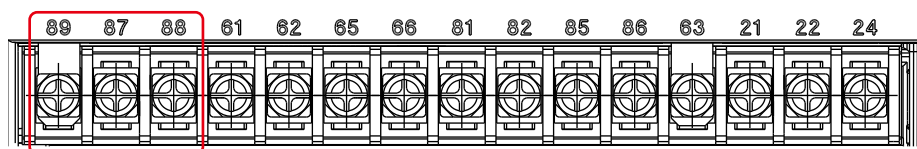
Figure 2.13 IO module terminal assignment

■ mA input

This describes a wiring when the suffix code for mA Output/Input is -A4.

FLXA402T receives 4-20 mA analog signals inputs, or of temperature compensation for pH, SC sensors.

Use shielded cable for input signal cable and connect the shield to terminal 89. Rated voltage of cable is 30 V AC or greater. For wiring use multicore shielded cable. Screws for IO module terminals are all M3 with washers.



Terminal number	Contact terminals	Description
87	AI+	4-20 mA input +
88	AI--	4-20 mA input-
89	SHILD	Shield

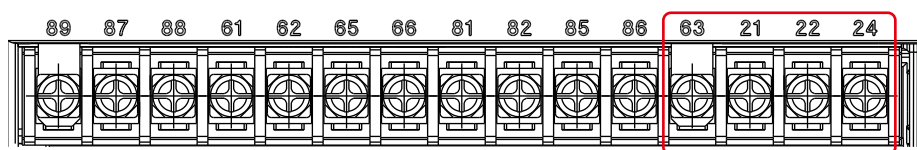
Figure 2.14 IO module terminal assignment

■ Contact input

IO module contains contact input function which is for starting WASH CYCLE or changing RANGE of 4-20 mA output.

For input signal cable, use shielded cables. Connect the shield to terminal 63.

All screws are M3 with washers.



Terminal number	Contact terminals	Description
21	DI1	Contact input 1
22	COM	Contact input common
24	DI2	Contact input 2*1
63	SHILD	Shield

*1 when mA IO code -A4 is selected

Figure 2.15 IO module terminal assignment

When all wiring is complete, close the FLXA402T front cover, and turn the power on.

Check that the screen displays normally.

CAUTION

To install the front panel, tighten each screw evenly until every four of them is completely fastened. For example, turn each screw in two times and repeat it until all of the screws are evenly tightened up.

Do not use an electric screwdriver with high revolutions such as 1000 rpm. The revolutions of the electric screwdriver should be less than 400 rpm.

Four front panel screws should be tightened to the following torque; 1.5 to 1.6 N•m

2.6 Sensor wiring

The FLXA402T can be used with a wide range of commercially available sensor types, both from Yokogawa and other manufacturers.

Terminal screw size is M3, and torque of screw up is 0.6 N•m.

Pin terminal, ring terminal and spade terminal can be used.

Pin terminal: pin diameter: max. 1.9 mm

Ring and fork (spade) terminal: width: max. 7.8 mm

For details on the sensors, refer to the respective instruction manuals of the sensors.

NOTE

When the second input is used, the upper-level module is for the first input. Be careful not to make a mistake when wiring the modules.

If the second input is available, wire the second module in the lower level first.

There are two cable entry holes. Both can be used.

When the second input is not available, be sure to plug holes of unused cable gland with the supplied rubber close up plug.

The table below shows the section of this IM describing the wiring of first/second input according to the suffix code.

Suffix code	Input	Section
-CL	SENCOM for Chlorine	2.6.1
-TB	SENCOM for Turbidity	
-P1	pH (PH)	2.6.2
-C1	Conductivity (SC)	2.6.3

CAUTION

It is assumed that sensors are used with one side grounding. Therefore, be careful not to use those sensors with both sides grounded.

2.6.1 Wiring Chlorine meter, Turbidity meter

This section describes the cable connection between FLXA402T and the chlorine meter or the turbidity meter when -CL (SENCOM for Chlorine) or -TB (SENCOM for Turbidity) is specified for the first or second input.

