User's
Manual

ADMAG TI Series
AXW Magnetic Flowmeter
[Size: 25 to 1800 mm (1 to 72 in.)]
Maintenance Manual

IM 01E24A01-02EN

YOKOGAWA
Yokogawa Electric Corporation

IM 01E24A01-02EN
7th Edition

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AXW Magnetic Flowmeter
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Revision Information

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1. Introduction

This manual provides the basic guidelines for maintenance procedures of ADMAG TI (Total Insight) Series AXW magnetic flowmeters.
For the items which are not covered in this manual, read the applicable user's manuals listed in "Table 1.1 Manual and General Specifications List" in ADMAG TI Series AXW Magnetic Flowmeter Installation Manual (IM 01E24A01-01EN or IM 01E25A01-01EN).
For specifications or model codes, read ADMAG TI Series AXW Magnetic Flowmeter General Specifications (GS 01E24A01-01EN or GS 01E25D11-01EN).
Website address: http://www.yokogawa.com/fld/doc/
These manuals can be downloaded from the website of YOKOGAWA or purchased from the YOKOGAWA representatives.

■ Precautions Related to the Protection, Safety, and Alteration of the Product

The following safety symbol marks are used in this manual and product .

WARNING

A WARNING sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death of personnel.

CAUTION

A CAUTION sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

IMPORTANT

An IMPORTANT sign denotes that attention is required to avoid damage to the product or system failure.

NOTE

A NOTE sign denotes information necessary for essential understanding of operation and features.

The following symbols are used in the product and the manual to indicate the accompanying safety precautions:

- Protective grounding terminal
- Functional grounding terminal (This terminal should not be used as a protective grounding terminal.)
- Alternating current
- Direct current
- Caution
  This symbol indicates that the operator must read an explanation in the user's manual in order to avoid the risk of injury or death of personnel or damage to the product.

- For the protection and safe use of the product and the system in which this product is incorporated, be sure to follow the instructions and precautions on safety that is stated in user's manual whenever you handle the product. Take special note that if you handle the product in a manner that violated these instructions, the protection functionality of the product may be damaged or impaired. In such cases, YOKOGAWA does not guarantee the quality, performance, function, and safety of product.
- Should use the parts specified by YOKOGAWA when replacing. Contact YOKOGAWA's service office for fuse replacement.
- Do not modify this product.
- YOKOGAWA will not be liable for malfunctions or damage resulting from any modification made to this product by the customer.
- The product should be disposed of in accordance with local and national legislation/ regulations.

■ Regarding This User's Manual

- This manual should be provided to the end user.
- The contents of this manual are subject to change without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without YOKOGAWA's written permission.
- YOKOGAWA makes no warranty of any kind with regard to this manual, including, but not limited to, implied warranty of merchantability and fitness for a particular purpose.
- If any question arises or errors are found, or if any information is missing from this manual, inform the nearest YOKOGAWA sales office.
- The specifications covered by this manual are limited to those for the standard type under the specified model number break-down and do not cover custom-made product.
- Note that changes in the specifications, construction, or component parts of the product may not immediately be reflected in this manual at the time of change, provided that postponement of revisions will not cause difficulty to the user from a functional or performance standpoint.
- This manual is intended for the following personnel;
  Engineers responsible for installation and wiring of the product.
  Personnel responsible for normal daily operation of the product.
- To ensure correct use, read this manual and the applicable manuals thoroughly before starting operation. Read the general specifications for its specification.

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1.1 For Safe Use of Product

For the protection and safe use of the product and the system in which this product is incorporated, be sure to follow the instructions and precautions on safety that is stated in user's manual whenever you handle the product. Take special note that if you handle the product in a manner that violated these instructions, the protection functionality of the product may be damaged or impaired. In such cases, YOKOGAWA shall not be liable for any indirect or consequential loss incurred by either using or not being able to use the product.

■ Maintenance

WARNING

- Only personnel authorized by Yokogawa Electric Corporation can repair the equipment.
- The magnetic flowmeter is a heavy product. Be careful that no damage is caused personnel through accidentally dropping it, or by exerting excessive force on the magnetic flowmeter. When moving the magnetic flowmeter, always use a trolley and have at least two people carry it.
- When the magnetic flowmeter is processing hot fluids, the product itself may become extremely hot. Take sufficient care not to get burnt.
- Where the fluid being processed is a toxic substance, avoid contact with the fluid and avoid inhaling any residual gas, even after the product has been taken off the piping line for maintenance and so forth.
- Do not apply excessive weight, for example, a person stepping on the magnetic flowmeter.
- Wiring and maintenance of the magnetic flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to wiring and maintenance.
- Do not open the cover in wet weather or humid environment. When the cover is open, stated enclosure protection is not applicable.
- Ensure that the power supply is off in order to prevent electric shocks.
- When opening the cover, wait for more than 20 minutes after turning off the power. Only expert engineer or skilled personnel are permitted to open the cover.
- Ensure the protective grounding terminal is grounded before turning on the power.

WARNING

- Install an external switch or circuit breaker as a means to turn the power off (capacitance: 15A, conforming to IEC60947-1, IEC60947-2 and IEC60947-3).
  Locate this switch either near the product or in other places facilitating easy operation. Affix a "Power Off Equipment" label to this external switch or circuit breaker.
- When opening and closing the cover, be sure to handle the cover carefully so that there are no damage and foreign matter adhesion at its threads and O-ring.
  Keep checking their condition and clean the threads in case of adhering the foreign matter.
  Replace the cover in case the treads receive damages.
  Replace the O-ring if there is any scarring or transformation.
  And apply silicone based grease at the O-ring in case of the shortage and exhaustion of grease.
- If dirt, dust or other substances surfaces on the glass of display cover, wipe them clean with a soft dry cloth.
- Wiring work should be done adequate wire, sleeve crimp and torque force. Use terminal with insulating cover for the power supply wiring and protective grounding wiring. Do not pull the wires too much strongly in order to prevent electric shocks caused by their damage.
- This product employs the parts which are affected by a function damage caused by static electricity. Thus, you should do the antistatic work using an anti-static wrist band for it and be careful to avoid touching each electrical parts and circuitry directly.
- When connecting the wiring, check that the supply voltage is within the range of the voltage specified for this product before connecting the power cable. In addition, check that no voltage is applied to the power cable before connecting the wiring.
- To prevent electric shocks, ensure the electrical wiring cover is completely attached after the wiring work.
- To prevent electric shocks, do not impress over rated voltage to each input/output terminals.
- To prevent electric shocks, do not remove safety cover (Read chapter 5,6).

WARNING

- If there is any unused cable entry, use the blanking plug to cover which comes with this product or which is supplied by YOKOGAWA. The blanking plug should be fastened into the unused cable entry without any mistake. If not, stated enclosure protection is not applicable.
- Maintenance of this flowmeter should be implemented in a maintenance service shop where the necessity tools and environment condition are provided.
  The necessity of this environmental condition is that ambient temperature is 5 to 40°C (the maximum relative humidity is 80 % for temperature 5 to 31°C, and decreasing linearly to 50 % relative humidity at 40°C).
- Be sure to enable the write protect function to prevent the overwriting of parameters after finishing parameter setting.
  In rare cases, the IR switches may respond unexpectedly to water drops or extraneous substances sticking on the surface of display panel, due to the operating principal. The possibility of malfunction arises after rain or cleaning operation near the place where the flowmeter is installed. Turning on and off the flashlight etc. towards the IR switch may also be a cause of malfunction.
  Read Chapter 5 for the hardware write protect function, and the user's manual of applicable communication type for the software write protect function.
- For explosion protection type products, confirm that it is "no explosive atmosphere".
- For replacement parts, contact our sales or service. In that case, tell us your product specifications.

IMPORTANT

- When closing the cover, close it with both hands until the cover does not turn in order to bring the housing and cover into tight contact.
- Tighten the cover while confirming that it rotates smoothly.

1.2 Warranty

- The warranty shall cover the period noted on the quotation presented to the purchaser at the time of purchase. Problems occurred during the warranty period shall basically be repaired free of charge.
- In case of problems, the customer should contact the YOKOGAWA representative from which the product was purchased, or the nearest YOKOGAWA office.
- If a problem arises with this product, inform us of the nature of the problem and the circumstances under which it developed, including the model specification and serial number. Any diagrams, data and other information you can include in your communication will also be helpful.
- Responsible party for repair cost for the problems shall be determined by YOKOGAWA based on our investigation.
- The Purchaser shall bear the responsibility for repair costs, even during the warranty period, if the malfunction is due to:
  - Improper and/or inadequate maintenance by the purchaser.
  - Failure or damage due to improper handling, use or storage which is out of design conditions.
  - Use of the product in question in a location not conforming to the standards specified by YOKOGAWA, or due to improper maintenance of the installation location.
  - Failure or damage due to modification or repair by any party except YOKOGAWA or an approved representative of YOKOGAWA.
  - Malfunction or damage from improper relocation of the product in question after delivery.
  - Reason of force majeure such as fires, earthquakes, storms/floods, thunder/ lightening, or other natural disasters, or disturbances, riots, warfare, or radioactive contamination.

1.3 Regular Inspection Items

(1) Inspection of moisture-proofing inside the terminal box: Once/year

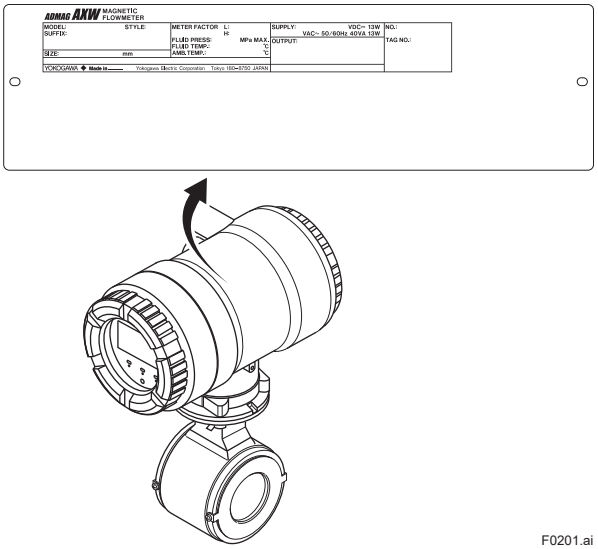
(2) Retightening of piping joint screws: About twice/year

(3) Inspection of electrodes and lining (in case of adhesive and/or abrasive fluids, etc.)
Determine the period of regular inspection as necessary.
Read also to the Device Health Diagnosis by Verification Function in Chapter 7 together.

2. Model and Specifications Check

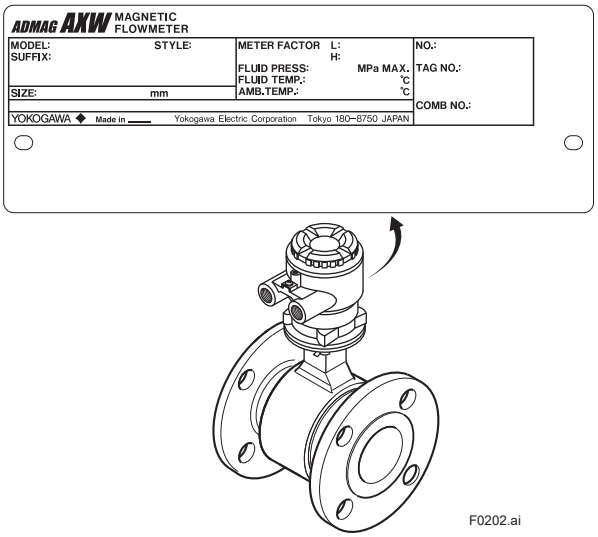
As shown in Figure 2.1 to Figure 2.6, the model, suffix code, serial number, meter factor, fluid specification, and device information are found on the name plate located on the outside of the housing. And, this product can check their information from parameters. Read the user's manual of applicable communication type for checking device information from parameters.
When checking the matching of model and specification you ordered, see the applicable general specifications.
Be sure you have the model code and serial number available when contacting YOKOGAWA.