Be sure to find the label "SENCOM SA" beside the terminals. Screws are all M3 with washers.

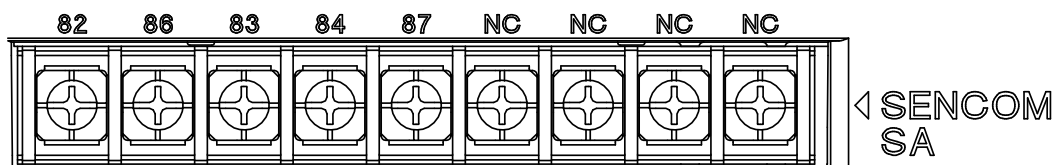


Figure 2.29 SENCOM SA module terminal assignment

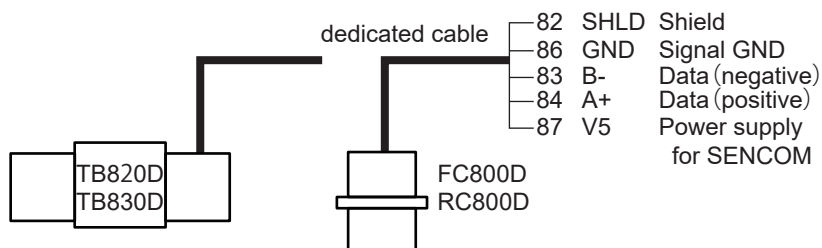
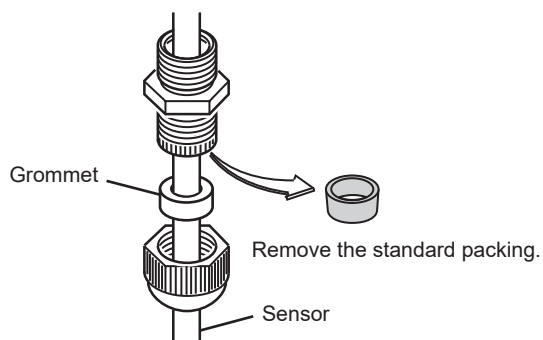


Figure 2.30 Wiring SENCOM

Wire a dedicated cable for the turbidimeter or chlorine meter to connect to FLXA402T.

Because the dedicated cables are thin, first remove the cable gland's standard packing and apply the supplied grommet instead.

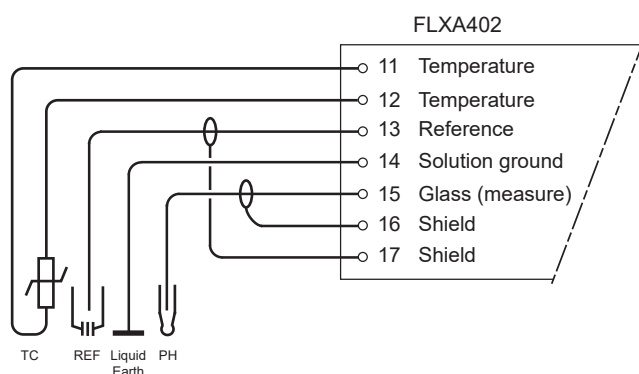


FLXA402T acknowledges the connection of sensors, if not, FLXA402T alerts an error.

2.6.2 Wiring the pH sensor

■ pH Measurement

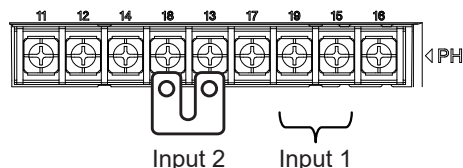
Conventional pH sensors are connected to the module as follows:



In addition to the wiring of the sensor, ensure that a jumper for low-impedance sensor inputs is installed. Two jumpers are supplied with each module. Keep unused jumpers in the jumper holder to avoid losing them.

- pH Glass Electrode is a high impedance sensor input
- Standard reference electrodes are low impedance sensor inputs
- Special electrodes using 2 glass sensors (example: Pfaudler, SC24V) do not need jumpers.

Terminals 15-19 are identified as input 1 (High Impedance) and terminals 13-18 are defined as input 2 (Low Impedance). For conventional pH sensors, the jumper is placed as illustrated:



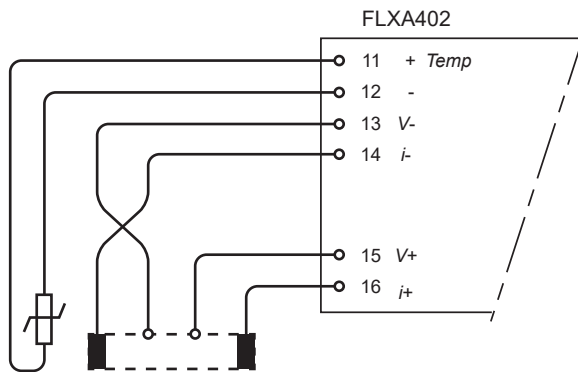
Glass sensor on Input 1

Reference sensor on Input 2

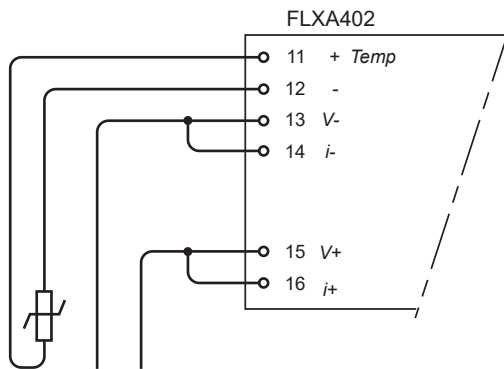
Store jumpers that you do not use in the jumper holder.

2.6.3 Wiring the conductivity (SC) sensor

Contacting Conductivity, SC, sensors are connected to the module as follows:

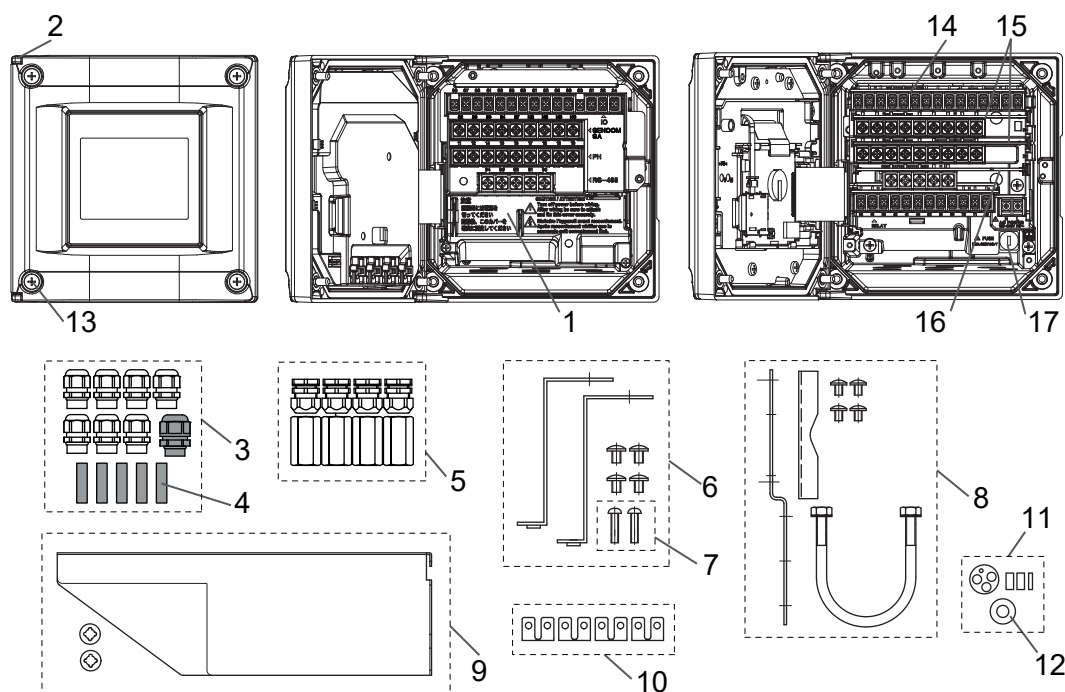


The above diagram shows wiring for 4-electrode conductivity sensors, such as SC42-SP34 large bore series. For 2-electrode conductivity sensors, such as SC42-SP36 small bore series, jumpers must be installed between terminals 13-14 and between terminals 15-16, as shown in the diagram below.