Note: Description on the nameplate
- Made in _____: Country of origin
- COMB No.: Serial number of the combined remote sensor or remote transmitter



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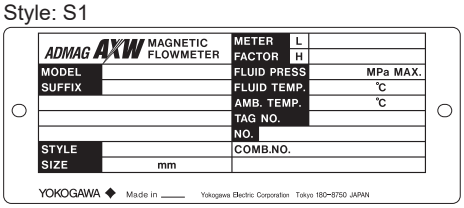
Figure 2.1 Name Plate (AXW Integral Flowmeter)



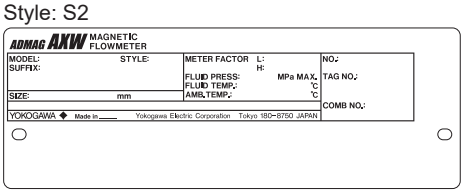
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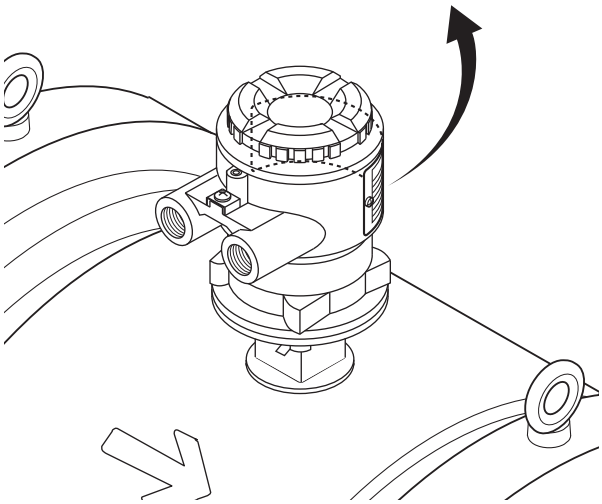
Figure 2.2 Name Plate (AXW Remote Sensor [Size: 25 to 450 mm (1 to 18 in.)])

Style: S1



Style: S2





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Figure 2.3 Name Plate (AXW Remote Sensor [Size: 500 to 1800 mm (20 to 72 in.)])

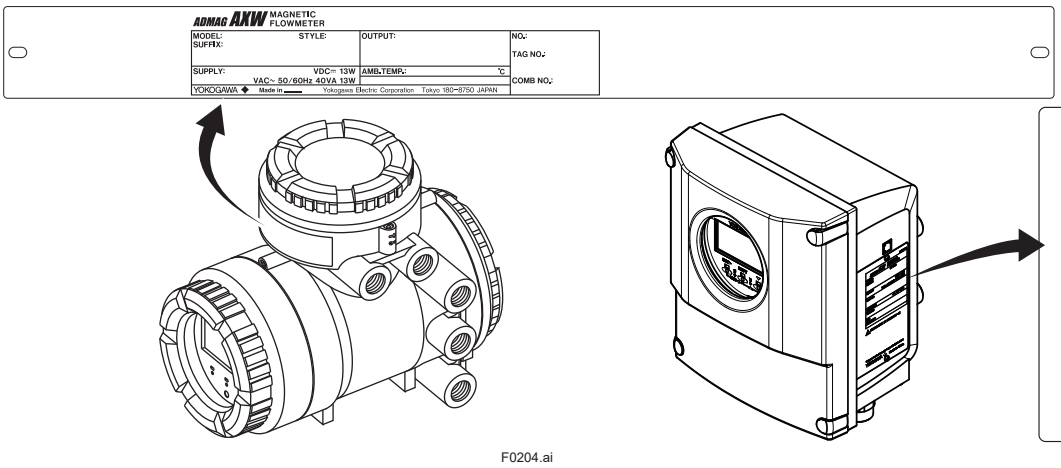


Figure 2.4 Name Plate (AXW4A Remote Transmitter)

Figure 2.5 Name Plate (AXG1A Remote Transmitter)

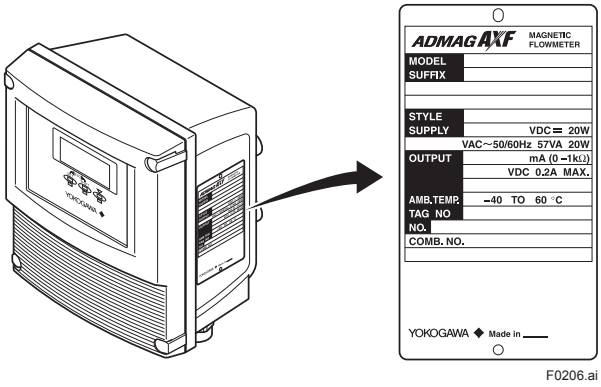


Figure 2.6 Name Plate (AXFA11 Remote Transmitter)

3. Changing Direction of Cable Entry

3.1 Integral Flowmeter [Size: 25 to 1000 mm (1 to 40 in.)] and Remote Sensor [Size: 25 to 450 mm (1 to 18 in.)]

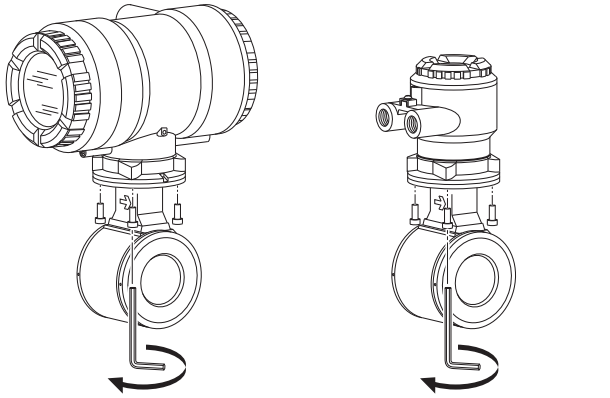
IMPORTANT

The following types can not be changed direction of cable entry after delivery.
- Submersible Type
- For District Heating and Cooling or Condensation-proof (Optional code: DHC)

(1) The following tool is required.
  - Hexagonal wrench (nominal size 5)

(2) Turn off the power to the flowmeter.

(3) Using the wrench, unscrew the four hexagonal bolts at the neck of transmitter or terminal box.



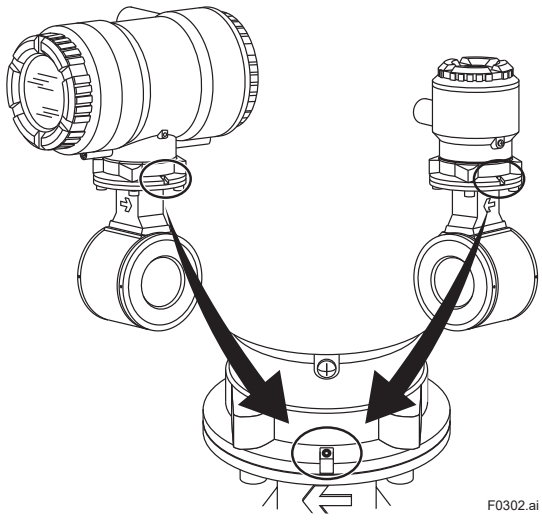
AXW Integral Flowmeter

AXW Remote Sensor [Size: 25 to 450 mm (1 to 18 in.)]

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CAUTION

Do not loosen the screw at the opposite side of cable entry (see the figure below).



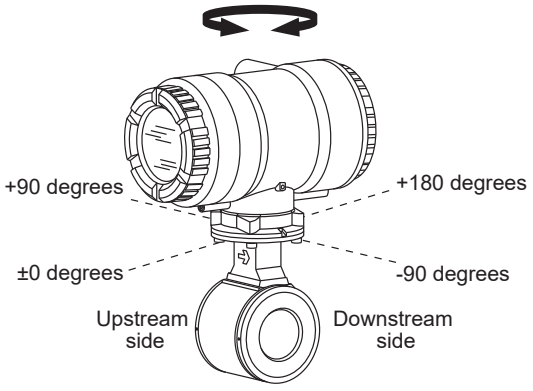
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(4) Rotate the transmitter or the terminal box in the desired direction. The direction can be changed to -90 degrees, +90 degrees or +180 degrees.

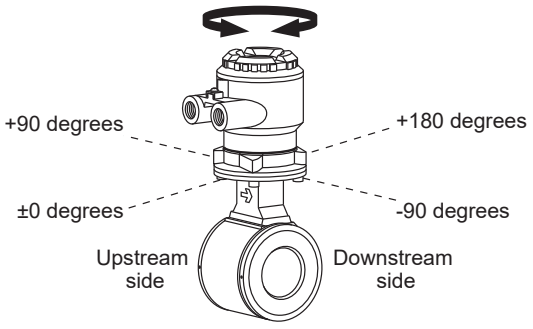
NOTE

The transmitter and the terminal box can be rotated -90 degrees to +180 degrees at every 90 degrees from the arrow mark indicating the flow direction. Do not exceed these angle.

(5) Tighten diagonally the four hexagonal bolts with the hexagonal wrench, and then be sure to check that the transmitter or the terminal box was firmly fixed to the sensor.



AXW Integral Flowmeter



AXW Remote Sensor [Size: 25 to 450 mm (1 to 18 in.)]

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3.2 Remote Sensor [Size: 500 to 1800 mm (20 to 72 in.)]

3.2.1 Style: S1

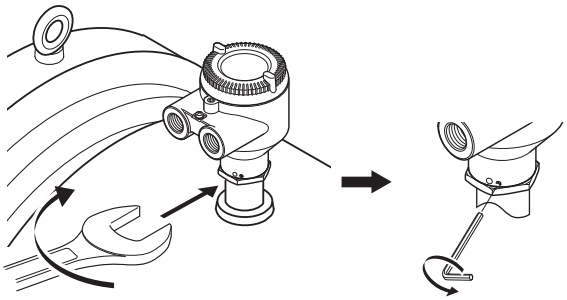
IMPORTANT

The following types can not be changed direction of electrical connection after delivery.
- Submersible Type (Model: AXW□□□W)
- For District Heating and Cooling or Condensation-proof (Optional code: DHC)

(1) The following tools are required.
- Hexagonal wrench (nominal size 1.5)
- Spanner (nominal size 46)

(2) Turn off the power to the flowmeter.

(3) Using the spanner, loosen the hexagonal nuts at the neck of remote sensor.



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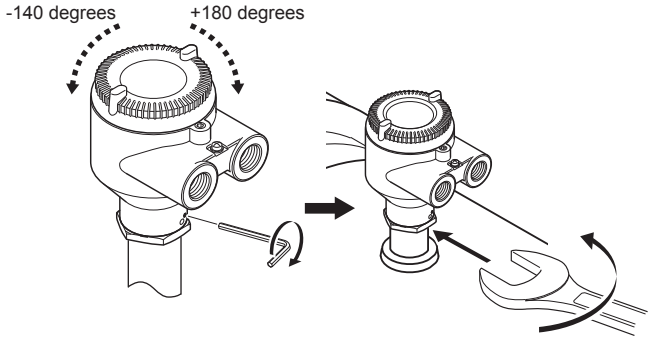
(4) Using the hexagonal wrench, loosen the screw at the neck.

(5) Rotate the terminal box in the desired direction.

NOTE

The terminal box can be rotated -140 degrees to +180 degrees from the arrow mark indicating the flow direction. Do not exceed these angle.

(6) Using the hexagonal wrench, retighten the screw at the neck.



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(7) Using the spanner, retighten the hexagonal nut at the neck, and then be sure to check that the terminal box was firmly fixed to the sensor.

3.2.2 Style: S2

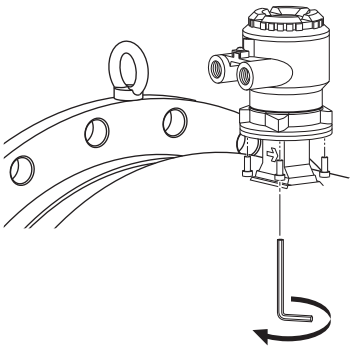
IMPORTANT

The following types can not be changed direction of electrical connection after delivery.
- Submersible Type (Model: AXW□□□W)
- For District Heating and Cooling or Condensation-proof (Optional code: DHC)

(1) The following tool is required.
- Hexagonal wrench (nominal size 5)

(2) Turn off the power to the flowmeter.

(3) Using the wrench, unscrew the four hexagonal bolts at the neck of remote sensor.

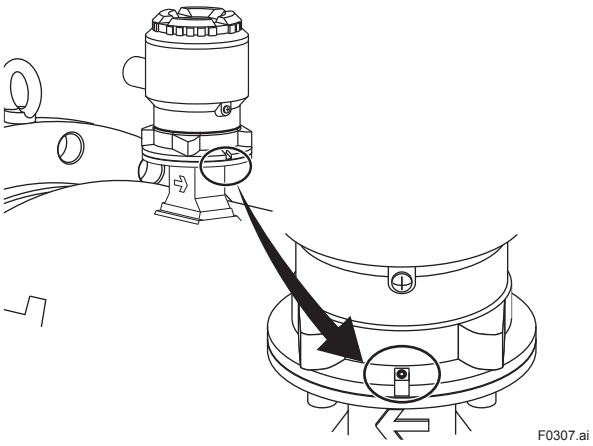


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AXW Remote Sensor

CAUTION

Do not loosen the screw at the opposite side of electrical connection (see the figure below).



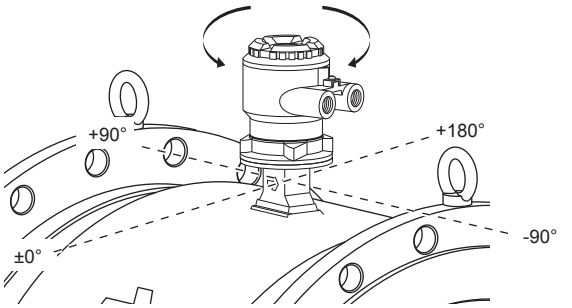
F0307.ai

(4) Rotate the transmitter or the terminal box in the desired direction. The direction can be changed to -90 degrees, +90 degrees or +180 degrees.

NOTE

The terminal box can be rotated -90 degrees to +180 degrees at every 90 degrees from the arrow mark indicating the flow direction. Do not exceed these angle.

(5) Tighten diagonally the four hexagonal bolts with the hexagonal wrench, and then be sure to check that the terminal box was firmly fixed to the sensor.



AXW Remote Sensor

4. Transmitter Maintenance (Integral Flowmeter and Remote Transmitter)

IMPORTANT

AXG1A is not available to change the direction of display unit.

4.1 Changing Direction of Display Unit

(1) Removing the Cover

- The following tool is required.
  Hexagonal wrench (nominal size 3)
- Turn off the power to the flowmeter.
  When opening the cover, wait for more than 20 minutes after turning off the power.
- Using the wrench, loosen the cover locking screw (1) (See Figure 4.1.1 and Figure 4.1.2) clockwise to unlock the cover. Upon shipment from the manufacturing plant, the cover is locked. Hold the flowmeter with your hand. Remove the cover by rotating it counterclockwise.

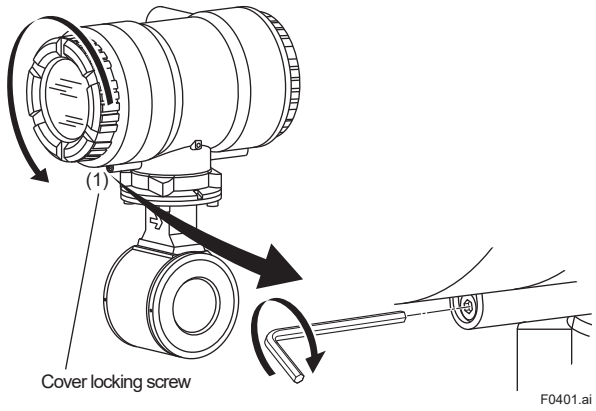


Figure 4.1.1 Removing the Display Cover (AXW Integral Flowmeter)

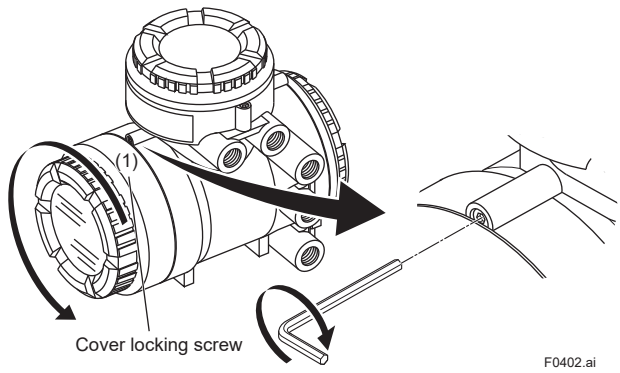


Figure 4.1.2 Removing the Display Cover (AXW4A Remote Transmitter)

WARNING

To prevent electric shocks and maintain performance, do not remove safety cover.

(2) Changing Display Unit Direction 90 degrees

- Hold the display unit with your hand and loosen the two mounting screws.
- Rotate the display unit 90 degrees clockwise and confirm the assembling position, taking care of the connector and wire of the display unit.
  At this time, do not remove the connector.
- Secure the display unit using its two mounting screws.

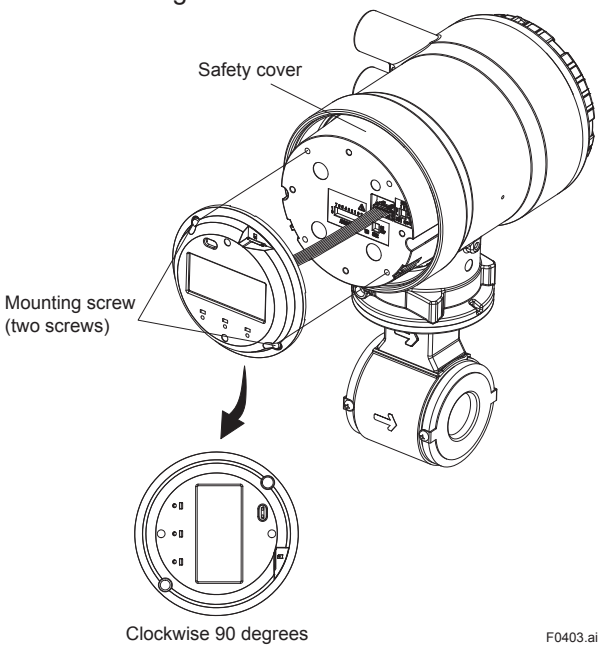


Figure 4.1.3 Changing Display Unit Direction 90 degrees

IMPORTANT

To preserve the safety, do not touch the electrical circuit and cable of shaded area.

(3) Installing the Cover

- Install the cover to the flowmeter by rotating the cover clockwise.
- Tighten cover locking screw (1) (See Figure 4.1.1 and Figure 4.1.2) counterclockwise using a hexagonal wrench (nominal size 3) to lock the cover.

IMPORTANT

Be sure to screw the cover firmly into the housing without any space between them.

4.2 Maintenance of the Display

WARNING

- For explosion protection type products, confirm that it is "no explosive atmosphere".
- Before doing the maintenance work, be sure to turn off the power supply of the magnetic flowmeter.
- To prevent electric shocks and maintain performance, do not remove safety cover.

CAUTION

The display has certain lifespan and it may deteriorate during operation. In this case replace the display board. Contact our sales or service.

4.3 Removing and Installing of Display Board

(1) Removing the Display unit side cover

Read Section 4.1 and remove the cover.

(2) Removing the Display Board

Hold the display unit with your hand and loosen the two mounting screws.

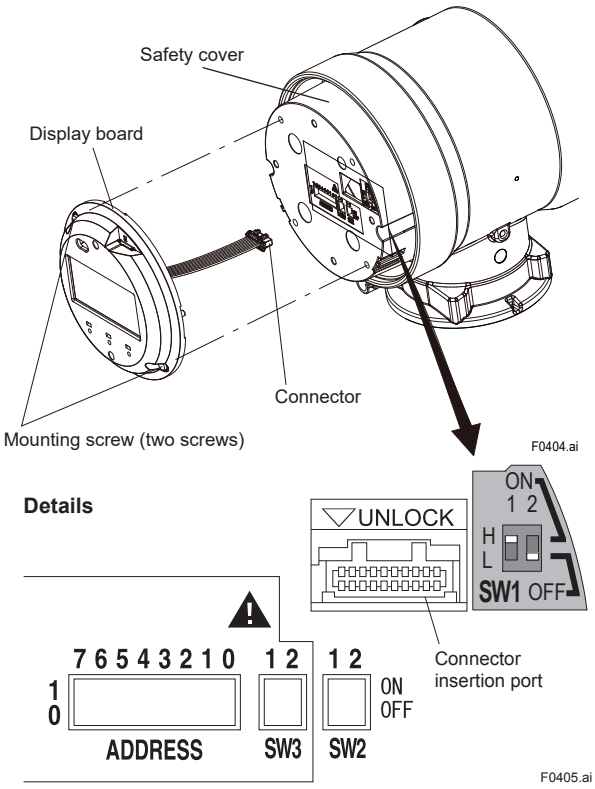


Figure 4.3 Connector Insertion Port of Display Board

WARNING

Do not use the insertion port of display board for other purposes, because some areas inside the connector insertion port have high voltages.
Do not insert except the connector into the insertion port of display board.

(3) Removing the Connector

Because of lock type connector, according to "▽UNLOCK" as shown in Figure 4.3, unlock by pushing the lever in the direction of "▽" mark, and then remove the connector.

(4) Installing the Display Board

- Insert the connector into connector insertion port of display board.
- Taking care not to entangle the cables of connector, confirm the installation direction, and fix the display board with two screws. Torque of indicator fixing screw: 0.6±0.05 N•m

(5) Installing the Display unit side cover

Read Section 4.1 and install the cover.

WARNING

- When opening and closing the cover, be sure to handle the cover carefully so that there are no damage and foreign matter adhesion at its threads and O-ring. Keep checking their condition and clean the threads in case of adhering the foreign matter.
- Replace the cover in case the treads receive damages.
- Replace the O-ring if there is any scarring or transformation. And apply silicone based grease at the O-ring in case of the shortage and exhaustion of grease.

IMPORTANT

- When closing the cover, close it with both hands until the cover does not turn in order to bring the housing and cover into tight contact.
- Tighten while confirming that the cover rotates smoothly.

4.4 Parameter Backup/Restore/ Duplicate

A backup of parameter setting can be stored to the built-in memory on the display unit (display board). The backup be restored to the device and also be duplicated to other device with the same model, suffix code, hardware and software revision through the display board with the backup. For the remote type, It is necessary to set the device information of remote sensor into the parameters of remote transmitter.
Read the user's manual of applicable communication type for checking device information from parameters and for functions in detail.

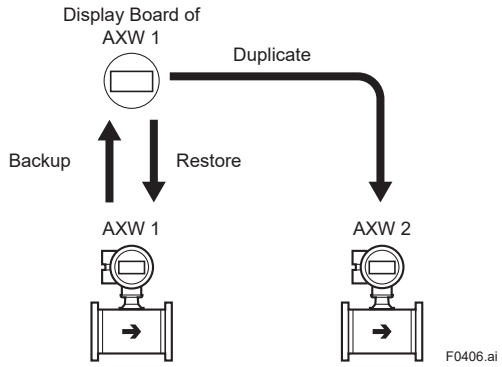


Figure 4.4 Parameter Transfer

Execution of "Restore" and "Duplicate" requires the matching on product specification as listed in following table.