Customer Maintenance Parts List

FLXA402T Liquid Analyzer for Turbidity and Chlorine



Item	Part No.	Qty	Description	Item	Part No.	Qty	Description
1	K9703SA	1	Shield plate assembly	10	K9703ZM	2	Jumper set (for pH, RS485), 5 pcs
2	K9699PP	1	Hinge pin assembly (Hinge pin + spring)	11	K9676BY	1	Grommet set (only for pH)
3	—	—	Cable gland set	12	K9676CL	1	Grommet (only for SENCOM)
	K9703PC	1	Cable gland x8 + Rubber plug x5	13	K9699PL	5	Screw assembly (M5 screw + spring)
	K9703PE	1	Cable gland x7 + for Ethernet x1 + Rubber plug x5	14	—	—	IO module assembly (QIC sheet is included.)
4	K9334CN	1	Rubber plug (for auxiliary component)		K9704QB	1	mA Output/Input: -N2
5	—	—	Adapter set for conduit work (Conduit adapter + Cable gland)		K9704QC	1	mA Output/Input: -N4
	K9703WF	1	G1/2 x 4 sets	15	—	—	Sensor module assembly (QIC sheet is included.)
	K9703WG	1	1/2NPT x 4 sets	(See Table 1)	1	1st/2nd input:	
	K9703WH	1	M20x1.5 x 4 sets			-CL (SENCOM for Chlorine) or -TB (SENCOM for Turbidity)	
	K9703WJ	1	G1/2 x 3 sets + for Ethernet x1 set	(See Table 1)	1	2nd input: -P1 (pH)	
	K9703WK	1	1/2NPT x 3 sets + for Ethernet x1 set				
	K9703WL	1	M20x1.5 x 3 sets + for Ethernet x1 set	(See Table 1)	1	2nd input: -C1 (SC)	
6	K9703ZD	1	Panel mounting set (option code: /PM)	16	—	—	Communication module assembly (QIC sheet is included.)
7	K9703ZL	2	Screw set (for panel mount), 2 pcs		K9704PB	1	Digital Communication: -E (Modbus TCP/IP)
8	K9703SS	1	Pipe and wall mounting set (option code: /U)		K9704PC	1	Digital Communication: -R (Modbus RTU (RS-485))
9	—	—	Sun shade hood set	17	A1633EF	1	Fuse
	K9698WK	1	Stainless steel (option code: /H6)				
	K9698WL	1	Stainless steel with urethane coating (option code: /H7)				

Table 1 Item 15; Sensor module assembly (QIC sheet is included.)

Type code Module	-AB, -AD, -AG, -AJ
pH	K9704EB
SC	K9704FB
SENCOM	K9704SB

Table 2 Sensor module assembly and sensor module itself (As reference info.)

Sensor module assembly	Sensor module itself
K9704EB	K9704ED
K9704FB	K9704FD
K9704SB	K9704SF

Note: Order the part number of the sensor module assembly (left column).

Revision Record

- Manual Title : FLXA402T Liquid Analyzer for Turbidity and Chlorine, Installation and Wiring
(Introduction and General Description)
- Manual No. : IM 12A01G01-02EN

June 2023/6th Edition

Changed SENCOM SA to SENCOM, revised CMPL

Apr. 2023/5th Edition

Revised CMPL (deleted parts), added notes to Model & Suffix Codes table (page 1-7), added TB830D

July 2022/4th Edition

CMPL revision (correction of incorrect part number)

June 2022/3rd Edition

Changed the part number of SD card. (page 1-10)

Oct. 2021/2nd Edition

Correction (page 2-7)

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