M:Items to be Matched.

Device Information	Duplicate Data	Restore Data
Option Board ID	M	M
Transmitter Serial No		M
Sensor Serial No		M
Main Board Software Rev.	M	M
Sensor Board Software Rev.	M	M
Display Board Software Rev.	M	M
Model (Note)	M	M
Communication and I/O Code	M	M

Note: Only between AXW type and AXW type can be duplicated or restored the data.

5. Hardware Switch Setting

NOTE

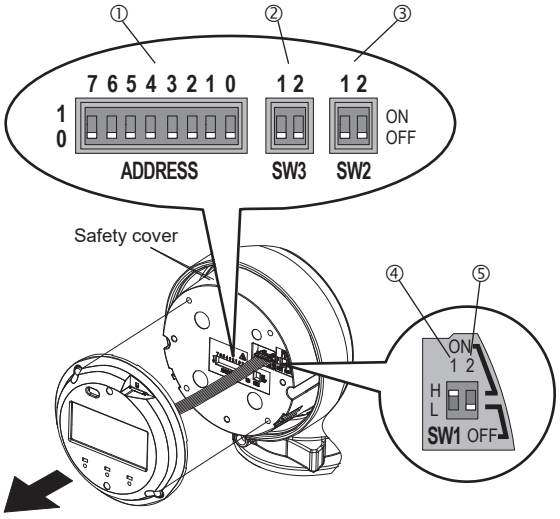
- The integral type is explained as an example. Pay same attention to the AXW4A remote transmitter.
- For AXFA11, read the applicable user's manual.

5.1 Integral Type and AXW4A Remote Transmitter

IMPORTANT

- Removing and installing the cover are necessary for hardware switches. Perform removing and installing the cover as described in Section 4.1. When opening the cover, wait for more than 20 minutes after turning off the power. This work must be carried out by the trained personnel having knowledge of safety standard.
- To preserve the safety, do not touch the electrical circuit and the cables except the setting switches.
- When installing the cover, in order to contact the housing and the cover, be sure to screw it firmly into the housing without any space between them.

(1) Remove the cover.
(2) While holding the display by hand, loosen the two mounting screws.
(3) While holding the display by hand (careful for connecting cable), set the switches. Never remove connector in this case.



① Address switch (ADDRESS)
② Pull up and Pull down switch (SW3)
*For EtherNet/IP communication: Enable hardware address switch (SW3-1)
*For EtherNet/IP communication: DHCP switch (SW3-2)
③ Line termination switch (SW2)
④ Burnout switch (SW1-1)
*For fieldbus communication: Simulation switch
⑤ Write protect switch (SW1-2)
*For fieldbus communication: Write lock switch

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Figure 5.1 Hardware switches

(4) Taking care not to entangle the cables, tighten the two screws on the display.
(5) Install the cover.

WARNING

To prevent electric shock and maintain performance, do not remove the safety cover.

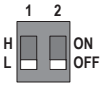
NOTE

The hardware switches are adjacent. Special care should be taken when making switch settings.

- **Setting of Burnout Switch (Except FOUNDATION fieldbus, PROFIBUS PA, EtherNet/IP)**

The burnout function sets the direction of current output in situations where the CPU has become damaged. Upon shipment from the manufacturing factory, the burnout direction is set to High (i.e., >21.6 mA); however, in cases where the optional codes C1 or C2 have been specified, the output direction will be set to Low (i.e., <2.4 mA).
Modification of the burnout direction must be carried out using the burnout switch (SW1-1) (See Figure 5.1).

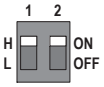
Table 5.1 Burnout switch (SW1-1)

Position of Switch	Burnout Direction	Burnout Output	Description
	High	> 21.6 mA	When optional code C1 or C2 is not specified, the setting is “High”.
	Low	< 2.4 mA	When optional code C1 or C2 is specified, the setting is “Low”.

- **Setting of Write Protect Switch (Except FOUNDATION fieldbus, PROFIBUS PA)**

The write protect function is to prevent the overwriting of parameters.
Write protection can be carried out using either the write protect switch (SW1-2) (See Figure 5.1) or software function with parameter setting. If either of these items is activated, the overwriting of parameters will be prohibited.

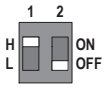
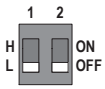
Table 5.2 Write protect switch (SW1-2)

Position of Switch	Write Protect Function
	OFF (Factory setting) Parameter can be overwritten.
	ON Parameter can not be overwritten.

- **Setting of Simulation Switch (Only for FOUNDATION fieldbus, PROFIBUS PA)**

The simulation function simulates the input of a function block and lets it operate as if the data was received from the transducer block. It is possible to conduct testing for the downstream function blocks or alarm processes.
A SIMULATE_ENABLE switch is mounted in the transmitter amplifier. This is to prevent the accidental operation of this function. When this is switched on, simulation is enabled. (See table below)
For FOUNDATION fieldbus type, if REMOTE LOOP TEST SWITCH is written to the SIM_ENABLE_MSG parameter (index 2922) of the maintenance transducer block, it activates the same operation as when the above switch is turned ON. Note that this parameter value is lost when the power is turned OFF.
In simulation enabled status, an alarm is generated from the resource block, and other device alarms will be masked. The simulation must be disabled immediately after using this function.

Table 5.3 Simulation Switch (SW1-1)

Position of Switch	Simulation Function
	ON: Simulation function enabled.
	OFF: Simulation function disabled.

- **Setting of Write Lock Switch (Only for FOUNDATION fieldbus, PROFIBUS PA)**

The transmitter is provided with a write lock function to restrict write operations to blocks and prevent inadvertent writing of parameter data.

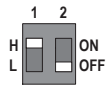
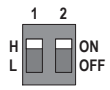
For FOUNDATION fieldbus:

To enable this function, use the write lock switch (Hard W Lock) or the WRITE_LOCK (index 1034) (Soft W Lock). To enable write lock function, set parameter in Feature Selection of Resource Block. For parameter in details, read section 5.12 of the user's manual for FOUNDATION Fieldbus communication type.

For PROFIBUS PA:

To enable this function, use the write lock switch (Hard W Lock) or the WRITE_LOCKING (Physical Block Relative index 18). For parameter in details, read section 5.12 of the user's manual for PROFIBUS PA communication type.

Table 5.4 Write Lock Switch (SW1-2)

Position of Switch	Write Lock Function
	OFF: Write Lock function disabled. (It depends on the setting in Feature Selection.)
	ON: Write Lock function enabled. (It depends on the setting in Feature Selection.)

NOTE

- If the hardware switch is set to "ON", the condition of preventing parameter overwriting keeps until the switch is set to "OFF".
- For the software write protect function, read the user's manual of applicable communication type.

- **Setting of Address Switch (ADDRESS)**

This switch is only available for the product with Modbus, PROFIBUS PA, or EtherNet/IP communication.

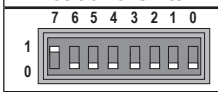
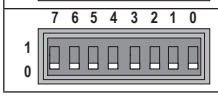
For the product with Modbus or PROFIBUS PA communication, it is necessary to set the device address.

The device address can be set using either the address switch (ADDRESS) (See Figure 5.1) or software function with parameter setting.

- Address Switch (Position 7)

By using the address switch (Position 7), select the device address to be used from the device address specified by either the hardware switch or the parameter setting.

Table 5.5 Address switch (Position 7)

Position of Switch	Description
	The device address set by Address Switch (Position 0 to 6) is used.
	The device address set by parameter setting is used. Factory setting.

- Address Switch (Position 0 to 6)

By using the address switch (Position 0 to 6), the device address is set.

For Modbus;

Setting range: 1 to 127

If the address switch is set to 0, the device address is automatically converted to 1.

For PROFIBUS PA;

Setting range: 0 to 126

Setting example:

If only the address switch "position 6" is set to 1, the resulting the device address is 64.

$(1 * 2^6 + 0 * 2^5 + 0 * 2^4 + 0 * 2^3 + 0 * 2^2 + 0 * 2^1 + 0 * 2^0)$

For the product with EtherNet/IP communication, the device IP address can be set using either the address switch (ADDRESS) (See Figure 5.1) or software parameters.

The Address Switch (ADDRESS) is used to set the 4th octet (8 bits) of the IP address. The 1st, 2nd and 3rd octets of the IP address are set by software parameters. The 4th octet of the address which is set by this switch (ADDRESS) is enabled when the Enable hardware switch (SW3-1) is set to ON. When the Enable hardware switch (SW3-1) is set to OFF, the 4th octet of the IP address set by this switch (ADDRESS) is disabled, and the 4th octet of the address set by software parameter is enabled.

Table 5.6 Address switch

Position of Switch	Description
	Setting range: 1 to 244 If all switches are set to "OFF" or "ON", the device IP address (4th octet) is automatically converted to 210.

Setting example:

If only the address switch "position 7" is set to 1, the device IP address (4th octet) is 128.

$(1 * 2^7 + 0 * 2^6 + 0 * 2^5 + 0 * 2^4 + 0 * 2^3 + 0 * 2^2 + 0 * 2^1 + 0 * 2^0)$

- **Setting of Line Termination Switch (SW2)**

This switch is only available for the product with Modbus communication.
Line terminations of two ends on the bus are required to communicate Modbus.
One termination mode can be set using the line termination switch (SW2) (See Figure 5.1).

Table 5.7 Line termination switch (SW2)

Position of Switch	Termination mode	Description
	Bus end	Available when both SW2-1 and SW2-2 are“ON”. (Resistance is 150 Ω)
	Not bus end	Available when both SW2-1 and SW2-2 are“OFF”. Factory setting.

Both SW2-1 and SW2-2 must be set at the same position.

- **Setting of Pull up and Pull down Switch (SW3)**

This switch is only available for the product with Modbus communication.
When the bus is in an idling state, it becomes unstable potentially without setting D1 for “pull up” and D0 for “pull down”.
Pull up and pull down mode can be set using the pull up and pull down switch (SW3) (See Figure 5.1).

Table 5.8 Pull up and pull down switch (SW3)

Position of Switch	Pull up and Pull down mode	Description
	Used	Available when both SW3-1 and SW3-2 are“ON”. (Resistance : 600 Ω, Pull-up voltage: +5 V)
	Not used	Available when both SW3-1 and SW3-2 are“OFF”. Factory setting.

Both SW3-1 and SW3-2 must be set at the same position.

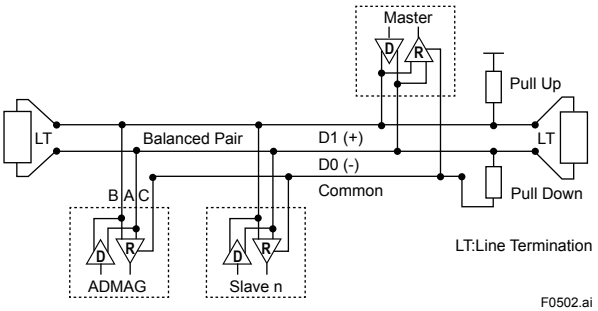


Figure 5.2 Modbus connection

- **Setting Enable Hardware Address Switch (SW3-1) (Only for EtherNet/IP)**

This switch is used to enable or disable the Address Switch (ADDRESS) and DHCP Switch (SW3-2).

Table 5.9 Enable hardware address switch (SW3-1)

Position of Switch	Description
	Hardware address switch: ON Device IP address is set by Address switch.
	Hardware address switch: OFF Device IP address is set by software parameters.

- **Setting DHCP Switch (SW3-2) (Only for EtherNet/IP)**

The DHCP switch (See Figure 5.1) is used to enable or disable DHCP function. The DHCP function is enabled or disabled by this switch when Enable hardware switch (SW3-1) is set to ON.
When the Enable hardware switch (SW3-1) is set to OFF, the setting by this switch is disabled and DHCP function is enabled or disabled by software parameter.

Table 5.10 DHCP switch (SW3-2)

Position of Switch	Description
	DHCP function is disabled. The fixed IP address set by the address switch or software parameter is used as the device address.
	DHCP function is enabled. The device IP address is set by DHCP.

5.2 Integral Type and AXG1A Remote Transmitter

IMPORTANT

- Removing and installing the cover are necessary for setting the hardware switches. Perform removing and installing the cover as described below. When opening the cover, wait for more than 20 minutes after turning off the power. This work must be carried out by the trained personnel having knowledge of safety standard.
- To preserve the safety, do not touch the electrical circuit and the cables except the setting switches.

(1) Remove the cover (See Figure 5.3).

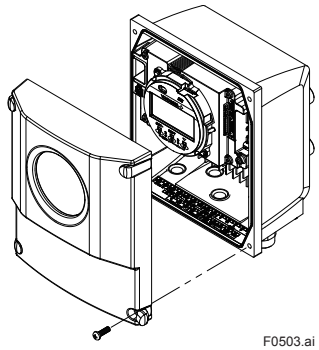


Figure 5.3 Removing the cover

(2) Set the switches.

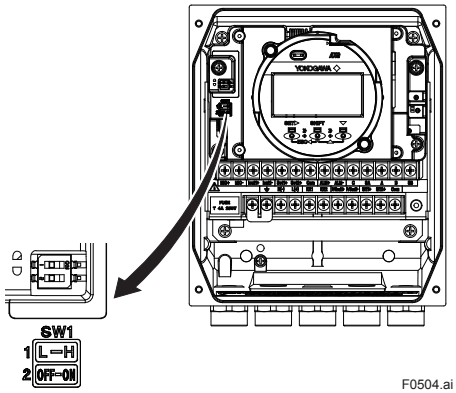


Figure 5.4 Hardware switches (SW1-1, SW1-2)

(3) Install the cover.

NOTE

On the front of the amplifier's, the burnout switch (i.e., SW1-1) and the write protect switch (i.e., SW1-2) are located adjacent to each other. Accordingly, special care should be taken when making switch settings.

(1) Setting of Burnout Switch

The burnout function sets the direction of current output in situations where the CPU has become damaged. Upon shipment from the manufacturing factory, the burnout direction is set to High (i.e., >21.6 mA); however, in cases where the optional codes C1 or C2 have been specified, the output direction will be set to Low (i.e., <2.4 mA). Modification of the burnout direction must be carried out using the burnout switch (i.e., SW1-1) (See Figure 5.4).

Table 5.11 Burnout switch (SW1-1)

Position of Switch	Burnout Direction	Burnout Output	Description
L H 1 2 OFF ON	High	>21.6 mA	When optional code C1 or C2 is not specified, the setting is "High".
L H 1 2 OFF ON	Low	<2.4 mA	When optional code C1 or C2 is specified, the setting is "Low".

(2) Setting of Write Protect Switch

The write protect function is to prevent the overwriting of parameters.
Write protection can be carried out using either the write protect switch (SW1-2) (See Figure 5.4) or software function with parameter setting. If either of these items is activated, the overwriting of parameters will be prohibited.

Table 5.12 Write protect switch (SW1-2)

Position of Switch	Write Protect Function
L H 1 2 OFF ON	OFF (Factory setting) Parameter can be overwritten.
L H 1 2 OFF ON	ON Parameter can not be overwritten.

NOTE

- If the hardware switch is set to "ON", the condition of preventing parameter overwriting keeps until the switch is set to "OFF".
- For write protect function by parameter (software), read the user's manual of applicable communication type.

6. Excitation Coil and Insulation Resistance Check (Remote Sensor)

WARNING

Before checking, be sure to disconnect the cables from the terminals of the remote sensor.

6.1 Removing or Installing the Cover (Remote Sensor)

This section describes how to remove and install the cover for remote sensor. For integral flowmeter and remote transmitter, read Section 4.1.

(1) Removing the Cover

Loosen the cover locking screw (1) (See Figure 6.1) clockwise using a hexagonal wrench (nominal size 3) to unlock the cover. Upon shipment from the manufacturing plant, the cover is unlocked. Support the main unit and turn the cover to the left (counterclockwise) to remove it.

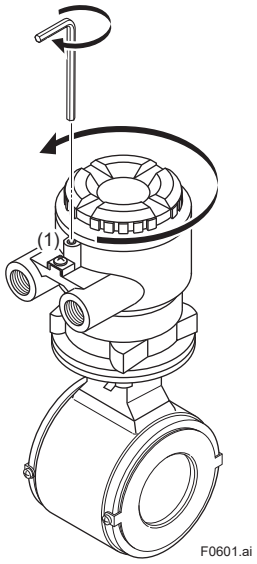


Figure 6.1 Removing the Cover (Remote Sensor)

(2) Installing the Cover

Install the cover to the terminal box by turning it clockwise. Tighten the cover locking screw (1) (See Figure 6.1) counterclockwise using a hexagonal wrench (nominal size 3) to lock the cover.

6.2 Excitation Coil Check

Check that there is continuity between excitation terminals "EX1" and "EX2" in the remote sensor. If there is no continuity, the coils may be broken, and replacement or repair of the sensor is necessary. If the coil resistance is 150 Ω or more, this may be an abnormal condition. Consult YOKOGAWA's sales or service offices.

6.3 Insulation Resistance Check

Check the insulation resistances in the remote sensor in accordance with the tables below. If any of them falls below the values listed in the tables, consult YOKOGAWA's sales or service offices. If the insulation resistance cannot be restored, replacement or repair of the sensor is necessary.

Coil Circuit

Checking is possible even if the pipe is filled with fluid.

Terminal	Test Voltage	Specification
Excitation current terminal (EX1) and Common terminal (C)	500 V DC (Use an insulation tester or the equivalent.)	1 MΩ or more

Signal Circuit

Before checking, be sure to empty and dry the interior of the pipe, checking that there is no adhesive material.

Terminal	Test Voltage	Specification
Common terminal (C) and Signal terminal (A) Common terminal (C) and Signal terminal (B)	500 V DC (Use an insulation tester or the equivalent.)	100 MΩ or more (between each terminal)

IMPORTANT

In case of the Explosion Protection (Suffix Code expect for 000), Signal Circuit can't conduct Insulation Resistance Check.

CAUTION

In case of the following types, remove the wiring connection on the transmitter side and measure resistance at the cable terminals.

- Submersible Type
- For District Heating and Cooling or Condensation-proof (Optional code: DHC)

7. Device Health Diagnosis by Verification Function

This product incorporates the verification function and can self-diagnose the health of device by using it.
There are cases that a magnetic flowmeter does not perform normally by failure of magnetic, excitation or calculation circuit, or insulation deterioration of excitation coil or electrodes. It is recommended to check the device's normal performance periodically (one or two years) by executing the verification function.
The verification function can diagnose circuits (magnetic, excitation, and calculation circuit), device status (alarm occurrence) and wiring connection (excitation and signal cable), in approximately 15 minutes, without removing a flowmeter from the piping.
The verification function can be executed in both fluid statuses of the fluid flowing and the fluid not flowing. For accurate diagnosis, it is recommended to execute it in each fluid status. Especially, in order to check if the excitation cable and the signal cable were perfectly wired when at the installation of flowmeter, it is recommended to execute it in the flow status of the fluid not flowing at first. The diagnosis results can be stored on the device memory and compared with the previous diagnosis result.

CAUTION

Before executing the verification function, be sure to disconnect this product from the control loop.

NOTE

- Before using the verification function, always make sure that the sensor is in the full pipe state. If the sensor is in the empty pipe state, this function may not run normally.
- When using the verification function, be sure to correctly specify the fluid status.
- Before executing the verification function, confirm that any warning or alarm does not occur.
- For the following application, be careful that the verification function may not perform normally.
  - Flow rate is extremely low.
  - Conductivity of fluid is lower than the product specifications.
  - Fluid includes slurrys.
  - Fluid includes many bubbles.
  - Stray current occurs.

7.1 Parameter of Verification Function

The verification function can be executed from the display unit or the applicable communication tool. This chapter describes the parameters related with the verification function. For more details, read the user's manual of applicable communication type.

NOTE

The language on the display is set to "English" as default upon shipment from the manufacturing plant. Select the adequate language read the installation manual. The display menu path on this manual is selected to "English".

Display Menu Path:
Device setup▶Language

	Display	Description
(1)	Device setup ► Diag/Service ► Verification ► Mode	Specifies the fluid status to execute the verification function.*1
(2)	Device setup ► Diag/Service ► Verification ► Execute	Specifies the execution of the verification function.*2
(3)	Device setup ► Diag/Service ► Verification ► VF No	Specifies the diagnosis result display time.*3
(4)	Device setup ► Diag/Service ► Verification ► Result ► Failed/Passed	Displays the diagnosis result.*4
(5)	Device setup ► Diag/Service ► Verification ► Result ► Magnetic circuit	Displays the magnetic circuit diagnosis result.*4
(6)	Device setup ► Diag/Service ► Verification ► Result ► Excite circuit	Displays the excitation circuit diagnosis result.*4
(7)	Device setup ► Diag/Service ► Verification ► Result ► Calc circuit	Displays the calculation circuit diagnosis result.*4
(8)	Device setup ► Diag/Service ► Verification ► Result ► Device status	Displays the device alarm diagnosis result.*4
(9)	Device setup ► Diag/Service ► Verification ► Result ► Connect status	Displays the wiring misconnection check result.*4

*1: From the table below, select the fluid status required to execute the verification function.

Selection / Display	Description
No flow	Executes the verification function with the fluid not flowing.
Flow	Executes the verification function with the fluid flowing.

*2: From the table below, select whether to execute the verification function.

Selection / Display	Description
Not execute	Does not execute the verification function.
Execute	Executes the verification function.

*3: From the table below, select the execution result of the verification function.

Selection / Display	Description
Factory	Displays the result obtained upon shipment from the manufacturing factory.
Previous	Displays the previous result.
Present	Displays the result at this time.

*4: The diagnosis result is judged as shown below.

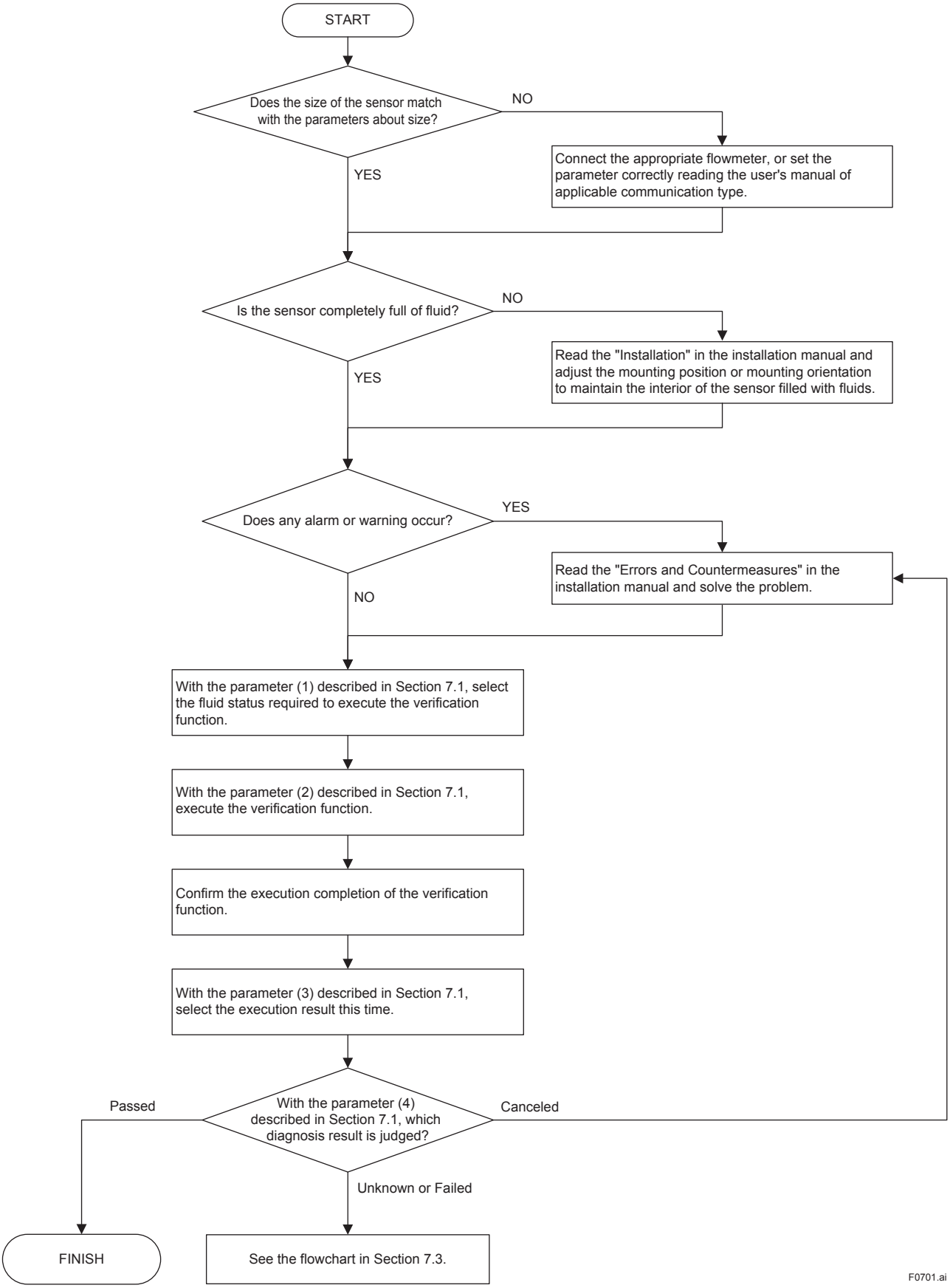
Result / Display	Description
Passed	There are no problems concerning the diagnosis result.
Failed	There is a problem concerning the diagnosis result.
Canceled	Cancels the diagnosis.*5
No data	No diagnosis result data (The verification function is not used.)
Unknown	Cannot perform a diagnosis.
Skip	Out of verification target.

*5: When the alarms in the following table occur or big flow noise is detected while the diagnosis runs, the diagnosis will stop.

Display
010: Main CPU FAIL
014: Snsr bd FAIL
015: Snsr comm ERR
016: AD 1 FAIL[Sig]
017: AD 2 FAIL[Excit]
050: Signal overflow
051: Empty detect

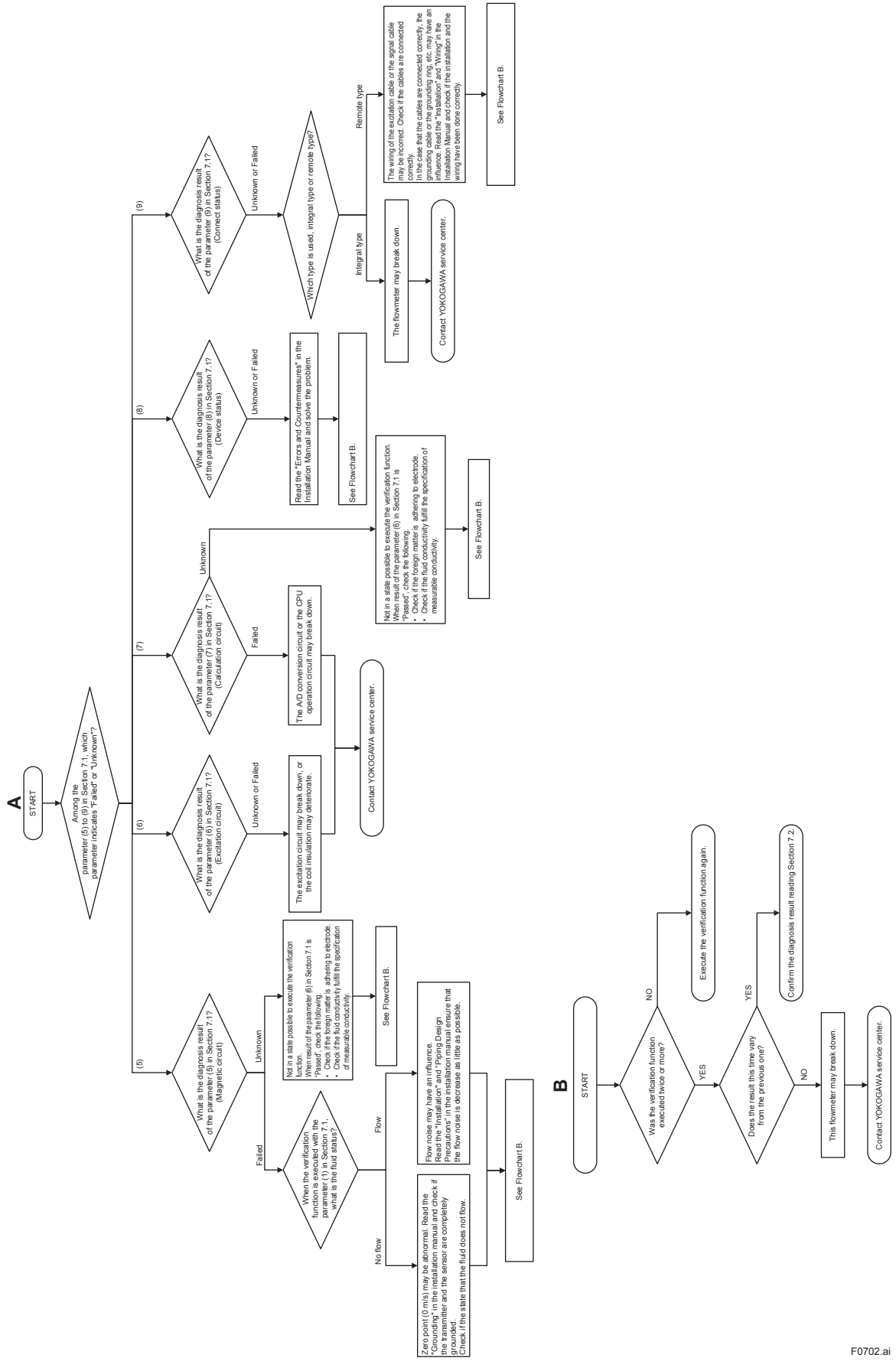
7.2 Execution of Verification Function

In accordance with the following flowchart, execute the verification function.



7.3 Confirmation of Verification Function

In accordance with the following flowchart, confirm the diagnosis result.

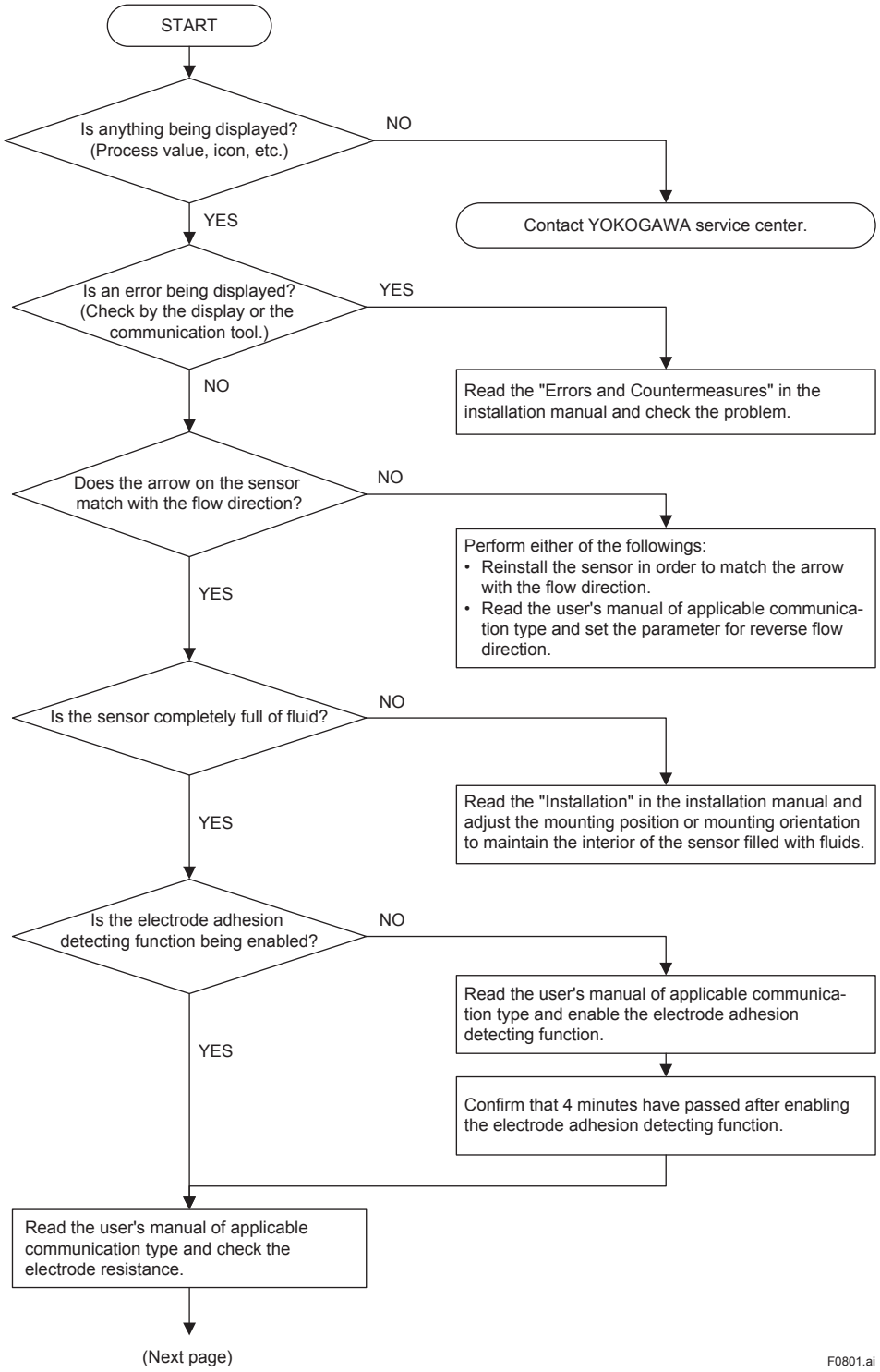


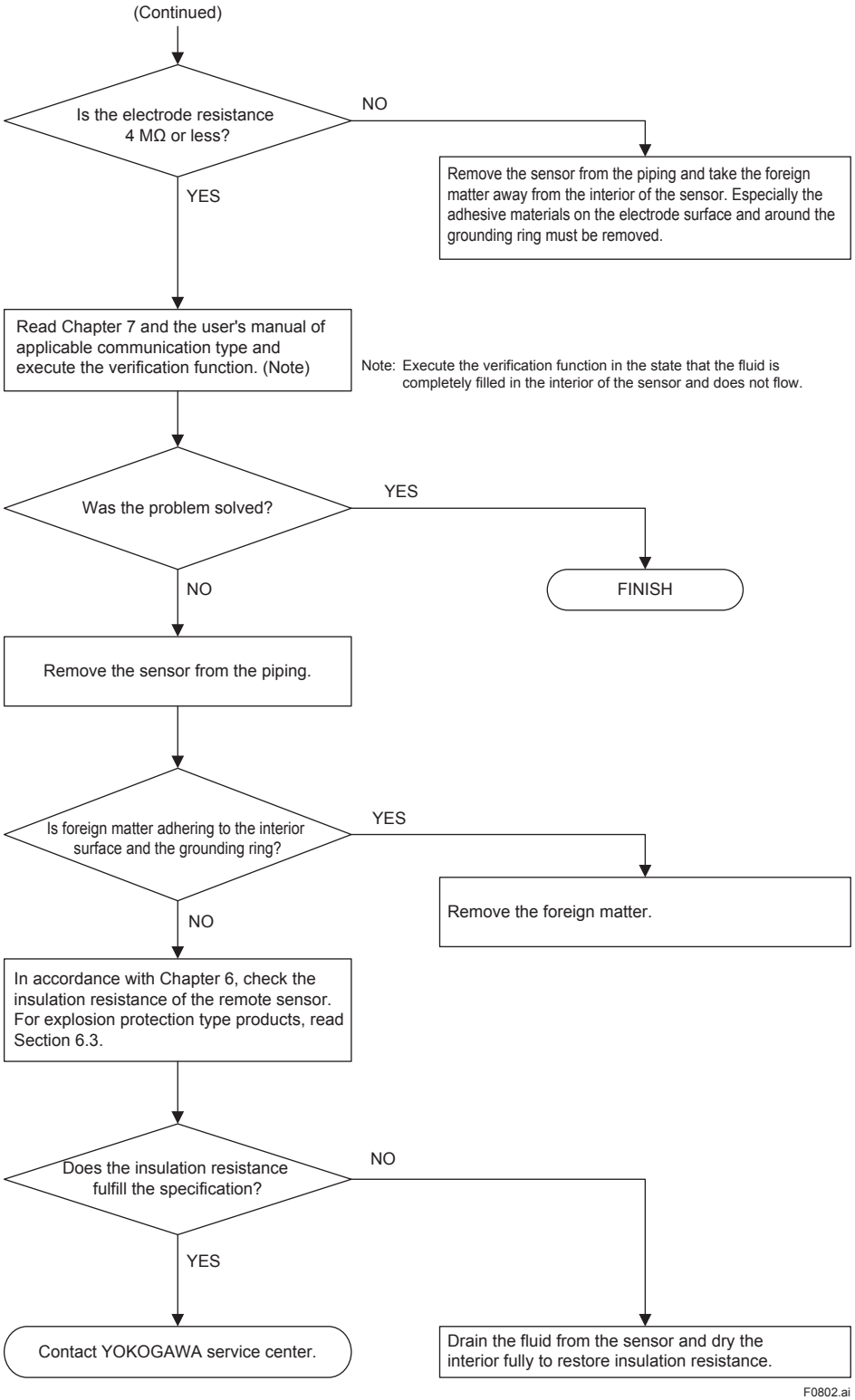
8. Troubleshooting

This chapter describes troubleshooting procedures, when the trouble occurs in the magnetic flowmeter.
For AXFA11, read the applicable user's manual.

8.1 No Display

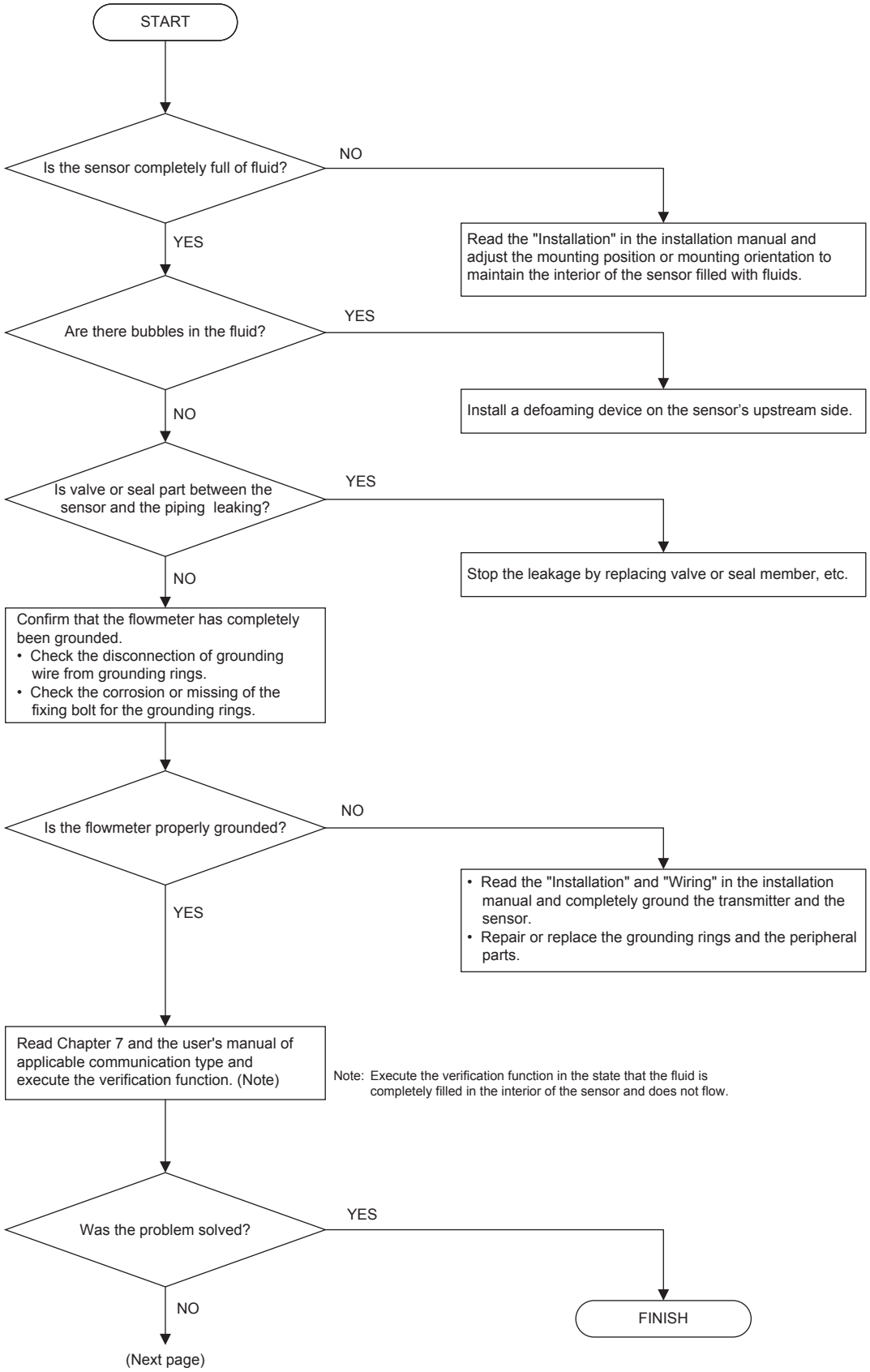
If nothing is displayed on the display even though the fluid is flowing, check according to the flowchart below.



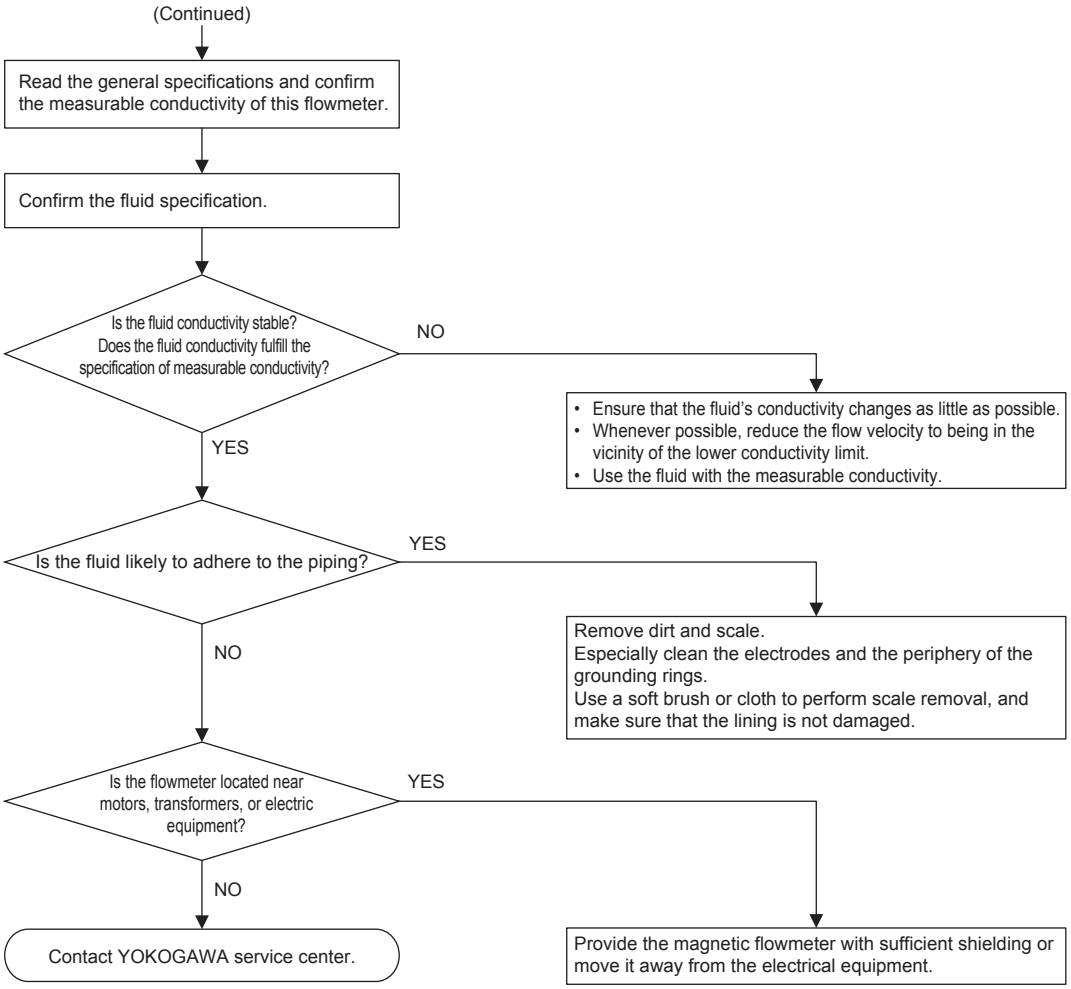

(Continued)
Is the electrode resistance 4 MΩ or less?
NO
YES
Remove the sensor from the piping and take the foreign matter away from the interior of the sensor. Especially the adhesive materials on the electrode surface and around the grounding ring must be removed.
Read Chapter 7 and the user's manual of applicable communication type and execute the verification function. (Note)
Note: Execute the verification function in the state that the fluid is completely filled in the interior of the sensor and does not flow.
Was the problem solved?
YES
NO
FINISH
Remove the sensor from the piping.
Is foreign matter adhering to the interior surface and the grounding ring?
YES
NO
Remove the foreign matter.
In accordance with Chapter 6, check the insulation resistance of the remote sensor. For explosion protection type products, read Section 6.3.
Does the insulation resistance fulfill the specification?
NO
YES
Contact YOKOGAWA service center.
Drain the fluid from the sensor and dry the interior fully to restore insulation resistance.
F0802.ai

8.2 Unstable Zero Point

if the adjustment value or output value of the zero point is unstable, check according to the flowchart below.

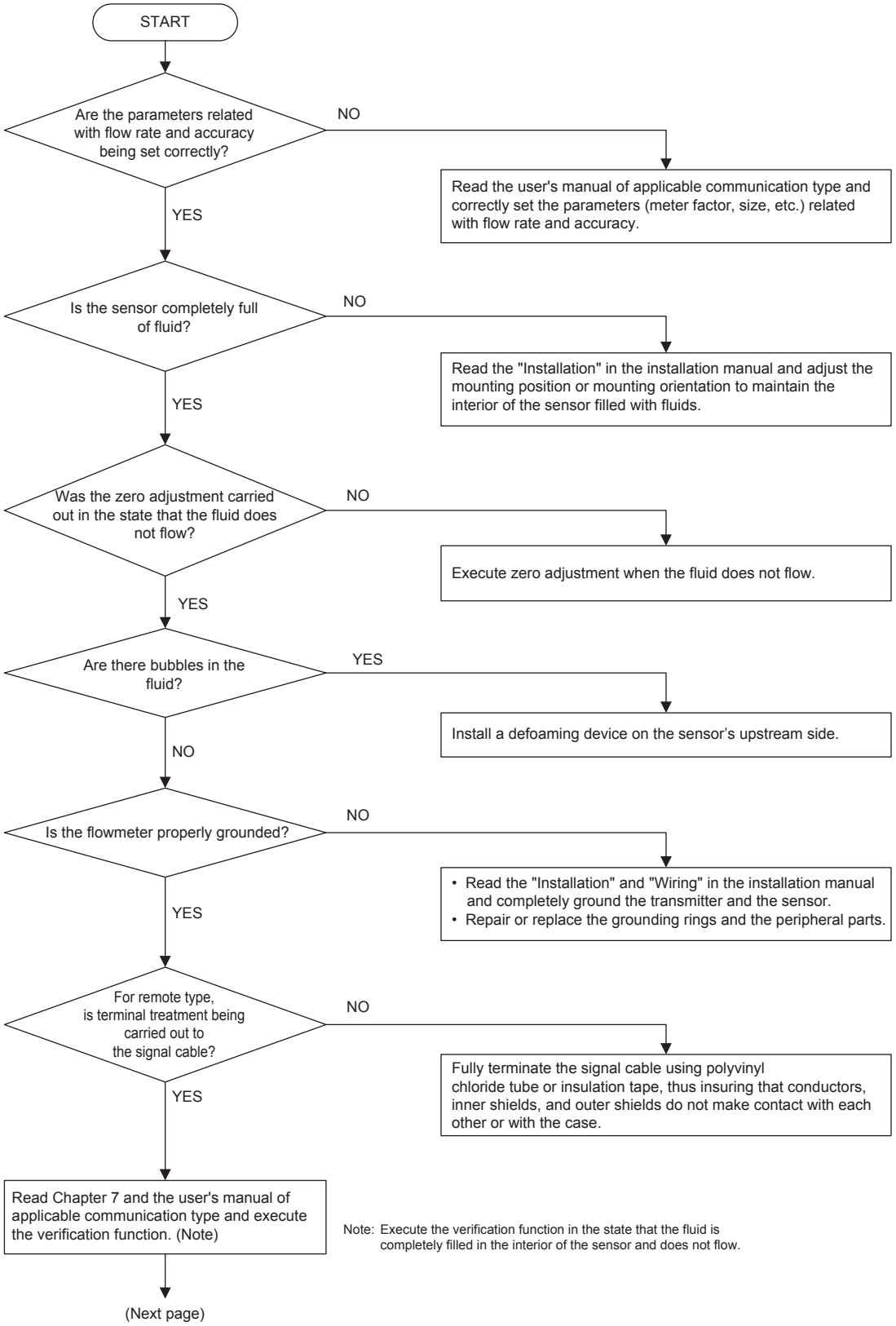


F0803.ai


(Continued)
Read the general specifications and confirm the measurable conductivity of this flowmeter.
Confirm the fluid specification.
Is the fluid conductivity stable? Does the fluid conductivity fulfill the specification of measurable conductivity?
NO
• Ensure that the fluid's conductivity changes as little as possible.
• Whenever possible, reduce the flow velocity to being in the vicinity of the lower conductivity limit.
• Use the fluid with the measurable conductivity.
YES
Is the fluid likely to adhere to the piping?
YES
Remove dirt and scale.
Especially clean the electrodes and the periphery of the grounding rings.
Use a soft brush or cloth to perform scale removal, and make sure that the lining is not damaged.
NO
Is the flowmeter located near motors, transformers, or electric equipment?
YES
Provide the magnetic flowmeter with sufficient shielding or move it away from the electrical equipment.
NO
Contact YOKOGAWA service center.
F0804.ai

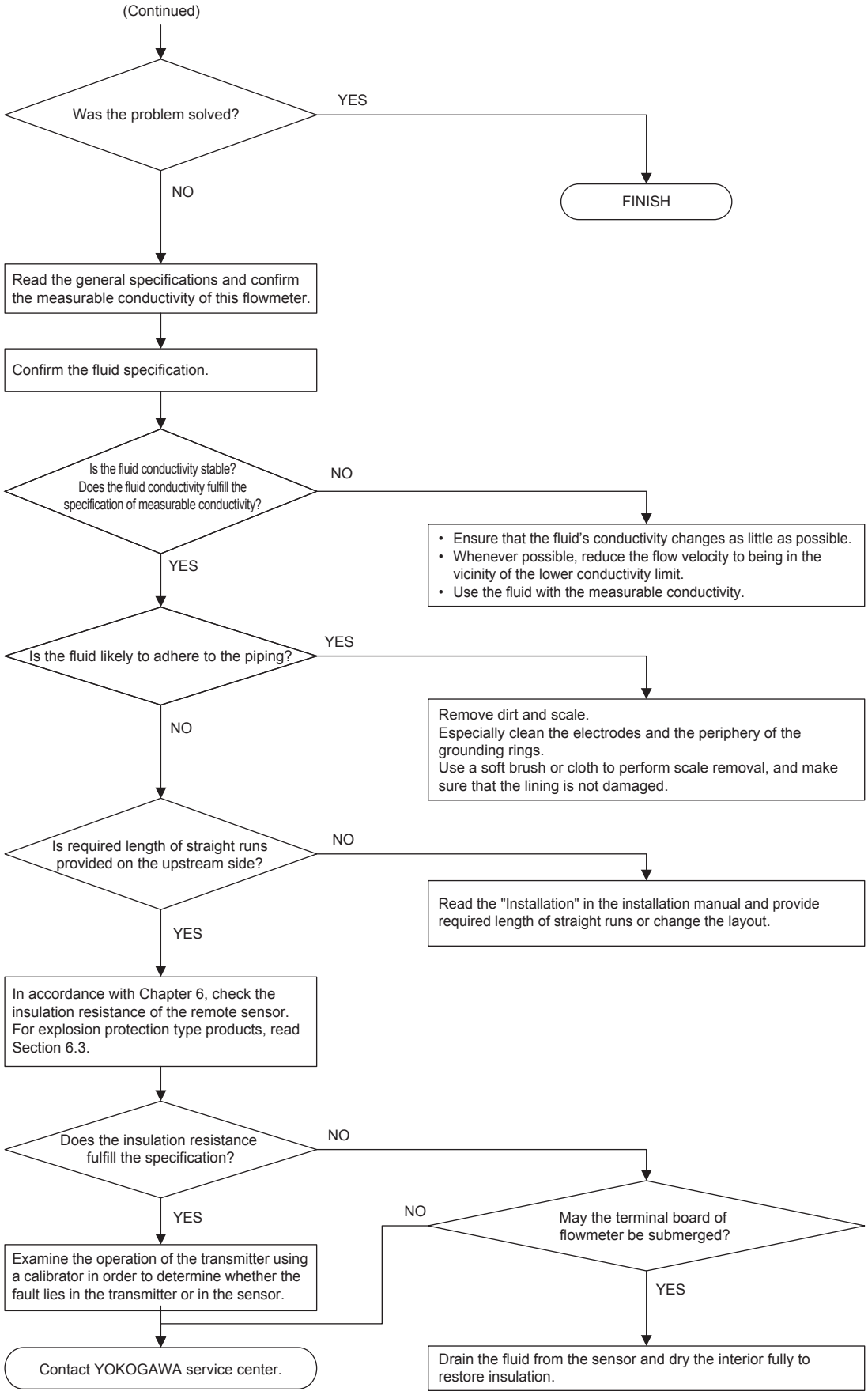
8.3 Disagreement Between Displayed Flow Rate and Actual Flow Rate

If the displayed flow rate does not match the actual flow rate, check according to the flowchart below.



Note: Execute the verification function in the state that the fluid is completely filled in the interior of the sensor and does not flow.

F0805.ai


(Continued)
Was the problem solved?
YES
FINISH
NO
Read the general specifications and confirm the measurable conductivity of this flowmeter.
Confirm the fluid specification.
Is the fluid conductivity stable? Does the fluid conductivity fulfill the specification of measurable conductivity?
NO
• Ensure that the fluid's conductivity changes as little as possible.
• Whenever possible, reduce the flow velocity to being in the vicinity of the lower conductivity limit.
• Use the fluid with the measurable conductivity.
YES
Is the fluid likely to adhere to the piping?
YES
Remove dirt and scale.
Especially clean the electrodes and the periphery of the grounding rings.
Use a soft brush or cloth to perform scale removal, and make sure that the lining is not damaged.
NO
Is required length of straight runs provided on the upstream side?
NO
Read the "Installation" in the installation manual and provide required length of straight runs or change the layout.
YES
In accordance with Chapter 6, check the insulation resistance of the remote sensor. For explosion protection type products, read Section 6.3.
Does the insulation resistance fulfill the specification?
NO
YES
NO
May the terminal board of flowmeter be submerged?
YES
Examine the operation of the transmitter using a calibrator in order to determine whether the fault lies in the transmitter or in the sensor.
Contact YOKOGAWA service center.
Drain the fluid from the sensor and dry the interior fully to restore insulation.

F0806.ai

Revision Information

- Title : ADMAG TI Series AXW Magnetic Flowmeter [Size: 25 to 1800 mm (1 to 72 in.)] Maintenance Manual
- Manual No. : IM 01E24A01-02EN

Edition	Date	Page	Revised Item
1st	June 2017	—	New publication
2nd	Sep. 2018	2 4 5 9 10 12 14 15 21 25	Add Instruction Manual for Ex-proof. Add notes for WARNING. Add notes for WARNING, add IMPORTANT and add note to 1.3. Change a drawing of Figure 4.1.3. Add WARNING, add a note for CAUTION, small corrections to 4.3, change drawing of 4.3, add WARNING and IMPORTANT to 4.3(5). Change a drawing of 5.1. Correction of 6.1(1). Add IMPORTANT to 6.3. Add a note to chart Add a note to chart
3rd	Oct. 2018	3 12, 13 17	Add trademark informations (HART, Modbus). Add the explanation of hardware switch setting for Modbus communication type. Add the information of parameter for Modbus communication.
4th	Aug. 2019	3 6 9 13 14 16 20	Add Fieldbus to Trademarks. Add AXG1A and revise picture of remote converter. Revise picture of remote converter. Configure by 3.2.1 for Style1 and 3.2.2 for Style2. Improve Figure 5.1. Add Simulation switch and Write Lock Switch. Add 5.2 Revise Parameter of Verification Function.
5th	Apr. 2021	3 15, 16	Add PROFIBUS PA to Trademarks. Add the explanation of hardware switch setting for PROFIBUS PA type.
6th	Apr. 2022	—	Added note on EtherNet/IP communication
7th	Oct. 2025	—	Add Nominal size 450 mm (18 in.)